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67095

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

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STATE PROJECT REFERENCE NO. BR-0095

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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 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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P.M. WEAVER C. O'TOOLE C.R. PASTRANA TRIGON EXPLORATION

INVESTIGATED BY ESP Associates, Inc.

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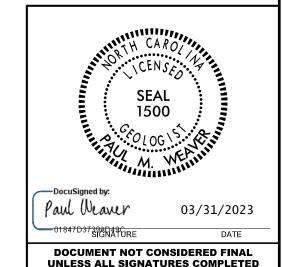
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PROJECT REFERENCE NO. SHEET NO.

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
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	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
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	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	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
CEMERAL CRAMIII AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN ICNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE,	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	NON-CRYSTALLINE NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL FINE TO COARSE GRAIN METAMORPHIC AND NOT FINE TO COARSE GRAIN METAMORPHIC FINE TO COARSE GRAIN FINE TO COARSE G	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 0000 d00000 coood	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 59 MX GRANULAR CLAY PEAT GRANULAR CLAY PEAT SOILS	GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
25 MX 25 MX 25 MX 35 MX 35 MX 35 MX 36 M 3	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN.	HORIZONTAL.
LL - - 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 1171 F OP	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP IW MX IW MX II MN II MN IW MX II MN II MN II MN MODERATE OPCOMIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE GROUND WATER	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX W W A MX 8 MX 12 MX 16 MX NU MX AMUUN 15 UF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TITES STUNE FRADS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) 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	PARENT MATERIAL.
AS SUBURAUE POUR	── SPRING OR SEEP	WITH FRESH ROCK.	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
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
DANCE OF CTANDARD DANCE OF UNICONETNED	TI SOCIETATE OUT OF THE OUT OUT OF THE OUT OF THE OUT OF THE OUT OF THE OUT OUT OF THE OUT	(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (IN-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) 25/825 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE < 4	T SPT C SLODE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY LOOSE 4 TO 10	SOIL SYMBOL OPT ONT TEST BORING INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	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
MATERIAL MEDIUM DENSE 10 10 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	TINHA VOHDAMI EMBHAKATENI T	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	── INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	A DIEZOMETER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	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
HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIF	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	LICED IN THE TOP 2 EEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (SE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE - COARSE ORG - ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	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.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC SEMISOLID: REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	
(PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: BL-4: N 1003061.2149, E 1729353.2186, -BL- STA. 20+23.34
- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 992.15 FEET
OM OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED Ø.16 - 1.5 FEET	NOTES:
PEGUIDEC ADDITIONAL MATER TO	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	F.I.A.D. FILLED IN AFTER DRILLING
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55 X 6° CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	THE THE PART OF TH
PLASTICITY	8*HOLLOW AUGERS	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X-N Q	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	X CASING W/ ADVANCER POST HOLE DIGGER	CDAING CAN BE CEDADATED FROM CAMPLE WITH CTEEL BRODE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG, CARB, COUNDING DOD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X MOBILE B-57 X CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
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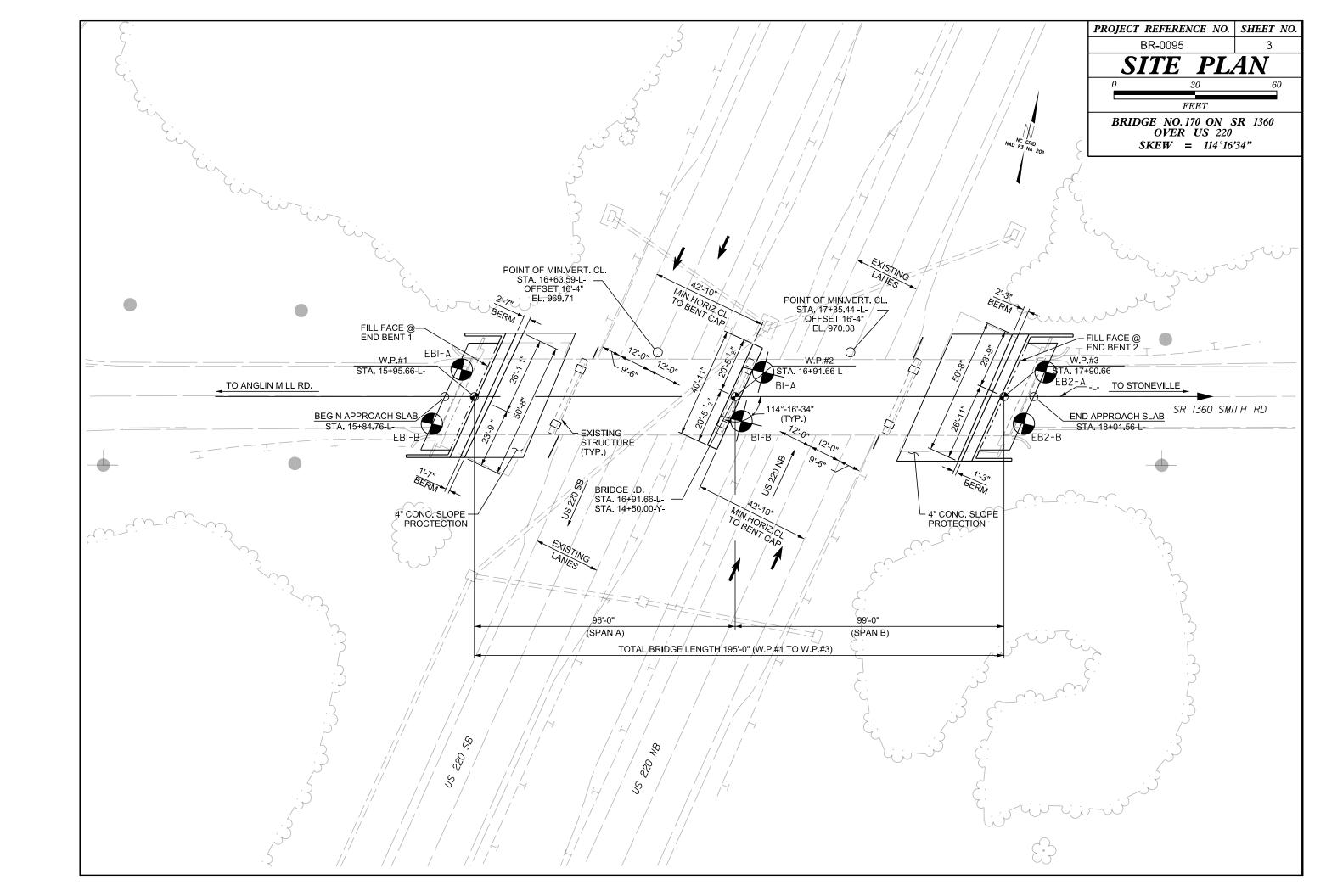
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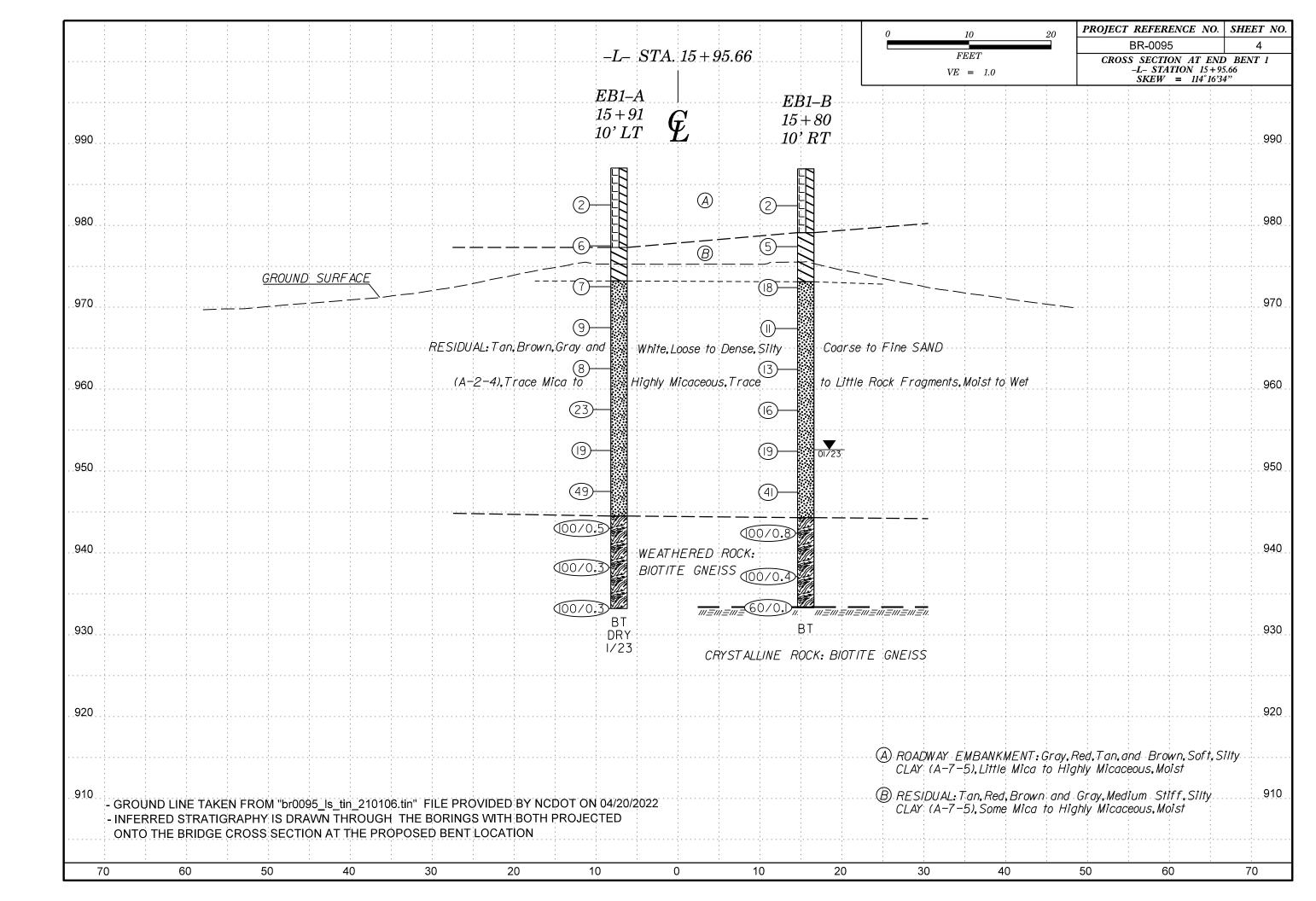
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

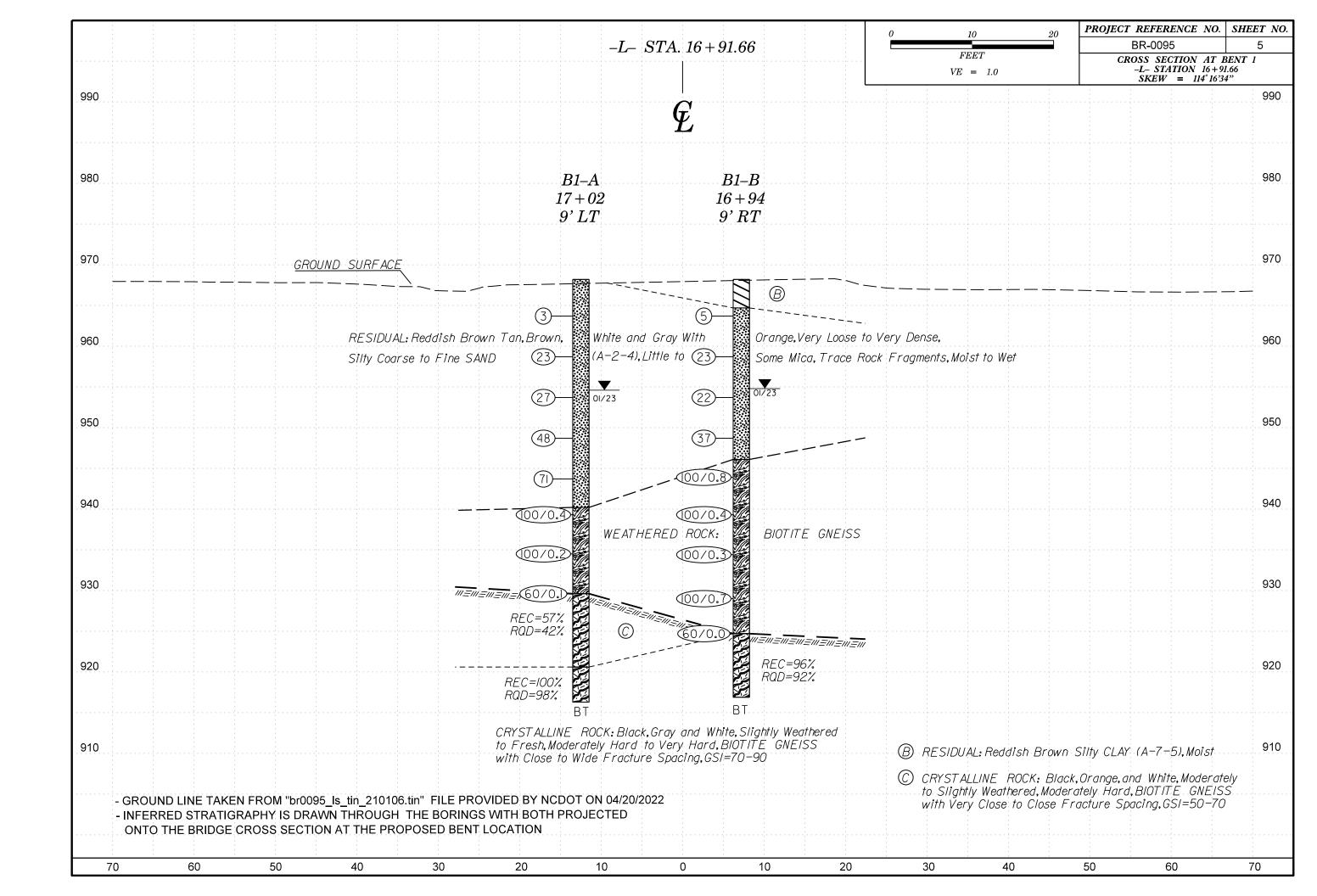
SUBSURFACE INVESTIGATION

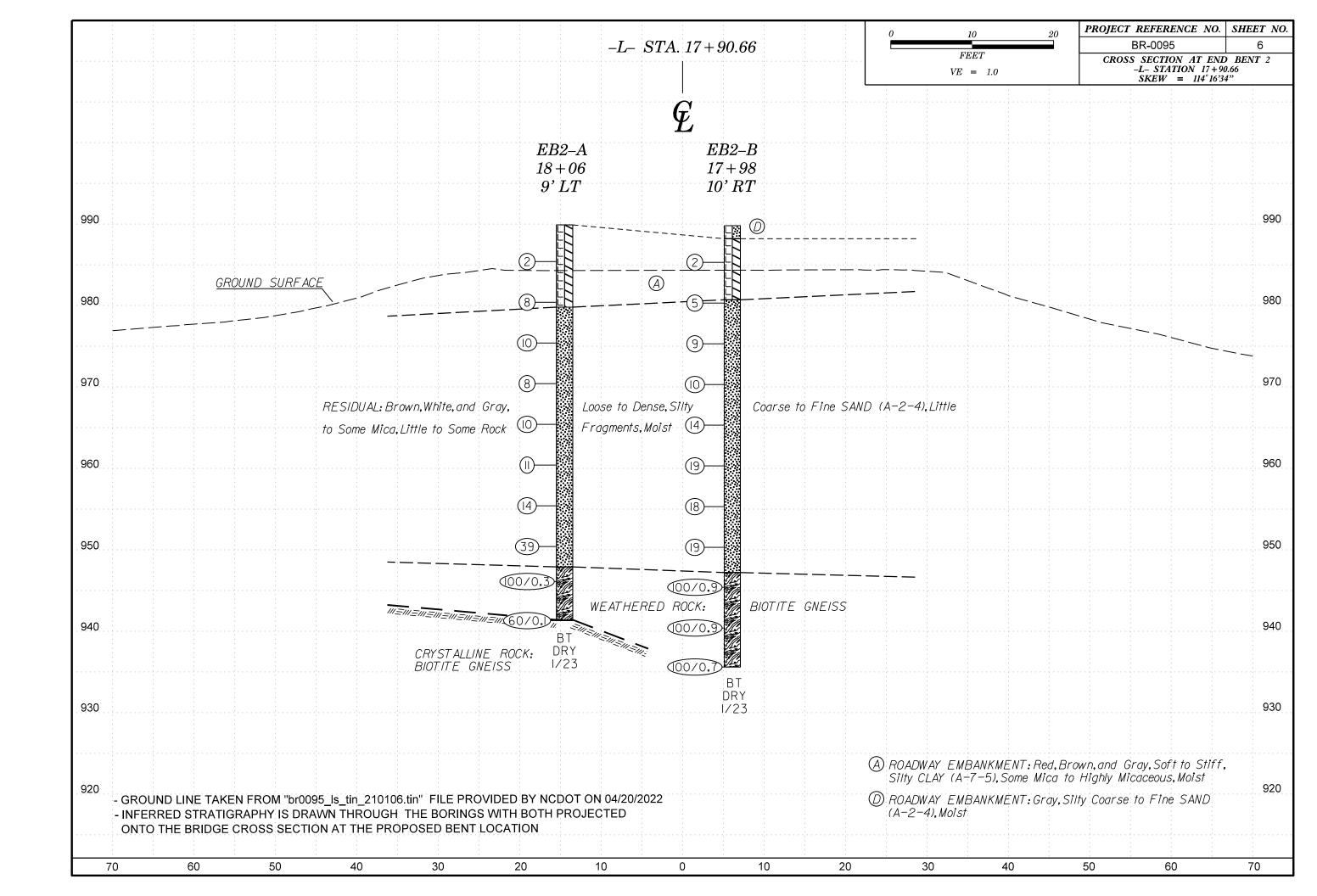
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES

FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS $\hbox{AASHTO LRFD Figure 10.4.6.4-2} \ - \ \hbox{Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)} \\$ AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000) GEOLOGICAL STRENGTH INDEX (GSI) FOR GSI FOR HETEROGENEOUS ROCK MASSES SUCH JOINTED ROCKS (Hoek and Marinos, 2000) AS FLYSCH (Marinos, P and Hoek E., 2000) From a description of the lithology, structure and ed surfē fillings POOR - Very smooth, slicken-l or highly weathered surfaces soft clay coatings or fillings From the lithology, structure and surface athered surf or fillings smooth, occasionally surfaces with compac fillings with angular and conditions of the discontinuities, estimate the average value of GSI. Do not try to surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not planes) weather position in the box that corresponds to the condition weathered of the discontinuities and estimate the average value ther of GSI from the contours. Do not attempt to be too eď, apply to structurally controlled failures. Where weak planar structural planes are precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the highly wea coatings ragments weather slightly present in an unfavorable orientation SURFACE CONDITIONS (DISCONTINUITIES) Hoek-Brown criterion does not apply to structurally with respect to the excavation face, CONDITIONS these will dominate the rock mass controlled failures. Where unfavourably oriented behaviour. The shear strength of surfaces continuous weak planar discontinuities are present, in rocks that are prone to deterioration slightly es POOR Slickensided, h with compact c these will dominate the behaviour of the rock mass. Rough, as a result of changes in moisture content will be reduced if water is GOOD -thered - Very : ensided ings or f The strength of some rock masses is reduced by the **G00D** rough, presence of groundwater and this can be allowed for present. When working with rocks in the by a slight shift to the right in the columns for fair, th, r fair to very poor categories, a shift to FAIR - weather poor and very poor conditions. Water pressure does the right may be made for wet conditions. GOOD Rough, s surface POOR -slicker coatin fragme VERY R sided with s VERY I VERY Very FAIR Smoot alter VERY Slick With not change the value of GSI and it is dealt with by Water pressure is dealt with by effective stress analysis. using effective stress analysis. COMPOSITION AND STRUCTURE STRUCTURE DECREASING SURFACE QUALITY INTACT OR MASSIVE - intact A. Thick bedded, very blocky sandstone 90 rock specimens or massive in 7Ó N/A N/A The effect of pelitic coatings on the bedding situ rock with few widely spaced planes is minimized by the confinement of PIECES discontinuities the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally 80 controlled instability. 60 BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets 50 B. Sand C. Sand-D. Siltstone F. Weak 60 or silty shale si/tstone stone with stone and or clayey С thin inter siltstone with sandshale with layers of in similar stone layers VERY BLOCKY - interlocked. amounts sands tone siltstone 40 partially disturbed mass with 50 multi-faceted angular blocks formed by 4 or more joint sets INTERL C. D. E. and G - may be more or F. Tectonically deformed, BLOCKY/DISTURBED/SEAMY -30 less folded than illustrated but intensively folded/faulted, folded with angular blocks this does not change the strength. sheared clayey shale or siltstone formed by many intersecting Tectonic deformation, faulting and with broken and deformed CREASING loss of continuity moves these discontinuity sets. Persistence sandstone layers forming an 30 categories to F and H. of bedding planes or schistosity almost chaotic structure 20 DISINTEGRATED - poorly interlocked, heavily broken rock mass H 20 G. Undisturbed silty H. Tectonically deformed silty with mixture of angular and or clayey shale with or clayey shale forming a 10 rounded rock pieces or without a few very chaotic structure with pockets thin sandstone layers of clay. Thin layers of sandstone are transformed nto small rock pieces. 10 LAMINATED/SHEARED - Lack of blockiness due to close spacing N/A N/A → Means deformation after tectonic disturbance of weak schistosity or shear planes









GEOTECHNICAL BORING REPORT

BORE LOG COUNTY ROCKINGHAM GEOLOGIST O'Toole, C. TIP BR-0095

SHEET 7

												<u>UG</u>			1				
WBS	67095	5 1 1			T	P BR-00)95		COUNT	Y RO	CKIN	GHAM			GEOLOGIST	O'Toole			
SITE	DESCR	RIPTION	Rep	lace E	Bridge	780170 c	n SR 13	360 (Smith Ro	oad) o	ver US	220			1			GROUND	WTR (f
BORI	NG NO	. EB1-	-A		S	TATION	15+91			OFF:	SET	10 ft L	Т		ALIGNMENT	-L-		0 HR.	Dr
COLL	AR ELI	EV. 98	37.0 ft		T	OTAL DE	PTH 53	3.8 ft		NOR	THING	1,00	02,959		EASTING 1,	729,005	2	4 HR.	Dr
DRILL	RIG/HA	MMER E	FF /DA	TE TE	RI8016	MOBILE B-	57 84% (05/09/	2022			DRILL	. METHO	D H.:	S. Augers		HAMMER	R TYPE A	utomatic
DRILI	LER E	step, E			S	TART DA	TE 01/0	05/23	3	CON	IP. DA	TE 01	1/06/23		SURFACE WA	ATER DE	PTH N/A		
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	JNT 0.5ft	0	BLO ¹	WS P	ER FOOT	75	100	SAMF NO.	17	L O G	SC ELEV. (ft)	IL AND RC	OCK DESCR	RIPTION	DEPTH
990	•	-													- 987.0		ID SURFAC		
985	983.5	3.5	WOH	1	1								М		_ Tan, F	Red, Brown,	EMBANKI , and Gray, Dighty Mic	Silty CLAY	
980	978.5 -	8.5	3	3	3	1							М		977.3				<u>.</u>
975	973.5	13.5	2	3	4	1							М		973.2	rown, and C Mic	SIDUAL Gray, Silty C caceous and White, S		y 1
970	968.5	18.5	3	4	5	.\f\(\frac{1}{2}\)							M	-	Fine SAN	ND, Trace N	Mica to High e Rock Frag	ly Micaceo	us,
965	963.5	23.5	3	3	5	. • • • • • • • • • • • • • • • • • • •								- -	-				
960	958.5	28.5	11	10	13								M	- - -	-				
955	953.5 ·	33.5					23						M	- -	-				
950	948.5	38.5	7	9	10		19						M	-	-				
945	943.5	43.5	7	19	30				149	+ -	==-		W		- 944.5	WEATH	ERED ROC	K	4
940	938.5	‡ ‡	100/0.5								100/0.5				-	BIOTI	TE GNEISS		
935	933.5	† - -	100/0.3								100/0.3				- 933,2				_
-	-	-	100/0.3				ı			- 1 ,	100/0.3			-	Boring		d at Elevatio k: BIOTITE		<u>5</u> n
	- - -	† † † †													-				
	- - - -	† - - - -													-				
	-	‡ + + +													_				

GEOTECHNICAL BORING REPORT **BORE LOG**

SHEET 7

										UKI					1	
WBS	67095	5.1.1			TI	P BR-0	0095		COUNT	Y RO	CKING	SHAM			GEOLOGIST O'Toole, C.	
SITE	DESCR	IPTION	I Rep	lace E	Bridge	780170	on SF	R 1360 (Smith Ro	oad) ov	er US	220				GROUND WTR (ft
BOR	ING NO	. EB1-	-B		S	TATION	15+	80		OFFS	ET 1	0 ft RT			ALIGNMENT -L-	0 HR. Dry
COLI	LAR ELI	EV. 98	36.9 ft		TO	OTAL DE	EPTH	53.6 ft		NORT	THING	1,002	,937		EASTING 1,728,999	24 HR. 34.3
DRILL	RIG/HA	MMER E	FF./DA	TE TE	RI8016	MOBILE E	3-57 84	4% 05/09	/2022	•		DRILL N	/IETHO	D H.S	S. Augers HAMN	IER TYPE Automatic
DRIL	LER E	step, E			S ⁻	TART DA	ATE	01/03/2	3	сомі	P. DA1	Γ E 01/0	03/23		SURFACE WATER DEPTH N	/A
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	UNT 0.5ft	0	25 1		PER FOOT	75	100	SAMP. NO.	MOI	L O G	SOIL AND ROCK DES	CRIPTION DEPTH (1
990																
985						1	-								986,9 GROUND SURF. ROADWAY EMBAN Gray and Reddish Brown, S	KMENT
	983.4	3.5	WOH	1	1	· · · · · · · · · • · · · ·							м		Mica	· • · · · · · · · · · · · · · · · · · ·
980	978.4	8.5	2	2	3	1	-	· · · · ·					М		979.1 RESIDUAL	
975						₹ 5		· · · · · · · · · · · · · · · · · · ·					IVI		Red and Brown, Silty CLA	
970	973.4	13.5	3	7	11		18						м		973.1 White, Brown, and Gray, Silts SAND, Little to Some Mica Fragments	y Coarse to Fine a, Trace Rock
	968.4	18.5	4	5	6	/. : / 11	1 .						м			
965	963.4	23.5	4	5	8		. 13				: :		м	_ -	-	
960	958.4	28.5	7	9	7	1	-								-	
955				9	,		16						M		-	
950	953.4	33.5	6	8	11		19							<u> </u>		
	948.4	38.5	11	17	24			41					w			
945	943.4	43.5	21	50	50/0.3			- -			00/0.8				-944.3 WEATHERED R BIOTITE GNEI:	
940	938.4	48.5	100/0.4				. ,	 								
935	933.4	52.5								1::	00/0.4				- 933.4	53.
		55.5	60/0.1						1	'	60/0.1 ⊕				933.3 / CRYSTALLINE R BIOTITE GNEI: Boring Terminated with	OCK 53. SS o Standard
		† - - - -													Penetration Test Refusal at ft in Crystalline Rock: BIO	
	- -														-	
	- -													[-	
		<u> </u>														

GEOTECHNICAL BORING REPORT

BORE LOG

SHEET 8

WBS 67095.1.1 TIP BR-0095									Y ROCKIN	GHAM			GEOLOGIST O'Toole, C.				
SITE	DESCR	RIPTION	I Rep	olace E	3ridge	78	80170 on SR 13	360 (Smith Ro	ad) over US	3 220			GROUND W				
BOR	ING NO	. B1-A	١		S	TΑ	ATION 17+02		OFFSET	9 ft LT			ALIGNMENT -L-	0 HR.	N/A		
COLI	LAR ELI	EV . 96	58.2 ft		T	ОТ	TAL DEPTH 51	1.9 ft	NORTHING	3 1,002	2,985		EASTING 1,729,113	24 HR.	13.6		
DRILL	. RIG/HA	MMER E	FF./DA	TE TI	RI8016	M	OBILE B-57 84%	05/09/2022		DRILL N	METHO	D Co	ore Boring HAM	MER TYPE	Automatic		
DRIL	LER E	step, E			S	TA	ART DATE 01/	05/23	COMP. DA	TE 01/	09/23		SURFACE WATER DEPTH	I/A			
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	UNT 0.5ft	$\ $	BLO 25	WS PER FOOT 50	75 100	SAMP.	MOI	L O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH				
	(1.7)					Ħ			1		WICI	Ĭ	LLLV. (II)		DEI III (II)		
970																	
		<u> </u>											968.2 GROUND SUR		0.0		
		Ŧ											RESIDUAI Reddish Brown, Tan, Bro	wn, White, ar	nd		
965	964.7 -	3.5	1	2	1	╁			1		10/		_ Gray, Silty Coarse to Fine Some Mica, Trace Roo	SAND, Little	to		
		Ŧ	'	-			3				W			J			
960	959.7 -	8.5											· -				
	959.7	T 0.5	7	10	13	1[23				М		-				
		Ŧ					: : : : : :										
955	954.7 -	13.5	6	11	16	╂	· · · · · · · · · · · · · · · · · · ·		 		V		<u>-</u>				
		Ŧ	"	''	10		27				W						
950	949.7 -	Ŧ ", "					: : : : : },										
	949.7 -	+ 18.5 +	17	22	26	11		48			М		- ·				
		‡															
945	944.7 -	23.5	24	35	36	╁							- -				
		‡	24	33	30				71		M						
940		‡											940.2		28.0		
	939.7 -	28.5	100/0.4	4		I			- 100/0.4				WEATHERED F BIOTITE GNE	OCK ISS			
		‡															
935	934.7 -	33.5	100/0						100/0.0				- -				
		‡	100/0.2	1					. 100/0.2				•				
930		‡															
	929.7 -	38.5	60/0.1	1		П			60/0.1				- 929.6 CRYSTALLINE		38.6		
		‡											Black, Orange, and White Slightly Weathered, Mo	derately Hard	,		
925	-	‡											BIOTITE GNEISS with Ver Fracture Space		ose		
		‡								RS-1	1		· ·				
920		‡											920.6		47.6		
525	-	‡				I							- CRYSTALLINE Black, Gray, and White	Very Slightly	,		
		‡											Weathered to Fresh, Mod 916.3 Very Hard, BIOTITE GNEI	SS with Close			
	-	‡											Moderately Close Frac Boring Terminated at Elev		t in		
		‡											Crystalline Rock: BIOT				
		‡															
		‡											-				
		‡															
	_	‡											-				
		‡															
		‡															
920	-	‡											-				
		‡															
	-	‡											-				
		‡															
		†										1 -					

GEOTECHNICAL BORING REPORT

SHEET 8

BORING NO. B1-A STATION 17+02 OFFSET 9 ft LT ALIGNMENT -L- 0 HR.										С	OF	RE L	OG						
BORING NO. B1-A STATION 17+02 OFFSET 9 ft LT ALIGNMENT -L- OHR.	NBS	67095	.1.1			TIP	BR-0	095	C	OUNT	YF	ROCKING	HAM		GEOLOGIST O'Toole, C.				
DRILLER Estep E. START DATE 01/05/23 DRILL METHOD Core Boring HAMMER TYPE Au	SITE	DESCRI	IPTION	l Rep	lace Brid	ge 780	0170 c	n SR 130	30 (Sm	nith Ro	oad)	over US	220				GROUND WTR (ft)		
DRILLER Estep, E. START DATE 01/05/23 COMP. DATE 01/09/23 SURFACE WATER DEPTH N/A	BORIN	NG NO.	B1-A			STAT	ΓΙΟΝ	17+02			OF	FSET 9	ft LT		ALIGNMENT -L-		0 HR.	N/A	
DRILLER Estep, E. START DATE 01/05/23 COMP. DATE 01/09/23 SURFACE WATER DEPTH N/A	COLL	AR ELE	V. 96	8.2 ft		TOTA	AL DE	PTH 51	.9 ft		NO	RTHING	1,002,985		EASTING 1,729,113		24 HR.	13.6	
CORE SIZE NQ TOTAL RUN 13.3 ft	ORILL	RIG/HAM	MER E	FF./DA	TE TRI80	16 MO	BILE B-	57 84% 0	5/09/20	/2022 DRILL METHOD (Core Boring HAMME			Automatic	
Select RUN City RUN City RUN REC REC ROD NO. ROD	DRILL	ER Es	step, E	•		STAF	RT DA	TE 01/0	5/23		СО	MP. DAT	E 01/09/23		SURFACE WATER DE	PTH N	/A		
929.6 929.6 38.6 3.3 0.26/0.3 (0.4) (0.0) (1.43/1.0 12% 0.0% (1.43/1.0 1.43/1.0 1.43/1.0 (1.43/1.0 1.43/1.0 1.43/1.0 (4.3) (CORE	SIZE	NQ			TOTA	AL RU	N 13.3 f			L.								
929.6 929.6 38.6 3.3 0.26/0.3 (0.4) (0.0) (1.43/1.0 12% 0% 1.43/1.0		ELEV			DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %		REC. (ft)	RQD (ft) %	0	ELEV. (ft)	DE	SCRIPTION AND REMAR	(S		DEPTH (
920 5.0 1:43/1.0 (4.7) (3.8) (76% RS-1	29.6														Begin Coring @ 38.6 ft				
920 930 94.04.10 3.08/1.0 3.08/1.0 3.40/1.0 916.3 51.9 916.3 51.9 916.3 51.9 916.3 51.9 916.3 51.9 916.3 51.9 916.3 51.9 916.3 51.9 916.3 51.9 916.3 51.9 916.3 61.0 916.3 61		926.3	- - 41.9 - - -	5.0	1:43/1.0 1:37/1.0 1:36/1.0 1:47/1.0 3:01/1.0	(4.3) 86%	(3.8) 76%	RS-1		(3.8) 42%		- - - - -	Hard, BIOTITE	E GN Folia	/hite, Moderately to Slightly IEISS with Very Close to Clo ation at 10 degrees to 30 de s to 45 degrees with moder	se Fracti arees	ure Spacing	1	
Foliation at 10 degrees to 30 degrees 4 fractures at 20 degrees to 30 degrees parallel to foliation GSI = 70-90 Boring Terminated at Elevation 916.3 ft in Crystalline Rock: BIOTITE	920		- -	5.0	2:24/1.0 3:08/1.0 3:40/1.0	94%				(4.2) 98%		- - -	Black, Gray, and W to Very Hard, BIO	Vhite OTITE	e, Very Slightly Weathered to E GNEISS with Close to Mo	o Fresh, M	Moderately l Close Fract	Hard ure	
		916.3	- 51.9 - - - - -		3:52/1.0							- 916.3 - - - - -	4 fractures	Folia s at 2	Spacing ation at 10 degrees to 30 de 20 degrees to 30 degrees p GSI = 70-90 at Elevation 916.3 ft in Crys	egrees arallel to t	foliation	51	
											-								

CORE PHOTOGRAPHS

B1-A

BOX 1: 38.6 FEET - 46.9 FEET



BOX 2: 46.9 FEET - 51.9 FEET





GEOTECHNICAL BORING REPORT

SHEET 10 **BORE LOG**

							<u>D</u>	OKE L	<u> </u>				
WBS	67095	5.1.1			TI	IP BR-0095	COUNT	Y ROCKING	SHAM			GEOLOGIST O'Toole, C.	
SITE	DESCR	IPTION	I Rep	olace B	Bridge	780170 on SR 1360	(Smith Ro	ad) over US	220				GROUND WTR (ff
30RI	NG NO.	B1-E	3		s	TATION 16+94		OFFSET 9	ft RT			ALIGNMENT -L-	0 HR. N/
COLL	AR ELE	EV . 96	38 2 ft		T	OTAL DEPTH 51.3	ft	NORTHING		966		EASTING 1,729,109	24 HR. 13.
						MOBILE B-57 84% 05/0) (c	1	MER TYPE Automatic
				(IL II)				COMP DAT			- 00		
	DRIVE		T	2/4/ 00/		TART DATE 01/09/		COMP. DAT		10/23	L	SURFACE WATER DEPTH N	//A
(ft)	ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0 25	PER FOOT 50	75 100	SAMP. NO.	моі	O G	SOIL AND ROCK DES	CRIPTION DEPTH
70	-	-									-	_	
	-					 	 	 			1	968.2 GROUND SURF	
965		F										Reddish Brown, Silt	
	964.7 -	3.5	2	2	3	5				м		_964.7 Brown and White with Oran	
	-	‡										to Fine SAND, Some Mica Fragments	a, Trace Rock
960	- 959.7 –	- 8.5									₩Ł	_	
Ī	-	- 0.5	8	9	14	23				м			
	-	ļ				:::::					ļ.		
955	954.7 –	13.5]						· -	
	-	<u> </u>	10	11	11	222				w			
	=	-											
50	949.7 -	18.5	1.5	1.7		1		1			-	-	
	-	<u> </u>	15	17	20	37.				M			
	-	t				:::: ::i <u>:</u> :		<u> </u>			∷∷±	946.1	2
945	944.7 –	23.5	44	66/0.3			ļ	+				_ WEATHERED R BIOTITE GNEI	
	-	ļ	44	00/0.3				100/0.8					
	-	ţ											
940	939.7 -	28.5	100/0.4	1		l 	<u> </u>	100/0.4				_	
	-	F	100/0.					100/0.4					
25	-	ļ											
35	934.7 –	33.5	100/0.3	3			 	- 100/0.3				-	
	-	<u> </u>									//		
30	-	ļ											
30	929.7 –	38.5	40	60/0.2			 	100/0.7				-	
	-	-						100/0.7					
25	-	ļ										· ·	
23	924.7 –	43.5	60/0.0				<u> </u>	60/0.0				= 924.7 CRYSTALLINE F	ROCK
	-	Ė										Black, Gray, and White, Slig to Fresh, Hard to Very Ha	htly Weathered
20	-	F							RS-2	1		GNEISS with Close to W	
	-	ļ										Spacing	
	-											916.9	5
Ī	-										F	Boring Terminated at Eleva Crystalline Rock: BIOTI	ation 916.9 ft in
	-	Ē									F	Stystem of took, BIOTI	2.12.00
	-	ļ											
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GEOTECHNICAL BORING REPORT CORE LOG

SHEET 10

											RE LUG	1			
WBS	67095.	.1.1			TIP	BR-0	095	C	TNUC	YF	ROCKINGHAM	GEOLOGIST O'Toole	, C.		
SITE	DESCRI	PTION	I Rep	lace Brid	ge 780	0170 c	n SR 136	60 (Sm	ith Ro	oad)	over US 220		GROUN	D WTR (ft)	
BOR	ING NO.	B1-B	3		STA	TION	16+94			OF	FSET 9 ft RT	ALIGNMENT -L-		0 HR.	N/A
COL	LAR ELE	V. 96	88.2 ft		TOT	TOTAL DEPTH 51.3 ft NORTHING 1,002,966					RTHING 1,002,966	EASTING 1,729,109		24 HR.	13.3
DRILL	RIG/HAN	MER E	FF./DA	TE TRI80	16 MO	BILE B-	57 84% 0	5/09/20:	22		DRILL METHOD Co	e Boring	HAMMI	ER TYPE	Automatic
DRILLER Estep, E. START DATE 01/09/23										CC	MP. DATE 01/10/23	SURFACE WATER DE	PTH N/	A	
COR	E SIZE	NQ			TOTA	AL RU	N 7.8 ft								
ELEV	RUN	DEPTH	RUN	DRILL	REC.	JN RQD	SAMP.	STR REC.	ATA RQD	Ļ			_		
(ft)	ELEV (ft)	(ft)	(ft)	RATE (Min/ft)	(ft) %	(ft)	NO.	(ft) %	(ft) %	O G	ELEV. (ft)	ESCRIPTION AND REMARK	(S		DEPTH (ft)
924.7					,,			,,				Begin Coring @ 43.5 ft			
	924.7	43.5	2.8	4:21/0.8 4:49/1.0	(2.5) 89%	(2.5) 89%		(7.5) 96%	(7.2) 92%	R	- 924.7	CRYSTALLINE ROCK nite, Slightly Weathered to Fr		to Very He	43.5
	921.9	46.3	5.0	4:14/1.0 4:15/1.0	(5.0)	(4.7)	RS-2	30%	32 /0		- BIOTITE G	NEISS with Close to Wide Fr	acture Spa	acing	iiu,
920	∤ ∓	-	0.0	3:22/1.0 3:38/1.0	100%						- Fo 4 fractures at 1	liation at 10 degrees to 30 de 0 degrees to 20 degrees with	grees I light iron	staining	
	916.9	51.3		3:06/1.0							- - _ 916.9	GSI = 70-90			51.3
	910.9	<u> </u>		2:18/1.0						رزاه		at Elevation 916.9 ft in Crys	talline Roc	k: BIOTIT	= 51.3
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CORE PHOTOGRAPHS

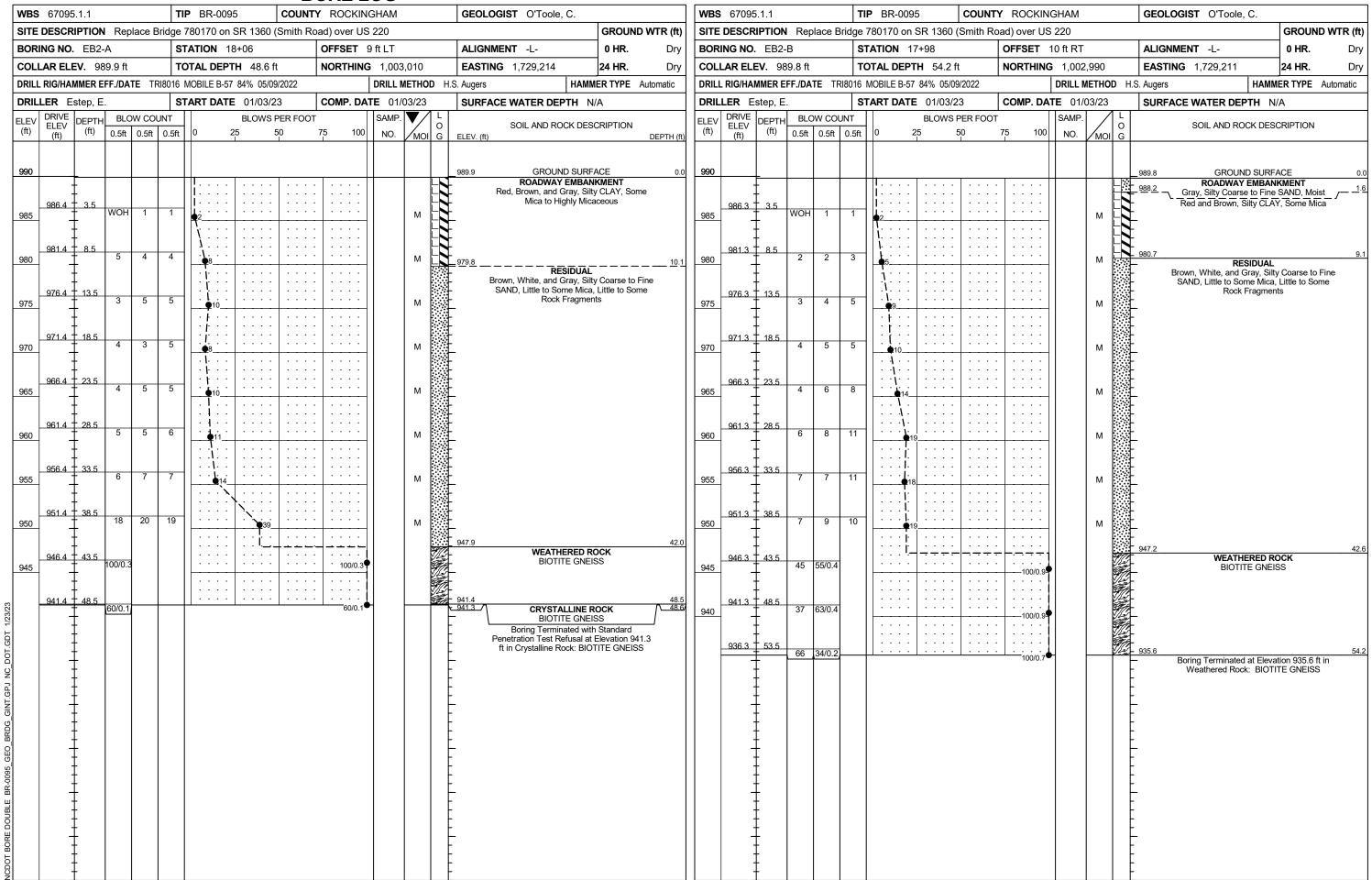
B1-B

BOX 1: 43.5 FEET - 51.3 FEET





GEOTECHNICAL BORING REPORT BORE LOG





UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

 Client:
 ESP Associates
 Boring No.:
 B1-A

 Client Project:
 IS14.329.000
 Depth (ft):
 44.3-44.7

 Project No.:
 R-2023-035-001
 Sample ID:
 RS-1

 Lab ID No.:
 R-2023-035-001-001
 Moisture Condition: As received

Specimen Weight (g): 585.16

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):
Reading 1:	4.52	Reading 1: 1.98
Reading 2:	4.52	Reading 2: 1.98
Reading 3:	4.53	Average: 1.98
Average:	4.53	Area (in ²): 3.08
		L/D: 2.28
MOISTURE CONTENT		
Tare Number:	SS-3	Total Load (lb): 4,410
Wt. of Tare & Wet Sample (g):	683.60	Uniaxial Compressive Strength (psi): 1,430
Wt. of Tare & Dry Sample (g):	682.06	
Weight of Tare (g):	100.66	Fracture Type: Shear
Weight of Wet Sample (g):	582.94	
Sample Volume (cm ³):	228.70	Rate of Loading (lb/sec): 96
Moisture Content (%):	0.26	Time to Break (min:sec): 0:45.81
Unit Wet Weight (g/cm ³):	2.559	Deviation From Straightness ² : Pass
Unit Wet Weight (pcf):	159.7	
Unit Dry Weight (g/cm³):	2.552	AXIAL: Pass TOP: Pass BOTTOM: Pass
Unit Dry Weight (pcf):	159.2	

<u>Physical Description:</u> Beige Gneiss

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:

R176 Compression Machine,

R525 Digital Calipers,

R148 Feeler Gauge, R419 Scale

R512 Rock Saw

Tested Bv:

R148 Straight Edge

R582 V-Block, R585 Dial Gauge



DO Date: 1/24/23 Checked By: GEM Date: 1/26/23

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page 1 of 1 DCN: CT45A; Revision No.: 1e3 Revision Date: 4/5/17





UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

 Client:
 ESP Associates
 Boring No.:
 B1-B

 Client Project:
 IS14.329.000
 Depth (ft):
 45.8-46.2

 Project No.:
 R-2023-035-001
 Sample ID:
 RS-2

 Lab ID No.:
 R-2023-035-001-002
 Moisture Condition: As received

Specimen Weight (g): 611.47

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	4.51	Reading 1:	1.99
Reading 2:	4.50	Reading 2:	1.99
Reading 3:	4.51	Average:	1.99
Average:	4.50	Area (in ²):	3.10
_		L/D:	2.27
MOISTURE CONTENT			
Tare Number:	SS-5	Total Load (lb):	23,770
Wt. of Tare & Wet Sample (g):	710.85	Uniaxial Compressive Strength (psi):	7,680
Wt. of Tare & Dry Sample (g):	710.31		
Weight of Tare (g):	99.79	Fracture Type:	Shear
Weight of Wet Sample (g):	611.06		
Sample Volume (cm ³):	228.45	Rate of Loading (lb/sec):	185
Moisture Content (%):	0.09	Time to Break (min:sec):	2:08.78
Unit Wet Weight (g/cm³):	2.677	Deviation From Straightness ² :	Pass
Unit Wet Weight (pcf):	167.0		
Unit Dry Weight (g/cm³):	2.674	AXIAL: Pass TOP: Pass	BOTTOM: Pass
Unit Dry Weight (pcf):	166.9		

Physical Description: Light Gray Gneiss

Notes

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:

R176 Compression Machine,

R525 Digital Calipers,

R148 Feeler Gauge, R419 Scale

R512 Rock Saw

R148 Straight Edge

R582 V-Block, R585 Dial Gauge



Tested By: DO Date: 1/24/23

SITE PHOTOGRAPHS

Bridge No. 780170 on SR 1360 (Smith Road) Over US 220







