

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, *VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6*

SOIL LEGEND AND AASHTO CLASSIFICATION

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.76	2.00	0.42	0.25	0.075	0.053
BOULDER (BLDR.)						
COBBLE (COB.)						
GRAVEL (GR.)						
COARSE SAND (CSE, SD.)						
FINE SAND (F SD.)						
SILT (SL.)						
CLAY (CL.)						
GRAIN SIZE	305	75	2.0	0.25	0.05	0.005
MM						
IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
 STATIC WATER LEVEL AFTER 24 HOURS
 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
 TEST BORING
 AUGER BORING
 CORE BORING
 MONITORING WELL
 PIEZOMETER INSTALLATION
 SLOPE INDICATOR INSTALLATION
 CONE PENETROMETER TEST
 SOUNDING ROD
 TEST BORING WITH CORE
 SPT N-VALUE

RECOMMENDATION SYMBOLS

UNDERCUT
 UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
 UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
 UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL - CLAY
CPT - CONE PENETRATION TEST
CSE - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILTY, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
SAMPLE ABBREVIATIONS
S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
 CME-45C
 CME-55
 CME-550
 VANE SHEAR TEST
 PORTABLE HOIST

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

HAMMER TYPE:
 AUTOMATIC MANUAL
CORE SIZE:
 -B -H
 -N WXL
HAND TOOLS:
 POST HOLE DIGGER
 HAND AUGER
 SOUNDING ROD
 VANE SHEAR TEST

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.
FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.
ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH 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 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 (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.

BENCH MARK: BL-104, IRON SPIKE WITH CAP, -LREV- STA. 26+04 25' RT

ELEVATION: 156.90 FEET

NOTES:
TEMPORARY BENCH MARK (TB-1), TOE OF PAVED EMBANKMENT, -LREV- STA. 25+12 31' RT ELEV.=142.7 FEET
EB1 TOP OF RAIL -LREV- STA. 22+25 56' RT ELEV.=160.2'
EB2 TOP OF RAIL -LREV- STA. 25+55 56' RT ELEV.=160.2'

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
 FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

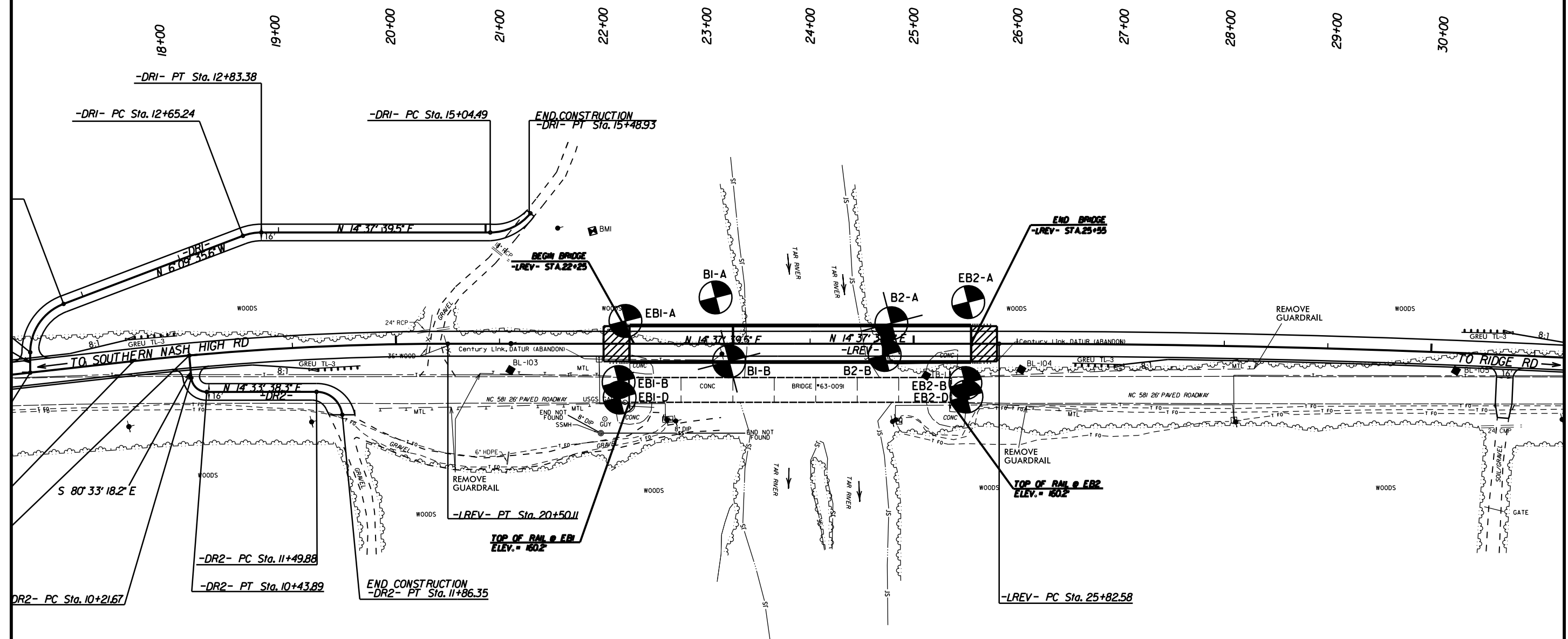
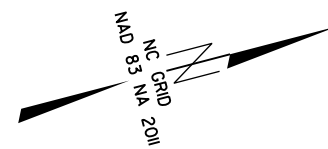
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

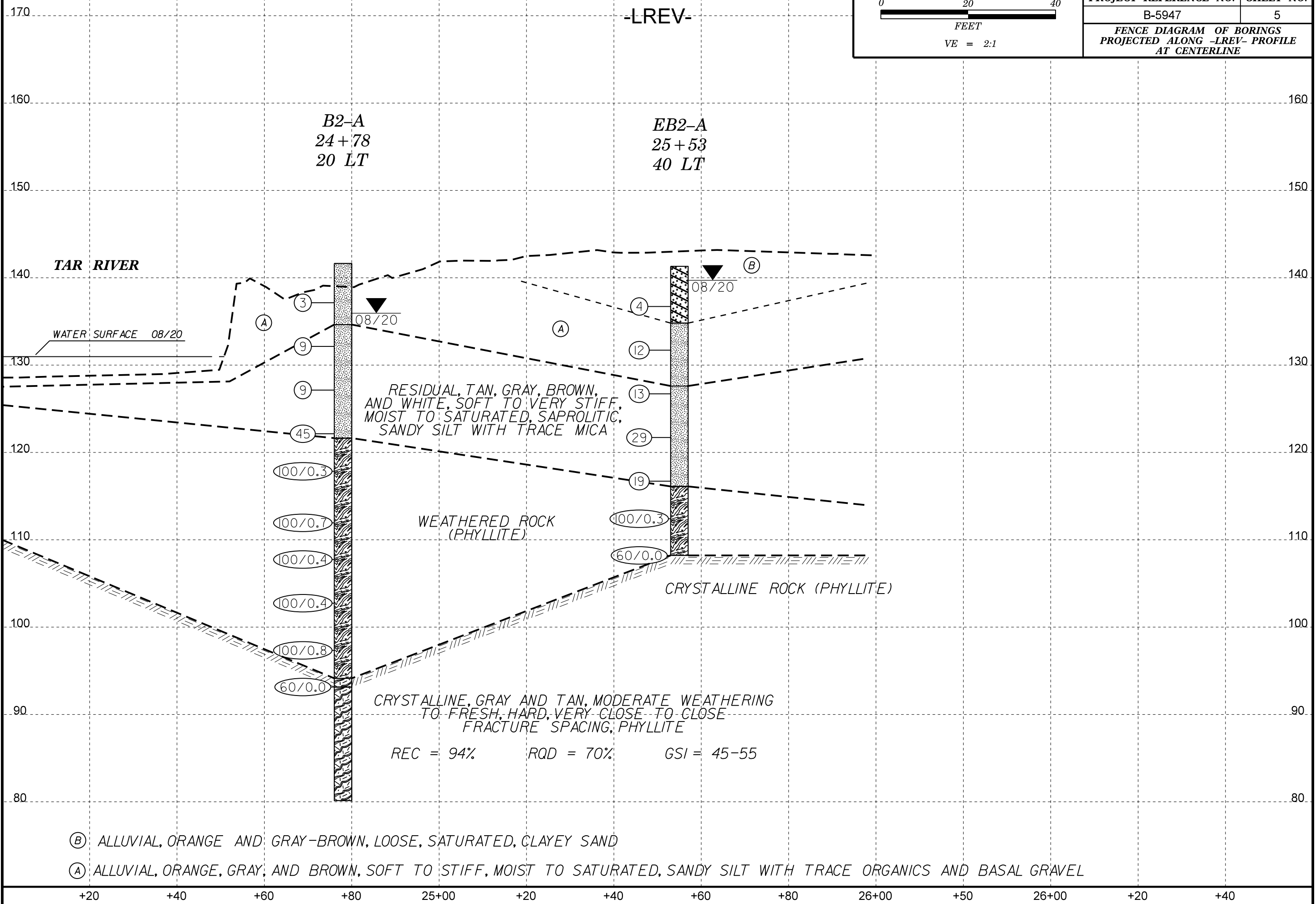
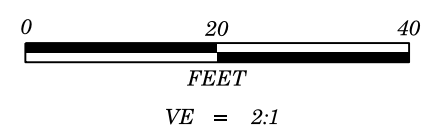
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)				
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.		VERY GOOD Very rough, fresh unweathered surfaces	GOOD Rough, slightly weathered, iron stained surfaces	FAIR Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.		VERY GOOD - Very Rough, fresh unweathered surfaces	GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
STRUCTURE		DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE						
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities		90			N/A	N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70					
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		80					B. Sandstone with thin inter-layers of siltstone	60					
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets			70				C. Sandstone and siltstone in similar amounts		50				
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity			60				D. Siltstone or silty shale with sandstone layers			40			
DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces				50			E. Weak siltstone or clayey shale with sandstone layers				30		
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes					40		F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure					20	
					30		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers						10
					20		H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.						
					10								
		N/A	N/A										

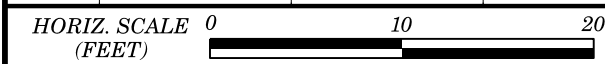
→ Means deformation after tectonic disturbance

.....
 B.M1 ELEVATION = 146.10
 N 777073 E 2269535
 LREV STATION 21+89.98 108.86 LEFT
 BENCHTIE NAIL SET IN 16" HARDWOOD



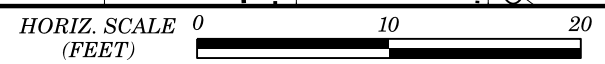
SKEW = 90°





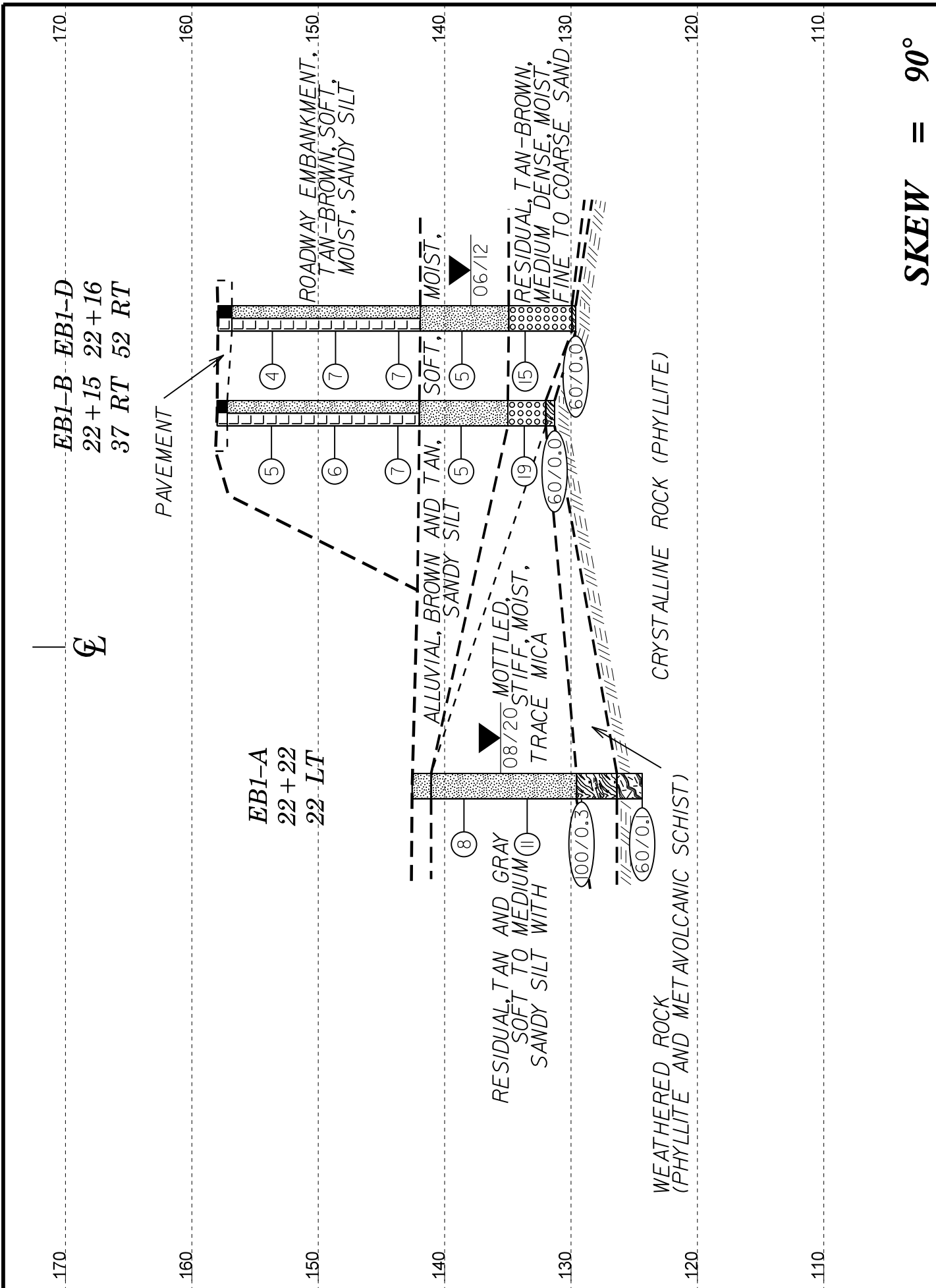
VE = 2:1

CROSS SECTION THROUGH EBI

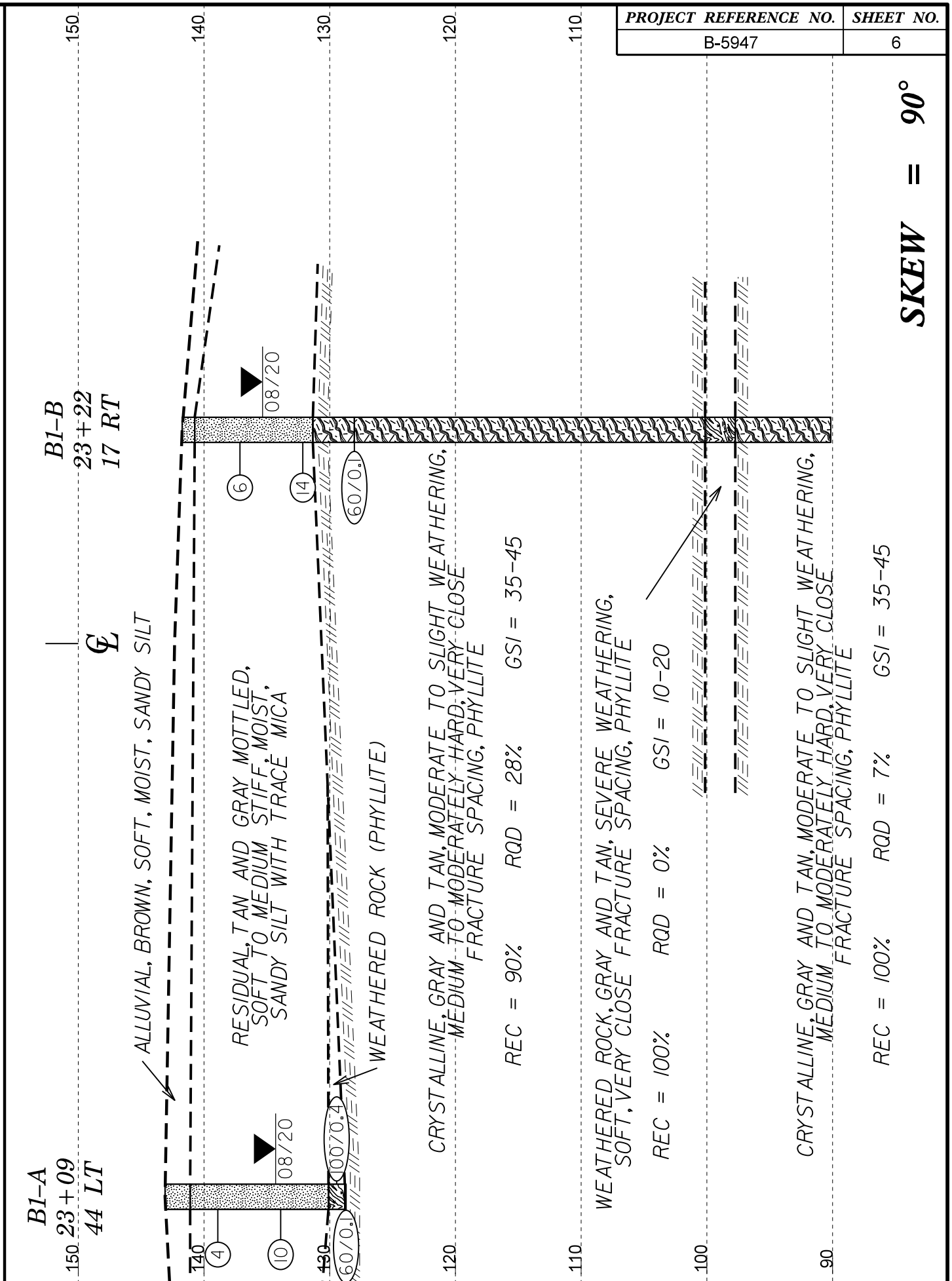


VE = 1:1

CROSS SECTION THROUGH BI



SKEW = 90°



SKEW = 90°

PROJECT REFERENCE NO.	SHEET NO.
B-5947	6



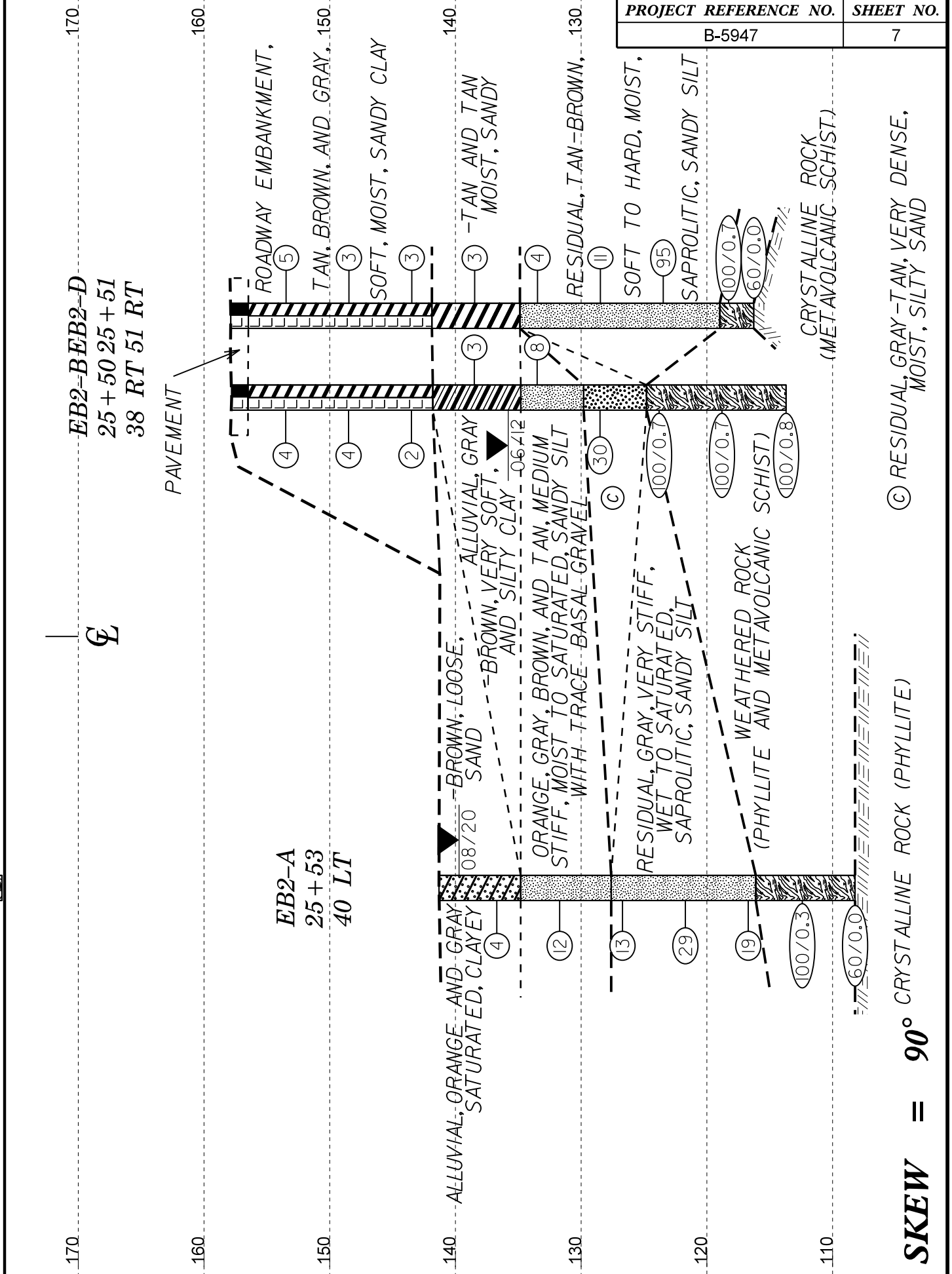
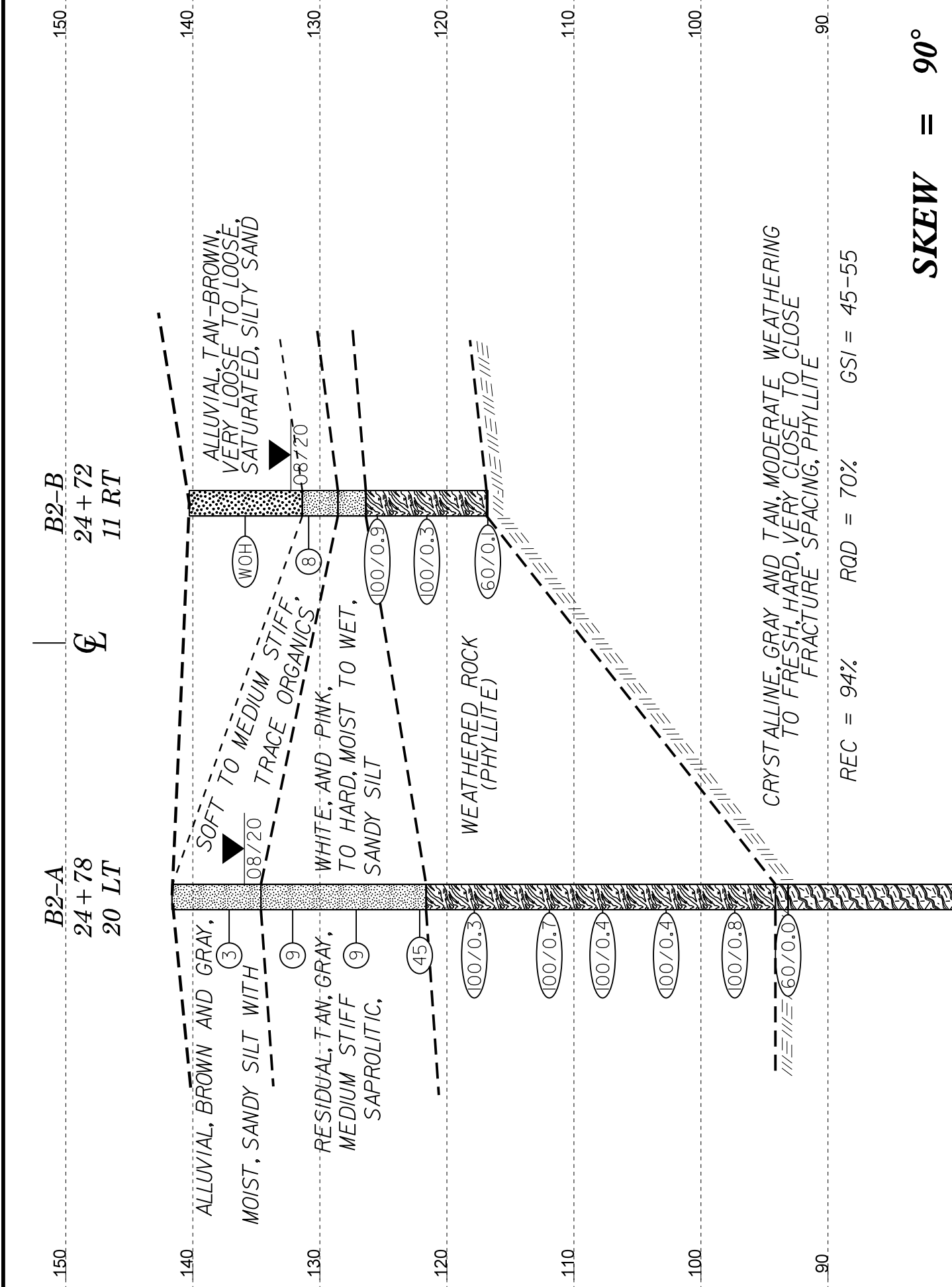
VE = 1:1

CROSS SECTION THROUGH B2



VE = 2:1

CROSS SECTION THROUGH EB2



PROJECT REFERENCE NO.	SHEET NO.
B-5947	7

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45983.1.1		TIP B-5947		COUNTY NASH		GEOLOGIST Jones, A. N.										
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 22+22		OFFSET 22 ft LT		ALIGNMENT -LREV-										
COLLAR ELEV. 142.5 ft		TOTAL DEPTH 18.2 ft		NORTHING 777,082		EASTING 2,269,627										
DRILL RIG/HAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 08/17/20		COMP. DATE 08/17/20		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						
145																
140	139.4	3.1	1	3	5								M	GROUND SURFACE 142.5	0.0	
													M	ALLUVIAL BROWN, SANDY SILT 141.0	1.5	
													M	RESIDUAL TAN AND GRAY MOTTLED, SANDY SILT WITH TRACE MICA		
135	134.4	8.1	4	4	7								M			
130	129.4	13.1	100/0.3													
125	124.4	18.1	60/0.1											WEATHERED ROCK PHYLLITE 129.5	13.0	
														CRYSTALLINE ROCK PHYLLITE 126.3	16.2	
														CRYSTALLINE ROCK PHYLLITE 124.3	18.2	
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 124.3 ft IN CRYSTALLINE ROCK (PHYLLITE)		

WBS 45983.1.1		TIP B-5947		COUNTY NASH		GEOLOGIST Oti, O. B.										
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 22+15		OFFSET 37 ft RT		ALIGNMENT -LREV-										
COLLAR ELEV. 158.0 ft		TOTAL DEPTH 26.7 ft		NORTHING 777,061		EASTING 2,269,682										
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 06/13/12		COMP. DATE 06/13/12		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						
160																
155	154.7	3.3	1	2	3								M	GROUND SURFACE 158.0	0.0	
													M	ROADWAY EMBANKMENT ASPHALT & ABC 157.2	0.8	
													M	TAN-BROWN, SANDY SILT		
150	149.7	8.3	1	2	4								M			
													M			
145	144.7	13.3	1	2	5								M			
													M			
140	139.7	18.3	1	2	3								M	ALLUVIAL TAN-BROWN, SANDY SILT 142.0	16.0	
													M			
135	134.7	23.3	6	9	10								M	RESIDUAL TAN-BROWN, FINE TO COARSE SAND 135.0	23.0	
													M	WEATHERED ROCK (METAVOLCANIC SCHIST) 132.0	26.0	
														WEATHERED ROCK (METAVOLCANIC SCHIST) 131.3	26.7	
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 131.3 ft ON CRYSTALLINE ROCK (METAVOLCANIC SCHIST)		

NCDOT BORE DOUBLE B5947_GEO_BRDG_BH.GPJ NC_DOT.GDT 10/20/20

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45983.1.1		TIP B-5947		COUNTY NASH		GEOLOGIST Oti, O. B.											
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581							GROUND WTR (ft)										
BORING NO. EB1-D		STATION 22+16		OFFSET 52 ft RT		ALIGNMENT -LREV-											
COLLAR ELEV. 157.9 ft		TOTAL DEPTH 28.3 ft		NORTHING 777,058		EASTING 2,269,697											
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER Contract Driller		START DATE 06/13/12		COMP. DATE 06/13/12		SURFACE WATER DEPTH 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							
160															157.9	GROUND SURFACE	0.0
															156.8	ROADWAY EMBANKMENT ASPHALT & ABC TAN-BROWN, SANDY SILT	1.1
155	154.6	3.3	1	2	2								M				
150	149.6	8.3	1	3	4								M				
145	144.6	13.3	2	3	4								M				
140	139.6	18.3	1	2	3								M				
135	134.6	23.3	4	7	8								M				
130	129.6	28.3	60/0.0											M			
															129.9	WEATHERED ROCK (METAVOLCANIC SCHIST)	28.0
															129.6	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 129.6 ft ON CRYSTALLINE ROCK (METAVOLCANIC SCHIST)	28.3

WBS 45983.1.1		TIP B-5947		COUNTY NASH		GEOLOGIST Jones, A. N.											
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581							GROUND WTR (ft)										
BORING NO. B1-A		STATION 23+09		OFFSET 44 ft LT		ALIGNMENT -LREV-											
COLLAR ELEV. 142.9 ft		TOTAL DEPTH 14.4 ft		NORTHING 777,172		EASTING 2,269,627											
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 80% 03/08/2019			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER Pinter, D. G.		START DATE 08/17/20		COMP. DATE 08/17/20		SURFACE WATER DEPTH 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							
145															142.9	GROUND SURFACE	0.0
															140.9	ALLUVIAL BROWN, SANDY SILT	2.0
140	139.7	3.2	2	2	2								M				
135	134.7	8.2	3	4	6								M				
130	129.7	13.2													129.9	WEATHERED ROCK PHYLLITE	13.0
	128.6	14.3	100/0.4												128.6	CRYSTALLINE ROCK PHYLLITE	14.3
															128.5	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 128.5 ft IN CRYSTALLINE ROCK (PHYLLITE)	14.4

NCDOT BORE DOUBLE B5947_GEO_BRDG_BH.GPJ NC_DOT.GDT 10/20/20

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45983.1.1		TIP B-5947		COUNTY NASH		GEOLOGIST Roberson, N. T.									
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581							GROUND WTR (ft)								
BORING NO. B2-B		STATION 24+72		OFFSET 11 ft RT		ALIGNMENT -LREV-									
COLLAR ELEV. 140.3 ft		TOTAL DEPTH 23.5 ft		NORTHING 777,316		EASTING 2,269,722									
DRILL RIGHAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Pinter, D. G.		START DATE 08/24/20		COMP. DATE 08/24/20		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					
145															
140														140.3	GROUND SURFACE 0.0
135	136.9	3.4	WOH	WOH	WOH										
130	131.9	8.4	3	4	4									131.4	ALLUVIAL GRAY, SANDY SILT 8.9
125	126.9	13.4	5	12	88/0.4									128.6	RESIDUAL TAN AND GRAY, SAPROLITIC, SANDY SILT 11.7
120	121.9	18.4	100/0.3											126.4	WEATHERED ROCK PHYLITE 13.9
	116.9	23.4	60/0.1											116.9	CRYSTALLINE ROCK PHYLITE 23.4
														116.8	CRYSTALLINE ROCK PHYLITE 23.5

WBS 45983.1.1		TIP B-5947		COUNTY NASH		GEOLOGIST Roberson, N. T.									
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 25+53		OFFSET 40 ft LT		ALIGNMENT -LREV-									
COLLAR ELEV. 141.3 ft		TOTAL DEPTH 33.1 ft		NORTHING 777,407		EASTING 2,269,693									
DRILL RIGHAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Pinter, D. G.		START DATE 08/24/20		COMP. DATE 08/24/20		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					
145															
140														141.3	GROUND SURFACE 0.0
135	137.7	3.6	WOH	1	3										
130	132.7	8.6	3	5	7									134.8	ALLUVIAL ORANGE AND GRAY-BROWN, CLAYEY SAND 6.5
125	127.7	13.6	5	5	8									132.7	ALLUVIAL ORANGE AND GRAY-BROWN, SANDY SILT 8.9
120	122.7	18.6	9	11	18									127.6	RESIDUAL GRAY, SAPROLITIC, SANDY SILT 13.7
115	117.7	23.6	4	7	12									126.4	RESIDUAL TAN AND GRAY, SAPROLITIC, SANDY SILT 13.9
110	112.7	28.6	100/0.3											122.7	WEATHERED ROCK PHYLITE 18.6
	108.2	33.1	60/0.0											117.7	WEATHERED ROCK PHYLITE 23.6
														116.1	WEATHERED ROCK PHYLITE 25.2
														108.2	CRYSTALLINE ROCK PHYLITE 33.1

NCDOT BORE DOUBLE B5947_GEO_BRDG_BH.GPJ NC_DOT.GDT 10/20/20

GEOTECHNICAL BORING REPORT

BORE LOG

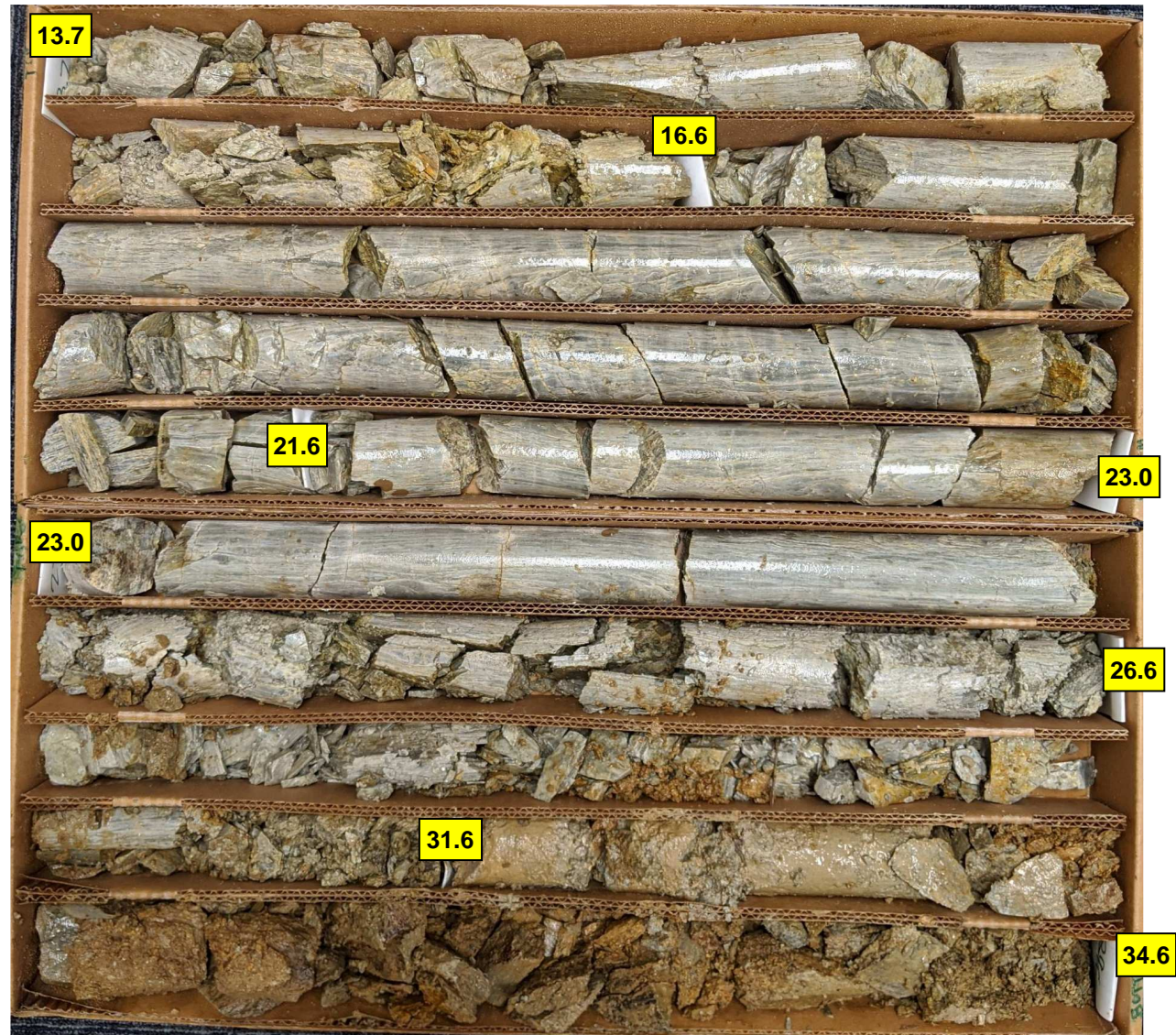
WBS 45983.1.1		TIP B-5947		COUNTY NASH		GEOLOGIST Oti, O. B.										
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 25+50		OFFSET 38 ft RT		ALIGNMENT -LREV-										
COLLAR ELEV. 157.8 ft		TOTAL DEPTH 44.1 ft		NORTHING 777,385		EASTING 2,269,768										
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 06/13/12		COMP. DATE 06/13/12		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						
160														157.8	GROUND SURFACE	0.0
														156.5	ROADWAY EMBANKMENT ASPHALT & ABC	1.3
155	154.5	3.3	1	2	2										TAN, BROWN, AND GRAY, SILTY CLAY	
150	149.5	8.3	2	2	2											
145	144.5	13.3	1	1	1											
140	139.5	18.3	1	1	2									141.8	ALLUVIAL GRAY-TAN, SANDY CLAY	16.0
135	134.5	23.3	2	3	5									134.8	TAN-BROWN, SANDY SILT	23.0
130	129.5	28.3	2	5	25									129.8	RESIDUAL GRAY-TAN, SILTY SAND	28.0
125	124.5	33.3	23	77/0.2										124.8	WEATHERED ROCK (METAVOLCANIC SCHIST)	33.0
120	119.5	38.3	85	15/0.2												
115	114.5	43.3	50	50/0.3												
														113.7	Boring Terminated at Elevation 113.7 ft IN WEATHERED ROCK (METAVOLCANIC SCHIST)	44.1

WBS 45983.1.1		TIP B-5947		COUNTY NASH		GEOLOGIST Oti, O. B.										
SITE DESCRIPTION BRIDGE NO. 91 OVER TAR RIVER ON NC 581							GROUND WTR (ft)									
BORING NO. EB2-D		STATION 25+51		OFFSET 51 ft RT		ALIGNMENT -LREV-										
COLLAR ELEV. 157.9 ft		TOTAL DEPTH 41.6 ft		NORTHING 777,382		EASTING 2,269,781										
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 02/02/2012			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 06/13/12		COMP. DATE 06/13/12		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						
160														157.9	GROUND SURFACE	0.0
														156.5	ROADWAY EMBANKMENT ASPHALT & ABC	1.4
155	154.5	3.4	2	2	3										TAN-BROWN, SILTY CLAY	
150	149.5	8.4	1	2	1											
145	144.5	13.4	1	1	2											
140	139.5	18.4	WOH	1	2									141.9	ALLUVIAL TAN-BROWN, SILTY CLAY	16.0
135	134.5	23.4	1	1	3									134.9	RESIDUAL TAN-BROWN, SAPROLITIC, SANDY SILT	23.0
130	129.5	28.4	1	2	9											
125	124.5	33.4	24	27	68											
120	119.5	38.4	27	23	77/0.2											
														116.3	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 116.3 ft ON CRYSTALLINE ROCK (METAVOLCANIC SCHIST)	41.6

NCDOT BORE DOUBLE B5947_GEO_BRDG_BH.GPJ NC_DOT.GDT 10/20/20

CORE PHOTOGRAPHS

B1-B
BOXES 1 & 2: 13.7 - 34.6 FEET



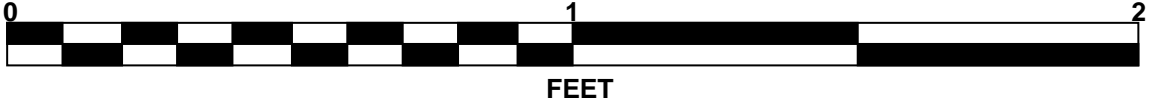
B1-B
BOXES 3 & 4: 34.6 - 51.6 FEET



CORE PHOTOGRAPHS

B2-A

BOXES 1 & 2: 48.5 - 61.5 FEET



SITE PHOTOGRAPH

Bridge No. 91 on -LREV- (NC 581) over Tar River



Looking Northwest towards End Bent 2