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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _GRAHAM

PROJECT DESCRIPTION <u>UPGRADE</u> 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 PROJECT REFERENCE NO. 16 A-0009CB

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 (1991) 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 SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. 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 METHOL. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE OR 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 INTERRETATIONS 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:

1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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



D. Matthew Brewer

6/7/2022 DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO. SHEET NO.

A-0009CB

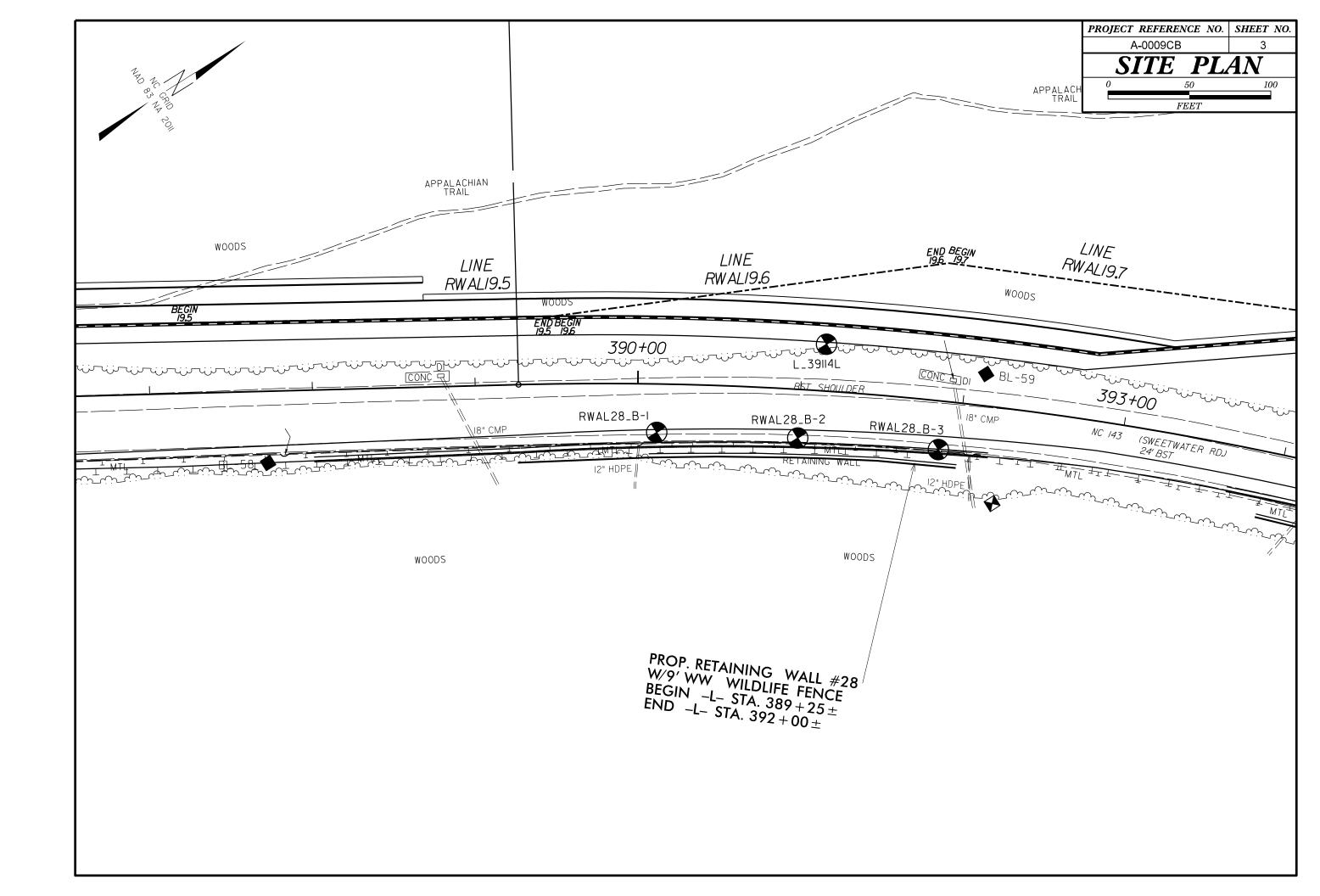
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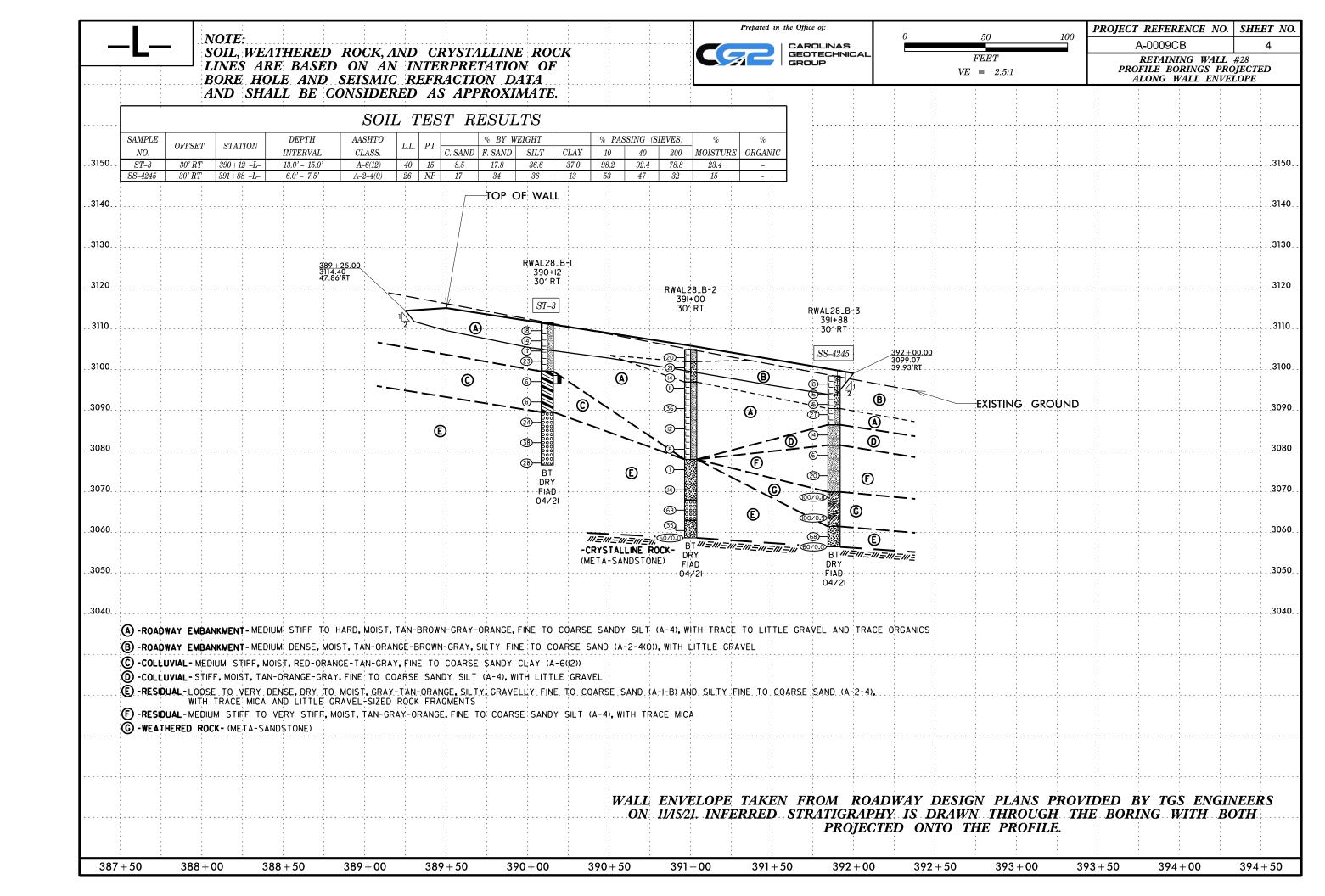
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

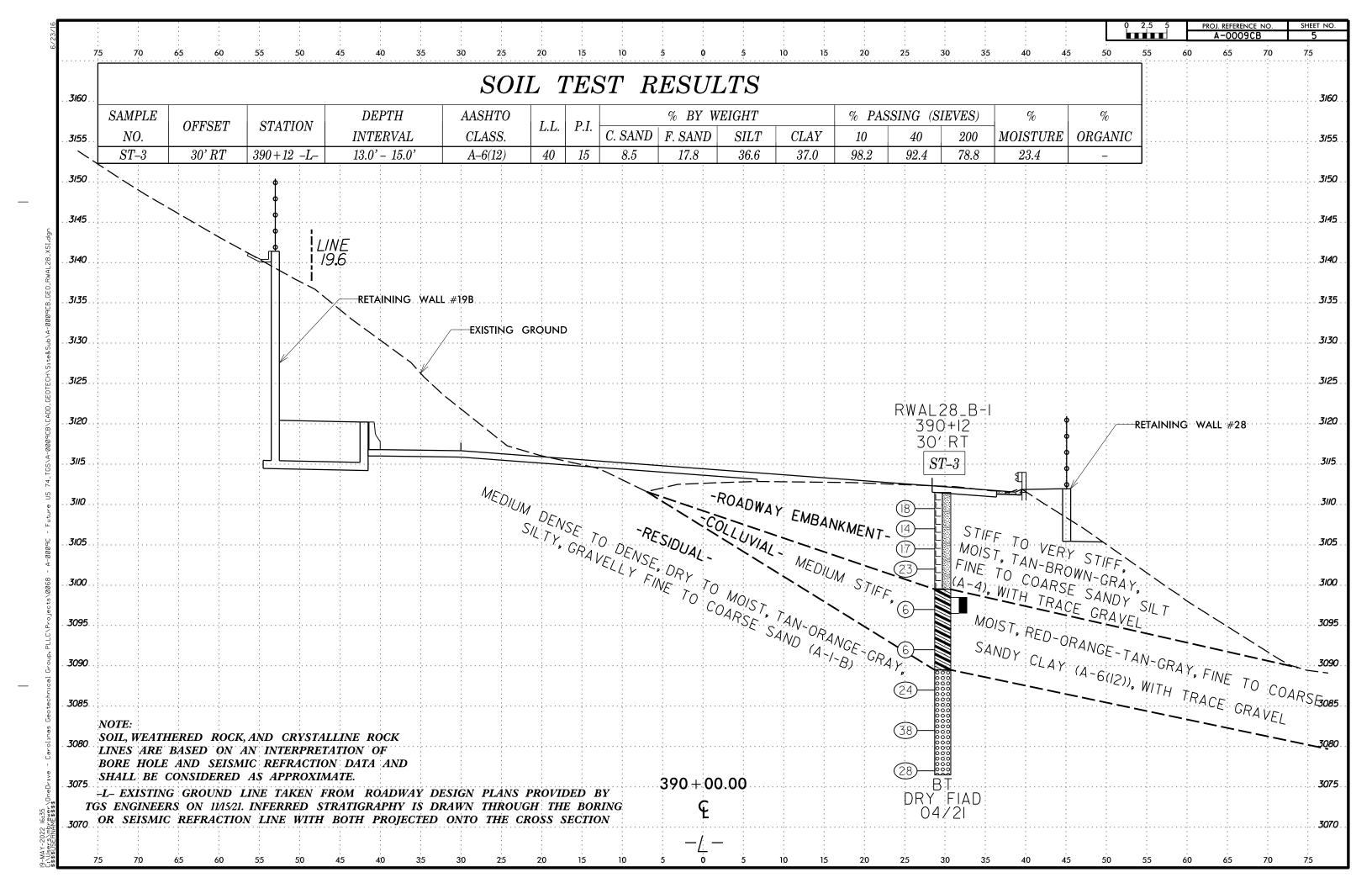
SUBSURFACE INVESTIGATION

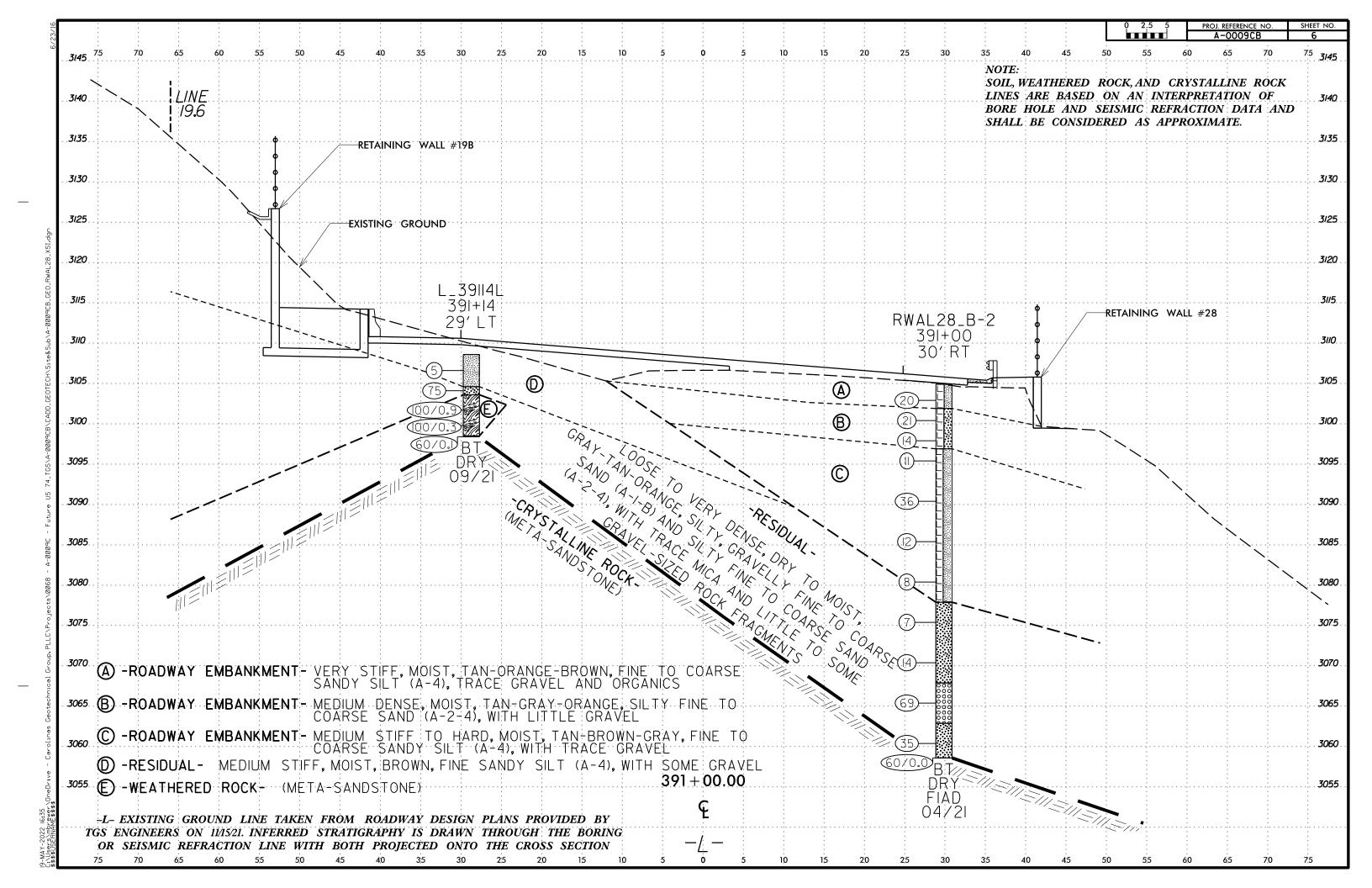
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

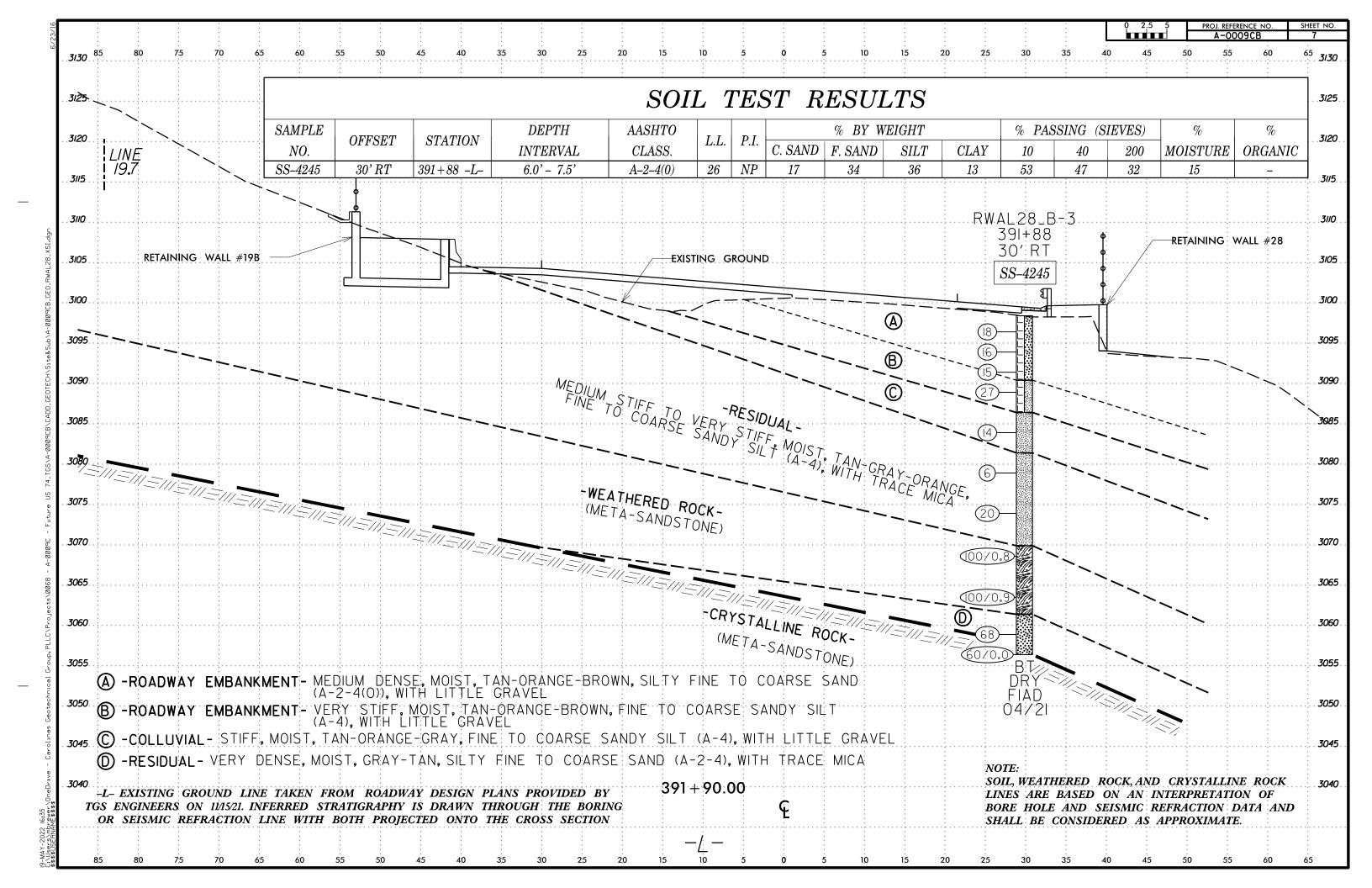
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
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	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	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
CENERAL CRANIII AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE,	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	NON-CRYSTALLINE NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN FOR TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN FOR TOWN THE PROPERTY OF THE PROP	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 0000 d00000 coood	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 59 MX GRANULAR CLAY PEAT MUCK, SOILS	GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
25 MA CS KM BI KM CS KM	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN.	HORIZONTAL.
LL - - 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 1111 F OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP IW MX IW MX II MN II MN IW MX II MN II MN II MN MODERATE ORGANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE GROUND WATER	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX W W 4 MX 8 MX 12 MX 16 MX NU MX AMUNTS OF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TITES STUNE FRAUS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	$lacktright$ static water level after $\underline{24}$ hours	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR POOR UNSUITABLE	<u> </u>	(MOD.) 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	PARENT MATERIAL.
HS SUBURHUE PUUR	SPRING OR SEEP	WITH FRESH ROCK.	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
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
DANCE OF CTANDARD DANCE OF UNICONSTITUT	TI SCEENICOS STIDOES	(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (IN-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE 4 4	SPT C SLOPE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY LOOSE 4 TO 10	SOIL SYMBOL OPT DAT TEST BORING INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	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
MATERIAL MEDIUM DENSE 10 10 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT TEST	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	T THE TOPOWHI EMBHINIMENT OF TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	— INFERRED SOIL BOUNDARY ← CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	A RIEZOMETER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	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
HARD > 30 > 4	TTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIF	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	LICED IN THE TOP 2 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (SE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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
SOIL MOISTURE - CORRELATION OF TERMS	_ CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	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.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC SEMISOLID: REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	
(PI) PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: N/A
- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
OM OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED Ø.16 - 1.5 FEET	NOTES:
PENLIPES ANDITIONAL WATER TO	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
- DRY - (D) ATTAIN OPTIMUM MOISTURE	X CME-550 CORE SIZE:	THINLY LAMINATED < 0.008 FEET	SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON II/15/2021
PLASTICITY	X 8" HULLOW AUGERS L -B L -H	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550X HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC Ø-5 VERY LOW	TUNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS: CASING POST HOLE DIGGER	CDAING CAN BE CEDADATED FROM CAMPLE WITH CTEEL BRODE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TRUCG-CARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	DATE: 8-15-1-
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		SAMPLE BREAKS ACROSS GRAINS.	



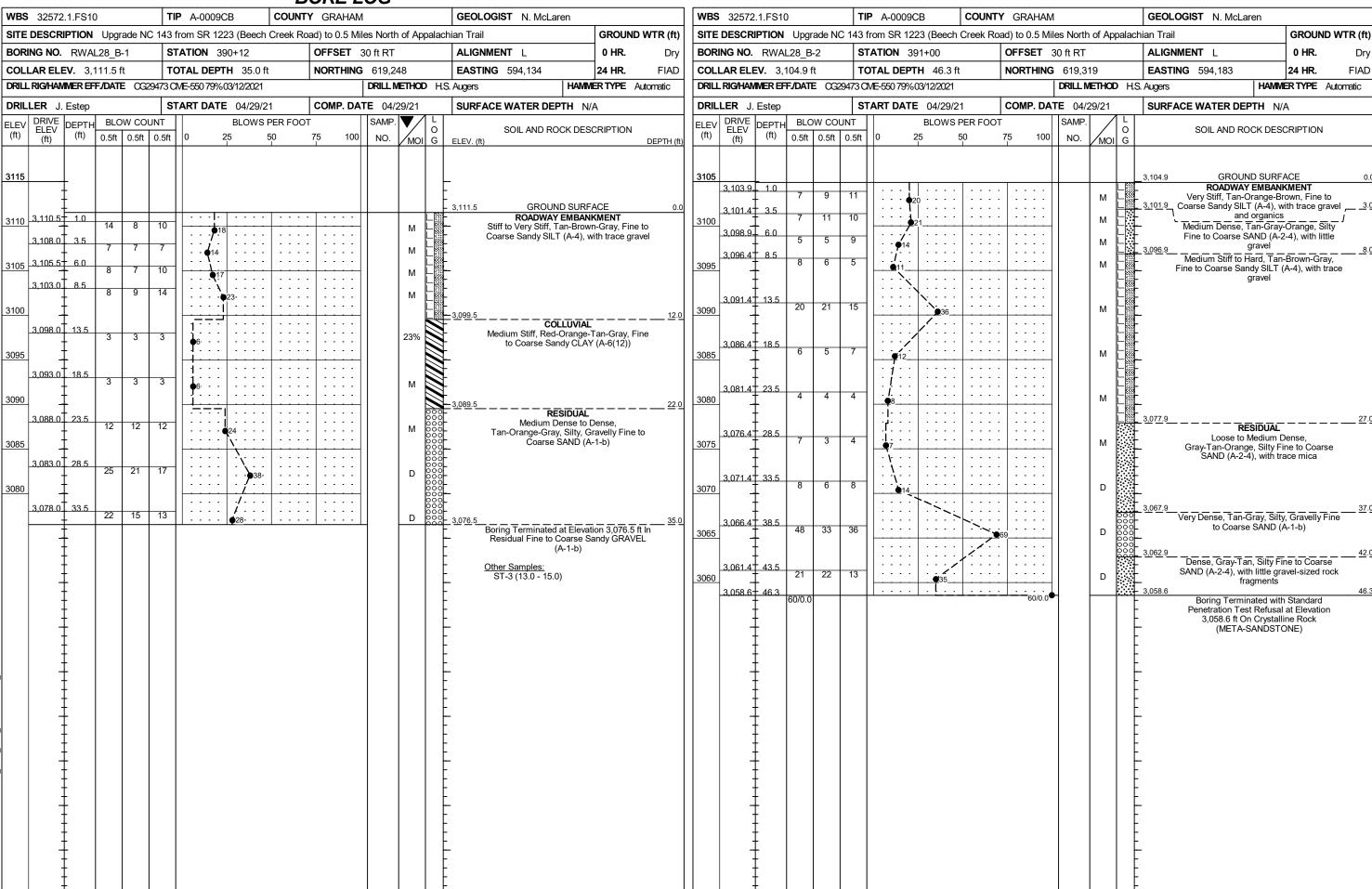








GEOTECHNICAL BORING REPORT BORE LOG

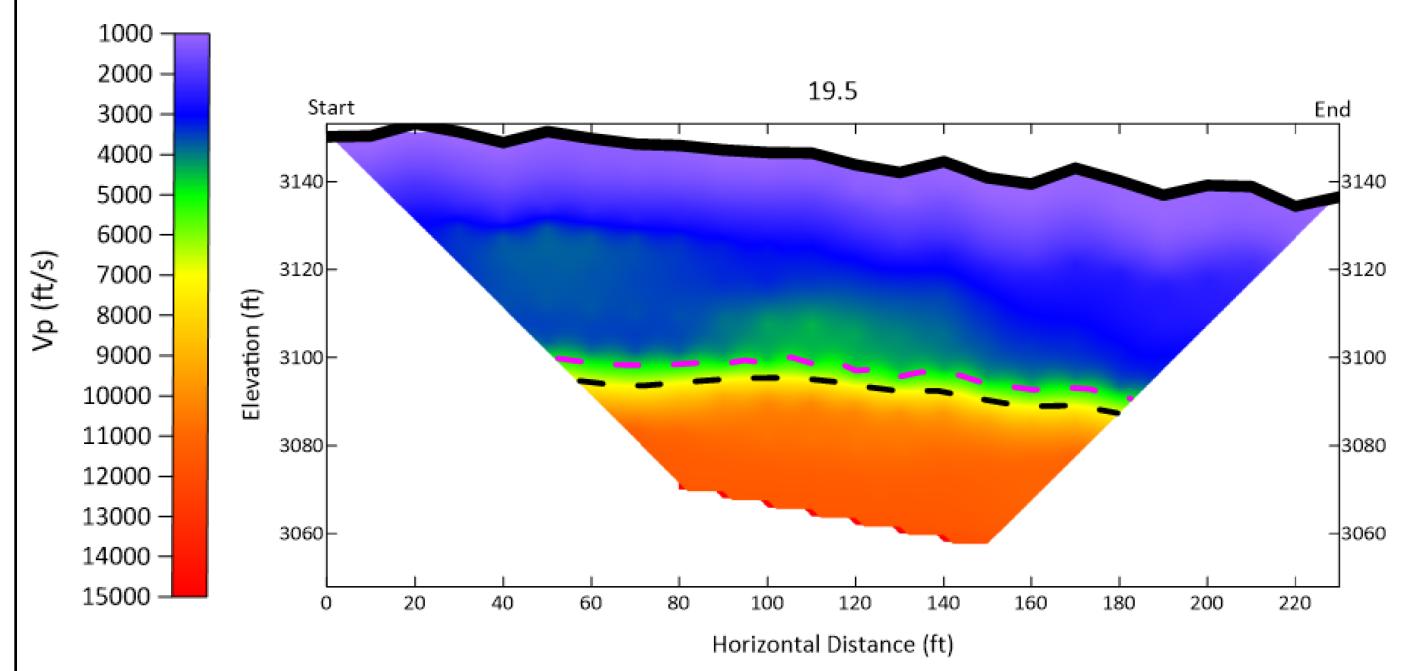


GEOTECHNICAL BORING REPORT BORE LOG

		BORE LOG									T				Т	
WBS 32572.1.FS10		TY GRAHAM	GEOLOGIST D. Goodnight			S 32572				TIP A-0009CB	COUNTY GRA				GEOLOGIST N. McLaren	
SITE DESCRIPTION Upgrade NC	<u> </u>			JND WTR (ft)						3 from SR 1223 (Beech			·	ppalachi	1	GROUND WTR (
BORING NO. L_39114L	STATION 391+14	OFFSET 29 ft LT	ALIGNMENT L 0 HR.	,		RING NO.				STATION 391+88		ET 30 ft R			ALIGNMENT L	0 HR . D
COLLAR ELEV. 3,108.6 ft	TOTAL DEPTH 10.2 ft	NORTHING 619,365	EASTING 594,144 24 HR. A Augers HAMMER TYPE			LAR ELI				CME-550 79%03/12/2021	t NORT	HING 619	,388 - METHO I	N 110	EASTING 594,235	24 HR. FIA WER TYPE Automatic
DRILL RIG/HAMMER EFF/DATE FIVE		DRILL METHOD HS		= Automatic				-/DAIE						D H.S.		
DRILLER J. Phillips FLEV DRIVE DEPTH BLOW COU	START DATE 09/17/21	COMP. DATE 09/17/21 OT	SURFACE WATER DEPTH N/A		-	LLER J.		DI OW		START DATE 04/30/2		P. DATE 0		<u> </u>	SURFACE WATER DEPTH N	I/A
ELEV (ft) DEPTH BLOW COU		75 100 100 100	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DN DEPTH (ft)	ELEV (ft)		DEPTH (ft)	0.5ft 0.	5ft 0.5ft	- □ 1	PER FOOT 50 75	100 NO		O OI G	SOIL AND ROCK DES	SCRIPTION
3110			3,108.6 GROUND SURFACE	0.0	3100		-								3,098.4 GROUND SURI	FACE
3,107.6+ 1.0 2 3 3105 3,105.1 3.5 4 15	2 60	м	RESIDUAL Medium Stiff, Brown, Fine Sandy S (A-4), with some gravel	4.0	3095	3,097.4	t l	10		18			М		ROADWAY EMBAI Medium Dense, Tan-Orar Fine to Coarse SAND (A-2 gravel	NKMENT age-Brown, Silty 2-4(0)), with little
3,102.6 6.0 43 57/0.4	00	100/0.9	3,103.6 Very Dense, Tan-Gray, Silty Fine S. (A-2-4), with some gravel-sized rofragments WEATHERED ROCK	SAND 5.0 rock	2000	3,092.4	† l	8 8	7 9 8 7	16 · · · · · · · · · · · · · · · · · · ·		 - ·	M 245 15%		3.090.4	
3100 3,100.1 8.5 100/0.3 3.098.5 10.1 60/0.1		60/0.1	3,098.5 Tan-Gray, (META-SANDSTONE) CRYSTALLINE ROCK Gray, (META-SANDSTONE)	/ 10.1 \10.2/	3090	3,089.9	8.5	10 1	13 14	27			М		Very Stiff, Tan-Orange-t Coarse Sandy SILT (A-4), 3,086.4	Brown, Fine to with little gravel
			Boring Terminated with Standar Penetration Test Refusal at Elevat 3,098.4 ft In Crystalline Rock (META-SANDSTONE)	ard ation	3085	3,084.9	13.5	6	6 8	14			М		Stiff, Tan-Orange-Gray, Sandy SILT (A-4), with	Fine to Coarse
			-		3080	3,079.9	18.5	3	3 3	4 · · · · · · · · · · · · · · · · · · ·			М		3,081.4 RESIDUAL Medium Stiff to Ve Tan-Gray-Orange, Fine to SILT (A-4), with tra	ery Stiff, o Coarse Sandv
			-		3075	3,074.9	23.5	2	9 11	20			М		SILT (A-4), With tra	ice mica
			-		3070	3,069.9	28.5	28 6	54 36/0.:	3		11			3,069.9 WEATHERED F Tan-Gray, (META-SA	
			-		3065	3,064.9	33.5	34 4	17 53/0. ₄	4						
							<u> </u>					0/0.9			3,061.4	3
			-		3060	3,059.9		23 2	25 43	 			М		Very Dense, Gray-Tan, Silt SAND (A-2-4), with t 3,056.4	y Fine to Coarse
UCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 5/17/22			-					60/0.0				0/0.0			Boring Terminated wi Penetration Test Refusa 3,056.4 ft On Crysta (META-SANDST	al at Elevation lline Rock

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	10

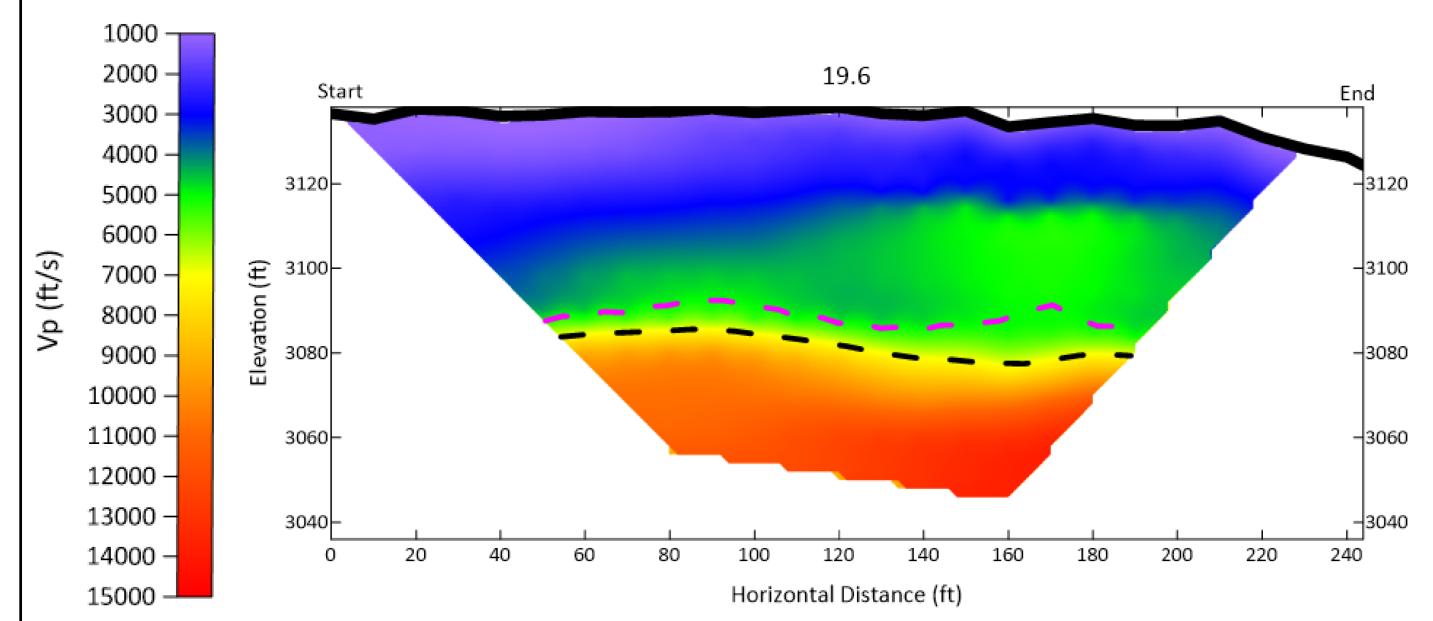
GEOPHYSICAL TEST RESULTS - SEISMIC REFRACTION LINE 19.5



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

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	11

GEOPHYSICAL TEST RESULTS - SEISMIC REFRACTION LINE 19.6

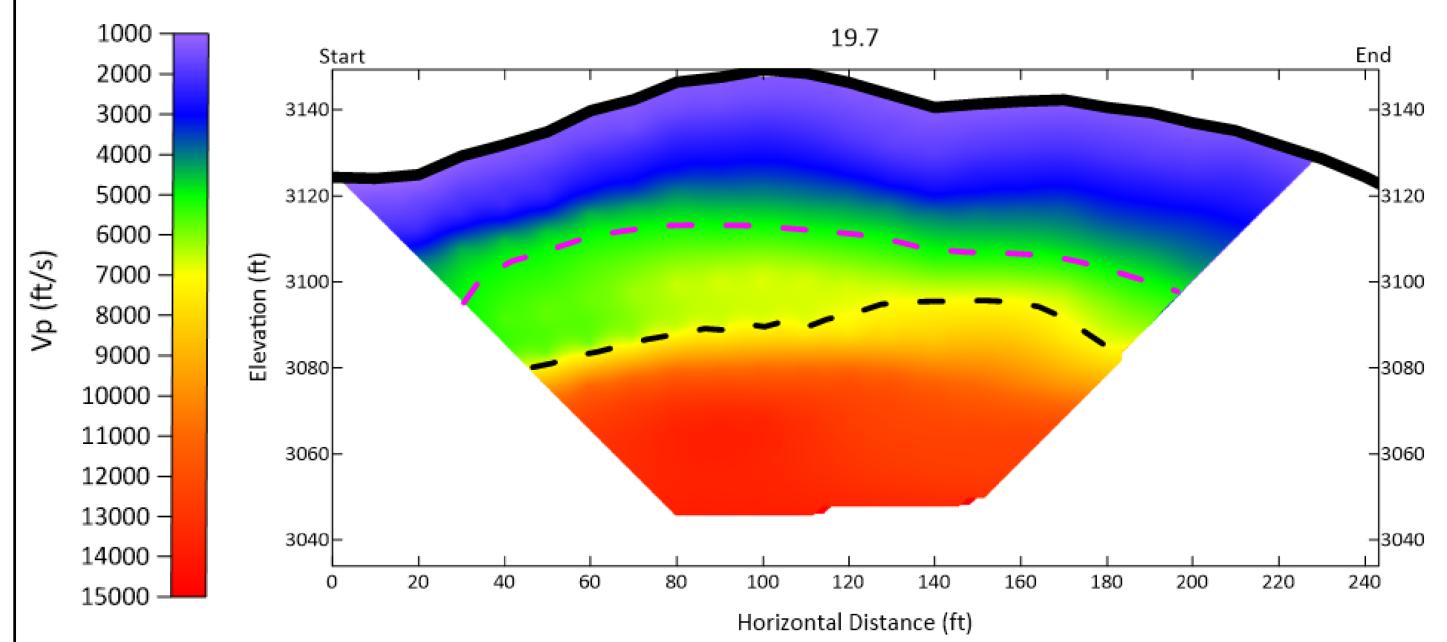


GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021 CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

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

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	12

GEOPHYSICAL TEST RESULTS - SEISMIC REFRACTION LINE 19.7

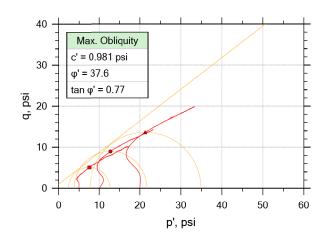


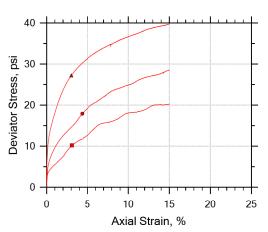
GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021 CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

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

PROJECT REFERENCE NO. SHEET NO. A-0009CB

Consolidated Undrained by AASHTO T297





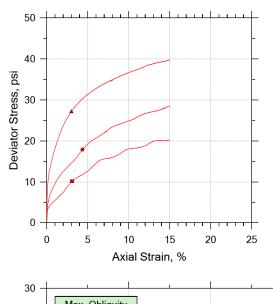
S.//	mbol	_		A	
,	mple ID	22-0009	22-0009	22-0009	
	pth	13.0' - 15.0'	13.0' - 15.0'	13.0' - 15.0'	
	st Number	ST-3.A	ST-3.B	ST-3.C	
re				6.055	
	Height, in	6.118	6.012		
_	Diameter, in	2.855	2.863	2.857	
Initial	Moisture Content (from Cuttings), %	23.5	23.5	23.5	
드	Dry Density, pcf	102.	103.	103.	
	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	
造	Saturation, %	100.0	100.0	100.0	
	Void Ratio	0.616	0.565	0.552	
	Back Pressure, psi	46.99	44.00	89.01	
Ve	rtical Effective Consolidation Stress, psi	4.985	9.939	19.90	
Но	rizontal Effective Consolidation Stress, psi	5.008	9.998	19.98	
Ve	rtical Strain after Consolidation, %	0.3156	0.9897	1.195	
Vo	lumetric Strain after Consolidation, %	0.9138	2.495	2.866	
Tin	ne to 50% Consolidation, min	1.000	1.500	1.800	
Sh	ear Strength, psi	5.103	8.964	13.62	
Str	ain at Failure, %	3.07	4.35	3.01	
Str	ain Rate, %/min	0.04000	0.04000	0.04000	
De	viator Stress at Failure, psi	10.21	17.93	27.23	
Eff	ective Minor Principal Stress at Failure, psi	2.395	3.779	7.666	
Eff	ective Major Principal Stress at Failure, psi	12.60	21.71	34.90	
B-\	/alue	0.96	0.95	0.96	

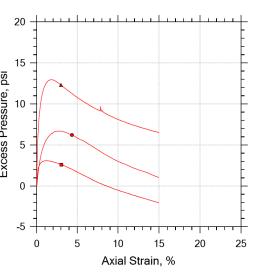
Notes:
- Before Shear Saturation set to 100% for phase calculation.
Moisture Content determined by ASTM D2216.

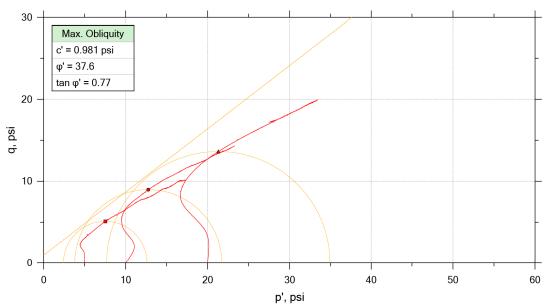
- Moisture Content determined by ASTM D2210.
 Atterberg Limits determined by ASTM D4318.
 Deviator Stress includes membrane correction.
 Values for c and \(\phi\) determined from best-fit straight line for the specific test conditions.
 Actual strength parameters may vary and should be determined by an engineer for site

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

Consolidated Undrained by AASHTO T297







	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
A	22-0009	ST-3.C	13.0' - 15.0'	WAP/RMC	04/15/2022	WAP/ WJG		ST-3.C.dat

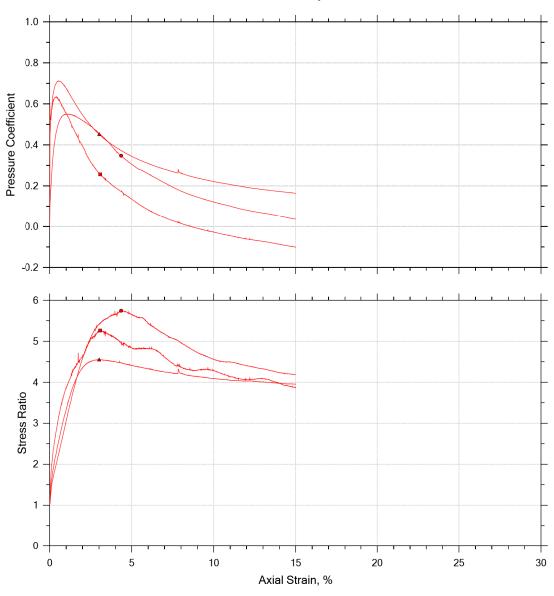


Project Name: A-0009C	Location: NC	Project Number: C8806.00005
Boring Number: RWAL28_B-1	Tester: WAP/RMC	Checker: WAP/ WJG
Sample Number: 22-0009	Test Date: 4/15/2022	Depth: 13.0' - 15.0'
Test Number: ST-3.A	Preparation: Undisturbed	Elevation:
Description: Soil Classification: A-6(12)		
Remarks:		

2022-04-28 17:27:34 V 3.2.22.41 2022-04-28 17:27:34 V 3.2.22.41 2022-04-15 17:10:22 V 3.0.19.306 2022-04-15 17:10:22 V 3.0.19.306

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	14

Consolidated Undrained by AASHTO T297



	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
A	22-0009	ST-3.C	13.0' - 15.0'	WAP/RMC	04/15/2022	WAP/ WJG		ST-3.C.dat



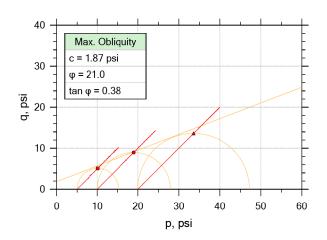
	Project Name: A-0009C	Location: NC	Project Number: C8806.00005			
	Boring Number: RWAL28_B-1	Tester: WAP/RMC	Checker: WAP/ WJG			
	Sample Number: 22-0009	Test Date: 4/15/2022	Depth: 13.0' - 15.0'			
	Test Number: ST-3.A	Preparation: Undisturbed	Elevation:			
TC	Description: Soil Classification: A-6(12)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

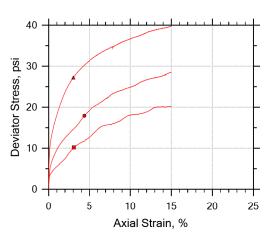
2022-04-28 17:27:35 V 3.2.22.41

2022-04-15 17:10:22 V 3.0.19.306

PROJECT REFERENCE NO. SHEET NO. A-0009CB

Consolidated Undrained by AASHTO T297





Sy	mbol		•	A	
Sample ID		22-0009	22-0009	22-0009	
De	pth	13.0' - 15.0'	13.0' - 15.0'	13.0' - 15.0'	
Te	st Number	ST-3.A	ST-3.B	ST-3.C	
	Height, in	6.118	6.012	6.055	
	Diameter, in	2.855	2.863	2.857	
Initial	Moisture Content (from Cuttings), %	23.5	23.5	23.5	
Ξ	Dry Density, pcf	102.	103.	103.	
	Saturation (Wet Method), %	98.5	101.1	101.4	
	Void Ratio	0.640	0.624	0.622	
al	Moisture Content, %	23.0	21.1	20.6	
	Dry Density, pcf	104.	107.	108.	
	Cross-Sectional Area (Method A), in ²	6.339	6.290	6.241	
Final	Saturation, %	100.0	100.0	100.0	
	Void Ratio	0.616	0.565	0.552	
	Back Pressure, psi	46.99	44.00	89.01	
Ve	rtical Effective Consolidation Stress, psi	4.985	9.939	19.90	
Но	rizontal Effective Consolidation Stress, psi	5.008	9.998	19.98	
Ve	rtical Strain after Consolidation, %	0.3156	0.9897	1.195	
Vo	lumetric Strain after Consolidation, %	0.9138	2.495	2.866	
Tin	ne 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.

- Before Shear Saturation set to 100% for phase calculation.

 Moisture Content determined by ASTM D2216.

 Atterberg Limits determined by ASTM D4318.

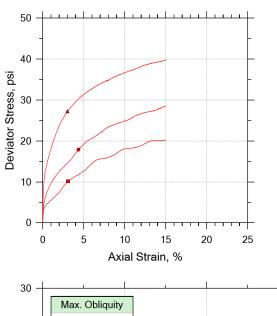
 Deviator Stress includes membrane correction.

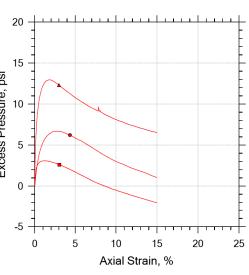
 Values for c and φ determined from best-fit straight line for the specific test conditions.

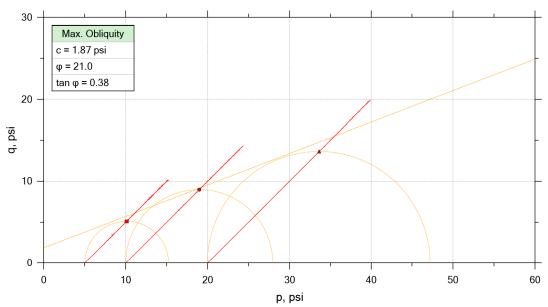
 Actual strength parameters may vary and should be determined by an engineer for site conditions.

	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'		
HVIF	Test Number: ST-3.A	Preparation: Undisturbed	Elevation:		
CONSULTANTS	Description: Soil Classification: A-6(12)				
CONSOLIANTS	Remarks:				
		4	0000 04 45 47 40 00 40 0 40 000		

Consolidated Undrained by AASHTO T297







	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
A	22-0009	ST-3.C	13.0' - 15.0'	WAP/RMC	04/15/2022	WAP/ WJG		ST-3.C.dat

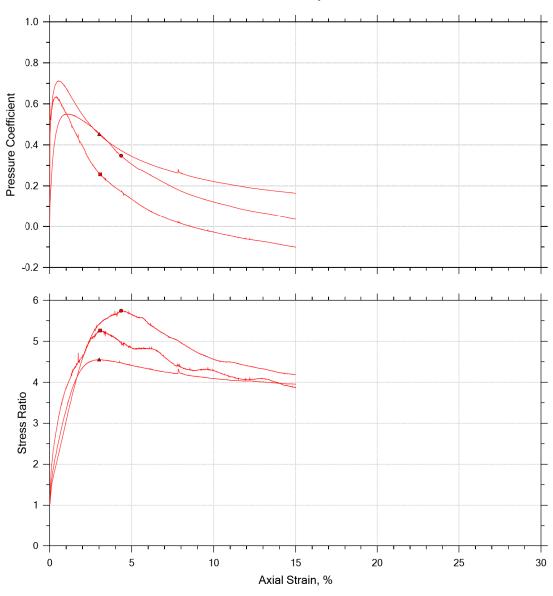


Project Name: A-0009C	Location: NC	Project Number: C8806.00005					
Boring Number: RWAL28_B-1	Tester: WAP/RMC	Checker: WAP/ WJG					
Sample Number: 22-0009	Test Date: 4/15/2022	Depth: 13.0' - 15.0'					
Test Number: ST-3.A	Preparation: Undisturbed	Elevation:					
Description: Soil Classification: A-6(12)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

2022-04-28 17:28:02 V 3.2.22.41 2022-04-28 17:28:02 V 3.2.22.41 2022-04-15 17:10:22 V 3.0.19.306 2022-04-15 17:10:22 V 3.0.19.306

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	16

Consolidated Undrained by AASHTO T297



	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
A	22-0009	ST-3.C	13.0' - 15.0'	WAP/RMC	04/15/2022	WAP/ WJG		ST-3.C.dat



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

2022-04-28 17:28:03 V 3.2.22.41

2022-04-15 17:10:22 V 3.0.19.306