

## SUBSURFACE INVESTIGATION AND BRIDGE FOUNDATION DESIGN RECOMMENDATIONS

WBS Element No. 50000.1.STR03T1B TIP No. P-5208A  
Haydock to Junker (H2J) Double Track Project  
Cabarrus County, North Carolina  
F&R PROJECT NO. 63P-0090

Prepared for:

HDR Engineering  
440 S. Church Street – Suite 1000  
Charlotte, North Carolina 28202

February 1, 2013

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GEOTECHNICAL ENGINEERING UNIT  
 SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION	
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T208, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRN, SATY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, ROCKY PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.	
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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	
SOIL LEGEND AND AASHTO CLASSIFICATION			
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIALS
GROUP CLASS.	A-1, A-1-b, A-2, A-2-4, A-2-5, A-2-6, A-2-7	A-4, A-5, A-6, A-7, A-7-5, A-7-6	A-1, A-2, A-3, A-4, A-5, A-6, A-7
SYMBOL	[Symbol]	[Symbol]	[Symbol]
% PASSING	50 HX, 30 HX, 50 HX, 51 HX, 15 HX, 25 HX, 10 HX	40 HX, 41 HX, 10 HX, 11 HX, 10 HX, 10 HX, 11 HX, 10 HX, 10 HX, 11 HX, 10 HX, 10 HX, 11 HX, 10 HX, 10 HX, 11 HX	GRANULAR SOILS, SILT-CLAY SOILS, MUCK, FEAT
LIQUID LIMIT	6 HX	NP, 0, 4 HX, 8 HX, 12 HX, 15 HX, 16 HX	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER, HIGHLY ORGANIC SOILS
PLASTIC INDEX	0	0, 4 HX, 8 HX, 12 HX, 15 HX, 16 HX	
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND, FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS, CLAYEY SOILS	
BEARING AS A 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/F <sup>2</sup> )
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 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4
TEXTURE OR GRAIN SIZE			
U.S. STD. SIEVE SIZE	4, 10, 40, 60, 200, 270		
OPENING (MM)	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	MM 305, IN 12	75, 3	2.0, 0.25, 0.05, 0.005
SOIL MOISTURE - CORRELATION OF TERMS			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	
LL - LIQUID LIMIT	- SATURATED - (SAT)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	
PL - PLASTIC LIMIT	- WET - (W)	SEMI-SOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	
PLASTICITY			
NONPLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH	
LOW PLASTICITY	0-5	VERY LOW	
MED. PLASTICITY	6-15	SLIGHT	
HIGH PLASTICITY	16-25	MEDIUM	
	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.			
MISCELLANEOUS SYMBOLS			
[Symbol]	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION	[Symbol]	TEST BORING WITH VST PPH
[Symbol]	SOIL SYMBOL	[Symbol]	AUGER BORING
[Symbol]	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT	[Symbol]	CORE BORING
[Symbol]	INFERRED SOIL BOUNDARY	[Symbol]	MONITORING WELL
[Symbol]	INFERRED ROCK LINE	[Symbol]	PIEZOMETER INSTALLATION
[Symbol]	ALLUVIAL SOIL BOUNDARY	[Symbol]	SLOPE INDICATOR INSTALLATION
[Symbol]	DIP & DIP DIRECTION OF ROCK STRUCTURES	[Symbol]	CONE PENETROMETER TEST
[Symbol]		[Symbol]	SOUNDING ROD
[Symbol]		[Symbol]	TEST BORING W/ CORE
[Symbol]		[Symbol]	SPT N-VALUE
[Symbol]		[Symbol]	SPT REFUSAL
ABBREVIATIONS			
AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST	
BT - BORING TERMINATED	MICA. - MICA	WEA. - WEATHERED	
CL - CLAY	MOD. - MODERATELY	U - UNIT WEIGHT	
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	U <sub>d</sub> - DRY UNIT WEIGHT	
CSE - COARSE	ORG. - ORGANIC		
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS	
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	S - BULK	
e - VOID RATIO	SD. - SAND, SANDY	SS - SPLIT SPOON	
F - FINE	SL. - SILT, SILTY	ST - SHELBY TUBE	
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	RS - ROCK	
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL	
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING RATIO	
HL - HIGHLY	V - VERY		
EQUIPMENT USED ON SUBJECT PROJECT			
DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	
<input type="checkbox"/> MOBILE B-	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	
<input type="checkbox"/> BK-51	<input checked="" type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	
<input type="checkbox"/> CME-45C	<input type="checkbox"/> 6" HOLLOW AUGERS	<input type="checkbox"/> B-	
<input type="checkbox"/> CME-550X	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> N-	
<input type="checkbox"/> PORTABLE MOIST	<input type="checkbox"/> TUNG-CARBIDE INSERTS	<input type="checkbox"/> H-	
	<input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER	HAND TOOLS:	
	<input type="checkbox"/> TRICONE _____ * STEEL TEETH	<input type="checkbox"/> POST HOLE DIGGER	
	<input type="checkbox"/> TRICONE _____ * TUNG-CARB.	<input type="checkbox"/> HAND AUGER	
	<input type="checkbox"/> CORE BIT	<input type="checkbox"/> SOUNDING ROD	
		<input type="checkbox"/> VANE SHEAR TEST	

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ROCK DESCRIPTION		TERMS AND DEFINITIONS
<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p><b>ALLOVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA.  <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.  <b>ARTESIAN</b> - 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.  <b>CALCAROUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.  <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.  <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.  <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.  <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISCLOSED FROM PARENT MATERIAL.  <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.  <b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.  <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.  <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.  <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.  <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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.  <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.  <b>SILL</b> - 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.  <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.  <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS IN OR BPFY OF A 148 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.  <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  <b>STRATA ROCK QUALITY DESIGNATION (SRQD)</b> - 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.  <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>
<p><b>WEATHERED ROCK (WR)</b></p> <p><b>CRYSTALLINE ROCK (CR)</b></p> <p><b>NON-CRYSTALLINE ROCK (NCR)</b></p> <p><b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b></p>		<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</p> <p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p> <p>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.</p> <p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>
<b>WEATHERING</b>		
<p><b>FRESH</b></p> <p><b>VERY SLIGHT (V SL.)</b></p> <p><b>SLIGHT (SL.)</b></p> <p><b>MODERATE (MOD.)</b></p> <p><b>MODERATELY SEVERE (MOD. SEV.)</b></p> <p><b>SEVERE (SEV.)</b></p> <p><b>VERY SEVERE (V SEV.)</b></p> <p><b>COMPLETE</b></p>	<p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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. <i>IF TESTED, WOULD YIELD SPT REFUSAL.</i></p> <p>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. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF.</i></p> <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF.</i></p> <p>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.</p>	
<b>ROCK HARDNESS</b>		
<p><b>VERY HARD</b></p> <p><b>HARD</b></p> <p><b>MODERATELY HARD</b></p> <p><b>MEDIUM HARD</b></p> <p><b>SOFT</b></p> <p><b>VERY SOFT</b></p>	<p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>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.</p> <p>CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>CAN BE GROOVED 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.</p> <p>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.</p>	
<b>FRACTURE SPACING</b>		
<b>BEDDING</b>		
<b>INDURATION</b>		
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.		

BENCH MARK: SURVEY INFORMATION PROVIDED BY MULKEY, INC.

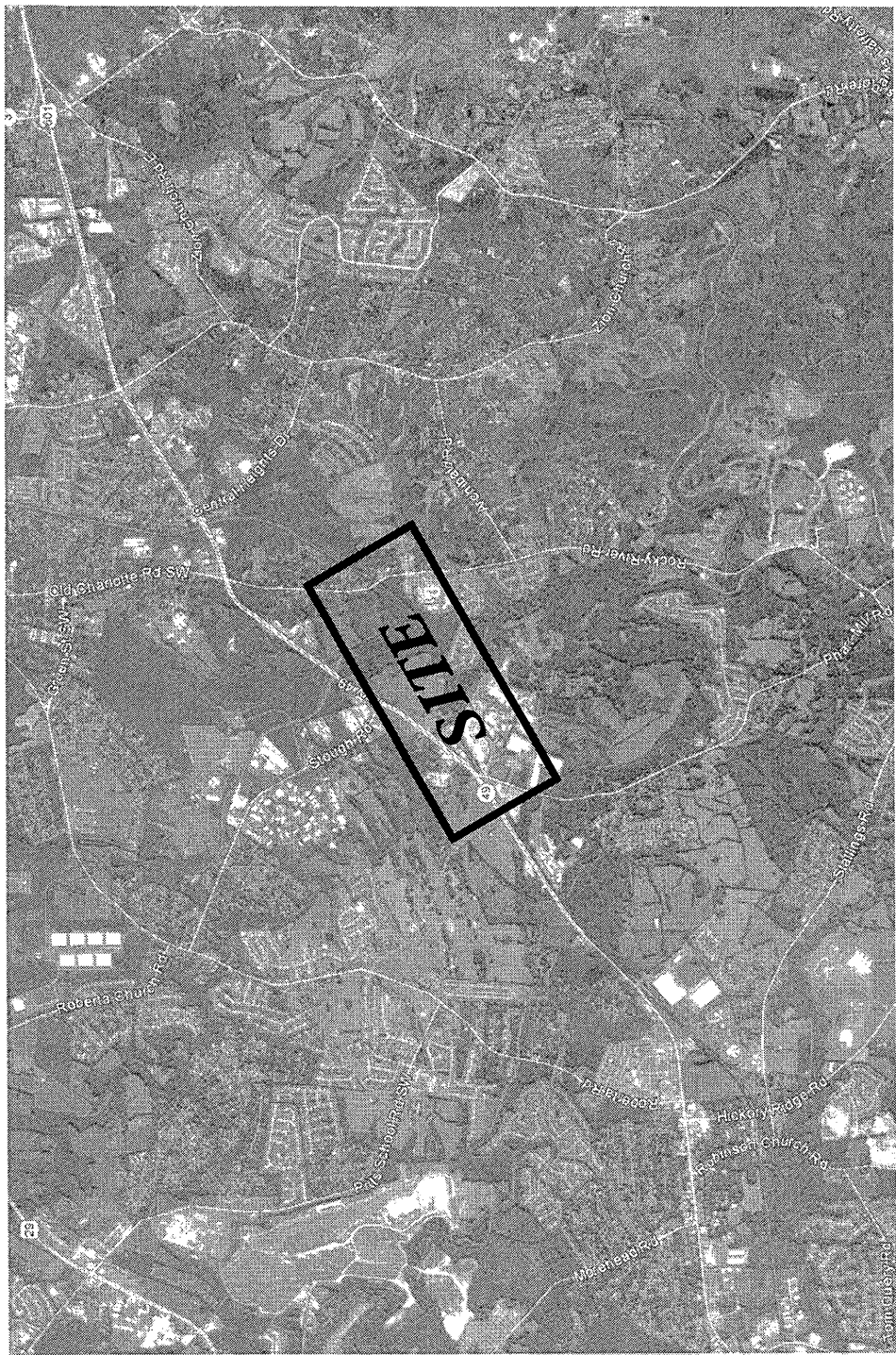
ELEVATION: \_\_\_\_\_ FT.

NOTES:

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\_\_\_\_\_

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PROJECT REFERENCE NO. SHEET  
P-52084 2  
2nd Main Track, Concord, NC  
Site Location Plan







# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 50000.1.STR03T1B	TIP P-5208A	COUNTY Cabarrus	GEOLOGIST R. Kral
SITE DESCRIPTION P-5208A Haydock to Junker Double Track			GROUND WTR (ft)
BORING NO. EB1-A	STATION 10281+67	OFFSET 29 ft LT	ALIGNMENT M1
COLLAR ELEV. 541.0 ft	TOTAL DEPTH 36.0 ft	NORTHING 582,659	EASTING 1,520,031
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 08/20/12	COMP. DATE 08/20/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
545															
540	541.0	0.0	2	3	4								M	GROUND SURFACE	0.0
	537.5	3.5	3	3	3								M	ROADWAY EMBANKMENT Brown silty fine to coarse SAND (A-2-4)	
535															
	532.5	8.5	2	2	2								M		
530															
	527.5	13.5	2	1	3								SS-4	RESIDUAL Brown and gray fine to coarse sandy SILT (A-4(0))	12.0
525														* Some rock fragments from 18.5 to 20 feet	
	522.5	18.5	6	22	21								W		
520															
	517.5	23.5	21	46	45								W		
515															
	512.5	28.5	29	51	49/0.4									WEATHERED ROCK Tan and brown (GRANITE)	29.0
510															
	507.5	33.5	70	30/0.2											
505	505.0	36.0	60/0.0											Boring Terminated with Standard Penetration Test Refusal at Elevation 505.0 ft On CRYSTALLINE ROCK (GRANITE)	36.0
														1) Driller indicated approximately 5 inches of Surficial Organic Laden soil.	

NCDOT BORE SINGLE 63P-0090 HADOCK TO JUNKER.GPJ NC\_DOT.GDT 1/31/13



WBS 50000.1.STR03T1B		TIP P-5208A		COUNTY Cabarrus		GEOLOGIST R. Kral											
SITE DESCRIPTION P-5208A Haydock to Junker Double Track							GROUND WTR (ft)										
BORING NO. EB1-B		STATION 10281+63		OFFSET 1 ft LT		ALIGNMENT M1	0 HR. 18.0										
COLLAR ELEV. 549.0 ft		TOTAL DEPTH 42.5 ft		NORTHING 582,687		EASTING 1,520,029	24 HR. 12.0										
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER C. Boyce		START DATE 08/21/12		COMP. DATE 08/21/12		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)		
550	549.0	0.0													549.0	0.0	GROUND SURFACE
			2	3	5	8							M				ROADWAY EMBANKMENT
																	Brown, tan, and orange silty fine to coarse SAND (A-2-4), trace to some gravel
545	545.5	3.5	6	5	5	10							M				* Wood encountered from 13.5 to 15 feet
540	540.5	8.5	5	4	4	8							M				
535	535.5	13.5	4	4	4	8							M				
530	530.5	18.5	4	4	3	7							SS-9	28%	531.0	18.0	ALLUVIAL
																	Brown and gray sandy CLAY (A-6(10))
525	525.5	23.5	0	1	1	2							W		526.0	23.0	Gray and tan silty fine to coarse SAND (A-2-4)
520	520.5	28.5	16	25	37	32							W		521.0	28.0	RESIDUAL
																	Gray and tan silty fine to coarse SAND (A-2-4)
515	515.5	33.5	10	30	70/0.2	100/0.7									515.0	34.0	WEATHERED ROCK
																	Tan and brown (GRANITE)
510	510.5	38.5	22	30	54	64							M		511.0	38.0	RESIDUAL
																	Tan and brown silty fine to coarse SAND (A-2-4)
	506.5	42.5	60/0.0			60/0.0									506.5	42.5	Boring Terminated with Standard Penetration Test Refusal at Elevation 506.5 ft On CRYSTALLINE ROCK (GRANITE)
																	1) Driller indicated approximately 4 inches of Surficial Organic Laden soil.

NCDOT BORE SINGLE 63P-0090 HADDOCK TO JUNKER.GPJ NC\_DOT\_GDT\_1/31/13







**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**CORE BORING REPORT**

WBS 50000.1.STR03T1B		TIP P-5208A		COUNTY Cabarrus		GEOLOGIST R. Kral / J. Harris					
SITE DESCRIPTION P-5208A Haydock to Junker Double Track							GROUND WTR (ft)				
BORING NO. B1-A		STATION 10282+14		OFFSET 21 ft LT		ALIGNMENT M1					
COLLAR ELEV. 538.8 ft		TOTAL DEPTH 51.5 ft		NORTHING 582,657		EASTING 1,519,983					
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic					
DRILLER C. Boyce		START DATE 08/21/12		COMP. DATE 08/24/12		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 20.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)	REC. (%)	RQD (%)			
507.3										Begin Coring @ 31.5 ft	
505	507.3	31.5	5.0	N=60/0.0 00:42/1.0 01:20/1.0 01:18/1.0 01:28/1.0 01:42/1.0	(4.8) 97%	(3.4) 88%	(9.8) 98%	(7.5) 75%		507.3 CRYSTALLINE ROCK Gray pink and white, moderately hard to very hard, very slightly to slightly weathered, very close to moderately closely spaced fractured (GRANITE)	31.5
500	502.3	36.5	5.0	01:53/1.0 02:03/1.0 01:58/1.0 01:58/1.0 01:38/1.0	(5.0) 100%	(4.1) 82%				RS-1: 35.7' - 36.2', qu = 700 psi	
495	497.3	41.5	5.0	01:53/1.0 01:56/1.0 01:54/1.0 02:04/1.0 02:21/1.0	(5.0) 100%	(4.9) 98%	(10.0) 100%	(9.5) 95%		497.3 CRYSTALLINE ROCK Gray pink and white, very hard, fresh to very slightly weathered, close to moderately closely spaced fractured (GRANITE)	41.5
490	492.3	46.5	5.0	02:08/1.0 01:57/1.0 02:03/1.0 01:57/1.0 02:51/1.0	(5.0) 100%	(4.6) 92%				RS-2: 44.9' - 45.4', qu = 3,985 psi	
	487.3	51.5								487.3 Boring Terminated at Elevation 487.3 ft in CRYSTALLINE ROCK (GRANITE) 1) Driller indicated approximately 3 inches of Surficial Organic Laden soil.	51.5

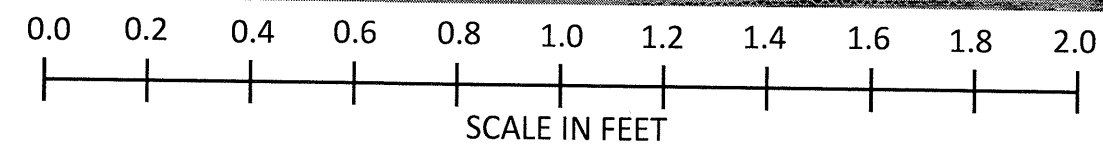
NCDOT CORE SINGLE 63P-0090 HADOCK TO JUNKER GPJ NC\_DOT.GDT 2/1/13



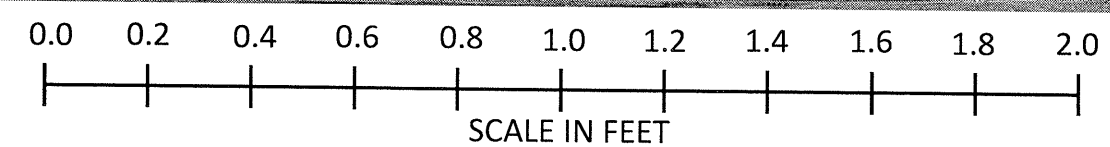
# Railroad Bridge across Coddle Creek

CORE PHOTOGRAPHS: B1-A: Station 10282+14

31.5 feet



41.5 feet







**NCDOT GEOTECHNICAL ENGINEERING UNIT  
CORE BORING REPORT**

WBS 50000.1.STR03T1B		TIP P-5208A		COUNTY Cabarrus		GEOLOGIST R. Kral / J. Harris							
SITE DESCRIPTION P-5208A Haydock to Junker Double Track							GROUND WTR (ft)						
BORING NO. B1-B		STATION 10282+31		OFFSET 6 ft LT		ALIGNMENT M1							
COLLAR ELEV. 538.4 ft		TOTAL DEPTH 51.5 ft		NORTHING 582,668		EASTING 1,519,964							
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER C. Boyce		START DATE 08/23/12		COMP. DATE 08/23/12		SURFACE WATER DEPTH N/A							
CORE SIZE NQ2		TOTAL RUN 20.0 ft											
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (%)	RQD (%)		REC. (%)	RQD (%)				
506.9											Begin Coring @ 31.5 ft		
505	506.9	31.5	5.0	N=60/0.0 01:42/1.0 01:45/1.0 01:55/1.0 02:00/1.0 02:20/1.0	(5.0) 100%	(3.0) 60%		(10.0) 100%	(6.7) 67%		506.9	31.5	
											CRYSTALLINE ROCK Gray green and pink, moderately hard to hard, very slightly to moderately weathered, very close to moderately closely spaced fractured (GRANITE) RS-3: 36.8' - 37.3', qu = 4,100 psi		
500	501.9	36.5	5.0	03:00/1.0 03:01/1.0 02:32/1.0 02:33/1.0 02:47/1.0	(5.0) 100%	(3.7) 73%					496.9	41.5	
495	496.9	41.5	5.0	02:32/1.0 02:17/1.0 02:25/1.0 02:32/1.0 02:38/1.0	(5.0) 100%	(4.2) 83%		(10.0) 100%	(8.2) 82%		496.9	41.5	
											CRYSTALLINE ROCK Pink gray and white, hard, very slightly weathered, very close to moderately closely spaced fractured (GRANITE) RS-4: 50.9' - 51.4', qu = 5,945 psi		
490	491.9	46.5	5.0	02:05/1.0 02:59/1.0 03:02/1.0 02:32/1.0 02:35/1.0	(5.0) 100%	(4.0) 80%							
	486.9	51.5										51.5	
Boring Terminated with Standard Penetration Test Refusal at Elevation 486.9 ft in CRYSTALLINE ROCK (GRANITE)													
1) Driller indicated approximately 4 inches of Surficial Organic Laden soil.													

NCDOT CORE SINGLE 63P-0050 HADDOCK TO JUNKER.GPJ NC\_DOT.GDT 2/1/13

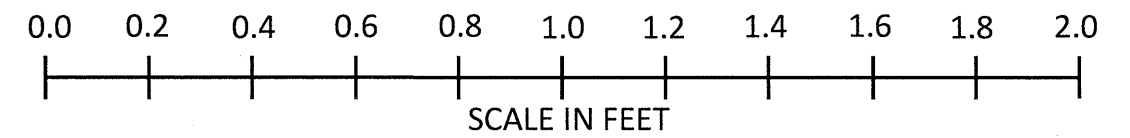




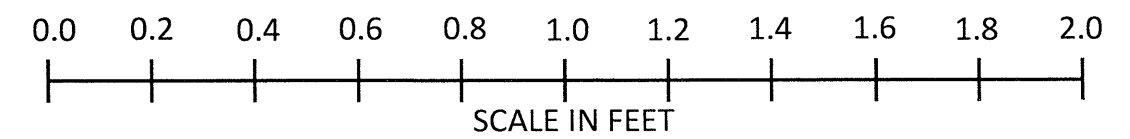
# Railroad Bridge across Coddle Creek

CORE PHOTOGRAPHS: B1-B: Station 10282+31

31.5 feet



41.5 feet





WBS 50000.1.STR03T1B		TIP P-5208A		COUNTY Cabarrus		GEOLOGIST R. Kral / J. Harris										
SITE DESCRIPTION P-5208A Haydock to Junker Double Track																
BORING NO. EB2-A		STATION 10283+75		OFFSET 8 ft LT		ALIGNMENT M1										
COLLAR ELEV. 562.3 ft		TOTAL DEPTH 81.0 ft		NORTHING 582,636		EASTING 1,519,823										
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE 09/07/12		COMP. DATE 09/07/12		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)	
565																
	562.3	0.0												562.3	GROUND SURFACE	0.0
560	558.8	3.5	5	12	18	30							D	ARTIFICIAL FILL Gray ABC Stone		
	553.8	8.5	8	9	5	14							D			
555	548.8	13.5	1	3	4	7							M	Brown fine to coarse sandy CLAY (A-6) with intermittent ABC stone layers	8.5	
550	543.8	18.5	0	1	2	3							M	RESIDUAL Tan, orange, and brown fine to coarse sandy SILT (A-4(0))	13.5	
545	538.8	23.5	3	3	2	5							SS-32 22%			
540	533.8	28.5	8	12	17	29							M	Tan, orange, gray, and white silty fine to coarse SAND (A-2-4)	23.0	
535	528.8	33.5	14	20	28	48							M			
530	523.8	38.5	51	49/0.2					100/0.7					WEATHERED ROCK Tan and gray (GRANITE)	33.5	
525	518.8	43.5	61	39/0.0					100/0.5							
520	513.8	48.5	69	31/0.0					100/0.5							
515	508.8	53.5	46	54/0.3					100/0.8							
510	503.8	58.5	11	13	51	64			100/0.8				M	RESIDUAL Tan and gray silty fine to coarse SAND (A-2-4)	53.0	
505	501.3	61.0							100/0.4					WEATHERED ROCK Tan and gray (GRANITE)	58.5	
500									60/0.0					CRYSTALLINE ROCK Gray, white, and pink (GRANITE)	61.0	
495														CRYSTALLINE ROCK Gray, white, and pink (GRANITE)	66.0	
490																
485																

NCDOT BORE SINGLE 63P-0080 HADOCK TO JUNKER.GPJ NC\_DOT\_GDT\_1/31/13



WBS 50000.1.STR03T1B		TIP P-5208A		COUNTY Cabarrus		GEOLOGIST R. Kral / J. Harris							
SITE DESCRIPTION P-5208A Haydock to Junker Double Track							GROUND WTR (ft)						
BORING NO. EB2-A		STATION 10283+75		OFFSET 8 ft LT		ALIGNMENT M1							
COLLAR ELEV. 562.3 ft		TOTAL DEPTH 81.0 ft		NORTHING 582,636		EASTING 1,519,823							
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER C. Boyce		START DATE 09/07/12		COMP. DATE 09/07/12		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				
485													
												Match Line	
													CRYSTALLINE ROCK Gray, white, and pink (GRANITE) (continued)
													481.3
													Boring Terminated at Elevation 481.3 ft In CRYSTALLINE ROCK (GRANITE)

NCDOT BORE SINGLE 6SP-0090 HADDOCK TO JUNKER, GFJ, NC, DOT, GDT, 1/31/13



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**CORE BORING REPORT**

WBS 50000.1.STR03T1B		TIP P-5208A		COUNTY Cabarrus		GEOLOGIST R. Kral / J. Harris					
SITE DESCRIPTION P-5208A Haydock to Junker Double Track							GROUND WTR (ft)				
BORING NO. EB2-A		STATION 10283+75		OFFSET 8 ft LT		ALIGNMENT M1					
COLLAR ELEV. 562.3 ft		TOTAL DEPTH 81.0 ft		NORTHING 582,636		EASTING 1,519,823					
DRILL RIGHAMMER EFF./DATE F&R968 CME-650X 81% 12/28/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic					
DRILLER C. Boyce		START DATE 09/07/12		COMP. DATE 09/07/12		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 20.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)	REC. (%)	ROD (%)			
501.3										Begin Coring @ 61.0 ft	
500	501.3	81.0	5.0	N=60/0.0 00:54/1.0 01:58/1.0 01:58/1.0 01:46/1.0 02:10/1.0	(3.8) 77%	(2.8) 55%	(3.8) 77%	(2.8) 55%		CRISTALLINE ROCK Gray white and pink, moderately hard to very hard, fresh to moderately weathered, very close to moderately closely spaced fractured (GRANITE)	61.0
	496.3	66.0								496.3	
495			5.0	03:31/1.0 02:30/1.0 03:07/1.0 03:09/1.0 03:24/1.0	(5.0) 100%	(4.7) 93%	(15.0) 100%	(14.1) 94%		CRISTALLINE ROCK Gray white and pink, very hard, fresh to very slightly weathered, close to moderately closely spaced fractured (GRANITE)	
490	491.3	71.0	5.0	02:41/1.0 02:52/1.0 02:31/1.0 02:47/1.0 02:45/1.0	(5.0) 100%	(5.0) 100%				RS-5: 67.0 - 67.4' - 45.4', qu = 4,005 psi RS-6: 80.2' - 80.7', qu = 7,135 psi	
485	486.3	76.0									
	481.3	81.0	5.0	02:47/1.0 02:39/1.0 03:02/1.0 02:20/1.0 03:30/1.0	(5.0) 100%	(4.4) 88%				Boring Terminated at Elevation 481.3 ft in CRISTALLINE ROCK (GRANITE)	81.0

NCDOT CORE SINGLE\_63P-0090 HADDOCK TO JUNKER.GPJ\_NC\_DOT.GDT 2/1/13

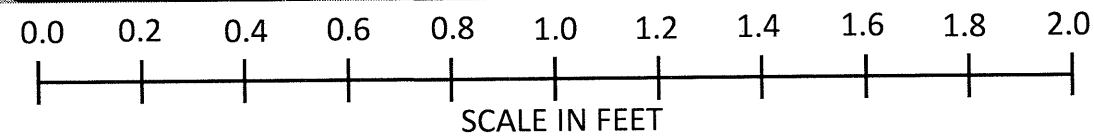




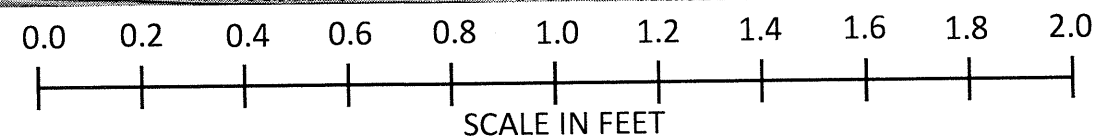
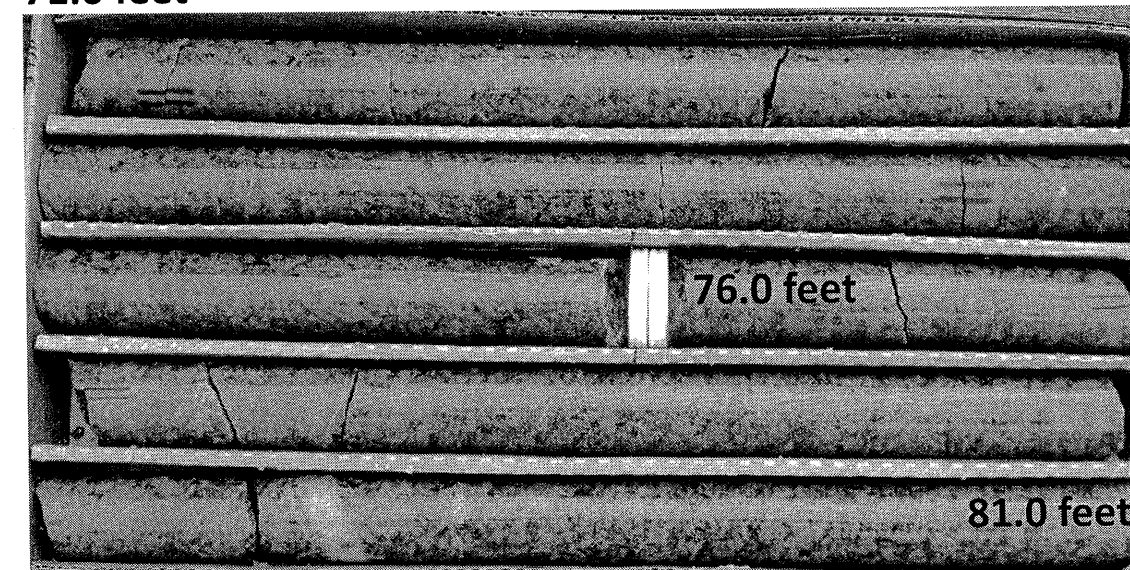
# Railroad Bridge across Coddle Creek

CORE PHOTOGRAPHS: EB2-A: Station 10283+75

61.0 feet



71.0 feet





WBS 50000.1.STR03T1B	TIP P-5208A	COUNTY Cabarrus	GEOLOGIST R. Kral / J. Harris	
SITE DESCRIPTION P-5208A Haydock to Junker Double Track				GROUND WTR (ft)
BORING NO. EB2-B	STATION 10283+83	OFFSET 10 ft RT	ALIGNMENT M1	0 HR. 43.0
COLLAR ELEV. 563.0 ft	TOTAL DEPTH 81.0 ft	NORTHING 582,652	EASTING 1,519,812	24 HR. 23.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER C. Boyce	START DATE 09/04/12	COMP. DATE 09/05/12	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						
565																
	563.0	0.0												563.0	GROUND SURFACE	0.0
			8	10	8											
560	559.5	3.5	3	4	1									561.0	ARTIFICIAL FILL Gray ABC Stone	2.0
555	554.5	8.5	2	1	1									555.0	Tan and gray silty fine to coarse SAND (A-2-4), some gravel	
550	549.5	13.5	2	1	3											
545	544.5	18.5	3	5	6									544.5	Brown and gray silty CLAY (A-7-6(9)), trace gravel	8.0
540	539.5	23.5	6	10	13											
535	534.5	28.5	14	14	26											
530	529.5	33.5	23	27	34											
525	524.5	38.5	47	53/0.3										524.5	RESIDUAL Tan, orange, and brown silty fine to coarse SAND (A-2-4(0))	18.5
520	519.5	43.5	100/0.2													
515	514.5	48.5	100/0.4													
510	509.5	53.5	32	63/0.3												
505	504.5	58.5	60/0.1													
500	502.0	61.0	60/0.0													
495																
490																
485																

NCDOT BORE SINGLE ESP-0090 HADDOCK TO JUNKER.GPJ NC\_DOT.GDT 1/31/13

WEATHERED ROCK  
Tan, brown, and orange (GRANITE)  
\* Hard rock lens from 40.5 to 43 feet

CRYSTALLINE ROCK  
Tan, brown, and orange (GRANITE)  
CRYSTALLINE ROCK  
Gray, pink, and white (GRANITE)



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR03T1B	TIP P-5208A	COUNTY Cabarrus	GEOLOGIST R. Kral / J. Harris	
SITE DESCRIPTION P-5208A Haydock to Junker Double Track				GROUND WTR (ft)
BORING NO. EB2-B	STATION 10283+83	OFFSET 10 ft RT	ALIGNMENT M1	0 HR. 43.0
COLLAR ELEV. 563.0 ft	TOTAL DEPTH 81.0 ft	NORTHING 582,652	EASTING 1,519,812	24 HR. 23.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER C. Boyce	START DATE 09/04/12	COMP. DATE 09/05/12	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					
485														
													Match Line	
													CRYSTALLINE ROCK	
													Gray, pink, and white (GRANITE) (continued)	81.0
													Boring Terminated at Elevation 482.0 ft in CRYSTALLINE ROCK (GRANITE)	
													1) Driller indicated lens of hard rock from 40.5 to 42 feet.	

NCDOT BORE SINGLE 63P-0690 HADDOCK TO JUNKER.GPJ NC\_DOT.GDT 1/31/13



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**CORE BORING REPORT**

WBS 50000.1.STR03T1B	TIP P-5208A	COUNTY Cabarrus	GEOLOGIST R. Kral / J. Harris
SITE DESCRIPTION P-5208A Haydock to Junker Double Track			
BORING NO. EB2-B	STATION 10283+83	OFFSET 10 ft RT	ALIGNMENT M1
COLLAR ELEV. 563.0 ft	TOTAL DEPTH 81.0 ft	NORTHING 582,652	EASTING 1,519,812
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 09/04/12	COMP. DATE 09/05/12	SURFACE WATER DEPTH N/A
CORE SIZE NQ2	TOTAL RUN 20.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
502	502.0	61.0	5.0	N=60/0.0 02:00/1.0 03:10/1.0 02:10/1.0 02:40/1.0 02:24/1.0	(4.8) 97%	(4.3) 87%		(19.8) 99%	(17.5) 87%		Begin Coring @ 61.0 ft	
500											CRYSTALLINE ROCK	61.0
											Gray pink and white, very hard, fresh to very slightly weathered, close to moderately closely spaced fractured (GRANITE)	
	497.0	66.0									RS-7: 67.0' - 67.5', qu = 10,325 psi	
495			5.0	02:38/1.0 03:03/1.0 02:34/1.0 02:11/1.0 02:08/1.0	(5.0) 100%	(4.8) 97%					RS-8: 73.0' - 73.4', qu = 3,820 psi	
	492.0	71.0										
490			5.0	02:25/1.0 02:17/1.0 02:35/1.0 02:22/1.0 02:49/1.0	(5.0) 100%	(4.5) 90%						
	487.0	76.0										
485			5.0	02:29/1.0 03:33/1.0 03:44/1.0 02:58/1.0	(5.0) 100%	(3.8) 77%						
	482.0	81.0		02:50/1.0								
											Boring Terminated at Elevation 482.0 ft in CRYSTALLINE ROCK (GRANITE)	
											1) Driller indicated lens of hard rock from 40.5 to 42 feet.	

NCDOT CORE SINGLE 68P-0090 HADDOCK TO JUNKER GPJ NC\_DOT\_GDT\_2/1/13

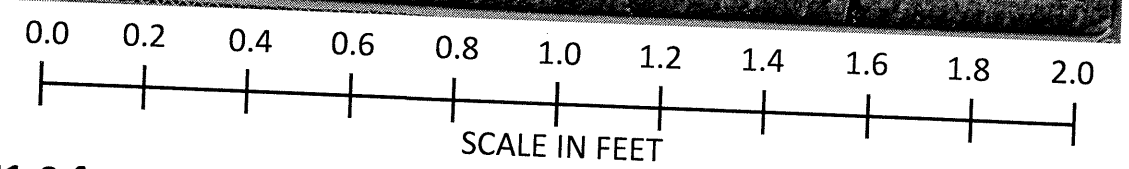
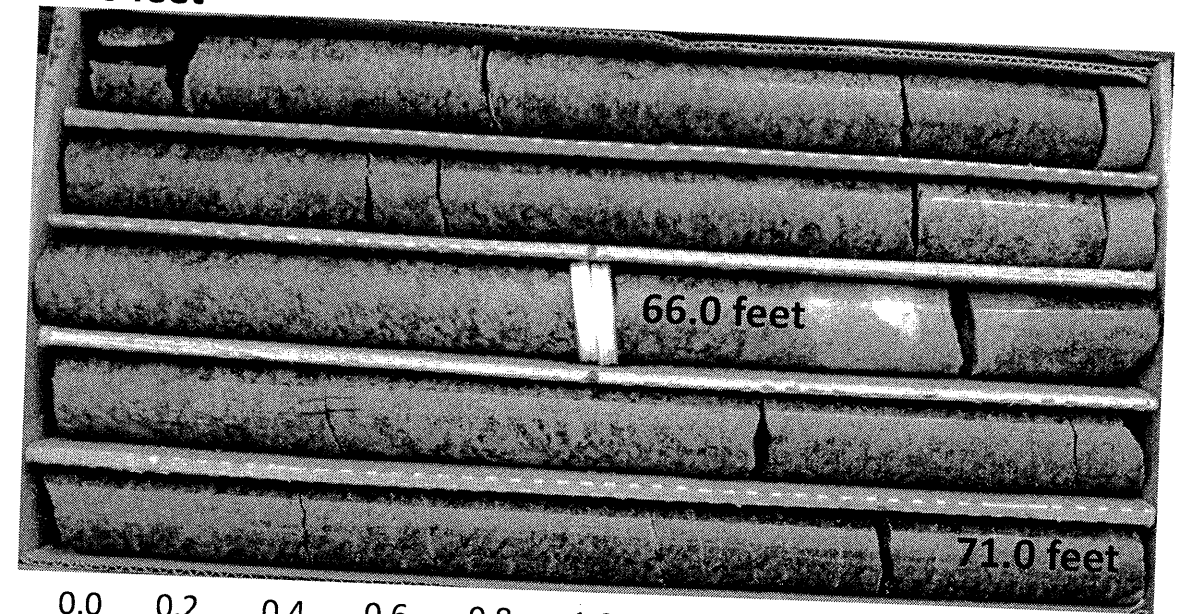




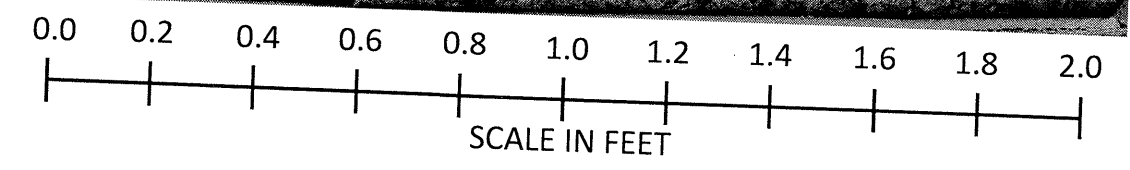
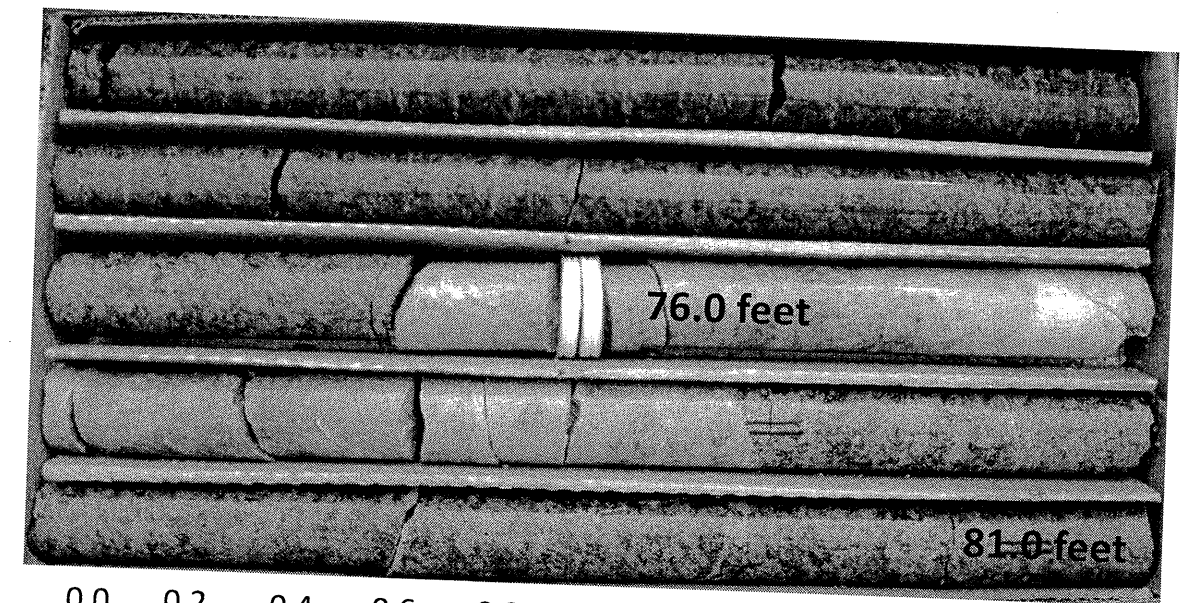
# Railroad Bridge across Coddle Creek

CORE PHOTOGRAPHS: EB2-B: Station 10283+83

61.0 feet



71.0 feet



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

## STRUCTURE SUBSURFACE INVESTIGATION

**CONTENTS**

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLANS
4	PROFILE
5-8	CROSS SECTIONS
9-18	BORE LOG, CORE REPORTS & CORE PHOTOGRAPHS
19	ROCK CORE TEST RESULTS
20	LABORATORY SUMMARY SHEET
21	SITE PHOTOGRAPHS

PROJ. REFERENCE NO. 50000.1.STR11T1B (P-5208G) F.A. PROJ. N/A  
 COUNTY MECKLENBERG  
 PROJECT DESCRIPTION MILLBROOK (MP 365.5) TO JUNKER (MP 372.2) ON THE NCRRNS MAINLINE

SITE DESCRIPTION BRIDGE ON NCRRNS MAINLINE OVER FUTURE MALLARD CREEK CHURCH ROAD

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PROJECT: 50000.1.STR11T1B ID: P-5208G

PERSONNEL

R. TOOTHMAN

G. LOWDERMILK

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W. FELDER

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INVESTIGATED BY T. WELLS

CHECKED BY R. WELLS

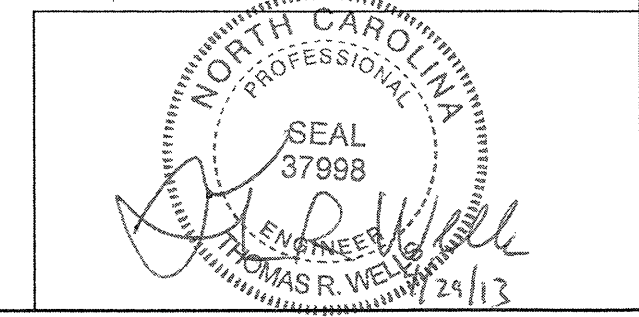
SUBMITTED BY KLEINFELDER

DATE APRIL 2013

DRAWN BY: W. FELDER

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

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



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

**SUBSURFACE INVESTIGATION**

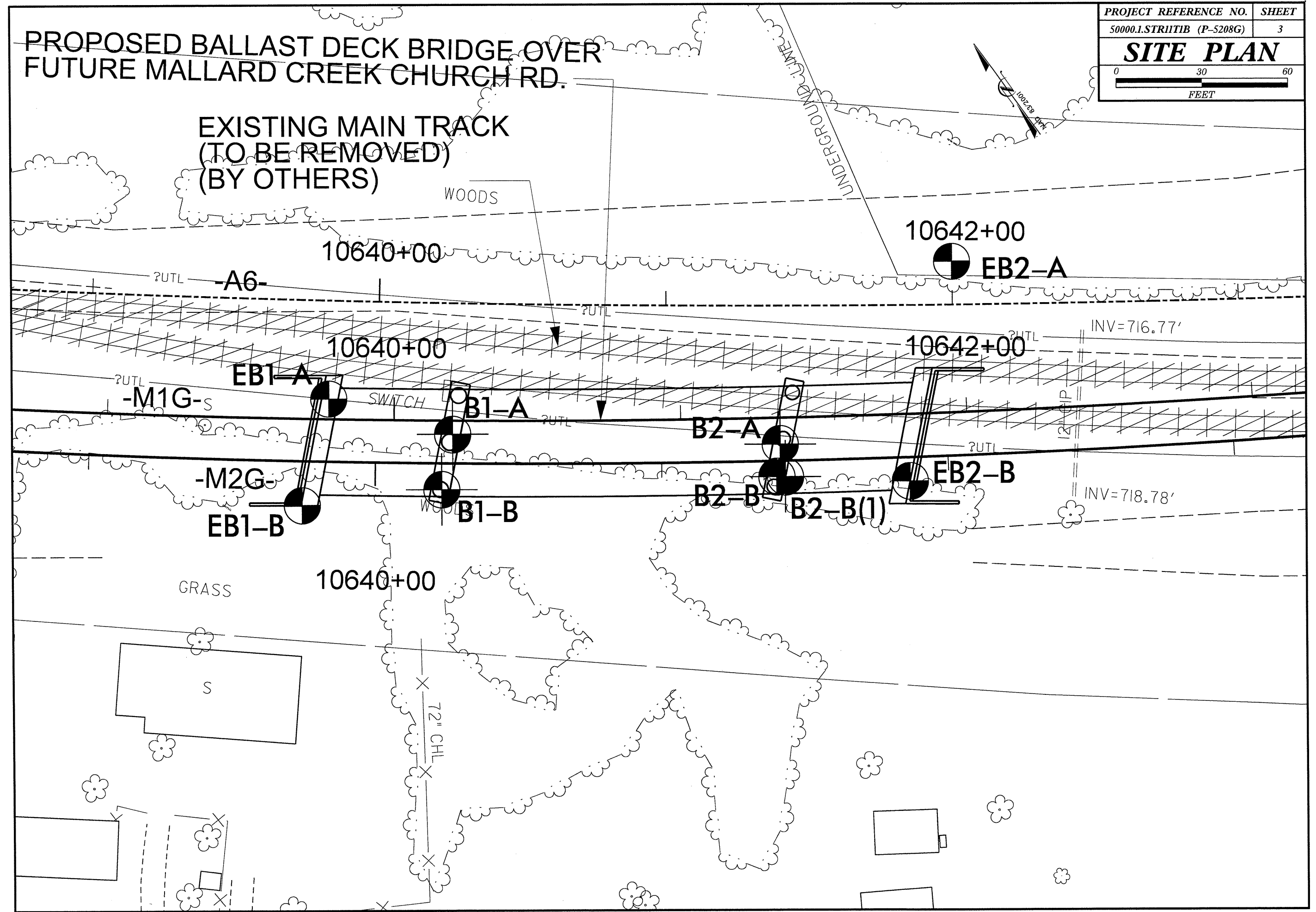
**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

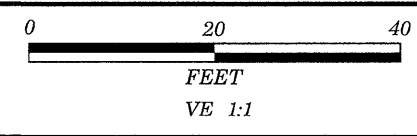
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																																													
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>		<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORM</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p>		<p><b>HARD ROCK</b> IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - A NOTABLE 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. 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<p><b>APPENDIX</b></p> <p>BENCH MARK: BM-107 (571705 FT N, 1487615 FT E)</p> <p>ELEVATION: 729.21</p> <p>NOTES: FIAD - FILLED IN AFTER DRILLING</p>		<p>REVISED 09/23/09</p>		<p></p>																																																																																																																																															

# PROPOSED BALLAST DECK BRIDGE OVER FUTURE MALLARD CREEK CHURCH RD.

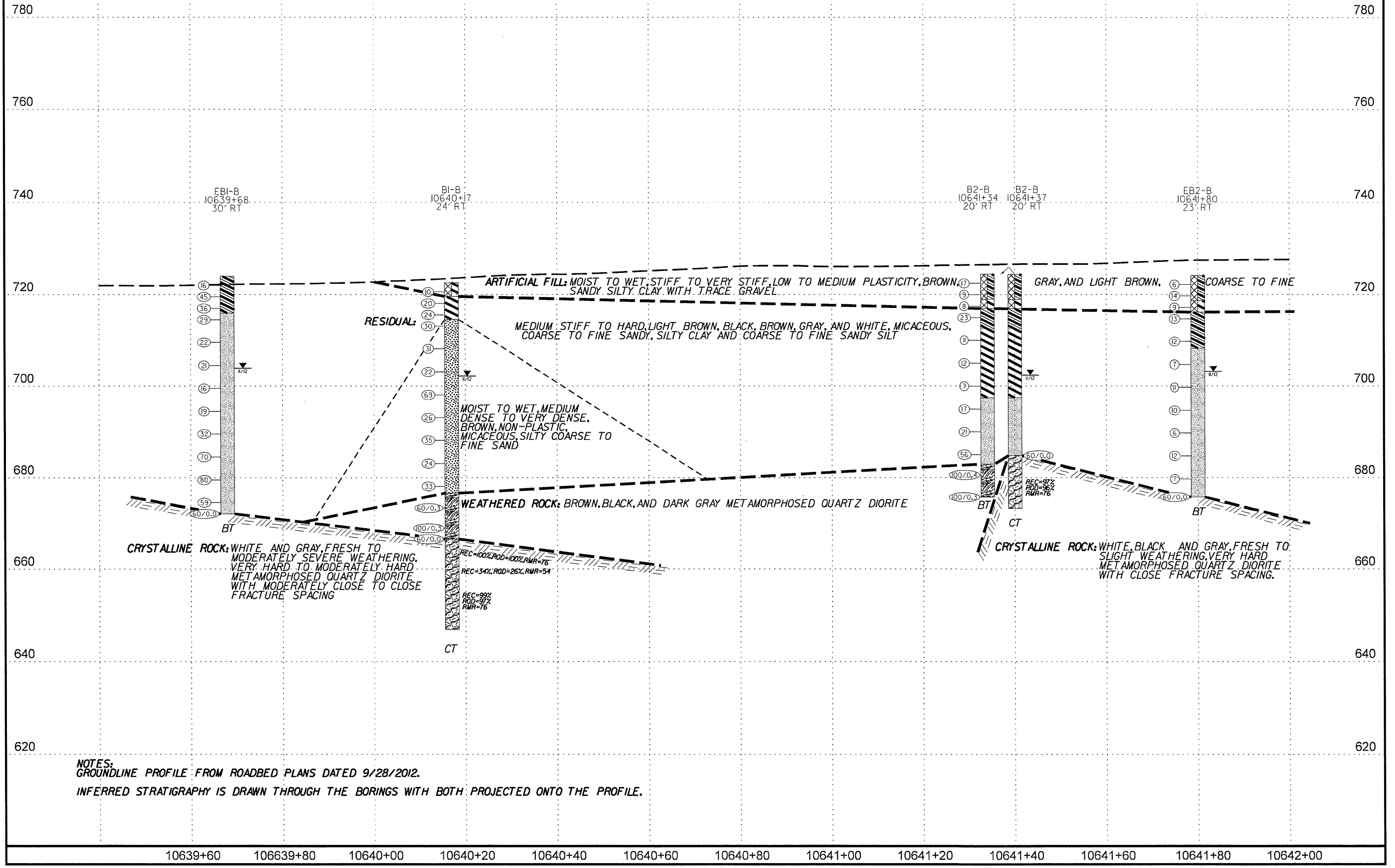
PROJECT REFERENCE NO.	SHEET
50000.1.STRIITIB (P-5208G)	3
<b>SITE PLAN</b>	
0 30 60 FEET	

EXISTING MAIN TRACK  
(TO BE REMOVED)  
(BY OTHERS)



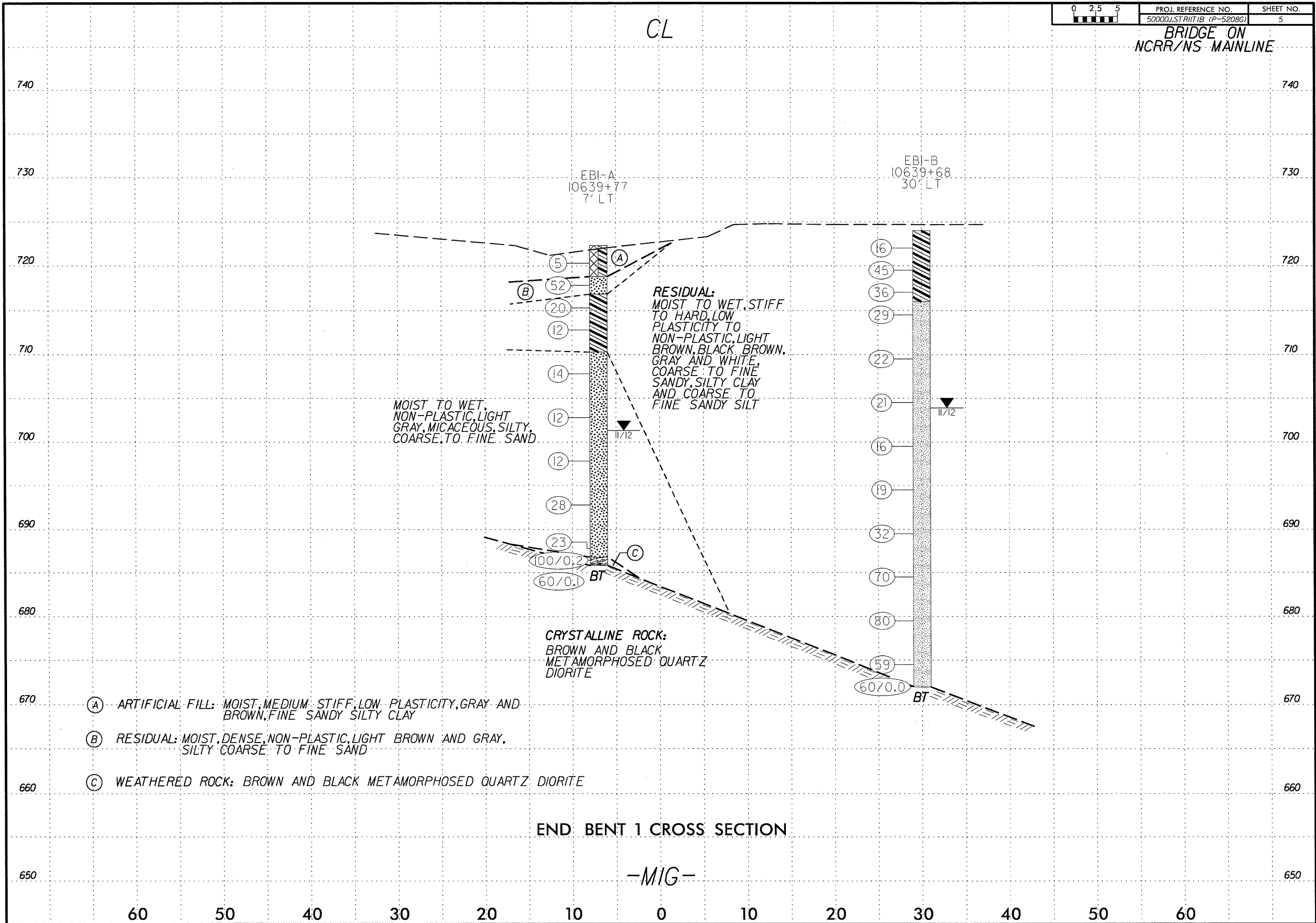


PROJECT REFERENCE NO.	SHEET
50000.1.STRITI (P-5208G)	4
<b>BRIDGE PROFILE</b>	

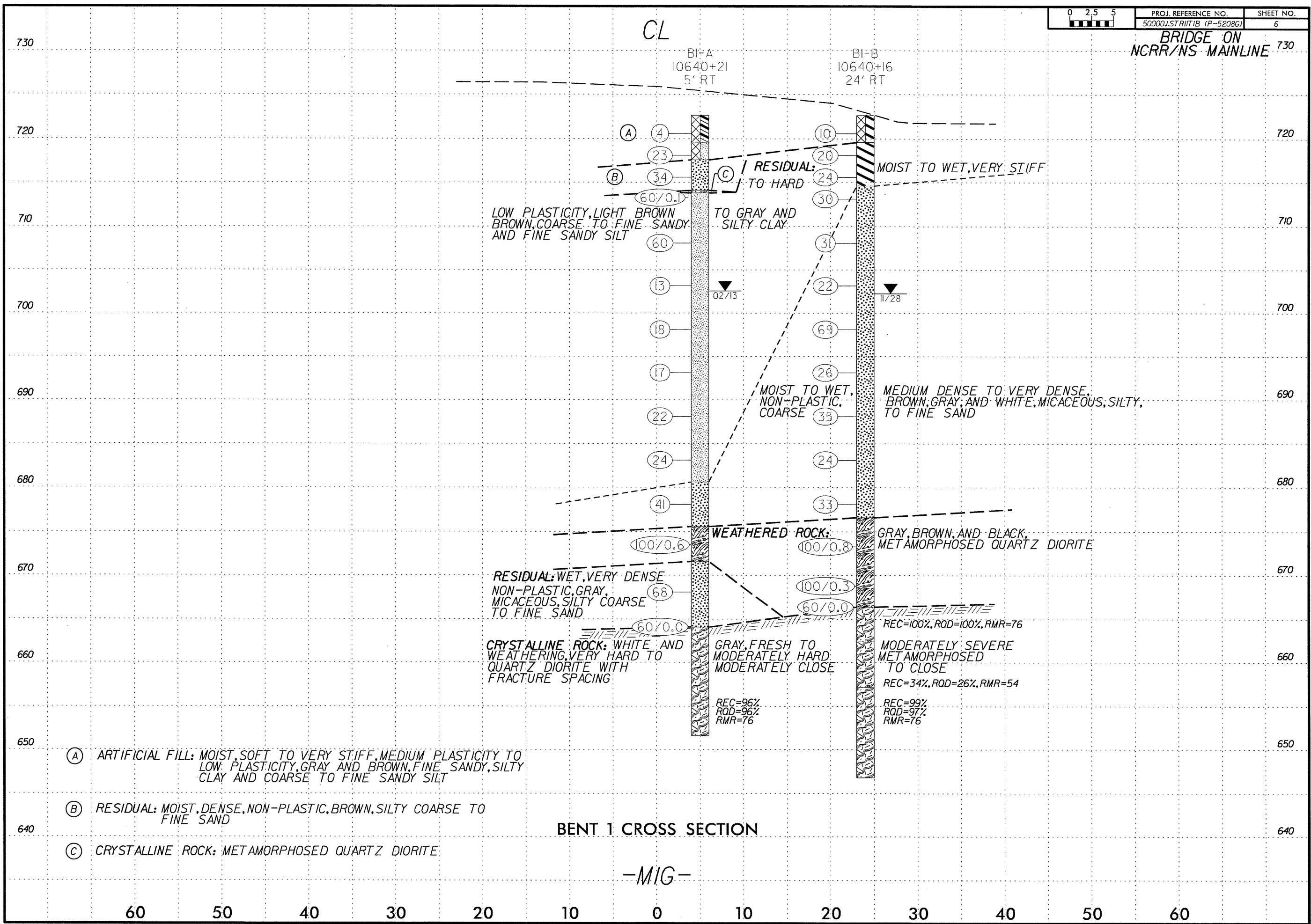


NOTES:  
GROUNDLINE PROFILE FROM ROADBED PLANS DATED 9/28/2012.  
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

BRIDGE ON  
NCRR/NS MAINLINE







- (A) ARTIFICIAL FILL: MOIST, SOFT TO VERY STIFF, MEDIUM PLASTICITY TO LOW PLASTICITY, GRAY AND BROWN, FINE SANDY, SILTY CLAY AND COARSE TO FINE SANDY SILT
- (B) RESIDUAL: MOIST, DENSE, NON-PLASTIC, BROWN, SILTY COARSE TO FINE SAND
- (C) CRYSTALLINE ROCK: METAMORPHOSED QUARTZ DIORITE

BENT 1 CROSS SECTION

-MIG-

BRIDGE ON  
NCCR/NS MAINLINE

CL

B2-A  
10641+35  
9' RT  
 B2-B  
10641+33  
20' RT

730 730

720 720

710 710

700 700

690 690

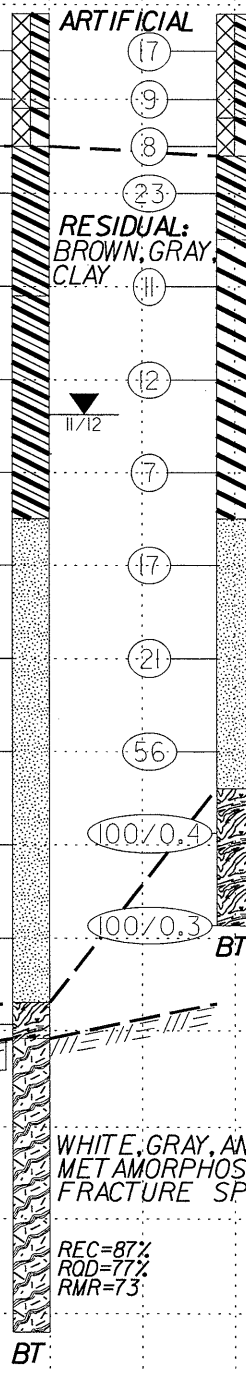
680 680

670 670

660 660

650 650

640 640



**ARTIFICIAL FILL:** MOIST TO WET, STIFF TO VERY STIFF, MEDIUM PLASTICITY, BLACK, BROWN, GRAY, AND LIGHT BROWN, COARSE TO FINE SANDY, SILTY CLAY WITH TRACE GRAVEL.

**RESIDUAL: BROWN, GRAY CLAY:** MOIST TO WET, STIFF TO HARD, LOW TO MEDIUM PLASTICITY, LIGHT WHITE, AND BROWN, COARSE TO FINE SANDY, SILTY TO COARSE TO FINE SANDY SILT.

**WEATHERED ROCK:** DARK BROWN, GRAY, AND BLACK METAMORPHOSED QUARTZ DIORITE

**CRYSTALLINE ROCK:** WHITE, GRAY, AND BLACK, VERY SLIGHT WEATHERING, HARD METAMORPHOSED QUARTZ DIORITE WITH CLOSE FRACTURE SPACING

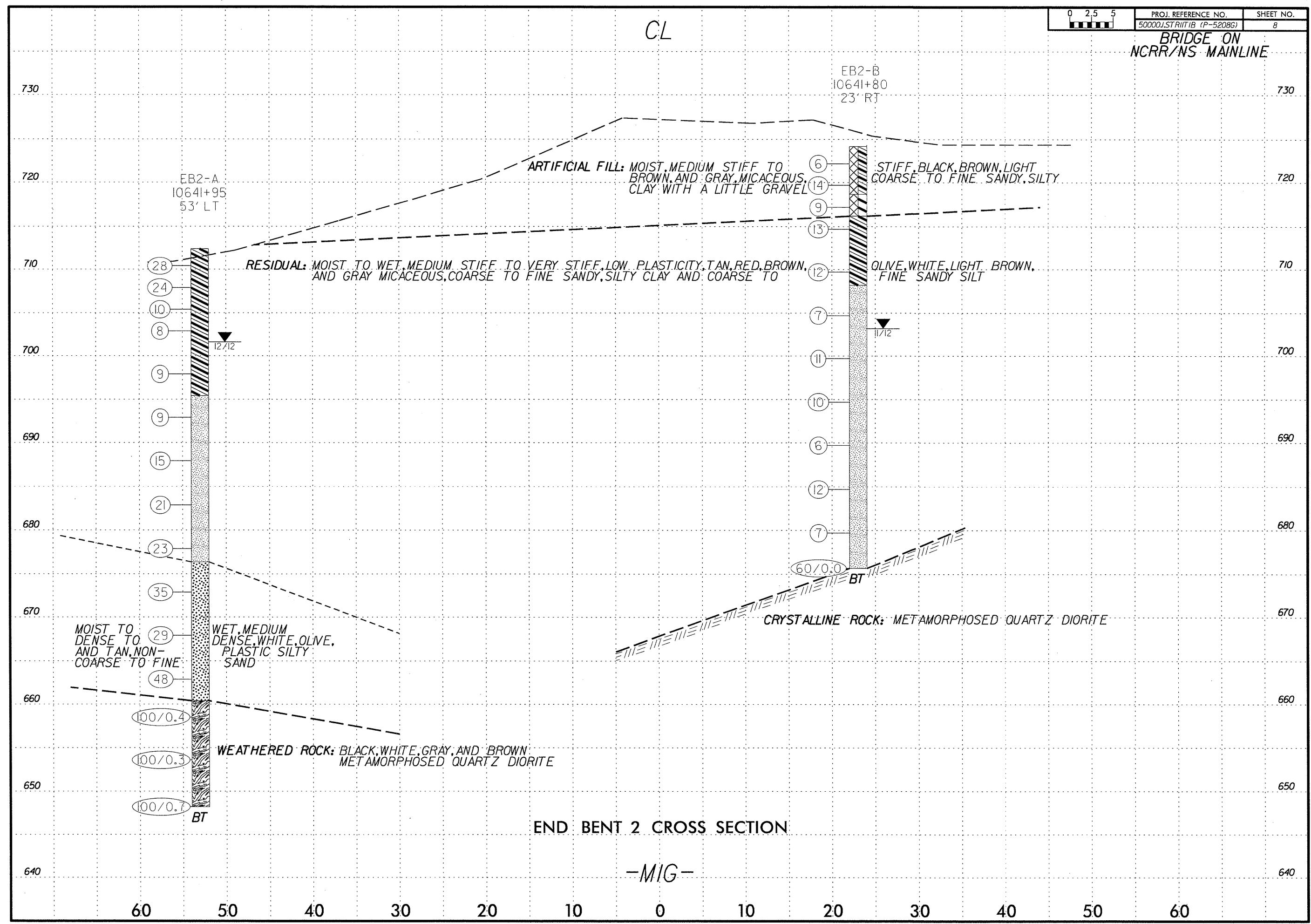
REC=87%  
ROD=77%  
RMR=73

BENT 2 CROSS SECTION

-MIG-

60 50 40 30 20 10 0 10 20 30 40 50 60

BRIDGE ON  
 NCRR/NS MAINLINE



CL

EB2-A  
 10641+95  
 53' LT

EB2-B  
 10641+80  
 23' RT

ARTIFICIAL FILL: MOIST, MEDIUM STIFF TO BROWN, AND GRAY, MICACEOUS, CLAY WITH A LITTLE GRAVEL

STIFF, BLACK, BROWN, LIGHT COARSE TO FINE SANDY, SILTY

RESIDUAL: MOIST TO WET, MEDIUM STIFF TO VERY STIFF, LOW PLASTICITY, TAN, RED, BROWN, AND GRAY MICACEOUS, COARSE TO FINE SANDY, SILTY CLAY AND COARSE TO FINE SANDY SILT

OLIVE, WHITE, LIGHT BROWN, FINE SANDY SILT

MOIST TO DENSE TO AND TAN, NON-COARSE TO FINE SAND

WET, MEDIUM DENSE, WHITE, OLIVE, PLASTIC SILTY SAND

CRYSTALLINE ROCK: METAMORPHOSED QUARTZ DIORITE

WEATHERED ROCK: BLACK, WHITE, GRAY, AND BROWN METAMORPHOSED QUARTZ DIORITE

END BENT 2 CROSS SECTION

-MIG-



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Fiora, M. E.										
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 10639+77		OFFSET 7 ft LT		ALIGNMENT M1G										
COLLAR ELEV. 722.3 ft		TOTAL DEPTH 36.5 ft		NORTHING 571,537		EASTING 1,487,542										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Toothman, R. E.		START DATE 11/14/12		COMP. DATE 11/14/12		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						
725																
	721.3	1.0	1	2	3										722.3	0.0
720	718.8	3.5	7	17	35						SS-1	23%			718.8	3.5
	716.3	6.0	7	9	11										716.8	5.5
715	713.8	8.5	4	5	7										710.3	12.0
	708.8	13.5	4	6	8											
710	703.8	18.5	3	5	7											
	698.8	23.5	4	5	7											
705	693.8	28.5	5	6	22											
	688.8	33.5	7	10	13											
700	685.6	35.7													686.8	35.5
	685.9	36.4													685.9	36.4
		100/0.2													685.4	36.5
		60/0.1														

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Wells, T. R.										
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 10639+68		OFFSET 30 ft RT		ALIGNMENT M1G										
COLLAR ELEV. 724.0 ft		TOTAL DEPTH 52.0 ft		NORTHING 571,573		EASTING 1,487,530										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Toothman, R. E.		START DATE 11/26/12		COMP. DATE 11/26/12		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						
725																
	723.0	1.0	5	8	8										724.0	0.0
720	720.5	3.5	5	14	31						SS-2	18%				
	718.0	6.0	12	14	22											
715	715.5	8.5	8	19	10										716.0	8.0
	710.5	13.5	8	10	12											
710	705.5	18.5	5	10	11											
	700.5	23.5	14	8	8											
705	695.5	28.5	5	8	11											
	690.5	33.5	11	13	19											
700	685.5	38.5	20	30	40											
	680.5	43.5	9	32	48											
695	675.5	48.5	24	26	33											
	672.0	52.0														
		60/0.0														

NCDOT BORE DOUBLE 127855.GPJ NC\_DOT.GDT 4/26/13

# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

# NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

WBS 50000.1.STR11T1B		TIP P-5208G	COUNTY MECKLENBURG	GEOLOGIST Flora, M. E.
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road				GROUND WTR (ft)
BORING NO. B1-A	STATION 10640+21	OFFSET 5 ft RT	ALIGNMENT M1G	0 HR. N/A
COLLAR ELEV. 722.6 ft	TOTAL DEPTH 71.0 ft	NORTHING 571,524	EASTING 1,487,499	24 HR. 20.1
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 94% 02/15/2013		DRILL METHOD NQ Casing W/SPT & Core		HAMMER TYPE Automatic
DRILLER Gower, S. D.		START DATE 02/07/13	COMP. DATE 02/08/13	SURFACE WATER DEPTH N/A

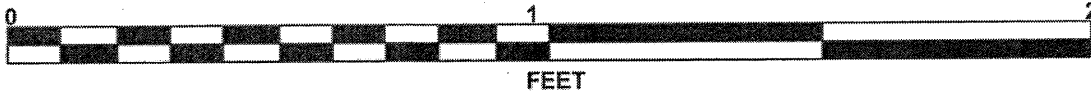
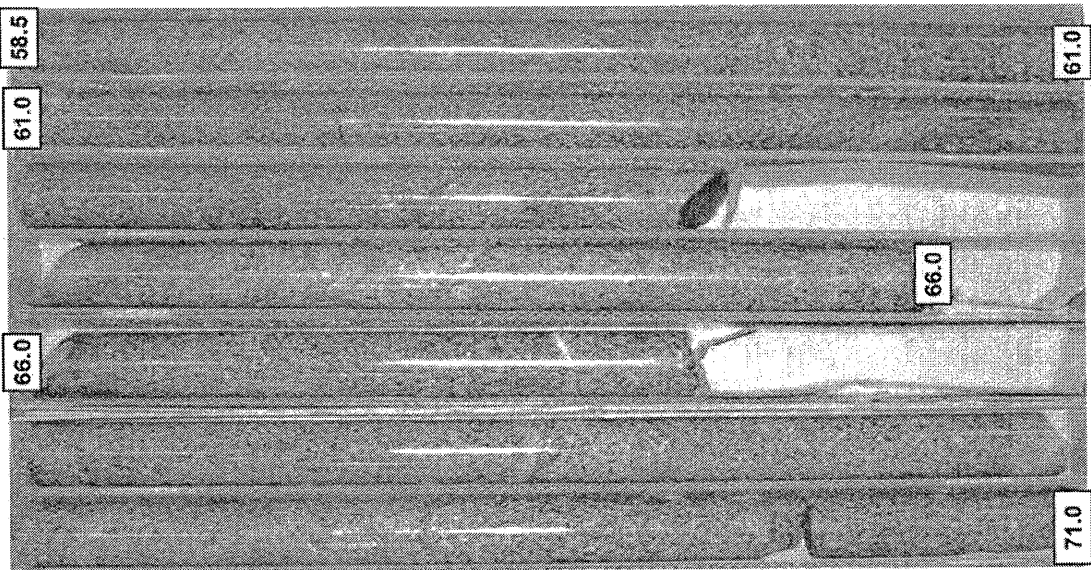
WBS 50000.1.STR11T1B		TIP P-5208G	COUNTY MECKLENBURG	GEOLOGIST Flora, M. E.
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road				GROUND WTR (ft)
BORING NO. B1-A	STATION 10640+21	OFFSET 5 ft RT	ALIGNMENT M1G	0 HR. N/A
COLLAR ELEV. 722.6 ft	TOTAL DEPTH 71.0 ft	NORTHING 571,524	EASTING 1,487,499	24 HR. 20.1
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 94% 02/15/2013		DRILL METHOD NQ Casing W/SPT & Core		HAMMER TYPE Automatic
DRILLER Gower, S. D.		START DATE 02/07/13	COMP. DATE 02/08/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75					
725													GROUND SURFACE	0.0
721.6		1.0	2	2	2					SS-4	21%		ARTIFICIAL FILL (ENGINEERED) Gray, Fine Sandy, Silty CLAY	3.0
720		3.5	4	11	12					M			Brown, Coarse to Fine Sandy SILT	5.0
715		6.0	12	16	18					M			RESIDUAL Brown, Silty Coarse to Fine SAND	8.5
714.1		8.5	60/0.1							M			CRYSTALLINE ROCK METAMORPHOSED QUARTZ DIORITE	8.5
710		13.5	5	7	53					SS-5	12%		RESIDUAL Brown, White, and Gray, Coarse to Fine Sandy SILT	13.5
705		18.5	3	6	7									
700		23.5	5	8	10									
695		28.5	6	7	10									
690		33.5	6	10	12									
685		38.5	7	11	13									
680		43.5	12	20	21					SS-6	16%		Gray, Micaceous, Silty Coarse to Fine SAND	43.5
675		48.5	31	69/0.1									WEATHERED ROCK Gray METAMORPHOSED QUARTZ DIORITE	47.0
670		53.5	21	30	38								RESIDUAL Gray, Micaceous, Silty Coarse to Fine SAND	51.0
665		58.5	60/0.0										CRYSTALLINE ROCK White, Black, and Gray METAMORPHOSED QUARTZ DIORITE	58.5
660														
655														
													651.6	Boring Terminated at Elevation 651.6 ft in Crystalline Rock: METAMORPHOSED QUARTZ DIORITE

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (%)		REC. (%)	ROD (%)			
714.1											Begin Coring @ 8.5 ft	
713.8		8.5	0.3	0.43/0.3	(0.0)	(0.0)		(0.0)	(0.0)		CRYSTALLINE ROCK METAMORPHOSED QUARTZ DIORITE	8.5
710				N=60						SS-5	RESIDUAL Brown, White, and Gray, Coarse to Fine Sandy SILT	
705				N=13								
700				N=18								
695				N=17								
690				N=22								
685				N=24								
680				N=41						SS-6	Gray, Micaceous, Silty Coarse to Fine SAND	42.0
675				N=100/0.6							WEATHERED ROCK Gray METAMORPHOSED QUARTZ DIORITE	47.0
670				N=68							RESIDUAL Gray, Micaceous, Silty Coarse to Fine SAND	51.0
665	664.1	58.5	2.5	N=60/0.0 7.40/1.0 5.02/1.0 2.41/0.5	(2.0)	(2.0)		(12.0)	(12.0)		CRYSTALLINE ROCK White, Black, and Gray, Very Slight Weathering, Hard METAMORPHOSED QUARTZ DIORITE with Moderately Close Fracture Sacing	58.5
660	661.6	61.0	5.0	5.21/1.0 5.06/1.0 4.22/1.0 4.13/1.0 4.52/1.0	(5.0)	(5.0)					2 Fractures at 60 Degrees 1 Fracture at 45 Degrees 2 Fractures at 30 Degrees	
655	656.6	66.0	5.0	3.26/1.0 4.02/1.0 3.47/1.0 3.36/1.0 3.49/1.0	(5.0)	(5.0)						
651.6		71.0									Boring Terminated at Elevation 651.6 ft in Crystalline Rock: METAMORPHOSED QUARTZ DIORITE	71.0

# CORE PHOTOGRAPHS

**B1-A**  
BOXES 1 and 2: 58.5 - 71.0 FEET







**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Fiora, M. E.									
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)								
BORING NO. B1-B		STATION 10640+17		OFFSET 24 ft RT		ALIGNMENT M1G									
COLLAR ELEV. 722.6 ft		TOTAL DEPTH 75.8 ft		NORTHING 571,542		EASTING 1,487,492									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013			DRILL METHOD NQ Casing W/SPT & Core			HAMMER TYPE Automatic									
DRILLER Toothman, R. E.		START DATE 11/26/12		COMP. DATE 11/27/12		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
730															
725															
720	721.6	1.0	6	4	6										
	719.1	3.5	7	7	13										
	716.6	6.0	5	11	13										
715	714.1	8.5	10	13	17										
	709.1	13.5	17	15	16										
	704.1	18.5	9	10	12										
700	699.1	23.5	7	9	60										
	694.1	28.5	10	12	14										
695	689.1	33.5	13	15	20										
	684.1	38.5	10	11	13										
690	679.1	43.5	10	15	18										
	674.1	48.5	71	39	0.3										
685	669.1	53.5	100	0.3											
	666.4	56.2	60	0.0											
680															
675															
670															
665															
660															
655															
650															

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Fiora, M. E.									
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)								
BORING NO. B1-B		STATION 10640+17		OFFSET 24 ft RT		ALIGNMENT M1G									
COLLAR ELEV. 722.6 ft		TOTAL DEPTH 75.8 ft		NORTHING 571,542		EASTING 1,487,492									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013			DRILL METHOD NQ Casing W/SPT & Core			HAMMER TYPE Automatic									
DRILLER Toothman, R. E.		START DATE 11/26/12		COMP. DATE 11/27/12		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
650															

NCDOT BORE DOUBLE 127855.GPJ NC DOT.GDT 4/26/13

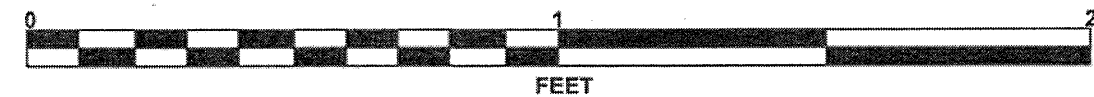
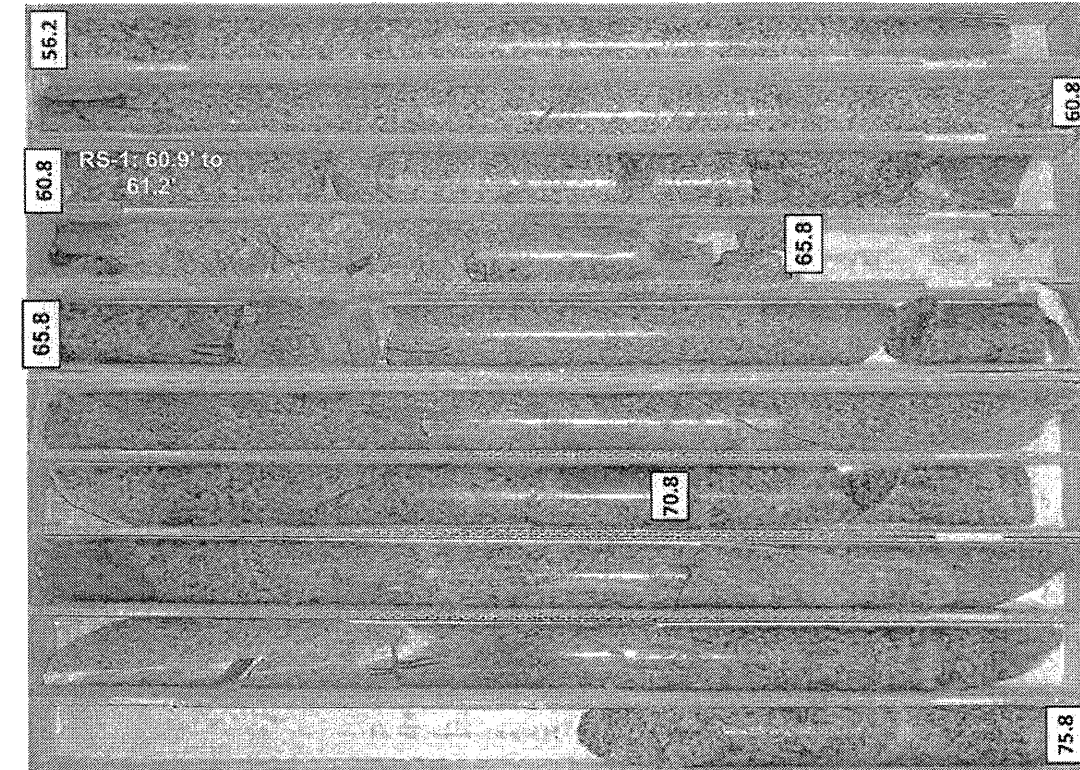


**NCDOT GEOTECHNICAL ENGINEERING UNIT  
CORE BORING REPORT**

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Fiora, M. E.					
SITE DESCRIPTION Millbrook to Junker on the NCR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)				
BORING NO. B1-B		STATION 10640+17		OFFSET 24 ft RT		ALIGNMENT M1G					
COLLAR ELEV. 722.6 ft		TOTAL DEPTH 75.8 ft		NORTHING 571,542		EASTING 1,487,492					
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013				DRILL METHOD NQ Casing W/SPT & Core		HAMMER TYPE Automatic					
DRILLER Toothman, R. E.		START DATE 11/26/12		COMP. DATE 11/27/12		SURFACE WATER DEPTH N/A					
CORE SIZE NQ		TOTAL RUN 19.6 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	ROD (ft) %	REC. (ft) %	ROD (ft) %			
666.4										Begin Coring @ 56.2 ft	
665	666.4	56.2	4.6	N=60/0.0 4:10/0.6 8:30/1.0 10:32/1.0 3:19/1.0 3:10/1.0	(3.9) 85%	(3.9) 85%	(3.9) 100%	(3.9) 100%		666.4 CRYSTALLINE ROCK White and Gray, Fresh to Very Slight Weathering, Very Hard to Moderately Hard METAMORPHOSED QUARTZ DIORITE with Moderately Close Fracture Sacing	56.2 60.1
660	661.8	60.8	5.0	4:15/1.0 2:50/1.0 4:09/1.0 2:55/1.0 8:25/1.0	(3.0) 60%	(1.3) 26%	(1.8) 34%	(1.4) 26%	RS-1	1 Fracture at 60 Degrees White and Gray, Moderate to Moderately Severe Weathering, Hard to Moderately Hard METAMORPHOSED QUARTZ DIORITE with Close Fracture Spacing	60.1 65.4
655	656.8	65.8	5.0	5:25/1.0 4:24/1.0 5:50/1.0 4:15/1.0 5:25/1.0	(4.9) 98%	(4.7) 94%	(10.3) 99%	(10.1) 97%		3 Fracture at 75 Degrees 2 Fracture at 60 Degrees 1 Fracture at 45 Degrees	65.4
650	651.8	70.8	5.0	4:35/1.0 5:43/1.0 5:50/1.0 5:49/1.0 7:15/1.0	(5.0) 100%	(5.0) 100%				R1=12, R2=8, R3=10, R4=20, R5=4, RMR = 54 ROCK CLASS III, ROCK TYPE E	
	646.8	75.8								White and Gray, Very Slight Weathering, Very Hard METAMORPHOSED QUARTZ DIORITE with Moderately Close Fracture Spacing 6 Fracture at 60 Degrees to 80 Degrees 1 Fracture at 45 Degrees 2 Fractures at 10 Degrees Some Soil Infilling in the Fracture at 69.9 feet Boring Terminated at Elevation 646.8 ft in Crystalline Rock: METAMORPHOSED QUARTZ DIORITE	75.8

**CORE PHOTOGRAPHS**

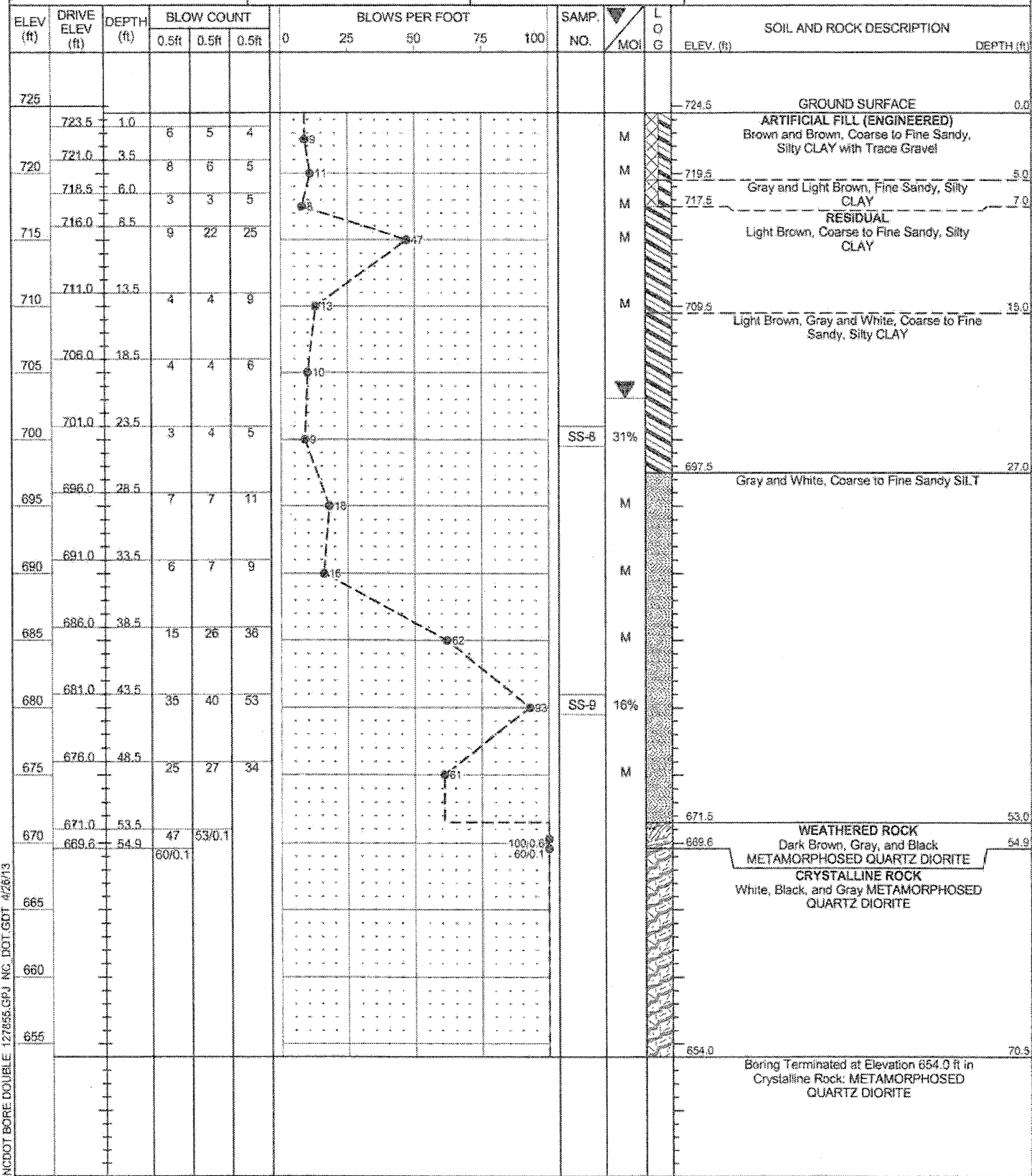
**B1-B**  
BOXES 1 and 2: 56.2 - 75.8 FEET



NCDOT CORE DOUBLE 127855.GPJ, NC\_DOT.GDT 4/26/13

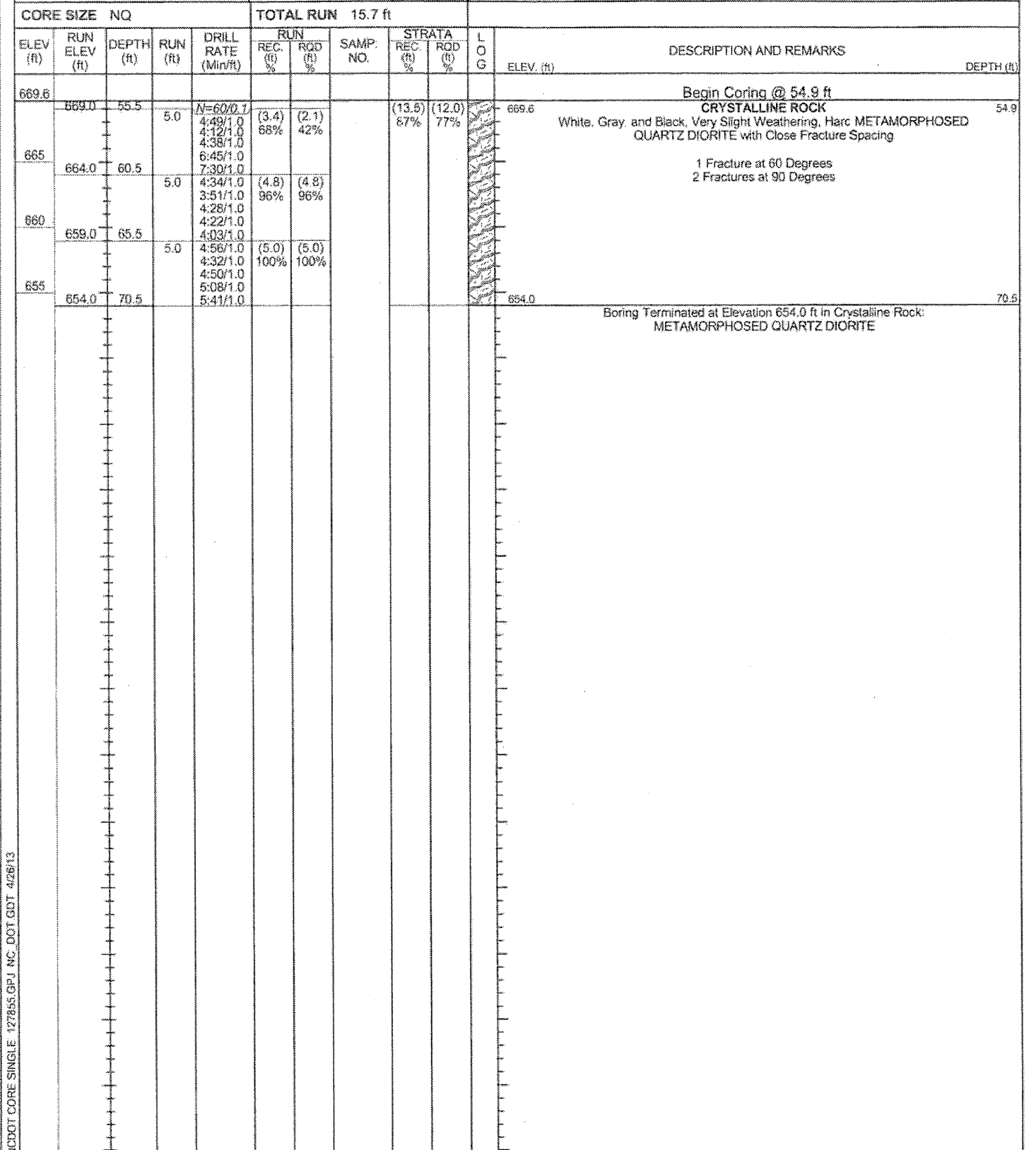
NCDOT GEOTECHNICAL ENGINEERING UNIT  
**BORELOG REPORT**

WBS 50000.1.STR11T1B	TIP P-5208G	COUNTY MECKLENBURG	GEOLOGIST Fregosi, J. D.
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road			GROUND WTR (ft)
BORING NO. B2-A	STATION 10641+35	OFFSET 9 ft RT	ALIGNMENT M1G
COLLAR ELEV. 724.5 ft	TOTAL DEPTH 70.5 ft	NORTHING 571,465	EASTING 1,487,401
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD NQ Casing W/SPT & Core	HAMMER TYPE Autmatic
DRILLER Toothman, R. E.	START DATE 11/20/12	COMP. DATE 11/21/12	SURFACE WATER DEPTH N/A



NCDOT GEOTECHNICAL ENGINEERING UNIT  
**CORE BORING REPORT**

WBS 50000.1.STR11T1B	TIP P-5208G	COUNTY MECKLENBURG	GEOLOGIST Fregosi, J. D.
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road			GROUND WTR (ft)
BORING NO. B2-A	STATION 10641+35	OFFSET 9 ft RT	ALIGNMENT M1G
COLLAR ELEV. 724.5 ft	TOTAL DEPTH 70.5 ft	NORTHING 571,465	EASTING 1,487,401
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD NQ Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Toothman, R. E.	START DATE 11/20/12	COMP. DATE 11/21/12	SURFACE WATER DEPTH N/A



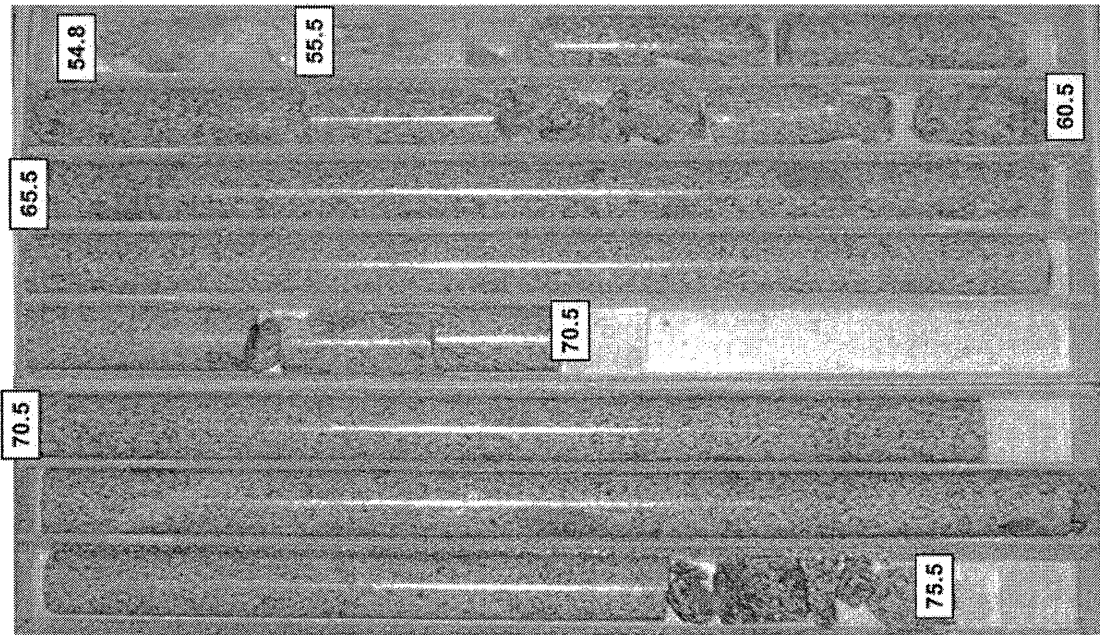
NCDOT BORE DOUBLE 127855.GPJ NC\_DOT\_GDT 4/26/13

NCDOT CORE SINGLE 127855.GPJ NC\_DOT\_GDT 4/26/13

# CORE PHOTOGRAPHS

**B2-A**

BOXES 1 and 2: 54.8 - 75.5 FEET





WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Wells, T. R.								
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)							
BORING NO. B2-B		STATION 10641+34		OFFSET 20 ft RT		ALIGNMENT M1G								
COLLAR ELEV. 724.5 ft		TOTAL DEPTH 48.8 ft		NORTHING 571,475		EASTING 1,487,396								
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Gower, S. D.		START DATE 11/15/12		COMP. DATE 11/15/12		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75					
725													724.5	0.0
	723.5	1.0	6	9	8									
720	721.0	3.5	3	4	5									
	718.5	6.0	3	4	4									
715	716.0	8.5	8	8	15									
	711.0	13.5	3	5	6									
710	706.0	18.5	4	5	7									
705	701.0	23.5	2	3	4									
700	696.0	28.5	3	6	11									
695	691.0	33.5	10	9	12									
685	686.0	38.5	16	25	31									
680	681.0	43.5	100/0.4										683.0	41.5
	676.0	48.5	100/0.3										675.7	48.8

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Fiora, M. E.								
SITE DESCRIPTION Millbrook to Junker on the NCRR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)							
BORING NO. B2-B(1)		STATION 10641+37		OFFSET 20 ft RT		ALIGNMENT M1G								
COLLAR ELEV. 724.5 ft		TOTAL DEPTH 51.3 ft		NORTHING 571,476		EASTING 1,487,392								
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013				DRILL METHOD NQ Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Toothman, R. E.		START DATE 11/16/12		COMP. DATE 11/20/12		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75					
725													724.5	0.0
720														
715														
710														
705														
700														
695														
690														
685	684.8	39.7	60/0.0										684.8	39.7
680														
675														

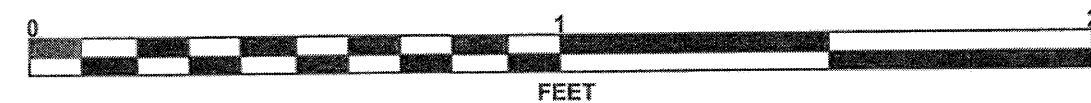
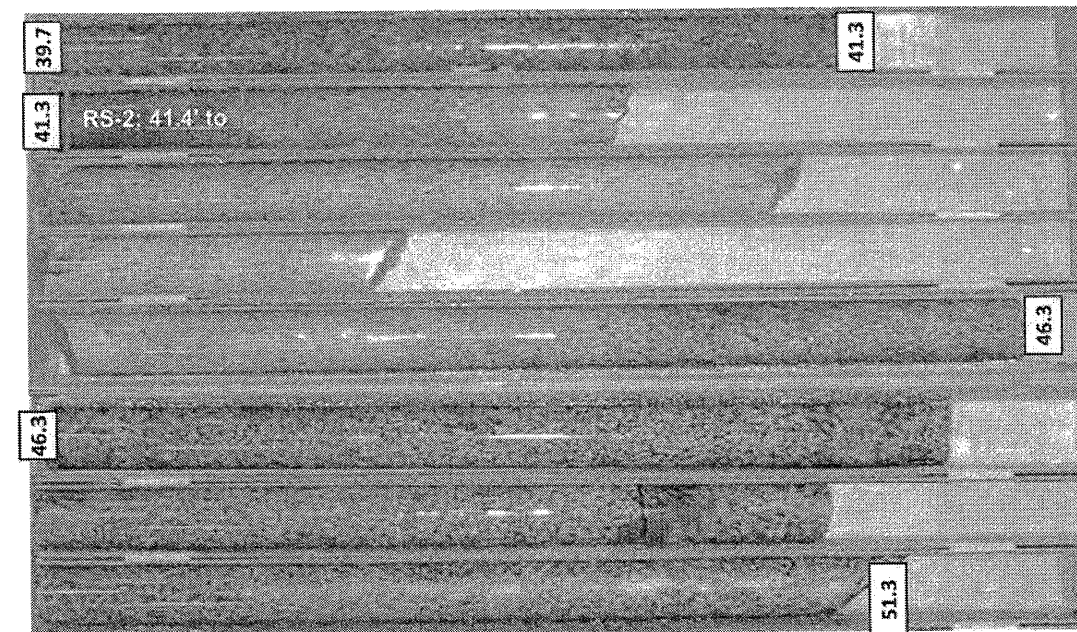
NCDOT BORE DOUBLE 127855.GPJ NC DOT.GDT 4/26/13

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**CORE BORING REPORT**

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Fiora, M. E.						
SITE DESCRIPTION Millbrook to Junker on the NCR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)					
BORING NO. B2-B(1)		STATION 10641+37		OFFSET 20 ft RT		ALIGNMENT M1G						
COLLAR ELEV. 724.5 ft		TOTAL DEPTH 51.3 ft		NORTHING 571,476		EASTING 1,487,392						
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013				DRILL METHOD NQ Casing W/SPT & Core		HAMMER TYPE Automatic						
DRILLER Toothman, R. E.		START DATE 11/16/12		COMP. DATE 11/20/12		SURFACE WATER DEPTH N/A						
CORE SIZE NQ		TOTAL RUN 11.6 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (ft)		REC. (%)	ROD (ft)			
684.8	684.8	39.7	1.6	N=60/0.0 3:45/0.6	(1.5)	(1.5)		(11.3)	(11.1)	684.8 CRISTALLINE ROCK White, Black, and Gray, Fresh to Very Slight Weathering, Hard METAMORPHOSED QUARTZ DIORITE with Close Fracture Spacing  1 Fracture at 45 Degrees 2 Fractures at 30 Degrees  R1=7, R2=20, R3=20, R4=20, R5=4, RMR = 71 ROCK CLASS II, ROCK TYPE E	39.7	
	683.2	41.3	5.0	5:25/1.0	(4.9)	(4.9)	RS-2					
680				7:24/1.0								
	678.2	46.3		5:49/1.0								
			5.0	6:55/1.0	(4.8)	(4.6)						
675				7:30/1.0								
	673.2	51.3		9:39/1.0								
				8:21/1.0								
				8:08/1.0								
				7:35/1.0								
				7:31/1.0								
											673.2	
Boring Terminated at Elevation 673.2 ft in Crystalline Rock: METAMORPHOSED QUARTZ DIORITE												

**CORE PHOTOGRAPHS**

**B2-B(1)**  
 BOXES 1 and 2: 39.7 - 51.3 FEET







# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Fiora, M. E.										
SITE DESCRIPTION Millbrook to Junker on the NCR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 10641+95		OFFSET 53 ft LT		ALIGNMENT M1G										
COLLAR ELEV. 712.4 ft		TOTAL DEPTH 64.2 ft		NORTHING 571,379		EASTING 1,487,385										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Toothman, R. E.		START DATE 12/03/12		COMP. DATE 12/03/12		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						
715																
	711.4	1.0	4	8	20											712.4
710	708.9	3.5	8	11	13											
	706.4	6.0	4	4	6											
705	703.9	8.5	3	4	4											
	698.9	13.5	3	4	5											
700	693.9	18.5	3	3	6											
	688.9	23.5	3	6	9											
695	683.9	28.5	6	8	13											
	678.9	33.5	7	10	13											
690	673.9	38.5	10	16	19											
	668.9	43.5	6	11	18											
685	663.9	48.5	10	18	30											
	658.9	53.5	100/0.4													
680	653.9	58.5	100/0.3													
	648.9	63.5	100/0.7													
675																
670																
665																
660																
655																
650																

WBS 50000.1.STR11T1B		TIP P-5208G		COUNTY MECKLENBURG		GEOLOGIST Wells, T. R.										
SITE DESCRIPTION Millbrook to Junker on the NCR/NS Mainline: Bridge over Mallard Creek Church Road							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 10641+80		OFFSET 23 ft RT		ALIGNMENT M1G										
COLLAR ELEV. 724.2 ft		TOTAL DEPTH 48.5 ft		NORTHING 571,451		EASTING 1,487,356										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Toothman, R. E.		START DATE 11/14/12		COMP. DATE 11/14/12		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						
725																
	723.2	1.0	2	3	3											
720	720.7	3.5	6	8	6											
	718.2	6.0	3	4	5											
715	715.7	8.5	3	6	7											
	710.7	13.5	4	5	7											
710	705.7	18.5	2	3	4											
	700.7	23.5	3	4	7											
705	695.7	28.5	4	5	5											
	690.7	33.5	3	3	3											
700	685.7	38.5	2	4	8											
	680.7	43.5	3	3	4											
695	675.7	48.5	60/0.0													
690																
685																
680																
675																
670																
665																
660																
655																
650																

NCDOT BORE DOUBLE 127855.GPJ NC\_DOT\_GDT 4/28/13



**SUMMARY OF LABORATORY TEST DATA**

**PROJECT NO. 50000.1.STR11T1B (P-5208G)**  
**FA NO. N/A**  
**COUNTY: MECKLENBURG**  
**BRIDGE ON NCRR/NS MAINLINE OVER MALLARD CREEK CHURCH ROAD**

Boring Number	Sample Depth (ft.)	Sample No.*	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	Atterberg Limits			Gradation Results							
						L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
EB1-A	1.0 – 2.5	SS-1	23.2	A-6 (5)	5	36	22	14	99.9	83.3	56.2	46.1	25.6	20.4	32.0	21.9
EB1-B	3.5 – 5.0	SS-2	17.9	A-6 (4)	45	39	26	13	99.8	84.3	55.2	49.4	25.6	23.7	30.7	19.9
EB1-B	23.5 – 25.0	SS-3	19.4	A-4 (0)	16	25	NP	NP	100.0	78.8	39.2	66.4	34.2	32.2	23.9	9.7
B1-A	1.0 – 2.5	SS-4	21.4	A-6 (7)	4	31	15	16	98.8	85.6	62.9	37.4	20.7	15.5	26.5	36.1
B1-A	13.5 – 15.0	SS-5	11.7	A-4 (0)	60	27	18	9	89.8	66.2	40.6	63.1	32.8	20.0	26.5	10.4
B1-A	43.5 – 45.0	SS-6	16.4	A-2-4(0)	41	21	NP	NP	99.7	77.5	33.8	67.4	36.3	30.8	22.0	10.6
B1-B	6.0 – 7.5	SS-7	35.5	A-7-5 (12)	24	46	35	11	99.8	95.4	88.2	15.7	5.6	9.9	66.3	18.0
B2-A	23.5 – 25.0	SS-8	30.8	A-6 (7)	9	40	29	11	99.1	91.2	73.1	31.5	11.3	19.3	58.9	9.6
B2-A	43.5 – 45.0	SS-9	16.3	A-4 (0)	93	26	NP	NP	99.4	84.4	46.4	59.6	23.7	35.4	34.8	5.6
B2-B	1.0 – 2.5	SS-10	15.1	A-6 (7)	17	36	17	19	99.1	81.5	57.6	45.6	27.9	16.9	21.2	33.2
B2-B	18.5 – 20.0	SS-11	39.9	A-7-6 (6)	12	44	27	17	93.8	74.3	53.6	49.9	27.3	16.4	33.1	17.0
EB2-A	13.5 – 15.0	SS-12	31.1	A-6 (4)	9	36	23	13	99.4	77.8	53.1	50.5	29.1	20.9	35.8	13.7
EB2-A	23.5 – 25.0	SS-13	24.4	A-4 (3)	15	36	26	10	99.7	84.5	56.2	48.2	23.5	24.4	40.3	11.5
EB2-A	38.5 – 40.0	SS-14	13.6	A-2-4 (0)	35	23	NP	NP	99.5	72.5	33.9	70.6	39.2	30.9	23.9	5.5
EB2-B	18.5 – 20.0	SS-15	25.3	A-4 (0)	7	33	28	5	99.0	74.7	42.9	62.1	34.5	26.6	31.4	6.5

SS = Split-Barrel Sample (ASTM-D-1586) ST = Shelby Tube (Undisturbed) Sample

S = Grab Sample

NP -- Non Plastic

NA-- Non Applicable

Lab Technician:

  
 Joshua D. Fregosi

NCDOT Certification No.: 111-05-1203

SITE PHOTOGRAPHS



View Looking Upstation along -M1G- from End Bent 1



View Looking Downstation along -M1G- from End Bent 2