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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34518.1.3	1	20

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34518.1.3 F.A. PROJ. STP-0221(40)

COUNTY Ashe

PROJECT DESCRIPTION US 221 FROM SR 1003 (IDLEWILD ROAD) TO NORTH OF SOUTH FORK OF NEW RIVER

SITE DESCRIPTION REPLACE CULVERT 3 ON US 221 OVER GAP CREEK WITH DUAL 3 SPAN PSCG BRIDGES

ID: R-2915B

PROJECT: 34518.1.3

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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) 707-6850. 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

R. DELOST

M. MORGAN

JC KUHNE

DM MULLEN

INVESTIGATED BY PQ LOCKAMY

CHECKED BY JC KUHNE

SUBMITTED BY JC KUHNE

DATE 12-13-2013

NORTH CAROLINA LICENSED SEAL 1907 GEOLOGIST Patrick Q. Lockamy

PQ Lockamy 12-13-13

DRAWN BY: PQ LOCKAMY

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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.
34518.1.3	2 / 20

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/026 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT / OPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- (REF) — SPT REFUSAL

ABBREVIATIONS

AR - AUGER REFUSAL
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

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

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

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

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

CORE SIZE:
- [ ] -B-
- [X] -N-
- [ ] -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 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

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

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

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: -BL- 2
-L- Sta. 198+92.5 62.9 Lt
- ELEVATION: 2881.92 FT.

NOTES:
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REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET NO.
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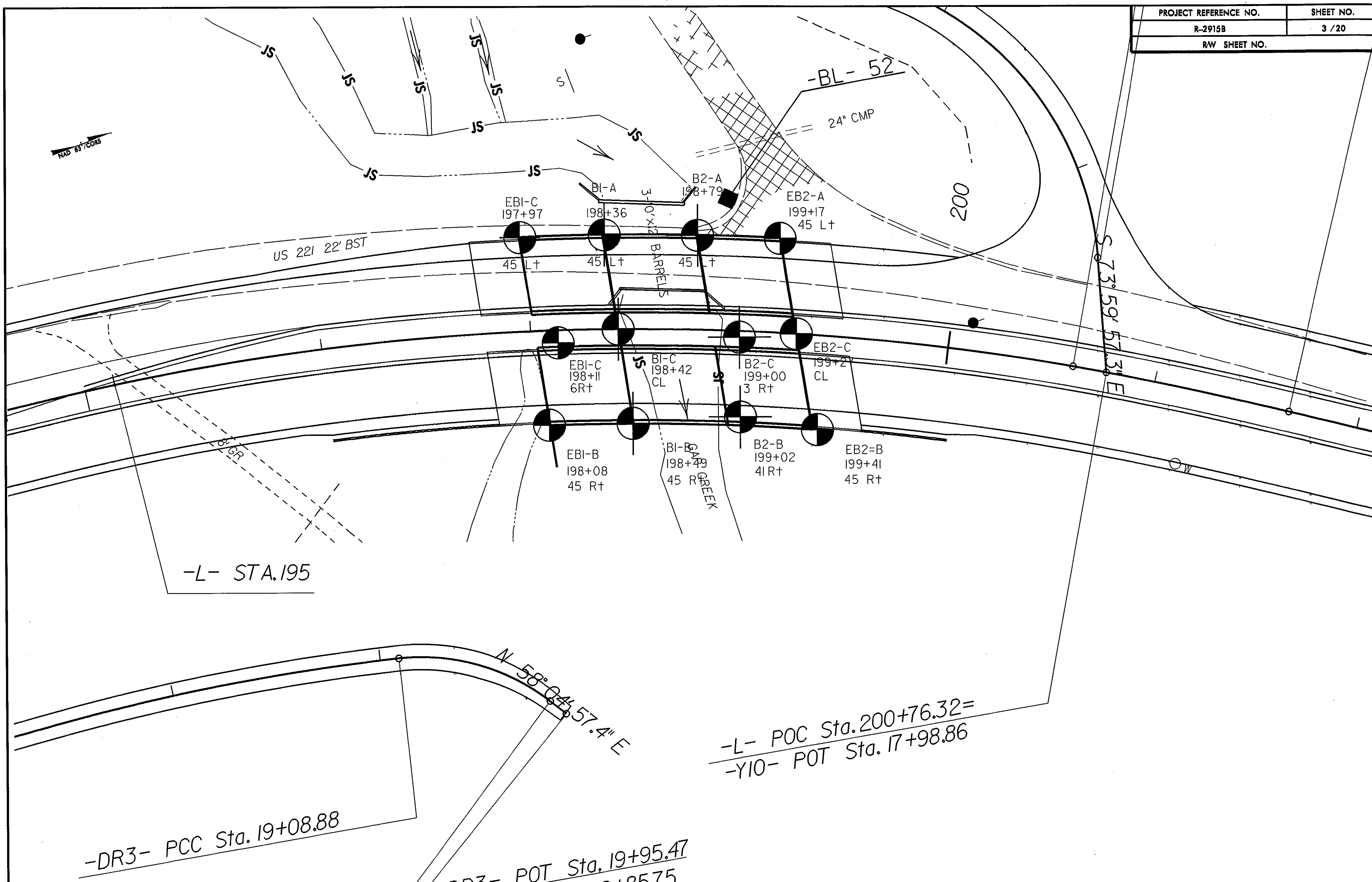
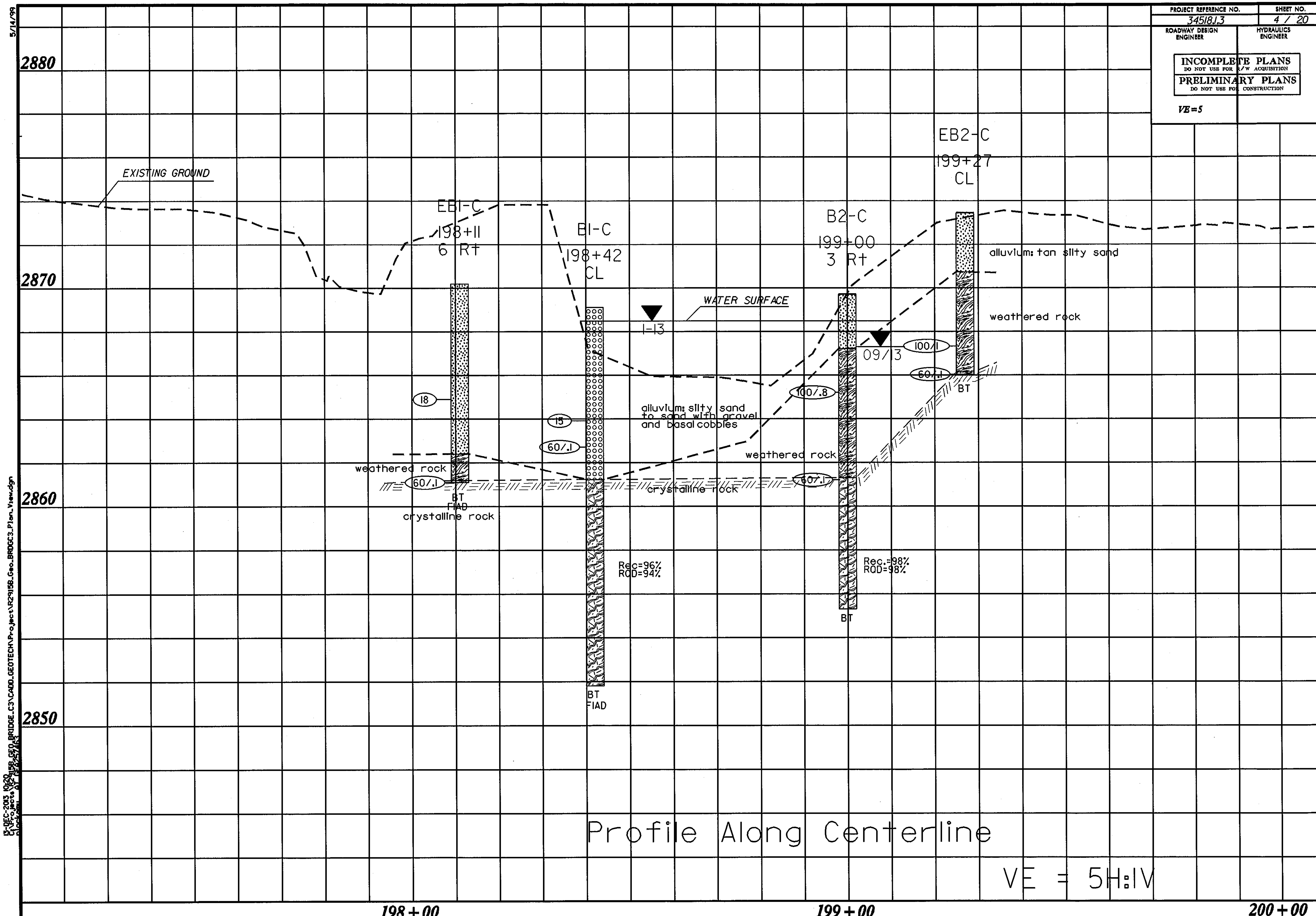
R/W SHEET NO.	




PROJECT REFERENCE NO.
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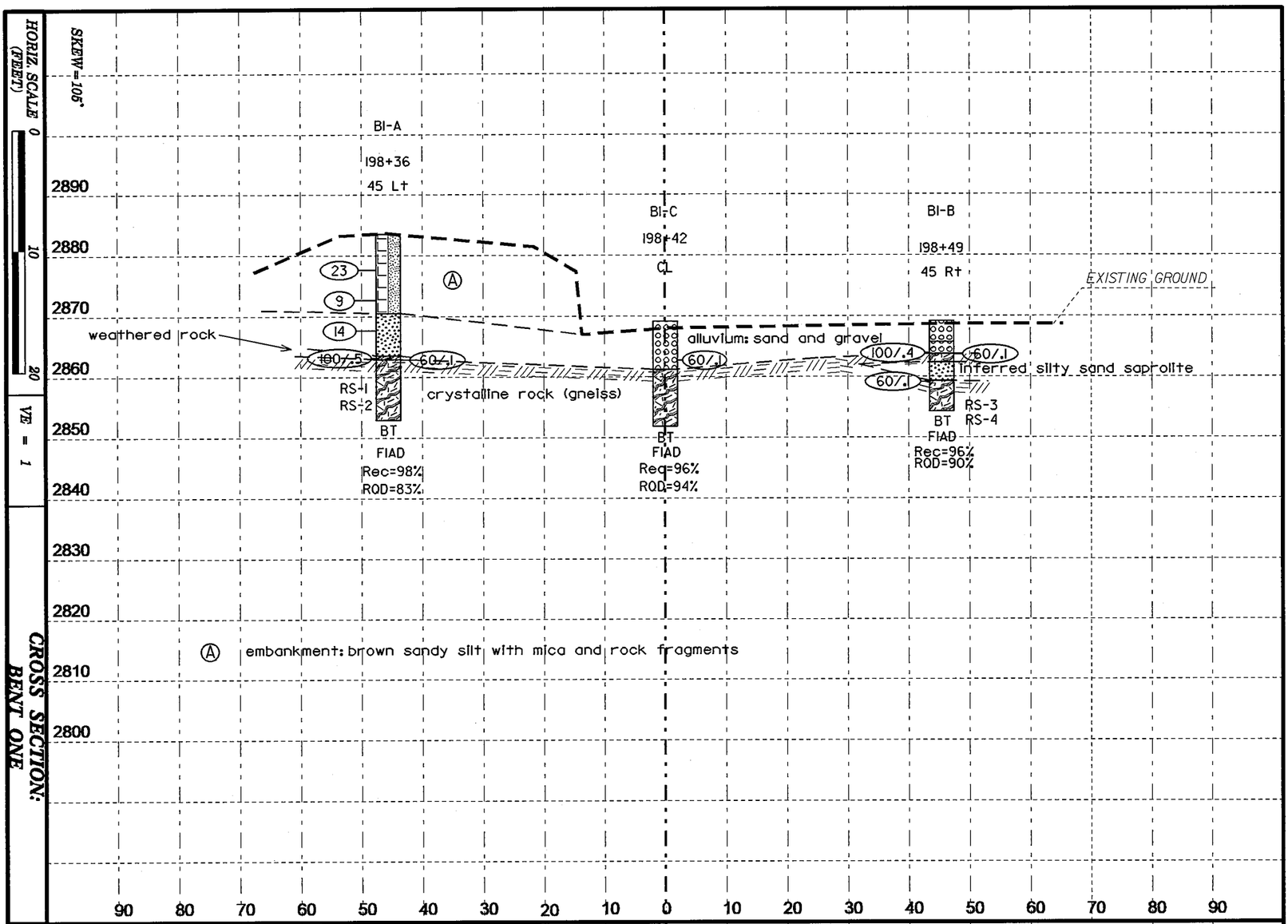
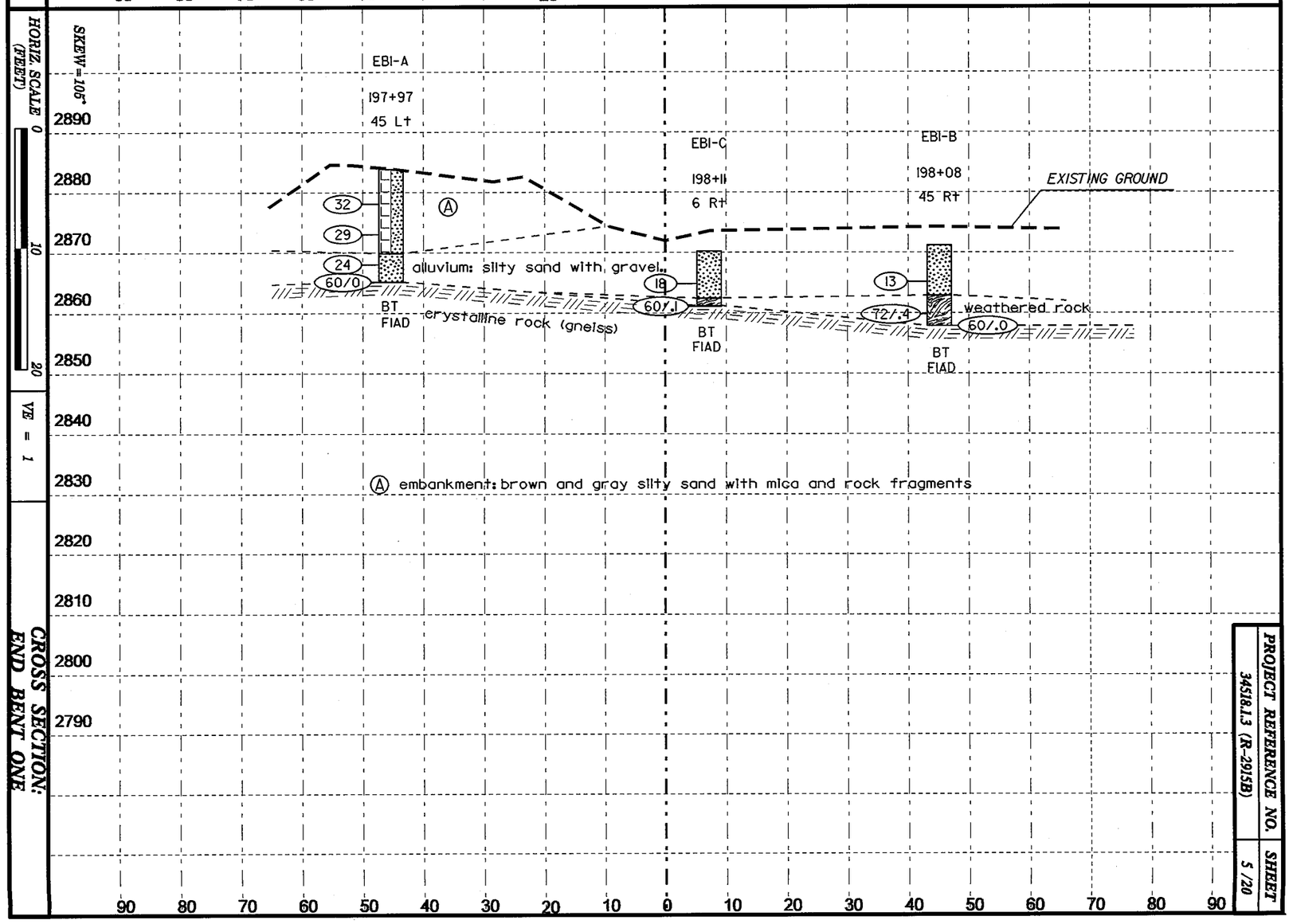
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
VE=5
5/14/99
2880
2870
2860
2850
EXISTING GROUND
EB1-C
198+11
6 Rt
B1-C
198+42
CL
B2-C
199+00
3 Rt
EB2-C
199+27
CL
WATER SURFACE
1-13
09/13
alluvium: tan silty sand
weathered rock
100/.1
60/.1
BT
18
15
60/.1
100/.8
alluvium: silty sand to sand with gravel and basal cobbles
weathered rock
weathered rock
60/.1
60/.1
crystalline rock
BT
FIAD
crystalline rock
Rec=96%
RQD=94%
Rec.=98%
RQD=98%
BT
BT
FIAD
Profile Along Centerline
VE = 5H:1V
198+00
199+00
200+00





PROJECT REFERENCE NO.	SHEET
34518.1.3 (R-2915B)	5 /20

PROJECT REFERENCE NO.	SHEET
34518.1.3 (R2915B)	6 / 20

EB2-C
199+27
CL

EB2-B
199+41
45 Rt

EB2-A
199+77
45 Lt

EXISTING GROUND

alluvium: tan coarse sand with gravel and cobbles
saprolite: white to gray silty sand with rock fragments and mica
crystalline rock
BT

embankment: brown to red silty fine sand with mica
alluvium: silty sand with gravel
weathered rock
BT
FIAD

SKEW=105°

HORIZ. SCALE (FEET) 0 10 20
VE = 1

CROSS SECTION: END BENT TWO

B2-C
199+00
3 Rt

B2-B
199+02
41 Rt

B2-A
198+79
45 Lt

EXISTING GROUND

alluvium: brown to gray silty fine sand with sub rounded gneiss gravel
weathered rock
BT
FIAD
Rec=100%
ROD=100%

alluvium: silty sand with gravel.
weathered rock
BT
FIAD
Rec=98%
ROD=98%

BT
FIAD
Rec=98%
ROD=83%

Ⓐ embankment: tan to black silty fine sand with rock fragments

SKEW=105°

HORIZ. SCALE (FEET) 0 10 20
VE = 1

CROSS SECTION: BENT TWO

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 197+97	**OFFSET** 45 ft LT	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,883.9 ft	**TOTAL DEPTH** 18.8 ft	**NORTHING** 931,541	**EASTING** 1,261,520	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER M. Morgan	**START DATE** 10/01/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2885										ELEV. (ft) DEPTH (ft)
	2,883.9	0.0								GROUND SURFACE
2880										embankment: brown and gray silty sand with mica and rock fragments
	2,879.1	4.8	9	16	16	32				
2875	2,874.1	9.8	9	12	17	29				
2870	2,869.9	14.0								alluvium: no recovery - inferred silty sand with gravel.
	2,869.1	14.8	4	8	16	24				
	2,865.2	18.7	60/0			60/0				Boring Terminated with Standard Penetration Test Refusal at Elevation 2,865.2 ft on crystalline rock

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 198+08	**OFFSET** 45 ft RT	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,871.2 ft	**TOTAL DEPTH** 13.5 ft	**NORTHING** 931,524	**EASTING** 1,261,609	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER M. Morgan	**START DATE** 10/02/13	**COMP. DATE** 10/02/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2875										ELEV. (ft) DEPTH (ft)
	2,871.2	0.0								GROUND SURFACE
2870										alluvium: gray silty sand with mica, roots, and gravel
	2,866.2	5.0	0	5	8	13				
2865	2,862.9	8.3								weathered rock
2860	2,861.2	10.0	13	28	72/.4	100/.9				
	2,857.9	13.3	60/0			60/0				Boring Terminated with Standard Penetration Test Refusal at Elevation 2,857.7 ft on crystalline rock

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

3/20

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 198+11	**OFFSET** 6 ft RT	**ALIGNMENT** I	**0 HR.** N/A
COLLAR ELEV. 2,870.2 ft	**TOTAL DEPTH** 9.1 ft	**NORTHING** 931,539	**EASTING** 1,261,573	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 09/25/13	**COMP. DATE** 09/25/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2875											
2870										2,870.2 GROUND SURFACE	0.0
										alluvium: no recovery - inferred silty sand with gravel	
2865	2,865.9	4.3	4	8	10	18				2,862.4	7.8
	2,861.2	9.0	60/.1			60/.1				2,861.2 weathered rock	9.0
										2,861.1 crystalline rock	9.1
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,861.1 ft on crystalline rock	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 198+36	**OFFSET** 45 ft LT	**ALIGNMENT** I	**0 HR** Caved at 1.0
COLLAR ELEV. 2,883.5 ft	**TOTAL DEPTH** 30.6 ft	**NORTHING** 931,579	**EASTING** 1,261,533	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 10/01/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2885										2,883.5 GROUND SURFACE 0.0
										embankment: brown sandy silt with mica and rock fragments
2880										
	2,878.6	4.9	6	6	17	23				
2875										
	2,873.6	9.9	8	4	5	9				
2870										2,870.5 13.0
	2,868.6	14.9								alluvium: no recovery - inferred silty sand with gravel
			2	4	10	14				
2865										
	2,863.6	19.9								2,863.5 20.0
	2,862.9	20.6	100/.5			100/.5				2,862.9 20.6
			60/.1			60/.1				weathered rock
2860										crystalline rock - cored from 20.6 to 30.6.
2855										
										2,852.9 30.6
										Boring Terminated at Elevation 2,852.9 ft in crystalline rock

NCDOT BORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/12/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 198+36	**OFFSET** 45 ft LT	**ALIGNMENT** I	**0 HR** Caved at 1.0
COLLAR ELEV. 2,883.5 ft	**TOTAL DEPTH** 30.6 ft	**NORTHING** 931,579	**EASTING** 1,261,533	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 10/01/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ-2	**TOTAL RUN** 10.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
2862.94											Begin Coring @ 20.6 ft
	2,862.9	20.6	5.0	2:44/1.0	(4.9)	(3.4)				2,862.9	crystalline rock. very slightly weathered and hard gneiss. 20.6
2860				*N=60/.1*	98%	68%					total REC=98% total RQD=83%.
				2:44/1.0							
				2:33/1.0							11 breaks on micaceous foliation at 45 degrees with 9 of those breaks from
				3:14/1.0							20 to 23.4 feet. very slight stains on breaks with no weathering.
	2,857.9	25.6		3:34/1.0							
			5.0	4:02/1.0	(4.9)	(4.7)					
2855				3:41/1.0	98%	94%					
				3:56/1.0							
				4:33/1.0							
				4:46/1.0							
	2,852.9	30.6		4:52/1.0						2,852.9	30.6
											Boring Terminated at Elevation 2,852.9 ft in crystalline rock

NCDOT CORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/13/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 198+49	**OFFSET** 45 ft RT	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,869.1 ft	**TOTAL DEPTH** 14.9 ft	**NORTHING** 931,561	**EASTING** 1,261,623	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER M. Morgan	**START DATE** 10/03/13	**COMP. DATE** 10/03/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2870										2,869.1 GROUND SURFACE	0.0
										alluvium: sand and gravel	
2865										2,865.6	3.5
	2,864.2	4.9								Basal alluvium - cobbles and sand.	
	2,863.7	5.4	100/.4			100/.4				2,863.7	5.4
			60/.1			60/.1				2,862.3 core run 1. 5.4-6.8 crystalline rock (gneiss) Rec= 31% RQD=31%	6.8
2860										Part of core run 1. 6.8-9.9 no recovery -	
	2,859.2	9.9								2,859.2 inferred silty sand saprolite	9.9
			60/.1			60/.1	RS-3			crystalline rock Rec=96% RQD=90%	
2855							RS-4				
										2,854.2	14.9
										Boring Terminated at Elevation 2,854.2 ft in crystalline rock	

NCDOT BORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/12/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 198+49	**OFFSET** 45 ft RT	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,869.1 ft	**TOTAL DEPTH** 14.9 ft	**NORTHING** 931,561	**EASTING** 1,261,623	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER M. Morgan	**START DATE** 10/03/13	**COMP. DATE** 10/03/13	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 5.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2859.24											Begin Coring @ 9.9 ft	
	2,859.2	9.9	5.0	5:58/1.0	(4.8)	(45.0)	RS-3				2,859.2 crystalline rock Rec=96% RQD=90%	9.9
				N=60/.1	96%	900%					hard and fresh except for 13.8-14.0 which is mod. weathered and soft.	
2855				5:58/1.0								
				5:42/1.0			RS-4					
				5:16/1.0								
	2,854.2	14.9		3:17/1.0							2,854.2	14.9
				4:34/1.0							Boring Terminated at Elevation 2,854.2 ft in crystalline rock	

NCDOT CORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/13/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 198+42	**OFFSET** CL	**ALIGNMENT** I — **0 HR.** FIAD
COLLAR ELEV. 2,869.1 ft	**TOTAL DEPTH** 17.3 ft	**NORTHING** 931,570	**EASTING** 1,264,571 — **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 09/30/13	**COMP. DATE** 09/30/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2870										2,869.1 GROUND SURFACE	0.0
										Alluvium: sand and gravel with mica and cobbles. Begin coring at 6.3 - Quartz cobble from 6.3 to 6.8.	
2865	2,864.9	4.2	5	8	7	15					
	2,862.8	6.3	60/.1			60/.1				2,862.3	6.8
										2,861.2 no recovery	7.9
2860										crystalline rock (gneiss) Rec=96% RQD=94%	
2855										2,851.8	17.3
										Boring Terminated at Elevation 2,851.8 ft in crystalline rock	

NCDOT BORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/12/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 198+42	**OFFSET** CL	**ALIGNMENT** I — **0 HR.** FIAD
COLLAR ELEV. 2,869.1 ft	**TOTAL DEPTH** 17.3 ft	**NORTHING** 931,570	**EASTING** 1,264,571 — **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 09/30/13	**COMP. DATE** 09/30/13	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ-2	**TOTAL RUN** 9.4 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2861.22											Begin Coring @ 7.9 ft	
2860	2,861.2	7.9	4.4	3:28/1.0 3:16/1.0 3:19/1.0 3:25/1.0	(4.4) 100%	(4.4) 100%					2,861.2 crystalline rock (gneiss) total Rec=96% total RQD=94% hard and fresh with few natural breaks	7.9
	2,856.8	12.3	5.0	0:42/0.4	(4.6) 92%	(4.6) 92%						
2855				2:38/1.0 3:10/1.0 3:09/1.0 3:56/1.0 3:09/1.0								
	2,851.8	17.3									2,851.8 Boring Terminated at Elevation 2,851.8 ft in crystalline rock	17.3

NCDOT CORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/13/13

SHEET

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 198+79	**OFFSET** 45 ft LT	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,883.0 ft	**TOTAL DEPTH** 35.1 ft	**NORTHING** 931,621	**EASTING** 1,261,549	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER M. Morgan	**START DATE** 10/02/13	**COMP. DATE** 10/02/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2885										2,883.0 GROUND SURFACE 0.0
										embankment: tan to black silty fine sand with rock fragments
2880										
	2,878.3	4.7	2	2	2	4				
2875										
	2,873.3	9.7	1	1	2	3				
2870										2,870.0 13.0
	2,868.3	14.7	3	6	6	12				alluvium: no recovery - inferred silty sand with garvel
2865										2,864.5 18.5
	2,863.9	19.1	100/.3			100/.3				weathered rock
	2,862.9	20.1	60/.1			60/.1				2,862.9 20.1
2860							RS-6			Crystalline rock (gneiss) Rec=91% RQD=66%
2855							RS-5			
2850										2,847.9 35.1
										Boring Terminated at Elevation 2,847.9 ft in crystalline rock

NCDOT BORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/12/13

SHEET
12/20

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 198+79	**OFFSET** 45 ft LT	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,883.0 ft	**TOTAL DEPTH** 35.1 ft	**NORTHING** 931,621	**EASTING** 1,261,549	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER M. Morgan	**START DATE** 10/02/13	**COMP. DATE** 10/02/13	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 15.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
2862.87											Begin Coring @ 20.1 ft
	2,862.9	20.1	5.0	2:58/1.0 *N=60/.1* 2:58/1.0 3:21/1.0 3:41/1.0 4:42/1.0	(4.7) 94%	(2.7) 54%					2,862.9 crystalline rock (gneiss) 20.1-27.7 variably weathered from mod to fresh which is soft to hard. many breaks on foliation at 35-40 degrees. 27.7-35.1 hard and fresh, no breaks. Rec=91% RQD=66% 20.1
2860							RS-6				
	2,857.9	25.1	5.0	4:36/1.0 2:46/1.0 3:35/1.0 2:41/1.0 4:54/1.0	(4.8) 96%	(3.4) 68%					
2855							RS-5				
	2,852.9	30.1	5.0	4:44/1.0 3:46/1.0 3:50/1.0 3:59/1.0 3:58/1.0	(4.1) 82%	(3.8) 76%					
2850											
	2,847.9	35.1		4:44/1.0							2,847.9 35.1
											Boring Terminated at Elevation 2,847.9 ft in crystalline rock

NCDOT CORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/13/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 199+02	**OFFSET** 41 ft RT	**ALIGNMENT** I — **0 HR.** FIAD
COLLAR ELEV. 2,870.3 ft	**TOTAL DEPTH** 11.1 ft	**NORTHING** 931,637	**EASTING** 1,261,637 — **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 09/24/13	**COMP. DATE** 09/24/10	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2875											
2870										2,870.3 GROUND SURFACE	0.0
										alluvium: brown to gray silty fine sand with sub rounded gneiss gravel	
2865	2,865.0	5.3								2,864.5	5.8
	2,864.2	6.1	4	96/.3		100/.8				2,864.2 weathered rock	6.1
			60	60/0						crystalline rock (gneiss) Rec=100% RQD=100%	
2860										2,859.2	11.1
										Boring Terminated at Elevation 2,859.2 ft in crystalline rock	

NCDOT BORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/12/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 199+02	**OFFSET** 41 ft RT	**ALIGNMENT** I — **0 HR.** FIAD
COLLAR ELEV. 2,870.3 ft	**TOTAL DEPTH** 11.1 ft	**NORTHING** 931,637	**EASTING** 1,261,637 — **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 09/24/13	**COMP. DATE** 09/24/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ-2	**TOTAL RUN** 5.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2864.2											Begin Coring @ 6.1 ft	
	2,864.2	6.1	5.0	*N=60/0* 3:37/1.0 4:57/1.0 4:54/1.0 4:52/1.0 4:47/1.0	(5.0) 100%	(5.0) 100%					2,864.2 hard fresh gneiss - no natural breaks. foliation at 30-35 degrees. Rec=100% RQD=100%	6.1
2860	2,859.2	11.1									2,859.2	11.1
											Boring Terminated at Elevation 2,859.2 ft in crystalline rock	

NCDOT CORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/13/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 199+00	**OFFSET** 3 ft RT	**ALIGNMENT** I — **0 HR.** FIAD
COLLAR ELEV. 2,869.7 ft	**TOTAL DEPTH** 14.4 ft	**NORTHING** 931,623	**EASTING** 1,261,601 — **24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 09/23/13	**COMP. DATE** 09/23/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) — DEPTH (ft)
2870										2,869.7 — GROUND SURFACE — 0.0
										alluvium: no recovery
	2,866.0	3.7		34	66/.3	100/.8				2,867.2 — 2.5
2865										weathered rock
	2,861.3	8.4		60/.1						2,861.3 — 8.4
2860										crystalline rock
										Rec.=98% RQD=98%
										2,855.3 — 14.4
										Boring Terminated at Elevation 2,855.3 ft in crystalline rock

NCDOT BORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/12/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 199+00	**OFFSET** 3 ft RT	**ALIGNMENT** I — **0 HR.** FIAD
COLLAR ELEV. 2,869.7 ft	**TOTAL DEPTH** 14.4 ft	**NORTHING** 931,623	**EASTING** 1,261,601 — **24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 09/23/13	**COMP. DATE** 09/23/13	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ-2	**TOTAL RUN** 6.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) — DEPTH (ft)
2861.3											Begin Coring @ 8.4 ft
2860	2,861.3	8.4	1.0	5:18/1.0	(1.0)	(1.0)					2,861.3 — crystalline rock (gneiss) — 8.4
	2,860.3	9.4	5.0	N=60/.1	95%	95%					Rec.=98% RQD=98%
				5:18/1.0							hard and fresh - no natural breaks
				3:33/1.0	(4.9)	(4.9)					
				4:47/1.0	98%	98%					
				5:12/1.0							
	2,855.3	14.4		4:09/1.0							2,855.3 — 14.4
				4:05/1.0							Boring Terminated at Elevation 2,855.3 ft in crystalline rock

NCDOT CORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/13/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 199+17	**OFFSET** 45 ft LT	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,882.6 ft	**TOTAL DEPTH** 20.9 ft	**NORTHING** 931,658	**EASTING** 1,261,564	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER M. Morgan	**START DATE** 10/01/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
2885										2,882.6 GROUND SURFACE 0.0
										embankmant: brown to red silty fine sand with mica
2880										
	2,877.7	4.9	2	2	2	4				
2875										
	2,872.7	9.9	2	3	3	6				2,870.1 12.5
2870										alluvium: silty sand with gravel
	2,867.7	14.9	9	17	11	28				
2865										
	2,862.7	19.9	20	80/.2		100/.7				2,862.1 20.5
										2,861.8 20.8 weathered rock
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,861.7 ft on crystalline rock

NCDOT BORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/12/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost	
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 199+41	**OFFSET** 45 ft RT	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,873.0 ft	**TOTAL DEPTH** 12.7 ft	**NORTHING** 931,643	**EASTING** 1,261,656	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER M. Morgan	**START DATE** 09/24/13	**COMP. DATE** 09/24/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
2875										2,873.0 GROUND SURFACE 0.0
										alluvium: tan coarse sand with gravel and cobbles
2870										
	2,868.0	5.0	8	11	9	20				2,865.5 7.5
2865										saprolite: white to gray silty sand with rock fragments and mica
	2,863.0	10.0	9	9	34	43				
	2,860.4	12.6	60/.1			60/1				2,860.4 12.6
										2,860.3 12.7 crystalline rock
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,860.3 ft on crystalline rock

NCDOT BORE SINGLE R2915_GEO_CULV3_BORINGS.GPJ NC_DOT.GDT 12/12/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

16/20

WBS 34518.1.3	**TIP** R2915B	**COUNTY** ASHE	**GEOLOGIST** R. DeLost
SITE DESCRIPTION Replace Ashe County Culvert C3 with dual bridges on US 221 over Gap Creek			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 199+27	**OFFSET** CL	**ALIGNMENT** I	**0 HR.** FIAD
COLLAR ELEV. 2,873.4 ft	**TOTAL DEPTH** 7.4 ft	**NORTHING** 931,649	**EASTING** 1,261,609	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic
DRILLER M. Morgan	**START DATE** 09/23/13	**COMP. DATE** 09/23/13	**SURFACE WATER DEPTH** N/A

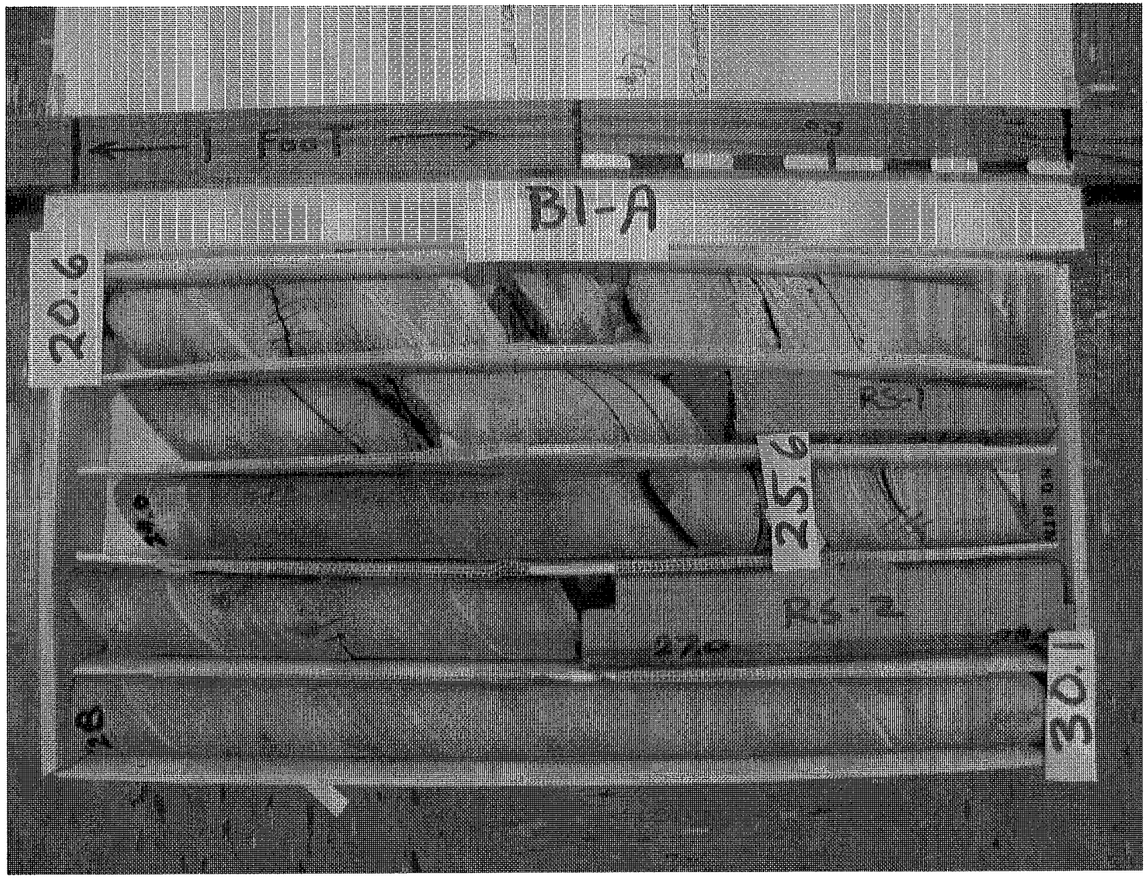
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2875										
										2,873.4 GROUND SURFACE 0.0
										alluvium: tan silty sand
2870										2,870.7 2.7
										weathered rock
	2,868.3	5.1	27	75						
	2,866.1	7.3	60/.1			60/.1				2,866.1 7.3
										2,866.0 crystalline rock 7.4
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,866.0 ft on crystalline rock

R-2915 B 34518.1.3

BORING B1-A

BOX 1 OF 2

DEPTH: 20.6 – 30.1

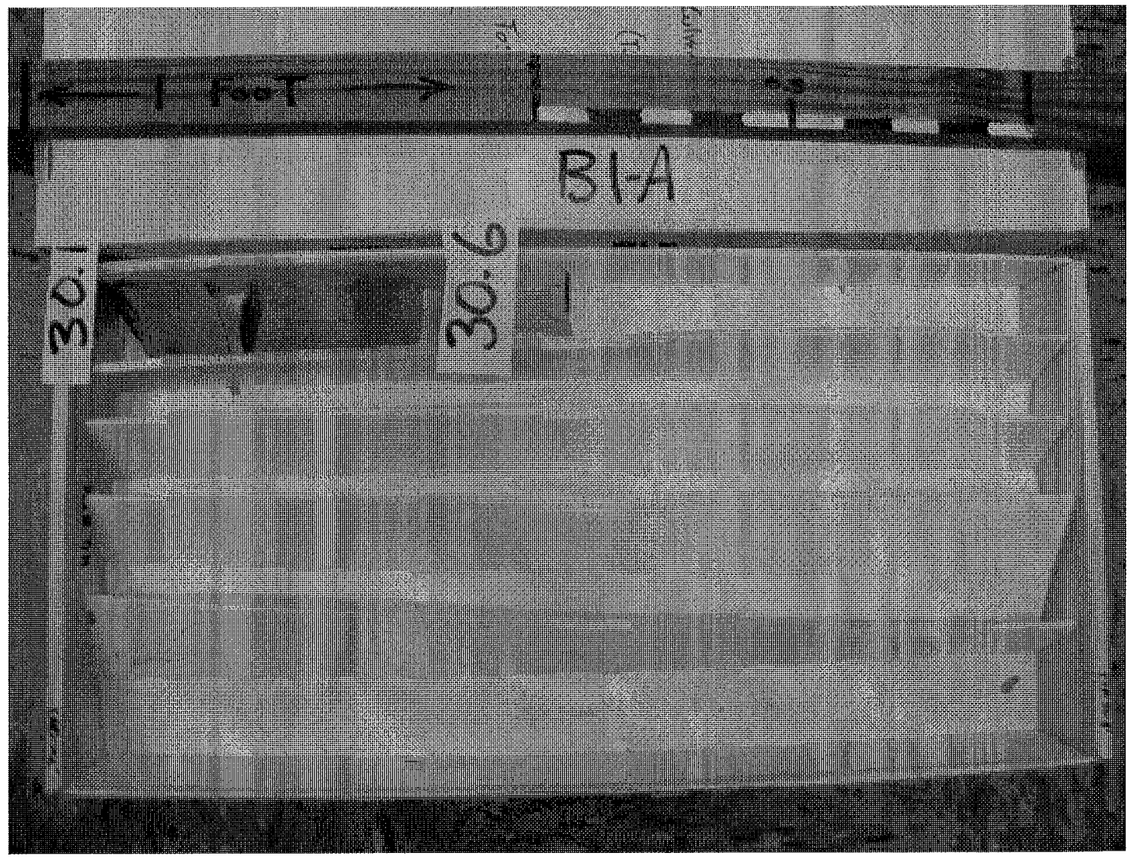


R-2915 B 34518.1.3

BORING B1-A

BOX 2 OF 2

DEPPTH: 30.1 – 30.6

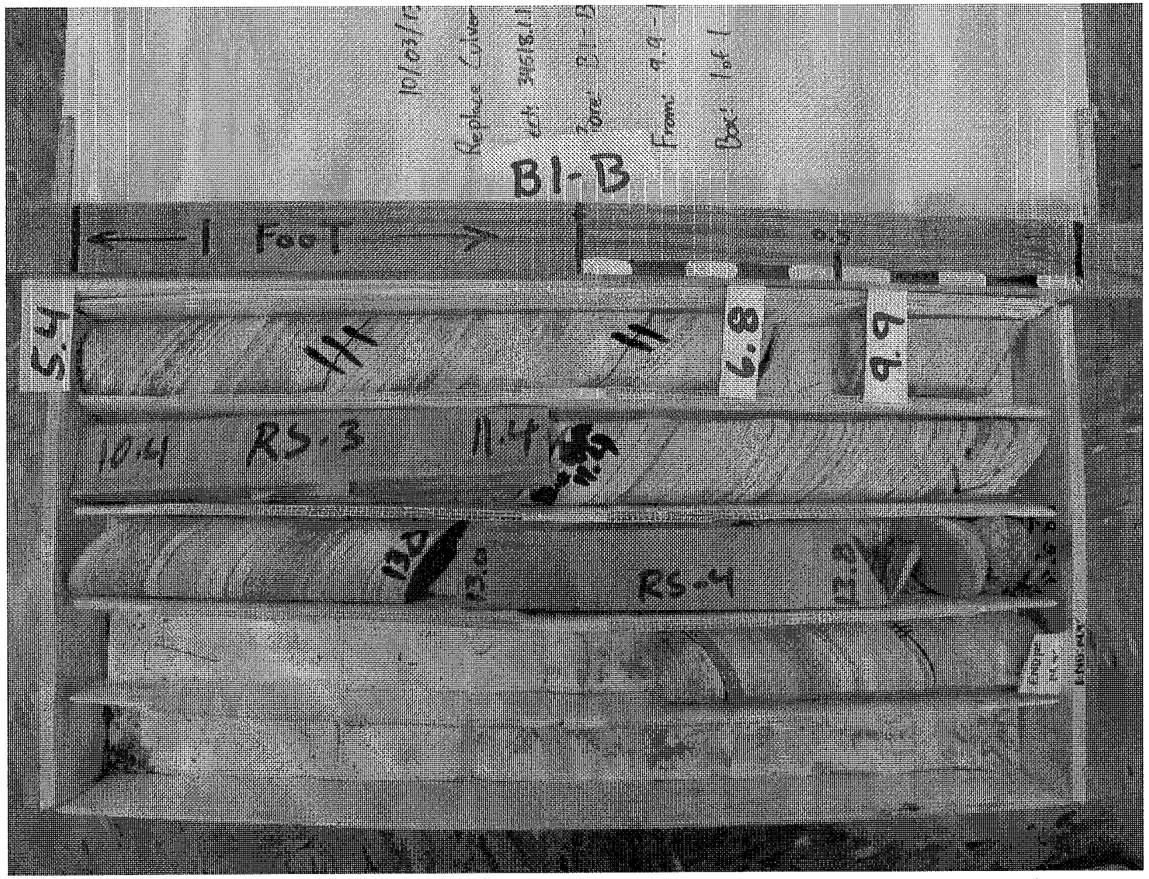


R-2915 B 34518.1.3

BORING B1-B

BOX 1 OF 1

DEPTH: 5.4 – 14.9

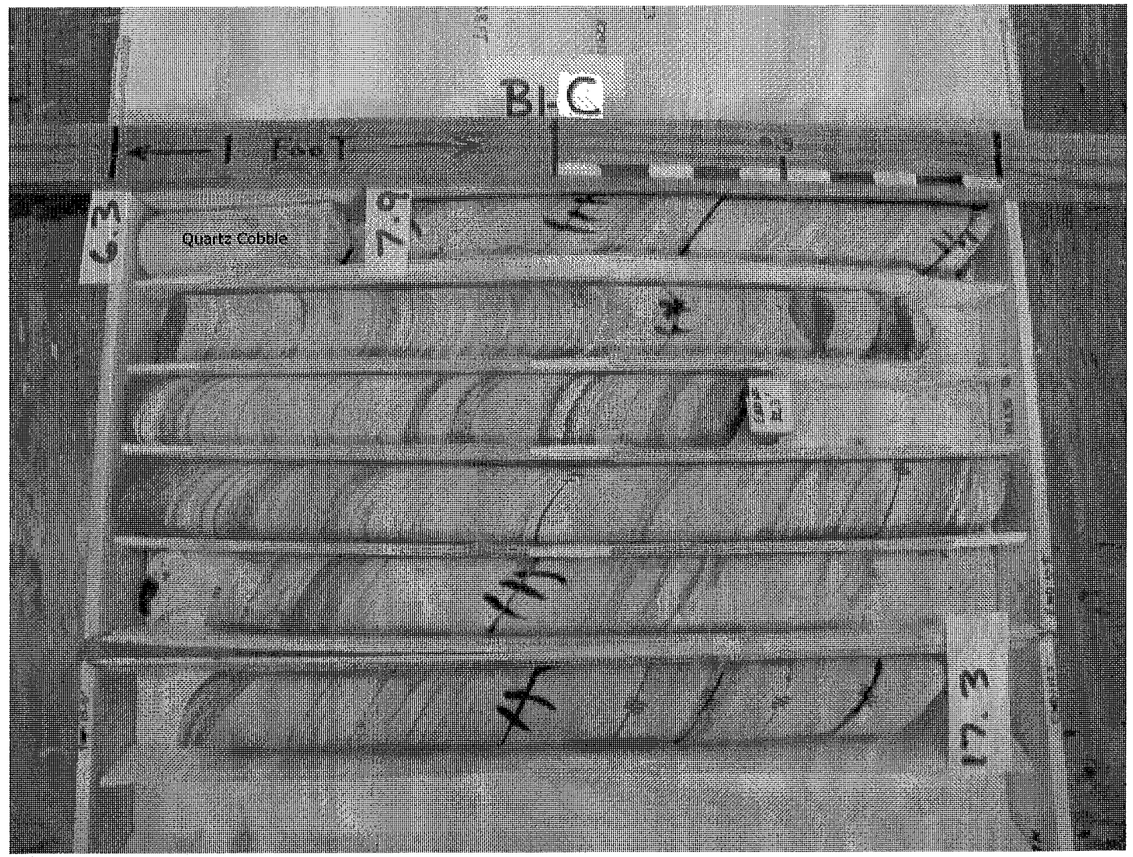


R-2915 B 34518.1.3

BORING B1-C

BOX 1 OF 1

DEPPTH: 6.3 – 17.3

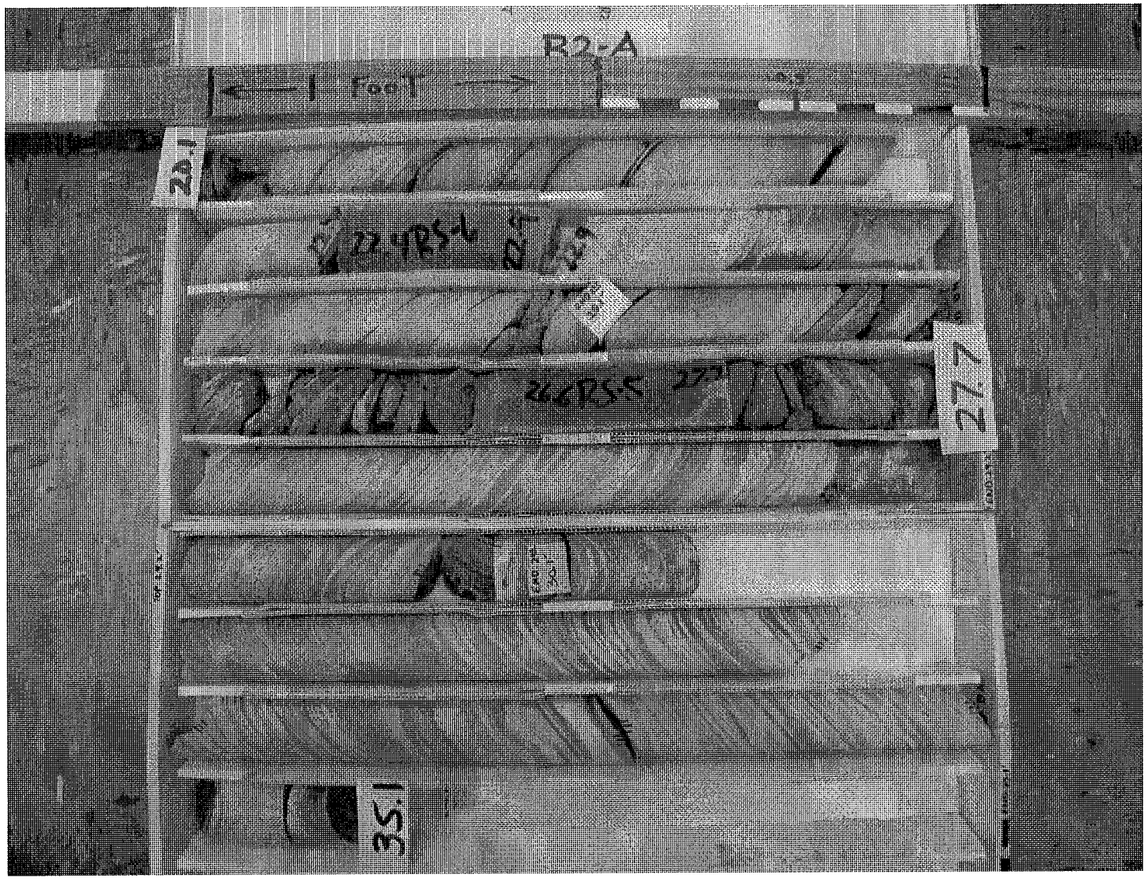


R-2915 B 34518.1.3

BORING B2-A

BOXS 1 AND 2

DEPTH: 20.1 – 35.1



R-2915 B 34518.1.3

BORING B2-B

BOX 1 OF 1

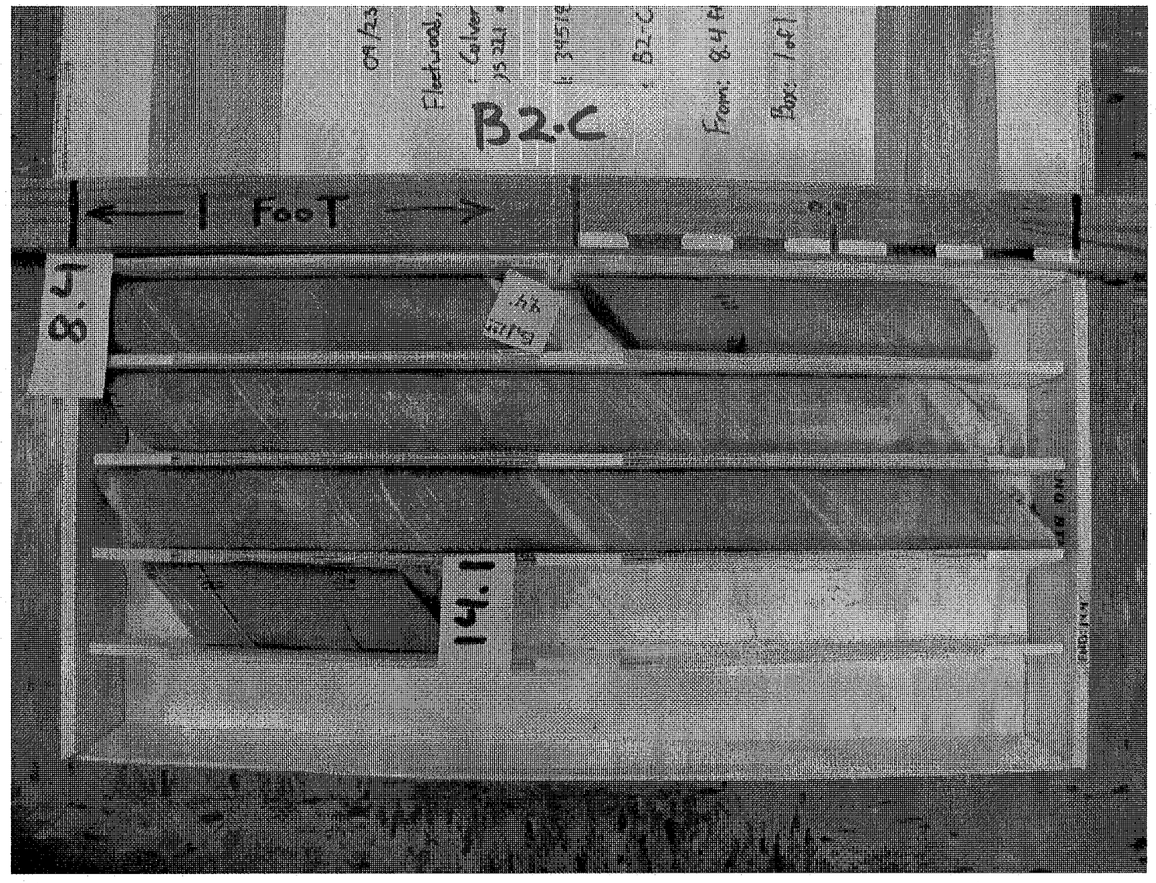
DEPPTH: 6.1 – 11.1

R-2915 B 34518.1.3

BORING B2-C

BOX 1 OF 1

DEPTH: 8.4 – 14.4



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2915B 34518.1.3	1	20

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. R-2915B 34518.1.3 F.A. PROJ. _____

COUNTY ASHE

PROJECT DESCRIPTION BRIDGE NO. 4 ON US 221 OVER THE SOUTH FORK OF THE NEW RIVER (OVERFLOW)

SITE DESCRIPTION NB BRIDGE, STA. 234+00

ID: R-2915B BR. 4

PROJECT: 34518.1.3

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.

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PERSONNEL
DC ELLIOTT
CJ COFFEY
DO CHEEK

INVESTIGATED BY JC KUHNE

CHECKED BY _____

SUBMITTED BY JC KUHNE

DATE 9/23/2013

NORTH CAROLINA LICENSED SEAL 1878 GEOLOGIST JODY KUHNE

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.

PROJECT REFERENCE NO.	SHEET NO.
R-2915B 34518.1.3	2 OF 20

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT DMT PMT VST — 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_w - 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
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [X] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" 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 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

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

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

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: BL POINT 56

ELEVATION: 2870.83 FT.

NOTES:

REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET
R-2915B 34518.1.3	3 OF 20

SITE PLAN

0 30 60

FEET

SKEW = 135

NAD 83/NSRS 2007 NC GRID

235+00

REBAR & CAP

EXISTING RW

RIPRAP

RETAIN EXISTING BRIDGE

WD

JS

SF

12" CMP

RIPRAP

BRIDGE #4

CONC

MTL

PROPERTY LINE=EXISTING RW

9' SOIL

EBI-A 233+27 26' RT

BI-A 233+82 20' RT

B2-A 234+26 15' RT

EB2-A 234+71 14.5' RT

EBI-B 233+09 45' RT

BI-B 233+56 41' RT

B2-B 233+96 45' RT

EB2-B 234+40 45' RT

36" CMP

F

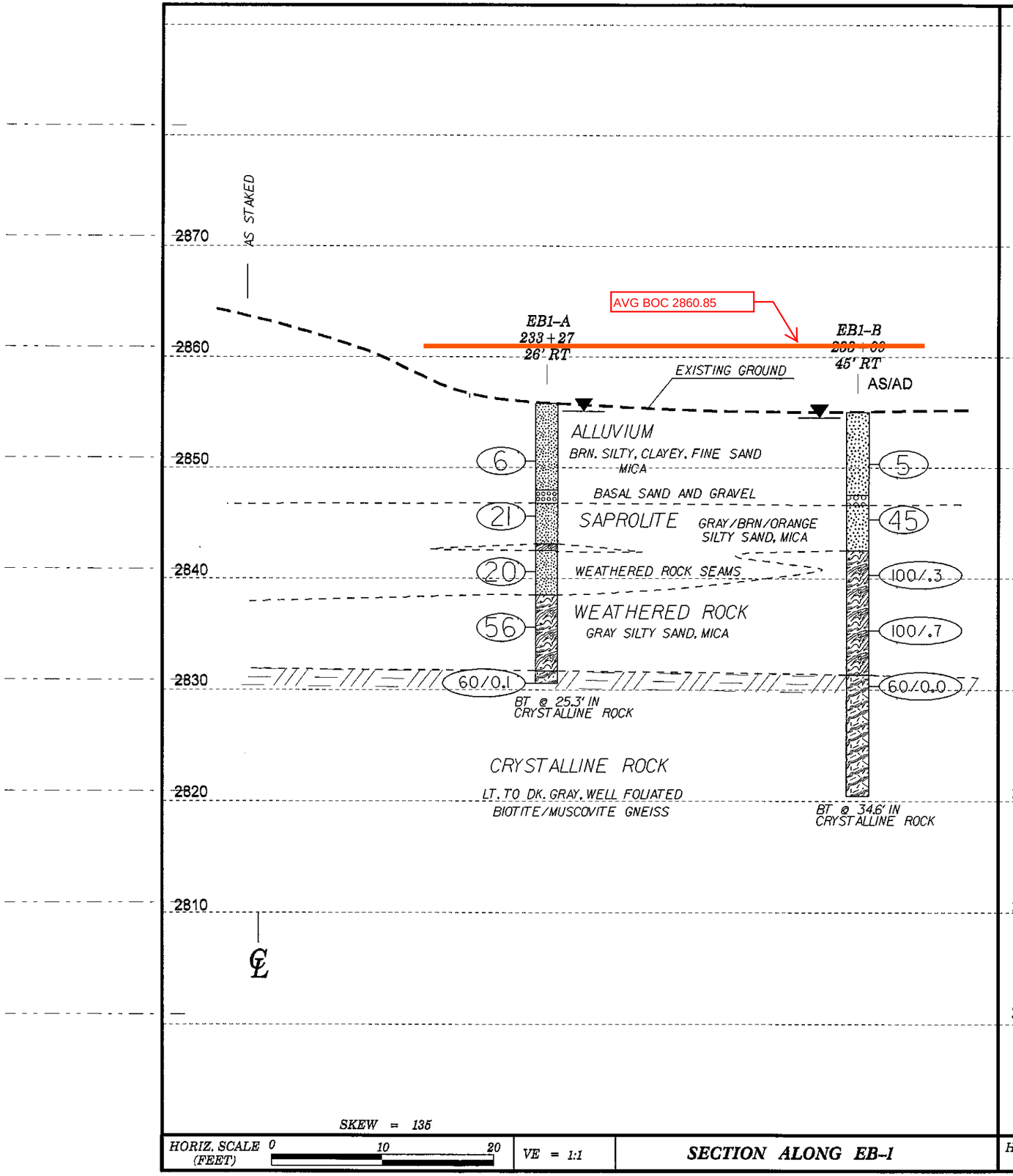
C

E

RW

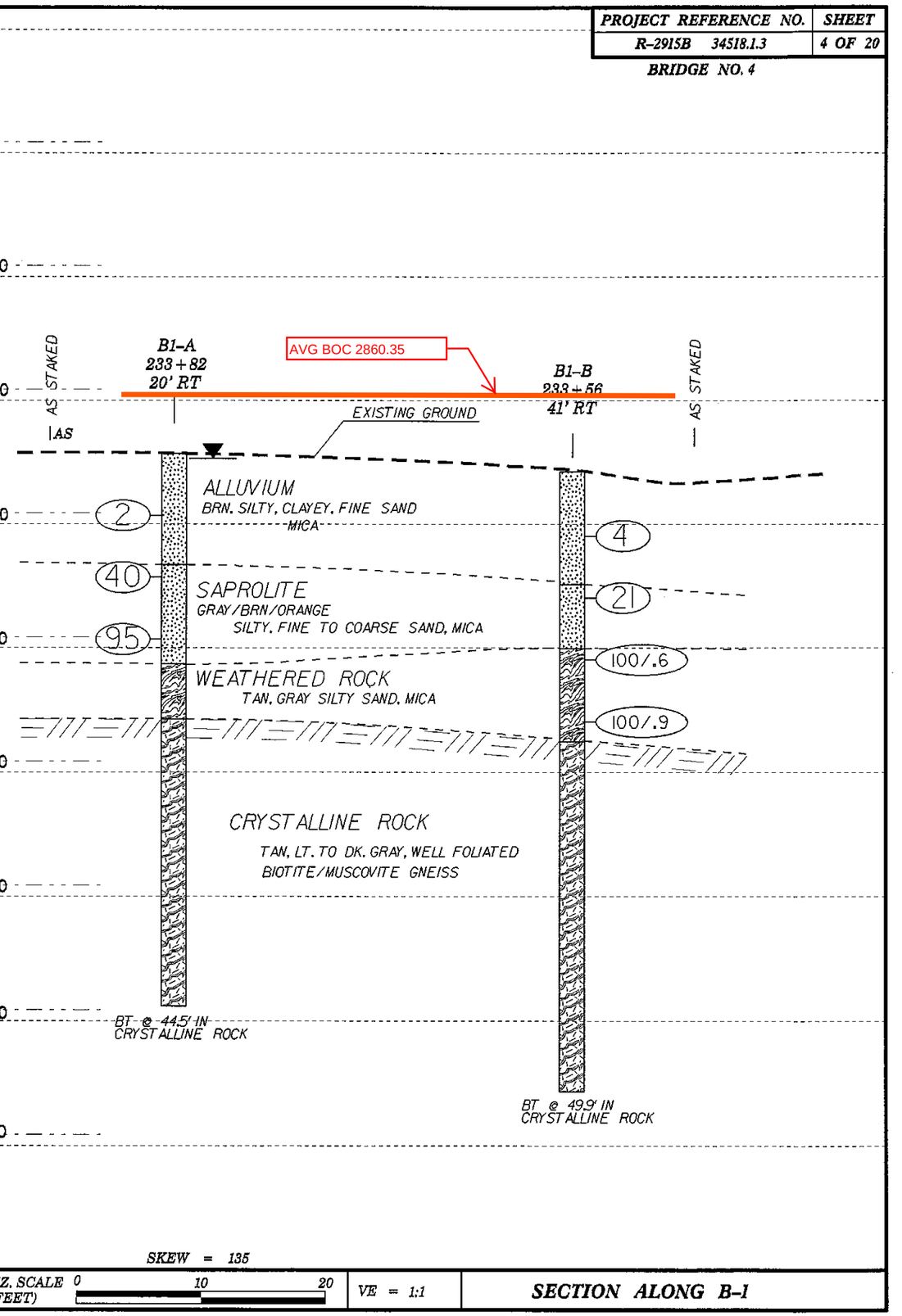
PROJECT REFERENCE NO.	SHEET
R-2915B 34518.1.3	4 OF 20

BRIDGE NO. 4



SKEW = 135

HORIZ. SCALE (FEET) 0 10 20 | VE = 1:1 | **SECTION ALONG EB-1**



SKEW = 135

HORIZ. SCALE (FEET) 0 10 20 | VE = 1:1 | **SECTION ALONG B-1**

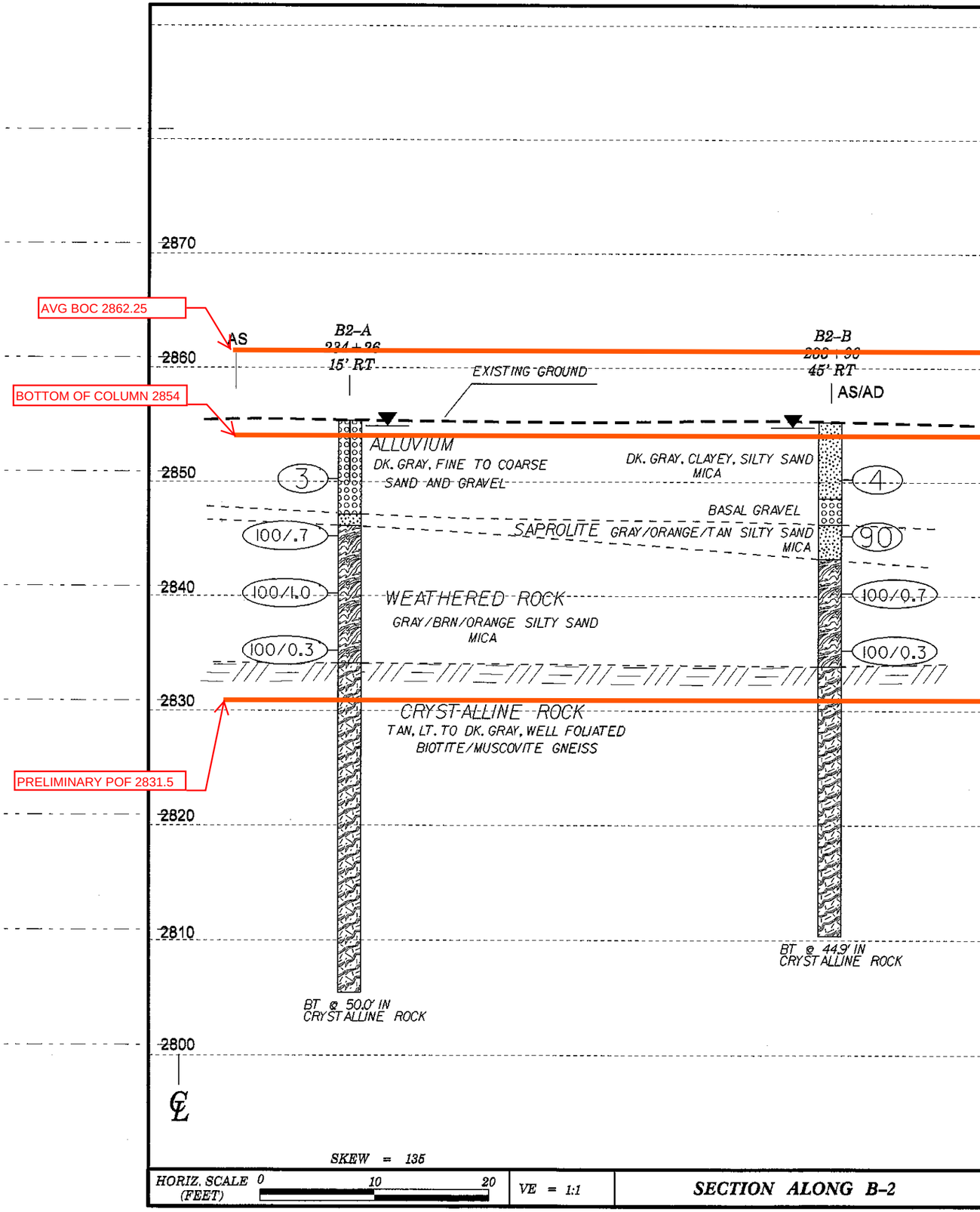
PROJECT REFERENCE NO.	SHEET
R-2915B 34518.1.3	5 OF 20

BRIDGE NO. 4

AVG BOC 2862.25

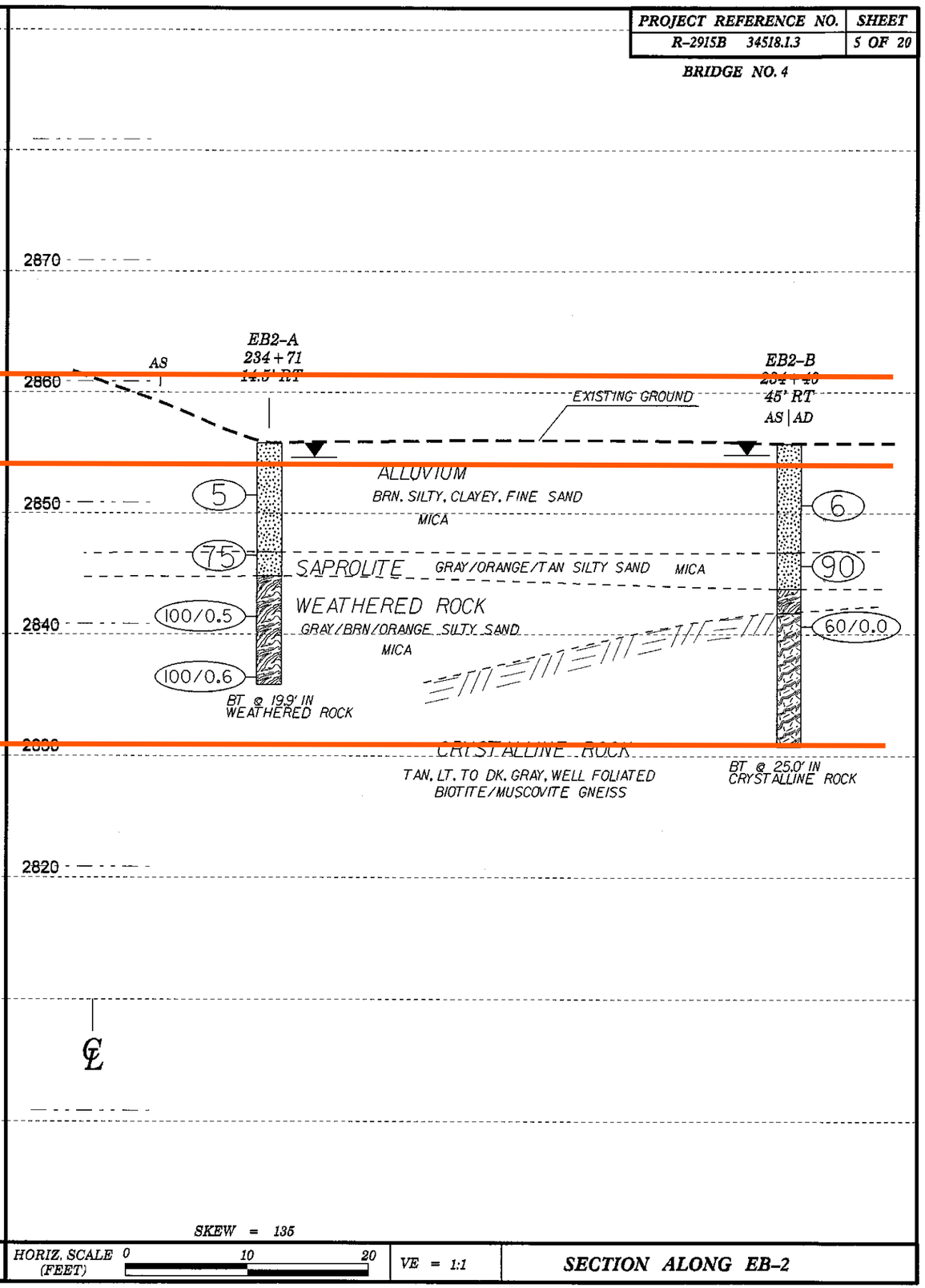
BOTTOM OF COLUMN 2854

PRELIMINARY POF 2831.5



SKEW = 135

HORIZ. SCALE (FEET) 0 10 20 | VE = 1:1 | **SECTION ALONG B-2**



SKEW = 135

HORIZ. SCALE (FEET) 0 10 20 | VE = 1:1 | **SECTION ALONG EB-2**

PROJECT REFERENCE NO.		SHEET
R-2915B	34518.1.3	6 OF 20
BRIDGE 4, PROFILE 45' RT		

0 10 20
FEET
VE = 1:1

2870
2860
2850
2840
2830
2820
2810
2800

EB1-B
233+09
45' RT
AS/AD

B1-B
233+56
AS 41' RT

B2-B
233+96
45' RT
AS/AD

EB2-B
234+40
45' RT
AS|AD

EXISTING GROUND

ALLUVIUM
BRN. SILTY, CLAYEY, FINE SAND
MICA
BASAL SAND AND GRAVEL

5
45
100/.3
100/.7
60/0.0

SAPROLITE GRAY/BRN/ORANGE SILTY SAND, MICA
WEATHERED ROCK SEAMS

WEATHERED ROCK
GRAY SILTY SAND, MICA

BT @ 34.6' IN
CRYSTALLINE ROCK

CRYSTALLINE ROCK
TAN, LT. TO DK. GRAY, WELL FOLIATED
BIOTITE/MUSCOVITE GNEISS

4
21
100/.6
100/.9

ALLUVIUM
DK. GRAY, FINE TO COARSE
SAND AND GRAVEL

SAPROLITE GRAY/ORANGE/TAN SILTY SAND
MICA

WEATHERED ROCK
GRAY/BRN/ORANGE SILTY SAND
MICA

BT @ 49.9' IN
CRYSTALLINE ROCK

BASAL GRAVEL

4
90
100/0.7
100/0.3

DK. GRAY, CLAYEY, SILTY SAND
MICA

SAPROLITE GRAY/ORANGE/TAN SILTY SAND MICA

WEATHERED ROCK
GRAY/BRN/ORANGE SILTY SAND
MICA

BT @ 44.9' IN
CRYSTALLINE ROCK

CRYSTALLINE ROCK
TAN, LT. TO DK. GRAY, WELL FOLIATED
BIOTITE/MUSCOVITE GNEISS

6
90
60/0.0

ALLUVIUM
BRN. SILTY, CLAYEY, FINE SAND
MICA

BT @ 25.0' IN
CRYSTALLINE ROCK

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.	
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 233+27	**OFFSET** 26 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,855.9 ft	**TOTAL DEPTH** 25.3 ft	**NORTHING** 934,177	**EASTING** 1,263,751	**24 HR.** 0.7
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 08/26/13	**COMP. DATE** 08/26/13	**SURFACE WATER DEPTH** N/A	

AVG BOC 2860.85

LAYER 1 - NEW EMBANKMENT FILL: WELL GRADED SAND W/ AVG BPF 10

LAYER 2 - ALLUVIAL: CLAY W/ AVG BPF 6

LAYER 3 - RESIDUAL: FINE WELL GRADED SAND W/ AVG BPF 20

LAYER 4 - PWR: BPF 100+, 6 TO 12 KSF SKIN AND 20 TO 100 END BEARING

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
									GROUND SURFACE	2,855.9	0.0
									ALLUVIAL DK BRN, FINE SANDY SILTY CLAY W/ ORGANIC. SOME MICA		
	2,850.7	5.2	2	2	4		M			2,848.1	7.8
									ALLUVIAL GRAVEL W/ SAND	2,846.9	9.0
	2,845.7	10.2	10	11	10		M		**SAPROLITE** BRN/GRAY/ORANGE SILTY SAND W/ MICA	2,843.2	12.7
									WEATHERED ROCK WEATHERED ROCK SEAM	2,842.6	13.3
	2,840.7	15.2	8	11	9		M		**SAPROLITE** BRN/GRAY/ORANGE SILTY SAND W/ MICA	2,838.6	17.3
	2,835.7	20.2	9	20	36		M		**WEATHERED ROCK** WEATHERED ROCK W/ SAPROLITE SEAMS	2,831.8	24.1
	2,830.7	25.2	60/.1		60/.1				**CRYSTALLINE ROCK** TAN/GRAY MUSCOVITE/BIOTITE GNEISS Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,830.6 ft IN CRYSTALLINE ROCK, MICA GNEISS	2,830.7	25.2

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.	
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 233+09	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,855.1 ft	**TOTAL DEPTH** 34.6 ft	**NORTHING** 934,156	**EASTING** 1,263,768	**24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Coffey, Jr., C.	**START DATE** 08/26/13	**COMP. DATE** 08/26/13	**SURFACE WATER DEPTH** N/A	

AVG BOC 2860.85

LAYER 1 - NEW EMBANKMENT FILL: WELL GRADED SAND W/ AVG BPF 10

LAYER 2 - ALLUVIAL: CLAY W/ AVG BPF 6

LAYER 3 - RESIDUAL: FINE WELL GRADED SAND W/ AVG BPF 45

LAYER 4 - PWR: BPF 100+, 6 TO 12 KSF SKIN AND 20 TO 100 END BEARING

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
									GROUND SURFACE	2,855.1	0.0
									ALLUVIAL DK BRN, FINE SILTY SANDY CLAY W/ MICA		
	2,850.4	4.7	1	2	3		M			2,847.6	7.5
									ALLUVIAL GRAVEL W/ SAND	2,846.7	8.4
	2,845.4	9.7	8	15	30		M		**SAPROLITE** GRAY/BRN/ORANGE SILTY FINE SAND. SOME MICA	2,842.6	12.5
	2,840.4	14.7	100/.3		100+				**WEATHERED ROCK** DK GRAY/BLK, BIOTITE GNEISS W/ SAPROLITE SEAMS		
	2,835.4	19.7	62		38/.2					2,831.4	23.7
	2,830.4	24.7	60/0.0		100+				**CRYSTALLINE ROCK** GRAY, WELL FOLIATED MICA GNEISS		
					60/0.0					2,820.5	34.6
									Boring Terminated at Elevation 2,820.5 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS		

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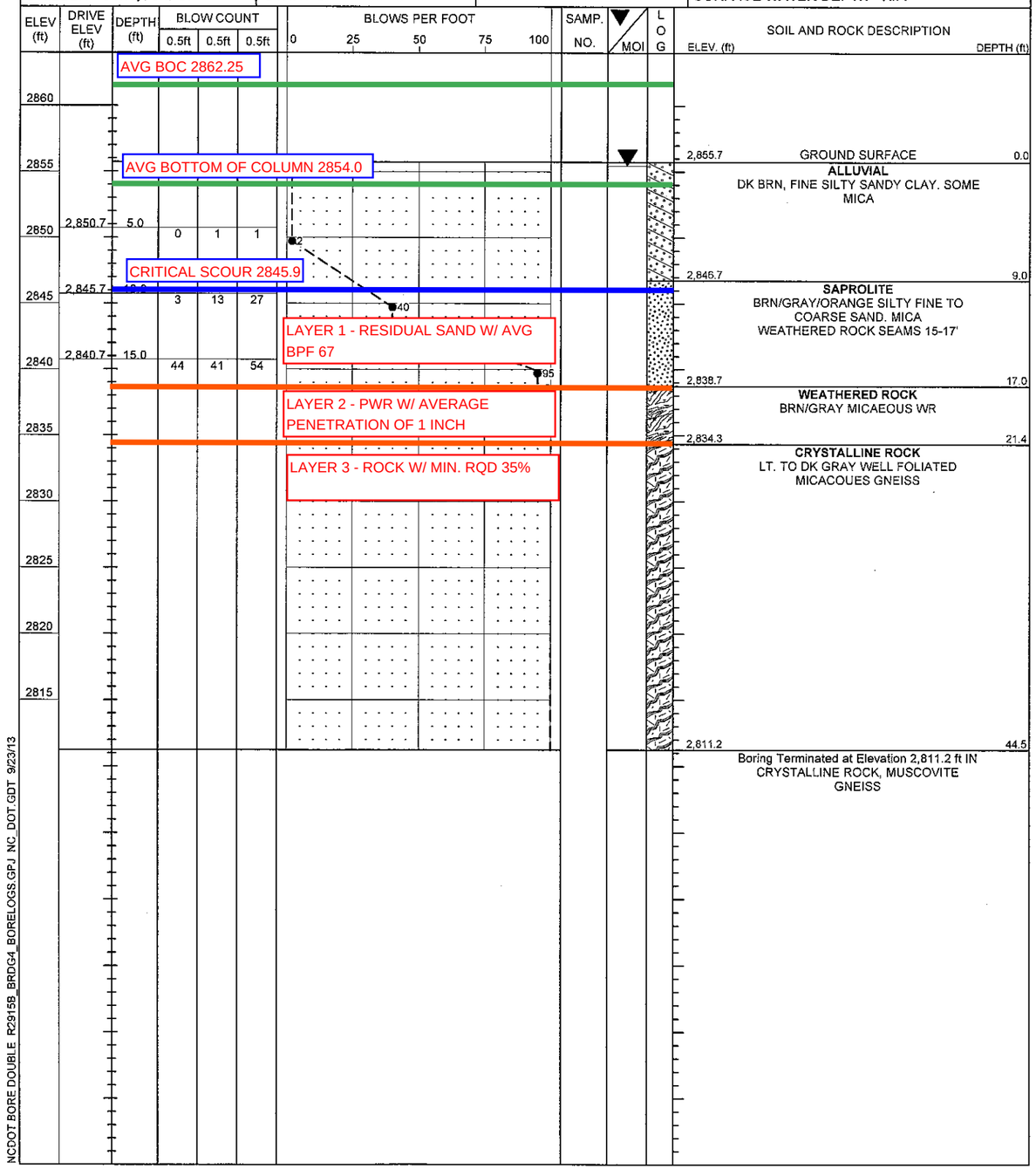
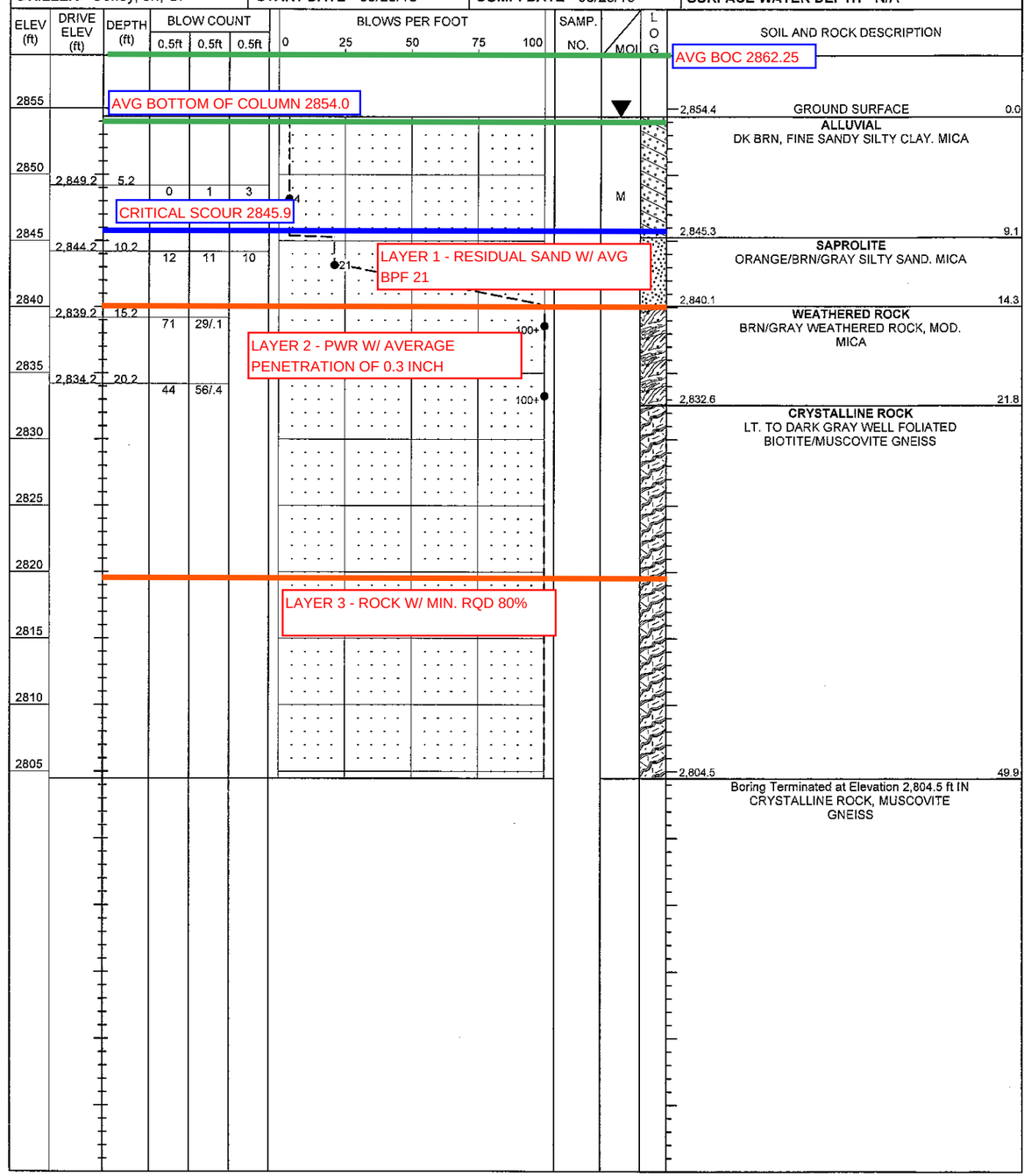
WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 233+82	**OFFSET** 20 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,855.7 ft	**TOTAL DEPTH** 44.5 ft	**NORTHING** 934,232	**EASTING** 1,263,751 / **24 HR.** 0.3
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Coffey, Jr., C.	**START DATE** 08/28/13	**COMP. DATE** 08/28/13	**SURFACE WATER DEPTH** N/A



WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 233+56	**OFFSET** 41 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 2,854.4 ft	**TOTAL DEPTH** 49.9 ft	**NORTHING** 934,204	**EASTING** 1,263,769 / **24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Coffey, Jr., C.	**START DATE** 08/28/13	**COMP. DATE** 08/28/13	**SURFACE WATER DEPTH** N/A



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BORELOG REPORT

SHEET 9/20

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 234+26	**OFFSET** 15 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 2,855.4 ft	**TOTAL DEPTH** 50.0 ft	**NORTHING** 934,276	**EASTING** 1,263,751 — **24 HR.** 0.6
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Coffey, Jr., C.	**START DATE** 08/27/13	**COMP. DATE** 08/27/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
						AVG BOC 2862.25					
2860											
2855						AVG BOTTOM OF COLUMN 2854.0				2,855.4 GROUND SURFACE	0.0
										ALLUVIAL	
										GRAY, FINE TO COARSE SAND AND GRAVEL	
2850	2,850.3	5.1	1	2	1	3		M			
						CRITICAL SCOUR 2845.5				2,847.2	8.2
										2,846.1 SAPROLITE	9.3
2845	2,845.3		18	48	52/.2					NO DESC.	
										WEATHERED ROCK	
						100+				GRAY/BRN/ORANGE MICACEOUS WEATHERED ROCK W/ SAPROLITE SEAMS	
						LAYER 1 - PWR W/ AVERAGE PENETRATION OF 0.4 INCH					
2840	2,840.3	15.1	31	69/.5		100					
2835	2,835.3	20.1	100/.3			100+				2,834.1	21.3
						LAYER 2 - ROCK W/ MIN. RQD 32%				CRYSTALLINE ROCK	
2830										LT. TO DARK GRAY/TAN, WELL FOLIATED, BIOTITE/MUSCOVITE GNEISS	
2825											
2820											
2815											
2810										2,805.4	50.0
										Boring Terminated at Elevation 2,805.4 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS	

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 233+96	**OFFSET** 45 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 2,855.3 ft	**TOTAL DEPTH** 44.9 ft	**NORTHING** 934,244	**EASTING** 1,263,777 — **24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Coffey, Jr., C.	**START DATE** 08/27/13	**COMP. DATE** 08/27/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
						AVG BOC 2862.25				
2860										
2855						AVG BOTTOM OF COLUMN 2854.0				2,855.3 GROUND SURFACE 0.0
										ALLUVIAL
										DK GRAY, CLAYEY/SILTY FINE SAND W/ MICA
2850	2,850.3	5.0	2	1	3	4				
						CRITICAL SCOUR 2845.5				2,846.6 6.7
										2,846.3 ALLUVIAL
2845	2,845.3		22	40	50					BASAL COARSE SAND AND GRAVEL 9.0
						90				SAPROLITE
						LAYER 1 - PWR W/ AVERAGE PENETRATION OF 1 INCH				GRAY/BRN/ORANGE SILTY SAND. HIGH MICA
2840	2,840.3	15.0	16	63	37/.2	100+				2,843.3 12.0
2835	2,835.3	20.0	100/3			100+				WEATHERED ROCK
										GRAY/BRN MICACEOUS WEATHERED ROCK
2830										
2825										
2820										
2815										
										2,833.9 21.4
										CRYSTALLINE ROCK
										LT. TO DARK GRAY/TAN, WELL FOLIATED, MUSCOVITE/BIOTITE GNEISS
										2,810.4 44.9
										Boring Terminated at Elevation 2,810.4 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS

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WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.	
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 234+71	**OFFSET** 15 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,855.8 ft	**TOTAL DEPTH** 19.9 ft	**NORTHING** 934,321	**EASTING** 1,263,755	**24 HR.** 1.2
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Coffey, Jr., C.	**START DATE** 08/26/13	**COMP. DATE** 08/26/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2860										AVG BOC 2860.36
										LAYER 1 - NEW EMBANKMENT FILL: WELL GRADED SAND W/ AVG BPF
2855										ELEV. (ft) 2,855.8 GROUND SURFACE DEPTH (ft) 0.0
	2,851.5	4.3	4	2	3	5		M		**ALLUVIAL** DK. BRN., SILTY, CLAYEY FINE SAND W/ MICA. BASAL GRAVELS 6-11'
2850										LAYER 2 - ALLUVIAL: CLAY W/ AVG BPF 5
	2,846.5	9.3	14	29	46	75		M		LAYER 3 - RESIDUAL: WELL GRADE FINE SAND AVG BPF 75
2845										2,846.8 9.0
										SAPROLITE TAN/ORANGE/GRAY SILTY FINE TO COARSE SAND. MICA 2,844.8 11.0
	2,841.5	14.3	100/.5			100+				**WEATHERED ROCK** BRN/GRAY SILTY SAND. SAPROLITE SEAMS TO 14'.
2840										LAYER 4 - PWR: BPF 100+, 6 TO 12 KSF SKIN AND 20 TO 100 END BEARING
	2,836.5	19.3	74	26/.1		100+				2,835.9 19.9
										Boring Terminated at Elevation 2,835.9 ft IN WEATHERED ROCK, GNEISS

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.	
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 234+40	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,855.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 934,287	**EASTING** 1,263,782	**24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Coffey, Jr., C.	**START DATE** 08/27/13	**COMP. DATE** 08/27/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2860										AVG BOC 2860.36
										LAYER 1 - NEW EMBANKMENT FILL: WELL GRADED SAND W/ AVG BPF
2855										2,855.8 GROUND SURFACE 0.0
	2,850.7	5.1	3	3	3	6		M		**ALLUVIAL** DK. GRAY, CLAYEY SILTY FINE SAND. BASAL GRAVELS 7.8-9'. MICA
2850										LAYER 2 - ALLUVIAL: CLAY W/ AVG BPF 6
	2,845.7	10.1	21	31	59	90		M		LAYER 3 - RESIDUAL: WELL GRADE FINE SAND AVG BPF 90
2845										9.0
										SAPROLITE DK BRN/GRAY SILTY FINE SAND. MICA 2,843.8 WEATHERED ROCK SEAMS 12.0
	2,840.7	15.1	60/0.0			60/0.0				**WEATHERED ROCK** 2,841.8 WEATHERED MICACEOUS GNEISS 14.0
2840										**CRYSTALLINE ROCK** LT. TO DK. GRAY, WELL FOLIATED, MUSCOVITE/BIOTITE GNEISS
										LAYER 4 - PWR: BPF 100+, 6 TO 12 KSF SKIN AND 20 TO 100 END BEARING
2835										2,830.8 25.0
										Boring Terminated at Elevation 2,830.8 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS

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WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 233+82	**OFFSET** 20 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 2,855.7 ft	**TOTAL DEPTH** 44.5 ft	**NORTHING** 934,232	**EASTING** 1,263,751 — **24 HR.** 0.3
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Coffey, Jr., C.	**START DATE** 08/28/13	**COMP. DATE** 08/28/13	**SURFACE WATER DEPTH** N/A
CORE SIZE NXWL	**TOTAL RUN** 23.1 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2834.33											Begin Coring @ 21.4 ft
	2,834.3	21.4	3.1	0:32/1.0 0:41/1.0 0:39/1.1	(2.8) 90%	(1.1) 35%					2,834.3 **CRYSTALLINE ROCK** 21.4
	2,831.2	24.5									
2830			5.0	0:40/1.0 0:39/1.0 0:44/1.0 0:42/1.0 0:49/1.0	(4.7) 94%	(2.7) 54%					
	2,826.2	29.5									
2825			5.0	0:32/1.0 0:50/1.0 0:52/1.0 0:50/1.0 0:39/1.0	(4.8) 96%	(3.0) 60%					
	2,821.2	34.5									
2820			5.0	0:47/1.0 0:42/1.0 0:38/1.0 0:41/1.0 0:44/1.0	(4.9) 98%	(2.4) 48%					
	2,816.2	39.5									
2815			5.0	0:57/1.0 1:04/1.0 1:12/1.0 0:59/1.0 1:01/1.0	(5.0) 100%	(4.2) 84%					
	2,811.2	44.5									2,811.2 44.5 Boring Terminated at Elevation 2,811.2 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 233+56	**OFFSET** 41 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 2,854.4 ft	**TOTAL DEPTH** 49.9 ft	**NORTHING** 934,204	**EASTING** 1,263,769 — **24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Coffey, Jr., C.	**START DATE** 08/28/13	**COMP. DATE** 08/28/13	**SURFACE WATER DEPTH** N/A
CORE SIZE NXWL	**TOTAL RUN** 28.1 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2832.58											Begin Coring @ 21.8 ft
	2,832.6	21.8	3.1	0:31/1.1 0:25/1.0 0:27/1.0	(2.1) 68%	(0.4) 13%					2,832.6 **CRYSTALLINE ROCK** 21.8
2830	2,829.5	24.9									
			5.0	0:11/1.0 0:17/1.0 0:27/1.0 0:10/1.0 0:12/1.0	(0.5) 10%	(0.0) 0% SAP AND WEAT.					
2825	2,824.5	29.9				ROCK					
			5.0	0:27/1.0 0:31/1.0 0:26/1.0 0:40/1.0 0:51/1.0	(2.0) 40%	(0.4) 8%					
2820	2,819.5	34.9									
			5.0	1:00/1.0 1:03/1.0 0:58/1.0 1:04/1.0 1:12/1.0	(4.8) 96%	(3.9) 78%					
2815	2,814.5	39.9									
			5.0	1:21/1.0 1:11/1.0 1:20/1.0 1:15/1.0 1:09/1.0	(5.0) 100%	(4.4) 88%					
2810	2,809.5	44.9									
			5.0	0:58/1.0 1:10/1.0 1:13/1.0 1:01/1.0 0:52/1.0	(4.6) 92%	(4.0) 80%					
2805	2,804.5	49.9									2,804.5 49.9 Boring Terminated at Elevation 2,804.5 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.		
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)				**GROUND WTR (ft)**	
BORING NO. B2-A	**STATION** 234+26	**OFFSET** 15 ft RT	**ALIGNMENT** -L-	**0 HR.**	N/A
COLLAR ELEV. 2,855.4 ft	**TOTAL DEPTH** 50.0 ft	**NORTHING** 934,276	**EASTING** 1,263,751	**24 HR.**	0.6
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic		
DRILLER Coffey, Jr., C.	**START DATE** 08/27/13	**COMP. DATE** 08/27/13	**SURFACE WATER DEPTH** N/A		
CORE SIZE NXWL	**TOTAL RUN** 28.7 ft				

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2834.08											Begin Coring @ 21.3 ft
	2,834.1	21.3	3.7	0:21/0.7 0:31/1.0 0:30/1.0 0:41/1.0	(3.5) 95%	(1.8) 49%					2,834.1 ELEV. (ft) **CRYSTALLINE ROCK** 21.3 DEPTH (ft)
2830	2,830.4	25.0	5.0	NO/1.0 NO/1.0 NO/1.0 NO/1.0 NO/1.0	(4.5) 90%	(1.3) 26%					
2825	2,825.4	30.0	5.0	0:51/1.0 0:47/1.0 0:50/1.0 0:54/1.0 1:02/1.0	(4.4) 88%	(1.9) 38%					
2820	2,820.4	35.0	5.0	NO/1.0 NO/1.0 NO/1.0 NO/1.0 NO/1.0	(4.2) 84%	(1.8) 36%					
2815	2,815.4	40.0	5.0	NO/1.0 NO/1.0 NO/1.0 NO/1.0 NO/1.0	(4.6) 92%	(2.3) 46%					
2810	2,810.4	45.0	5.0	NO/1.0 NO/1.0 NO/1.0 NO/1.0 NO/1.0	(3.2) 64%	(1.9) 38% CORE BARREL PROBLEMS					
	2,805.4	50.0									2,805.4 ELEV. (ft) 50.0 DEPTH (ft) Boring Terminated at Elevation 2,805.4 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.		
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)				**GROUND WTR (ft)**	
BORING NO. B2-B	**STATION** 233+96	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.**	N/A
COLLAR ELEV. 2,855.3 ft	**TOTAL DEPTH** 44.9 ft	**NORTHING** 934,244	**EASTING** 1,263,777	**24 HR.**	0.5
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic		
DRILLER Coffey, Jr., C.	**START DATE** 08/27/13	**COMP. DATE** 08/27/13	**SURFACE WATER DEPTH** N/A		
CORE SIZE NXWL	**TOTAL RUN** 23.5 ft				

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2833.9											Begin Coring @ 21.4 ft
	2,833.9	21.4	3.5	0:21/0.5 0:56/1.0 0:49/1.0 0:41/1.0	(3.5) 100%	(1.1) 31%					2,833.9 **CRYSTALLINE ROCK** 21.4
2830	2,830.4	24.9	5.0	0:42/1.0 0:56/1.0 0:48/1.0 0:39/1.0 0:41/1.0	(4.3) 86%	(1.9) 38%					
2825	2,825.4	29.9	5.0	0:55/1.0 0:46/1.0 0:51/1.0 0:59/1.0 0:49/1.0	(4.2) 84%	(2.4) 48%					
2820	2,820.4	34.9	5.0	1:05/1.0 0:58/1.0 1:10/1.0 1:01/1.0 1:14/1.0	(4.9) 98%	(3.5) 70%					
2815	2,815.4	39.9	5.0	1:42/1.0 1:47/1.0 1:42/1.0 1:33/1.0 1:37/1.0	(5.0) 100%	(4.3) 86%					
	2,810.4	44.9									2,810.4 44.9 Boring Terminated at Elevation 2,810.4 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.		
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)				**GROUND WTR (ft)**	
BORING NO. EB1-B	**STATION** 233+09	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.**	N/A
COLLAR ELEV. 2,855.1 ft	**TOTAL DEPTH** 34.6 ft	**NORTHING** 934,156	**EASTING** 1,263,768	**24 HR.**	0.5
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic		
DRILLER Coffey, Jr., C.	**START DATE** 08/26/13	**COMP. DATE** 08/26/13	**SURFACE WATER DEPTH** N/A		
CORE SIZE NXWL	**TOTAL RUN** 8.1 ft				

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2828.56											Begin Coring @ 26.5 ft
	2,828.6	26.5	3.1	0:40/1.0 0:49/1.0 1:03/1.1	(2.4) 77%	(1.0) 32% SEAM @ 28.5'					**CRYSTALLINE ROCK** *(continued)*
2825	2,825.5	29.6	5.0	1:17/1.0 1:04/1.0 1:09/1.0 0:53/1.0 0:45/1.0	(4.6) 92%	(2.1) 42%					
	2,820.5	34.6									ELEV. (ft) 2,820.5 DEPTH (ft) 34.6 Boring Terminated at Elevation 2,820.5 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS

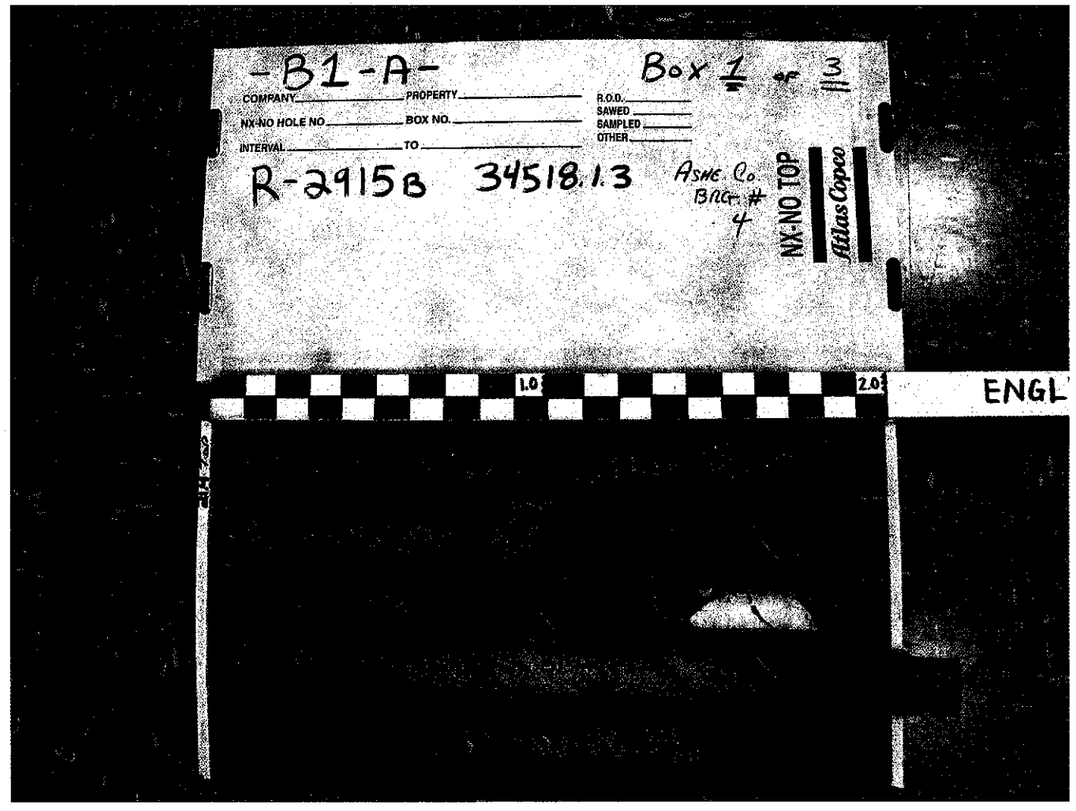
WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** Elliott, D. C.		
SITE DESCRIPTION BRIDGE #4 ON US 221 OVER S. FORK OF NEW RIVER (OVERFLOW)				**GROUND WTR (ft)**	
BORING NO. EB2-B	**STATION** 234+40	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.**	N/A
COLLAR ELEV. 2,855.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 934,287	**EASTING** 1,263,782	**24 HR.**	1.0
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic		
DRILLER Coffey, Jr., C.	**START DATE** 08/27/13	**COMP. DATE** 08/27/13	**SURFACE WATER DEPTH** N/A		
CORE SIZE NXWL	**TOTAL RUN** 8.9 ft				

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2839.7											Begin Coring @ 16.1 ft
	2,839.7	16.1	3.9	0:20/0.9 0:17/1.0 0:31/1.0 0:21/1.0	(1.0) 26%	(0.0) 0% SAPROLITE SEAMS					**CRYSTALLINE ROCK** *(continued)*
2835	2,835.8	20.0	5.0	0:23/1.0 0:29/1.0 0:41/1.0 0:32/1.0 0:46/1.0	(3.6) 72%	(1.1) 22% W. ROCK SEAMS					
	2,830.8	25.0									ELEV. (ft) 2,830.8 DEPTH (ft) 25.0 Boring Terminated at Elevation 2,830.8 ft IN CRYSTALLINE ROCK, MUSCOVITE GNEISS

R-2915B, 34518.1.3

BORING B1-A
BOX 1 OF 3

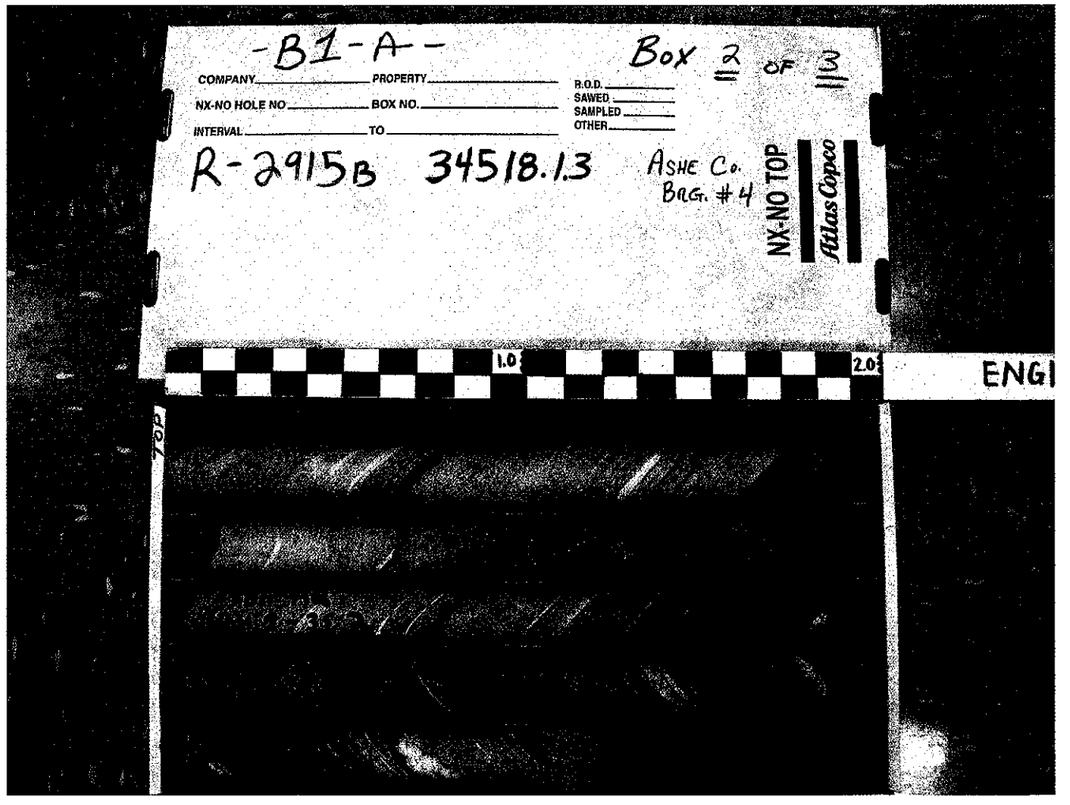
DEPTH: 21.4' – 30.0'



R-2915B, 34518.1.3

BORING B1-A
BOX 2 OF 3

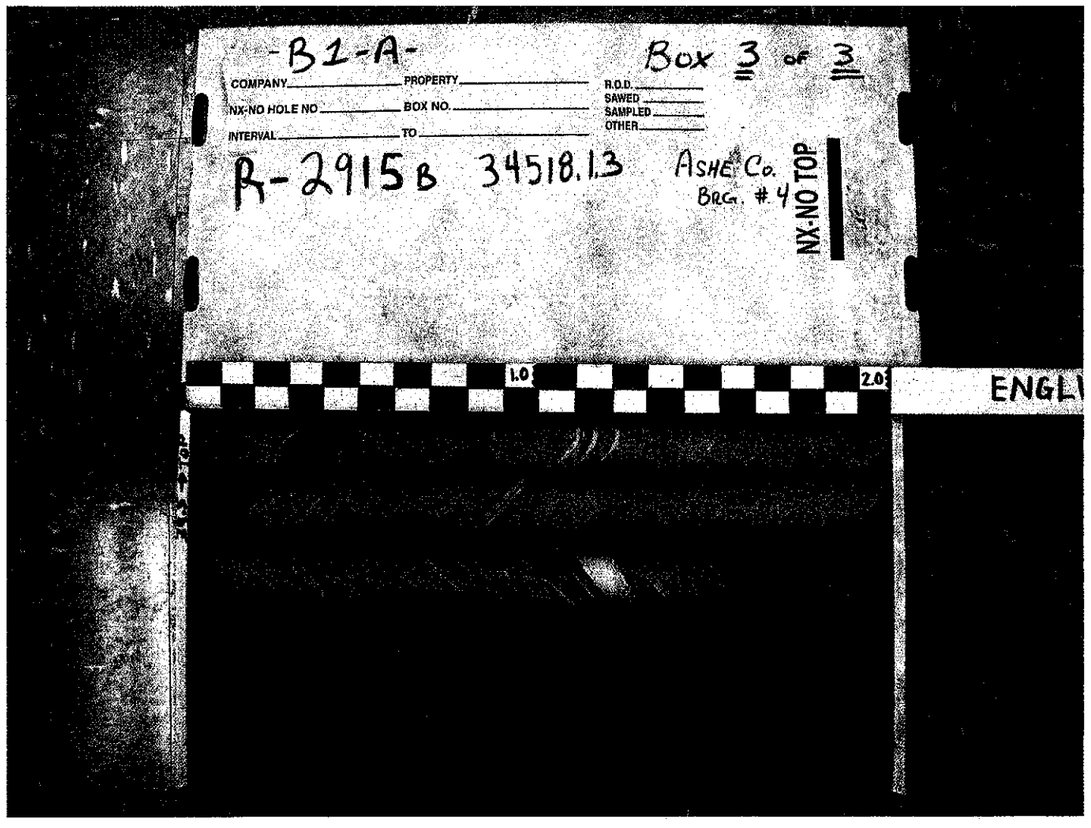
DEPTH: 30.0' – 39.5'



R-2915B, 34518.1.3

BORING B1-A
BOX 3 OF 3

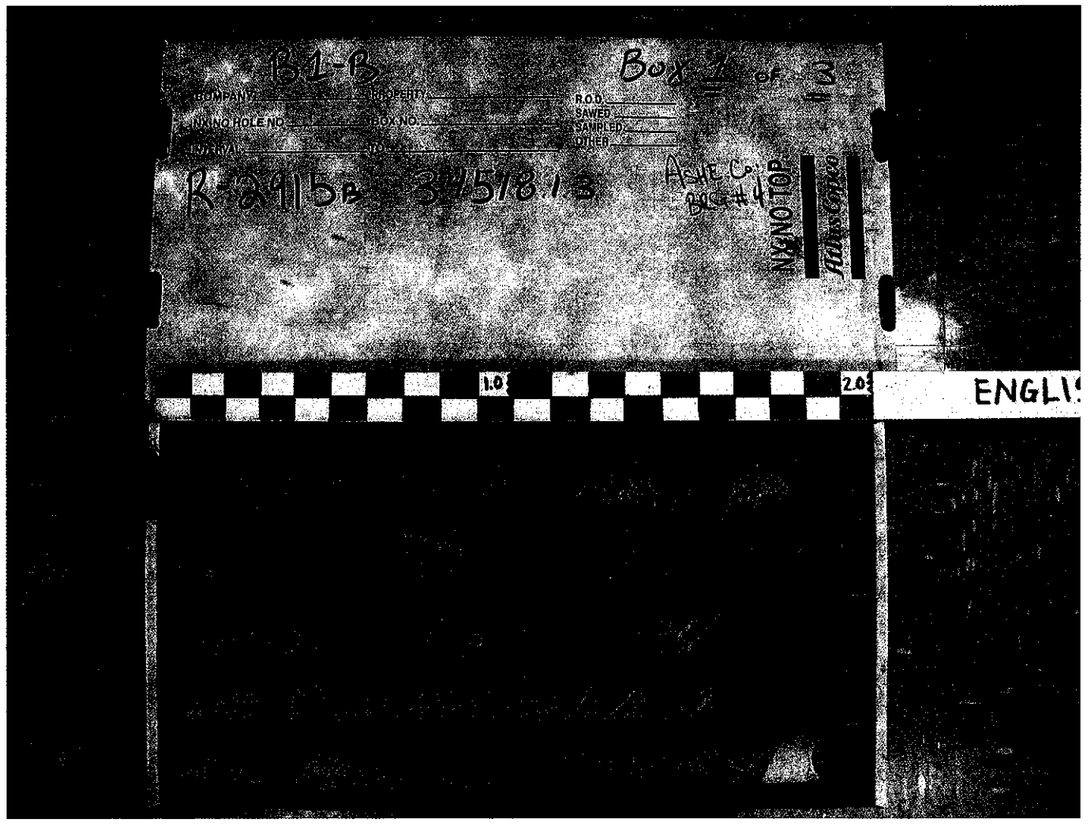
DEPTH: 39.5' – 44.5'



R-2915B, 34518.1.3

BORING B1-B
BOX 1 OF 3

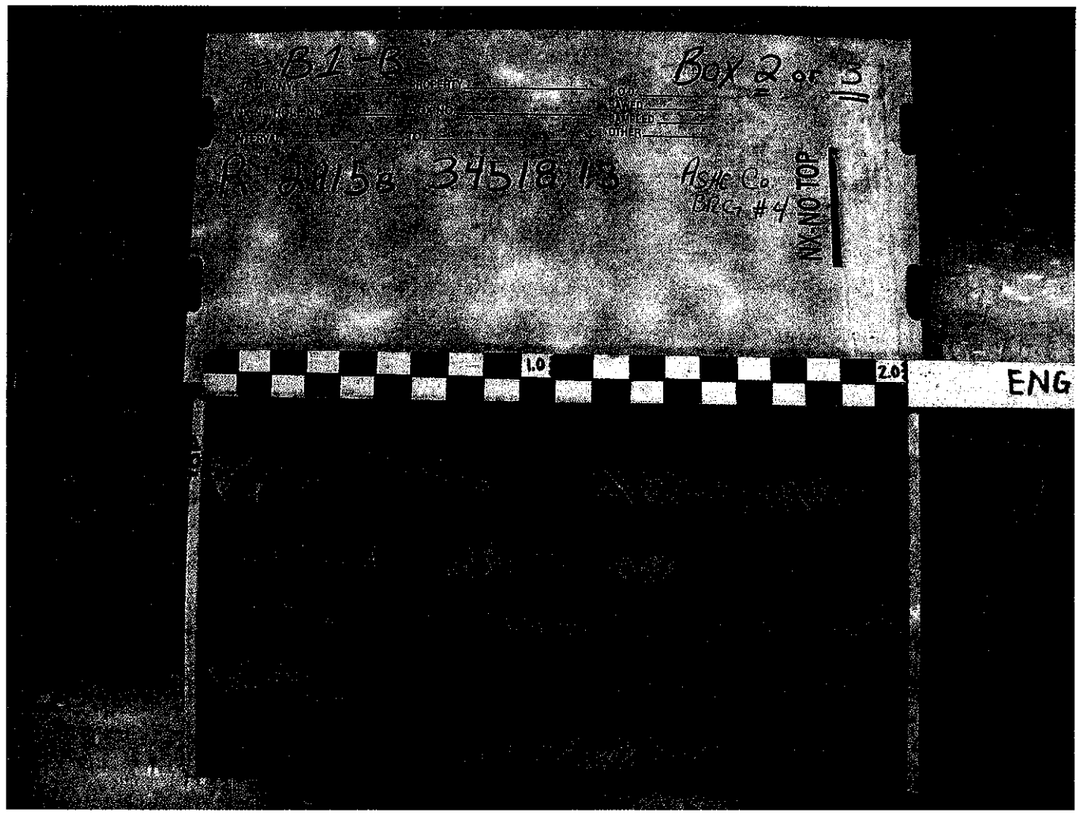
DEPTH: 21.8' – 38.9'



R-2915B, 34518.1.3

BORING B1-B
BOX 2 OF 3

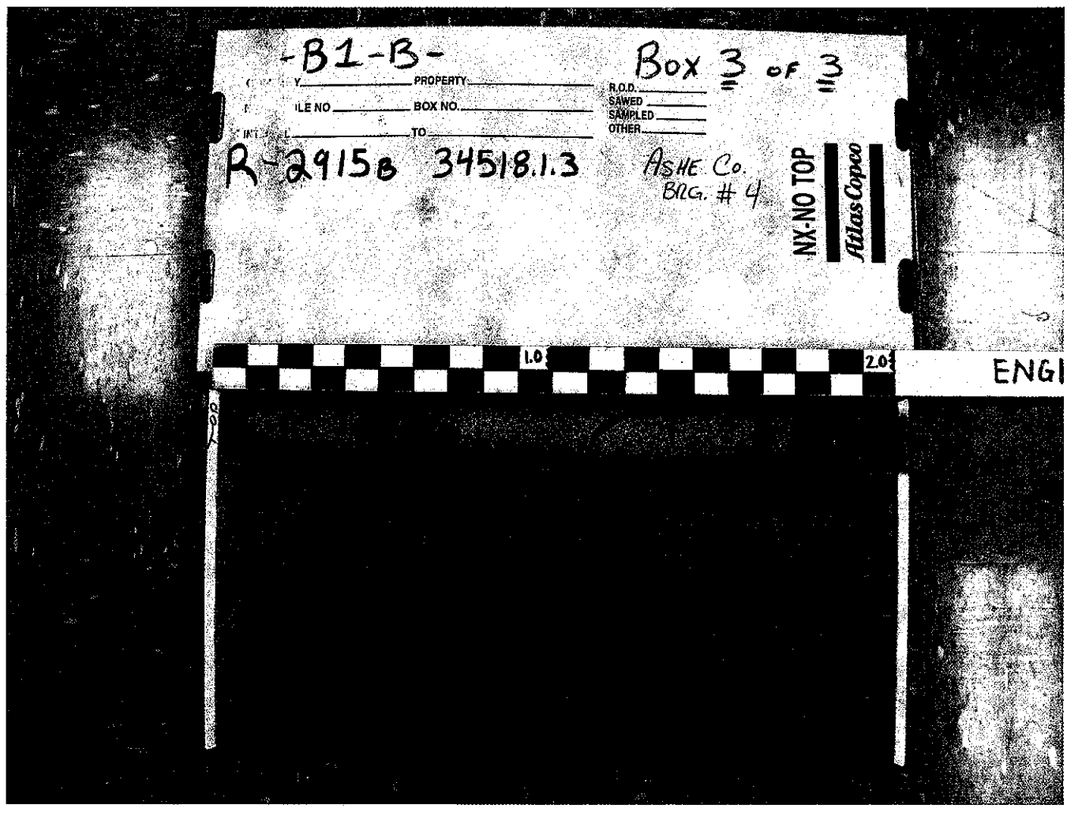
DEPTH: 38.9' – 47.9'



34518.1.3

BORING B1-B
BOX 3 OF 3

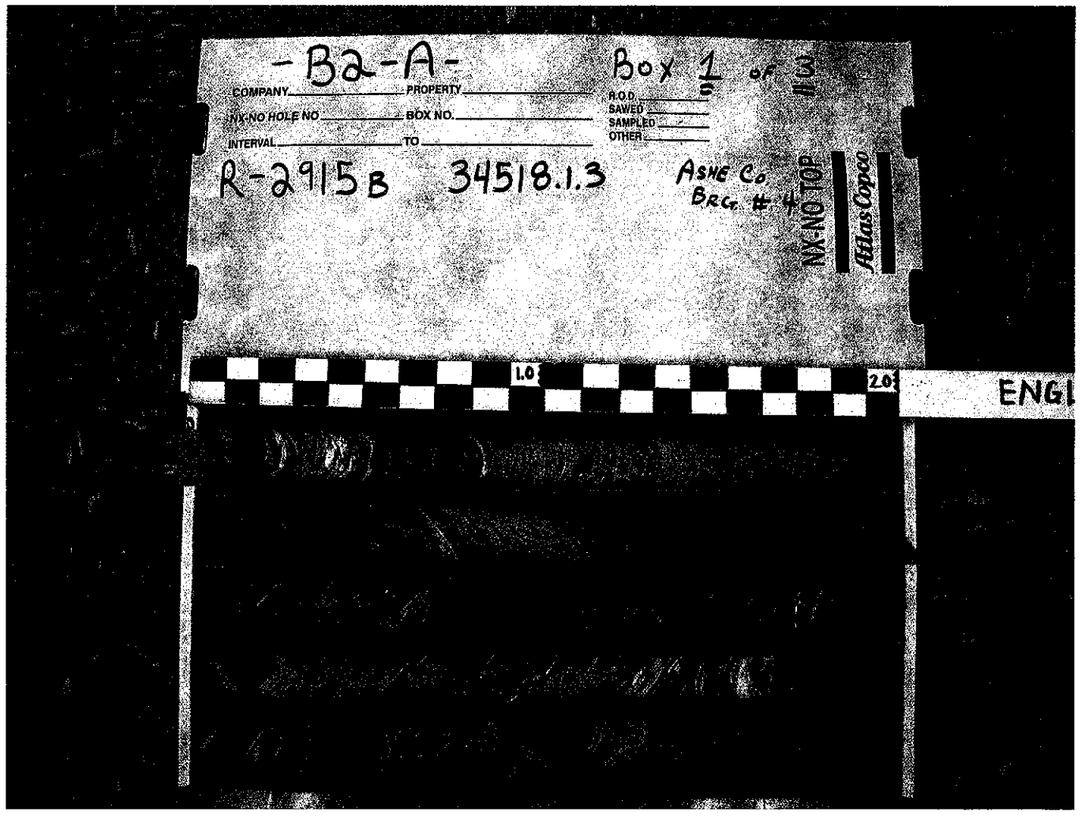
DEPTH: 47.9' – 49.9'



R-2915B, 34518.1.3

BORING B2-A
BOX 1 OF 3

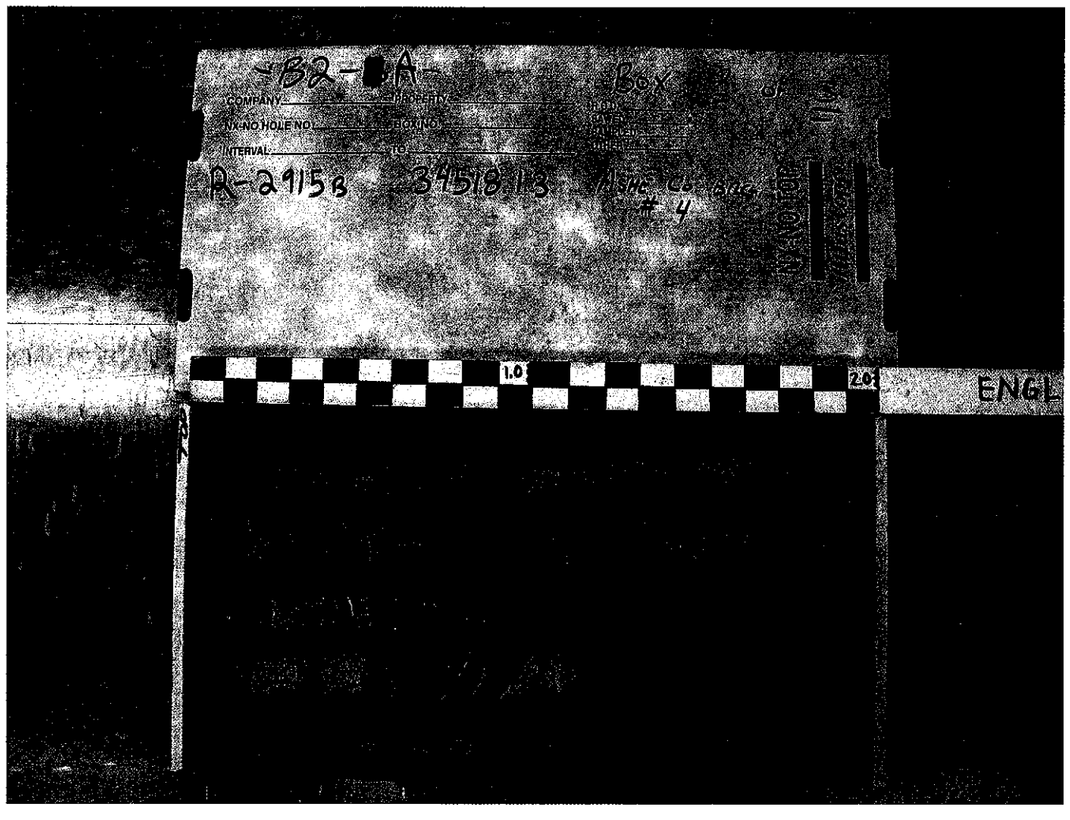
DEPTH: 21.3' – 31.6'



R-2915B, 34518.1.3

BORING B2-A
BOX 2 OF 3

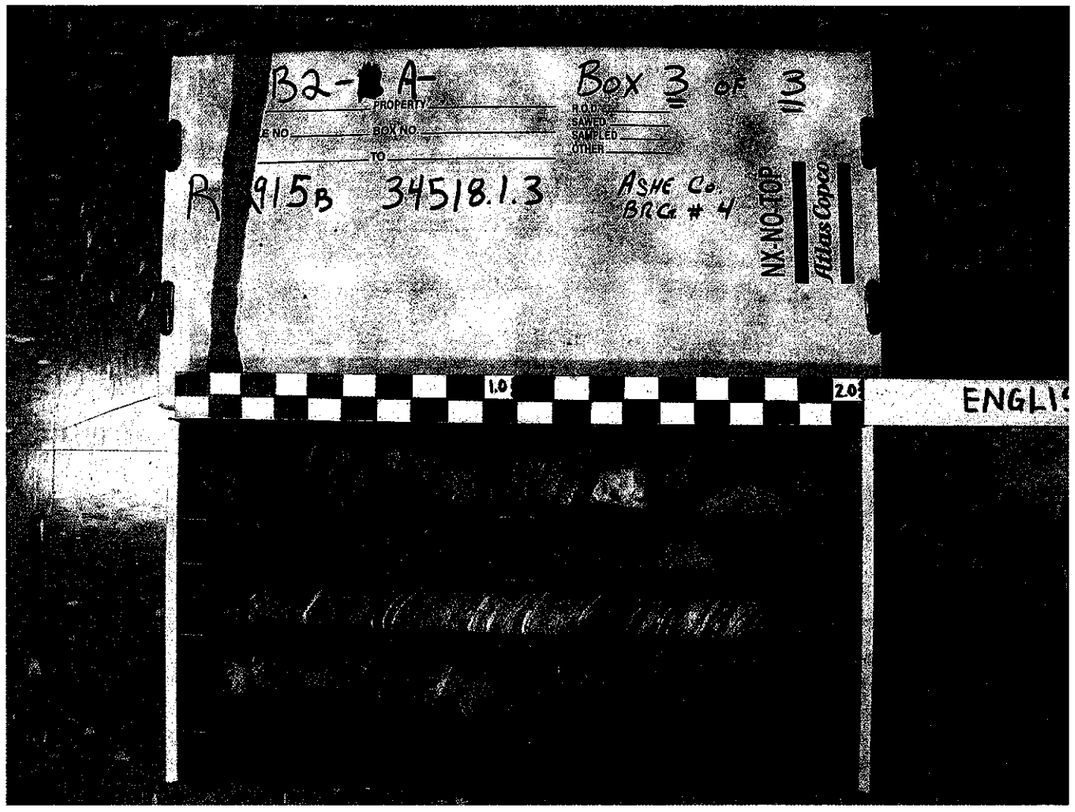
DEPTH: 31.6' – 42.0'



R-2915B, 34518.1.3

BORING B2-A
BOX 3 OF 3

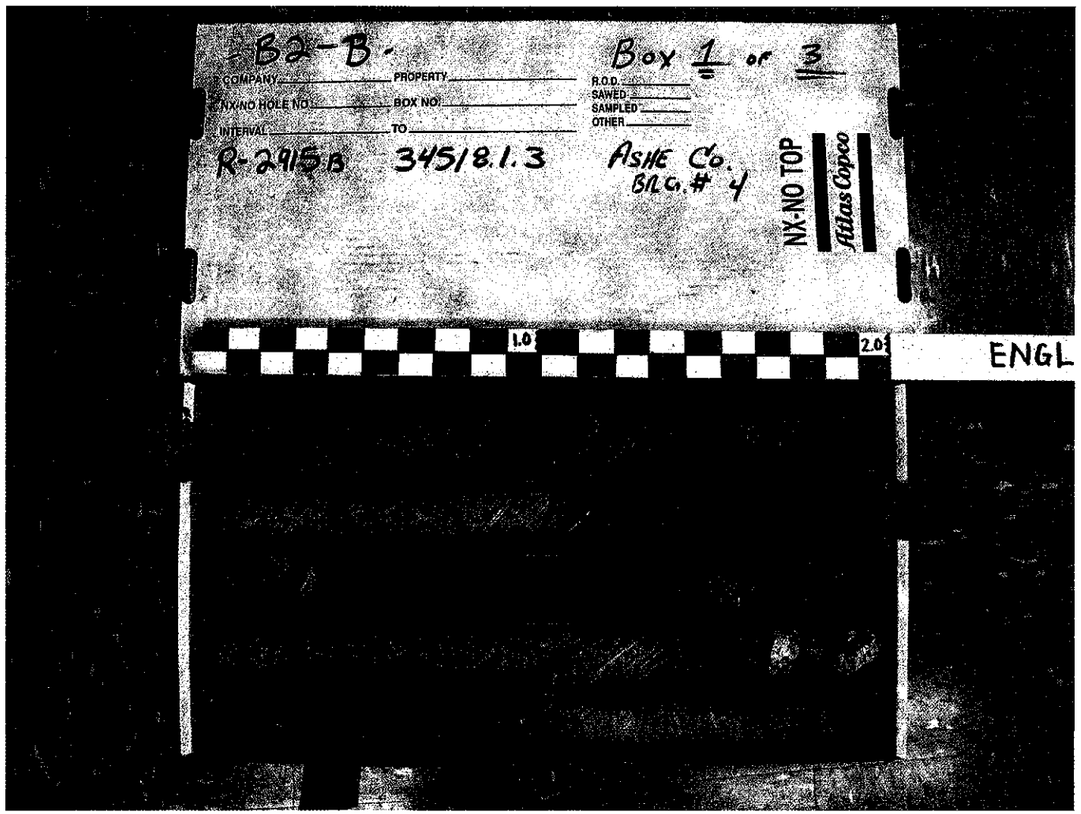
DEPTH: 42.0' – 50.0'



R-2915B, 34518.1.3

BORING B2-B
BOX 1 OF 3

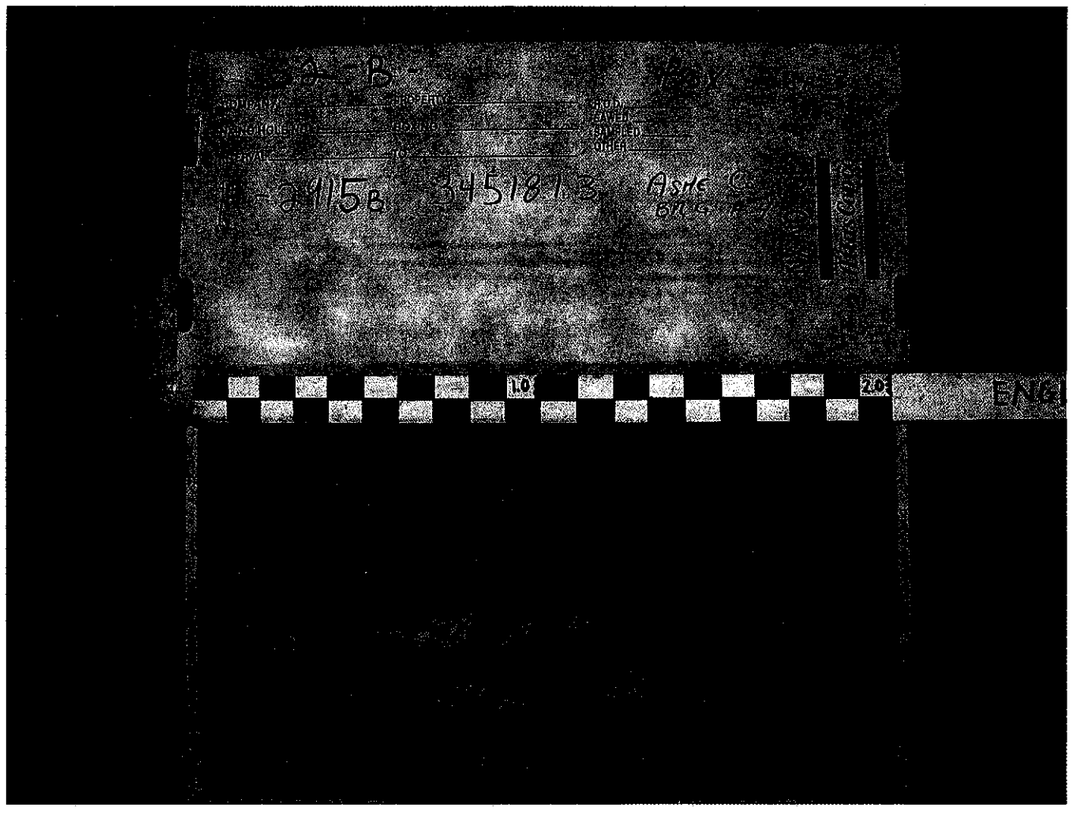
DEPTH: 21.4' – 31.7'



R-2915B, 34518.1.3

BORING B2-B
BOX 2 OF 3

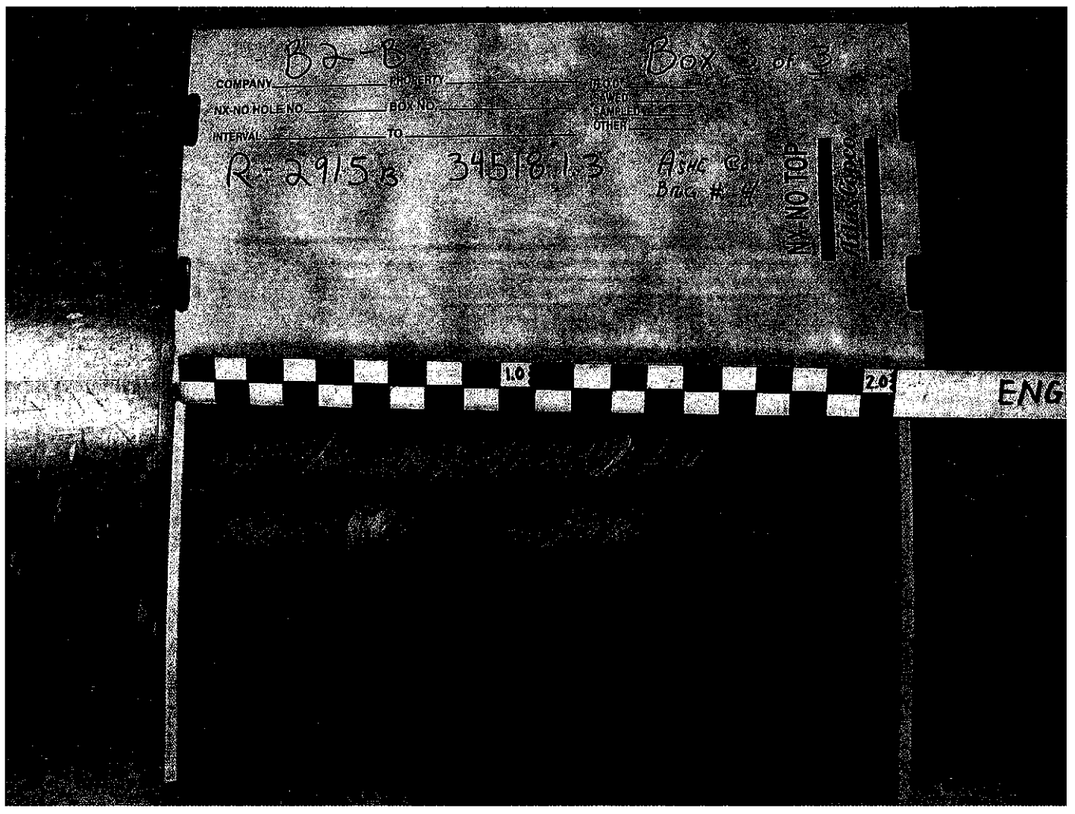
DEPTH: 31.7' – 41.9'



R-2915B, 34518.1.3

BORING B2-B
BOX 3 OF 3

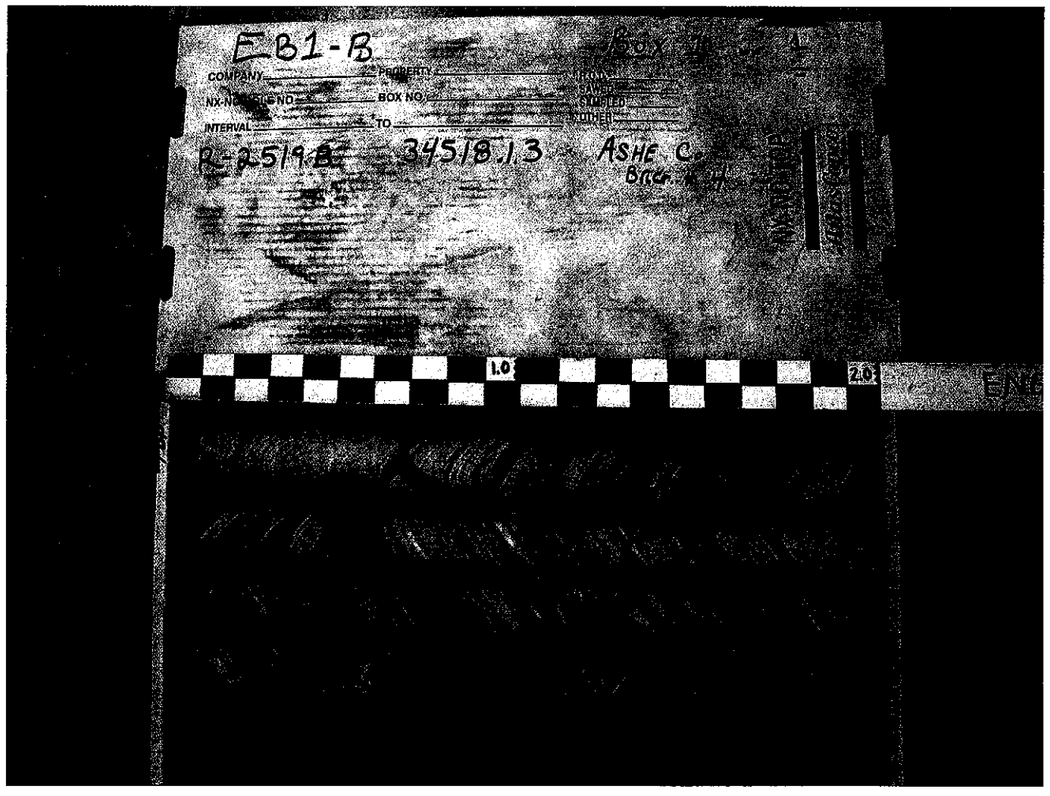
DEPTH: 41.9' – 44.9'



R-2915B, 34518.1.3

BORING EB1-B
BOX 1 OF 1

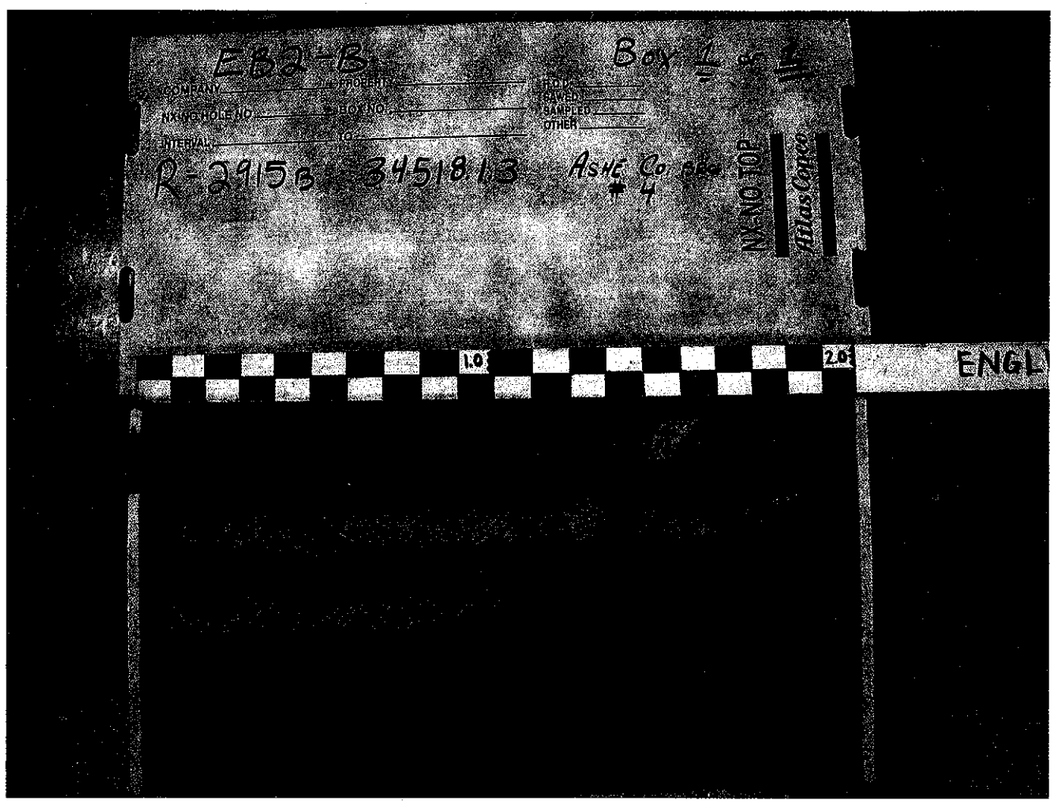
DEPTH: 26.5' – 34.6'



R-2915B, 34518.1.3

BORING EB2-B
BOX 1 OF 1

DEPTH: 16.1' – 25.0'



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2915B 34518.1.3	1	27

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *R-2915B* F.A. PROJ. *STP - 0221 (40)*

COUNTY *ASHE*

PROJECT DESCRIPTION *BRIDGE #10 ON US221 OVER SOUTH FORK NEW RIVER*

SITE DESCRIPTION *NB + SB BRIDGE, STA. 242+67*

ID: R-2915B BR. 10

PROJECT: 34518.1.3

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-FILSED 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 AND DUE 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

B. SMITH G.I.T.

B. WORLEY P.G.

J. BARE

INVESTIGATED BY *DMM*

CHECKED BY *JCK*

SUBMITTED BY *DMM*

DATE *12/1/2013*

DRAWN BY: *DM MULLEN*

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 SHOULD NOT WAIVE 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 PROFESSIONAL SEAL 029878 ENGINEER D MATT MULLEN

PROJECT REFERENCE NO.	SHEET NO.
R-2915B 34518.1.3	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 FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING # 10 # 40 # 200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — 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
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] SUM93 D-50
- [ ] _____

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

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

CORE SIZE:
- [ ] -B_____
- [X] -N 0-2
- [ ] -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 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

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

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

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: -BL- 57

ELEVATION: 2670.93 FT.

NOTES:

REVISED 02/23/06

BORINGS AS DRILLED, 10/2013

PROJECT REFERENCE NO.	SHEET
R-2915B 34518.1.3	3

SITE PLAN

0 30 60

FEET

SKEW = 110

243+00

EB-1A AS DRILLED
STA. 214+57 OFF. 77' LT

B-1A AS DRILLED
STA. 241+93 OFF. 61' LT

EB-1C AS DRILLED
STA. 241+31 OFF. 23' RT

B-1B AS DRILLED
STA. 241+58 OFF. 49' RT

EB-1B AS DRILLED
STA. 241+18 OFF. 47' RT

EXISTING BRIDGE
TO BE REMOVED

BRIDGE #10
CONC

100.00'

EB-2A AS DRILLED
STA. 244+24 OFF. 76' LT

B-2A AS DRILLED
STA. 243+35 OFF. 42' LT

B-2C AS DRILLED
STA. 243+17 OFF. C/L

EB-2C AS DRILLED
STA. 243+86 OFF. 24' RT

B-2B AS DRILLED
STA. 242+89 OFF. 52' RT

EB-2B AS DRILLED
STA. 243+78 OFF. 42' RT

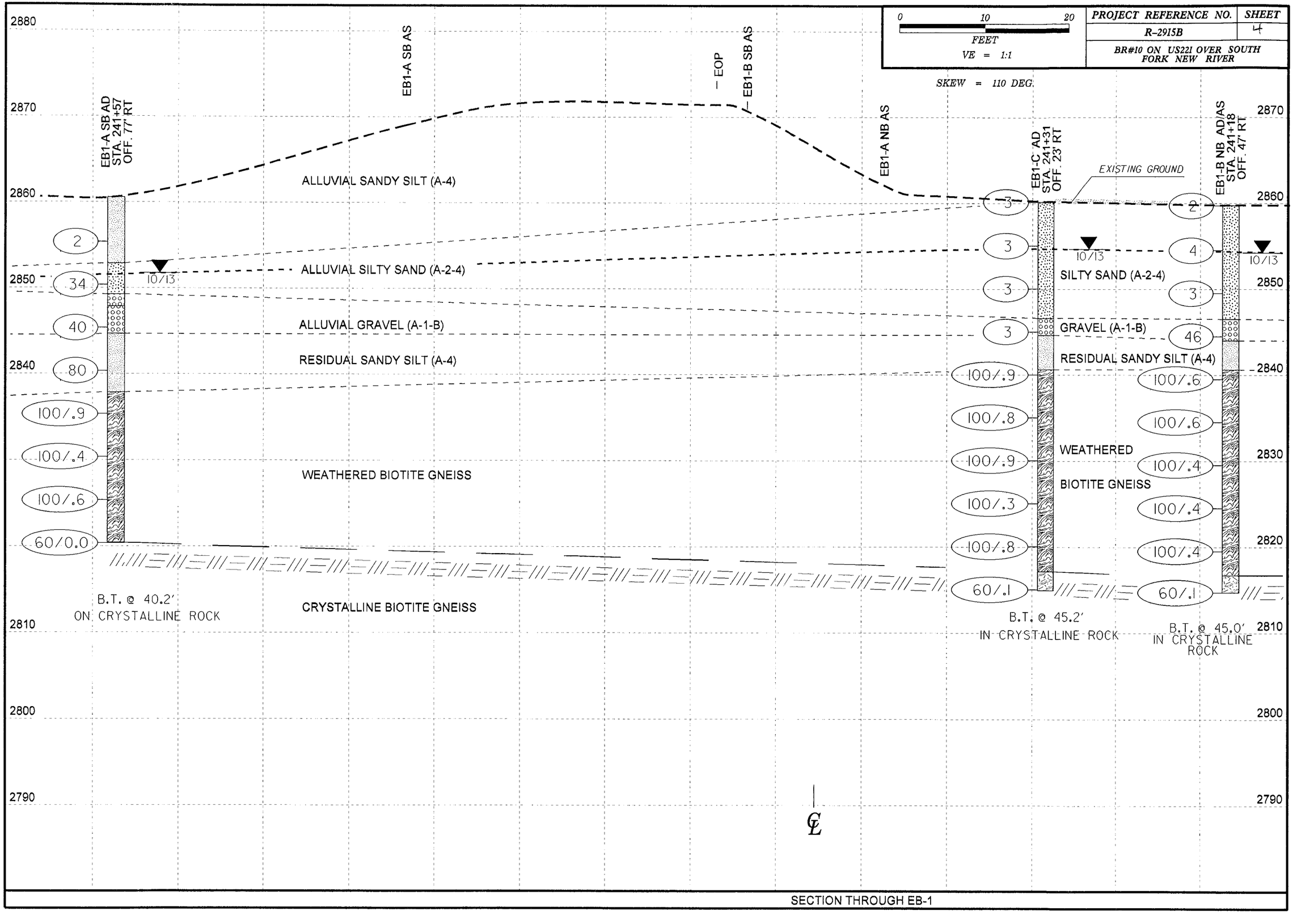
EXISTING RW

SOUTH FORK OF NEW RIVER

NC GRID
NAD 83/NSRS 2007

0 10 20 FEET VE = 1:1	PROJECT REFERENCE NO.	SHEET
	R-2915B	4
	BR#10 ON US221 OVER SOUTH FORK NEW RIVER	

SKEW = 110 DEG.

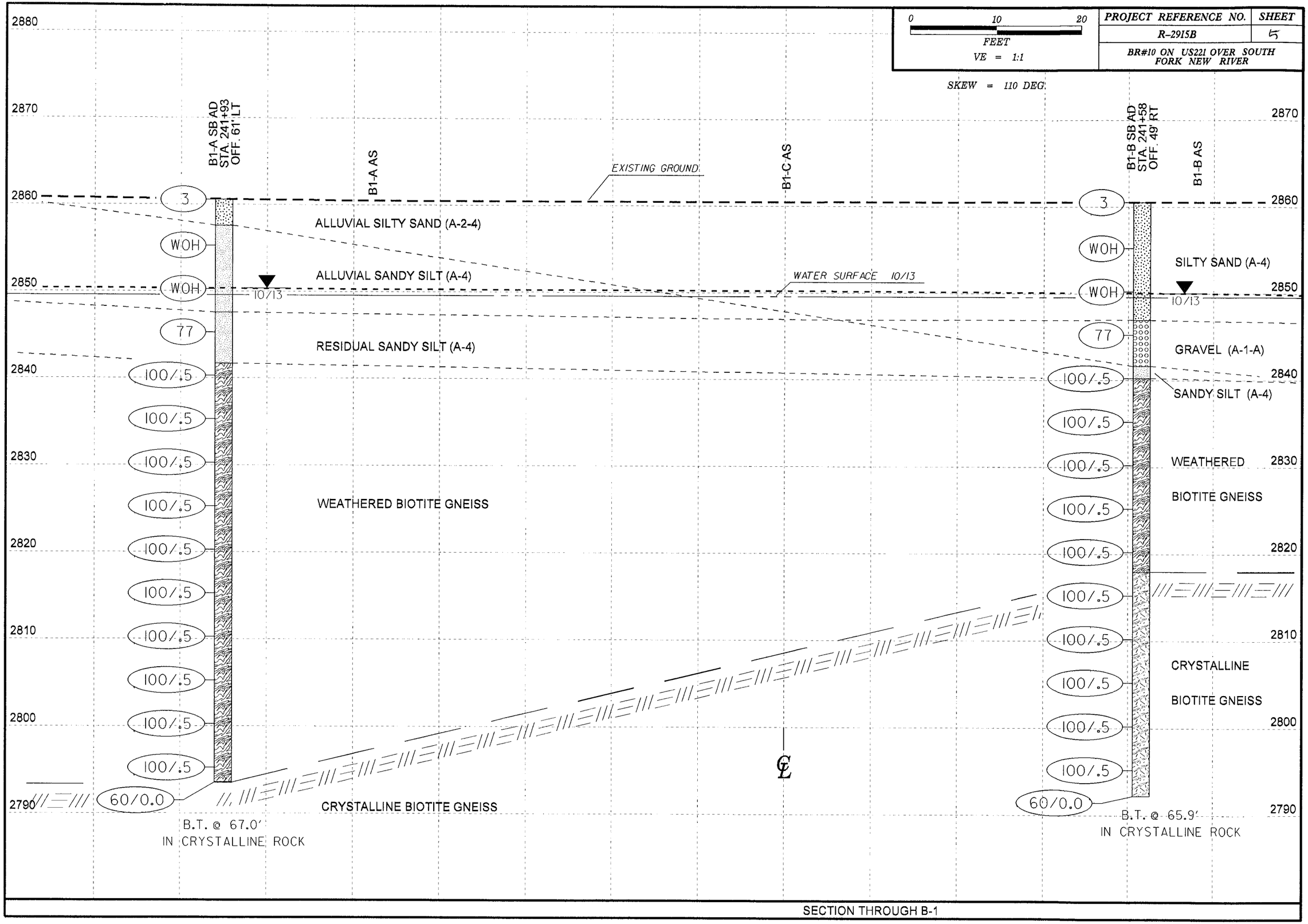


SECTION THROUGH EB-1

PROJECT REFERENCE NO.	SHEET
R-2915B	5
BR#10 ON US221 OVER SOUTH FORK NEW RIVER	

0 10 20
FEET
VE = 1:1

SKEW = 110 DEG.



SECTION THROUGH B-1

PROJECT REFERENCE NO.	SHEET
R-2915B	9
BR#10 ON US221 OVER SOUTH FORK NEW RIVER	

0 10 20
FEET
VE = 1:1

SKEW = 110 DEG.

B2-A AS
B2-A AD
STA. 243+35
OFF. 42' LT

B2-C AD
STA. 243+11
OFF. C/L

B2-B AS
B2-B AD
STA. 242+89
OFF. 52' RT

EXISTING GROUND

WATER SURFACE 10/13

2870
2860
2850
2840
2830
2820
2810
2800
2790
2780

B2-A AS	B2-C AD	B2-B AS
23	5	3
30	19	8
100/.6	15	18
95	73	63
100/.3	21	100/.5
100/.3	100/.9	100/.7
100/.2	100/.2	100/.4
60/.6	100/.2	100/.4
	100/.4	100/.3
	100/.4	100/.2
	60/.1	100/.5
		60/.1

10/13

ALLUVIAL SANDY SILT (A-4)

ALLUVIAL SAND(A-1-B)

WEATHERED BIOTITE GNEISS

RESIDUAL SANDY SILT (A-4)

WEATHERED BIOTITE GNEISS

CRYSTALLINE BIOTITE GNEISS

B.T. @ 71.0'
IN CRYSTALLINE ROCK

ALLUVIAL SILTY SAND (A-2-4)

ALLUVIAL SILTY SAND (A-1-B)

RESIDUAL SANDY SILT (A-4)

WEATHERED BIOTITE GNEISS

CRYSTALLINE BIOTITE GNEISS

B.T. @ 81.5'
IN CRYSTALLINE ROCK

ALLUVIAL SILTY SAND (A-2-4)

RESIDUAL SANDY SILT (A-4)

WEATHERED BIOTITE GNEISS

CRYSTALLINE BIOTITE GNEISS

B.T. @ 76.1'
IN CRYSTALLINE ROCK

SECTION THROUGH B-2

PROJECT REFERENCE NO.	SHEET
R-2915B	7
BR#10 ON US221 OVER SOUTH FORK NEW RIVER	

0 10 20
FEET
VE = 1:1

SKEW = 110 DEG.

EB2-A AS

EXISTING GROUND

EB2-B AS

EB2-A AD
STA. 244+24
OFF. 76' LT

EB2-C AD
STA. 243+86
OFF. 24' RT

EB2-B AD
STA. 243+78
OFF. 42' RT

2880
2870
2860
2850
2840
2830
2820
2810
2800
2790

ALLUVIAL SANDY SILT (A-4)
ALLUVIAL SILTY SAND (A-2-4)
RESIDUAL SANDY SILT(A-4)
WEATHERED BIOTITE GNEISS
RESIDUAL SANDY SILT (A-4)
WEATHERED BIOTITE GNEISS
CRYSTALLINE BIOTITE GNEISS

SANDY SILT (A-4)
SAND (A-1-B)
SANDY SILT (A-4)
WEATHERED BIOTITE GNEISS
CRYSTALLINE BIOTITE GNEISS

10/13

5 0 20 47 48 100/.4 100/.5 70 100/.3 60/.1

7 0 17 45 100/.9 100/.9 100/.9 100/.9 60/.1

7 0 22 40 100/.4 100/.9 100/.4 100/.4 100/.3 60/.1

B.T. @ 45.2'
IN CRYSTALLINE ROCK

B.T. @ 46.3'
IN CRYSTALLINE ROCK

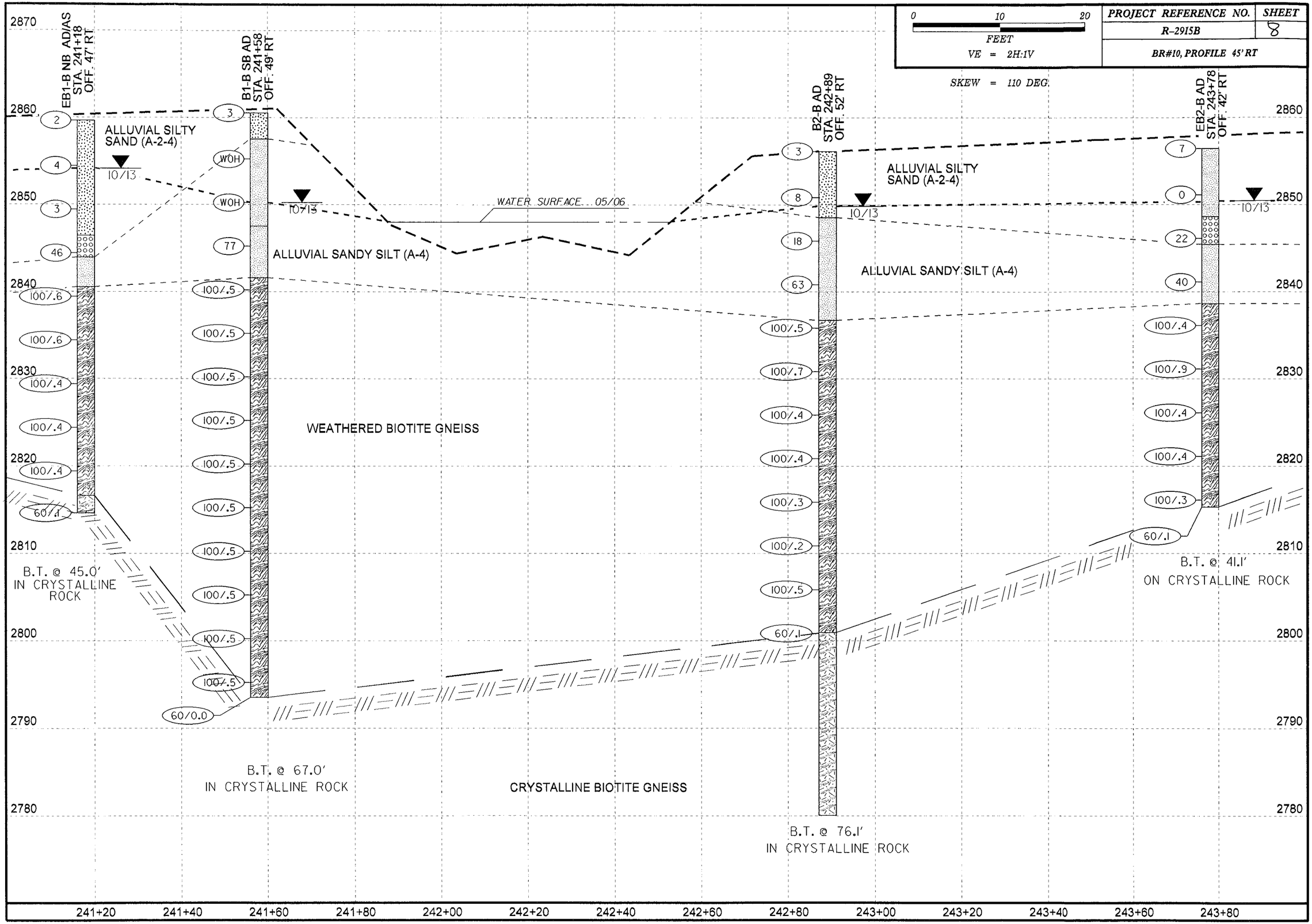
B.T. @ 41.1'
ON CRYSTALLINE ROCK

℄

SECTION THROUGH EB-2

0 10 20 FEET VE = 2H:1V	PROJECT REFERENCE NO.	SHEET
	R-2915B	8
	BR#10, PROFILE 45' RT	

SKEW = 110 DEG.



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 241+57	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,860.5 ft	**TOTAL DEPTH** 40.2 ft	**NORTHING** 935,013	**EASTING** 1,263,735	**24 HR.** 8.8
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/08/13	**COMP. DATE** 10/08/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
2865										
2860										2,860.5 GROUND SURFACE 0.0
										ALLUVIAL
										Brown to dark brown, soft, mod. organic, f. SANDY SILT (A-4) w/ some mica
2855	2,855.3	5.2	WOH	1	1	2		Sat.		
										2,852.8 7.7
										Brown to dark gray, loose, mod. organinc, SILTY f. SAND (A-2-4) w/ some mica
2850	2,850.3	10.2	WOH	4	30	34		Sat.		2,849.2 11.3
										2,847.8 Brown and gray, dense to v. dense, gravel w/ f. to cse. SAND (A-1-a) 12.7
2845	2,845.3	15.2	4	14	26	40		Sat.		2,844.6 Light gray, med. dense, f. to cse. SAND (A-1-b) w/ little gravel 15.9
										RESIDUAL
2840	2,840.3	20.2	12	23	57	80		W		Brown to orange-brown, hard, highly micaceous, saprolitic, SANDY SILT (A-4)
2835	2,835.3	25.2	63	37/0.4		100/0.9				2,837.8 22.7
										WEATHERED ROCK
2830	2,830.3	30.2	100/0.4			100/0.4				(biotite gneiss)
2825	2,825.3	35.2	70	30.0/1		100/0.6				
	2,820.3	40.2	60/0.0			60/0.0				2,820.3 40.2
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,820.3 ft ON CRYSTALLINE ROCK (GNEISS)

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Worley, P.G.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 241+18	**OFFSET** 47 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,859.6 ft	**TOTAL DEPTH** 45.0 ft	**NORTHING** 934,961	**EASTING** 1,263,853	**24 HR.** 5.5
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/03/13	**COMP. DATE** 10/03/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
2860	2,859.6	0.0	WOH	1	1	2		M		2,859.6 GROUND SURFACE 0.0
										ALLUVIAL
2855	2,854.4	5.2	1	1	3	4		M		Brown to dark brown, v. loose to loose, moderatly organic to slightly organic, SILTY f. SAND (A-2-4), slightly micaceous to micaceous
2850	2,849.4	10.2	WOH	1	2	3		M		2,846.4 13.2
2845	2,844.4	15.2	13	17	29	46		M		Dense cse SAND and GRAVEL (A-1-b)
2840	2,839.4	20.2	18	64	36/0.1	100/0.6				2,843.9 15.7
2835	2,834.4	25.2	60	40/0.1		100/0.6				**RESIDUAL**
2830	2,829.4	30.2	100/0.4			100/0.4				2,840.5 Brown, hard, micaceous, saprolitic, f. SANDY SILT (A-4) 19.1
2825	2,824.4	35.2	100/0.4			100/0.4				**WEATHERED ROCK**
2820	2,819.4	40.2	100/0.4			100/0.4				(biotite gneiss)
2815	2,814.7	44.9	60/0.1			60/0.1				2,816.6 43.0
										CRYSTALLINE ROCK
										2,814.6 45.0
										(biotite gneiss)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 2,814.6 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Worley, P.G.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 241+31	**OFFSET** 23 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,860.1 ft	**TOTAL DEPTH** 45.2 ft	**NORTHING** 934,977	**EASTING** 1,263,831	**24 HR.** 8.5
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/03/13	**COMP. DATE** 10/03/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
2865										
2860	2,860.1	0.0	1	1	2	3		D		2,860.1 GROUND SURFACE 0.0 **ALLUVIAL** Brown to dark brown, loose to v. loose, slightly organic, micaceous to with little mica, SILTY f. SAND (A-2-4)
2855	2,855.0	5.1	1	1	2	3		M		
2850	2,850.0	10.1	WOH	1	1	2		M		2,846.6 13.5 Alluvial GRAVEL (A-1-b) 2,844.6 15.5
2845	2,845.0	15.1	6	9	15	24				**RESIDUAL** Brown v. stiff, slightly micaceous, saprolitic, f. SANDY SILT (A-4)
2840	2,840.0	20.1	17	40	60/0.4	100/0.9				2,840.6 19.5 **WEATHERED ROCK** (biotite gneiss)
2835	2,835.0	25.1	38	62/0.3		100/0.8				
2830	2,830.0	30.1	45	55/0.4		100/0.9				
2825	2,825.0	35.1	100/0.3			100/0.3				
2820	2,820.0	40.1	48	52/0.3		100/0.8				2,817.1 43.0 **CRYSTALLINE ROCK**
2815	2,815.0	45.1	60/0.1							2,814.9 45.2 (biotite gneiss) Boring Terminated with Standard Penetration Test Refusal at Elevation 2,814.9 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 241+93	**OFFSET** 61 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,860.6 ft	**TOTAL DEPTH** 67.0 ft	**NORTHING** 935,047	**EASTING** 1,263,754	**24 HR.** 10.2
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/08/13	**COMP. DATE** 10/08/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
2865										
2860	2,860.6	0.0	1	2	1	3		M		2,860.6 GROUND SURFACE 0.0 **ALLUVIAL**
2855	2,855.3	5.3	WOH	1	1	2		W		2,857.6 3.0 Brown, v. loose, mod. organic, SILTY f. SAND (A-2-4) w/ some mica Dark brown to dark gray and black, soft, highly organic, f. SANDY SILT (A-4) w/ trace to little clay and some mica
2850	2,850.3	10.3	WOH	1	1	2		W		2,847.6 13.0 **RESIDUAL**
2845	2,845.3	15.3	14	29	48	77		Sat.		Brown, hard, highly micaceous, saprolitic, f. SANDY SILT (A-4)
2840	2,840.3	20.3	100/0.5			100/0.5				2,841.7 18.9 **WEATHERED ROCK** (biotite gneiss)
2835	2,835.3	25.3	100/0.3			100/0.3				
2830	2,830.3	30.3	100/0.3			100/0.3				
2825	2,825.3	35.3	100/0.3			100/0.3				
2820	2,820.3	40.3	100/0.3			100/0.3				
2815	2,815.3	45.3	30	70/0.3		100/0.8				
2810	2,810.3	50.3	100/0.3			100/0.3				
2805	2,805.3	55.3	63	37/0.3		100/0.8				
2800	2,800.3	60.3	100/0.5			100/0.5				
2795	2,795.3	65.3	100/0.4			100/0.4				
	2,793.6	67.0	60/0.0			60/0.0				2,793.6 67.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 2,793.6 ft ON CRYSTALLINE ROCK (GNEISS)

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 241+58	**OFFSET** 49 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,860.5 ft	**TOTAL DEPTH** 65.9 ft	**NORTHING** 935,001	**EASTING** 1,263,850	**24 HR.** 10.5
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/02/13	**COMP. DATE** 10/02/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
2865										
2860	2,860.5	0.0	1	1	2	3		M		2,860.5 GROUND SURFACE 0.0 **ALLUVIAL** Brown to dark brown and gray, v. loose to loose, moderately to highly organic, SILTY f. SAND, with mica
2855	2,855.4	5.1	1	2	2	4		W		
2850	2,850.4	10.1	WOH	1	1	2		Sat.		
2845	2,845.4	15.1	22	40	18	58		Sat.		2,846.9 13.6 Brown, v. dense, GRAVEL with coarse sand (A-1-a) 2,844.0 16.5 **RESIDUAL** 2,842.6 17.9 Brown, hard, highly micaceous, saprolitic, f. SANDY SILT (A-4) **WEATHERED ROCK** (biotite gneiss)
2840	2,840.4	20.1	89	11/0.1		100/0.6				
2835	2,835.4	25.1	30	45	55/0.2	100/0.7				
2830	2,830.4	30.1	62	38/0.2		100/0.7				
2825	2,825.4	35.1	100/0.2			100/0.2				
2820	2,820.4	40.1	60/0.1			60/0.1				2,820.3 40.2 **CRYSTALLINE ROCK** (biotite gneiss)
2815										
2810										
2805										
2800										
2795										2,794.6 65.9 Boring Terminated at Elevation 2,794.6 ft IN

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 241+58	**OFFSET** 49 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,860.5 ft	**TOTAL DEPTH** 65.9 ft	**NORTHING** 935,001	**EASTING** 1,263,850	**24 HR.** 10.5
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/02/13	**COMP. DATE** 10/02/13	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 25.7 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft) / DEPTH (ft)
2820.3											Begin Coring @ 40.2 ft
	2,820.3	40.2	0.7	1:17/0.7	(0.6)	(0.0)		(25.3)	(10.0)		2,820.3 **CRYSTALLINE ROCK** 40.2
	2,819.6	40.9	5.0	1:36/1.0 1:28/1.0 1:22/1.0 0:50/1.0 1:02/1.0	86% (4.8) 96%	0% (1.5) 30%		98%	39%		Very dark gray and black, mod. severly weathered to v. slightly weathered, med. hard to hard, close-fractured, biotite gneiss
2815	2,814.6	45.9	5.0	1:14/1.0 1:17/1.0 1:07/1.0 1:23/1.0 1:22/1.0	(4.9) 98%	(2.6) 52%					
2810	2,809.6	50.9	5.0	1:18/1.0 1:25/1.0 1:29/1.0 1:09/1.0 1:22/1.0	(5.0) 100%	(1.3) 26%					
2805	2,804.6	55.9	5.0	1:15/1.0 2:08/1.0 1:00/1.0 0:55/1.0 1:03/1.0	(5.0) 100%	(2.7) 54%					
2800	2,799.6	60.9	5.0	1:00/1.0 1:38/1.0 1:01/1.0 1:10/1.0 1:45/1.0	(5.0) 100%	(1.9) 38%					
2795	2,794.6	65.9									2,794.6 65.9 Boring Terminated at Elevation 2,794.6 ft IN

NCDOT CORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 243+35	**OFFSET** 42 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,852.6 ft	**TOTAL DEPTH** 71.0 ft	**NORTHING** 935,186	**EASTING** 1,263,788	**24 HR.** 2.5
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/26/13	**COMP. DATE** 09/26/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
2855										
	2,852.6	0.0	5	10	13	23		W		2,852.6 GROUND SURFACE 0.0 **ALLUVIAL**
2850										2,850.1 Brown, v. stiff, moderatly organic, SANDY SILT (A-4), with gravel, trace clay 2.5
	2,847.4	5.2	11	20	10	30		Sat.		Light tan-brown to brown, dense, fine to cse SAND (A-1-b), with gravel
2845										2,844.9 7.7 **WEATHERED ROCK**
	2,842.4	10.2	62	38/0.1		100/0.6				(biotite gneiss)
2840										2,839.9 12.7 **RESIDUAL**
	2,837.4	15.2	30	45	50	95		Sat.		Brown, hard, highly micaceous, saprolitic, f. SANDY SILT (A-4)
2835										2,833.7 18.9 **WEATHERED ROCK**
	2,832.4	20.2	100/0.3			100/0.3				(biotite gneiss)
2830										
	2,827.4	25.2	100/0.3			100/0.3				
2825										
	2,822.4	30.2	100/0.2			100/0.2				
2820										
	2,817.4	35.2	60/0.1			60/0.1				2,817.3 35.3 **CRYSTALLINE ROCK**
2815										(biotite gneiss)
2810										
2805										
2800										
2795										
2790										
2785										2,781.6 71.0 Boring Terminated at Elevation 2,781.6 ft IN

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 243+35	**OFFSET** 42 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,852.6 ft	**TOTAL DEPTH** 71.0 ft	**NORTHING** 935,186	**EASTING** 1,263,788	**24 HR.** 2.5
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/26/13	**COMP. DATE** 09/26/13	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 35.7 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft) / DEPTH (ft)
2817.3											Begin Coring @ 35.3 ft
	2,817.3	35.3	0.7	1:51/0.7	(0.6)	(0.4)		(33.2)	(11.9)		2,817.3 **CRYSTALLINE ROCK** 35.3
2815	2,816.6	36.0	5.0	1:41/1.0 1:47/1.0	86%	57%		93%	33%		Light gray, dark gray, brown and orange-brown, sli. to mod. sev. weathering, hard (in sli. weathered zones) to soft (in mod. sev. weathered zones), close to v. close fracture spacing, gneiss
				1:42/1.0	(4.9)	(1.7)					
	2,811.6	41.0		1:39/1.0 1:36/1.0	98%	34%					
2810			5.0	1:33/1.0 1:55/1.0	(4.9)	(1.8)					
				2:01/1.0 1:22/1.0	98%	36%					
	2,806.6	46.0		1:38/1.0							
2805			5.0	1:49/1.0 1:45/1.0	(4.9)	(1.2)					
				1:57/1.0 2:12/1.0	98%	24%					
	2,801.6	51.0		2:00/1.0							
2800			5.0	1:30/1.0 1:21/1.0	(4.2)	(1.0)					
				1:36/1.0 1:20/1.0	84%	20%					
	2,796.6	56.0		1:04/1.0							
2795			5.0	2:18/1.0 1:33/1.0	(4.7)	(2.4)					
				1:19/1.0 1:36/1.0	94%	48%					
	2,791.6	61.0		1:14/1.0							
2790			5.0	1:38/1.0 1:08/1.0	(4.8)	(0.4)					
				1:23/1.0 1:45/1.0	96%	8%					
	2,786.6	66.0		1:03/1.0							
2785			5.0	1:20/1.0 2:08/1.0	(4.2)	(3.0)					
				2:03/1.0 1:34/1.0	84%	60%					
	2,781.6	71.0		1:30/1.0							2,781.6 71.0 Boring Terminated at Elevation 2,781.6 ft IN

NCDOT CORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 242+89	**OFFSET** 52 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,856.1 ft	**TOTAL DEPTH** 76.1 ft	**NORTHING** 935,130	**EASTING** 1,263,876	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/01/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2860										
	2,856.1	0.0								2,856.1 GROUND SURFACE 0.0
2855			2	1	2	3		M		**ALLUVIAL**
	2,851.0	5.1								Brown, v. loose to loose, moderatly organic, SILTY f. SAND (A-2-4), with mica, trace gravel
2850			WOH	1	7	8		Sat.		
										2,848.5 7.6
	2,846.0	10.1								**RESIDUAL**
2845			6	8	10	18		Sat.		Brown to orange-brown, v. stiff to hard, highly micaceous, saprolitic, f. SANDY SILT (A-4)
	2,841.0	15.1								
2840			19	32	31	63		Sat.		
	2,836.0	20.1								2,836.7 19.4
2835			100/0.5			100/0.5				**WEATHERED ROCK**
	2,831.0	25.1								(biotite gneiss)
2830			70	30/0.2		100/0.7				
	2,826.0	30.1	100/0.4			100/0.4				
2825										
	2,821.0	35.1	100/0.4			100/0.4				
2820										
	2,816.0	40.1	100/0.3			100/0.3				
2815										
	2,811.0	45.1	100/0.2			100/0.2				
2810										
	2,806.0	50.1	100/0.5			100/0.5				
2805										
	2,801.0	55.1	60/0.1			60/0.1				2,800.9 55.2
2800										**CRYSTALLINE ROCK**
2795										(biotite gneiss)
2790										
2785										2,780.0 76.1

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 242+89	**OFFSET** 52 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,856.1 ft	**TOTAL DEPTH** 76.1 ft	**NORTHING** 935,130	**EASTING** 1,263,876	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/01/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2780						Match Line				Boring Terminated at Elevation 2,780.0 ft IN

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 242+89	**OFFSET** 52 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,856.1 ft	**TOTAL DEPTH** 76.1 ft	**NORTHING** 935,130	**EASTING** 1,263,876	**24 HR.** 6.3
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 10/01/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 20.9 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2800.93											Begin Coring @ 55.2 ft
2800	2,800.9	55.2	0.9	1:38/0.9	(0.8) 89%	(0.5) 56%		(19.2) 92%	(15.3) 73%		2,800.9 **CRYSTALLINE ROCK** 55.2
	2,800.0	56.1	5.0	1:30/1.0 1:36/1.0 1:17/1.0 1:20/1.0	(4.2) 84%	(3.0) 60%					Black, white, light to dark gray, with dark green and brown, v. sli. to sli. weathered with two mod. weathered zones, mod. close to close fracture spacing, gneiss
2795	2,795.0	61.1	5.0	0:53/1.0 1:18/1.0 1:23/1.0 1:14/1.0 1:31/1.0	(4.6) 92%	(3.5) 70%					
2790	2,790.0	66.1	5.0	2:06/1.0 2:33/1.0 2:38/1.0 2:30/1.0 2:35/1.0	(4.8) 96%	(4.8) 96%					
2785	2,785.0	71.1	5.0	2:30/1.0 2:14/1.0 2:44/1.0 1:50/1.0 2:01/1.0	(4.8) 96%	(3.5) 70%					
	2,780.0	76.1		2:17/1.0							2,780.0 76.1 Boring Terminated at Elevation 2,780.0 ft IN

NCDOT CORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 243+17	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,853.4 ft	**TOTAL DEPTH** 81.5 ft	**NORTHING** 935,163	**EASTING** 1,263,827	**24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/30/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2855										
	2,853.4	0.0	2	3	2	5		M		2,853.4 GROUND SURFACE 0.0
2850										**ALLUVIAL**
	2,847.9	5.5	8	10	9	19		Sat.		2,850.4 Brown, loose, moderately organic, SILTY f. SAND (A-2-4), with mica, trace gravel 3.0 Tan-brown to brown, med. dense, f. to cse SAND (A-1-b), with gravel
2845										2,845.4 8.0
	2,842.9	10.5	4	7	8	15		Sat.		**RESIDUAL**
2840										Brown to orange-brown, stiff to hard, highly micaceous, saprolitic, f. SANDY SILT (A-4)
	2,837.9	15.5	20	31	42	73		Sat.		
2835										
	2,832.9	20.5	5	10	11	21		Sat.		
2830										
	2,827.9	25.5	9	32	68/0.4	100/0.9				2,827.4 26.0
2825										**WEATHERED ROCK**
	2,822.9	30.5	100/0.2			100/0.2				(biotite gneiss)
2820										
	2,817.9	35.5	100/0.2			100/0.2				
2815										
	2,812.9	40.5	100/0.4			100/0.4				
2810										
	2,807.9	45.5	100/0.4			100/0.4				
2805										
	2,802.9	50.5	60/0.1			60/0.1				2,802.8 50.6
2800										**CRYSTALLINE ROCK**
2795										(biotite gneiss)
2790										
2785										
2780										
2775										

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 243+17	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,853.4 ft	**TOTAL DEPTH** 81.5 ft	**NORTHING** 935,163	**EASTING** 1,263,827	**24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/30/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2775						Match Line					
										2,771.9	81.5
										Boring Terminated at Elevation 2,771.9 ft IN	

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 243+17	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,853.4 ft	**TOTAL DEPTH** 81.5 ft	**NORTHING** 935,163	**EASTING** 1,263,827	**24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/30/13	**COMP. DATE** 10/01/13	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 30.9 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2802.79											Begin Coring @ 50.6 ft	
	2,802.8	50.6	0.9	2:01/0.9	(0.8)	(0.5)		(27.6)	(8.9)		2,802.8 **CRYSTALLINE ROCK**	50.6
	2,801.9	51.5	5.0	1:46/1.0	89%	56%		89%	29%		brown to orange-brown, light to dark gray, dark green and white, mod. to	
2800				1:44/1.0							mod. sev. weathering (50.6'-62.7'), v. sli. to mod. weathering (62.7'-81.5'),	
				1:21/1.0	(3.3)	(0.0)					mod. hard to soft (50.6'-62.7'), hard to mod. hard (62.7'-81.5'), close to v.	
				1:38/1.0	66%	0%					close fracture spacing, gneiss	
	2,796.9	56.5		1:21/1.0								
			5.0	2:02/1.0	(4.6)	(1.5)						
2795				1:29/1.0	92%	30%						
				1:18/1.0								
				1:39/1.0								
	2,791.9	61.5		1:29/1.0								
			5.0	1:35/1.0	(4.2)	(1.8)						
2790				1:52/1.0	84%	36%						
				1:59/1.0								
				1:10/1.0								
	2,786.9	66.5		1:41/1.0								
			5.0	1:35/1.0	(5.0)	(1.7)						
2785				1:39/1.0	100%	34%						
				1:58/1.0								
				1:28/1.0								
	2,781.9	71.5		1:56/1.0								
			5.0	1:39/1.0	(4.8)	(1.7)						
2780				1:41/1.0	96%	34%						
				1:38/1.0								
				1:43/1.0								
	2,776.9	76.5		1:30/1.0								
			5.0	2:01/1.0	(4.9)	(1.7)						
2775				1:40/1.0	98%	34%						
				1:39/1.0								
				1:36/1.0								
	2,771.9	81.5		1:54/1.0								
											2,771.9	81.5
											Boring Terminated at Elevation 2,771.9 ft IN	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 244+24	**OFFSET** 76 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,856.2 ft	**TOTAL DEPTH** 61.6 ft	**NORTHING** 935,278	**EASTING** 1,263,762	**24 HR.** 6.6
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/24/13	**COMP. DATE** 09/25/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2860											
	2,856.2	0.0	1	2	3	5		M		2,856.2 GROUND SURFACE	0.0
2855										**ALLUVIAL**	
										2,853.7 Brown to dark brown, med. stiff, moderately organic, f. SANDY SILT (A-4), with mica	2.5
2850	2,850.8	5.4	WOH	WOH	WOH	0		Sat.		Gray to black, v. loose, highly organic, SILTY SAND, trace mica	
										2,848.6 **RESIDUAL**	7.6
2845	2,845.8	10.4	6	7	13	20		Sat.		Brown to orange-brown, gray and black, v. stiff to hard, highly micaceous, saprolitic, f. SANDY SILT (A-4)	
2840	2,840.8	15.4	10	17	30	47		Sat.			
2835	2,835.8	20.4	17	28	20	48		Sat.			
2830	2,830.8	25.4	14	32	66	98		Sat.		2,829.0 **WEATHERED ROCK**	27.2
	2,825.8	30.4	100/0.4			100/0.4				(biotite gneiss)	
2825											
2820	2,820.8	35.4	100/0.5			100/0.5				2,818.3 **RESIDUAL**	37.9
2815	2,815.8	40.4	18	15	55	70		Sat.		Brown, gray and black, hard, highly micaceous, saprolitic, f. SANDY SILT, trace quartz fragments	
										2,813.3 **WEATHERED ROCK**	42.9
2810	2,810.8	45.4	100/0.3			100/0.3				2,809.5 (biotite gneiss)	46.7
	2,809.5	46.7	60/0.0			60/0.0				**CRYSTALLINE ROCK**	
2805										(biotite gneiss)	
2800											
2795										2,795.1 Boring Terminated at Elevation 2,794.6 ft	61.1

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 244+24	**OFFSET** 76 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,856.2 ft	**TOTAL DEPTH** 61.6 ft	**NORTHING** 935,278	**EASTING** 1,263,762	**24 HR.** 6.6
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/24/13	**COMP. DATE** 09/25/13	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 14.4 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2809.53											Begin Coring @ 46.7 ft	
	2,809.5	46.7	4.4	*N=60/0.0* 1:01/0.4 2:34/1.0 2:19/1.0 1:49/1.0 1:21/1.0	(4.4) 100%	(1.2) 27%		(13.4) 93%	(3.7) 26%		2,809.5 **CRYSTALLINE ROCK**	46.7
2805	2,805.1	51.1	5.0	2:17/1.0 1:58/1.0 2:36/1.0 2:05/1.0 1:45/1.0	(4.8) 96%	(1.2) 24%					Gray, brown and orange-brown, mod. to mod. sev. weathering, med. hard to soft, close to v. close fracture spacing, gneiss	
2800	2,800.1	56.1	5.0	1:51/1.0 2:39/1.0 1:05/1.0 1:12/1.0 1:19/1.0	(4.2) 84%	(1.3) 26%						
2795	2,795.1	61.1									2,795.1 Boring Terminated at Elevation 2,794.6 ft	61.1

NCDOT CORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 243+86	**OFFSET** 24 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,856.5 ft	**TOTAL DEPTH** 46.3 ft	**NORTHING** 935,230	**EASTING** 1,263,859	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/26/13	**COMP. DATE** 09/27/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2860											
	2,856.5	0.0	2	2	5	7		M		2,856.5 GROUND SURFACE	0.0
2855										**ALLUVIAL**	
										Brown to dark gray, med. stiff to v. soft, moderate to highly organic, f. SANDY SILT (A-4), with gravel and mica, trace clay	
	2,851.1	5.4	WOH	WOH	WOH	0		Sat.			
2850											
	2,846.1	10.4	3	7	10	17		Sat.		2,847.0	9.5
2845										**ALLUVIAL**	
										2,843.8 Tan-brown to brown, med. dense, f. to cse SAND (A-1-b), with gravel	12.7
	2,841.1	15.4	17	20	25	45		Sat.		**ALLUVIAL**	
2840										Brown, hard, highly micaceous, saprolitic, f. SANDY SILT (A-4)	
	2,836.1	20.4	24	42	58/0.4	100/0.9				2,836.8	19.7
2835										**WEATHERED ROCK**	
										(biotite gneiss)	
	2,831.1	25.4	26	51	49/0.4	100/0.9					
2830											
	2,826.1	30.4	33	55	42/0.2	100/0.7					
2825											
	2,821.1	35.4	100/0.3			100/0.3				2,820.2	36.3
2820	2,820.2	36.3	60/0.0			60/0.0				**CRYSTALLINE ROCK**	
2815										(biotite gneiss)	
										2,810.2	46.3
										Boring Terminated at Elevation 2,810.2 ft IN	

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 243+86	**OFFSET** 24 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,856.5 ft	**TOTAL DEPTH** 46.3 ft	**NORTHING** 935,230	**EASTING** 1,263,859	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 09/26/13	**COMP. DATE** 09/27/13	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ-2	**TOTAL RUN** 10.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2820.23											Begin Coring @ 36.3 ft	
	2,820.2	36.3	5.0	*N=60/0.0*	(4.5)	(3.3)		(9.5)	(6.7)		2,820.2 **CRYSTALLINE ROCK**	36.3
				2:29/1.0	90%	66%		95%	67%		light to dark gray and brown, v. sli. to mod. weathering, mostly hard with	
				2:08/1.0							mod. weathered zones med. hard, close fracture spacing, gneiss	
				1:28/1.0								
				1:36/1.0								
2815	2,815.2	41.3		1:19/1.0								
			5.0	1:44/1.0	(5.0)	(3.4)						
				1:22/1.0	100%	68%						
				1:43/1.0								
				1:30/1.0								
	2,810.2	46.3		1:29/1.0							2,810.2	46.3
											Boring Terminated at Elevation 2,810.2 ft IN	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.3	**TIP** R-2915B	**COUNTY** ASHE	**GEOLOGIST** B. Smith, G.I.T.	
SITE DESCRIPTION Bridge 10 over South Fork of New River on				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 243+78	**OFFSET** 42 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,856.4 ft	**TOTAL DEPTH** 41.1 ft	**NORTHING** 935,220	**EASTING** 1,263,881	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 86% 08/15/2013		**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
DRILLER J. Bare	**START DATE** 09/27/13	**COMP. DATE** 09/27/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2860											
	2,856.4	0.0								2,856.4 GROUND SURFACE	0.0
2855			3	3	4	7		M		**ALLUVIAL**	
										Brown to dark gray, med. stiff to v. soft, moderately to highly organic, f. SANDY SILT (A-4), with mica, trace clay	
2850	2,851.1	5.3	WOH	WOH	WOH	0		Sat.		2,848.6	7.8
										Brown, med. dense, f. to cse SAND (A-1-b), with gravel	
2845	2,846.1	10.3	16	10	12	22		Sat.		2,845.4	11.0
										RESIDUAL	
2840	2,841.1	15.3	12	19	21	40		Sat.		Brown to orange-brown, v. stiff to hard, highly micaceous, saprolitic, f. SANDY SILT (A-4)	
										2,838.6	17.8
2835	2,836.1	20.3	100/0.4			100/0.4				**WEATHERED ROCK**	
										(biotite gneiss)	
2830	2,831.1	25.3	34	66/0.4		100/0.9					
2825	2,826.1	30.3	100/0.4			100/0.4					
2820	2,821.1	35.3	100/0.4			100/0.4					
	2,816.1	40.3									
	2,815.3	41.1	100/0.3			100/0.3				2,815.3	41.1
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 2,815.3 ft ON CRYSTALLINE ROCK (GNEISS)	

NCDOT BORE SINGLE R2915B_GEO_BRDG0010_SUMMIT_PRELIM_GINT.GPJ NC_DOT.GDT 11/14/13

R-2915 B 34518.1.3

BORING B1-B

BOX 1 OF 3

DEPTH: 40.2-49.4

R-2915 B 34518.1.3

BORING B1-B

BOX 2 OF 3

DEPTH: 49.4-58.8

R-2915 B 34518.1.3

BORING B1-B

BOX 3 OF 3

DEPTH: 58.8-65.9

R-2915 B 34518.1.3

BORING B2-A

BOX 1 OF 4

DEPTH: 35.3-45.3

R-2915 B 34518.1.3

BORING B2-A

BOX 2 OF 4

DEPTH: 45.3-55.3

R-2915 B 34518.1.3

BORING B2-A

BOX 3 OF 4

DEPTH: 55.3-65.3

R-2915 B 34518.1.3

BORING B2-A

BOX 4 OF 4

DEPTH: 65.3-71.0

R-2915 B 34518.1.3

BORING B2-B

BOX 1 OF 3

DEPTH: 55.2-65.2

R-2915 B 34518.1.3

BORING B2-B

BOX 2 OF 3

DEPTH: 65.2-75.2

R-2915 B 34518.1.3

BORING B2-B

BOX 3 OF 3

DEPTH: 75.2-76.1

R-2915 B 34518.1.3

BORING B2-C

BOX 1 OF 4

DEPTH: 50.6-60.6

R-2915 B 34518.1.3

BORING B2-C

BOX 2 OF 4

DEPTH: 60.6-70.6

R-2915 B 34518.1.3

BORING B2-C

BOX 3 OF 4

DEPTH: 70.6-80.6

R-2915 B 34518.1.3

BORING B2-C

BOX 4 OF 4

DEPTH: 80.6-81.5

R-2915 B 34518.1.3

BORING EB2-A

BOX 1 OF 2

DEPTH: 46.7-56.7

R-2915 B 34518.1.3

BORING EB2-A

BOX 1 OF 2

DEPTH: 46.7-56.7

R-2915 B 34518.1.3

BORING EB2-C

BOX 1 OF 1

DEPTH: 36.5-46.3

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2915B 34518.1.3	1	4

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. R-2915B 34518.1.3 F.A. PROJ. _____

COUNTY ASHE

PROJECT DESCRIPTION US 221 FROM SR 1003 (IDLEWILD) TO NORTH OF SOUTH FORK OF NEW RIVER

SITE DESCRIPTION RETAINING WALL 1, STA. 219+22 TO 221+63

ID: R-2915B WALL 1

PROJECT: 34518.1.3

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) 707-6850. 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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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

DC ELLIOTT

DO CHEEK

CJ COFFEY

INVESTIGATED BY JC KUHNE

CHECKED BY _____

SUBMITTED BY JC KUHNE

DATE _____

NORTH CAROLINA LICENSED SEAL 1878 GEOLOGIST JODY C KUHNE

DocuSigned by: Jody C. Kuhne 4F9C0666A1BC400...

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.

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP	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	
CLASS.	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING ▪ 10 ▪ 40 ▪ 200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE 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
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 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
- SPT / DPT DMT / VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

ABBREVIATIONS

AR - AUGER REFUSAL
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

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

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

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

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: NA

ELEVATION: FT.

NOTES:

REVISED 09/23/09

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SITE PLAN

0 30 60
FEET

F
C
HW
BURY PIPE 1.0 FT
GRAU 350
15"
C
C
16' EXISTING RW
C
F
15" HDPE
.03
.02
.01
DI
-L- 220+00.00
CONCRETE MONUMENT
.03
.02
54" CMP
F
F
B-7
220+00
26' RT
B-8
220+50
27' RT
-L-
B-1
219+23
66' RT
B-2
219+50
53' RT
B-3
220+00
46' RT
B-4
220+50
47' RT
B-5
221+00
57' RT
B-6
221+63
74' RT
F
0909
JS
JS
JS
JS
JS
JS
JS
JS
JS
BEGIN WALL 1
-WALL1- STA 9+96.99
-L- STA 219+22.60
67.19' RT
PROP. CONC.
RETAINING WALL
END WALL 1
-WALL1- 12+44.84
-L- STA 221+63.12
72.72' RT
NAD 83/CORS

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RET. WALL 1
-L- STA. 219+23 – 221+63 RT

0 20 40
FEET
VE = 2H:1V