



December 10, 2021

MEMORANDUM TO: Wright Archer, III, PE
Division Engineer

ATTENTION: Brian Ketner, PE
Division Project Engineer

FROM: Don Brown, P.E.
Practice Leader, Geotechnical & Construction Services

STATE PROJECT: 67070.1.1 (BR-0070)
COUNTY: Caswell
DESCRIPTION: Replacement of Bridge 61 Over Hogan’s Creek on NC 86 between SR 1300 and SR 1500

SUBJECT: Roadway Subsurface Inventory

Project Description

The proposed project consists of improvements to NC 86, located in Providence, North Carolina. The total length of the project is approximately 0.7± miles, with one alignment as noted below:

Alignment	Road Name	Stations
-L-	NC 86	12+85 to 48+00

Plans call for a new three span bridge over Hogan’s Creek on new location, just east of the existing bridge. The project will include the realignment of NC 86, as a two-lane facility, to accommodate the new bridge location.

The project corridor is undeveloped land consisting of open fields and woodlands. Portions of the alignment appear to have been clear cut in the past 5-10 years.

The geotechnical field investigation for the project was conducted in September 2021 with a total of eight standard penetration test (SPT) borings for the roadway and seven hand auger borings. Eight SPT borings were also performed for the bridge, which are reported under separate cover.

Physiography & Geology

The project site is located in the town of Princeville in Caswell County, North Carolina. According to available literature, the site is situated within the Milton Belt of the Piedmont Geologic Province of North Carolina and underlain by mica gneiss and mica schist (mgs). The same literature also illustrates an inferred diabase dike crossing Hogan’s Creek just west of NC 86.

The project corridor slopes downward from the higher elevations on the north (435± feet) and south (475± feet) ends of the project, toward Hogan’s Creek.



Soil Properties

Soils encountered at the site included alluvial and residual soils. The alluvial soils consisted very loose to medium dense Silty SAND (A-2-4) and fine SAND (A-3) and medium stiff Sandy SILT (A-4). Medium dense coarse SAND with Gravel (A-1-b) was also encountered deeper in the alluvial profile. Boring L_3500 was terminated in alluvial soil.

The native residual soils, which are the weathered remains of the parent rock, were encountered below the alluvium or directly under the surficial topsoil. The residual soil primarily consists of very loose to very dense Silty SAND (A-2-4) and Clayey SAND (A-2-6) and medium stiff to hard Sandy SILT (A-4). Lesser amounts of Sandy CLAY (A-6) were also encountered.

Although not encountered in the borings, roadway embankment exists within the current footprint of NC 86, with the greater amounts being in the lower elevations of the project approaching the bridge over Hogan’s Creek.

Rock Properties

Weathered rock was encountered in borings L_1600, L_1900, L_2200, and L_3800 at elevations ranging from 375.1 feet to 463.2 feet. The weathered rock was classified as mica schist.

Rock was encountered in one boring (L_2200) an elevation of 410.4 feet. The rock was classified as mica schist.

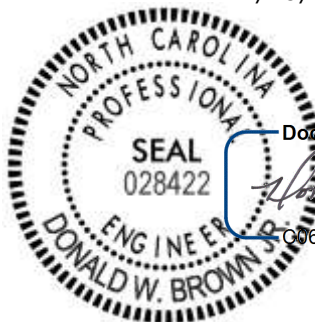
Groundwater

Groundwater was encountered in one boring (L_3800) after a 24± hour stabilization period, at a depth of 5.3 feet below the existing grade (el. 391.8 feet). Based on the split-spoon samples collected, we expect groundwater at a similar depth in the area of boring L_3500.

Areas of Special Geotechnical Interest

- Plank Road – According to a conversation with the current landowner, the proposed alignment reportedly once contained a plank road through the lower elevations of the corridor (i.e., flood plain). Remnants of what may have been the old timber road was encounter during sampling for End Bent No. 1 (boring EB1-B), at a depth of 2.8 feet below the current ground surface.

12/15/2021



DocuSigned by:

Donald W. Brown Jr.

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1		TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.	
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)
BORING NO. L_1600		STATION 16+00		OFFSET 55 ft RT		ALIGNMENT L	
COLLAR ELEV. 467.1 ft		TOTAL DEPTH 19.0 ft		NORTHING 1,001,397		EASTING 1,886,190	
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic	
DRILLER McCain, P.		START DATE 10/01/21		COMP. DATE 10/01/21		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
470																
	467.1	0.0												467.1	GROUND SURFACE	0.0
465																
	463.7	3.4	1	1	2	3							M	RESIDUAL LOOSE, TAN, CLAYEY SAND (A-2-6)	2.5	
	463.7	3.4	6	12	16								D	VERY STIFF, TAN AND BLACK, SANDY CLAY (A-6)		
460																
	458.7	8.4	5	11	18								D	MEDIUM DENSE, TAN AND WHITE, SILTY SAND (A-2-4)	7.0	
455																
	453.7	13.4	25	50	50/0.3								D			
450																
	448.7	18.4								100/0.8			D	WEATHERED ROCK TAN AND WHITE, MICA SCHIST, SAMPLED AS SILTY SAND	13.9	
			91	9/0.1						100/0.6			D	Boring Terminated at Elevation 448.1 ft in Weathered Rock (Mica Schist)	19.0	

NCDOT BORE SINGLE BR070_GEO_RDWY_BH.GPJ NC_DOT.GDT 12/10/21

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1			TIP BR-0070			COUNTY CASWELL			GEOLOGIST Ferreira, E.							
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500									GROUND WTR (ft)							
BORING NO. L_1600_HA_2			STATION 16+00			OFFSET 30 ft RT			ALIGNMENT L							
COLLAR ELEV. 458.5 ft			TOTAL DEPTH 1.0 ft			NORTHING 1,001,391			EASTING 1,886,165							
DRILL RIG/HAMMER EFF./DATE N/A						DRILL METHOD Hand Auger			HAMMER TYPE N/A							
DRILLER N/A			START DATE 10/04/21			COMP. DATE 10/04/21			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	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						ELEV. (ft)
460																
															458.5	GROUND SURFACE 0.0
															457.5	RESIDUAL TAN AND WHITE, MOIST, SILTY, FINE, SAND (A-2-4) 1.0
																Boring Terminated with hand auger refusal at Elevation 457.5 ft in dense Silty Sand Offset HA boring

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1			TIP BR-0070			COUNTY CASWELL			GEOLOGIST Ferreira, E.							
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500									GROUND WTR (ft)							
BORING NO. L_1900			STATION 19+00			OFFSET 60 ft RT			ALIGNMENT L							
COLLAR ELEV. 475.2 ft			TOTAL DEPTH 24.2 ft			NORTHING 1,001,688			EASTING 1,886,124							
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER McCain, P.			START DATE 10/01/21			COMP. DATE 10/01/21			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
480																
475	475.2	0.0												475.2	GROUND SURFACE	0.0
470	472.0	3.2	2	4	4							M	RESIDUAL			
	466.7	8.5	5	17	27							M	LOOSE, TAN, CLAYEY SAND (A-2-6)	2.5		
465	461.7	13.5	100	0.4									M	DENSE TO VERY DENSE, WHITE, PINK AND BLACK, SILTY SAND (A-2-4)		
	456.7	18.5	24	76	0.2								D	WEATHERED ROCK	12.0	
460	451.7	23.5	44	56	0.2								D	WHITE AND BROWN, MICA SCHIST, SAMPLED AS SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE ROCKS AND MICA		
													D	Boring Terminated at Elevation 451.0 ft in Weathered Rock (Mica Schist)	24.2	

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1			TIP BR-0070			COUNTY CASWELL			GEOLOGIST Ferreira, E.						
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500										GROUND WTR (ft)					
BORING NO. L_2200			STATION 22+00			OFFSET 14 ft RT			ALIGNMENT L						
COLLAR ELEV. 424.6 ft			TOTAL DEPTH 14.3 ft			NORTHING 1,001,971			EASTING 1,886,014						
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER McCain, P.			START DATE 09/20/21			COMP. DATE 09/20/21			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	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
425	424.6	0.0	2	6	10									GROUND SURFACE	0.0
420	421.3	3.3	7	8	10									RESIDUAL MEDIUM DENSE TO VERY DENSE, BROWN, SILTY FINE TO COARSE SAND (A-2-4)	
415	416.1	8.5	16	21	35										
	411.1	13.5	100/0.4												
	410.4	14.2	60/0.1											WEATHERED ROCK BROWN, MICA SCHIST, SAMPLED AS SILTY SAND (A-2-4)	13.5
														CRYSTALLINE ROCK MICA SCHIST	14.2
														Boring Terminated with Standard Penetration Test Refusal at Elevation 410.3 ft in Crystalline Rock (Mica Schist)	14.3

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1			TIP BR-0070			COUNTY CASWELL			GEOLOGIST Ferreira, E.							
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500									GROUND WTR (ft)							
BORING NO. L_2500			STATION 25+00			OFFSET CL			ALIGNMENT L							
COLLAR ELEV. 430.5 ft			TOTAL DEPTH 11.5 ft			NORTHING 1,002,259			EASTING 1,885,929							
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER McCain, P.			START DATE 09/20/21			COMP. DATE 09/20/21			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)
435																
430	430.5	0.0													430.5	GROUND SURFACE 0.0
425	427.0	3.5	3	4	3	7							M	RESIDUAL MEDIUM STIFF TO HARD, BROWN, GRAY AND TAN, MICACEOUS, SANDY SILT (A-4)		
420	423.0	7.5	4	10	8	18							M			
	420.5	10.0	13	17	17	34							M			
			3	11	19	30							M		419.0	Boring Terminated at Elevation 419.0 ft in Sandy Silt 11.5

NCDOT BORE SINGLE BR070_GEO_RDWY_BH.GPJ NC_DOT.GDT 12/10/21

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1			TIP BR-0070			COUNTY CASWELL			GEOLOGIST Ferreira, E.								
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500										GROUND WTR (ft)							
BORING NO. L_3500			STATION 35+00			OFFSET 10 ft RT			ALIGNMENT L								
COLLAR ELEV. 398.4 ft			TOTAL DEPTH 16.0 ft			NORTHING 1,003,223			EASTING 1,885,662								
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic								
DRILLER McCain, P.			START DATE 09/30/21			COMP. DATE 09/30/21			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							
400																	
	398.4	0.0													398.4	GROUND SURFACE	0.0
395	395.3	3.1	WOH	1	2	3							M		396.4	VERY LOOSE, BROWN, SILTY FINE SAND (A-2-4)	2.0
						3	2	3					M			LOOSE, BROWN AND TAN, FINE SAND (A-3)	
390	389.9	8.5	WOH	WOH	1								Sat.		389.7	VERY LOOSE TO MEDIUM DENSE, GRAY, SILTY FINE TO COARSE SAND (A-2-4)	8.7
385	383.9	14.5											Sat.		382.4	Boring Terminated at Elevation 382.4 ft in Silty Sand (Alluvial)	16.0

NCDOT BORE SINGLE BR070_GEO_RDWY_BH.GPJ NC_DOT.GDT 12/10/21

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1		TIP BR-0070		COUNTY CASWELL		GEOLOGIST Ferreira, E.	
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500							GROUND WTR (ft)
BORING NO. L_3800		STATION 38+00		OFFSET 27 ft RT		ALIGNMENT L	
COLLAR ELEV. 397.1 ft		TOTAL DEPTH 23.3 ft		NORTHING 1,003,513		EASTING 1,885,584	
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER McCain, P.		START DATE 09/30/21		COMP. DATE 09/30/21		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
400																
	397.1	0.0												397.1	GROUND SURFACE	0.0
395													M	394.1	ALLUVIAL MEDIUM STIFF, TAN, SANDY SILT (A-4)	3.0
	392.1	5.0											▼		LOOSE, GRAY, SILTY FINE TO COARSE SAND (A-2-4)	
390													Sat.			
	387.6	9.5	WOH	2	2								Sat.			
385													Sat.			
	384.1	13.0											Sat.			
380													Sat.			
	379.1	18.0	WOH	3	13								Sat.	378.8	MEDIUM DENSE, GRAY, COARSE SAND WITH GRAVEL (A-1-B)	18.3
375													Sat.	375.1		22.0
	374.1	23.0											Sat.	373.8	WEATHERED ROCK ORANGE, MICA SCHIST, WITH ROCK FRAGMENTS	23.3
															Boring Terminated at Elevation 373.8 ft in Weathered Rock (Mica Schist)	

NCDOT BORE SINGLE BR070_GEO_RDWY_BH.GPJ NC_DOT.GDT 12/10/21

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1	TIP BR-0070	COUNTY CASWELL	GEOLOGIST Ferreira, E.
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500			GROUND WTR (ft)
BORING NO. L_4150	STATION 41+50	OFFSET 44 ft RT	ALIGNMENT L
COLLAR ELEV. 436.7 ft	TOTAL DEPTH 25.0 ft	NORTHING 1,003,849	EASTING 1,885,481
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER McCain, P.	START DATE 09/30/21	COMP. DATE 09/30/21	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							
440																	
	436.7	0.0													436.7	GROUND SURFACE	0.0
435	433.4	3.3	2	3	5	8								M	434.7	RESIDUAL LOOSE, BROWN AND RED, CLAYEY FINE SAND (A-2-6)	2.0
430	428.2	8.5	4	9	13	22								D		MEDIUM STIFF TO VERY STIFF, RED, TAN, WHITE AND BLACK, MICACEOUS, SANDY SILT (A-4)	
425	423.2	13.5	3	4	4	8								D			
420	418.2	18.5	3	4	5	9								D		SAPROLITIC WITH TRACE MICA BELOW 12 FEET	
415	413.2	23.5	5	7	8	15								D			
			9	12	18	30								D	411.7	Boring Terminated at Elevation 411.7 ft in Sandy Silt	25.0

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1			TIP BR-0070			COUNTY CASWELL			GEOLOGIST Ferreira, E.							
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500										GROUND WTR (ft)						
BORING NO. L_4150_HA			STATION 41+50			OFFSET 12 ft RT			ALIGNMENT L							
COLLAR ELEV. 421.0 ft			TOTAL DEPTH 6.0 ft			NORTHING 1,003,838			EASTING 1,885,451							
DRILL RIG/HAMMER EFF./DATE N/A						DRILL METHOD Hand Auger			HAMMER TYPE N/A							
DRILLER N/A			START DATE 10/04/21			COMP. DATE 10/04/21			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						
425																
420																
415																

GROUND SURFACE

RESIDUAL

BROWN, MOIST, SANDY SILT (A-4) WITH TRACE MICA

TAN, MOIST, SILTY SAND (A-2-4) WITH TRACE MICA

WHITE AND BLACK, DRY, SANDY SILT (A-4) WITH TRACE MICA

Boring Terminated at Elevation 415.0 ft in Silt

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1			TIP BR-0070			COUNTY CASWELL			GEOLOGIST Ferreira, E.							
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500										GROUND WTR (ft)						
BORING NO. L_4490_HA			STATION 45+50			OFFSET 30 ft RT			ALIGNMENT L							
COLLAR ELEV. 427.6 ft			TOTAL DEPTH 1.2 ft			NORTHING 1,004,221			EASTING 1,885,339							
DRILL RIG/HAMMER EFF./DATE N/A						DRILL METHOD Hand Auger			HAMMER TYPE N/A							
DRILLER N/A			START DATE 10/04/21			COMP. DATE 10/04/21			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						
430																
														427.6	GROUND SURFACE	0.0
														426.4	RESIDUAL BROWN, MOIST, SILTY, FINE, SAND (A-2-4)	1.2
															Boring Terminated with hand auger refusal at Elevation 426.4 ft in dense Silty Sand	

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67070.1.1			TIP BR-0070			COUNTY CASWELL			GEOLOGIST Ferreira, E.							
SITE DESCRIPTION BRIDGE 61 OVER HOGAN'S CREEK ON NC 86 BETWEEN SR 1300 AND SR 1500									GROUND WTR (ft)							
BORING NO. L_4550			STATION 45+50			OFFSET 85 ft RT			ALIGNMENT L							
COLLAR ELEV. 467.1 ft			TOTAL DEPTH 19.9 ft			NORTHING 1,004,238			EASTING 1,885,391							
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 86.8% 03/12/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER McCain, P.			START DATE 09/30/21			COMP. DATE 09/30/21			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	100						ELEV. (ft)
470																
	467.1	0.0													467.1	GROUND SURFACE 0.0
465	463.7	3.4	2	1	4	5							D	RESIDUAL MEDIUM STIFF TO STIFF, RED AND BLACK, MICACEOUS, SILT (A-4)		
	463.7	3.4	3	5	6	11							D			
460	458.7	8.4	3	3	5	8							M			
455	453.7	13.4	3	3	5	8							M			
450	448.7	18.4	3	3	6	9							M		447.2	Boring Terminated at Elevation 447.2 ft in Silt 19.9

NCDOT BORE SINGLE BR070_GEO_RDWY_BH.GPJ NC_DOT.GDT 12/10/21

