

REFERENCE: R-5963A

PROJECT: 48599

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2A	SUPPLEMENTAL LEGEND (GSI)
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CHATHAM
PROJECT DESCRIPTION CHATHAM PARK WAY FROM
US 15-501 TO US 64 BUSINESS

SITE DESCRIPTION BRIDGE NO.180B01 ON SR 2700
(CHATHAM PARK WAY) OVER UNNAMED
TRIBUTARY TO ROBESON CREEK -L- STA. 76 + 49

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5963A	1	

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.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS 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.

- NOTES:
- 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 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

P. PERRY, E.I.T.

T. WENNER, P.G.

CG2 EXPLORATION

INVESTIGATED BY CG2, PLLC

DRAWN BY M. MALISHER, E.I.T.

CHECKED BY M. WALKO, P.E.

SUBMITTED BY CG2, PLLC

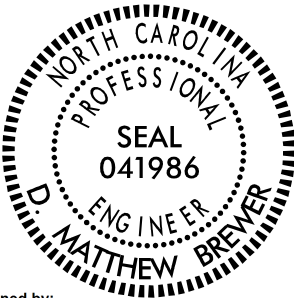
DATE DECEMBER 2024

Prepared in the Office of:



CAROLINAS
GEOTECHNICAL
GROUP

2400 CROWNPOINT EXECUTIVE DRIVE
SUITE 800
CHARLOTTE, NC 28227
(980) 339-8684



DocuSigned by:

Matt Brewer

01/13/2025

386129C0A4C1462...

SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

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

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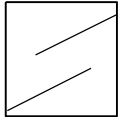
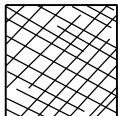
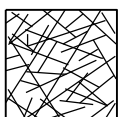

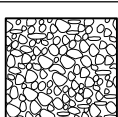
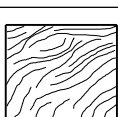
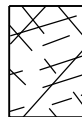
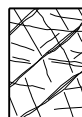
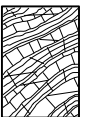



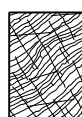

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DIVISION OF HIGHWAYS
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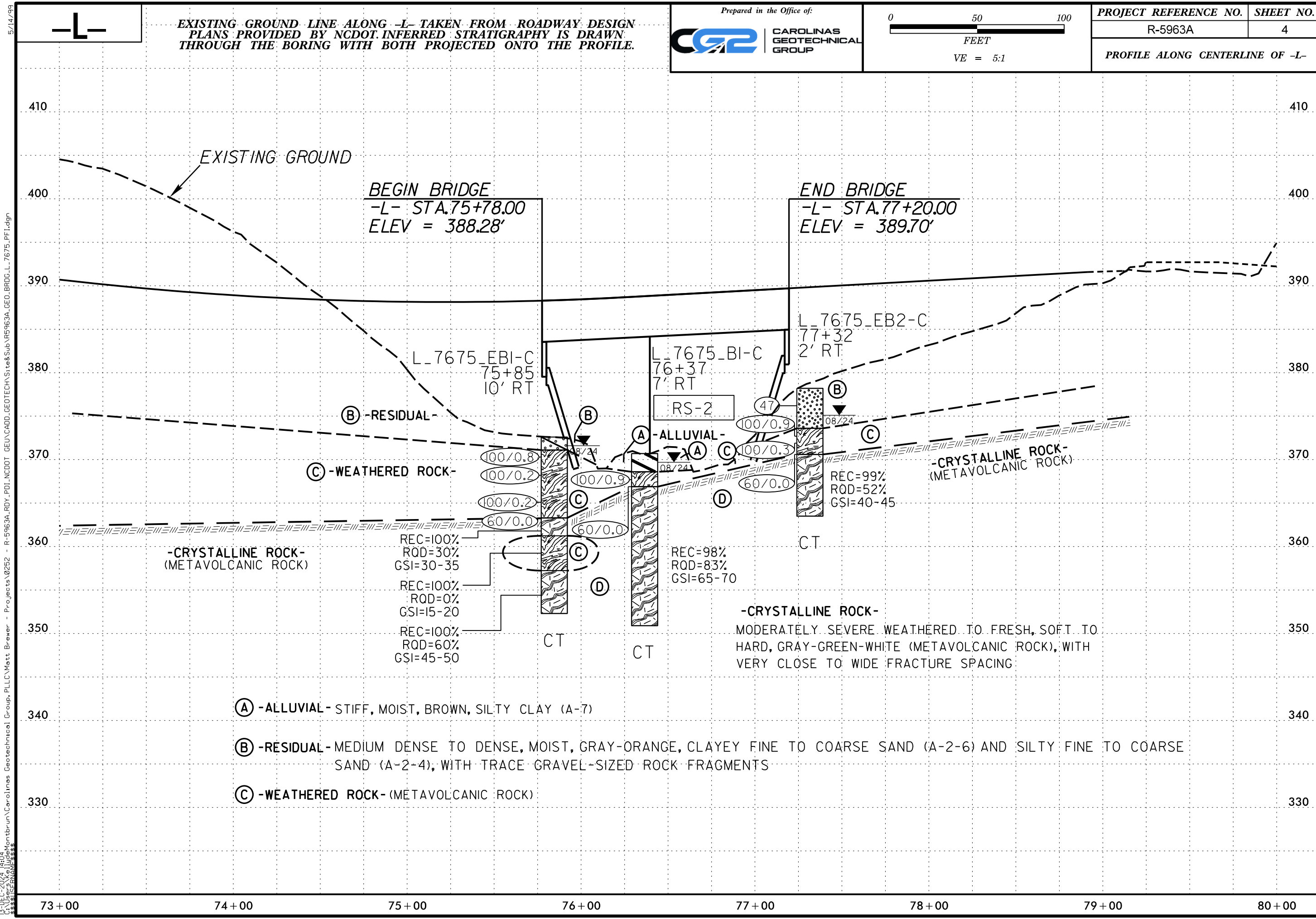
SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

<div><div>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</div><div>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.</div></div>	<div>SURFACE CONDITIONS</div> <div>VERY GOOD Very rough, fresh unweathered surfaces</div> <div>GOOD Rough, slightly weathered, iron stained surfaces</div> <div>FAIR Smooth, moderately weathered and altered surfaces</div> <div>POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</div> <div>VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings</div>	<div>STRUCTURE</div> <div><div>INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities</div><div>BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</div><div>VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</div><div>BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</div><div>DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</div><div>LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes</div></div>	<div>DECREASING SURFACE QUALITY ➡</div> <div>90</div> <div>80</div> <div>70</div> <div>60</div> <div>50</div> <div>40</div> <div>30</div> <div>20</div> <div>10</div> <div>N/A</div> <div>N/A</div>	<div>GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)</div> <div>From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.</div>	<div>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</div> <div>VERY GOOD - Very Rough, fresh unweathered surfaces</div> <div>GOOD - Rough, slightly weathered surfaces</div> <div>FAIR - Smooth, moderately weathered and altered surfaces</div> <div>POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</div> <div>VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</div>	<div>COMPOSITION AND STRUCTURE</div> <div><div>A. Thick bedded, very blocky sandstone. The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.</div><div>B. Sandstone with thin inter-layers of siltstone</div><div>C. Sandstone and siltstone in similar amounts</div><div>D. Siltstone or silty shale with sandstone layers</div><div>E. Weak siltstone or clayey shale with sandstone layers</div><div>F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</div><div>G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</div><div>H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.</div></div> <div>➡ Means deformation after tectonic disturbance</div>	<div>70</div> <div>60</div> <div>50</div> <div>40</div> <div>30</div> <div>20</div> <div>10</div>
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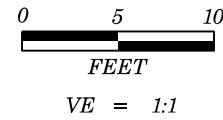
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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15

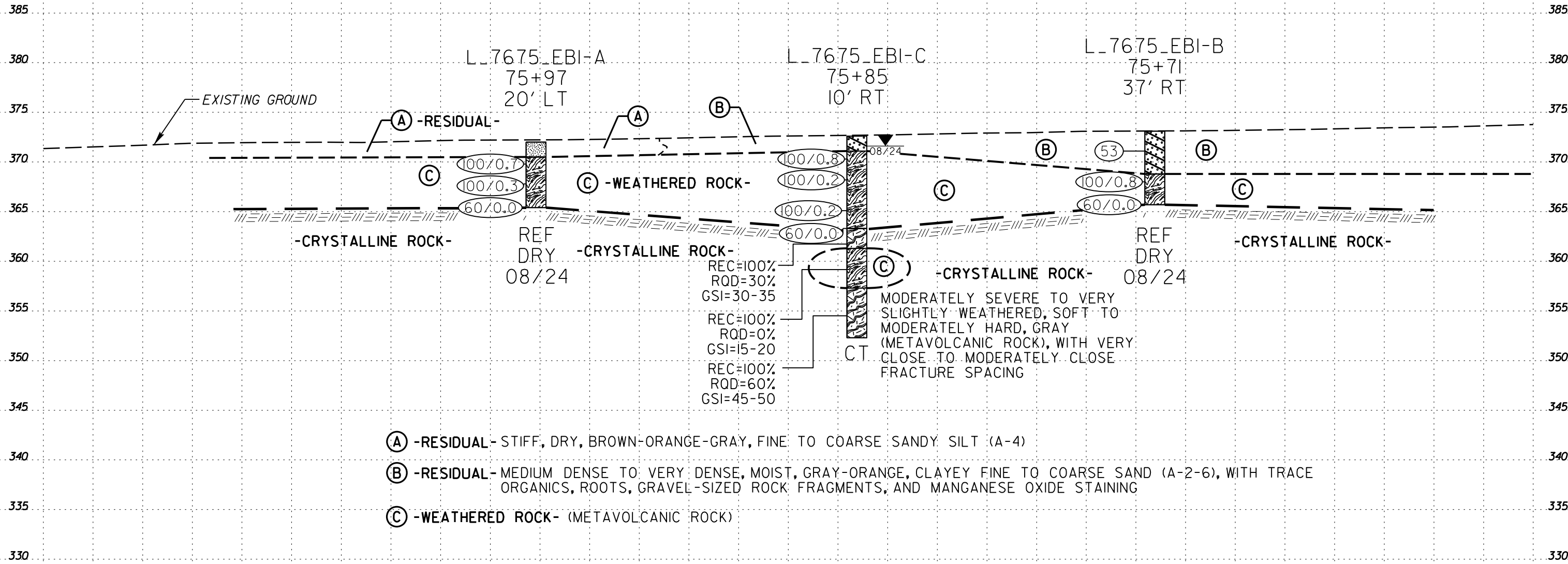
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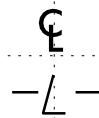


PROJECT REFERENCE NO.	SHEET NO.
R-5963A	5
CROSS SECTION AT END BENT NO.1 SKEW = 110 DEGREES	

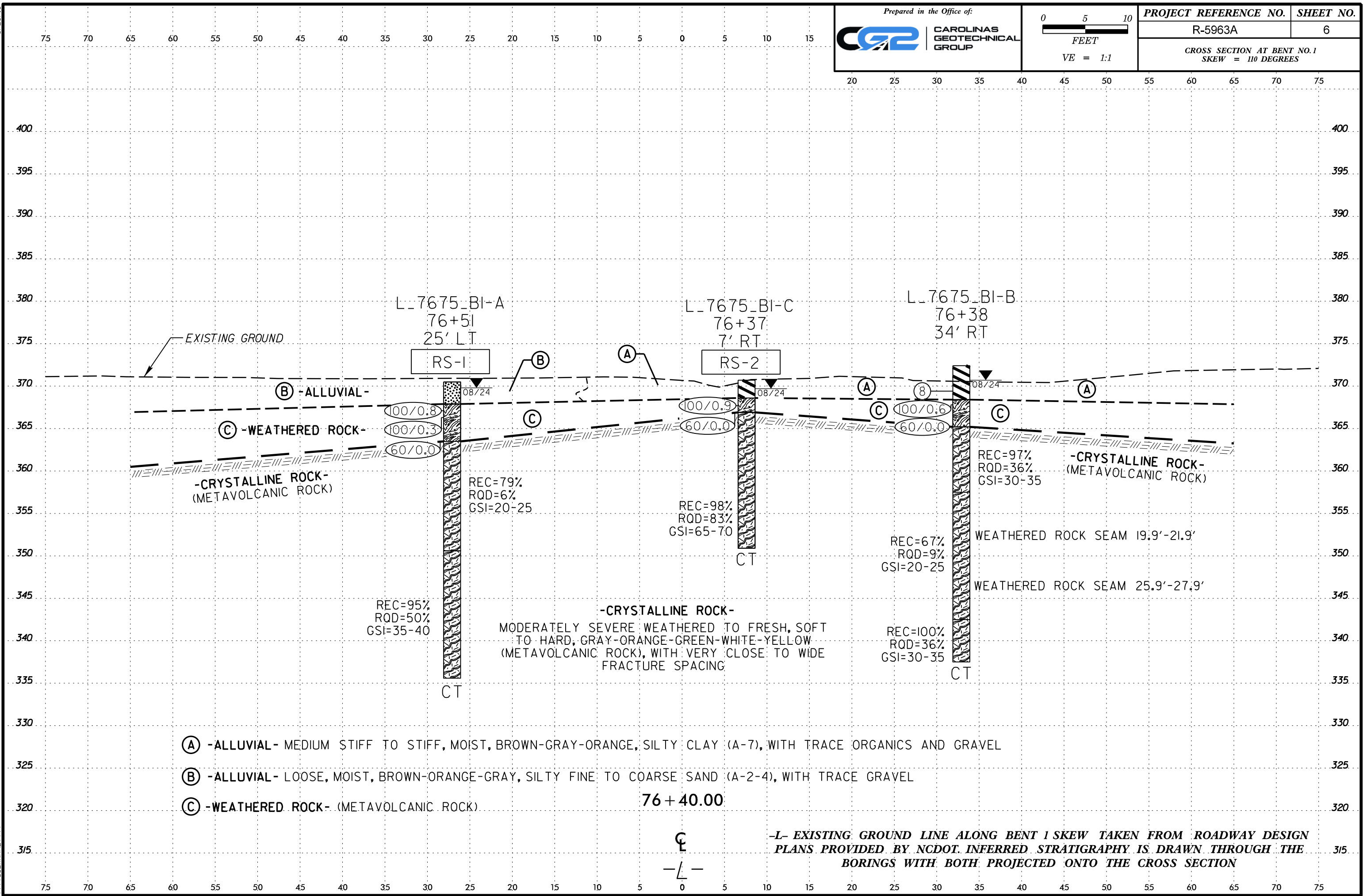
20 25 30 35 40 45 50 55 60 65 70 75



75 + 78.00



-L- EXISTING GROUND LINE ALONG END BENT 1 SKEW TAKEN FROM ROADWAY
DESIGN PLANS PROVIDED BY NCDOT. INFERRED STRATIGRAPHY IS DRAWN THROUGH
THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

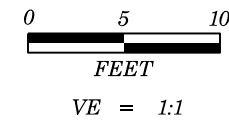


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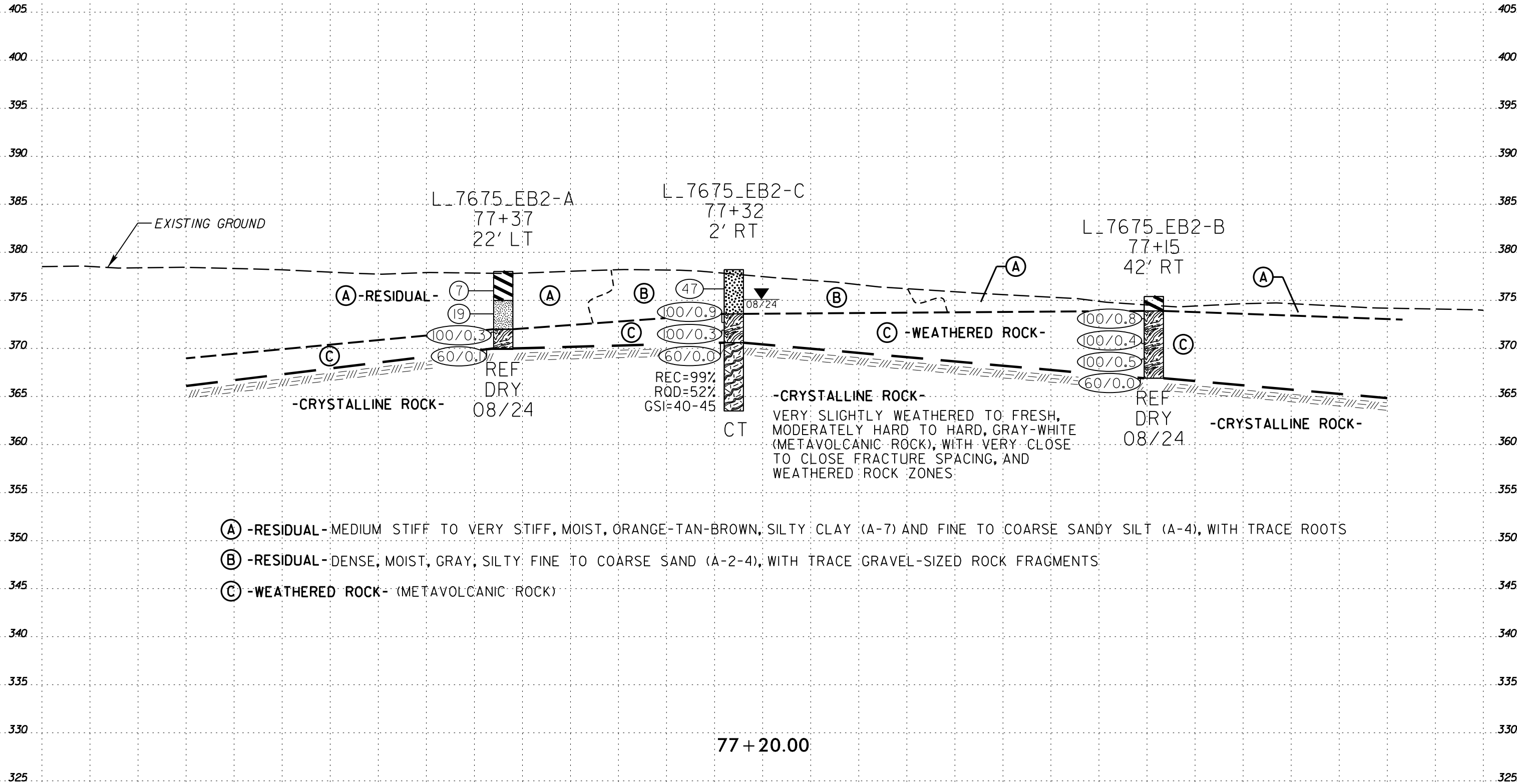
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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15

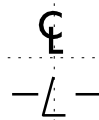


PROJECT REFERENCE NO.	SHEET NO.
R-5963A	7
CROSS SECTION AT END BENT NO. 2 SKEW = 110 DEGREES	

20 25 30 35 40 45 50 55 60 65 70 75



77 + 20.00



-L- EXISTING GROUND LINE ALONG END BENT 2 SKEW TAKEN FROM ROADWAY
DESIGN PLANS PROVIDED BY NCDOT. INFERRED STRATIGRAPHY IS DRAWN THROUGH
THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

GEOTECHNICAL BORING REPORT
BORE LOG


WBS 48599.1.1			TIP R-5963A			COUNTY CHATHAM			GEOLOGIST P. Perry						
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business									GROUND WTR (ft)						
BORING NO. L_7675_EB1-A			STATION 75+97			OFFSET 20 ft LT			ALIGNMENT -L-						
COLLAR ELEV. 372.0 ft			TOTAL DEPTH 6.6 ft			NORTHING 707,284			EASTING 1,953,162						
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 96% 07/26/2024						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER C. Odom			START DATE 08/12/24			COMP. DATE 08/12/24			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)
375															
	371.0	1.0	14	42	58/0.2	.	.	.	.	.		D		372.0	GROUND SURFACE 0.0
370	368.1	3.9	100/0.3			.	.	.	.	100/0.7				370.5	RESIDUAL 1.5
	365.4	6.6	60/0.0			.	.	.	.	100/0.3					Stiff, Brown-Orange-Gray, Fine to Coarse Sandy SILT (A-4)
						.	.	.	.	60/0.0				365.4	WEATHERED ROCK 6.6
															Boring Terminated with Standard Penetration Test Refusal at Elevation 365.4 ft On Crystalline Rock (Metavolcanic Rock)
															Surficial Organic Soil 0.0 - 0.2'

NCDOT BORE DOUBLE R5963A_RDWY_GEO_GTM.GPJ NC_DOT.GDT 10/22/24

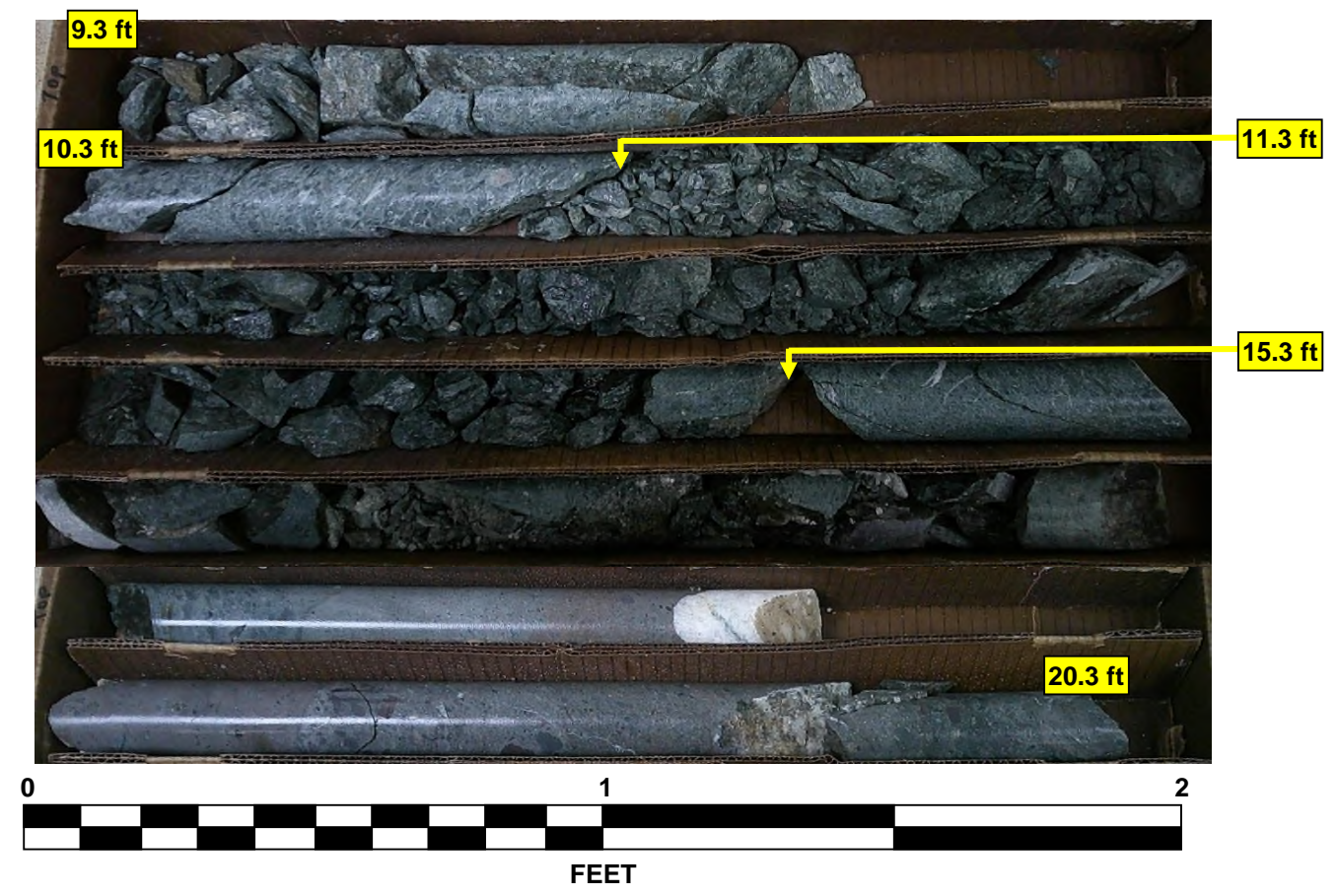
GEOTECHNICAL BORING REPORT

CORE LOG

WBS 48599.1.1		TIP R-5963A		COUNTY CHATHAM		GEOLOGIST P. Perry										
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business								GROUND WTR (ft)								
BORING NO. L_7675_EB1-C		STATION 75+85		OFFSET 10 ft RT		ALIGNMENT -L-		0 HR.	Dry							
COLLAR ELEV. 372.6 ft		TOTAL DEPTH 20.3 ft		NORTHING 707,253		EASTING 1,953,170		24 HR.	1.0							
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 96% 07/26/2024				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 08/12/24		COMP. DATE 08/14/24		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)	
375																
370	371.6	1.0	20	59	41/0.3									372.6	GROUND SURFACE	0.0
	368.4	4.2	100/0.2								100/0.8			371.1	RESIDUAL Medium Dense, Gray-Orange, Clayey Fine to Coarse SAND (A-2-6)	1.5
365	365.2	7.4	100/0.2								100/0.2				WEATHERED ROCK Gray-Orange (Metavolcanic Rock)	
	363.3	9.3	60/0.0								100/0.2			363.3		9.3
360											60/0.0			361.3	CRYSTALLINE ROCK Gray (Metavolcanic Rock)	11.3
														357.3	REC=100% RQD=30% GSI=30-35	15.3
355														352.3	WEATHERED ROCK Gray (Metavolcanic Rock)	
															CRYSTALLINE ROCK Gray (Metavolcanic Rock)	20.3
															REC = 100% RQD = 0% GSI = 15-20	
															CRYSTALLINE ROCK Gray (Metavolcanic Rock)	
															REC = 100% RQD = 60% GSI = 45-50	
															Boring Terminated at Elevation 352.3 ft In Crystalline Rock (Metavolcanic Rock)	
															Surficial Organic Soil 0.0 - 0.2'	

WBS				48599.1.1				TIP				R-5963A				COUNTY				CHATHAM				GEOLOGIST				P. Perry																																											
SITE DESCRIPTION																Chatham Parkway from US 15-501 to US 64 Business																GROUND WTR (ft)																																							
BORING NO.								L_7675_EB1-C								STATION								75+85								OFFSET								10 ft RT								ALIGNMENT								-L-								0 HR.				Dry			
COLLAR ELEV.								372.6 ft								TOTAL DEPTH								20.3 ft								NORTHING								707,253								EASTING								1,953,170								24 HR.				1.0			
DRILL RIG/HAMMER EFF./DATE																GEO366 Diedrich D-50 96% 07/26/2024																DRILL METHOD								SPT Core Boring								HAMMER TYPE								Automatic															
DRILLER								C. Odom								START DATE								08/12/24								COMP. DATE								08/14/24								SURFACE WATER DEPTH																N/A							
CORE SIZE								NQ								TOTAL RUN								11.0 ft																																															
ELEV (ft)		RUN ELEV (ft)		DEPTH (ft)		RUN (ft)		DRILL RATE (Min/ft)		RUN REC. (ft) %		ROD (ft) %		SAMP. NO.		STRATA REC. (ft) %		ROD (ft) %		LOG		DESCRIPTION AND REMARKS																								DEPTH (ft)																									
363.3		363.3		9.3		1.0		N=60/0.0		(1.0)		(0.0)				(2.0)		(0.6)				Begin Coring @ 9.3 ft																								9.3																									
360		362.3		10.3		5.0		3:53/1.0		100%		0%				100%		30%				CRISTALLINE ROCK																								11.3																									
								3:27/1.0		(5.0)		(0.6)				100%		0%				Moderately Severe to Moderately Weathered, Moderately Hard, Gray (Metavolcanic Rock), with Very Close Fracture Spacing																																																	
		357.3		15.3				3:43/1.0		100%		12%				100%		0%				GSI=30-35																								15.3																									
355						5.0		2:31/1.0		(5.0)		(3.0)				100%		60%				WEATHERED ROCK																																																	
								2:43/1.0		100%		60%				100%		60%				Gray (Metavolcanic Rock)																																																	
		352.3		20.3				3:11/1.0														GSI = 15-20																																																	
								2:20/1.0														CRISTALLINE ROCK																								20.3																									
								2:32/1.0														Moderately Severe to Very Slightly Weathered, Soft to Moderately Hard, Gray (Metavolcanic Rock), with Very Close to Moderately Close Fracture Spacing																																																	
																						GSI=45-50																																																	
																						Boring Terminated at Elevation 352.3 ft In Crystalline Rock (Metavolcanic Rock)																																																	
																						Surficial Organic Soil 0.0 - 0.2'																																																	

Chatham Park Way from US 15-501 to US 64 Business
Chatham County, North Carolina
Rock Core Photographs
L_7675_EB1-C
9.3 to 20.3 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48599.1.1			TIP R-5963A		COUNTY CHATHAM		GEOLOGIST P. Perry									
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business										GROUND WTR (ft)						
BORING NO. L_7675_EB1-B			STATION 75+71		OFFSET 37 ft RT		ALIGNMENT -L-		0 HR. Dry							
COLLAR ELEV. 373.1 ft			TOTAL DEPTH 7.4 ft		NORTHING 707,223		EASTING 1,953,174		24 HR. Dry							
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 96% 07/26/2024					DRILL METHOD H.S. Augers			HAMMER TYPE Automatic								
DRILLER C. Odom			START DATE 08/12/24		COMP. DATE 08/12/24		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						
375																
370	372.1	1.0	8	23	30									373.1	GROUND SURFACE 0.0	
	368.8	4.3	68	32/0.3							M		368.8	RESIDUAL Very Dense, Gray-Orange, Clayey Fine to Coarse SAND (A-2-6), with trace gravel-sized rock fragments, organics and roots, Manganese Oxide staining 4.3		
	365.7	7.4	60/0.0									365.7	WEATHERED ROCK Gray-Orange (Metavolcanic Rock) 7.4			
													Boring Terminated with Standard Penetration Test Refusal at Elevation 365.7 ft On Crystalline Rock (Metavolcanic Rock)			
																Surficial Organic Soil 0.0 - 0.3'

NCDOT BORE DOUBLE R5963A_RDWY_GEO_GTM.GPJ NC_DOT.GDT 10/22/24

GEOTECHNICAL BORING REPORT

BORE LOG

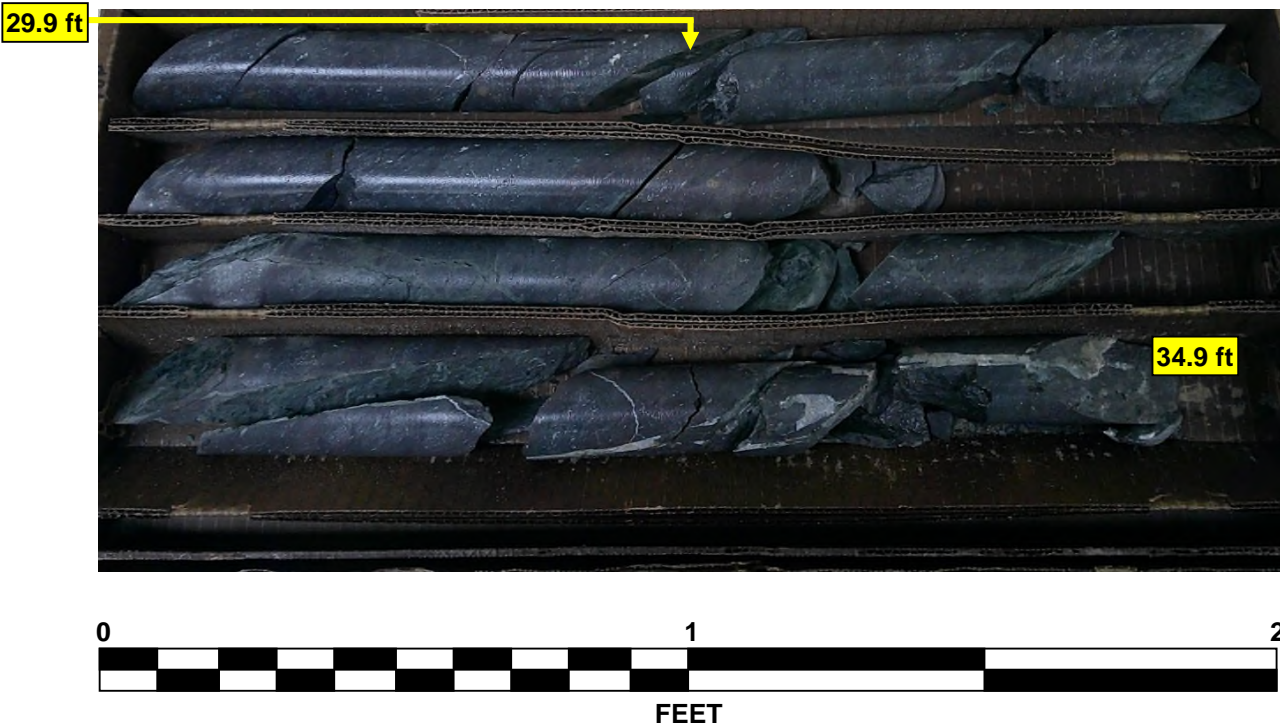
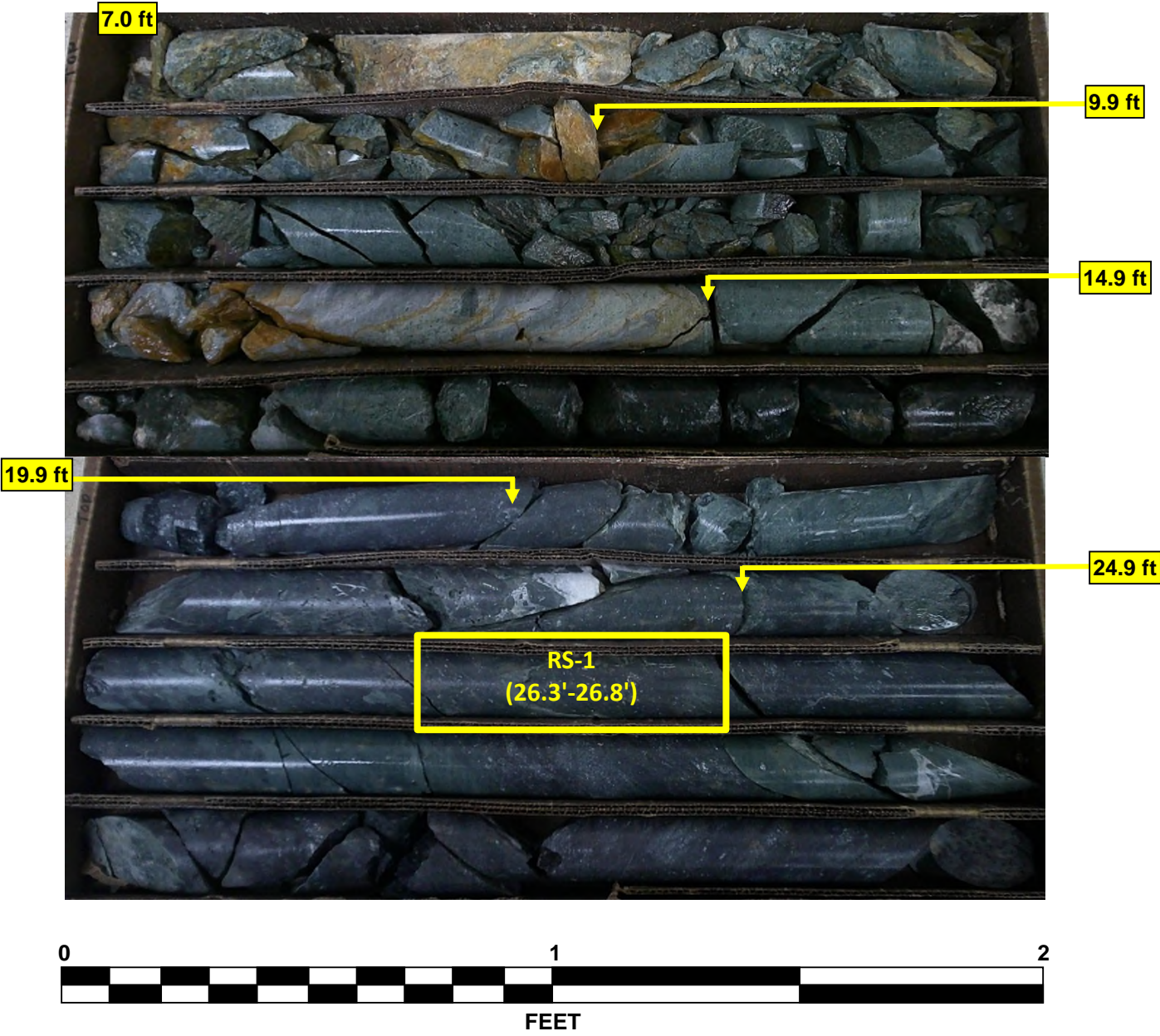
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GEOTECHNICAL BORING REPORT

CORE LOG

WBS 48599.1.1				TIP R-5963A				COUNTY CHATHAM				GEOLOGIST P. Perry												
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business												GROUND WTR (ft)												
BORING NO. L_7675_B1-A				STATION 76+51				OFFSET 25 ft LT				ALIGNMENT -L-				0 HR. NM								
COLLAR ELEV. 370.5 ft				TOTAL DEPTH 34.9 ft				NORTHING 707,319				EASTING 1,953,204				24 HR. 0.7								
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 96% 07/26/2024								DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic												
DRILLER C. Odom				START DATE 08/13/24				COMP. DATE 08/13/24				SURFACE WATER DEPTH N/A												
CORE SIZE NQ				TOTAL RUN 27.9 ft																				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) % ROD (ft) %		SAMP. NO.	STRATA REC. (ft) % ROD (ft) %		L O G	DESCRIPTION AND REMARKS												DEPTH (ft)	
363.5											Begin Coring @ 7.0 ft													
	363.5	7.0	2.9	N=60/0.0 2:54/1.0 4:05/1.0 5:38/0.9	(2.9) 100%	(0.0) 0%		(10.2) 79%	(0.8) 6%		363.5	CRYSTALLINE ROCK												7.0
360	360.6	9.9	5.0	5:24/1.0 3:39/1.0 1:53/1.0 2:58/1.0 3:46/1.0	(4.3) 86%	(0.8) 16%						Moderately Severe to Moderately Weathered, Soft to Moderately Hard, Gray-Orange (Metavolcanic Rock), with Very Close to Close Fracture Spacing												
												GSI=20-25												
355	355.6	14.9	5.0	3:33/1.0 1:11/1.0 3:06/1.0 9:08/1.0 4:01/1.0	(3.0) 60%	(0.0) 0%																		
350	350.6	19.9	5.0	3:26/1.0 7:57/1.0 3:31/1.0 1:51/1.0 2:24/1.0	(4.5) 90%	(2.2) 44%		(14.3) 95%	(7.5) 50%		350.6	Slightly Weathered, Moderately Hard, Gray-Green-White (Metavolcanic Rock), with Very Close to Close Fracture Spacing												19.9
345	345.6	24.9	5.0	1:54/1.0 1:49/1.0 1:57/1.0 6:07/1.0 2:17/1.0	(4.8) 96%	(3.2) 64%	RS-1					RS-1: 26.3-26.8' Unit Weight: 174.0 pcf Unconfined Compressive Strength: 7,680 psi (1,106 ksf)												
												GSI=35-40												
340	340.6	29.9	5.0	3:42/1.0 1:49/1.0 3:00/1.0 1:58/1.0 2:21/1.0	(5.0) 100%	(2.1) 42%																		
	335.6	34.9									335.6	Boring Terminated at Elevation 335.6 ft In Crystalline Rock (Metavolcanic Rock)												34.9
												Surficial Organic Soil 0.0 - 0.3'												

Chatham Park Way from US 15-501 to US 64 Business
Chatham County, North Carolina
Rock Core Photographs
L_7675_B1-A
7.0 to 34.9 Feet



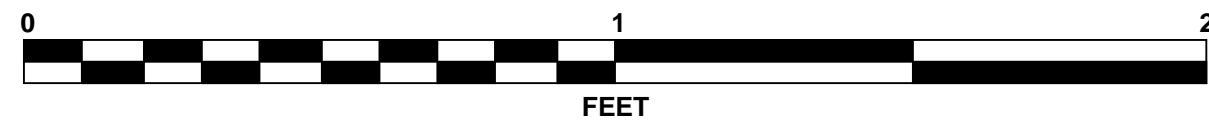
GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48599.1.1				TIP R-5963A				COUNTY CHATHAM				GEOLOGIST P. Perry					
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business												GROUND WTR (ft)					
BORING NO. L_7675_B1-C				STATION 76+37				OFFSET 7 ft RT				ALIGNMENT -L-				0 HR. NM	
COLLAR ELEV. 370.7 ft				TOTAL DEPTH 19.8 ft				NORTHING 707,285				EASTING 1,953,211				24 HR. 1.0	
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 96% 07/26/2024								DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic					
DRILLER C. Odom				START DATE 08/14/24				COMP. DATE 08/14/24				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)		
375																	
370																	
	368.6	2.1												370.7	GROUND SURFACE	0.0	
															ALLUVIAL		
	366.6			20	80/0.4									368.6	Stiff, Brown, Silty CLAY (A-7)	2.1	
	366.9	3.8												366.9	WEATHERED ROCK	3.8	
365				60/0.0											Brown-Gray (Metavolcanic Rock)		
															CRYSTALLINE ROCK		
															Gray-Green-White (Metavolcanic Rock)		
															REC=98%		
360															RQD=83%		
															GSI=65-70		
355																	

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 48599.1.1				TIP R-5963A				COUNTY CHATHAM				GEOLOGIST P. Perry										
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business												GROUND WTR (ft)										
BORING NO. L_7675_B1-C				STATION 76+37				OFFSET 7 ft RT				ALIGNMENT -L-				0 HR. NM						
COLLAR ELEV. 370.7 ft				TOTAL DEPTH 19.8 ft				NORTHING 707,285				EASTING 1,953,211				24 HR. 1.0						
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 96% 07/26/2024								DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic										
DRILLER C. Odom				START DATE 08/14/24				COMP. DATE 08/14/24				SURFACE WATER DEPTH N/A										
CORE SIZE NQ				TOTAL RUN 16.0 ft																		
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS											
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %													
366.9	366.9	3.8	1.0	N=60/0.0 4:42/1.0	(1.0)	(1.0)		(15.7)	(13.3)		Begin Coring @ 3.8 ft CRYSTALLINE ROCK											
365	365.9	4.8	5.0	3:29/1.0 3:19/1.0 3:47/1.0 3:52/1.0 3:36/1.0	100%	100%	RS-2	98%	83%														Slightly Weathered to Fresh, Moderately Hard to Hard, Gray-Green-White (Metavolcanic Rock), with Very Close to Wide Fracture Spacing
360	360.9	9.8	5.0	3:28/1.0 3:37/1.0 3:11/1.0 3:28/1.0 5:28/1.0	(5.0) 100%	(3.6) 72%					RS-2: 4.8-5.3' Unit Weight: 170.2 pcf Unconfined Compressive Strength: 8,280 psi (1,192 ksf) GSI=65-70											
355	355.9	14.8	5.0	4:14/1.0 2:45/1.0 3:31/1.0 4:00/1.0 3:35/1.0	(5.0) 100%	(4.2) 84%																
	350.9	19.8																				

Chatham Park Way from US 15-501 to US 64 Business
Chatham County, North Carolina
Rock Core Photographs
L_7675_B1-C
3.8 to 19.8 Feet



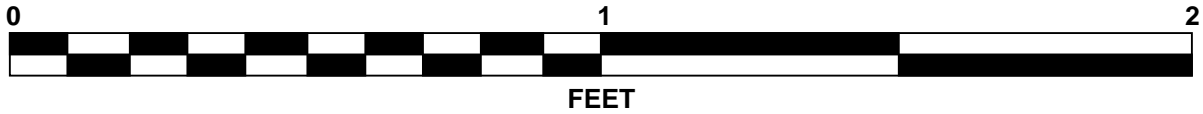
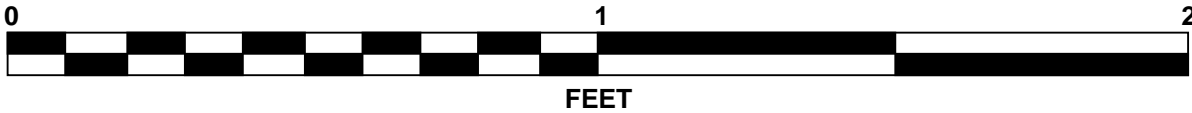
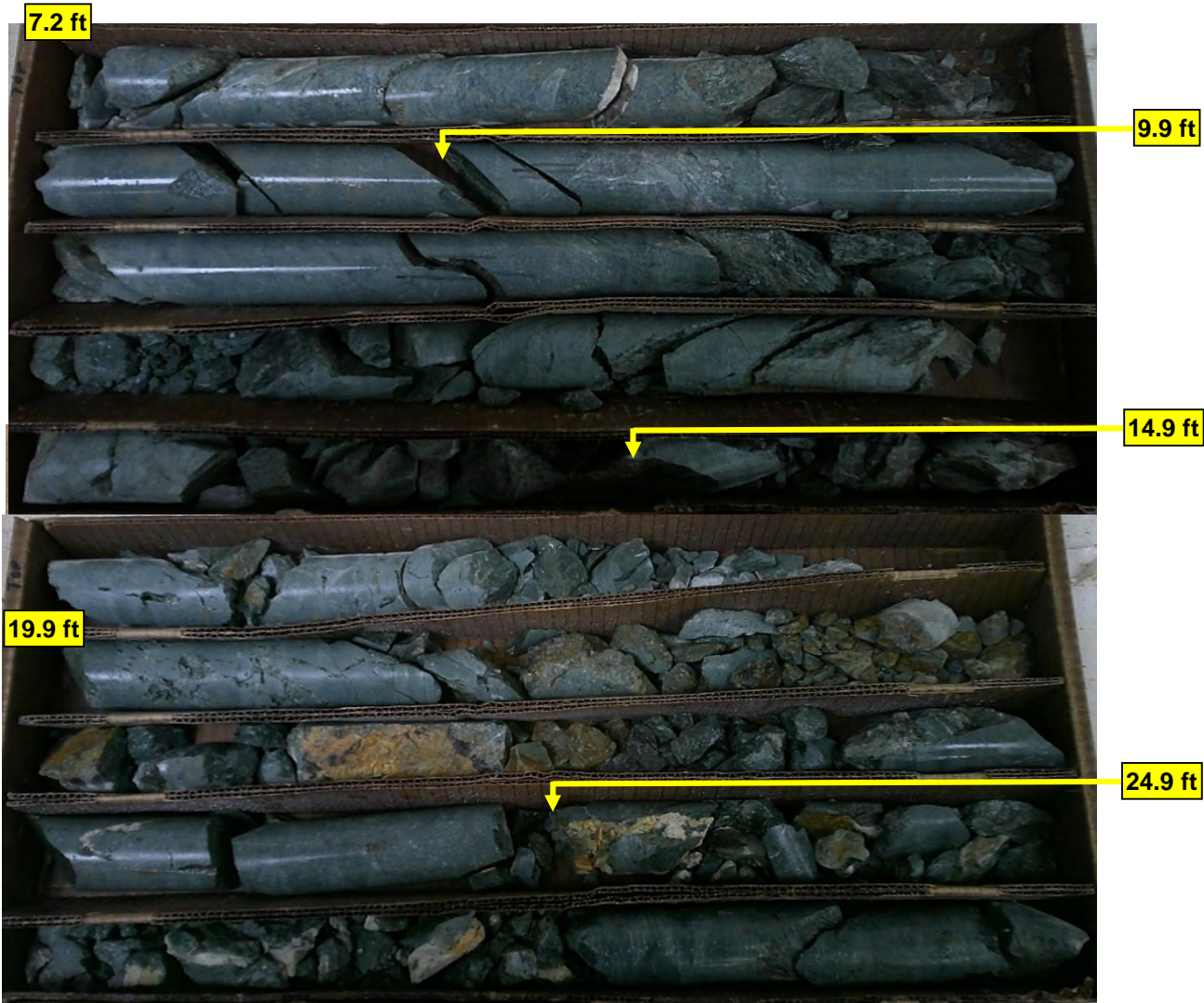
GEOTECHNICAL BORING REPORT

CORE LOG

NCDOT CORE DOUBLE R5963A RDWY GEO GTM GP.I NC DOT GDT 12/13/24

WBS 48599.1.1				TIP R-5963A				COUNTY CATHAM				GEOLOGIST P. Perry												
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business												GROUND WTR (ft)												
BORING NO. L_7675_B1-B				STATION 76+38				OFFSET 34 ft RT				ALIGNMENT -L-				0 HR. NM								
COLLAR ELEV. 372.4 ft				TOTAL DEPTH 34.9 ft				NORTHING 707,263				EASTING 1,953,227				24 HR. 1.7								
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 96% 07/26/2024								DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic												
DRILLER C. Odom				START DATE 08/14/24				COMP. DATE 08/14/24				SURFACE WATER DEPTH N/A												
CORE SIZE NQ				TOTAL RUN 27.7 ft																				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) % ROD (ft) %		SAMP. NO.	STRATA REC. (ft) % ROD (ft) %		L O G	DESCRIPTION AND REMARKS													
											ELEV. (ft)	DEPTH (ft)												
365.2	365.2	7.2	2.7	N=60/0.0 0:59/1.0 3:08/1.0 2:47/0.7	(2.5) 93%	(0.8) 30%		(7.5) 97%	(2.8) 36%		365.2	Begin Coring @ 7.2 ft												
	362.5	9.9										CRYSTALLINE ROCK 7.2												
			5.0	2:56/1.0 2:40/1.0 5:31/1.0 2:41/1.0 3:17/1.0	(5.0) 100%	(2.0) 40%						Moderately Severe to Slightly Weathered, Soft to Moderately Hard, Gray-White-Green (Metavolcanic Rock), with Very Close to Moderately Close Fracture Spacing												
	357.5	14.9										GSI=30-35												
			5.0	2:59/1.0 3:54/1.0 2:33/1.0 3:04/1.0 2:46/1.0	(4.1) 82%	(0.6) 12%		(10.1) 67%	(1.4) 9%		357.5	Moderately Severe Weathering, Soft to Moderately Hard, Gray-Green-Yellow-White (Metavolcanic Rock), with Very Close to Close Fracture Spacing												
	352.5	19.9										GSI=20-25												
			5.0	1:34/1.0 2:12/1.0 3:39/1.0 6:26/1.0 2:54/1.0	(3.0) 60%	(0.8) 16%						Weathered Rock Seam 19.9'-21.9'												
	347.5	24.9										Weathered Rock Seam 25.9'-27.9'												
			5.0	2:40/1.0 1:18/1.0 1:00/1.0 7:20/1.0 2:32/1.0	(3.0) 60%	(0.0) 0%																		
	342.5	29.9										342.5	Moderately Severe to Moderately Weathered, Soft to Moderately Hard, Gray-Green (Metavolcanic Rock), with Very Close to Close Fracture Spacing											
	337.5	34.9										337.5	GSI=30-35											
												Boring Terminated at Elevation 337.5 ft In Crystalline Rock (Metavolcanic Rock)												

Chatham Park Way from US 15-501 to US 64 Business
Chatham County, North Carolina
Rock Core Photographs
L_7675_B1-B
7.2 to 34.9 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48599.1.1			TIP R-5963A			COUNTY CHATHAM			GEOLOGIST T. Wenner					
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business									GROUND WTR (ft)					
BORING NO. L_7675_EB2-A			STATION 77+37			OFFSET 22 ft LT			ALIGNMENT -L-					
COLLAR ELEV. 378.0 ft			TOTAL DEPTH 8.1 ft			NORTHING 707,368			EASTING 1,953,273					
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 78% 05/06/2024						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER L. Ard			START DATE 08/05/24			COMP. DATE 08/05/24			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)
380														
	377.0	1.0	3	3	4									378.0 GROUND SURFACE 0.0
375	374.6	3.4	7	6	13							M		RESIDUAL Medium Stiff, Orange-Tan, Silty CLAY (A-7) 3.0
	372.0	6.0	100/0.3									M		Very Stiff, Tan, Fine to Coarse Sandy SILT (A-4) 6.0
370	370.0	8.0	60/0.1											WEATHERED ROCK Gray (Metavolcanic Rock) 8.0
														CRYSTALLINE ROCK (Metavolcanic Rock) 8.1
														Boring Terminated with Standard Penetration Test Refusal at Elevation 369.9 ft In Crystalline Rock (Metavolcanic Rock)
														Surficial Organic Soil 0.0 - 0.6'

NCDOT BORE DOUBLE R5963A_RDWY_GEO_GTM.GPJ NC_DOT.GDT 10/22/24

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48599.1.1				TIP R-5963A		COUNTY CHATHAM		GEOLOGIST T. Wenner								
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business										GROUND WTR (ft)						
BORING NO. L_7675_EB2-C			STATION 77+32			OFFSET 2 ft RT		ALIGNMENT -L-		0 HR.	Dry					
COLLAR ELEV. 378.2 ft			TOTAL DEPTH 14.7 ft			NORTHING 707,346		EASTING 1,953,284		24 HR.	3.1					
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 78% 05/06/2024						DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic							
DRILLER L. Ard			START DATE 08/05/24			COMP. DATE 08/22/24		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)	
380																
375	377.2	1.0	18	29	18									378.2	GROUND SURFACE	0.0
	374.1	4.1	48	52	48/0.4							M		Dense, Gray, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments	4.6	
	372.2	6.0	100/0.3													
370	370.6	7.6	60/0.0											373.6	WEATHERED ROCK	7.6
365														370.6	Gray (Metavolcanic Rock)	
															CRYSTALLINE ROCK	
														Gray-White (Metavolcanic Rock)		
														REC=99% RQD=52% GSI=40-45		
														363.5	Boring Terminated at Elevation 363.5 ft In Crystalline Rock (Metavolcanic Rock)	14.7
															Surficial Organic Soil 0.0 - 1.0'	

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 48599.1.1				TIP R-5963A				COUNTY CHATHAM				GEOLOGIST T. Wenner										
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business												GROUND WTR (ft)										
BORING NO. L_7675_EB2-C				STATION 77+32				OFFSET 2 ft RT				ALIGNMENT -L-				0 HR. Dry						
COLLAR ELEV. 378.2 ft				TOTAL DEPTH 14.7 ft				NORTHING 707,346				EASTING 1,953,284				24 HR. 3.1						
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 78% 05/06/2024								DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic										
DRILLER L. Ard				START DATE 08/05/24				COMP. DATE 08/22/24				SURFACE WATER DEPTH N/A										
CORE SIZE NQ				TOTAL RUN 7.1 ft																		
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS											
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %													
370.6											Begin Coring @ 7.6 ft											
370	370.6	7.6	2.1	N=60/0.0	(2.0)	(1.1)		(7.0)	(3.7)		CRYSTALLINE ROCK 7.6											
	368.5	9.7		3:13/1.0	95%	52%		99%	52%		Very Slightly Weathered to Fresh, Moderately Hard to Hard, Gray-White											
			5.0	2:58/1.0	(5.0)	(2.6)					(Metavolcanic Rock), with Very Close to Close Fracture Spacing											
				0:18/0.1	100%	52%					GSI=40-45											
365				3:08/1.0																		
	363.5	14.7		3:04/1.0							363.5 14.7											
				3:37/1.0							Boring Terminated at Elevation 363.5 ft In Crystalline Rock (Metavolcanic Rock)											
				4:55/1.0							Surficial Organic Soil 0.0 - 1.0'											
				2:43/1.0																		

Chatham Park Way from US 15-501 to US 64 Business
Chatham County, North Carolina
Rock Core Photographs
L_7675_EB2-C
7.6 to 14.7 Feet



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48599.1.1			TIP R-5963A		COUNTY CHATHAM		GEOLOGIST T. Wenner								
SITE DESCRIPTION Chatham Parkway from US 15-501 to US 64 Business										GROUND WTR (ft)					
BORING NO. L_7675_EB2-B			STATION 77+15		OFFSET 42 ft RT		ALIGNMENT -L-		0 HR. Dry						
COLLAR ELEV. 375.4 ft			TOTAL DEPTH 8.5 ft		NORTHING 707,304		EASTING 1,953,296		24 HR. Dry						
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 78% 05/06/2024					DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER L. Ard			START DATE 08/05/24		COMP. DATE 08/05/24		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)
380															
375	374.4	1.0												375.4	0.0
370	370.9	4.5	16	64	36/0.3	.	.	.	.	.	.	.	.	373.9	1.5
	369.4	6.0				.	.	.	.	.	.	.	.	Very Stiff, Brown, Silty CLAY (A-7), with trace roots	
						.	.	.	.	.	.	.	.	WEATHERED ROCK	
	366.9	8.5				.	.	.	.	.	.	.	.	Gray, (Metavolcanic Rock)	
			60/0.0											366.9	8.5
														Boring Terminated with Standard Penetration Test Refusal at Elevation 366.9 ft On Crystalline Rock (Metavolcanic Rock)	
														Surficial Organic Soil 0.0 - 0.2'	

NCDOT BORE DOUBLE R5963A_RDWY_GEO_GTM.GPJ NC_DOT.GDT 10/22/24

ROCK TEST RESULTS									
SAMPLE NO.	BORING	STATION	OFFSET	NORTHING	EASTING	DEPTH INTERVAL	ROCK TYPE	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH
RS-1	L 7675 B1-A	76+51 -L-	25' LT	707319	1953204	26.3 - 26.8'	METAVOLCANIC ROCK	174.0	7,680 psi (1,106 ksf)
RS-2	L 7675 B1-C	76+37 -L-	7' RT	707285	1953211	4.8 - 5.3'	METAVOLCANIC ROCK	170.2	8,280 psi (1,192 ksf)

Alex M. Atkinson

AUTHORIZED SIGNATURE
NCDOT CERT NO. 130-04-0212

Prepared in the Office of:
F&ME CONSULTANTS, INC.
COLUMBIA, SOUTH CAROLINA
NCDOT LAB CERT. NO. 130-0212

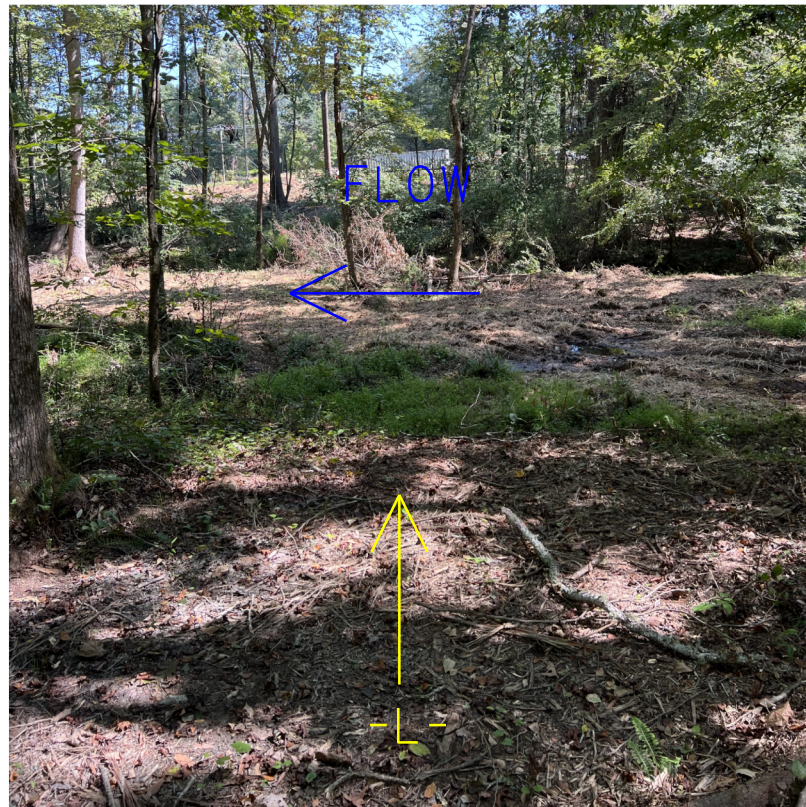


PHOTO #1: VIEW NEAR END BENT NO. 1, FACING UPSTATION



PHOTO #2: VIEW NEAR END BENT NO. 2, FACING DOWNSTATION