

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

STRUCTURE
SUBSURFACE INVESTIGATION

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5	CROSS SECTIONS
7	BORE LOG & CORE REPORTS
10	SOIL TEST RESULTS
11	SCOUR REPORT
12	CORE PHOTOGRAPHS

PROJ. REFERENCE NO. 33475.1.1 (B-4122) F.A. PROJ. BRZ-1117(8)
 COUNTY GRAHAM
 PROJECT DESCRIPTION BRIDGE No. 81 ON SR-1117 OVER LONG 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.

PERSONNEL
M M HAGER
L E LANGFORD
R D CHILDERS

INVESTIGATED BY C A DUNNAGAN
 CHECKED BY W D FRYE, Jr
 SUBMITTED BY W D FRYE, Jr
 DATE MARCH 2009

PROJECT: 33475.1.1 ID: B-4122

DRAWN BY: C A DUNNAGAN

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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.



C A Dunnagan

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

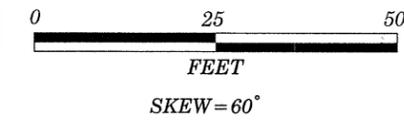
PROJECT REFERENCE NO. 33475.J.(KB-4122) SHEET NO. 2

SUBSURFACE INVESTIGATION

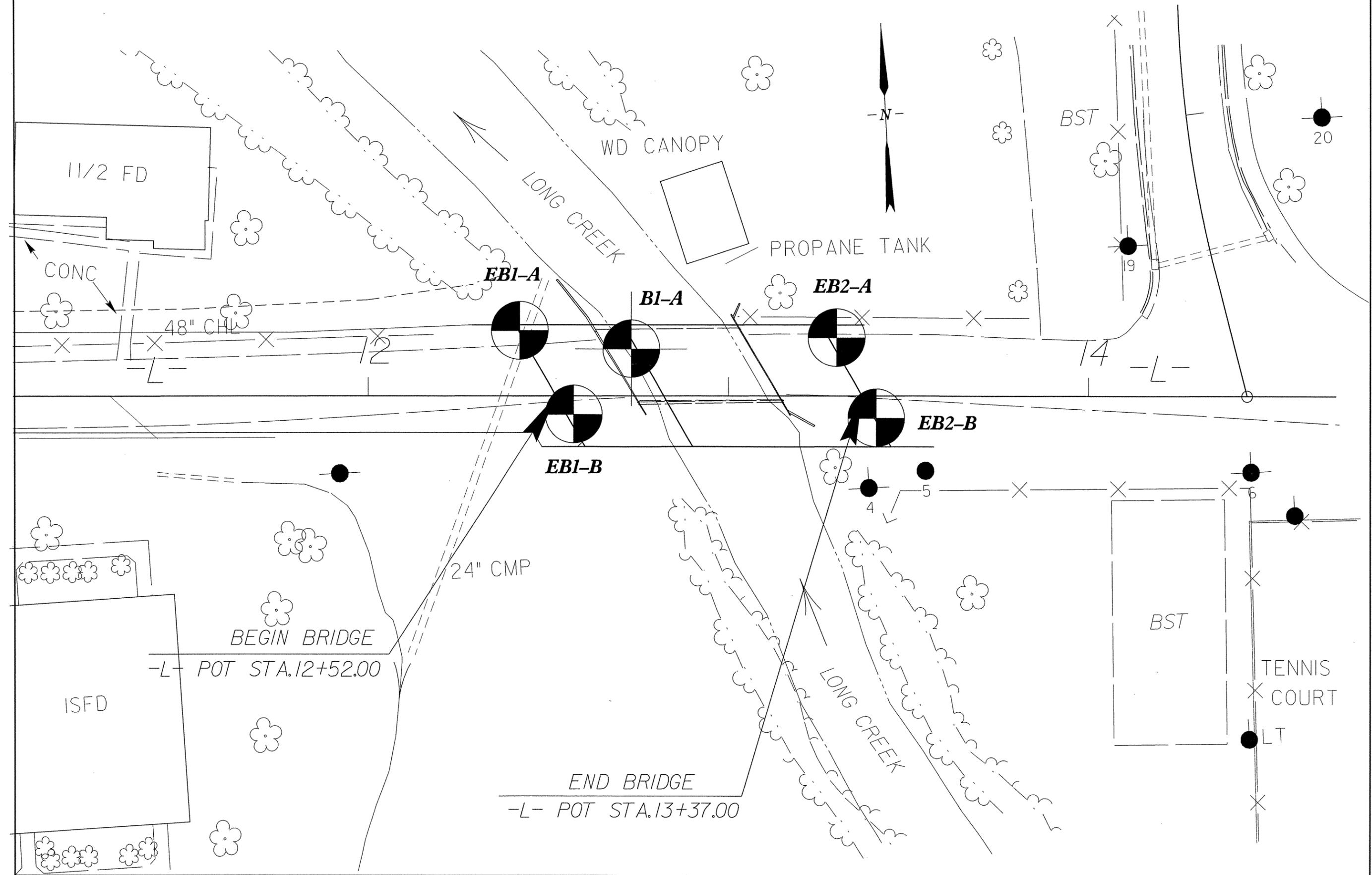
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

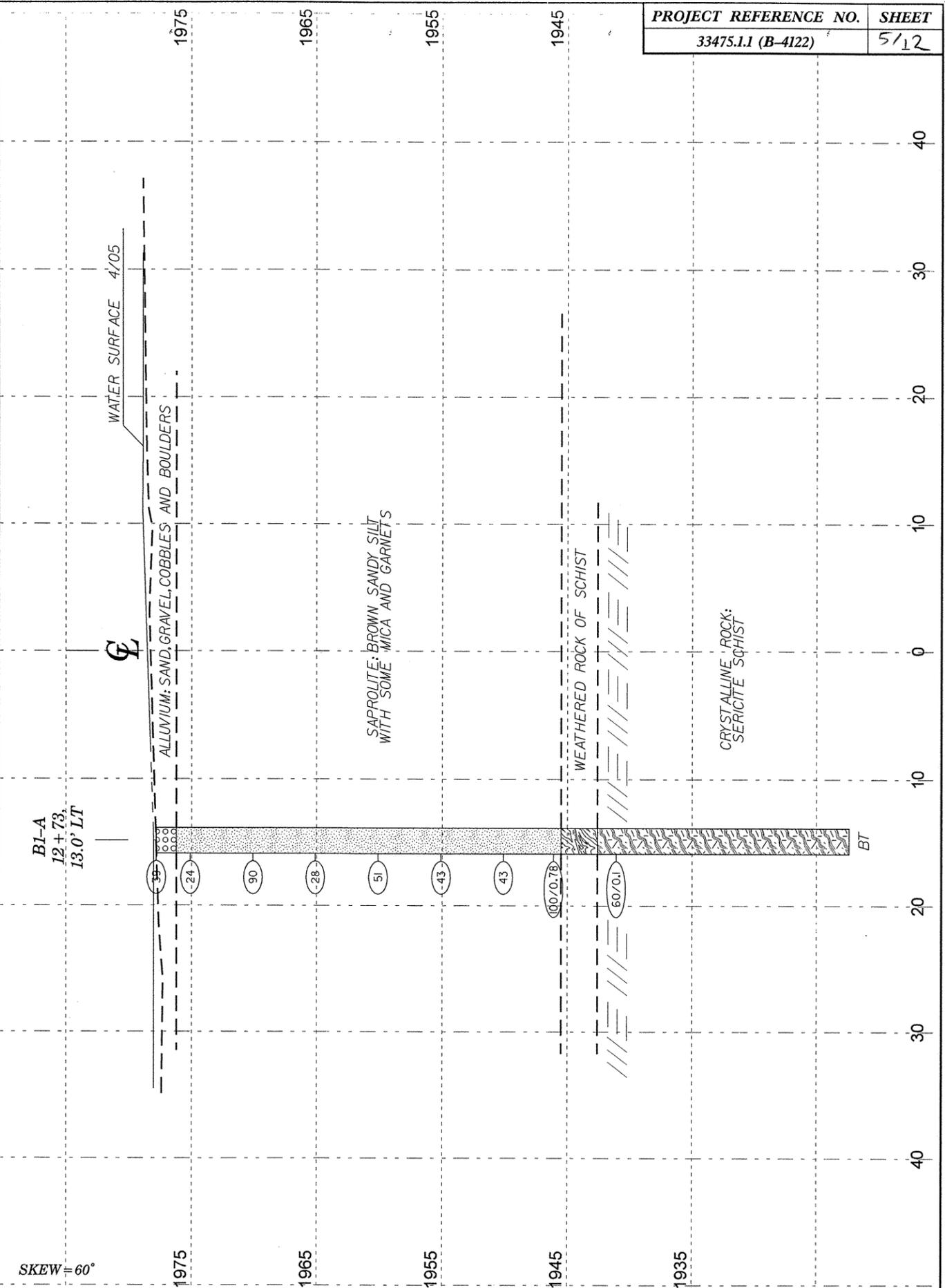
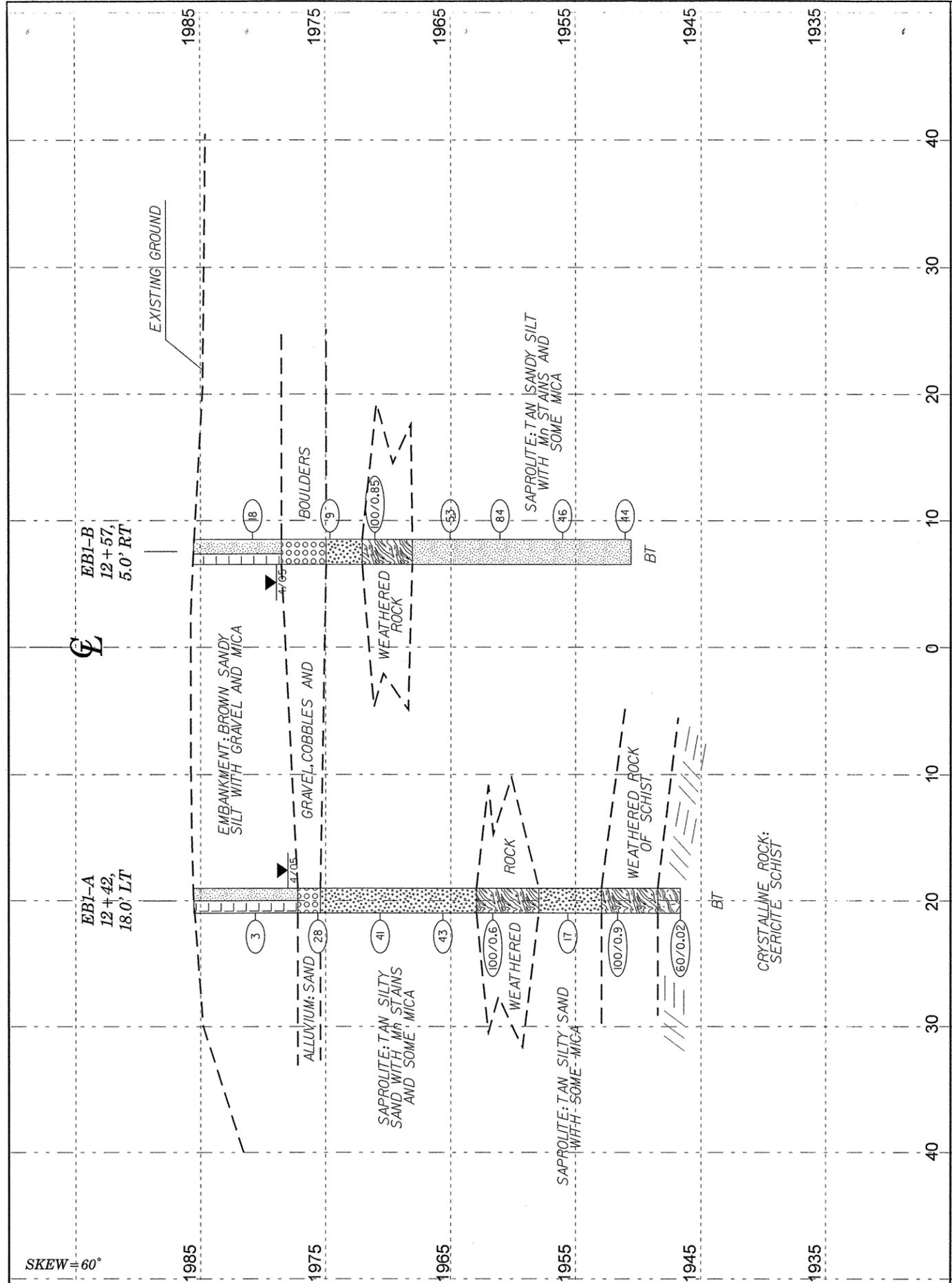
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (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:</p> <p style="text-align: center;"><i>VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>		<p>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)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>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.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - A FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (ROD) - 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.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>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.</p> <p>STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SROD) - 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.</p> <p>TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>	
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING			
<p>GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS</p> <p>GROUP CLASS. A-1, A-1-b, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5, A-7-6, A-1, A-2, A-3, A-6, A-7</p> <p>SYMBOL</p> <p>% PASSING # 10, # 40, # 200</p> <p>LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX</p> <p>USUAL TYPES OF MAJOR MATERIALS</p> <p>GEN. RATING AS A SUBGRADE</p>		<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE, MODERATELY COMPRESSIBLE, HIGHLY COMPRESSIBLE</p> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <p>ORGANIC MATERIAL, GRANULAR SOILS, SILT-CLAY SOILS, OTHER MATERIAL</p> <p>TRACE OF ORGANIC MATTER, LITTLE ORGANIC MATTER, MODERATELY ORGANIC, HIGHLY ORGANIC</p> <p style="text-align: center;">GROUND WATER</p> <p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING, STATIC WATER LEVEL AFTER 24 HOURS, PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA, SPRING OR SEEP</p>		<p>WEATHERED ROCK (WR)</p> <p>CRYSTALLINE ROCK (CR)</p> <p>NON-CRYSTALLINE ROCK (NCR)</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p> <p>FRESH, VERY SLIGHT (V SLI.), SLIGHT (SLI.), MODERATE (MOD.), MODERATELY SEVERE (MOD. SEV.), SEVERE (SEV.), VERY SEVERE (V SEV.), COMPLETE</p>			
CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBOLS		ROCK HARDNESS			
<p>PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</p>		<p>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</p> <p>SPT OPT TEST BORING, AUGER BORING, CORE BORING, MONITORING WELL, PIEZOMETER INSTALLATION, SLOPE INDICATOR INSTALLATION, CALIFORNIA BEARING RATIO SAMPLE, SPT N-VALUE, SPT REFUSAL</p>		<p>VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, SOFT, VERY SOFT</p>			
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		EQUIPMENT USED ON SUBJECT PROJECT			
<p>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.)</p>		<p>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</p> <p>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</p>		<p>MOBILE B-51, BK-51, CME-45C, CME-550, PORTABLE HOIST</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING, W/ ADVANCER, TRICONE, STEEL TEETH, TRICONE, TUNG-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, XL, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>			
SOIL MOISTURE - CORRELATION OF TERMS		FRACTURE SPACING		BEDDING			
<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION</p> <p>LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE, SL - SHRINKAGE LIMIT</p> <p>- SATURATED - (SAT.), - WET - (W), - MOIST - (M), - DRY - (D)</p>		<p>TERM, SPACING: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE</p>		<p>TERM, THICKNESS: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED</p>			
PLASTICITY		INDURATION		BENCH MARK			
<p>NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY</p> <p>PLASTICITY INDEX (PI), DRY STRENGTH, VERY LOW, SLIGHT, MEDIUM, HIGH</p>		<p>FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>		<p>TBM- BRIDGE NAIL IN POLE-L- STA. 12+61, 19.0' RT</p> <p>ELEVATION: 1986.45 FT.</p>			
COLOR				NOTES:			
<p>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.</p>				<p>NOTES:</p>			

BRIDGE No. 81 ON SR-1117 OVER LONG CREEK



PROJECT REFERENCE NO.	SHEET
33475.1.1 (B-4122)	3/42
PLAN VIEW	



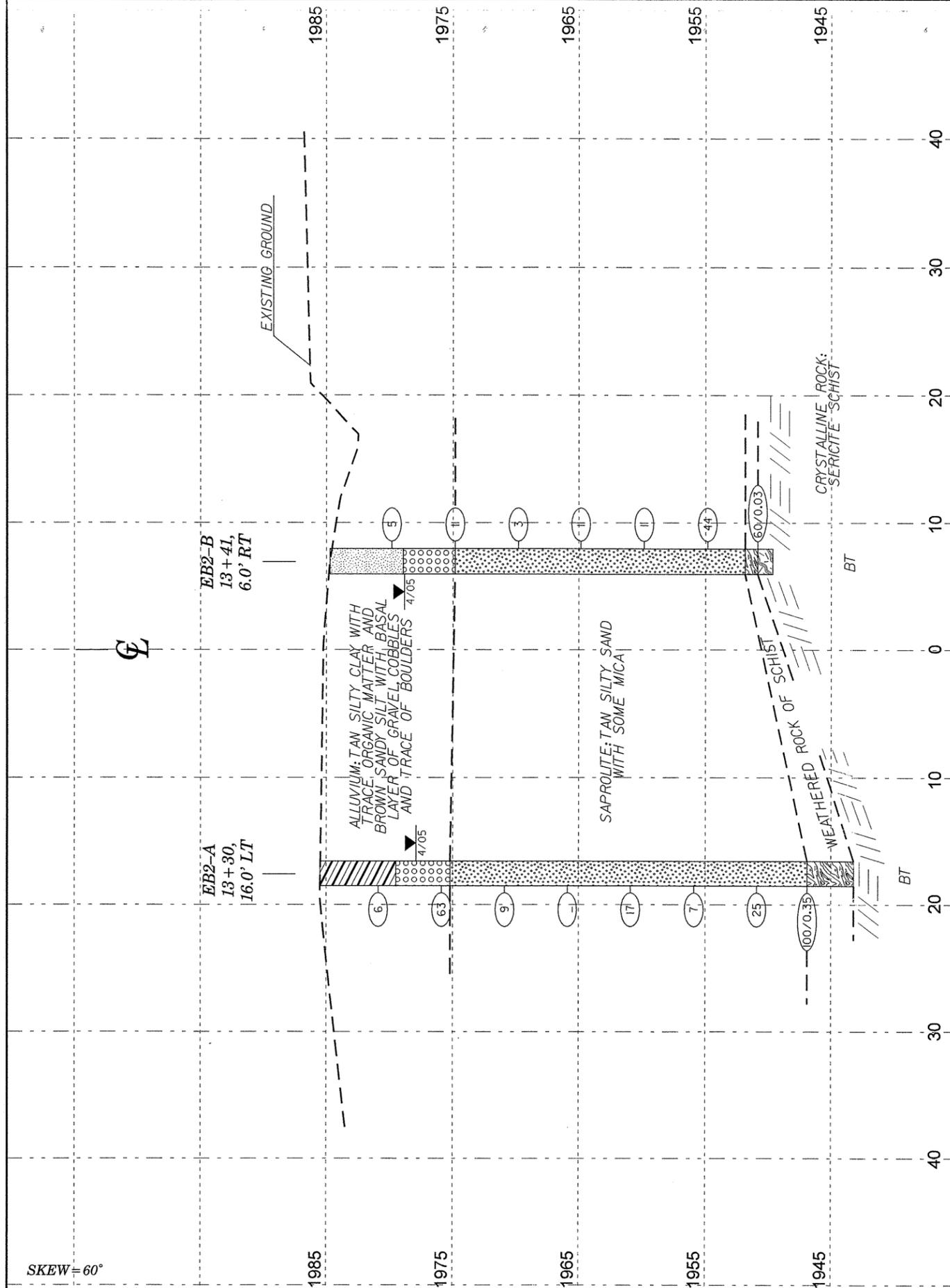


HORIZ. SCALE 0 10 20 (FEET) VE = 1

CROSS SECTION END BENT ONE

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

CROSS SECTION INTERIOR BENT ONE



HORIZ. SCALE 0 10 20 (FEET)

VE = 1

CROSS SECTION
END BENT TWO

PROJECT NO. 33475.1.1		ID. B-4122		COUNTY Graham		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Bridge No. 81 on SR-1117 over Long Creek.							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 12+42		OFFSET 18ft LT		ALIGNMENT -L-										
COLLAR ELEV. 1,985.5 ft		TOTAL DEPTH 38.9 ft		NORTHING 608,105		EASTING 565,457										
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
START DATE 04/06/05		COMP. DATE 04/06/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 37.1 ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1990																
1985															1,985.5	GROUND SURFACE
																ROADWAY EMBANKMENT
																Brown sandy silt.
1980	1,981.6	3.9		1	1	2										
1975	1,976.6	8.9		10	16	12										
1970	1,971.6	13.9		15	17	24										
1965	1,966.6	18.9		7	21	22										
1960	1,961.6	23.9		29	47	53/0.1										
1955	1,956.6	28.9		5	7	10										
1950	1,951.6	33.9		15	67	33/0.4										
1945	1,946.6	38.9		60/0.02												
1940																
1935																
1930																
1925																
1920																
1915																
1910																

NCDOT BORE SINGLE BORECORELOGS.GPJ NC_DOT.GDT 3/25/09

7/12

PROJECT NO. 33475.1.1		ID. B-4122		COUNTY Graham		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Bridge No. 81 on SR-1117 over Long Creek.							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 12+57		OFFSET 5ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,985.6 ft		TOTAL DEPTH 35.0 ft		NORTHING 608,081		EASTING 565,471										
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
START DATE 04/05/05		COMP. DATE 04/05/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1990																
1985															1,985.6	GROUND SURFACE
																ROADWAY EMBANKMENT
																Orange sandy silt with trace of gravel and mica.
1980	1,981.9	3.7		5	12	6										
1975	1,976.1	9.5		4	5	4										
1970	1,971.1	14.5		43	57/0.35											
1965	1,966.1	19.5		31	27	26										
1960	1,962.1	23.5		29	42	42										
1955	1,957.1	28.5		51	21	25										
1950	1,952.1	33.5		27	19	25										
1945																
1940																
1935																
1930																
1925																
1920																
1915																
1910																

NCDOT BORE SINGLE BORECORELOGS.GPJ NC_DOT.GDT 3/24/09



PROJECT NO. 33475.1.1		ID. B-4122		COUNTY Graham		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION Bridge No. 81 on SR-1117 over Long Creek.							GROUND WTR (ft)								
BORING NO. B1-A		STATION 12+73		OFFSET 13ft LT		ALIGNMENT -L-									
COLLAR ELEV. 1,977.8 ft		TOTAL DEPTH 55.4 ft		NORTHING 608,098		EASTING 565,488									
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
START DATE 04/05/05		COMP. DATE 04/05/05		SURFACE WATER DEPTH 0.2ft		DEPTH TO ROCK 35.2 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					
1980	1,977.8	0.0											1,977.8	WATER SURFACE (04/05/05)	0.0
1975	1,976.1	1.7	18	18	21						SS-1		1,976.2	ALLUVIAL Sand, gravel, cobbles and boulders.	1.6
1970	1,971.1	6.7	14	12	12						SS-2			SAPROLITE Brown sandy silt with some mica and garnets.	
1965	1,966.1	11.7	32	39	51										
1960	1,961.1	16.7	14	14	14										
1955	1,956.1	21.7	19	27	24						SS-3				
1950	1,951.1	26.7	16	22	21										
1945	1,946.1	31.7	8	20	23										
1940	1,941.1	36.7	28	72/0.28									1,945.5	WEATHERED ROCK Weathered rock of schist.	32.3
1935													1,942.6	CRYSTALLINE ROCK Sericite schist.	35.2
1930															
1925															
1920													1,922.4	Boring Terminated at Elevation 1,922.4 ft in sericite schist.	55.4

NCDOT BORE SINGLE BORE&CORELOGS.GPJ NC_DOT.GDT 3/25/09



PROJECT NO. 33475.1.1		ID. B-4122		COUNTY Graham		GEOLOGIST Hager, M. M.						
SITE DESCRIPTION Bridge No. 81 on SR-1117 over Long Creek.							GROUND WTR (ft)					
BORING NO. B1-A		STATION 12+73		OFFSET 13ft LT		ALIGNMENT -L-						
COLLAR ELEV. 1,977.8 ft		TOTAL DEPTH 55.4 ft		NORTHING 608,098		EASTING 565,488						
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic							
START DATE 04/05/05		COMP. DATE 04/05/05		SURFACE WATER DEPTH 0.2ft		DEPTH TO ROCK 32.3 ft						
CORE SIZE NXWL		TOTAL RUN 17.2 ft		DRILLER Childers, R.								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (%)		REC. (%)	ROD (%)			
1939.64	1,939.6	38.2	3.2		(88.0)	(88.0)					Begin Coring @ 38.2 ft	
1935	1,936.4	41.4	5.0		2750%	2750%					CRYSTALLINE ROCK Light grey sericite schist with garnets, biotite and staurolite. Trace of pyrite. Fresh; medium hard. a) Occasional joints with Fe staining @ 10°. Joint spacing approx. 2.0 feet. (continued)	
1930	1,931.4	46.4	5.0		(96.0)	(96.0)						
1925	1,926.4	51.4	4.0		1920%	1920%						
1920	1,922.4	55.4			(93.0)	(93.0)						
1915					2325%	2325%						
1910												
1905												
1900												
1895												
1890												
1885												
1880												
1875												
1870												
1865												
1860												

NCDOT CORE SINGLE BORE&CORELOGS.GPJ NC_DOT.GDT 3/24/09

PROJECT NO. 33475.1.1	ID. B-4122	COUNTY Graham	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Bridge No. 81 on SR-1117 over Long Creek.			GROUND WTR (ft)
BORING NO. EB2-A	STATION 13+30	OFFSET 16ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,983.5 ft	TOTAL DEPTH 42.3 ft	NORTHING 608,098	EASTING 565,545
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 04/06/05	COMP. DATE 04/06/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1985														1,983.5 GROUND SURFACE	0.0
1980	1,979.9	3.6										SS-5	W	ALLUVIAL Tan silty clay with trace of organic matter.	
1975	1,974.9	8.6	6											1,977.5 ALLUVIAL Grey gravel with sand and trace of boulders.	6.0
1970	1,969.9	13.6	28	47	16									1,973.2 SAPROLITE Tan silty sand with some mica.	10.3
1965			1	3	6							SS-6			
1960	1,959.9	23.6													
1955	1,954.9	28.6	1	8	9							SS-7			
1950	1,949.9	33.6	1	2	5										
1945	1,944.9	38.6	5	12	13										
1940			100/0.35											1,944.9 WEATHERED ROCK Weathered rock of schist.	38.6
1935														1,941.2 WEATHERED ROCK Weathered rock of schist.	42.3
1930														Boring Terminated with Casing Advancer Refusal at Elevation 1,941.2 ft in sericite schist.	

NCDOT BORE SINGLE BORELOGS.GPJ NC_DOT.GDT 3/25/09

PROJECT NO. 33475.1.1	ID. B-4122	COUNTY Graham	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Bridge No. 81 on SR-1117 over Long Creek.			GROUND WTR (ft)
BORING NO. EB2-B	STATION 13+41	OFFSET 6ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,984.6 ft	TOTAL DEPTH 35.1 ft	NORTHING 608,076	EASTING 565,554
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 04/06/05	COMP. DATE 04/06/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 33.9 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1985														1,984.6 GROUND SURFACE	0.0
1980	1,980.7	3.9												ALLUVIAL Brown sandy silt with trace of small gravel.	
1975	1,975.7	8.9	2	2	3									1,978.8 ALLUVIAL Sand, gravel and cobbles.	5.8
1970	1,970.7	13.9	5	5	6									1,974.7 SAPROLITE Tan silty sand with some mica.	9.9
1965	1,965.7	18.9	1	2											
1960	1,960.7	23.9	WOH	1	2										
1955	1,955.7	28.9	2	5	6										
1950	1,950.7	33.9	1	5	6										
1945			7	12	32										
1940			60/0.03											1,951.7 WEATHERED ROCK Weathered rock of schist.	32.9
1935														1,950.7 WEATHERED ROCK Weathered rock of schist.	33.9
1930														1,949.5 WEATHERED ROCK Weathered rock of schist.	35.1
1925														CRYSTALLINE ROCK Sericite schist.	
1920														Boring Terminated with Casing Advancer Refusal at Elevation 1,949.5 ft in sericite schist.	

NCDOT BORE SINGLE BORELOGS.GPJ NC_DOT.GDT 3/25/09

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

T.I.P. ID #: B-4122

REPORT ON SAMPLES OF: Soils for Classification

PROJECT:	33475.1.1	COUNTY:	Graham	Owner:	--
DATE SAMPLED:	4-5-05	DATE RECEIVED:	4-12-05	DATE REPORTED:	4-22-05
SAMPLED FROM:	Bridge	SAMPLED BY:	C. A. Dunnagan		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8
Lab Sample No. A	148686	148687	148688	148689	148690	148691	148692	148693
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	--	--	--	--	--	--	--	--
Passing #10 Sieve %	29	100	100	98	78	100	100	98
Passing #40 Sieve %	17	85	86	85	75	91	98	85
Passing #200 Sieve %	8	47	45	45	57	27	33	25

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	55	22	21	21	9	17	11	34
Fine Sand - Ret. #270	30	55	57	57	23	68	71	47
Silt 0.05-0.005 mm %	11	19	18	18	22	9	14	13
Clay < 0.005 mm %	4	4	4	4	46	6	4	6
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	23	38	36	37	38	49	35	25
Plastic Index	NP	NP	NP	NP	NP	NP	NP	NP
AASHTO Classification	A-1-a (0)	A-4 (2)	A-4 (2)	A-4 (2)	A-6 (7)	A-2-5 (0)	A-2-4 (0)	A-2-4 (0)
Quantity								
Texture								
Station	12+86	12+86	12+86	12+70	13+44.5	13+44.3	13+44.3	12+55
Hole No.								
Depth (ft) From:	0.0	1.7	16.7	19.5	3.6	13.6	23.6	13.9
To:	1.5	3.2	18.2	21.0	5.1	15.1	25.1	15.4

Remarks:

A-148686 - 148693

CC:

C. A. Dunnagan	
File	

SOILS ENGINEER:

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

T.I.P. ID #: B-4122

REPORT ON SAMPLES OF: Soils for Classification

PROJECT:	33475.1.1 (cont.)	COUNTY:	Graham	Owner:	--
DATE SAMPLED:	4-5-05	DATE RECEIVED:	4-12-05	DATE REPORTED:	4-22-05
SAMPLED FROM:	Bridge	SAMPLED BY:	C. A. Dunnagan		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-9							
Lab Sample No. A	148694							
HiCAMS Sample #	--							
Retained #4 Sieve %	--							
Passing #10 Sieve %	95							
Passing #40 Sieve %	85							
Passing #200 Sieve %	29							

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	28							
Fine Sand - Ret. #270	53							
Silt 0.05-0.005 mm %	13							
Clay < 0.005 mm %	6							
Passing # 40 Sieve %	--							
Passing # 200 Sieve %	--							

Liquid Limit	41							
Plastic Index	NP							
AASHTO Classification	A-2-5 (0)							
Quantity								
Texture								
Station	12+55							
Hole No.								
Depth (ft) From:	28.9							
To:	30.1							

Remarks:

A-148694

CC:

C. A. Dunnagan	
File	

SOILS ENGINEER:



FIELD SCOUR REPORT

WBS: 33475.1.1 TIP: B-4122 COUNTY: Graham

DESCRIPTION(1): Bridge No. 81 on SR-1117 over Long Creek

EXISTING BRIDGE

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

Bridge No.: 81 Length: 40.7' Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
 Foundation Type:

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None noted.

Interior Bents: N/A

Channel Bed: None noted.

Channel Bank: None noted

EXISTING SCOUR PROTECTION

Type(3): Pile & panel end-bent wingwalls.

Extent(4): Wingwall maximum length (EB1-A) is 15'; minimum length (EB1-B is 0'.

Effectiveness(5): Good.

Obstructions(6): Pipe in channel creating minor spillway, approx. 10' upstream existing bridge.

INSTRUCTIONS

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

Channel Bank Material(8): Silty sand with gravel.

Channel Bank Cover(9): Trees and brush.

Floodplain Width(10): >100' on either side.

Floodplain Cover(11): Grass.

Stream is(12): Aggrading Degrading Static

Channel Migration Tendency(13): East.

Observations and Other Comments: Most of floodplain on EB1-B and EB2-B side probably has had several feet of fill placed upon it.

Reported by: C A Dunnagan Date: 3/29/2005

DESIGN SCOUR ELEVATIONS(14)

Feet Meters

BENTS

B1

DSE	1971																			

Comparison of DSE to Hydraulics Unit theoretical scour:
 We concur with Hydraulics Unit's theoretical scour elevation FOR THE Interior Bent as presented in the Hydraulic Design Report dated November 2008. The End Bents will not be affected.

DSE determined by: C A Dunnagan Date: 3/31/2009

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																					



33475.1.1 (B-4122)
 Graham County
 Bridge No. 81 on SR-1117
 Over Long Creek
 B1-A
 Box 1 of 2



33475.1.1 (B-4122)
 Graham County
 Bridge No. 81 on SR-1117
 Over Long Creek
 B1-A
 Box 2 of 2