

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33498.1.1 B-4149	1	21

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STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33498.1.1 F.A. PROJ. B-4149
 COUNTY HENDERSON
 PROJECT DESCRIPTION BRIDGE #34 ON SR 1387 OVER
CLEAR CREEK

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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

ID: B-4149

PROJECT: 33498.1.1

PERSONNEL

T.B. DANIEL

C.J. COFFEY

G.K. ROSE

R.D. CHILDERS

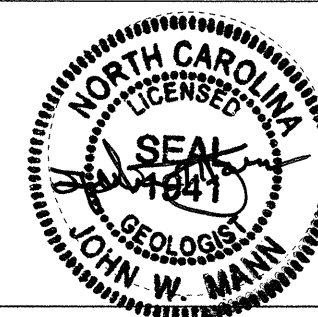
P.Q. LOCKAMY

INVESTIGATED BY J.W. MANN

CHECKED BY W.D. FRYE

SUBMITTED BY W.D. FRYE

DATE 11.14.07



DRAWN BY: J.T. WILLIAMS

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

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

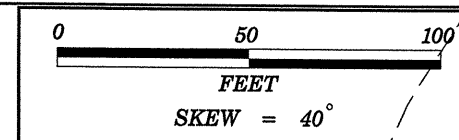
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 33498.1.I B-4149 SHEET NO. 2

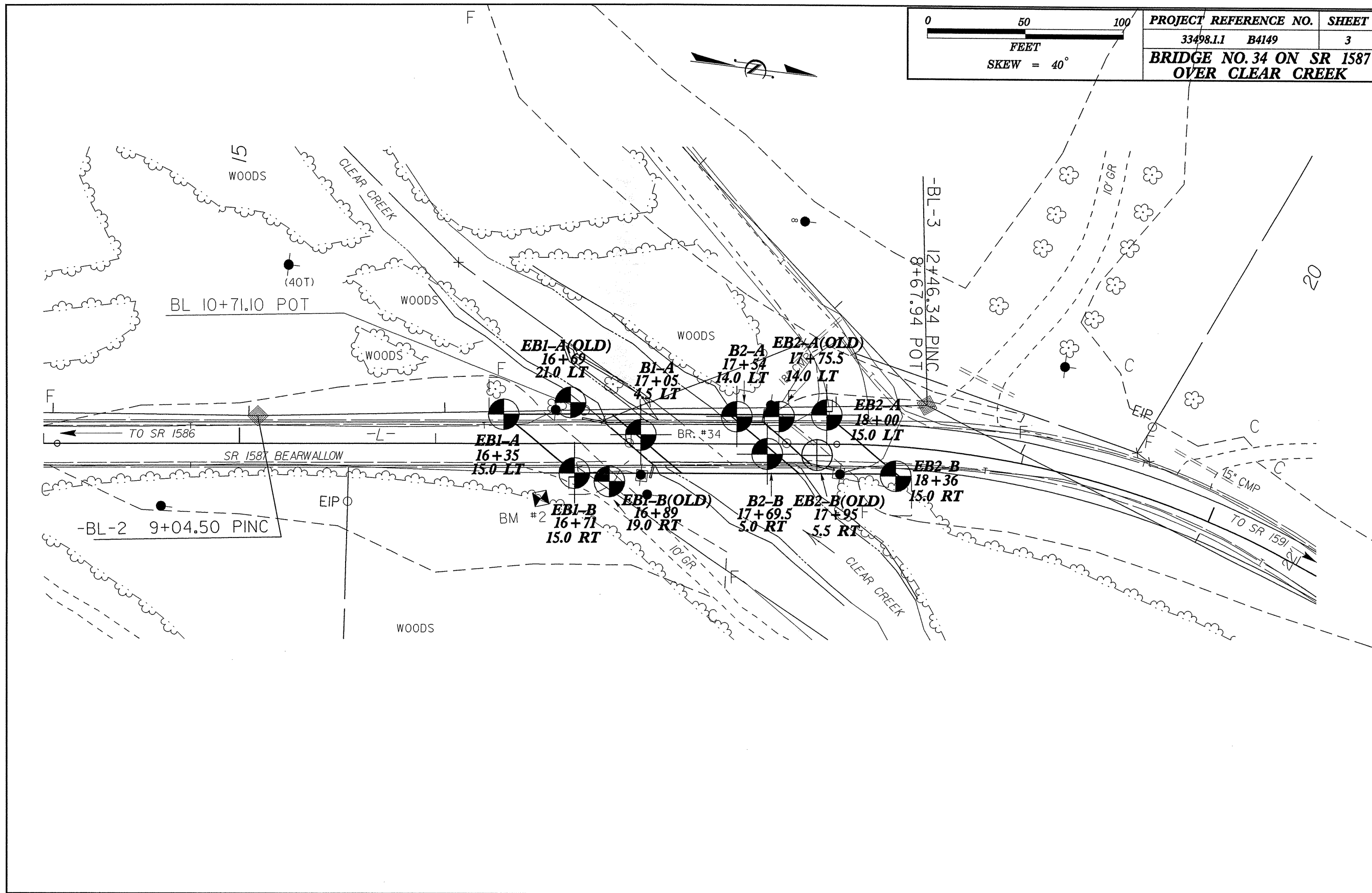
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

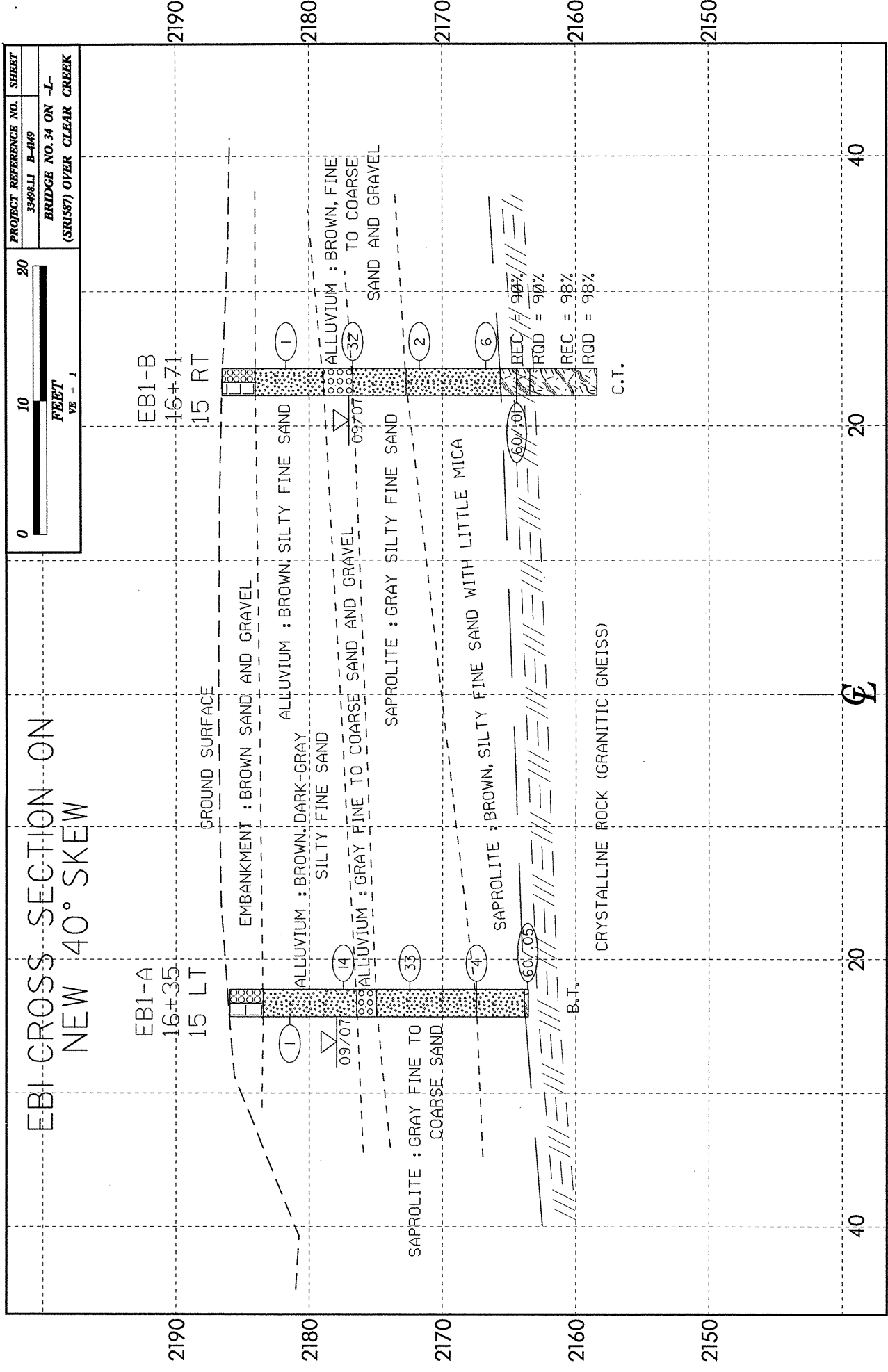
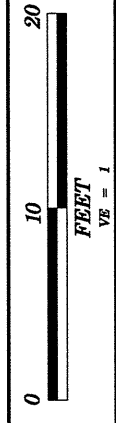
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 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: <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>	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. 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) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)	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. ARIESIAN - 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 DISLOGGED 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.
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			
SYMBOL			
% PASSING			
LIQUID LIMIT PLASTIC INDEX			
GROUP INDEX			
USUAL TYPES OF MAJOR MATERIALS			
GEN. RATING AS A SUBGRADE			
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 RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)			
GENERAL GRANULAR MATERIAL (NON-COHESIVE)			
GENERAL SILT-CLAY MATERIAL (COHESIVE)			
TEXTURE OR GRAIN SIZE			
U.S. STD. SIEVE SIZE OPENING (MM)			
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)			
GRAIN SIZE			
SOIL MOISTURE - CORRELATION OF TERMS			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			
LL - LIQUID LIMIT PLASTIC RANGE (PI) PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT			
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH			
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY			
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			
MINERALOGICAL COMPOSITION			
COMPRESSIBILITY			
PERCENTAGE OF MATERIAL			
GROUND WATER			
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			
DIP & DIP DIRECTION OF ROCK STRUCTURES			
SOUNDING ROD			
SPT OPT DMT TEST BORING			
SAMPLE DESIGNATIONS			
S - BULK SAMPLE			
SS - SPLIT SPOON SAMPLE			
ST - SHELBY TUBE SAMPLE			
RM - RESILIENT MODULUS SAMPLE			
RS - ROCK SAMPLE			
RT - RECOMPACTED TRIAXIAL SAMPLE			
CBR - CALIFORNIA BEARING RATIO SAMPLE			
ROCK HARDNESS			
VERY HARD			
HARD			
MODERATELY HARD			
MEDIUM HARD			
SOFT			
VERY SOFT			
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			
HL - 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 WEAL - WEATHERED w - UNIT WEIGHT w _d - DRY UNIT WEIGHT CT - CORING TERMINATED			
EQUIPMENT USED ON SUBJECT PROJECT			
DRILL UNITS:			
ADVANCING TOOLS:			
HAMMER TYPE:			
CORE SIZE:			
HAND TOOLS:			
FRACTURE SPACING			
BEDDING			
INDURATION			
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
FRIABLE			
MODERATELY INDURATED			
INDURATED			
EXTREMELY INDURATED			
BENCH MARK: BM #2 SPIKE IN BASE OF 12" RED OAK -BL- STA. 10+48.22 44.72 RT. ELEVATION: 2186.77 FT.			
NOTES:			



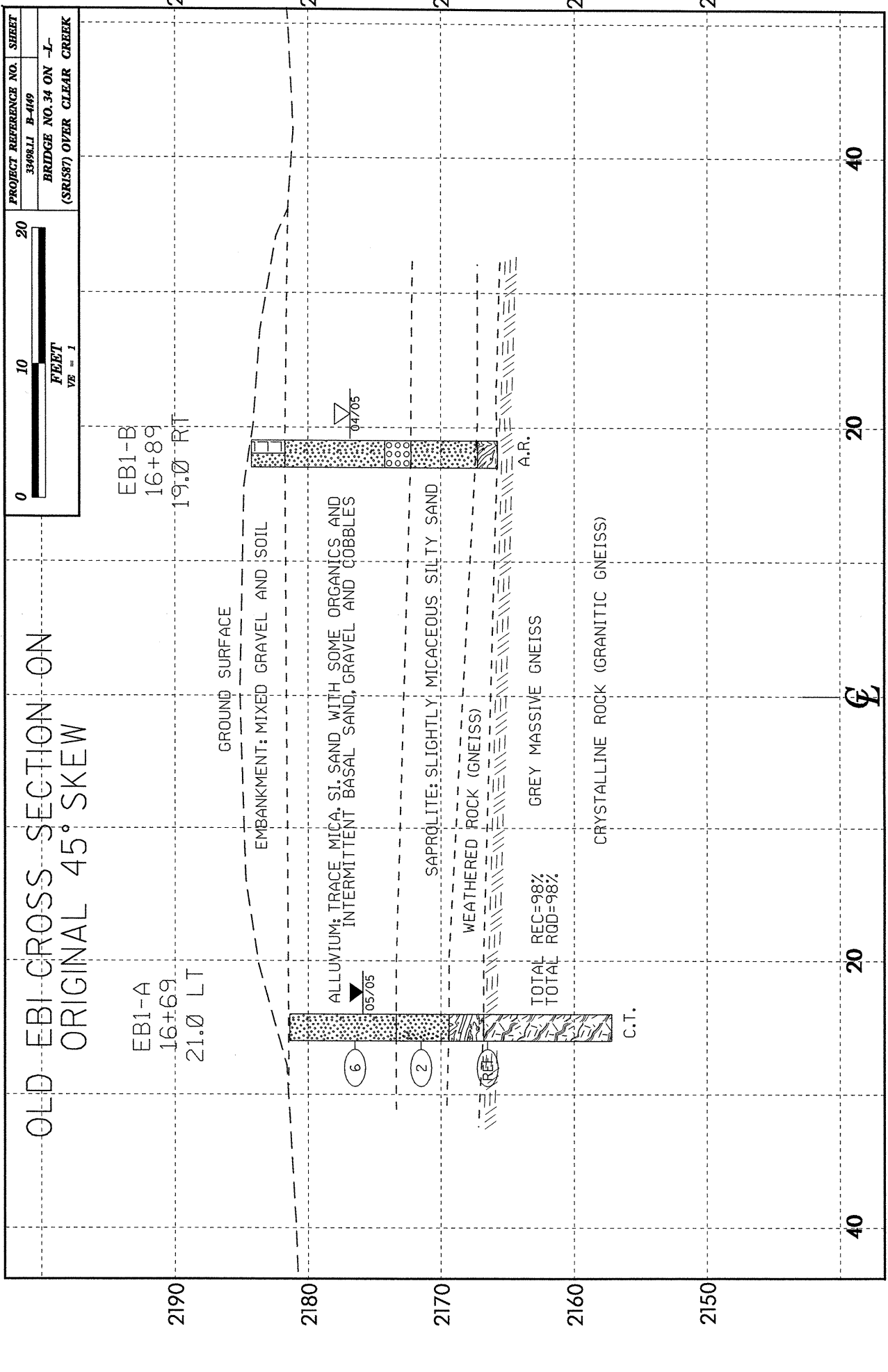
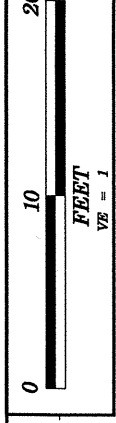
PROJECT REFERENCE NO.	SHEET
33498.1.1 B4149	3
BRIDGE NO. 34 ON SR 1587 OVER CLEAR CREEK	



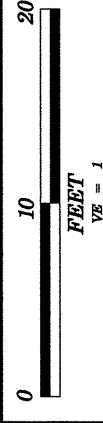
PROJECT REFERENCE NO. SHEET
 33498.L1 B-449
 BRIDGE NO. 34 ON -L-
 (SR1587) OVER CLEAR CREEK



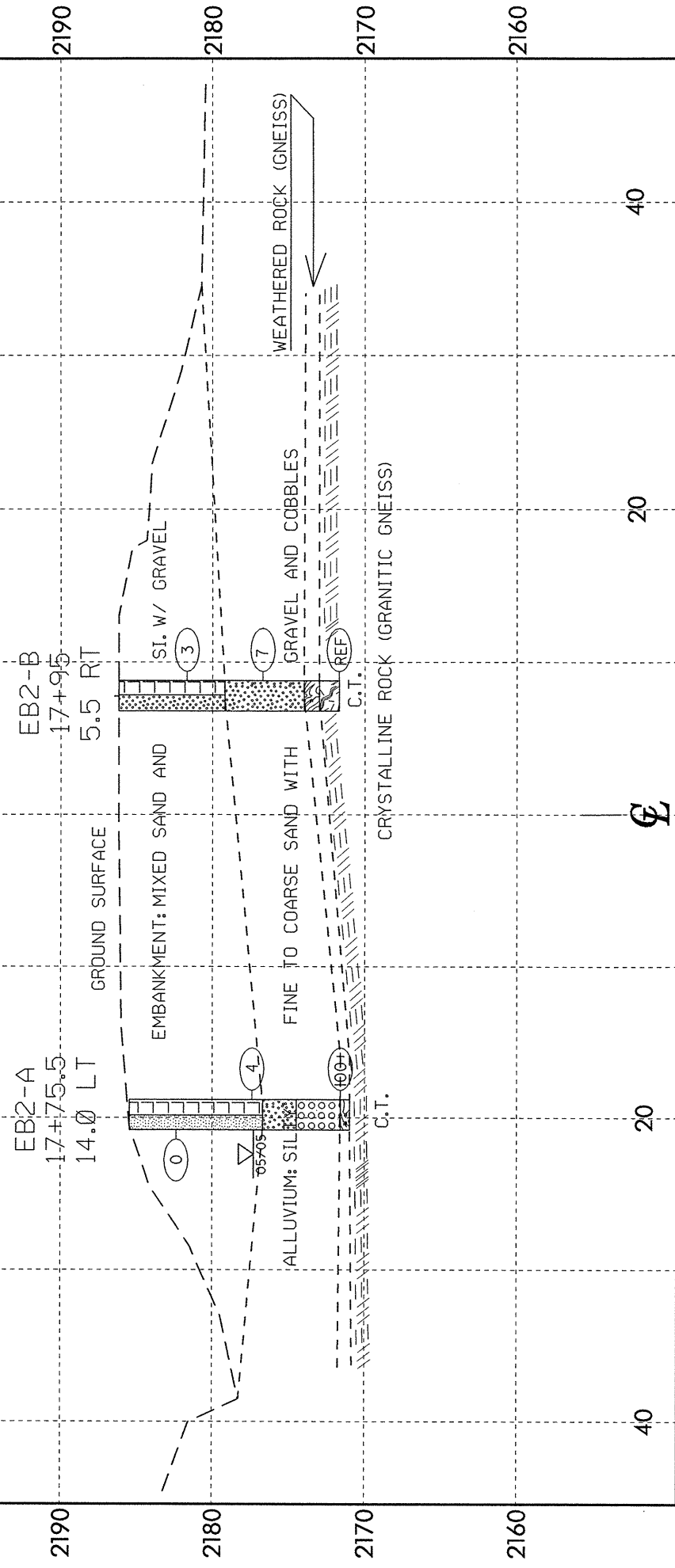
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 BRIDGE NO. 34 ON -L-
 (SR1587) OVER CLEAR CREEK



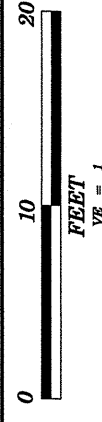
PROJECT REFERENCE NO. SHEET
33498.11 B-4149
BRIDGE NO. 34 ON -L-
(SR1587) OVER CLEAR CREEK



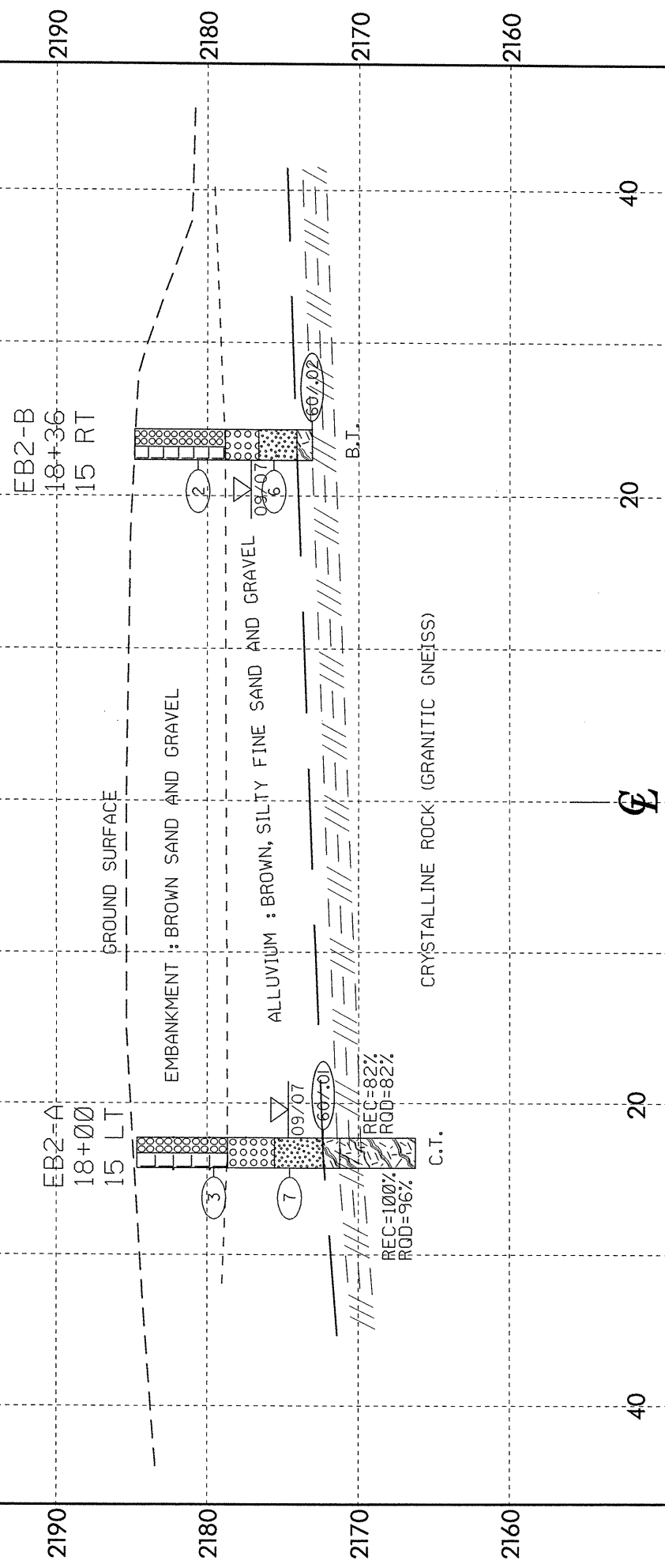
OLD EB2 CROSS SECTION ON
ON ORIGINAL 45° SKEW



PROJECT REFERENCE NO. SHEET
33498.11 B-4149
BRIDGE NO. 34 ON -L-
(SR1587) OVER CLEAR CREEK



EB2 CROSS SECTION ON
ON NEW 40° SKEW





NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET

SHEET 8 OF 21

PROJECT NO. 33498.1.1		ID. B-4149		COUNTY Henderson		GEOLOGIST Daniel, T. B.											
SITE DESCRIPTION Bridge No. 34 over Clear Creek on SR 1587							GROUND WTR (ft)										
BORING NO. EB1-A		STATION 16+35		OFFSET 15ft LT		ALIGNMENT -L-	0 HR. 8.0										
COLLAR ELEV. 2,186.0 ft		TOTAL DEPTH 22.4 ft		NORTHING 623,806		EASTING 999,322	24 HR. FIAD										
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT				HAMMER TYPE Automatic											
START DATE 09/26/07		COMP. DATE 09/26/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 22.1 ft											
ELEV (ft)	DRIVE 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	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
2190																	
2185															2,186.0	GROUND SURFACE	0.0
															2,183.5	ROADWAY EMBANKMENT Brown SAND & GRAVEL	2.5
2180	2,182.5	3.5	1	0	1							W				ALLUVIAL Brown-dark gray silty fine SAND	
2175	2,177.5	8.5	0	0	14							Sat.			2,176.5	ALLUVIAL Gray fine-coarse SAND & GRAVEL	9.5
															2,175.0	SAPROLITE Gray fine-coarse SAND	11.0
2170	2,172.5	13.5	13	18	15												
2165	2,167.5	18.5	1	1	3										2,167.5	SAPROLITE Brown silty fine SAND with little mica	18.5
2160	2,163.7	22.3	60/0.05			60/0.05									2,163.9	CRYSTALLINE ROCK Granitic Gneiss	22.1
															2,163.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 2,163.7 ft In Crystalline Rock (Granitic Gneiss)	22.4
2155																	
2150																	
2145																	
2140																	
2135																	
2130																	
2125																	
2120																	
2115																	
2110																	

NCDOT BORE SINGLE B4149 GEO BH NEVENDRENTS.GPJ NC_DOT_GDT_10/18/07

PROJECT NO. 33498.1.1	ID. B-4149	COUNTY Henderson	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION Bridge No. 34 over Clear Creek on SR 1587			GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+71	OFFSET 15ft RT	ALIGNMENT -L-
COLLAR ELEV. 2,186.5 ft	TOTAL DEPTH 28.1 ft	NORTHING 623,845	EASTING 999,347
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 09/24/07	COMP. DATE 09/24/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 20.9 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2190																
														2,186.5	GROUND SURFACE	0.0
2185														2,184.0	ROADWAY EMBANKMENT Brown SAND & GRAVEL	2.5
	2,182.7	3.8													ALLUVIAL Brown silty fine SAND	
2180			1	0	1											
	2,177.7	8.8													ALLUVIAL Brown fine-coarse SAND & GRAVEL	7.8
2175			2	6	26										SAPROLITE Gray silty SAND	9.8
	2,172.7	13.8														
2170			1	1	1										SAPROLITE Brown silty fine SAND with little mica	13.8
	2,167.7	18.8														
2165			1	1	5											
	2,164.4	22.1													CRYSTALLINE ROCK Granitic Gneiss	20.9
															CRYSTALLINE ROCK Granitic Gneiss	22.1
2160															Run 1: 22.1-23.1 REC=90% RQD=90% Run 2: 23.1-28.1 REC=98% RQD=98%	28.1
2155																
2150																
2145																
2140																
2135																
2130																
2125																
2120																
2115																
2110																

NCDOT BORE SINGLE B4149_GEO_BH_NEWEMBENTS.GPJ NC_DOT.GDT 10/18/07

PROJECT NO. 33498.1.1	ID. B-4149	COUNTY Henderson	GEOLOGIST Daniel, T. B.
SITE DESCRIPTION Bridge No. 34 over Clear Creek on SR 1587			GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+71	OFFSET 15ft RT	ALIGNMENT -L-
COLLAR ELEV. 2,186.5 ft	TOTAL DEPTH 28.1 ft	NORTHING 623,845	EASTING 999,347
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 09/24/07	COMP. DATE 09/24/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 20.9 ft

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
	2164.4											
	2,164.4	22.1	1.0	3:14	(0.9)	(0.9)		(5.8)	(5.8)		Begin Coring @ 22.1 ft	
	2,163.4	23.1	5.0	3:14	90%	90%		97%	97%		CRYSTALLINE ROCK	22.1
2160				3:55	(4.9)	(4.9)					Gray, fresh, hard, widely fractured Crystalline Rock: Biotite Granitic Gneiss. Rock has Quartz Monzonite composition.	
	2,158.4	28.1		7:19	98%	98%						
				7:21								
				10:03								
				19:17								
2155											Boring Terminated at Elevation 2,158.4 ft In Crystalline Rock (Granitic Gneiss)	28.1
2150												
2145												
2140												
2135												
2130												
2125												
2120												
2115												
2110												
2105												
2100												
2095												
2090												
2085												

NCDOT CORE SINGLE B4149_GEO_BH_NEWEMBENTS.GPJ NC_DOT.GDT 10/18/07

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG**

PROJECT NO. 33498.1.1		ID. B-4149		COUNTY HENDERSON		GEOLOGIST TB DANIEL								
SITE DESCRIPTION BRIDGE NO. 34 ON -L- (SR 1587) OVER CLEAR CREEK							GROUND WATER							
BORING NO. EBI-B(OLD)		BORING LOCATION 16+89		OFFSET 19' RT		ALIGNMENT -L-								
COLLAR ELEVATION 2184.33		NORTHING 623845		EASTING		0 HR. 7.5 24 HR.								
TOTAL DEPTH 18.5		DRILL MACHINE CME 550		DRILL METHOD HOLLOW AUGERS		HAMMER TYPE NA								
START DATE 04.21.05		COMPLETION DATE 04.21.05		SURFACE WATER DEPTH		DEPTH TO ROCK								
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100				
2184.33														EMBANKMENT: GRAVEL, MIXED FILL, AND COBBLES
2180.00														ALLUVIUM: LOOSE TO MEDIUM DENSE SILTY FINE SAND AND SLIGHTLY ORGANIC SI. F. SAND
														BASAL ALLUVIUM: SAND, GRAVEL AND COBBLES
2170.00														SAPROLITE: MED. DENSE SILTY SAND GRADES TO WEATHERED ROCK
														WEATHERED ROCK
2160.00														BORING TERMINATED AT ELEVATION 2165.83 FEET ON CRYSTALLINE ROCK BY AUGER REFUSAL

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

SHEET

PROJECT NO. 33498.1.1		ID. B-4149		COUNTY HENDERSON		GEOLOGIST TB DANIEL								
SITE DESCRIPTION BRIDGE NO. 34 ON -L- (SR 1587) OVER CLEAR CREEK							GROUND WATER							
BORING NO. B2-A(OLD)		BORING LOCATION 17+54		OFFSET 14 LT		ALIGNMENT -L-								
COLLAR ELEVATION 2178.41		NORTHING 623916		EASTING 999313		0 HR. 1.4 24 HR.								
TOTAL DEPTH 23.7		DRILL MACHINE CME 550		DRILL METHOD CASING		HAMMER TYPE AUTOMATIC								
START DATE 04.27.05		COMPLETION DATE 04.27.05		SURFACE WATER DEPTH		DEPTH TO ROCK								
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOL.	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100				
2178.41														ALLUVIUM: SAND, GRAVEL AND COBBLES
														CRYSTALLINE ROCK NOT CORED
2170.00	4.5	60		0.0										VERY HARD FRESH GNEISS FEW BREAKS TOTAL RECOVERY-97% TOTAL ROD-93%
2160.00														
2150.00														
CORING TERMINATED AT ELEVATION 2154.7 FEET IN CRYSTALLINE ROCK														

SHEET 13 OF 21

CORE BORING REPORT							DATE 5/2/2005
PROJECT: 33498.1.1		I. D. NO: B-4149		BORING NO: B2-A		GEOLOGIST: TB DANIEL	
DESCRIPTION: BRIDGE NO. 34 ON S.R. 1587 OVER CLEAR CREEK 17+54 14' LT							
COUNTY: HENDERSON		COLLAR ELEVATION: 2178.4 FT.		TOTAL DEPTH: 23.7 FT.			
ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
2173.6	4.8			3.9	3.9		GREY MASSIVE GNEISS. VERY HARD AND FRESH. ONE NATURAL BREAK.
			3.9	100	100		
2169.7	8.7			4.4	3.9		GREY MASSIVE GNEISS. 2 BREAKS HARD TO VERY HARD AND FRESH.
2169.7	8.7		5.0	88	78		
2164.7	13.7			5.0	5.0		LIGHT AND DARK GREY GNEISS, VERY HARD AND FRESH. NO BREAKS.
2164.7	13.7		5.0	100	100		
2159.7	18.7			4.9	4.7		LIGHT GREY GNEISS. VERY HARD AND FRESH. NO BREAKS.
70.8	18.7		5.0	98	94		
65.8	23.7						
CORING TERMINATED AT ELEVATION 2154.7 FT.							
DRILLER: GK ROSE		CORE SIZE: NXWL		EQUIPMENT: CME-550			

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33498.1.1		ID. B-4149		COUNTY HENDERSON		GEOLOGIST TB DANIEL								
SITE DESCRIPTION BRIDGE NO. 34 ON -L- (SR 1587) OVER CLEAR CREEK							GROUND WATER							
BORING NO. B2-B(OLD)		BORING LOCATION 17+69.5		OFFSET 5' RT		ALIGNMENT -L-								
COLLAR ELEVATION 2176.51		NORTHING 623933		EASTING 99330		0 HR. 24 HR.								
TOTAL DEPTH 19.6		DRILL MACHINE CME 550		DRILL METHOD CASING		HAMMER TYPE AUTOMATIC								
START DATE 04.22.05		COMPLETION DATE 04.22.05		SURFACE WATER DEPTH 0.8		DEPTH TO ROCK								
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI. G	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100				
2176.51	.4	4	5	11	1.0									SURFACE WATER
2170.00	5.4 6.9	9	91	0	.9									ALLUVIUM: GRAVEL, SAND, AND SILT WITH BASAL GRAVEL AND COBBLES SAPROLITE: SLL MICA, SILTY FINE SAND WEATHERED ROCK
2160.00														VERY HARD, FRESH AND MASSIVE GNEISS OF DOMINANTLY METAMORPHIC ORIGIN (PARAGNEISS) WITH SOME INTRUSIVE GRANITE GNEISS. VERY FEW BREAKS ON RARE BIOTITE RICH LAYERS. SLIGHTLY INCLINED FOLIATION. TOTAL RECOVERY=94% TOTAL RECOVERY=94%
2150.00														CORING TERMINATED AT ELEVATION 2156.91 FEET IN CRYSTALLINE ROCK

SHEET 14 OF 21

CORE BORING REPORT							DATE <u>4/22/2005</u>
PROJECT: <u>33498.1.1</u>		I. D. NO: <u>B-4149</u>		BORING NO: <u>B2-B</u>		GEOLOGIST: <u>TB DANIEL</u>	
DESCRIPTION: <u>BRIDGE NO. 34 ON S.R. 1587 OVER CLEAR CREEK</u>							<u>17+69.5 5' RT</u>
COUNTY: <u>HENDERSON</u>		COLLAR ELEVATION: <u>2176.5</u> FT.		TOTAL DEPTH: <u>19.6</u> FT.			
ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
2169.6	6.9			2.6	2.6		WHITE PORPHYROCLASTIC ORTHOGNEISS AND LIGHT GREY TO WHITE MASSIVE TO VAGUELY LAMINAR PARAGNEISS. NO BREAKS. VERY HARD AND FRESH.
2166.9	9.6		2.7	96	96		
2166.9	9.6			5.0	5.0		LIGHT AND DARK GREY LAMINAR PARAGNEISS. HARD TO VERY HARD AND FRESH. 1 BREAK ON FOLIATION. DARK GREY COLOR FROM GREATER BIOTITE MICA CONTENT IS WHERE THE ONLY NATURAL ROCK BREAK IN 12.7 FEET OF CORING OCCURRED.
2161.9	14.6			100	100		CLEAN - UNSTAINED BREAK.
2161.9	14.6			4.4	4.4		LAST 0.6 FEET OF CORE WOULD NOT BREAK OFF. LIGHT GREY, LAMINAR, PARAGNEISS. VERY HARD AND FRESH.
2156.9	19.6		5.0	88	88		NO BREAKS.
CORING TERMINATED AT ELEVATION 2156.9 FT.							
DRILLER: <u>CJ COFFEY</u>		CORE SIZE: <u>NXWL</u>		EQUIPMENT: <u>CME-550</u>			

PROJECT NO. 33498.1.1		ID. B-4149		COUNTY Henderson		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION Bridge No. 34 over Clear Creek on SR 1587						GROUND WTR (ft)									
BORING NO. EB2-A		STATION 18+00		OFFSET 15ft LT		ALIGNMENT -L-									
COLLAR ELEV. 2,184.8 ft		TOTAL DEPTH 18.4 ft		NORTHING 629,970		EASTING 999,303									
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
START DATE 09/25/07		COMP. DATE 09/25/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 12.3 ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2185														2,184.8	0.0
														2,184.8	0.0
2180	2,180.7	4.1												2,178.8	6.0
			1	1	2									2,178.8	6.0
2175	2,175.7	9.1												2,175.7	9.1
			3	3	4									2,175.7	9.1
2170	2,172.5	12.3												2,172.5	12.3
			60/0.01											2,172.5	12.3
														2,166.4	18.4
														2,166.4	18.4
2165															
2160															
2155															
2150															
2145															
2140															
2135															
2130															
2125															
2120															
2115															
2110															
2105															

NCDOT BORE SINGLE B4149_GEO_BH_NEVENDENTS.GPJ NC_DOT.GDT 10/18/07

PROJECT NO. 33498.1.1		ID. B-4149		COUNTY Henderson		GEOLOGIST Daniel, T. B.						
SITE DESCRIPTION Bridge No. 34 over Clear Creek on SR 1587						GROUND WTR (ft)						
BORING NO. EB2-A		STATION 18+00		OFFSET 15ft LT		ALIGNMENT -L-						
COLLAR ELEV. 2,184.8 ft		TOTAL DEPTH 18.4 ft		NORTHING 629,970		EASTING 999,303						
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic								
START DATE 09/25/07		COMP. DATE 09/25/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 12.3 ft						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
	2172.5											
	2,172.5	12.3	1.1	3:17/1.1	(0.9)	(0.8)		(5.9)	(5.6)		2,172.5	12.3
2170	2,171.4	13.4	5.0	3:17/1.1 N=60/0.01	82%	73%		97%	92%		2,172.5	12.3
				1:52	(5.0)	(4.8)						
				2:28	100%	96%						
				2:14								
				2:40								
				2:04								
2165	2,166.4	18.4									2,166.4	18.4
2160												
2155												
2150												
2145												
2140												
2135												
2130												
2125												
2120												
2115												
2110												
2105												
2100												
2095												

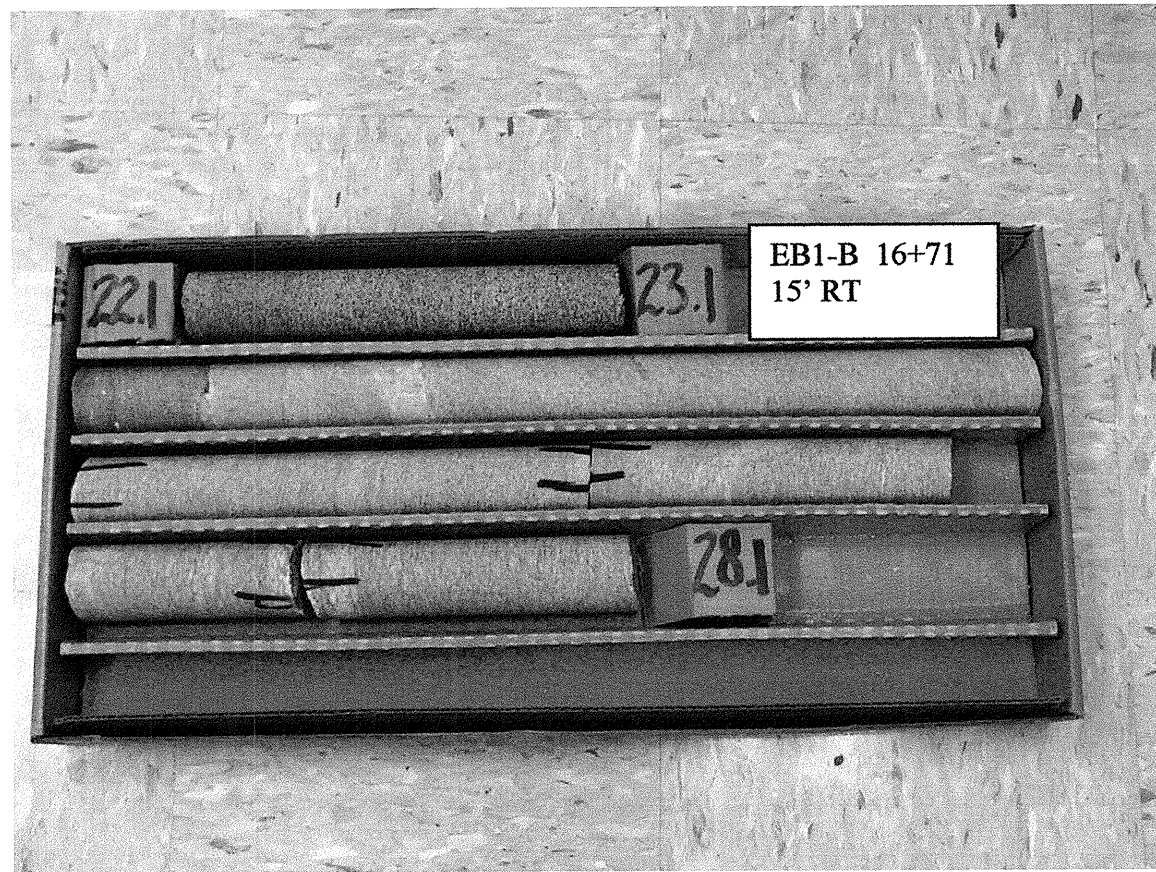
NCDOT CORE SINGLE B4149_GEO_BH_NEVENDENTS.GPJ NC_DOT.GDT 10/18/07



PROJECT NO. 33498.1.1		ID. B-4149		COUNTY Henderson		GEOLOGIST Daniel, T. B.									
SITE DESCRIPTION Bridge No. 34 over Clear Creek on SR 1587							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 18+36		OFFSET 15ft RT		ALIGNMENT -L-									
COLLAR ELEV. 2,184.6 ft		TOTAL DEPTH 11.7 ft		NORTHING 624,009		EASTING 999,329									
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT				HAMMER TYPE Automatic									
START DATE 09/26/07		COMP. DATE 09/26/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 10.7 ft									
ELEV (ft)	DRIVE 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	25	50	75			100	ELEV. (ft)	DEPTH (ft)	
2185													2,184.6	0.0	GROUND SURFACE
	2,181.4	3.2													ROADWAY EMBANKMENT
2180			1	1	1						M		2,178.6	6.0	Brown silty fine SAND
	2,176.4	8.2											2,176.4	8.2	ALLUVIAL GRAVEL
2175			2	3	3						Sat.		2,173.9	10.7	ALLUVIAL Tan silty fine-coarse SAND
	2,172.9	11.7											2,172.9	11.7	CRYSTALLINE ROCK
2170			60/0.02			60/0.02									Granitic Gneiss
															Boring Terminated with Standard Penetration Test Refusal at Elevation 2,172.9 ft In Crystalline Rock (Granitic Gneiss)
2165															
2160															
2155															
2150															
2145															
2140															
2135															
2130															
2125															
2120															
2115															
2110															
2105															

NCDOT BORE SINGLE B4149_GEO_BH_NEWEMBENTS.GPJ NC_DOT.GDT 10/18/07

33498.1.1 B-4149
HENDERSON CO. BR. 34
ON SR-1587 OVER CLEAR CK.



33498.1.1 B-4149
HENDERSON CO. BR. 34
ON SR-1587 OVER CLEAR CK.



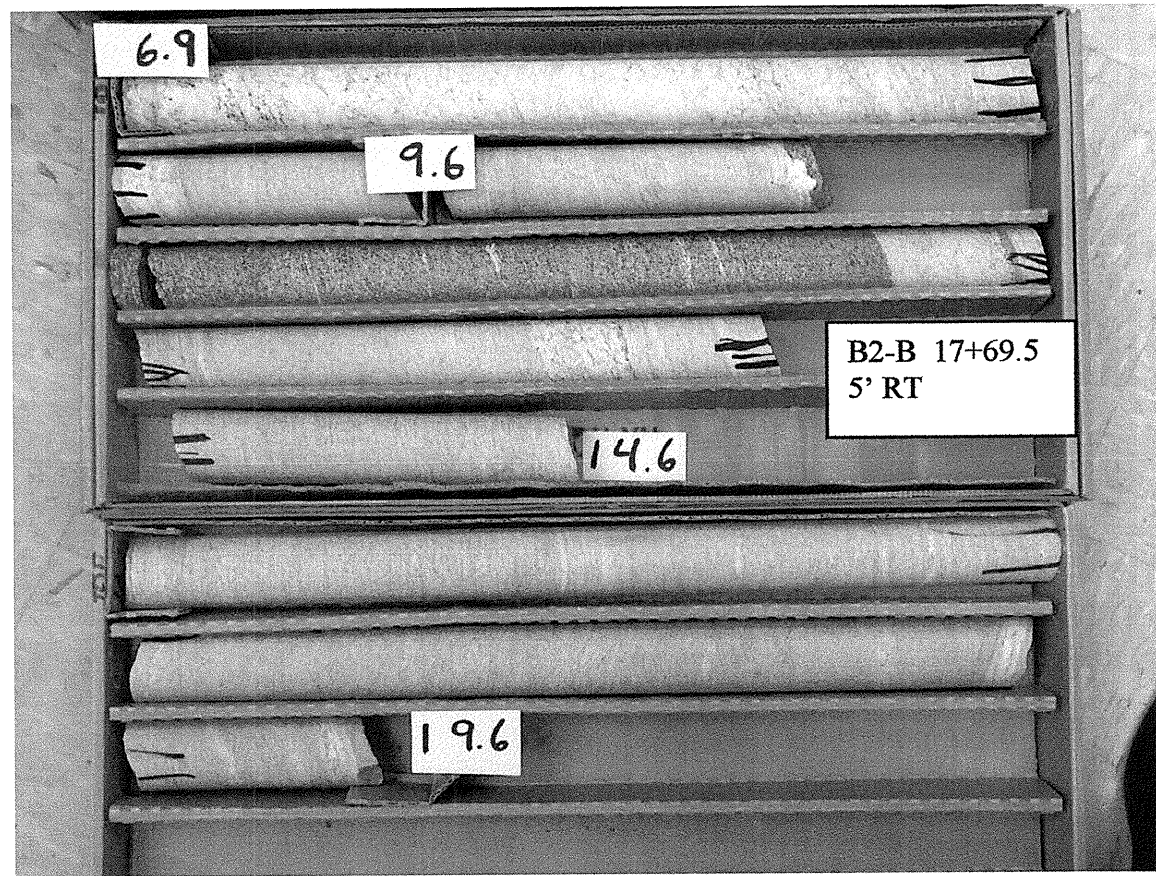
33498.1.1 B-4149
HENDERSON CO. BR. 34
ON SR-1587 OVER CLEAR CK.



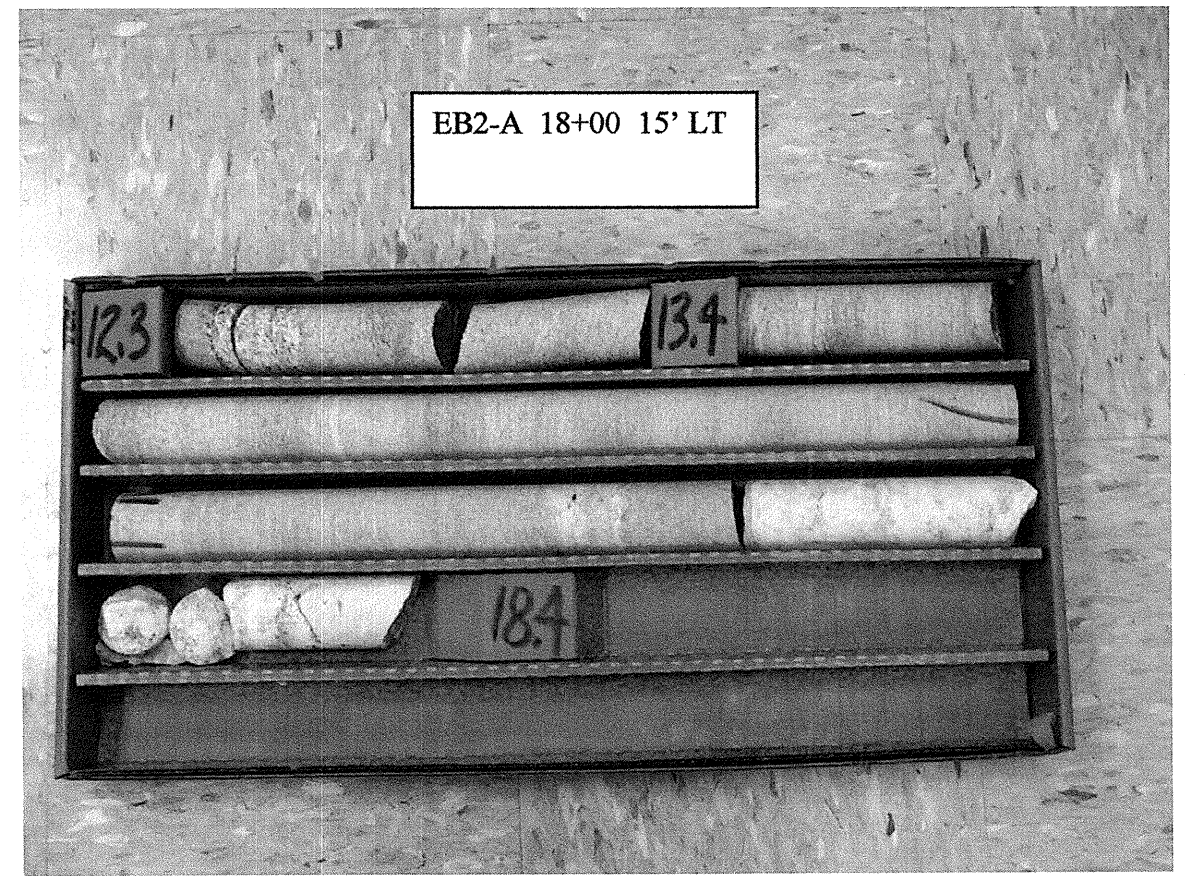
33498.1.1 B-4149
HENDERSON CO. BR. 34
ON SR-1587 OVER CLEAR CK.



33498.1.1 B-4149
HENDERSON CO. BR. 34
ON SR-1587 OVER CLEAR CK.



33498.1.1 B-4149
HENDERSON CO. BR. 34
ON SR-1587 OVER CLEAR CK.





**FIELD
SCOUR REPORT**

WBS: 33498.1.1 TIP: B-4149 COUNTY: HENDERSON

DESCRIPTION(1): Bridge No. 34 over Clear Creek on SR 1587

EXISTING BRIDGE

Information from: Field Inspection Microfilm (reel pos:)
Other (explain) Bridge Survey and Hydraulic Design Report

Bridge No.: 34 Length: ~80' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
Foundation Type: Concrete, Abutments

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: Some local scour evident around upstream end of the interior bent. Scour hole is partially filled with silty sand therefore obscuring depth.

Channel Bed: None

Channel Bank: Minimal

EXISTING SCOUR PROTECTION

Type(3): Concrete abutment walls

Extent(4): Wing walls approximately 6' long, 6' tall and tapered

Effectiveness(5): Good

Obstructions(6): None

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit 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): Silty sand with basal gravel and cobbles

Channel Bank Material(8): Silty fine sand

Channel Bank Cover(9): Trees, brush, grass

Floodplain Width(10): 100 ft.

Floodplain Cover(11): Grass and trees

Stream is(12): Aggrading Degrading Static

Channel Migration Tendency(13): To the north

Observations and Other Comments: Stonework from previous abutment located on bank downstream of existing End Bent One.

DESIGN SCOUR ELEVATIONS(14)

Feet X Meters

	BENTS									
	B1	B2	B3	B4						
B1-A	2170									
B2-A		2174								
B2-B		2170								

Comparison of DSE to Hydraulics Unit theoretical scour:

The calculated design scour elevation is within 2 feet of the theoretical scour elevation provided on the BSR dated 03/08/2007.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

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

Reported by: J.W. MANN

Date: 10/19/2007