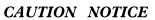


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THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALE(OF BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT INGEESSARILY 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 SOLL MOISTURE CONDITIONS MOICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL MOISTIGE 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 INTERRETATIONS MADE, OR OPNION 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 IMINSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- FES: THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. BY HAVING REDUESTED 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

C. WANG

S. DAVIS

M. RENZA

T. WALKER

INVESTIGATED BY \_\_\_\_\_\_.

DRAWN BY D. RACEY

CHECKED BY \_P. ALTON

SUBMITTED BY \_P. ALTON

DATE \_\_\_\_\_\_ 2015



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

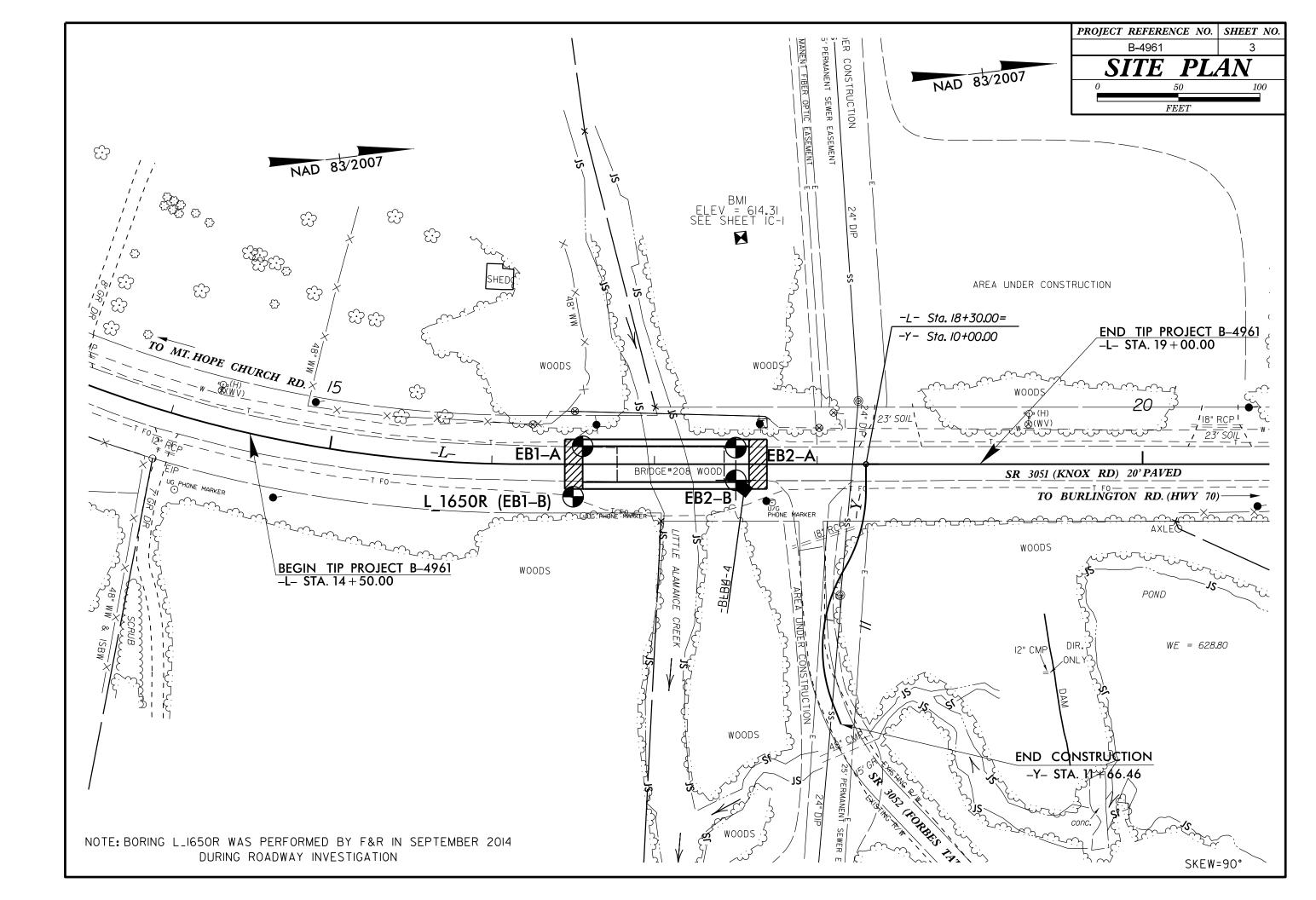
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

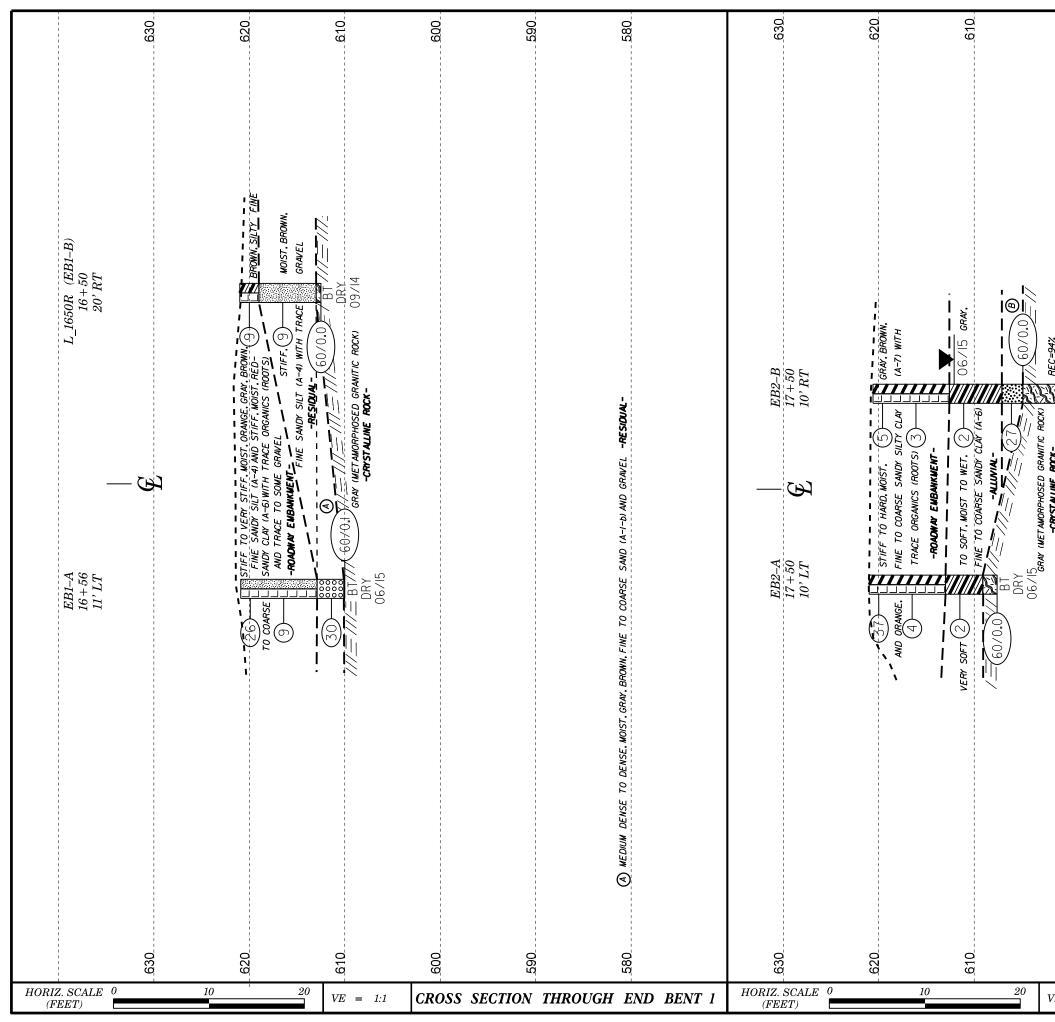
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT I SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OF
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
AS MINERALOGICAL COMPOSITION, ANOULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SULTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAVERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VA ROCK (WR) 100 BLOWS PER FOOT IF TESTED.
GENERAL CRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK TH
LLASS. ( \$ 39% PASSING *200) ( > 39% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDE:
GROUP         A-1         A-3         A-2         A-4         A-5         A-6         A-7         A-1, A-2         A-4, A-5           CLASS.         A-1-a         A-1-b         A-2-4         A-2-5         A-2-6         A-2-7         A-3         A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLA
SYMBOL SCOORDON STATES STATES STATES	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK (NCR) ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE,
100 50 MX GRANULAR SILT- MUCK, 40 30 MX 50 MX 51 MN SOLLAY PEAT	PERCENTAGE OF MATERIAL	
■200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS
MATERIAL PASSING *40 LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR	TRACE OF ORGANIC MATTER         2         -3%         3         -5%         TRACE         1         -10%           LITTLE ORGANIC MATTER         3         -5%         5         -12%         LITTLE         10         -20%           MODERATELY ORGANIC         5         -10%         12         -20%         SOME         20         -35%	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATING (V SLI). CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE HUHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE GROUND WATER	OF A CRYSTALLINE NATURE.
USUAL TYPES STORE FRACS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP (SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELC CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOW
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN
GEN, RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR UNSUITABLE	∑PW         PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA           ○●∭1→         SPRING OR SEEP	(MOD.) GRANITOLD ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROC DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS CO WITH FRESH ROCK.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSP SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF
		(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN S
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT
GENERALLY VERY LOOSE < 4	SOIL SYMBOL	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KA
GRANULAR MEDIUM DENSE 10 TO 30 N/A		TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</u>
MATERIAL DENSE 30 TO 50 (NON-COHESIVE) VERY DENSE > 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISC SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRO
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY CORE BORING • SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY
GENERALLY         SOFT         2 TO 4         0.25 TO 0.5           SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES</u> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMA
MATERIAL         STIFF         8 T0 15         1 T0 2           (COHESIVE)         VERY STIFF         15 T0 30         2 T0 4           HARD         > 30         > 4	HILD HOLK EINE     HILD HOL	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPP ALSO AN EXAMPLE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	[XX] UNDERCUT [77] UNCLASSIFIED EXCAVATION - [75] UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQU SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS F
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY (BLDR.) (COB.) (GR.) SAND SAND (SL.) (CL.)		TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CA
(LSE, SU.) (F SU.)		HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHE BY MODERATE BLOWS.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{d}$ - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS POINT OF A GEOLOGIST'S PICK.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGM
(ATTERBERG LIMITS) DESCRIPTION OFFICE PORTABLE DESCRIPTION	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMA PIECES CAN BE BROKEN BY FINGER PRESSURE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO         SD SAND, SANDY         SS - SPLIT SPOON           F - FINE         SL SILT, SILTY         ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECE
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED REA FINGERNAIL.
RANGE C - WET - (W) SEMISULIDE REUDINES DRYING TO	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING
	HI HIGHLY V - VERY RATIO EQUIPMENT USED ON SUBJECT PROJECT	TERM         SPACING         TERM         THICK           VERY WIDE         MORE THAN 10 FEET         VERY THICKLY BEDDED         4 FE
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.
SL SHRINKAGE LIMIT		CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.
- DRY - (D) ATTAIN OPTIMUM MOISTURE	X CME-55 6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0. THINLY LAMINATED < 0.008
PLASTICITY	X         CHE-55         X         8' HOLLOW AUGERS         B         I	INDURATION
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X-N Q3	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PR
NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	VANE SHEAR TEST	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL P
	PORTABLE HOIST	BREAKS EASILY WHEN HIT WITH HAMMER.
	U TRICONE TUNGCARB.	INDURATED DIFFICULT TO BREAK WITH HAMMER.
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.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: SAMPLE BREAKS ACROSS GRAINS.

# PROJECT REFERENCE NO.



	TERMS AND DEFINITIONS
AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
FOOT PER 60 S OFTEN	ADUIFER - A WATER BEARING FORMATION OR STRATA.
5 OF TEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
N VALUES >	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.
N VHEUES /	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
K THAT _UDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
TESTED.	<u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
MAY NOT YIELD ONE, CEMENTED	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.
INGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
ATINGS IF OPEN. MMER BLOWS IF	DIPLOVINEL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP. MEASURED CLOCKWISE FROM NORTH.
K UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
FELDSPAR BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
ROCK HAS	PARENT MATERIAL.
AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
LDSPARS DULL SS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
EN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
IDENT BUT	LEDCE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
E KAOLINIZED	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
DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
STRONG ROCK ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
LUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
I SMALL AND SAPROLITE IS	ROCK DUALITY DESIGNATION (ROD) - A MEASURE OF ROCK DUALITY DESCRIBED BY TOTAL LENOTH OF ROCK SEGMENTS EDUAL 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
REQUIRES	ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
DWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
P CAN BE TACHED	<u>SLICKENSIDE</u> - 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
PICK POINT. LOWS OF THE	A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN & IFOOT PER 60 BLOWS.
RAGMENTS SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
PIECES 1 INCH	STRATA ROCK DUALITY DESIGNATION (SROD) - A MEASURE OF ROCK DUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EDUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
D READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: BL-4, N: 843518.4803, E: 1809465.5372
HICKNESS	
4 FEET - 4 FEET	ELEVATION: 620.26 FEET
- 1.5 FEET - 0.16 FEET	NOTES:
- 0.03 FEET	
0.008 FEET	
T, PRESSURE, ETC.	
EL PROBE:	
ROBE	



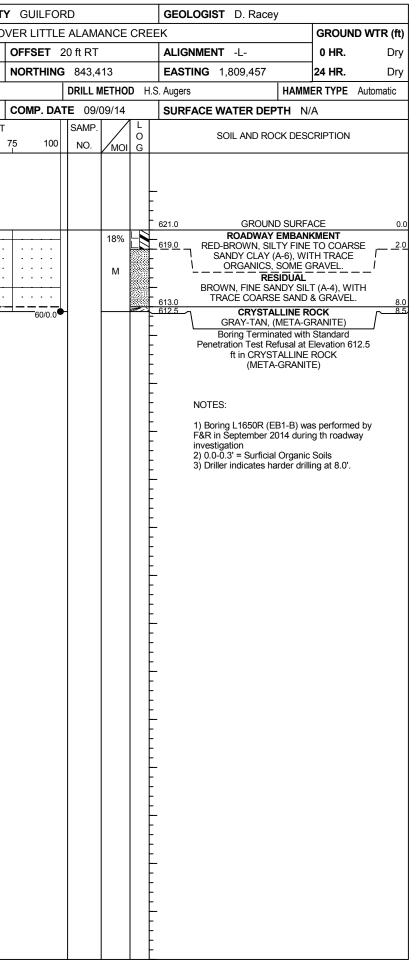


0	Q	PROJECT	REFERENCE	<i>NO</i> .	SHEET	<i>NO</i> .
-009	- 590		B-4961		4	
				1		
<i>4.</i> 7.						
REC=94% R0D=94%						
×						
2042   ш						
-CAYST ALLINE ROCK-			   	- אַ		
Y				ESID		
				(A-2-4) -RESIDUAL-		
				4-2-z		
				E		
				Y FIN		
				SILT		
				ROWN.		
				AY -BI		
				T. CR		
				NOIS		
				ENSE.		
				IN DF		
				B MEDIUN DENSE, MOIST, GRAY-BROWN, SILTY FINE SAND		
				_		
				C		
600	590			570		
VE = 1:1	CROSS	SECTION	THROUGH	ENI	D BEN	Г2

## NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

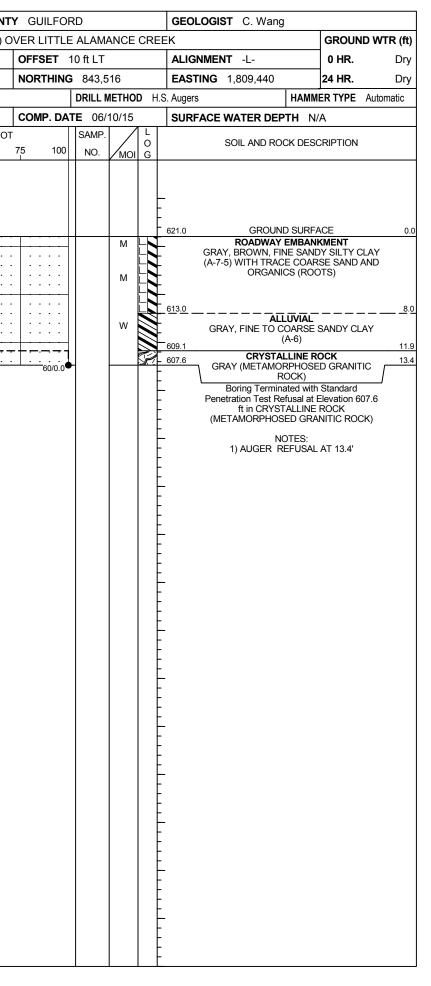
١	WBS         40152.1.1         TIP         B-4961         COUNTY         GUILFORD         GEOLOGIST         C. Wang           SITE DESCRIPTION         BRIDGE NO. 208 ON SR 3051 (KNOX RD.) OVER LITTLE ALAMANCE CREEK         GROUND WTR (ft)												WBS	<b>4</b> 0152	961		COUNT															
SITE DESCRIPTION BRIDGE NO. 208 ON SR 3051 (KNOX RD.) OV											VER LITTL	e alam	ANCE	CRE	EEł	К	SITE	DESCR	RIPTION	BRI	NO. 20	208 ON SR 3051 (KNOX RD.) C										
											OFFSET	11 ft LT				ALIGNMENT -L- 0 HR. Dry				BORING NO. L_1650R (EB1-B)						STATION 16+50						
0	COLI	AR EL	<b>EV.</b> 62	20.9 ft		т	DTAL DEF	<b>TH</b> 10	).9 ft		NORTHING	<b>G</b> 843,4	123			EASTING 1,809,427	24 HR.	Dry														
ſ	DRILL	. RIG/HA	MMER E	FF./DA	TE F8	R2175	CME-55 76	6% 02/25	5/2015			DRILL I	METHO	DD H	I.S.	Augers	HAMMER TYPE	Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE F8	R2175	CME-55	5 76% 0	2/22/201	4				
1	DRIL		6. Davis	-			ART DAT	<b>E</b> 06/2	10/15		COMP. DA		-			SURFACE WATER DEPT	TH N/A		DRIL		ER S. Davis					START DATE 09/09/14						
		DRIVE ELEV		·	W COL					R FOOT	75 400	SAMP.		0		SOIL AND ROCH	K DESCRIPTION		ELEV	DRIVE ELEV	DEPTH		W COL					PER FOOT				
-	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50		75 100	NO.	Имо	I G	E	ELEV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	50 				
	625 620 615	620.9 617.4	- 0.0 - 3.5	3	8	18		26	· · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		M			<b>ROADWAY E</b> ORANGE, GRAY, BF SILT (A-4) WITH TR/ GRAVEL AND ORGA	ACE COARSE SA	ND	625 620 615	621.0	÷	4 3	5	4								
NCDOT BORE DOUBLE B4961_GEO_BH_BRDG0208.GPJ_NC_DOT.GDT_7/20/15				22	18	12		▲ 30-			60/0.1		М			GRAY, BROWN, FINI AND GRAY BIO.0 GRAY (METAMORF RO Boring Terminat Penetration Test Refu ft in CRYSTA (METAMORPHOSE)	VEL (A-1-b) LINE ROCK PHOSED GRANI OCK) ed with Standard usal at Elevation 6 ALLINE ROCK	10.8 10.9				60/0.0										

### SHEET 5 OF 9



WBS	40152	2.1.1			Т	ΊF	P B-4961 COUN	1.
SITE	DESCR		I BRI	DGE I	NO. 2	08	8 ON SR 3051 (KNOX RD.)	(
BOR	ING NO.	EB2-	A				TATION 17+50	
						-	DTAL DEPTH 13.4 ft	
				TE F8		_	CME-55 76% 02/25/2015	_
	LER S					T	TART DATE 06/10/15	_
ELEV (ft)	DRIVE	DEPTH (ft)	BLC 0.5ft	0.5ft	UNT 0.5ft	$\left  \right $	BLOWS PER FO	С
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	617.5 -	3.5		_	-			
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### SHEET 6 OF 9



# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

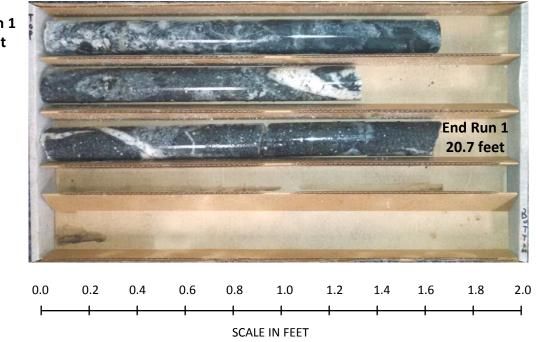


WB		0152.1	-	BOI			TIP			<u> </u>		COUN	ту	GLIII		חמ				GEOLOG		C War	a				ו ו	WBS	·	52.1.1		RE E	-	B-496			
	-				DGE					)51 (4								E C	È			C. Wai	g	GRC		WTR (ft)									3051 (K		
		NO.					STA					( ND.)				0 ft R1								ОН		7.7				<b>0</b> . EB2			-		17+50		ND.) C
		RELE								H 20	) 7 ft		_			843,				EASTIN				24 H		8.5				LEV. 6					<b>PTH</b> 20	7 ft	
				FF./DA	TE E								1.					HOD	SF	PT Core Borin		00,400	НАМ			utomatic									76% 02/25		
		<b>R</b> S.								06/			С	OMP.		<b>FE</b> 06			0.	SURFAC	•	TER DE								S. Davis			-		TE 06/1		
ELEV	, DR	RIVE _	DEPTH		W CO							ER FO				SAMP		Ζ	L	1001010					<u></u>					NQ3	-				N 5.0 ft		
(ft)		LEV	(ft)	0.5ft	0.5ft	0.5	ift C	)	25	5	5	0	75	5	100	NO.	М	OI	O G	ELEV. (ft)	SOI	L AND R	OCK DES	CRIPTI	ON	DEPTH (ft)		ELEV	RUN	, DEPTI	I RUN	DRILL	R		SAMP.		RATA RQD
																												(ft)	ELEV (ft)	(ft)	(ft)	RATE (Min/ft)	(ft) %	RQD (ft) %	NO.	(ft) %	(ft) %
625																				_								604.94	604.0	15.7		0.00/4.0	(4.7)				
		‡																	þ										004.0	, <u> </u>	5.0	3:20/1.0 2:37/1.0 3:26/1.0	94%	(4.7) 94%		94%	(4.7) 94%
620	62	20.6 +	0.0		2														╷┟	620.6			ND SURF		-	0.0		600	599.9	20.7		3:48/1.0 2:54/1.0					
	1	Ŧ		2	2	3		<b>9</b> 5.									M	1 L	N		ORANO	GE, RED	BROWN	, SILTY	CLAY					Ŧ		2.0 // 1.0					
		17.1 T	3.5	2	2	1	-			•••	· · ·						м		N	()			ACE FINE			E				Ŧ							
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610	_	‡				'		2 .	•••	•••	•••		·		•		M			—	GRAY,	SILTY F	NE SANE	DY CLAY	Y (A-6)					‡							
	60	)7.1 <sup>+</sup>	13.5							· · · ·	· · · ·	· · · ·	:	· · · · · ·					Ì	607.1						13.5				Ŧ							
605		05.0 I		3	5	22	2	•••	· · · •	• • • 27	· ·	· · · ·	_:	· · ·	:		м	1	-		RAY B		ESIDUAL BILTY FIN		— — — ) (A-2-4					Ŧ							
			10.7	60/0.0										60	0.0				B			CRYST	ALLINE F	ROCK						Ŧ							
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600		-+													_	-		ľ		_599.9 E	Joring T	erminate	d at Eleva	ation 59	9.9 ft ir	20.7 1				+							
		ŧ																	þ	CF	YSTAL	LINE RO	OCK (MET	AMOR	PHOSE	D				‡							
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	C	OUNT	<b>Y</b> GUILFORD	GEOLOGIST C. Wang	
(N	OX F	RD.) O	VER LITTLE ALAMANCE CREE	K	GROUND WTR (ft)
			OFFSET 10 ft RT	ALIGNMENT -L-	0 HR. 7.7
.7	' ft		NORTHING 843,514	EASTING 1,809,459	<b>24 HR.</b> 8.5
/2	015		DRILL METHOD SPT	Core Boring HAM	MER TYPE Automatic
10	/15		COMP. DATE 06/10/15	SURFACE WATER DEPTH	I/A
F	STR REC.	ATA RQD	L		
	(ft) %	(ft) %	O D D D D D D D D D D D D D D D D D D D	ESCRIPTION AND REMARKS	DEPTH (ft)
				Begin Coring @ 15.7 ft	
	(4.7) 94%	(4.7) 94%	GRAY, VERY SLIGHT	CRYSTALLINE ROCK LY WEATHERED TO FRESH, MODI	15.7 ERATELY HARD
			TO HARD, METAN	ORPHOSED GRANITIC ROCK, CLC FRACTURE SPACING	SE TO WIDE
┝			599.9 Boring Terminate	ed at Elevation 599.9 ft in CRYSTALL	20.7 INE ROCK
				TAMORPHOSED GRANITIC ROCK)	
				EFUSAL AT 15.7', BEGIN CORING /	41 15.7
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# CORE PHOTOGRAPHS: Bridge No. 208 on SR 3051 over Little Alamance Creek, EB2-B 17+50, 10' RT



Begin Run 1 15.7 feet

### Sheet 8



## Bridge No. 208 on SR 3051 (Knox Road) over Little Alamance Creek SITE PHOTOGRAPHS



Photograph No. 1: View of drilling operations at boring EB1-B looking northwest



Photograph No. 2: View of End Bent 1 looking south



Photograph No. 3: View of Forbes Tate Road (-Y-) looking east



Photograph No. 4: View of Little Alamance Creek looking upstream

### Sheet 9