

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 33361.1.1 F.A. PROJ. BRZ-1351 (1)
COUNTY WATAUGA
PROJECT DESCRIPTION BRIDGE NO. 334 OVER SOUTH FORK
NEW RIVER ON SR 1351 AND SR 1100

SITE DESCRIPTION _____

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) 230-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

PROJECT : 33361.1.1 ID : B-3928

For Letting

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DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

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INVESTIGATED BY ECS CAROLINAS, LLP
CHECKED BY JAMES D. HOSKINS, III, P.E.
SUBMITTED BY M. LANDERS
DATE 05/20/2009

Professional Seal: NORTH CAROLINA PROFESSIONAL ENGINEER
JAMES D. HOSKINS, III
18493
5-20-09

DRAWN BY: TAC

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

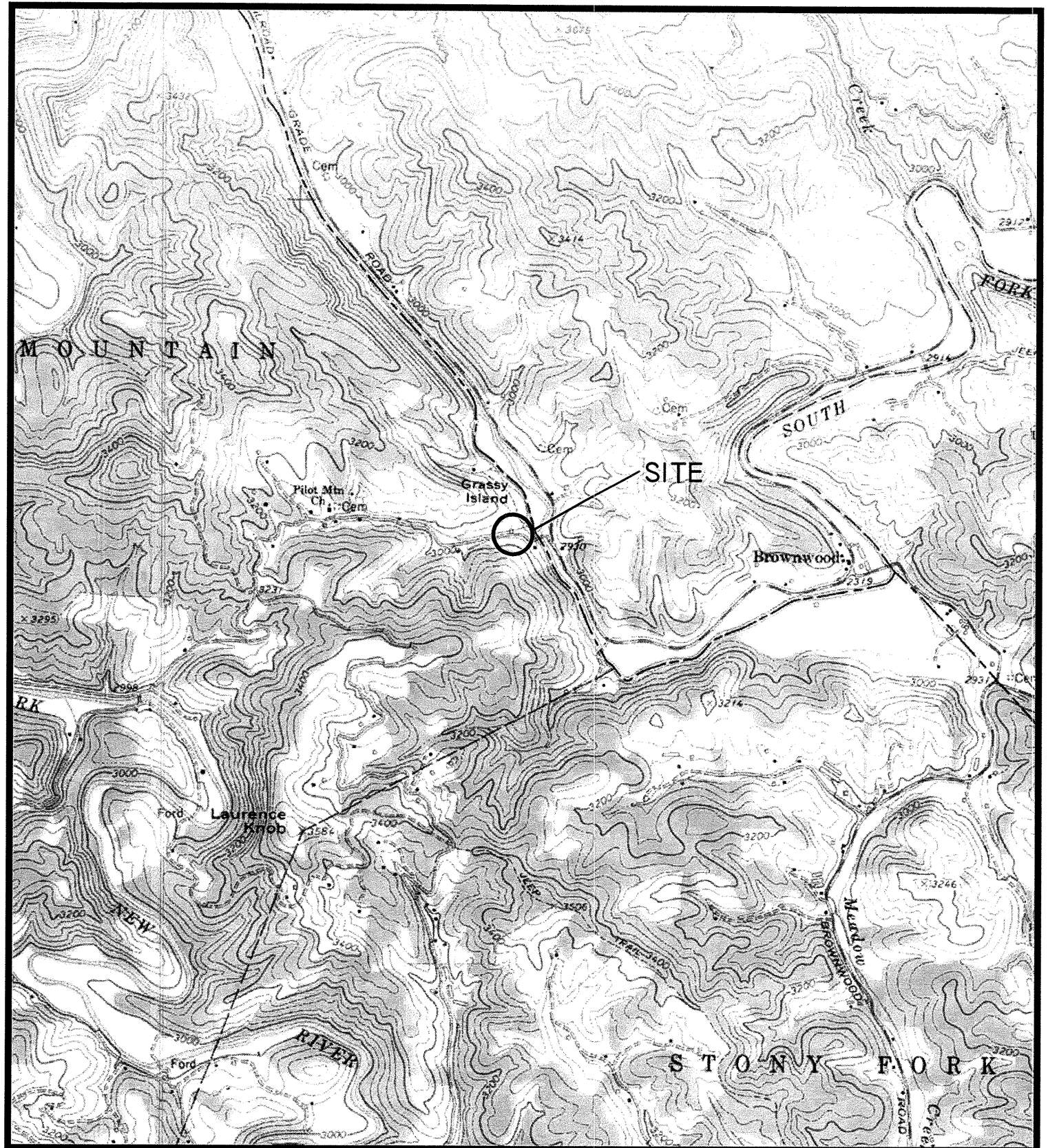
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 33361.1.1	SHEET NO. 2
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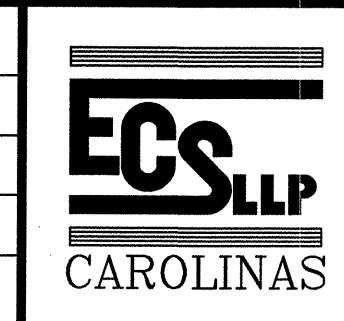
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

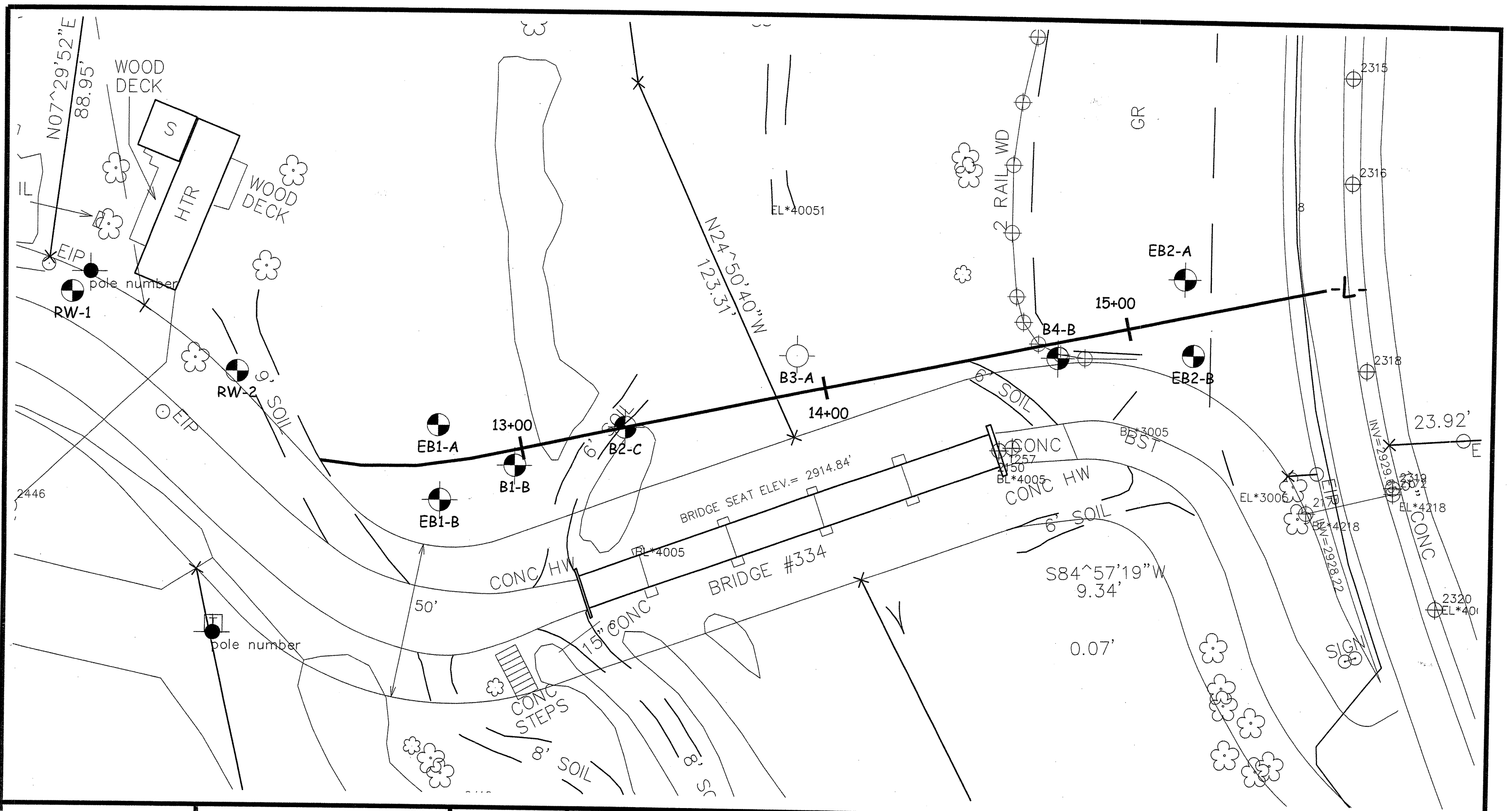
SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS																																																																																																			
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (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, MOST WITH INTERBEDDED FINE SAND LAYERS, SLIGHTLY PLASTIC, A7-6				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.				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 YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CPS) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.				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 DISLOADED 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 - A FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHALE-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 (SCRC) - 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: CONCRETE MON. DESIGNATED BY -8 ELEVATION: 2929.93 FT.																																																																																																			
SOIL LEGEND AND AASHTO CLASSIFICATION <table border="1" style="width: 100%; border-collapse: collapse; font-size: 6px;"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="4">GRANULAR MATERIALS (<= 35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="4">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> <th></th> <th></th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-7-5</td> <td>A-7-6</td> <td>A-7-7</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> </tr> </table>				GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)				SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS				A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7				GROUP 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	A-7-7					SYMBOL														% PASSING	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	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 MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50				PERCENTAGE OF MATERIAL <table border="1" style="width: 100%; border-collapse: collapse; font-size: 6px;"> <tr> <th rowspan="2">ORGANIC MATERIAL</th> <th colspan="2">GRANULAR SOILS</th> <th colspan="2">SILT - CLAY SOILS</th> <th rowspan="2">OTHER MATERIAL</th> </tr> <tr> <th>TRACE OF ORGANIC MATTER</th> <th>2 - 3%</th> <th>3 - 5%</th> <th>5 - 12%</th> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>12 - 20%</td> <td>20 - 35%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>>10%</td> <td></td> <td></td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td></td> <td></td> <td></td> <td></td> <td>HIGHLY</td> </tr> </table>				ORGANIC MATERIAL	GRANULAR SOILS		SILT - CLAY SOILS		OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	5 - 12%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	12 - 20%	20 - 35%	LITTLE	MODERATELY ORGANIC	5 - 10%	>10%			SOME	HIGHLY ORGANIC					HIGHLY
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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.				NOTES:																																																																																																											



PROJECT NO. 33361.1.1	TIP NO. B-3928
FAN BRZ-1351 (1)	
DATE 12/22/2008	SCALE 1" = 2000'
DRAWN BY MBS	CHECKED BY/DATE SEB 12/15/08
	DRAWING NO. 3

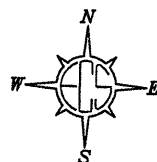
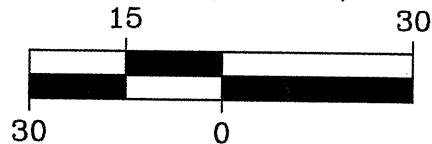


SITE LOCATION MAP
 BRIDGE NO. 334 OVER SOUTH FORK
 NEW RIVER ON SR 1351 AND SR 1100
 STATE PROJECT NO. 33361.1.1
 TIP NO. B-3928
 WATAUGA COUNTY, NORTH CAROLINA



☉ = LOCATION OF SOIL BORING

SCALE (IN FEET)



PROJECT NO. 33361.1.1	TIP NO. B-3928
FAN BRZ-1351 (1)	SCALE 1" = 30'
DATE 12/22/2008	DRAWING NO. 4
DRAWN BY MBS	CHECKED BY/DATE



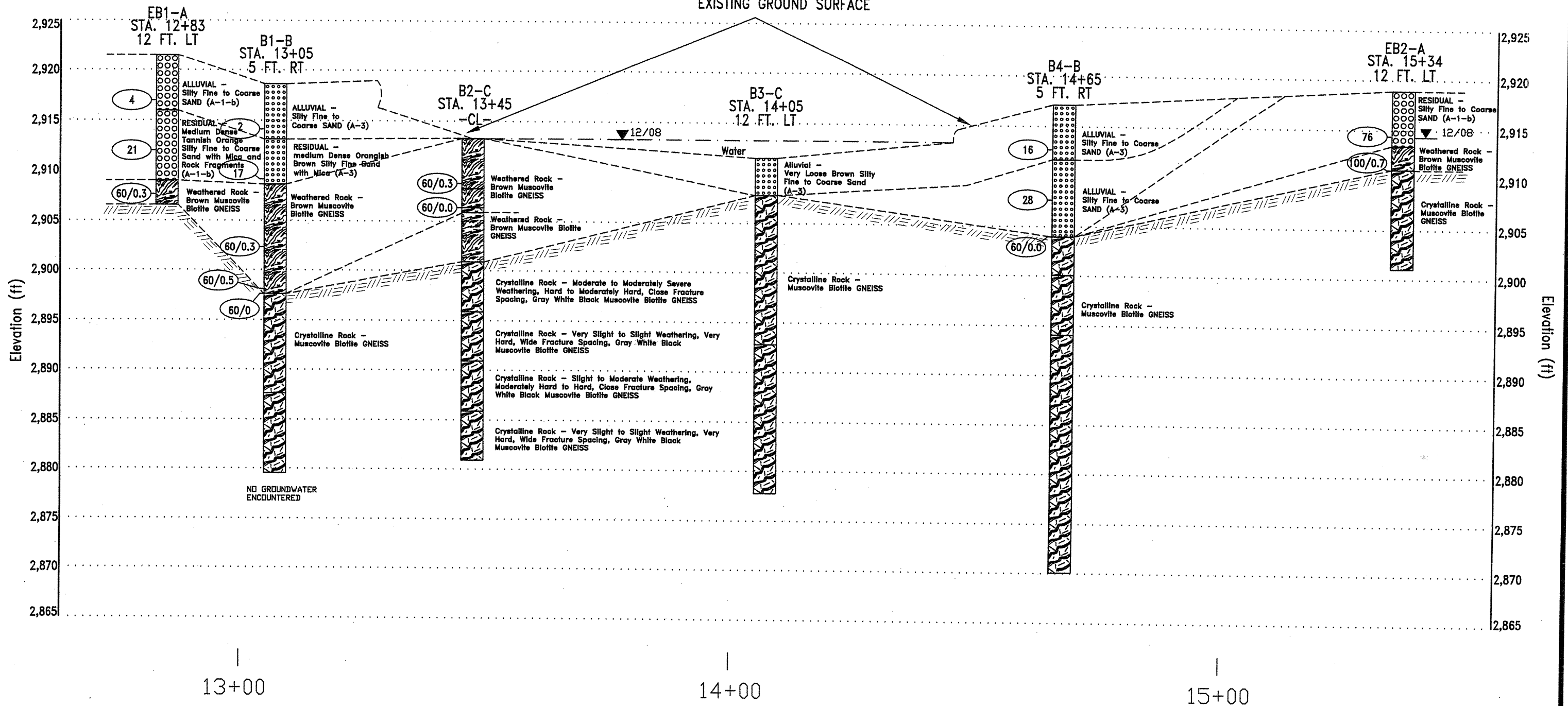
BORING LOCATION DIAGRAM

BRIDGE NO. 334
OVER SOUTH FORK NEW RIVER ON
SR 1351 AND SR 1100

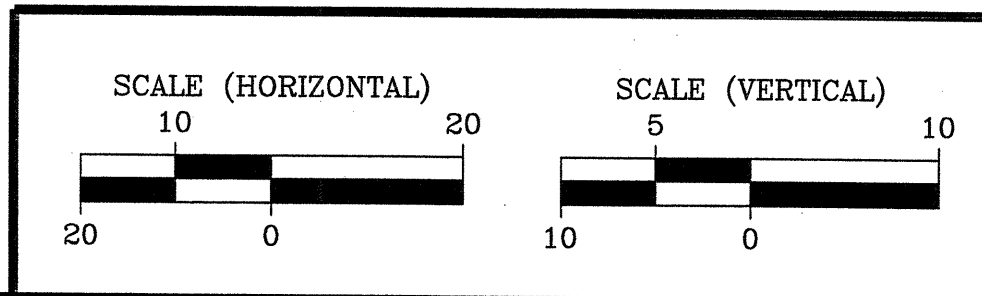
WATAUGA COUNTY, NORTH CAROLINA

PROFILE ALONG -L-
EXISTING GROUND SURFACE

GROUND LINE PROFILE OF -L- TAKEN FROM THE BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT FOR BRIDGE MAINTENANCE BRIDGES DATED 12-22-08.



INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

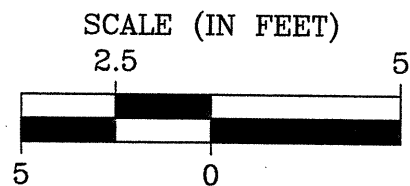
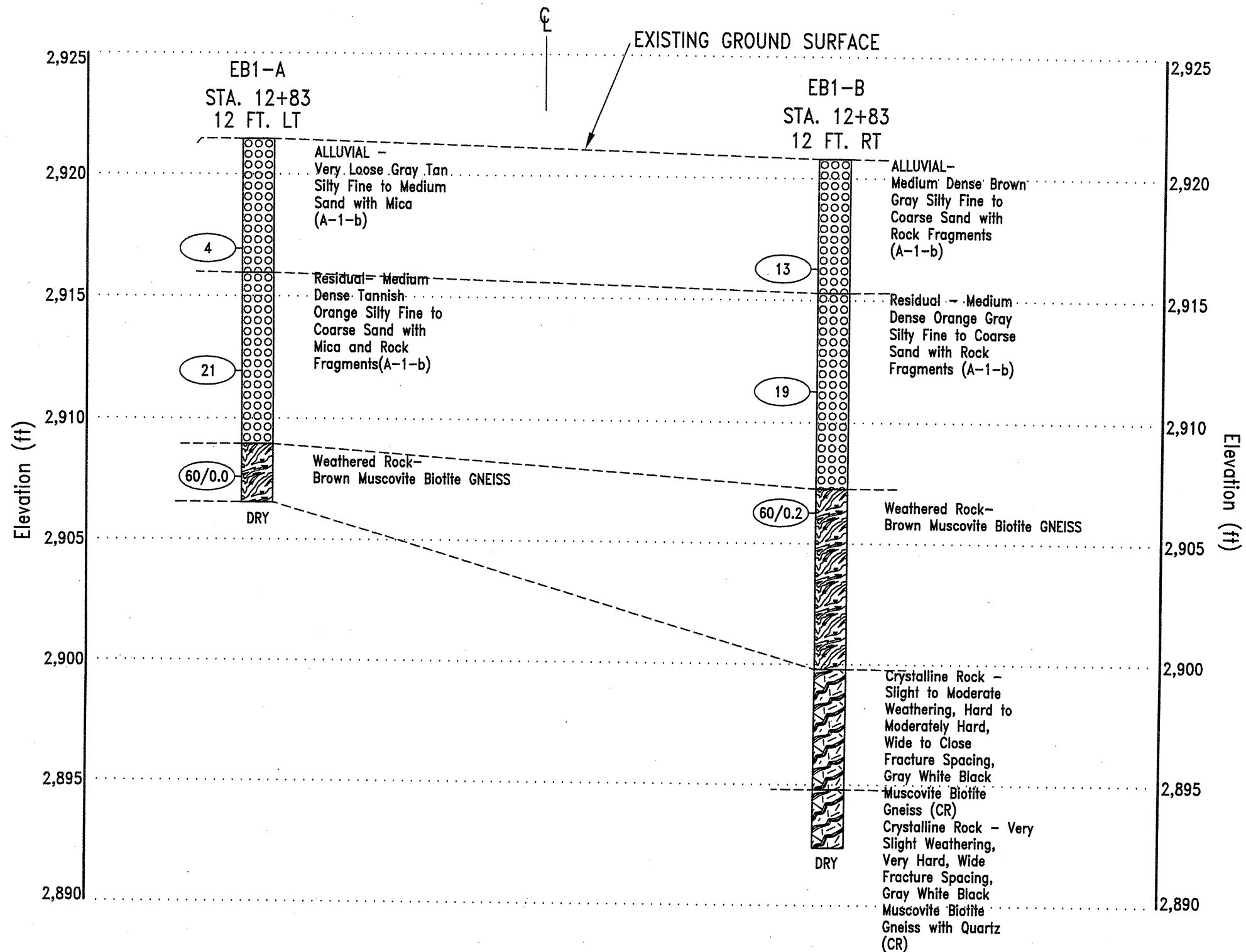


PROJECT NO. 33361.1.1	TIP NO. B-3928
F.A. NO. BRZ-1351 (1)	
DATE 12/22/2008	SCALE
DRAWN BY MBS	CHECKED BY/DATE 5
DRAWING NO. 5	



PROFILE ALONG -L-
BRIDGE NO. 334
OVER SOUTH FORK NEW RIVER ON
SR 1351 AND SR 1100
WATAUGA COUNTY, NORTH CAROLINA

SECTION THROUGH END BENT-1 ON -L-



PROJECT NO. 33361.1.1	TIP NO. B-3928
F.A. NO. BRZ-1351 (1)	
DATE 12/22/2008	SCALE
DRAWN BY MBS	CHECKED BY/DATE
	DRAWING NO. 6

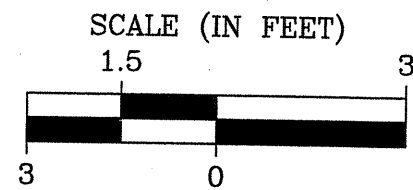
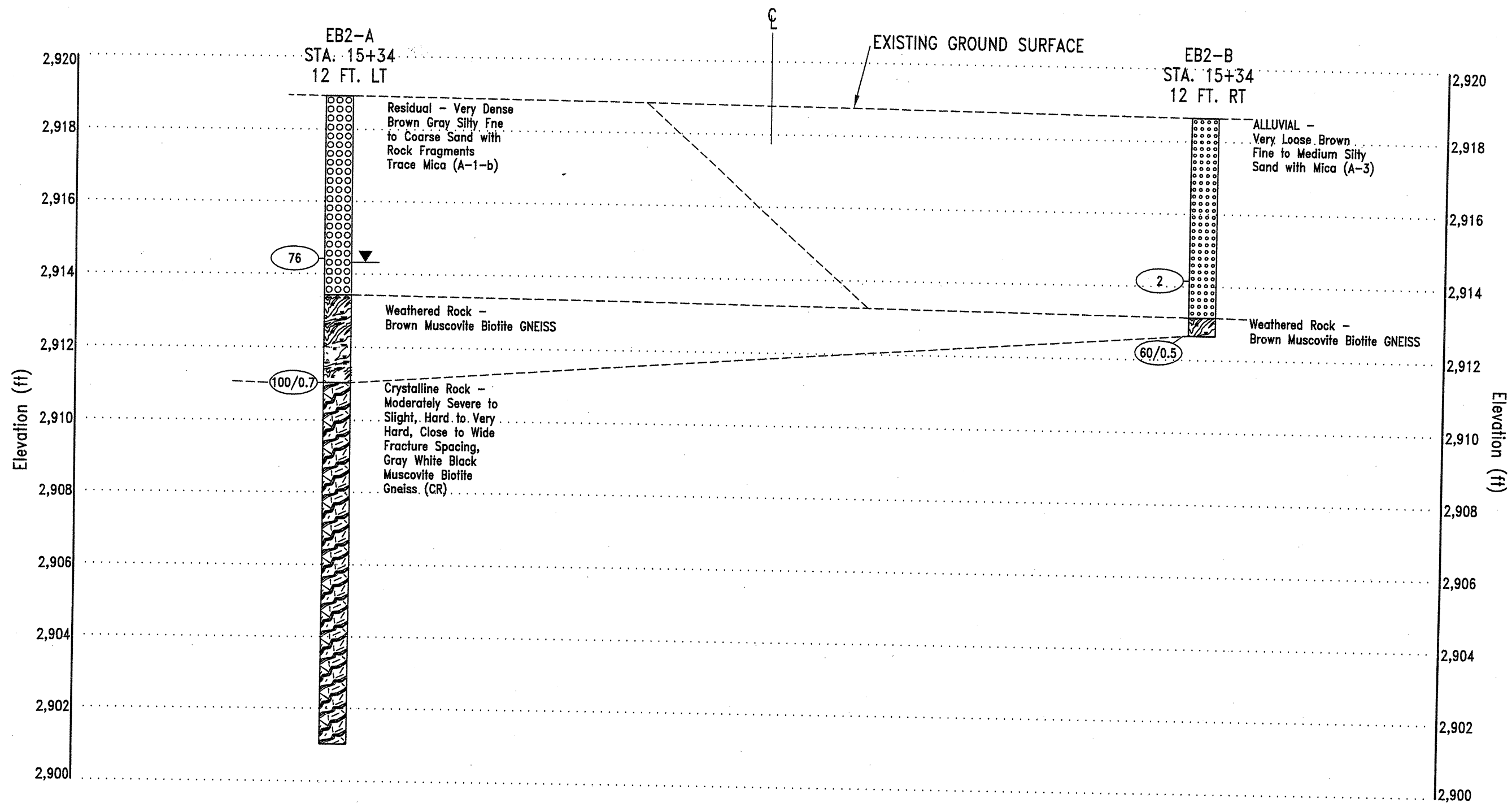


SECTION THROUGH END BENT-1

BRIDGE NO. 334
OVER SOUTH FORK NEW RIVER ON
SR 1351 AND SR 1100

WATAUGA COUNTY, NORTH CAROLINA

SECTION THROUGH END BENT-2 ON -L-

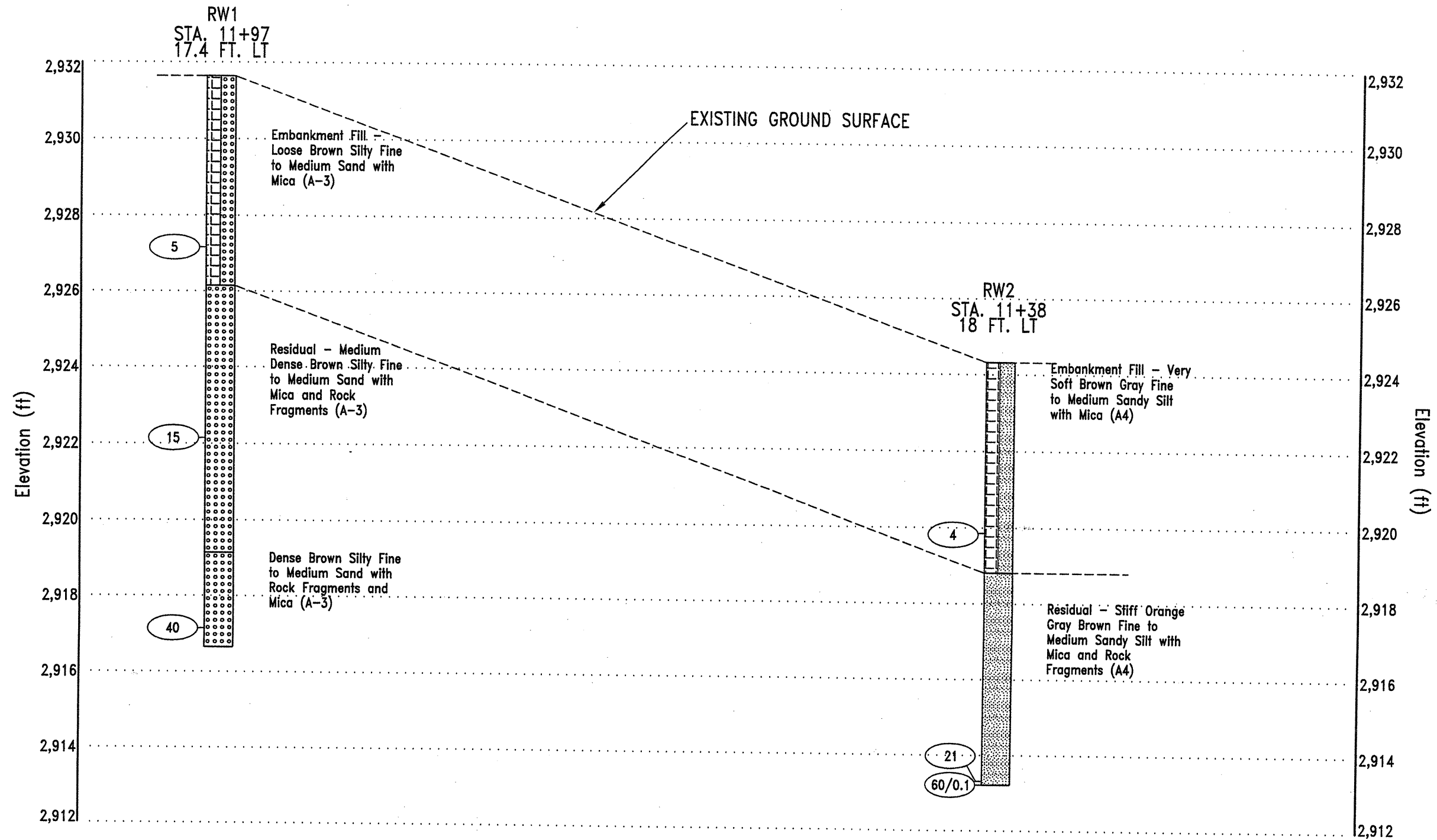


PROJECT NO. 33361.1.1	TIP NO. B-3928
F.A. NO. BRZ-1351 (1)	SCALE
DATE 12/22/2008	
DRAWN BY MBS	CHECKED BY/DATE DRAWING NO. 7

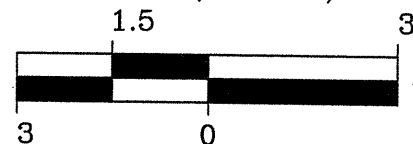


SECTION THROUGH END BENT-2
BRIDGE NO. 334
OVER SOUTH FORK NEW RIVER ON
SR 1351 AND SR 1100
WATAUGA COUNTY, NORTH CAROLINA

PROFILE ALONG RETAINING WALL



SCALE (IN FEET)



PROJECT NO. 33361.1.1	TIP NO. B-3928
F.A. NO. BRZ-1351 (1)	
DATE 12/22/2008	SCALE
DRAWN BY MBS	CHECKED BY/DATE
	DRAWING NO. 8



PROFILE ALONG RETAINING WALL

BRIDGE NO. 334
OVER SOUTH FORK NEW RIVER ON
SR 1351 AND SR 1100

WATAUGA COUNTY, NORTH CAROLINA



PROJECT NO. 33361.1.1				ID. B-3928		COUNTY Watauga				GEOLOGIST S. Bullin					
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100												GROUND WATER (ft) 0 HR. 24 HR.			
BORING NO. EB1-A			STATION 12+83			OFFSET 12ft LT		ALIGNMENT -L-							
COLLAR ELEV. 2,921.5 ft			NORTHING 929,919			EASTING 1,242,215									
TOTAL DEPTH 14.9 ft			DRILL MACHINE CME 550X			DRILL METHOD Rotary				HAMMER TYPE Automatic					
DATE STARTED 12/4/08				COMPLETED 12/4/08				SURFACE WATER DEPTH N/A				DEPTH TO ROCK			
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT						SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100					
2,921.5															2,921.5 0.00
2,916.5	5.0														2,916.0 5.5
2,911.5	10.0	1	2	2											
2,908.0	13.5	6	10	11											
2,906.6	14.9	60/0.3													2,909.0 12.5
		60/0													2,906.6 14.9
															Boring Terminated by Auger Refusal at Elevation 2,906.6 ft

NCDOT BORE SINGLE 18923_NEW.GPJ NC_DOT.GDT 5/20/09



N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin					
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)				
BORING NO. EB1-B		STATION 12+83		OFFSET 12ft RT		ALIGNMENT -L-					
COLLAR ELEV. 2,920.8 ft		NORTHING 929,895		EASTING 1,242,216		0 HR.					
TOTAL DEPTH 28.4 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		24 HR.					
DATE STARTED 12/4/08		COMPLETED 12/4/08		SURFACE WATER DEPTH N/A		HAMMER TYPE Automatic					
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT			SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	
2,920.8											2,920.8 0.00
2,915.8	5.0										2,915.3 5.5
2,910.8	10.0	1	2	11							2,907.3 13.5
2,905.8	15.0	11	10	9							2,899.8 21.0
2,900.8	20.0	25	37	60/0.2							2,894.8 26.0
2,899.8	21.0	33	60/0.5								2,892.4 28.4
		60/0.0									

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09



N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

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SHEET 1 OF 1

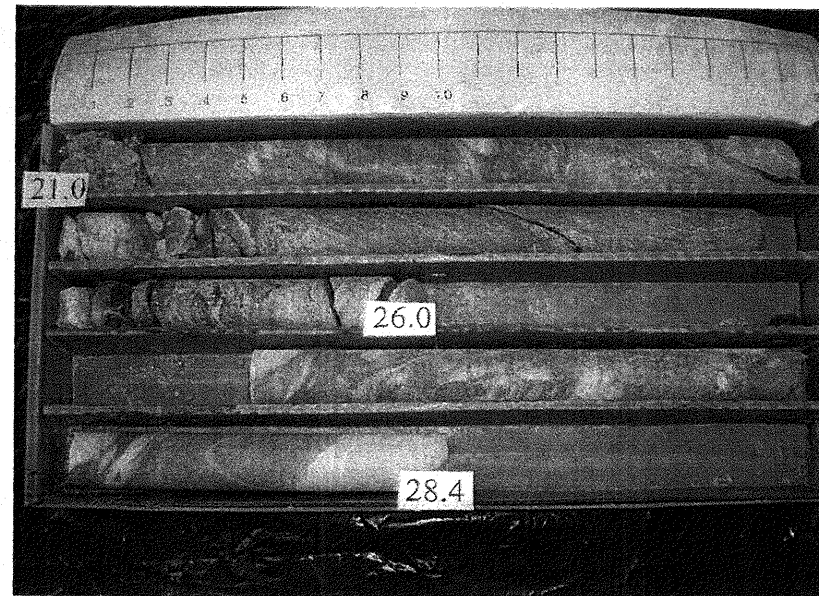
PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin				
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)			
BORING NO. EB1-B		STATION 12+83		OFFSET 12ft RT		ALIGNMENT -L-				
COLLAR ELEV. 2,920.8 ft		NORTHING 929,895		EASTING 1,242,216		0 HR.				
TOTAL DEPTH 28.4 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		24 HR.				
DATE STARTED 12/4/08		COMPLETED 12/4/08		SURFACE WATER DEPTH N/A		HAMMER TYPE Automatic				
CORE SIZE NQ		TOTAL RUN 7.4 ft		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 21.0 ft				
DRILLER Contract Driller										
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (%)	RUN ROD (%)	SAMP. NO.	STRATA REC. (%)	ROD (%)	LOG	DESCRIPTION AND REMARKS
2,899.8	21.0	5.0	4:05/1.0	(4.7) 94%	(4.5) 90%		(4.7) 94%	(4.5) 90%		2,899.8 Crystalline Rock - Slight to Moderate Weathering, Hard to Moderately Hard, Wide to Close Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR) 21.0
			3:47/1.0							
			3:17/1.0							
			3:08/1.0							
2,894.8	26.0		3:15/1.0							2,894.8 Crystalline Rock - Very Slight Weathering, Very Hard, Wide Fracture Spacing, Gray White Black Muscovite Biotite Gneiss with Quartz (CR) 26.0
		2.4	5:27/1.0	(2.4) 100%	(2.4) 100%		(2.4) 100%	(2.4) 100%		
			10:52/1.0							
2,892.4	28.4		21:00/0.4							2,892.4 Boring Terminated at Elevation 2,892.4 ft in CR 28.4

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09

CORE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina
EB1-B

Scale: 1" = 0.5'



Box 1 of 1



N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin								
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)							
BORING NO. B1-B		STATION 13+05		OFFSET 5ft RT		ALIGNMENT -L-								
COLLAR ELEV. 2,918.6 ft		NORTHING 929,906		EASTING 1,242,238		0 HR. 24 HR.								
TOTAL DEPTH 39.1 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic								
DATE STARTED 12/3/08		COMPLETED 12/4/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 21.0 ft								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
2,918.6													2,918.6 0.00	
2,913.6	5.0												2,913.1 5.5	Alluvial - Very Loose Brown Silty Fine to Coarse Sand with Mica (A-3)
2,908.6	10.0	2	1	1									2,908.6 10.0	Residual - Medium Dense Orangish Brown Silty Fine Sand with Mica (A-3)
2,903.6	15.0	7	7	10							SS-2		2,903.6 15.0	Weathered Rock - Gray Brown Muscovite Biotite Gneiss (WR)
2,898.6	20.0	20	44	60/0.3									2,898.6 20.0	
2,897.6	21.0	60/0.5											2,897.6 21.0	Crystalline Rock - Very Slight to Slight Weathering, Hard, Wide Fracture Spacing, Gray White Muscovite Biotite Gneiss with Quartz (CR)
2,887.6	31.0	60/0											2,887.6 31.0	Crystalline Rock - Very Slight Weathering, Very Hard to Hard, Wide fracture Spacing, Gray White Muscovite Biotite Gneiss with Quartz (CR)
2,879.5	39.1												2,879.5 39.1	Boring Terminated at Elevation 2,879.5 ft in CR

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09



N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

12

SHEET 1 OF 1

PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin				
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)			
BORING NO. B1-B		STATION 13+05		OFFSET 5ft RT		ALIGNMENT -L-				
COLLAR ELEV. 2,918.6 ft		NORTHING 929,906		EASTING 1,242,238		0 HR. 24 HR.				
TOTAL DEPTH 39.1 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic				
DATE STARTED 12/3/08		COMPLETED 12/4/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 21.0 ft				
CORE SIZE NQ		TOTAL RUN 18.1 ft		DRILLER Contract Driller						
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
				REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
										Begin Coring @ 21.0 ft
2,897.6	21.0	5.0	5:27 5:07 5:12 5:09 5:16	(5.0) 100%	(4.9) 98%		(10.0) 100%	(9.9) 99%		2,897.6 Crystalline Rock - Very Slight to Slight Weathering, Hard, Wide Fracture Spacing, Gray White Muscovite Biotite Gneiss with Quartz (CR) 21.0
2,892.6	26.0	5.0	7:38 5:47 6:00 6:02 6:07	(5.0) 100%	(5.0) 100%					
2,887.6	31.0	5.0	5:17 4:49 4:32 4:02 8:51	(5.0) 100%	(5.0) 100%		(8.1) 100%	(8.1) 100%		2,887.6 Crystalline Rock - Very Slight Weathering, Very Hard to Hard, Wide fracture Spacing, Gray White Muscovite Biotite Gneiss with Quartz (CR) 31.0
2,882.6	36.0	3.1	12:14 26:32 30:15	(3.1) 100%	(3.1) 100%	RS-2				
2,879.5	39.1		7:50 0:10/0.1							2,879.5 Boring Terminated at Elevation 2,879.5 ft in CR 39.1

NCDOT CORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09

CORE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina
B1-B

Scale : 1"= 0.5'



Box 1 of 2



Box 2 of 2



N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin										
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100																
BORING NO. B2-C		STATION 13+45		OFFSET 0ft CL		ALIGNMENT -L-										
COLLAR ELEV. 2,913.3 ft		NORTHING 929,923		EASTING 1,242,276		GROUND WATER (ft) 0 HR. 0.1 24 HR. 0.1										
TOTAL DEPTH 32.4 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic										
DATE STARTED 12/8/08		COMPLETED 12/8/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 6.9 ft										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT				BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION			
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100						
2,913.3														2,913.3	0.00	
2,909.8	3.5													2,908.3		Weathered Rock - Brown Muscovite Biotite Gneiss (WR)
2,908.3	5.0	5	60/0.3											2,906.4		Weathered Rock - Brown Muscovite Biotite Gneiss (WR)
		60/0												2,905.9		Crystalline Rock - Quartz
														2,900.9		Weathered Rock - Severely Weathered Soft Very Close Fracture Spacing, Brown Muscovite Biotite Gneiss (WR)
														2,900.9		Crystalline Rock - Moderate to Moderately Severe Weathering, Hard to Moderately Hard, Close Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
														2,895.9		Crystalline Rock - Very Slight to Slight Weathering, Very Hard, Wide fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
														2,890.9		Crystalline Rock - Slight to Moderate Weathering, Moderately Hard to Hard, Close Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
														2,885.9		Crystalline Rock - Very Slight to Slight Weathering, Very Hard, Wide Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
														2,880.9		Boring Terminated at Elevation 2,880.9 ft in CR

NCDOT BORE SINGLE 16823_NEW/GPJ NC_DOT.GDT 5/20/09



N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

14

SHEET 1 OF 1

PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin			
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100									
BORING NO. B2-C		STATION 13+45		OFFSET 0ft CL		ALIGNMENT -L-			
COLLAR ELEV. 2,913.3 ft		NORTHING 929,923		EASTING 1,242,276		GROUND WATER (ft) 0 HR. 0.1 24 HR. 0.1			
TOTAL DEPTH 32.4 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic			
DATE STARTED 12/8/08		COMPLETED 12/8/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 6.9 ft			
CORE SIZE NQ			TOTAL RUN 25.5 ft			DRILLER Contract Driller			
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS
				REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %		
									Begin Coring @ 6.9 ft
2,906.4	6.9	0.5	0:45/0.5	(0.5)	(0.0)	(0.5)	(0.0)		2,906.4 Crystalline Rock - Quartz
2,905.9	7.4	5.0	0:25	100%	0%	100%	0%		2,905.9 Weathered Rock - Severely Weathered Soft Very Close Fracture Spacing, Brown Muscovite Biotite Gneiss (WR)
			0:2	(0.0)	(N/A)	(0.0)	(N/A)		
			0:12						
			0:15						
			0:17						
2,900.9	12.4	5.0	0:35	(0.7)	(0.5)	(0.7)	(0.5)		2,900.9 Crystalline Rock - Moderate to Moderately Severe Weathering, Hard to Moderately Hard, Close Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
			0:24	14%	9%	14%	9%		
			0:17						
			0:20						
2,895.9	17.4	5.0	1:33						2,895.9 Crystalline Rock - Very Slight to Slight Weathering, Very Hard, Wide fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
			1:47	(4.6)	(4.3)	(4.6)	(4.3)		
			2:12	92%	86%	92%	86%		
			2:15						
			3:02						
2,890.9	22.4	5.0	3:42						2,890.9 Crystalline Rock - Slight to Moderate Weathering, Moderately Hard to Hard, Close Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
			2:37	(2.5)	(2.5)	(2.5)	(2.5)		
			2:30	49%	49%	49%	49%		
			1:45						
			3:24						
2,885.9	27.4	5.0	4:53						2,885.9 Crystalline Rock - Very Slight to Slight Weathering, Very Hard, Wide Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
			4:25	(5.0)	(5.0)	(5.0)	(5.0)		
			4:35	100%	100%	100%	100%		
			4:37						
			4:52						
2,880.9	32.4		5:12					RS-3	2,880.9 Boring Terminated at Elevation 2,880.9 ft in CR

NCDOT CORE SINGLE 16823_NEW/GPJ NC_DOT.GDT 5/20/09

CORE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina
B2-C

Scale 1"=0.5'



Box 1 of 2



Box 2 of 2



PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin							
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)						
BORING NO. B3-A		STATION 14+05		OFFSET 12ft LT		ALIGNMENT -L-		0 HR. 0.0					
COLLAR ELEV. 2,911.5 ft		NORTHING 929,959.		EASTING 1,242,331				24 HR. 0.0					
TOTAL DEPTH 33.7 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic							
DATE STARTED 12/5/08		COMPLETED 12/5/08		SURFACE WATER DEPTH -1.8		DEPTH TO ROCK 3.7 ft							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
2,913.7													Water Surface
													River Channel
													2,911.9 0.00 Alluvial- Very Loose Brown Silty Fine to Coarse Sand (A-3)
													2,908.2 3.7 Crystalline Rock - Moderate to Very Severe Weathering, Soft to Very Soft, Close to Very Close Fracture Spacing, Gray Brown Muscovite Biotite Gneiss with Mica
													2,893.2 18.7 Crystalline Rock - Very Slight to Slight Weathering, Wide Fracture Spacing, Gray White Black Muscovite Biotite Gneiss
													2,878.2 33.7 Boring Terminated at Elevation 2,878.2 ft in CR

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT_GDT_5/20/09



PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin				
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)			
BORING NO. B3-A		STATION 14+05		OFFSET 12ft LT		ALIGNMENT -L-		0 HR. 0.0		
COLLAR ELEV. 2,911.5 ft		NORTHING 929,959		EASTING 1,242,331				24 HR. 0.0		
TOTAL DEPTH 33.7 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic				
DATE STARTED 12/5/08		COMPLETED 12/5/08		SURFACE WATER DEPTH -1.8		DEPTH TO ROCK 3.7 ft				
CORE SIZE NQ		TOTAL RUN 30.0 ft		DRILLER Contract Driller						
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
				REC. (%)	RQD (%)		REC. (%)	RQD (%)		
										Begin Coring @ 3.7 ft
2,908.2	3.7	5.0	2:30	(4.0) 80%	(2.5) 50%		(10.4) 69%	(3.2) 21%		2,908.2 Crystalline Rock - Moderate to Very Severe Weathering, Soft to Very Soft, Close to Very Close Fracture Spacing, Gray Brown Muscovite Biotite Gneiss with Mica 3.7
			1:55							
			2:10							
			2:07							
2,903.2	8.7	5.0	2:05							
			1:12	(5.0) 99%	(1.7) 34%					
			1:15							
			1:05							
			1:02							
			1:02							
2,898.2	13.7	5.0	0:30	(1.4) 28%	(0.0) 0%					
			0:35							
			0:41							
			0:27							
			0:32							
2,893.2	18.7	5.0	0:37	(4.2) 84%	(3.9) 78%		(14.2) 95%	(13.8) 92%		2,893.2 Crystalline Rock - Very Slight to Slight Weathering, Wide Fracture Spacing, Gray White Black Muscovite Biotite Gneiss 18.7
			2:27							
			2:30							
			3:12							
			4:16							
2,888.2	23.7	5.0	4:27	(5.0) 100%	(4.9) 98%					
			3:52							
			3:47							
			3:45							
			3:37							
2,883.2	28.7	5.0	4:00	(5.0) 100%	(5.0) 100%					
			5:19							
			6:24							
			6:00							
			8:25							
2,878.2	33.7									2,878.2 Boring Terminated at Elevation 2,878.2 ft in CR 33.7

NCDOT CORE SINGLE 16823_NEW.GPJ NC_DOT_GDT_5/20/09

CORE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina
B3-A



Box 1 of 3



Box 3 of 3



Box 2 of 3

Scale: 1"=0.5'



N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin							
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)						
BORING NO. B4-B		STATION 14+65		OFFSET 5ft RT	ALIGNMENT -L-		0 HR.						
COLLAR ELEV. 2,917.2 ft		NORTHING 929,953		EASTING 1,242,415			24 HR.						
TOTAL DEPTH 47.1 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic							
DATE STARTED 12/2/08		COMPLETED 12/2/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 13.2 ft							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
2,917.2													2,917.2 0.00
2,912.2	5.0	4	7	9									2,912.2 5.0
2,907.2	10.0	20	14	14									2,907.2 10.0
2,904.0	13.2	60/0											2,904.0 13.2
													2,900.1 17.1
													2,895.1 22.1
													2,890.1 27.1
													2,885.1 32.1
													2,880.1 37.1
													2,875.1 42.1
													2,870.1 47.1



N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT 18

SHEET 1 OF 1

PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin				
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)			
BORING NO. B4-B		STATION 14+65		OFFSET 5ft RT	ALIGNMENT -L-		0 HR.			
COLLAR ELEV. 2,917.2 ft		NORTHING 929,953		EASTING 1,242,415			24 HR.			
TOTAL DEPTH 47.1 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic				
DATE STARTED 12/2/08		COMPLETED 12/2/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 13.2 ft				
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
				REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
										Begin Coring @ 13.2 ft
2,904.0	13.2	3.9	4:05	(3.0) 77%	(1.9) 49%		(3.0) 77%	(1.9) 49%		2,904.0 Crystalline Rock - Moderate to Moderately Severe Weathering, Moderately Hard, Close Fracture Spacing, Gray White Black Muscovite Biotite Gneiss with Quartz (CR) 13.2
2,900.1	17.1	5.0	2:30	(1.9) 38%	(0.5) 10%		(1.9) 38%	(0.5) 10%		2,900.1 Crystalline Rock - Very Severe to Complete Weathering, Soft to Very Soft, Very Close Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR) 17.1
2,895.1	22.1	5.0	5:17	(5.3) 106%	(5.3) 106%		(25.0) 100%	(25.1) 100%		2,895.1 Crystalline Rock - Very Slight to Slight Weathering, Hard, Wide Fracture Spacing, Gray White Black Muscovite Biotite Gneiss with Quartz (CR) 22.1
2,890.1	27.1	5.0	5:52	(5.2) 104%	(5.2) 104%					
2,885.1	32.1	5.0	4:37	(5.0) 99%	(5.0) 99%					
2,880.1	37.1	5.0	5:07	(5.0) 100%	(5.0) 100%					
2,875.1	42.1	5.0	3:57	(4.7) 94%	(4.6) 92%	RS-4				
2,870.1	47.1		4:47							2,870.1 Boring Terminated at Elevation 2,870.1 ft in CR 47.1

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09

CORE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina
B4-B

Scale: 1"=0.5'



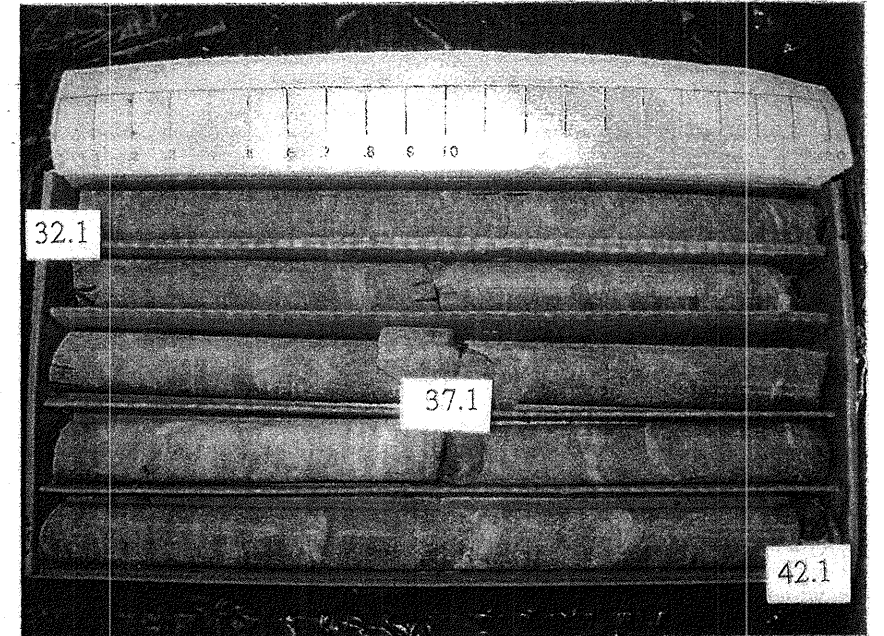
Box 1 of 4



Box 2 of 4

CORE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina
B4-B



Box 3 of 4



Box 4 of 4



N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin							
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)						
BORING NO. EB2-A		STATION 15+34		OFFSET 12ft LT	ALIGNMENT -L-		0 HR. 4.2						
COLLAR ELEV. 2,918.9 ft		NORTHING 929,965		EASTING 1,242,456			24 HR. 4.6						
TOTAL DEPTH 17.9 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic							
DATE STARTED 12/2/08		COMPLETED 12/2/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 7.9 ft							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
2,918.9													2,918.9 0.00
2,915.4	3.5												Residual - Very Dense Brown Gray Silty Fine to Coarse Sand with Rock Fragments Trace Mica (A-1-b)
2,913.0	5.9	11	37	39									2,913.4 5.5
		42	60/0.2										2,911.0 7.9
													Crystalline Rock - Moderately Severe to Slight, Hard to Very Hard, Close to Wide Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR)
													2,901.0 17.9
													Boring Terminated at Elevation 2,901.0 ft in CR

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09



N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

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SHEET 1 OF 1

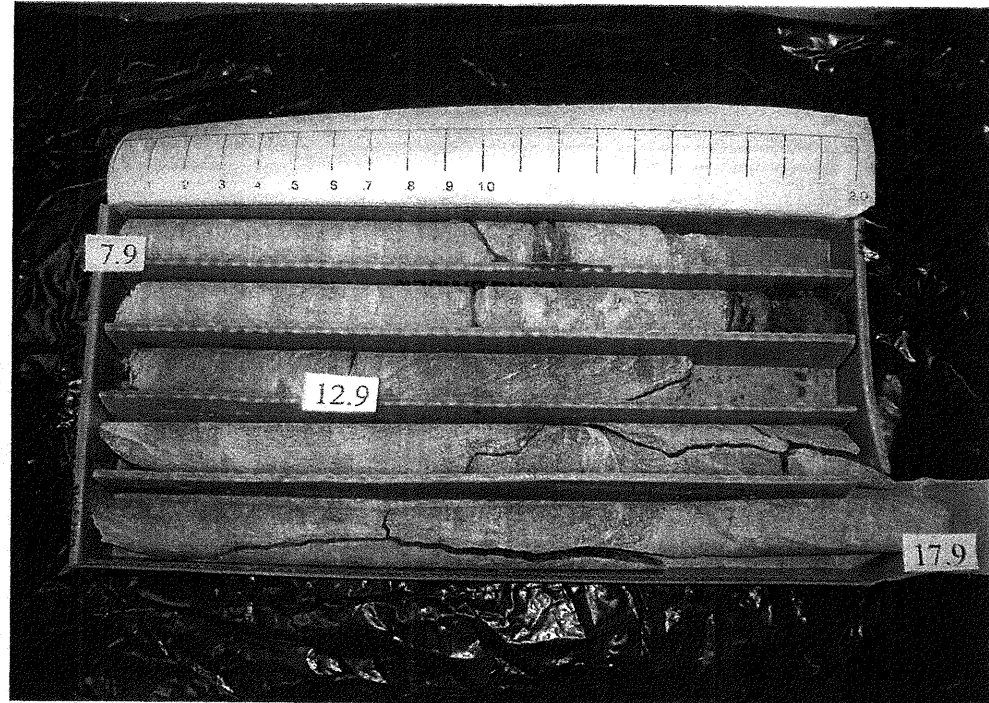
PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin				
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)			
BORING NO. EB2-A		STATION 15+34		OFFSET 12ft LT	ALIGNMENT -L-		0 HR. 4.2			
COLLAR ELEV. 2,918.9 ft		NORTHING 929,965		EASTING 1,242,456			24 HR. 4.6			
TOTAL DEPTH 17.9 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic				
DATE STARTED 12/2/08		COMPLETED 12/2/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 7.9 ft				
CORE SIZE NQ		TOTAL RUN 10.0 ft		DRILLER Contract Driller						
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
				REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
										Begin Coring @ 7.9 ft
2,911.0	7.9	5.0	4:00/1.0	(4.1) 82%	(3.3) 65%		(9.1) 91%	(8.3) 83%		2,911.0 Crystalline Rock - Moderately Severe to Slight, Hard to Very Hard, Close to Wide Fracture Spacing, Gray White Black Muscovite Biotite Gneiss (CR) 7.9
			4:26/1.0							
			4:35/1.0							
			5:10/1.0							
2,906.0	12.9		6:00/1.0							
		5.0	5:25/1.0	(5.0) 100%	(5.0) 100%					
			5:30/1.0							
			5:15/1.0							
			5:05/1.0							
			4:45/1.0			RS-1				
2,901.0	17.9									2,901.0 Boring Terminated at Elevation 2,901.0 ft in CR 17.9

NCDOT CORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09

CORE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina
EB2-A

Scale: 1" = 0.5'



Box 1 of 1



PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin							
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100													
BORING NO. EB2-B		STATION 15+34		OFFSET 12ft RT		ALIGNMENT -L-							
COLLAR ELEV. 2,918.7 ft		NORTHING 929,953		EASTING 1,242,456									
TOTAL DEPTH 6.0 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic							
DATE STARTED 12/2/08		COMPLETED 12/2/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
2,918.7													
2,915.2	3.5												2,918.7 Alluvial - Very Loose Brown Fine to Medium Silty Sand with Mica (A-3) 0.00
2,913.2	5.5	2	1	1									2,913.2 Weathered Rock - Brown Muscovite Biotite Gneiss (WR) 5.5
		60/0.5											2,912.7 Boring Terminated by Auger Refusal at Elevation 2,912.7 ft 6.0

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09



PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin								
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)							
BORING NO. RW-1		STATION 11+97		OFFSET 17ft LT		ALIGNMENT -L-								
COLLAR ELEV. 2,931.7 ft		NORTHING 929,936.		EASTING 1,242,151		0 HR.								
TOTAL DEPTH 15.0 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic								
DATE STARTED 12/8/08		COMPLETED 12/8/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80					100
2,931.7														2,931.7 0.00
2,926.7	5.0	1	2	3										2,926.2 5.5
2,921.7	10.0	5	8	7										2,919.2 12.5
2,918.2	13.5	9	20	20										2,916.7 15.0
														Boring Terminated at Elevation 2,916.7 ft in residual soil

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09

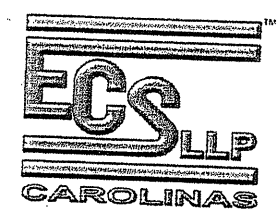


PROJECT NO. 33361.1.1		ID. B-3928		COUNTY Watauga		GEOLOGIST S. Bullin								
SITE DESCRIPTION Bridge 334 Over New Fork South River on SR1351 and SR1100							GROUND WATER (ft)							
BORING NO. RW-2		STATION 11+38		OFFSET 18ft LT		ALIGNMENT -L-								
COLLAR ELEV. 2,924.3 ft		NORTHING 929,961.		EASTING 1,242,097		0 HR.								
TOTAL DEPTH 11.1 ft		DRILL MACHINE CME 550X		DRILL METHOD Rotary		HAMMER TYPE Automatic								
DATE STARTED 12/8/08		COMPLETED 12/8/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80					100
2,924.3														2,924.3 0.00
2,919.3	5.0	1	2	2										2,918.8 5.5
2,914.3	10.0													2,913.2 11.1
2,913.3	11.0	3	7	14										Boring Terminated at Elevation 2,913.2 ft in residual soil

NCDOT BORE SINGLE 16823_NEW.GPJ NC_DOT.GDT 5/20/09

SUMMARY OF LABORATORY TEST DATA FOR NCDOT
 Project No. 33361.1.1 (B-3928)
 Bridge 334 over New Fork South River on SR1351 and SR1100
 Watauga County, North Carolina

Boring No.	Sample Depth (ft)	Sample No.	AASHTO Class	Atterberg Limits		Gradation Results						
				L.L.	P.L.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
EB1-A	8.5-10	SS-1	A-1-b	NP	NP	41.8	26.5	12.3	45	35	15	5
B1	8.5-10.0	SS-2	A-2-4	NP	NP	81	67.4	22.4	68	22	9	1
B4	3.5-5	SS-3	A-2-4	NP	NP	78.8	72.3	17.8	72	18	7	3
RW2	3.5-5	SS-4	A-4	NP	NP	94.4	92.8	49.5	34	34	20	12
River Bank	1-2.5	SS-6	A-1-b	NP	NP	96.8	50	4.3	50	30	10	10



Chris Cary
 NCDOT Cert. 110-06-1103
Chris Cary



**FIELD
SCOUR REPORT**

WBS: 33361.1.1 TIP: B-3928 COUNTY: WATAUGA

DESCRIPTION(1): Bridge No. 334 over New Fork South River on SR 1351 and SR 1100

EXISTING BRIDGE

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

Bridge No.: 334 Length: 200 Total Bents: 3 Bents in Channel: 3 Bents in Floodplain: _____
Foundation Type: Concrete Piers on Footings

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Minor Sloughing at existing End Bent-3

Interior Bents: Scour pockets approximately 108 feet deep on upstream side of interior bents.

Channel Bed: none

Channel Bank: Minor sloughing along east and west banks

EXISTING SCOUR PROTECTION

Type(3): n/a

Extent(4): n/a

Effectiveness(5): n/a

Obstructions(6): Debris in immediate area of existing bridge bents

INSTRUCTIONS

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

DESIGN INFORMATION

Channel Bed Material(7): A-1-b Fine to Coarse Sand with Cobbles (SS-5)

Channel Bank Material(8): A-1-b Fine to Coarse Sand (SS-6)

Channel Bank Cover(9): Grass underbrush and trees

Floodplain Width(10): 100 feet

Floodplain Cover(11): Trees on Stream Banks, Farm Land and Grasses

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

Channel Migration Tendency(13): To the south

Observations and Other Comments: _____

Reported by: _____ Date: 12/4/2008

S. Bullin, ECS Carolinas

DESIGN SCOUR ELEVATIONS(14)

Feet x Meters _____

BENTS

B2	B3	EB2											
2911.9	2907.9	2912.7											

Comparison of DSE to Hydraulics Unit theoretical scour:

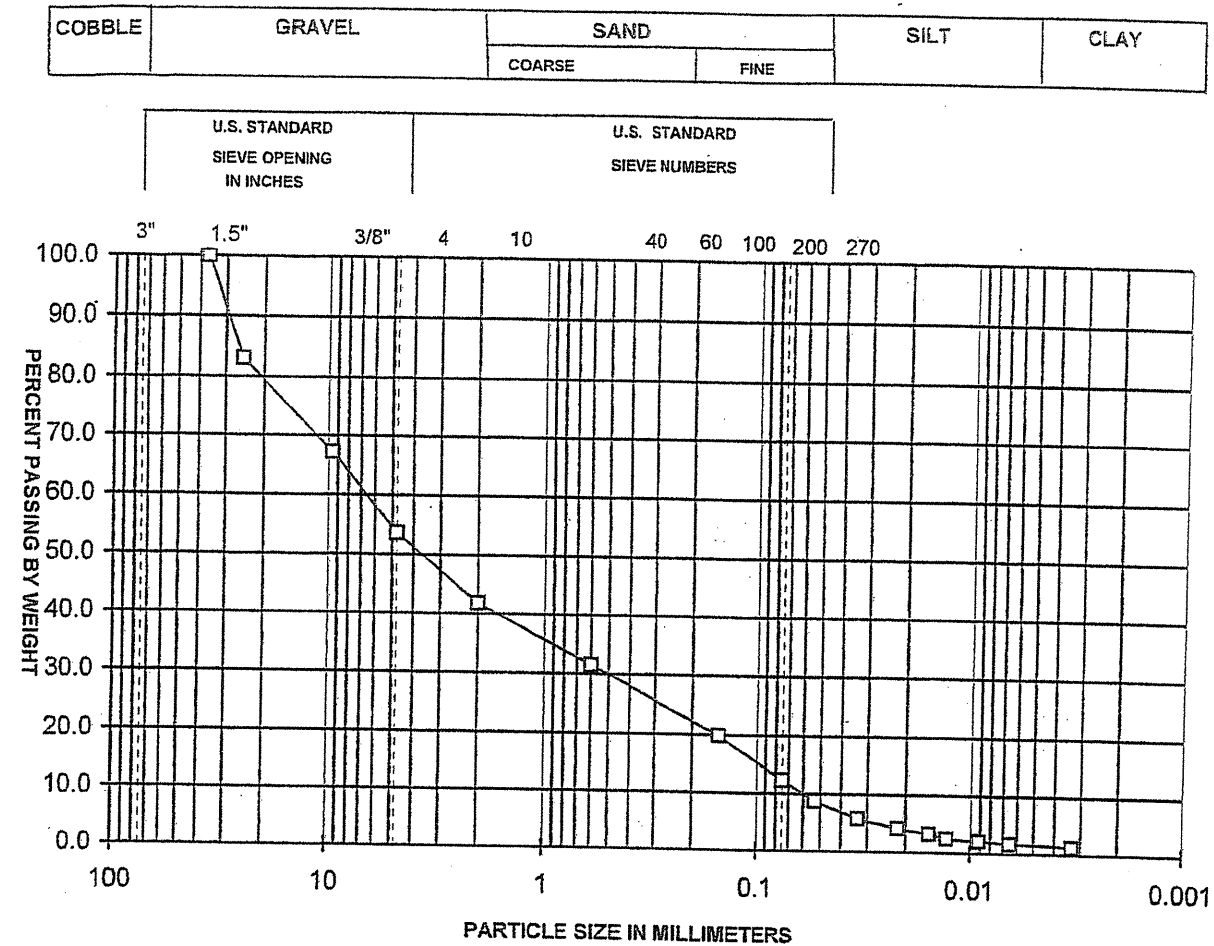
The GEU and the Hydraulics Unit agree that the design scour elevations should be raised from the theoretical scour elevation proposed in the Hydraulics report dated December 17, 2008.

DSE determined by: _____ Date: 5/27/2009

William F. Goforth, PG

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

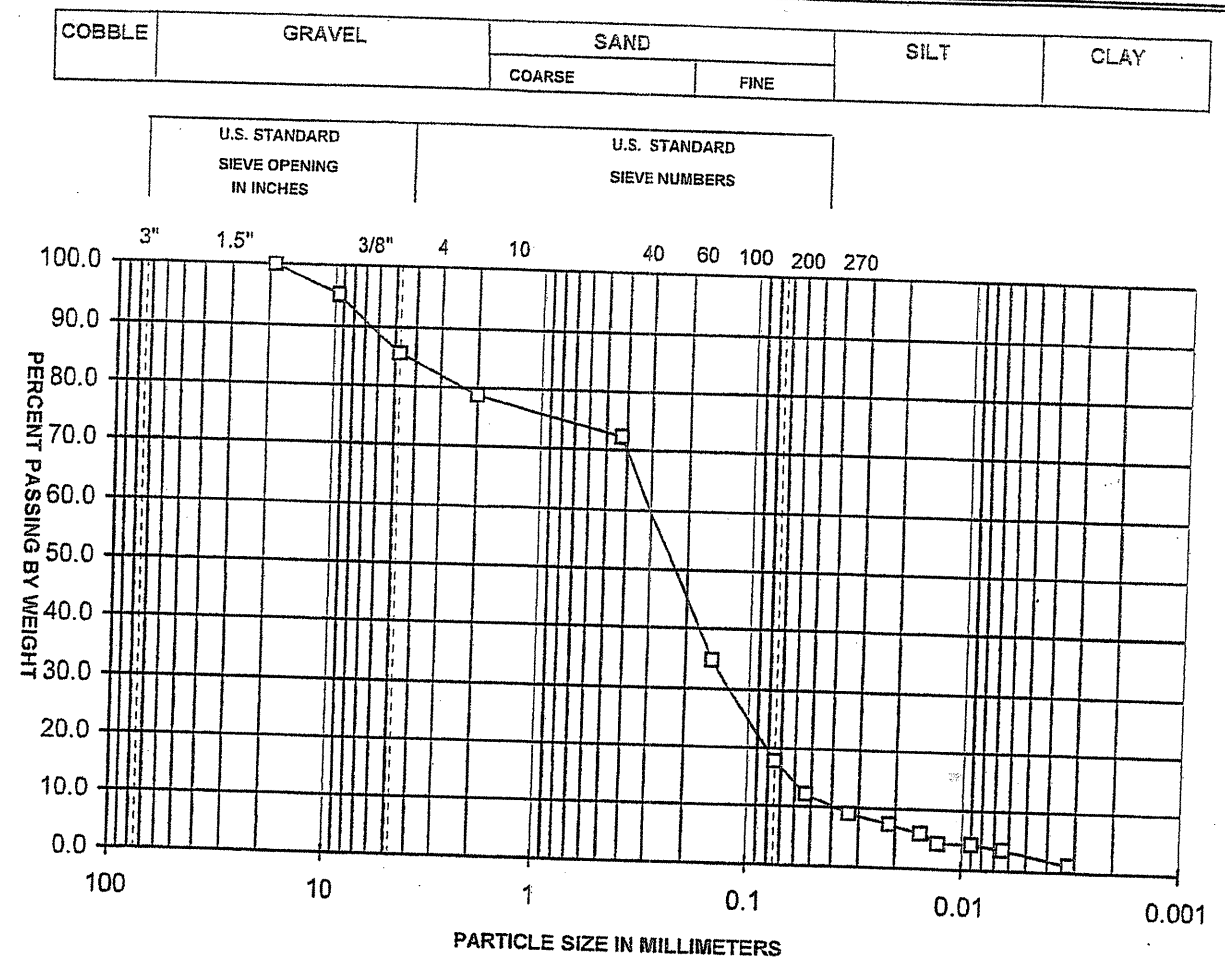
Bed or Bank	Bed	Bank					
Sample No.	SS-5	SS-6					
Retained #4	43.8	2.6					
Passed #10	46.2	96.8					
Passed #40	27.9	50					
Passed #200	2.2	4.3					
Coarse Sand	50	50					
Fine Sand	40	30					
Silt	5	10					
Clay	5	10					
LL	NP	NP					
PI	NP	NP					
AASHTO	A-1-b	A-1-b					
Station							
Offset							
Depth	2.5-3	1-2.5					



Boring/ Sample No.	Depth (feet)	Symbol	LL	PI	Description
EB1-A/ SS-1	8.5-10	□		NP	Brown Silty Fine to Coarse SAND
/		■			
/		△			
/		▲			

State Project: 33361.1.1 (B-3928)
 Bridge 334 Over New Fork South River on SR1351
 Watauga County, North Carolina
 Date: 12/22/08

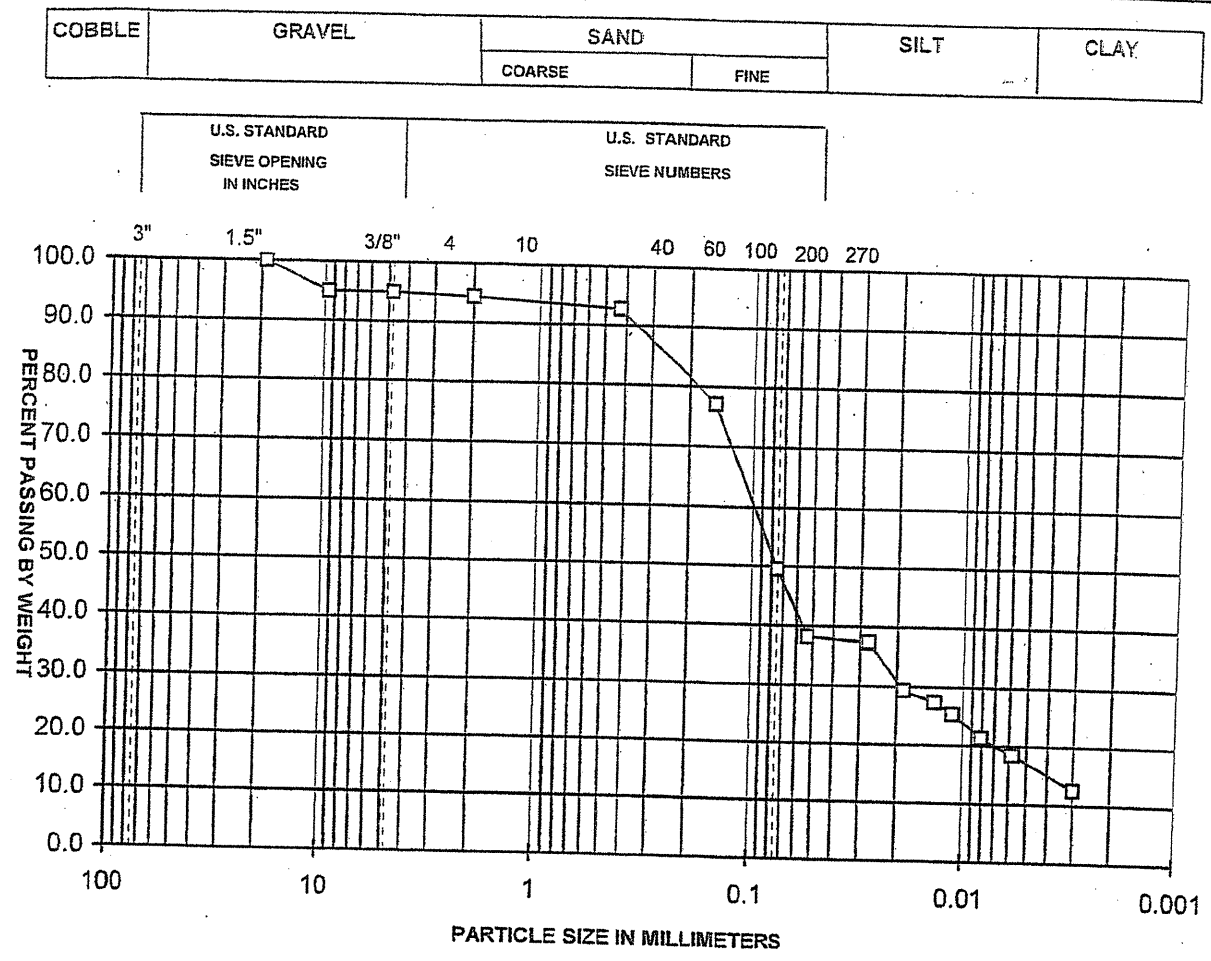
ECS Carolinas, LLP
 Greensboro, North Carolina
 Particle Size Distribution Curve



Boring/ Sample No.	Depth (feet)	Symbol	LL	PI	Description
B4 / SS-3	3.5-5	□		NP	Brown Silty Fine to Coarse SAND
/		■			
/		△			
/		▲			

State Project: 33361.1.1 (B-3928)
 Bridge 334 Over New Fork South River on SR1351
 Watauga County, North Carolina
 Date: 12/22/08

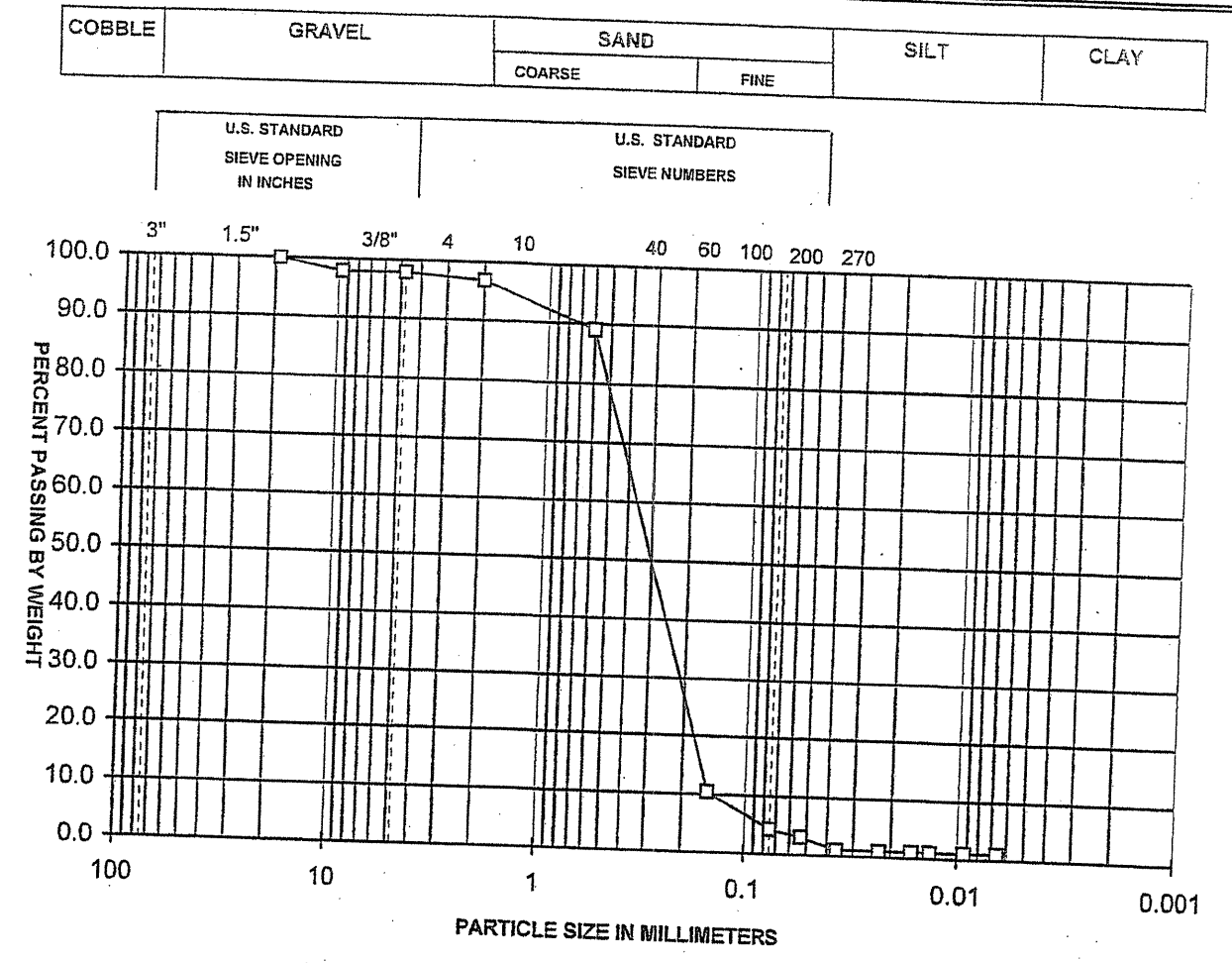
ECS Carolinas, LLP
 Greensboro, North Carolina
 Particle Size Distribution Curve



Boring/ Sample No.	Depth (feet)	Symbol	LL	PI	Description
RW2/ SS-4	3.5-5	□		NP	Brown Fine to Coarse Sandy SILT
/		■			
/		△			
/		▲			

State Project: 33361.1.1 (B-3928)
 Bridge 334 Over New Fork South River on SR1351
 Watauga County, North Carolina
 Date: 12/22/08

ECS Carolinas, LLP
 Greensboro, North Carolina
 Particle Size Distribution Curve



Boring/ Sample No.	Depth (feet)	Symbol	LL	PI	Description
River Bank SS-6	1-2.5	□		NP	Brown Silty Fine to Coarse SAND
/		■			
/		△			
/		▲			

State Project: 33361.1.1 (B-3928)
 Bridge 334 Over New Fork South River on SR1351
 Watauga County, North Carolina
 Date: 12/22/08

ECS Carolinas, LLP
 Greensboro, North Carolina
 Particle Size Distribution Curve



Unconfined Compressive Strength of Rock Core

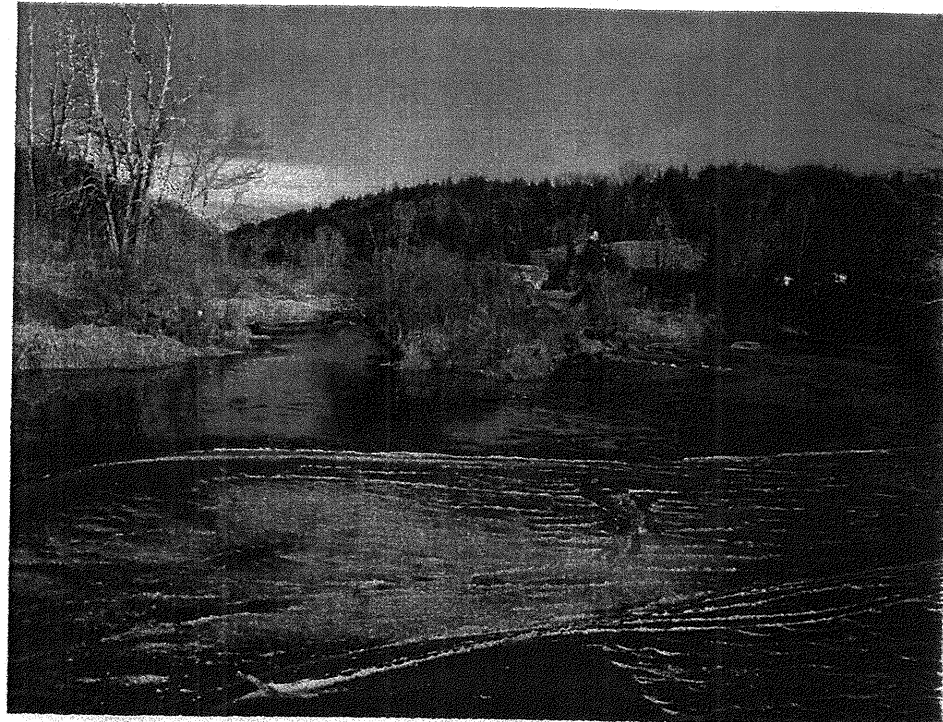
Job Name: Bridge 334 Over New Fork South River/ State Road 1351
Job #: 09.16823

<u>CORE</u>		<u>DIAMETER (in)</u>	<u>AREA (SQ IN)</u>	<u>LENGTH (IN)</u>	<u>L/D</u>	<u>CORRECTION FACTOR*</u>	<u>LOAD (LB)</u>	<u>CORRECTED COMPRESSIVE STRENGTH (PSI)</u>
RS-1	EB2-A 16.4-16.9	1.875	2.76	4.000	2.13	1	32760	11860
RS-2	B-1 37.1-37.6	1.875	2.76	4.000	2.13	1	11430	4140
RS-3	B-2 31.5-32.1	1.873	2.75	4.000	2.14	1	19080	6930
RS-4	B-4 42.1-44.6	1.870	2.75	4.000	2.14	1	47620	17340

Terry L. Pope, Lab manager
Performed by Chis Cary
NCDOT Cert. 110-06-1103

SITE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina



View Looking Upstream of New Fork South River



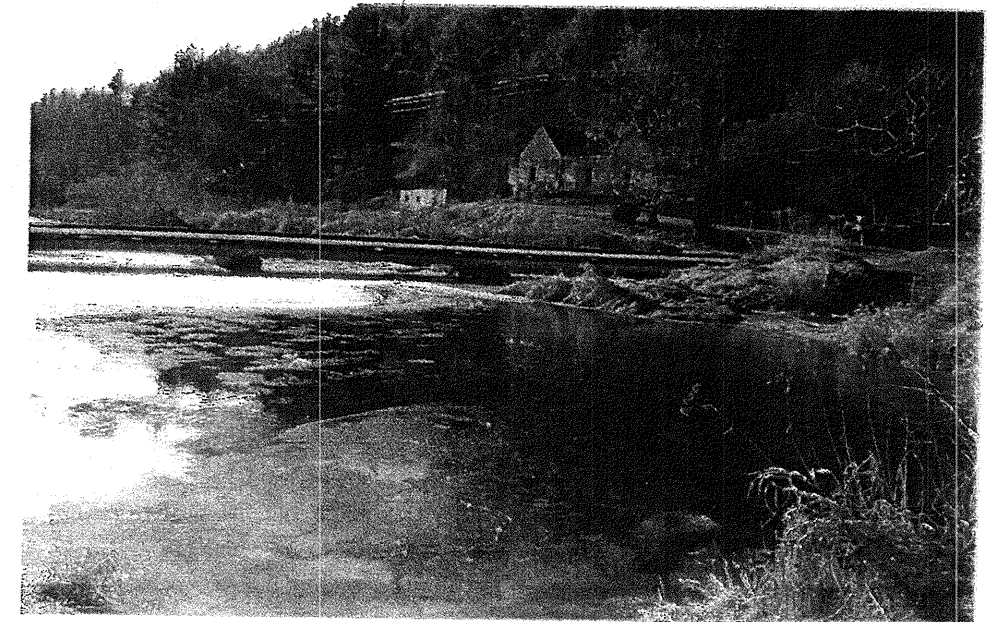
View Looking Downstream of New Fork South River

SITE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina



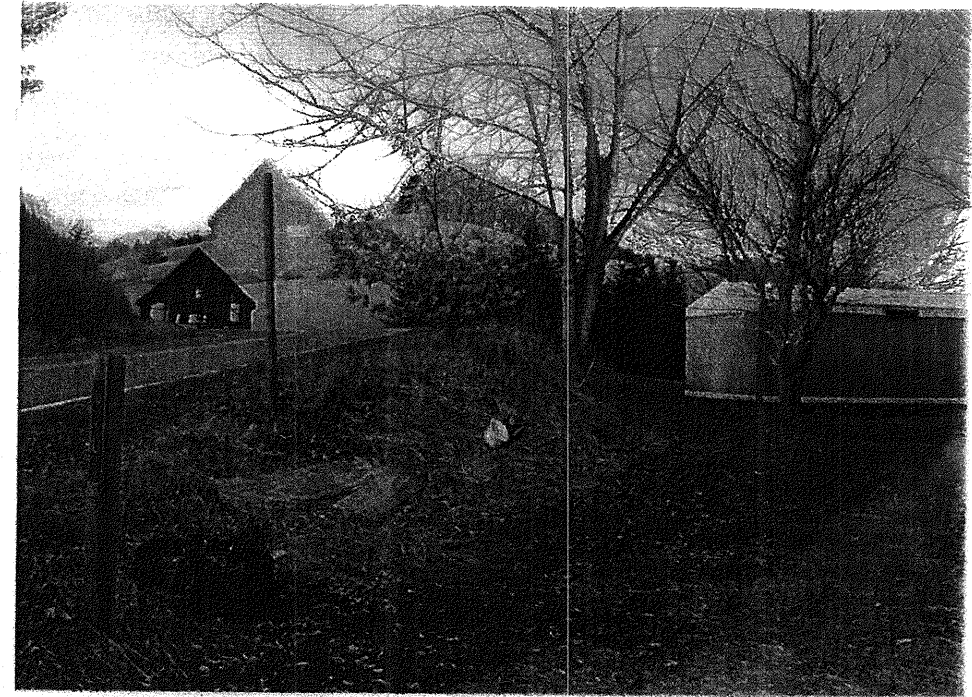
Cross-Sectional View Looking Downstream New Fork South River



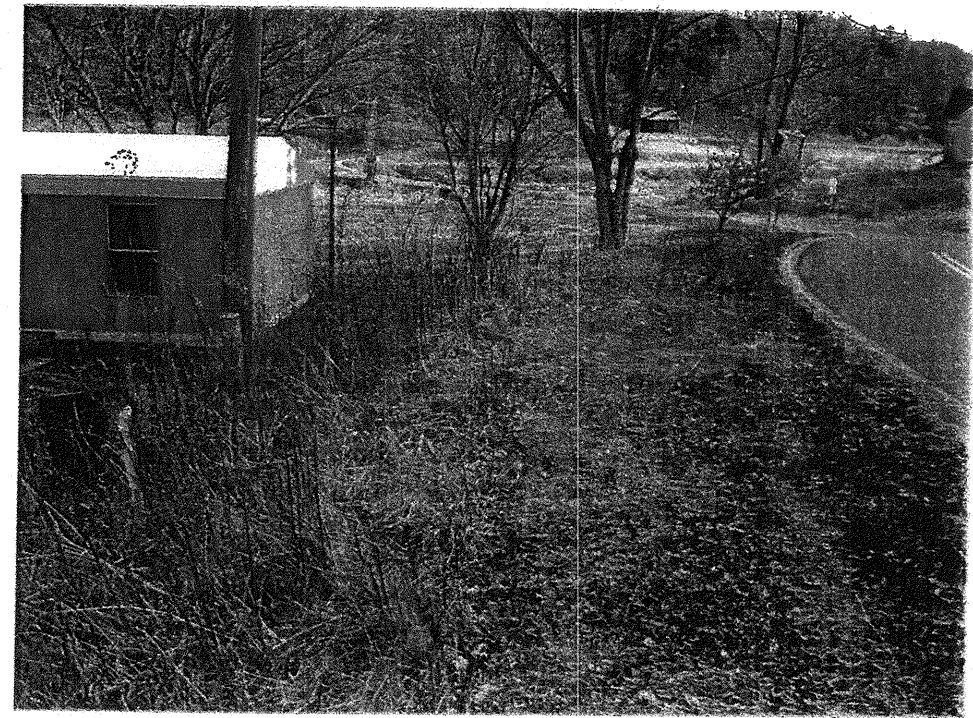
Cross-Sectional View Looking Downstream at Bent 2

SITE PHOTOGRAPHS

NCDOT Project No. 33361.1.1 (B-3928)
Bridge No. 334 over New Fork South River on SR1351 and SR1100
Watauga County, North Carolina



View Looking West Along Retaining Wall Alignment



View Looking East Along Retaining Wall Alignment