

PROJECT: 17BP.5.R.71 REFERENCE: SF-340025

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY FRANKLIN
 PROJECT DESCRIPTION BRIDGE NO. 25 ON SR 1203
(GREEN HILL RD.) OVER MIDDLE CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-340025	1	14

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

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- NOTES:
1. 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.
 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

TRIGON

GOODNIGHT, D.J.

INVESTIGATED BY DJG

DRAWN BY HILL, M.J.

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SUBMITTED BY FALCON ENG.

DATE AUGUST 2017



[Handwritten Signature] 8/23/17

SIGNATURE DATE

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

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, **VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6**

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.76	2.00	0.42	0.25	0.075	0.053
Boulder (BLDR.)						
Cobble (COB.)						
Gravel (GR.)						
Coarse Sand (CSE. SD.)						
Fine Sand (F SD.)						
Silt (SL.)						
Clay (CL.)						
GRAIN SIZE	305	75	2.0	0.25	0.05	0.005
MM						
IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; 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

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
 STATIC WATER LEVEL AFTER 24 HOURS
 PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
 SPRING OR SEEP

MISCELLANEOUS SYMBOLS

	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		DIP & DIP DIRECTION OF ROCK STRUCTURES
	SOIL SYMBOL		TEST BORING
	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		AUGER BORING
	INFERRED SOIL BOUNDARY		CORE BORING
	INFERRED ROCK LINE		MONITORING WELL
	ALLUVIAL SOIL BOUNDARY		PIEZOMETER INSTALLATION
	SLOPE INDICATOR INSTALLATION		CONE PENETROMETER TEST
	SOUNDING ROD		TEST BORING WITH CORE
	SPT N-VALUE		

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:
<input type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL
<input checked="" type="checkbox"/> CME-55	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:
<input type="checkbox"/> CME-550	<input checked="" type="checkbox"/> 8" HOLLOW AUGERS	<input type="checkbox"/> -B <input type="checkbox"/> -H
<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> HARD FACED FINGER BITS	<input checked="" type="checkbox"/> -N Q2
<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG-CARBIDE INSERTS	HAND TOOLS:
<input type="checkbox"/>	<input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER	<input type="checkbox"/> POST HOLE DIGGER
<input type="checkbox"/>	<input checked="" type="checkbox"/> TRICONE 3 7/8" STEEL TEETH	<input type="checkbox"/> HAND AUGER
<input type="checkbox"/>	<input type="checkbox"/> TRICONE " TUNG-CARB.	<input type="checkbox"/> SOUNDING ROD
<input type="checkbox"/>	<input checked="" type="checkbox"/> CORE BIT	<input type="checkbox"/> VANE SHEAR TEST
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.
ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL.
FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

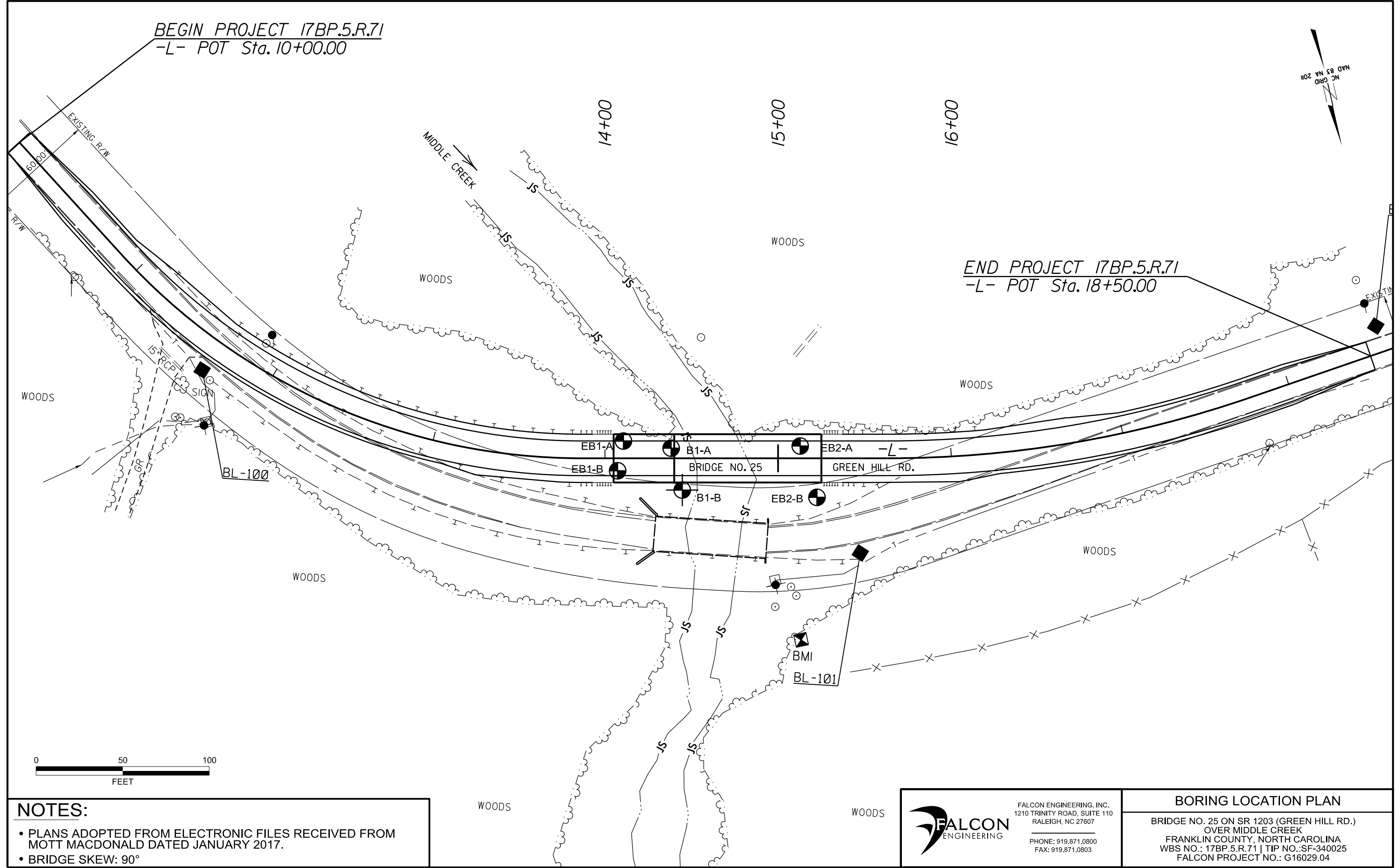
BENCH MARK: BL-101; ALUMINUM TRAVERSE CAP
 N: 882039.8 E: 2151269.5
 STA. 15+47.50 OFFSET: 54.6' RT, -L- ELEVATION: 235.88 FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

BEGIN PROJECT 17BP.5.R.71
 -L- POT Sta. 10+00.00

END PROJECT 17BP.5.R.71
 -L- POT Sta. 18+50.00



NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM MOTT MACDONALD DATED JANUARY 2017.
- BRIDGE SKEW: 90°

FALCON ENGINEERING

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BORING LOCATION PLAN

BRIDGE NO. 25 ON SR 1203 (GREEN HILL RD.)
 OVER MIDDLE CREEK
 FRANKLIN COUNTY, NORTH CAROLINA
 WBS NO.: 17BP.5.R.71 | TIP NO.: SF-340025
 FALCON PROJECT NO.: G16029.04

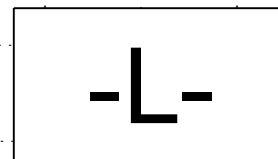
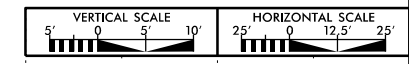
INCOMPLETE PLANS
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HATCH MOTT MACDONALD I & E, LLC
LICENSE NO. F-06697

ICA ENGINEERING
LICENSE NO. F-0258

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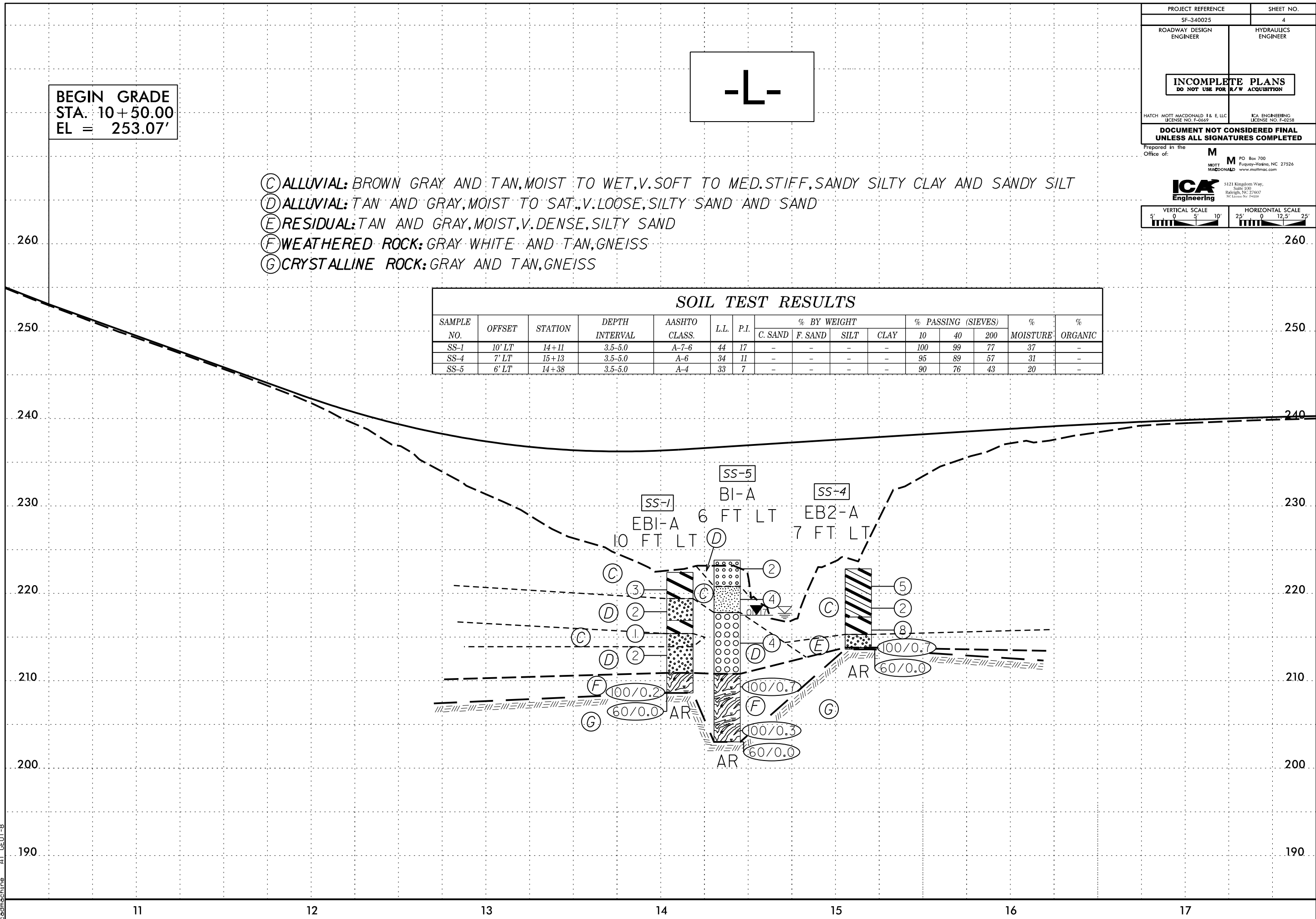
Prepared in the Office of: **M**
MOTT MACDONALD
PO Box 700
Furqoy-Vasno, NC 27526
www.mottmac.com



BEGIN GRADE
STA. 10+50.00
EL = 253.07'

- Ⓒ ALLUVIAL: BROWN GRAY AND TAN, MOIST TO WET, V. SOFT TO MED. STIFF, SANDY SILTY CLAY AND SANDY SILT
- Ⓓ ALLUVIAL: TAN AND GRAY, MOIST TO SAT., V. LOOSE, SILTY SAND AND SAND
- Ⓔ RESIDUAL: TAN AND GRAY, MOIST, V. DENSE, SILTY SAND
- Ⓕ WEATHERED ROCK: GRAY WHITE AND TAN, GNEISS
- Ⓖ CRYSTALLINE ROCK: GRAY AND TAN, GNEISS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	10' LT	14+11	3.5-5.0	A-7-6	44	17	-	-	-	-	100	99	77	37	-
SS-4	7' LT	15+13	3.5-5.0	A-6	34	11	-	-	-	-	95	89	57	31	-
SS-5	6' LT	14+38	3.5-5.0	A-4	33	7	-	-	-	-	90	76	43	20	-



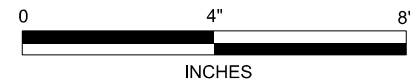
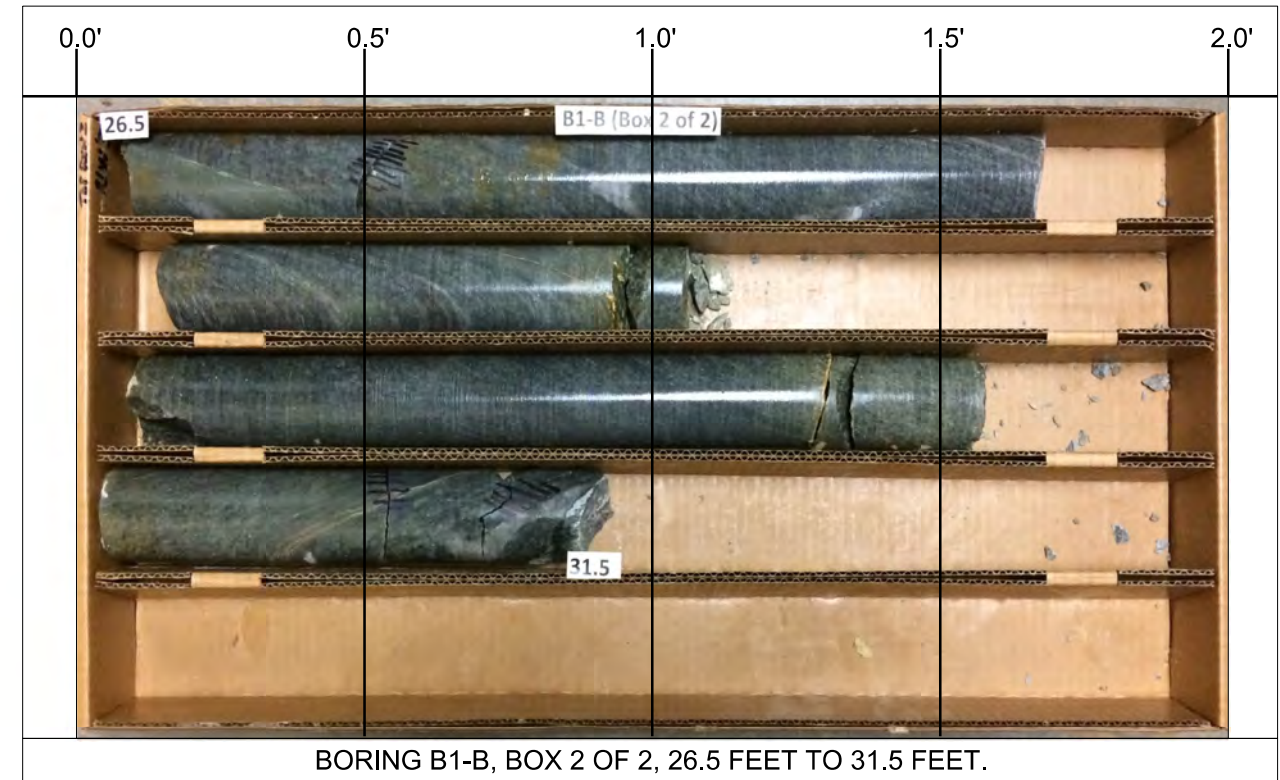
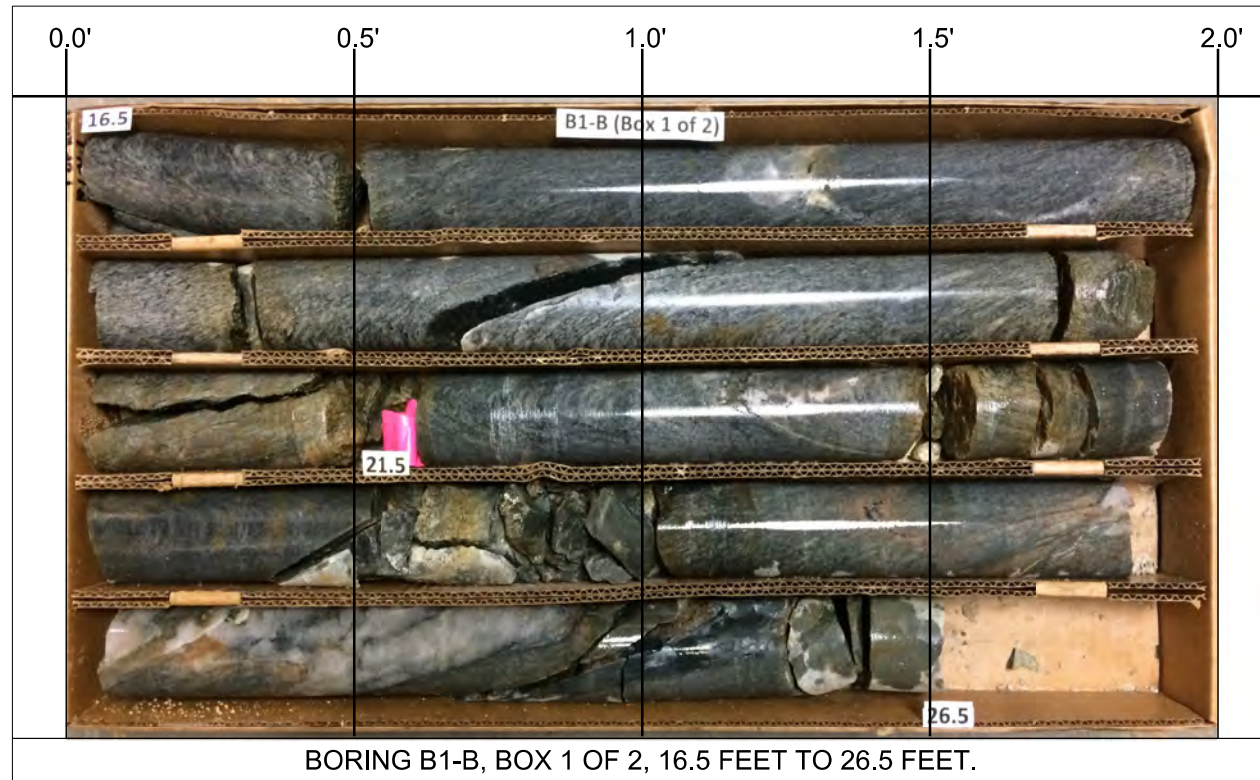
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 cadmachine AT GEOT-8

GEOTECHNICAL BORING REPORT BORE LOG

WBS 17BP.5.R.71		TIP SF-340025		COUNTY FRANKLIN		GEOLOGIST Goodnight, D.										
SITE DESCRIPTION BRIDGE NO. 25 ON SR 1203 (GREEN HILL RD.) OVER MIDDLE CREEK						GROUND WTR (ft)										
BORING NO. EB1-A		STATION 14+11		OFFSET 10 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 222.4 ft		TOTAL DEPTH 13.8 ft		NORTHING 881,947		EASTING 2,151,389										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Toothman, R.		START DATE 04/18/17		COMP. DATE 04/18/17		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						
225																
220	221.4	1.0	2	1	2										222.4	0.0
	218.9	3.5	1	1	1										219.4	3.0
	216.4	6.0	WOH	WOH	1										216.9	5.5
215	213.9	8.5	WOH	WOH	2										215.4	7.0
	208.9	13.5													210.9	11.5
210	208.6	13.8	100/0.0												208.6	13.8
			60/0.0													

WBS 17BP.5.R.71		TIP SF-340025		COUNTY FRANKLIN		GEOLOGIST Goodnight, D.										
SITE DESCRIPTION BRIDGE NO. 25 ON SR 1203 (GREEN HILL RD.) OVER MIDDLE CREEK						GROUND WTR (ft)										
BORING NO. EB1-B		STATION 14+07		OFFSET 7 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 222.4 ft		TOTAL DEPTH 13.0 ft		NORTHING 881,963		EASTING 2,151,396										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Toothman, R.		START DATE 04/18/17		COMP. DATE 04/18/17		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						
225																
220	221.4	1.0	3	2	2										222.4	0.0
	218.9	3.5	1	2	2										219.4	3.0
	216.4	6.0	1	WOH	1										216.9	5.5
215	213.9	8.5	WOH	1	5										215.4	7.0
	209.4	13.0													210.9	11.5
															208.6	13.8

NCDOT BORE DOUBLE BR25 FRANKLIN CO.GPJ NC_DOT.GDT 7/21/17



FALCON
ENGINEERING

FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607

PHONE: 919.871.0800
FAX: 919.871.0803

ROCK CORE PHOTOGRAPHS

BRIDGE NO. 25 ON SR 1203 (GREEN HILL RD.)
OVER MIDDLE CREEK
FRANKLIN COUNTY, NORTH CAROLINA
WBS NO.: 17BP.5.R.71 | TIP NO.:SF-340025
FALCON PROJECT NO.: G16029.04

GEOTECHNICAL BORING REPORT BORE LOG

WBS 17BP.5.R.71		TIP SF-340025		COUNTY FRANKLIN		GEOLOGIST Goodnight, D.										
SITE DESCRIPTION BRIDGE NO. 25 ON SR 1203 (GREEN HILL RD.) OVER MIDDLE CREEK							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 15+13		OFFSET 7 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 222.8 ft		TOTAL DEPTH 9.2 ft		NORTHING 881,972		EASTING 2,151,290										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Toothman, R.		START DATE 04/18/17		COMP. DATE 04/18/17		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						
225																
220	221.8	1.0	1	2	3	5							M	ALLUVIAL BROWN, F. SANDY SILTY CLAY (A-6)	0.0	
	219.3	3.5	1	1	1	2							W			
	216.8	6.0	1	2	6	8							SS-4	GRAY, F. SANDY SILTY CLAY (A-7) WITH TRACE GRAVEL	5.5	
215	214.3	8.5	13	87	0.2								M	RESIDUAL TAN AND GRAY, SILTY SAND (A-2-4), SAPROLITIC WITH SOME ROCK FRAGMENTS	9.0	
	213.8	8.2												WEATHERED ROCK TAN AND GRAY, GNEISS	9.2	
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 213.6 ft ON CR: GNEISS		

WBS 17BP.5.R.71		TIP SF-340025		COUNTY FRANKLIN		GEOLOGIST Goodnight, D.										
SITE DESCRIPTION BRIDGE NO. 25 ON SR 1203 (GREEN HILL RD.) OVER MIDDLE CREEK							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 15+22		OFFSET 23 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 234.1 ft		TOTAL DEPTH 17.0 ft		NORTHING 882,003		EASTING 2,151,287										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Toothman, R.		START DATE 04/18/17		COMP. DATE 04/18/17		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						
235																
	233.1	1.0	2	2	2	4							M	ROADWAY EMBANKMENT RED-TAN, AND GRAY SANDY SILTY CLAY (A-7) WITH TRACE GRAVEL	0.0	
230	230.6	3.5	1	1	2	3							M	TAN-BROWN, SILTY SAND (A-2-4) WITH TRACE GRAVEL	3.0	
	228.1	6.0	1	1	1	2							M	TAN, SANDY SILT (A-4) WITH TRACE GRAVEL AND ORGANICS	5.5	
225	225.6	8.5	WOH	WOH	1								M			
	222.1													RESIDUAL TAN, SILTY SAND (A-2-4) SAPROLITIC	12.0	
220	220.6	13.5	15	20	62									WEATHERED ROCK TAN, GNEISS	15.1	
	217.1	17.0												Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 217.1 ft ON CR: GNEISS		

NCDOT BORE DOUBLE BR25 FRANKLIN CO.GPJ NC_DOT.GDT 7/21/17



LABORATORY TEST RESULTS
 Bridge No. 25 over Middle Cr. on SR 1203
 Franklin County, North Carolina
 Falcon Engineering Project Number: G16029.04
 June 8, 2017

UNIAXIAL COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMENS *Performed in General Accordance with ASTM D7012*

Sample ID.: RC-1
 Location: B1-B
 Depth (ft): 21.5-22.0

Length (in.): 4.49
 Diameter (in.): 1.98
 Area (in²): 3.079
 L/D 2.27

Unit Weight (pcf): 164.9

Compressive Strength (psi): 15980
 Time to Failure, mins:sec: 7:14

Deflection (in.)	Strain (%)	Load (lbf)	Compressive Strength (psi)	Young's Modulus (psi)
0.000	0.000	0	0	
0.005	0.111	4840	1570	1,409,860
0.010	0.223	14440	4690	2,105,810
0.015	0.334	27270	8860	2,652,093
0.020	0.445	40450	13140	2,949,930
0.024	0.535	49200	15980	2,989,592

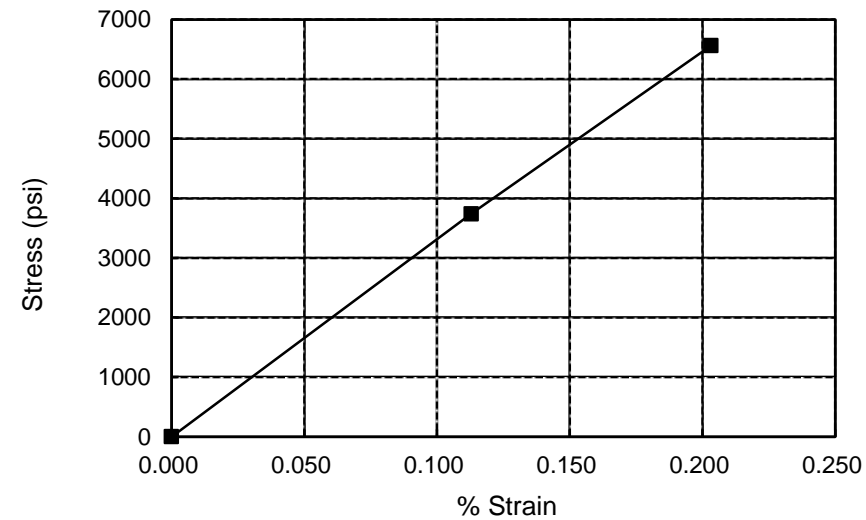
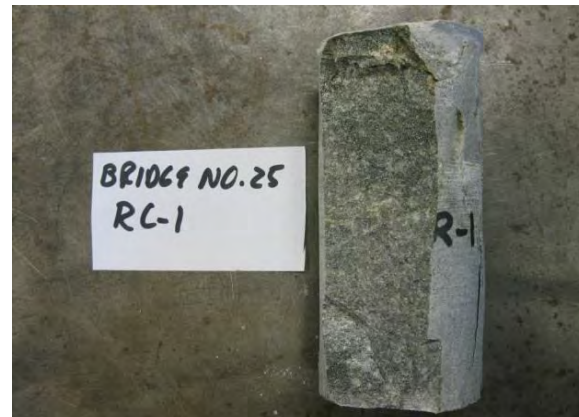
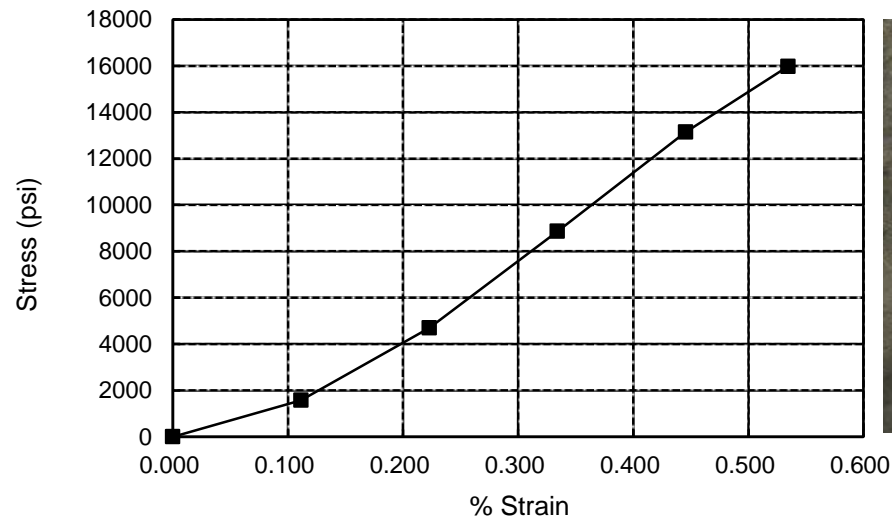
Sample ID.: RC-2
 Location: B1-B
 Depth (ft): 28.2-28.7

Length (in.): 4.43
 Diameter (in.): 1.99
 Area (in²): 3.110
 L/D 2.23

Unit Weight (pcf): 165.8

Compressive Strength (psi): 6560
 Time to Failure, mins:sec: 3:57

Deflection (in.)	Strain (%)	Load (lbf)	Compressive Strength (psi)	Young's Modulus (psi)
0.000	0.000	0	0	
0.005	0.113	11640	3740	3,313,640
0.009	0.203	20390	6560	3,228,978



Remarks:

*Young's modulus is calculated using the secant modulus at each data point per Figure 2 (C) in ASMTM D 7012

Reviewed by: *John Saily*