

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.13.R.14	1	9

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.13.R.14 F.A. PROJ. N/A
COUNTY MITCHELL
PROJECT DESCRIPTION DIVISION 13 EXPRESS DESIGN BUILD
BRIDGE REPLACEMENT

SITE DESCRIPTION BRIDGE NO. 93 OVER CREEK
ON SR-1330 (HUGHES GAP ROAD)

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4 - 9	BORE LOG(S) & CORE LOG(S)

PERSONNEL

A.F. RIGGS, JR.

J. BRANDSEN

S. HARDEE

S. LOW

M. MEDLIN

INVESTIGATED BY S&ME, INC.

CHECKED BY A.F. RIGGS, JR.

SUBMITTED BY S&ME, INC.

DATE JULY, 2012

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

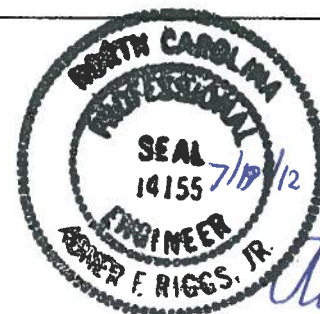
SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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 DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION 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 THE 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.

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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.

DRAWN BY: B. RATTI



PROJECT REFERENCE NO. 17BP.J3.R.14 SHEET NO. 2																																																																																																																																		
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS																																																																																																																																		
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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: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6			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.																																																																																																																															
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

ROCK DESCRIPTION**TERMS AND DEFINITIONS**

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 SPDM 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 (WRI)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (ICR)		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 (ICNR)		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 (ICP)		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 (V SL.)	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 (SL.)	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. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u>
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. <u>IF TESTED, YIELDS SPT N VALUES > 100 BPF</u>
VERY SEVERE (V SEV.)	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. <u>IF TESTED, YIELDS SPT N VALUES < 100 BPF</u>
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 GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT, CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	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.
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**BEDDING**

TERM	SPACING	TERM	THICKNESS
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	> 4 FEET
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET
CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET
		THINLY LAMINATED	< 0.008 FEET

INDURATION

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

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

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, 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 DISLODGED 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 (RQD) - 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 IN 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 SPDM 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 (SRQD) - 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: REFERENCE 'G' MARKED ON BRIDGE DECK IN N.W. CORNER

ELEVATION: 100.00 FT.

NOTES:



BM - BENCH MARK



0 40 80
 FEET

SCALE: 1" = 40'

DATE: JULY 2012

DRAWN BY: BTR

PROJECT NO:
 1051-12-065E



S&ME
 WWW.SMEINC.COM

NC ENGINEER LICENSE #F-0176
 3201 SPRING FOREST RD, RALEIGH, NC 27616

BORING LOCATION MAP

BRIDGE NO. 93
 OVER CREEK ON SR-1330
 STATE PROJ NO. 17BP.13.R.14
 MITCHELL COUNTY, NORTH CAROLINA

FIGURE NO.

3



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 4

WBS 17BP.13.R.14			TIP 17BP.13.R.14			COUNTY MITCHELL			GEOLOGIST Brandsen, J.		
SITE DESCRIPTION Bridge No. 93 over Creek on SR. 1330										GROUND WTR (ft)	
BORING NO. EB1-A			STATION N/A			OFFSET N/A			ALIGNMENT N/A		
COLLAR ELEV. 99.1 ft			TOTAL DEPTH 28.5 ft			NORTHING 877,487			EASTING 1,060,089		
DRILL RIG/HAMMER EFF./DATE SME CME-45B 77% 6/29/12			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic			0 HR. N/A		
DRILLER Hardee, S.			START DATE 05/01/12			COMP. DATE 05/03/12			24 HR. FIAD		
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)	
100																
	99.1	0.0	3	3	5										99.1	0.0
95	95.6	3.5	9	9	8											
90	90.6	8.5													90.6	8.5
85	85.6	13.5														
	83.6	15.5														
80	79.6	19.5													80.1	19.0
75	75.6	23.5														
	70.6	28.5													70.6	28.5

Boring Terminated with Standard Penetration Test Refusal at Elevation 70.6 ft on Crystalline Rock (Gneiss)

- 1) Advanced 3-1/4" HSA to 3.5 feet.
- 2) Advanced 2-15/16" Tricone to 28 feet.
- 3) Advanced NW Casing to 16.0 feet.
- 4) Advanced NWD4 Core Barrel from 8.5 feet to 13.5 and 15.5 feet to 19.5 feet.
- 4) Creek Water Used as Drilling Fluid.
- 5) Some Drilling Fluid Loss Observed.
- 6) Approximate Drilling Fluid Density 62.4 feet.



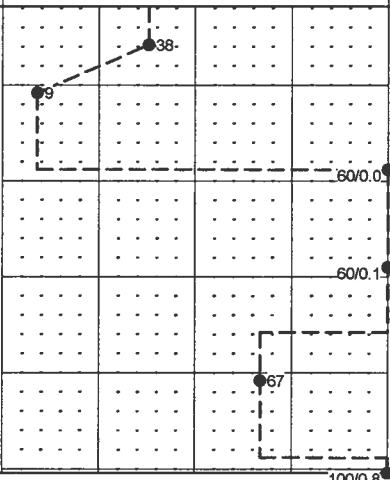
NCDOT GEOTECHNICAL ENGINEERING UNIT

CORE BORING REPORT

SHEET 5

WBS 17BP.13.R.14				TIP 17BP.13.R.14				COUNTY MITCHELL				GEOLOGIST Brandsen, J.			
SITE DESCRIPTION Bridge No. 93 over Creek on SR. 1330												GROUND WTR (ft)			
BORING NO. EB1-A				STATION N/A				OFFSET N/A				ALIGNMENT N/A			
COLLAR ELEV. 99.1 ft				TOTAL DEPTH 28.5 ft				NORTHING 877,487				EASTING 1,060,089			
DRILL RIG/HAMMER EFF./DATE SME CME-45B 77% 6/29/12								DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic			
DRILLER Hardee, S.				START DATE 05/01/12				COMP. DATE 05/03/12				SURFACE WATER DEPTH N/A			
CORE SIZE NWD4				TOTAL RUN 9.0 ft											
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	LOG	DESCRIPTION AND REMARKS		DEPTH (ft)		
90.6	90.6	8.5	5.0	N=60/0.0 1:30/1.0 0:42/1.0 0:45/1.0 0:48/1.0 0:52/1.0	(0.0) 0%			(0.0) 0%			Begin Coring @ 8.5 ft				
85	85.6	13.5		N=60/0.1							Boulders	8.5			
80	83.6	15.5													
80	79.6	19.5	4.0	N=60/0.0 0:44/1.0 1:23/1.0 1:11/1.0 0:17/1.0	(0.0) 0%										
75				N=100/0.4							WEATHERED ROCK (Gneiss)	19.0			
				N=100/0.4											
				N=60/0.0											
											Boring Terminated with Standard Penetration Test Refusal at Elevation 70.6 ft on Crystalline Rock (Gneiss)	28.5			
											1) Advanced 3-1/4" HSA to 3.5 feet. 2) Advanced 2-15/16" Tricone to 28 feet. 3) Advanced NW Casing to 16.0 feet. 4) Advanced NWD4 Core Barrel from 8.5 feet to 13.5 and 15.5 feet to 19.5 feet. 4) Creek Water Used as Drilling Fluid. 5) Some Drilling Fluid Loss Observed. 6) Approximate Drilling Fluid Density 62.4 feet.				



WBS 17BP.13.R.14				TIP 17BP.13.R.14				COUNTY MITCHELL				GEOLOGIST Brandsen, J.					
SITE DESCRIPTION Bridge No. 93 over Creek on SR. 1330												GROUND WTR (ft)					
BORING NO. EB1-B				STATION N/A				OFFSET N/A				ALIGNMENT N/A				0 HR. N/A	
COLLAR ELEV. 99.1 ft				TOTAL DEPTH 24.3 ft				NORTHING 877,471				EASTING 1,060,095				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE SME CME-45B 77% 6/29/12								DRILL METHOD Wash Boring				HAMMER TYPE Automatic					
DRILLER Hardee, S.				START DATE 05/03/12				COMP. DATE 05/03/12				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				ELEV. (ft)			
100																	
	98.1	1.0	19	18	20									98.1	PAVEMENT	0.0	
95	95.6	3.5	3	4	5								M	95.6	Asphalt and CABG Stone	0.5	
													M		COLLUVIAL		
															Tan-Gray Silty Fine SAND with Some Rock Fragments		
90	90.6	8.5	60/0.0											90.6	Boulders	8.5	
85	85.6	13.5	60/0.1														
80	80.6	18.5	32	37	30								M	82.1	RESIDUAL	17.0	
															Tan Silty Fine SAND with Trace of Rock Fragments		
75	75.6 74.8	23.5 24.3	40	60/0.3										75.6 74.8	WEATHERED ROCK (Gneiss)	23.5 24.3	
			60/0.0												Boring Terminated with Standard Penetration Test Refusal at Elevation 74.8 ft on Crystalline Rock (Gneiss)		
1) Advanced 3-1/4" HSA to 3.0 feet. 2) Advanced 2-15/16" Tricone to 24.3 feet. 3) Advanced NW Casing to 13.5 feet. 4) Creek Water Used as Drilling Fluid. 5) Some Drilling Fluid Loss Observed. 6) Approximate Drilling Fluid Density 62.4 PCF.																	



WBS 17BP.13.R.14			TIP 17BP.13.R.14			COUNTY MITCHELL			GEOLOGIST Brandsen, J.					
SITE DESCRIPTION Bridge No. 93 over Creek on SR. 1330									GROUND WTR (ft)					
BORING NO. EB2-A			STATION N/A			OFFSET N/A			ALIGNMENT N/A					
COLLAR ELEV. 100.3 ft			TOTAL DEPTH 28.4 ft			NORTHING 877,496			EASTING 1,060,129					
DRILL RIG/HAMMER EFF./DATE SME CME-45B 77% 6/29/12						DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic					
DRILLER Hardee, S.			START DATE 04/30/12			COMP. DATE 05/01/12			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			ELEV. (ft)	DEPTH (ft)
105														
100	99.3	1.0	6	25	20								100.3	0.0
													99.3	0.7
	96.8	3.5	60/0.1										96.8	3.5
95													95.8	4.5
													95.8	
	91.8	8.5	20	19	18									
90														
	87.0	13.3	60/0.0										87.0	13.3
85													86.0	14.3
	80.3	20.0	100/0.2											
80														
	76.8	23.5	100/0.2											
75														
	71.9	28.4	60/0.0										71.9	28.4



NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

SHEET 8

WBS 17BP.13.R.14				TIP 17BP.13.R.14				COUNTY MITCHELL				GEOLOGIST Brandsen, J.			
SITE DESCRIPTION Bridge No. 93 over Creek on SR. 1330												GROUND WTR (ft)			
BORING NO. EB2-A				STATION N/A				OFFSET N/A				ALIGNMENT N/A			
COLLAR ELEV. 100.3 ft				TOTAL DEPTH 28.4 ft				NORTHING 877,496				EASTING 1,060,129			
DRILL RIG/HAMMER EFF./DATE SME CME-45B 77% 6/29/12								DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic			
DRILLER Hardee, S.				START DATE 04/30/12				COMP. DATE 05/01/12				SURFACE WATER DEPTH N/A			
CORE SIZE NWD4				TOTAL RUN 7.7 ft											
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	LOG	ELEV. (ft)	DESCRIPTION AND REMARKS	DEPTH (ft)		
87												Begin Coring @ 13.3 ft			
85	87.0	13.3	7.7	N=60/0.0 1:30/0.7 1:28/7.0	(1.7) 22%			(0.7) 70%			87.0 86.0	Boulder (No Recovery)	13.3 14.3		
80	79.3	21.0		N=100/0.2				(1.0) 11%			81.3	WEATHERED ROCK (Gneiss)	19.0		
75				N=100/0.2							71.9	Boring Terminated with Standard Penetration Test Refusal at Elevation 71.9 ft on Crystalline Rock (Gneiss)	28.4		
1) Advanced 3-1/4" HSA to 3.7 feet. 2) Advanced 2-15/16" Tricone to 28.4 feet. 3) Advanced NWD4 Core Barrel from 13.3 feet to 21.0 feet. 4) Advanced NW Casing to 23.5 feet. 5) Creek Water Used as Drilling Fluid. 6) Some Drilling Fluid Loss Observed. 7) Approximate Drilling Fluid Density 62.4 PC															



WBS 17BP.13.R.14			TIP 17BP.13.R.14			COUNTY MITCHELL			GEOLOGIST Brandsen, J.							
SITE DESCRIPTION Bridge No. 93 over Creek on SR. 1330									GROUND WTR (ft)							
BORING NO. EB2-B			STATION N/A			OFFSET N/A			ALIGNMENT N/A							
COLLAR ELEV. 100.3 ft			TOTAL DEPTH 26.4 ft			NORTHING 877,487			EASTING 1,060,132							
									0 HR. N/A							
									24 HR. FIAD							
DRILL RIG/HAMMER EFF./DATE SME CME-45B 77% 6/29/12						DRILL METHOD Wash Boring			HAMMER TYPE Automatic							
DRILLER Hardee, S.			START DATE 04/27/12			COMP. DATE 04/27/12			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
105																
100																
	99.3	1.0	5	4	3								M	100.3	0.0	PAVEMENT Asphalt and CAB Stone
	96.8	3.5	14	14	16								M	97.8	2.5	ROADWAY EMBANKMENT Brown Fine Sandy Clay
95																COLLUVIAL Brown-Tan Silty Fine SAND with Some Rock Fragments
	91.8	8.5	48	22	23								M			
90																
	86.8	13.5	58	42/0.2										88.3	12.0	Boulders
85																
	81.8	18.5	30	38	36								M	82.3	18.0	RESIDUAL Tan Silty Fine SAND
80														78.3	22.0	WEATHERED ROCK (Gneiss)
	76.8	23.5	100/0.4													
75														73.9	26.4	Boring Terminated with Standard Penetration Test Refusal at Elevation 73.9 ft on Crystalline Rock (Gneiss)
	73.9	26.4	60/0.0													1) Advanced 3-1/4" HSA to 4.2 feet. 2) Advanced 2-15/16" Tricone to 26.4 feet. 3) Advanced NW Casing to 18.5 feet. 5) Creek Water Used as Drilling Fluid. 6) Some Drilling Fluid Loss Observed. 7) Approximate Drilling Fluid Density 62.4 PC