

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	38489.1.1 B-4715	1	15

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 38489.1.1 B-4715 F.A. PROJ. BRZ-2797(1)
COUNTY BUNCOMBE
PROJECT DESCRIPTION BRIDGE NO. 655 ON SR 2797 OVER
BROAD RIVER

SITE DESCRIPTION _____

CONTENTS

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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1931 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. HAGAR

D.O. CHEEK

C.J. COFFEY

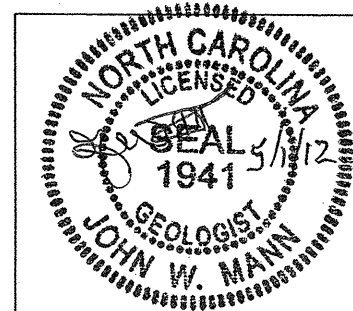
TRIGON

INVESTIGATED BY J.W. MANN

CHECKED BY W.D. FRYE

SUBMITTED BY W.D. FRYE

DATE MAY 2012



PROJECT: 38489.1.1 ID: B-4715

DRAWN BY: J.W. MANN

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

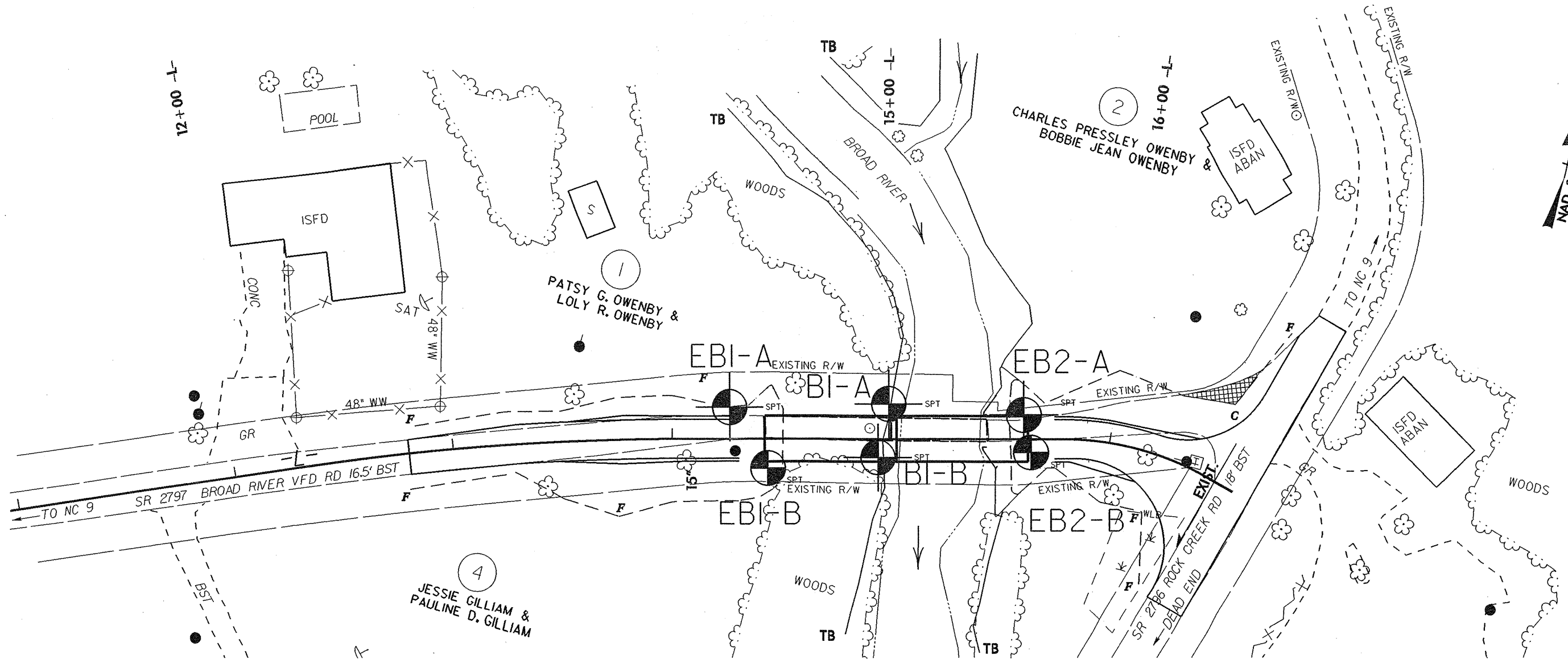
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO.	SHEET NO.
38489.1.1 B-4715	2 OF 15

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. EXAMPLES: <i>VERY STIFF, GRAY, SILTY CLAY, MOST 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. 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 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. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 60 BLOWS. STRATA CORE RECOVERY (ISREJ) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. 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. 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-1-b, A-2, A-2-4, A-2-5, A-2-6, A-2-7		A-3, A-4, A-5, A-6, A-6, A-7		A-7, A-7-5, A-7-6
SYMBOL		[Diagrams of soil symbols]		[Diagrams of soil symbols]		[Diagrams of soil symbols]
% PASSING		No. 10, 20, 40, 60, 100		No. 10, 20, 40, 60, 100		No. 10, 20, 40, 60, 100
LIQUID LIMIT PLASTIC INDEX		0, 1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50		0, 1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50		0, 1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50
GROUP INDEX		0, 1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50		0, 1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50		0, 1, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50
USUAL TYPES OF MAJOR MATERIALS		STONE FRAGS, GRAVEL AND SAND, FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND, SILTY SOILS, CLAYEY SOILS		SILT-CLAY SOILS, GRANULAR SOILS, MUCK, PEAT		HIGHLY ORGANIC SOILS
GEN. RATING AS A SUBGRADE		EXCELLENT TO GOOD, FAIR TO POOR, POOR, UNSUITABLE		FAIR TO POOR, POOR, UNSUITABLE		FAIR TO POOR, POOR, UNSUITABLE
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30						
CONSISTENCY OR DENSENESS						
PRIMARY SOIL TYPE		RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)
GENERALLY GRANULAR MATERIAL (NON-COESIVE)		VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE		4 to 10, 10 to 30, 30 to 50, >50		N/A
GENERALLY SILT-CLAY MATERIAL (COESIVE)		VERY SOFT, SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD		2 to 4, 4 to 8, 8 to 15, 15 to 30, >30		0.25 to 1.0, 1.0 to 2, 2 to 4, >4
TEXTURE OR GRAIN SIZE						
U.S. STD. SIEVE SIZE OPENING (MM): 4, 10, 40, 60, 200, 270						
BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GR.)		COARSE SAND (CSE, SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.)
GRAIN SIZE: 305, 75, 2.0, 0.25, 0.05, 0.005 (MM); 12, 3, 2.0, 0.25, 0.05, 0.005 (IN.)						
SOIL MOISTURE - CORRELATION OF TERMS						
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		
LL LIQUID LIMIT, PL PLASTIC LIMIT		- SATURATED - (SAT), - WET - (W)		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE. SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE.		
OM OPTIMUM MOISTURE, SL SHRINKAGE LIMIT		- MOIST - (M), - DRY - (D)		SOLID; AT OR NEAR OPTIMUM MOISTURE. REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE.		
PLASTICITY						
NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY		PLASTICITY INDEX (PI)		DRY STRENGTH		
		0-5, 6-15, 16-25, 26 OR MORE		VERY LOW, SLIGHT, MEDIUM, HIGH		
COLOR						
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.						
GRADATION						
ANGULARITY OF GRAINS						
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						
ORGANIC MATERIAL		GRANULAR SOILS		SILT - CLAY SOILS		OTHER MATERIAL
TRACE OF ORGANIC MATTER, LITTLE ORGANIC MATTER, MODERATELY ORGANIC, HIGHLY ORGANIC		2 - 3%, 3 - 5%, 5 - 10%, >10%		3 - 5%, 5 - 12%, 12 - 20%, >20%		TRACE 1 - 10%, LITTLE 10 - 20%, SOME 20 - 35%, HIGHLY 35% AND ABOVE
GROUND WATER						
WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING, STATIC WATER LEVEL AFTER 24 HOURS, PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA, SPRING OR SEEP						
MISCELLANEOUS SYMBOLS						
ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION, SOIL SYMBOL, ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT, INFERRED SOIL BOUNDARY, INFERRED ROCK LINE, ALLUVIAL SOIL BOUNDARY, DIP & DIP DIRECTION OF ROCK STRUCTURES, SPT, AUGER BORING, CORE BORING, MONITORING WELL, PIEZOMETER INSTALLATION, SLOPE INDICATOR INSTALLATION, CONE PENETRATOR TEST, SOUNDING ROD, TEST BORING W/ CORE, SPT N-VALUE, SPT REFUSAL						
ABBREVIATIONS						
AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, CSE - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, V - VOID RATIO, F - FINE, FOSS. - FOSSILIFEROUS, FRAC. - FRACTURED, 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, WE. - WEATHERED, UNIT WEIGHT, DRY UNIT WEIGHT, SAMPLE ABBREVIATIONS: S - BULK, SS - SPLIT SPOON, ST - SHELBY TUBE, RS - ROCK, RT - RECOMPACTED TRIAXIAL, CBR - CALIFORNIA BEARING RATIO						
EQUIPMENT USED ON SUBJECT PROJECT						
DRILL UNITS:		ADVANCING TOOLS:		HAMMER TYPE:		CORE SIZE:
MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST		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		AUTOMATIC, MANUAL, B, N XWL, H		B, N XWL, H
FRACTURE SPACING						
TERM		SPACING		TERM		THICKNESS
VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE		MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.6 TO 1 FEET, LESS THAN 0.16 FEET		VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED		> 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, < 0.008 FEET
BEDDING						
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.						
FRIABLE		RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.				
MODERATELY INDURATED		GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.				
INDURATED		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.				
EXTREMELY INDURATED		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.				
NOTES:						
BENCH MARK: BM#1; 18" REBAR WITH ALUMINUM CAP STAMPED "B4715, BL 4" AT BL STA. 15+32.00 ELEVATION: 2091.58' FT.						

SKEW = 90°



NAD 83 NAVD88

2130

2120

2110

2100

2090

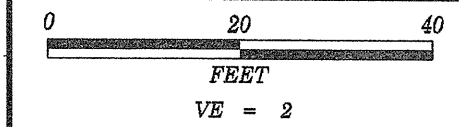
2080

2070

2060

2050

2040



PROJECT REFERENCE NO.	SHEET
38489.1.1 B-4715	4 OF 15
PROFILE 12' LEFT OF -L-	

2120

2110

2100

2090

2080

2070

2060

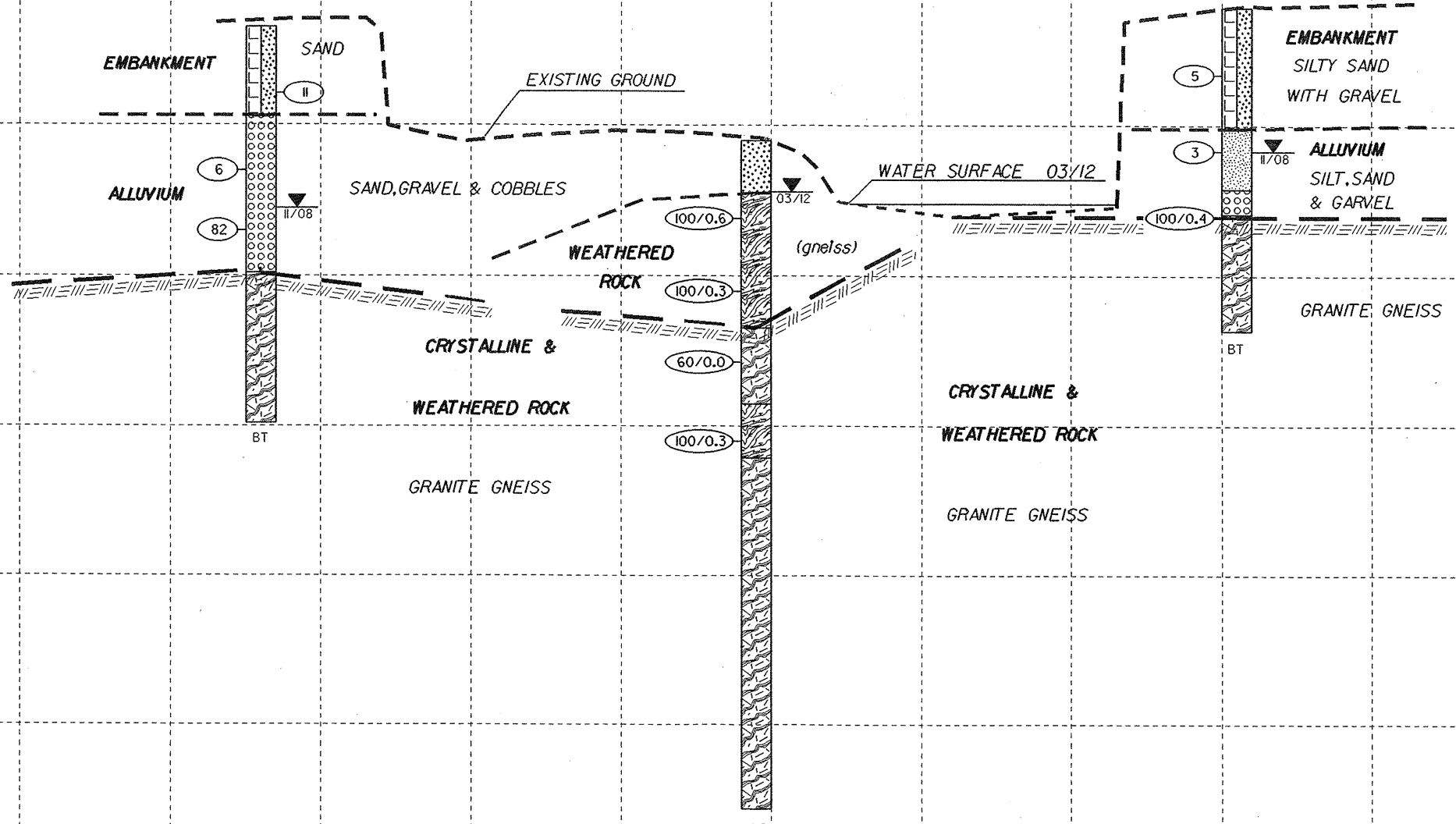
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2040

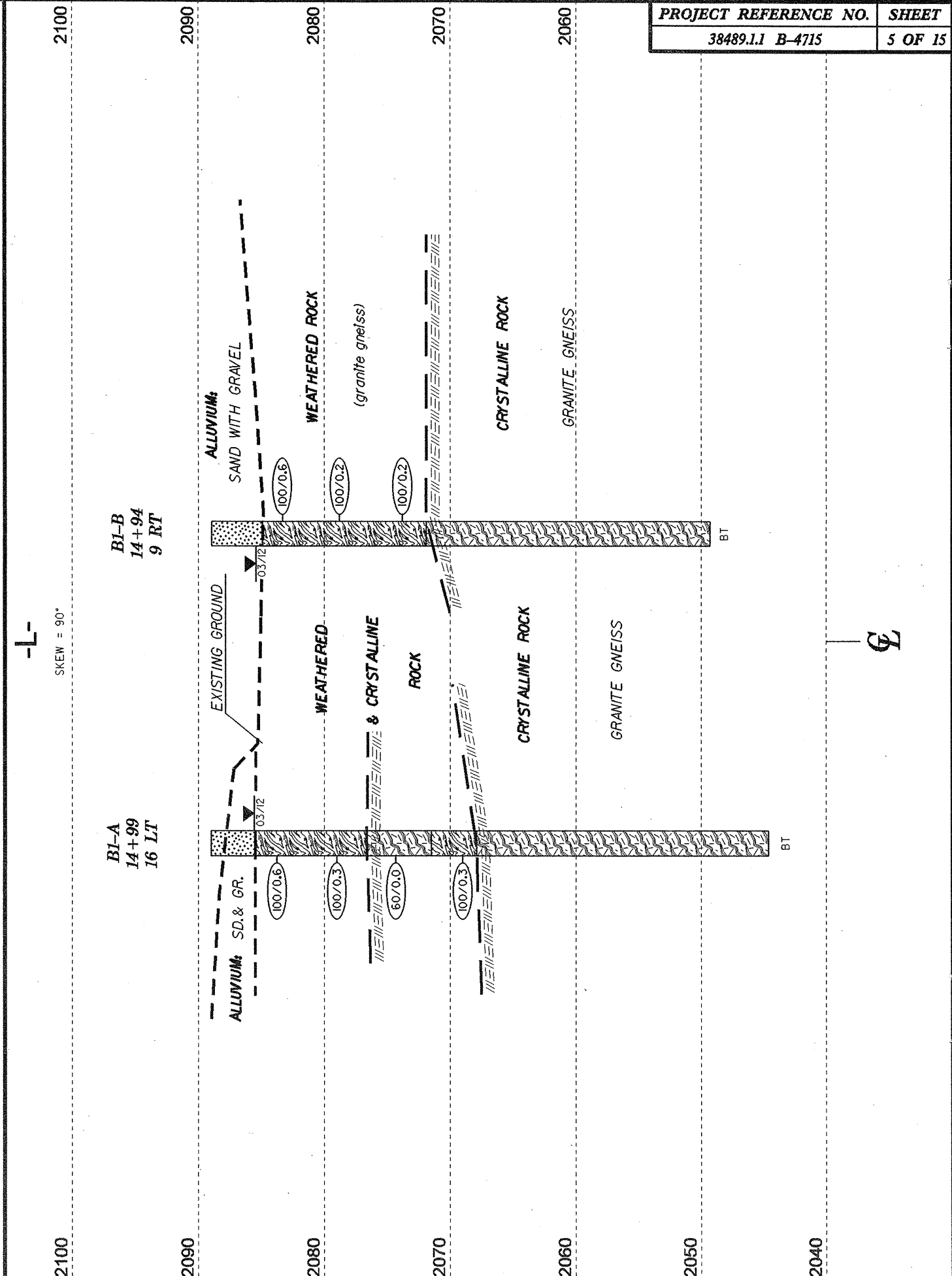
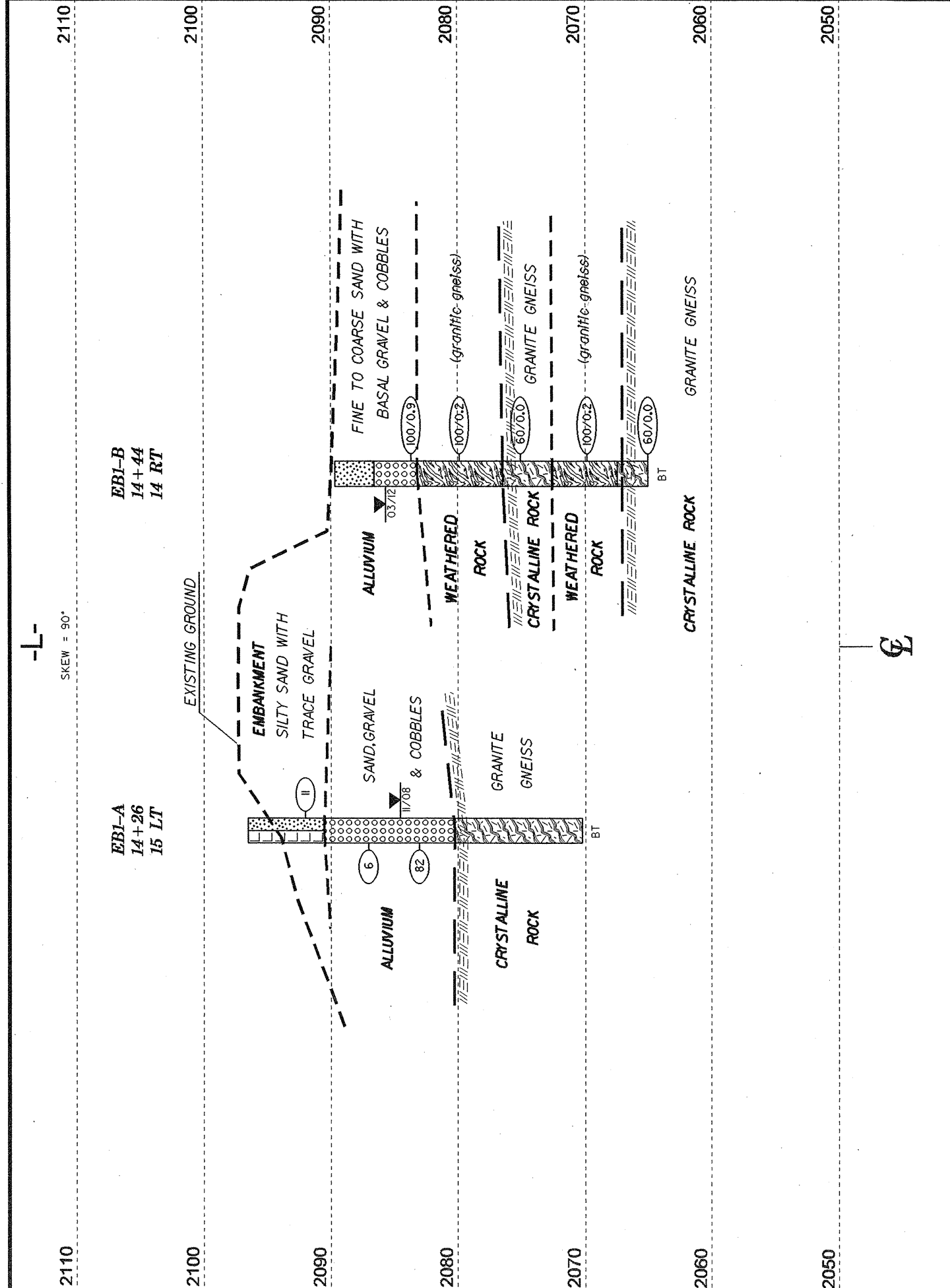
EB1-A
14+26
15 LT

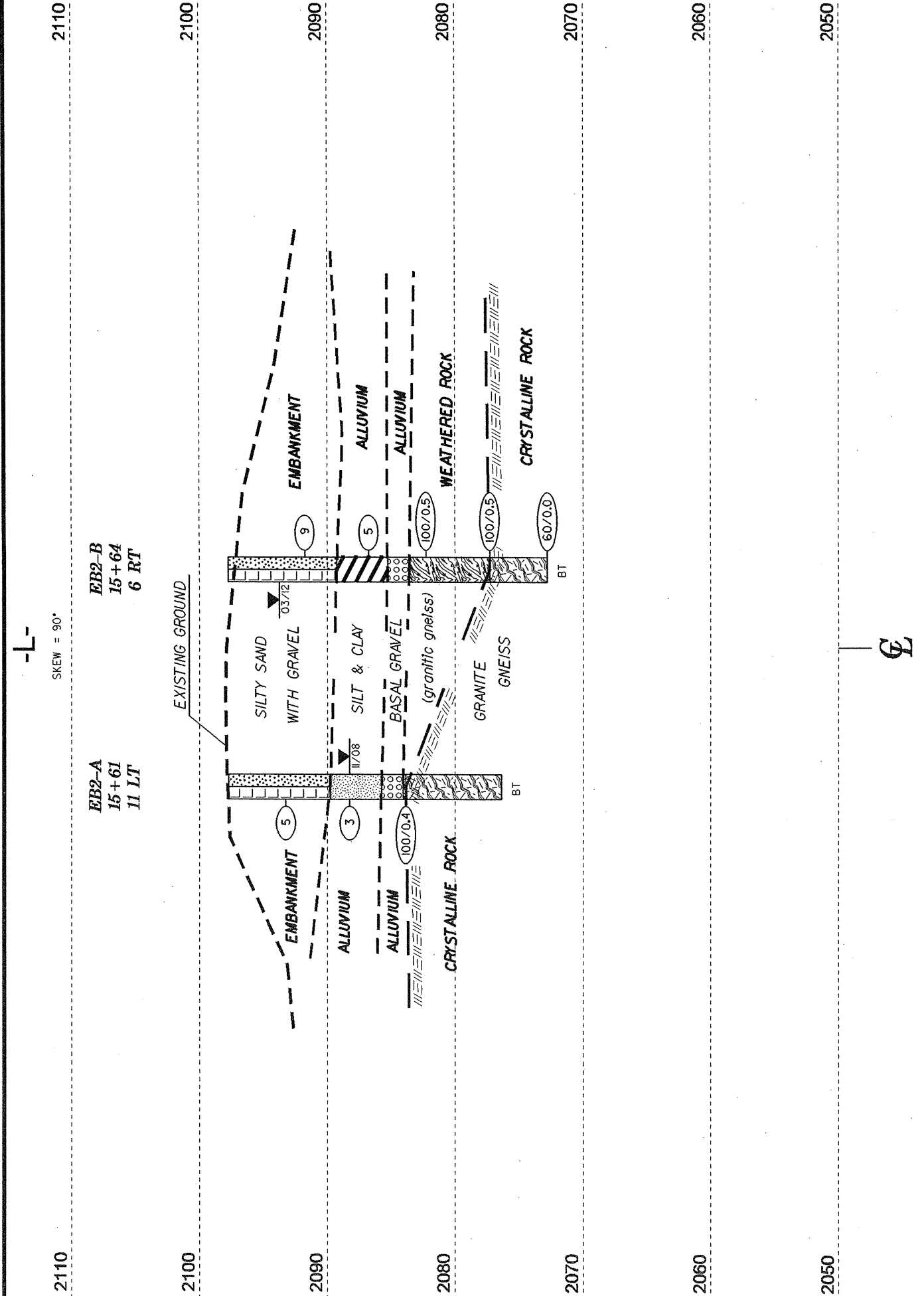
BI-A
14+99
16 LT

EB2-A
15+61
11 LT



14+00 14+20 14+40 14+60 14+80 15+00 15+20 15+40 15+60 15+80 16+00





VE = 1

SECTION THROUGH PROPOSED END BENT TWO



VE =

title (1 or 2 lines)

###

WBS 38489.1.1		TIP B-4175		COUNTY BUNCOMBE		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 14+26		OFFSET 15 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 2,096.5 ft		TOTAL DEPTH 26.3 ft		NORTHING 656,705		EASTING 1,031,325									
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD SPT Core Boring		HAMMER TYPE Manual											
DRILLER N/A		START DATE 11/03/08		COMP. DATE 11/03/08		SURFACE WATER DEPTH N/A									
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					
2100															
2095														2,096.5	0.0
														2,096.5	0.0
														2,093.0	3.5
														2,093.0	3.5
														2,090.5	6.0
														2,090.5	6.0
														2,088.0	8.5
														2,088.0	8.5
														2,084.5	12.0
														2,084.5	12.0
														2,080.2	16.3
														2,080.2	16.3
														2,075.2	21.3
														2,075.2	21.3
														2,070.2	26.3
														2,070.2	26.3
														2,070.2	26.3
														2,070.2	26.3

NCDOT BORE SINGLE B4175 GEO BH BRD0655 BUNCOMBE.GPJ NC_DOT.GDT 4/17/12

WBS 38489.1.1		TIP B-4175		COUNTY BUNCOMBE		GEOLOGIST Hager, M. M.						
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River							GROUND WTR (ft)					
BORING NO. EB1-A		STATION 14+26		OFFSET 15 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 2,096.5 ft		TOTAL DEPTH 26.3 ft		NORTHING 656,705		EASTING 1,031,325						
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD SPT Core Boring		HAMMER TYPE Manual								
DRILLER N/A		START DATE 11/03/08		COMP. DATE 11/03/08		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 10.0 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
2080.2	2,080.2	16.3	5.0		(0.2) 4%	(0.0) 0%					Begin Coring @ 16.3 ft	
2075	2,075.2	21.3	5.0		(2.9) 58%	(0.0) 0%					CRystalline Rock	16.3
											Brown-gray GRANITE GNEISS with biotite. Weakly foliated with trace augen structures. Medium hard and moderately severe to severely weathered. Joint @ 70° with abundant parts along foliation @ 10°.	
											Boring Terminated at Elevation 2,070.2 ft in Crystalline Rock: Granite GNEISS	26.3

NCDOT BORE SINGLE B4175 GEO BH BRD0655 BUNCOMBE.GPJ NC_DOT.GDT 4/24/12

WBS 38489.1.1		TIP B-4175		COUNTY BUNCOMBE		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 14+44		OFFSET 14 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 2,089.7 ft		TOTAL DEPTH 24.6 ft		NORTHING 656,682		EASTING 1,031,349										
DRILL RIG/HAMMER EFF./DATE AFO0071 CME-550X 72% 09/03/2009		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
DRILLER Coffey, Jr., C.		START DATE 03/16/12		COMP. DATE 03/16/12		SURFACE WATER DEPTH N/A										
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)		
2090														2,089.7	0.0	GROUND SURFACE
																ALLUVIAL
														2,086.6	3.1	Brown silty fine to coarse SAND
2085	2,085.1	4.6	6	8	92/0.4									2,083.2	6.5	ALLUVIAL
																Basal SAND, GRAVEL, COBBLES
2080	2,080.1	9.6	100/0.2													WEATHERED ROCK
																(granitic gneiss)
2075	2,075.1	14.6	60/0.0											2,076.5	13.2	CRYSTALLINE ROCK
																GRANITE GNEISS
2070	2,070.1	19.6	100/0.2											2,072.6	17.1	WEATHERED ROCK
																(granitic gneiss)
														2,067.5	22.2	CRYSTALLINE ROCK
																GRANITE GNEISS
	2,065.1	24.6	60/0.0											2,065.1	24.6	Boring Terminated at Elevation 2,065.1 ft In Crystalline Rock: Granite GNEISS

WBS 38489.1.1	TIP B-4175	COUNTY BUNCOMBE	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River			GROUND WTR (ft)
BORING NO. B1-A	STATION 14+99	OFFSET 16 ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,089.0 ft	TOTAL DEPTH 44.4 ft	NORTHING 656,726	EASTING 1,031,394
DRILL RIG/HAMMER EFF./DATE AFO0071 CME-550X 72% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Coffey, Jr., C.	START DATE 03/16/12	COMP. DATE 03/16/12	SURFACE WATER DEPTH N/A

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				
2090													2,089.0 GROUND SURFACE	0.0
													ALLUVIAL Brown-tan silty fine to coarse SAND with basal Gravel	
2085	2,084.3	4.7	65	35	0.1								2,085.5 WEATHERED ROCK (Dark gray-brown granitic gneiss)	3.5
2080	2,079.3	9.7												
2075	2,074.3	14.7											2,076.6 CRYSTALLINE ROCK GRANITE GNEISS	12.4
2070	2,069.3	19.7											2,071.5 WEATHERED ROCK (granitic gneiss)	17.5
2065													2,067.9 CRYSTALLINE ROCK White-gray-brown severely to very slightly weathered GRANITE GNEISS	21.1
2060													Run 1: 21.1-24.4' REC=100% RQD=36% Run 2: 24.4-29.4' REC=72% RQD=34% Run 3: 29.4-34.4' REC=98% RQD=14% Run 4: 34.4-39.4' REC=60% RQD=32% Run 5: 39.4-44.4' REC=60% RQD=10%	
2055														
2050														
2045													2,044.6 Boring Terminated at Elevation 2,044.6 ft In Crystalline Rock: Granite GNEISS	44.4

NCDOT BORE SINGLE B4175_GEO_BH_BRD0655_BUNCOMBE.GPJ NC_DOT.GDT 5/3/12

WBS 38489.1.1	TIP B-4175	COUNTY BUNCOMBE	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River			GROUND WTR (ft)
BORING NO. B1-A	STATION 14+99	OFFSET 16 ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,089.0 ft	TOTAL DEPTH 44.4 ft	NORTHING 656,726	EASTING 1,031,394
DRILL RIG/HAMMER EFF./DATE AFO0071 CME-550X 72% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Coffey, Jr., C.	START DATE 03/16/12	COMP. DATE 03/16/12	SURFACE WATER DEPTH N/A

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	RQD (ft)		REC. (ft)	RQD (ft)			
2067.9	2,067.9	21.1	3.3	0:50/1.0 1:02/1.0 1:11/1.0	(3.3)	(1.2)					2,067.9	Begin Coring @ 21.1 ft CRYSTALLINE ROCK
2065	2,064.6	24.4	5.0	1:10/1.0 1:14/1.0 1:15/1.0 0:55/1.0 1:10/1.0	(3.6)	(1.7)	RS-3					White-gray-brown severely to very slightly weathered GRANITE GNEISS. Recovered rock is medium hard to hard with fracture spacing very close to close. Poorly developed foliation to massive. Discontinuities are typically along foliation @ ~10° with a few high angle joints. Some augen structure present.
2060	2,059.6	29.4	5.0	1:24/1.0 1:15/1.0 1:25/1.0 1:11/1.0 1:30/1.0	(4.9)	(0.7)	RS-4					
2055	2,054.6	34.4	5.0	0:53/1.0 2:34/2.0	(3.0)	(1.6)						
2050	2,049.6	39.4	5.0	1:43/1.0 1:44/1.0	(3.0)	(0.5)						
2045	2,044.6	44.4		0:51/1.0 1:11/1.0 1:30/1.0 1:18/1.0 1:31/1.0								Boring Terminated at Elevation 2,044.6 ft In Crystalline Rock: Granite GNEISS

NCDOT CORE SINGLE B4175_GEO_BH_BRD0655_BUNCOMBE.GPJ NC_DOT.GDT 5/3/12

WBS 38489.1.1		TIP B-4175		COUNTY BUNCOMBE		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River							GROUND WTR (ft)									
BORING NO. B1-B		STATION 14+94		OFFSET 9 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 2,089.0 ft		TOTAL DEPTH 39.7 ft		NORTHING 656,701		EASTING 1,031,396										
DRILL RIG/HAMMER EFF./DATE AFO0071 CME-550X 72% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic												
DRILLER Cheek, D. O.		START DATE 03/15/12		COMP. DATE 03/15/12		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
2090														2,089.0	0.0	GROUND SURFACE
																ALLUVIAL
																Brown silty fine to coarse SAND with gravel
2085	2,084.0	5.0	42	58/0.1										2,085.0	4.0	WEATHERED ROCK
																(granite gneiss)
2080	2,079.0	10.0		100/0.2												
2075	2,074.0	15.0		100/0.2												
2070														2,071.9	17.1	CRYSTALLINE ROCK
																White-gray-brown slightly to very slightly weathered GRANITE GNEISS.
																Run 1: 17.1-19.7' REC=92% RQD=58%
																Run 2: 19.7-24.7' REC=94% RQD=50%
																Run 3: 24.7-29.7' REC=96% RQD=60%
																Run 4: 29.7-34.7' REC=82% RQD=1%
																Run 5: 37.7-39.7' REC=74% RQD=24%
2065																
2060																
2055																
2050														2,049.3	39.7	Boring Terminated at Elevation 2,049.3 ft In Crystalline Rock: Granite GNEISS

NCDOT BORE SINGLE B4175 GEO. BH. BRDG0655_BUNCOMBE.GPJ NC_DOT.GDT 5/3/12

WBS 38489.1.1		TIP B-4175		COUNTY BUNCOMBE		GEOLOGIST Hager, M. M.					
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River							GROUND WTR (ft)				
BORING NO. B1-B		STATION 14+94		OFFSET 9 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 2,089.0 ft		TOTAL DEPTH 39.7 ft		NORTHING 656,701		EASTING 1,031,396					
DRILL RIG/HAMMER EFF./DATE AFO0071 CME-550X 72% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic							
DRILLER Cheek, D. O.		START DATE 03/15/12		COMP. DATE 03/15/12		SURFACE WATER DEPTH N/A					
CORE SIZE NXWL			TOTAL RUN 22.6 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (%)	RQD (%)		REC. (%)	RQD (%)		
2071.89	2,071.9	17.1	2.6	1:26/1.0 1:21/1.0	(2.4) 92%	(1.5) 58%					Begin Coring @ 17.1 ft
2070	2,069.3	19.7	5.0	0:48/0.7 1:17/1.0	(4.7) 94%	(2.5) 50%	RS-1				CRYSTALLINE ROCK
				1:31/1.0 1:14/1.0							White-gray-brown slightly to very slightly weathered GRANITE GNEISS. Recovered rock is hard with fracture spacing very close to close. Rock is generally massive. Discontinuities are at ~10° with some high angle fractures.
2065	2,064.3	24.7	5.0	1:04/1.0 1:12/1.0	(4.8) 96%	(3.0) 60%	RS-2				
				1:12/1.0 1:08/1.0							
2060	2,059.3	29.7	5.0	1:11/1.0 1:08/1.0	(4.1) 82%	(0.4) 8%					
				1:01/1.0 1:16/1.0							
2055	2,054.3	34.7	5.0	0:58/1.0 1:03/1.0	(3.7) 74%	(1.2) 24%					
				1:04/1.0 1:24/1.0							
2050	2,049.3	39.7									Boring Terminated at Elevation 2,049.3 ft In Crystalline Rock: Granite GNEISS

NCDOT CORE SINGLE B4175 GEO. BH. BRDG0655_BUNCOMBE.GPJ NC_DOT.GDT 5/3/12

WBS 38489.1.1		TIP B-4175		COUNTY BUNCOMBE		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 15+61		OFFSET 11 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 2,097.8 ft		TOTAL DEPTH 21.4 ft		NORTHING 656,737		EASTING 1,031,455									
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD SPT Core Boring		HAMMER TYPE Manual											
DRILLER N/A		START DATE 11/03/08		COMP. DATE 11/03/08		SURFACE WATER DEPTH N/A									
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					
2100														2,097.8	0.0
ROADWAY EMBANKMENT Brown silty SAND with gravel															
2095	2,094.3	3.5	3	2	3									2,089.8	8.0
ALLUVIAL Gray-brown sandy SILT with clay															
2090	2,089.3	8.5	2	1	2									2,085.8	12.0
ALLUVIAL SAND & GRAVEL															
2085	2,084.3	13.5	100/0.4											2,084.1	13.7
WEATHERED ROCK (gneiss)															
2080														2,076.4	21.4
CRYSTALLINE ROCK GRANITE GNEISS															
Boring Terminated at Elevation 2,076.4 ft In Crystalline Rock: Granite GNEISS															

NCDOT BORE SINGLE B4175_GEO_BH_BRD0655_BUNCOMBE.GPJ NC_DOT.GDT 4/17/12

WBS 38489.1.1		TIP B-4175		COUNTY BUNCOMBE		GEOLOGIST Hager, M. M.						
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River							GROUND WTR (ft)					
BORING NO. EB2-A		STATION 15+61		OFFSET 11 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 2,097.8 ft		TOTAL DEPTH 21.4 ft		NORTHING 656,737		EASTING 1,031,455						
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD SPT Core Boring		HAMMER TYPE Manual								
DRILLER N/A		START DATE 11/03/08		COMP. DATE 11/03/08		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 7.5 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
2083.85												
	2,083.9	13.9	2.5		(0.2) 8%	(0.0) 0%					2,083.9	13.9
Begin Coring @ 13.9 ft CRYSTALLINE ROCK												
	2,081.4	16.4	5.0		(1.7) 34%	(0.0) 0%						
	2,076.4	21.4									2,076.4	21.4
Boring Terminated at Elevation 2,076.4 ft In Crystalline Rock: Granite GNEISS												

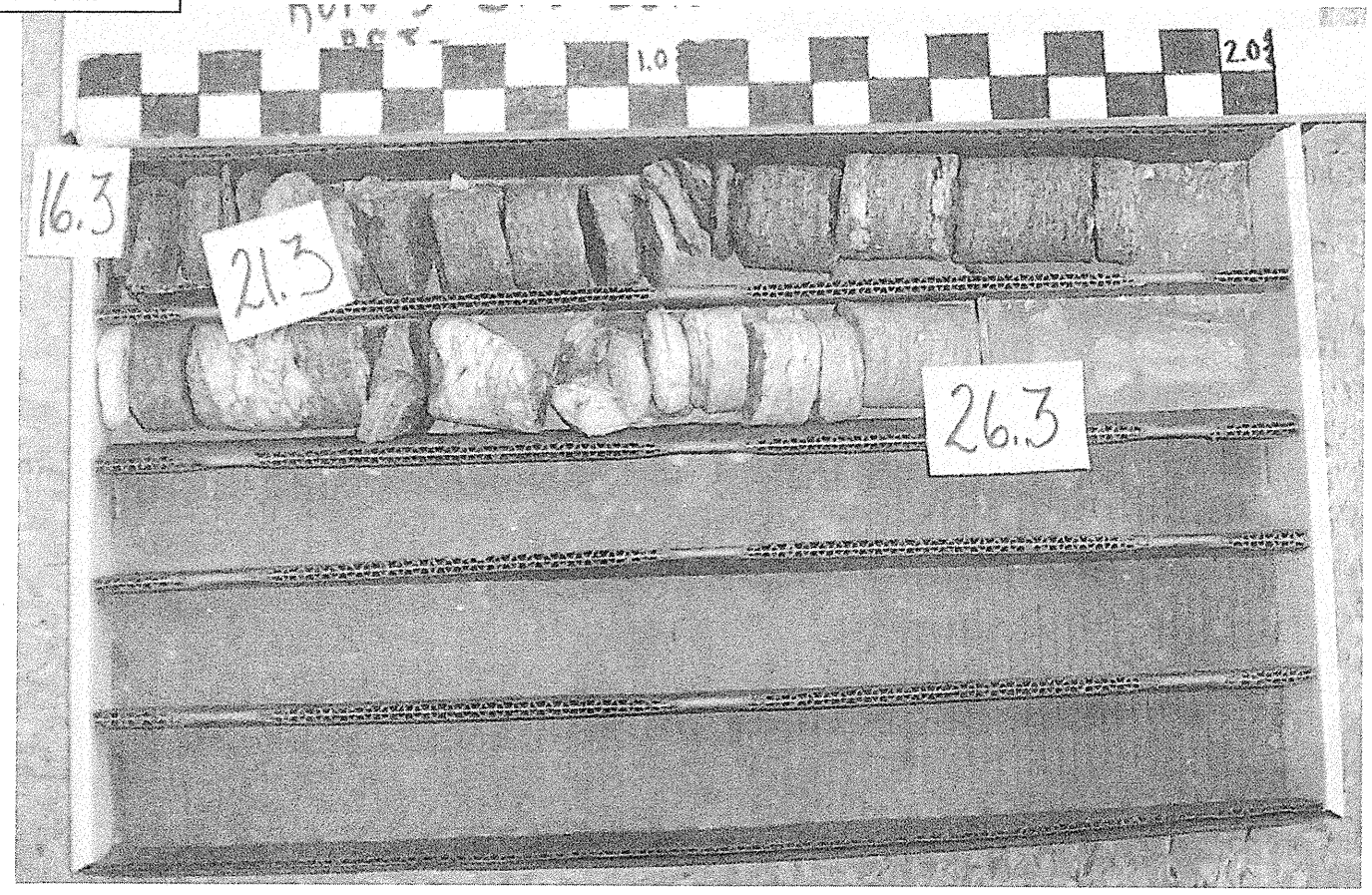
NCDOT CORE SINGLE B4175_GEO_BH_BRD0655_BUNCOMBE.GPJ NC_DOT.GDT 4/24/12

WBS 38489.1.1		TIP B-4175		COUNTY BUNCOMBE		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Bridge No. 655 on SR 2797 over Broad River							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 15+64		OFFSET 6 ft RT		ALIGNMENT -L-	0 HR. N/A									
COLLAR ELEV. 2,097.8 ft		TOTAL DEPTH 25.0 ft		NORTHING 656,722		EASTING 1,031,463	24 HR. 4.0									
DRILL RIG/HAMMER EFF/DATE AFO0071 CME-550X 72% 09/03/2009				DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic										
DRILLER Cheek, D. O.		START DATE 03/15/12		COMP. DATE 03/15/12		SURFACE WATER DEPTH N/A										
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						
2100														2,097.8	0.0	GROUND SURFACE
2095																ROADWAY EMBANKMENT Tan-brown silty fine SAND with intermittent gravel
2090	2,092.8	5.0	2	4	5									2,089.3	8.5	
2085	2,087.8	10.0	1	2	3									2,085.3	12.5	ALLUVIAL Dark gray-brown silty CLAY
2080	2,082.8	15.0	90	10/0.0						100/0.5			2,083.6	14.2	ALLUVIAL Basal GRAVEL	
2075	2,077.8	20.0	46	60/0.0						100/0.5			2,077.3	20.5	WEATHERED ROCK (granitic gneiss)	
	2,072.8	25.0	60/0.0							60/0.0			2,072.8	25.0	CRYSTALLINE ROCK GRANITE GNEISS	
															Boring Terminated at Elevation 2,072.8 ft In Crystalline Rock: Granite GNEISS	

38489.1.1 (B-4715)
BUNCOMBE COUNTY
BRIDGE # 655 ON SR 2797 OVER BROAD RIVER

CORE PHOTOS

EB1-A

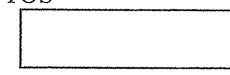


EB2-A



38489.1.1 (B-4715)
BUNCOMBE COUNTY
BRIDGE # 655 ON SR 2797 OVER BROAD RIVER

CORE PHOTOS



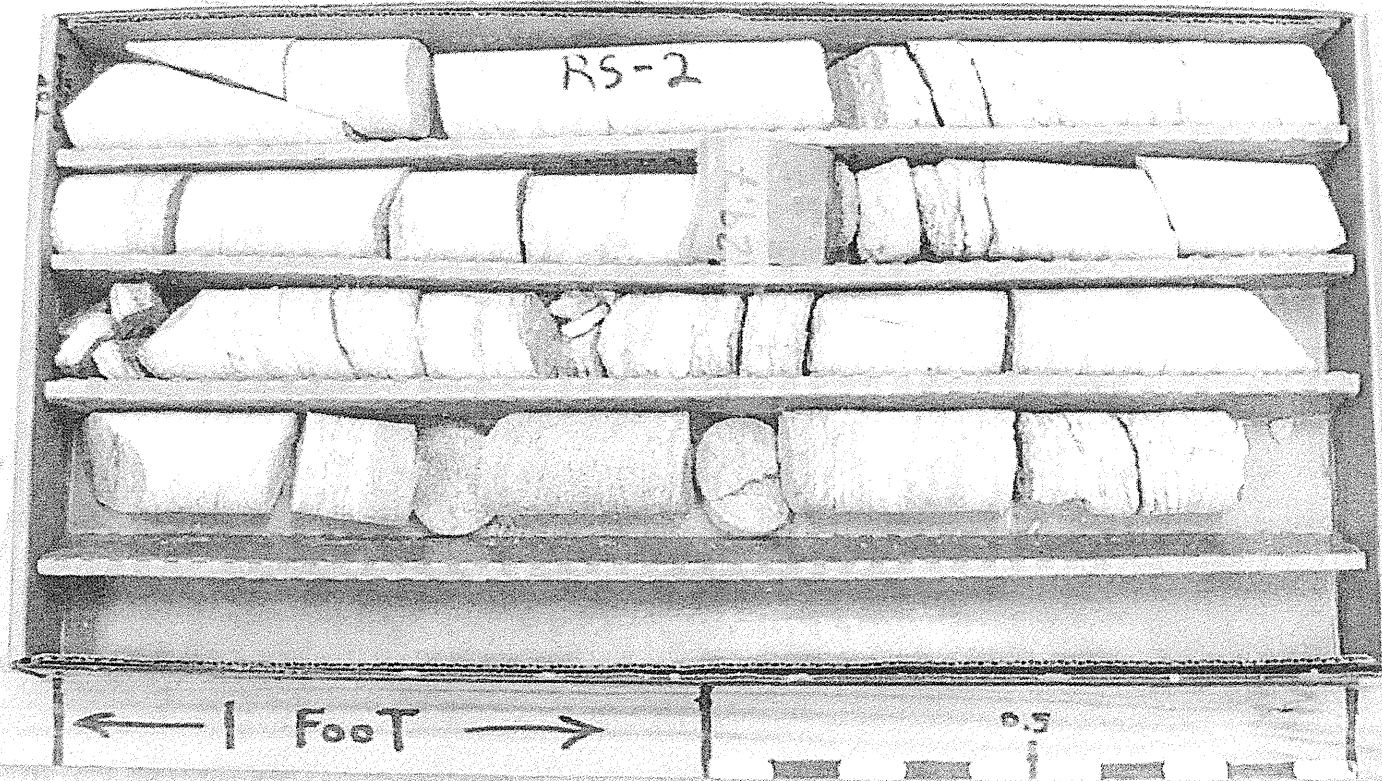
B1-A



38489.1.1 (B-4715)
BUNCOMBE COUNTY
BRIDGE # 655 ON SR 12797 OVER BROAD RIVER

CORE PHOTOS

B1-B



B1-B

