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PROJECT: 32572.1.FS10 REFERENCE: A-0009CB

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GRAHAM
 PROJECT DESCRIPTION UPGRADE NC 143 FROM SR 1223 (BEECH CREEK ROAD) TO 0.5 MILES NORTH OF APPALACHIAN TRAIL
 SITE DESCRIPTION RETAINING WALL #28: SHORED MECHANICALLY STABILIZED EARTH (SMSE) WALL ON -L- FROM 389+25 RT TO 392+00 RT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CB	1	16

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 EXPLORATION

N. MCLAREN

D. GOODNIGHT

GEL SOLUTIONS

F&ME CONSULTANTS

BRECCIA

INVESTIGATED BY CG2

DRAWN BY M. BREWER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY M. BREWER, P.E.

DATE MAY 2022

Prepared in the Office of:



**CAROLINAS
GEOTECHNICAL
GROUP**

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



DocuSigned by:

D. Matthew Brewer 6/7/2022

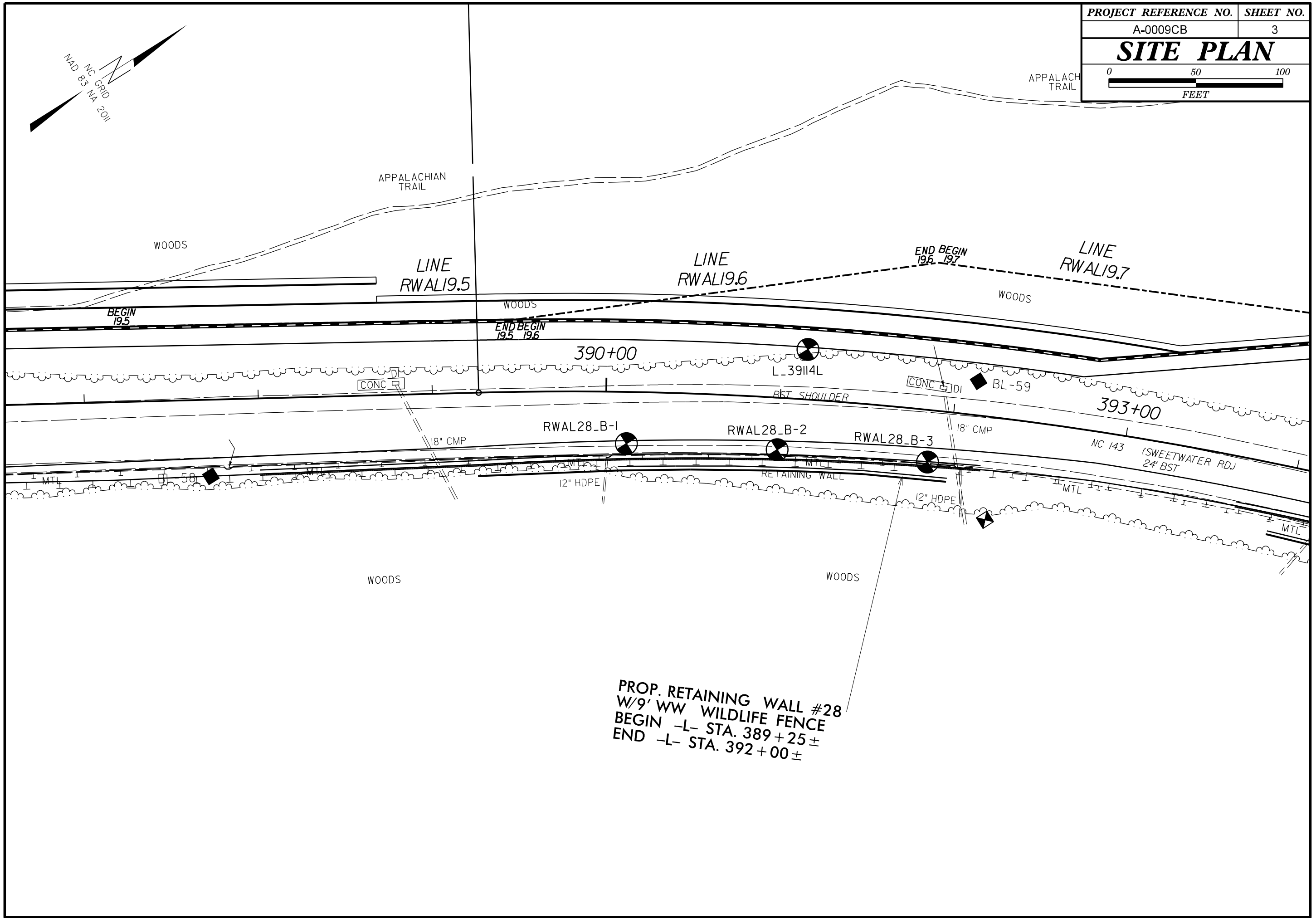
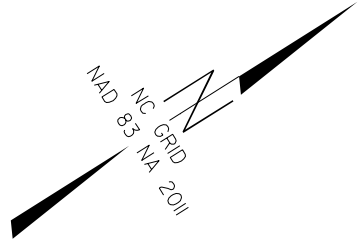
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Table with 4 main columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, and TERMS AND DEFINITIONS. Includes sub-sections like SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION, and ELEVATION.



PROP. RETAINING WALL #28
 W/9' WW WILDLIFE FENCE
 BEGIN -L- STA. 389+25±
 END -L- STA. 392+00±

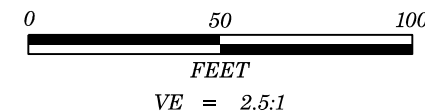


NOTE:
SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK
LINE ARE BASED ON AN INTERPRETATION OF
BORE HOLE AND SEISMIC REFRACTION DATA
AND SHALL BE CONSIDERED AS APPROXIMATE.

Prepared in the Office of:



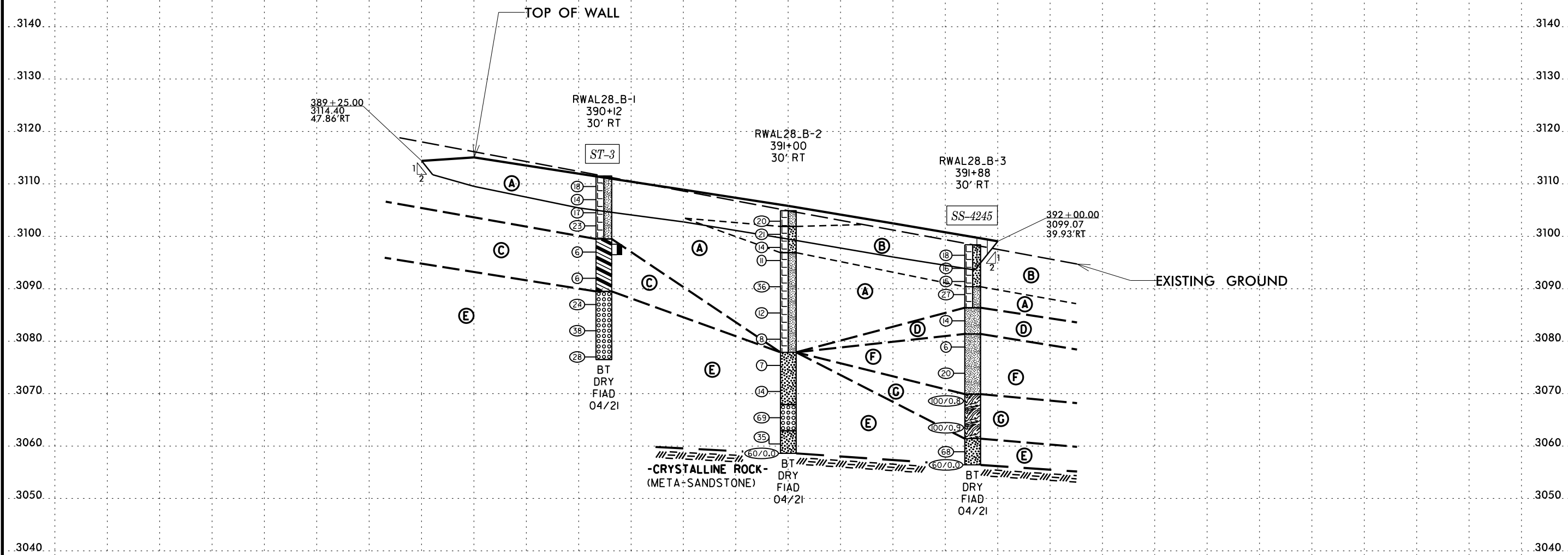
CAROLINAS
 GEOTECHNICAL
 GROUP



PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	4
RETAINING WALL #28 PROFILE BORINGS PROJECTED ALONG WALL ENVELOPE	

SOIL TEST RESULTS

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		
ST-3	30' RT	390+12 -L-	13.0' - 15.0'	A-6(12)	40	15	8.5	17.8	36.6	37.0	98.2	92.4	78.8	23.4	-
SS-4245	30' RT	391+88 -L-	6.0' - 7.5'	A-2-4(0)	26	NP	17	34	36	13	53	47	32	15	-



- (A) -ROADWAY EMBANKMENT- MEDIUM STIFF TO HARD, MOIST, TAN-BROWN-GRAY-ORANGE, FINE TO COARSE SANDY SILT (A-4), WITH TRACE TO LITTLE GRAVEL AND TRACE ORGANICS
- (B) -ROADWAY EMBANKMENT- MEDIUM DENSE, MOIST, TAN-ORANGE-BROWN-GRAY, SILTY FINE TO COARSE SAND (A-2-4(0)), WITH LITTLE GRAVEL
- (C) -COLLUVIAL- MEDIUM STIFF, MOIST, RED-ORANGE-TAN-GRAY, FINE TO COARSE SANDY CLAY (A-6(12))
- (D) -COLLUVIAL- STIFF, MOIST, TAN-ORANGE-GRAY, FINE TO COARSE SANDY SILT (A-4), WITH LITTLE GRAVEL
- (E) -RESIDUAL- LOOSE TO VERY DENSE, DRY TO MOIST, GRAY-TAN-ORANGE, SILTY, GRAVELLY FINE TO COARSE SAND (A-1-B) AND SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA AND LITTLE GRAVEL-SIZED ROCK FRAGMENTS
- (F) -RESIDUAL- MEDIUM STIFF TO VERY STIFF, MOIST, TAN-GRAY-ORANGE, FINE TO COARSE SANDY SILT (A-4), WITH TRACE MICA
- (G) -WEATHERED ROCK- (META-SANDSTONE)

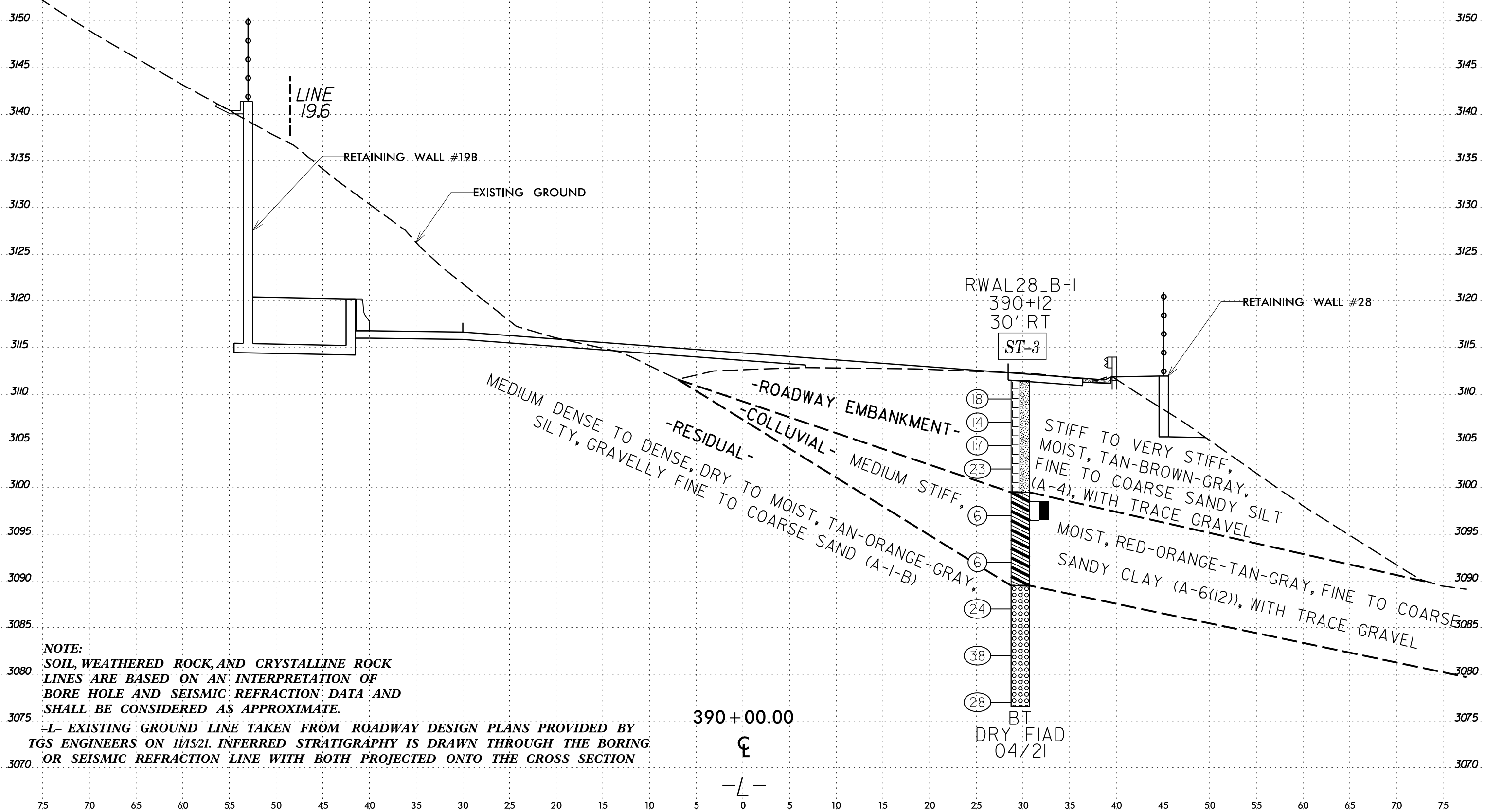
WALL ENVELOPE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/15/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE PROFILE.

19-MAY-2022 16:35
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 \$\$\$USERNAME\$\$\$

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SOIL TEST RESULTS

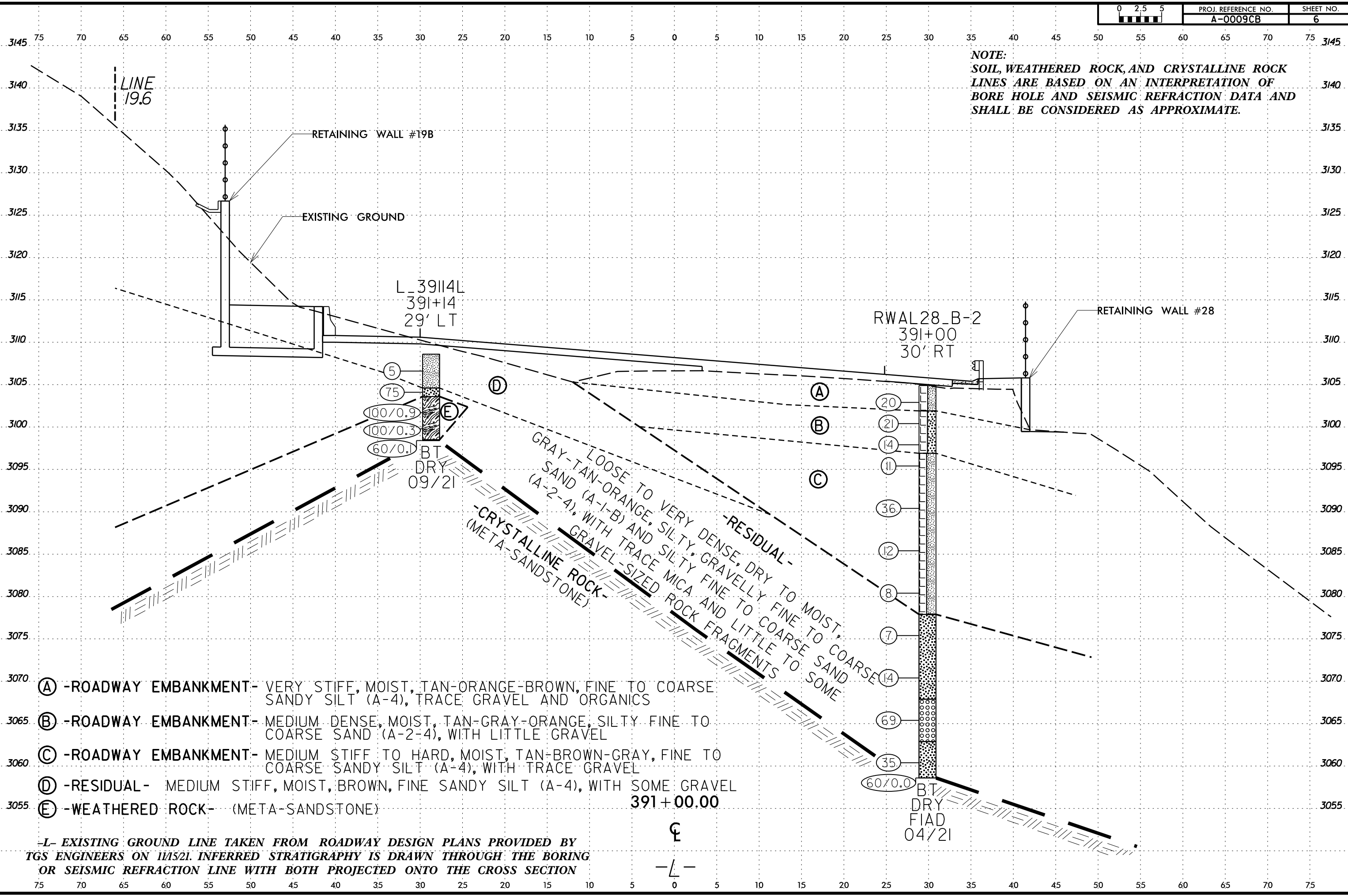
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
ST-3	30' RT	390+12 -L-	13.0' - 15.0'	A-6(12)	40	15	8.5	17.8	36.6	37.0	98.2	92.4	78.8	23.4	-



NOTE:
 SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK
 LINES ARE BASED ON AN INTERPRETATION OF
 BORE HOLE AND SEISMIC REFRACTION DATA AND
 SHALL BE CONSIDERED AS APPROXIMATE.
 -L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY
 TGS ENGINEERS ON 11/15/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING
 OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

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

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 \$\$\$SUBSERIALNAME\$\$\$



NOTE:
 SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK
 LINES ARE BASED ON AN INTERPRETATION OF
 BORE HOLE AND SEISMIC REFRACTION DATA AND
 SHALL BE CONSIDERED AS APPROXIMATE.

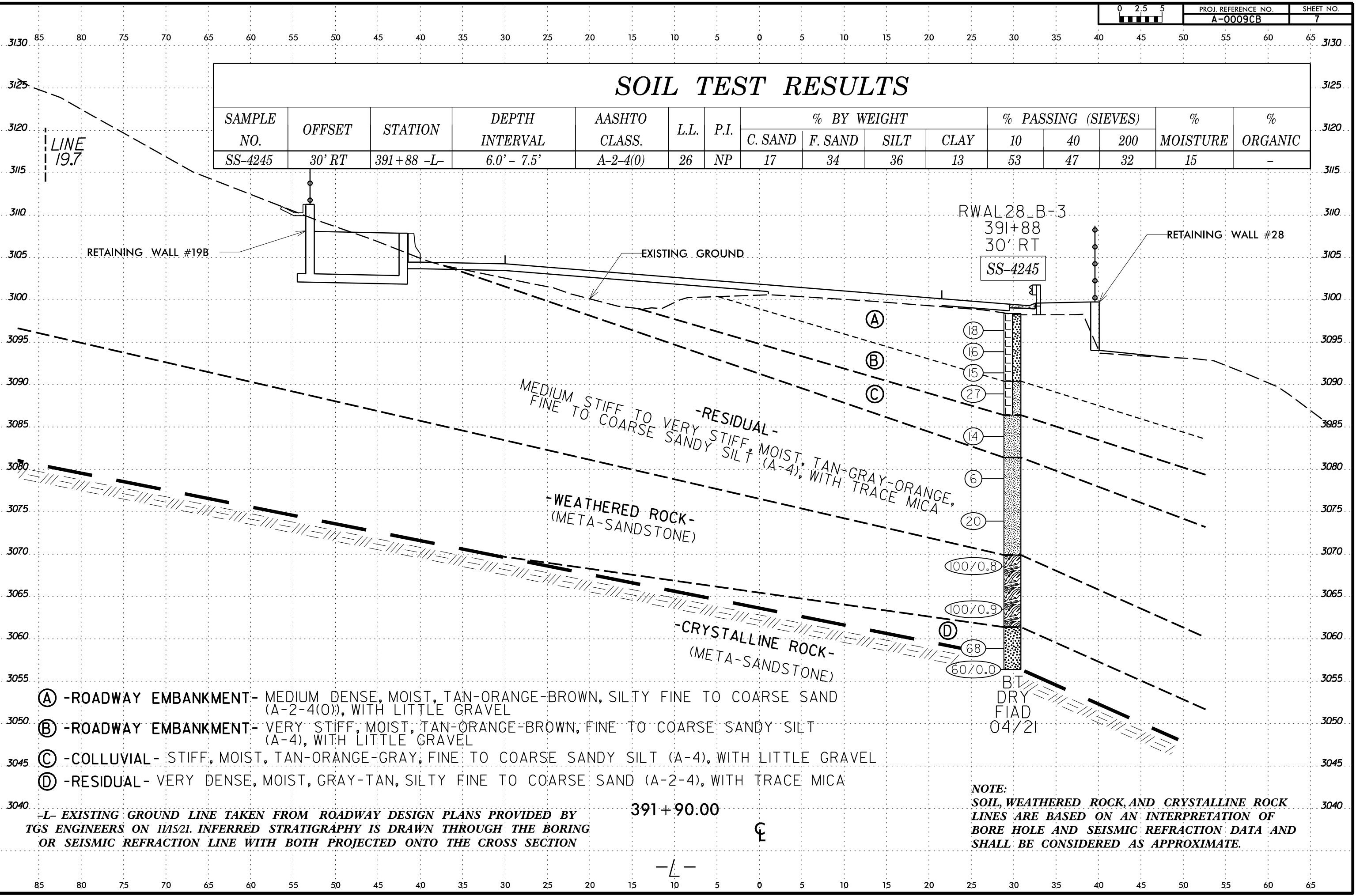
- (A) -ROADWAY EMBANKMENT- VERY STIFF, MOIST, TAN-ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4), TRACE GRAVEL AND ORGANICS
- (B) -ROADWAY EMBANKMENT- MEDIUM DENSE, MOIST, TAN-GRAY-ORANGE, SILTY FINE TO COARSE SAND (A-2-4), WITH LITTLE GRAVEL
- (C) -ROADWAY EMBANKMENT- MEDIUM STIFF TO HARD, MOIST, TAN-BROWN-GRAY, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL
- (D) -RESIDUAL- MEDIUM STIFF, MOIST, BROWN, FINE SANDY SILT (A-4), WITH SOME GRAVEL
- (E) -WEATHERED ROCK- (META-SANDSTONE)

-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/5/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

⊕
 -L-

SOIL TEST RESULTS

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		
SS-4245	30' RT	391+88 -L-	6.0' - 7.5'	A-2-4(0)	26	NP	17	34	36	13	53	47	32	15	-



-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/15/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

NOTE:
 SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK LINES ARE BASED ON AN INTERPRETATION OF BORE HOLE AND SEISMIC REFRACTION DATA AND SHALL BE CONSIDERED AS APPROXIMATE.

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST N. McLaren								
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)							
BORING NO. RWAL28_B-1		STATION 390+12		OFFSET 30 ft RT		ALIGNMENT L								
COLLAR ELEV. 3,111.5 ft		TOTAL DEPTH 35.0 ft		NORTHING 619,248		EASTING 594,134								
DRILL RIGHAMMER EFF./DATE CG29473 CME-550 79%03/12/2021			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Estep		START DATE 04/29/21		COMP. DATE 04/29/21		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				
3115														
3110	3,110.5	1.0	14	8	10								M	3,111.5 GROUND SURFACE 0.0
	3,108.0	3.5	7	7	7								M	ROADWAY EMBANKMENT Stiff to Very Stiff, Tan-Brown-Gray, Fine to Coarse Sandy SILT (A-4), with trace gravel
3105	3,105.5	6.0	8	7	10								M	
	3,103.0	8.5	8	9	14								M	
3100													M	
	3,098.0	13.5	3	3	3								M	3,099.5 COLLUVIAL 12.0 Medium Stiff, Red-Orange-Tan-Gray, Fine to Coarse Sandy CLAY (A-6(12))
3095													M	
	3,093.0	18.5	3	3	3								M	
3090													M	
	3,088.0	23.5	12	12	12								M	3,089.5 RESIDUAL 22.0 Medium Dense to Dense, Tan-Orange-Gray, Silty, Gravelly Fine to Coarse SAND (A-1-b)
3085													M	
	3,083.0	28.5	25	21	17								D	
3080													D	
	3,078.0	33.5	22	15	13								D	
														3,076.5 Boring Terminated at Elevation 3,076.5 ft In Residual Fine to Coarse Sandy GRAVEL (A-1-b)
														Other Samples: ST-3 (13.0 - 15.0)

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST N. McLaren								
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)							
BORING NO. RWAL28_B-2		STATION 391+00		OFFSET 30 ft RT		ALIGNMENT L								
COLLAR ELEV. 3,104.9 ft		TOTAL DEPTH 46.3 ft		NORTHING 619,319		EASTING 594,183								
DRILL RIGHAMMER EFF./DATE CG29473 CME-550 79%03/12/2021			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Estep		START DATE 04/29/21		COMP. DATE 04/29/21		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				
3105														
	3,103.9	1.0	7	9	11								M	3,104.9 GROUND SURFACE 0.0
3100	3,101.4	3.5	7	11	10								M	ROADWAY EMBANKMENT Very Stiff, Tan-Orange-Brown, Fine to Coarse Sandy SILT (A-4), with trace gravel and organics
	3,098.9	6.0	5	5	9								M	Medium Dense, Tan-Gray-Orange, Silty Fine to Coarse SAND (A-2-4), with little gravel
3095	3,096.4	8.5	8	6	5								M	3,096.9 Medium Stiff to Hard, Tan-Brown-Gray, Fine to Coarse Sandy SILT (A-4), with trace gravel
													M	
	3,091.4	13.5	20	21	15								M	
3090													M	
	3,086.4	18.5	6	5	7								M	
3085													M	
	3,081.4	23.5	4	4	4								M	
3080													M	
	3,076.4	28.5	7	3	4								M	3,077.9 RESIDUAL 27.0 Loose to Medium Dense, Gray-Tan-Orange, Silty Fine to Coarse SAND (A-2-4), with trace mica
3075													M	
	3,071.4	33.5	8	6	8								D	
3070													D	
	3,066.4	38.5	48	33	36								D	3,067.9 Very Dense, Tan-Gray, Silty, Gravelly Fine to Coarse SAND (A-1-b) 37.0
3065													D	
	3,061.4	43.5	21	22	13								D	3,062.9 Dense, Gray-Tan, Silty Fine to Coarse SAND (A-2-4), with little gravel-sized rock fragments 42.0
3060													D	
	3,058.6	46.3	60/0.0											3,058.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 3,058.6 ft On Crystalline Rock (META-SANDSTONE) 46.3

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ_NC_DOT.GDT 5/17/22

GEOTECHNICAL BORING REPORT

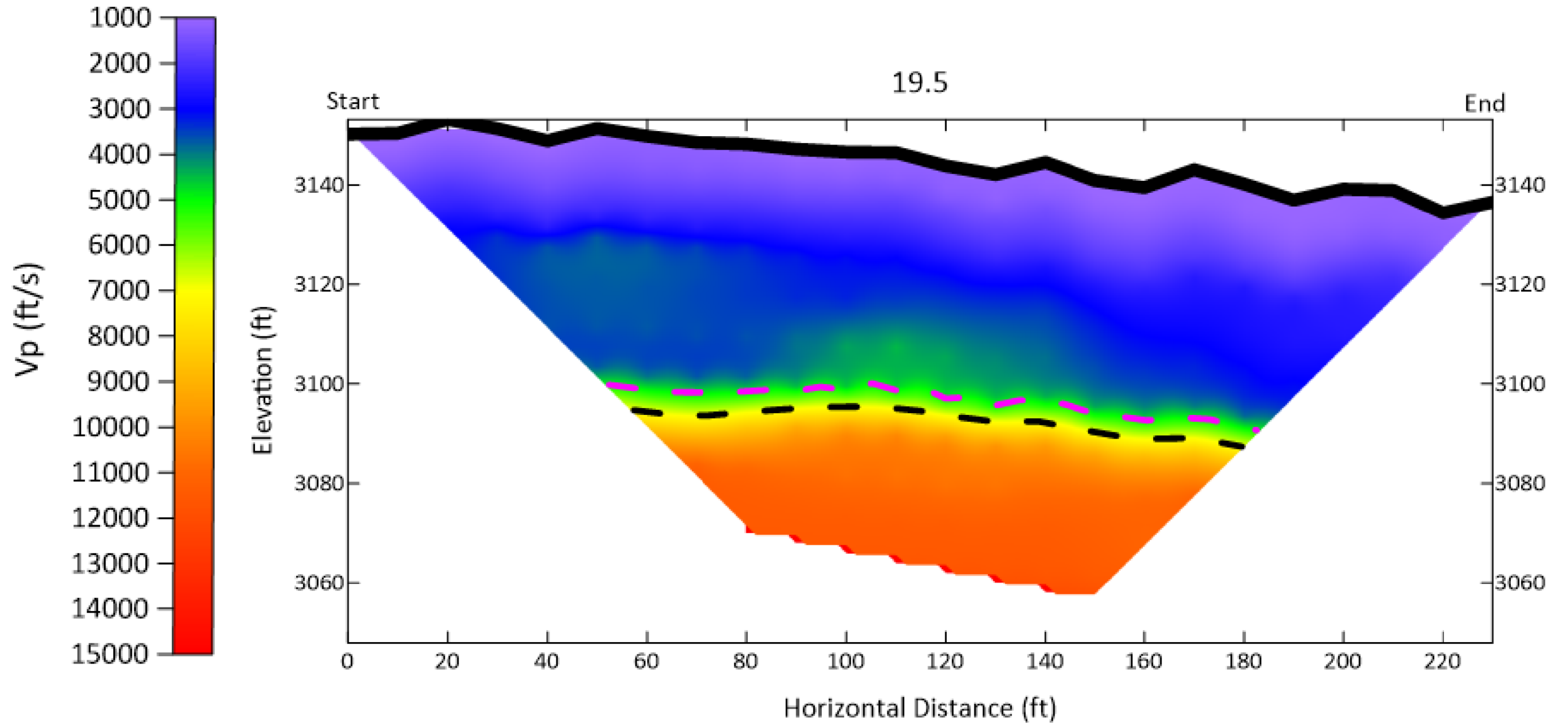
BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST D. Goodnight										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. L_39114L		STATION 391+14		OFFSET 29 ft LT		ALIGNMENT L										
COLLAR ELEV. 3,108.6 ft		TOTAL DEPTH 10.2 ft		NORTHING 619,365		EASTING 594,144										
DRILL RIGHAMMER EFF./DATE FVE9553 CME-550X 80% 03/12/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER J. Phillips		START DATE 09/17/21		COMP. DATE 09/17/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
3110																
	3,107.6	1.0	2	3	2											3,108.6
3105	3,105.1	3.5	4	15	60											3,104.6
																3,103.6
	3,102.6	6.0	43	57/0.4												3,102.6
3100	3,100.1	8.5	100/0.3													3,098.5
	3,098.5	10.1	60/0.1													3,098.4

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST N. McLaren										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL28_B-3		STATION 391+88		OFFSET 30 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,098.4 ft		TOTAL DEPTH 42.0 ft		NORTHING 619,388		EASTING 594,235										
DRILL RIGHAMMER EFF./DATE CG29473 CME-550 79% 03/12/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER J. Estep		START DATE 04/30/21		COMP. DATE 04/30/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
3100																
	3,097.4	1.0	10	9	9											3,098.4
3095	3,094.9	3.5	7	7	9											3,104.6
																3,103.6
	3,092.4	6.0	8	8	7											3,102.6
3090	3,089.9	8.5	10	13	14											3,098.5
																3,098.4
3085	3,084.9	13.5	6	6	8											3,098.4
3080	3,079.9	18.5	3	3	3											3,086.4
3075	3,074.9	23.5	2	9	11											3,086.4
3070	3,069.9	28.5	28	64	36/0.3											3,081.4
3065	3,064.9	33.5	34	47	53/0.4											3,081.4
3060	3,059.9	38.5	23	25	43											3,069.9
	3,056.4	42.0	60/0.0													3,069.9

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 5/17/22

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.5

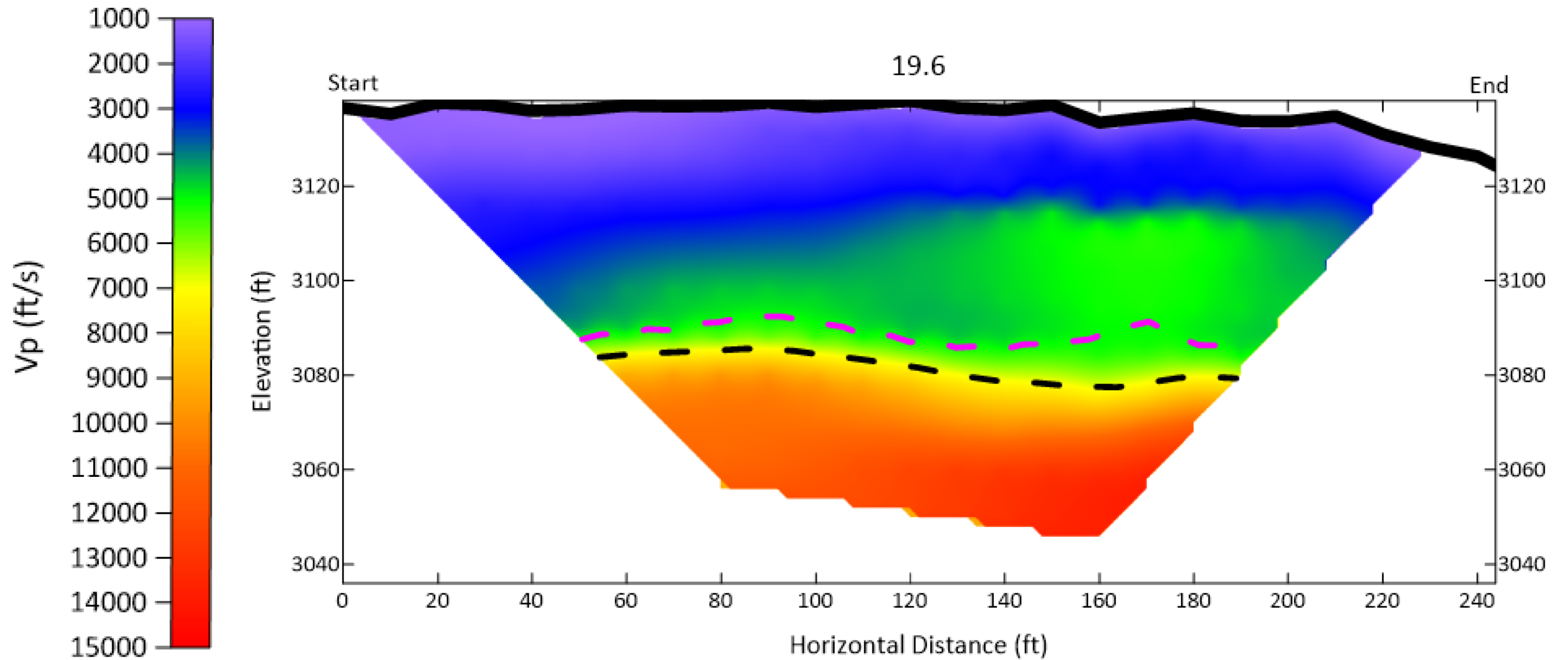


GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.6

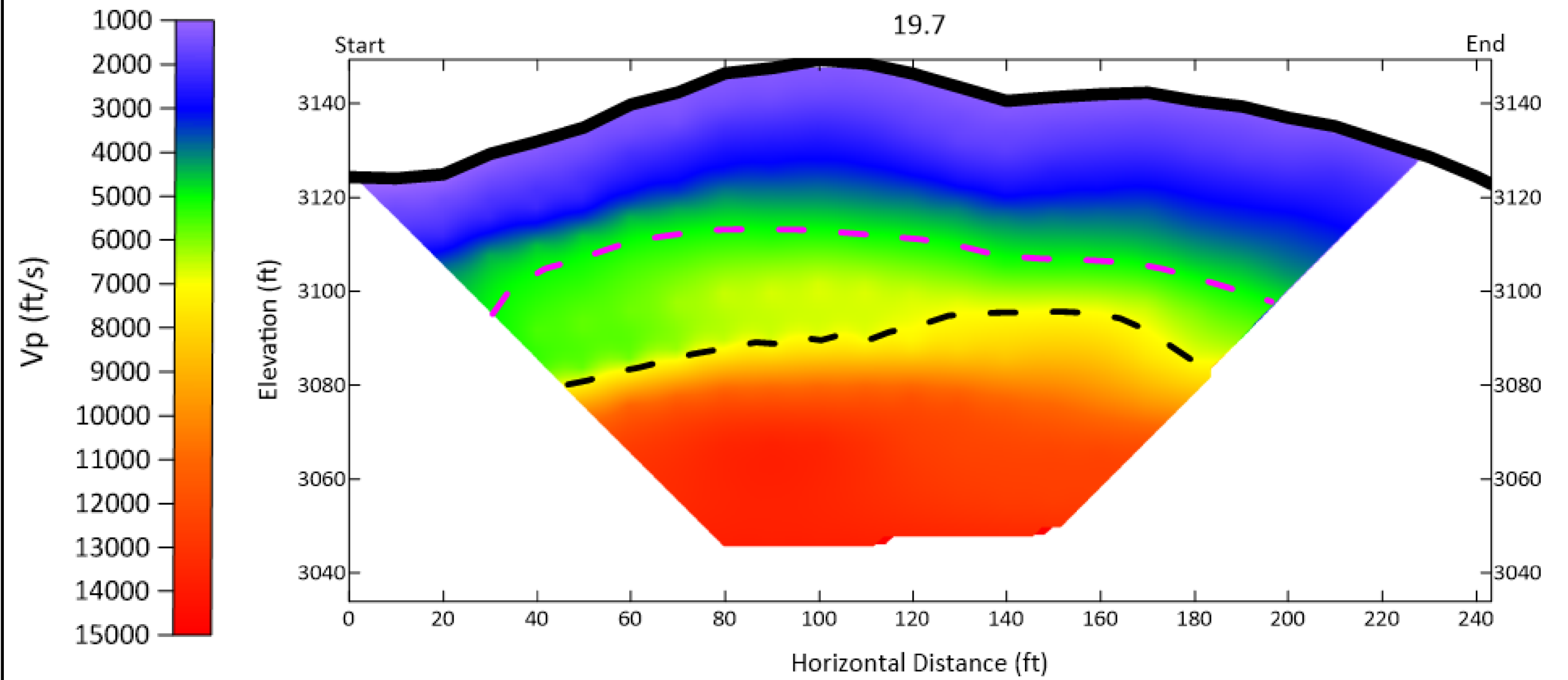


GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

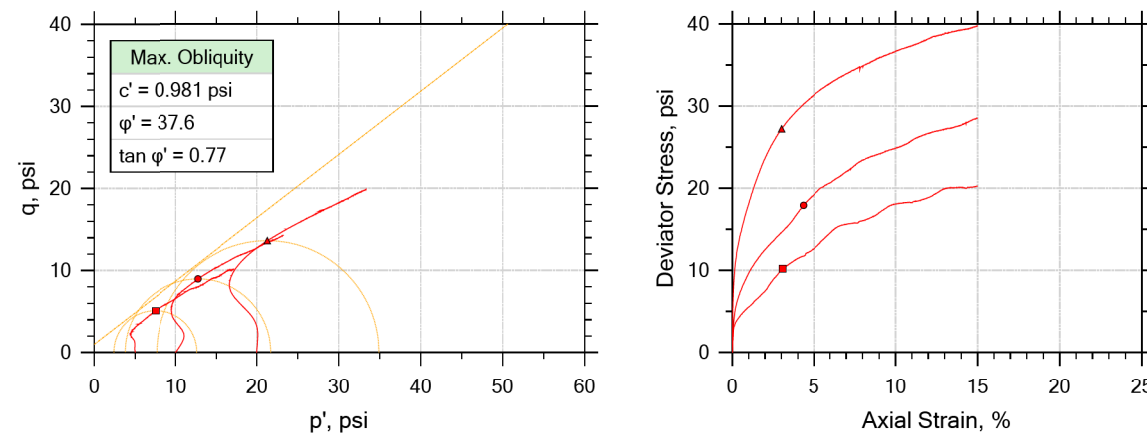
CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.7

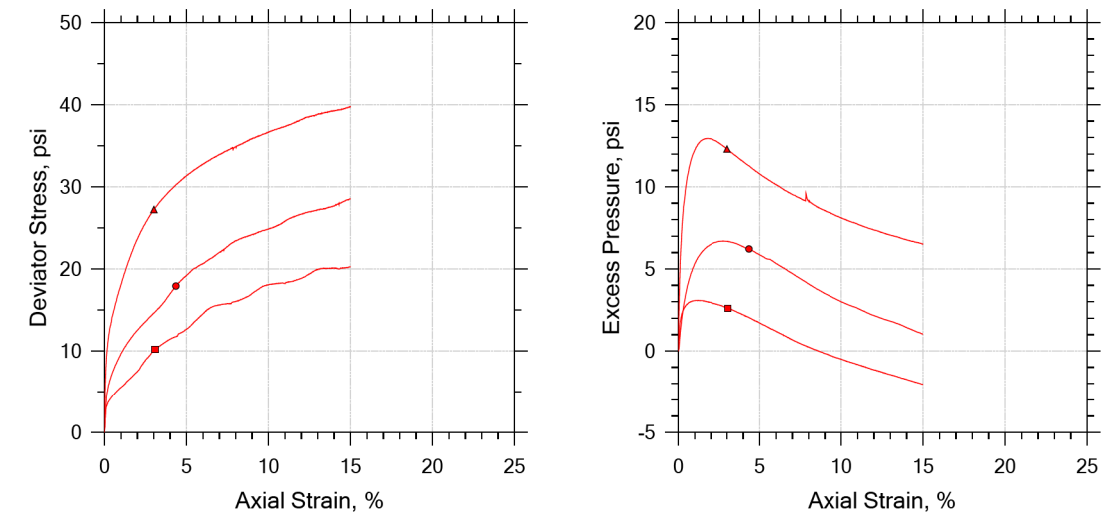


GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/1/2021
 CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC
 CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

Consolidated Undrained by AASHTO T297



Consolidated Undrained by AASHTO T297



Symbol	■	●	▲
Sample ID	22-0009	22-0009	22-0009
Depth	13.0' - 15.0'	13.0' - 15.0'	13.0' - 15.0'
Test Number	ST-3.A	ST-3.B	ST-3.C
Initial			
Height, in	6.118	6.012	6.055
Diameter, in	2.855	2.863	2.857
Moisture Content (from Cuttings), %	23.5	23.5	23.5
Dry Density, pcf	102.	103.	103.
Saturation (Wet Method), %	98.5	101.1	101.4
Void Ratio	0.640	0.624	0.622
Moisture Content, %	23.0	21.1	20.6
Dry Density, pcf	104.	107.	108.
Final			
Cross-Sectional Area (Method A), in ²	6.339	6.290	6.241
Saturation, %	100.0	100.0	100.0
Void Ratio	0.616	0.565	0.552
Back Pressure, psi	46.99	44.00	89.01
Vertical Effective Consolidation Stress, psi	4.985	9.939	19.90
Horizontal Effective Consolidation Stress, psi	5.008	9.998	19.98
Vertical Strain after Consolidation, %	0.3156	0.9897	1.195
Volumetric Strain after Consolidation, %	0.9138	2.495	2.866
Time to 50% Consolidation, min	1.000	1.500	1.800
Shear Strength, psi	5.103	8.964	13.62
Strain at Failure, %	3.07	4.35	3.01
Strain Rate, %/min	0.04000	0.04000	0.04000
Deviator Stress at Failure, psi	10.21	17.93	27.23
Effective Minor Principal Stress at Failure, psi	2.395	3.779	7.666
Effective Major Principal Stress at Failure, psi	12.60	21.71	34.90
B-Value	0.96	0.95	0.96

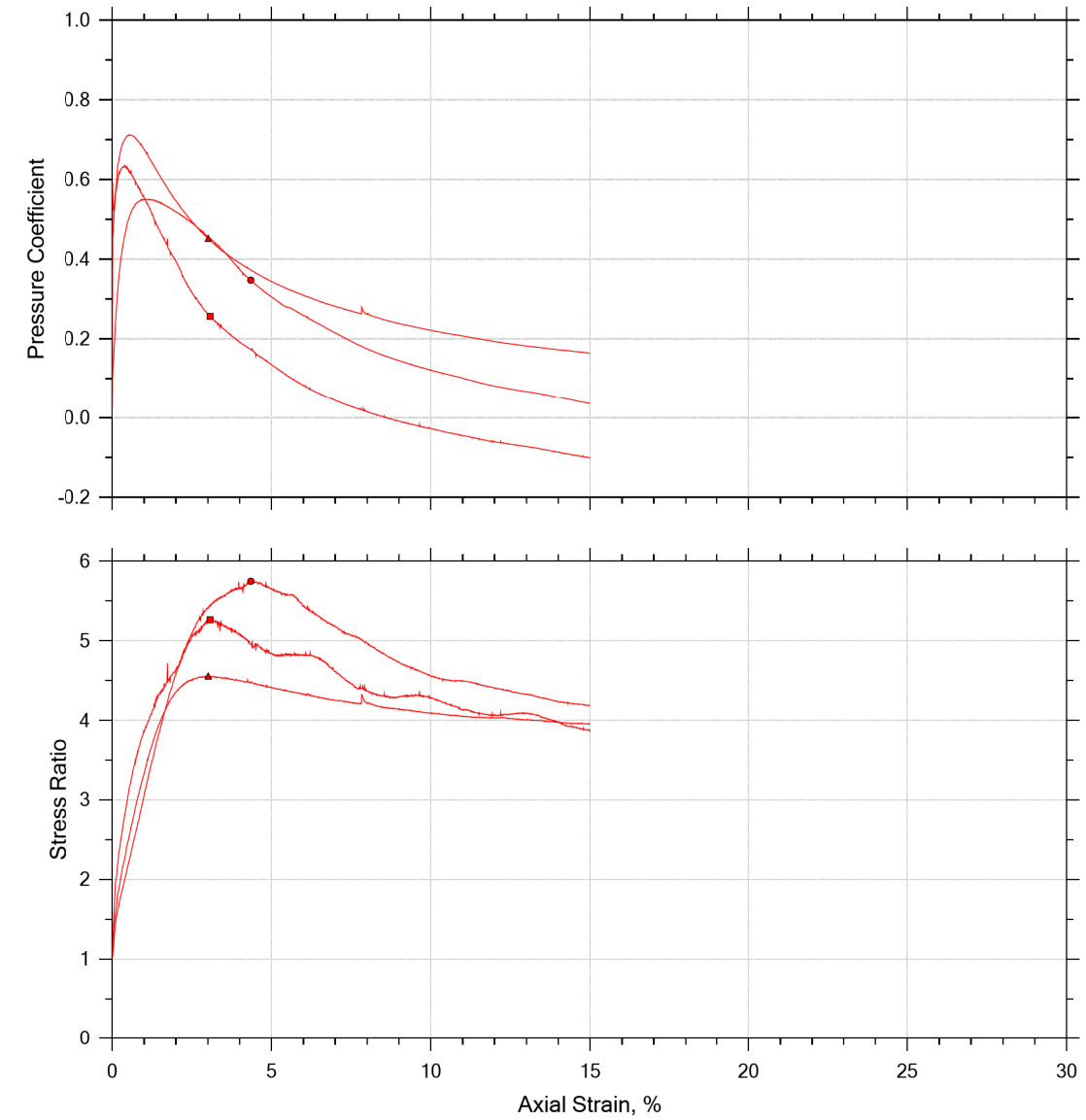
Notes:
 - Before Shear Saturation set to 100% for phase calculation.
 - Moisture Content determined by ASTM D2216.
 - Atterberg Limits determined by ASTM D4318.
 - Deviator Stress includes membrane correction.
 - Values for c and phi determined from best-fit straight line for the specific test conditions.
 Actual strength parameters may vary and should be determined by an engineer for site conditions.

	Project Name: A-0009C	Location: NC	Project Number: C8806.00005
	Boring Number: RWAL28_B-1	Tester: WAP/RMC	Checker: WAP/ WJG
	Sample Number: 22-0009	Test Date: 4/15/2022	Depth: 13.0' - 15.0'
	Test Number: ST-3.A	Preparation: Undisturbed	Elevation:
	Description: Soil Classification: A-6(12)	Remarks:	

Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	22-0009	ST-3.A	13.0' - 15.0'	WAP/RMC	4/15/2022	WAP/ WJG	ST-3.A.1.dat
●	22-0009	ST-3.B	13.0' - 15.0'	WAP/RMC	4/15/2022	WAP/ WJG	ST-3.B.dat
▲	22-0009	ST-3.C	13.0' - 15.0'	WAP/RMC	04/15/2022	WAP/ WJG	ST-3.C.dat

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	Boring Number: RWAL28_B-1	Tester: WAP/RMC	Checker: WAP/ WJG
	Sample Number: 22-0009	Test Date: 4/15/2022	Depth: 13.0' - 15.0'
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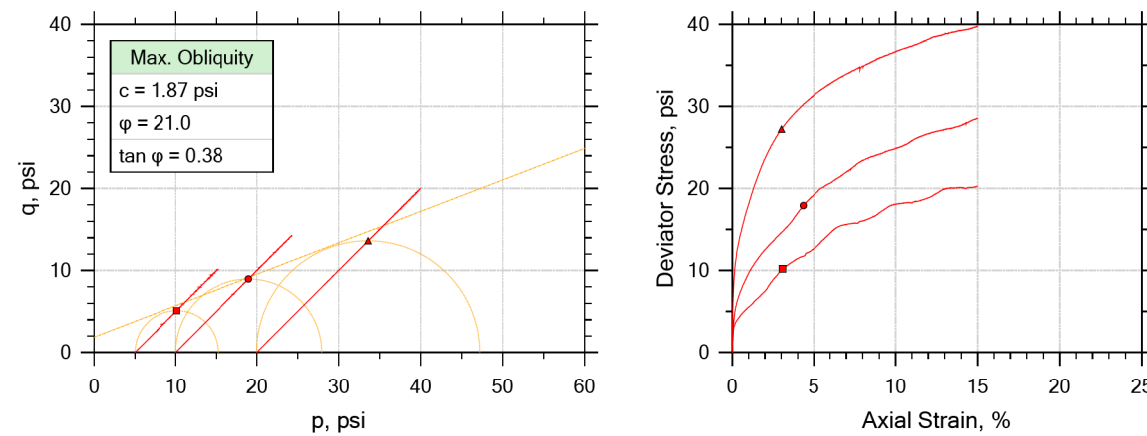
Consolidated Undrained by AASHTO T297



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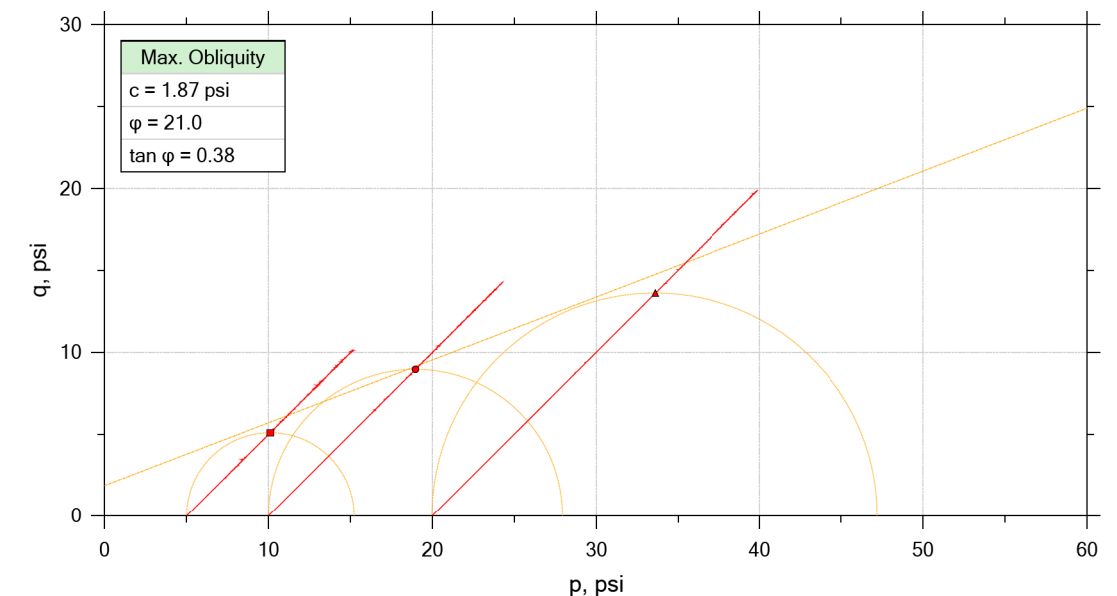
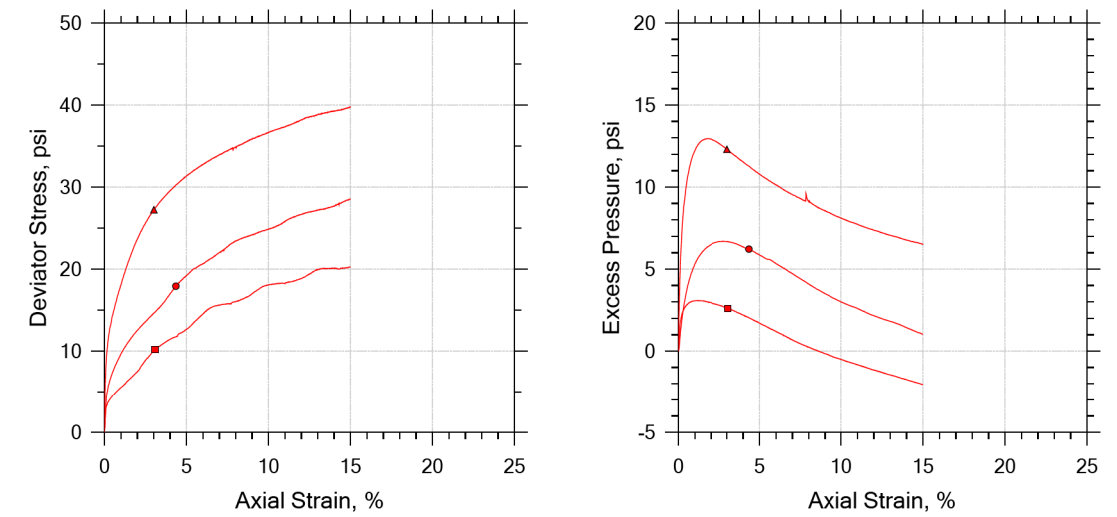


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	Sample Number: 22-0009	Test Date: 4/15/2022	Depth: 13.0' - 15.0'
	Test Number: ST-3.A	Preparation: Undisturbed	Elevation:
	Description: Soil Classification: A-6(12)	Remarks:	

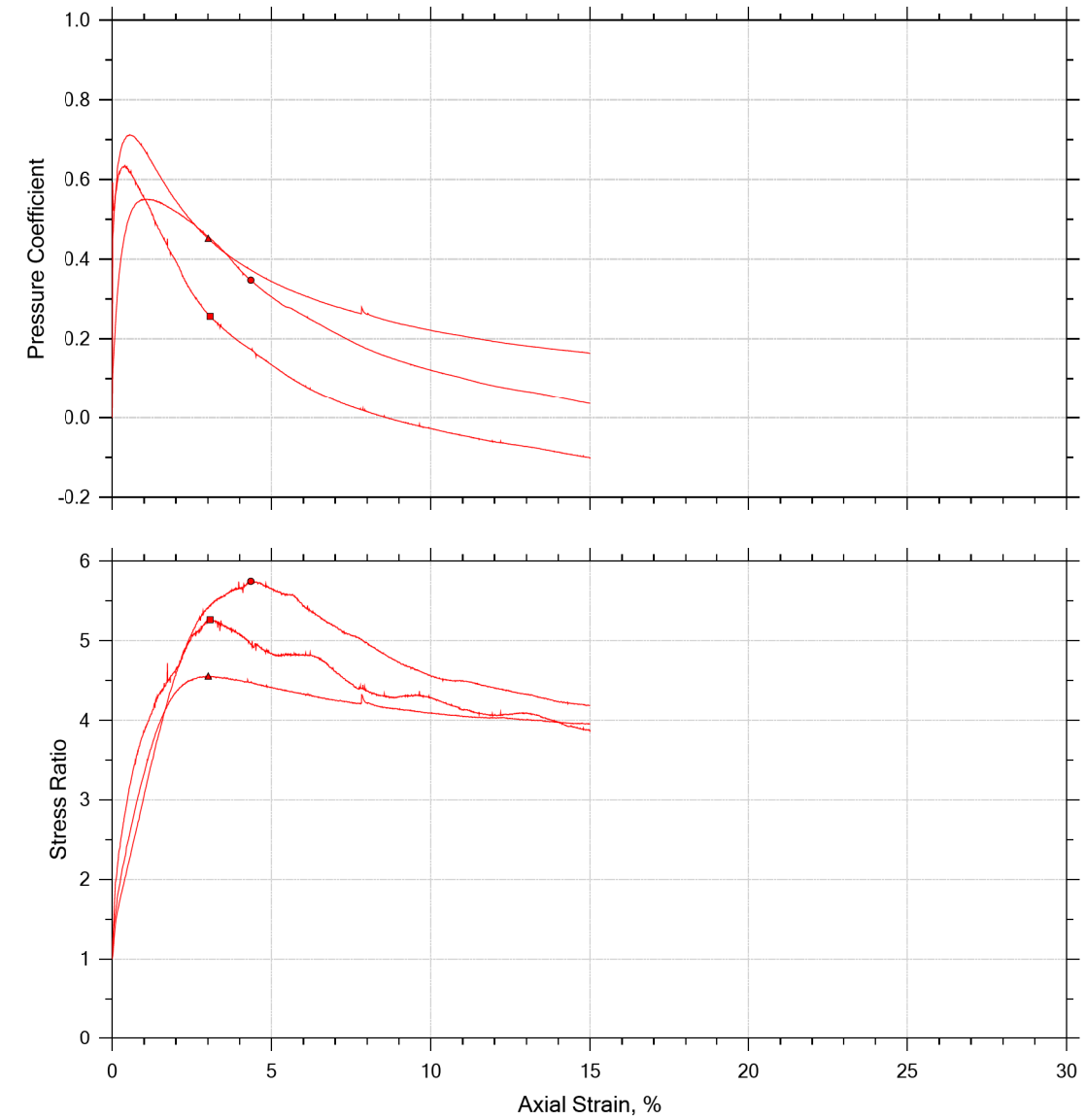
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	Description: Soil Classification: A-6(12)		
	Remarks:		

PROJECT: 32572.1.FS10 REFERENCE: A-0009CB

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	WALL ENVELOPE
5-8	CROSS SECTIONS
9-10	BORE LOGS
11-12	GEOPHYSICAL TEST RESULTS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GRAHAM
 PROJECT DESCRIPTION UPGRADE NC 143 FROM SR 1223 (BEECH CREEK ROAD) TO 0.5 MILES NORTH OF APPALACHIAN TRAIL
 SITE DESCRIPTION RETAINING WALL #29: SHORED MECHANICALLY STABILIZED EARTH (SMSE) WALL ON -L- FROM 393+90 RT TO 395+90 RT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CB	1	12

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 EXPLORATION

BRECCIA

C. PIERCY

D. GOODNIGHT

M. BREWER

S. BRAUN

GEL SOLUTIONS

INVESTIGATED BY CG2

DRAWN BY M. BREWER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY M. BREWER, P.E.

DATE MAY 2022

Prepared in the Office of:



**CAROLINAS
GEOTECHNICAL
GROUP**

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



DocuSigned by:

D. Matthew Brewer 6/7/2022

386129C0A4C1462

SIGNATURE DATE

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

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

SOIL DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

GRADATION
WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.
ANGULARITY OF GRAINS
MINERALOGICAL COMPOSITION
COMPRESSIONIBILITY
PERCENTAGE OF MATERIAL
GROUND WATER

ROCK DESCRIPTION
HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. 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.
WEATHERED ROCK (WR)
CRYSTALLINE ROCK (CR)
NON-CRYSTALLINE ROCK (NCR)
COASTAL PLAIN SEDIMENTARY ROCK (CP)

TERMS AND DEFINITIONS
ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
AQUIFER - A WATER BEARING FORMATION OR STRATA.
ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

SOIL LEGEND AND AASHTO CLASSIFICATION
GENERAL CLASS.
GROUP CLASS.
SYMBOL
% PASSING #10 #40 #200
MATERIAL PASSING #40 LL PI
GROUP INDEX

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

WEATHERING
FRESH
VERY SLIGHT (IV SLI)
SLIGHT (SLI)
MODERATE (MOD)
MODERATELY SEVERE (MOD. SEV.)
SEVERE (SEV)
VERY SEVERE (IV SEV)
COMPLETE

ROCK HARDNESS
VERY HARD
HARD
MODERATELY HARD
MEDIUM HARD
SOFT
VERY SOFT

TEXTURE OR GRAIN SIZE
U.S. STD. SIEVE SIZE OPENING (MM)
BOULDER (BLDR.)
COBBLE (COB.)
GRAVEL (GR.)
COARSE SAND (CS.E. SD.)
FINE SAND (F SD.)
SILT (SL.)
CLAY (CL.)

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

ABBREVIATIONS
AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DPT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - 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
DRY UNIT WEIGHT

ROCK HARDNESS (CONT.)
SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

EQUIPMENT USED ON SUBJECT PROJECT
DRILL UNITS:
CME-45C
CME-550
CME-550X
VANE SHEAR TEST
PORTABLE HOIST
DIEDRICH D50
ADVANCING TOOLS:
CLAY BITS
6" CONTINUOUS FLIGHT AUGER
8" HOLLOW AUGERS
HARD FACED FINGER BITS
TUNG-CARBIDE INSERTS
CASING w/ ADVANCER
TRICONE *STEEL TEETH
TRICONE *TUNG-CARB.
CORE BIT
HAMMER TYPE:
AUTOMATIC
MANUAL
CORE SIZE:
-B
-H
-N
HAND TOOLS:
POST HOLE DIGGER
HAND AUGER
SOUNDING ROD
VANE SHEAR TEST

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

INDURATION
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.
FRIABLE
MODERATELY INDURATED
INDURATED
EXTREMELY INDURATED
RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

PLASTICITY
PLASTICITY INDEX (PI)
DRY STRENGTH
NON PLASTIC
SLIGHTLY PLASTIC
MODERATELY PLASTIC
HIGHLY PLASTIC
VERY LOW
SLIGHT
MEDIUM
HIGH

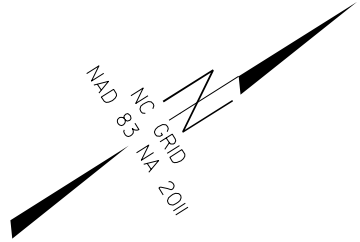
COLOR
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

INDURATION (CONT.)
INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

NOTES:
SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021
ELEVATION: FEET
DATE: 8-15-14

-L- PT 395+12.74

APPALACHIAN TRAIL



BEGIN 19.7
LINE RWAL19.7

WOODS

END 19.7

SHOULDER
CONC 5' DI BL-59

18" CMP

393+00

L 39432L

BEGIN 19.8

WOODS

LINE RWAL19.8

END 19.8

NC 143 (SWEETWATER RD.)
24' BST

RWAL 29 B-1

395+00
BST SHOULDER

ROCK OUTCROP 23

WOODS

RWAL 29 B-2

RWAL 29 B-3

WOODS

RETAINING WALL

18" CMP

WOODS

BL-60

12" HDPE
DIRECTION

PROP. RETAINING WALL #29
W/9' WW WILDLIFE FENCE
BEGIN -L- STA. 393+90±
END -L- STA. 395+90±

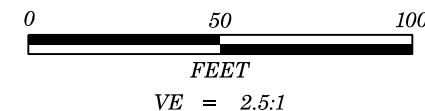


NOTE:
SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK
LINE ARE BASED ON AN INTERPRETATION OF
BORE HOLE AND SEISMIC REFRACTION DATA AND
SHALL BE CONSIDERED AS APPROXIMATE.

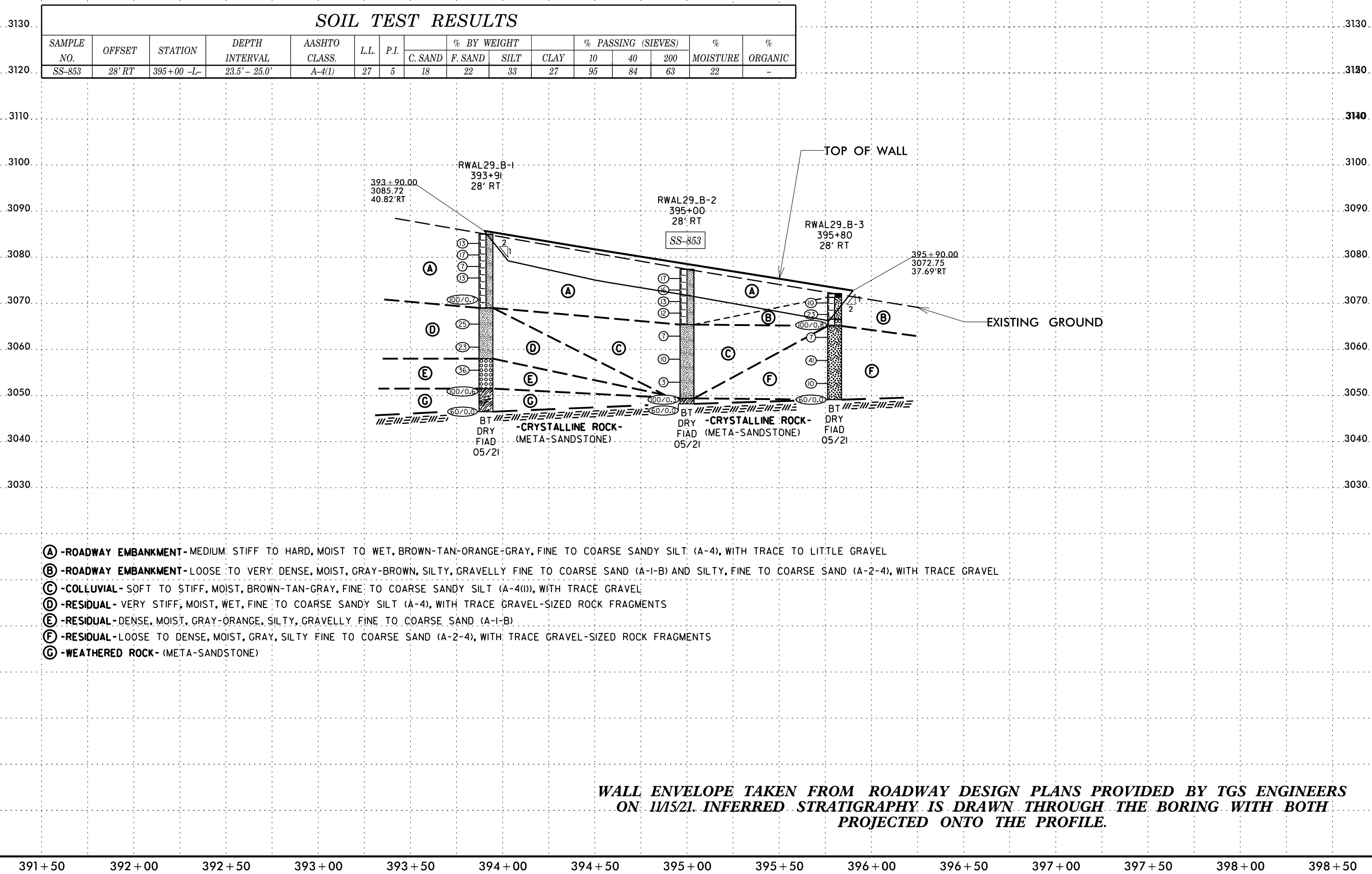
Prepared in the Office of:



CAROLINAS
 GEOTECHNICAL
 GROUP

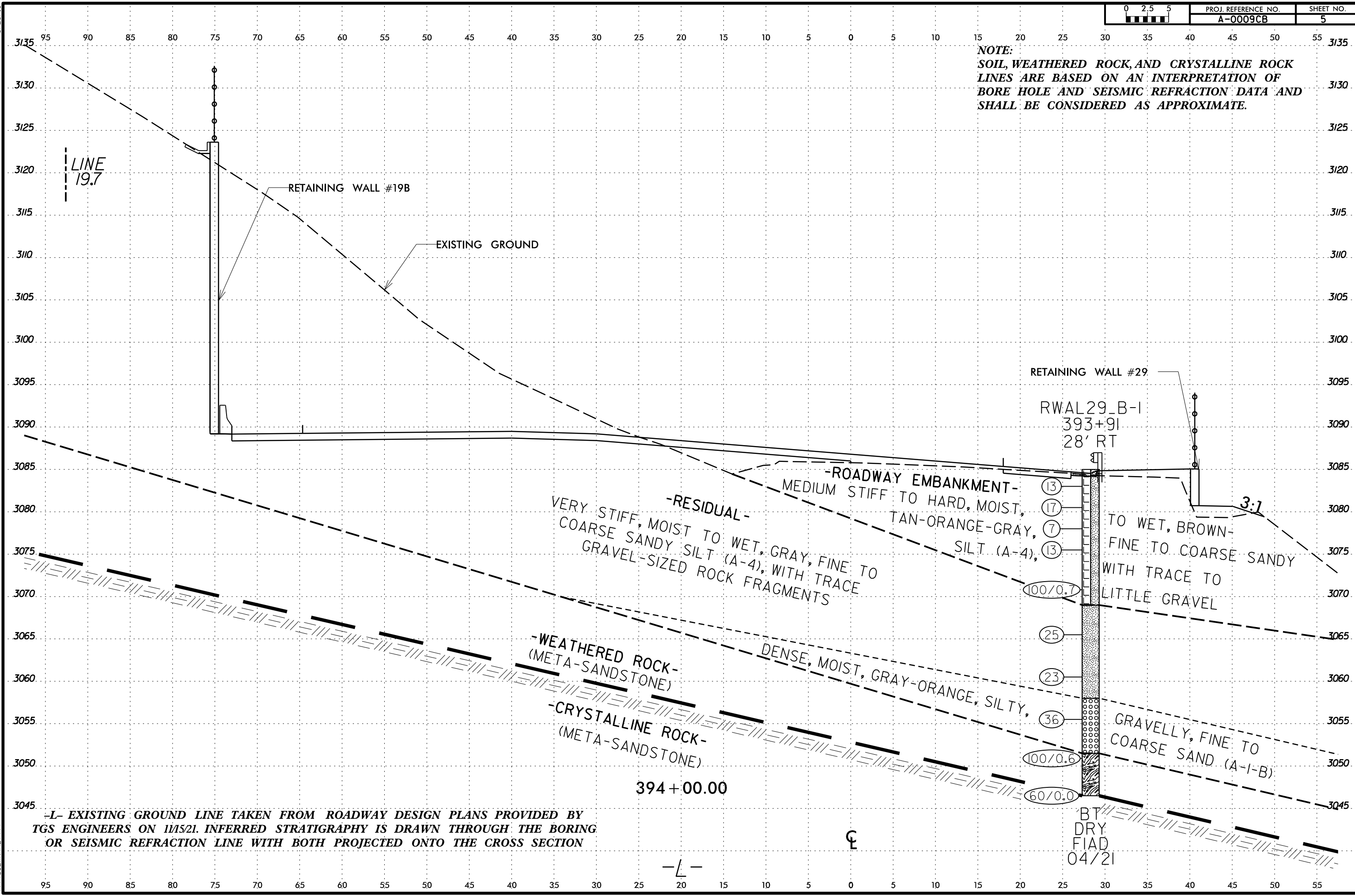


PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	4
RETAINING WALL #29 PROFILE BORINGS PROJECTED ALONG WALL ENVELOPE	



- (A) -ROADWAY EMBANKMENT- MEDIUM STIFF TO HARD, MOIST TO WET, BROWN-TAN-ORANGE-GRAY, FINE TO COARSE SANDY SILT (A-4), WITH TRACE TO LITTLE GRAVEL
- (B) -ROADWAY EMBANKMENT- LOOSE TO VERY DENSE, MOIST, GRAY-BROWN, SILTY, GRAVELLY FINE TO COARSE SAND (A-I-B) AND SILTY, FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL
- (C) -COLLUVIAL- SOFT TO STIFF, MOIST, BROWN-TAN-GRAY, FINE TO COARSE SANDY SILT (A-4(1)), WITH TRACE GRAVEL
- (D) -RESIDUAL- VERY STIFF, MOIST, WET, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS
- (E) -RESIDUAL- DENSE, MOIST, GRAY-ORANGE, SILTY, GRAVELLY FINE TO COARSE SAND (A-I-B)
- (F) -RESIDUAL- LOOSE TO DENSE, MOIST, GRAY, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS
- (G) -WEATHERED ROCK- (META-SANDSTONE)

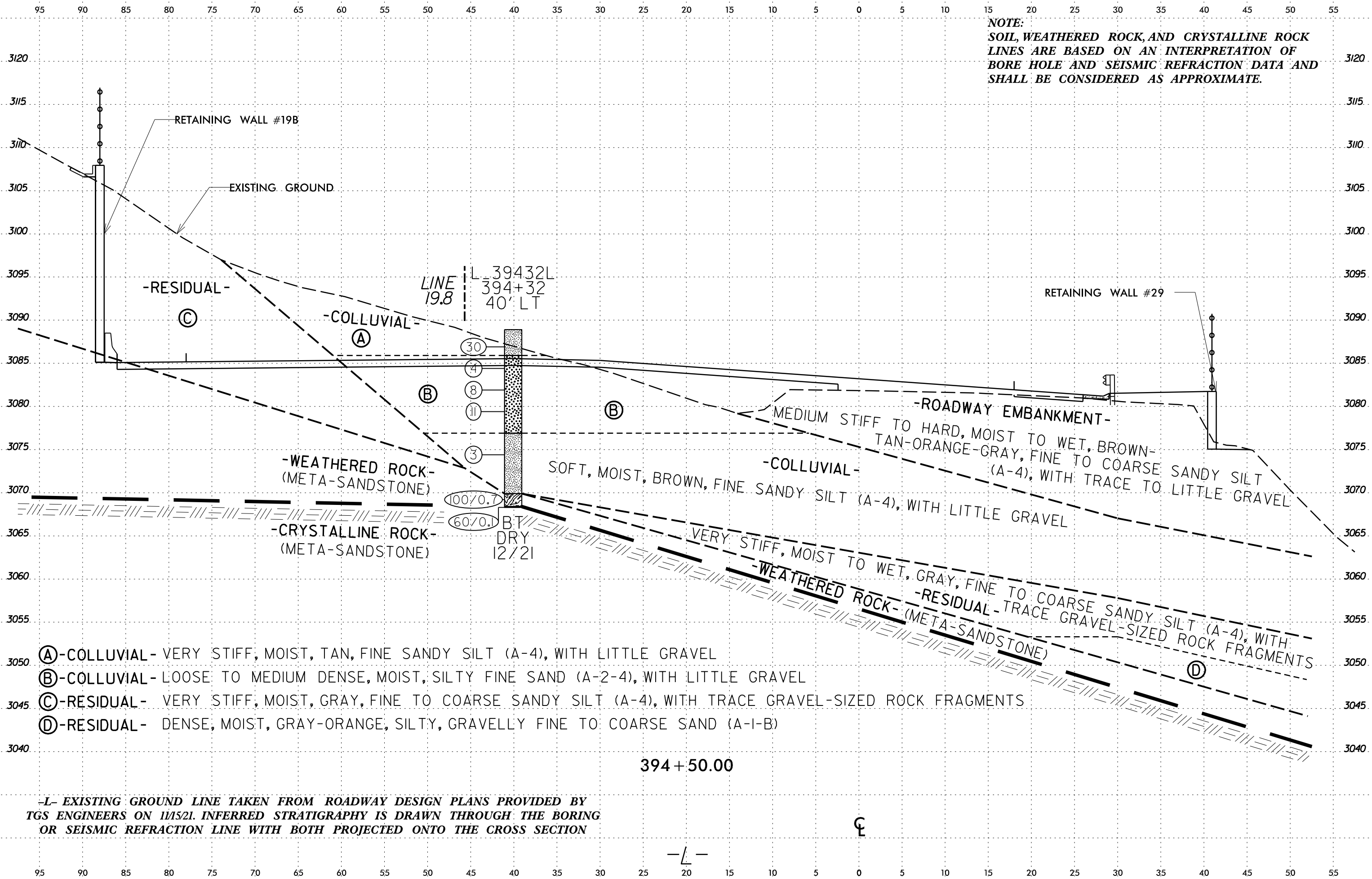
NOTE:
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-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY
TGS ENGINEERS ON 11/5/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING
OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

6/23/16
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 \$\$\$SUBSERIALNAME\$\$\$

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 \$\$\$SUBSERIAL\$\$\$



- (A) - COLLUVIAL - VERY STIFF, MOIST, TAN, FINE SANDY SILT (A-4), WITH LITTLE GRAVEL
- (B) - COLLUVIAL - LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4), WITH LITTLE GRAVEL
- (C) - RESIDUAL - VERY STIFF, MOIST, GRAY, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS
- (D) - RESIDUAL - DENSE, MOIST, GRAY-ORANGE, SILTY, GRAVELLY FINE TO COARSE SAND (A-I-B)

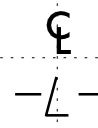
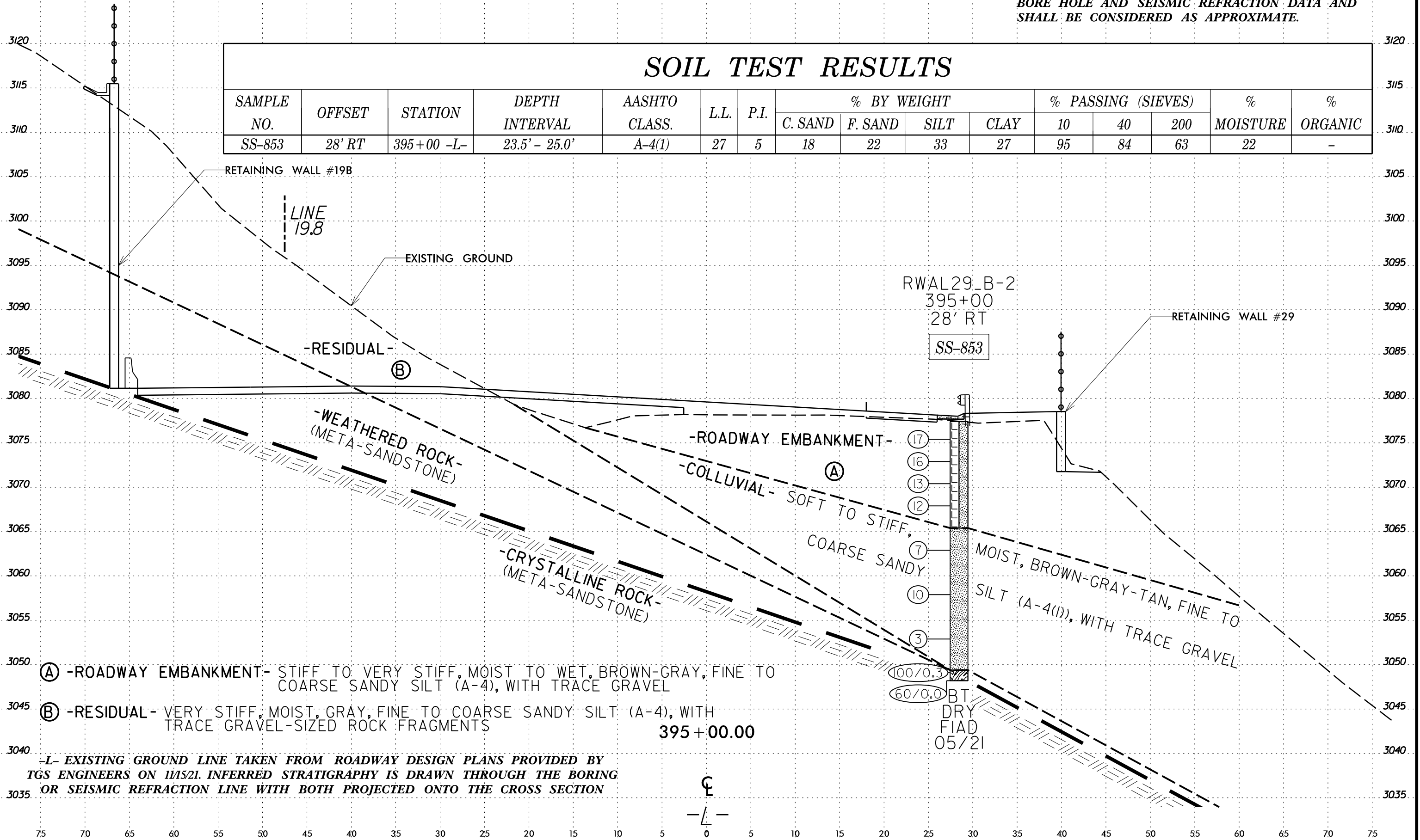
-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY
 TGS ENGINEERS ON 11/15/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING
 OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

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 \$\$\$SUSERRNAME\$\$\$

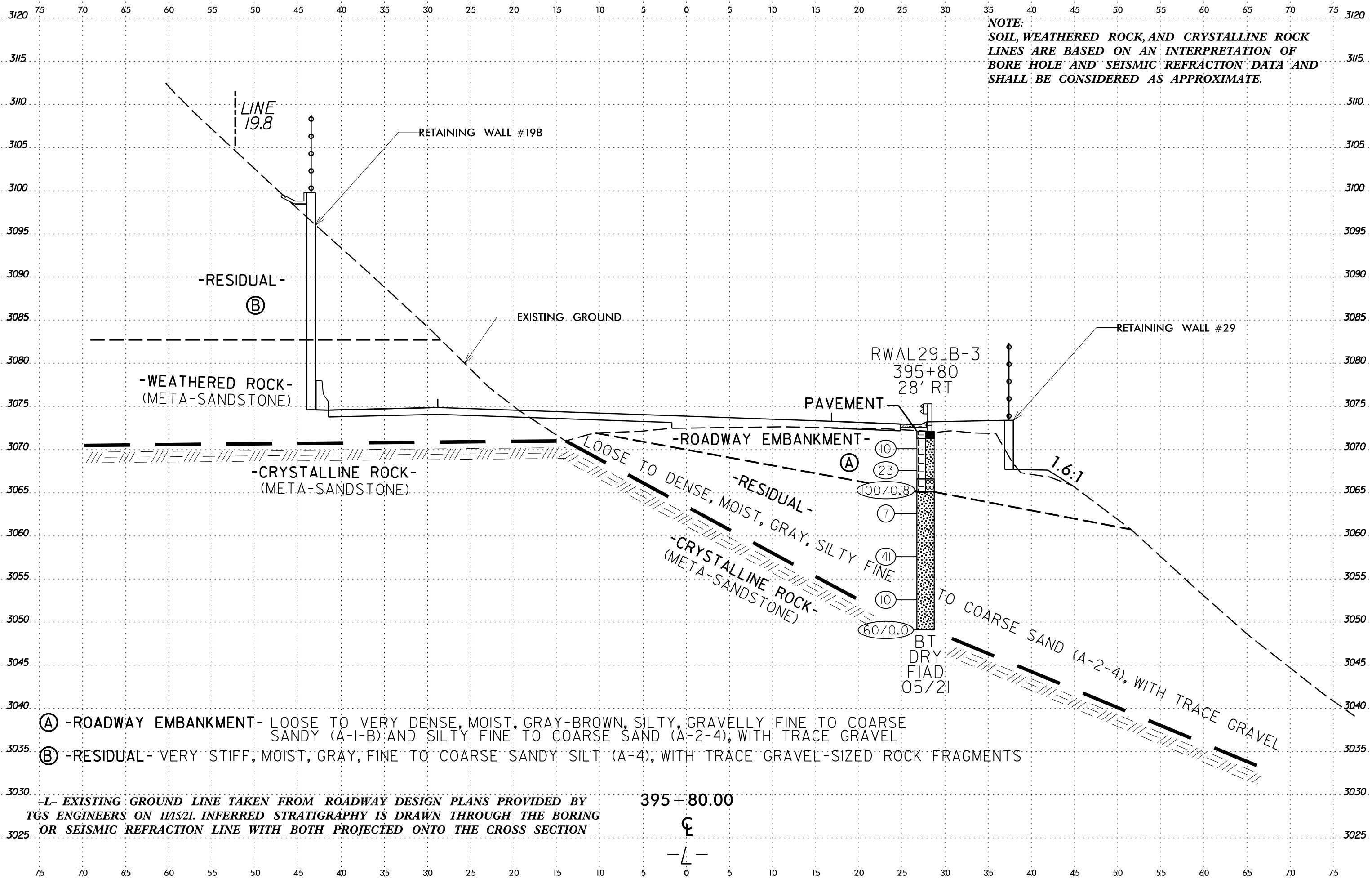
NOTE:
 SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK
 LINES ARE BASED ON AN INTERPRETATION OF
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 SHALL BE CONSIDERED AS APPROXIMATE.

SOIL TEST RESULTS

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		
SS-853	28' RT	395+00 -L-	23.5' - 25.0'	A-4(1)	27	5	18	22	33	27	95	84	63	22	-



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 \$\$\$SUBSERIALNAME\$\$\$



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST M. Brewer									
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)								
BORING NO. RWAL29_B-1		STATION 393+91		OFFSET 28 ft RT		ALIGNMENT L									
COLLAR ELEV. 3,085.0 ft		TOTAL DEPTH 38.5 ft		NORTHING 619,540		EASTING 594,366									
DRILL RIGHAMMER EFF./DATE CG29473 CME-550 79% 03/12/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Estep		START DATE 05/05/21		COMP. DATE 05/05/21		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3085	3,084.0	1.0	9	8	5								GROUND SURFACE	0.0	
3080	3,081.5	3.5	25	8	9								ROADWAY EMBANKMENT Medium Stiff to Hard, Brown-Tan-Orange-Gray, Fine to Coarse Sandy SILT (A-4), with trace to little gravel		
	3,079.0	6.0	2	2	5										
3075	3,076.5	8.5	5	6	7								RESIDUAL Very Stiff, Gray, Fine to Coarse Sandy SILT (A-4), with trace gravel-sized rock fragments		
	3,071.5	13.5	72	28/0.2											
3065	3,066.5	18.5	18	9	16								WEATHERED ROCK Gray-Orange-Brown, (META-SANDSTONE)		
	3,061.5	23.5	27	10	13										
3055	3,056.5	28.5	31	20	16								Dense, Gray-Orange, Silty, Gravelly Fine to Coarse SAND (A-1-b)		
	3,051.5	33.5	57	43/0.1											
3050	3,046.5	38.5	60/0.0										WEATHERED ROCK Gray-Orange-Brown, (META-SANDSTONE)		
														Boring Terminated with Standard Penetration Test Refusal at Elevation 3,046.5 ft On Crystalline Rock (META-SANDSTONE)	

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST D. Goodnight									
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)								
BORING NO. L_39432L		STATION 394+32		OFFSET 40 ft LT		ALIGNMENT L									
COLLAR ELEV. 3,088.9 ft		TOTAL DEPTH 20.6 ft		NORTHING 619,617		EASTING 594,346									
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 76% 06/14/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Odom		START DATE 12/14/21		COMP. DATE 12/14/21		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3090	3,088.9	0.0											GROUND SURFACE	0.0	
3085	3,087.9	1.0	3	20	10								COLLUVIAL Very Stiff, Tan, Fine Sandy SILT (A-4), with little gravel		
	3,085.4	3.5	2	2	2										
3080	3,082.9	6.0	5	5	3								Loose to Medium Dense, Silty Fine SAND (A-2-4), with little gravel		
	3,080.4	8.5	5	6	5										
3075	3,075.4	13.5	1	1	2								Soft, Brown, Fine Sandy SILT (A-4), with little gravel		
	3,070.4	18.5	8	62	38/0.2										
3065	3,068.4	20.5	60/0.1										WEATHERED ROCK Tan-Gray, (META-SANDSTONE)		
	3,068.3	20.6													
														CRISTALLINE ROCK Tan-Gray, (META-SANDSTONE) Boring Terminated with Standard Penetration Test Refusal at Elevation 3,068.3 ft In Crystalline Rock (META-SANDSTONE)	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 5/17/22

GEOTECHNICAL BORING REPORT

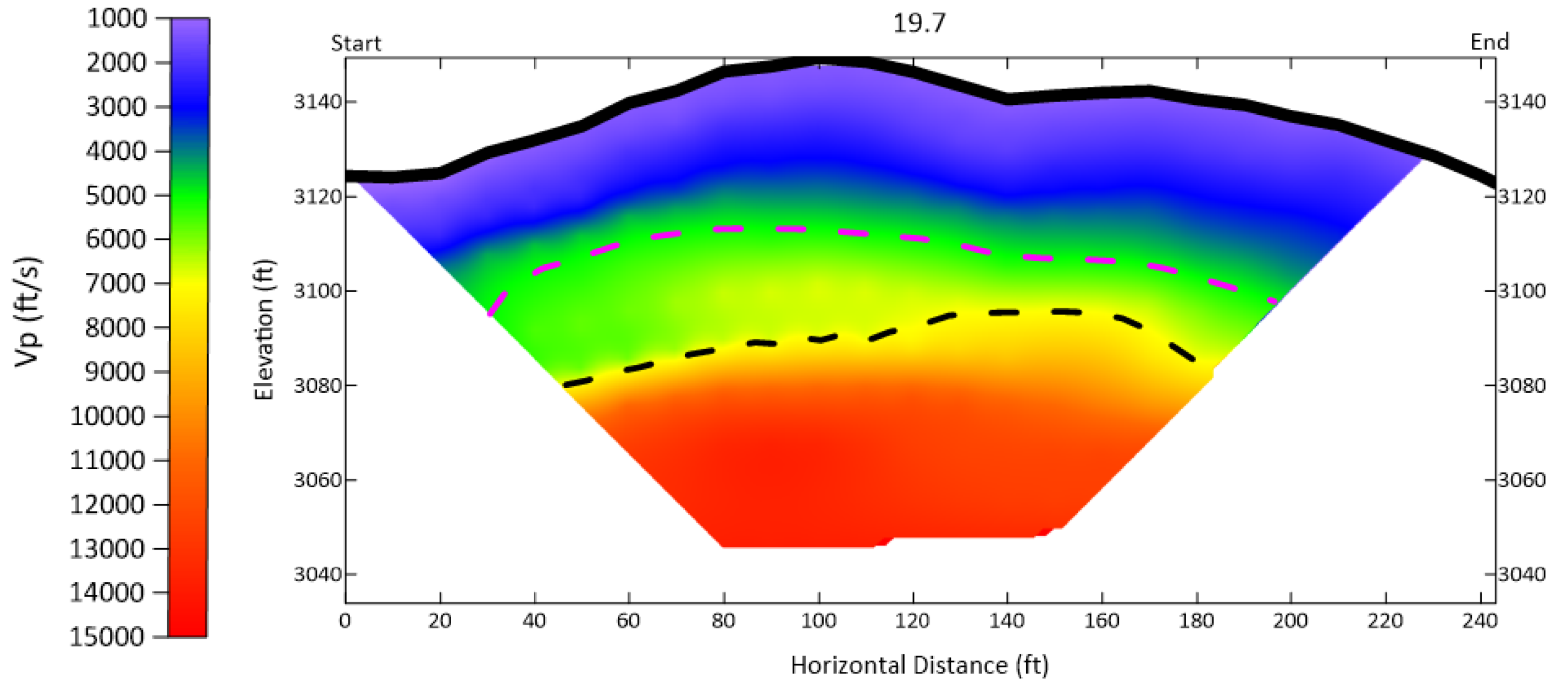
BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL29_B-2		STATION 395+00		OFFSET 28 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,077.4 ft		TOTAL DEPTH 29.2 ft		NORTHING 619,615		EASTING 594,443										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER J. Estep		START DATE 05/06/21		COMP. DATE 05/06/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
3080																
	3,076.4	1.0	9	8	9										3,077.4	0.0
3075	3,073.9	3.5	10	8	8											
	3,071.4	6.0	9	6	7											
3070	3,068.9	8.5	5	7	5											
	3,063.9	13.5	7	3	4											
3065	3,058.9	18.5	9	5	5											
3060	3,053.9	23.5	1	2	1											
	3,049.4	28.0													3,049.4	28.0
3050	3,048.2	29.2	100/0.3												3,048.2	29.2
			60/0.0													

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST C. Piercy										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL29_B-3		STATION 395+80		OFFSET 28 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,072.1 ft		TOTAL DEPTH 23.0 ft		NORTHING 619,669		EASTING 594,501										
DRILL RIG/HAMMER EFF./DATE BRE9533 OME-550X 78%/03/12/2021			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER J. Phillips		START DATE 05/06/21		COMP. DATE 05/06/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
3075																
	3,071.1	1.0	6	5	5										3,072.1	0.0
3070	3,068.6	3.5	5	12	11										3,071.3	0.8
	3,066.1	6.0	71	29/0.3												
3065	3,063.6	8.5	4	3	4											
	3,058.6	13.5	9	30	11											
3060	3,053.6	18.5	8	6	4											
3055	3,049.1	23.0														
			60/0.0													

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 5/17/22

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.7

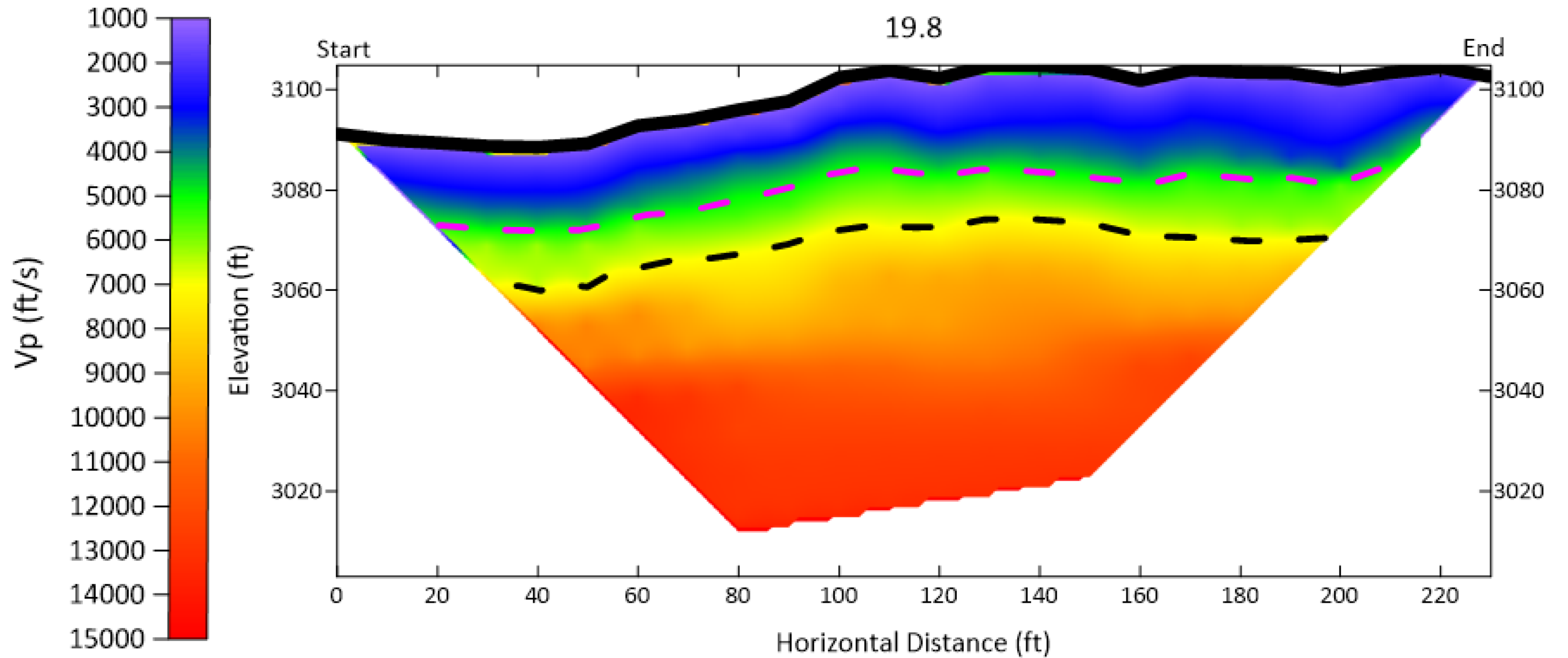


GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.8



GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

PROJECT: 32572.1.FS10 REFERENCE: A-0009CB

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CB	1	15

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	WALL ENVELOPE
5-10	CROSS SECTIONS
11-14	BORE LOGS
15	GEOPHYSICAL TEST RESULTS

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GRAHAM
 PROJECT DESCRIPTION UPGRADE NC 143 FROM SR 1223 (BEECH CREEK ROAD) TO 0.5 MILES NORTH OF APPALACHIAN TRAIL
 SITE DESCRIPTION RETAINING WALL #29A: SHORED MECHANICALLY STABILIZED EARTH (SMSE) WALL ON -L- FROM 396+75 RT TO 398+75 RT

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 EXPLORATION
 - BRECCIA
 - C. PIERCY
 - D. GOODNIGHT
 - GEL SOLUTIONS

INVESTIGATED BY CG2
 DRAWN BY M. BREWER, P.E.
 CHECKED BY R. KRAL, P.E.
 SUBMITTED BY M. BREWER, P.E.
 DATE MAY 2022

Prepared in the Office of:

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 CHARLOTTE, NC 28227
 (980) 339-8684

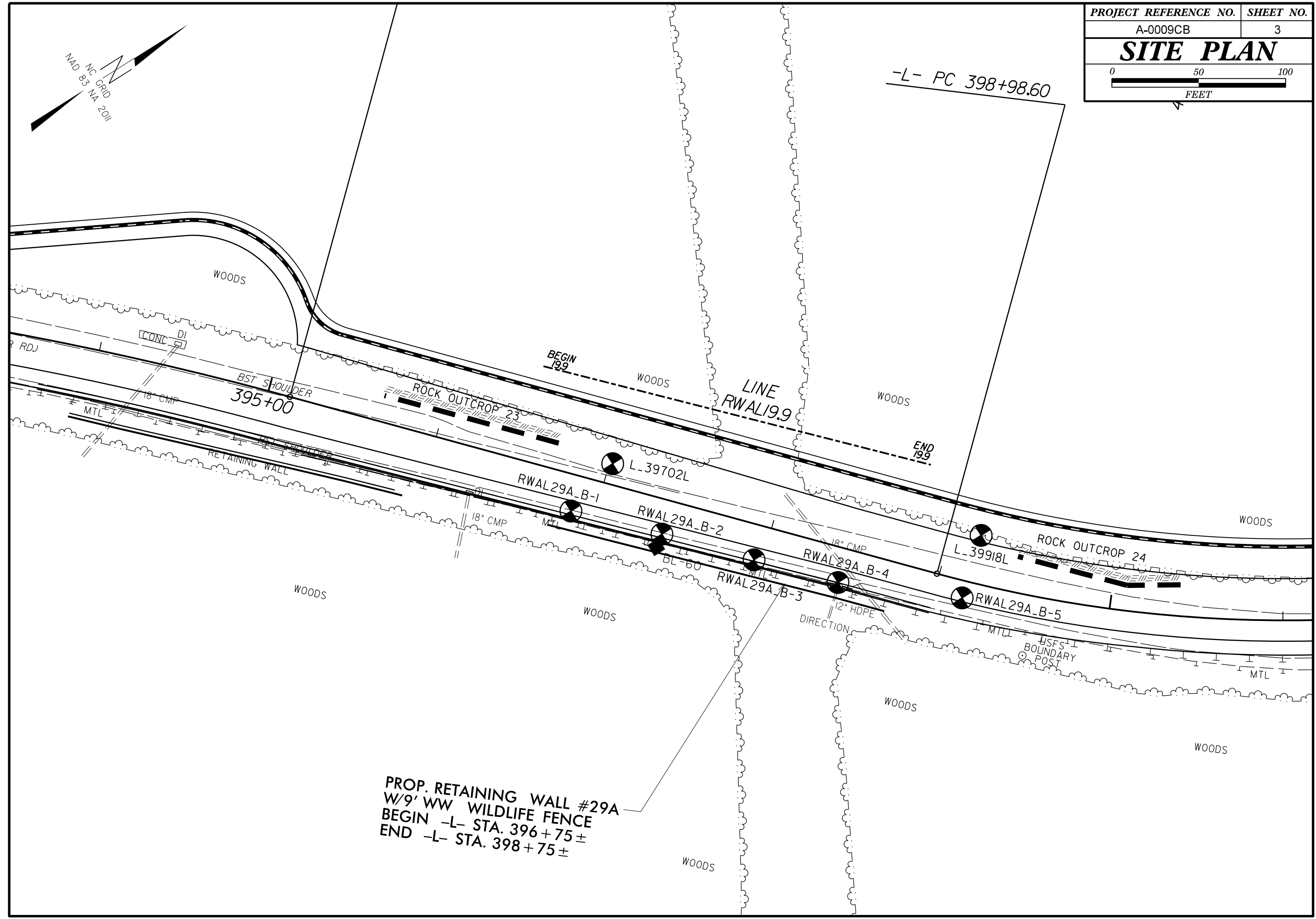
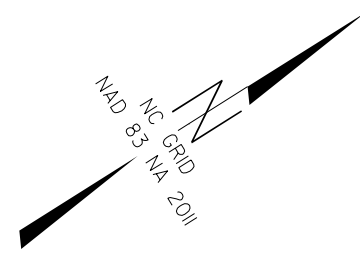


DocuSigned by:
D. Matthew Brewer 6/7/2022
 386129C0A4C1462
 SIGNATURE DATE

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

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

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																																													
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p>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.</p>										<p>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:</p>										<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT 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.</p>																																																																																																																																																																													
<p style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th colspan="5"></th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>51 MN 35 MX 35 MX</td> <td>35 MX 35 MX 35 MX</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td colspan="5">MUCK, PEAT</td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="11"></td> <td colspan="4">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="1">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="11"></td> <td colspan="4">FAIR TO POOR</td> <td colspan="1">POOR</td> <td colspan="1">UNSATURABLE</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. 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ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p style="text-align: center;">WEATHERING</p> <p>FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (IV 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.</p> <p>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.</p> <p>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.</p> <p>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></p> <p>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></p> <p>VERY SEVERE (IV SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i></p> <p>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.</p>																						
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<p style="text-align: center;">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE: RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED: GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED: SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p style="text-align: center;">NOTES:</p> <p>SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021</p>																																																																																																																																																																																																	
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PROP. RETAINING WALL #29A
W/9' WW WILDLIFE FENCE
BEGIN -L- STA. 396+75±
END -L- STA. 398+75±

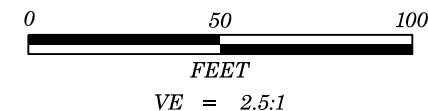


NOTE:
SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK LINES
ARE BASED ON AN INTERPRETATION OF BORE HOLE
AND SEISMIC REFRACTION DATA AND SHALL BE
CONSIDERED AS APPROXIMATE.

Prepared in the Office of:



CAROLINAS
 GEOTECHNICAL
 GROUP

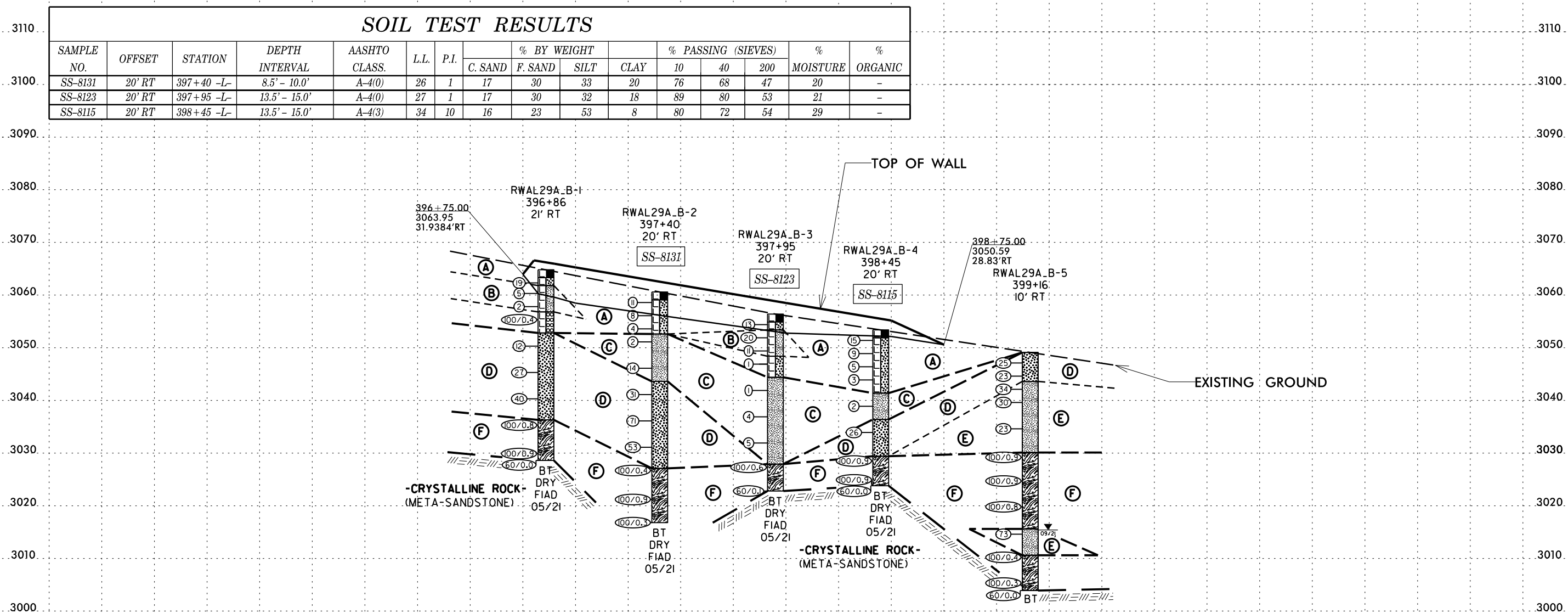


PROJECT REFERENCE NO. SHEET NO.

A-0009CB

4

RETAINING WALL #29A
 PROFILE BORINGS PROJECTED
 ALONG WALL ENVELOPE

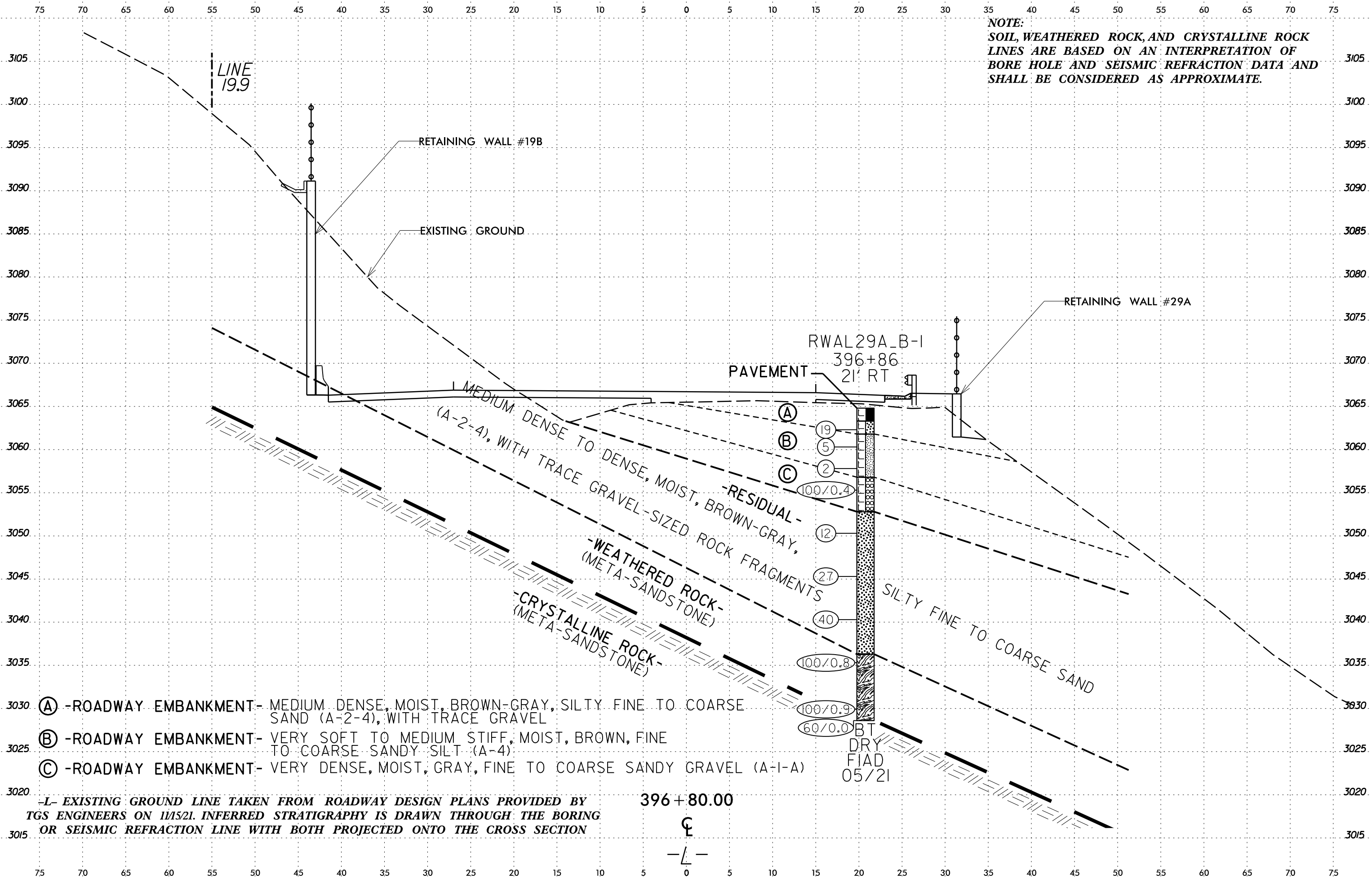


- (A) -ROADWAY EMBANKMENT- VERY LOOSE TO VERY DENSE, MOIST, BROWN-GRAY, SILTY, FINE TO COARSE SANDY GRAVEL (A-1-A) AND SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL
- (B) -ROADWAY EMBANKMENT- VERY SOFT TO VERY STIFF, MOIST, BROWN, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL
- (C) -COLLUVIAL- VERY SOFT TO STIFF, MOIST, BROWN-ORANGE, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL
- (D) -RESIDUAL- MEDIUM DENSE TO VERY DENSE, DRY TO MOIST, BROWN-GRAY-ORANGE-TAN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS
- (E) -RESIDUAL- VERY STIFF TO HARD, MOIST, TAN, FINE TO COARSE SANDY SILT (A-4), WITH TRACE MANGANESE OXIDE AND GRAVEL-SIZED ROCK FRAGMENTS
- (F) -WEATHERED ROCK- (META-SANDSTONE)

WALL ENVELOPE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS
ON 11/5/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH
PROJECTED ONTO THE PROFILE.

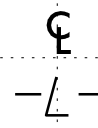
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 \$\$\$SUBSERIAL\$\$\$



- A -ROADWAY EMBANKMENT- MEDIUM DENSE, MOIST, BROWN-GRAY, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL
- B -ROADWAY EMBANKMENT- VERY SOFT TO MEDIUM STIFF, MOIST, BROWN, FINE TO COARSE SANDY SILT (A-4)
- C -ROADWAY EMBANKMENT- VERY DENSE, MOIST, GRAY, FINE TO COARSE SANDY GRAVEL (A-1-A)
- L** - EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/15/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

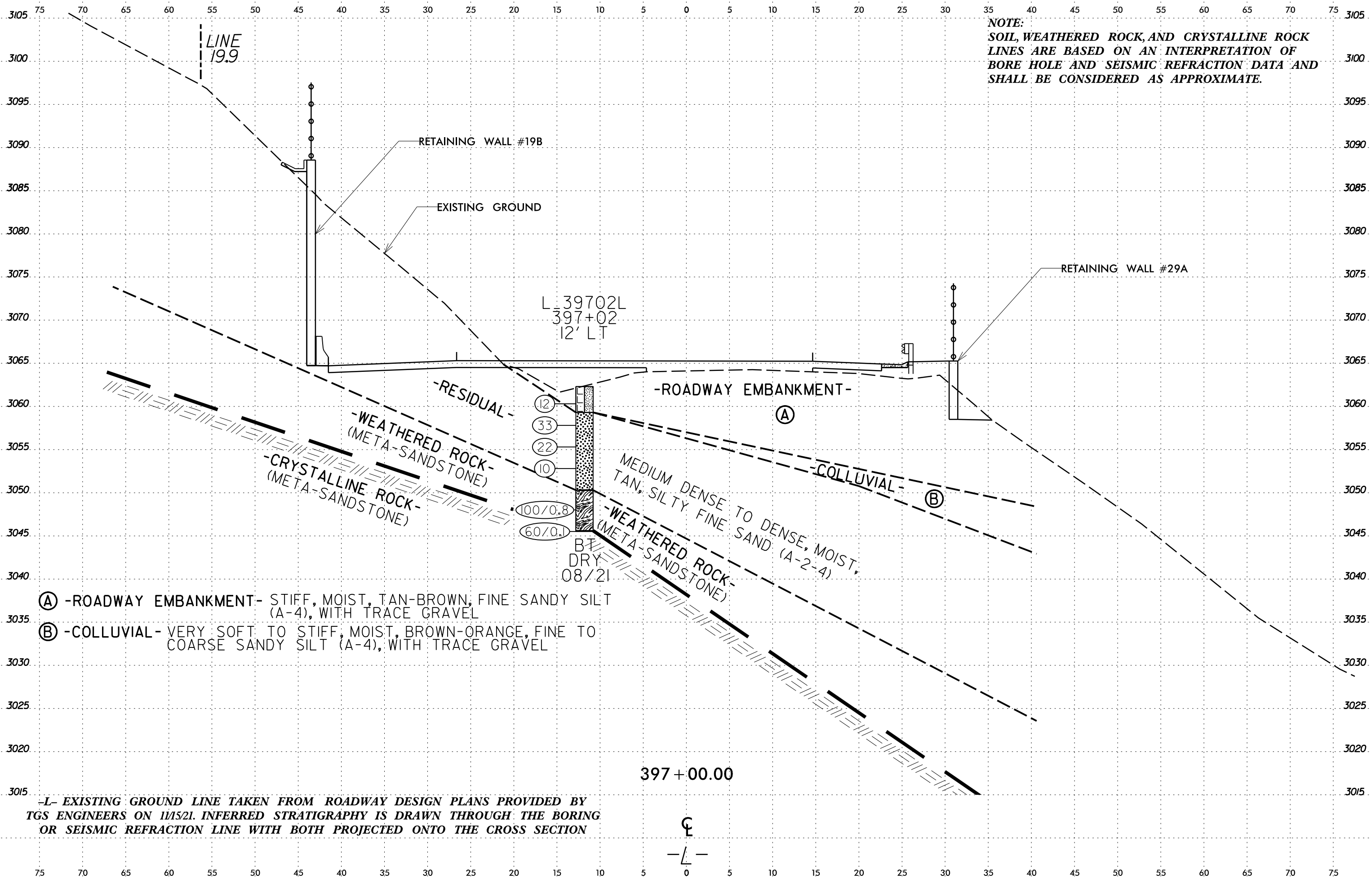
396 + 80.00



- A
- B
- C
- (100/0.4)
- (12)
- (27)
- (40)
- (100/0.8)
- (100/0.9)
- (60/0.0)

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19-MAY-2022 17:45
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NOTE:
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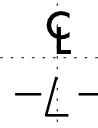
L-39702L
397+02
12' LT

B
DRY
08/21

- (A) -ROADWAY EMBANKMENT- STIFF, MOIST, TAN-BROWN, FINE SANDY SILT (A-4), WITH TRACE GRAVEL
- (B) -COLLUVIAL- VERY SOFT TO STIFF, MOIST, BROWN-ORANGE, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL

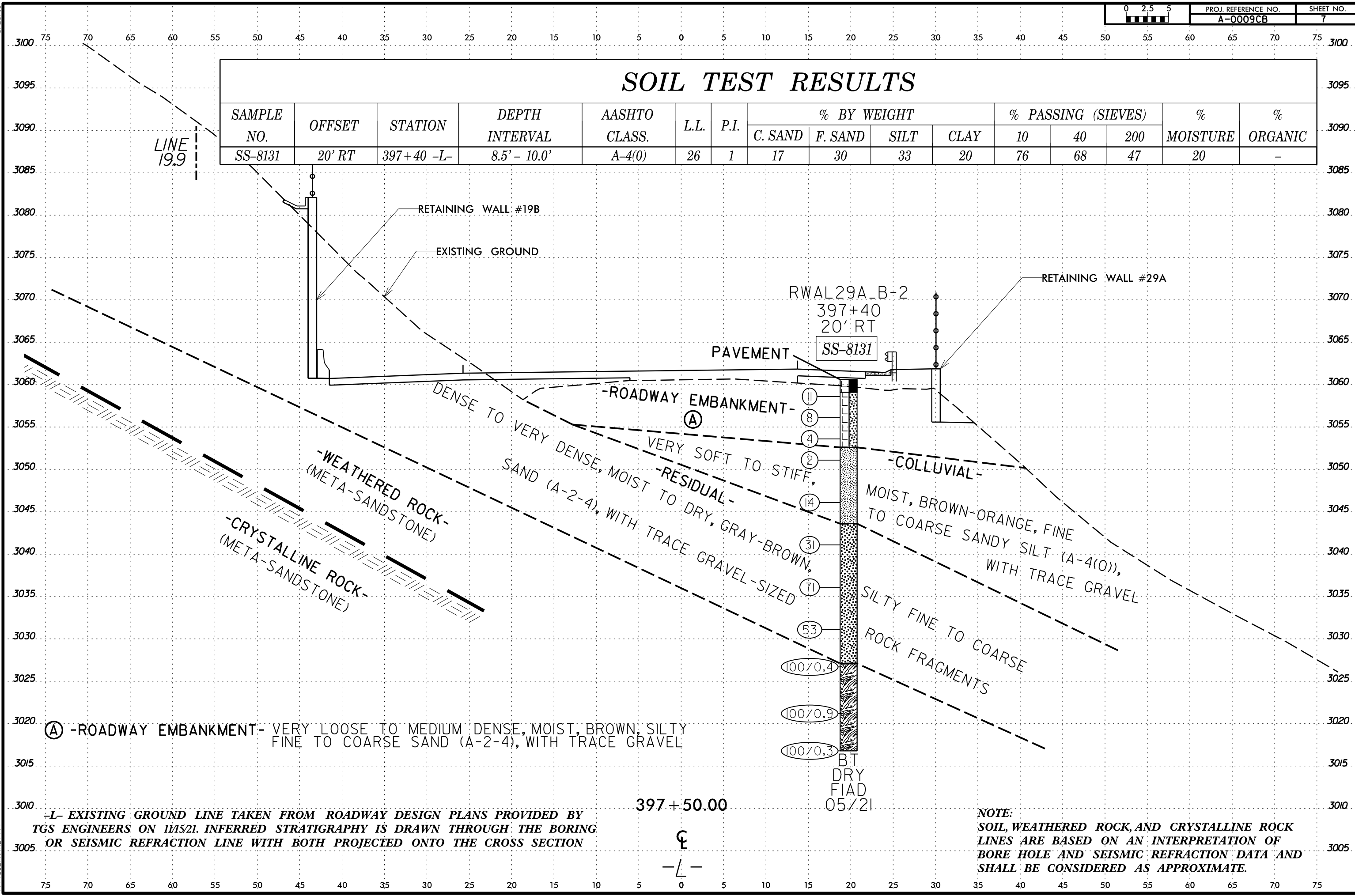
-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/15/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

397 + 00.00



SOIL TEST RESULTS

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		
SS-8131	20' RT	397+40 -L-	8.5' - 10.0'	A-4(0)	26	1	17	30	33	20	76	68	47	20	-



(A) -ROADWAY EMBANKMENT- VERY LOOSE TO MEDIUM DENSE, MOIST, BROWN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL

-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/5/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

NOTE: SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK LINES ARE BASED ON AN INTERPRETATION OF BORE HOLE AND SEISMIC REFRACTION DATA AND SHALL BE CONSIDERED AS APPROXIMATE.

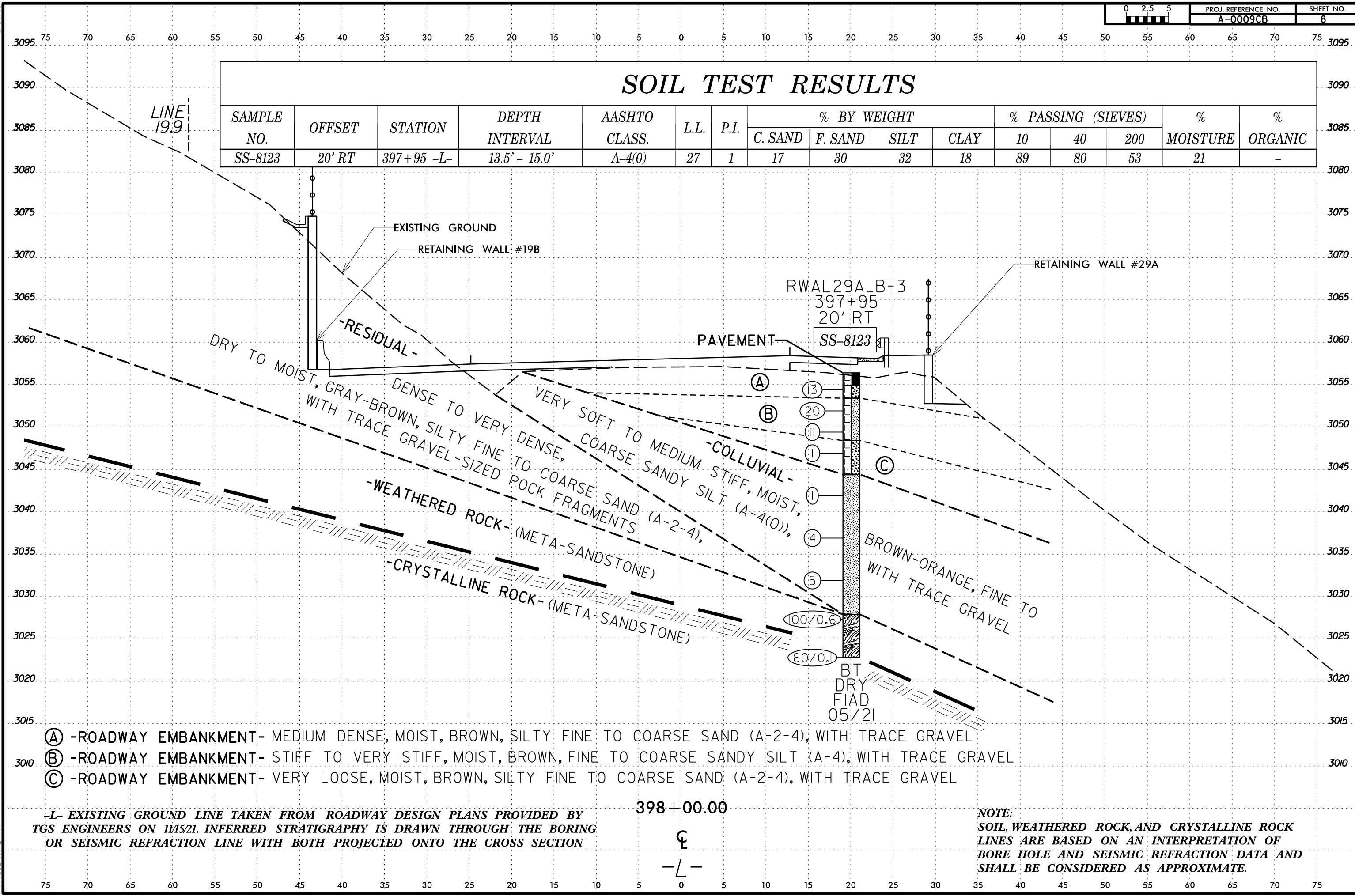
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 \$\$\$SUBSERIAL\$\$\$

SOIL TEST RESULTS

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		
SS-8123	20' RT	397+95 -L-	13.5' - 15.0'	A-4(0)	27	1	17	30	32	18	89	80	53	21	-



- (A) -ROADWAY EMBANKMENT- MEDIUM DENSE, MOIST, BROWN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL
- (B) -ROADWAY EMBANKMENT- STIFF TO VERY STIFF, MOIST, BROWN, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL
- (C) -ROADWAY EMBANKMENT- VERY LOOSE, MOIST, BROWN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL

-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/5/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING OR SEISMIC REFRACTION LINE WITH BOTH PROJECTED ONTO THE CROSS SECTION

398 + 00.00

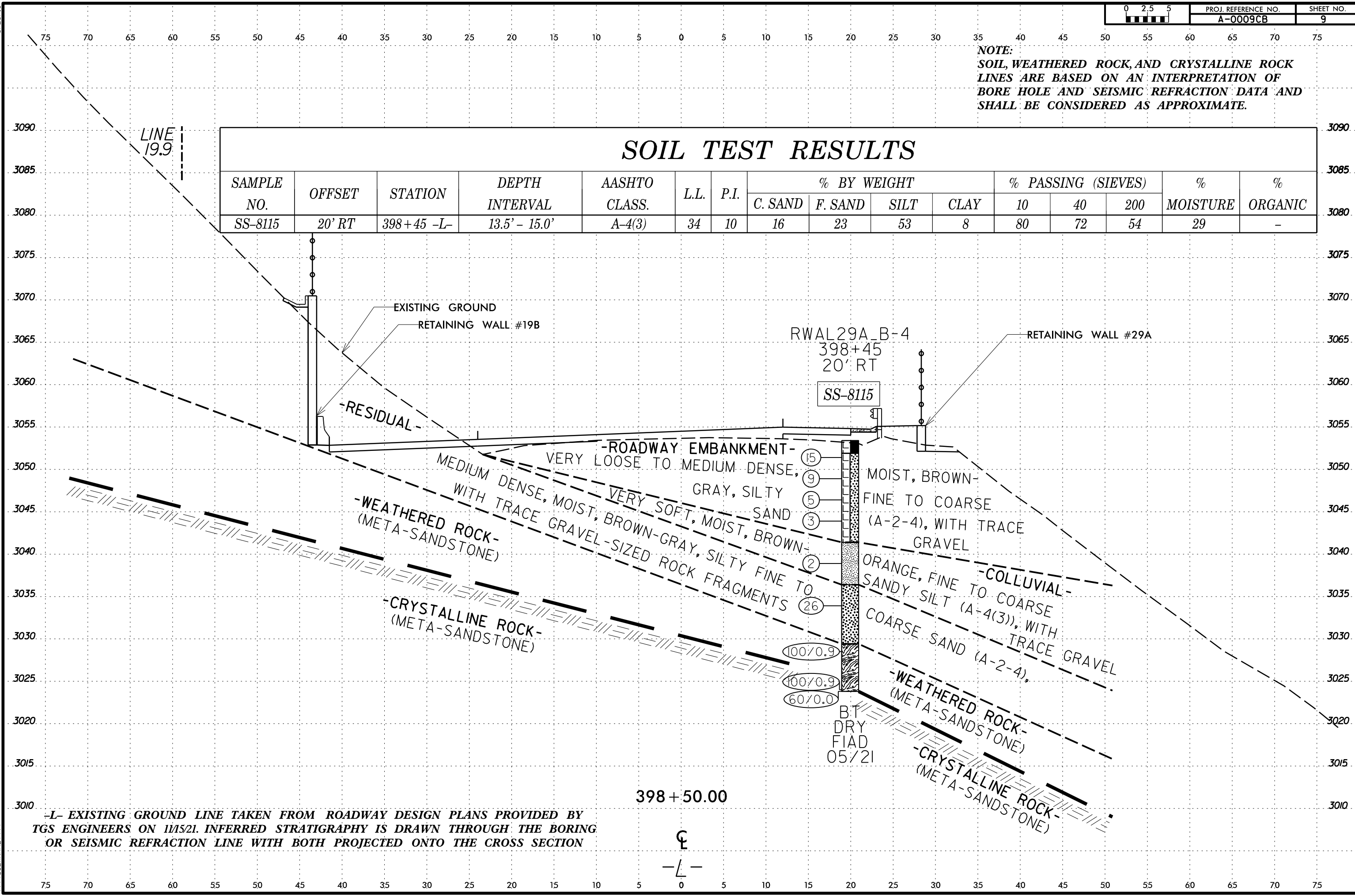
NOTE:
SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK LINES ARE BASED ON AN INTERPRETATION OF BORE HOLE AND SEISMIC REFRACTION DATA AND SHALL BE CONSIDERED AS APPROXIMATE.

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 \$\$\$SUBSERIAL\$\$\$

NOTE:
 SOIL, WEATHERED ROCK, AND CRYSTALLINE ROCK
 LINES ARE BASED ON AN INTERPRETATION OF
 BORE HOLE AND SEISMIC REFRACTION DATA AND
 SHALL BE CONSIDERED AS APPROXIMATE.

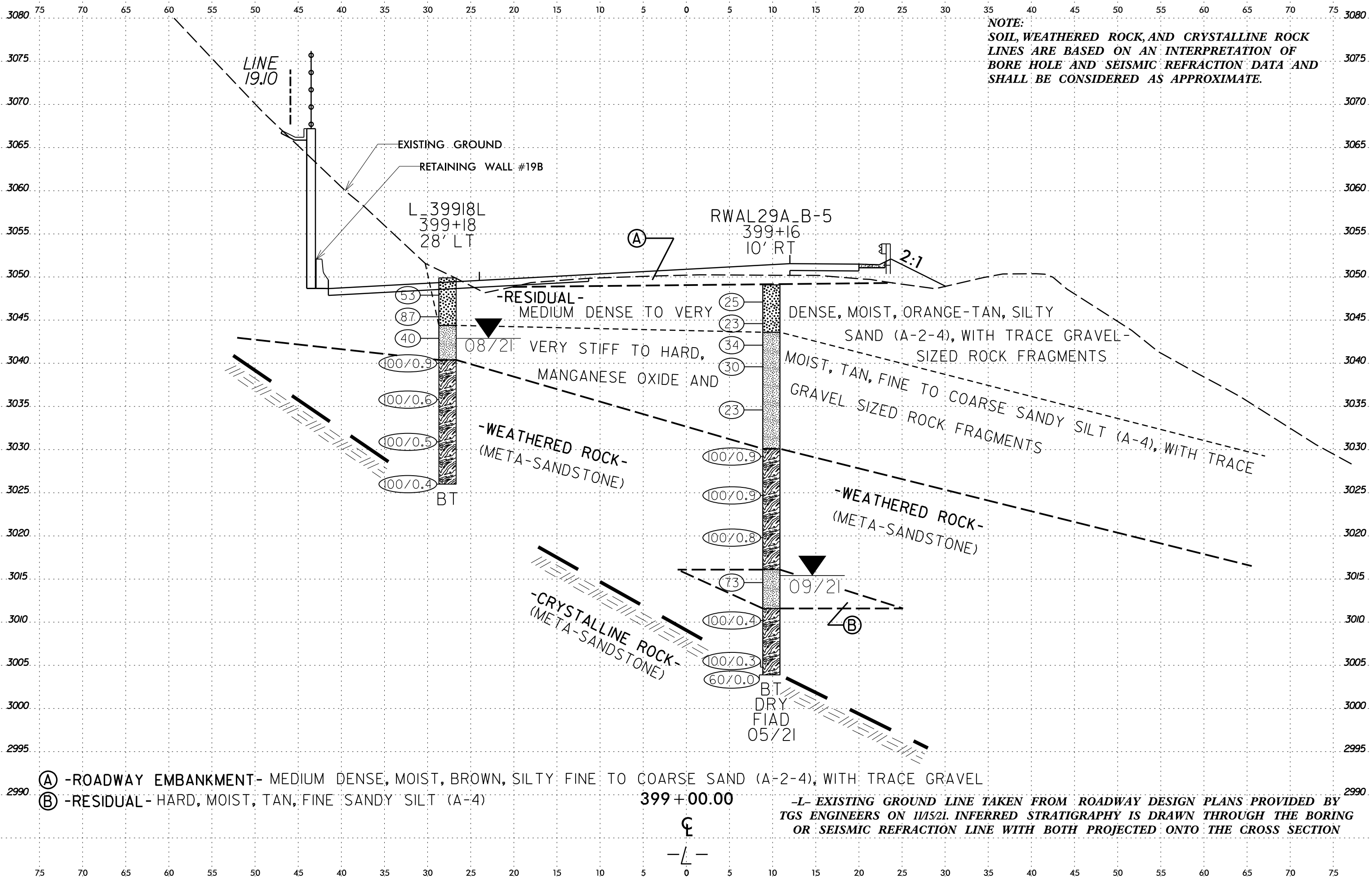
SOIL TEST RESULTS

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		
SS-8115	20' RT	398+45 -L-	13.5' - 15.0'	A-4(3)	34	10	16	23	53	8	80	72	54	29	-



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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST M. Brewer									
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)								
BORING NO. RWAL29_B-1		STATION 393+91		OFFSET 28 ft RT		ALIGNMENT L									
COLLAR ELEV. 3,085.0 ft		TOTAL DEPTH 38.5 ft		NORTHING 619,540		EASTING 594,366									
DRILL RIG/HAMMER EFF./DATE CG29473 CME-550 79% 03/12/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Estep		START DATE 05/05/21		COMP. DATE 05/05/21		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3085	3,084.0	1.0	9	8	5								GROUND SURFACE	0.0	
3080	3,081.5	3.5	25	8	9								ROADWAY EMBANKMENT Medium Stiff to Hard, Brown-Tan-Orange-Gray, Fine to Coarse Sandy SILT (A-4), with trace to little gravel		
	3,079.0	6.0	2	2	5										
3075	3,076.5	8.5	5	6	7								RESIDUAL Very Stiff, Gray, Fine to Coarse Sandy SILT (A-4), with trace gravel-sized rock fragments		
	3,071.5	13.5	72	28/0.2											
3065	3,066.5	18.5	18	9	16								WEATHERED ROCK Gray-Orange-Brown, (META-SANDSTONE)		
	3,061.5	23.5	27	10	13										
3055	3,056.5	28.5	31	20	16								Dense, Gray-Orange, Silty, Gravelly Fine to Coarse SAND (A-1-b)		
	3,051.5	33.5	57	43/0.1											
3050	3,046.5	38.5	60/0.0										WEATHERED ROCK Gray-Orange-Brown, (META-SANDSTONE)		
														Boring Terminated with Standard Penetration Test Refusal at Elevation 3,046.5 ft On Crystalline Rock (META-SANDSTONE)	

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST D. Goodnight									
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)								
BORING NO. L_39432L		STATION 394+32		OFFSET 40 ft LT		ALIGNMENT L									
COLLAR ELEV. 3,088.9 ft		TOTAL DEPTH 20.6 ft		NORTHING 619,617		EASTING 594,346									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 76% 06/14/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Odom		START DATE 12/14/21		COMP. DATE 12/14/21		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3090	3,088.9	0.0											GROUND SURFACE	0.0	
3085	3,087.9	1.0	3	20	10								COLLUVIAL Very Stiff, Tan, Fine Sandy SILT (A-4), with little gravel		
	3,085.4	3.5	2	2	2										
3080	3,082.9	6.0	5	5	3								Loose to Medium Dense, Silty Fine SAND (A-2-4), with little gravel		
	3,080.4	8.5	5	6	5										
3075	3,075.4	13.5	1	1	2								Soft, Brown, Fine Sandy SILT (A-4), with little gravel		
	3,070.4	18.5	8	62	38/0.2										
3065	3,068.4	20.5	60/0.1										WEATHERED ROCK Tan-Gray, (META-SANDSTONE)		
	3,068.3	20.6													
														CRISTALLINE ROCK Tan-Gray, (META-SANDSTONE) Boring Terminated with Standard Penetration Test Refusal at Elevation 3,068.3 ft In Crystalline Rock (META-SANDSTONE)	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 5/17/22

GEOTECHNICAL BORING REPORT

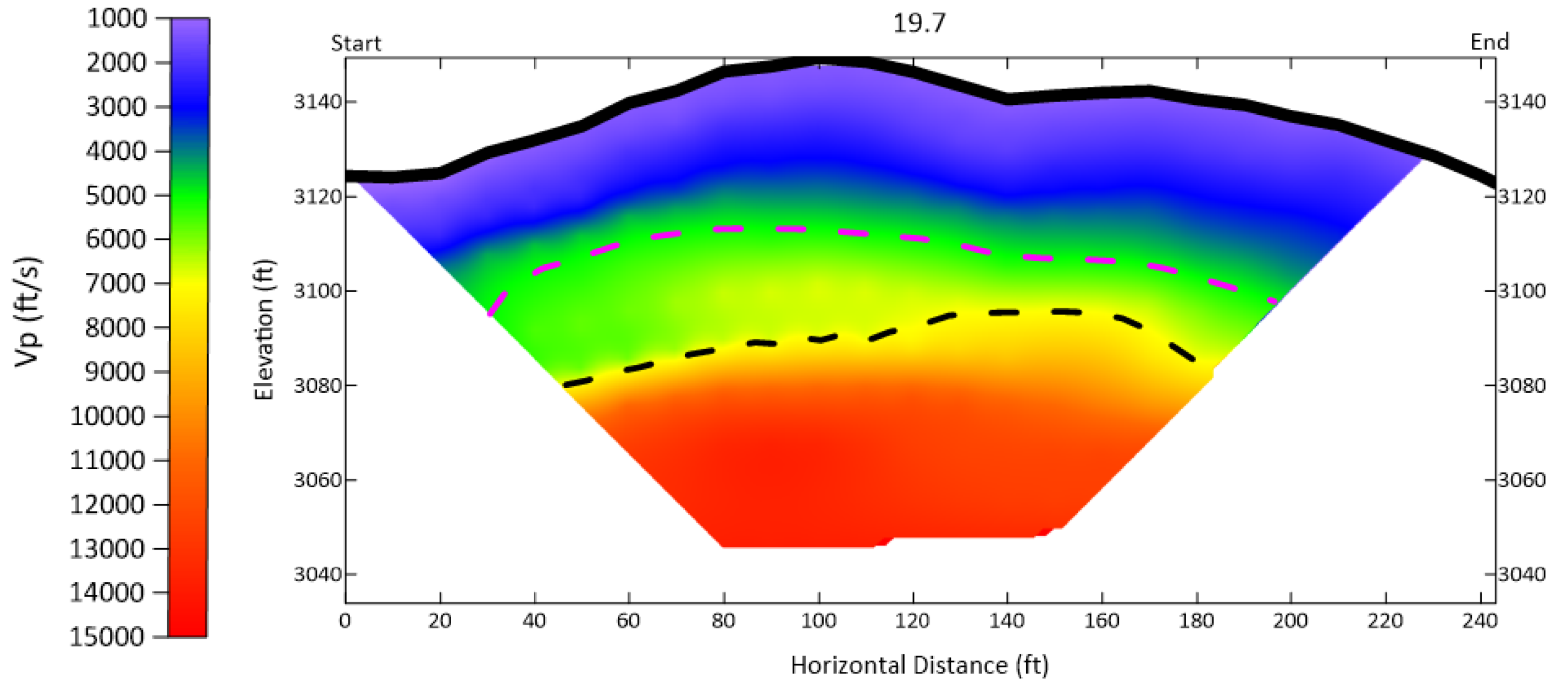
BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL29_B-2		STATION 395+00		OFFSET 28 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,077.4 ft		TOTAL DEPTH 29.2 ft		NORTHING 619,615		EASTING 594,443										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER J. Estep		START DATE 05/06/21		COMP. DATE 05/06/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
3080																
	3,076.4	1.0	9	8	9										3,077.4	0.0
3075	3,073.9	3.5	10	8	8											
	3,071.4	6.0	9	6	7											
3070	3,068.9	8.5	5	7	5											
	3,063.9	13.5	7	3	4											
3065	3,058.9	18.5	9	5	5											
3060	3,053.9	23.5	1	2	1											
3055	3,049.4	28.0														
3050	3,048.2	29.2	100/0.3													
			60/0.0													

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST C. Piercy										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL29_B-3		STATION 395+80		OFFSET 28 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,072.1 ft		TOTAL DEPTH 23.0 ft		NORTHING 619,669		EASTING 594,501										
DRILL RIG/HAMMER EFF./DATE BRE9533 OME-550X 78%/03/12/2021			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER J. Phillips		START DATE 05/06/21		COMP. DATE 05/06/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
3075																
	3,071.1	1.0	6	5	5										3,072.1	0.0
3070	3,068.6	3.5	5	12	11										3,071.3	0.8
	3,066.1	6.0	71	29/0.3												
3065	3,063.6	8.5	4	3	4											
	3,058.6	13.5	9	30	11											
3060	3,053.6	18.5	8	6	4											
3055	3,049.1	23.0														
3050			60/0.0													

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 5/17/22

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.7

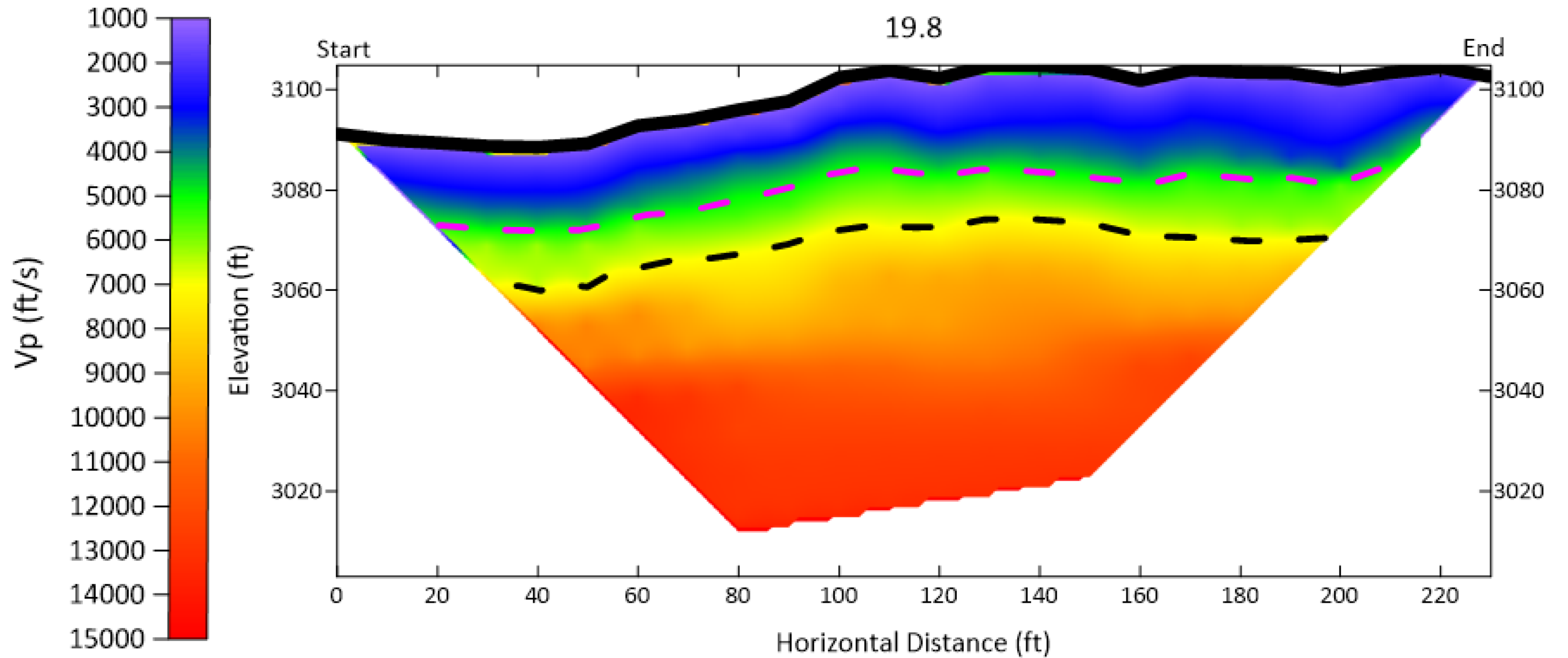


GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/1/2021

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.8



GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

REFERENCE: A-0009CB

PROJECT: 32572.1.FS10

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CB	1	7

STRUCTURE
SUBSURFACE INVESTIGATION

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	WALL ENVELOPE
5-6	CROSS SECTIONS
7	BORE LOGS

COUNTY GRAHAM

PROJECT DESCRIPTION UPGRADE NC 143 FROM SR 1223 (BEECH CREEK ROAD) TO 0.5 MILES NORTH OF APPALACHIAN TRAIL

SITE DESCRIPTION RETAINING WALL #38: CAST-IN-PLACE CONCRETE WALL ON -L- FROM 319+29 RT TO 321+08 RT

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 EXPLORATION
S. BRAUN

INVESTIGATED BY CG2
DRAWN BY M. BREWER, P.E.
CHECKED BY R. KRAL, P.E.
SUBMITTED BY M. BREWER, P.E.
DATE MAY 2022

Prepared in the Office of:
CG2 CAROLINAS GEOTECHNICAL GROUP
2400 CROWNPOINT EXECUTIVE DRIVE
SUITE 800
CHARLOTTE, NC 28227
(980) 339-8684



DocuSigned by:
Donald Brewer 05/06/2022
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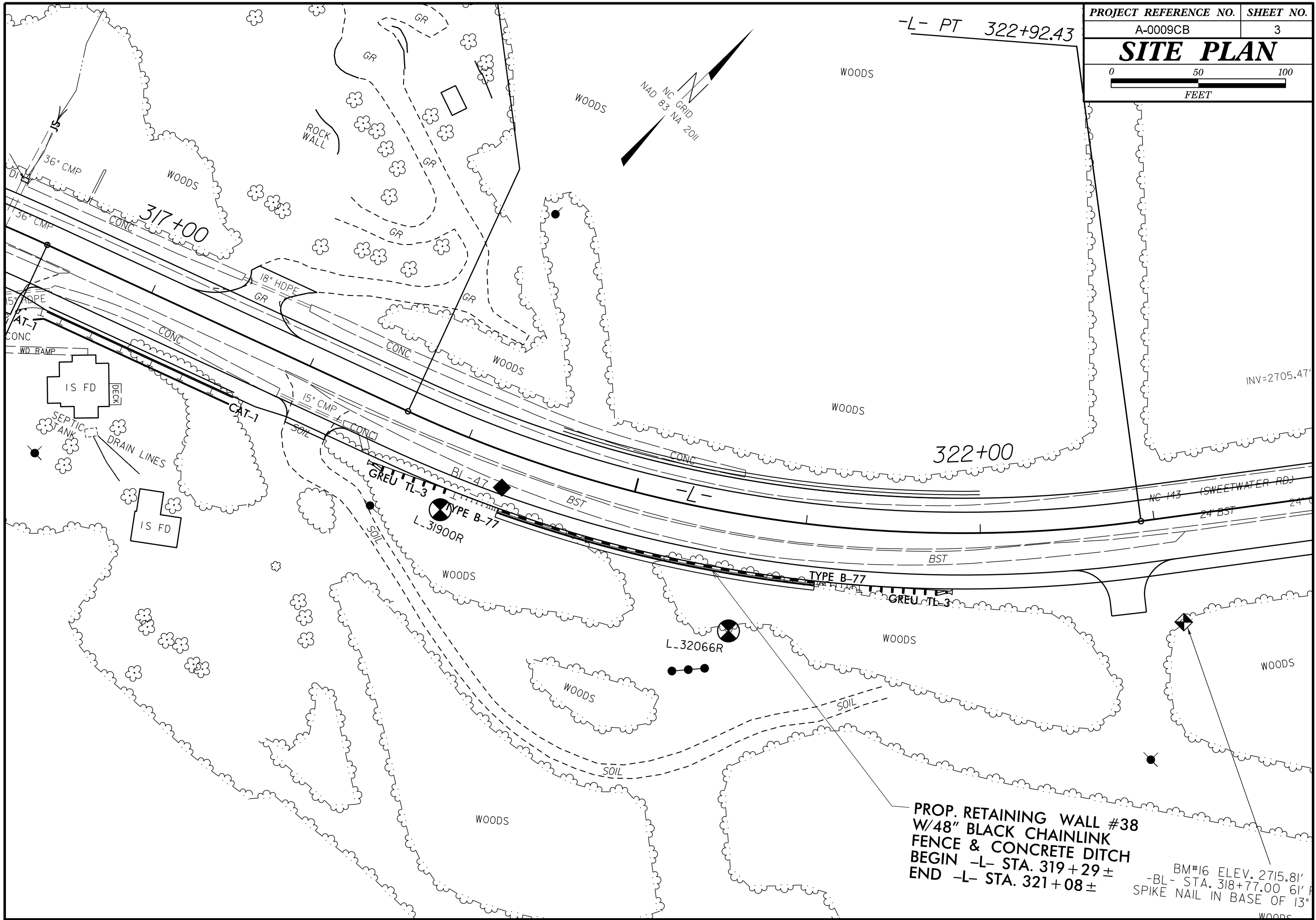
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

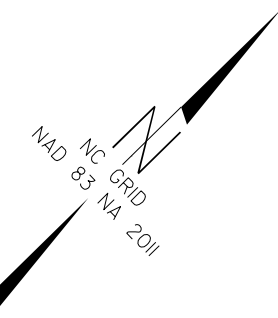
SUBSURFACE INVESTIGATION

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 DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENISE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT 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																																																																																									
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th></th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>NON PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table>					PLASTICITY INDEX (PI)	DRY STRENGTH	NON PLASTIC	0-5	VERY LOW	SLIGHTLY PLASTIC	6-15					SLIGHT	MODERATELY PLASTIC	16-25	MEDIUM	HIGHLY PLASTIC	26 OR MORE	HIGH	<input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550X <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> DIEDRICH D50				DRILL UNITS: <input type="checkbox"/> ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT <input type="checkbox"/> HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																																																		
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HIGHLY PLASTIC	26 OR MORE	HIGH																																																																																															
COLOR				NOTES:				INDURATION																																																																																									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.				SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021				INDURATION																																																																																									
												DATE: 8-15-14																																																																																					



-L- PT 322+92.43



317+00

322+00

INV=2705.47'

NC 143 (SWEETWATER RD)
24' BST

IS FD

IS FD

GREU TL-3
RI-47
TYPE B-77
L-31900R

L-32066R

TYPE B-77
GREU TL-3

PROP. RETAINING WALL #38
W/48" BLACK CHAINLINK
FENCE & CONCRETE DITCH
BEGIN -L- STA. 319+29±
END -L- STA. 321+08±

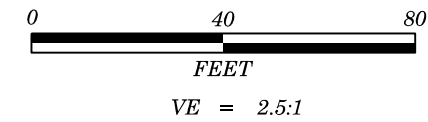
BM#16 ELEV. 2715.81'
 -BL- STA. 318+77.00 61'
 SPIKE NAIL IN BASE OF 13"



Prepared in the Office of:



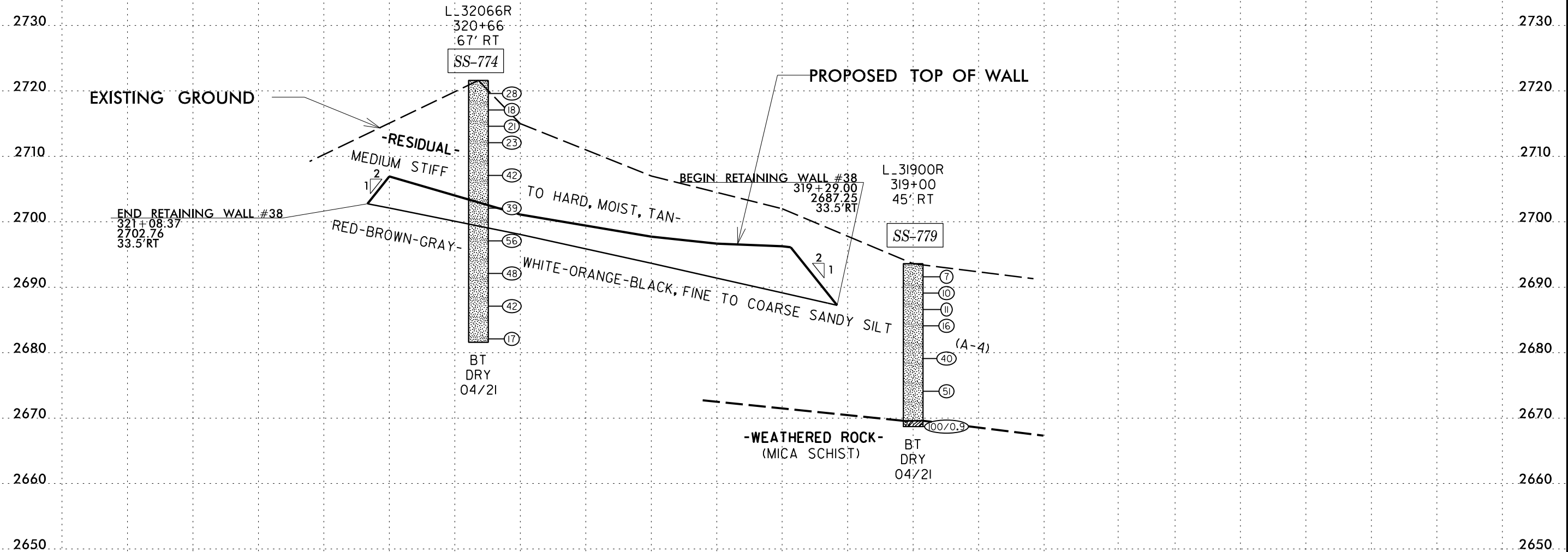
CAROLINAS
GEOTECHNICAL
GROUP



PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	4
RETAINING WALL #38 PROFILE BORINGS PROJECTED ALONG WALL ENVELOPE	

SOIL TEST RESULTS

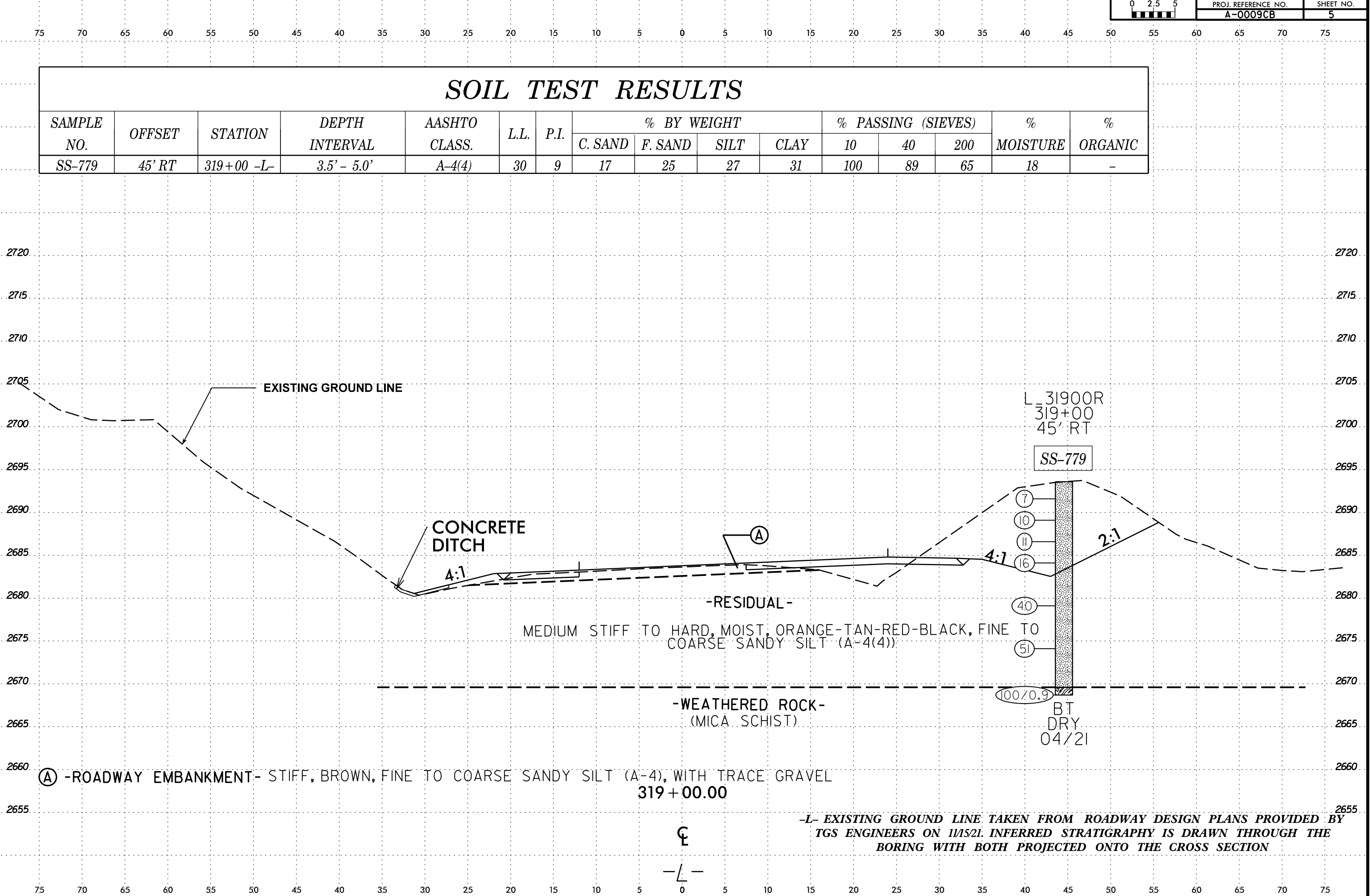
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-779	45' RT	319+00 -L-	3.5' - 5.0'	A-4(4)	30	9	17	25	27	31	100	89	65	18	-
SS-774	67' RT	320+66 -L-	23.5' - 25.0'	A-4(0)	10	NP	19	43	30	8	100	89	50	15	-



WALL ENVELOPE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/5/21.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE
PROFILE. EXISTING GROUND LINE IS DRAWN BORING TO BORING.

SOIL TEST RESULTS

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		
SS-779	45' RT	319+00 -L-	3.5' - 5.0'	A-4(4)	30	9	17	25	27	31	100	89	65	18	-



-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/5/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

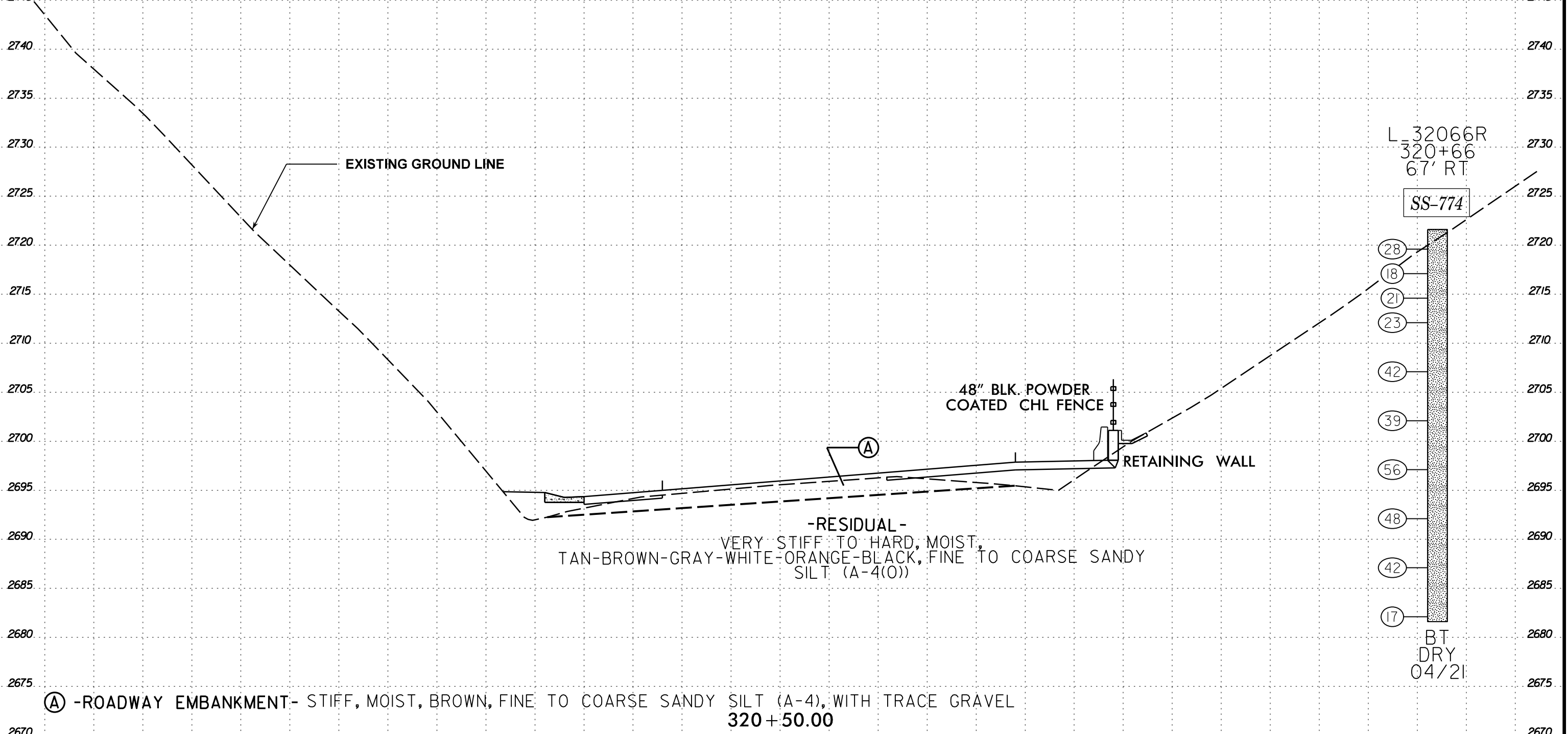
6/23/16
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 \$\$\$USERNAME\$\$\$

2760 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 2760

SOIL TEST RESULTS

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		
SS-774	67' RT	320+66 -L-	23.5' - 25.0'	A-4(0)	10	NP	19	43	30	8	100	89	50	15	-



L_32066R
 320+66
 67' RT
 SS-774

- (28)
- (18)
- (21)
- (23)
- (42)
- (39)
- (56)
- (48)
- (42)
- (17)

BT
 DRY
 04/21

(A) -ROADWAY EMBANKMENT- STIFF, MOIST, BROWN, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL
 320+50.00

-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY
 TGS ENGINEERS ON 11/5/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE
 BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

2670 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 2670

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. L_31900R		STATION 319+00		OFFSET 45 ft RT		ALIGNMENT L										
COLLAR ELEV. 2,693.6 ft		TOTAL DEPTH 24.9 ft		NORTHING 621,154		EASTING 591,905										
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 04/29/21		COMP. DATE 04/29/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2695																
	2,692.6	1.0	4	3	4										2,693.6	0.0
2690	2,690.1	3.5	2	3	7											
	2,687.6	6.0	4	4	7											
2685	2,685.1	8.5	5	8	8											
	2,680.1	13.5	7	17	23											
2675	2,675.1	18.5	16	23	28											
	2,670.1	23.5	4	23	77/0.4											
2670	2,670.1	23.5	4	23	77/0.4											
															2,669.6	24.0
															2,668.7	24.9
WEATHERED ROCK Tan-Gray, (MICA SCHIST) Boring Terminated at Elevation 2,668.7 ft In Weathered Rock (MICA SCHIST)																

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. L_32066R		STATION 320+66		OFFSET 67 ft RT		ALIGNMENT L										
COLLAR ELEV. 2,721.6 ft		TOTAL DEPTH 40.0 ft		NORTHING 621,223		EASTING 592,070										
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 04/29/21		COMP. DATE 04/29/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2725																
	2,720.6	1.0	20	18	10										2,721.6	0.0
2720	2,718.1	3.5	8	8	10											
	2,715.6	6.0	8	6	15											
2715	2,713.1	8.5	9	10	13											
	2,708.1	13.5	14	19	23											
2710	2,703.1	18.5	13	11	28											
	2,698.1	23.5	23	26	30											
2695	2,693.1	28.5	13	19	29											
	2,688.1	33.5	14	20	22											
2690	2,683.1	38.5	5	8	9											
2685																
															2,681.6	40.0
Boring Terminated at Elevation 2,681.6 ft In Residual Sandy Silt (A-4)																

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ_NC_DOT.GDT 4/26/22

REFERENCE: A-0009CB

PROJECT: 32572.1.FS10

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	WALL ENVELOPE
5-7	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GRAHAM
 PROJECT DESCRIPTION UPGRADE NC 143 FROM SR 1223 (BEECH CREEK ROAD) TO 0.5 MILES NORTH OF APPALACHIAN TRAIL
 SITE DESCRIPTION RETAINING WALL #7: CAST-IN-PLACE CONCRETE WALL ON -L- FROM 269+25 RT TO 272+19 RT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CB	1	7

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 EXPLORATION
S. BRAUN
N. MCLAREN

INVESTIGATED BY CG2
 DRAWN BY M. BREWER, P.E.
 CHECKED BY R. KRAL, P.E.
 SUBMITTED BY M. BREWER, P.E.
 DATE MAY 2022

Prepared in the Office of:
 **CAROLINAS GEOTECHNICAL GROUP**
 2400 CROWNPOINT EXECUTIVE DRIVE
 SUITE 800
 CHARLOTTE, NC 28227
 (980) 339-8684



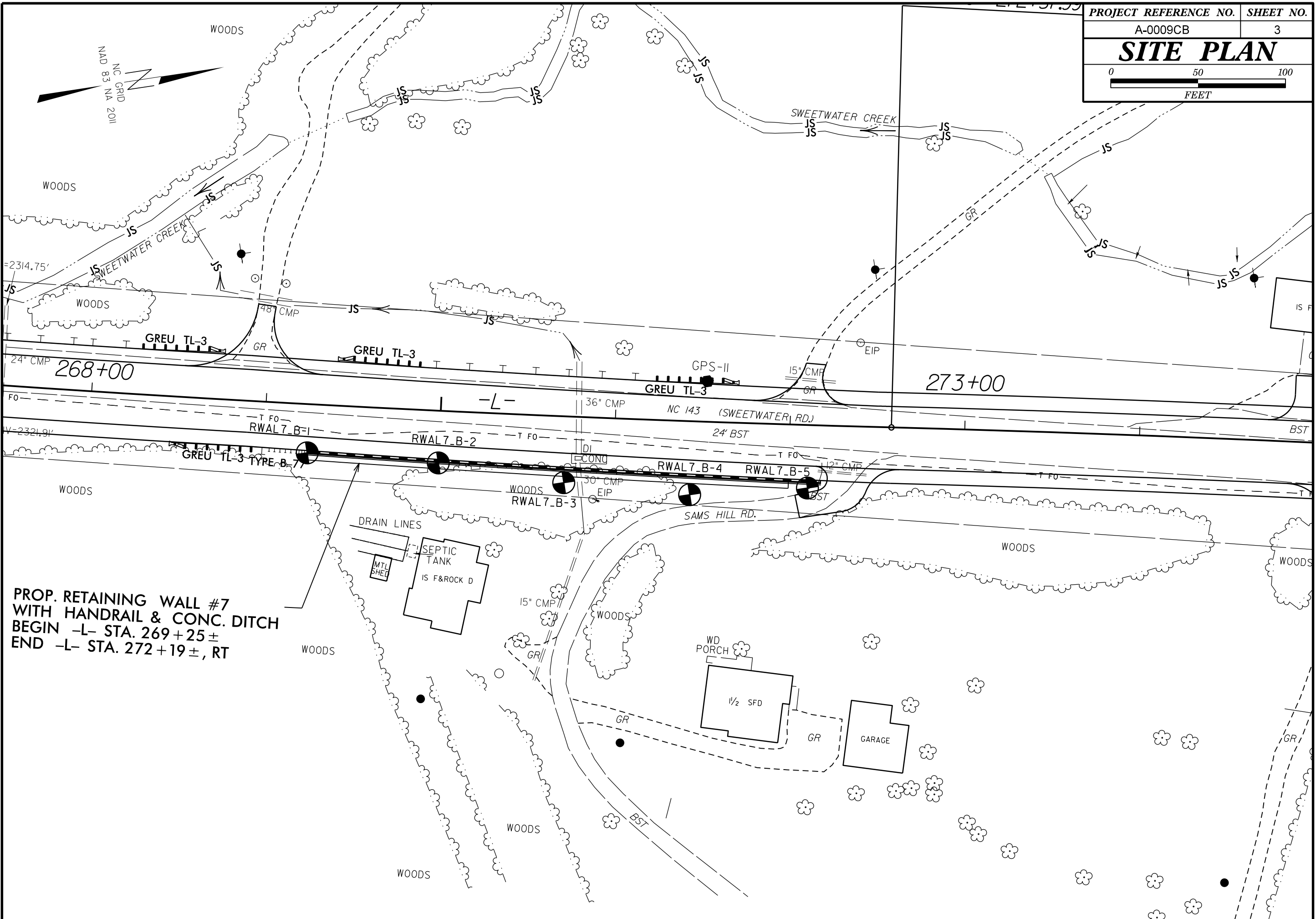
DocuSigned by:

 386129C0A4C1462
 SIGNATURE DATE 05/06/2022

**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 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6						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 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 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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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 (SCREC.) - 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 GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS 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 SYMBOL % PASSING #10 #40 #200 MATERIAL PASSING #40 LL PI GROUP INDEX USUAL TYPES OF MAJOR MATERIALS GEN. RATING AS SUBGRADE PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30						GRADATION ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE				ROCK DESCRIPTION WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP) WEATHERING FRESH VERY SLIGHT (IV SLI.) SLIGHT (SLI.) MODERATE (MOD.) MODERATELY SEVERE (MOD. SEV.) SEVERE (SEV.) VERY SEVERE (IV SEV.) COMPLETE						TERMS AND DEFINITIONS ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND 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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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 (SCREC.) - 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.					
CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) GENERALLY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE 4 TO 10 4 TO 10 MEDIUM DENSE 10 TO 30 DENSE 30 TO 50 VERY DENSE > 50 N/A GENERALLY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT < 2 0.25 TO 0.5 SOFT 2 TO 4 0.5 TO 1.0 MEDIUM STIFF 4 TO 8 1 TO 2 STIFF 8 TO 15 2 TO 4 VERY STIFF 15 TO 30 > 4 HARD > 30 > 4						MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE				ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROUDED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1/8 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROUDED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.											
TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053 BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3						RECOMMENDATION SYMBOLS UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK				ABBREVIATIONS AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL - CLAY MOD. - MODERATELY U - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC W - DRY UNIT WEIGHT CSE - COARSE ORG. - ORGANIC SAMPLE ABBREVIATIONS DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST S - BULK DPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC SD. - SAND, SANDY SS - SPLIT SPOON e - VOID RATIO SL. - SILTY SLI. - SLIGHTLY ST - SHELBY TUBE F - FINE FOSS. - FOSSILIFEROUS TCR - TRICONE REFUSAL RS - ROCK FRAC. - FRACTURED, FRACTURES // - MOISTURE CONTENT RT - RECOMPACTED TRIAXIAL FRAGS. - FRAGMENTS HI. - HIGHLY V - VERY CBR - CALIFORNIA BEARING RATIO											
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL LIQUID LIMIT PLASTIC RANGE (PI) PL PLASTIC LIMIT OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE						EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST DIEDRICH D50 ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE *STEEL TEETH TRICONE *TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B H N HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST				FRACTURE SPACING TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET BEDDING TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.											
PLASTICITY NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC PLASTICITY INDEX (PI) VERY LOW SLIGHT MEDIUM HIGH DRY STRENGTH						COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.				ELEVATION: FEET NOTES: SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021											



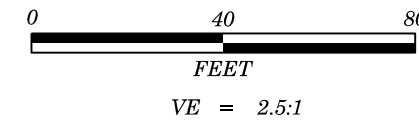
**PROP. RETAINING WALL #7
WITH HANDRAIL & CONC. DITCH
BEGIN -L- STA. 269+25±
END -L- STA. 272+19±, RT**



Prepared in the Office of:



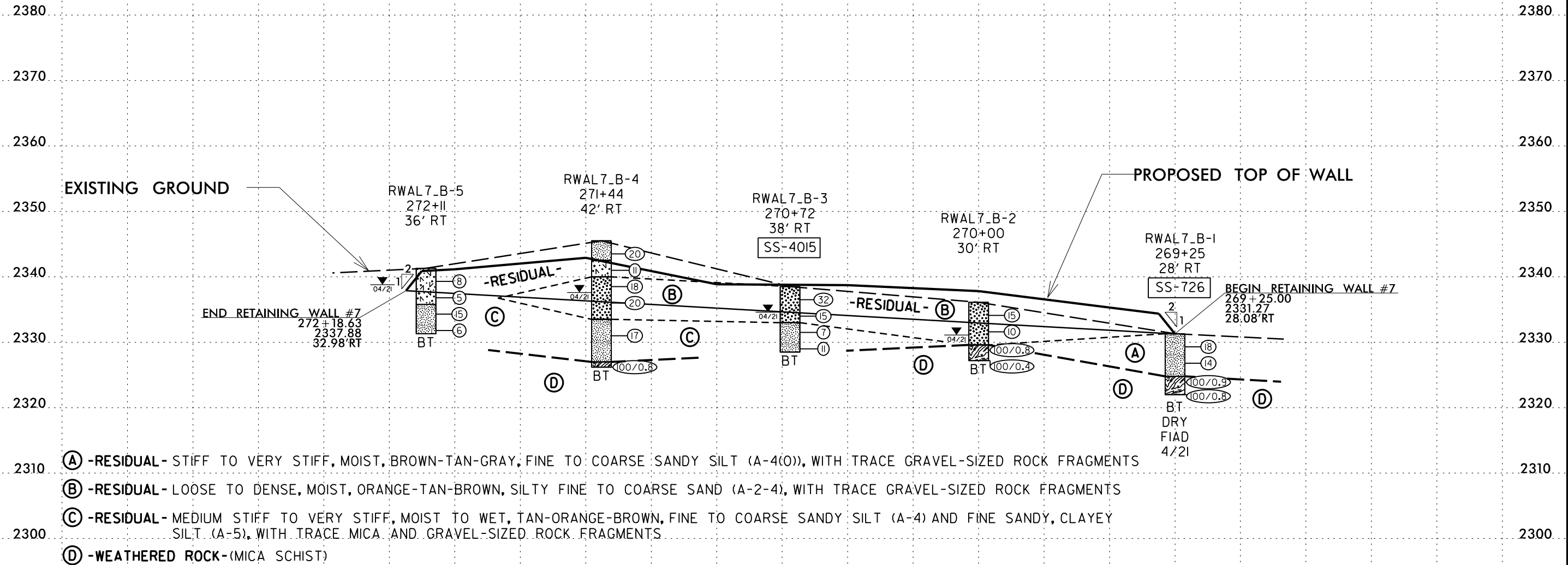
CAROLINAS
GEOTECHNICAL
GROUP



PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	4
RETAINING WALL #7 PROFILE BORINGS PROJECTED ALONG WALL ENVELOPE	

SOIL TEST RESULTS

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		
SS-726	28' RT	269+25 -L-	1.0' - 2.5'	A-4(0)	25	NP	22	28	30	20	71	61	41	12	-
SS-4015	38' RT	270+72 -L-	6.0' - 7.5'	A-4(0)	32	NP	21	29	33	17	88	75	51	26	-



WALL ENVELOPE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/5/21.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE
PROFILE. EXISTING GROUND LINE IS DRAWN BORING TO BORING.

273+50 273+00 272+50 272+00 271+50 271+00 270+50 270+00 269+50 269+00 268+50 268+00

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL7_B-1		STATION 269+25		OFFSET 28 ft RT		ALIGNMENT L										
COLLAR ELEV. 2,331.3 ft		TOTAL DEPTH 9.3 ft		NORTHING 617,092		EASTING 589,567										
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83% 06/16/2020			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER J. Estep		START DATE 04/13/21		COMP. DATE 04/13/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2335																
2330	2,330.3	1.0	8	11	7										2,331.3	GROUND SURFACE
	2,327.8	3.5	2	7	7											RESIDUAL Stiff to Very Stiff, Brown-Tan-Gray, Fine to Coarse Sandy SILT (A-4(0)), with trace gravel-sized rock fragments
2325	2,325.3	6.0	34	48	52/0.4										2,324.8	WEATHERED ROCK Brown-Gray-Tan, (MICA SCHIST)
	2,322.8	8.5	50	50/0.3						100/0.9					2,322.0	Boring Terminated at Elevation 2,322.0 ft In Weathered Rock (MICA SCHIST)

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST N. McLaren										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL7_B-2		STATION 270+00		OFFSET 30 ft RT		ALIGNMENT L										
COLLAR ELEV. 2,336.1 ft		TOTAL DEPTH 8.9 ft		NORTHING 617,165		EASTING 589,584										
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83% 06/16/2020			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 04/20/21		COMP. DATE 04/20/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2340																
2335	2,335.1	1.0	7	8	7										2,336.1	GROUND SURFACE
	2,332.6	3.5	5	5	5											RESIDUAL Loose to Medium Dense, Orange-Tan-Brown, Silty Fine to Coarse SAND (A-2-4)
2330	2,330.1	6.0	3	17	83/0.3										2,329.6	WEATHERED ROCK Gray-Tan-Brown, (MICA SCHIST)
	2,327.6	8.5	100/0.4							100/0.8					2,327.2	Boring Terminated at Elevation 2,327.2 ft In Weathered Rock (MICA SCHIST)

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/26/22

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST N. McLaren										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL7_B-3		STATION 270+72		OFFSET 38 ft RT		ALIGNMENT L										
COLLAR ELEV. 2,338.5 ft		TOTAL DEPTH 10.0 ft		NORTHING 617,234		EASTING 589,606										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 04/20/21		COMP. DATE 04/20/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2340														2,338.5	0.0	GROUND SURFACE
	2,337.5	1.0	4	7	25											RESIDUAL Medium Dense to Dense, Tan-Orange-Brown, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments
2335	2,335.0	3.5	4	7	8											
	2,332.5	6.0	4	3	4											
2330	2,330.0	8.5	5	5	6											Medium Stiff to Stiff, Tan-Orange-Brown, Fine to Coarse Sandy SILT (A-4(0)), with trace mica
																Boring Terminated at Elevation 2,328.5 ft In Residual Sandy Silt (A-4(0))

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)									
BORING NO. RWAL7_B-4		STATION 271+44		OFFSET 42 ft RT		ALIGNMENT L										
COLLAR ELEV. 2,345.5 ft		TOTAL DEPTH 19.3 ft		NORTHING 617,305		EASTING 589,624										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER J. Estep		START DATE 04/06/21		COMP. DATE 04/06/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2350														2,345.5	0.0	GROUND SURFACE
	2,344.5	1.0	7	10	10											RESIDUAL Very Stiff, Brown, Fine to Coarse Sandy SILT (A-4)
2345	2,342.0	3.5	6	6	5											Stiff, Tan-Brown-Orange, Fine to Coarse Sandy, Clayey SILT (A-5)
	2,339.5	6.0	3	2	16											Medium Dense, Tan, Silty Fine to Coarse SAND (A-2-4), with trace gravel-sized rock fragments
2340	2,337.0	8.5	6	8	12											
	2,332.0	13.5	6	8	9											Very Stiff, Brown, Fine Sandy SILT (A-4)
2330	2,327.0	18.5	20	80/0.3												WEATHERED ROCK Brown-Gray, (MICA SCHIST) Boring Terminated at Elevation 2,326.2 ft In Weathered Rock (MICA SCHIST)

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/26/22

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun									
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)								
BORING NO. RWAL7_B-5		STATION 272+11		OFFSET 36 ft RT		ALIGNMENT L									
COLLAR ELEV. 2,341.3 ft		TOTAL DEPTH 10.0 ft		NORTHING 617,372		EASTING 589,630									
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Estep		START DATE 04/06/21		COMP. DATE 04/06/21		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)	
2345															
														2,341.3	0.0
2340	2,340.3	1.0	3	3	5	•	•	•	•	•		M	RESIDUAL Medium Stiff to Stiff, Tan, Fine Sandy, Clayey SILT (A-5)		
	2,337.8	3.5	3	3	2	•	•	•	•	•		M			
2335	2,335.3	6.0	10	10	5	•	•	•	•	•		M	Medium Stiff to Very Stiff, Tan-Orange-Brown-Gray, Fine Sandy SILT (A-4), with trace gravel-sized rock fragments		5.5
	2,332.8	8.5	2	2	4	•	•	•	•	•		M			
														2,331.3	10.0
														Boring Terminated at Elevation 2,331.3 ft In Residual Sandy Silt (A-4)	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/26/22

PROJECT: 32572.1.FS10 REFERENCE: A-0009CB

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	WALL ENVELOPE
5-6	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GRAHAM
 PROJECT DESCRIPTION UPGRADE NC 143 FROM SR 1223 (BEECH CREEK ROAD) TO 0.5 MILES NORTH OF APPALACHIAN TRAIL
 SITE DESCRIPTION RETAINING WALL #9: CAST-IN-PLACE CONCRETE WALL ON -L- FROM 290+80 LT TO 292+85 LT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CB	1	6

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

BRECCIA
C. PIERCY

INVESTIGATED BY CG2
 DRAWN BY M. BREWER, P.E.
 CHECKED BY R. KRAL, P.E.
 SUBMITTED BY M. BREWER, P.E.
 DATE APRIL 2022

Prepared in the Office of:



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



DocuSigned by:
Donald Brewer 05/06/2022
 386129C0A4C1462
 SIGNATURE DATE

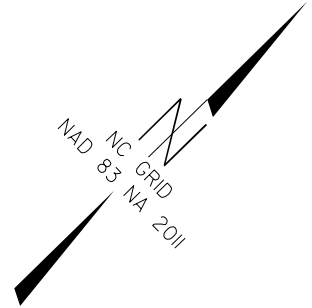
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

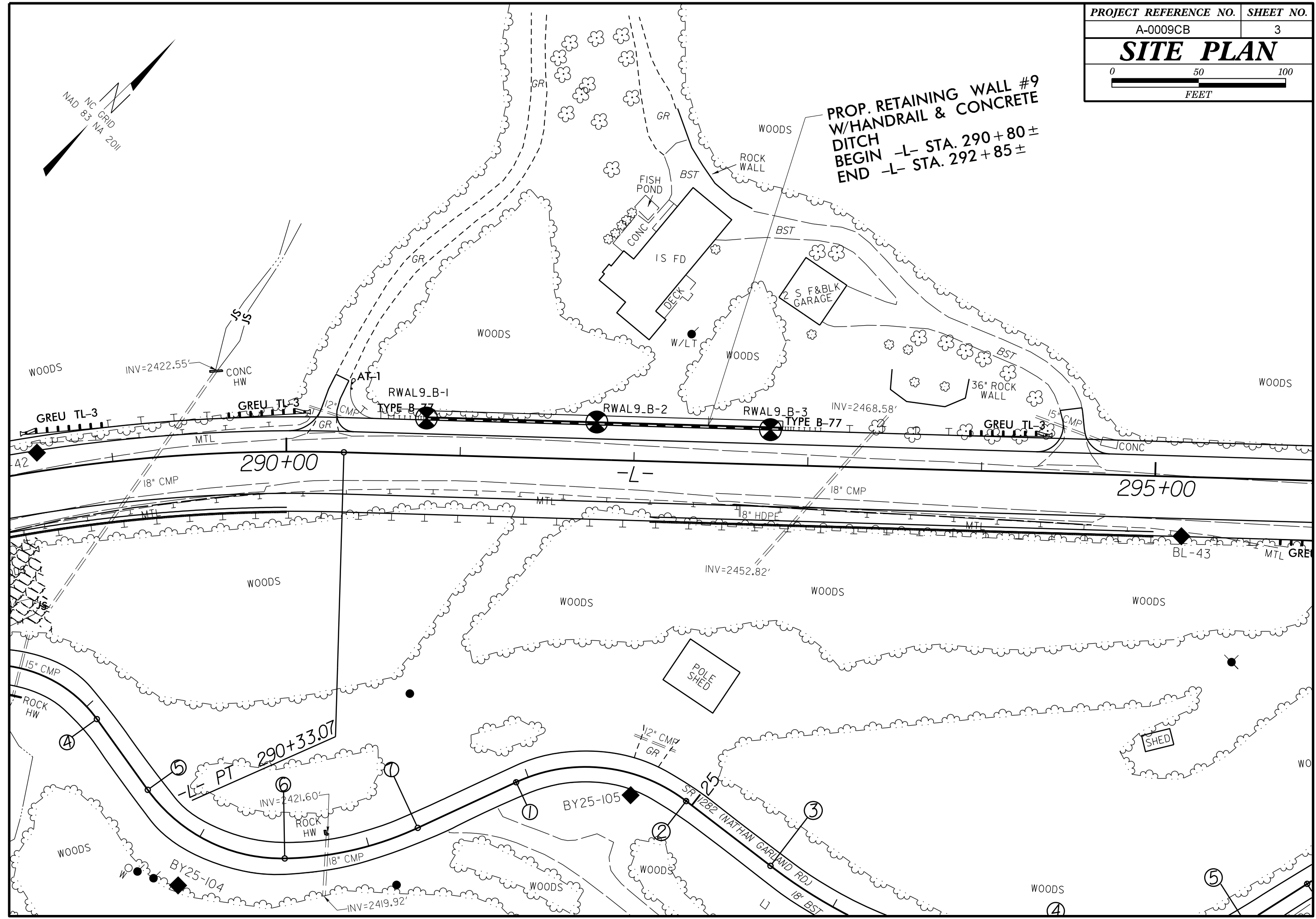
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Table with multiple columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSION, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION.



**PROP. RETAINING WALL #9
W/HANDRAIL & CONCRETE
DITCH**
 BEGIN -L- STA. 290+80±
 END -L- STA. 292+85±

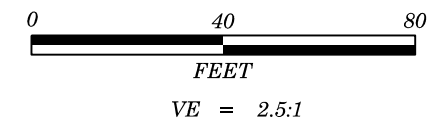




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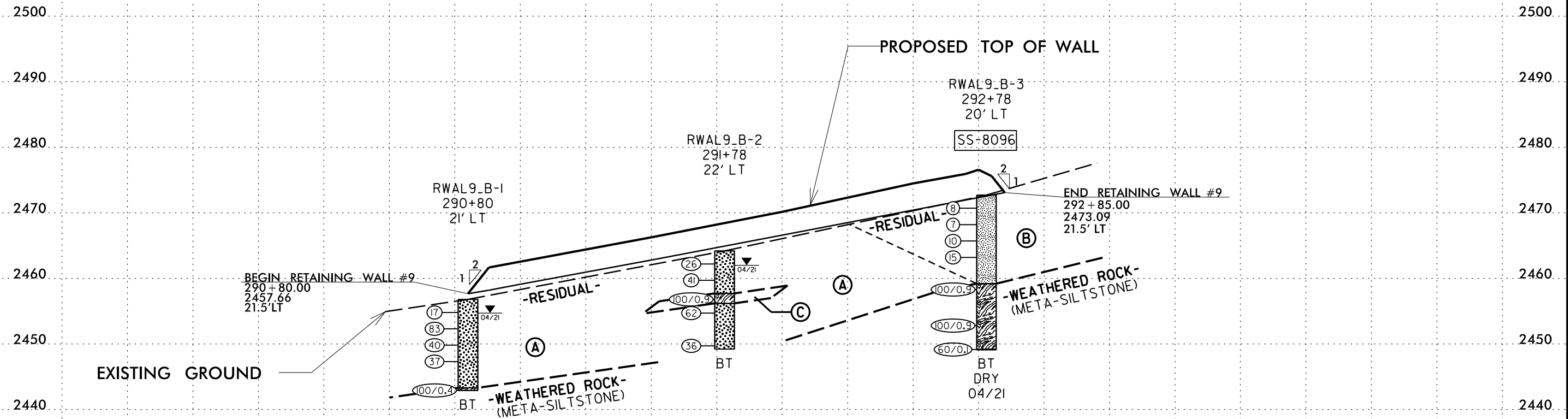
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PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	4
RETAINING WALL #9 PROFILE BORINGS PROJECTED ALONG WALL ENVELOPE	

SOIL TEST RESULTS

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		
SS-8096	20' LT	292+78 -L-	6.0' - 7.5'	A-4(0)	24	NP	15	46	23	16	100	94	52	26	-



- (A) -RESIDUAL- MEDIUM DENSE TO VERY DENSE, MOIST, GRAY-BROWN-YELLOW, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS
- (B) -RESIDUAL- MEDIUM STIFF TO VERY STIFF, MOIST, BROWN-RED-GRAY, FINE TO COARSE SANDY SILT (A-4(0)), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS
- (C) -WEATHERED ROCK-(META-SILTSTONE)

WALL ENVELOPE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 11/5/21.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE
PROFILE. EXISTING GROUND LINE IS DRAWN BORING TO BORING.

289 + 50 290 + 00 290 + 50 291 + 00 291 + 50 292 + 00 292 + 50 293 + 00 293 + 50 294 + 00 294 + 50

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST C. Piercy									
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)								
BORING NO. RWAL9_B-1		STATION 290+80		OFFSET 21 ft LT		ALIGNMENT L									
COLLAR ELEV. 2,456.8 ft		TOTAL DEPTH 13.9 ft		NORTHING 619,143		EASTING 590,140									
DRILL RIGHAMMER EFF./DATE BRE9533 CME-550X 78% 03/12/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Phillips		START DATE 04/29/21		COMP. DATE 04/29/21		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2460															
	2,455.8	1.0	2	6	11									2,456.8	0.0
2455	2,453.3	3.5	21	37	46										
	2,450.8	6.0	11	18	22										
2450	2,448.3	8.5	11	17	20										
	2,443.3	13.5												2,443.3	13.5
			100/0.4											2,442.9	13.9

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST C. Piercy									
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)								
BORING NO. RWAL9_B-2		STATION 291+78		OFFSET 22 ft LT		ALIGNMENT L									
COLLAR ELEV. 2,464.2 ft		TOTAL DEPTH 15.0 ft		NORTHING 619,211		EASTING 590,210									
DRILL RIGHAMMER EFF./DATE BRE9533 CME-550X 78% 03/12/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER J. Phillips		START DATE 04/29/21		COMP. DATE 04/29/21		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2465															
	2,463.2	1.0	7	12	14									2,464.2	0.0
2460	2,460.7	3.5	22	17	24										
	2,458.2	6.0	35	55	45/0.4										
2455	2,455.7	8.5	30	34	28										
	2,450.7	13.5	11	18	18										
														2,449.2	15.0

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/26/22

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST C. Piercy											
SITE DESCRIPTION Upgrade NC 143 from SR 1223 (Beech Creek Road) to 0.5 Miles North of Appalachian Trail							GROUND WTR (ft)										
BORING NO. RWAL9_B-3		STATION 292+78		OFFSET 20 ft LT		ALIGNMENT L											
COLLAR ELEV. 2,472.7 ft		TOTAL DEPTH 23.6 ft		NORTHING 619,279		EASTING 590,283											
DRILL RIGHAMMER EFF./DATE BRE9533 CME-550X 78% 03/12/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Phillips		START DATE 04/29/21		COMP. DATE 04/29/21		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
2475															2,472.7	0.0	GROUND SURFACE
2470	2,471.7	1.0	2	3	5							M	SS-8096 26%	M	2,469.2	3.5	RESIDUAL Medium Stiff to Stiff, Brown-Red-Gray, Fine to Coarse Sandy SILT (A-4(0)), with trace gravel-sized rock fragments
	2,466.7	6.0	2	3	4						M						
2465	2,464.2	8.5	4	4	6						M						
	2,459.2	13.5	4	6	9											2,459.2	
2455	2,454.2	18.5	11	89/0.4					100/0.9								
2450	2,449.2	23.5	44	48	52/0.4				100/0.9						2,449.2	23.5	CRYSTALLINE ROCK Gray, (META-SILTSTONE) Boring Terminated with Standard Penetration Test Refusal at Elevation 2,449.1 ft In Crystalline Rock (META-SILTSTONE)
	2,449.1	23.6	60/0.1						60/0.1						2,449.1	23.6	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/26/22