CONTRACT: 34445.1.1 ID: R-2518B

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34445.1.1	1	4
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
R-2518B		P.E.	
		CONST.	

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 34445.1.1 I.D. NO. R-2518B

F.A. PROJECT

COUNTY YANCEY

PROJECT DESCRIPTION US 19E FROM EAST OF THE YANCEY CO. LINE TO SR 1336

SITE DESCRIPTION RETAINING WALL STA. 126+50 TO 127+30

CAUTION NOTICE

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

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

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

INVESTIGATED BY JC KUHNE PERSONNEL DO CHEEK

CHECKED BY C COFFEY

SUBMITTED BY JC KUHNE GK ROSE

DATE 8-23-05

DRAWN BY: JC KUHNE

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 1878 GEOLOGIST JODY KUHNE

7/15/05

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
R-2518B	34445.1.1	2	4

METRIC

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER 30 cm ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (kN/m^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	<25
	SOFT	2 TO 4	25 TO 50
	MEDIUM STIFF	4 TO 8	50 TO 100
	STIFF	8 TO 15	100 TO 200
	VERY STIFF	15 TO 30	200 TO 400
	HARD	>30	>400

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE

UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE (ALSO POORLY GRADED).

GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

SAMPLE DESIGNATIONS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:

- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER_____
- [ ] OTHER_____

ADVANCING TOOLS:

- [ ] CLAY BITS
- [ ] 152 mm CONTINUOUS FLIGHT AUGER
- [X] 203 mm HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____ mm STEEL TEETH
- [ ] TRICONE _____ mm TUNG.-CARB.
- [ ] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:

- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:

- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

HAND TOOLS:

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 2.5 cm PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER 30 cm.
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 2.5 cm. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BLOWS PER 30 cm.*
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 BLOWS PER 30 cm.*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GRODVES TO 6 mm DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GRODVED OR GOUGED 1 mm DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 25 mm MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL CENTIMETERS 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 25 mm OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 3 m
WIDE	1 TO 3 m
MODERATELY CLOSE	30 TO 100 cm
CLOSE	5 TO 30 cm
VERY CLOSE	LESS THAN 5 cm

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 1 m
THICKLY BEDDED	0.5 - 1 m
THINLY BEDDED	0.05 - 0.5 m
VERY THINLY BEDDED	10 - 50 mm
THICKLY LAMINATED	2.5 - 10 mm
THINLY LAMINATED	< 2.5 mm

INDURATION

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

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

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N) OF A 63.5 kg HAMMER FALLING 0.76 METERS REQUIRED TO PRODUCE A PENETRATION OF 30 cm INTO SOIL WITH A 5 cm OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 2.5 cm PENETRATION WITH 50 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK:

ELEVATION:

NOTES:

REVISED 09/15/00

8/17/98

REVISIONS

METRIC	PROJECT REFERENCE NO.	SHEET NO.
5 0 10	34445JJ R-2518B	3
	R/W SHEET NO.	
CONST.REV.	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
R/W REV.	PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	

NAD 83

-L-

PI Sta 125+84.331
Δ = 32° 39' 17.3" (LT)
L = 256.470
T = 131.823
R = 450.000
SE = 0.08

PIs Sta 127+41.816
θs = 6° 15' 51.6"
Ls = 98.400
LT = 65.641
ST = 32.837

PIs Sta 128+73.031
θs = 7° 02' 50.6"
Ls = 98.400
LT = 65.652
ST = 32.847

-Y3-

PI Sta 10+95.168
Δ = 26° 05' 44.3" (LT)
L = 126.650
T = 64.443
R = 278.074
SE = 0.07

MATCHLINE -L- STA. 125+20.000 - SEE SHEET 6

MATCHLINE -L- STA. 128+60.000 - SEE SHEET 8

126

127

128

PROPOSED EXPRESSWAY GUTTER

16.5m FULL LANE

PROP. MONO. CONC. ISLAND

15:1 TAPER

30m TAPER

REMOVE EXISTING GUARDRAIL

+01.400
BEG. CURB TRANSITION
SEE SHEET 2-D

1200mm WW & ISBW

ROCK

-L- CSSta. 127+08.979

-L- SRSSta. 128+07.379

+04.379
BEG. CURB TRANSITION
SEE SHEET 2-D

+10.379
END CURB TRANSITION

PROP. 450mm C&G

PROP. RAISED GRASS MEDIAN

PROP. 825mm C&G

PROPOSED CONC. RET. WALL

BEGIN WALL
-L- STA. 126+50+/-

126+50
6.5 M RT

126+70
6.5 M RT

126+90
7 M RT

END WALL
-L- STA. 127+30+/-

127+30
7.5 M RT

CAT-1

-Y3- PTSta. 11+57.376

-Y3- POTSta. 11+92.773

S 81° 58' 14.6" E

BALD CREEK

ISFD

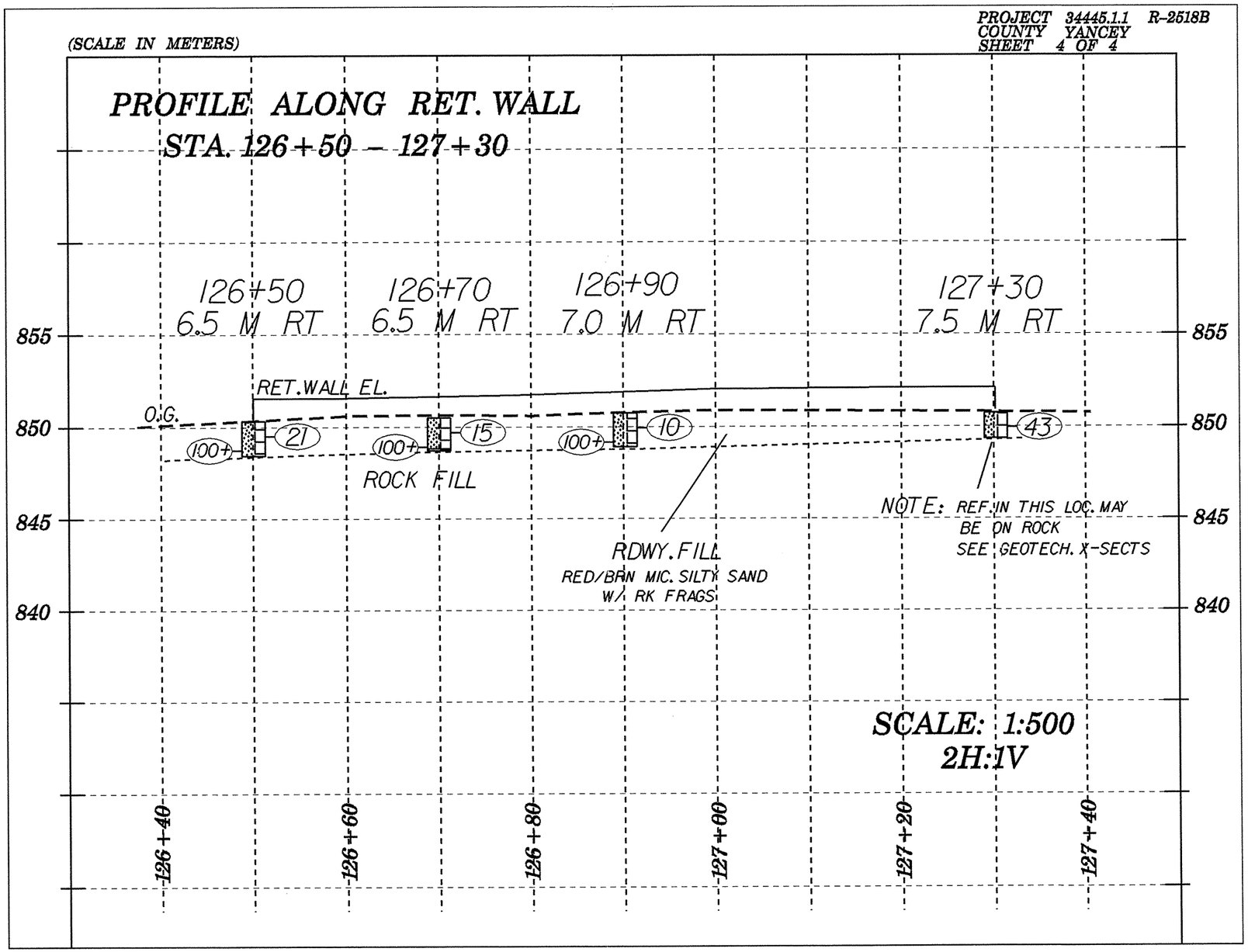
4PT

23-JAN-2006 14:03
$USER
$DGN
$RFA
$XREF

PROJECT 34445.1.1 R-2518B
COUNTY YANCEY
SHEET 4 OF 4

(SCALE IN METERS)

PROFILE ALONG RET. WALL
STA. 126+50 – 127+30



SCALE: 1:500
2H:1V

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34445.1.1 (R-2518B)	1	16

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34445.1.1 (R-2518B) F.A. PROJ. _____

COUNTY YANCEY

PROJECT DESCRIPTION US 19 FROM EAST OF THE YANCEY COUNTY LINE TO SR 1336

SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK

ID: R-2518B

PROJECT: 34445.1.1

CONTENTS

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.

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PERSONNEL

M.M. HAGER

D.O. CHEEK

G.K. ROSE

INVESTIGATED BY J.W. MANN

CHECKED BY W.D. FRYE

SUBMITTED BY W.D. FRYE

DATE 6/27/07

NORTH CAROLINA LICENSED SEAL 1941 GEOLOGIST JOHN W. MANN

DRAWN BY: J.W. MANN

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.

METRIC	PROJECT REFERENCE NO.	SHEET NO.
	34445.1.1 (R-2518B)	2 of 16

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 30 CM 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	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 (kN/m^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<25 25 TO 50 50 TO 100 100 TO 200 200 TO 400 >400

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 DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS

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

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 152mm CONTINUOUS FLIGHT AUGER
- [ ] 203mm HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____mm STEEL TEETH
- [ ] TRICONE _____mm TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

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 3 CM 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 30 CM 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 BLOWS PER 30 CM*
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 BLOWS PER 30 CM*
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 6 MM 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 13 MM DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 25 MM 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 25 MM OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 3 M
WIDE	100 TO 3 M
MODERATELY CLOSE	30 TO 100 CM
CLOSE	5 TO 30 CM
VERY CLOSE	LESS THAN 5 CM

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 1 M
THICKLY BEDDED	0.5 - 1 M
THINLY BEDDED	0.05 - 0.5 M
VERY THINLY BEDDED	10 - 50 MM
THICKLY LAMINATED	2.5 - 10 MM
THINLY LAMINATED	< 2.5 MM

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 10 CM 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) OF A 63.5 KG HAMMER FALLING 0.76 M REQUIRED TO PRODUCE A PENETRATION OF 30 CM INTO SOIL WITH A 5 CM OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 3 CM 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 10 CM DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: BY16A-129: DISC IN GROUND
STA. 192+05.866 72.922m LT -L-
ELEVATION: 758.846 M

NOTES:

REVISED 02/23/06

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

June 22, 2007

STATE PROJECT: 34445.1.1 (R-2518B)
COUNTY: Yancey
DESCRIPTION: Bridge No. 309 on US-19E over Price Creek

SUBJECT: Geotechnical Report – Foundation Investigation

Project Description

The Geotechnical Engineering Unit has completed an investigation for foundation design and presents the following findings.

Bridge No. 309 is located in west-central Yancey County approximately 8 kilometers east of the Madison/Yancey County line and ± 7.2 kilometers west of the town of Burnsville.

The proposed replacement structure is to consist of a three-span replacement bridge with all bents constructed on a 90-degree skew angle. Two spans will be 20 meters, one at 15 meters, for an overall length of 55 meters and a width of ± 10.5 meters.

A CME-550X ORV drill machine equipped with an automatic drive hammer was utilized to conduct the investigation. NW casing was used to advance borings at all bent locales. NXWL rock coring apparatus was employed at Boring B1-A to retrieve hard rock specimens. Standard Penetration Tests (SPT) were performed in all borings and representative soil samples were collected for correlation and tested for AASHTO classification.

Physiography and Geology

The project area is located in mountainous terrain of the Blue Ridge Physiographic Province. The bridge site is located in the floodplains of Price Creek and the Cane River, which serves as the major drainage feature of the project corridor. The confluence of these bodies of water is

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

located ± 0.4 kilometers northwest of the existing crossing. The area is underlain by a heterogeneous gneiss unit, Middle Proterozoic in age, that lies unconformably and has been intruded by metagabbro dikes and sills.

End Bent One and Two

Borings at these locales penetrated embankment, alluvium, saprolite, and weathered rock. Embankment soils consist of ± 1 to ± 7 meters of medium stiff to stiff sandy silt and silty sand. Alluvium is less than 3 meters thick and is composed of loose to medium dense silty sand and soft silt with a basal gravel layer. Ten to 16.5 meters of saprolitic interlayered loose to very dense silty sand and stiff to hard sandy silt lies beneath the alluvium. Rock fragments are interspersed in this horizon. Weathered rock (gneiss) was encountered at Elevations ± 739 meters in Boring EB2-B and Elevation ± 742 in Boring EB2-A. A weathered rock ledge lies between Elevations 743 and 745 meters at Boring EB1-A.

Bents One and Two

Bents one and Two have developed a similar soil profile as aforementioned with the exception of the absence of embankment materials. Weathered rock (gneiss) was penetrated in three borings between Elevations ± 742 and ± 747 meters. Crystalline rock (gneiss) was retrieved only from Boring B1-A. The top of the contact is at Elevation ± 747 meters.

Rock Properties

The recovered rock consisted of predominantly moderately severely weathered, medium to moderately hard, very closely fractured gneiss. Joints ranged from 0-80 degrees with no discernible sets due to the poor recovery. Strata recovery was 34 percent with RQD equaling zero percent.

Groundwater

A 24-hour tape measurement was obtained in the borings yielding a uniform groundwater surface at Elevation 756.5 meters.

Notice

This geotechnical foundation investigation is based on a Bridge Survey and Hydraulic Design Report dated April 22, 2005. If any significant changes are made in the design or location of the proposed structure, the subsurface information will have to be reviewed and modified as necessary.

Respectfully Submitted,

John W. Mann, L.G.
Project Geological Engineer

PROJECT REFERENCE NO.	SHEET
34445.1.1 (R-2518B)	4 OF 16

SITE PLAN

0 10 20

METERS

ISMTL
BUS

G
MTL

G
MTL

CONC

235
W/LT

S

GR

GR

NAD 83

191+20

192

C C C F

F C C C

3.0 BST

3.0 BST

EB1-A EBL

B1-A EBL

B2-A EBL

EB2-A EBL

-L-

TO MADISON COUNTY LINE

US 19 TO BURNSVILLE

SKEW 90°

EB1-B EBL

B1-B EBL

B2-B EBL

EB2-B EBL

TOP OF
BANK

PRICE CREEK

F F F

F F F F

BEGIN BRIDGE
-L- STA. 191+65+/-

END BRIDGE
-L- STA. 192+20+/-

PROJECT REFERENCE NO.	SHEET
34445.1.1 (R-2518B)	5 OF 16

PROFILE 12m RT of -L-

METRIC

0 4 8
METERS
VE = 2

EB1-B EBL
191+65
12m RT

B1-B EBL
191+80
11.38m RT

B2-B EBL
192+00
11.5m RT

EB2-B
192+20
12m RT

EXISTING GROUND

WATER SURFACE 05/06

760
758
756
754
752
750
748
746
744
742
740
738

EMBANKMENT: SANDY SILT

ALLUVIAL: SILTY SAND

ALLUVIAL: BASAL GRAVEL

SANDY SILT

SANDY SILT

COBBLES & BOULDERS

SAND & PEBBLES

SAND & PEBBLES

SANDY SILT

EMBANKMENT: SILTY SAND

ALLUVIAL

ALLUVIAL

BASAL GRAVEL

SAPROLITE:

VARIEGATED & INTERSTRATIFIED

SILTY FINE TO COARSE SAND

& SANDY SILT WITH

INTERSPERSED ROCK FRAGNENTS & TRACE MICA

& INTERMITTENT ROCK FRAGMENTS,

WEATHERED ROCK LEDGES

WEATHERED ROCK

(GNEISS)

08/04 04/07 08/04 08/04

EB1-B: 9, 5, 8, 17, 29, 62, 36, 41, 59, 85, 100+, 100/0.28

B1-B: 2, 5, 5, 29, 47, 39, 77, 64, 78, 100/0.20, 100/0.16, 100/0.18

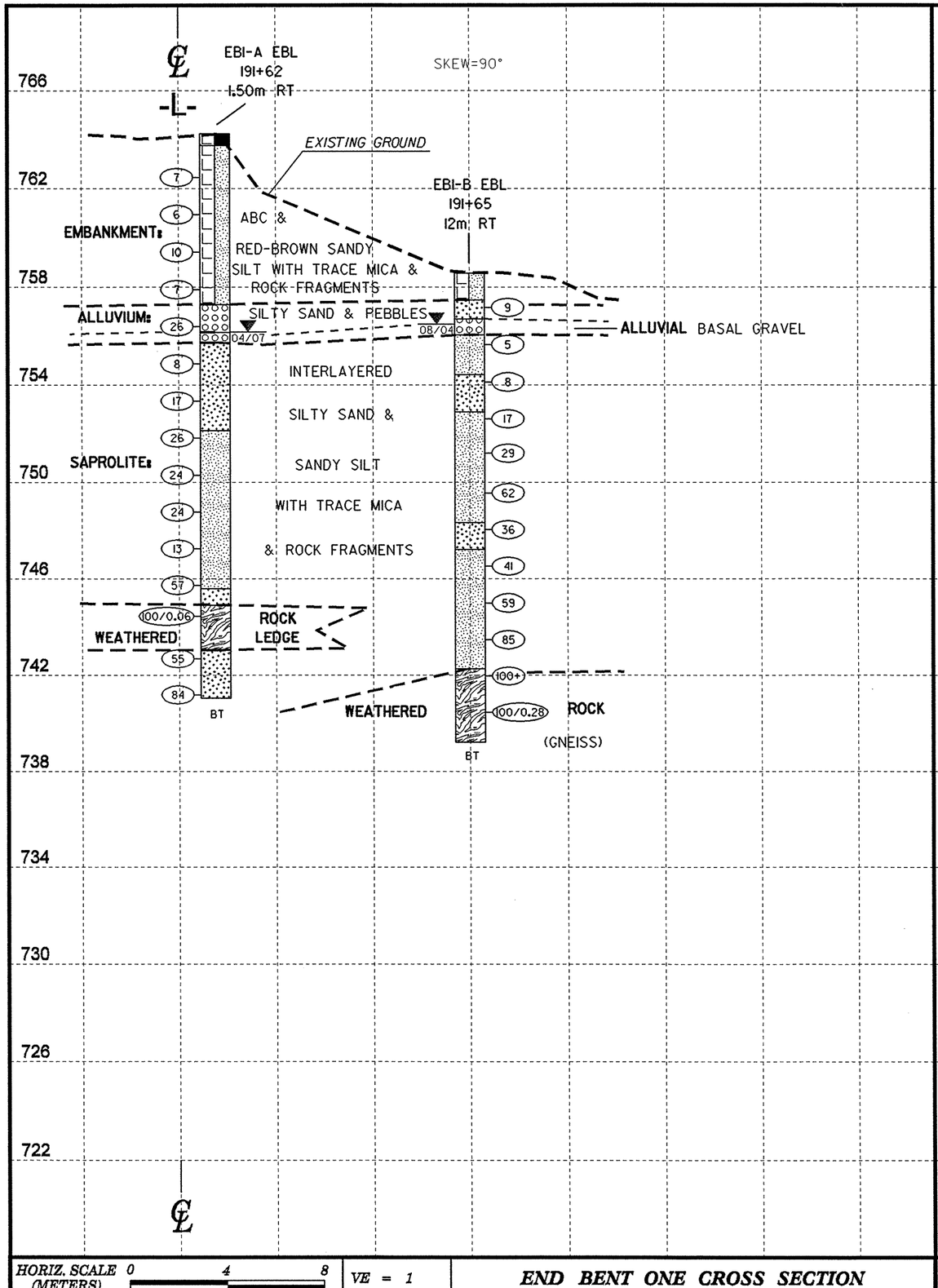
B2-B: 11, 23, 16, 11, 14, 13, 8, 45, 48, 100/0.29, 100/0.22, 100/0.24

EB2-B: 12, 9, 12, 17, 23, 35, 25, 32, 36, 64, 88, 100/0.2

BT BT BT BT

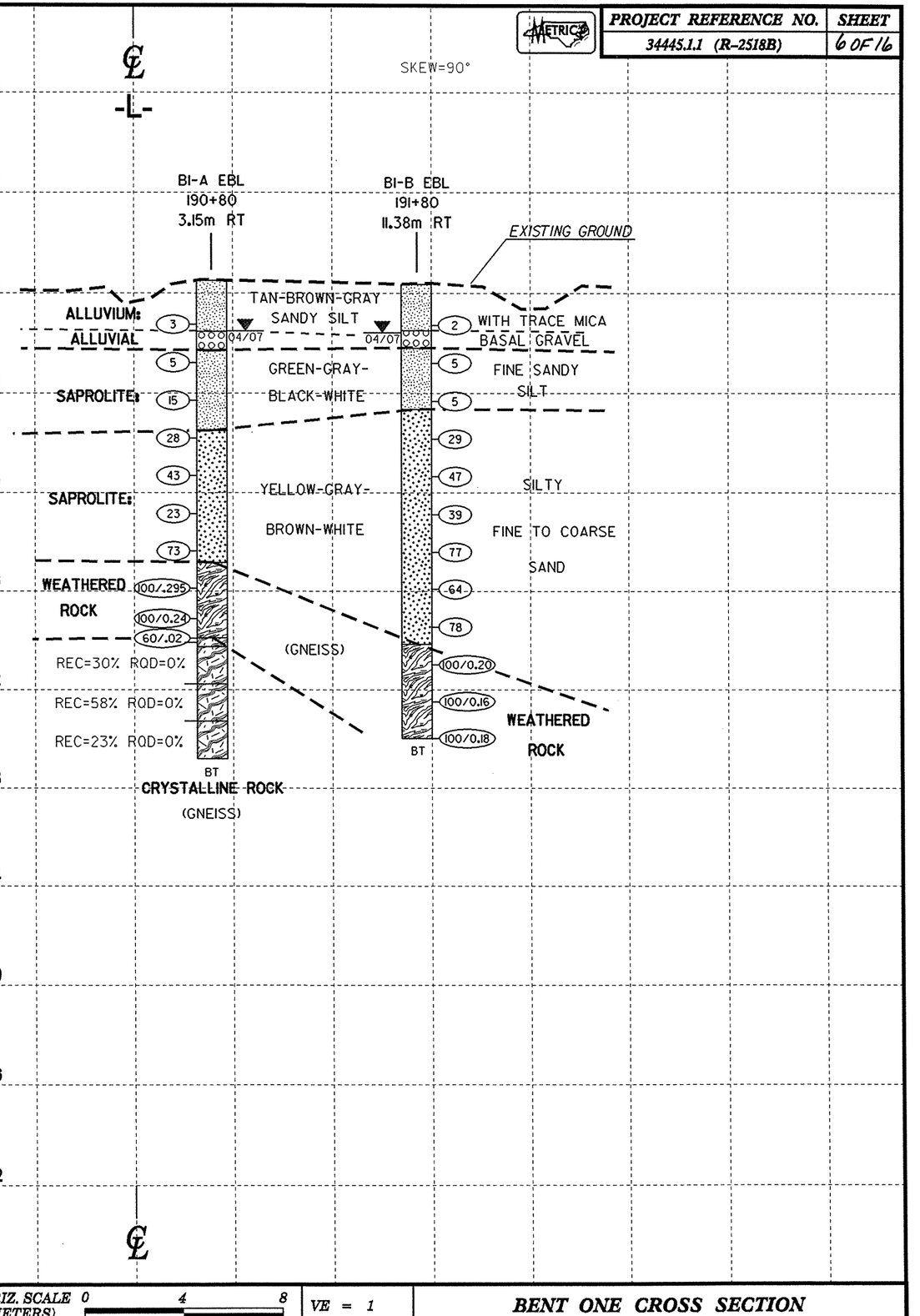
191+60 191+80 192+00 192+20

PROJECT REFERENCE NO.	SHEET
34445.1.1 (R-2518B)	6 OF 16



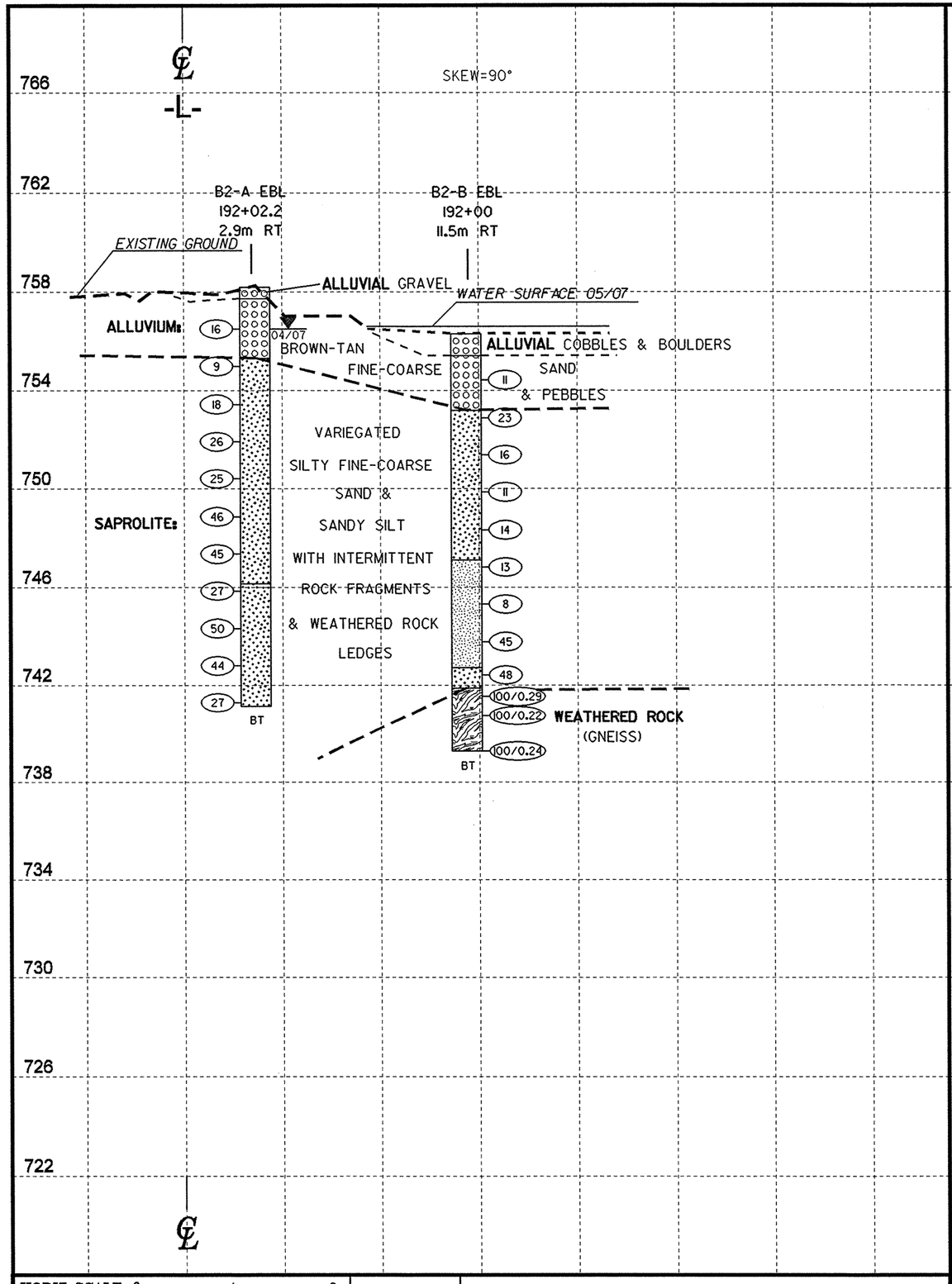
HORIZ. SCALE (METERS) 0 4 8 | VE = 1

END BENT ONE CROSS SECTION



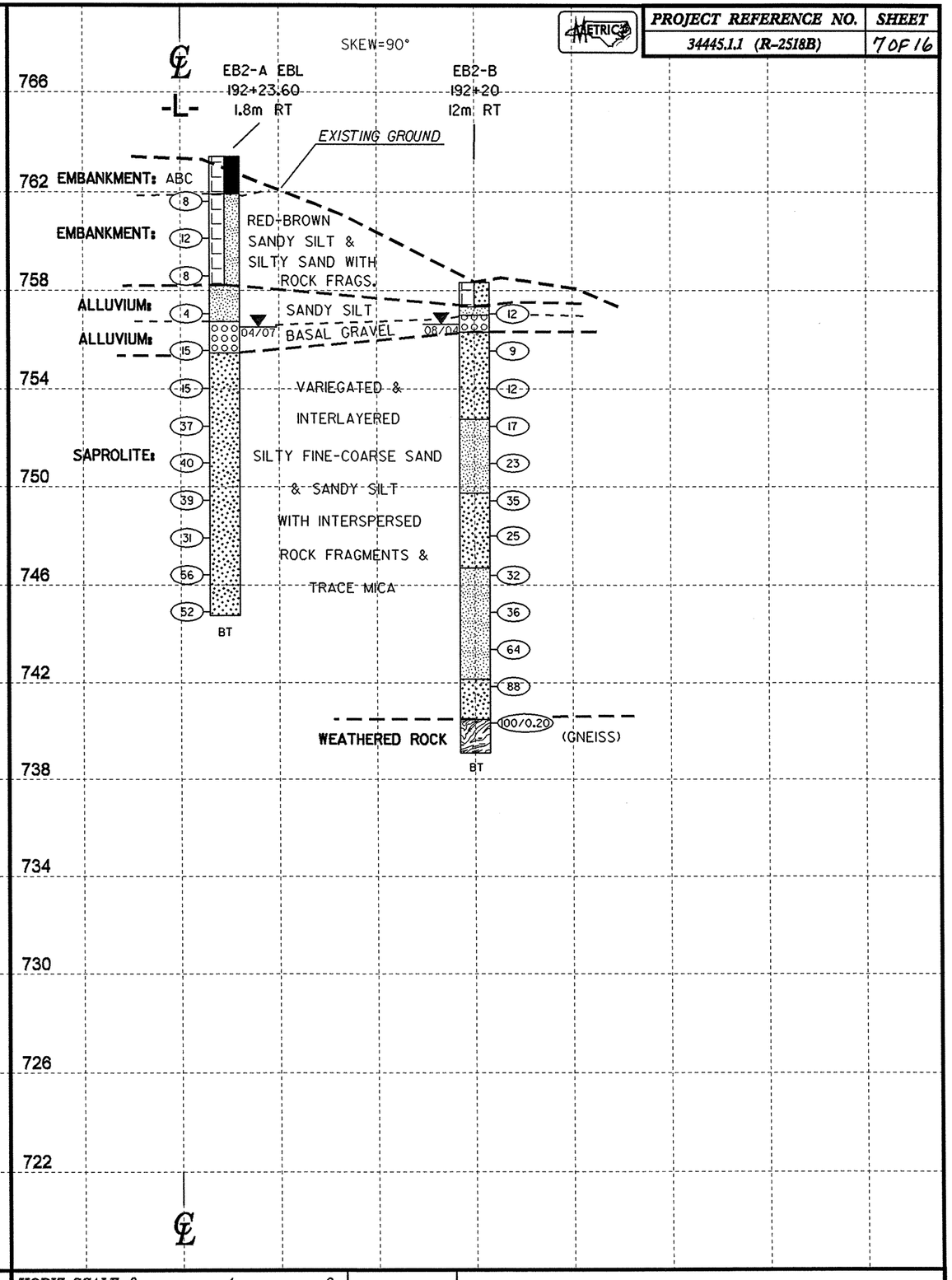
HORIZ. SCALE (METERS) 0 4 8 | VE = 1

BENT ONE CROSS SECTION



HORIZ. SCALE (METERS) 0 4 8 | VE = 1

BENT TWO CROSS SECTION



HORIZ. SCALE (METERS) 0 4 8 | VE = 1

END BENT TWO CROSS SECTION

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK				**GROUND WTR (m)**
BORING NO. EB1-A EBL	**STATION** 191+62.0	**OFFSET** 1.5m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 764.26 m	**TOTAL DEPTH** 23.23 m	**NORTHING** 244,894.3	**EASTING** 304,230.9	**24 HR.** 8.10
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 04/25/07	**COMP. DATE** 04/25/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
765									764.26 GROUND SURFACE	0.00
									763.76 **ROADWAY EMBANKMENT** AGGREGATE BASE COURSE	0.50
762.76	1.50								**ROADWAY EMBANKMENT** Red-brown sandy SILT with mica & rock fragments	
		3	3	4	7	SS-9	M			
761.24	3.02									
		3	3	3	6					
759.72	4.54									
		3	4	6	10					
758.20	6.06									
		2	3	4	7		W			
756.68	7.58								757.29 **ALLUVIAL** Gray fine-coarse SAND & PEBBLES	6.97
		3	12	14	26	SS-10			756.14	8.12
755.16	9.10								755.72 **ALLUVIAL** Basal GRAVEL	8.54
		2	3	5	8	SS-11			**SAPROLITE** Dark gray silty SAND with trace mica	
753.64	10.62									
		3	7	10	17					
752.12	12.14								752.12 **SAPROLITE** Light gray-white sandy SILT	12.14
		7	12	14	26	SS-12				
750.60	13.66									
		3	10	14	24					
749.08	15.18									
		4	11	13	24					
747.56	16.70									
		6	6	7	13					
746.04	18.22									
		18	22	37	59				745.60 **SAPROLITE** Red-brown to black silty SAND with trace mica	18.66
									744.92	19.34

NCDOT BORE SINGLE R2518B_GEO_BH.GPJ NC_DOT.GDT 06/13/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK				**GROUND WTR (m)**
BORING NO. EB1-A EBL	**STATION** 191+62.0	**OFFSET** 1.5m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 764.26 m	**TOTAL DEPTH** 23.23 m	**NORTHING** 244,894.3	**EASTING** 304,230.9	**24 HR.** 8.10
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 04/25/07	**COMP. DATE** 04/25/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
745					Match Line					
744.52	19.74								**WEATHERED ROCK** (Gneiss ledge) *(continued)*	
		100/0.06			100/0.06					
743.00	21.26								743.06 **SAPROLITE** Gray-red brown-white silty fine-coarse SAND	21.20
		22	21	34	55					
741.48	22.78									
		20	39	45	84				741.03 Boring Terminated at Elevation 741.03 m IN SAPROLITE (SAND)	23.23

NCDOT BORE SINGLE R2518B_GEO_BH.GPJ NC_DOT.GDT 06/13/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK				**GROUND WTR (m)**
BORING NO. EB1-B EBL	**STATION** 191+65.0	**OFFSET** 12.0m RT	**ALIGNMENT** -L-	**0 HR.** 2.10
COLLAR ELEV. 758.58 m	**TOTAL DEPTH** 19.35 m	**NORTHING** 244,883.8	**EASTING** 304,233.8	**24 HR.** 2.50
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 08/10/04	**COMP. DATE** 08/16/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
759										
									758.58 GROUND SURFACE	0.00
									ROADWAY EMBANKMENT Red-brown sandy SILT with mica & rock fragments	
757.47	1.11								757.47	1.11
		2	4	5	9				**ALLUVIAL** Brown-black-gray silty SAND	
							▽		756.70	1.88
755.95	2.63						▼		**ALLUVIAL** Basal GRAVEL	
		2	2	3	5				756.04	2.54
									SAPROLITE Blue-white fine sandy SILT with mica	
754.43	4.15								754.43	4.15
		2	4	4	8				**SAPROLITE** Orange-tan-white fine silty SAND with trace mica & rock fragments	
752.91	5.67								752.91	5.67
		4	7	10	17				**SAPROLITE** Tan-white-brown fine sandy SILT with trace mica	
751.39	7.19									
		5	14	15	29					
749.87	8.71									
		8	19	43	62					
748.35	10.23								748.35	10.23
		8	19	17	36				**SAPROLITE** Black-tan-white silty SAND with rock fragments	
746.83	11.75								747.23	11.35
		15	20	21	41				**SAPROLITE** White-tan-gray fine sandy SILT with mica	
745.31	13.27									
		12	21	38	59					
743.79	14.79									
		16	30	55	85					
742.27	16.31								742.27	16.31
		25	42	65	100+				**WEATHERED ROCK** (Gneiss)	
740.75	17.83									
		18	32	68/0.13	100/0.28					
									739.23	19.35
									Boring Terminated at Elevation 739.23 m IN WEATHERED ROCK (GNEISS)	

NCDOT BORE SINGLE R2518B_GEO_BH.GPJ NC_DOT.GDT 06/27/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK			**GROUND WTR (m)**
BORING NO. B1-A EBL	**STATION** 191+80.0	**OFFSET** 3.2m RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 758.52 m	**TOTAL DEPTH** 19.32 m	**NORTHING** 244,892.5	**EASTING** 304,248.9 — **24 HR.** 2.05
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic
START DATE 04/11/07	**COMP. DATE** 04/11/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 14.4 m

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM (0 25 50 75 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (m)	DEPTH (m)
759										
									758.52 GROUND SURFACE	0.00
									ALLUVIAL Tan-brown-gray sandy SILT with trace mica	
757.05	1.47	2	1	2	3	SS-1	▼		756.46	2.06
									ALLUVIAL Basal GRAVEL	
755.53	2.99	1	2	3	5	SS-2			755.69	2.83
									SAPROLITE Dark green-gray fine sandy SILT	
754.01	4.51	6	7	8	15				752.49	6.03
									SAPROLITE Gray-brown-white silty fine to coarse SAND	
752.49	6.03	7	14	14	28	SS-3				
750.98	7.54	10	19	24	43					
749.49	9.03	10	13	10	23					
747.94	10.58	11	43	30	73	SS-4			747.18	11.34
									WEATHERED ROCK (Gneiss)	
746.42	12.10	30	43	57/0.145	100/0.295					
744.90	13.62	23	53	47/0.09	100/0.24				744.12	14.40
744.12	14.40	60/0.02			60/0.02				**CRYSTALLINE ROCK** GNEISS Run: 14.42-14.76 REC=0% RQD=0%	
									743.76	14.76
									CRYSTALLINE ROCK GNEISS Run: 14.76-16.28 REC=30% RQD=0%	
									742.24	16.28
									CRYSTALLINE ROCK GNEISS Run: 16.28-17.80 REC=58% RQD=0%	
									740.72	17.80
									CRYSTALLINE ROCK GNEISS Run: 17.80-19.32 REC=23% RQD=0%	
									739.20	19.32
									Boring Terminated at Elevation 739.20 m IN CRYSTALLINE ROCK (GNEISS)	

NCDOT BORE SINGLE_R2518B_GEO_BH.GPJ NC_DOT.GDT 06/13/07

SHEET 1 OF 1

DATE 4/11/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B1-A EBL GEOLOGIST: J.W. MANN

DESCRIPTION: BRIDGE NO. 309 ON US 19E OVER PRICE CREEK

COUNTY: YANCEY COLLAR ELEVATION: 758.52 m TOTAL DEPTH: 19.32 m

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./.3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
744.10	14.42		0.34	0.00 0	0.00 0		ROCK IS PREDOMINANTLY MODERATELY SEVERELY WEATHERED, MEDIUM TO MODERATELY HARD, VERY CLOSELY FRACTURED GNEISS. RECOVERED ROCK IS PREDOMINANTLY PINK-WHITE FELDSPAR. JOINTS VARIABLE FROM 0-80°. SREC=34% SRQD=0%
743.76	14.76		1.52	0.45 30	0.00 0		
742.24	16.28		1.52	0.88 58	0.00 0		
740.72	17.80		1.52	0.35 23	0.00 0		
739.20	19.32						

CORING TERMINATED AT ELEVATION 739.20 m

DRILLER: G.K. ROSE CORE SIZE: NXWL EQUIPMENT: CME-550X

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK				**GROUND WTR (m)**
BORING NO. B1-B EBL	**STATION** 191+80.0	**OFFSET** 11.4m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 758.36 m	**TOTAL DEPTH** 18.34 m	**NORTHING** 244,884.3	**EASTING** 304,248.9	**24 HR.** 1.95
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 04/12/07	**COMP. DATE** 04/12/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
759									758.36 GROUND SURFACE	0.00
757.02	1.34	WOH	WOH	2	2				**ALLUVIAL** Tan-brown sandy SILT	
755.50	2.86	WOH	3	2	5				756.50 **ALLUVIAL** Basal GRAVEL	1.86
753.98	4.38	1	2	3	5				755.80 **SAPROLITE** Green-gray-black-white fine sandy SILT	2.56
752.46	5.90	5	8	21	29	SS-5			753.36 **SAPROLITE** Yellow-brown-white silty fine to coarse SAND with intermittent weathered rock ledges from 10.10-11.80	5.00
750.94	7.42	11	19	28	47					
749.42	8.94	12	16	23	39					
747.90	10.46	22	38	39	77					
746.38	11.98	19	32	32	64					
744.86	13.50	31	34	44	78					
743.34	15.02	37	65	35/0.05	100/0.20				743.87 **WEATHERED ROCK** (Gneiss)	14.49
741.82	16.54	28	60	40/0.01	100/0.13					
740.20	18.16	84	16/0.03		100/0.18				740.02 Boring Terminated at Elevation 740.02 m IN WEATHERED ROCK (GNEISS)	18.34

NCDOT BORE SINGLE R2518B_GEO_BH.GPJ NC_DOT.GDT 06/13/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY		**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK				**GROUND WTR (m)**
BORING NO. B2-A EBL	**STATION** 192+02.2	**OFFSET** 2.9m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 758.19 m	**TOTAL DEPTH** 17.05 m	**NORTHING** 244,892.6	**EASTING** 304,270.9	**24 HR.** 1.70
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 04/17/07	**COMP. DATE** 04/17/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
759									758.19 GROUND SURFACE	0.00
756.79	1.40								757.74 **ALLUVIAL** GRAVEL	0.45
		5	7	9	16				**ALLUVIAL** Brown-tan silty fine to coarse SAND with pebbles	
755.27	2.92								755.29	2.90
		3	4	5	9				**SAPROLITE** White-gray silty fine to coarse SAND with rock fragments	
753.75	4.44									
		5	10	8	18	SS-6				
752.23	5.96									
		10	12	14	26					
750.71	7.48									
		8	12	13	25					
749.19	9.00									
		11	23	23	46					
747.67	10.52									
		17	26	19	45	SS-7				
746.15	12.04								746.15	12.04
		5	12	15	27	SS-8			**SAPROLITE** Tan-brown-green silty coarse SAND with intermittent weathered rock ledges	
744.63	13.56									
		8	16	34	50					
743.11	15.08									
		51	19	25	44					
741.59	16.60									
		9	12	15	27					
									741.14	17.05
									Boring Terminated at Elevation 741.14 m IN SAPROLITE (SAND)	

NCDOT BORE SINGLE R2518B_GEO_BH.GPJ NC_DOT.GDT 06/13/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY		**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK				**GROUND WTR (m)**
BORING NO. B2-B EBL	**STATION** 192+00.0	**OFFSET** 11.5m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 756.29 m	**TOTAL DEPTH** 17.00 m	**NORTHING** 244,884.0	**EASTING** 304,268.8	**24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 05/01/07	**COMP. DATE** 05/01/07	**SURFACE WATER DEPTH** 0.30m	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
757									WATER SURFACE (05/01/07)	
756.29									756.29 CHANNEL BOTTOM	0.00
									ALLUVIAL COBBLES & BOULDERS	
754.73	1.56								755.39	0.90
		4	3	8	11				**ALLUVIAL** SAND & PEBBLES	
753.21	3.08								753.21	3.08
		2	8	15	23				**SAPROLITE** Yellow-brown-white-gray silty fine to coarse SAND	
751.69	4.60									
		3	6	10	16					
750.17	6.12									
		3	4	7	11					
748.65	7.64									
		3	5	9	14					
747.13	9.16								747.13	9.16
		3	5	8	13				**SAPROLITE** Red-brown fine sandy SILT	
745.61	10.68									
		2	4	4	8					
744.09	12.20								742.73	13.56
		9	14	31	45				**SAPROLITE** Red-brown-black-white silty fine to coarse SAND	
742.73	13.56								741.89	14.40
		49	21	27	48				**WEATHERED ROCK** (Gneiss)	
741.84	14.45									
		35	54	46/0.14	100/0.29					
741.05	15.24									
		27	61	39/0.07	100/0.22					
739.53	16.76									
		44	56/0.09		100/0.24				739.29	17.00
									Boring Terminated at Elevation 739.29 m IN WEATHERED ROCK (GNEISS)	

NCDOT BORE SINGLE R2518B_GEO_BH.GPJ NC_DOT.GDT 06/14/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK				**GROUND WTR (m)**
BORING NO. EB2-A EBL	**STATION** 192+23.6	**OFFSET** 1.8m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 763.42 m	**TOTAL DEPTH** 18.67 m	**NORTHING** 244,893.5	**EASTING** 304,292.5	**24 HR.** 6.90
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 04/26/07	**COMP. DATE** 04/26/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
764									763.42 GROUND SURFACE	0.00
761.92	1.50								**ROADWAY EMBANKMENT** AGGREGATE BASE COURSE	1.50
760.40	3.02	1	4	4	8				**ROADWAY EMBANKMENT** Red-brown sandy SILT	
758.88	4.54	4	6	6	12					
757.36	6.06	3	3	5	8				758.20	5.22
755.84	7.58	0	1	3	4	SS-13			**ALLUVIAL** Dark gray fine sandy SILT	6.68
754.32	9.10	12	11	4	15				756.74 **ALLUVIAL** BASAL GRAVEL & SAND	7.98
752.80	10.62	4	6	9	15				755.44 **SAPROLITE** Red-brown-gray-green silty fine to coarse SAND	
751.28	12.14	12	15	22	37	SS-14				
749.76	13.66	11	17	23	40					
748.24	15.18	11	16	23	39					
746.72	16.70	7	15	16	31					
745.20	18.22	15	22	34	56					
		14	20	32	52				744.75	18.67

Boring Terminated at Elevation 744.75 m IN SAPROLITE (SAND)

NCDOT BORE SINGLE R2518B_GEO_BH.GPJ NC_DOT.GDT 06/14/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION BRIDGE NO. 309 ON US 19E OVER PRICE CREEK				**GROUND WTR (m)**
BORING NO. EB2-B EBL	**STATION** 192+20.0	**OFFSET** 12.0m RT	**ALIGNMENT** -L-	**0 HR.** 1.70 1.70
COLLAR ELEV. 758.33 m	**TOTAL DEPTH** 19.22 m	**NORTHING** 244,883.4	**EASTING** 304,288.8	**24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 08/17/04	**COMP. DATE** 08/17/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
759									758.33 GROUND SURFACE	0.00
757.35	0.98								**ROADWAY EMBANKMENT** Red-brown silty SAND with rock fragments	0.98
755.83	2.50	2	4	8	12				757.00 **ALLUVIAL** Gray-blue-black sandy SILT	1.33
754.31	4.02	3	5	4	9				756.31 **ALLUVIAL** BASAL GRAVEL & SAND	2.02
752.79	5.54	3	5	7	12				**SAPROLITE** Tan-gray-white-orange silty fine SAND with minor rock fragments	
751.27	7.06	3	8	9	17					
749.75	8.58	6	11	12	23				752.79	5.54
748.32	10.01	8	14	21	35				**SAPROLITE** Variegated fine sandy SILT with mica	
746.71	11.62	7	10	15	25					
745.19	13.14	7	15	17	32					
743.67	14.66	9	14	22	36					
742.15	16.18	9	26	38	64					
740.63	17.70	25	37	51	88					
		24	55	45/0.05	100/0.20				749.75	8.58
									SAPROLITE White-gray-tan silty SAND with rock fragments	
									746.71	11.62
									SAPROLITE Tan-white-gray fine sandy SILT with mica	
									742.15	16.18
									SAPROLITE Tan-pink-gray-black silty SAND with rock fragments	
									740.48	17.85
									WEATHERED ROCK (Gneiss)	
									739.11	19.22

Boring Terminated at Elevation 739.11 m IN ~~WEATHERED ROCK (GNEISS)~~

NCDOT BORE SINGLE R2518B_GEO_BH.GPJ NC_DOT.GDT 06/14/07

M&T 503E

JCS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #:	R-2518 B

REPORT ON SAMPLES OF:	Soils for Quality

PROJECT:	34445.1.1	COUNTY:	Yancey	Owner:	NCDOT		
DATE SAMPLED:	4.11.07	DATE RECEIVED:	5.7.07	DATE REPORTED:	5.11.07		
SAMPLED FROM:	Bridge	SAMPLED BY:	J. W. Mann				
SUBMITTED BY:	W. D. Frye			2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville						

TEST RESULTS

Project Sample No.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8
Lab Sample No. A	155063	155064	155065	155066	155067	155068	155069	155070
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passing #10 Sieve %	92	99	83	76	80	99	50	87
Passing #40 Sieve %	89	93	69	51	56	82	33	74
Passing #200 Sieve %	41	43	29	28	23	33	11	29

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	8	14	29	44	51	30	50	32
Fine Sand - Ret. #270	56	54	45	24	25	47	33	40
Silt 0.05-0.005 mm %	22	24	20	22	16	21	13	20
Clay < 0.005 mm %	14	8	6	10	8	2	4	8
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	31	38	33	23	26	22	20	40
Plastic Index	NP	NP	NP	NP	NP	NP	NP	NP
AASHTO Classification	A-4 (1)	A-4 (2)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-1-b (0)	A-2-4 (0)
Quantity								
Texture								
Station	191+80	191+80	191+80	191+80	191+80	192+02.2	192+02.2	192+02.2
Hole No.								
Depth (ft) From:	1.62	3.14	6.18	10.73	6.05	4.59	10.67	12.19
To:	1.92	3.44	6.48	11.03	6.35	4.89	10.97	12.49

Remarks:

A-155063 - 155070

CC:

J. W. Mann	
File	

SOILS ENGINEER:	

M&T 503E

JCS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #:	R-2518 B

REPORT ON SAMPLES OF:	Soils for Quality

PROJECT:	34445.1.1 (cont.)	COUNTY:	Yancey	Owner:	NCDOT		
DATE SAMPLED:	4.25.07	DATE RECEIVED:	5.7.07	DATE REPORTED:	5.11.07		
SAMPLED FROM:	Bridge	SAMPLED BY:	J. W. Mann				
SUBMITTED BY:	W. D. Frye			2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville						

TEST RESULTS

Project Sample No.	SS-9	SS-10	SS-11	SS-12	SS-13	SS-14		
Lab Sample No. A	155071	155072	155073	155074	155075	155076		
HiCAMS Sample #	--	--	--	--	--	--		
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0	0.0		
Passing #10 Sieve %	90	56	97	90	92	99		
Passing #40 Sieve %	77	43	95	74	91	93		
Passing #200 Sieve %	39	10	34	40	72	34		

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	25	44	12	30	3	26		
Fine Sand - Ret. #270	39	41	64	32	30	49		
Silt 0.05-0.005 mm %	20	7	20	28	42	19		
Clay < 0.005 mm %	16	8	4	10	25	6		
Passing # 40 Sieve %	--	--	--	--	--	--		
Passing # 200 Sieve %	--	--	--	--	--	--		

Liquid Limit	37	20	34	32	37	33		
Plastic Index	NP	NP	NP	NP	NP	NP		
AASHTO Classification	A-4 (1)	A-1-b (0)	A-2-4 (0)	A-4 (1)	A-4 (7)	A-2-4 (0)		
Quantity								
Texture								
Station	191+62	191+62	191+62	191+62	192+23.6	192+23.6		
Hole No.								
Depth (ft) From:	1.65	7.73	9.25	12.29	6.21	10.72		
To:	1.95	8.03	9.55	12.59	6.51	11.07		

Remarks:

A-155071 - 155076

CC:

J. W. Mann	
File	

SOILS ENGINEER:	

G:/Everyone. . . /M&T Forms/Regional Lab Statesville/Soils Test Report M&T 503E 8-19-2000

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34445.1.1 TIP: R-2518B COUNTY: YANCEY

DESCRIPTION(1): BRIDGE NO. 309 ON US 19E OVER PRICE CREEK

EXISTING BRIDGE

Information from: Field Inspection X Microfilm (reel pos:)
Other (explain) Bridge Survey Report

Bridge No.: 309 Length: 54.97m Total Bents: 4 Bents in Channel: 0 Bents in Floodplain: 4
Foundation Type: Interior: Concrete Piles End Bents: Spill-through Abutment

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Both slopes have evidence of scour at the toe.

Interior Bents: Upstream piles have scour pockets at both bents.

Channel Bed: Possible scour pocket downstream but not clearly evident other than granular deposits. Stream accelerates under bridge at Interior Bent One.

Channel Bank: Past scour evident on both banks under bridge.

EXISTING SCOUR PROTECTION

Type(3): Riprap/Boulders

Extent(4): Placed on toe of both end bent slopes.

Effectiveness(5): Fair

Obstructions(6): None noted

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): Sand, gravel, cobbles, boulders...predominantly cobbles

Channel Bank Material(8): Silt, sand, gravel

Channel Bank Cover(9): Grass, bramble, trees

Floodplain Width(10): ~457 meters

Floodplain Cover(11): Grass, crops, sparse trees

Stream is(12): Aggrading Degrading X Static

Channel Migration Tendency(13): Toward Interior Bent One

Observations and Other Comments: Point bar located upstream. Slight meander at bridge site.

DESIGN SCOUR ELEVATIONS(14) Feet Meters X

BENTS										
B1	B2	B3	B4							
755.3	753									

Comparison of DSE to Hydraulics Unit theoretical scour:
The DSE is in accordance with the theoretical scour shown on the Bridge Survey & Hydraulics Report dated 4/22/05.

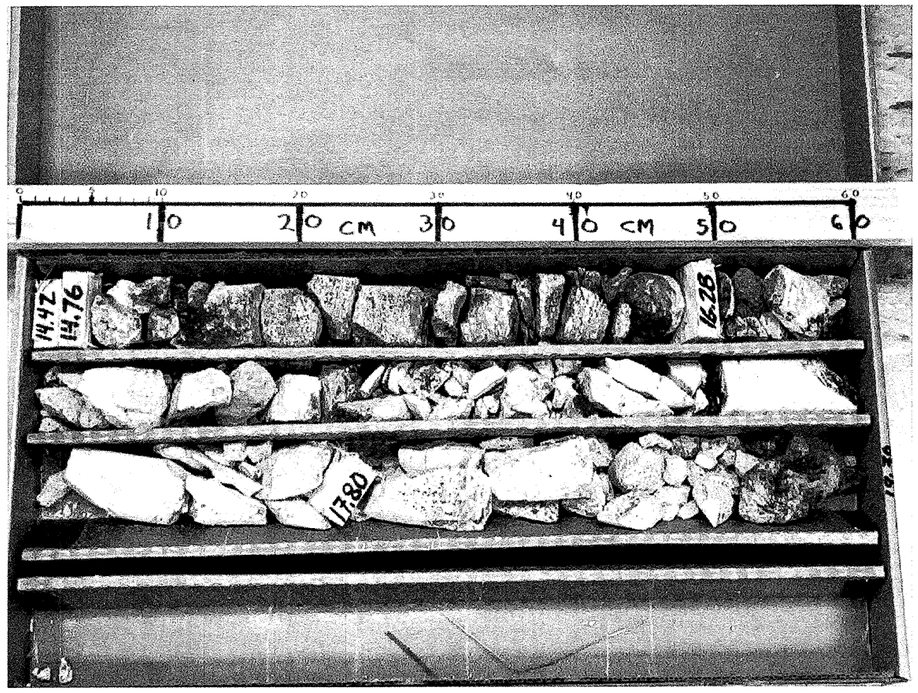
SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

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: J.W. Mann **Date:** 6/28/2007

WBS 34445.1.1 I.D. R-2518B
BRIDGE NO. 309 ON US 19 OVER PRICE'S CREEK
YANCEY COUNTY



B1-A (EBL)
STA. 191+80 3.15 M RT
CORE RUN DEPTH - 14.40 M – 19.32 M

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2518B	1	48

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. R-2518B F.A. PROJ. _____

COUNTY YANCEY

PROJECT DESCRIPTION US 19 FROM EAST OF THE MADISON COUNTY LINE TO SR 1336

SITE DESCRIPTION DUAL BRIDGES ON US 19 OVER BALD CREEK

ID: R-2518B

PROJECT: 34445.1.1

CONTENTS

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.

PERSONNEL

M.M. HAGER

D.O. CHEEK

C.J. COFFEY

G.K. ROSE

INVESTIGATED BY P. Q. LOCKAMY

CHECKED BY W.D. FRYE

SUBMITTED BY W.D. FRYE

DATE 6.15.07

NORTH CAROLINA LICENSED SEAL 1907 GEOLOGIST Patrick Q. Lockamy

6-15-07

DRAWN BY: J.T. WILLIAMS

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.

PROJECT REFERENCE NO.	SHEET NO.
R-2518B	2

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 30 CM 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-7-5, A-7-6)	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							
SYMBOL														
% PASSING #10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		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 (kN/m^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	<25
	SOFT	2 TO 4	25 TO 50
	MEDIUM STIFF	4 TO 8	50 TO 100
	STIFF	8 TO 15	100 TO 200
	VERY STIFF	15 TO 30	200 TO 400
	HARD	>30	>400

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 (PD) PL — PLASTIC LIMIT)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE; SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, 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 DMT / VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- (REF) — SPT REFUSAL

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

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 152mm CONTINUOUS FLIGHT AUGER
- [X] 203mm HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE __ mm STEEL TEETH
- [ ] TRICONE __ mm TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B__
- [X] -N XWL
- [ ] -H__

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

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 3 CM 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 30 CM 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 BLOWS PER 30 CM*
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 BLOWS PER 30 CM*
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 6 MM 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 13 MM DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 25 MM 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 25 MM OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 3 M
WIDE	1 TO 3 M
MODERATELY CLOSE	30 TO 100 CM
CLOSE	5 TO 30 CM
VERY CLOSE	LESS THAN 5 CM

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 1 M
THICKLY BEDDED	0.5 - 1 M
THINLY BEDDED	0.05 - 0.5 M
VERY THINLY BEDDED	10 - 50 MM
THICKLY LAMINATED	2.5 - 10 MM
THINLY LAMINATED	< 2.5 MM

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 10 CM 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) OF A 63.5 KG HAMMER FALLING 0.76 M REQUIRED TO PRODUCE A PENETRATION OF 30 CM INTO SOIL WITH A 5 CM OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 3 CM 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 10 CM DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: -BY13-I24 - NORTHING : 245198.47 EASTING : 302672.242

ELEVATION: 766.995 M

NOTES:

REVISED 02/23/06

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

June 15, 2007

STATE PROJECT: 34445.1.1 (R-2518B)
COUNTY: Yancey
DESCRIPTION: Bridge No. 30 on US-19 over Bald Creek

SUBJECT: Geotechnical report - Inventory

Introduction

This project is located in Yancey County, approximately 5.5 miles west of Burnsville on US-19. The existing 4-barrel RCBC will be replaced with tandem, triple-span, 2-lane bridges centered at -L- Station 175+52.267. The proposed structures are identical in dimension with spans of 12, 20 and 12 meters on a 135° skew and an out to out distance of 11.19 meters. The west bound lane bridge, referred to as WBL or left lane, is centered left of -L- Station 175+58.5354. The east bound lane bridge (right lane or EBL) is centered right of -L- Station 175+46.00. A detour is not needed.

The subsurface investigation was conducted using a CME-550 drill machine with -N- casing and advancer. Standard Penetration Tests were performed where applicable, using an automatic drop hammer. Rock core was retrieved with NXWL equipment.

The existing culvert is founded on predominantly very dense sandy saprolite and patches of weathered rock. At B1-B WBL the culvert rests directly on crystalline rock. Aggregate used in the concrete appears to be Pensacola gravel, mostly subrounded gneissic alluvium which was mined along Pensacola Creek in Yancey County.

A boring was not made at the B1-A EBL location due to the steep slope. The near by boring at B1-B WBL is used on the EBL B1 cross section. Two borings on B2 WBL went through the culvert cap and floor. Datum elevations from the bottom of the culvert's concrete floor are used there.

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FAX: 919-250-4237

WEBSITE: WWW.DOH.DOT.STATE.NC.US

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

Physiography and Geology

This site is located on a long east-west trending valley (one of the more prominent physiographic features in the Southern Appalachians). The valley is oblique to regional strike and does not follow faults, rock type, or any geologic structure that typically controls such a long, straight valley. The lineation may be a dextral shear produced by a rotational event during compression.

Generally, shallow medium dense to very dense saprolitic silty sand and/or weathered rock or crystalline rock is present below thin alluvium across this site. Some embankment overlies alluvium. Crystalline rock is layered with weathered rock and possesses poor RQD.

Embankment encountered consists of 2.3 to 4.4 meters of loose silty sand with some stiff to very stiff sandy silt. At this site, the existing 2-lane highway utilizes the WBL alignment and most of the embankment encountered is along the WBL.

Alluvium consists predominantly of silty sand with basal sand and gravel with cobbles; some sandy silt is also present. The lithic portion of the alluvia is composed of subrounded amphibolitic and gneissic rocks with a lesser amount of vein quartz. Flood events here can be intense with large patches of alluvial soil being swept away leaving just the cobbles and gravel behind. The alluvium tends to be rather thin – two meters or less with a coarse base.

Saprolite up to 4.74 meters thick consists of medium to very dense silty sand. Some borings had weathered rock in contact with basal alluvium with no saprolite. Saprolite layers are also present in the weathered rock.

Weathered rock from just a thin rind to more than 6 meters thick is present across the site. Weathered rock may alternate to dense to very dense sand. Some thin layers of crystalline rock may also be present within weathered rock strata.

Rock Properties

Rock type is Grenville age basement gneiss composed on dark colored (mafic) hornblende gneiss grading to amphibolite intricately mixed with light colored (felsic) gneiss. The rock has so many joints and fractures that it breaks up in small pieces – very much like tempered glass – and has produced rubble covered slopes on near by road cuts. Coring proved exceedingly difficult in this very close to close fractured rock. A typical 1.52 meter core run would have to be pulled 3 or 4 times per run as the rock would wedge and block the inner barrel.

Differential weathering is striking in this location with the mafic gneiss typically rotting away while the felsic gneiss remains relatively fresh. Consequently, crystalline rock is layered with weathered rock and weathered rock is layered with saprolitic sand.

Recovery and RQD of cored rock is quite variable with recovery rates ranging from 7 to 100 percent and RQD generally being very low.

Groundwater

Groundwater was measured using a weighted tape measure lowered into the borings after a 24-hour period. Across the site static groundwater averages 762.3 to 763.1 meters in elevation.

Closing Statement

This subsurface investigation is based on a Bridge Survey and Hydraulic Report dated April 22, 2005. If any significant changes are made to the design or location of the proposed structures, the subsurface information will have to be reviewed or modified as necessary.

Respectfully Submitted,

P.Q. Lockamy

PQ Lockamy, LG
Project Geologist

PROJECT REFERENCE NO.	SHEET
R-2518B	4/4B

SKEW = 135°
SCALE = 1:300

175

BEGIN BRIDGE
-L- STA. 175+30+/-

N

C C F

WESTBOUND LANES

US-19

EBI-A WBL
175+40.8
10.5 LT

BI-A WBL
175+52.3
10.0 LT

EBI-B WBL
175+32
2.2 LT

B2-A WBL
175+71
10.2 LT

EB2-A WBL
175+87.5
9.8 LT

0.6 BST

B2-B WBL
175+65.8
2.9 LT

EB2-B WBL
175+78.6
2.0 LT

BI-B WBL
175+45
2.8 LT

0.6 BST -L-

EBI-A EBL
175+27
4.0 RT

B2-A EBL
175+59
3.1 RT

EB2-A EBL
175+71.1
2.9 RT

EASTBOUND LANES

EBI-B EBL
175+18
12.7 RT

BI-B EBL
175+33.1
10.4 RT

B2-B EBL
175+51
11.2 RT

EB2-B EBL
175+62
12.3 RT

BALD CREEK

F

END BRIDGE
-L- STA. 175+74+/-

PREPARED BY: J.T. WILLIAMS	DATE: 6.1.07
REVIEWED BY: P.Q. LOCKAMY	DATE: 6.1.07

NOTE : PLAN VIEW FROM ROADWAY DESIGN PLANS

GEOTECHNICAL ENGINEERING UNIT
☐ EASTERN REGIONAL OFFICE
☒ WESTERN REGIONAL OFFICE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN VIEW- DUAL BRIDGES ON US-19 OVER BALD CREEK

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1	-	-	3	-	-
2	-	-	4	-	-

PROFILE 12.27 M LT OF -L-

BRIDGE NO. C30 ON US 19 OVER BALD CREEK

0 2 4
METERS
VE = 1

PROJECT REFERENCE NO.	SHEET
R-2518B	5/48

PROFILE ALONG A-SIDE WESTBOUND LANE

SCALE = 1 : 100

EBI-A WBL
175+40.80
10.5 LT

BI-A WBL
175+52.30
10 LT

EXISTING GROUND

MATCH LINE

EMBANKMENT : BROWN, SILTY SAND W/ SOME SANDY SILT AND GRAVEL

EMBANKMENT : TAN, GREY SILTY SAND W/ FINE SANDY SILT AND GRAVEL

ALLUVIAL : DARK GREY, SANDY SILT W/ SAND LAYERS

ALLUVIAL : GREY, SILTY SAND

ALLUVIAL BASAL SAND AND GRAVEL W/ COBBLES

ALLUVIAL : GREY SAND AND GRAVEL

5/07

SAPROLITE : BROWN, SILTY SAND W/ ROCK FRAGMENTS

WEATHERED ROCK (GNEISS)

CRYSTALLINE ROCK (GNEISS) W/ LAYERS OF WEATHERED ROCK

	EBI-A WBL	BI-A WBL
	10	6
	2	8
	16	19
	100/0.21	100/0.05
	REC = 30% RQD = 0%	REC = 93% RQD = 44%
	REC = 68% RQD = 11%	REC = 79% RQD = 18%
	REC = 92% RQD = 0%	REC = 94% RQD = 17%
		REC = 86% RQD = 54%
		REC = 79% RQD = 46%
		REC = 100% RQD = 60%

FIAD

B.T.

B.T.

770 768 766 764 762 760 758 756 754 752 750 748

175+30 175+40 175+50 175+60

PROFILE 12.27 M LT OF -L-
BRIDGE NO. C30 ON US 19 OVER BALD CREEK

0 2 4
METERS
VE = 1

PROJECT REFERENCE NO.	SHEET
R-2518B	6/48

PROFILE ALONG A-SIDE WESTBOUND LANE

SCALE = 1 : 100

770
768
766
764
762
760
758
756
754
752
750
748

MATCH LINE

BEGIN EXISTING CULVERT

EXISTING GROUND

EMBANKMENT

ALLUVIUM

CONCRETE

B2-A WBL
175+71
10.2 LT

ALLUVIUM

5/07

CONCRETE

15 SAPROLITE : BROWN, SILTY SAND W/ ROCK FRAGMENTS

60/0.01 — 90

REC = 52%
RQD = 0%

WEATHERED ROCK (GNEISS)

REC = 97%
RQD = 18%

REC = 99%
RQD = 16%

REC = 91%
RQD = 33%

REC = 99%
RQD = 8%

REC = 93%
RQD = 33%

CRYSTALLINE ROCK (GNEISS) W/ LAYERS OF WEATHERED ROCK

REC = 97%
RQD = 66%

REC = 96%
RQD = 54%

B.T.

END EXISTING CULVERT

EB2-A WBL
175+87.50
9.80 LT

10 EMBANKMENT : BROWN, SILTY SAND W/ SANDY SILT LAYERS

4

5 ALLUVIAL : DARK BROWN, FINE SANDY CLAYEY SILT

ALLUVIAL : SILTY SAND AND GRAVEL W/ COBBLES

78

SAPROLITE : SILTY, FINE SAND

56

70

WEATHERED ROCK (GNEISS)

100/.27

FIAD
B.T.

175+60 175+70 175+80 175+90

0	2	4
METERS		
VE = 1		

PROJECT REFERENCE NO.	SHEET
R-2518B	7/48

SECTION THRU EBI WESTBOUND LANE

SCALE 1 : 100

770 768 766 764 762 760 758 756 754

EBI-A WBL
175+40.80
10.5 LT

EXISTING GROUND

(10) EMBANKMENT : BROWN, SILTY SAND W/ SOME SANDY SILT AND GRAVEL

(2) ALLUVIAL : DARK GREY, SANDY SILT W/ SAND LAYERS

ALLUVIAL BASAL SAND AND GRAVEL W/ COBBLES (16)

SAPROLITE : BROWN, SILTY SAND W/ ROCK FRAGMENTS

(100/0.2) WEATHERED ROCK (GNEISS)

REC = 30%
RQD = 0%

REC = 68%
RQD = 11%

REC = 92%
RQD = 0%

CRYSTALLINE ROCK W/ LAYERS OF WEATHERED ROCK (GNEISS)

FIAD
B.T.

EBI-B WBL
175+32
2.2 LT

(20) EMBANKMENT : LAYERED SANDY SILT W/ SOME SILTY SAND AND ROCK FRAGMENTS

(100/0.44) ALLUVIAL : DARK GREY SILT W/ ROOTS AND SAND LAYERS

(12) ALLUVIAL : DARK GREY SAND W/ BASAL GRAVEL AND COBBLES

SAPROLITE : BROWN, SILTY SAND

(100/0.05)

(100/0.28)

(100/0.05) WEATHERED ROCK W/ SAPROLITIC SAND LAYERS (GNEISS)

FIAD
B.T.

-L- SKEW = 135°

24 22 20 18 16 14 12 10 8 6 4 2 0 2 4 6 8

0	2	4

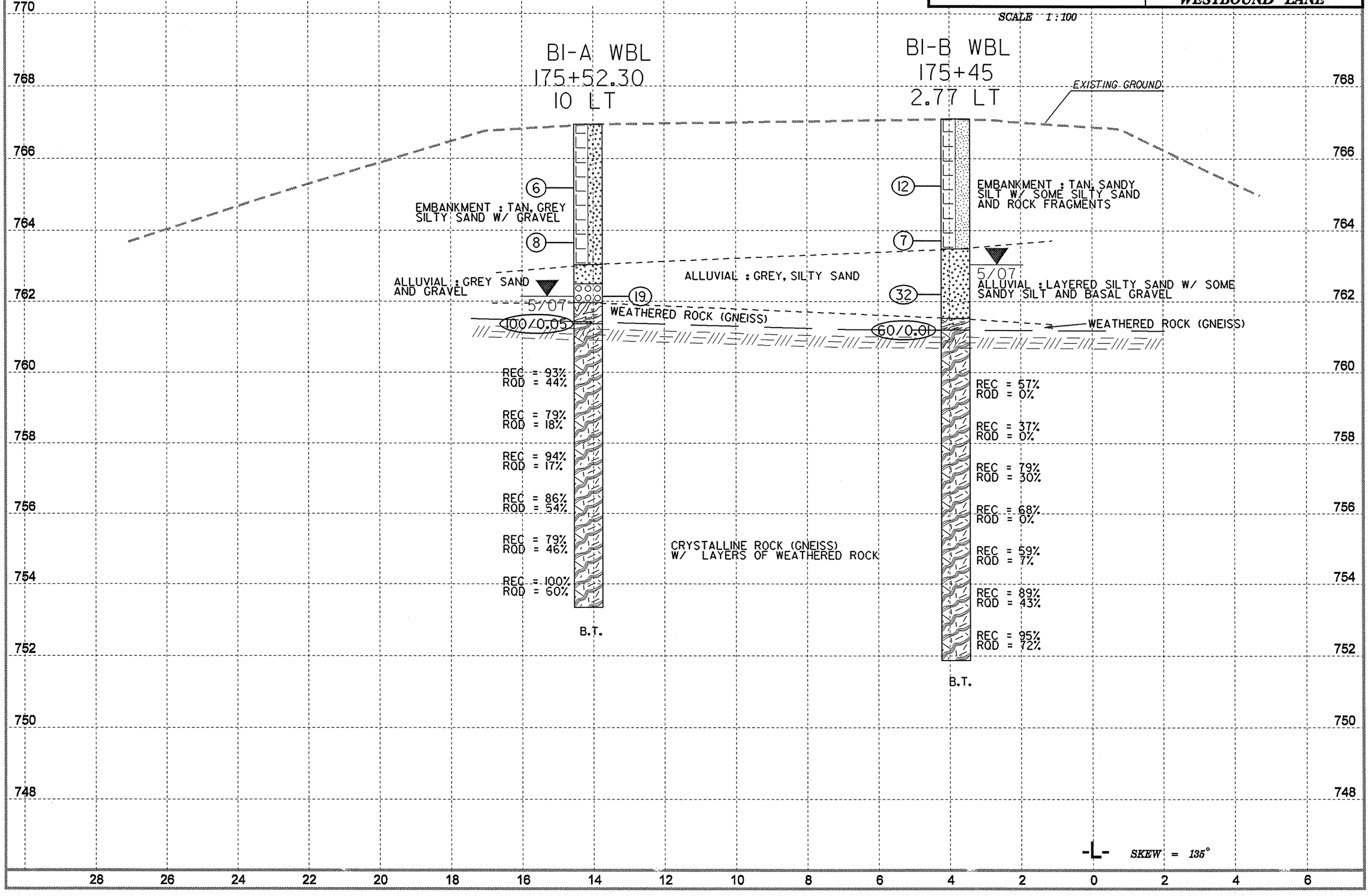
METERS

VE = 1

PROJECT REFERENCE NO.	SHEET
R-2518B	8/48

SECTION THRU BI WESTBOUND LANE

SCALE 1:100



0 2 4 METERS VE = 1	PROJECT REFERENCE NO. R-2518B	SHEET 9/48
	SECTION THRU B2 WESTBOUND LANE	

SCALE 1 : 100

B2-A WBL
175+71
10.2 LT

B2-B WBL
175+65.80
2.9 LT

EXISTING GROUND

EMBANKMENT

CONCRETE

EXISTING CULVERT

ALLUVIUM

CONCRETE

5/07

5/07

15

SAPROLITE : BROWN, SILTY SAND W/ ROCK FRAGMENTS

90

WEATHERED ROCK (GNEISS)

60/0.01

REC = 52%
RQD = 0%

REC = 97%
RQD = 18%

REC = 99%
RQD = 16%

REC = 91%
RQD = 33%

REC = 99%
RQD = 8%

REC = 98%
RQD = 33%

REC = 97%
RQD = 66%

REC = 96%
RQD = 54%

B.T.

REC = 64%
RQD = 0%

REC = 70%
RQD = 16%

REC = 79%
RQD = 14%

REC = 91%
RQD = 34%

REC = 68%
RQD = 32%

REC = 95%
RQD = 20%

REC = 95%
RQD = 41%

B.T.

CRYSTALLINE ROCK W/ LAYERS OF WEATHERED ROCK (GNEISS)

-L- SKEW = 135°

770 768 766 764 762 760 758 756 754 752 750 748

26 24 22 20 18 16 14 12 10 8 6 4 2 0 2 4 6

0 2 4 METERS VE = 1	PROJECT REFERENCE NO.	SHEET
	R-2518B	10/48
	SECTION THRU EB2 WESTBOUND LANE	

SCALE 1 : 100

EB2-A WBL
175+87.50
9.80 LT

EB2-B WBL
175+78.60
2.00 LT

EXISTING GROUND

EMBANKMENT

CONCRETE

EMBANKMENT : BROWN, SILTY SAND W/ SILT LAYERS

CONCRETE CULVERT FLOOR

ALLUVIAL : DARK BROWN, FINE SANDY CLAYEY SILT

ALLUVIAL : DARK GREY SILT W/ ROOTS AND SAND LAYERS

ALLUVIAL : SILTY SAND AND GRAVEL W/ COBBLES

SAPROLITE : BROWN, SILTY SAND W/ WEATHERED ROCK LAYERS (GNEISS)

SAPROLITE : SILTY, FINE SAND

WEATHERED ROCK (GNEISS)

WEATHERED ROCK (GNEISS)

FIAD B.T.

FIAD B.T.

NOTE : ALLUVIUM INSIDE CULVERT IS NOT SHOWN

SKEW = 135°

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34445.1.1	ID. R-2518B	COUNTY YANCEY	GEOLOGIST Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				GROUND WTR (m)
BORING NO. EB1-A WBL	STATION 175+40.8	OFFSET 10.5m LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 767.04 m	TOTAL DEPTH 9.00 m	NORTHING 245,260.0	EASTING 302,677.5	24 HR. FIAD
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core		HAMMER TYPE Automatic	
START DATE 05/18/07	COMP. DATE 05/22/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 5.7 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
768										
									767.04 GROUND SURFACE	0.00
									ROADWAY EMBANKMENT BROWN, SILTY SAND W/ SOME SANDY SILT AND GRAVEL	
765.59	1.45									
		3	5	5	10					
764.07	2.97								764.27	2.77
		2	1	1	2				**ALLUVIAL** DARK GREY, SANDY SILT W/ SAND LAYERS	
762.55	4.49								763.16	3.88
		6	6	10	16				**ALLUVIAL** BASAL SAND AND GRAVEL W/ COBBLES	
761.59	5.45								762.25	4.79
		48	52/.06		100/0.21				761.90 **SAPROLITE** BROWN, SILTY SAND W/ ROCK FRAGMENTS	5.14
									761.38 **WEATHERED ROCK** (GNEISS)	5.66
									CRYSTALLINE ROCK (GNEISS) W/ LAYERS OF WEATHERED ROCK TOTAL REC = 76% TOTAL RQD = 5%	
									758.04	9.00
									Boring Terminated at Elevation 758.04 m IN CRYSTALLINE ROCK (GNEISS)	

PROJECT NO. 34445.1.1	ID. R-2518B	COUNTY YANCEY	GEOLOGIST Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				GROUND WTR (m)
BORING NO. EB1-B WBL	STATION 175+32.0	OFFSET 2.2m LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 767.25 m	TOTAL DEPTH 9.17 m	NORTHING 245,252.3	EASTING 302,668.2	24 HR. FIAD
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic	
START DATE 05/22/07	COMP. DATE 05/22/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
768										
									767.25 GROUND SURFACE	0.00
									ROADWAY EMBANKMENT LAYERED SANDY SILT W/ SOME SILTY SAND AND ROCK FRAGMENTS	
765.73	1.52									
		3	9	11	20					
764.21	3.04								763.81	3.44
		2	7	93/.14	100/0.44				**ALLUVIAL** DARK GREY SILT W/ ROOTS AND SAND LAYERS	
762.69	4.56								762.85	4.40
		1	1	11	12				**ALLUVIAL** DARK GREY SAND W/ BASAL GRAVEL AND COBBLES	
761.17	6.08								761.77	5.48
		100/0.05			100/0.05				761.47 **SAPROLITE** BROWN, SILTY SAND	5.78
									WEATHERED ROCK W/ SAPROLITIC SANDY LAYERS (GNEISS)	
759.65	7.60									
		24	76/0.13		100/0.28					
758.13	9.12								758.08	9.17
		100/0.05			100/0.05				Boring Terminated at Elevation 758.08 m IN WEATHERED ROCK (GNEISS)	

NCDOT BORE DOUBLE R2518B_GEO.GPJ NC_DOT.GDT 06/13/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34445.1.1	ID. R-2518B	COUNTY YANCEY	GEOLOGIST Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				GROUND WTR (m)
BORING NO. B1-A WBL	STATION 175+52.3	OFFSET 10.0m LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 766.94 m	TOTAL DEPTH 13.60 m	NORTHING 245,258.8	EASTING 302,688.9	24 HR. 4.80
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core		HAMMER TYPE Automatic	
START DATE 05/15/07	COMP. DATE 05/15/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 5.6 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
767										
									766.94 GROUND SURFACE	0.00
									ROADWAY EMBANKMENT TAN, GREY SILTY SAND W/ FINE SANDY SILT AND GRAVEL	
765.48	1.46									
		3	3	3	6					
763.96	2.98									
		1	3	5	8					
762.44	4.50									
		8	10	9	19					
761.42	5.52	100/0.05			100/0.05					
									763.04	3.90
									ALLUVIAL GREY, SILTY SAND	
									762.49	4.45
									ALLUVIAL GREY, SAND AND GRAVEL	
									761.96	4.98
									WEATHERED ROCK (GNEISS)	
									761.37	5.57
									CRYSTALLINE ROCK W/ LAYERS OF WEATHERED ROCK (GNEISS) TOTAL REC = 88% TOTAL RQD = 39%	
									753.34	13.60
									Boring Terminated at Elevation 753.34 m IN CRYSTALLINE ROCK (GNEISS)	

PROJECT NO. 34445.1.1	ID. R-2518B	COUNTY YANCEY	GEOLOGIST Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				GROUND WTR (m)
BORING NO. B1-B WBL	STATION 175+45.0	OFFSET 2.8m LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 767.10 m	TOTAL DEPTH 15.22 m	NORTHING 245,252.1	EASTING 302,681.2	24 HR. 4.04
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core		HAMMER TYPE Automatic	
START DATE 05/14/07	COMP. DATE 05/14/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 5.9 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
768									
									767.10 GROUND SURFACE 0.00
									ROADWAY EMBANKMENT TAN, SANDY SILT W/ SOME SILTY SAND AND ROCK FRAGMENTS
765.55	1.55								
		3	5	7	12				
764.03	3.07								
		2	3	4	7				
762.51	4.59								
		11	20	12	32				
761.21	5.89	60/0.01			60/0.01				
									763.50 3.60
									ALLUVIAL LAYERED SILTY SAND W/ SOME SANDY SILT, AND BASAL GRAVEL AND COBBLES
									761.54 5.56
									761.21 WEATHERED ROCK (GNEISS) 5.89
									CRYSTALLINE ROCK W/LAYERS OF WEATHERED ROCK (GNEISS) TOTAL REC = 71% TOTAL RQD = 25%
									751.88 15.22
									Boring Terminated at Elevation 751.88 m IN CRYSTALLINE ROCK (GNEISS)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK			**GROUND WTR (m)**
BORING NO. B2-A WBL	**STATION** 175+71.0	**OFFSET** 10.2m LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 761.84 m	**TOTAL DEPTH** 14.02 m	**NORTHING** 245,257.9	**EASTING** 302,707.6	**24 HR.** -0.63
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT Core		**HAMMER TYPE** Automatic	
START DATE 05/16/07	**COMP. DATE** 05/17/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 2.4 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
762										
									761.84 DATUM SURFACE	0.00
761.39	0.45								**SAPROLITE** BROWN SILTY SAND W/ ROCK FRAGMENTS	
		11	8	7	15					
759.98	1.86									
		12	22	68	90					
759.44	2.40	60/0.01			60/0.01				759.49 **WEATHERED ROCK** (GNEISS)	2.35
									759.44 **CRYSTALLINE ROCK** W/ LAYERS OF WEATHERED ROCK (GNEISS) TOTAL REC = 93% TOTAL RQD = 30%	2.40
									747.82 Boring Terminated at Elevation 747.82 m IN CRYSTALLINE ROCK (GNEISS)	14.02

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK			**GROUND WTR (m)**
BORING NO. B2-B WBL	**STATION** 175+65.8	**OFFSET** 2.9m LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 761.84 m	**TOTAL DEPTH** 10.13 m	**NORTHING** 245,250.9	**EASTING** 302,701.9	**24 HR.** -0.70
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Core		**HAMMER TYPE** Automatic	
START DATE 05/21/07	**COMP. DATE** 05/21/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 0.0 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
762									
									761.84 GROUND SURFACE 0.00
									CRYSTALLINE ROCK W/ LAYERS OF WEATHERED ROCK (GNEISS) TOTAL REC = 81% TOTAL RQD = 24%
									751.71 Boring Terminated at Elevation 751.71 m IN CRYSTALLINE ROCK (GNEISS) 10.13

NCDOT BORE DOUBLE R2518B_GEO.GPJ NC_DOT.GDT 09/07/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK			**GROUND WTR (m)**
BORING NO. EB2-A WBL	**STATION** 175+87.5	**OFFSET** 9.8m LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 766.47 m	**TOTAL DEPTH** 10.88 m	**NORTHING** 245,256.5	**EASTING** 302,724.0 — **24 HR.** FIAD
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic
START DATE 05/17/07	**COMP. DATE** 05/17/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (m)	DEPTH (m)
767									766.47	0.00
									GROUND SURFACE	
									ROADWAY EMBANKMENT BROWN, SILTY SAND W/ SANDY SILT LAYERS	
764.98	1.49									
		1	2	8	10					
763.46	3.01									
		2	1	3	4					
761.94	4.53								762.27	4.20
		0	0	5	5				**ALLUVIAL** DARK BROWN, FINE SANDY CLAYEY SILT	
760.42	6.05								761.54	4.93
		14	35	43	78				**ALLUVIAL** SILTY SAND AND GRAVEL W/ COBBLES	
758.90	7.57								760.95	5.52
		10	15	41	56				**SAPROLITE** SILTY, FINE SAND	
757.38	9.09									
		22	30	40	70					
755.86	10.61								756.39	10.08
		46	54/0.12		100/0.27				**WEATHERED ROCK** (GNEISS)	
									755.59	10.88
									Boring Terminated at Elevation 755.59 m IN WEATHERED ROCK (GNEISS)	

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK			**GROUND WTR (m)**
BORING NO. EB2-B WBL	**STATION** 175+78.6	**OFFSET** 2.0m LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 766.63 m	**TOTAL DEPTH** 10.68 m	**NORTHING** 245,249.3	**EASTING** 302,714.7 — **24 HR.** FIAD
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic
START DATE 05/22/07	**COMP. DATE** 05/22/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (m)
767									766.63	0.00
									GROUND SURFACE	
									ROADWAY EMBANKMENT BROWN, SILTY SAND W /SILT LAYERS	
765.13	1.50									
		1	3	2	5					
763.61	3.02									
		1	3	3	6					
762.09	4.54								762.39	4.24
		3	5	6	11				**ALLUVIAL** DARK GREY, FINE, SANDY, CLAYEY SILT W/ BASAL GRAVEL AND COBBLES	
760.57	6.06								761.64	4.99
		9	23	25	48				**SAPROLITE** BROWN, SILTY SAND W/ WEATHERED ROCK LAYERS (GNEISS)	
759.05	7.58								759.43	7.20
		100/0.14			100/0.14				**WEATHERED ROCK** (GNEISS)	
757.53	9.10									
		100/0.08			100/0.08					
756.01	10.62									
		100/0.06			100/0.06				755.95	10.68
									Boring Terminated at Elevation 755.95 m IN WEATHERED ROCK (GNEISS)	

NCDOT BORE DOUBLE R2518B_GEO.GPJ NC_DOT.GDT 06/12/07

SHEET ____ OF ____

DATE 5/22/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: EB1-A WBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+40.8 10.5m Lt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 767.04 m. TOTAL DEPTH: 9.00 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
761.38	5.66		0.30	0.09 30	0.00 0		CLOSE FRACTURED MAFIC GNEISS (SLIGHT, MOD. HARD). WITH LAYERS OF WEATHERED ROCK.
761.08	5.96						
761.08	5.96		1.52	1.04 68	0.16 11		VERY CLOSE TO CLOSE FRACTURED MAFIC GNEISS, MOD. WEATHERED, MED. HARD WITH LAYERS OF WEATHERED ROCK.
759.56	7.48						
759.56	7.48		1.52	1.40 92	0.00 0		VERY CLOSE TO CLOSE FRACTURED MAFIC GNEISS, MOD. WEATHERED, MED. TO MOD. HARD WITH LAYERS OF WEATHERED ROCK.
758.04	9.00						

CORING TERMINATED AT
ELEVATION 758.04 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

SHEET ____ OF ____

DATE 5/15/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B1-A WBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+52.3 12.34m Lt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 766.94 m. TOTAL DEPTH: 13.60 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
761.37	5.57		0.43	0.40 93	0.19 44		CLOSE FRACTURED MAFIC GNEISS. HARD TO MOD. HARD, VERY SLIGHT WEATHERED.
760.94	6.00						
760.94	6.00		1.42	1.12 79	0.26 18		CLOSE FRACTURED MAFIC GNEISS. HARD TO MOD. HARD, VERY SLIGHT WEATHERED.
759.52	7.42						
759.52	7.42		1.62	1.52 94	0.27 17		CLOSE FRACTURED MAFIC GNEISS. SLIGHT TO MOD. WEATHERING, HARD TO MOD. HARD.
757.90	9.04						
757.90	9.04		1.52	1.30 86	0.82 54		CLOSE FRACTURED MAFIC GNEISS. SLIGHT WEATHERING, HARD.
756.38	10.56						
756.38	10.56		1.52	1.20 79	0.70 46		MOSTLY CLOSE FRACTURED MAFIC GNEISS. VERY SLIGHT TO FRESH, HARD.
754.86	12.08						
754.86	12.08		1.52	1.52 100	0.91 60		CLOSE FRACTURED MAFIC GNEISS. HARD AND FRESH.
753.34	13.60						

CORING TERMINATED AT
ELEVATION 753.34 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 5/14/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B1-B WBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+45 2.77m Lt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 767.10 m. TOTAL DEPTH: 15.22 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
761.21	5.89		0.21	0.12 57	0.00 0		VERY CLOSE FRACTURED FELSIC GNEISS. HARD, MOD. WEATHERED.
761.00	6.10						
761.00	6.10		1.52	0.56 37	0.00 0		VERY CLOSE FRACTURED FELSIC GNEISS WITH LAYERS OF WEATHERED ROCK. HARD, MOD. WEATHERED.
759.48	7.62						
759.48	7.62		1.52	1.20 79	0.45 30		CLOSE FRACTURED FELSIC GNEISS HARD, MOD. WEATHERED.
757.96	9.14						
757.96	9.14		1.52	1.03 68	0.00 0		VERY CLOSE FRACTURED MAFIC GNEISS. MOD. SEVERE WEATHERED, MEDIUM HARD TO SOFT.
756.44	10.66						
756.44	10.66		1.52	0.90 59	0.10 7		VERY CLOSE FRACTURED GNEISS. MOD. WEATHERED, MODERATE HARD.
754.92	12.18						
754.92	12.18		1.52	1.35 89	0.66 43		CLOSE FRACTURED GNEISS MOD. TO SLIGHT WEATHERED, HARD TO MOD HARD.
753.40	13.70						

CORING TERMINATED AT
ELEVATION 751.88 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 5/14/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B1-B WBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+45 2.77m Lt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 767.10 m. TOTAL DEPTH: 15.22 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
753.40	13.70		1.52	1.45 95	1.10 72		MODERATELY CLOSE GRACTURED GNEISS. FELSIC PORTIONS ARE FRESH AND VERY HARD. MAFIC PORTIONS ARE MOSTLY SLIGHT WITH SOME MOD. SEVERE WEATHERING AND ARE MOSTLY HARD WITH A SOME SOFT MATERIAL.
751.88	15.22						

CORING TERMINATED AT
ELEVATION 748.44 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 5/17/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B2-A WBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+71 10.2m Lt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 761.84 m. TOTAL DEPTH: 14.02 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
759.43	2.41		0.97	0.50 52	0.00 0		VERY CLOSE FRACTURED GNEISS. MOD. TO MOD. SEVER WEATHERING. MED. HARD.
758.46	3.38						
758.46	3.38		1.52	1.47 97	0.28 18		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. TO MOD. SEVER WEATHERING. MED. HARD.
756.94	4.90						
756.94	4.90		1.52	1.50 99	0.25 16		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. TO MOD. SEVER WEATHERING. MED. TO MOD. HARD.
755.42	6.42						
-6.42	6.42		1.52	1.38 91	0.50 33		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. TO MOD. SEVER WEATHERING. MED. HARD TO HARD.
753.90	7.94						
753.90	7.94		1.52	1.50 99	0.12 8		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. TO MOD. SEVER WEATHERING. MED. HARD TO HARD.
752.38	9.46						
752.38	9.46		1.52	1.42 93	0.50 33		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. TO MOD. SEVER WEATHERING. MED. HARD TO HARD.
750.86	10.98						

CORING TERMINATED AT
ELEVATION 747.82 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 5/17/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B2-A WBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+71 10.2m Lt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 761.84 m. TOTAL DEPTH: 14.02 m.

750.86	10.98		1.52	1.48 97	1.01 66		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. TO SLIGHT WEATHERING. MOD. HARD TO HARD.
749.34	12.50						
749.34	12.50		1.52	1.46 96	0.82 54		VERY CLOSE TO CLOSE FRACTURED GNEISS. SLIGHT WEATHERING. MOD. HARD TO HARD.
747.82	14.02						

CORING TERMINATED AT
ELEVATION 747.82 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 5/21/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B2-B WBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+65.8 2.9m Lt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 761.84 m. TOTAL DEPTH: 10.13 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
761.84	0.00		1.01	0.65 64	0.00 0		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. WEATHERED. MOD. HARD.
760.83	1.01						
760.83	1.01		1.52	1.06 70	0.24 16		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. WEATHERED. MOD. HARD.
759.31	2.53						
759.31	2.53		1.52	1.20 79	0.22 14		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. TO MOD. SEVER WEATHERED. MOD. TO MED. HARD.
757.79	4.05						
757.79	4.05		1.52	1.38 91	0.52 34		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. WEATHERED. MOD. HARD.
756.27	5.57						
756.27	5.57		1.52	1.03 68	0.49 32		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. WEATHERED. MOD. HARD.
754.75	7.09						
754.75	7.09		1.52	1.44 95	0.30 20		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. WEATHERED. MOD. HARD.
753.23	8.61						

CORING TERMINATED AT
ELEVATION 751.71 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 5/21/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B2-B WBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+65.8 2.9m Lt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 761.84 m. TOTAL DEPTH: 10.13 m.

METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
753.23	8.61		1.52	1.45 95	0.62 41		VERY CLOSE TO CLOSE FRACTURED GNEISS. MOD. TO SLIGHT WEATHERING. MOD. HARD TO HARD.
751.71	10.13						

CORING TERMINATED AT
ELEVATION 751.71 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

0	2	4
METERS		
VE = 1		

PROJECT REFERENCE NO.	SHEET
R-2518B	20/48

PROFILE ALONG B-SIDE EASTBOUND LANE

SCALE = 1 : 100

PROFILE 12.27 M RT OF -L-
BRIDGE NO. C30 ON US 19 OVER BALD CREEK

770
768
766
764
762
760
758
756
754
752
750
748

EBI-B EBL
175+18
12.7 RT

BI-B EBL
175+33.1
10.4 RT

EXISTING GROUND

MATCH LINE

EMBANKMENT : GREY, SILTY SAND

ALLUVIAL : SILTY SAND W/ GRAVEL AND COBBLES

SAPROLITE : SILTY SAND

WEATHERED ROCK (GNEISS)

CRYSTALLINE ROCK (GNEISS)

B.T.

4
5/07
22
38
73
100/0.13
100/0.14
100/0.11
60/0.0

5/07
35
51
55
100/0.12
100/0.14

ALLUVIAL : SILTY SAND
W/ GRAVEL AND COBBLES

SAPROLITE : SILTY SAND
W/ ROCK FRAGMENTS

WEATHERED ROCK (GNEISS)

REC = 56%
RQD = 0%

REC = 37%
RQD = 9%

REC = 59%
RQD = 12%

CRYSTALLINE ROCK (GNEISS)
W/ LAYERS OF WEATHERED ROCK

REC = 80%
RQD = 10%

REC = 93%
RQD = 7%

B.T.

175+10
175+20
175+30
175+40

PROFILE 12.27 M RT OF -L-
BRIDGE NO. C30 ON US 19 OVER BALD CREEK

0 2 4
METERS
VE = 1

PROJECT REFERENCE NO.	SHEET
R-2518B	21/48
PROFILE ALONG B-SIDE EASTBOUND LANE	

SCALE = 1 : 100

MATCH LINE

B2-B EBL
175+51
11.2 RT

EB2-B EBL
175+62.00
12.3 RT

EXISTING GROUND

WATER SURFACE 05/07
BALD CREEK

ALLUVIAL : BASAL SAND AND GRAVEL W/ COBBLES

4/07

ALLUVIAL : BROWN SILTY SAND

5/07

ALLUVIAL : BROWN, SILTY SAND W/ SANDY SILT LAYERS

SAPROLITE : BROWN SILTY SAND

64

WEATHERED ROCK (GNEISS)

60/0.03

100/0.12

100/0.1

100/0.42

WEATHERED ROCK (GNEISS)

60/0.02

CRYSTALLINE ROCK (GNEISS)

100/0.08

REC = 82%
RQD = 13%

REC = 84%
RQD = 53%

REC = 7%
RQD = 0%

REC = 76%
RQD = 55%

CRYSTALLINE ROCK (GNEISS)
W/ LAYERS OF WEATHERED ROCK

REC = 62%
RQD = 0%

REC = 48%
RQD = 8%

REC = 94%
RQD = 32%

REC = 49%
RQD = 7%

B.T.

WEATHERED ROCK (GNEISS)

100/0.14

100/0.06

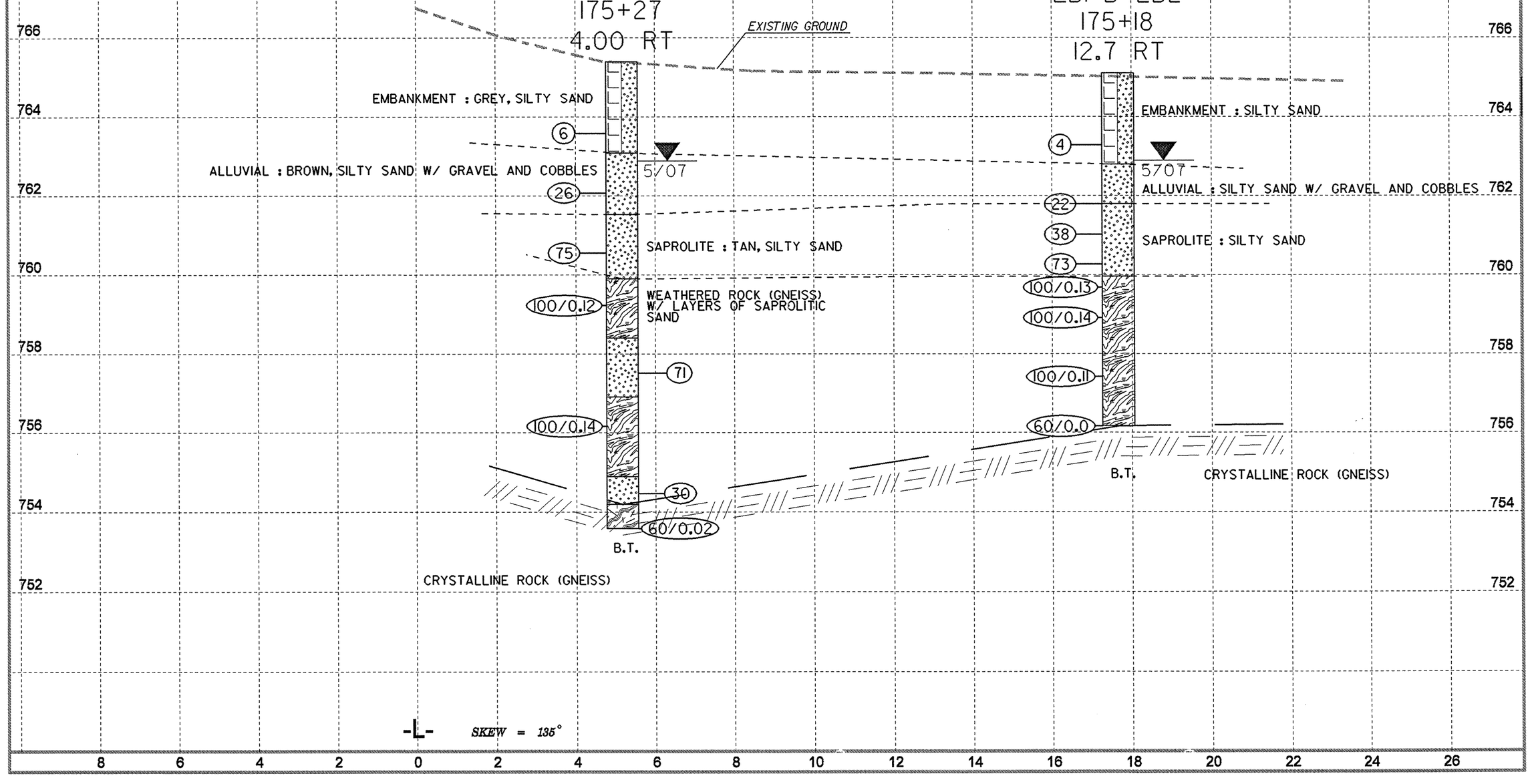
B.T.

770
768
766
764
762
760
758
756
754
752
750
748

175+40
175+50
175+60
175+70

0 2 4 METERS VE = 1	PROJECT REFERENCE NO.	SHEET
	R-2518B	22 48
	SECTION THRU EBI EASTBOUND LANE	

SCALE 1 : 100



0	2	4

METERS
VE = 1

PROJECT REFERENCE NO.	SHEET
R-2518B	23/48

SECTION THRU B1 EASTBOUND LANE

SCALE 1 : 100

BI-B WBL
175+45
2.77 LT

BI-B EBL
175+33.1
10.4 RT

EXISTING GROUND

12 — EMBANKMENT : TAN, SANDY SILT W/ SOME SILTY SAND AND ROCK FRAGMENTS

7 — 5/07

32 — ALLUVIAL : LAYERED SILTY SAND W/ SOME SANDY SILT AND BASAL GRAVEL

50/0.01 — SAPROLITE : SILTY SAND W/ ROCK FRAGMENTS

WEATHERED ROCK (GNEISS)

CRYSTALLINE ROCK (GNEISS) W/ LAYERS OF WEATHERED ROCK

	BI-B WBL	BI-B EBL
		5/07
		35
		51
		55
		100/0.12
		100/0.14
	REC = 57% RQD = 0%	REC = 56% RQD = 0%
	REC = 37% RQD = 0%	REC = 37% RQD = 9%
	REC = 79% RQD = 30%	REC = 59% RQD = 12%
	REC = 68% RQD = 0%	REC = 80% RQD = 10%
	REC = 59% RQD = 7%	REC = 93% RQD = 7%
	REC = 89% RQD = 43%	
	REC = 95% RQD = 72%	
	B.T.	B.T.

770 768 766 764 762 760 758 756 754 752 750 748

8 6 4 2 0 2 4 6 8 10 12 14 16 18 20 22

-L- SKEW = 135°

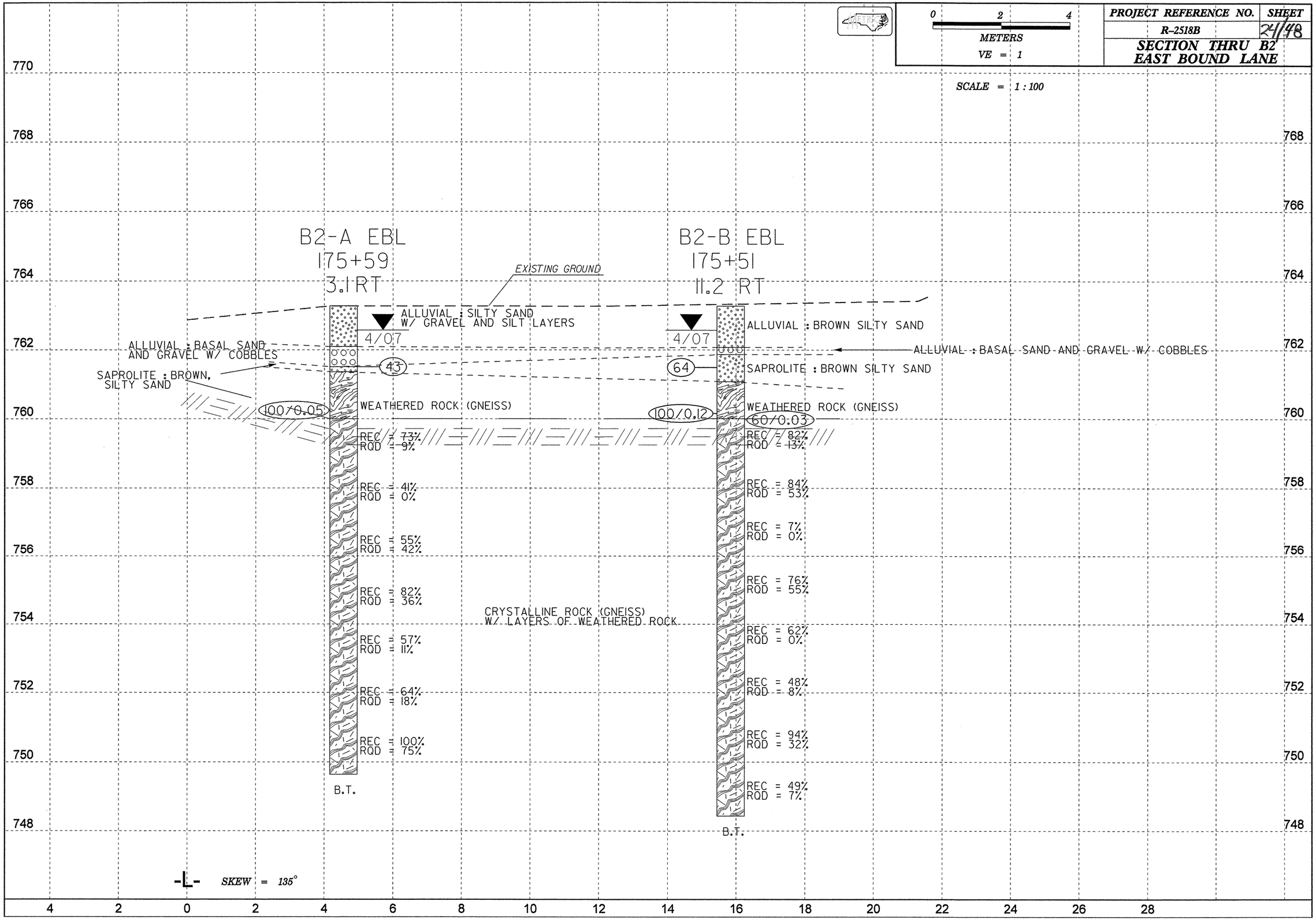
0	2	4

METERS
VE = 1

PROJECT REFERENCE NO.	SHEET
R-2518B	24/48

SECTION THRU B2 EAST BOUND LANE

SCALE = 1 : 100



0 2 4 METERS VE = 1	PROJECT REFERENCE NO.	SHEET
	R-2518B	25/48
	SECTION THRU EB2 EASTBOUND LANE	

SCALE 1 : 100

EB2-A EBL
175+75.1
2.9 RT

EB2-B EBL
175+62
12.3 RT

EXISTING GROUND

4/07

ALLUVIAL : BROWN, SILTY SAND W/ GRAVEL AND COBBLES

ALLUVIAL : BASAL SAND AND GRAVEL

SAPROLITE : BASAL SILTY SAND

WEATHERED ROCK (GNEISS)

100/0.24

69

SAPROLITE : BROWN, SILTY SAND

100/0.2

100/0.16

100/0.13

WEATHERED ROCK (GNEISS)

100/0.16

100/0.12

100/0.25

B.T.

5/07

ALLUVIAL : BROWN, SILTY SAND W/ SANDY SILT LAYERS

100/0.42

100/0.1

WEATHERED ROCK (GNEISS)

60/0.02

CRYSTALLINE ROCK (GNEISS)

100/0.08

WEATHERED ROCK (GNEISS)

100/0.14

100/0.06

B.T.

-L- SKEW = 135°

770 768 766 764 762 760 758 756 754 752

6 4 2 0 2 4 6 8 10 12 14 16 18 20 22 24 26

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.		
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				**GROUND WTR (m)**	
BORING NO. EB1-A EBL	**STATION** 175+27.0	**OFFSET** 4.0m RT	**ALIGNMENT** -L-	**0 HR.**	N/A
COLLAR ELEV. 765.40 m	**TOTAL DEPTH** 11.81 m	**NORTHING** 245,246.4	**EASTING** 302,662.8	**24 HR.**	2.50
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic		
START DATE 05/09/07	**COMP. DATE** 05/09/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 11.2 m		

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
766										
									765.40 GROUND SURFACE	0.00
									ROADWAY EMBANKMENT GREY, SILTY SAND	
763.90	1.50	4	3	3	6					
									763.10	2.30
									ALLUVIAL BROWN, SILTY SAND W/GRAVEL AND COBBLES	
762.38	3.02	8	11	15	26					
									761.53	3.87
									SAPROLITE TAN, SILTY SAND	
760.86	4.54	28	42	33	75					
									759.90	5.50
									WEATHERED ROCK (GNEISS)	
759.34	6.06	100/0.12			100/0.12					
									758.40	7.00
									SAPROLITE BROWN, SILTY SAND	
757.82	7.58	46	45	26	71					
									756.90	8.50
									WEATHERED ROCK (GNEISS)	
756.30	9.10	100/0.14			100/0.14					
									754.90	10.50
									SAPROLITE BROWN, SILTY SAND	
754.78	10.62	20	16	14	30				754.20	11.20
									CRYSTALLINE ROCK (GNEISS)	
753.60	11.80	60/0.02			60/0.02				753.60	11.80

Boring Terminated with Standard Penetration Test Refusal at Elevation 753.59 m IN CRYSTALLINE ROCK (GNEISS)

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.		
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				**GROUND WTR (m)**	
BORING NO. EB1-B EBL	**STATION** 175+18.0	**OFFSET** 12.7m RT	**ALIGNMENT** -L-	**0 HR.**	N/A
COLLAR ELEV. 765.11 m	**TOTAL DEPTH** 8.95 m	**NORTHING** 245,238.3	**EASTING** 302,653.3	**24 HR.**	2.20
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic		
START DATE 05/04/07	**COMP. DATE** 05/08/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 8.9 m		

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
766									
									765.11 GROUND SURFACE 0.00
									ROADWAY EMBANKMENT GREY, SILTY SAND
763.60	1.51	2	2	2	4				
									762.81 2.30
									ALLUVIAL BROWN, SILTY SAND W/GRAVEL AND COBBLES
762.09	3.02	17	11	11	22				761.79 3.32
									SAPROLITE TAN, SILTY SAND
761.33	3.78	16	14	24	38				
760.57	4.54	11	30	43	73				759.96 5.15
									WEATHERED ROCK (GNEISS)
759.81	5.30	100/0.13			100/0.13				
759.05	6.06	100/0.14			100/0.14				
757.53	7.58	100/0.11			100/0.11				
756.16	8.95	60/0.0			60/0.0				756.16 8.95
									756.16 **CRYSTALLINE ROCK** (GNEISS) 8.95

Boring Terminated with Standard Penetration Test Refusal at Elevation 756.16 m ON CRYSTALLINE ROCK (GNEISS)

NCDOT BORE DOUBLE R2518B_GEO.GPJ NC_DOT.GDT 08/11/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				**GROUND WTR (m)**
BORING NO. B1-B EBL	**STATION** 175+33.1	**OFFSET** 10.4m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 763.31 m	**TOTAL DEPTH** 15.08 m	**NORTHING** 245,239.6	**EASTING** 302,668.5	**24 HR.** 0.50
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT Core		**HAMMER TYPE** Automatic	
START DATE 05/08/07	**COMP. DATE** 05/09/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 7.8 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
764										
									763.31 GROUND SURFACE	0.00
761.93	1.38								**ALLUVIAL** SILTY SAND W/GRAVEL AND COBBLES	
		13	18	17	35				762.15	1.16
760.41	2.90								**SAPROLITE** BROWN, SILTY SAND W/ ROCK FRAGMENTS	
		24	16	35	51					
758.89	4.42									
		12	23	32	55					
757.37	5.94								757.41	5.90
		100/0.12			100/0.12				**WEATHERED ROCK** (GNEISS)	
755.85	7.46								755.55	7.76
		100/0.14			100/0.14				**CRYSTALLINE ROCK** W/ LAYERS OF WEATHERED ROCK (GNEISS) TOTAL REC = 65% TOTAL RQD = 8%	
									748.23	15.08
									Boring Terminated at Elevation 748.23 m IN CRYSTALLINE ROCK (GNEISS)	

NCDOT BORE DOUBLE R2518B_GEO.GPJ NC_DOT.GDT 08/11/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				**GROUND WTR (m)**
BORING NO. B2-A EBL	**STATION** 175+59.0	**OFFSET** 3.1m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 763.28 m	**TOTAL DEPTH** 13.64 m	**NORTHING** 245,245.4	**EASTING** 302,694.8	**24 HR.** 0.67
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT Core		**HAMMER TYPE** Automatic	
START DATE 04/19/07	**COMP. DATE** 04/19/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 3.3 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (m)	DEPTH (m)
764									763.28 GROUND SURFACE	0.00
									ALLUVIAL SILTY SAND W/ GRAVEL AND SILT LAYERS	
761.82	1.46								762.10	1.18
		8	8	35	43				**ALLUVIAL** BASAL SAND AND GRAVEL W/ COBBLES	
									761.52	1.76
									SAPROLITE BROWN SILTY SAND	
760.30	2.98								761.37	1.91
		100/0.05			100/0.05				**WEATHERED ROCK** (GNEISS)	
									760.00	3.28
									CRYSTALLINE ROCK W/ LAYERS OF WEATHERED ROCK (GNEISS) TOTAL REC = 67% TOTAL RQD = 28%	
									749.64	13.64
									Boring Terminated at Elevation 749.64 m IN CRYSTALLINE ROCK (GNEISS)	

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				**GROUND WTR (m)**
BORING NO. B2-B EBL	**STATION** 175+51.0	**OFFSET** 11.2m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 763.28 m	**TOTAL DEPTH** 14.84 m	**NORTHING** 245,237.8	**EASTING** 302,686.3	**24 HR.** 0.67
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT Core		**HAMMER TYPE** Automatic	
START DATE 04/18/07	**COMP. DATE** 04/18/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 3.3 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
764									763.28 DATUM SURFACE 0.00
									ALLUVIAL BROWN SILTY SAND
761.80	1.48								762.08 1.20
		13	21	43	64				761.88 **ALLUVIAL** BASAL SAND AND GRAVEL W/ COBBLES 1.40
									761.09 **SAPROLITE** BROWN SILTY SAND 2.19
760.28	3.00								**WEATHERED ROCK** (GNEISS)
760.01	3.27	100/0.12			100/0.12 60/0.03				760.01 3.27
		60/0.03							**CRYSTALLINE ROCK** W/ LAYERS OF WEATHERED ROCK (GNEISS) TOTAL REC = 69% TOTAL RQD = 15%
									748.44 14.84
									Boring Terminated at Elevation 748.44 m IN CRYSTALLINE ROCK (GNEISS)

NCDOT BORE DOUBLE R2518B_GEO.GPJ NC_DOT.GDT 06/11/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				**GROUND WTR (m)**
BORING NO. EB2-A EBL	**STATION** 175+71.1	**OFFSET** 2.9m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 763.18 m	**TOTAL DEPTH** 9.44 m	**NORTHING** 245,244.8	**EASTING** 302,207.0	**24 HR.** 0.91
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 04/24/07	**COMP. DATE** 04/24/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (m) / DEPTH (m))
764									
									763.18 GROUND SURFACE 0.00
									ALLUVIAL BROWN SILTY SAND W/ GRAVEL AND COBBLES
761.59	1.59								761.89 1.29
		10	41	59/0.09	100/0.24				ALLUVIAL BASAL SAND AND GRAVEL 761.68 1.50 / 761.44 1.74
760.83	2.35								SAPROLITE BROWN SILTY SAND 761.08 2.10
		25	30	39	69				WEATHERED ROCK (GNEISS) 760.18 3.00
760.07	3.11								SAPROLITE BROWN SILTY SAND
		77	23/0.05		100/0.2				WEATHERED ROCK (GNEISS)
759.31	3.87								
		88	12/0.01		100/0.16				
758.55	4.63								
		100/0.13			100/0.13				
757.03	6.15								
		89	11/0.01		100/0.16				
755.51	7.67								
		100/0.12			100/0.12				
753.99	9.19								
		60	40/0.1		100/0.25				753.74 9.44 Boring Terminated at Elevation 753.74 m IN WEATHERED ROCK (GNEISS)

PROJECT NO. 34445.1.1	**ID.** R-2518B	**COUNTY** YANCEY	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION DUAL BRIDGES ON US-19 OVER BALD CREEK				**GROUND WTR (m)**
BORING NO. EB2-B EBL	**STATION** 175+62.0	**OFFSET** 12.3m RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 763.03 m	**TOTAL DEPTH** 7.47 m	**NORTHING** 245,236.0	**EASTING** 302,697.2	**24 HR.** 0.49
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 05/03/07	**COMP. DATE** 05/03/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 2.5 m	

ELEV (m)	DEPTH (m)	BLOW COUNT 15cm	15cm	15cm	BLOWS PER 30 CM 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
764									
									763.03 GROUND SURFACE 0.00
									ALLUVIAL BROWN, SILTY SAND W/ SANDY SILT LAYERS
761.70	1.33								761.55 1.48
		18	82	18	100/0.42				WEATHERED ROCK (GNEISS)
760.94	2.09								760.51 2.52
		100/0.1			100/0.1				CRYSTALLINE ROCK (GNEISS)
760.18	2.85								
		60/0.02			60/0.02				
758.66	4.37								758.96 4.07
		100/0.08			100/0.08				WEATHERED ROCK (GNEISS)
757.14	5.89								
		100/0.14			100/0.14				
755.62	7.41								
		100/0.06			100/0.06				755.56 7.47 Boring Terminated at Elevation 755.56 m IN WEATHERED ROCK (GNEISS)

NCDOT BORE DOUBLE R2518B_GEO.GPJ NC_DOT.GDT 06/13/07

SHEET ____ OF__

DATE 5/8/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B1-B EBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+33.1 10.4m Rt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 763.31 m. TOTAL DEPTH: 15.08 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
755.55	7.76		1.24	0.70 56	0.00 0		GNEISS. MOD. TO V. SEVERE WEATHERED, MOD. HARD.
754.31	9.00						
754.31	9.00		1.52	0.56 37	0.13 9		9.00 - 9.44m GNEISS. MOD. TO V. SEVERE WEATHERED, MOD. HARD. CLOSE TO VERY CLOSE FRACTURED. 9.44 - 10.52m LOW RECOVERY.
752.79	10.52						
752.79	10.52		1.52	0.90 59	0.18 12		10.52 - 11.10 POOR RECOVERY 11.10 - 12.04 GNEISS. MOD. WEATHERED, MOD. HARD.
751.27	12.04						
751.27	12.04		1.52	1.21 80	0.15 10		CLOSE FRACTURED GNEISS. MODERATE WEATHERING, MODERATE HARDNESS.
749.75	13.56						
749.75	13.56		1.52	1.42 93	0.10 7		CLOSE FRACTURED GNEISS. MODERATE TO MOD. SEVERE WEATHERING, MEDIUM HARD TO SOFT.
748.23	15.08						

CORING TERMINATED AT
ELEVATION 748.23 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 4/19/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B2-A EBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+59 3.1m Rt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 763.28 m. TOTAL DEPTH: 13.64 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
760.00	3.28		1.24	0.91 73	0.11 9		VERY CLOSELY FRACTURED HORNBLENDE GNEISS. MODERATELY SEVERELY TO MODERATE WEATHERED SOFT TO MODERATELY HARD
758.76	4.52						
758.76	4.52		1.52	0.62 41	0.00 0		VERY CLOSELY FRACTURED HORNBLENDE GNEISS. MODERATELY SEVERELY WEATHERED SOFT TO MEDIUM HARD
757.24	6.04						
757.24	6.04		1.52	0.83 55	0.64 42		CLOSELY FRACTURED HORNBLENDE GNEISS. MODERATELY WEATHERED MEDIUM HARD
755.72	7.56						
755.72	7.56		1.52	1.25 82	0.54 36		VERY CLOSELY FRACTURED HORNBLENDE GNEISS. MODERATELY SEVERELY TO MODERATE WEATHERED SOFT TO MODERATELY HARD
754.20	9.08						
754.20	9.08		1.52	0.86 57	0.17 11		CLOSE TO VERY CLOSELY FRACTURED HORNBLENDE GNEISS. MODERATELY SEVERELY WEATHERED SOFT
752.68	10.60						
752.68	10.60		1.52	0.98 64	0.28 18		CLOSELY FRACTURED FELSIC AND HORNBLENDE GNEISS. MODERATELY WEATHERED SOFT TO MEDIUM HARD
751.16	12.12						

CORING TERMINATED AT
ELEVATION 749.64 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 4/19/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B2-A EBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+59 3.1m Rt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 763.28 m. TOTAL DEPTH: 13.64 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
751.16	12.12		1.52	1.52 100	1.14 75		LAYERED AND SPOTTED (CHLORITE PORPHYROBLASTS) GNEISS SLIGHTLY WEATHERED, HARD WITH RUSTY, SCALE FILLED VERTICAL FRACTURES.
749.64	13.64						

CORING TERMINATED AT
ELEVATION 749.64 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 4/18/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B2-B EBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+51 11.2m Rt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 763.28 m. TOTAL DEPTH: 14.84 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
759.97	3.31		0.89	0.73 82	0.12 13		CLOSELY FRACTURED HORNBLENDE GNEISS. SLIGHTLY WEATHERED AND MODERATELY HARD.
759.08	4.20						
759.08	4.20		1.52	1.28 84	0.81 53		HORNBLENDE GNEISS. SLIGHTLY TO SEVERELY WEATHERED, MOD. HARD TO SOFT.
757.56	5.72						
757.56	5.72		1.52	0.11 7	0.00 0		HORNBLENDE GNEISS. WITH WEATHERED ROCK.
756.04	7.24						
756.04	7.24		1.52	1.15 76	0.84 55		HORNBLENDE GNEISS. VERY HARD AND FRESH TO SEVERELY WEATHERED AND SOFT.
754.52	8.76						
754.52	8.76		1.52	0.94 62	0.00 0		LAYERED GNEISS AND MASSIVE HORNBLENDE GNEISS, CLOSE FRACTURES IN PLACES. SLIGHT TO SEVERELY WEATHERED AND, HARD TO SOFT.
753.00	10.28						
753.00	10.28		1.43	0.68 48	0.12 8		POOR RECOVERY AT TOP AND BOTTOM OF RUN. CLOSE FRACTURED MYLONITE GNEISS.
751.57	11.71						

CORING TERMINATED AT
ELEVATION 748.44 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

DATE 4/18/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518B BORING NO: B2-B EBL GEOLOGIST: MM HAGER

DESCRIPTION: BRIDGE NO.30 ON US 19 OVER BALD CREEK 175+51 11.2m Rt. -L-

COUNTY: YANCEY COLLAR ELEVATION: 763.28 m. TOTAL DEPTH: 14.84 m.

ELEV. METERS	DEPTH METERS	DRILL RATE MIN./.305m.	RUN METERS	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
751.57	11.71		1.61	1.52 94	0.52 32		SLIGHTLY TO SEVERELY WEATHERED, HARD TO SOFT HORNBLENDE AND MYLONITE GNEISS WITH CLOSE FRACTURES.
749.96	13.32						
749.96	13.32		1.52	0.74 49	0.11 7		SLIGHT TO V. SEVERELY WEATHERED - MOD. HARD TO VERY SOFT. 13.31 - 13.64 MYLONITE GNEISS WITH VERY CLOSE FRACTURES. 13.64 - 14.44 NO RECOVERY 14.44 - 14.84 RUBBLE & LAYERED GNEISS
748.44	14.84						
748.44	14.84						

CORING TERMINATED AT
ELEVATION 748.44 m.

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34445.1.1 TIP: R-2518B COUNTY: YANCEY

DESCRIPTION(1): CULVERT 30 ON US-19 OVER BALD CREEK

EXISTING BRIDGE

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

Bridge No.: 30 Length: 26.8 Total Bents: Bents in Channel: Bents in Floodplain:
Foundation Type: 4 BARREL CONCRETE BOX CULVERT ON SKEW OF 135 DEGREES

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: UPSTREAM WEST BANK HAS BEEN REINFORCED WITH BOULDERS. WING WALL THERE HAS A 1.1 METER DEEP SCOUR HOLE.

Interior Bents: N/A

Channel Bed: SCOUR HOLE AT TOE OF SOUTH WEST WING WALL AND INLET TO FIRST (WESTERN MOST BOX.

Channel Bank: DOWNSTREAM WEST BANK HAS BEEN REINFORCED WITH STACKED COBBLES.

EXISTING SCOUR PROTECTION

Type(3): BOULDERS, COBBLES. CONCRETE WINGS ON ON ALL 4 CORNERS.

Extent(4): BOULDER RIP RAP ON WEST BANK UPSTREAM - COBBLES DOWNSTREAM WEST BANK.

Effectiveness(5): VERY GOOD

Obstructions(6): NONE

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 GRAVEL AND COBBLES WITH SILTY SAND MATRIX.

Channel Bank Material(8): BROWN SILT AND BROWN SAND.

Channel Bank Cover(9): BRUSH AND WEEDS.

Floodplain Width(10): 130 METERS

Floodplain Cover(11): FIELDS

Stream is(12): Aggrading Degrading XXX Static

Channel Migration Tendency(13): TO THE WEST

Observations and Other Comments: EXISTING FLOW FOCUSED ON SW WING WALL AND DEFLECTING INTO FIRST BARREL OF CULVERT.

DESIGN SCOUR ELEVATIONS(14) Feet Meters XXX

ELEV. IN METERS

EBL B1	762.5										
EBL B2	762.4										
WBL B1	762.4										
WBL B2	761.8										

Comparison of DSE to Hydraulics Unit theoretical scour:
DSE IS THE SAME AS THE THEORETICAL SCOUR CALCULATED BY THE HYDRAULICS UNIT ON THE BRIDGE SURVEY AND HYDRAULIC REPORT DATED 4/22/05.

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

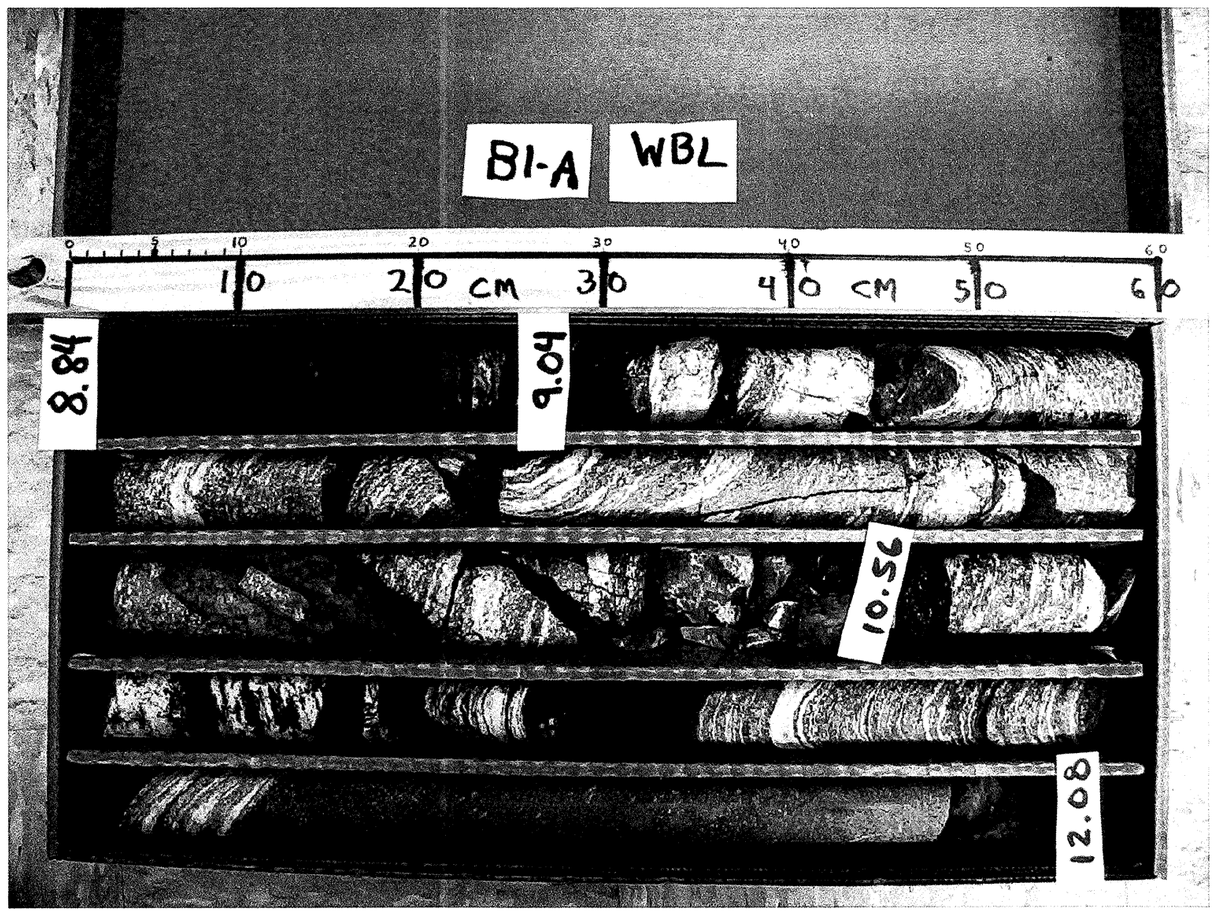
Reported by: P.Q. Lockamy PQ LOCKAMY Date: 5/29/2007

34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B1-A WBL Box 1

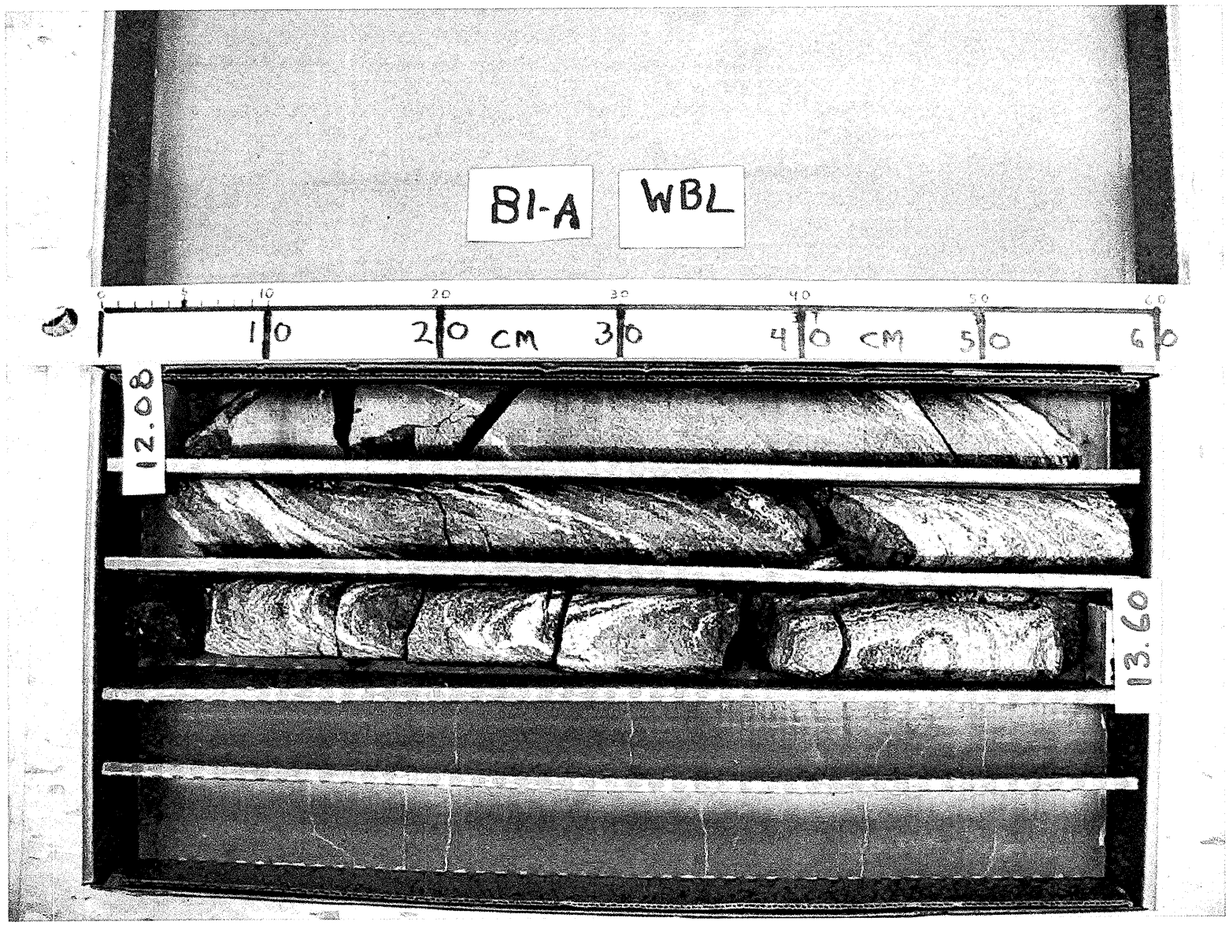
34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B1-A WBL Box 2



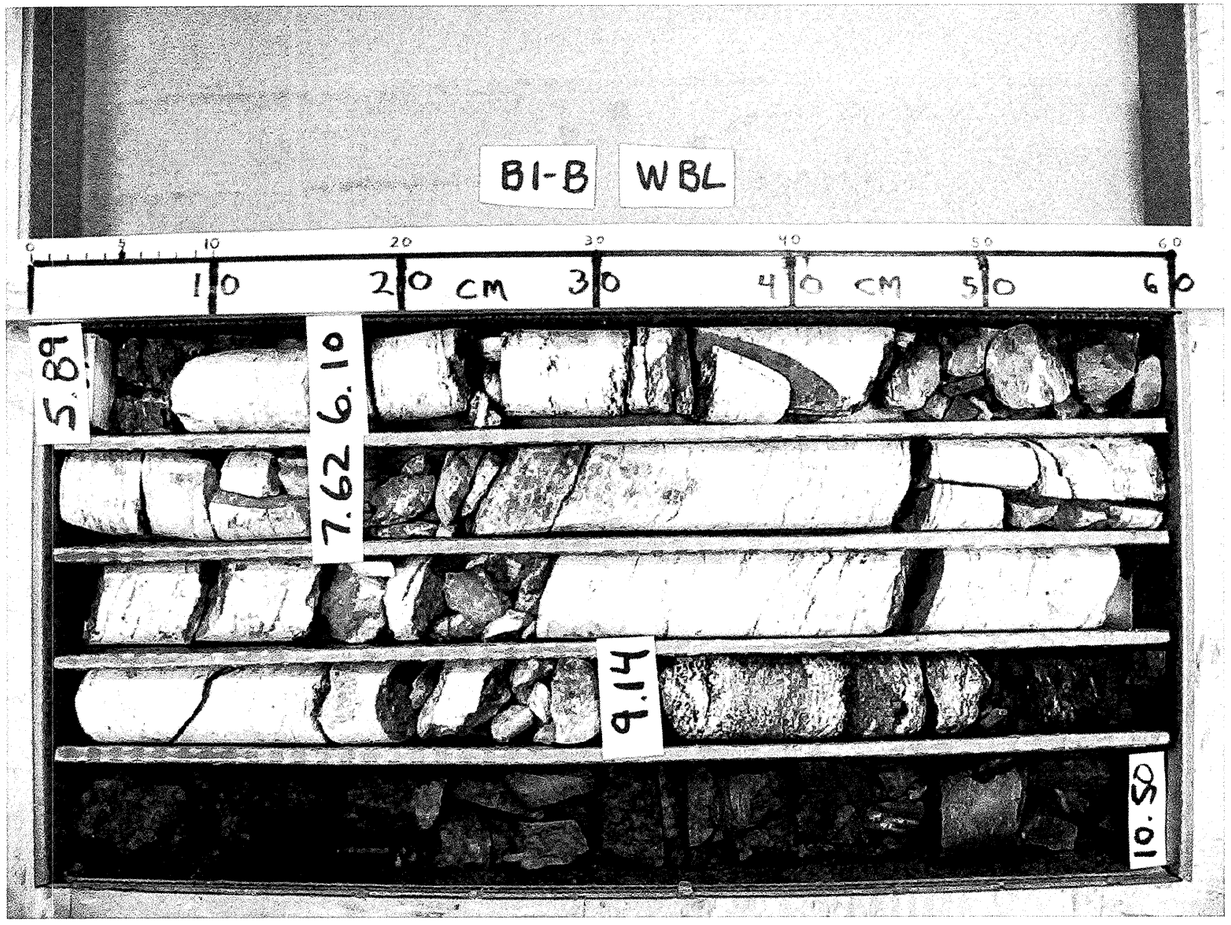
34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B1-A WBL Box 3



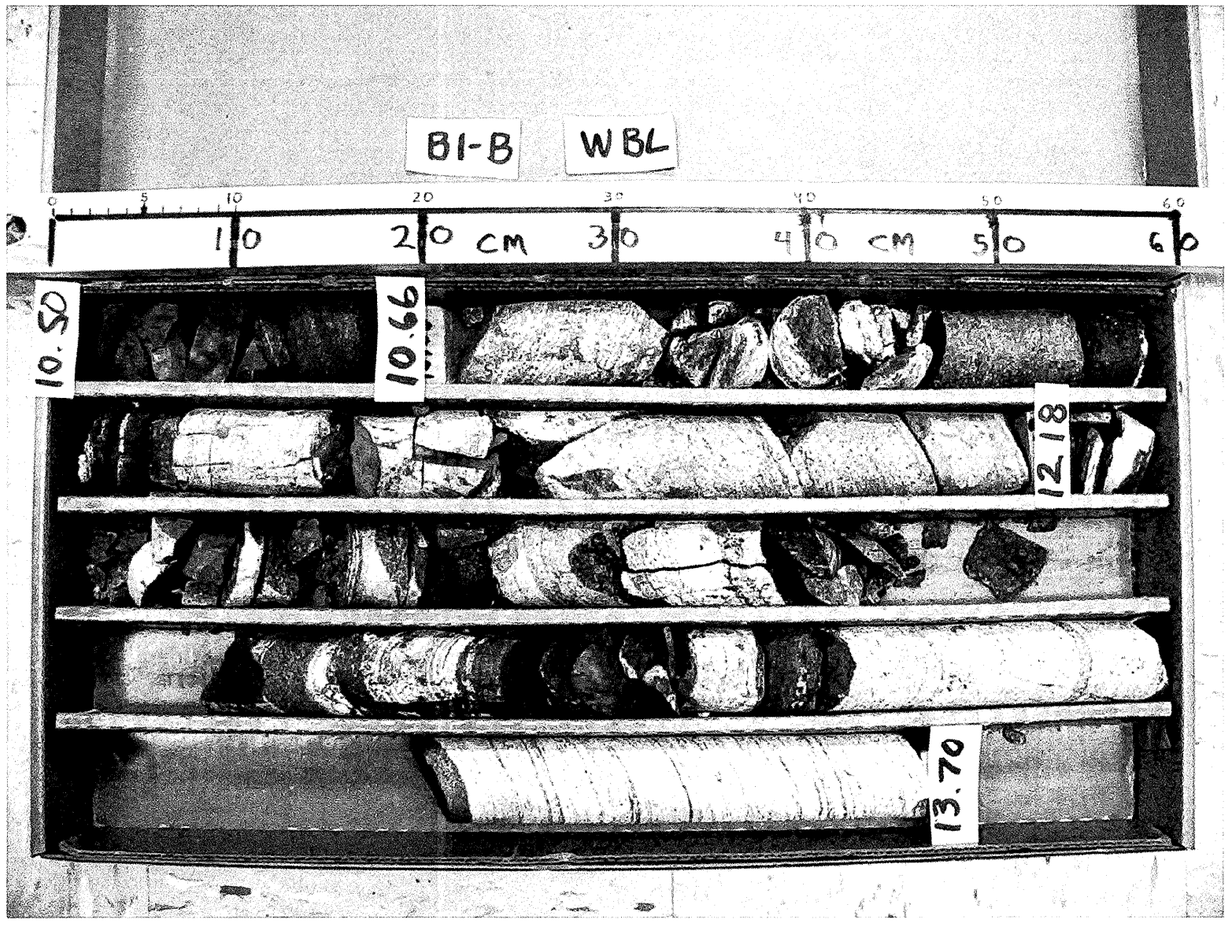
34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B1-B WBL Box 1



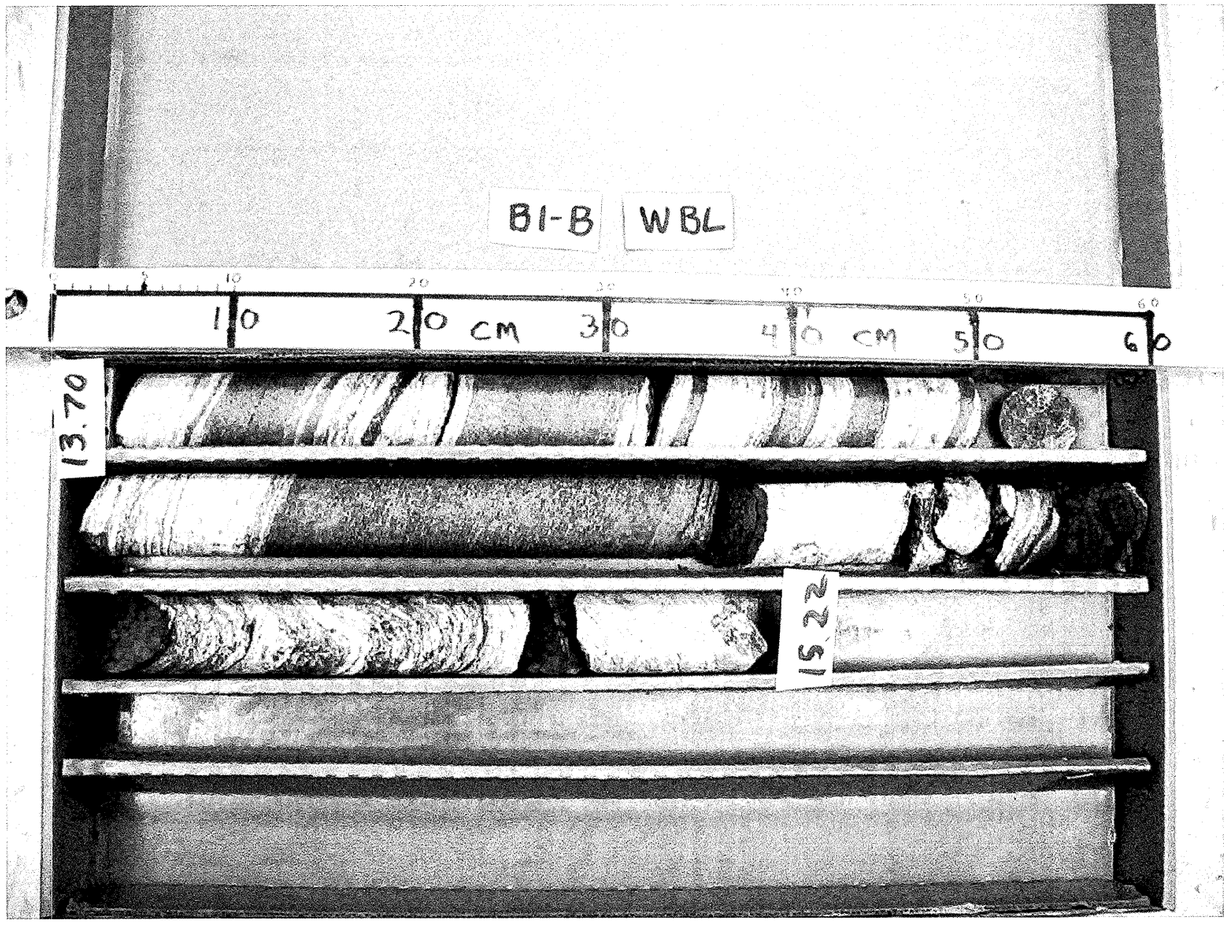
34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B1-B WBL Box 2



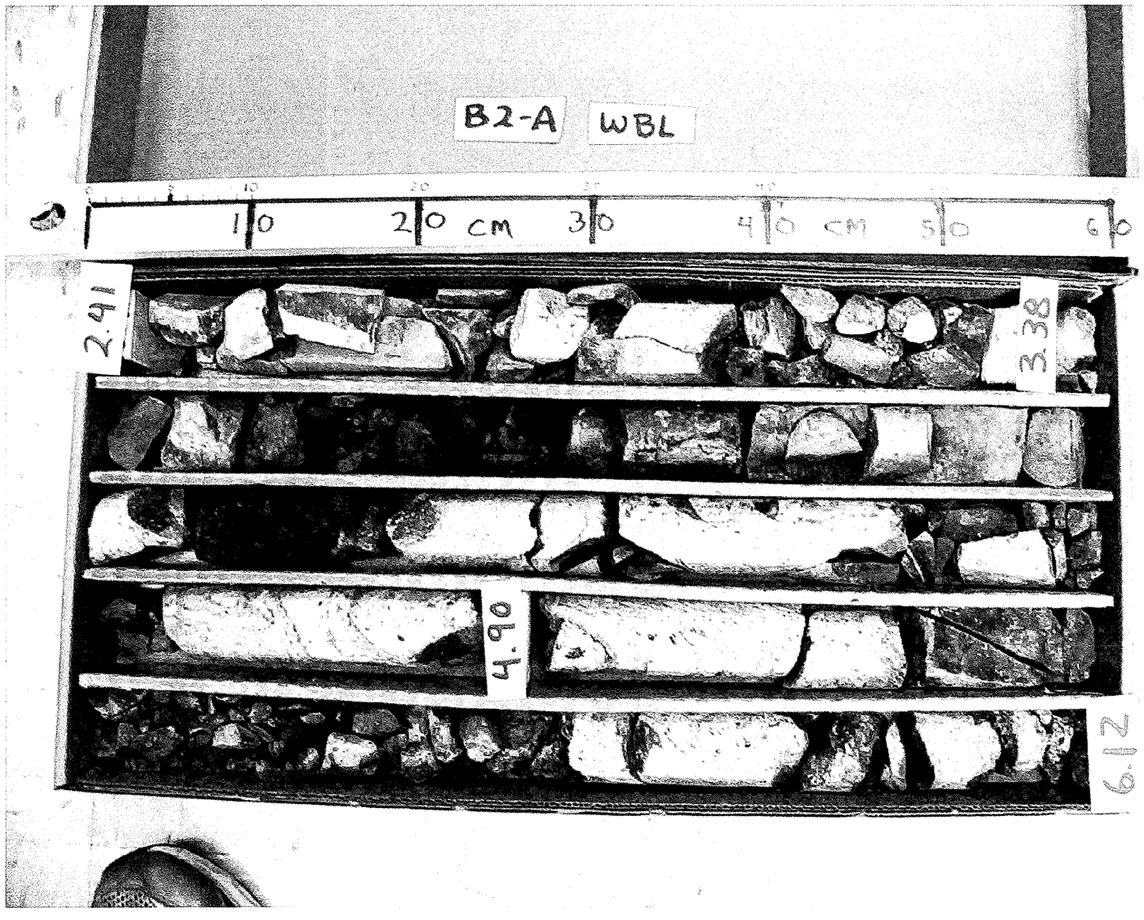
34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B1-B WBL Box 3



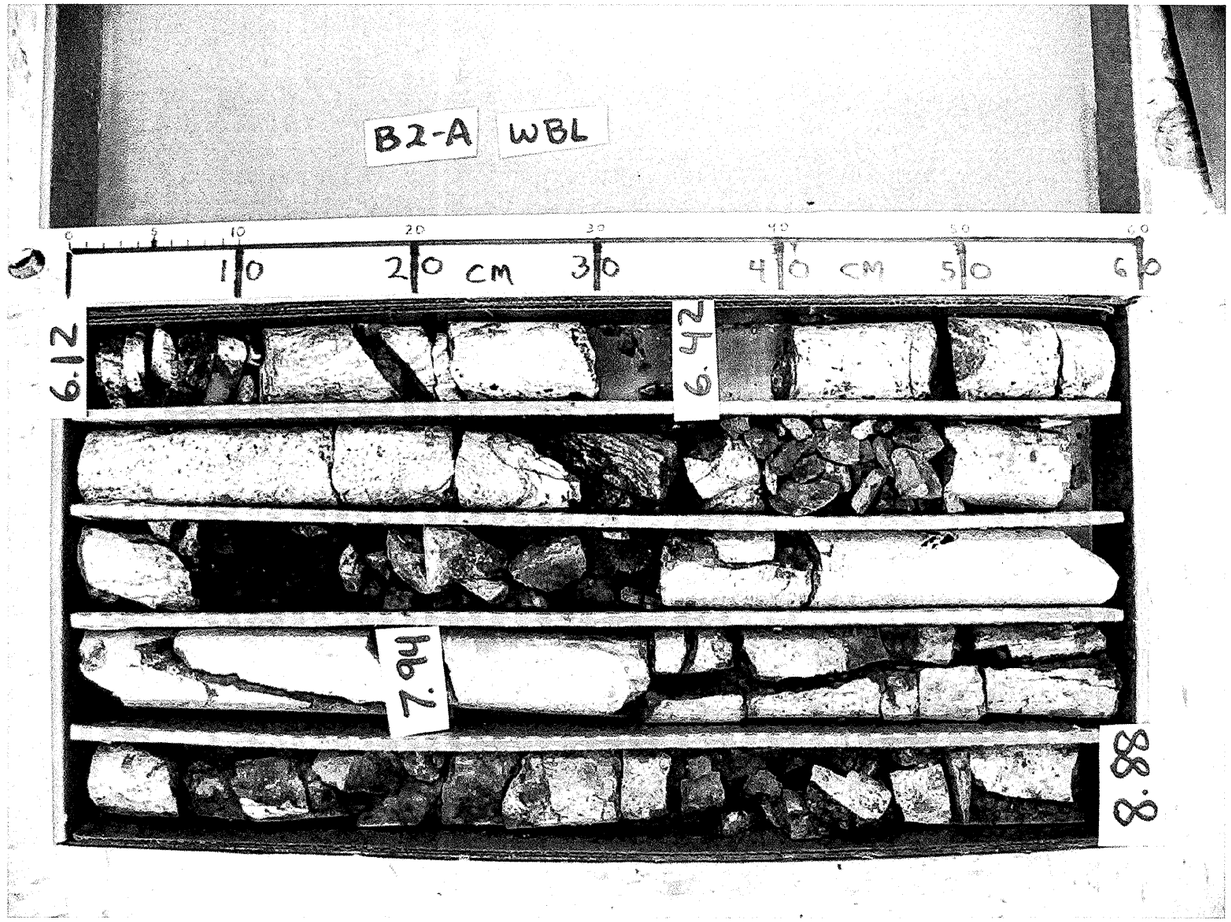
34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-A WBL Box 1



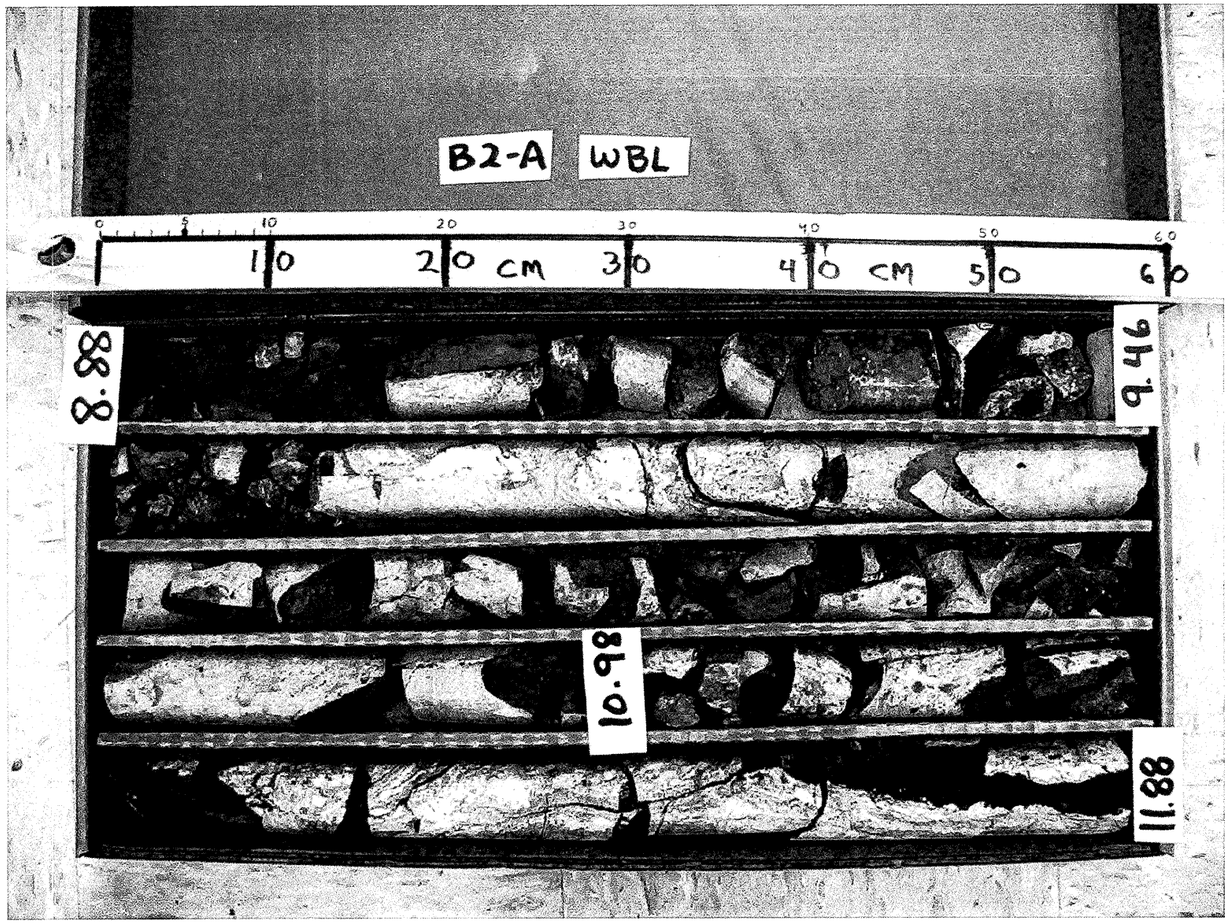
34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-A WBL Box 2



34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-A WBL Box 3

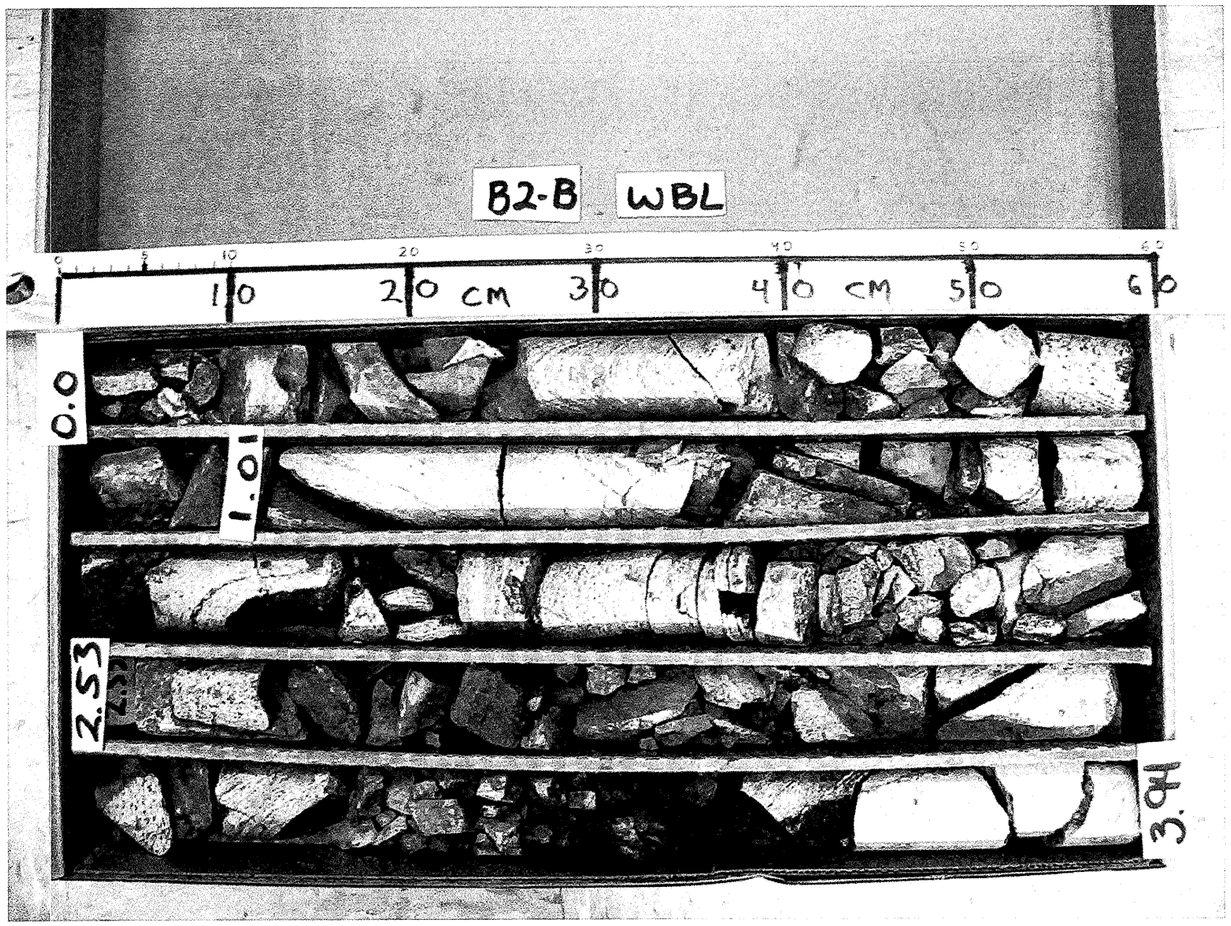


34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-A WBL Box 4

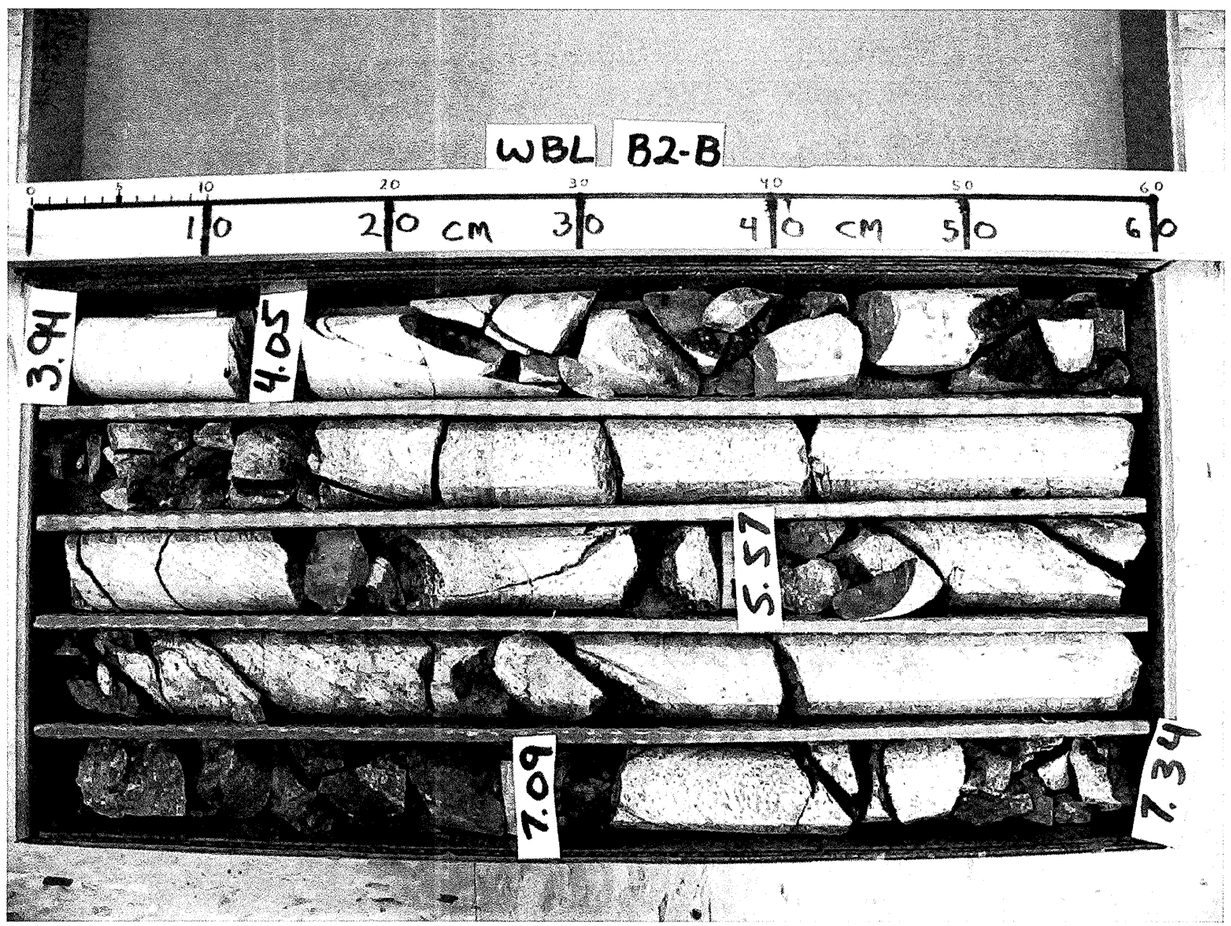
34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-B WBL Box 1



34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-B WBL Box 2



34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-B WBL Box 3

34445.1.1
R-2518B

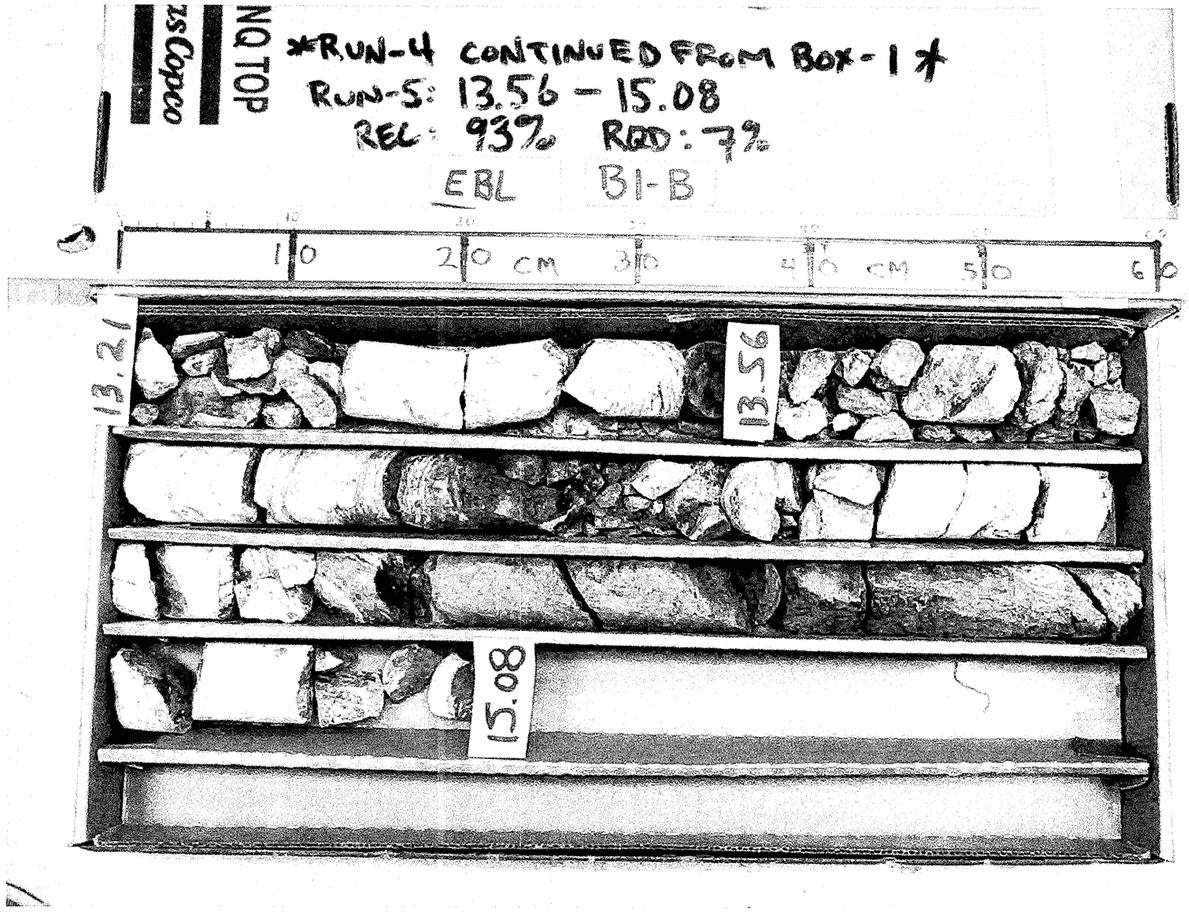
Yancey County Bridge 30 on US-19
Over Bald Creek. EB1-A WBL Box 1

34445.1.1
R-2518B

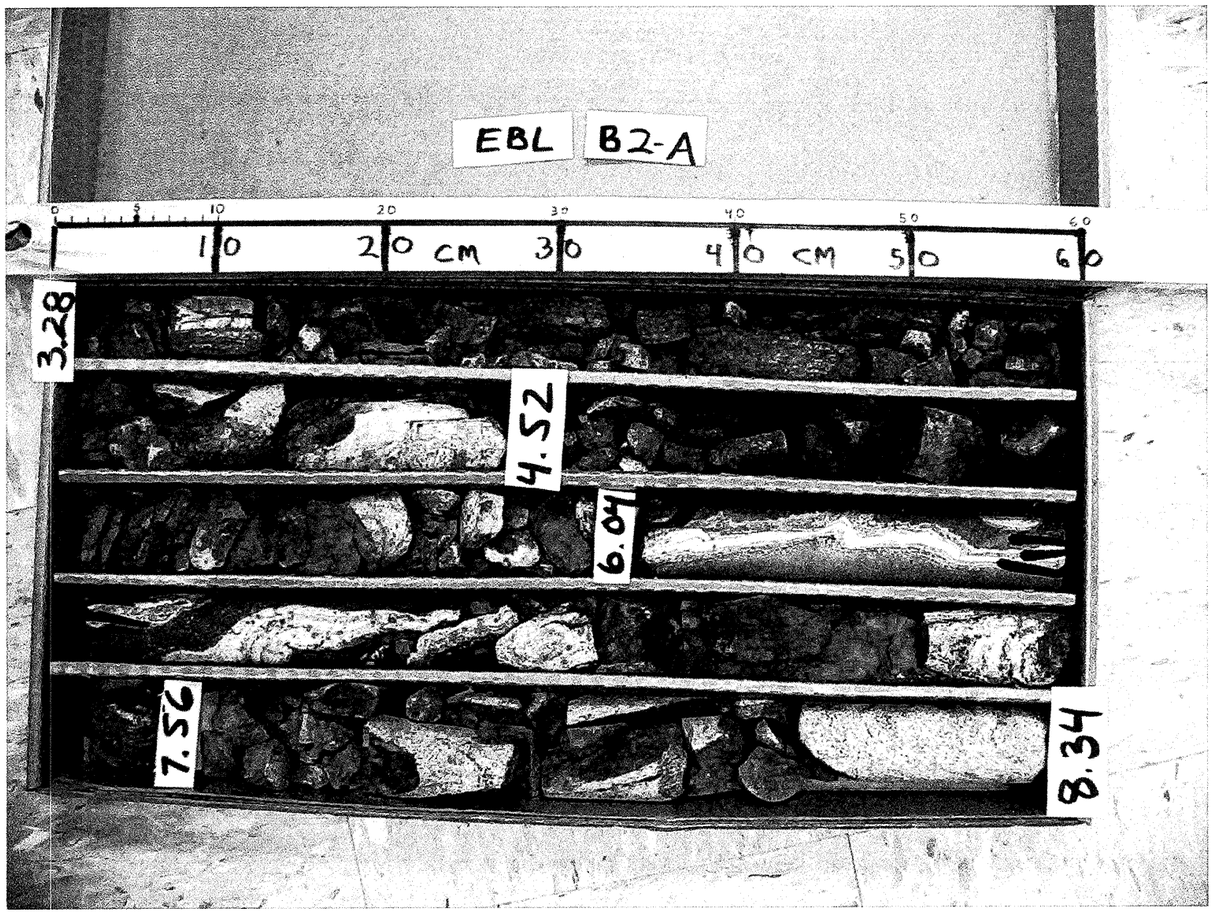
Yancey County Bridge 30 on US-19
Over Bald Creek. B1-B EBL Box 1

34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B1-B EBL Box 2

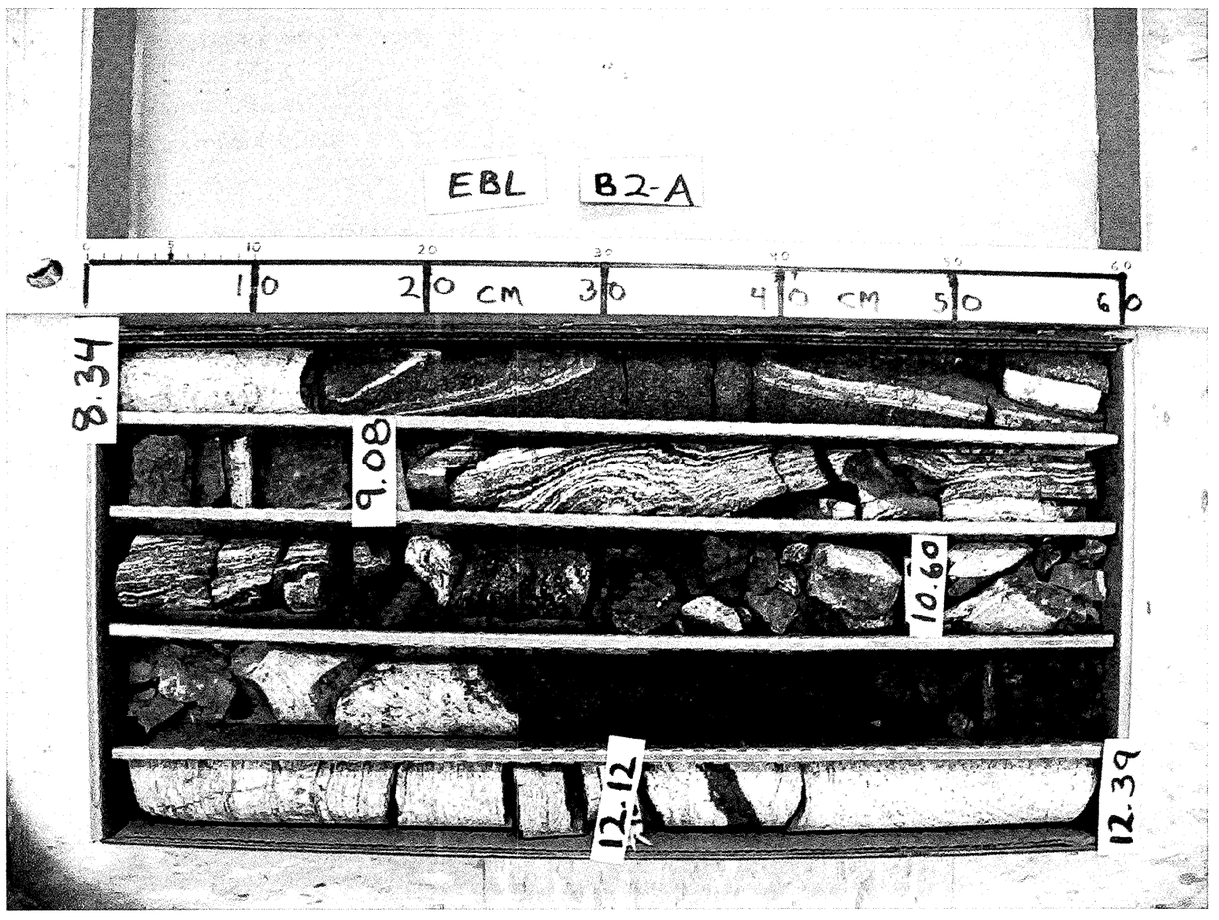


Yancey County Bridge 30 on US-19
Over Bald Creek. B2-A EBL Box 1



34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-A EBL Box 2

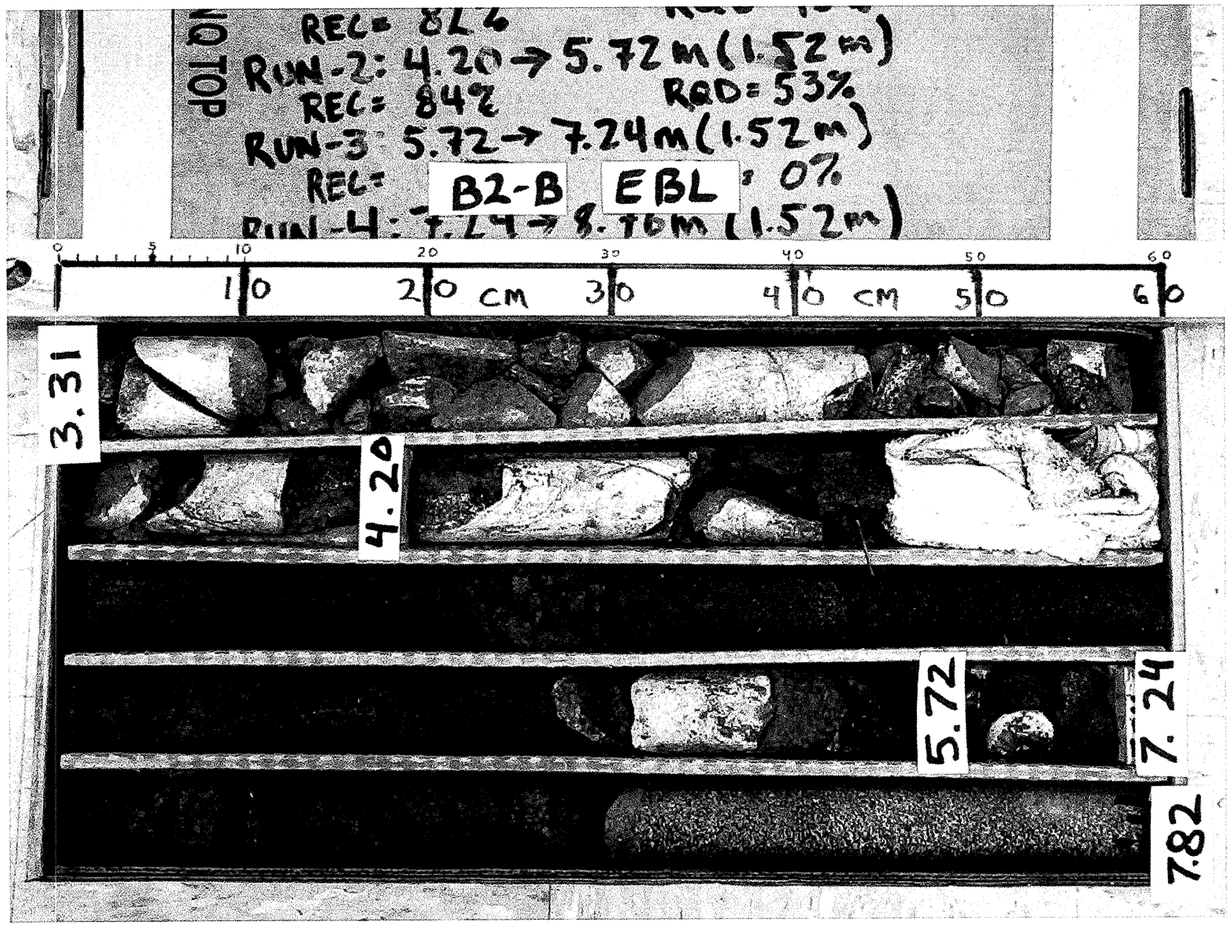


34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-A EBL Box 3

34445.1.1
R-2518B

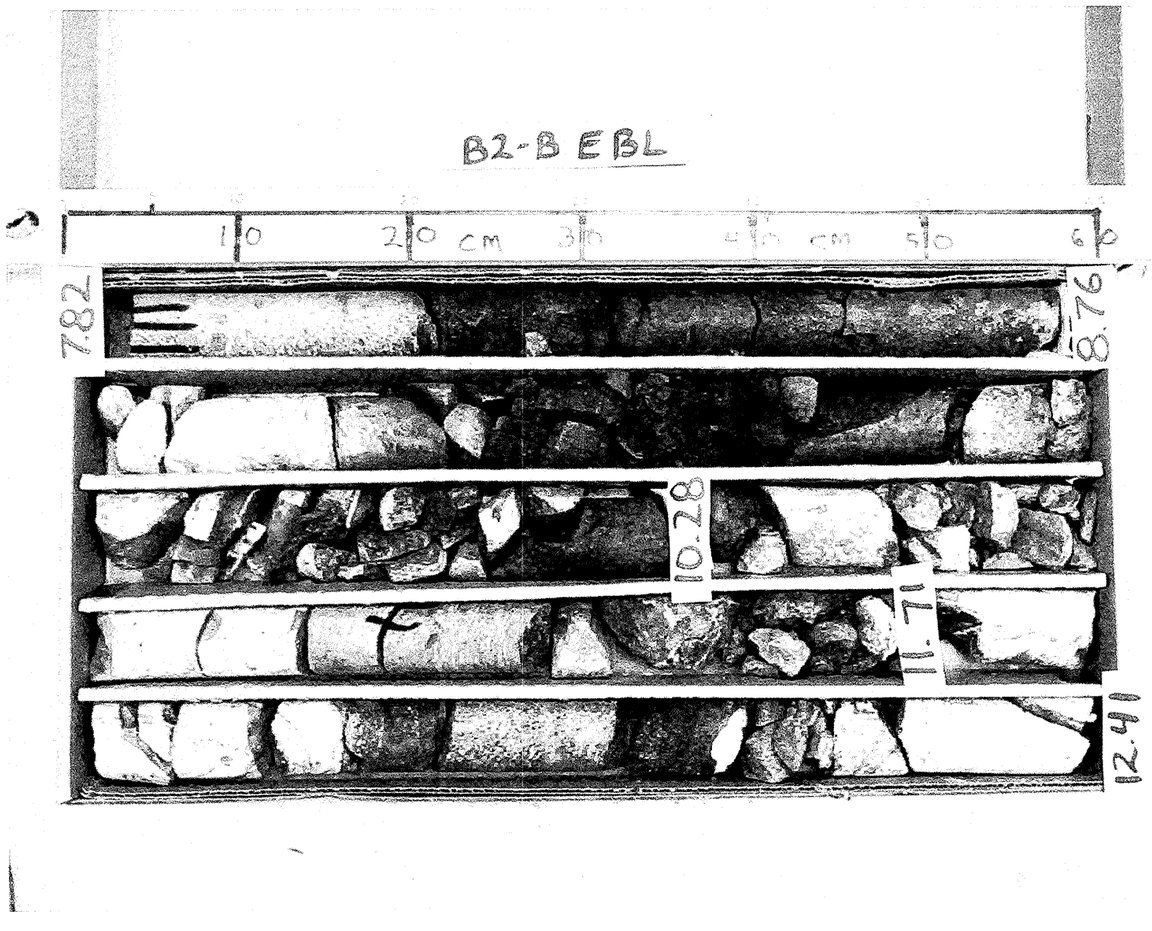
Yancey County Bridge 30 on US-19
Over Bald Creek. B2-B EBL Box 1



Close fractures in places.
Note recovery from 5.72 to 7.24 meters.
Massive hornblende gneiss is fresh near 7.8 meters.

34445.1.1
R-2518B

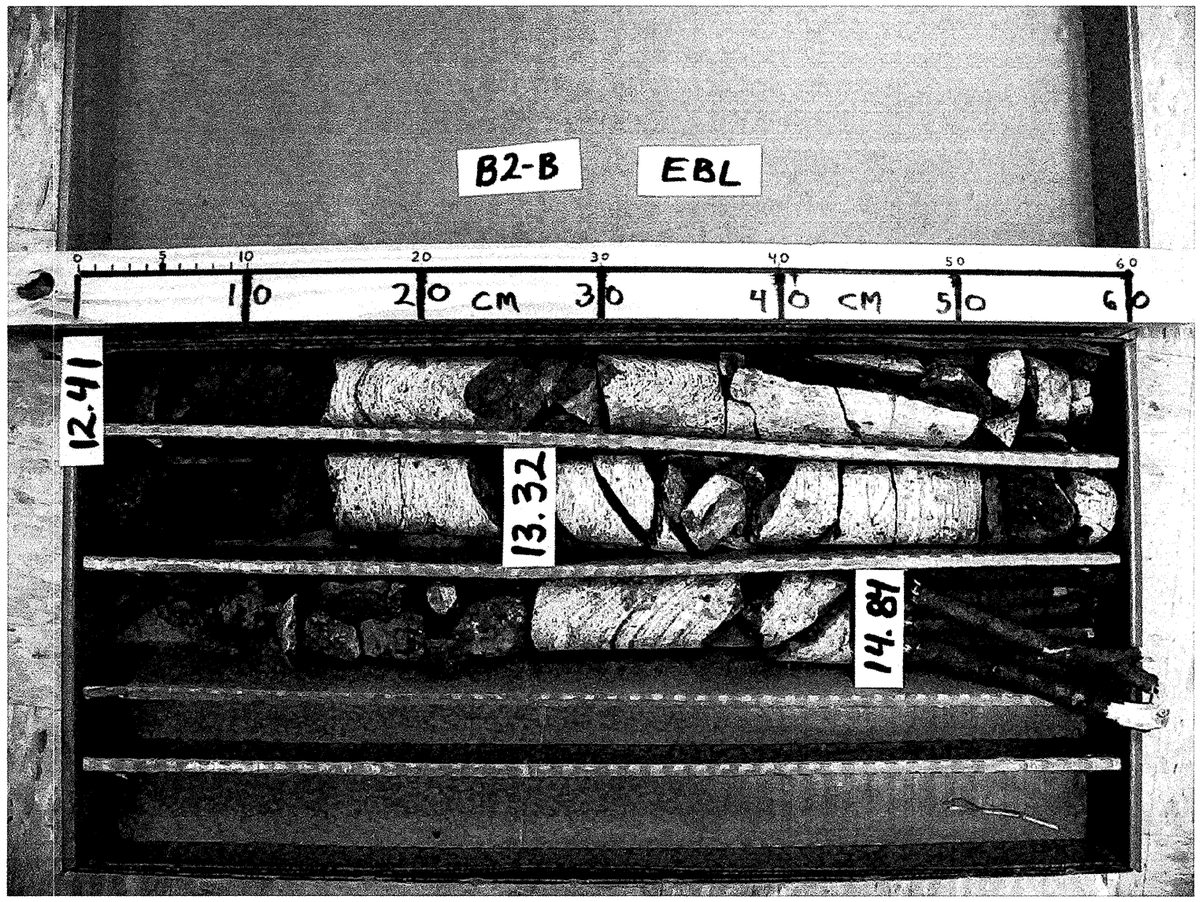
Yancey County Bridge 30 on US-19
Over Bald Creek. B2-B EBL Box 2



Close fractures in places.
Differential weathering abounds.

34445.1.1
R-2518B

Yancey County Bridge 30 on US-19
Over Bald Creek. B2-B EBL Box 3



34445.1.1
R-2518B

Stream flow focused on SW wing wall.

Yancey County Bridge 30 on US-19
Over Bald Creek.

34445.1.1
R-2518B

Normal flow in western most box only.
Basal sand and gravel in next box is exposed.

Yancey County Bridge 30 on US-19
Over Bald Creek.