

REFERENCE: I-2513AC

PROJECT: 34165

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY **BUNCOMBE**
PROJECT DESCRIPTION **I-26/I-40/I-240 INTERCHANGE
TO SR 3548 (HAYWOOD ROAD)**

SITE DESCRIPTION **RETAINING WALL NO. 2**
-WALL2- STA. 10.85.77 (-L- STA. 53+86.35) TO
-WALL2- STA. 20+73.70 (-L- STA. 63+81.00)

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-12	BORE LOGS
13	SOIL TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AC	1	13

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 CONDITIONS IN THE BOREHOLE. THEREFORE, THE DATA FROM THIS 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. TEMPERATURE 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 SHALL BE RESPONSIBLE FOR PERFORMING ADDITIONAL 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:

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

A. BLACKMORE

T. COOK

GEOLOGIC EXPLORATION

TERRACON CONSULTANTSINVESTIGATED BY ECS SOUTHEAST, LLC

DRAWN BY A. SUTTLE, P.G.

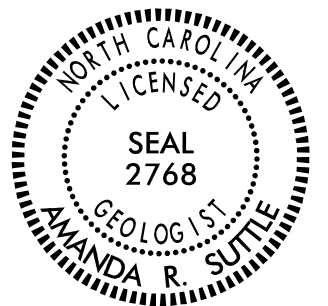
CHECKED BY M. MULLA, P.E.

SUBMITTED BY ECS SOUTHEAST, LLCDATE JULY 2024

Prepared in the Office of:



ECS SOUTHEAST, LLC
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 [PHONE]
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NC REGISTERED
ENGINEERING
FIRM # F-1519



— Signed by:

Amanda R. Suttle PG 6/30/2026

SIGNATURE	DATE
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**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

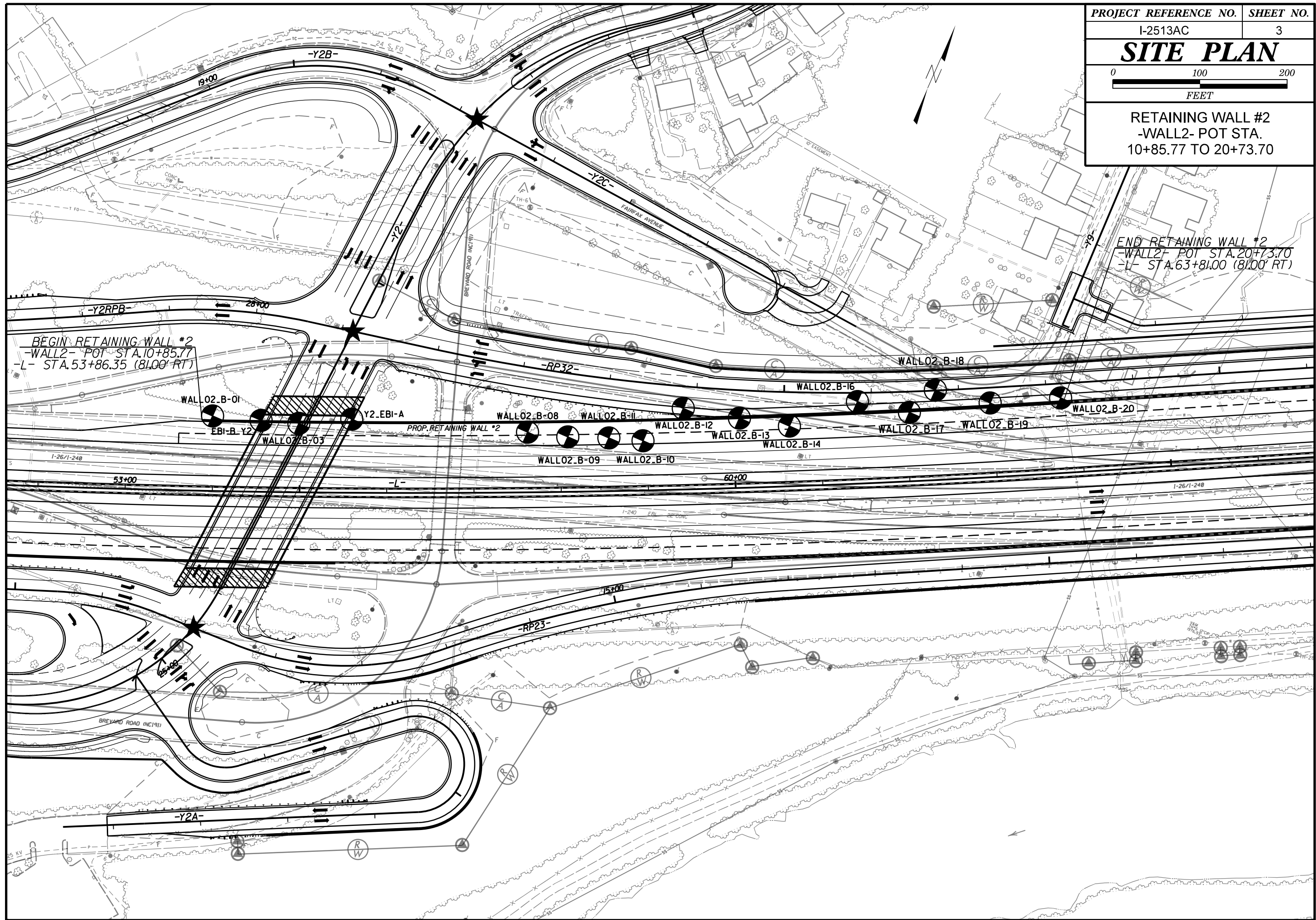
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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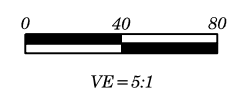
PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	3
SITE PLAN	
0 100 200 FEET	
RETAINING WALL #2 -WALL2- POT STA. 10+85.77 TO 20+73.70	



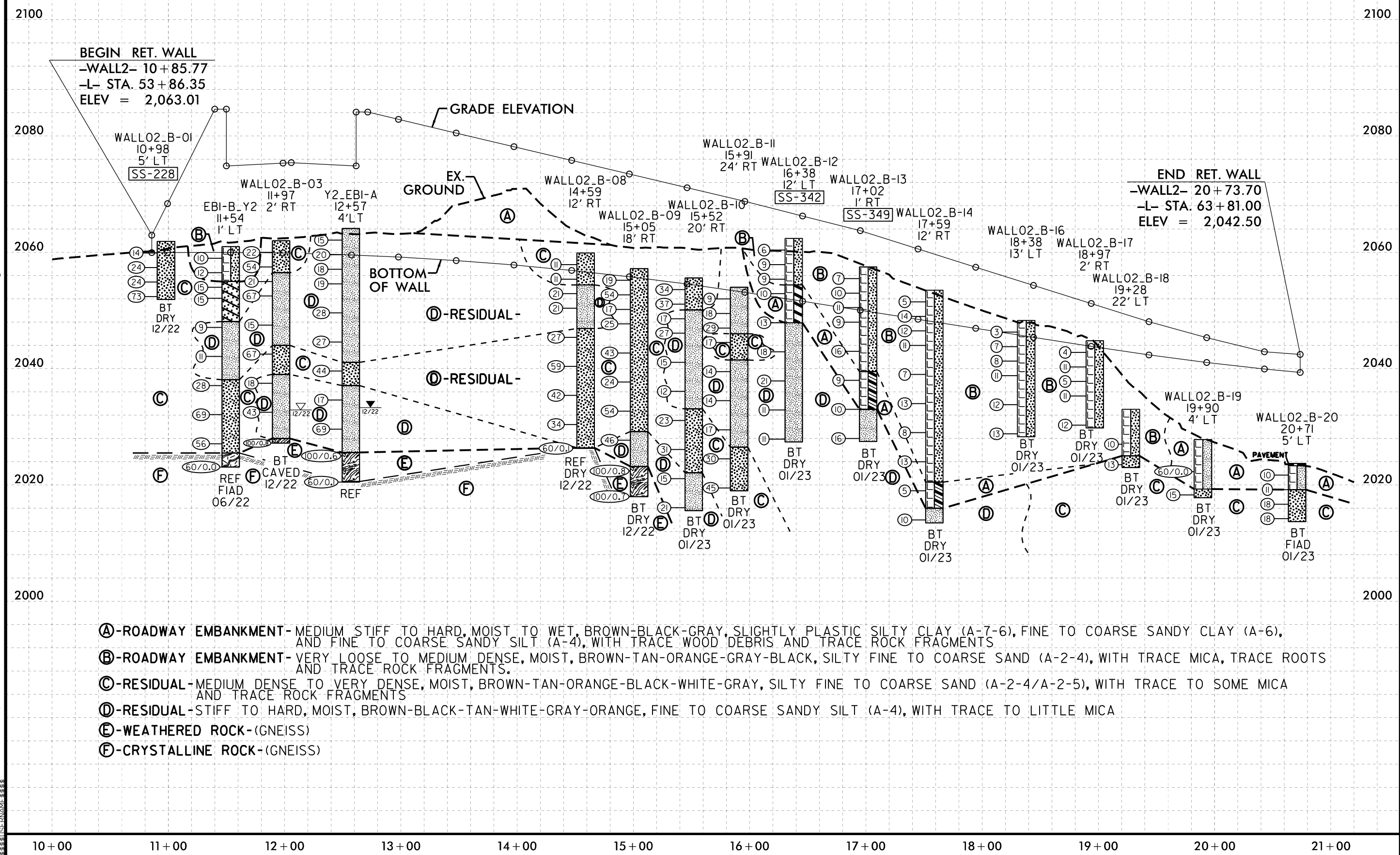
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-WALL2- PROFILE ALONG EXISTING GROUND LINE FROM ROADWAY
DESIGN FILES, PROVIDED BY AECOM JULY 2024 AND I2513 Is tnl.fin. INFERRED
STRATIGRAPHY IS DRAWN THROUGH THE BORING, PROJECTED ON THE PROFILE.

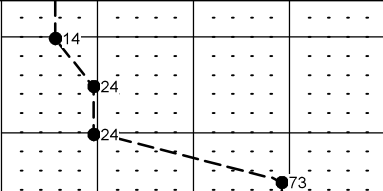
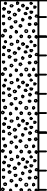
-WALL2-



PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	4
PROFILE BORINGS PROJECTED ON -WALL2- ALONG WALL NO. 2	



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)									GROUND WTR (ft)						
BORING NO. WALL02_B-01			STATION 10+98			OFFSET 5 ft LT			ALIGNMENT -WALL2-			0 HR. Dry			
COLLAR ELEV. 2,061.9 ft			TOTAL DEPTH 10.0 ft			NORTHING 679,474			EASTING 931,132			24 HR. Dry			
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER T. Cook			START DATE 12/01/22			COMP. DATE 12/01/22			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)
2065															
2060	2,060.9	1.0												2,061.9 GROUND SURFACE 0.0	
	2,058.4	3.5	5	5	9						SS-228	14%		RESIDUAL Medium Dense to Very Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4(0))	
	2,058.4	3.5	8	10	14							M			
2055	2,055.9	6.0	9	10	14							M			
	2,053.4	8.5	15	33	40							M			2,051.9 10.0
														Boring Terminated at Elevation 2,051.9 ft In Residual Silty SAND (A-2-4)	
														Surficial Organic Soil from 0.0 to 0.3 feet.	

WBS 34165.1.2			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST CHITTICK, N.						
SITE DESCRIPTION I-26 CONNECTOR (I-40 TO US 19 - 23 - 70 NORTH OF ASHEVILLE)									GROUND WTR (ft)						
BORING NO. EB1-B_Y2			STATION 11+54			OFFSET 1 ft LT			ALIGNMENT -WALL2-			0 HR. N/A			
COLLAR ELEV. 2,061.5 ft			TOTAL DEPTH 37.9 ft			NORTHING 679,492			EASTING 931,185			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 95% 02/06/2021						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic						
DRILLER TURNAGE, J. R.			START DATE 06/15/22			COMP. DATE 06/15/22			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)
2065															
2060	2,060.5	1.0												2,061.5	0.0
2055	2,058.0	3.5	5	5	5									ROADWAY EMBANKMENT	
	2,055.5	6.0	6	6	6									MEDIUM DENSE, BROWN, SILTY FINE SAND, TRACE ROOTS, TRACE MICA, MOIST (A-2-4)	
	2,053.6	7.9	5	6	9									2,055.5	6.0
2050			5	7	8									RESIDUAL	
														MEDIUM DENSE, BROWN, SILTY FINE SAND, TRACE MICA, MOIST (A-2-5)	
2045	2,048.6	12.9	4	4	5									2,048.6	12.9
	2,043.6	17.9	3	5	6									STIFF, TAN, BLACK, BROWN, FINE SANDY SILT, MOIST (A-4)	
2040															
	2,038.6	22.9	9	11	17									2,038.6	22.9
2035														MEDIUM DENSE TO VERY DENSE, BROWN, TAN, SITY FINE TO COARSE SAND, SOME MICA, MOIST (A-2-4)	
	2,033.6	27.9	6	27	42										
2030															
	2,028.6	32.9	22	18	38										
2025														2,026.0	35.5
	2,023.6	37.9	60/0.0											2,023.6	37.9
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,023.6 ft IN CRYSTALLINE ROCK (GNEISS)															
CAVED DRY @ 34.0' TOPSOIL 3"															

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 7/29/24

GEOTECHNICAL BORING REPORT
BORE LOG

SHEET 6

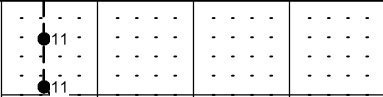
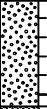
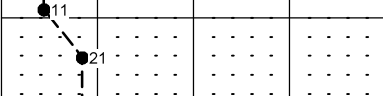
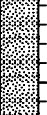
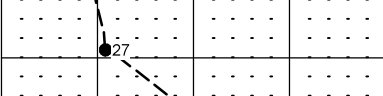
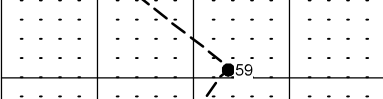
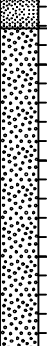
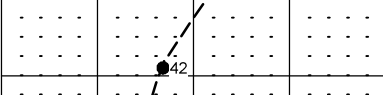
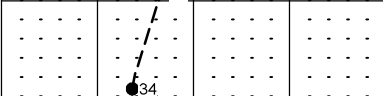
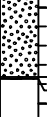
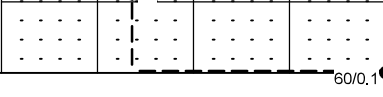
WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)									GROUND WTR (ft)						
BORING NO. WALL02_B-03			STATION 11+97			OFFSET 2 ft RT			ALIGNMENT -WALL2-			0 HR. 29.3			
COLLAR ELEV. 2,062.0 ft			TOTAL DEPTH 34.8 ft			NORTHING 679,506			EASTING 931,226			24 HR. Caved			
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER T. Cook			START DATE 12/01/22			COMP. DATE 12/01/22			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)
2065															
2060	2,061.0	1.0	6	10	12									2,062.0	GROUND SURFACE 0.0
	2,058.5	3.5	13	23	31							M			
2055	2,056.0	6.0	11	9	12							M		2,056.5	5.5
	2,053.5	8.5	30	19	48							M			
2050												M			
	2,048.5	13.5	22	8	7							M			
2045															
	2,043.5	18.5	16	30	37							M		2,044.0	18.0
2040															
	2,038.5	23.5	11	8	10							M		2,039.0	23.0
2035															
	2,033.5	28.5	12	21	22										
2030															
	2,028.5	33.5	25	49	60/0.3									2,028.0	34.0
														2,027.2	34.8
						</									

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore					
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)									GROUND WTR (ft)					
BORING NO. Y2_EB1-A			STATION 12+57			OFFSET 4 ft LT			ALIGNMENT -WALL2-			0 HR. 34.2		
COLLAR ELEV. 2,064.1 ft			TOTAL DEPTH 43.6 ft			NORTHING 679,535			EASTING 931,279			24 HR. 30.8		
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER T. Cook			START DATE 12/01/22			COMP. DATE 12/01/22			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				
2065														
	2,063.1	1.0	4	6	9									2,064.1 GROUND SURFACE 0.0
2060	2,060.6	3.5	7	7	13									RESIDUAL Stiff to Very Stiff, Brown-Tan-White-Gray, Fine to Coarse Sandy SILT (A-4)
	2,058.1	6.0	6	8	10									
2055	2,055.6	8.5	5	8	11									
2050	2,050.6	13.5	8	12	16									
2045	2,045.6	18.5	11	11	16									
2040	2,040.6	23.5	15	20	24									2,041.1 23.0 Dense, Brown-Black, Silty Fine to Coarse SAND (A-2-4), with trace mica
														2,037.1 27.0 Very Stiff to Hard, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica
2035	2,035.6	28.5	7	6	11									
2030	2,030.6	33.5	15	36	33									
2025	2,025.6	38.5	46	54/0.1										2,025.6 38.5 WEATHERED ROCK Gray (MUSCOVITE-BIOTITE GNEISS)
	2,020.6	43.5	60/0.1											2,020.6 43.5 2,020.5 43.6 CRYSTALLINE ROCK (MUSCOVITE-BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 2,020.5 ft In Crystalline Rock (GNEISS) Surficial Organic Soil 0.0 to 0.3 feet

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 7/29/24

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.13				TIP I-2513AC				COUNTY BUNCOMBE				GEOLOGIST A. Blackmore					
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)												GROUND WTR (ft)					
BORING NO. WALL02_B-08				STATION 14+59				OFFSET 12 ft RT				ALIGNMENT -WALL2-				0 HR. Dry	
COLLAR ELEV. 2,059.9 ft				TOTAL DEPTH 33.6 ft				NORTHING 679,602				EASTING 931,470				24 HR. Dry	
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic					
DRILLER T. Cook				START DATE 12/01/22				COMP. DATE 12/01/22				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)		
2060														2,059.9	GROUND SURFACE 0.0		
2055	2,058.9	1.0		5	5	6							M		RESIDUAL Medium Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4)		
	2,056.4	3.5		3	5	6							M		2,054.4 5.5		
2050	2,053.9	6.0		5	7	14							M		Very Stiff, Brown-Tan, Fine to Coarse Sandy SILT (A-4)		
	2,051.4	8.5		6	9	12							M		2,046.9 13.0		
2045	2,046.4	13.5		10	12	15							M		Medium Dense to Very Dense, Brown-Gray-White, Silty Fine to Coarse SAND (A-2-4), with trace mica		
	2,041.4	18.5		17	24	35							M		2,026.4 33.5		
2035	2,036.4	23.5		11	19	23							M		CRYSTALLINE ROCK (GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 2,026.3 ft In Crystalline Rock (GNEISS) Surficial Organic Soil from 0.0 to 0.2 feet.		
	2,031.4	28.5		9	11	23							M		2,026.3 33.6		
2030	2,026.4	33.5	60/0.1			60/0.1											

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)							GROUND WTR (ft)							
BORING NO. WALL02_B-09		STATION 15+05		OFFSET 18 ft RT		ALIGNMENT -WALL2-		0 HR. Dry						
COLLAR ELEV. 2,057.2 ft		TOTAL DEPTH 39.2 ft		NORTHING 679,616		EASTING 931,514		24 HR. Dry						
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER T. Cook			START DATE 12/02/22		COMP. DATE 12/02/22		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				
2060														
	2,056.2	1.0	8	9	10									2,057.2 GROUND SURFACE 0.0
2055	2,053.7	3.5	19	26	28									RESIDUAL Medium Dense to Very Dense, Brown-Tan-Gray, Silty Fine to Coarse SAND (A-2-4), with trace rock fragments
	2,051.2	6.0	4	6	11									
2050	2,048.7	8.5	11	13	12									
2045	2,043.7	13.5	15	16	27									
2040	2,038.7	18.5	8	11	13									
2035	2,033.7	23.5	15	26	28									
2030	2,028.7	28.5	19	22	24									2,029.2 Hard, Brown-Black, Fine to Coarse Sandy SILT (A-4), with trace mica 28.0
2025	2,023.7	33.5	25	41	59/0.3									2,023.2 WEATHERED ROCK Gray-White (GNEISS) 34.0
2020	2,018.7	38.5	30	70/0.2										2,017.7 Boring Terminated at Elevation 2,018.0 ft In Weathered Rock (GNEISS) 39.5
														Surficial Organic Soil from 0.0 to 0.3 feet.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore							
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)									GROUND WTR (ft)							
BORING NO. WALL02_B-10			STATION 15+52			OFFSET 20 ft RT			ALIGNMENT -WALL2-			0 HR. Dry				
COLLAR ELEV. 2,055.6 ft			TOTAL DEPTH 40.0 ft			NORTHING 679,634			EASTING 931,558			24 HR. Dry				
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 80% 03/18/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER J. Messick			START DATE 01/23/23			COMP. DATE 01/23/23			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)	
2060																
2055														2,055.6	0.0	GROUND SURFACE
2050	2,054.6	1.0	12	13	21											
	2,052.1	3.5	16	22	15											
	2,049.6	6.0	7	10	7											
2045	2,047.1	8.5	11	13	14											
	2,042.1	13.5	5	6	9											
2040																
2035	2,037.1	18.5	4	5	7											
	2,032.1	23.5	12	12	11											
2030																
2025	2,027.1	28.5	10	15	16											
	2,022.1	33.5	5	6	9											
2020																
	2,017.1	38.5	9	8	13											

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)							GROUND WTR (ft)							
BORING NO. WALL02_B-11		STATION 15+91		OFFSET 24 ft RT		ALIGNMENT -WALL2-		0 HR. Dry						
COLLAR ELEV. 2,054.0 ft		TOTAL DEPTH 35.0 ft		NORTHING 679,647		EASTING 931,595		24 HR. Dry						
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 80% 03/18/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER J. Messick		START DATE 01/23/23		COMP. DATE 01/23/23		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				
2055														
	2,053.0	1.0	3	4	5									2,054.0 GROUND SURFACE 0.0
2050	2,050.5	3.5	6	7	11							M		RESIDUAL Stiff to Very Stiff, Brown-Black, Fine to Coarse Sandy SILT (A-4), with trace to little mica
	2,048.0	6.0	11	12	17							M		
2045	2,045.5	8.5	7	8	9							M		2,046.0 Medium Dense, Black-White-Brown, Silty Fine to Coarse SAND (A-2-4) 8.0
												M		
2040	2,040.5	13.5	6	6	8							M		2,041.5 Stiff to Very Stiff, Brown-Tan-Orange, Fine to Coarse Sandy SILT (A-4), with trace mica 12.5
2035	2,035.5	18.5	4	5	9							M		
2030	2,030.5	23.5	5	7	10							M		
2025	2,025.5	28.5	12	14	16							M		2,026.5 Dense, White-Tan-Orange, Silty Fine to Coarse SAND (A-2-4) 27.5
2020	2,020.5	33.5	23	25	20							M		2,019.0 Boring Terminated at Elevation 2,019.0 ft In Residual Silty SAND (A-2-4) 35.0
														Surficial Organic Soil from 0.0 to 0.3 feet.

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 7/29/24

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT.GDT 7/29/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)							GROUND WTR (ft)							
BORING NO. WALL02_B-13		STATION 17+02		OFFSET 1 ft RT		ALIGNMENT -WALL2-		0 HR. Dry						
COLLAR ELEV. 2,057.5 ft		TOTAL DEPTH 30.0 ft		NORTHING 679,715		EASTING 931,686		24 HR. Dry						
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 80% 03/18/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER J. Messick		START DATE 01/23/23		COMP. DATE 01/23/23		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				
2060														
	2,056.5	1.0	1	2	5	7								2,057.5 GROUND SURFACE 0.0
2055	2,054.0	3.5	7	5	5	10					SS-349	15%		ROADWAY EMBANKMENT Loose to Medium Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4(0)), with trace mica
2050	2,051.5	6.0	3	5	6	11						M		
	2,049.0	8.5	4	4	5	9						M		
2045	2,044.0	13.5	5	7	9	16						M		
2040	2,039.0	18.5	2	2	7	9						M		2,039.5 Stiff, Brown-Black-Gray, Fine to Coarse Sandy CLAY (A-6), with trace wood debris 18.0
2035	2,034.0	23.5	6	6	4	10						M		2,033.0 24.5
2030	2,029.0	28.5	6	7	9	16						M		2,027.5 RESIDUAL Very Stiff, Brown-Tan, Fine to Coarse Sandy SILT (A-4), with trace mica 30.0
														Boring Terminated at Elevation 2,027.5 ft In Residual Sandy SILT (A-4) Surficial Organic Soil from 0.0 to 0.3 feet.

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT.GDT 7/29/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)							GROUND WTR (ft)							
BORING NO. WALL02_B-16		STATION 18+38		OFFSET 13 ft LT		ALIGNMENT -WALL2-		0 HR. Dry						
COLLAR ELEV. 2,048.9 ft		TOTAL DEPTH 20.0 ft		NORTHING 679,787		EASTING 931,802		24 HR. Dry						
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 80% 03/18/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER J. Messick			START DATE 01/24/23		COMP. DATE 01/24/23		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				
2050														
	2,047.9	1.0	2	1	2									2,048.9 GROUND SURFACE 0.0
2045	2,045.4	3.5	3	3	4							M		ROADWAY EMBANKMENT Very Loose to Medium Dense, Brown-Tan-Gray, Silty Fine to Coarse SAND (A-2-4), with trace mica
	2,042.9	6.0	3	3	5							M		
2040	2,040.4	8.5	4	5	6							M		
												M		
2035	2,035.4	13.5	5	5	7							M		
												M		
2030	2,030.4	18.5	4	5	8							M		2,028.9 20.0
														Boring Terminated at Elevation 2,028.9 ft In Roadway Embankment Sandy SILT (A-4)
														Surficial Organic Soil from 0.0 to 0.2 feet.

WBS			34165.1.13			TIP			I-2513AC			COUNTY			BUNCOMBE			GEOLOGIST			A. Blackmore																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
SITE DESCRIPTION																		I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)			GROUND WTR (ft)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
BORING NO.			WALL02_B-18			STATION			19+28			OFFSET			22 ft LT			ALIGNMENT			-WALL2-			0 HR.		Dry																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
COLLAR ELEV.			2,033.0 ft			TOTAL DEPTH			10.0 ft			NORTHING			679,835			EASTING			931,878			24 HR.		Dry																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
DRILL RIG/HAMMER EFF./DATE										GEO366 Diedrich D-50 80% 03/18/2022										DRILL METHOD				H.S. Augers/Hand Auger				HAMMER TYPE		Automatic																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
DRILLER					J. Messick					START DATE					01/24/23					COMP. DATE					01/24/23					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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
2035																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

WBS		34165.1.13		TIP		I-2513AC		COUNTY		BUNCOMBE		GEOLOGIST		A. Blackmore						
SITE DESCRIPTION													I-26/I-40/I-240 Interchange to SR 3548 (Haywood Road)			GROUND WTR (ft)				
BORING NO.		WALL02_B-20		STATION		20+71		OFFSET		5 ft LT		ALIGNMENT		-WALL2-		0 HR.	Dry			
COLLAR ELEV.		2,023.7 ft		TOTAL DEPTH		10.0 ft		NORTHING		679,884		EASTING		932,013		24 HR.	FIAD			
DRILL RIG/HAMMER EFF./DATE								GEO366 Diedrich D-50 80% 03/18/2022				DRILL METHOD			H.S. Augers		HAMMER TYPE		Automatic	
DRILLER				J. Messick		START DATE		01/24/23		COMP. DATE		01/24/23		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										
2025																				
	2,022.7	1.0																		
2020	2,020.2	3.5		2	4	6														
				6	5	6														
	2,017.7	6.0		5	7	11														
2015	2,015.2	8.5		7	8	10														

SOIL TEST RESULTS																
BORING NO.	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
WALL02_B-01	SS-228	5' LT	10+98 -WALL2-	1.0 - 2.5	A-2-4(0)	37	NP	36.2	37.2	21.3	5.2	94.2	69.7	33.3	13.7	-
WALL02_B-12	SS-342	12' LT	16+38 -WALL2-	8.5 - 10.0	A-7-6(5)	42	13	28.1	20.0	24.5	27.5	95.2	75.6	54.1	19.1	-
WALL02_B-13	SS-349	1' RT	17+02 -WALL2-	3.5 - 5.0	A-2-4(0)	28	NP	33.6	38.8	20.3	7.2	87.8	69.4	30.5	15.1	-

LAB TECHNICIAN: DANIEL REEVE

NCDOT CERTIFICATION NO. 135-03-0816

REFERENCE: I-2513AC

PROJECT: 34165

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3-5	SITE PLAN
6-9	PROFILES
10-30	BORE LOGS
31	SOIL TEST RESULTS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE

PROJECT DESCRIPTION I-26I-40I-240 INTERCHANGE
TO SR 3548 (HAYWOOD ROAD)

SITE DESCRIPTION RETAINING WALL NO. 3
-WALL3- STA. 11 + 12.94 (-RP23- STA. 16 + 60.00) TO
-WALL3- STA. 31 + 86.65 (-RP23- STA. 37 + 33.23)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AC	1	31

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

A. BLACKMORE

T. HIBDON

W. KING

GEOLOGIC EXPLORATION

TOTAL DEPTH DRILLING

TERRACON CONSULTANTS

INVESTIGATED BY ECS SOUTHEAST, LLC

DRAWN BY A. SUTTLE, P.G.

CHECKED BY M. MULLA, P.E.

SUBMITTED BY ECS SOUTHEAST, LLC

DATE SEPTEMBER 2024

Prepared in the Office of:



ECS SOUTHEAST, LLC
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 [PHONE]
(704) 357-0023 [FAX]
NC REGISTERED
ENGINEERING
FIRM # F-1519

ECS PROJ: 31-4489



Signed by:

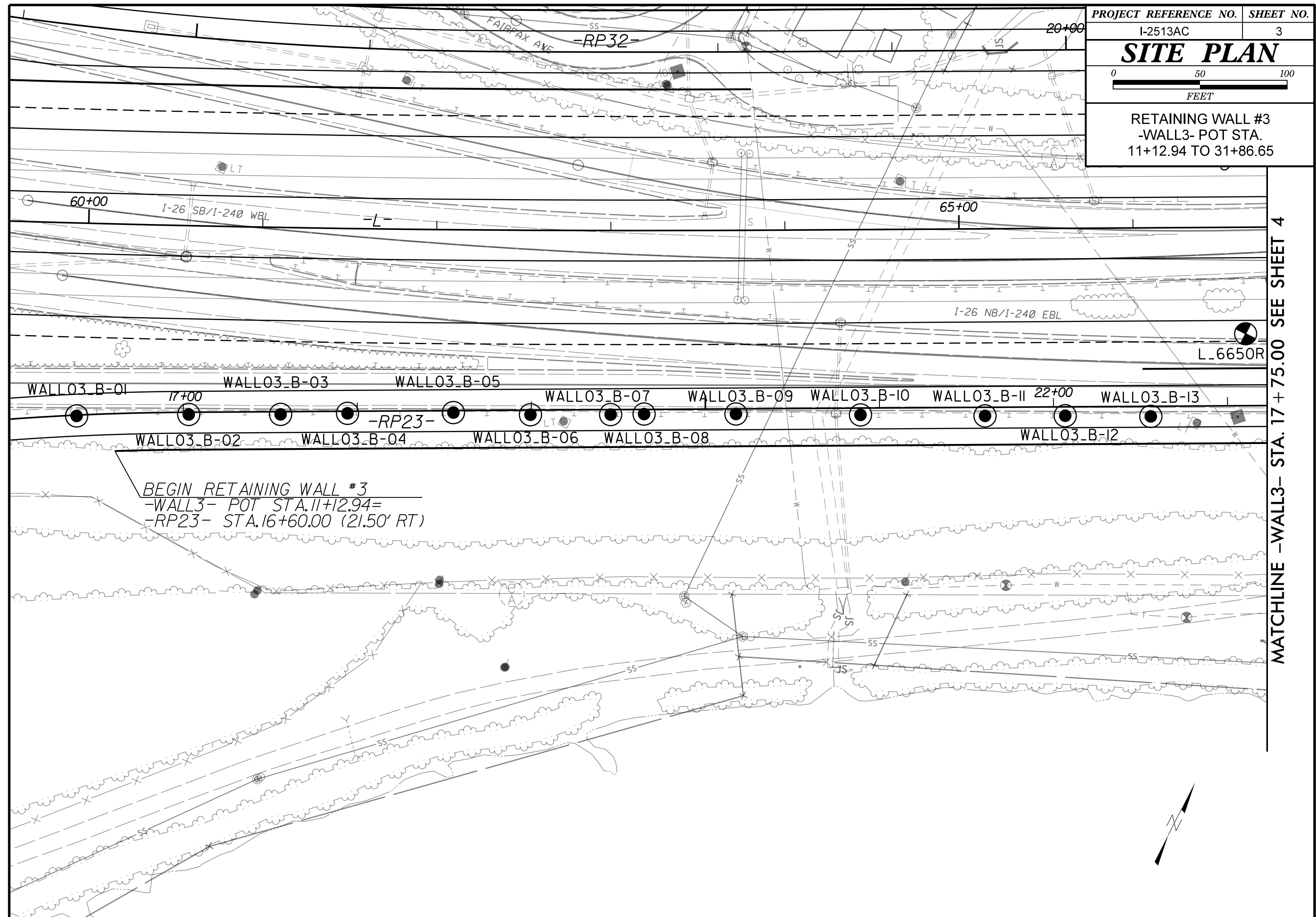
Amanda R. Suttle PG

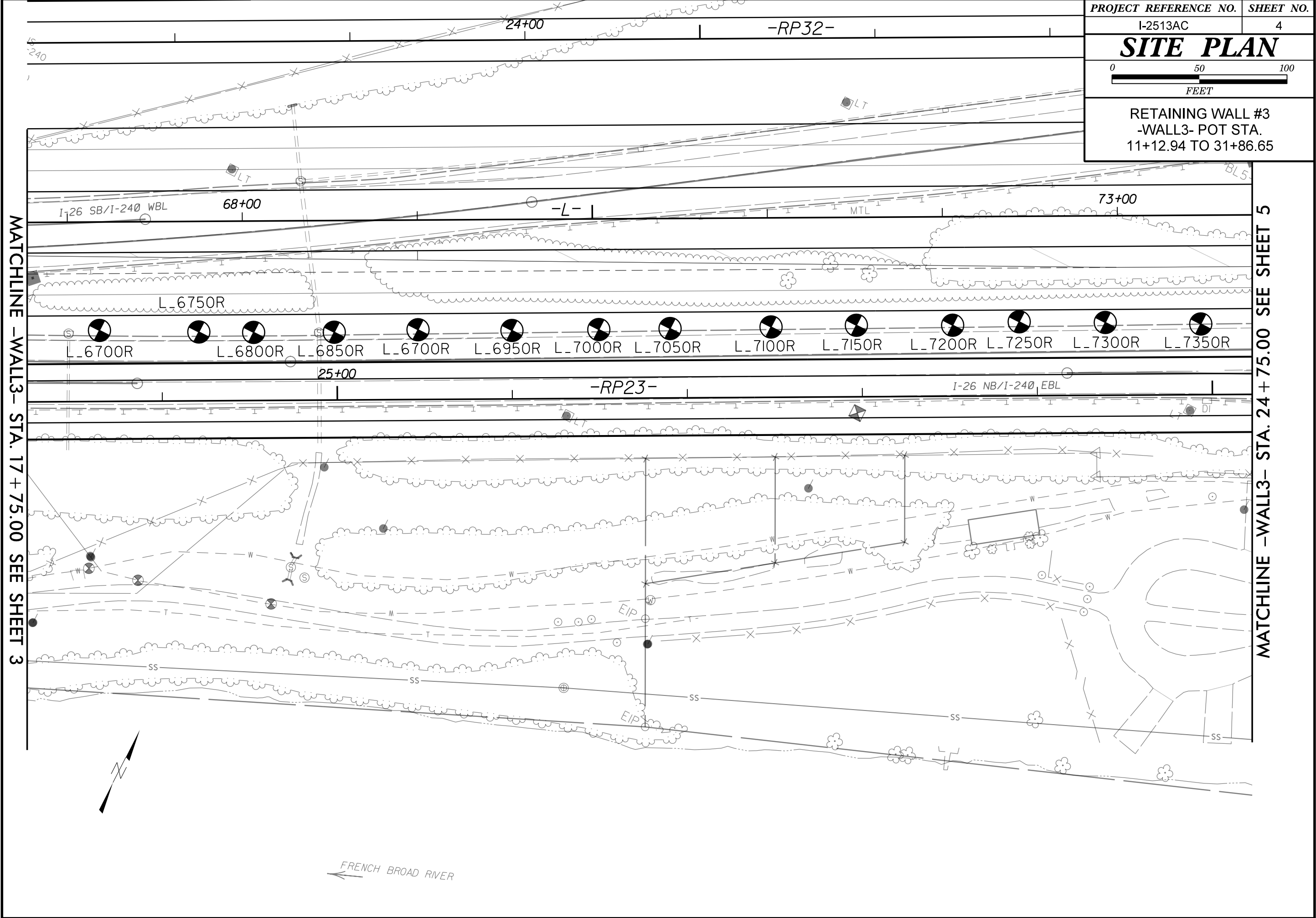
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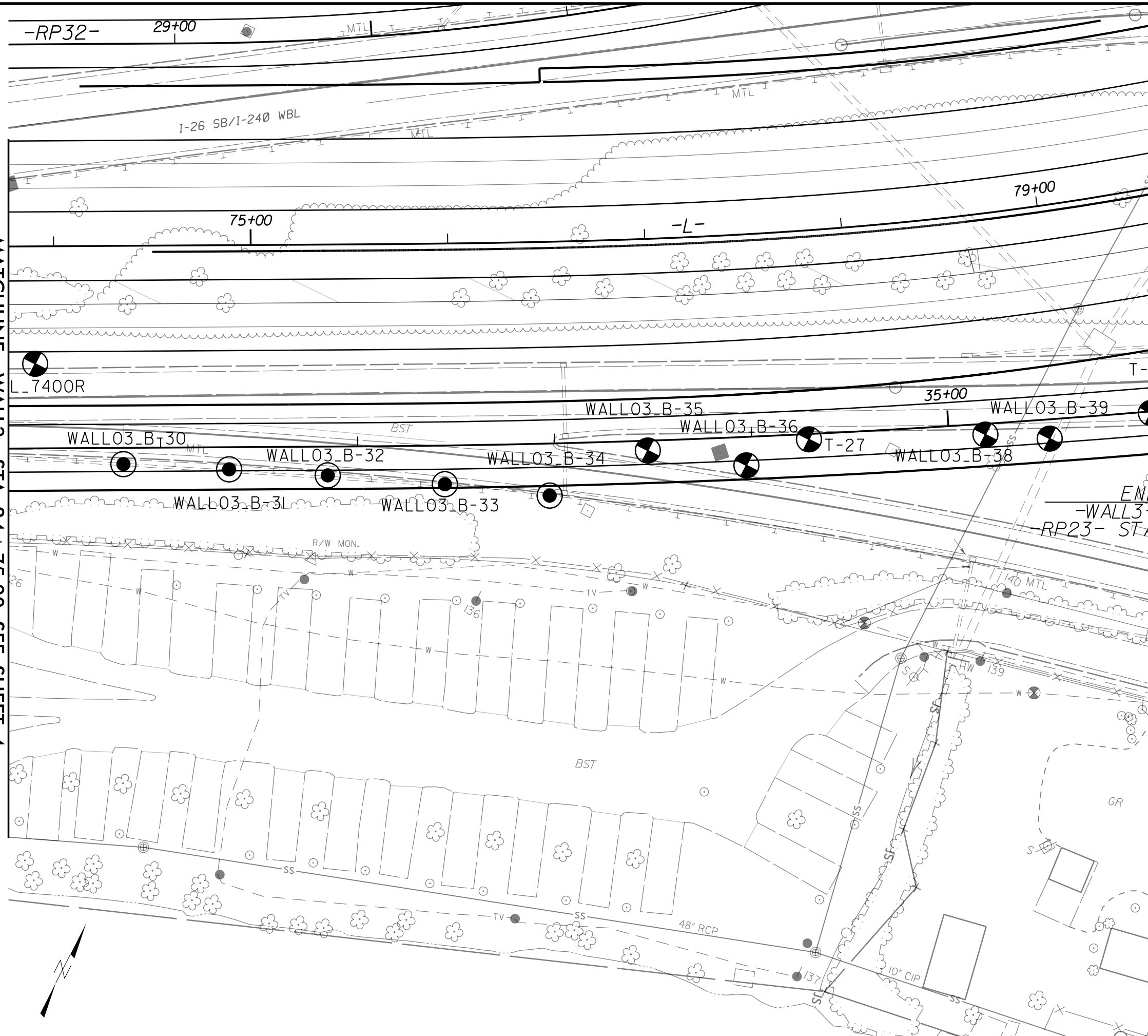
DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED





PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	4
SITE PLAN	
0 50 100 FEET	
RETAINING WALL #3 -WALL3- POT STA. 11+12.94 TO 31+86.65	



MATCHLINE - WALL3- STA. 24+75.00 SEE SHEET 4

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	5
SITE PLAN	
RETAINING WALL #3 -WALL3- POT STA. 11+12.94 TO 31+86.65	

END RETAINING WALL #3
 -WALL3- POT STA. 31+86.65=
 -RP23- STA. 37+33.23 (21.50' RT)

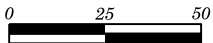
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-WALL3- PROFILE ALONG EXISTING GROUND LINE FROM ROADWAY
DESIGN FILES, PROVIDED BY AECOM JULY 2024 AND I2513 Is tnl.tin. INFERRED
STRATIGRAPHY IS DRAWN THROUGH THE BORING, PROJECTED ON THE PROFILE.

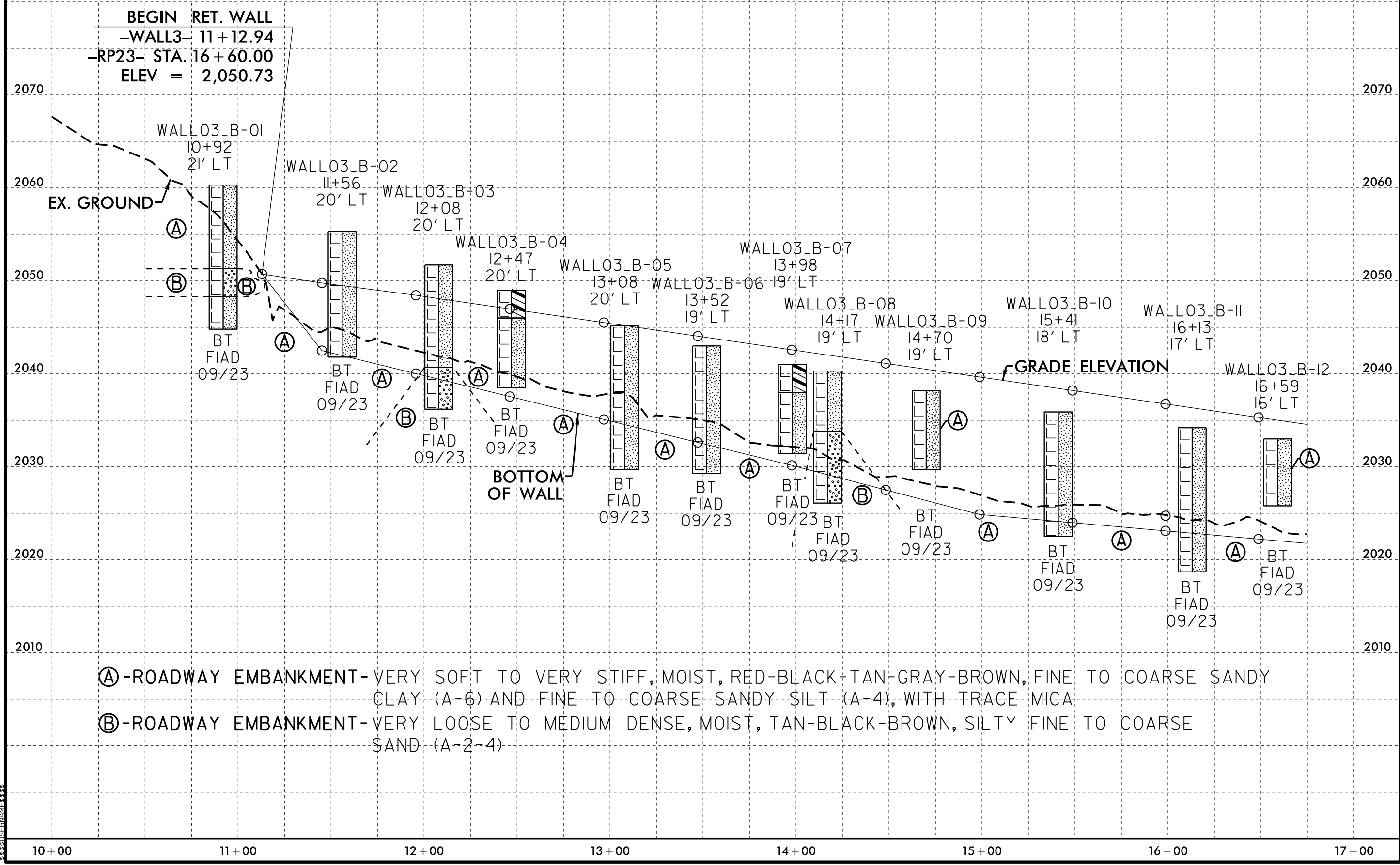
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Prepared in the Office of:

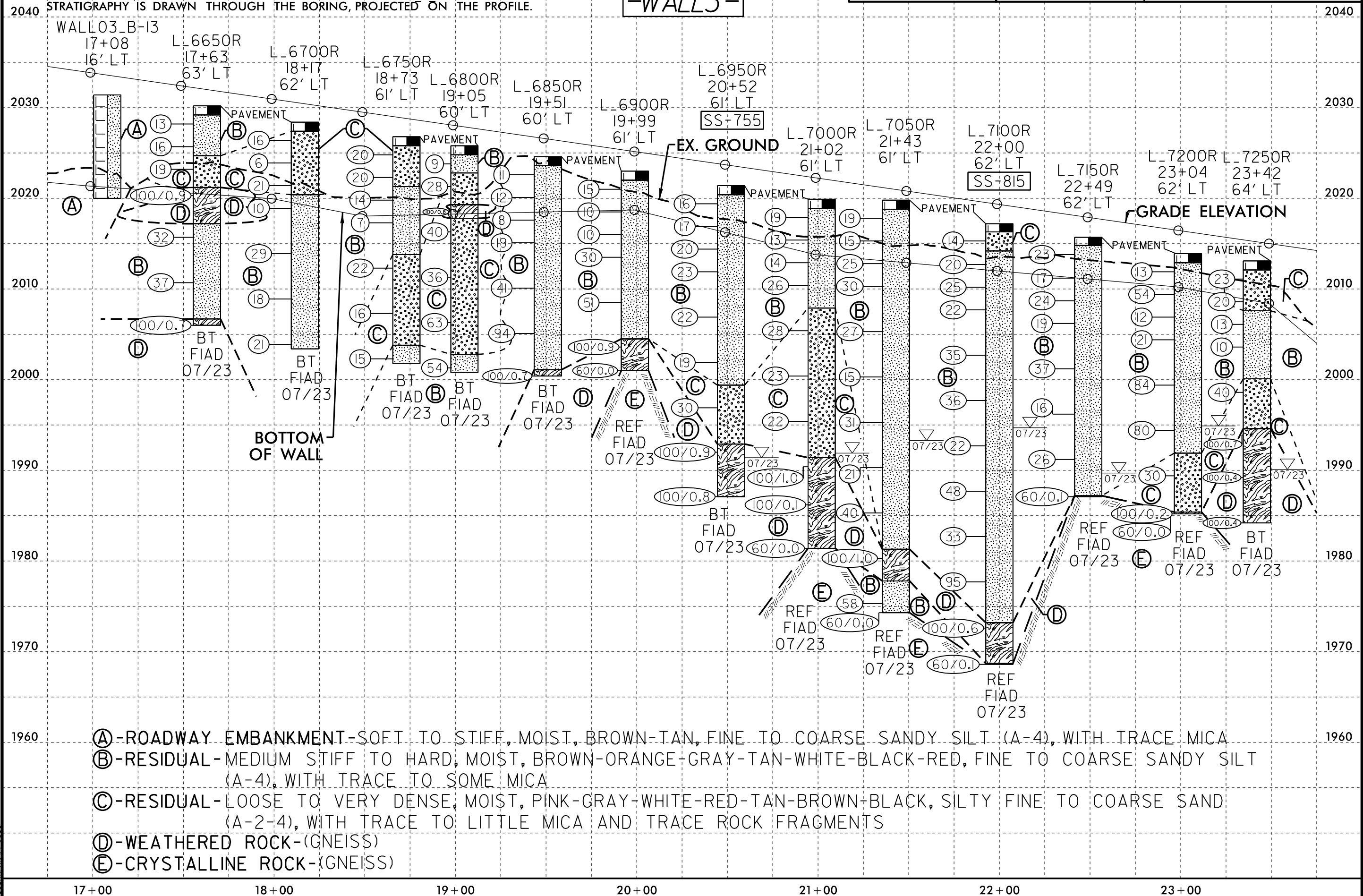
ECS SOUTHEAST, LLC
1815 CHERRY LANE, SUITE 200
CHERRYVILLE, NC 28021
(704) 525-5152 (OFFICE)
(704) 525-5153 (FAX)
NC REGISTERED
ENGINEERING
FIRM # 1-1519


VE = 5:1

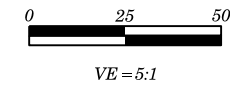
PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	6
PROFILE BORINGS PROJECTED ON -WALL3- ALONG WALL NO. 3	



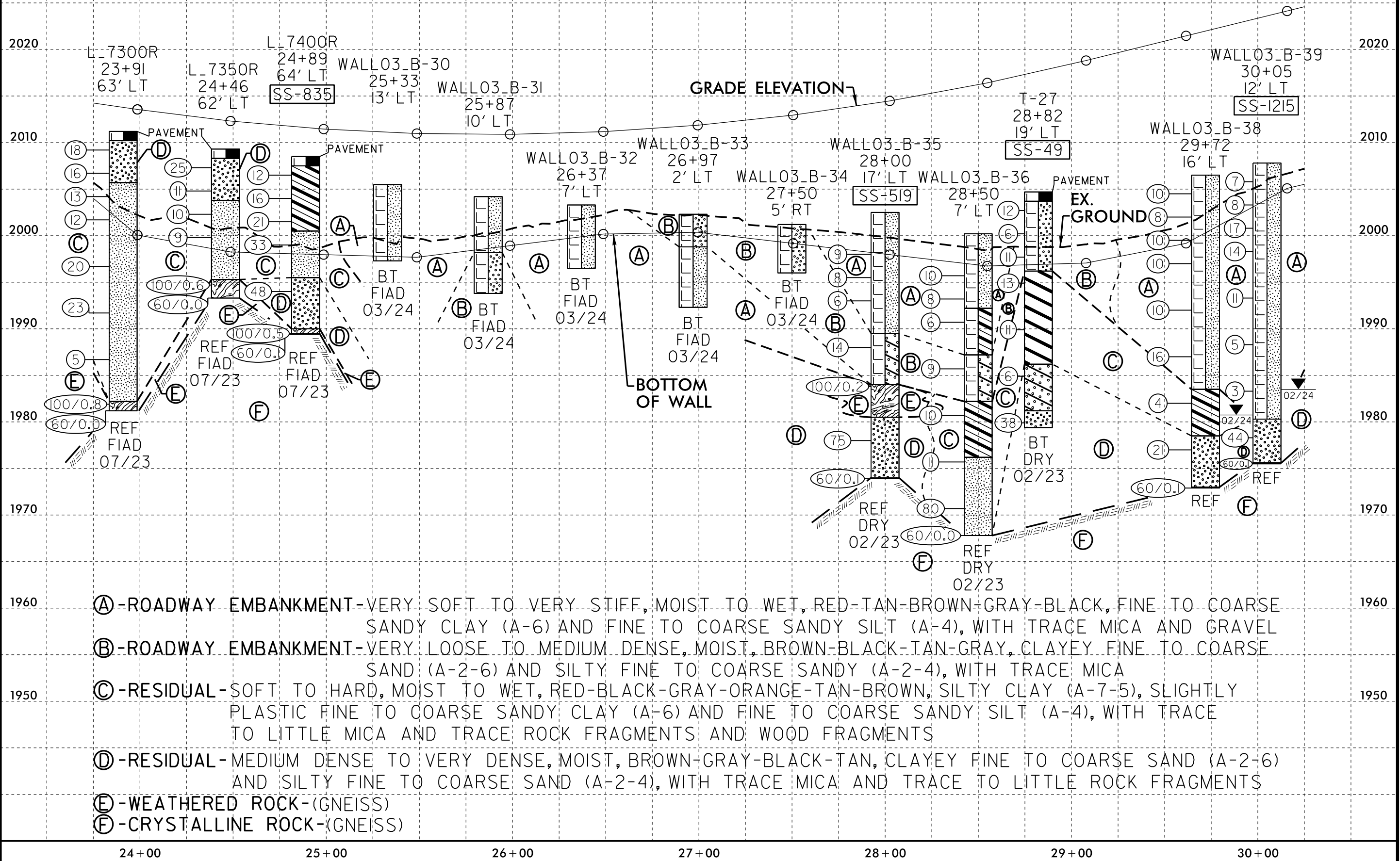
-WALL3- PROFILE ALONG EXISTING GROUND LINE FROM ROADWAY DESIGN FILES, PROVIDED BY AECOM, JULY 2024 AND 12513 ls tn.tin. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, PROJECTED ON THE PROFILE.



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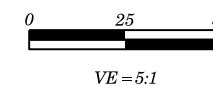


-WALL3-





ECS SOUTHEAST, LLC
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(704) 525-5152 [PHONE]
(704) 357-0023 [FAX]
NC REGISTERED
ENGINEERING
FIRM # F-1519



PROJECT REFERENCE NO. _____

I-2513AC

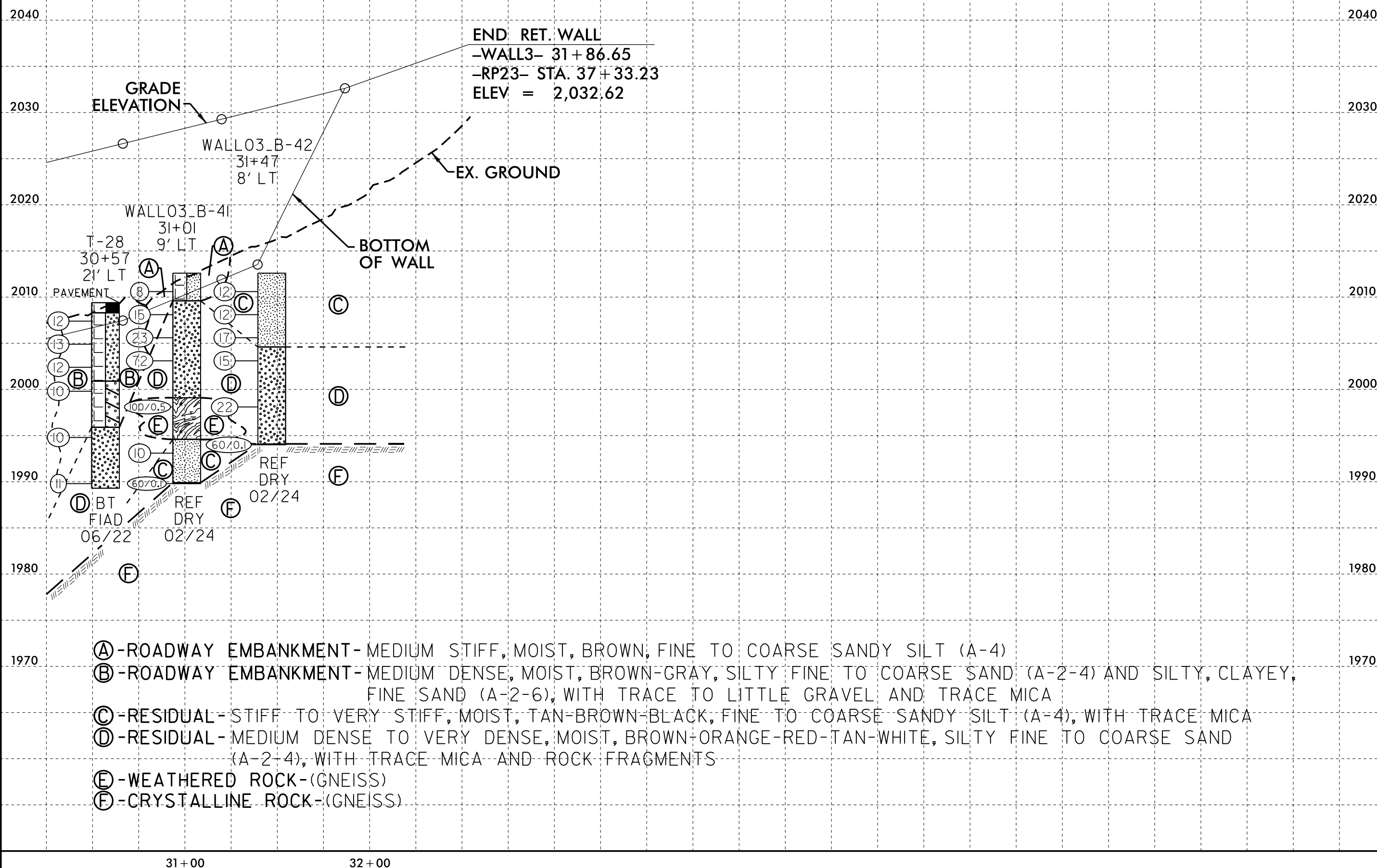
SHEET NO. _____

9

PROFILE BORINGS PROJECTED ON
-WALL3- ALONG WALL NO. 3

-WALL3- PROFILE ALONG EXISTING GROUND LINE FROM ROADWAY DESIGN FILES, PROVIDED BY AECOM, JULY 2024 AND 12513 ls tnl.tin. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, PROJECTED ON THE PROFILE.

-WALL3-



NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore									
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23								GROUND WTR (ft)							
BORING NO. WALL03_B-02		STATION 11+56		OFFSET 20 ft LT		ALIGNMENT -WALL3-		0 HR.	Dry						
COLLAR ELEV. 2,055.3 ft		TOTAL DEPTH 13.5 ft		NORTHING 679,568		EASTING 931,815		24 HR.	FIAD						
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer				DRILL METHOD Hand Auger/DCP			HAMMER TYPE N/A								
DRILLER N/A			START DATE 09/01/23		COMP. DATE 09/01/23		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	MOI				
2060															
2055	2,055.3	0.0	0	0	2								2,055.3	GROUND SURFACE	0.0
	2,054.3	1.0	0	0	1									ROADWAY EMBANKMENT Very Soft to Soft, Brown-Black-Tan-Gray, Fine to Coarse Sandy SILT (A-4), with trace mica	
	2,053.3	2.0	0	0	2										
	2,052.3	3.0	0	0	3										
	2,051.3	4.0	0	0	2										
2,050.3	5.0	0	0	1											
2050	2,049.3	6.0	0	0	3								M		
	2,048.3	7.0	0	0	2										
	2,047.3	8.0	0	0	4										
	2,046.3	9.0	0	0	2										
	2,045.3	10.0	0	0	3										
2045	2,044.3	11.0	0	0	3										
	2,043.3	12.0	0	0	2										
	2,042.3	13.0	0	0	3										2,041.8
														Boring Terminated by Auger Refusal at Elevation 2,041.8 ft In Roadway Embankment Sandy SILT (A-4)	
												Surficial Organic Soil from 0.0 to 0.3 feet.			

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23								GROUND WTR (ft)						
BORING NO. WALL03_B-04		STATION 12+47		OFFSET 20 ft LT		ALIGNMENT -WALL3-		0 HR.	Dry					
COLLAR ELEV. 2,049.0 ft		TOTAL DEPTH 10.5 ft		NORTHING 679,610		EASTING 931,896		24 HR.	FIAD					
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer				DRILL METHOD Hand Auger/DCP			HAMMER TYPE N/A							
DRILLER N/A			START DATE 09/01/23		COMP. DATE 09/01/23		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				
2050														
	2,049.0	0.0	0	0	2	2								2,049.0 GROUND SURFACE 0.0
	2,048.0	1.0	0	0	2	2						M		ROADWAY EMBANKMENT Very Soft to Soft, Red-Brown, Fine to Coarse Sandy CLAY (A-6)
	2,047.0	2.0	0	0	1	1								
	2,046.0	3.0	0	0	3	3								2,046.0 3.0
2045	2,045.0	4.0	0	0	2	2								Very Soft to Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica
	2,044.0	5.0	0	0	2	2								
	2,043.0	6.0	0	0	1	1						M		
	2,042.0	7.0	0	0	1	1								
	2,041.0	8.0	0	0	2	2								
2040	2,040.0	9.0	0	0	2	2								
	2,039.0	10.0	0	0	12	12								2,038.5 10.5
														Boring Terminated by Auger Refusal at Elevation 2,038.5 ft In Roadway Embankment Sandy SILT (A-4)
														Surficial Organic Soil from 0.0 to 0.3 feet.

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)						
BORING NO. WALL03_B-06			STATION 13+52			OFFSET 19 ft LT			ALIGNMENT -WALL3-			0 HR. Dry			
COLLAR ELEV. 2,043.0 ft			TOTAL DEPTH 13.5 ft			NORTHING 679,657			EASTING 931,990			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer						DRILL METHOD Hand Auger/DCP			HAMMER TYPE N/A						
DRILLER N/A			START DATE 09/28/23			COMP. DATE 09/28/23			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	MOI				
2045															
	2,043.0	0.0	0	0	2	2							2,043.0	GROUND SURFACE	0.0
	2,042.0	1.0	0	0	2	2								ROADWAY EMBANKMENT Very Soft to Soft, Brown-Tan-Gray-Black, Fine to Coarse Sandy SILT (A-4), with trace mica	
	2,041.0	2.0	0	0	2	2									
2040	2,040.0	3.0	0	0	3	3									
	2,039.0	4.0	0	0	3	3									
	2,038.0	5.0	0	0	2	2									
	2,037.0	6.0	0	0	1	1									
	2,036.0	7.0	0	0	1	1									
2035	2,035.0	8.0	0	0	2	2									
	2,034.0	9.0	0	0	4	4									
	2,033.0	10.0	0	0	3	3									
	2,032.0	11.0	0	0	2	2									
	2,031.0	12.0	0	0	2	2									
2030	2,030.0	13.0	0	0	3	3							2,029.5	Boring Terminated by Auger Refusal at Elevation 2,029.5 ft In Roadway Embankment Sandy SILT (A-4) Surficial Organic Soil from 0.0 to 0.3 feet.	13.5

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore							
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)							
BORING NO. WALL03_B-07			STATION 13+98			OFFSET 19 ft LT			ALIGNMENT -WALL3-			0 HR. Dry				
COLLAR ELEV. 2,041.0 ft			TOTAL DEPTH 9.5 ft			NORTHING 679,678			EASTING 932,031			24 HR. FIAD				
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer						DRILL METHOD Hand Auger/DCP			HAMMER TYPE N/A							
DRILLER N/A			START DATE 09/28/23			COMP. DATE 09/28/23			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						
2045																
	2,041.0	0.0												2,041.0		0.0
	2,040.0	1.0	0	0	1	1								2,040.0		1.0
2040																
	2,039.0	2.0	0	0	1	1								2,039.0		2.0
	2,038.0	3.0	0	0	2	2								2,038.0		3.0
	2,037.0	4.0	0	0	3	3								2,037.0		4.0
	2,036.0	5.0	0	0	1	1								2,036.0		5.0
	2,035.0	6.0	0	0	2	2								2,035.0		6.0
2035																
	2,034.0	7.0	0	0	2	2								2,034.0		7.0
	2,033.0	8.0	0	0	2	2								2,033.0		8.0
	2,032.0	9.0	0	0	2	2								2,032.0		9.0

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)					
BORING NO. WALL03_B-08			STATION 14+17			OFFSET 19 ft LT			ALIGNMENT -WALL3-			0 HR. Dry		
COLLAR ELEV. 2,040.3 ft			TOTAL DEPTH 14.5 ft			NORTHING 679,687			EASTING 932,048			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer						DRILL METHOD Hand Auger/DCP			HAMMER TYPE N/A					
DRILLER N/A			START DATE 09/28/23			COMP. DATE 09/28/23			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				
2045														
2040	2,040.3	0.0	0	0	2									2,040.3 GROUND SURFACE 0.0
	2,039.3	1.0	0	0	1									ROADWAY EMBANKMENT Very Soft to Soft, Brown-Tan, Fine to Coarse Sandy SILT (A-4)
	2,038.3	2.0	0	0	2									
	2,037.3	3.0	0	0	2									
2,036.3	4.0	0	0	2										
2035	2,035.3	5.0	0	0	2									2,033.8 Very Loose to Medium Dense, Tan-Brown, Silty Fine to Coarse SAND (A-2-4) 6.5
	2,034.3	6.0	0	0	3									
	2,033.3	7.0	0	0	2									
	2,032.3	8.0	0	0	2									
2030	2,031.3	9.0	0	0	2									2,025.8 Boring Terminated by Auger Refusal at Elevation 2,025.8 ft In Roadway Embankment Silty SAND (A-2-4) 14.5 Surficial Organic Soil from 0.0 to 0.2 feet.
	2,030.3	10.0	0	0	2									
	2,029.3	11.0	0	0	3									
	2,028.3	12.0	0	0	2									
	2,027.3	13.0	0	0	2									
	2,026.3	14.0	0	0	20									

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 9/25/24

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)					
BORING NO. WALL03_B-10			STATION 15+41			OFFSET 18 ft LT			ALIGNMENT -WALL3-			0 HR. Dry		
COLLAR ELEV. 2,035.9 ft			TOTAL DEPTH 13.5 ft			NORTHING 679,743			EASTING 932,159			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer						DRILL METHOD Hand Auger/DCP			HAMMER TYPE N/A					
DRILLER N/A			START DATE 09/28/23			COMP. DATE 09/28/23			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				
2040														
2035	2,035.9	0.0												
	2,034.9	1.0	0	0	1	1								
	2,033.9	2.0	0	0	1	1	.	.	.	.	.	.		
2030	2,032.9	3.0	0	0	1	1	.	.	.	.	.	.		
	2,031.9	4.0	0	0	2	2	.	.	.	.	.	.		
	2,030.9	5.0	0	0	2	2	.	.	.	.	.	.		
	2,029.9	6.0	0	0	2	2	.	.	.	.	.	.		
	2,028.9	7.0	0	0	3	3	.	.	.	.	.	.		
2025	2,027.9	8.0	0	0	3	3	.	.	.	.	.	.		
	2,026.9	9.0	0	0	2	2	.	.	.	.	.	.		
	2,025.9	10.0	0	0	2	2	.	.	.	.	.	.		
	2,024.9	11.0	0	0	2	2	.	.	.	.	.	.		
	2,023.9	12.0	0	0	2	2	.	.	.	.	.	.		
	2,022.9	13.0	0	0	17	2	.	.	.	.	.	.		
						17								
GROUND SURFACE 2,035.9 0.0														
ROADWAY EMBANKMENT														
Very Soft to Very Stiff, Tan-Brown-Black, Fine to Coarse Sandy SILT (A-4), with trace mica														
Boring Terminated by Auger Refusal at Elevation 2,022.4 ft In Roadway Embankment Sandy SILT (A-4)														
Surficial Organic Soil from 0.0 to 0.3 feet.														

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23												GROUND WTR (ft)			
BORING NO. WALL03_B-11			STATION 16+13			OFFSET 17 ft LT			ALIGNMENT -WALL3-			0 HR. Dry			
COLLAR ELEV. 2,034.2 ft			TOTAL DEPTH 15.5 ft			NORTHING 679,775			EASTING 932,223			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer						DRILL METHOD Hand Auger/DCP				HAMMER TYPE N/A					
DRILLER N/A			START DATE 09/28/23			COMP. DATE 09/28/23			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)
2035															
	2,034.2	0.0	0	0	1	1								2,034.2	0.0
	2,033.2	1.0	0	0	1	1								GROUND SURFACE	
	2,032.2	2.0	0	0	2	2								ROADWAY EMBANKMENT	
	2,031.2	3.0	0	0	1	2								Very Soft to Soft, Red-Brown-Tan, Fine to Coarse Sandy SILT (A-4)	
2030	2,030.2	4.0	0	0	3	1									
	2,029.2	5.0	0	0	2	3									
	2,028.2	6.0	0	0	2	2									
	2,027.2	7.0	0	0	2	2									
	2,026.2	8.0	0	0	2	2									
2025	2,025.2	9.0	0	0	1	2									
	2,024.2	10.0	0	0	1	1									
	2,023.2	11.0	0	0	2	1									
	2,022.2	12.0	0	0	2	2									
	2,021.2	13.0	0	0	2	2									
2020	2,020.2	14.0	0	0	2	2									
	2,019.2	15.0	0	0	3	2									
						3								2,018.7	15.5
														Boring Terminated at Elevation 2,018.7 ft In Roadway Embankment Sandy SILT (A-4)	
														Surficial Organic Soil from 0.0 to 0.3 feet.	

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)					
BORING NO. WALL03_B-12			STATION 16+59			OFFSET 16 ft LT			ALIGNMENT -WALL3-			0 HR. Dry		
COLLAR ELEV. 2,033.0 ft			TOTAL DEPTH 7.5 ft			NORTHING 679,796			EASTING 932,264			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer						DRILL METHOD Hand Auger/DCP			HAMMER TYPE N/A					
DRILLER N/A			START DATE 10/20/23			COMP. DATE 10/20/23			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				
2035														
	2,033.0	0.0	0	0	1	1							2,033.0	0.0
	2,032.0	1.0	0	0	1	1								
	2,031.0	2.0	0	0	1	1								
2030	2,030.0	3.0	0	0	1	1								
	2,029.0	4.0	0	0	2	2								
	2,028.0	5.0	0	0	2	2								
	2,027.0	6.0	0	0	2	2								
	2,026.0	7.0	0	0	15	15							2,025.5	7.5

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 9/25/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23								GROUND WTR (ft)						
BORING NO. L_6650R		STATION 17+63		OFFSET 63 ft LT		ALIGNMENT -WALL3-		0 HR.	Dry					
COLLAR ELEV. 2,030.2 ft		TOTAL DEPTH 24.2 ft		NORTHING 679,885		EASTING 932,335		24 HR.	FIAD					
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER T. Hibdon			START DATE 07/11/23		COMP. DATE 07/11/23		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				
2035														
2030														
2025	2,029.2	1.0	4	6	7									2,030.2 GROUND SURFACE 0.0
														2,029.2 ROADWAY EMBANKMENT 1.0
	2,026.7	3.5	6	5	11									Asphalt (0.1'), Concrete (0.9')
	2,024.2	6.0	8	8	11									RESIDUAL
2020	2,021.7	8.5	10	33	67/0.4									Stiff to Very Stiff, Brown-Tan, Fine to Coarse Sandy SILT (A-4), with trace mica
														2,024.7 Coarse Sandy SILT (A-4), with trace mica 5.5
														Medium Dense, Brown-Black, Silty Fine to Coarse SAND (A-2-4), with trace mica
														2,021.2 WEATHERED ROCK 9.0
2015	2,016.7	13.5	35	18	14									Brown-Tan (GNEISS)
														2,017.2 RESIDUAL 13.0
	2,011.7	18.5	23	16	21									Hard, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica
2010	2,006.7	23.5	70	30/0.2										2,006.7 WEATHERED ROCK 23.5
														2,006.0 WEATHERED ROCK 24.2
														Gray-Brown (GNEISS)
														Boring Terminated at Elevation 2,006.0 ft In Weathered Rock (GNEISS)

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)					
BORING NO. L_6750R			STATION 18+73			OFFSET 61 ft LT			ALIGNMENT -WALL3-			0 HR. Dry		
COLLAR ELEV. 2,026.8 ft			TOTAL DEPTH 25.0 ft			NORTHING 679,934			EASTING 932,434			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER T. Hibdon			START DATE 07/11/23			COMP. DATE 07/11/23			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				
2030														
2025	2,025.8	1.0	7	10	10									2,026.8 GROUND SURFACE 0.0 2,025.8 ROADWAY EMBANKMENT 1.0 Asphalt (0.1'), Concrete (0.9')
2020	2,023.3	3.5	8	7	13							M		RESIDUAL Medium Dense, Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica
	2,020.8	6.0	6	7	7							M		2,021.3 Medium Stiff to Stiff, Tan-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica 5.5
2015	2,018.3	8.5	2	3	4							M		
	2,013.3	13.5	8	11	11							M		2,013.8 Medium Dense, Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica 13.0
2010	2,008.3	18.5	7	7	9							M		
2005	2,003.3	23.5	4	7	8							M		2,003.8 Very Stiff, Brown-White, Fine to Coarse Sandy SILT (A-4) 23.0 2,001.8 Boring Terminated at Elevation 2,001.8 ft In Residual Sandy SILT (A-4) 25.0

GEOTECHNICAL BORING REPORT
BORE LOG

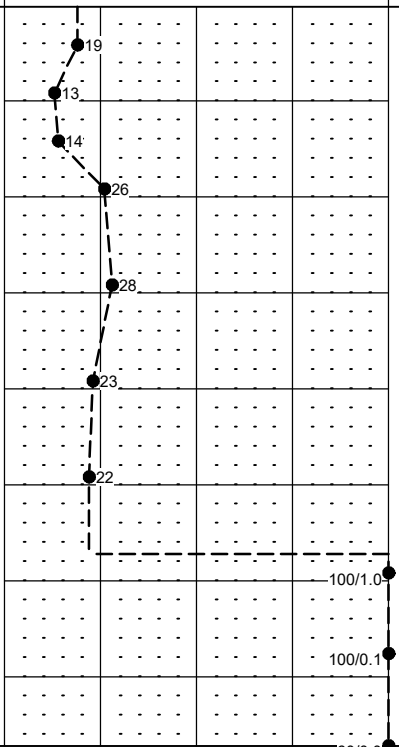
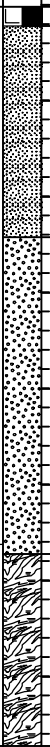
WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23											GROUND WTR (ft)				
BORING NO. L_6800R			STATION 19+05			OFFSET 60 ft LT			ALIGNMENT -WALL3-			0 HR. Dry			
COLLAR ELEV. 2,025.8 ft			TOTAL DEPTH 25.0 ft			NORTHING 679,948			EASTING 932,462			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers				HAMMER TYPE Automatic					
DRILLER T. Hibdon			START DATE 07/11/23			COMP. DATE 07/12/23			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)
2030															
2025	2,024.8	1.0	4	5	4									2,025.8 GROUND SURFACE 0.0	
														2,024.8 ROADWAY EMBANKMENT 1.0	
	2,022.3	3.5	8	13	15									2,022.8 RESIDUAL 3.0	
2020	2,019.8	6.0	20	57	43/0.3									2,019.3 Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica 6.5	
	2,017.3	8.5	31	21	19									2,017.8 Medium Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4), with trace mica and rock fragments 8.0	
2015														WEATHERED ROCK	
														Brown (GNEISS)	
2010	2,012.3	13.5	11	14	22									RESIDUAL	
														Dense to Very Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4), with trace rock fragments	
2005	2,007.3	18.5	31	31	32										
	2,002.3	23.5	16	21	33									2,002.8 Hard, Brown-Tan, Fine to Coarse Sandy SILT (A-4), with trace mica 23.0	
														2,000.8 Boring Terminated at Elevation 2,000.8 ft In Residual Sandy SILT (A-4) 25.0	

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)					
BORING NO. L_6850R			STATION 19+51			OFFSET 60 ft LT			ALIGNMENT -WALL3-			0 HR. Dry		
COLLAR ELEV. 2,024.6 ft			TOTAL DEPTH 24.2 ft			NORTHING 679,969			EASTING 932,503			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER T. Hibdon			START DATE 07/12/23			COMP. DATE 07/12/23			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				
2025														
	2,023.6	1.0												2,024.6 GROUND SURFACE 0.0
			3	6	5									2,023.6 ROADWAY EMBANKMENT 1.0
														Asphalt (0.1'), Concrete (0.9')
2020	2,021.1	3.5	4	5	7									RESIDUAL
														Medium Stiff to Hard, Brown-Tan, Fine to Coarse Sandy SILT (A-4)
	2,018.6	6.0	2	4	4									
2015	2,016.1	8.5	5	9	10									
2010	2,011.1	13.5	10	14	27									
2005	2,006.1	18.5	18	34	60									
	2,001.1	23.5	50	50/0.2										2,001.1 WEATHERED ROCK 23.5
														2,000.4 Boring Terminated at Elevation 2,000.4 ft In Weathered Rock (GNEISS) 24.2

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 9/25/24

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. West										
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23											GROUND WTR (ft)								
BORING NO. L_7000R			STATION 21+02			OFFSET 61 ft LT			ALIGNMENT -WALL3-			0 HR. 28.0							
COLLAR ELEV. 2,019.9 ft			TOTAL DEPTH 38.5 ft			NORTHING 680,039			EASTING 932,637			24 HR. FIAD							
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER W. King			START DATE 07/11/23			COMP. DATE 07/11/23			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)				
2020														2,019.9	GROUND SURFACE 0.0				
2015	2,018.9	1.0	6	9	10									2,018.9	ROADWAY EMBANKMENT Concrete (1.0') 1.0				
	2,016.4	3.5	4	6	7						M								RESIDUAL Stiff to Very Stiff, White-Orange-Brown-Black, Fine to Coarse Sandy SILT (A-4), with trace mica
	2,013.9	6.0	12	9	5						M								
2010	2,013.9	6.0	12	9	5	M													
	2,011.4	8.5	12	13	13	M													
2005	2,011.4	8.5	12	13	13	M													
	2,006.4	13.5	10	14	14	M								2,007.9	Medium Dense, Brown-Black-Red, Silty Fine to Coarse SAND (A-2-4), with trace mica 12.0				
2000	2,006.4	13.5	10	14	14	M													
	2,001.4	18.5	9	12	11	M													
1995	2,001.4	18.5	9	12	11	M													
	1,996.4	23.5	18	9	13	M													
1990	1,996.4	23.5	18	9	13	M													
	1,991.4	28.5	14	86/0.5										1,991.4	WEATHERED ROCK Brown-Black (GNEISS) 28.5				
1985	1,991.4	28.5	14	86/0.5															
	1,986.4	33.5	100/0.1																
	1,986.4	33.5	100/0.1																
	1,981.4	38.5	60/0.0											1,981.4	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,981.4 ft On Crystalline Rock (GNEISS) 38.5				

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. West					
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)					
BORING NO. L_7050R			STATION 21+43			OFFSET 61 ft LT			ALIGNMENT -WALL3-			0 HR. 26.5		
COLLAR ELEV. 2,019.8 ft			TOTAL DEPTH 45.5 ft			NORTHING 680,058			EASTING 932,673			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER W. King			START DATE 07/12/23			COMP. DATE 07/12/23			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				
2020														
	2,018.8	1.0	8	9	10									2,019.8 GROUND SURFACE 0.0
	2,016.3	3.5	10	7	8									2,018.8 ROADWAY EMBANKMENT Concrete (1.0') 1.0
2015	2,013.8	6.0	6	11	14									RESIDUAL
	2,011.3	8.5	10	12	18									Stiff to Hard, Brown, Fine to Coarse Sandy SILT (A-4)
2010														
	2,006.3	13.5	28	11	16									
2005	2,001.3	18.5	4	7	8									
2000	1,996.3	23.5	11	11	20									
1995	1,991.3	28.5	4	9	12									
1990	1,986.3	33.5	10	17	23									
1985	1,981.3	38.5	35	65/0.5										1,981.3 WEATHERED ROCK Brown (GNEISS) 38.5
1980	1,976.3	43.5	6	16	42									1,977.8 RESIDUAL 42.0
1975	1,974.3	45.5	60/0.0											1,974.3 Hard, Brown, Fine to Coarse Sandy SILT (A-4) 45.5
														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,974.3 ft On Crystalline Rock (GNEISS)

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 9/25/24

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

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NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23								GROUND WTR (ft)						
BORING NO. L_7250R		STATION 23+42		OFFSET 64 ft LT		ALIGNMENT -WALL3-		0 HR.	23.0					
COLLAR ELEV. 2,013.1 ft		TOTAL DEPTH 28.9 ft		NORTHING 680,152		EASTING 932,849		24 HR.	FIAD					
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER T. Hibdon			START DATE 07/12/23		COMP. DATE 07/12/23		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				
2015														
	2,012.1	1.0	8	11	12									2,013.1 GROUND SURFACE 0.0
2010	2,009.6	3.5	7	11	9								M	2,012.1 ROADWAY EMBANKMENT 1.0
	2,007.1	6.0	16	6	7								M	Asphalt (0.1'), Concrete (0.9')
2005	2,004.6	8.5	3	4	6								M	RESIDUAL
	1,999.6	13.5	7	12	28								M	Medium Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4)
2000	1,994.6	18.5	32	68/0.2									M	2,007.6 Stiff, Brown-Tan-White, Fine to Coarse Sandy SILT (A-4) 5.5
1995	1,989.6	23.5	100/0.4										M	2,000.1 Dense, Brown-Tan-Black, Silty Fine to Coarse SAND (A-2-4), with little mica 13.0
1990	1,984.6	28.5	100/0.4										M	1,994.6 WEATHERED ROCK 18.5
1985														Brown-Gray (GNEISS)
														1,984.2 Boring Terminated at Elevation 1,984.2 ft In Weathered Rock (GNEISS) 28.9

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore							
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23								GROUND WTR (ft)					
BORING NO. L_7350R		STATION 24+46		OFFSET 62 ft LT		ALIGNMENT -WALL3-		0 HR.	Dry				
COLLAR ELEV. 2,009.3 ft		TOTAL DEPTH 16.0 ft		NORTHING 680,198		EASTING 932,942		24 HR.	FIAD				
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER T. Hibdon		START DATE 07/12/23		COMP. DATE 07/12/23		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	MOI		
2010													
	2,008.3	1.0	7	13	12								2,009.3 GROUND SURFACE 0.0
	2,008.3												2,008.3 ROADWAY EMBANKMENT 1.0
2005	2,005.8	3.5	7	5	6								Asphalt (0.1'), Concrete (0.9')
	2,003.3	6.0	11	5	5								RESIDUAL
	2,003.3												Medium Dense, Tan-Brown, Silty Fine to Coarse SAND (A-2-4) 5.5
2000	2,000.8	8.5	2	4	5								Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica
	2,000.8												
	1,995.8	13.5	14	26	74/0.1								1,995.3 WEATHERED ROCK 14.0
1995	1,993.3	16.0											1,993.3 WEATHERED ROCK 16.0
													Boring Terminated with Standard Penetration Test Refusal at Elevation 1,993.3 ft On Crystalline Rock (GNEISS)

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

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NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23								GROUND WTR (ft)						
BORING NO. WALL03_B-32		STATION 26+37		OFFSET 7 ft LT		ALIGNMENT -WALL3-		0 HR.	Dry					
COLLAR ELEV. 2,003.3 ft		TOTAL DEPTH 6.5 ft		NORTHING 680,237		EASTING 933,137		24 HR.	FIAD					
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer				DRILL METHOD Hand Auger/DCP			HAMMER TYPE N/A							
DRILLER N/A			START DATE 03/29/24		COMP. DATE 03/29/24		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				
2005														
	2,003.3	0.0	0	0	2	2	-	-	-	-				2,003.3 GROUND SURFACE 0.0
	2,002.3	1.0	0	0	5	5	-	-	-	-				ROADWAY EMBANKMENT Very Soft to Medium Stiff, Brown-Tan-Black, Fine to Coarse Sandy SILT (A-4)
	2,001.3	2.0	0	0	1	1	-	-	-	-				
2000	2,000.3	3.0	0	0	2	2	-	-	-	-				
	1,999.3	4.0	0	0	2	2	-	-	-	-				
	1,998.3	5.0	0	0	4	4	-	-	-	-				
	1,997.3	6.0	0	0	2	2	-	-	-	-				
														1,996.8 6.5
														Boring Terminated by Auger Refusal at Elevation 1,996.8 ft In Roadway Embankment Sandy SILT (A-4)
														Surficial Organic Soil from 0.0 to 0.2 feet.

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

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NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 9/25/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23								GROUND WTR (ft)						
BORING NO. WALL03_B-36		STATION 28+50		OFFSET 7 ft LT		ALIGNMENT -WALL3-		0 HR.	Dry					
COLLAR ELEV. 2,000.2 ft		TOTAL DEPTH 32.4 ft		NORTHING 680,338		EASTING 933,324		24 HR.	Dry					
DRILL RIG/HAMMER EFF./DATE GEO366 Diedrich D-50 80% 03/18/2022				DRILL METHOD H.S. Augers/Hand Auger		HAMMER TYPE Automatic								
DRILLER J. Messick			START DATE 02/02/23		COMP. DATE 02/02/23		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				
2005														
2000														2,000.2 GROUND SURFACE 0.0
1995	1,996.7	3.5	3	4	6									ROADWAY EMBANKMENT Medium Stiff to Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica
	1,994.2	6.0	3	3	5									
1990	1,991.7	8.5	3	2	4									1,992.2 Medium Stiff, Brown-Gray, Fine to Coarse Sandy CLAY (A-6) 8.0
	1,986.7	13.5	3	4	5									1,987.2 Loose, Black-Gray, Clayey Fine to Coarse SAND (A-2-6) 13.0
1985	1,981.7	18.5	5	5	5									1,982.2 RESIDUAL 18.0
	1,976.7	23.5	3	5	6									1,976.2 Stiff, Brown-Tan-Gray, Fine to Coarse Sandy CLAY (A-6), with trace rock fragments 24.0
1975	1,971.7	28.5	19	28	52									1,967.2 Stiff to Hard, Orange-Brown-Tan-Gray, Fine to Coarse Sandy SILT (A-4), with trace mica and rock fragments 24.0
	1,967.8	32.4	60/0.0											1,967.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 1,967.8 ft On Crystalline Rock (GNEISS) 32.4
1970														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,967.8 ft On Crystalline Rock (GNEISS)
														Surficial Organic Soil from 0.0 to 0.2 feet.
														Hand Auger Probe from 0.0 to 3.0 feet due to close proximity to underground utilities.

NCDOT BORE DOUBLE I2513AC GEO RDWY TERRACON.GPJ NC DOT.GDT 4/17/24

WBS		34165.1.13		TIP		I-2513AC		COUNTY		BUNCOMBE		GEOLOGIST		A. Blackmore							
SITE DESCRIPTION												RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23				GROUND WTR (ft)					
BORING NO.		WALL03_B-38		STATION		29+72		OFFSET		16 ft LT		ALIGNMENT		-WALL3-		0 HR.	27.8				
COLLAR ELEV.		2,006.5 ft		TOTAL DEPTH		33.6 ft		NORTHING		680,407		EASTING		933,425		24 HR.	25.8				
DRILL RIG/HAMMER EFF./DATE								TDD417 CME75 82.7% 06/15/2021				DRILL METHOD				H.S. Augers		HAMMER TYPE		Automatic	
DRILLER				D. Hamilton		START DATE		02/21/24		COMP. DATE		02/21/24		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)					
2010																					
2005	2,005.5	1.0													2,006.5	GROUND SURFACE 0.0					
2000	2,003.0	3.5	3	5	5	10									ROADWAY EMBANKMENT						
	2,000.5	6.0	3	4	4	8									Medium Stiff to Very Stiff, Brown-Black, Fine to Coarse Sandy SILT (A-4), with trace mica						
	1,998.0	8.5	3	5	5	10															
1995						10															
	1,993.0	13.5	3	5	5	10															
1990																					
	1,988.0	18.5	3	3	13	16															
1985																					
	1,983.0	23.5	3	2	2	4									RESIDUAL						
1980															Soft, Black-Brown, Fine to Coarse Sandy CLAY (A-6), with trace wood fragments						
	1,978.0	28.5	22	11	10										Medium Dense, Gray-Tan, Silty Fine to Coarse SAND (A-2-4)						
1975																					
	1,973.0	33.5	60/0.1			60/0.1									1,973.0	33.5					
															1,972.9	33.6					
															CRYSTALLINE ROCK (GNEISS)						
															Boring Terminated with Standard Penetration Test Refusal at Elevation 1,972.9 ft In Crystalline Rock (GNEISS)						
															Surficial Organic Soil from 0.0 to 0.3 feet.						

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)					
BORING NO. WALL03_B-39			STATION 30+05			OFFSET 12 ft LT			ALIGNMENT -WALL3-			0 HR. 25.9		
COLLAR ELEV. 2,007.8 ft			TOTAL DEPTH 32.3 ft			NORTHING 680,420			EASTING 933,455			24 HR. 24.3		
DRILL RIG/HAMMER EFF./DATE TDD417 CME75 82.7% 06/15/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER D. Hamilton			START DATE 02/21/24			COMP. DATE 02/21/24			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				
2010														
	2,006.8	1.0												2,007.8 GROUND SURFACE 0.0
2005	2,004.3	3.5	3	2	5						SS-1215	17%		ROADWAY EMBANKMENT
	2,004.3													Soft to Very Stiff, Brown-Gray-Black, Fine to Coarse Sandy SILT (A-4(1)), with trace gravel
	2,001.8	6.0	3	4	4							M		
2000	2,001.8											M		
	1,999.3	8.5	8	8	9							M		
	1,999.3													
		8.5	4	6	8							M		
1995	1,994.3	13.5										M		
	1,994.3		3	5	6									
1990	1,989.3	18.5										M		
	1,989.3		2	2	3									
1985	1,984.3	23.5										M		
	1,984.3		3	1	2									
1980	1,979.3	28.5										M		1,980.3 RESIDUAL 27.5
	1,979.3		35	11	33									Dense, Gray-Brown-Tan, Silty Fine to Coarse SAND (A-2-4), with trace mica and rock fragments
	1,975.6	32.2												1,975.6 32.2
			60/0.1			60/0.1								1,975.5 32.3
														CRYSTALLINE ROCK (GNEISS)
														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,975.5 ft In Crystalline Rock (GNEISS)
														Surficial Organic Soil from 0.0 to 0.3 feet.

WBS 34165.1.2			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST BRAUN, S.						
SITE DESCRIPTION I-26 CONNECTOR (I-40 TO US 19 - 23 - 70 NORTH OF ASHEVILLE)									GROUND WTR (ft)						
BORING NO. T-28			STATION 30+57			OFFSET 21 ft LT			ALIGNMENT -RP23-			0 HR. Dry			
COLLAR ELEV. 2,009.4 ft			TOTAL DEPTH 20.1 ft			NORTHING 680,455			EASTING 933,495			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 95% 02/06/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER TURNAGE, J. R.			START DATE 06/10/22			COMP. DATE 06/10/22			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)
2010															
	2,008.4	1.0	7	6	6									2,009.4	GROUND SURFACE 0.0
														2,008.3	PAVEMENT (ASPHALT, ABC) 1.1
2005	2,005.9	3.5	5	6	7										
	2,003.4	6.0	4	5	7										
2000	2,000.8	8.6	3	4	6									2,000.9	MEDIUM DENSE, GRAY-BROWN, SILTY CLAYEY FINE SAND, TRACE GRAVEL, MOIST (A-2-6) 8.5
1995	1,995.8	13.6	2	5	5									1,995.9	RESIDUAL 13.5
1990	1,990.8	18.6	5	5	6										
														1,989.3	20.1
														Boring Terminated at Elevation 1,989.3 ft IN RESIDUAL, SILTY SAND	

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 4/17/24

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 8/20/24

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 3, STA. -RP23- to 16+60.00 TO -RP23- 37+33.23									GROUND WTR (ft)						
BORING NO. WALL03_B-42			STATION 31+47			OFFSET 8 ft LT			ALIGNMENT -WALL3-			0 HR. Dry			
COLLAR ELEV. 2,012.6 ft			TOTAL DEPTH 18.6 ft			NORTHING 680,492			EASTING 933,577			24 HR. Dry			
DRILL RIG/HAMMER EFF./DATE TDD417 CME75 82.7% 06/15/2021						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER D. Hamilton			START DATE 02/21/24			COMP. DATE 02/21/24			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					
2015															
	2,011.6	1.0	2	4	8									2,012.6 GROUND SURFACE 0.0	
2010	2,009.1	3.5	3	6	6									RESIDUAL Stiff to Very Stiff, Tan-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica	
	2,006.6	6.0	3	7	10										
2005	2,004.1	8.5	4	6	9										2,004.6 8.0
															Medium Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4), with trace mica
2000	1,999.1	13.5	4	10	12										
1995	1,994.1	18.5													
														1,994.1 18.5	
														1,994.0 18.6	
														CRYSTALLINE ROCK (GNEISS)	
														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,994.0 ft In Crystalline Rock (GNEISS)	
														Surficial Organic Soil from 0.0 to 0.3 feet.	

SOIL TEST RESULTS																
BORING NO.	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
L_6950R	SS-755	61' LT	20+52 -WALL3-	3.5 - 5.0	A-4(0)	40	10	35.3	25.8	17.0	22.0	78.2	57.4	35.4	15.8	-
L_7100R	SS-815	62' LT	22+00 -WALL3-	0.9 - 2.4	A-2-4(0)	33	4	31.9	38.3	15.9	13.9	91.6	74.0	33.3	11.8	-
L_7400R	SS-835	64' LT	24+89 -WALL3-	1.0 - 2.5	A-6(4)	32	13	23.6	25.8	36.7	13.9	95.6	81.7	52.8	15.5	-
WALL03_B-35	SS-519	17' LT	28+00 -WALL3-	3.5 - 5.0	A-4(1)	37	7	28.0	34.3	22.3	15.4	94.0	76.9	43	18.6	-
*T-27	SS-49	19' LT	28+82 -WALL3-	8.8 - 10.3	A-7-5(0)	44	11	26.0	28.7	22.8	22.5	72.0	61.0	36.0	21.1	-
WALL03_B-39	SS-1215	12' LT	30+05 -WALL3-	1.0 - 2.5	A-4(1)	40	10	33.2	30.7	26.3	9.2	88.3	68.5	37.9	17.2	-

LAB TECHNICIAN: DANIEL REEVE

LAB TECHNICIAN: STEPHANIE H. HUFFMAN

NCDOT CERTIFICATION NO. 135-03-0816

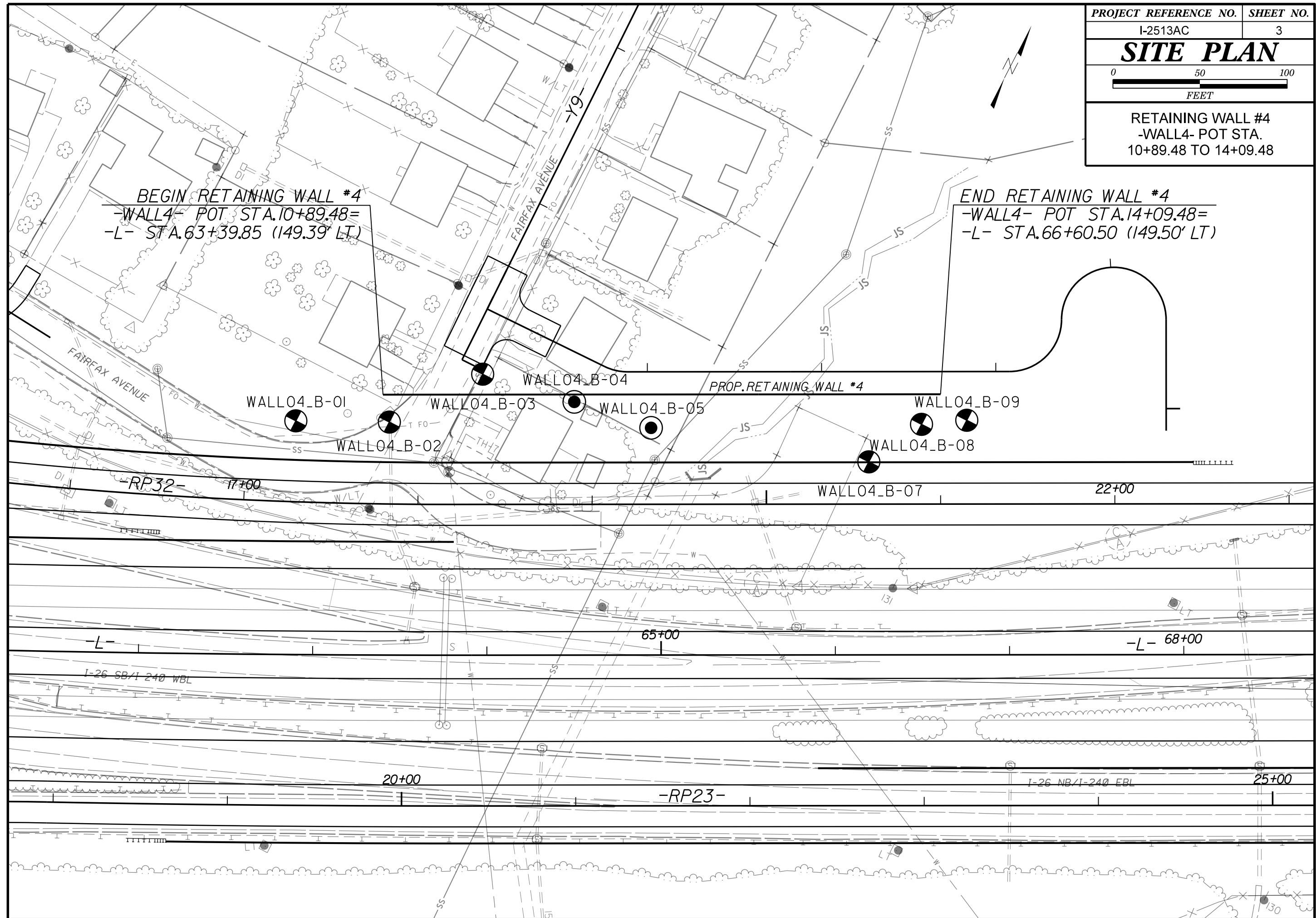
NCDOT CERTIFICATION NO. 114-01-1203

*LAB TESTING FOR T-27 WAS PERFORMED BY OTHERS DURING A PREVIOUS EXPLORATION.

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	3
SITE PLAN	
0 50 100 FEET	
RETAINING WALL #4 -WALL4- POT STA. 10+89.48 TO 14+09.48	

BEGIN RETAINING WALL #4
-WALL4- POT STA.10+89.48=
-L- STA.63+39.85 (149.39' LT)

END RETAINING WALL #4
-WALL4- POT STA.14+09.48=
-L- STA.66+60.50 (149.50' LT)



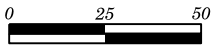
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24-JUN-2026 16:21
C:\Users\jg\OneDrive - ECS Corporate Services\31-4489 I-2513AC 1%g Structures\CADD\GEOTECH\Site&Sub\RWAL04\I2513AC_GEO_RWAL04_PFI.dgn

-WALL4- PROFILE ALONG EXISTING GROUND LINE FROM ROADWAY
DESIGN FILES PROVIDED BY AECOM MARCH 2026 AND I2513 Is trl.tin. INFERRED
STRATIGRAPHY IS DRAWN THROUGH THE BORING, PROJECTED ON THE PROFILE.

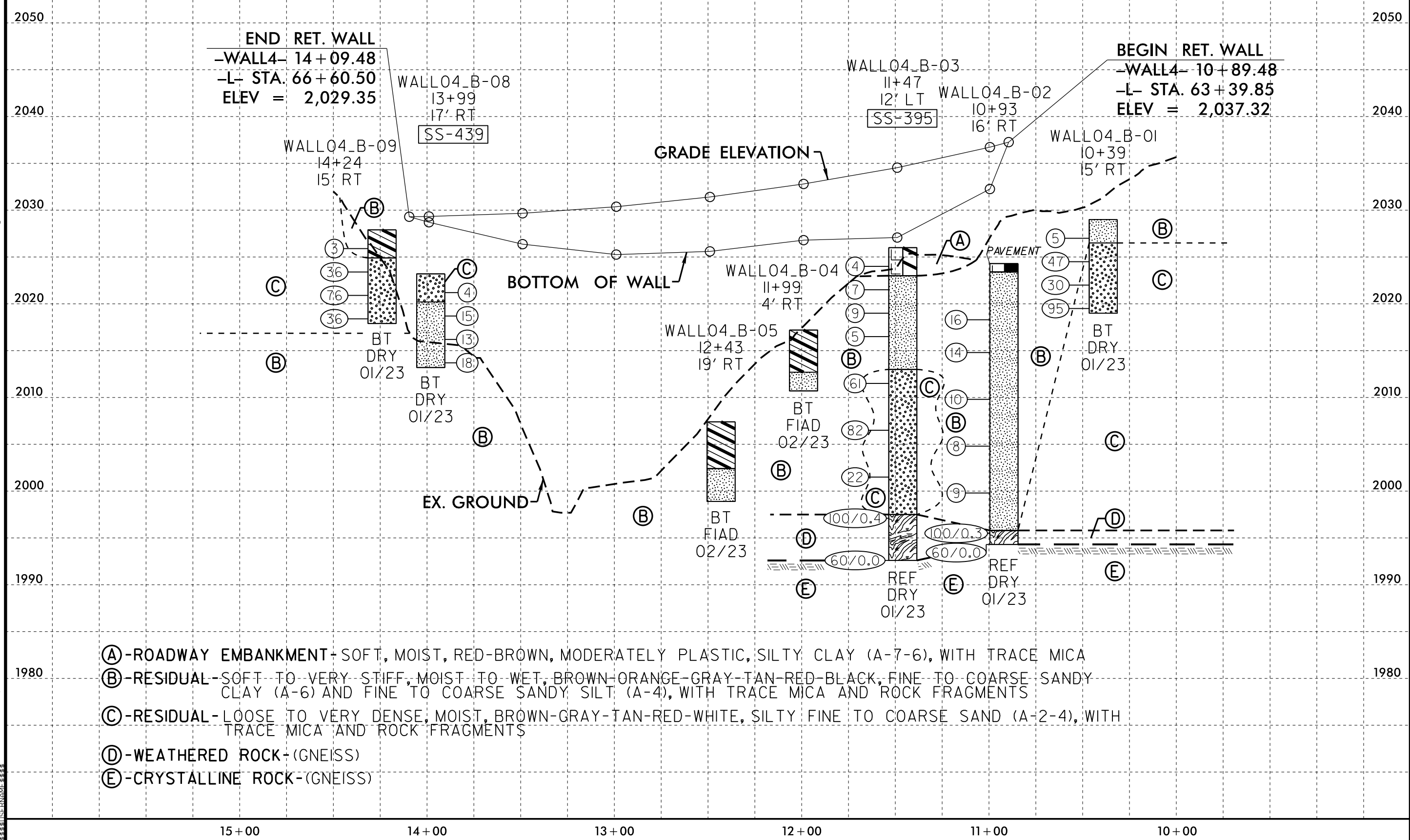
-WALL4-

Prepared in the Office of:

ECS SOUTHEAST, LLC
1815 CHERRY LANE, SUITE 100
CHERRYVILLE, NC 28021
(704) 525-5132 (PHONE)
(704) 525-5000 (FAX)
NC REGISTERED
ENGINEERING
FIRM #1-1519


VE = 5:1

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	4
PROFILE BORINGS PROJECTED ON -WALL4- ALONG WALL NO. 4	



- (A) -ROADWAY EMBANKMENT- SOFT, MOIST, RED-BROWN, MODERATELY PLASTIC, SILTY CLAY (A-7-6), WITH TRACE MICA
- (B) -RESIDUAL- SOFT TO VERY STIFF, MOIST TO WET, BROWN-ORANGE-GRAY-TAN-RED-BLACK, FINE TO COARSE SANDY CLAY (A-6) AND FINE TO COARSE SANDY SILT (A-4), WITH TRACE MICA AND ROCK FRAGMENTS
- (C) -RESIDUAL- LOOSE TO VERY DENSE, MOIST, BROWN-GRAY-TAN-RED-WHITE, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA AND ROCK FRAGMENTS
- (D) -WEATHERED ROCK- (GNEISS)
- (E) -CRYSTALLINE ROCK- (GNEISS)

F-2513AC

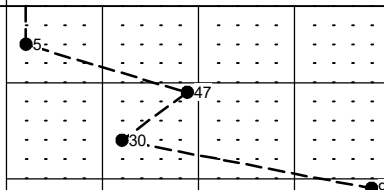


PROJECT REFERENCE

SHEET

I-2513AC

5

WBS: 34165.1.13			TIP: I-2513AC			COUNTY: BUNCOMBE			GEOLOGIST: A. Blackmore								
SITE DESCRIPTION: RETAINING WALL NO. 4 FROM -L- STA. 63+39.85 TO -L- STA. 66+60.50												GROUND WTR (ft)					
BORING NO.: WALL04_B-01			STATION: 10+39			OFFSET: 15 ft RT			ALIGNMENT: -WALL4-			0 HR.	Dry				
COLLAR ELEV.: 2,029.0 ft			TOTAL DEPTH: 10.0 ft			NORTHING: 679,887			EASTING: 931,913			24 HR.	Dry				
DRILL RIG/HAMMER EFF./DATE: GEO366 Diedrich D-50 80% 03/18/2022						DRILL METHOD: H.S. Augers			HAMMER TYPE: Automatic								
DRILLER: J. Messick			START DATE: 01/24/23			COMP. DATE: 01/24/23			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)		
2030																	
2025	2,028.0	1.0	2	2	3									2,029.0	LAND SURFACE	0.0	
	2,025.5	3.5	7	20	27						M			2,026.5	RESIDUAL Medium Stiff, Brown-Orange, Fine to Coarse Sandy SILT (A-4), with trace mica		2.5
	2,023.0	6.0	24	16	14						M				Dense to Very Dense, Brown-Gray, Silty Fine to Coarse SAND (A-2-4), with trace mica and rock fragments		
2020	2,020.5	8.5	23	40	55						M			2,019.0	10.0		
														Boring Terminated at Elevation 2,019.0 ft In Residual Silty SAND (A-2-4)			
														Surficial Organic Soil from 0.0 to 0.3 feet.			

WBS: 34165.1.13			TIP: I-2513AC			COUNTY: BUNCOMBE			GEOLOGIST: A. Blackmore				
SITE DESCRIPTION: RETAINING WALL NO. 4 FROM -L- STA. 63+39.85 TO -L- STA. 66+60.50									GROUND WTR (ft)				
BORING NO.: WALL04_B-02			STATION: 10+93			OFFSET: 16 ft RT			ALIGNMENT: -WALL4-			0 HR. Dry	
COLLAR ELEV.: 2,024.3 ft			TOTAL DEPTH: 30.0 ft			NORTHING: 679,911			EASTING: 931,961			24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE: GEO366 Diedrich D-50 80% 03/18/2022						DRILL METHOD: H.S. Augers			HAMMER TYPE: Automatic				
DRILLER: J. Messick			START DATE: 01/24/23			COMP. DATE: 01/24/23			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			
2025													
2020	2,019.3	5.0	5	6	10								
2015	2,015.8	8.5	6	7	7								
2010	2,010.8	13.5	3	4	6								
2005	2,005.8	18.5	5	3	5								
2000	2,000.8	23.5	4	4	5								
1995	1,995.8	28.5	100/0.3										
	1,994.3	30.0	60/0.0										

NC DOT BORE DOUBLE | 2513AC GEO RWAL WALL04.GPJ ECS GINT DATA-TEMP1.ATE.GDT 6/24/26

T-2513AC



6

NCDOT BORE DOUBLE I2513AC GEO RWAL WALL04.GPJ ECS GINT DATA-TEMPLATE.GDT 6/24/26

WBS: 34165.1.13			TIP: I-2513AC			COUNTY: BUNCOMBE			GEOLOGIST: A. Blackmore					
SITE DESCRIPTION: RETAINING WALL NO. 4 FROM -L- STA. 63+39.85 TO -L- STA. 66+60.50											GROUND WTR (ft)			
BORING NO.: WALL04_B-04			STATION: 11+99			OFFSET: 4 ft RT			ALIGNMENT: -WALL4-			0 HR.	Dry	
COLLAR ELEV.: 2,017.2 ft			TOTAL DEPTH: 6.5 ft			NORTHING: 679,970			EASTING: 932,050			24 HR.	FIAD	
DRILL RIG/HAMMER EFF./DATE: G. Sowers Dynamic Cone Penetrometer						DRILL METHOD: Hand Auger/DCP				HAMMER TYPE: N/A				
DRILLER: N/A			START DATE: 02/13/23			COMP. DATE: 02/13/23			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				
2020														
	2,017.2	0.0	0	0	4	4								2,017.2 LAND SURFACE 0.0
	2,016.2	1.0	0	0	3	4								
2015	2,015.2	2.0	0	0	6	6								
	2,014.2	3.0	0	0	6	6								
	2,013.2	4.0	0	0	7	7								
	2,012.2	5.0	0	0	7	7								2,012.7 4.5
	2,011.2	6.0	0	0	9	9								2,010.7 6.5
														Boring Terminated By Auger Refusal at Elevation 2,010.7 ft In Residual Sandy SILT (A-4)
														Surficial Organic Soil from 0.0 to 0.2 feet.

F-2513AC



7

WBS: 34165.1.13			TIP: I-2513AC			COUNTY: BUNCOMBE			GEOLOGIST: A. Blackmore				
SITE DESCRIPTION: RETAINING WALL NO. 4 FROM -L- STA. 63+39.85 TO -L- STA. 66+60.50									GROUND WTR (ft)				
BORING NO.: WALL04_B-07			STATION: 13+68			OFFSET: 39 ft RT			ALIGNMENT: -WALL4-			0 HR.	Dry
COLLAR ELEV.: 2,023.5 ft			TOTAL DEPTH: 10.0 ft			NORTHING: 680,017			EASTING: 932,216			24 HR.	Dry
DRILL RIG/HAMMER EFF./DATE: GEO366 Diedrich D-50 80% 03/18/2022						DRILL METHOD: H.S. Augers			HAMMER TYPE: Automatic				
DRILLER: J. Messick			START DATE: 01/27/23			COMP. DATE: 01/27/23			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			
2025													
	2,022.5	1.0											2,023.5 LAND SURFACE 0.0
2020	2,020.0	3.5	2	1	2						M		ARTIFICIAL FILL Soft, Brown-Tan, Fine to Coarse Sandy SILT (A-4), with trace rock fragments
	2,017.5	6.0	1	1	1						M		
2015	2,015.0	8.5	7	7	4						M		
			9	7	9						M		
													2,013.5 10.0
													Boring Terminated at Elevation 2,013.5 ft In Residual Sandy SILT (A-4)
													Surficial Organic Soil from 0.0 to 0.3 feet.
													Boring location appears to be along an old abandoned roadbed.

F-2513AC



PROJECT REFERENCE

SHEET

I-2513AC

8

NC DOT BORE DOUBLE I2513AC GEO RWAL WALL04.GPJ ECS GINT DATA-TEMPLATE.GDT 6/24/26

WBS: 34165.1.13		TIP: I-2513AC		COUNTY: BUNCOMBE		GEOLOGIST: A. Blackmore									
SITE DESCRIPTION: RETAINING WALL NO. 4 FROM -L- STA. 63+39.85 TO -L- STA. 66+60.50								GROUND WTR (ft)							
BORING NO.: WALL04_B-09		STATION: 14+25		OFFSET: 15 ft RT		ALIGNMENT: -WALL4-		0 HR.	Dry						
COLLAR ELEV.: 2,027.9 ft		TOTAL DEPTH: 10.0 ft		NORTHING: 680,064		EASTING: 932,255		24 HR.	Dry						
DRILL RIG/HAMMER EFF./DATE: GEO366 Diedrich D-50 80% 03/18/2022				DRILL METHOD: H.S. Augers		HAMMER TYPE: Automatic									
DRILLER: J. Messick		START DATE: 01/27/23		COMP. DATE: 01/27/23		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					
2030															
	2,026.9	1.0												2,027.9 LAND SURFACE 0.0	
2025	2,024.4	3.5	1	1	2							M		2,024.9 RESIDUAL Soft, Red-Brown, Fine to Coarse Sandy CLAY (A-6) 3.0	
	2,021.9	6.0	8	10	26							M		2,021.9 Dense to Very Dense, Red-Brown-White-Tan, Silty Fine to Coarse SAND (A-2-4), with trace mica and rock fragments	
2020	2,019.4	8.5	16	38	38							M			
	2,017.9	10.0	25	20	16							M		2,017.9 Boring Terminated at Elevation 2,017.9 ft In Residual Silty SAND (A-2-4) 10.0	
														Surficial Organic Soil from 0.0 to 0.3 feet.	

SOIL TEST RESULTS																		
BORING NO.	SAMPLE NO.	OFFSET	STATION	NORTH	EAST	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
										C. SAND	F. SAND	SILT	CLAY	10	40	200		
WALL04_B-03	SS-395	12' LT	11+47 -WALL4-	679,960	931,996	1.0 - 2.5	A-7-6(10)	52	25	24.9	17.2	16.3	41.6	86.1	71.9	53.1	25.6	-
WALL04_B-08	SS-439	17' RT	13+99 -WALL4-	680,050	932,233	1.0 - 2.5	A-2-4(0)	35	9	32.4	28.8	15.5	23.3	70.8	54.8	31.7	19.5	-

LAB TECHNICIAN: DANIEL REEVE

NCDOT CERTIFICATION NO. 135-03-0816

Dan Reeve

REFERENCE: I-2513AC

PROJECT: 34165

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3-5	SITE PLAN
6-7	PROFILE
8-23	BORE LOGS
24	SOIL TEST RESULTS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
PROJECT DESCRIPTION I-26T-40I-240 INTERCHANGE
TO SR 3548 (HAYWOOD ROAD)

SITE DESCRIPTION RETAINING WALL NO. 5
-WALL5- STA. 10 + 55.00 (-L- STA. 66 + 05.00) TO
-WALL5- 26 + 51.90 (-L- 81 + 75.93)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AC	1	24

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

A. BLACKMORE

A. WEST

T. HIBDON

W. KING

INVESTIGATED BY ECS SOUTHEAST, LLC

DRAWN BY A. SUTTLE, P.G.

CHECKED BY S. HUDSON, P.E.

SUBMITTED BY ECS SOUTHEAST, LLC

DATE AUGUST 2024

Prepared in the Office of:



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NC REGISTERED
ENGINEERING
FIRM # F-1519

ECS PROJ: 31-4489



Signed by:

Amanda R. Suttle PG

6/30/2026

399DBE42974A494...

SIGNATURE

DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

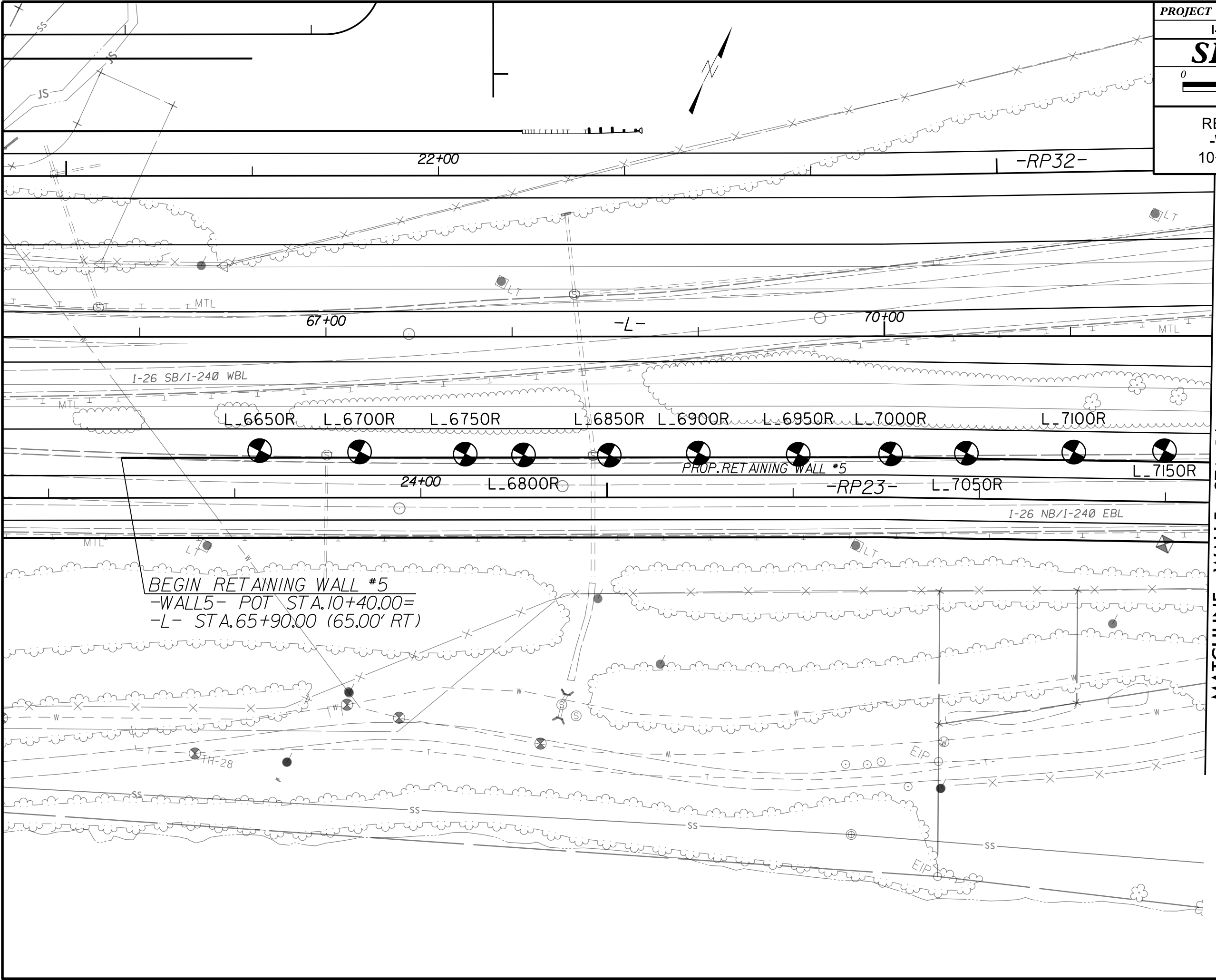
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

[illegible]

PROJECT REFERENCE NO.	SHEET NO.
I-2512AC	3
SITE PLAN	
0 50 100 FEET	
RETAINING WALL #5 -WALL5- POT STA. 10+40.00 TO 26+39.23	



MATCHLINE -WALL5- STA. 16 + 25.00 SEE SHEET 4

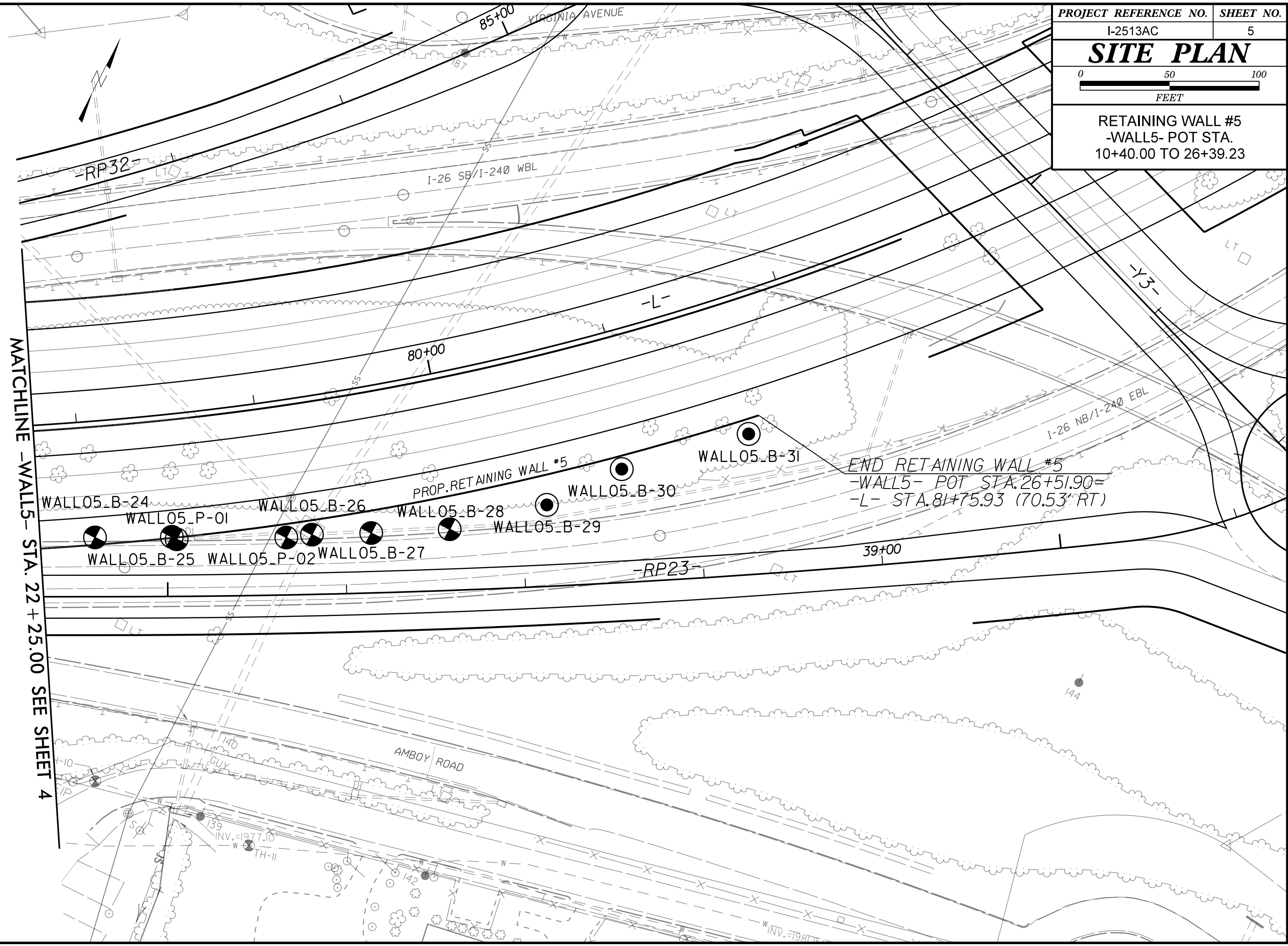
PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	4
SITE PLAN	
0 50 100 FEET	
RETAINING WALL #5 -WALL5- POT STA. 10+40.00 TO 26+39.23	



MATCHLINE -WALL5- STA. 16+25.00 SEE SHEET 3

MATCHLINE -WALL5- STA. 22+25.00 SEE SHEET 5

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	5
SITE PLAN	
0 50 100 FEET	
RETAINING WALL #5 -WALL5- POT STA. 10+40.00 TO 26+39.23	



MATCHLINE -WALL5- STA. 22+25.00 SEE SHEET 4

END RETAINING WALL #5
-WALL5- POT STA. 26+39.23
-L- STA. 81+75.93 (70.53' RT)

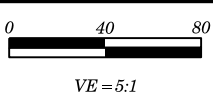
5/14/99

Structures\CADD\Geotech\Site&Sub\RWAL05\I-2513AC_GEO_RWAL05.PFI.dgn

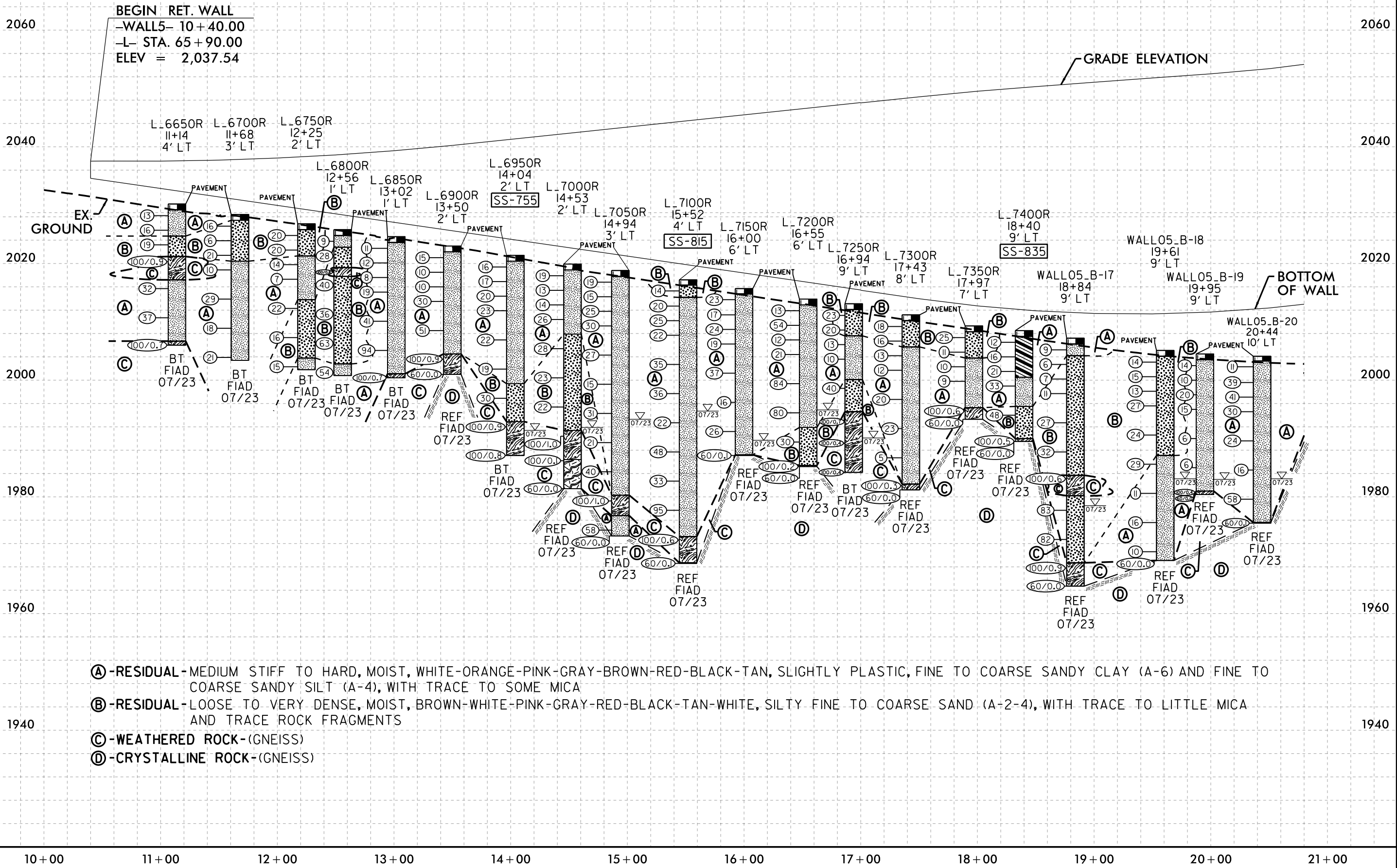
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\$\$\$\$\$PERMANENT\$\$\$\$\$

-WALL5- PROFILE ALONG EXISTING GROUND LINE FROM ROADWAY
DESIGN FILES, PROVIDED BY AECOM JULY 2025 AND I2513 Is tnl.fin. INFERRED
STRATIGRAPHY IS DRAWN THROUGH THE BORING, PROJECTED ON THE PROFILE.

-WALL5-



PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	6
PROFILE BORINGS PROJECTED ON -WALL5- ALONG WALL NO. 5	



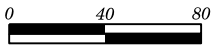
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-WALL5- PROFILE ALONG EXISTING GROUND LINE FROM ROADWAY DESIGN FILES, PROVIDED BY AECOM JULY 2025 AND I2513 Is tnl.fin. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, PROJECTED ON THE PROFILE.

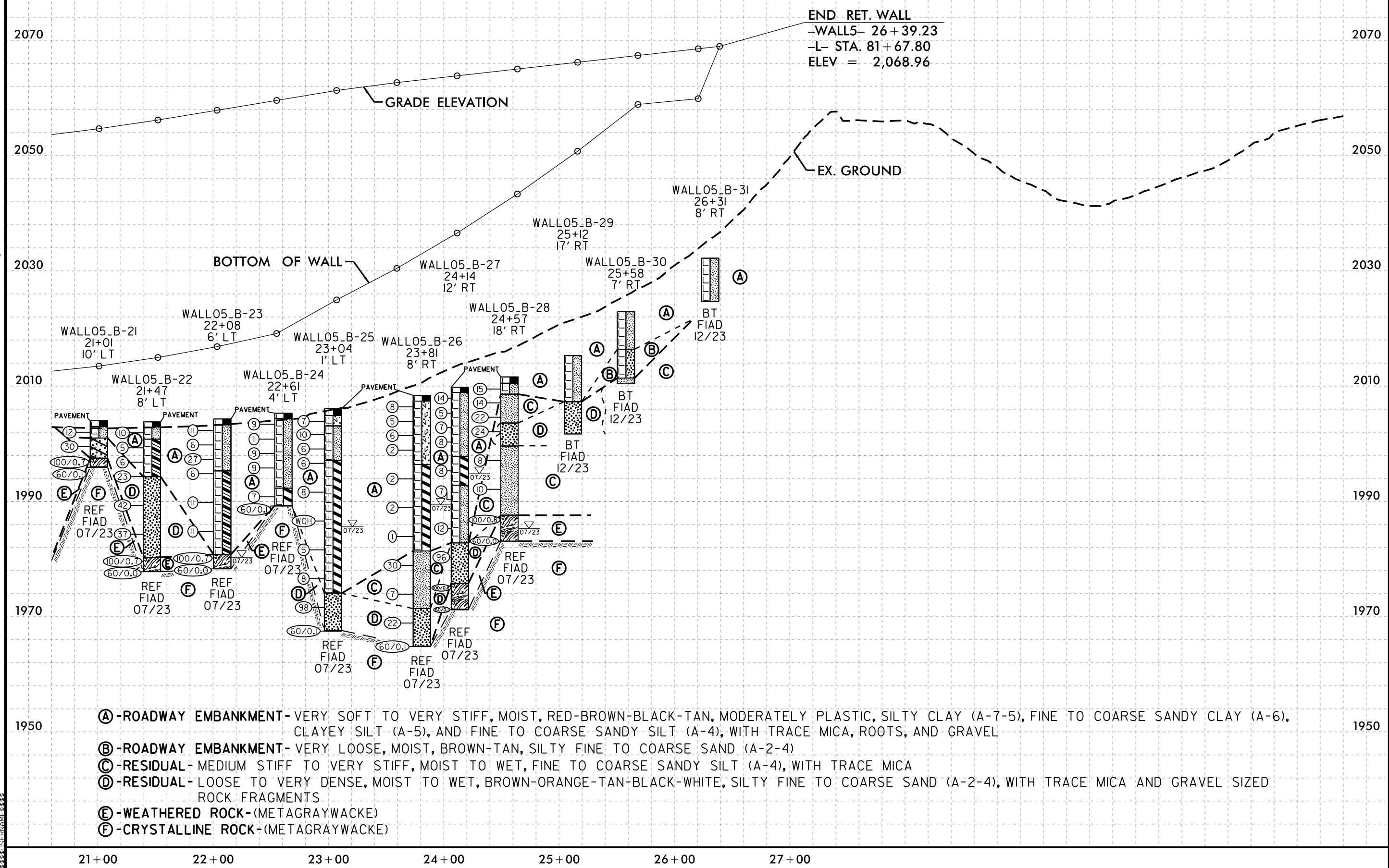
-WALL5-

Prepared in the Office of:

ECS SOUTHEAST, LLC
1812 CHERRY LANE, SUITE 100
DALLAS, TEXAS 75241
(214) 525-5132 (PHONE)
(214) 525-5133 (FAX)
ECS REGISTRATION
FORM # 1-1519


VE = 5:1

PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	7
PROFILE BORINGS PROJECTED ON -WALL5- ALONG WALL NO. 5	



NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 8/13/24

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93											GROUND WTR (ft)				
BORING NO. L_6750R			STATION 12+25			OFFSET 18 ft LT			ALIGNMENT -WALL5-			0 HR. Dry			
COLLAR ELEV. 2,026.8 ft			TOTAL DEPTH 25.0 ft			NORTHING 679,934			EASTING 932,434			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER T. Hibdon			START DATE 07/11/23			COMP. DATE 07/11/23			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)
2030															
2025	2,025.8	1.0	7	10	10									2,026.8 GROUND SURFACE 0.0	
2020	2,023.3	3.5	8	7	13							M		2,025.8 ROADWAY EMBANKMENT 1.0	
	2,020.8	6.0	6	7	7							M		Asphalt (0.1'), Concrete (0.9')	
	2,018.3	8.5	2	3	4							M		RESIDUAL	
2015	2,013.3	13.5	8	11	11							M		Medium Dense, Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica	5.5
	2,008.3	18.5	7	7	9							M		Medium Stiff to Stiff, Tan-Brown, Fine to Coarse Sandy SILT (A-4), with trace mica	
2010												M		2,013.8 Medium Dense, Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica 13.0	
2005	2,003.3	23.5	4	7	8							M		2,003.8 Very Stiff, Brown-White, Fine to Coarse Sandy SILT (A-4) 23.0	
												M		2,001.8 Boring Terminated at Elevation 2,001.8 ft In Residual Sandy SILT (A-4) 25.0	

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore									
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93								GROUND WTR (ft)							
BORING NO. L_6800R		STATION 12+56		OFFSET 17 ft LT		ALIGNMENT -WALL5-		0 HR.	Dry						
COLLAR ELEV. 2,025.8 ft		TOTAL DEPTH 25.0 ft		NORTHING 679,948		EASTING 932,462		24 HR.	FIAD						
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER T. Hibdon		START DATE 07/11/23		COMP. DATE 07/12/23		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					
2030															
2025	2,024.8	1.0	4	5	4										2,025.8 GROUND SURFACE 0.0
															2,024.8 ROADWAY EMBANKMENT 1.0
	2,022.3	3.5	8	13	15										2,022.8 3.0
2020	2,019.8	6.0	20	57	43/0.3										2,019.3 RESIDUAL 6.5
	2,017.3	8.5	31	21	19										2,017.8 Medium Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4), with trace mica and rock fragments 8.0
2015															WEATHERED ROCK Brown (GNEISS)
	2,012.3	13.5	11	14	22										RESIDUAL
2010															Dense to Very Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4), with trace rock fragments
	2,007.3	18.5	31	31	32										
2005															
	2,002.3	23.5	16	21	33										2,002.8 23.0
															2,000.8 Hard, Brown-Tan, Fine to Coarse Sandy SILT (A-4), with trace mica 25.0
															Boring Terminated at Elevation 2,000.8 ft In Residual Sandy SILT (A-4)

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 8/13/24

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93												GROUND WTR (ft)			
BORING NO. L_6850R			STATION 13+02			OFFSET 17 ft LT			ALIGNMENT -WALL5-			0 HR.	Dry		
COLLAR ELEV. 2,024.6 ft			TOTAL DEPTH 24.2 ft			NORTHING 679,969			EASTING 932,503			24 HR.	FIAD		
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER T. Hibdon			START DATE 07/12/23			COMP. DATE 07/12/23			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)
2025															
2020	2,023.6	1.0	3	6	5	1						M		2,024.6 GROUND SURFACE 0.0	
	2,021.1	3.5	4	5	7	2						M		2,023.6 ROADWAY EMBANKMENT 1.0	
2015	2,018.6	6.0	2	4	4	3						M		RESIDUAL Medium Stiff to Hard, Brown-Tan, Fine to Coarse Sandy SILT (A-4)	
	2,016.1	8.5	5	9	10	4						M			
2010	2,011.1	13.5	10	14	27	5						M			
	2,006.1	18.5	18	34	60	6						M			
2005	2,001.1	23.5	50	50/0.2		7						M		2,001.1 23.5	
						8								2,000.4 24.2	
						9								WEATHERED ROCK	
						10								Brown (GNEISS)	
						11								Boring Terminated at Elevation 2,000.4 ft In Weathered Rock (GNEISS)	
						12									
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WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. West					
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93										GROUND WTR (ft)				
BORING NO. L_6900R			STATION 13+50			OFFSET 18 ft LT			ALIGNMENT -WALL5-		0 HR. Dry			
COLLAR ELEV. 2,023.0 ft			TOTAL DEPTH 22.0 ft			NORTHING 679,992			EASTING 932,545		24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022						DRILL METHOD H.S. Augers				HAMMER TYPE Automatic				
DRILLER W. King			START DATE 07/11/23			COMP. DATE 07/11/23			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				
2025														
	2,022.0	1.0												2,023.0 GROUND SURFACE 0.0
2020			2	6	9									2,022.0 ROADWAY EMBANKMENT 1.0
	2,019.5	3.5	3	4	6									Concrete (1.0')
	2,017.0	6.0	3	4	6									RESIDUAL
2015														Stiff to Hard, Brown-White-Black, Fine to Coarse Sandy SILT (A-4), with some mica
	2,014.5	8.5	3	5	25									
2010	2,009.5	13.5	9	15	36									
2005	2,004.5	18.5	33	67/0.4										2,004.5 18.5
														WEATHERED ROCK
	2,001.0	22.0												Brown-White-Black (GNEISS)
														2,001.0 22.0
														Boring Terminated with Standard Penetration Test Refusal at Elevation 2,001.0 ft On Crystalline Rock (GNEISS)

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 8/13/24

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 8/13/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. West									
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93								GROUND WTR (ft)							
BORING NO. L_7000R		STATION 14+53		OFFSET 18 ft LT		ALIGNMENT -WALL5-		0 HR.	28.0						
COLLAR ELEV. 2,019.9 ft		TOTAL DEPTH 38.5 ft		NORTHING 680,039		EASTING 932,637		24 HR.	FIAD						
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic								
DRILLER W. King			START DATE 07/11/23		COMP. DATE 07/11/23		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					
2020															
	2,018.9	1.0													
2015	2,018.9		6	9	10										
	2,016.4	3.5	4	6	7										
2010	2,013.9	6.0	12	9	5										
	2,011.4	8.5	12	13	13										
2005	2,006.4	13.5	10	14	14										
	2,001.4	18.5	9	12	11										
2000	1,996.4	23.5	18	9	13										
	1,991.4	28.5	14	86/0.5											
1995	1,986.4	33.5	100/0.1												
	1,981.4	38.5	60/0.0												
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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. West								
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93							GROUND WTR (ft)							
BORING NO. L_7050R		STATION 14+94		OFFSET 18 ft LT		ALIGNMENT -WALL5-		0 HR. 26.5						
COLLAR ELEV. 2,019.8 ft		TOTAL DEPTH 45.5 ft		NORTHING 680,058		EASTING 932,673		24 HR. FIAD						
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER W. King			START DATE 07/12/23		COMP. DATE 07/12/23		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)
2020														
2015	2,018.8	1.0												2,019.8 GROUND SURFACE 0.0
	2,016.3	3.5	8	9	10									2,018.8 ROADWAY EMBANKMENT Concrete (1.0')
	2,013.8	6.0	10	7	8									RESIDUAL Stiff to Hard, Brown, Fine to Coarse Sandy SILT (A-4)
2010	2,013.8	6.0	6	11	14									
	2,011.3	8.5	10	12	18									
2005	2,006.3	13.5												
	2,001.3	18.5	28	11	16									
2000	1,996.3	23.5	4	7	8									
	1,991.3	28.5	11	11	20									
1995	1,986.3	33.5												
1990	1,981.3	38.5	10	17	23									
	1,976.3	43.5	35	65/0.5										1,981.3 WEATHERED ROCK Brown (GNEISS) 38.5
1985	1,974.3	45.5	6	16	42									1,977.8 RESIDUAL Hard, Brown, Fine to Coarse Sandy SILT (A-4) 42.0
1980	1,974.3	45.5												1,974.3 Boring Terminated with Standard Penetration Test Refusal at Elevation 1,974.3 ft On Crystalline Rock (GNEISS) 45.5

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. West							
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93							GROUND WTR (ft)						
BORING NO. L_7100R		STATION 15+52		OFFSET 19 ft LT		ALIGNMENT -WALL5-		0 HR. 22.5					
COLLAR ELEV. 2,017.2 ft		TOTAL DEPTH 48.6 ft		NORTHING 680,085		EASTING 932,724		24 HR. FIAD					
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER W. King			START DATE 07/12/23		COMP. DATE 07/12/23		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			
2020													
2015	2,016.3	0.9	3	4	10								2,017.2 GROUND SURFACE 0.0
	2,013.7	3.5	11	10	10								2,016.3 ROADWAY EMBANKMENT Concrete (0.9') 0.9
2010	2,011.2	6.0	5	11	14								2,014.2 RESIDUAL 3.0
	2,008.7	8.5	12	11	11								Medium Dense, Brown-White, Silty Fine to Coarse SAND (A-2-4(0))
2005	2,003.7	13.5	13	22	13								Very Stiff to Hard, Brown-White, Fine to Coarse Sandy SILT (A-4)
	1,998.7	18.5	16	19	17								
2000	1,993.7	23.5	9	10	12								
	1,988.7	28.5	11	18	30								
1985	1,983.7	33.5	8	13	20								
	1,978.7	38.5	20	35	60								
1975	1,973.7	43.5	13	40	60/0.1								
	1,968.7	48.5	60/0.1										
1970													

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 8/13/24

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 8/13/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. West								
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93								GROUND WTR (ft)						
BORING NO. L_7200R		STATION 16+56		OFFSET 19 ft LT		ALIGNMENT -WALL5-		0 HR.	19.0					
COLLAR ELEV. 2,013.9 ft		TOTAL DEPTH 28.7 ft		NORTHING 680,133		EASTING 932,816		24 HR.	FIAD					
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER W. King		START DATE 07/12/23		COMP. DATE 07/13/23		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				
2015														
	2,012.9	1.0	3	6	7									2,013.9 GROUND SURFACE 0.0
														2,012.9 ROADWAY EMBANKMENT 1.0
2010	2,010.4	3.5	8	30	24									Concrete (1.0')
	2,007.9	6.0	4	3	9									RESIDUAL
	2,005.4	8.5	7	11	10									Stiff to Hard, Brown-White, Fine to Coarse Sandy SILT (A-4)
2005	2,000.4	13.5	20	39	45									
	1,995.4	18.5	12	37	43									
	1,990.4	23.5	8	8	22									
2000	1,985.4	28.5	100/0.2											1,991.9 Dense, White-Brown, Silty Fine to Coarse SAND (A-2-4), with trace rock fragments 22.0
	1,985.2	28.7	60/0.0											1,985.4 WEATHERED ROCK (GNEISS) 28.5
														1,985.2 Boring Terminated with Standard Penetration Test Refusal at Elevation 1,985.2 ft On Crystalline Rock (GNEISS) 28.7

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93												GROUND WTR (ft)			
BORING NO. L_7300R			STATION 17+43			OFFSET 20 ft LT			ALIGNMENT -WALL5-			0 HR.	Dry		
COLLAR ELEV. 2,011.2 ft			TOTAL DEPTH 30.0 ft			NORTHING 680,174			EASTING 932,893			24 HR.	FIAD		
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER T. Hibdon			START DATE 07/12/23			COMP. DATE 07/12/23			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					
2015															
2010	2,010.2	1.0													2,011.2 GROUND SURFACE 0.0
	2,007.7	3.5	6	7	11										2,010.2 ROADWAY EMBANKMENT 1.0
2005	2,005.2	6.0	8	7	9										Asphalt (0.1'), Concrete (0.9')
	2,002.7	8.5	4	6	7										RESIDUAL
2000	2,002.7	8.5	2	4	8										Medium Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4)
	1,997.7	13.5	7	10	10										Medium Stiff to Very Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace to little mica
1995	1,992.7	18.5	11	11	12										
1990	1,987.7	23.5	2	2	3										
1985	1,982.7	28.5	16	84/0.3											
	1,981.2	30.0	60/0.0												1,982.2 WEATHERED ROCK 29.0
															1,981.2 BROWN-TAN (GNEISS) 30.0
															Boring Terminated with Standard Penetration Test Refusal at Elevation 1,981.2 ft On Crystalline Rock (GNEISS)

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93								GROUND WTR (ft)						
BORING NO. L_7400R		STATION 18+40		OFFSET 21 ft LT		ALIGNMENT -WALL5-		0 HR.	Dry					
COLLAR ELEV. 2,008.5 ft		TOTAL DEPTH 19.1 ft		NORTHING 680,220		EASTING 932,979		24 HR.	FIAD					
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER T. Hibdon			START DATE 07/13/23		COMP. DATE 07/13/23		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				
2010														
	2,007.5	1.0	4	7	5	12					SS-835	16%		2,008.5 GROUND SURFACE 0.0 2,007.5 ROADWAY EMBANKMENT 1.0 Asphalt (0.1'), Concrete (0.9')
2005	2,005.0	3.5	10	6	10	16						M		RESIDUAL Stiff to Very Stiff, Red-Brown, Slightly Plastic Fine to Coarse Sandy CLAY (A-6(4))
	2,002.5	6.0	9	6	15	21						M		
2000	2,000.0	8.5	7	12	21							M		2,000.5 Hard, Brown-Black, Fine to Coarse Sandy SILT (A-4), with trace mica 8.0
			26	29	19							M		1,995.5 Dense, Brown-Black-Tan, Silty Fine to Coarse SAND (A-2-4), with trace mica 13.0
1995	1,995.0	13.5												
	1,990.0	18.5												1,990.0 WEATHERED ROCK 18.5 Brown (GNEISS) 19.0
1990	1,989.5	19.0												1,989.5 CRYSTALLINE ROCK 19.0 (GNEISS) 19.1
														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,989.4 ft On Crystalline Rock (GNEISS)

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore								
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93								GROUND WTR (ft)						
BORING NO. WALL05_B-18		STATION 19+61		OFFSET 21 ft LT		ALIGNMENT -WALL5-		0 HR.	22.0					
COLLAR ELEV. 2,005.1 ft		TOTAL DEPTH 36.0 ft		NORTHING 680,275		EASTING 933,087		24 HR.	FIAD					
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER T. Hibdon			START DATE 07/13/23		COMP. DATE 07/13/23		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				
2010														
2005														
2000	2,004.1	1.0		4	6	8								2,005.1 GROUND SURFACE 0.0
														2,004.1 ROADWAY EMBANKMENT 1.0
	2,001.6	3.5		5	6	9								Asphalt (0.1'), Concrete (0.9')
	1,999.1	6.0		7	6	7								RESIDUAL
1995	1,996.6	8.5		5	11	16								Medium Dense, Brown-White, Silty Fine to Coarse SAND (A-2-4), with trace mica
1990	1,991.6	13.5		7	11	13								
1985	1,986.6	18.5		7	13	16								1,987.1 18.0
														Stiff to Very Stiff, White-Brown, Fine to Coarse Sandy SILT (A-4), with little mica
1980	1,981.6	23.5		7	4	7								
1975	1,976.6	28.5		4	8	8								
1970	1,971.6	33.5		3	3	7								
	1,969.1	36.0	60/0.0							60/0.0				1,969.1 36.0
														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,969.1 ft On Crystalline Rock (GNEISS)

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 8/13/24

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. West									
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93								GROUND WTR (ft)							
BORING NO. WALL05_B-20		STATION 20+44		OFFSET 22 ft LT		ALIGNMENT -WALL5-		0 HR.	21.0						
COLLAR ELEV. 2,004.1 ft		TOTAL DEPTH 28.6 ft		NORTHING 680,314		EASTING 933,160		24 HR.	FIAD						
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic								
DRILLER W. King			START DATE 07/13/23		COMP. DATE 07/13/23		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					
2005															
	2,003.3	0.8		5	5	6									2,004.1 GROUND SURFACE 0.0
															2,003.3 ROADWAY EMBANKMENT 0.8
2000	2,000.6	3.5		16	19	20									Concrete (0.8')
	1,998.1	6.0		12	15	26									RESIDUAL
	1,995.6	8.5		21	16	14									Stiff to Hard, Brown, Fine to Coarse Sandy SILT (A-4)
1995															
	1,990.6	13.5		11	11	13									
1990															
	1,985.6	18.5		6	5	11									
1985															
	1,980.6	23.5		36	24	34									
1980															
	1,975.6	28.5		60/0.1											1,975.6 28.5
															1,975.5 28.6
															CRYSTALLINE ROCK
															Brown (GNEISS)
															Boring Terminated with Standard
															Penetration Test Refusal at Elevation
															1,975.5 ft In Crystalline Rock (GNEISS)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore											
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93												GROUND WTR (ft)								
BORING NO. WALL05_B-21			STATION 21+01			OFFSET 22 ft LT			ALIGNMENT -WALL5-			0 HR.	Dry							
COLLAR ELEV. 2,004.0 ft			TOTAL DEPTH 8.1 ft			NORTHING 680,341			EASTING 933,210			24 HR.	FIAD							
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER T. Hibdon			START DATE 07/13/23			COMP. DATE 07/13/23			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)					
2005																				
2000	2,003.0	1.0	3	6	6						M		2,004.0	GROUND SURFACE	0.0					
													2,003.0	ROADWAY EMBANKMENT	1.0					
	2,000.5	3.5	9	11	19														RESIDUAL	
	1,998.0	6.0	12	17	83/0.2														Medium Dense, Brown-Red, Clayey Fine to Coarse SAND (A-2-6), with trace rock fragments	6.5
	1,996.0	8.0																		
			60/0.1											1,996.0	WEATHERED ROCK	8.0				
														1,995.9	CRYSTALLINE ROCK (GNEISS)	8.1				

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93												GROUND WTR (ft)		
BORING NO. WALL05_B-22			STATION 21+47			OFFSET 20 ft LT			ALIGNMENT -WALL5-			0 HR. Dry		
COLLAR ELEV. 2,003.8 ft			TOTAL DEPTH 26.0 ft			NORTHING 680,361			EASTING 933,251			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER T. Hibdon			START DATE 07/13/23			COMP. DATE 07/13/23			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				
2005														
	2,002.9	0.9	3	5	5	10								2,003.8 GROUND SURFACE 0.0
														2,002.9 ROADWAY EMBANKMENT 0.9
2000	2,000.3	3.5	3	2	3	5								2,000.8 Asphalt (0.1'), Concrete (0.8') 3.0
	1,997.8	6.0	5	3	3	6								Stiff, Brown-Tan, Fine to Coarse Sandy SILT (A-4)
	1,995.3	8.5	4	9	14									Medium Stiff, Brown, Fine to Coarse Sandy CLAY (A-6)
1995														1,994.3 9.5
														RESIDUAL
1990	1,990.3	13.5	6	22	20									Medium Dense to Dense, Brown-Black, Silty Fine to Coarse SAND (A-2-4), with trace mica
1985	1,985.3	18.5	16	13	24									
1980	1,980.3	23.5	46	54/0.2										1,980.3 23.5
	1,977.8	26.0	60/0.0											WEATHERED ROCK 26.0
														Brown-Tan (GNEISS)
														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,977.8 ft On Crystalline Rock (GNEISS)

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 8/13/24

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93												GROUND WTR (ft)			
BORING NO. WALL05_B-23			STATION 22+09			OFFSET 18 ft LT			ALIGNMENT -WALL5-			0 HR.	24.0		
COLLAR ELEV. 2,004.3 ft			TOTAL DEPTH 26.0 ft			NORTHING 680,390			EASTING 933,305			24 HR.	FIAD		
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER T. Hibdon			START DATE 07/13/23			COMP. DATE 07/13/23			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)
2005															
2000	2,003.3	1.0	3	6	5									2,004.3 GROUND SURFACE 0.0	
														2,003.3 ROADWAY EMBANKMENT 1.0	
	2,000.8	3.5	6	4	2									Asphalt (0.1'), Concrete (0.9')	
1995	1,998.3	6.0	3	7	20									2,001.3 Medium Dense, Tan-Brown, Silty Fine to Coarse SAND (A-2-4) 3.0	
														Medium Stiff to Very Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica and rock fragments	
	1,995.8	8.5	3	3	3									1,995.3 Medium Stiff to Stiff, Red-Brown, Fine to Coarse Sandy CLAY (A-6), with trace mica and roots 9.0	
1990															
	1,990.8	13.5	3	5	6										
1985	1,985.8	18.5	3	7	4										
1980	1,980.8	23.5	80	20/0.2										1,980.8 WEATHERED ROCK 23.5	
	1,978.3	26.0												1,978.3 Brown-Tan (GNEISS) 26.0	
			60/0.0											Boring Terminated with Standard Penetration Test Refusal at Elevation 1,978.3 ft On Crystalline Rock (GNEISS)	

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore							
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93								GROUND WTR (ft)					
BORING NO. WALL05_B-24		STATION 22+62		OFFSET 16 ft LT		ALIGNMENT -WALL5-		0 HR.	Dry				
COLLAR ELEV. 2,005.3 ft		TOTAL DEPTH 16.1 ft		NORTHING 680,415		EASTING 933,351		24 HR.	FIAD				
DRILL RIG/HAMMER EFF./DATE ECS0888 CME 750X 93% 12/02/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER T. Hibdon		START DATE 07/13/23		COMP. DATE 07/14/23		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			
2010													
2005													
	2,004.4	0.9	5	5	4								2,005.3 GROUND SURFACE 0.0
													2,004.4 ROADWAY EMBANKMENT 0.9
	2,001.8	3.5	5	4	7								Asphalt (0.1'), Concrete (0.8')
													Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace mica
2000	1,999.3	6.0	4	4	5								
	1,996.8	8.5	3	4	5								
1995													
	1,991.8	13.5	2	3	4								1,992.3 RESIDUAL 13.0
1990	1,989.3	16.0											Medium Stiff, Brown-Black, Fine to Coarse Sandy CLAY (A-6) 16.0
													1,989.3 CRYSTALLINE ROCK (GNEISS) 16.1
													Boring Terminated with Standard Penetration Test Refusal at Elevation 1,989.2 ft In Crystalline Rock (GNEISS)

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. West						
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93									GROUND WTR (ft)						
BORING NO. WALL05_B-27			STATION 24+16			OFFSET CL			ALIGNMENT -WALL5-			0 HR. 15.0			
COLLAR ELEV. 2,009.8 ft			TOTAL DEPTH 38.6 ft			NORTHING 680,488			EASTING 933,487			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER W. King			START DATE 07/13/23			COMP. DATE 07/13/23			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)	
2010													2,009.8	GROUND SURFACE 0.0	
	2,008.9	0.9										M	2,008.9	ROADWAY EMBANKMENT 0.9	
				4	6	8									Concrete (0.9')
2005	2,006.3	3.5		2	2	3							M		Medium Stiff to Stiff, Brown-Red, Fine to Coarse Sandy SILT (A-4)
	2,003.8	6.0		2	3	4							M		
2000	2,001.3	8.5		2	2	6							M		
1995	1,996.3	13.5		3	3	5								1,997.8	RESIDUAL 12.0
															Medium Stiff, Brown-Red, Silty CLAY (A-7-5)
1990	1,991.3	18.5		2	3	4							W	1,992.8	17.0
															Medium Stiff to Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace rock fragments
1985	1,986.3	23.5		5	6	6							W		
1980	1,981.3	28.5		17	26	70							M	1,982.8	27.0
															Very Dense, Brown, Silty Fine to Coarse SAND (A-2-4)
1975	1,976.3	33.5		39	42	58/0.3								1,975.8	34.0
															WEATHERED ROCK Brown (GNEISS)
	1,971.3	38.5												1,971.3	38.5
														1,971.2	38.6
															CRYSTALLINE ROCK (GNEISS)
															Boring Terminated with Standard Penetration Test Refusal at Elevation 1,971.2 ft In Crystalline Rock (GNEISS)

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. West				
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93									GROUND WTR (ft)				
BORING NO. WALL05_B-28			STATION 24+59			OFFSET 6 ft RT			ALIGNMENT -WALL5-				
COLLAR ELEV. 2,011.6 ft			TOTAL DEPTH 28.5 ft			NORTHING 680,510			EASTING 933,525				
DRILL RIG/HAMMER EFF./DATE ECS3518 CME 750X 96% 07/21/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER W. King			START DATE 07/14/23			COMP. DATE 07/14/23			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			
2015													
2010	2,010.5	1.1	4	6	9								2,011.6 GROUND SURFACE 0.0
													2,010.5 ROADWAY EMBANKMENT 1.1
	2,008.1	3.5	6	6	8						M		2,008.6 Concrete (1.1') 3.0
											M		Stiff, Brown-Tan, Fine to Coarse Sandy SILT (A-4)
2005	2,005.6	6.0	9	9	13						M		RESIDUAL
											M		Stiff to Very Stiff, Brown-Tan, Fine to Coarse Sandy SILT (A-4), with trace mica
	2,003.1	8.5	8	9	15						M		2,003.6 Coarse Sandy SILT (A-4), with trace mica 8.0
											M		Medium Dense, Brown-Tan, Silty Fine to Coarse SAND (A-2-4)
2000											M		1,999.6 Medium Stiff to Stiff, Brown-Tan, Fine to Coarse Sandy SILT (A-4) 12.0
	1,998.1	13.5	4	3	5						M		
1995											M		
	1,993.1	18.5	4	5	5						M		
1990											M		
	1,988.1	23.5	5	11	89/0.3								1,987.6 WEATHERED ROCK 24.0
													Brown (GNEISS)
1985													
	1,983.1	28.5	60/0.0										1,983.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 1,983.1 ft On Crystalline Rock (GNEISS) 28.5

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 8/13/24

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT GDT 8/13/24

WBS 34165.1.13				TIP I-2513AC				COUNTY BUNCOMBE				GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93												GROUND WTR (ft)					
BORING NO. WALL05_B-30				STATION 25+61				OFFSET 5 ft LT				ALIGNMENT -WALL5-				0 HR. Dry	
COLLAR ELEV. 2,022.9 ft				TOTAL DEPTH 12.5 ft				NORTHING 680,584				EASTING 933,595				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer								DRILL METHOD Hand Auger/DCP				HAMMER TYPE N/A					
DRILLER N/A				START DATE 12/15/23				COMP. DATE 12/15/23				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							
2025																	
	2,022.9	0.0	0	0	2									2,022.9 GROUND SURFACE 0.0			
	2,021.9	1.0	0	0	1									ROADWAY EMBANKMENT Very Soft to Soft, Brown-Tan, Fine to Coarse Sandy SILT (A-4), with trace mica			
	2,020.9	2.0	0	0	2												
	2,019.9	3.0	0	0	2												
	2,018.9	4.0	0	0	3												
2020	2,017.9	5.0	0	0	2												
	2,016.9	6.0	0	0	3												
	2,015.9	7.0	0	0	1									2,016.4 Very Loose, Brown-Tan, Silty Fine to Coarse SAND (A-2-4) 6.5			
2015	2,014.9	8.0	0	0	2												
	2,013.9	9.0	0	0	2												
	2,012.9	10.0	0	0	1												
	2,011.9	11.0	0	0	3									2,011.4 11.5			
	2,010.9	12.0	0	0	8									2,010.4 RESIDUAL 12.5			
														Stiff, Tan-Brown, Fine to Coarse Sandy SILT (A-4)			
														Boring Terminated at Elevation 2,010.4 ft In Residual Sandy SILT (A-4)			
														Surficial Organic Soil from 0.0 to 0.2 feet.			

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. Blackmore						
SITE DESCRIPTION RETAINING WALL NO. 5, -L- STA. 66+05.00 TO -L- STA. 81+75.93											GROUND WTR (ft)				
BORING NO. WALL05_B-31			STATION 26+34			OFFSET 5 ft RT			ALIGNMENT -WALL5-			0 HR. Dry			
COLLAR ELEV. 2,032.2 ft			TOTAL DEPTH 7.5 ft			NORTHING 680,634			EASTING 933,649			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE G. Sowers Dynamic Cone Penetrometer						DRILL METHOD Hand Auger/DCP				HAMMER TYPE N/A					
DRILLER N/A			START DATE 12/15/23			COMP. DATE 12/15/23			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)	
2035															
	2,032.2	0.0	0	0	1	1	-	-	-	-				2,032.2	0.0
	2,031.2	1.0	0	0	2	2	-	-	-	-					
2030	2,030.2	2.0	0	0	3	3	-	-	-	-					
	2,029.2	3.0	0	0	3	3	-	-	-	-					
	2,028.2	4.0	0	0	2	2	-	-	-	-					
	2,027.2	5.0	0	0	3	3	-	-	-	-					
	2,026.2	6.0	0	0	2	2	-	-	-	-					
2025	2,025.2	7.0	0	0	8	8	-	-	-	-				2,024.7	7.5

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 8/13/24

SOIL TEST RESULTS																
BORING NO.	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
L_6950R	SS-755	18' LT	14+04 -WALL5-	3.5 - 5.0	A-4(0)	40	10	35.3	25.8	17.0	22.0	78.2	57.4	35.4	15.8	-
L_7100R	SS-815	19' LT	15+52 -WALL5-	0.9 - 2.4	A-2-4(0)	33	4	31.9	38.3	15.9	13.9	91.6	74.0	33.3	11.8	-
L_7400R	SS-835	21' LT	18+40 -WALL5-	1.0 - 2.5	A-6(4)	32	13	23.6	25.8	36.7	13.9	95.6	81.7	52.8	15.5	-

LAB TECHNICIAN: DANIEL REEVE

NCDOT CERTIFICATION NO. 135-03-0816

REFERENCE: I-2513AC

PROJECT: 34165

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-9	BORE LOGS
10	SOIL TEST RESULTS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE

PROJECT DESCRIPTION I-26I-40I-240 INTERCHANGE
TO SR 3548 (HAYWOOD ROAD)

SITE DESCRIPTION RETAINING WALL NO. 6
-WALL6- STA. 11+13.60 (-L- STA. 74+13.60) TO
-WALL6- STA. 16+34.39 (-L- STA. 79+47.89)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AC	1	10

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

A. BLACKMORE

A. WEST

C. OSBORNE

TOTAL DEPTH DRILLING

INVESTIGATED BY ECS SOUHEAST, LLC

DRAWN BY A. SUTTLE, P.G.

CHECKED BY M. MULLA, P.E.

SUBMITTED BY ECS SOUTHEAST, LLC

DATE AUGUST 2024

Prepared in the Office of:

ECS SOUTHEAST, LLC
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 [PHONE]
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NC REGISTERED
ENGINEERING
FIRM # F-1519



Signed by:

Amanda R. Suttle P.G. 6/30/2026

399DBE4295140401

DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

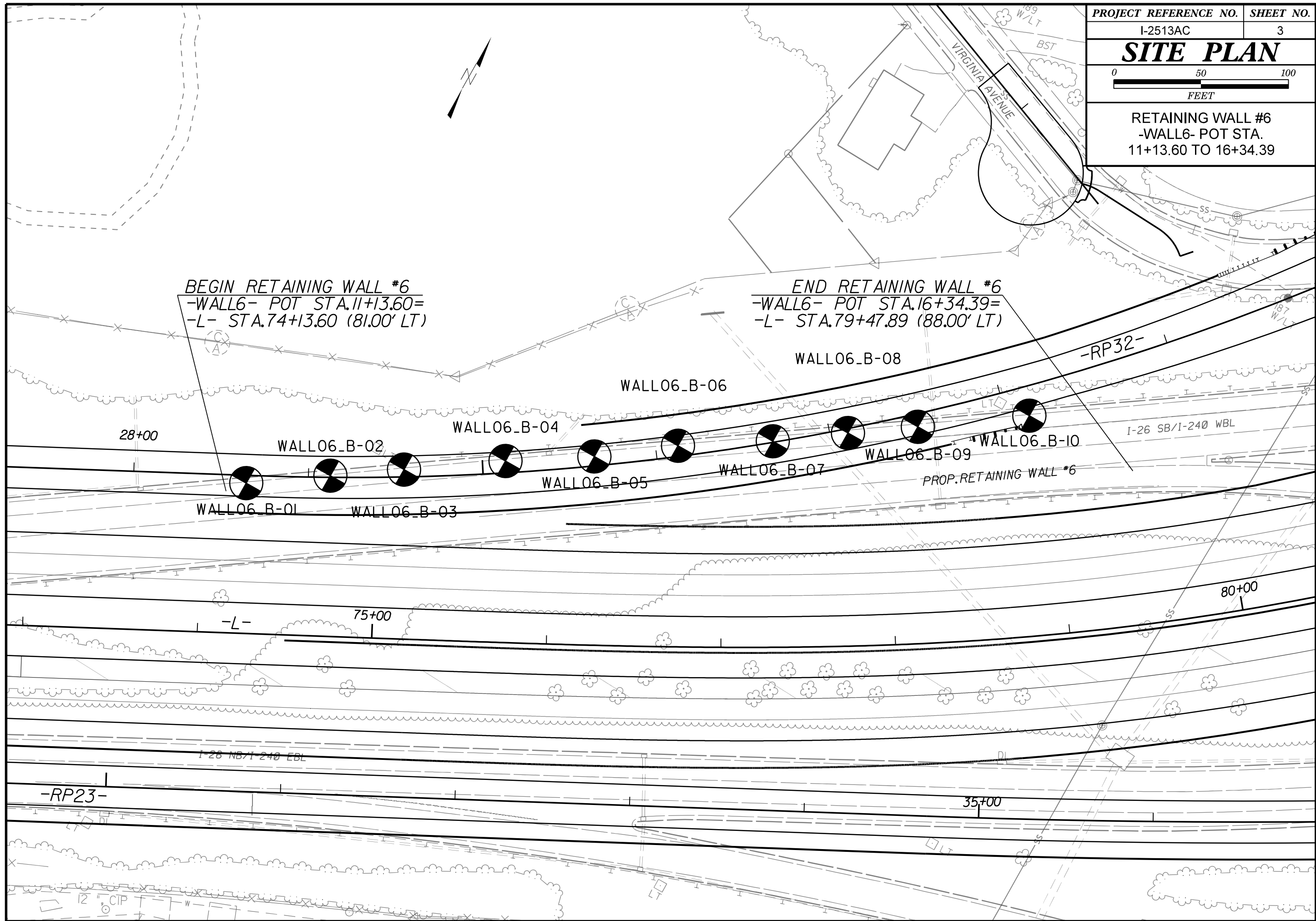
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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.										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. 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.										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 DISLOGGED 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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING																			
GENERAL CLASS.										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.																			
GROUP CLASS.																				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.																			
SYMBOL																				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.																			
% PASSING										SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE										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.																			
MATERIAL PASSING #40 LL PI										PERCENTAGE OF MATERIAL										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>																			
GROUP INDEX										GROUND WATER										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>																			
USUAL TYPES OF MAJOR MATERIALS										MISCELLANEOUS SYMBOLS										VERY SEVERE (V 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>																			
GEN. RATING AS SUBGRADE										RECOMMENDATION SYMBOLS										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.																			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30										ABBREVIATIONS										ROCK HARDNESS																			
CONSISTENCY OR DENSENESS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING																			
PRIMARY SOIL TYPE										DRILL UNITS:										BEDDING																			
COMPACTNESS OR CONSISTENCY										ADVANCING TOOLS:										TERM																			
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)										HAMMER TYPE:										THICKNESS																			
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										CORE SIZE:																													
N/A										HAND TOOLS:																													
< 0.25																																							
0.25 TO 0.5																																							
0.5 TO 1.0																																							
1 TO 2																																							
2 TO 4																																							
> 4																																							
TEXTURE OR GRAIN SIZE										COLOR																													
U.S. STD. SIEVE SIZE OPENING (MM)										DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																													
BOULDER (BLDR.)																																							
COBBLE (COB.)																																							
GRAVEL (GR.)																																							
COARSE SAND (CSE. SD.)																																							
FINE SAND (F SD.)																																							
SILT (SL.)																																							
CLAY (CL.)																																							
GRAIN SIZE																																							
SOIL MOISTURE - CORRELATION OF TERMS																																							
SOIL MOISTURE SCALE (ATTERBERG LIMITS)																																							
FIELD MOISTURE DESCRIPTION																																							
GUIDE FOR FIELD MOISTURE DESCRIPTION																																							
LL - LIQUID LIMIT																																							
PL - PLASTIC LIMIT																																							
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT																																							
SL - SHRINKAGE LIMIT																																							
PLASTICITY																																							
NON PLASTIC																																							
SLIGHTLY PLASTIC																																							
MODERATELY PLASTIC																																							
HIGHLY PLASTIC																																							
PLASTICITY INDEX (PI)																																							
DRY STRENGTH																																							
VERY LOW																																							
SLIGHT																																							
MEDIUM																																							
HIGH																																							
COLOR																																							
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																							

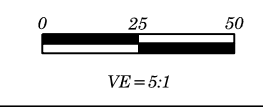
PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	3
SITE PLAN	
0 50 100 FEET	
RETAINING WALL #6 -WALL6- POT STA. 11+13.60 TO 16+34.39	



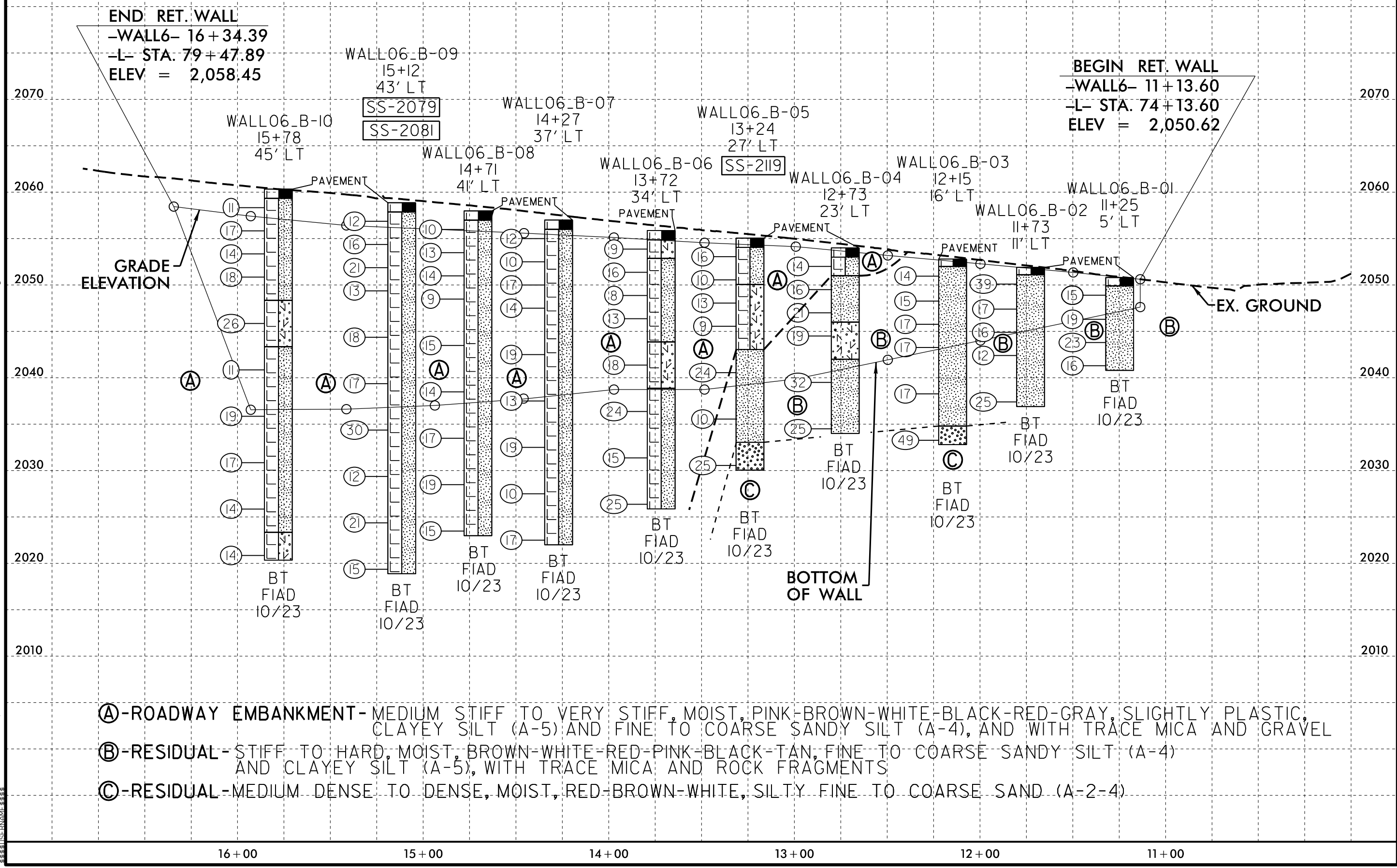
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Structures\CADD_GEOTECH\Site&Sub\I2513AC_GEO_RWAL06_PFL.dgn

-WALL6- PROFILE ALONG EXISTING GROUND LINE FROM ROADWAY
DESIGN FILES, PROVIDED BY AECOM, JULY 2024 AND I2513 Is tnl.in. INFERRED
STRATIGRAPHY IS DRAWN THROUGH THE BORING, PROJECTED ON THE PROFILE.

-WALL6-



PROJECT REFERENCE NO.	SHEET NO.
I-2513AC	4
PROFILE BORINGS PROJECTED ON -WALL6- ALONG WALL NO. 6	



NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT.GDT 8/25/24

WBS 34165.1.13				TIP I-2513AC				COUNTY BUNCOMBE				GEOLOGIST A. Blackmore					
SITE DESCRIPTION RETAINING WALL NO. 6, STA. -L- to 74+13.60 TO -L- 79+47.89												GROUND WTR (ft)					
BORING NO. WALL06_B-02				STATION 11+73				OFFSET 11 ft LT				ALIGNMENT -WALL6-				0 HR. Dry	
COLLAR ELEV. 2,051.9 ft				TOTAL DEPTH 15.0 ft				NORTHING 680,393				EASTING 932,983				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE TDD417 CME75 82.7% 06/15/2021								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic					
DRILLER D. Hamilton				START DATE 10/11/23				COMP. DATE 10/11/23				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							
2055																	
	2,051.1	0.8	7	17	22												

[illegible]

WBS 34165.1.13		TIP I-2513AC		COUNTY BUNCOMBE		GEOLOGIST A. West							
SITE DESCRIPTION RETAINING WALL NO. 6, STA. -L- to 74+13.60 TO -L- 79+47.89								GROUND WTR (ft)					
BORING NO. WALL06_B-06		STATION 13+72		OFFSET 34 ft LT		ALIGNMENT -WALL6-		0 HR.	Dry				
COLLAR ELEV. 2,055.9 ft		TOTAL DEPTH 30.0 ft		NORTHING 680,505		EASTING 933,148		24 HR.	FIAD				
DRILL RIG/HAMMER EFF./DATE ECS1390 AMS PowerProbe 9410-D 97% 12/20/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER C. Osborne		START DATE 10/11/23		COMP. DATE 10/12/23		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	MOI		
2060													
2055	2,054.9	1.0											2,055.9 GROUND SURFACE 0.0 2,054.9 ROADWAY EMBANKMENT 1.0 Asphalt (0.7'), Stonebase (0.3')
	2,052.4	3.5	3	4	5	9						M	2,052.9 Stiff, Pink-Brown-White, Clayey SILT (A-5), with trace mica 3.0
2050	2,049.9	6.0	5	7	9	16						M	Medium Stiff to Very Stiff, Pink-Brown-Black-White, Fine to Coarse Sandy SILT (A-4), with trace mica
	2,047.4	8.5	3	4	4	8						M	
2045			4	6	7	13						M	2,043.9 Very Stiff, Red-Brown-White, Clayey SILT (A-5), with trace mica 12.0
	2,042.4	13.5	9	9	9	18						M	
2040													2,038.9 Stiff to Very Stiff, Pink-Brown-Black, Fine to Coarse Sandy SILT (A-4), with trace mica 17.0
	2,037.4	18.5	9	12	12	24						M	
2035													
	2,032.4	23.5	7	7	8	15						M	
2030													
	2,027.4	28.5	12	12	13	25						M	2,025.9 Boring Terminated at Elevation 2,025.9 ft In Roadway Embankment Sandy SILT (A-4) 30.0

NCDOT BORE DOUBLE I2513AC GEO GTM.GPJ NC DOT.GDT 8/25/24

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. West				
SITE DESCRIPTION RETAINING WALL NO. 6, STA. -L- to 74+13.60 TO -L- 79+47.89									GROUND WTR (ft)				
BORING NO. WALL06_B-08			STATION 14+71			OFFSET 41 ft LT			ALIGNMENT -WALL6-			0 HR. Dry	
COLLAR ELEV. 2,058.0 ft			TOTAL DEPTH 35.0 ft			NORTHING 680,559			EASTING 933,229			24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE ECS1390 AMS PowerProbe 9410-D 97% 12/20/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER C. Osborne			START DATE 10/11/23			COMP. DATE 10/11/23			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	MOI		
2060													
	2,057.0	1.0											2,058.0 GROUND SURFACE 0.0
2055	2,054.5	3.5	5	5	5	10	.	.	.	.	M		2,057.0 ROADWAY EMBANKMENT 1.0
	2,054.5						.	.	.	.	M		Asphalt (0.7'), Stonebase (0.3')
	2,052.0	6.0	10	9	4	13	.	.	.	.	M		Stiff to Very Stiff,
2050	2,052.0						.	.	.	.	M		Pink-Brown-White-Gray-Black, Fine to
	2,049.5	8.5	7	7	7	14	.	.	.	.	M		Coarse Sandy SILT (A-4), with trace mica
	2,049.5						.	.	.	.	M		and gravel
	2,044.5	8.5	4	4	5	9	.	.	.	.	M		
2045	2,044.5						.	.	.	.	M		
	2,044.5	13.5	5	6	9	15	.	.	.	.	M		
2040	2,039.5	18.5					.	.	.	.	M		
	2,039.5		6	7	7	14	.	.	.	.	M		
2035	2,034.5	23.5					.	.	.	.	M		
	2,034.5		8	8	9	17	.	.	.	.	M		
2030	2,029.5	28.5					.	.	.	.	M		
	2,029.5		7	9	10	19	.	.	.	.	M		
2025	2,024.5	33.5					.	.	.	.	M		
	2,024.5		6	6	9	15	.	.	.	.	M		
													2,023.0 Boring Terminated at Elevation 2,023.0 ft In Roadway Embankment Sandy SILT (A-4) 35.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. West						
SITE DESCRIPTION RETAINING WALL NO. 6, STA. -L- to 74+13.60 TO -L- 79+47.89												GROUND WTR (ft)			
BORING NO. WALL06_B-09			STATION 15+12			OFFSET 43 ft LT			ALIGNMENT -WALL6-			0 HR.	Dry		
COLLAR ELEV. 2,058.9 ft			TOTAL DEPTH 40.0 ft			NORTHING 680,582			EASTING 933,262			24 HR.	FIAD		
DRILL RIG/HAMMER EFF./DATE ECS1390 AMS PowerProbe 9410-D 97% 12/20/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER C. Osborne			START DATE 10/11/23			COMP. DATE 10/11/23			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)
2060															
2055	2,057.9	1.0	5	5	7	12						M		2,058.9 GROUND SURFACE	0.0
														2,057.9 ROADWAY EMBANKMENT	1.0
	2,055.4	3.5	5	6	10	16						M		Asphalt (0.7'), Stonebase (0.3')	
2050	2,052.9	6.0	10	10	11	21						M		Stiff to Very Stiff,	
	2,050.4	8.5	6	6	7	13						M		Brown-Pink-Black-Gray-Red, Fine to Coarse Sandy SILT (A-4(0)), with trace mica	
2045	2,045.4	13.5	9	9	9	18					SS-2079	18%			
2040	2,040.4	18.5	8	6	11	17						M			
2035	2,035.4	23.5	9	15	15	30					SS-2081	15%			
2030	2,030.4	28.5	5	6	6	12						M			
2025	2,025.4	33.5	10	10	11	21						M			
2020	2,020.4	38.5	9	8	7	15						M		2,018.9	40.0
														Boring Terminated at Elevation 2,018.9 ft In Roadway Embankment Sandy SILT (A-4)	

WBS 34165.1.13			TIP I-2513AC			COUNTY BUNCOMBE			GEOLOGIST A. West					
SITE DESCRIPTION RETAINING WALL NO. 6, STA. -L- to 74+13.60 TO -L- 79+47.89									GROUND WTR (ft)					
BORING NO. WALL06_B-10			STATION 15+78			OFFSET 45 ft LT			ALIGNMENT -WALL6-			0 HR. Dry		
COLLAR ELEV. 2,060.3 ft			TOTAL DEPTH 40.0 ft			NORTHING 680,619			EASTING 933,315			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE ECS1390 AMS PowerProbe 9410-D 97% 12/20/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER C. Osborne			START DATE 10/11/23			COMP. DATE 10/11/23			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				
2065														
2060														
2055	2,059.3	1.0	5	5	6	11	.	.	.	.	.	M		2,060.3 GROUND SURFACE 0.0
	2,056.8	3.5	5	8	9	17	.	.	.	.	.	M		2,059.3 ROADWAY EMBANKMENT 1.0
	2,054.3	6.0	7	6	8	14	.	.	.	.	.	M		Asphalt (0.7'), Stonebase (0.3')
2050	2,051.8	8.5	22	11	7	18	.	.	.	.	.	M		Stiff to Very Stiff, Pink-White-Brown, Fine to Coarse Sand SILT (A-4), with trace mica
	2,046.8	13.5	56	13	13	26	.	.	.	.	.	M		2,048.3 Very Stiff, Red-Pink-White, Clayey SILT 12.0
	2,041.8	18.5	15	5	6	11	.	.	.	.	.	M		2,043.3 Stiff to Very Stiff, Brown-White-Black, Fine to Coarse Sandy SILT (A-4), with trace mica and gravel 17.0
2035	2,036.8	23.5	13	9	10	19	.	.	.	.	.	M		
	2,031.8	28.5	5	8	9	17	.	.	.	.	.	M		
	2,026.8	33.5	4	6	8	14	.	.	.	.	.	M		
2025	2,021.8	38.5	5	6	8	14	.	.	.	.	.	M		2,023.3 Stiff, Brown-White-Pink, Clayey SILT (A-5), with trace mica 37.0
														2,020.3 Boring Terminated at Elevation 2,020.3 ft In Roadway Embankment Clayey SILT (A-5) 40.0

NCDOT BORE DOUBLE I2513AC_GEO_GTM.GPJ NC_DOT.GDT 8/25/24

SOIL TEST RESULTS																
BORING NO.	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
WALL06_B-05	SS-2119	27' LT	13+24 -WALL6-	6.0 - 7.5	A-5(3)	41	9	28.4	25.0	15.8	30.8	92.9	72.7	48.7	19.1	-
WALL06_B-09	SS-2079	43' LT	15+12 -WALL6-	13.5 - 15.0	A-4(0)	35	3	34.3	29.7	19.3	16.7	97.8	76.8	41.5	18.3	-
WALL06_B-09	SS-2081	43' LT	15+12 -WALL6-	23.5 - 25.0	A-4(0)	34	2	27.2	38.0	26.1	8.7	95.3	80.7	41.6	14.6	-

LAB TECHNICIAN: DANIEL REEVE

NCDOT CERTIFICATION NO. 135-03-0816

REFERENCE: I-25I3AC

PROJECT: 34165

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2, 2A	LEGEND
3	SITE PLAN
4	PROFILE
5-10	BORE LOGS, CORE LOGS, AND CORE PHOTOS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
PROJECT DESCRIPTION I-26I-40I-240 INTERCHANGE TO
SR 3548 (HAYWOOD RD)

SITE DESCRIPTION RETAINING WALL NO. 9, FROM
-Y8- STA. 19+25.53 TO -Y8- STA. 21+03.96

STATE	TOWN OF HOLLY SPRINGS PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-25I3AC	1	11

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 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.

- 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

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE JULY 2024



DocuSigned by:

Stephen Crockett

C6CA6FED48E0436
SIGNATURE

7/22/2024

DATE

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

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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.										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. 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) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)										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 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 (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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING																			
GENERAL CLASS.										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.																			
GROUP CLASS.										COMPRESSIBILITY										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.																			
SYMBOL										PERCENTAGE OF MATERIAL										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.																			
%										GROUND WATER										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.																			
MATERIAL PASSING #10 #40 #200										MISCELLANEOUS SYMBOLS										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>																			
GROUP INDEX										RECOMMENDATION SYMBOLS										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>																			
USUAL TYPES OF MAJOR MATERIALS										ABBREVIATIONS										VERY SEVERE (V 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>																			
GEN. RATING AS SUBGRADE										EQUIPMENT USED ON SUBJECT PROJECT										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.																			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																				ROCK HARDNESS																			
CONSISTENCY OR DENSENESS																				VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																			
PRIMARY SOIL TYPE																				HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.																			
COMPACTNESS OR CONSISTENCY																				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.																			
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)																				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.																			
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																				SOFT CAN BE GROVED 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.																			
TEXTURE OR GRAIN SIZE																				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.																			
U.S. STD. SIEVE SIZE OPENING (MM)																				FRACTURE SPACING										BEDDING									
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)																				TERM SPACING										TERM THICKNESS									
GRAIN SIZE MM IN.																				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 FOOT										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									
SOIL MOISTURE - CORRELATION OF TERMS																				INDURATION																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)																				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.																			
FIELD MOISTURE DESCRIPTION																				FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.																			
GUIDE FOR FIELD MOISTURE DESCRIPTION																				MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.																			
LL - LIQUID LIMIT																				INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.																			
PL - PLASTIC LIMIT																				EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																			
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT																																							
SL - SHRINKAGE LIMIT																																							
PLASTICITY																																							
NON PLASTIC																																							
SLIGHTLY PLASTIC																																							
MODERATELY PLASTIC																																							
HIGHLY PLASTIC																																							
COLOR																																							
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

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)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000) 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.	SURFACE CONDITIONS VERY GOOD Very rough, fresh unweathered surfaces GOOD Rough, slightly weathered, iron stained surfaces FAIR Smooth, moderately weathered and altered surfaces POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000) 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.	SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes) VERY GOOD - Very Rough, fresh unweathered surfaces GOOD - Rough, slightly weathered surfaces FAIR - Smooth, moderately weathered and altered surfaces POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
STRUCTURE INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	DECREASING INTERLOCKING OF ROCK PIECES DECREASING SURFACE QUALITY ➡	COMPOSITION AND STRUCTURE 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. B. Sandstone with thin inter-layers of siltstone C. Sandstone and siltstone in similar amounts D. Siltstone or silty shale with sandstone layers E. Weak siltstone or clayey shale with sandstone layers F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers 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. — Means deformation after tectonic disturbance	

050100

FEET

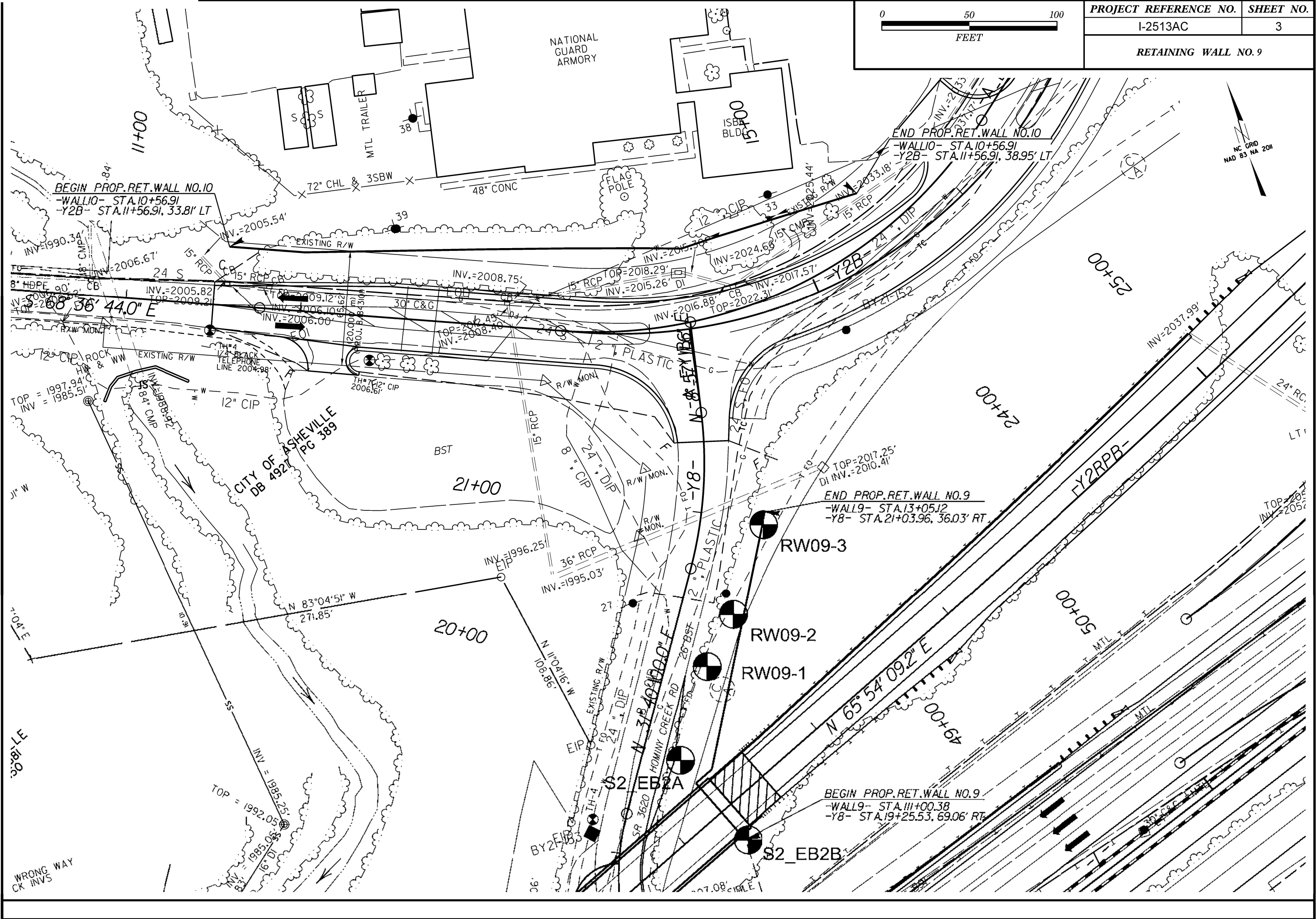
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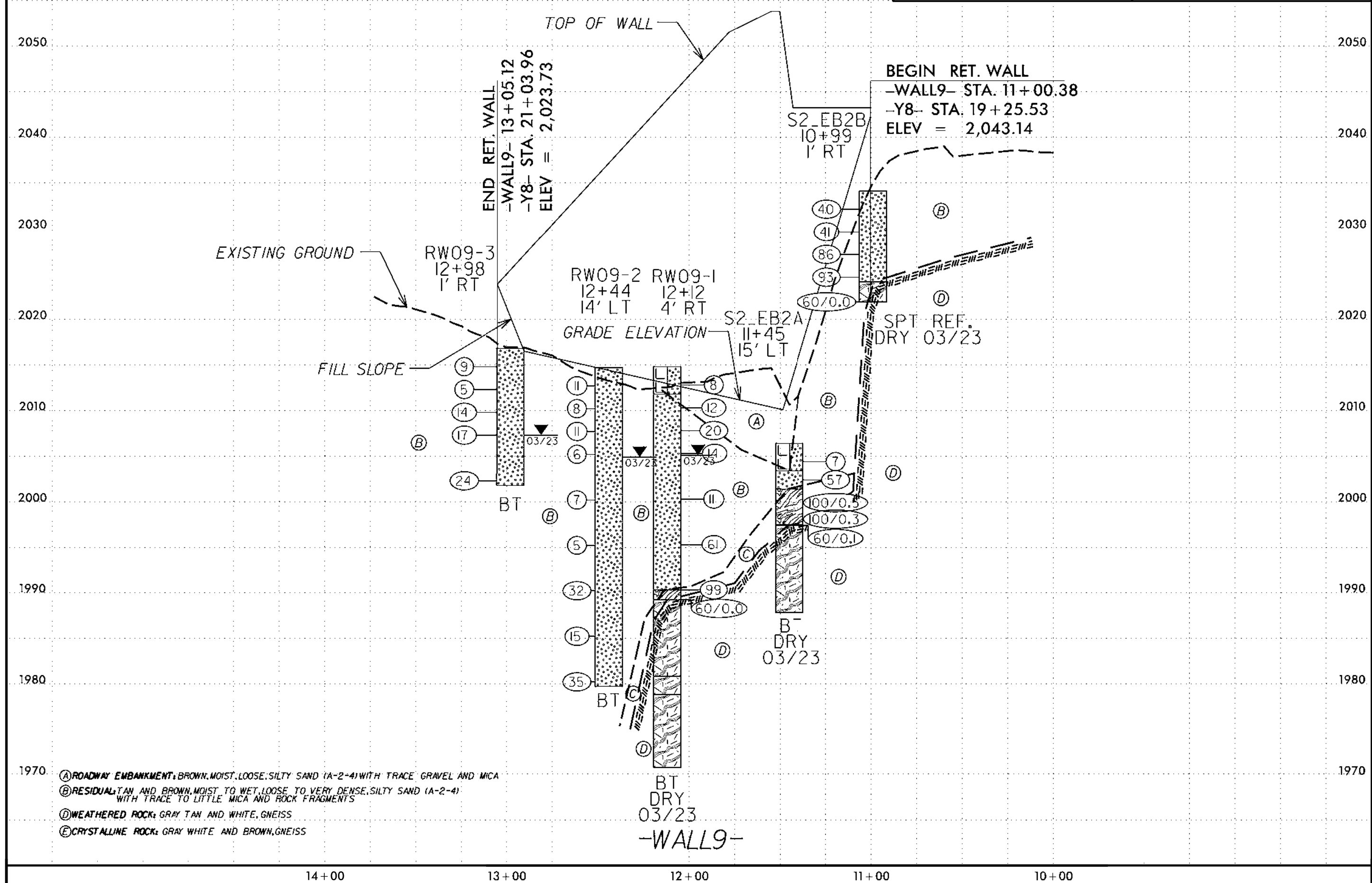
I-2513AC

SHEET NO.

3

RETAINING WALL NO.9





WBS 34165.1.2		TIP 1-2513AC		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. 9							GROUND WTR (ft)									
BORING NO. S2_EB2B		STATION 10+99		OFFSET 1 ft RT		ALIGNMENT -WALL9-		0 HR. Dry								
COLLAR ELEV. 2,034.0 ft		TOTAL DEPTH 12.2 ft		NORTHING 679,298		EASTING 930,532		24 HR. N/A								
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers			HAMMER TYPE Automate									
DRILLER Odom, C.		START DATE 03/14/23		COMP. DATE 03/14/23		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)		
2035																
2030	2,033.0	1.0	8	14	26						M	M	M	2,034.0	GROUND SURFACE	0.0
	2,030.5	3.5	15	23	18										RESIDUAL TAN-BROWN, DENSE TO VERY DENSE, SILTY SAND (A-2-4) WITH SOME ROCK FRAGMENTS	
	2,028.0	6.0	31	38	48											
2025	2,025.5	8.5	36	51	42									2,024.0		10.0
	2,021.8	12.2	60/0.0											2,021.8	CRYSTALLINE ROCK GRAY AND WHITE, GNEISS	12.2
Boring Terminated at Elevation 2,021.8 ft on CR: GNEISS																

NCDOT BORE DOUBLE I-1213AC_GEO_RWALS.GPJ NC_DOT_GDT 3/25/24

GEOTECHNICAL BORING REPORT

CORE LOG

[illegible]



 FALCON ENGINEERING, INC. 1210 TRINITY ROAD, SUITE 110 CARY, NC 27513 PHONE: 919.871.0800 www.falconengineering.com	ROCK CORE PHOTOGRAPHS
	RETAINING WALLS NO. 9 AND NO. 10 BUNCOMBE COUNTY, NC WBS: 34165 TIP: I-2513AC FALCON PROJECT NO. G22009.01

GEOTECHNICAL BORING REPORT
BORE LOG

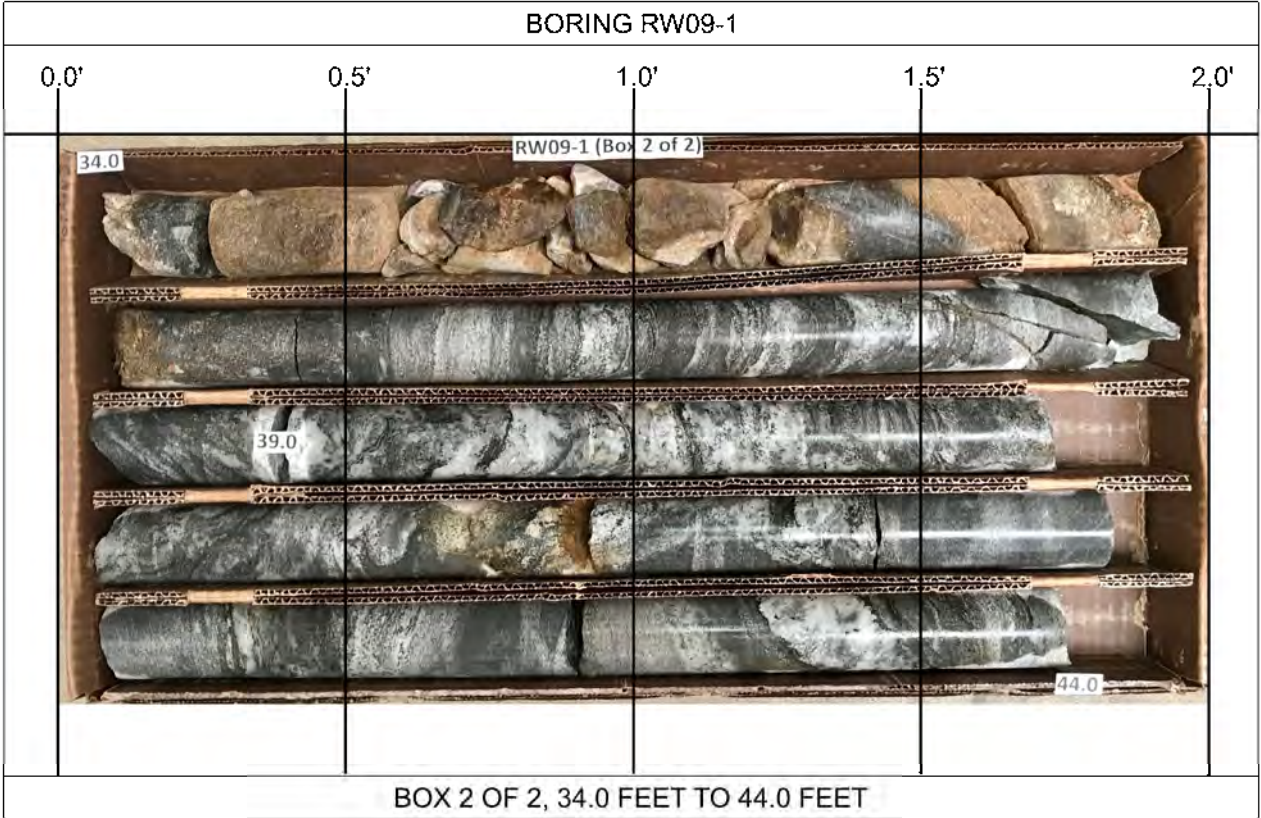
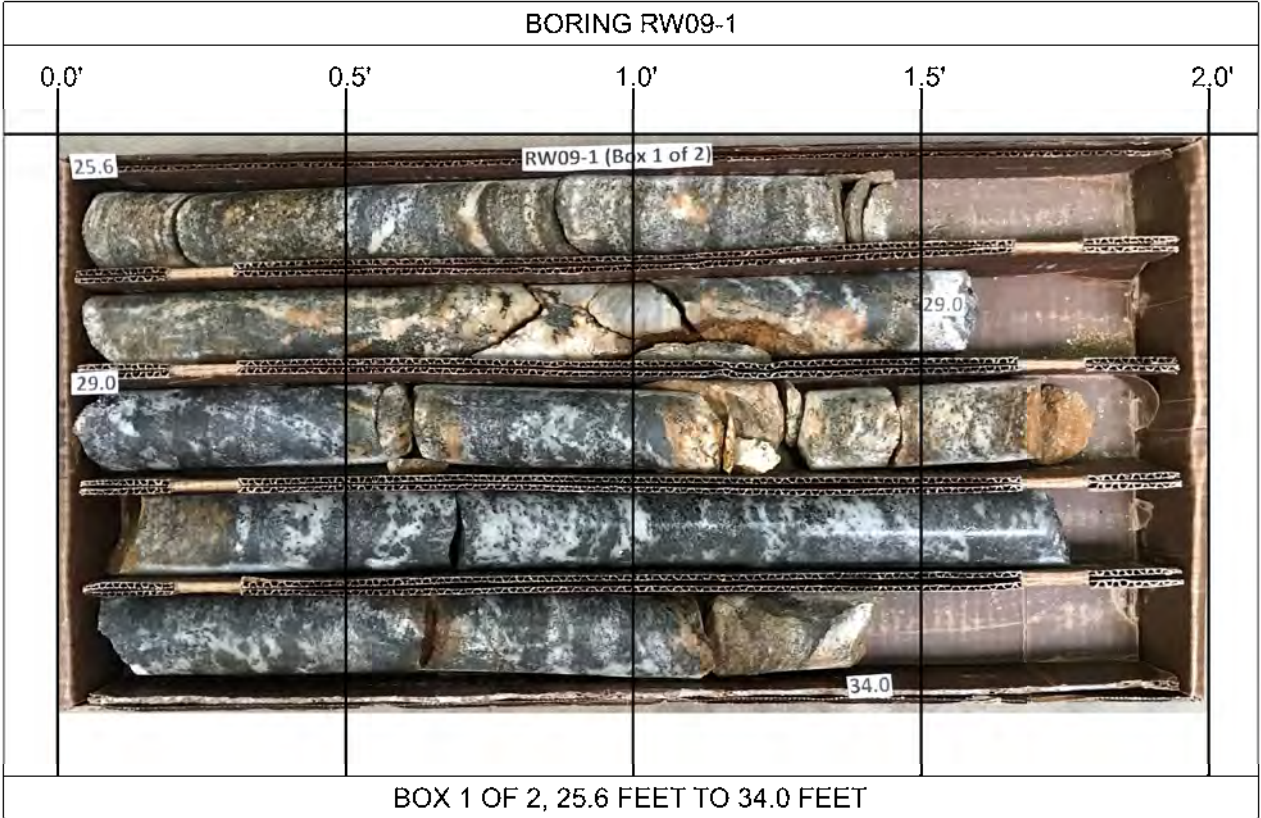
WBS 34165.1.2			TIP 1-2513AC			COUNTY BUNCOMBE			GEOLOGIST Goodnight, D.J.						
SITE DESCRIPTION RETAINING WALL NO. 9 FROM -Y8- STA. 19+25.53 TO -Y8- STA. 21+03.96												GROUND WTR (ft)			
BORING NO. RW09-1			STATION 12+12			OFFSET 14 ft LT			ALIGNMENT -WALL9-			0 HR.	12.8		
COLLAR ELEV. 2,014.7 ft			TOTAL DEPTH 44.0 ft			NORTHING 679,399			EASTING 930,539			24 HR.	9.7		
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022						DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Auto						
DRILLER Odom, C.			START DATE 03/13/23			COMP. DATE 03/13/23			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)
2015														2,014.7	0.0
2010	2,013.7	1.0												ROADWAY EMBANKMENT	
	2,011.2	3.5	2	3	5									BROWN, LOOSE, SILTY SAND (A-2-4)	
	2,008.7	6.0	5	6	6									WITH TRACE GRAVEL	
2005	2,006.2	8.5	6	8	12									RESIDUAL	
	2,001.2	13.5	6	8	6									TAN-BROWN, MEDIUM DENSE TO VERY	
	1,996.2	18.5	4	24	37									DENSE, SILTY SAND (A-2-4) WITH LITTLE	
2000														MICA	
1995	1,991.2	23.5	17	17	82										
	1,989.1	25.6	60/0.0											WEATHERED ROCK	
														TAN AND WHITE, GNEISS	
1985														CRYSTALLINE ROCK	
														GRAY AND WHITE, GNEISS	
1980														1,980.7	
														34.0	
														1,978.7	
1975														36.0	
														GRAY AND WHITE, GNEISS	
														1,970.7	
														44.0	
														Boring Terminated at Elevation 1,970.7 ft on CR: GNEISS	

NCDOT BORE SINGLE I-213AC_GEO_RWALS.GPJ NC_DOT.GDT 4/19/24

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34165.1.2				TIP 1-2513AC				COUNTY BUNCOMBE				GEOLOGIST Goodnight, D.J.						
SITE DESCRIPTION RETAINING WALL NO. 9 FROM -Y8- STA. 19+25.53 TO -Y8- STA. 21+03.96												GROUND WTR (ft)						
BORING NO. RW09-1				STATION 12+12				OFFSET 14 ft LT				ALIGNMENT -WALL9-				0 HR.	12.8	
COLLAR ELEV. 2,014.7 ft				TOTAL DEPTH 44.0 ft				NORTHING 679,399				EASTING 930,539				24 HR.	9.7	
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022								DRILL METHOD NW Casing W/SPT & Core				HAMMER TYPE Auto						
DRILLER Odom, C.				START DATE 03/13/23				COMP. DATE 03/13/23				SURFACE WATER DEPTH N/A						
CORE SIZE NQ				TOTAL RUN 18.4 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)		
											ELEV. (ft)							
1989.1											Begin Coring @ 25.6 ft							
1985	1,989.1	25.6	3.4	6:01/1.0	(3.2)	(2.6)		(8.2)	(6.7)		1,989.1	CRYSTALLINE ROCK				25.6		
	1,985.7	29.0		5:07/1.0	94%	76%			98%		80%	SLIGHT TO VERY SLIGHT WEATHERING, HARD TO VERY HARD, GRAY AND WHITE, GNEISS, WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING						
			5.0	5:33/1.0														
				2:24/0.4	(5.0)	(4.1)												
				4:50/1.0	100%	82%												
1980	1,980.7	34.0		4:55/1.0							1,980.7					34.0		
			5.0	3:55/1.0	(4.7)	(2.8)		(1.7)	(0.4)			MODERATE WEATHERING, MODERATELY HARD TO HARD, BROWN AND GRAY, GNEISS, WITH CLOSE TO VERY CLOSE FRACTURE SPACING						
1975				4:27/1.0	94%	56%		(8.0)	(7.2)		1,978.7					36.0		
				4:46/1.0														
	1,975.7	39.0		4:42/1.0	(5.0)	(4.8)						FRESH TO VERY SLIGHT WEATHERING, HARD TO VERY HARD, GRAY AND WHITE, GNEISS, WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING						
			5.0	5:28/1.0	100%	96%												
	1,970.7	44.0		4:40/1.0							1,970.7					44.0		
				5:27/1.0							Boring Terminated at Elevation 1,970.7 ft on CR: GNEISS							
				5:14/1.0														

NCDOT CORE SINGLE I-213AC_GEO_RWALS.GPJ NC_DOT.GDT 4/19/24



FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
CARY, NC 27513
PHONE: 919.871.0800
www.falconengineering.com

ROCK CORE PHOTOGRAPHS

RETAINING WALLS NO. 9 AND NO. 10
BUNCOMBE COUNTY, NC
WBS: 34165 | TIP: I-2513AC
FALCON PROJECT NO. G22009.01

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.2			TIP 1-2513AC			COUNTY BUNCOMBE			GEOLOGIST Goodnight, D.J.							
SITE DESCRIPTION RETAINING WALL NO. 9 FROM -Y8- STA. 19+25.53 TO -Y8- STA. 21+03.96									GROUND WTR (ft)							
BORING NO. RW09-2			STATION 12+44			OFFSET 6 ft LT			ALIGNMENT -WALL9-			0 HR. 10.6				
COLLAR ELEV. 2,014.6 ft			TOTAL DEPTH 35.0 ft			NORTHING 679,424			EASTING 930,562			24 HR. 9.8				
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Auto							
DRILLER Odom, C.			START DATE 03/10/23			COMP. DATE 03/10/23			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)	
2025														2,014.6	GROUND SURFACE	0.0
2010	2,013.6	1.0												M	RESIDUAL TAN AND BROWN, LOOSE TO DENSE, SILTY SAND (A-2-4) WITH TRACE TO LITTLE MICA	
	2,011.1	3.5	2	4	7											
	2,008.6	6.0	4	4	4											
2005	2,006.1	8.5	2	3	8									M		
			2	2	4											
2000	2,001.1	13.5	3	3	4									W		
1995	1,996.1	18.5	1	2	3									W		
1990	1,991.1	23.5	10	10	22									W		
1985	1,986.1	28.5	3	7	8									W		
1980	1,981.1	33.5	41	21	14									W		
Boring Terminated at Elevation 1,979.6 ft in RESIDUAL: SILTY SAND																

NCDOT BORE SINGLE I-213AC_GEO_RWALS.GPJ NC_DOT.GDT 4/19/24

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.2			TIP 1-2513AC			COUNTY BUNCOMBE			GEOLOGIST Goodnight, D.J.							
SITE DESCRIPTION RETAINING WALL NO. 9 FROM -Y8- STA. 19+25.53 TO -Y8- STA. 21+03.96									GROUND WTR (ft)							
BORING NO. RW09-3			STATION 12+98			OFFSET 1 ft RT			ALIGNMENT -WALL9-							
COLLAR ELEV. 2,016.7 ft			TOTAL DEPTH 15.0 ft			NORTHING 679,467			EASTING 930,593							
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Auto							
DRILLER Odom, C.			START DATE 03/10/23			COMP. DATE 03/10/23			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)	
2020																
2015	2,015.7	1.0	2	5	4									2,016.7	GROUND SURFACE	0.0
	2,013.2	3.5	2	2	3							M		RESIDUAL TAN-BROWN, LOOSE TO MEDIUM DENSE, SILTY SAND (A-2-4), WITH LITTLE MICA		
2,010.7	6.0	3	6	8							M					
2,008.2	8.5	5	7	10							M					
2,003.2	13.5	8	11	13												
2005														2,001.7	Boring Terminated at Elevation 2,001.7 ft in RESIDUAL: SILTY SAND	15.0

NCDOT BORE SINGLE I-213AC_GEO_RWALS.GPJ NC_DOT.GDT 4/19/24

REFERENCE: I-2513AC

PROJECT: 34165

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2, 2A	LEGEND
3	SITE PLAN
4	PROFILE
5-8	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
PROJECT DESCRIPTION I-26I-40I-240 INTERCHANGE TO
SR 3548 (HAYWOOD RD)

SITE DESCRIPTION RETAINING WALL NO. 10, FROM
-Y2B- STA. 11 + 56.91 TO -Y2B- STA. 15 + 50.00

STATE	TOWN OF HOLLY SPRINGS PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AC	1	9

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 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.

- 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

CG2

GOODNIGHT, D.J.

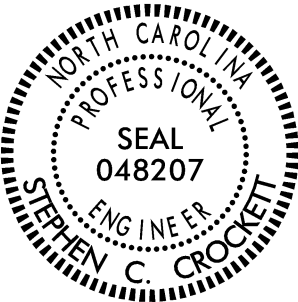
INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE JULY 2024



DocuSigned by:

Stephen Crockett

7/22/2024

C6CA6FED48E0436
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										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																			
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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.										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. 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:										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 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 (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 (SROQ) - 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.																			
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING																													
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.																													
GROUP CLASS. 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										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										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.																													
SYMBOL										COMPRESSIBILITY										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.																													
% PASSING #10 #40 #200										PERCENTAGE OF MATERIAL										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.																													
MATERIAL PASSING #40 LL PI										GROUND WATER										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.																													
GROUP INDEX										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING										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.																													
USUAL TYPES OF MAJOR MATERIALS										STATIC WATER LEVEL AFTER 24 HOURS										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.																													
GEN. RATING AS SUBGRADE										PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA										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. IF TESTED, WOULD YIELD SPT REFUSAL																													
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30										SPRING OR SEEP										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. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF																													
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										VERY SEVERE (V 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. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF																													
PRIMARY SOIL TYPE										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION										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.																													
COMPACTNESS OR CONSISTENCY										SOIL SYMBOL										ROCK HARDNESS																													
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)										ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																													
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										INFERRED SOIL BOUNDARY										HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.																													
GENERALY GRANULAR MATERIAL (NON-COHEISVE)										INFERRED ROCK LINE										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.																													
GENERALY SILT-CLAY MATERIAL (COHEISVE)										ALLUVIAL SOIL BOUNDARY										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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.																													
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										SOFT CAN BE GROVED 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.																													
U.S. STD. SIEVE SIZE OPENING (MM)										ABBREVIATIONS										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 FINGERNAIL.																													
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)										AR - AUGER REFUSAL BT - BORING TERMINATED CL. - CLAY CPT - CONE PENETRATION TEST CSE. - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HL. - HIGHLY										MED. - MEDIUM MICA. - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY										VST - VANE SHEAR TEST WEA. - WEATHERED % - UNIT WEIGHT %g - DRY UNIT WEIGHT																			
GRAIN SIZE										SAMPLE ABBREVIATIONS										BENCH MARK: ELEVATIONS TAKEN FROM I2513.LS.TNL.TIN DATED 04/22																													
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.																													
SOIL MOISTURE SCALE (ATTERBERG LIMITS)										DRILL UNITS:										MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.																													
FIELD MOISTURE DESCRIPTION										ADVANCING TOOLS:										INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.																													
GUIDE FOR FIELD MOISTURE DESCRIPTION										HAMMER TYPE:										EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																													
LL - LIQUID LIMIT										CME-45C																																							
PL - PLASTIC LIMIT										CME-55																																							
OM - OPTIMUM MOISTURE										CME-550X																																							
SL - SHRINKAGE LIMIT										VANE SHEAR TEST																																							
PLASTICITY										PORTABLE HOIST																																							
NON PLASTIC										DIEDRICH D-50																																							
SLIGHTLY PLASTIC																																																	
MODERATELY PLASTIC																																																	
HIGHLY PLASTIC																																																	
COLOR																																																	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																																	

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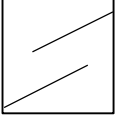
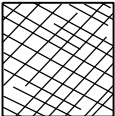
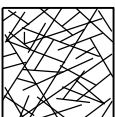
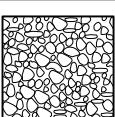
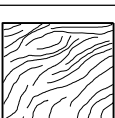
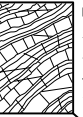
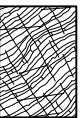
SUBSURFACE INVESTIGATION

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)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000) 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.	SURFACE CONDITIONS VERY GOOD Very rough, fresh unweathered surfaces GOOD Rough, slightly weathered, iron stained surfaces FAIR Smooth, moderately weathered and altered surfaces POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000) 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.	SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes) VERY GOOD - Very Rough, fresh unweathered surfaces GOOD - Rough, slightly weathered surfaces FAIR - Smooth, moderately weathered and altered surfaces POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
STRUCTURE INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	DECREASING INTERLOCKING OF ROCK PIECES 90 80 70 60 50 40 30 20 10 N/A N/A	COMPOSITION AND STRUCTURE 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. B. Sandstone with thin inter-layers of siltstone C. Sandstone and siltstone in similar amounts D. Siltstone or silty shale with sandstone layers E. Weak siltstone or clayey shale with sandstone layers F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers 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.	70 60 50 40 30 20 10

050100

FEET

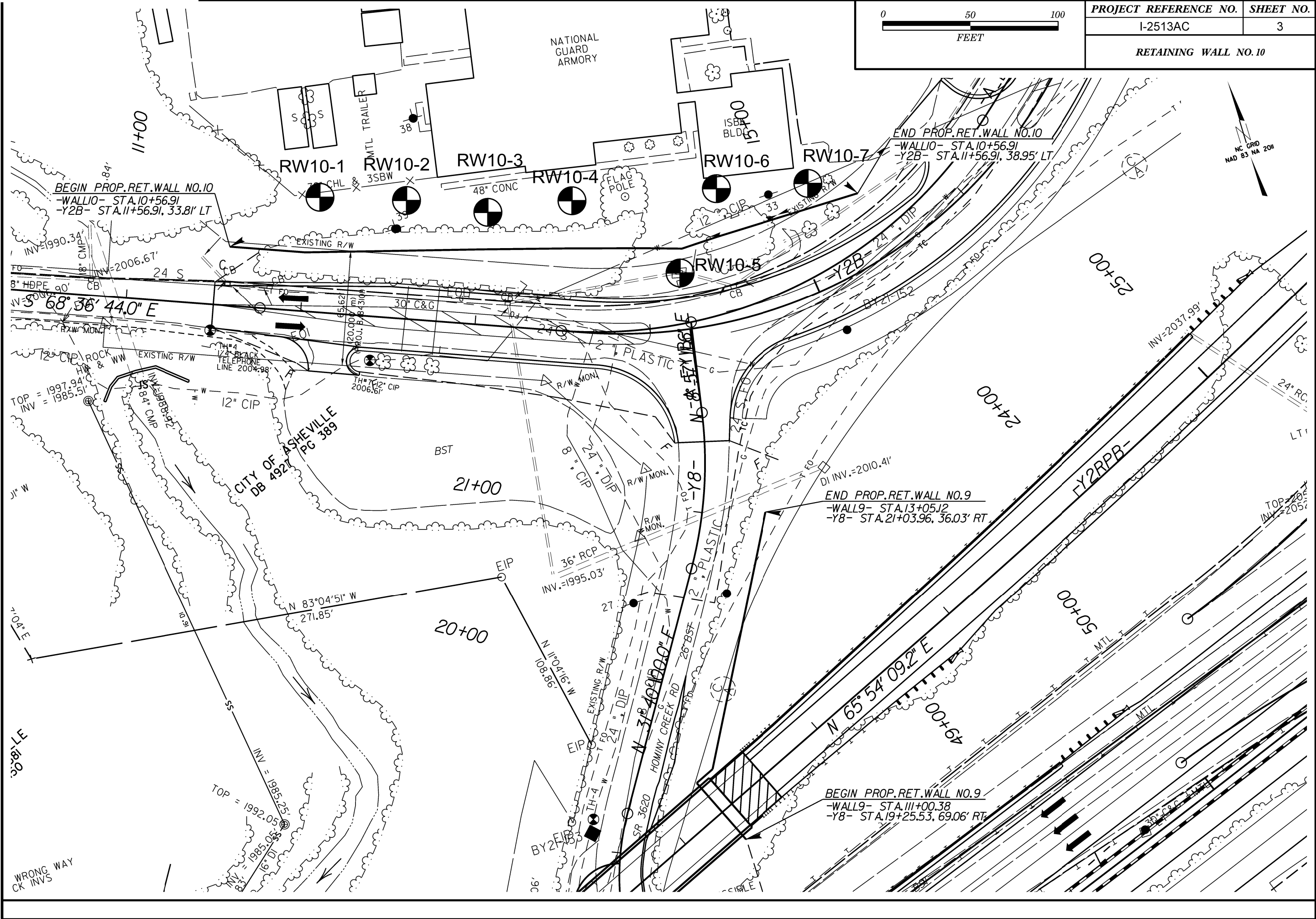
PROJECT REFERENCE NO.

I-2513AC

SHEET NO.

3

RETAINING WALL NO.10



Legend:

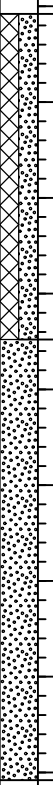
- (A) ARTIFICIAL FILL: TAN AND BROWN, MOIST, LOOSE, SILTY SAND (A-2-4) WITH TRACE MICA AND ORGANICS
- (B) ARTIFICIAL FILL: BROWN, MOIST, SOFT, SANDY CLAYEY SILT (A-5) WITH TRACE ROOTS
- (C) RESIDUAL: TAN AND BROWN, MOIST, STIFF, SANDY SILT (A-4) WITH LITTLE MICA
- (D) RESIDUAL: TAN AND BROWN, MOIST TO WET, LOOSE TO DENSE, SAND AND SILT SAND (A-1-b, A-2-4) WITH TRACE TO LITTLE MICA
- (E) WEATHERED ROCK: GRAY TAN AND WHITE, GNEISS

Key Data Points:

- BEGIN RET. WALL:** STA. 10+56.91, ELEV. 2,018.64
- END RET. WALL:** STA. 14+20.30, ELEV. 2,036.92
- Soil Layers (from top to bottom):**
 - Layer 1: (A) ARTIFICIAL FILL
 - Layer 2: (B) ARTIFICIAL FILL
 - Layer 3: (C) RESIDUAL
 - Layer 4: (D) RESIDUAL
 - Layer 5: (E) WEATHERED ROCK
- Groundwater Levels (BT DRY 03/23):** Indicated by dashed lines and circles.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2			TIP 1-2513AC			COUNTY BUNCOMBE			GEOLOGIST Goodnight, D.J.						
SITE DESCRIPTION RETAINING WALL NO. 10 FROM -Y2B- STA. 11+56.91 TO -Y2B- STA. 15+50.00											GROUND WTR (ft)				
BORING NO. RW10-1			STATION 11+09			OFFSET 31 ft LT			ALIGNMENT -WALL10-			0 HR.	Dry		
COLLAR ELEV. 2,039.6 ft			TOTAL DEPTH 40.0 ft			NORTHING 679,721			EASTING 930,406			24 HR.	Dry		
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Auto						
DRILLER Odom, C.			START DATE 03/07/23			COMP. DATE 03/07/23			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)
2040															
2035	2,038.6	1.0	1	WOH	1									2,039.6	0.0
	2,036.1	3.5	1	1	1							M		ARTIFICIAL FILL TAN-BROWN, VERY LOOSE, SILTY SAND (A-2-4) WITH TRACE GRAVEL	
2030	2,033.6	6.0	1	1	2							M			
	2,031.1	8.5	2	3	3							M			
	2,026.1	13.5	3	3	4							M			
2020	2,021.1	18.5	9	17	26							M		2,022.6	17.0
	2,016.1	23.5	8	10	12							M		RESIDUAL TAN, DENSE, SILTY SAND (A-2-4) WITH TRACE MICA	
2010	2,011.1	28.5	9	16	13							M			
	2,006.1	33.5	11	17	19							M			
2000	2,001.1	38.5	14	20	26							M			
														Boring Terminated at Elevation 1,999.6 ft in RESIDUAL: SILTY SAND	

GEOTECHNICAL BORING REPORT

BORE LOG

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GEOTECHNICAL BORING REPORT

BORE LOG

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GEOTECHNICAL BORING REPORT

BORE LOG

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.2			TIP 1-2513AC			COUNTY BUNCOMBE			GEOLOGIST Goodnight, D.J.							
SITE DESCRIPTION RETAINING WALL NO. 10 FROM -Y2B- STA. 11+56.91 TO -Y2B- STA. 15+50.00												GROUND WTR (ft)				
BORING NO. RW10-5			STATION 13+14			OFFSET 14 ft RT			ALIGNMENT -WALL10-			0 HR.	Dry			
COLLAR ELEV. 2,018.6 ft			TOTAL DEPTH 20.5 ft			NORTHING 679,619			EASTING 930,589			24 HR.	Dry			
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Auto							
DRILLER Odom, C.			START DATE 03/08/23			COMP. DATE 03/08/23			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)	
2020																
2015	2,017.1	1.5												2,018.6	GROUND SURFACE	0.0
	2,014.6	4.0	1	2	3	5						M	X	ARTIFICIAL FILL		
2010	2,011.6	7.0	2	2	2	4						M		X	BROWN, LOOSE, SILTY SAND (A-2-4) WITH TRACE GRAVEL	
	2,009.6	9.0	1	2	4	6						M	X		2,012.6	6.0
2005	2,004.6	14.0	3	4	5	9						M		X	RESIDUAL	
												M	X		TAN, LOOSE TO MEDIUM DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA	
2000	1,999.6	19.0	3	4	5	11						M		X		
						9						M	X		1,998.1	20.5
															Boring Terminated at Elevation 1,998.1 ft in RESIDUAL: SILTY SAND	

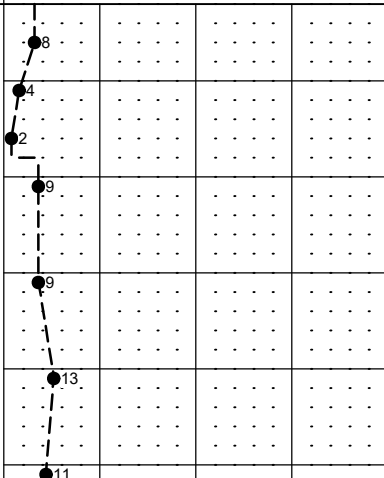
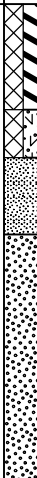
NCDOT BORE SINGLE I-213AC_GEO_RWALS.GPJ NC_DOT.GDT 4/19/24

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.2			TIP 1-2513AC			COUNTY BUNCOMBE			GEOLOGIST Goodnight, D.J.						
SITE DESCRIPTION RETAINING WALL NO. 10 FROM -Y2B- STA. 11+56.91 TO -Y2B- STA. 15+50.00												GROUND WTR (ft)			
BORING NO. RW10-6			STATION 13+44			OFFSET 26 ft LT			ALIGNMENT -WALL10-			0 HR.	Dry		
COLLAR ELEV. 2,040.2 ft			TOTAL DEPTH 35.0 ft			NORTHING 679,659			EASTING 930,623			24 HR.	Dry		
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022						DRILL METHOD H.S. Augers			HAMMER TYPE Auto						
DRILLER Odom, C.			START DATE 03/08/23			COMP. DATE 03/08/23			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)
2045															
2040															
2035	2,038.7	1.5													
	2,036.7	3.5	2	3	3										
2030	2,034.2	6.0	3	3	4										
	2,031.7	8.5	4	4	4										
2025	2,026.7	13.5	2	4	6										
	2,021.7	18.5	12	7	7										
2020	2,016.7	23.5	5	7	9										
	2,011.7	28.5	2	5	5										
2010	2,006.7	33.5	8	8	11										

NCDOT BORE SINGLE I-213AC_GEO_RWALS.GPJ NC_DOT.GDT 4/19/24

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34165.1.2			TIP 1-2513AC			COUNTY BUNCOMBE			GEOLOGIST Goodnight, D.J.						
SITE DESCRIPTION RETAINING WALL NO. 10 FROM -Y2B- STA. 11+56.91 TO -Y2B- STA. 15+50.00												GROUND WTR (ft)			
BORING NO. RW10-7			STATION 13+95			OFFSET 14 ft LT			ALIGNMENT -WALL10-			0 HR.	Dry		
COLLAR ELEV. 2,039.0 ft			TOTAL DEPTH 25.0 ft			NORTHING 679,646			EASTING 930,674			24 HR.	Dry		
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022						DRILL METHOD H.S. Augers				HAMMER TYPE Auto					
DRILLER Odom, C.			START DATE 03/08/23			COMP. DATE 03/08/23			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)
2040															
2035	2,038.0	1.0	3	4	4									2,039.0 GROUND SURFACE 0.0	
	2,035.5	3.5	1	2	2						M			ARTIFICIAL FILL BROWN, MEDIUM STIFF TO SOFT, SANDY, SILTY CLAY (A-7) WITH TRACE GRAVEL	
	2,033.0	6.0	1	1	1						M			2,033.5 BROWN, SOFT, SANDY CLAYEY SILT (A-5) WITH TRACE ROOTLETS 5.5	
2030	2,030.5	8.5	2	4	5						W		2,031.0	8.0	
											M		RESIDUAL TAN-BROWN, STIFF, SANDY SILT (A-4) WITH LITTLE MICA		
2025	2,025.5	13.5	4	3	6						M		2,027.0	12.0	
											M		TAN, LOOSE TO MEDIUM DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA		
2020	2,020.5	18.5	3	6	7						M				
											M				
2015	2,015.5	23.5	3	5	6						M		2,014.0	25.0	
													Boring Terminated at Elevation 2,014.0 ft in RESIDUAL: SILTY SAND		

NCDOT BORE DOUBLE I-1213AC_GEO_RWALS.GPJ NC_DOT.GDT 4/18/24