

REFERENCE: BR-0140

PROJECT: 67140

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY DAVIDSON

PROJECT DESCRIPTION REPLACE BRIDGES 280087 & 280089 ON I-85 BUS N, US 29, US 70 OVER WSSB RAILROAD

SITE DESCRIPTION DUAL SRUCTURES AT -L- STATION 39 + 70

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0140	1	

CAUTION NOTICE

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 - 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.

PERSONNEL

P.M. WEAVER

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F & R

INVESTIGATED BY ESP Associates, Inc.

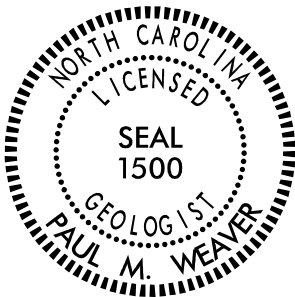
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SUBMITTED BY ESP Associates, Inc.

DATE September 2023

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01847D3739AD49C SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
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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

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													
GROUP CLASS.	A-1		A-3		A-2		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	50 MX		30 MX		50 MX		51 MN		35 MX		35 MX		35 MX		35 MX		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		41 MN		40 MX		41 MN		41 MN		41 MN		40 MX		41 MN		41 MN	
GROUP INDEX	0		0		0		0		4 MX		8 MX		12 MX		16 MX		NO MX		NO MX		NO MX		NO MX		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS		HIGHLY ORGANIC SOILS	
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. OF GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS		CLAYEY SOILS	
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD		FAIR TO POOR		FAIR TO POOR		POOR		UNSATURABLE		UNSATURABLE		UNSATURABLE		UNSATURABLE		UNSATURABLE		UNSATURABLE		UNSATURABLE		UNSATURABLE		UNSATURABLE		UNSATURABLE		UNSATURABLE	

PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30

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
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY

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
 SHALLOW 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
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 - TRI-CONE 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 _____
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)
 CRYSTALLINE ROCK (CR)
 NON-CRYSTALLINE ROCK (NCR)
 COASTAL PLAIN SEDIMENTARY ROCK (CP)

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

WEATHERING

FRESH
VERY SLIGHT (V SLI.)
SLIGHT (SLI.)
MODERATE (MOD.)
MODERATELY SEVERE (MOD. SEV.)
SEVERE (SEV.)
VERY SEVERE (V SEV.)
COMPLETE

ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
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.
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.
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.
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*
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*
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*
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
HARD
MODERATELY HARD
MEDIUM HARD
SOFT
VERY SOFT

CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
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.
CAN BE GROOVED 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.
CAN BE GROVED 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.
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
VERY WIDE
WIDE
MODERATELY CLOSE
CLOSE
VERY CLOSE

SPACING
MORE THAN 10 FEET
3 TO 10 FEET
1 TO 3 FEET
0.16 TO 1 FOOT
LESS THAN 0.16 FEET

BEDDING

TERM
VERY THICKLY BEDDED
THICKLY BEDDED
THINLY BEDDED
VERY THINLY BEDDED
THICKLY LAMINATED
THINLY LAMINATED

THICKNESS
4 FEET
1.5 - 4 FEET
0.16 - 1.5 FEET
0.03 - 0.16 FEET
0.008 - 0.03 FEET
< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE
MODERATELY INDURATED
INDURATED
EXTREMELY INDURATED

RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

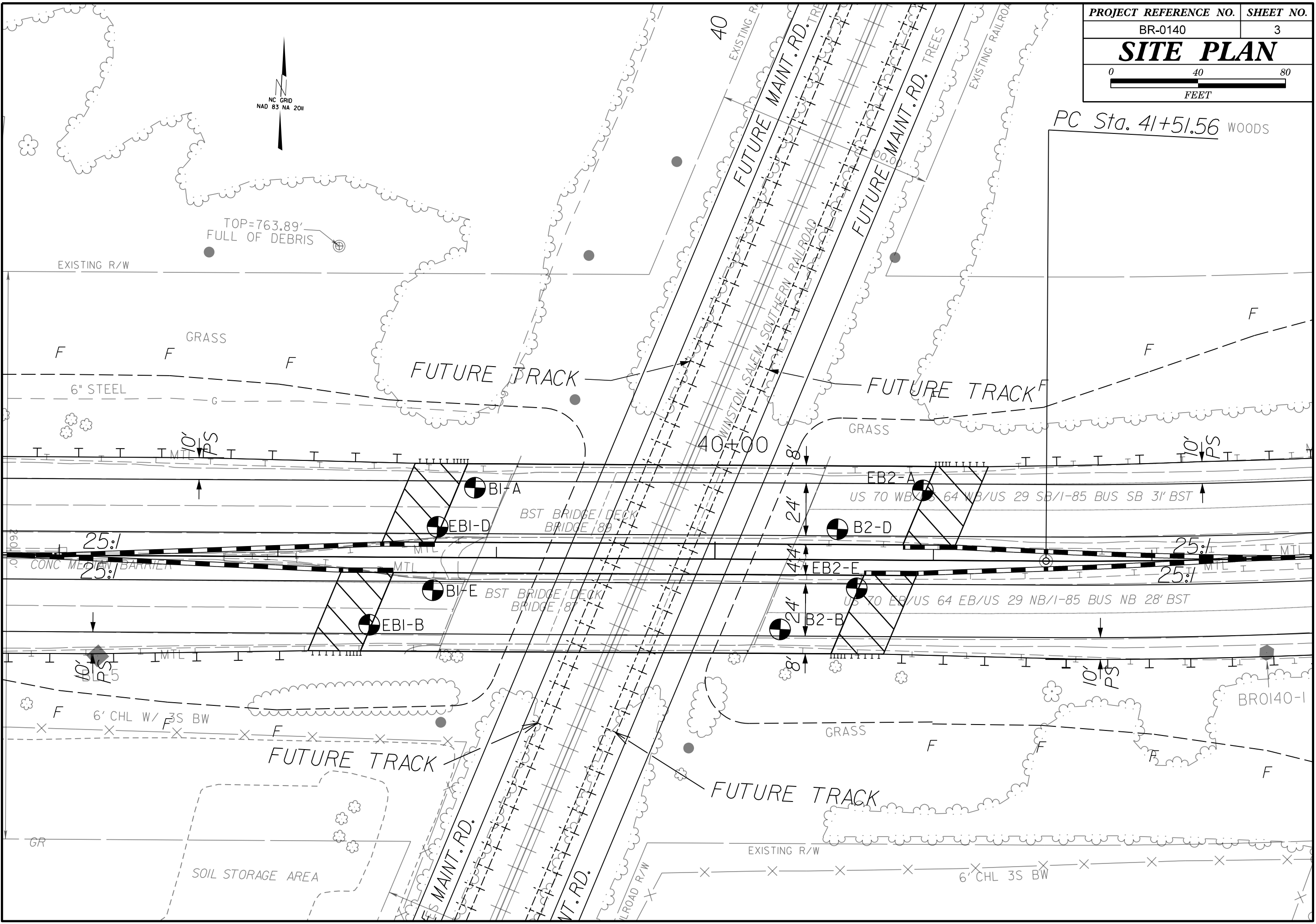
ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.
ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION 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 DISLOOGED 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 (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
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: BR0140-I, N760824.8838, E 1626190.5472

ELEVATION: 778.11 FEET

NOTES:
F.I.A.D = FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67140.1.1			TIP BR-0140			COUNTY DAVIDSON			GEOLOGIST Long, B.						
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad											GROUND WTR (ft)				
BORING NO. EB1-D			STATION 38+73			OFFSET 14 ft LT			ALIGNMENT -L-			0 HR. 51.0			
COLLAR ELEV. 781.0 ft			TOTAL DEPTH 74.8 ft			NORTHING 760,862			EASTING 1,625,809			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER Davis, S.			START DATE 08/07/23			COMP. DATE 08/07/23			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
785															
780														781.0	0.0
														GROUND SURFACE	
														ROADWAY EMBANKMENT	
														Red, Brown, and Gray with Black, Silty CLAY, Trace Organics, Trace Mica	
775	777.5	3.5	3	2	3	5						M			
770	772.5	8.5	2	3	4	7						M		771.3	9.7
														RESIDUAL	
														Gray, Brown, Orange, Red, Tan, and White, Coarse to Fine Sandy SILT, Trace Mica	
765	767.5	13.5	3	4	5	9						M			
760	762.5	18.5	2	3	4	7						M			
755	757.5	23.5	2	3	5	8						M			
750	752.5	28.5	3	3	5	8						M			
745	747.5	33.5	3	4	6	10						M			
740	742.5	38.5	3	4	6	10						M			
735	737.5	43.5	3	6	9	15						M			
730	732.5	48.5	5	9	13	22						M			
725	727.5	53.5	7	11	15	26						M		724.7	56.3
														WEATHERED ROCK	
														Greenish Gray, METAMORPHOSED MAFIC ROCK	
720	722.5	58.5	37	63/0.4						100/0.9				718.0	63.0
														RESIDUAL	
														White and Brown, Silty Coarse to Fine SAND	
715	717.5	63.5	17	25	45	70								713.7	67.3
														WEATHERED ROCK	
														Brown and Gray, METAMORPHOSED MAFIC ROCK	
710	712.5	68.5	53	47/0.2						100/0.7				706.2	74.8
														Boring Terminated at Elevation 706.2 ft in	
	707.5	73.5	42	49	51/0.3					100/0.8					

NCDOT BORE DOUBLE BR0140_GEO BRDG_GINT.GPJ NC_DOT.GDT 8/30/23

WBS 67140.1.1			TIP BR-0140			COUNTY DAVIDSON			GEOLOGIST Long, B.					
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad									GROUND WTR (ft)					
BORING NO. EB1-D			STATION 38+73			OFFSET 14 ft LT			ALIGNMENT -L-			0 HR. 51.0		
COLLAR ELEV. 781.0 ft			TOTAL DEPTH 74.8 ft			NORTHING 760,862			EASTING 1,625,809			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER Davis, S.			START DATE 08/07/23			COMP. DATE 08/07/23			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
705						Match Line								Weathered Rock: METAMORPHOSED MAFIC ROCK

NCDOT BORE DOUBLE BR0140_GEO_BRDG_GINT.GPJ NC_DOT.GDT 8/30/23

WBS 67140.1.1		TIP BR-0140		COUNTY DAVIDSON		GEOLOGIST Gonzales, P.G.							
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad							GROUND WTR (ft)						
BORING NO. EB1-B		STATION 38+42		OFFSET 31 ft RT		ALIGNMENT -L-		0 HR. 52.6					
COLLAR ELEV. 780.7 ft		TOTAL DEPTH 84.2 ft		NORTHING 760,816		EASTING 1,625,780		24 HR. FIAD					
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER Davis, S.		START DATE 08/15/23		COMP. DATE 08/15/23		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			
705						Match Line							
	702.2	78.5		85	15/0.1	100/0.6							 WEATHERED ROCK Orange, Brown, and White, GRANITIC ROCK (continued)
700	697.2	83.5		55	45/0.2	100/0.7							
													696.5 84.2
Boring Terminated at Elevation 696.5 ft in Weathered Rock: GRANITIC ROCK													

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67140.1.1				TIP BR-0140				COUNTY DAVIDSON				GEOLOGIST Long, B.					
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad												GROUND WTR (ft)					
BORING NO. B1-A				STATION 38+90				OFFSET 32 ft LT				ALIGNMENT -L-				0 HR. 52.2	
COLLAR ELEV. 781.2 ft				TOTAL DEPTH 93.7 ft				NORTHING 760,881				EASTING 1,625,825				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic					
DRILLER Davis, S.				START DATE 08/09/23				COMP. DATE 08/10/23				SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
785																	
780															781.2	GROUND SURFACE 0.0	
	777.7	3.5	1	2	2												
775																	
	772.7	8.5	4	5	8										774.4	ROADWAY EMBANKMENT 6.8	
770																	
	767.7	13.5	2	4	5												
765																	
	762.7	18.5	1	2	3												
760																	
	757.7	23.5	1	2	3												
755																	
	752.7	28.5	2	3	4												
750																	
	747.7	33.5	2	3	5												
745																	
	742.7	38.5	3	3	6												
740																	
	737.7	43.5	3	3	6												
735																	
	732.7	48.5	6	9	11												
730																	
	727.7	53.5	6	12	18												
725																	
	722.7	58.5	12	18	28												
720																	
	717.7	63.5	33	67/0.3											718.0	WEATHERED ROCK 63.2	
715																	
	712.7	68.5	42	58/0.3													
710																	
	707.7	73.5	21	36	64/0.4												
705																	

WBS 67140.1.1				TIP BR-0140		COUNTY DAVIDSON		GEOLOGIST Long, B.					
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad								GROUND WTR (ft)					
BORING NO. B1-A		STATION 38+90		OFFSET 32 ft LT		ALIGNMENT -L-		0 HR. 52.2					
COLLAR ELEV. 781.2 ft		TOTAL DEPTH 93.7 ft		NORTHING 760,881		EASTING 1,625,825		24 HR. FIAD					
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER Davis, S.		START DATE 08/09/23		COMP. DATE 08/10/23		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			
705						Match Line							
	702.7	78.5											
			30	70/0.4						100/0.9			
700													
	697.7	83.5											
			100/0.3							100/0.3			
695													
	692.7	88.5											
			60/0.1							60/0.1			
690													
	687.7	93.5											
			100/0.2							100/0.2			

NCDOT BORE DOUBLE BR0140 GEO BRDG GINT.GPJ NC DOT.GDT 9/13/23

NC DOT BORE DOUBLE BR0140 GEO BRDG GINT.GPJ NC_DOT.GDT 9/13/23

WBS 67140.1.1		TIP BR-0140		COUNTY DAVIDSON		GEOLOGIST Weaver, P. & Gonzales, P.B.								
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad							GROUND WTR (ft)							
BORING NO. B1-E		STATION 38+71		OFFSET 15 ft RT		ALIGNMENT -L-		0 HR. 70.3						
COLLAR ELEV. 781.0 ft		TOTAL DEPTH 103.8 ft		NORTHING 760,833		EASTING 1,625,808		24 HR. FIAD						
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER Davis, S.		START DATE 08/11/23		COMP. DATE 08/14/23		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
705						Match Line								
	702.5	78.5	35	63	37/0.2	</								

NCDOT BORE DOUBLE BR0140_GEO_BRDG_GINT.GPJ NC_DOT.GDT 8/30/23

[illegible]

NCDOT BORE DOUBLE BR0140_GEO_BRDG_GINT.GPJ NC_DOT.GDT 8/30/23

[illegible]

NC DOT BORE DOUBLE BR0140 GEO BRDG GINT.GPJ NC_DOT_GDT 8/30/23

WBS 67140.1.1			TIP BR-0140			COUNTY DAVIDSON			GEOLOGIST Long, B.					
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad									GROUND WTR (ft)					
BORING NO. EB2-A			STATION 40+95			OFFSET 32 ft LT			ALIGNMENT -L-			0 HR. 57.7		
COLLAR ELEV. 780.4 ft			TOTAL DEPTH 83.6 ft			NORTHING 760,891			EASTING 1,626,029			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER Davis, S.			START DATE 08/09/23			COMP. DATE 08/09/23			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
705						Match Line								
	701.9	78.5	100/0.4			100/0.4								WEATHERED ROCK White and Brown, GRANITIC ROCK (continued)
700														
	696.9	83.5	60/0.1			60/0.1								CRYSTALLINE ROCK White and Brown, GRANITIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 696.8 ft in Crystalline Rock: GRANITIC ROCK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67140.1.1			TIP BR-0140			COUNTY DAVIDSON			GEOLOGIST Weaver, P.							
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad										GROUND WTR (ft)						
BORING NO. EB2-E			STATION 40+65			OFFSET 13 ft RT			ALIGNMENT -L-			0 HR. 50.3				
COLLAR ELEV. 780.9 ft			TOTAL DEPTH 83.8 ft			NORTHING 760,844			EASTING 1,626,002			24 HR. FIAD				
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER Davis, S.			START DATE 08/11/23			COMP. DATE 08/11/23			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
785																
780														780.9		GROUND SURFACE 0.0
775	777.4	3.5	3	2	3	5							M			
770	772.4	8.5	3	5	8	13							M		772.7	8.2
765	767.4	13.5	3	4	6	10							M		768.5	12.4
760	762.4	18.5	2	3	3	6							M		762.8	18.1
755	757.4	23.5	2	3	4	7							M			
750	752.4	28.5	2	3	4	7							M			
745	747.4	33.5	3	3	5	8							M			
740	742.4	38.5	2	3	3	6							M			
735	737.4	43.5	3	5	8	13							M		738.6	42.3
730	732.4	48.5	7	8	6	14							M			
725	727.4	53.5	6	10	15	25							M		728.3	52.6
720	722.4	58.5	8	19	34	53							M			
715	717.4	63.5	13	23	41	64							M			
710	712.4	68.5	21	32	48	80							M			
705	707.4	73.5	9	19	26	45							M			

WBS 67140.1.1			TIP BR-0140			COUNTY DAVIDSON			GEOLOGIST Weaver, P.					
SITE DESCRIPTION Replace Bridges 280087 and 280089 on I-85 BUS/US 29/US 70 over WSSB Railroad									GROUND WTR (ft)					
BORING NO. EB2-E			STATION 40+65			OFFSET 13 ft RT			ALIGNMENT -L-			0 HR. 50.3		
COLLAR ELEV. 780.9 ft			TOTAL DEPTH 83.8 ft			NORTHING 760,844			EASTING 1,626,002			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 07/28/2023						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER Davis, S.			START DATE 08/11/23			COMP. DATE 08/11/23			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
705						Match Line								
	702.4	78.5												
700			32	68/0.3						100/0.8				702.6 Black, Brown, and Tan with White, Coarse to Fine Sandy SILT, Trace Mica (continued) 78.3
	697.4	83.5												
			100/0.3							100/0.3				

NCDOT BORE DOUBLE BR0140_GEO BRDG_GINT.GPJ NC_DOT.GDT 9/13/23

SITE PHOTOGRAPHS
BR-0140 (Dual Bridges over RR on US 29-70 in Lexington)

Looking Left to Right Along Existing EB1



Looking Left to Right Along Existing EB2



Looking Upstation From Downstation of End Bent-1



Looking Downstation from Upstation of EB2

