STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CA	1	8

#### STATE OF NORTH CAROLINA

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

# STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GRAHAM

PROJECT DESCRIPTION <u>UPGRADE US</u> 129 FROM SOUTH OF SR 1275 TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223

SITE DESCRIPTION STRUCTURE ON NC 143 OVER SWEETWATER CREEK AT -DRIA— STATION 10+59

#### **CONTENTS**

SHEET NO.

2. 2A

3 4-7 **DESCRIPTION** 

TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN

BORE LOGS LAB TEST RESULTS PERSONNEL

**CG2 EXPLORATION** 

D. GOODNIGHT

S. BRAUN

INVESTIGATED BY CG2

DRAWN BY S. N. PATTERSON, G.I.T.

CHECKED BY M. BREWER, P.E.

SUBMITTED BY CG2

DATE MARCH 2022

#### **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 1(99) 707-850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL 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 (INP-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 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 DEEM NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED TO 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:

  I. 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.



**CHARLOTTE. NC 28227** (980) 339-8684



DocuSigned by:

. Matthew Brewer 3/17/2022

386129C0A4C1462... SIGNATURE

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

PROJECT REFERENCE NO.	SHEET NO.
A-0009CA	2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 1 OF 2)

											(1 2	IUL	1 OF 2)
					SO	IL DI	ESCR	IPT:	ION				GRADATION
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 DISSOB, 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, ANDULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,								ER AN HTO T TIONS IFICAT RUCTUI	D YIELD LES 206, ASTM GENERALLY ION, AND OTH RE, PLASTICI	SS THAN 101 D1586). SOU INCLUDE TH HER PERTINE TY,ETC. FO	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  THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:		
<u> </u>	VERY STIF	SOIL							SAND LAYER				ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.
GENERAL		GRANI	ULAR MA	ATERI	ALS	IND F	SIL	T-CLAY	MATERIALS		GANIC MATER	RIALS	MINERALOGICAL COMPOSITION
CLASS. GROUP	A-1	(≤ 357 A-3	Z PASSI	NG *2	200) A-2		( > A-4	35% PA	SSING #200) A-6 A-7	A-1, A-2	A-4, A-5	T	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.
CLASS.	A-1-a A-1		A-2-4	A-2	2-5 A-2	6 A-2-7	400000000		A-7-5. A-7-6	A-3	A-6, A-7		COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LL < 31
SYMBOL	00000000				8			17.7					SLIGHTLY COMPRESSIBLE   LL < 31   MODERATELY COMPRESSIBLE   LL = 31 - 50   HIGHLY COMPRESSIBLE   LL > 50   LL > 50
% PASSING #10	50 MX									GRANULAR	SILT- CLAY	MUCK,	PERCENTAGE OF MATERIAL
*40 *200	30 MX 50 15 MX 25			35	MX 35 I	4X 35 M	36 MN	36 MN	36 MN 36 MN	SOILS	SOILS	PEAT	GRANULAR SILT - CLAY  ORGANIC MATERIAL SOILS OTHER MATERIAL
MATERIAL PASSING *40 LL PI GROUP INDEX	_ 6 MX	– NP	10 MX		MX 11 M			10 MX	40 MX 41 MN 11 MN 11 MN	LITT MODI	S WITH LE OR ERATE NTS OF	HIGHLY ORGANIC	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  GROUND WATER
USUAL TYPES	STONE FRA	ne en		_						ORC	GANIC	SOILS	₩ATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
OF MAJOR MATERIALS	GRAVEL, AM	ND FINE SAND			OR CLA			LTY ILS	CLAYEY SOILS	MA	TTER		STATIC WATER LEVEL AFTER 24 HOURS
GEN. RATING		EXCEL	LLENT T	0 G0	00			FAIR I	0 POOR	FAIR TO	POOR	UNSUITABLE	∇PW     PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
AS SUBGRADE		PI OF	A-7-5	SUBGF	ROUP IS	≤ LL -	30 ; P1	OF A-7	-6 SUBGROUP I	P00R 5 > LL - 30			SPRING OR SEEP
			С	ON	SIST	ENC			NSENESS				MISCELLANEOUS SYMBOLS
PRIMARY	SOIL TYP	PΈ	CON	SIS	TENCY	R		RATION (N-V	STANDARD N RESISTENCI ALUE)		GE OF UNC PRESSIVE S (TONS/F	STRENGTH	ROADWAY EMBANKMENT (RE) 25/825 DIP & DIP DIRECTION OF ROCK STRUCTURES
GRANUL MATERI	GENERALLY VERY LOOSE GRANULAR LOOSE MATERIAL MEDIUM DENSE (NON-COHESIVE) VERY DENSE VERY DENSE					4 T 10 T 30 T	4 0 10 0 30 10 50 50		N/A		SOIL SYMBOL  SOIL SYMBOL  ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  THAN ROADWAY EMBANKMENT  SPI ONT TEST BORING  SLOPE INDICATOR INSTALLATION  AUGER BORING  CONE PENETROMETER TEST		
SILT-C MATER	GENERALLY SOFT SILT-CLAY MEDIUM STIFF MATERIAL STIFF (COHESIVE) VERY STIFF HARD					2 1 4 1 8 T 15 1	2 10 4 10 8 0 15 10 30 30		< 0.25 0.25 TO 0.5 TO 1 TO 2 2 TO 4 > 4	0.5 1.0 2	INFERRED SOIL BOUNDARY  TEST BORING  MONITORING WELL  TEST BORING WITH CORE		
				T	EXTL	RE C	R G	RAIN	I SIZE				RECOMMENDATION SYMBOLS
U.S. STD. S OPENING (N				4	4 1.76	10 2.00	40 0.4	2	60 200 0.25 0.07	75 0.053			UNDERCUT UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE  SHALLOW UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAV
BOULDI (BLDR		(COB.)			AVEL GR.)		COAR SAN (CSE.	ID	FIN SAN (F S	ID .	SILT (SL.)	(CL.)	UNDERCUT ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL  ABBRE VIATIONS
GRAIN M SIZE IN		SOIL	75 3 <b>M</b> C	)IS	TURF	2.0	ORRE		0.25	0.05	0.005	5	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACCOUS WEA WEATHERED CL CLAY MODERATELY 7 - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 - DRY UNIT WEIGHT
	MOISTUF	RE SCAL	.E	Ī	FIE	LD MO: ESCRIP	STURE		GUIDE FOR			SCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS
LL		JID LIMI				ATURA'			USUALLY L FROM BELO				DPT - DYNAMIC PENETRATION TEST
			SEMISOLID: ATTAIN OP			D	FRAC, - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRACS FRAGMENTS ## MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO						
OM OPTIMUM MOISTURE - MOIST - (M) SL SHRINKAGE LIMIT				SOLID; AT	OR NEAR O	PTIMUM MO	DISTURE	DRILL UNITS:  DRILL UNITS:  ADVANCING TOOLS:  DRILL UNITS:  ADVANCING TOOLS:  HAMMER TYPE:					
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		0	CME-45C CLAY BITS X AUTOMATIC MANUAL  CME-55  CORE SIZE:										
	1					PLA	STIC	ΙΤΥ					X 8' HOLLOW AUGERS
NO	<u>Plasticity Index (PI)</u> <u>Dry Strength</u> NON Plastic 0-5 Very Low					(PI)	<u>D</u>	CME-550 HARD FACED FINGER BITS TUNGCARBIDE INSERTS					
SL MO	IGHTLY PI DERATELY GHLY PLA	LASTIC ′ PLAST	TIC			20	6-15 16-25 OR M				SLIGHT MEDIUM HIGH		VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS:  CASING POST HOLE DIGGER
All	JILI FLA	0110					OLOF				HUI		PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER
						OLOR	COMBIN	AOITA	IS (TAN, RED USED TO I				X DIEDRICH D50 TRICONE TRUGGCARB. SOUNDING ROD  CORE BIT VANE SHEAR TEST  MOBILE B-29 TRICONE TRUGGCARB. SOUNDING ROD  VANE SHEAR TEST

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		(PAGE 2	OF 2)
	BUCK	DESCRIPTION	TERMS AND DEFINITIONS
ROCK LINE I SPT REFUSA BLOWS IN N REPRESENTE	IS NON-COASTAL PLAIN MATERIAL TH INDICATES THE LEVEL AT WHICH NON- IL IS PENETRATION BY A SPLIT SPOOR	T WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SAMPLER EQUAL TO OR LESS THAN Ø.1 FOOT PER 6Ø RANSITION BETWEEN SOIL AND ROCK IS OFTEN	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.
WEATHERED ROCK (WR)	NON-COASTAL	LAIN MATERIAL THAT WOULD YIELD SPT N VALUES > FOOT IF TESTED.	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
CRYSTALLINE ROCK (CR)	FINE TO COAR	E GRAIN IGNEOUS AND METAMORPHIC ROCK THAT PT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
NON-CRYSTA ROCK (NCR)	LLINE FINE TO COARS	G GRAIN METAMORPHIC AND NON-COASTAL PLAIN OCK THAT WOULD YEILD SPT REFUSAL IF TESTED. LUDES PHYLLITE, SLATE, SANDSTONE, ETC.	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.
COASTAL PL SEDIMENTAR (CP)		SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED C.	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDE BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
		THERING	<u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW CHAMMER IF CRYSTALLINE.	DINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
VERY SLIGHT (V SLI.)		ED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, EE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
SLIGHT (SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN CL	ED AND DISCOLORATION EXTENDS INTO ROCK UP TO AY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW	CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  DISCOLORATION AND WEATHERING EFFECTS. IN E DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
	WITH FRESH ROCK.	D SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	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
MODERATELY SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORITY SH	OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL W KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH OGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK,	FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
SEVERE	IF TESTED, WOULD YIELD SPT REFUSA ALL ROCK EXCEPT QUARTZ DISCOLORE	OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
(SEV.)		L. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	<u>IF TESTED, WOULD YIELD SPT N VALU</u>	S > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SEVERE (V SEV.)	BUT MASS IS EFFECTIVELY REDUCED REMAINING. SAPROLITE IS AN EXAMPL	DOR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE O SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
COMPLETE		MEMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	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
	SCATTERED CONCENTRATIONS. QUARTZ ALSO AN EXAMPLE.	MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK SEMENTS EQUAL TO DR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
VERY HARD		HARDNESS SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PAREN ROCK.
HARD	SEVERAL HARD BLOWS OF THE GEOLOG CAN BE SCRATCHED BY KNIFE OR PICE		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.
MODERATELY HARD	EXCAVATED BY HARD BLOW OF A GEO	. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE DGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
MEDIUM HARD		HES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. O PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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 SOI WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOFT	CAN BE GROVED OR GOUGED READILY FROM CHIPS TO SEVERAL INCHES IN	Y KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS IZE 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.
VERY SOFT		ESSURE. XXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH N BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	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.
	FRACTURE SPACING	BEDDING	BENCH MARK: N/A
TERM VERY WID		TERM THICKNESS  VERY THICKLY BEDDED 4 FEET  THICKLY BEDDED 15 - 4 FEET	ELEVATION: FEET
WIDE MODERATI CLOSE VERY CLO	3 TO 10 FEET LY CLOSE 1 TO 3 FEET 0.16 TO 1 FOOT OSE LESS THAN 0.16 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 FEET THINLY LAMINATED 0.008 FEET	NOTES: ROADWAY DESIGN FILES DATED 7/11/2021 PROVIDED BY TGS ENGINEERS
		URATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING
EUD CEUTME	NITARY ROCKS INDURATION IS THE HAS	DENING OF MATERIAL BY CEMENTING HEAT DESCRIPE FTC	1

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS: FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. MODERATELY INDURATED

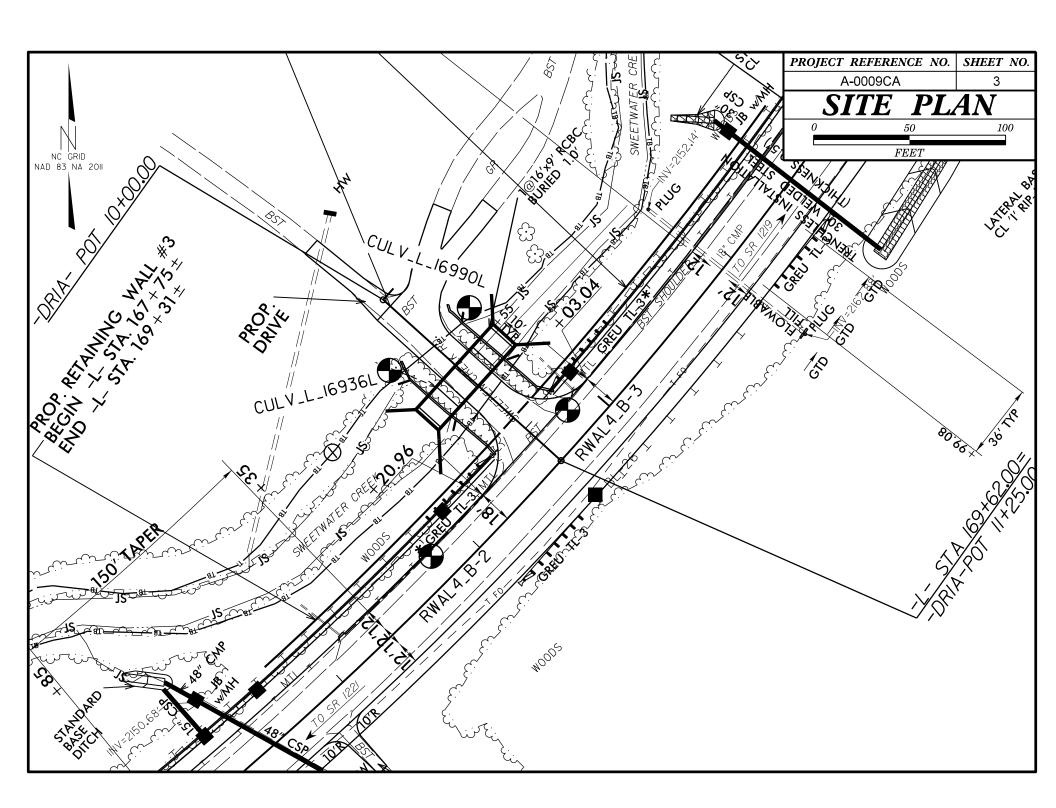
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:

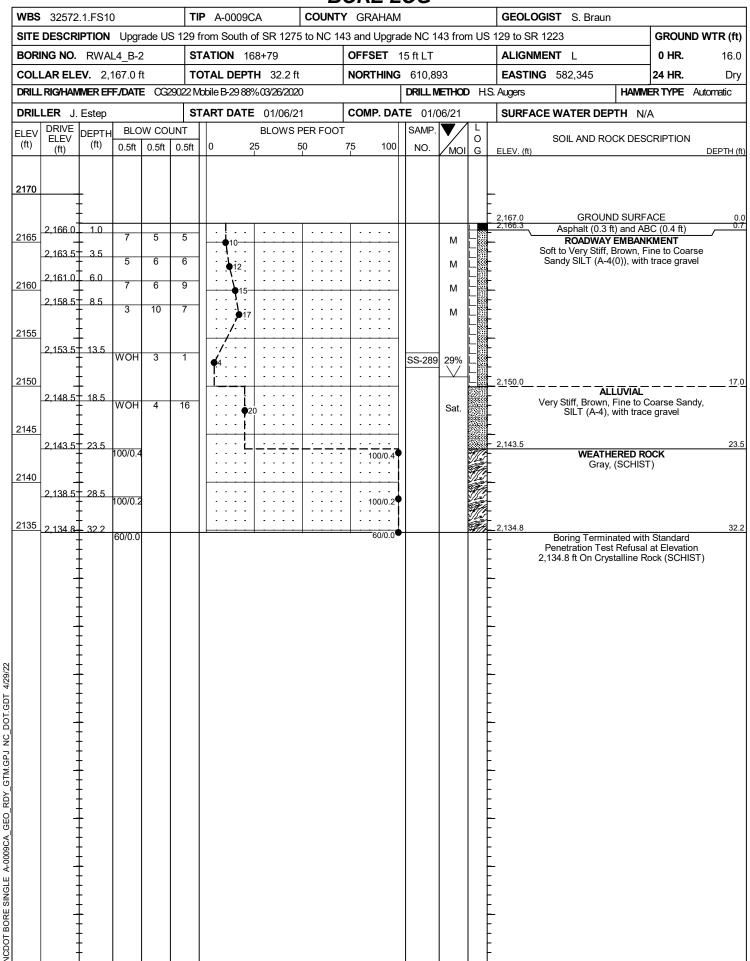
INDURATED

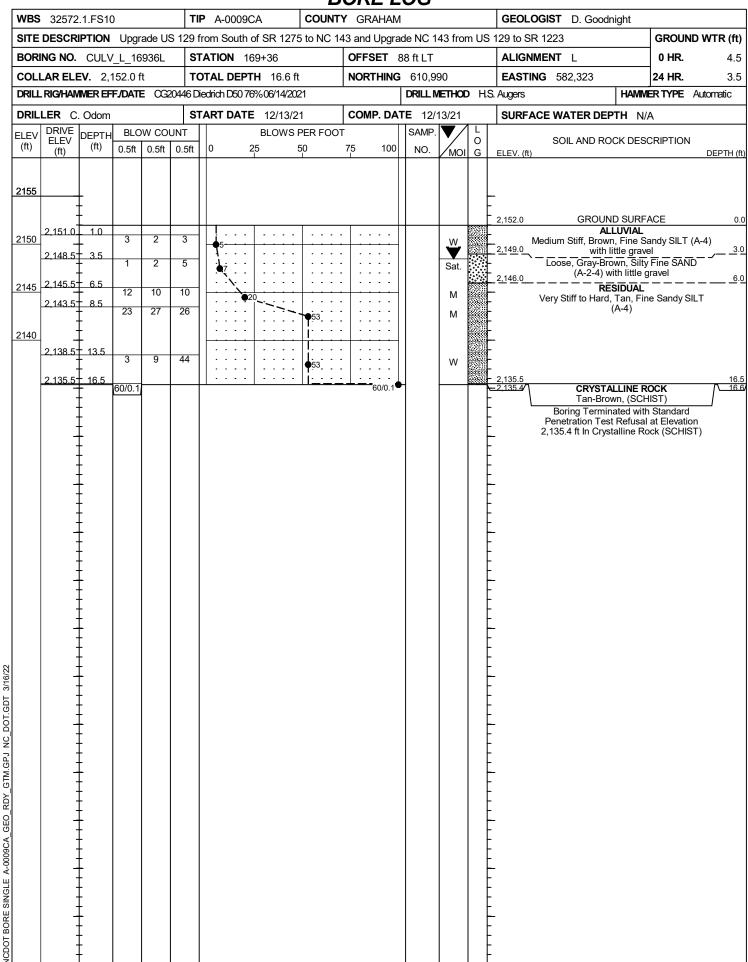
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.

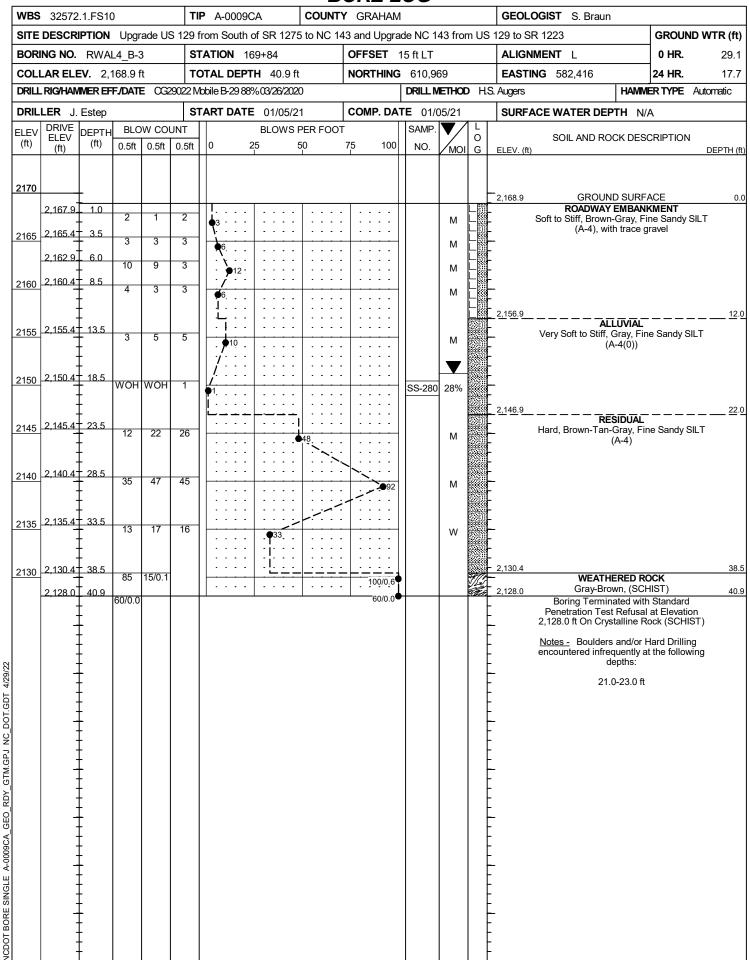
DIFFICULT TO BREAK WITH HAMMER.

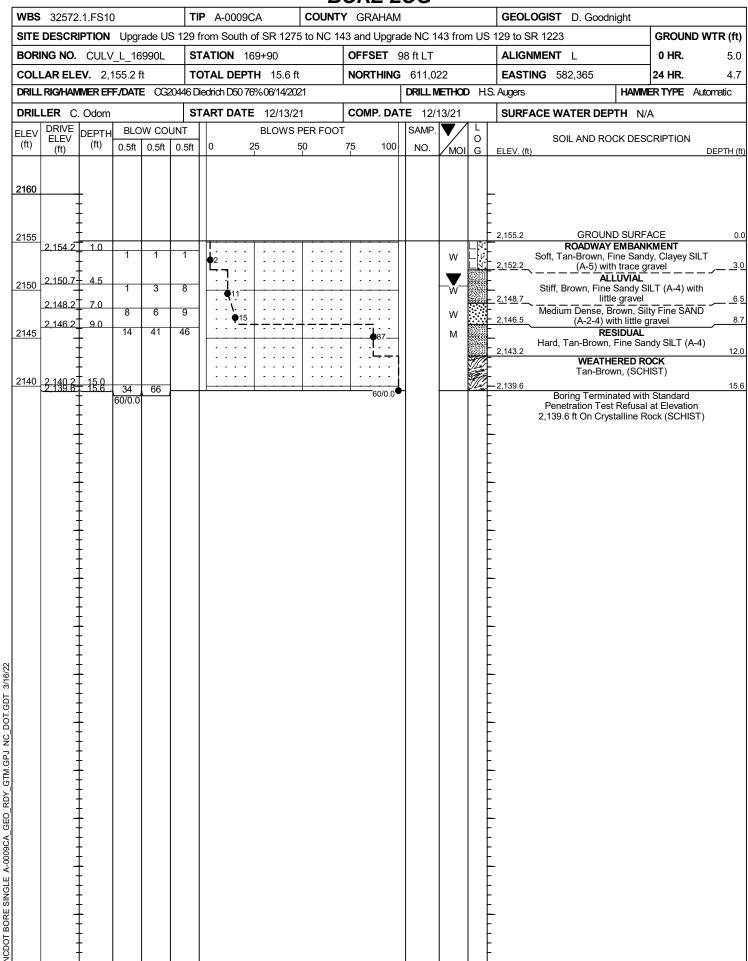
DATE: 8-15-14











PROJECT REFERENCE NO.	SHEET NO.						
A-0009CA	8						
LAB TEST RESULTS							

SOIL TEST RESULTS															
SAMPLE	OFFSET	STATION	DEPTH	AASHTO	L.L.	P.I.		% BY W	EIGHT		% PAS	SING (S.	IEVES)	%	%
NO.	OFFSEI	STATION	INTERVAL	CLASS.	L.L.	P.1.	C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-289	15' LT	168 + 79 -L-	13.5 - 15.0'	A-4(0)	29	NP	22.0	33.0	26.0	19.0	95.0	81.0	51.0	29.0	-
SS-280	15' LT	169+84 -L-	18.5 - 20.0'	A-4(0)	31	NP	33.0	30.0	23.0	14.0	80.0	64.0	36.0	28.0	_

LAB TESTING PERFORMED BY FALCON ENGINEERS: 105-0803

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CA	1	5

#### STATE OF NORTH CAROLINA

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

# STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GRAHAM

PROJECT DESCRIPTION <u>UPGRADE US</u> 129 FROM SOUTH OF SR 1275 TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223

SITE DESCRIPTION STRUCTURE ON NC 143 OVER SLAY BACON BRANCH AT -L- STATION 108+27 - REINFORCED CONCRETE BOX CULVERT

#### **CONTENTS**

SHEET NO.

2. 2A 3 4-5

**DESCRIPTION** 

TITLE SHEET LEGEND (SOIL & ROCK)

SITE PLAN BORE LOGS PERSONNEL

CG2 EXPLORATION

**BRECCIA** 

D. GOODNIGHT

INVESTIGATED BY \_CG2

DRAWN BY \_\_M. BRE WER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY CG2

DATE \_DECEMBER 2021

#### **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 1(99) 707-850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL 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 (INP-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 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 DEEM NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED TO 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:

  I. 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.



(980) 339-8684



. Matthew Brewer 1/20/2022

386129C0A4C1462... SIGNATURE

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

PROJECT REFERENCE NO.	SHEET NO.
A-0009CA	2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 1 OF 2)

											(PA	4GE	I OF 2)
					SOII	. DE	SCRI	PTI	ON				GRADATION
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 DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:									WEATHERED YIELD LES 206, ASTM	SS THAN 101 D1586). SOI	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <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.		
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,											ANGULARITY OF GRAINS		
NERV STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6  SOIL LEGEND AND AASHTO CLASSIFICATION								FINE	SAND LAYER	S,HIGHLY PL	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		
GENERAL				GENL IATERIALS		U AF			MATERIALS				MINERALOGICAL COMPOSITION
CLASS. GROUP	A-1		PASS:	ING #200	1-2		( > 3		SING #200) A-6 A-7	A-1, A-2	A-4, A-5	IALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.
CLASS.	A-1-a A-1-		A-2-	4 A-2-5			XX0250XXXX 1	N	A-7-5. A-7-6	A-3	A-6, A-7	************	COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LL < 31
SYMBOL	00000000				13			1.7.1					MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50
% PASSING *10	50 MX									GRANULAR	SILT-	MUCK,	PERCENTAGE OF MATERIAL
*40 *200	30 MX 50 I			1X 35 MX	35 MX	35 MX	36 MN :	36 MN	36 MN 36 MN	SOILS	CLAY SOILS	PEAT	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL
MATERIAL PASSING *40													TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%
LL PI	- 6 MX	- NP							40 MX 41 MN		S WITH LE OR	HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE
GROUP INDEX	вмх	NP	M BI	מייי שון ג	_	_		_	11 MN 11 MN 16 MX NO MX		erate NTS of	ORGANIC	GROUND WATER
USUAL TYPES	STONE FRAC	_		SILTY 0	1		SILT		CLAYEY	ORC	GANIC TTER	SOILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
OF MAJOR MATERIALS	GRAVEL, AN SAND	SAND		GRAVEL			SOIL		SOILS	MH	IIEN		lacktright STATIC WATER LEVEL AFTER $24$ HOURS
GEN. RATING		EALE	LENT	TO GOOD				AIR TO	n poop	FAIR TO	POOR	UNSUITABLE	$\sqrt{{ t Pw}}$ Perched water, saturated zone, or water bearing strata
AS SUBGRADE										POOR	1 0011	ONSOTTABLE	O-MA SPRING OR SEEP
		ri UF							SUBGROUP I				MISCELLANEOUS SYMBOLS
PRIMARY	SOIL TYP	E		ACTNES		F			STANDARD RESISTENC		GE OF UNC PRESSIVE S (TONS/F)	STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES
GENERA	VIIV			RY LO				<					SPT SET POPING SLOPE INDICATOR
GRANUL	.AR			LOOSE				4 TO			N/A		▼ 151 PM1 = 1.10
MATERI (NON-CI	OHESIVE)		٧E	DENSE RY DE	NSE			30 T					THAN ROADWAY EMBANKMENT THOUGH BURING TEST
GENERA	ALLY		VE	ERY SO	FT			∠ 2 T	2 0 4		< 0.25 0.25 TO		INFERRED SOIL BOUNDARY      CORE BORING      SOUNDING ROD
SILT-C MATERI	LAY		MED	STIFF				4 T 8 T	0 8		0.5 TO 1	1.0	INFERRED ROCK LINE MNONITORING WELL TEST BORING WITH CORE
COHES			VE	RY ST				15 T	0 30		2 TO 4		TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE
				HARD TF	KTUF	F OF	R GR	. ← AIN	SIZE		> 4		RECOMMENDATION SYMBOLS
U.S. STD. SI	EVE SIZE			4		10	40		60 20	0 270			UNCLASSIFIED EXCAVATION - TAN UNCLASSIFIED EXCAVATION -
OPENING (M	1M)	COBBLE	.	4.7		2.00	0.42 COARS	Ε	0.25 0.0	75 <b>0.0</b> 53	SILT	CLAY	UNSUITABLE WASTE  UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF  UNDERCUT  UNDERCUT  UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF  EMBANKMENT OR BACKFILL
(BLDR.		(COB.)		(GR		(1	SAND CSE. SI		SAN (F S	U	(SL.)	(CL.)	ABBREVIATIONS
GRAIN M			75			2.0			0.25	0.05	0.005	5	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST
SIZE IN	1. 12		3										BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT
	MOISTUR	SOIL		DIST		- CC		$\overline{}$	ION OF				CPT - CONE PENETRATION TEST NP - NON PLASTIC 7/d- DRY UNIT WEIGHT CSE COARSE ORG ORGANIC
	TERBERG					CRIPT			GUIDE FOR	FIELD MOI	STURE DES	SCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>
						TURATE	.D -			IQUID; VERY			DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON
LL	. 丄 LIQU	ID LIM	ΙT	_	(	SAT.)			FROM BELO	W THE GRO	OUND WATE	R TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK
PLASTIC					- WE	T - (W)				REQUIRES		)	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRACMENTS # - MOISTURE CONTENT CBR - CALIFORNIA BEARING
(PI) PL	.   PLAS	TIC LI	міт	_					HITAIN UP	TIMUM MOIS	DIUKE		HI HIGHLY V - VERY RATIO
0.1	, , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	MIIM M	יודפוי	RF	- MO	IST - (	(M)		SOLID; AT	OR NEAR O	PTIMUM MO	DISTURE	EQUIPMENT USED ON SUBJECT PROJECT
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT — SOCIAL REPORT OF REGISTRON			DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:  CME-45C CLAY BITS X AUTOMATIC MANUAL										
	- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE						CME-55  G* CONTINUOUS FLIGHT AUGER  CORE SIZE:						
PLASTICITY						ΤY			X 8'HOLLOW AUGERS -B -B -H -H				
NO	<u>Plasticity Index (PI)</u> <u>Dry Strength</u> NON Plastic 0-5 Very Low						DEX (	PI)	<u>D</u>	X CME-550X HARD FACED FINGER BITS -N -N			
SL	SLIGHTLY PLASTIC 6-15 SLIGHT										VANE SHEAR TEST		
	DERATELY GHLY PLAS		IU				16-25 DR MOI	RE			MEDIUM HIGH		POST HOLE DIGGER
	COLOR											TRICONE TUNG,-CARB. COUNDING DOD	
UESCRIB	TIONS MA	ץ זארו	UDF 1	:01 UB	UB CO	ו טפירי	MRINA	TIONS	S (TAN REF	, YELLOW-B	BROWN. RI III	F-GRAY)	X DIEDRICH D-50 CORE BIT SOUNDING ROD VANE SHEAR TEST
										DESCRIBE A			

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		(PAGE 2	<b>OF</b> 2)
	BUCK	DESCRIPTION	TERMS AND DEFINITIONS
ROCK LINE II SPT REFUSAL BLOWS IN NO REPRESENTED	S NON-COASTAL PLAIN MATERIAL T NDICATES THE LEVEL AT WHICH NO . IS PENETRATION BY A SPLIT SPO	IAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED -COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. N SAMPLER EQUAL TO OR LESS THAN Ø.1FOOT PER 60 TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	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
WEATHERED ROCK (WR)	NON-COASTAL 100 BLOWS P	PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > R 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
CRYSTALLINE ROCK (CR)	WOULD YIELD	SE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, O,SCHIST,ETC.	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.
NON-CRYSTAL ROCK (NCR) COASTAL PLA	LINE FINE TO COA SEDIMENTARY ROCK TYPE I	SE GRAIN METAMORPHIC AND NON-COASTAL PLAIN ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. CLUDES PHYLLITE, SLATE, SANDSTONE, ETC. N SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SEDIMENTARY (CP)		ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDE BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
		ATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW HAMMER IF CRYSTALLINE.	JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
VERY SLIGHT (V SLI.)		INED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, ACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
SLIGHT (SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN	INED AND DISCOLORATION EXTENDS INTO ROCK UP TO LAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHO	D. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  W DISCOLORATION AND WEATHERING EFFECTS. IN  ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
	WITH FRESH ROCK.	AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	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
MODERATELY SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORITY S AND CAN BE EXCAVATED WITH A GE	EO OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL 10W KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH LOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
SEVERE		ED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
(SEV.)	TO SOME EXTENT. SOME FRAGMENTS  IF TESTED, WOULD YIELD SPT N VAL		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
VERY SEVERE	ALL ROCK EXCEPT QUARTZ DISCOLOR	TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
(V SEV.)	REMAINING. SAPROLITE IS AN EXAMP	TO SOIL STHIOS, WITH ONLY MEDICAL OF STANDARDOR NO.  E OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM.
COMPLETE	ROCK REDUCED TO SOIL, ROCK FABR	C NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	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
		CHARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PAREN
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OF SEVERAL HARD BLOWS OF THE GEOL	SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
HARD		CK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	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.
MODERATELY HARD		CK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE DLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 I	CHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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 SOI WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOFT	FROM CHIPS TO SEVERAL INCHES IN	BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS 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.
VERY SOFT		RESSURE. EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH KEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	STRATA ROCK QUALITY DESIGNATION ISROD) - 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.
F	FRACTURE SPACING	BEDDING	BENCH MARK: N/A
TERM VERY WID		TERM THICKNESS  VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET
WIDE MODERATE	3 TO 10 FEET LY CLOSE 1 TO 3 FEET	THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET	
CLOSE VERY CLO	Ø.16 TO 1 FOOT	VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
ACK! CTO		THINLY LAMINATED < 0.008 FEET	ROADWAY DESIGN FILES DATED 7/II/2021 PROVIDED BY TGS ENGINEERS
	- IN	DURATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING

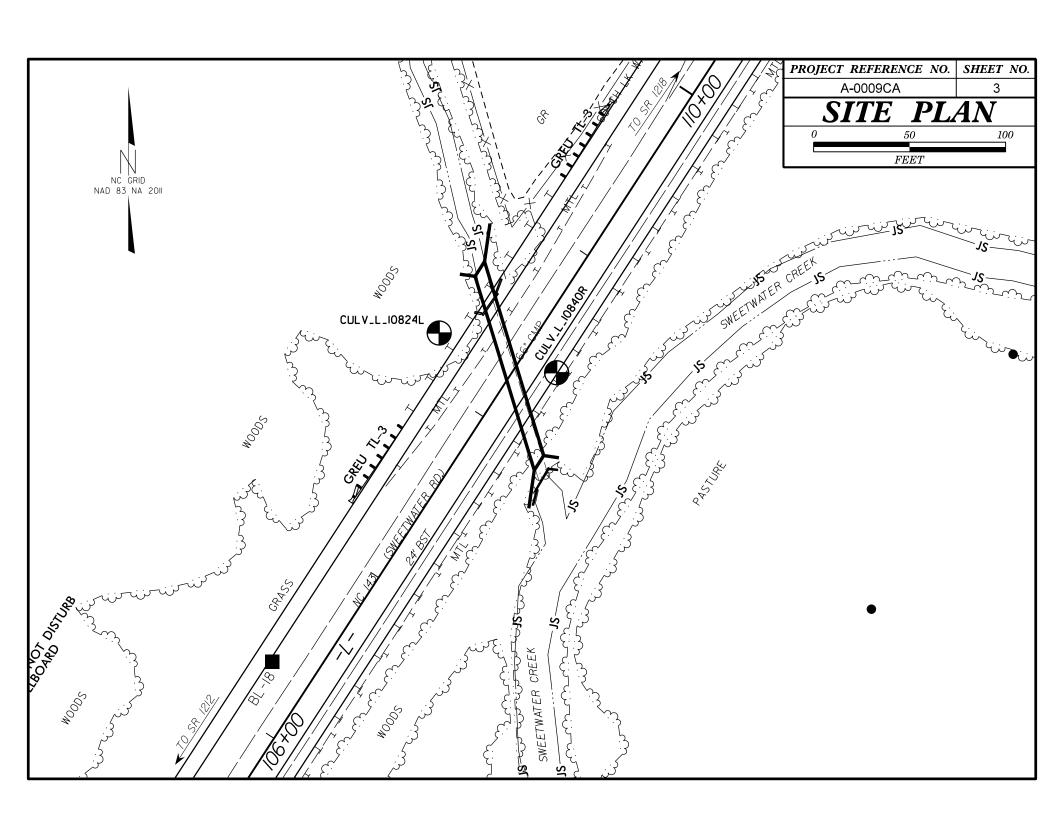
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS: FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. MODERATELY INDURATED INDURATED

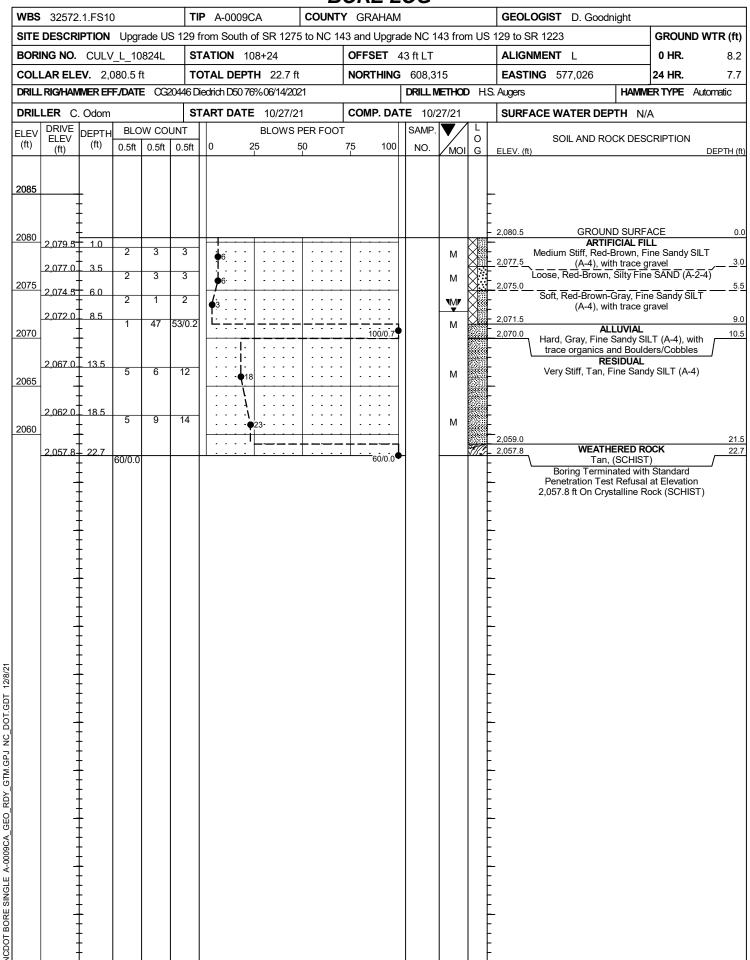
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:

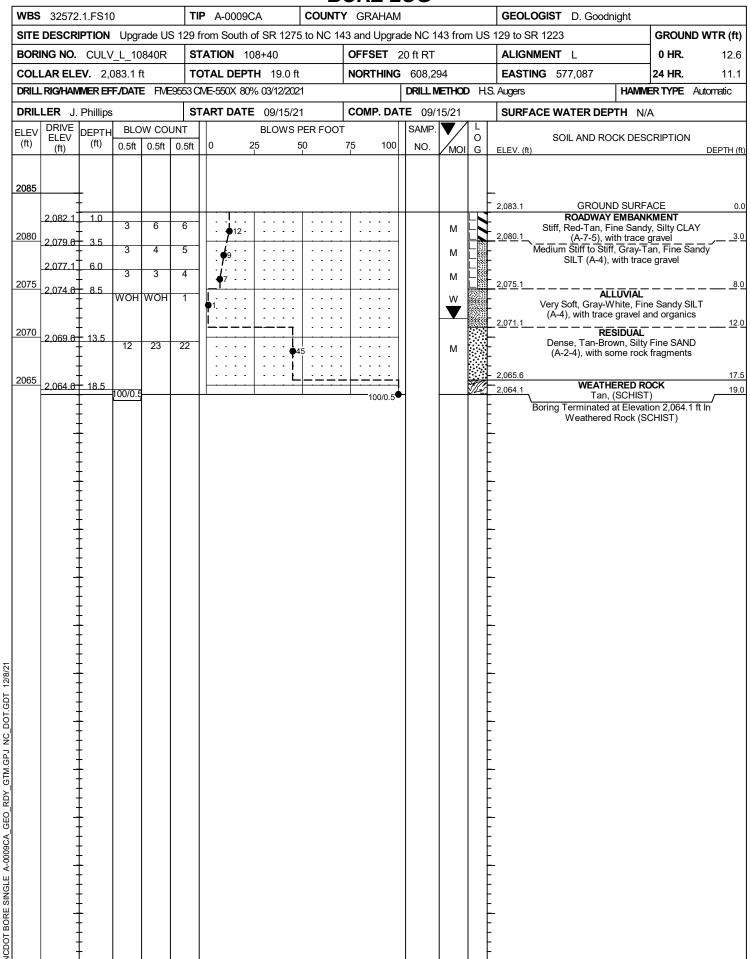
DIFFICULT TO BREAK WITH HAMMER.

SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.

DATE: 8-15-14







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

#### STATE OF NORTH CAROLINA

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

# STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GRAHAM

PROJECT DESCRIPTION <u>UPGRADE US</u> 129 FROM SOUTH OF SR 1275 TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223

SITE DESCRIPTION STRUCTURE ON NC 143 OVER SWEETWATER CREEK AT -L- STATION 113+69 - RCBC CULVERT EXTENSION

#### **CONTENTS**

SHEET NO.

2. 2A 3 4-7

**DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN BORE LOGS

PERSONNEL

CG2 EXPLORATION

N. MCLAREN

INVESTIGATED BY  $\underline{CG}_2$ 

DRAWN BY \_\_M. BRE WER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY CG2

DATE \_DECEMBER 2021

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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 1(99) 707-850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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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 DEEM NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED TO 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.

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(980) 339-8684



. Matthew Brewer 1/20/2022

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

PROJECT REFERENCE NO.	SHEET NO.
A-0009CA	2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 1 OF 2)

													(PA	4GE	1 <b>OF</b> 2)		
						SOI	L_DE	SCR	<u>IP</u> TI	ON					GRADATION		
BE PENE ACCORD IS CONSIST	SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PEMETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO TO 206, ASTM DI586). 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												) BLOWS PI . CLASSIFI E FOLLOWI NT FACTOR	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			
	AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE.  VERY STIFF, GRAY, SLITY CLAY, WOUST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6  SOIL LEGEND AND AASHTO CLASSIFICATION													THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.			
GENERAL	CENERAL CRAMIII AR MATERIALS SILT-CLAY MATERIALS													MINERALOGICAL COMPOSITION			
CLASS. GROUP	A-1	(:			G =200					SING #200		ORC 1, A-2	GANIC MATER	IALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.		
CLASS.	A-1-a A	-1-ь		A-2-4	A-2-5	A-2-6		51801920801		A- A-		A-3	A-6, A-7		COMPRESSIBILITY		
SYMBOL						>	8		171						SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50		
% PASSING *10	EQ. 14V										CDA	NULAR	SILT-	MUCK,	HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL		
*40 *200	50 MX 30 MX 50 15 MX 25			35 MX	35 MX	( 35 M)	35 MX	36 MN	36 MN	36 MN 36	SC	OILS	CLAY SOILS	PEAT	GRANULAR SILT - CLAY  ORGANIC MATERIAL  SOILS  OTHER MATERIAL		
MATERIAL PASSING *40 LL PI	_ 6 MX						( 41 MN 11 MN			40 MX 41		SOILS LITTL	E OR	HIGHLY	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%  LITTLE DRGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%  MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%  HIGHLY DRGANIC > 10% > 20% HIGHLY 35% AND ABOVE		
GROUP INDEX	0		0	_	0	+	MX	-		16 MX NO	_	MODE! AMOUN		ORGANIC	GROUND WATER		
USUAL TYPES OF MAJOR	STONE FR	AND .	FINE SAND			r Clay and sa		SIL SOI		CLAYEY SOILS		ORGA MAT		SOILS			
GEN. RATING	SAND				) GOOD					O POOR		IR TO	POOR	UNSUITABLE	✓ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA		
AS SUBGRADE							≤ LL -					00R 30	1 0011	ONSOTTABLE	O-M⊶ SPRING OR SEEP		
	PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30  CONSISTENCY OR DENSENESS														MISCELLANEOUS SYMBOLS		
PRIMARY	SOIL TY	(PE	0		CTNES	SS OR NCY	:		RATION	STANDAR I RESISTE ALUE)			GE OF UNC RESSIVE S (TONS/F)	STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES		
GENERA	LLY				Y LOO					4					SOIL SYMBOL SIDE INDICATOR STATE TEST BORING SLOPE INDICATOR INSTALLATION		
GRANUL MATERI		,		MEDI (	UM DE	M DENSE 10 TO 30 ENSE 30 TO 50						N/A			ARTIFICIAL FILL (AF) OTHER AUGER BORING AUGER PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST		
	51125112				Y DEI				>	2			< 0.25	<u> </u>	MI   NFERRED SOIL BOUNDARY		
GENERA SILT-C					SOFT		2 TO 4					0.25 TO 0.5 0.5 TO 1.0			TEST BORING  MONITORING WELL  TEST BORING WITH CORF		
MATERI (COHES	AL		MEDIUM STIFF STIFF VERY STIFF					8 TO 15 15 TO 30				1 TO 2 2 TO 4			ALLUMIN COTH POLINIDARY A PIEZOMETER COTH NOVALUE		
					HARD TF:	X T I IF	RE O	R GE		зø I SIZE			> 4		RECOMMENDATION SYMBOLS		
U.S. STD. SI	EVE SIZ	ZE			4		10	40			200	270			UNICLASSIFIED EXCAVATION - TAN UNCLASSIFIED EXCAVATION -		
OPENING (M	Т	COB	BBLE	Τ	4.7		2.00	0.42 COARS	SE .	F	INE	<b>0.0</b> 53	SILT	CLAY	UNDERCUT  UNDERC		
(BLDR.	.)	(C)	0B.)		(GR	ı,		SANI (CSE. S			AND SD.)	(	(SL.)	(CL.)	ABBREVIATIONS		
GRAIN MI SIZE IN				75 3			2.0			0.25		0.05	0.005	5	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED		
		SI	OIL	MO	IST	URE	- C	ORRE	LAT	ION C	F TE	RMS			CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT		
	MOISTU TERBERO						D MOI SCRIP			GUIDE F	OR FIEL	D MOIS	STURE DES	SCRIPTION	CSE COARSE ORG ORGANIC  DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS		
							TURAT	ED -					WET, USU		DPT - DYNAMIC PENETRATION TEST		
PLASTIC RANGE (PI)	. + LIC				- WET - (W) SEMISOLID; ATTAIN OP									)	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING HJ HIGHLY V - VERY RATIO		
	_				- MC	DIST -	(M)		SOLID; A	r or ne	EAR OP	TIMUM MO	DISTURE	EQUIPMENT USED ON SUBJECT PROJECT			
	OM OPTIMUM MOIST SL SHRINKAGE LIM				_		·-			REQUIRE	S ADDIT	IONAL	WATER TO	0	DRILL UNITS:  ADVANCING TOOLS:  CME-45C  CLAY BITS  HAMMER TYPE:  X AUTOMATIC MANUAL		
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  PLASTICITY													CME-55  G* CONTINUOUS FLIGHT AUGER CORE SIZE:  X 8* HOLLOW AUGERS  -B -H				
								ITY IN		PI)		DR	RY STRENO	GTH .	CME-550 HARD FACED FINGER BITS		
	N PLAST		TIC					Ø-5 6-15	N			_	VERY LOW SLIGHT		VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:		
MO	DERATEL SHLY PL	Y PL	ASTI	С			26	16-25 OR MC	DRE				MEDIUM HIGH		CASING W/ ADVANCER POST HOLE DIGGER		
								OLOR							PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER TRICONE TUNGCARB. SOUNDING POD		
	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.													X MOBILE B-29 CORE BIT SOUNDING ROD VANE SHEAR TEST			

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		(PAGE	2 OF 2)
	PO:	CK DESCRIPTION	TERMS AND DEFINITIONS
ROCK LINE I SPT REFUSA BLOWS IN N REPRESENTE	IS NON-COASTAL PLAIN MATERIA INDICATES THE LEVEL AT WHICH L IS PENETRATION BY A SPLIT	L THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFER NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSA SPOON SAMPLER EQUAL TO OR LESS THAN Ø.1 FOOT PER E THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN CK.	RED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
WEATHERED ROCK (WR)	NON-COAS 100 BLOW	TAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES S 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
CRYSTALLINE ROCK (CR)	WOULD YI	COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT ELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRAN ABBRO, SCHIST, ETC.	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.
NON-CRYSTAI ROCK (NCR)	LLINE FINE TO SEDIMENT ROCK TYP	COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN ARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. 'E INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YI	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SEDIMENTAR'		JSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMEN	
	, , , ,	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
FRESH	ROCK FRESH, CRYSTALS BRIGHT, I HAMMER IF CRYSTALLINE.	FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
VERY SLIGHT (V SLI.)		STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF O EN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS	PEN, DID DIDECTION (DID ATMITTE) - THE DIDECTION OF BEADING OF THE HODIZONTAL TRACE OF THE
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS 1 INCH. OPEN JOINTS MAY CONTA	STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO BIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK	LORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  SHOW DISCOLORATION AND WEATHERING EFFECTS. IN  ARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
	DULL SOUND UNDER HAMMER BLO WITH FRESH ROCK.	DWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARE	D FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM,
MODERATELY SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORI	DLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DL IY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STREI GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	NGTH FIELD.
SEVERE	<u>IF TESTED, WOULD YIELD SPT RI</u>		LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
(SEV.)	REDUCED IN STRENGTH TO STRO	DEURED ON STRINED, NOCK FABRIC CLEAR AND EVIDENT BUT NG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZE NTS OF STRONG ROCK USUALLY REMAIN.	
	IF TESTED, WOULD YIELD SPT N	VALUES > 100 BPF	MOTILED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTILING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SEVERE (V SEV.)	BUT MASS IS EFFECTIVELY REDU REMAINING, SAPROLITE IS AN EX	DLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBL JCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROC KAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	EXX PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
COMPLETE		BRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100</i> ABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AN	NESIDORE WEST SOIL - SOIL FORMED IN FERCE BY THE WEST MENTING OF NOCK.
COM EE TE	SCATTERED CONCENTRATIONS. OL ALSO AN EXAMPLE.	JARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE	
		OCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PAREN ROCK.
VERY HARD	SEVERAL HARD BLOWS OF THE C	E OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES EOLOGIST'S PICK. R PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRE	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
MODERATELY	TO DETACH HAND SPECIMEN.  CAN BE SCRATCHED BY KNIFE OF	R PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
HARD	BY MODERATE BLOWS.	A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
MEDIUM HARD		35 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT HIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF TH	
SOFT		DILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS 5 IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THI	
VERY SOFT	CAN BE CARVED WITH KNIFE. CA	RER PRESSURE. N BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INC BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY I	
	FRACTURE SPACING	BEDDING	BENCH MARK: N/A
TERM VERY WID	SPACING DE MORE THAN 10 F	TERM THICKNESS EET VERY THICKLY BEDDED 4 FEET	
WIDE	3 TO 10 FEET ELY CLOSE 1 TO 3 FEET	T THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
CLOSE	Ø.16 TO 1 FOO	T VERY THINLY BEDDED 0.03 - 0.16 FEE	T NOTES:
VERY CLO	OSE LESS THAN 0.16	FEET THICKLY LAMINATED 0.008 - 0.03 FE THINLY LAMINATED < 0.008 FEET	
		INDURATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING
			•

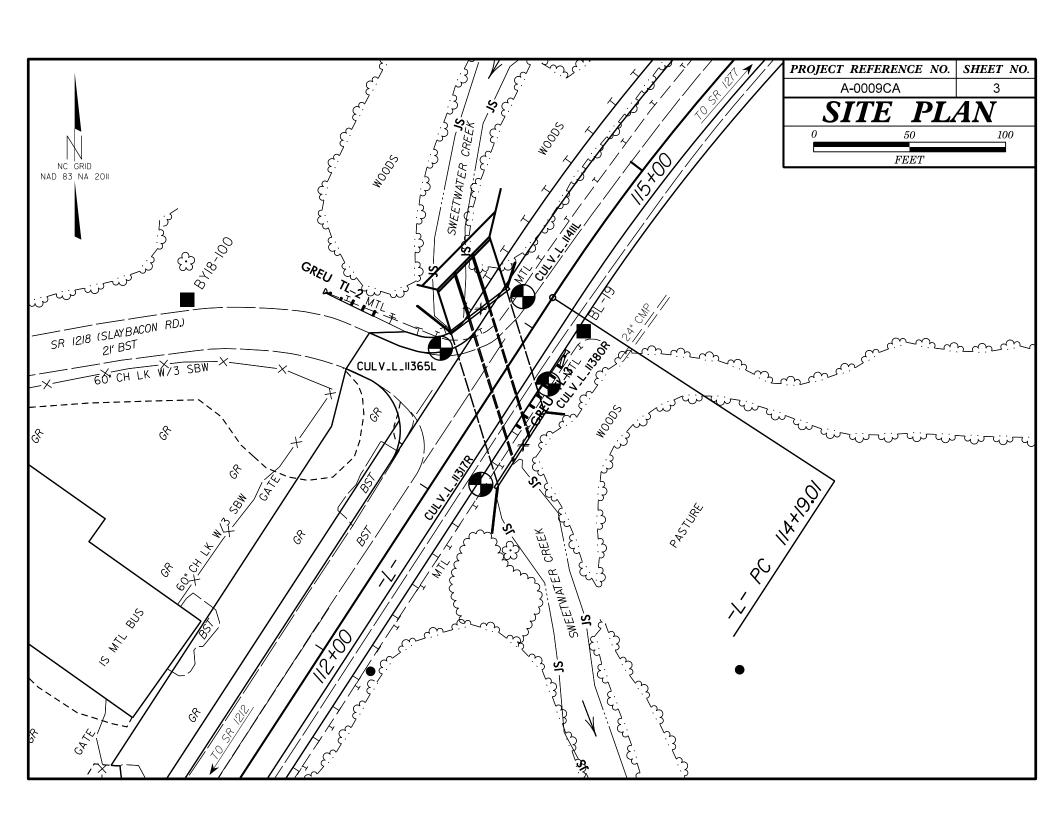
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS: FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. MODERATELY INDURATED INDURATED

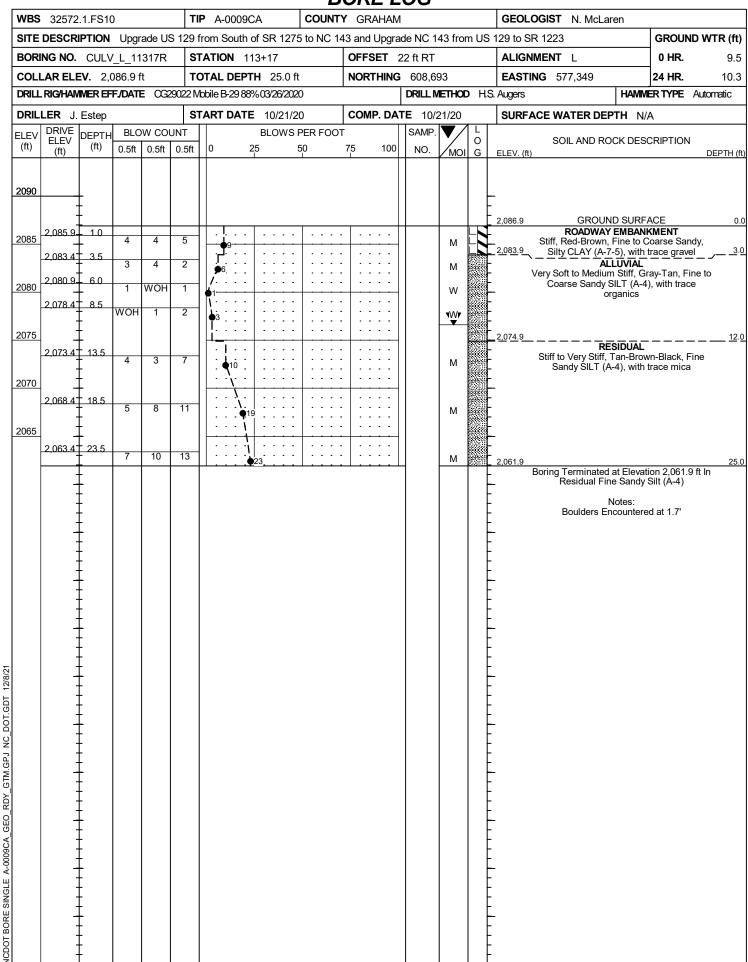
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:

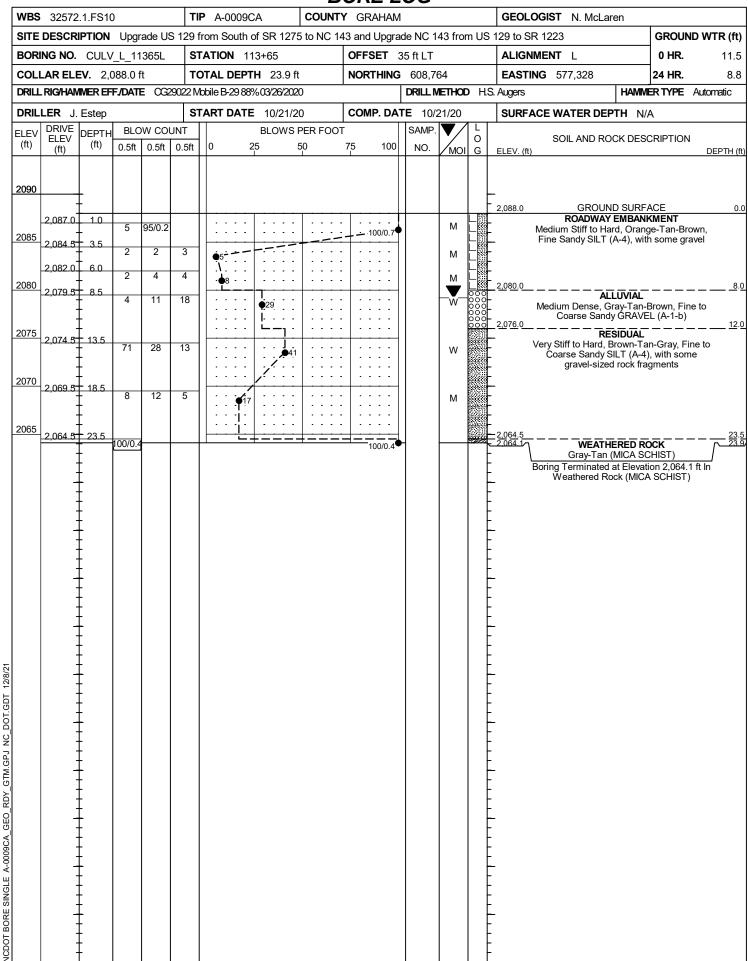
DIFFICULT TO BREAK WITH HAMMER.

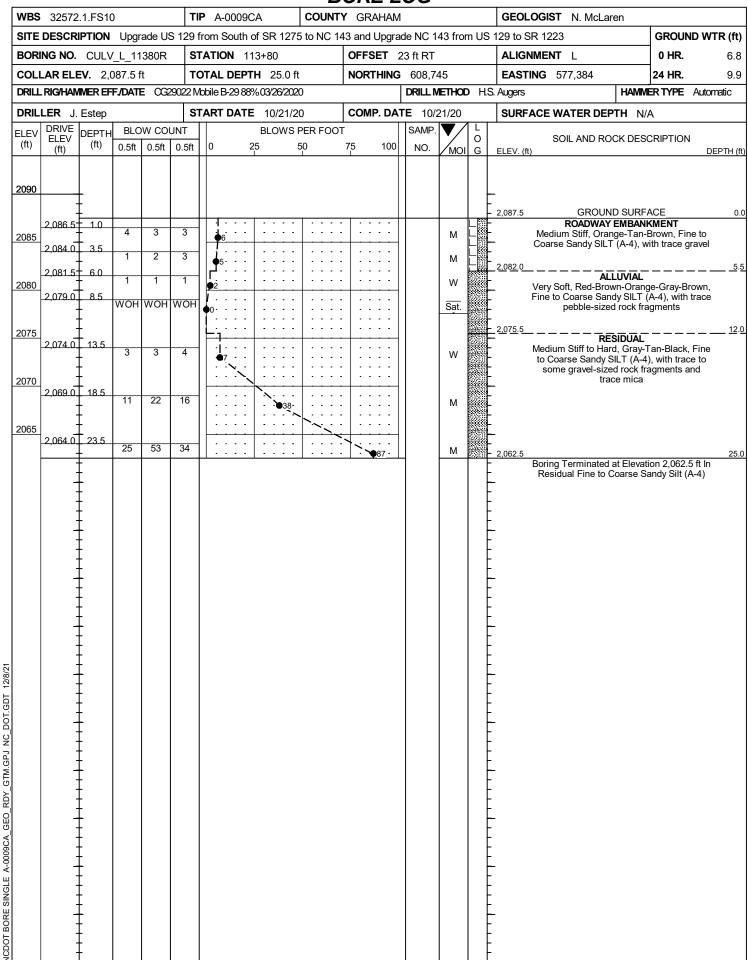
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.

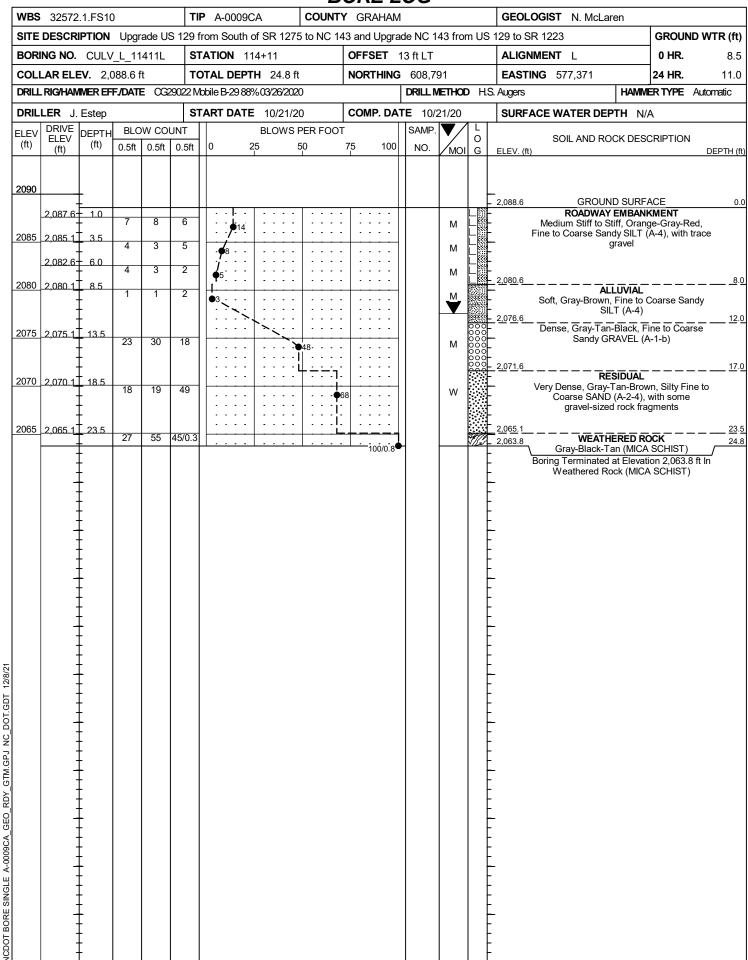
DATE: 8-15-14











STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CA	1	5

#### STATE OF NORTH CAROLINA

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

# STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GRAHAM

PROJECT DESCRIPTION <u>UPGRADE US</u> 129 FROM SOUTH OF SR 1275 TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223

SITE DESCRIPTION STRUCTURE ON NC 143 OVER HARWOOD BRANCH AT -L- STATION 144+74.5

#### **CONTENTS**

SHEET NO.

2. 2A

3 4-5 **DESCRIPTION** 

TITLE SHEET LEGEND (SOIL & ROCK)

SITE PLAN BORE LOGS PERSONNEL

CG2 EXPLORATION

D. GOODNIGHT

INVESTIGATED BY  $\underline{CG}_2$ 

DRAWN BY \_\_M. BRE WER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY CG2

DATE JANUARY 2021

#### **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 1(99) 707-850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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(980) 339-8684



D. Matthew Brewer 1/20/2022

386129C0A4C1462... SIGNATURE

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

PROJECT REPERENCE NO.	SHEET NO.
A-0009CA	2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 1 OF 2)

											(PA	4GE	(1 OF 2)				
				SOII	L DE	SCR	IPTI	ON					GRADATION				
BE PENE ACCORD IS E CONSISTI	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 DI586), 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												WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <u>UNIFORMLY GRADED</u> - INDICATES A 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.  ANGULARITY OF GRAINS				
	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  SOIL LEGEND AND AASHTO CLASSIFICATION												THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.				
GENERAL			LEGEN AR MATERIA		ND A			LAS MATERIA				MINERALOGICAL COMPOSITION					
CLASS.	(	≤ 35%	PASSING #2	00)		( > 3	5% PAS	SING #2	(00)		GANIC MATERI	IALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.				
GROUP CLASS.	A-1 A-1-a A-1-b	A-3	A-2-4 A-2			A-4	A-5	A-6	A-7-5 A-7-6	A-1, A-2 A-3	A-4. A-5 A-6. A-7		COMPRESSIBILITY				
SYMBOL				×			1 7 1						SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50				
% PASSING *10	50 MX									GRANULAR	SILT-	MUCK,	HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL				
<b>*</b> 40	30 MX 50 MX 15 MX 25 MX		35 MX 35	MX 35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	SOILS	CLAY SOILS	PEAT	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL				
MATERIAL													TRACE OF DRGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%  LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%				
PASSING *40 LL PI	- 6 MX		40 MX 41 M							SOILS LITTL		HIGHLY	MODERATELY ORGANIC 5 - 10%, 12 - 20%, SOME 20 - 35%, HIGHLY ORGANIC > 10%, > 20%, HIGHLY 35%, AND ABOVE				
GROUP INDEX	0	0	0	_	MX	8 MX		-		Mode Amoun		ORGANIC SOILS	GROUND WATER				
USUAL TYPES OF MAJOR	STONE FRAGS. GRAVEL, AND	FINE		OR CLAY		SIL		CLA		ORGI MAT		3011.3	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING				
MATERIALS	SAND	SAND	GRAVE	_ AND SA	ND	S01	LS	SOI	LS				▼ STATIC WATER LEVEL AFTER 24 HOURS  ▼PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA				
GEN, RATING AS SUBGRADE		EXCELL	ENT TO GOO	00			FAIR TO	0 POOR		FAIR TO POOR	POOR	UNSUITABLE	SPRING OR SEEP				
	l	PI OF A	-7-5 SUBGR	OUP IS ≤						> LL - 30			MISCELLANEOUS SYMBOLS				
DDIMARY	SOIL TYPE		OMPACTN				GE OF	STAND	ARD		E OF UNC		III 25,425				
PRIMART	OUL TIPE		CONSIST			PENEIP	(N-VA	ALUE)	TENCE	COMP	(TONS/FT		ROADWAY EMBANKMENT (RE) 29 00 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES				
GENERA GRANUL			VERY L	E			4 TI	0 10					SOIL SYMBOL       SOIL SYMBOL    SLOPE INDICATOR INSTALLATION  SLOPE INDICATOR INSTALLATION				
MATERI (NON-CC			MEDIUM DENS	E		10 TO 30 N/A 30 TO 50 > 50							ARTIFICIAL FILL (AF) OTHER AUGER BORING ONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING				
			VERY D	OFT			<	2			< 0.25		— INFERRED SOIL BOUNDARY — CORE BORING ◆ SOUNDING ROD				
GENERA SILT-CL	AY.		MEDIUM	SOFT 2 TO 4 JM STIFF 4 TO 8							0.25 TO 1	1.0	INFERRED ROCK LINE  MV  MONITORING WELL  TEST BORING WITH CORE				
MATERI (COHESI			STIF VERY S	TIFF		8 TO 15 1 15 TO 30 2 > 30							TTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER INSTALLATION SPI N-VALUE				
			HAR TE	XTUF	RE O	R GF			'E		> 4		RECOMMENDATION SYMBOLS				
U.S. STD. SI				4	10	40		60	200	270			UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE				
OPENING (M	R CO	BBLE	GR	AVEL	2.00	COARS	SE.	<b>0.</b> 25	0.075 FINE SAND		SILT	CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL				
(BLDR.		:0B.)		GR.)		(CSE. S			(F SD.	.)	SL.)	(CL.)	ABBREVIATIONS  AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST				
GRAIN MM SIZE IN			75 3		2.0		,	<b>0.</b> 25		0.05	0.005	)	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED				
		OIL					LAT	ION	OF	TERMS			CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT				
	MOISTURE TERBERG LIF				D MOI: SCRIP			GUIDE	FOR F	TIELD MOIS	STURE DES	SCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK				
LL _	LIQUID	LIMIT			TURAT SAT.)	ED -					WET, USU		e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK				
PLASTIC RANGE (PI) PL	_ PLASTII			- WE	T - (V	<b>v</b> ))				REQUIRES I	ORYING TO TURE	)	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRAGS FRAGMENTS # - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHY V - VERY RATIO				
OM				- MO	NST -	(M)		SOLID	AT OF	R NEAR OF	TIMUM MO	ISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:				
SL	SL _ SHRINKA							REQUI	RES AD	DITIONAL	WATER TO		CME-45C CLAY BITS X AUTOMATIC MANUAL				
- DRY - (D) ATTAIN OPTIMUM MOISTURE  PLASTICITY									N OPTI	MUM MOIS	CME-55  G* CONTINUOUS FLIGHT AUGER  CORE SIZE:  X 8* HOLLOW AUGERS  CORE SIZE:  -B -H -H						
						ITY IN		PI)		DF	RY STRENG	TH .	CME-550 HARD FACED FINGER BITS				
SLI	PLASTIC			_		Ø-5 6-15					VERY LOW SLIGHT	1	VANE SHEAR TEST TUNGCARBIDE INSERTS				
	ERATELY PI HLY PLASTI					16-25 OR MC	IRE				MEDIUM HIGH		CASING W/ ADVANCER POST HOLE DIGGER PORTABLE HOIST TRICONE STEEL TEETH WAND AUGUST				
					C	OLOR							TRICONE TUNGCARB. SQUINDING POD				
	TIONS MAY												X DIEDRICH D50 CORE BIT VANE SHEAR TEST				
	MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		(PAGE 2	OF 2)			
	DUCK	DESCRIPTION	TERMS AND DEFINITIONS			
ROCK LINE I SPT REFUSA BLOWS IN N REPRESENTE	IS NON-COASTAL PLAIN MATERIAL THI INDICATES THE LEVEL AT WHICH NON- IL IS PENETRATION BY A SPLIT SPOOM	T WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL, SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 RANSITION BETWEEN SOIL AND ROCK IS OFTEN	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.			
WEATHERED ROCK (WR)	NON-COASTAL I	LAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	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.			
CRYSTALLINE ROCK (CR)	FINE TO COARS	E GRAIN IGNEOUS AND METAMORPHIC ROCK THAT PT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	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.			
NON-CRYSTA ROCK (NCR)	LLINE FINE TO COARS	CONTINUE OF THE STATE OF T	— 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.			
COASTAL PL SEDIMENTAR (CP)		SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED C.	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDE BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
		THERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.			
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW S HAMMER IF CRYSTALLINE.	DINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.			
VERY SLIGHT (V SLI.)		ED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.			
SLIGHT (SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN CL	ED AND DISCOLORATION EXTENDS INTO ROCK UP TO AY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.			
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW	CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  DISCOLORATION AND WEATHERING EFFECTS. IN  E DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.			
	WITH FRESH ROCK.	D SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	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			
MODERATELY SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORITY SH	O OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL  W KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH  DGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK,	FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.			
SEVERE	IF TESTED, WOULD YIELD SPT REFUSA  ALL ROCK EXCEPT QUARTZ DISCOLORE	) OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.			
(SEV.)		L. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.			
	<u>IF TESTED, WOULD YIELD SPT N VALU</u>	S > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.			
VERY SEVERE (V SEV.)	BUT MASS IS EFFECTIVELY REDUCED REMAINING. SAPROLITE IS AN EXAMPLI	DOR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE O SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	<u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.			
COMPLETE		REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	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			
	SCATTERED CONCENTRATIONS. QUARTZ ALSO AN EXAMPLE.	MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK SECTION DESIGNATION (NOD) - MERODRE OF NOCK WORLTH DESCRIBED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
VERY HARD		HARDNESS SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PAREN ROCK.			
HARD	SEVERAL HARD BLOWS OF THE GEOLOG CAN BE SCRATCHED BY KNIFE OR PICE		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.			
MODERATELY HARD	EXCAVATED BY HARD BLOW OF A GEOL	. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE OGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.			
MEDIUM HARD		HES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. O PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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 SOI WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.			
SOFT	CAN BE GROVED OR GOUGED READILY FROM CHIPS TO SEVERAL INCHES IN	Y KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS IZE 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.			
VERY SOFT		ESSURE. EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH N BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	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.			
	FRACTURE SPACING	BEDDING	_BENCH MARK: N/A			
TERM VERY WID		TERM THICKNESS  VERY THICKLY BEDDED 4 FEET  THICKLY BEDDED 15 - 4 FEET	ELEVATION: FEET			
WIDE MODERATI CLOSE VERY CLO	3 TO 10 FEET 1 TO 3 FEET 0.16 TO 1 FOOT 0SE LESS THAN 0.16 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	NOTES: ROADWAY DESIGN FILES DATED 7/II/2021 PROVIDED BY TGS ENGINEERS			
		URATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING			
EUD CEUTME	NITARY ROCKS INDURATION IS THE HAS	DENING OF MATERIAL BY CEMENTING HEAT DESCRIPE FTC	1			

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS: FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. MODERATELY INDURATED

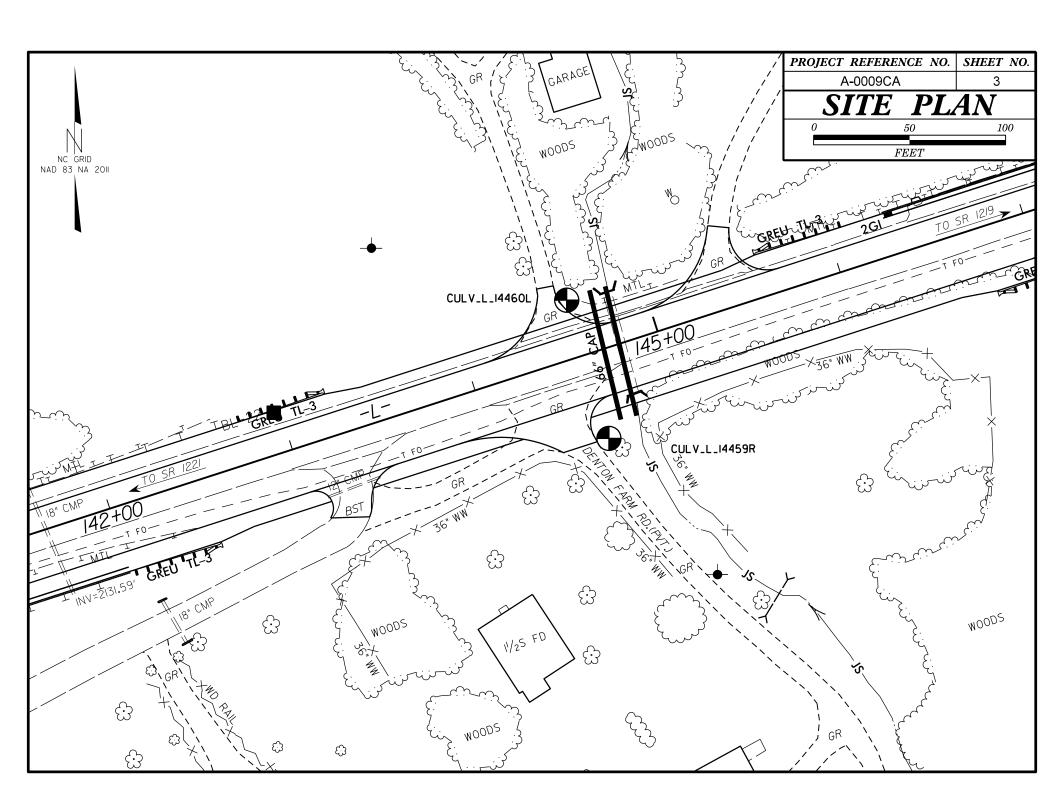
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:

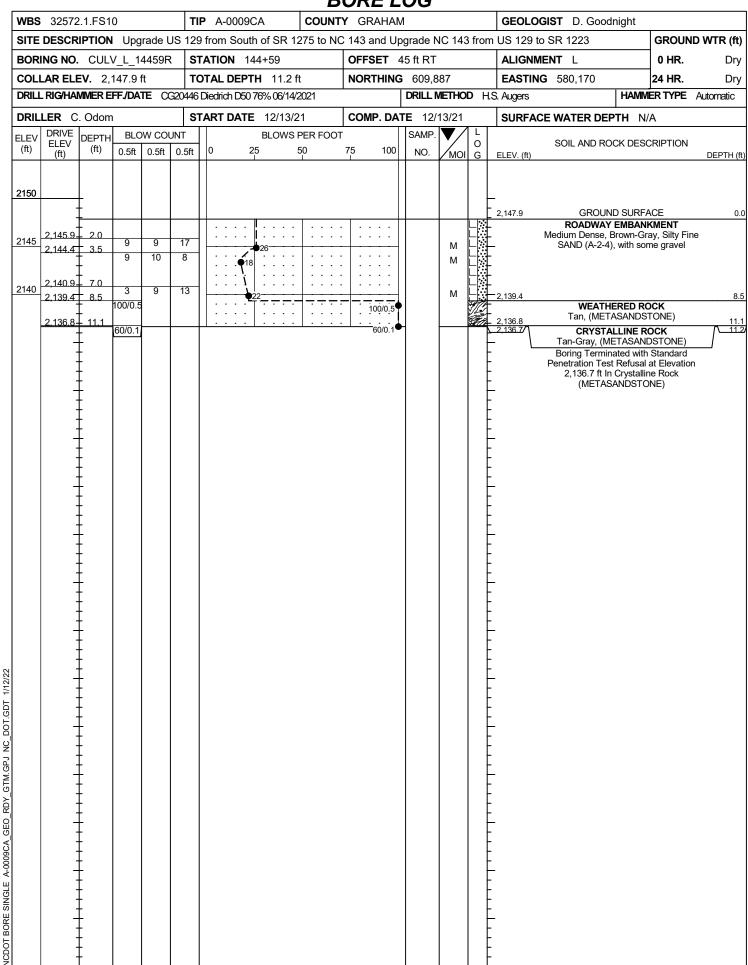
INDURATED

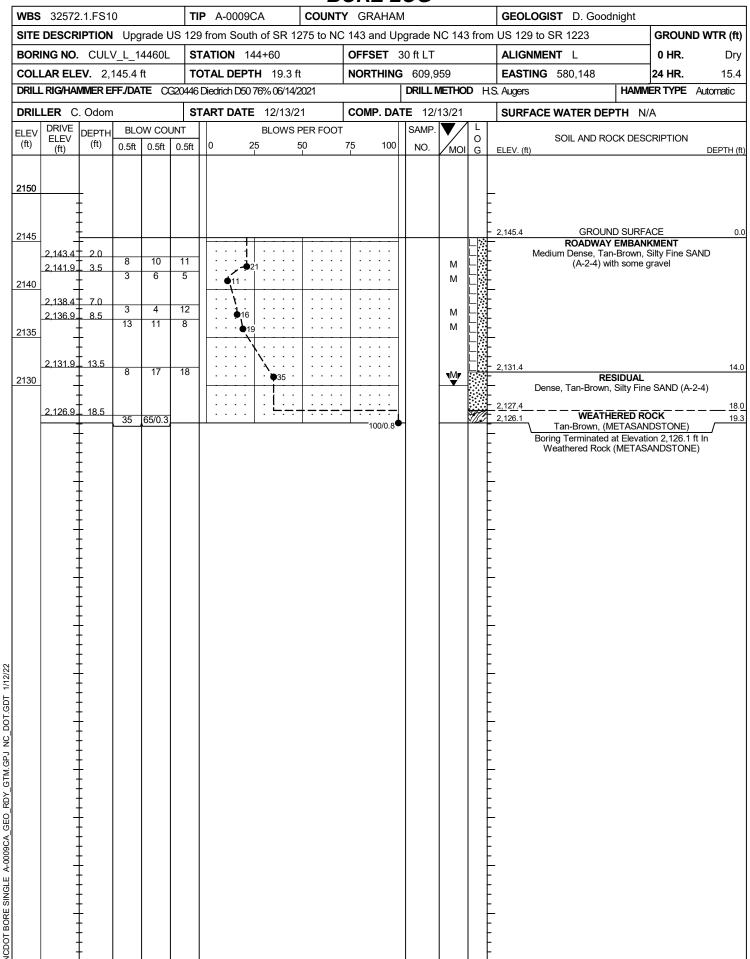
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.

DIFFICULT TO BREAK WITH HAMMER.

DATE: 8-15-14







STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CA	1	5

#### STATE OF NORTH CAROLINA

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

# STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GRAHAM

PROJECT DESCRIPTION <u>UPGRADE US</u> 129 FROM SOUTH OF SR 1275 TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223

SITE DESCRIPTION STRUCTURE ON NC 143 OVER BEECH CREEK AT -L- STATION 195+16 - REINFORCED CONCRETE BOX CULVERT

#### **CONTENTS**

SHEET NO.

2. 2A 3 4-5

**DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN BORE LOGS

PERSONNEL

CG2 EXPLORATION

S. BRAUN

D. GOODNIGHT

INVESTIGATED BY \_CG2

DRAWN BY \_\_M. BRE WER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY CG2

DATE \_DECEMBER 2021

#### **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 1(99) 707-850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL 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 (INP-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 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 DEEM NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED TO 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:

  I. 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.



**CHARLOTTE. NC 28227** (980) 339-8684



DocuSigned by:

. Matthew Brewer 1/20/2022

386129C0A4C1462... SIGNATURE

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

PROJECT REPERENCE NO.	SHEET NO.
A-0009CA	2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 1 OF 2)

											(PA	4GE	I OF 2)			
					SOI	L DE	SCRI	PTI	ON				GRADATION			
BE PENE ACCORD	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 PERETRATION TEST (AASHTO) T 206, ASTM DISBÓB. SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOSITURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH												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.			
									ON, AND OTH				ANGULARITY OF GRAINS			
		F,GRAY,	SILTY	CLAY, MC	IST WIT	H INTER	BEDDEL	FINE	SAND LAYER	S,HIGHLY PLA	ASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.				
GENERAL	SOIL LEGEND AND AASHTO CLASSIFICATION  RAL GRANULAR MATERIALS SILT-CLAY MATERIALS												MINERALOGICAL COMPOSITION			
CLASS. GROUP	A-1		% PAS	SING #2	00) A-2				SING #200) A-6 A-7	A-1, A-2	A-4, A-5	IALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.			
CLASS.	A-1-a A-1		A-2	-4 A-2			0000000000		A-7-5. A-7-6	A-3	A-6, A-7	************	COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LL < 31			
SYMBOL	00000000				13			1,7 1					MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50			
% PASSING *10	50 MX									GRANULAR	SILT-	MUCK,	PERCENTAGE OF MATERIAL			
*40 *200	30 MX 50			MX 35 I	4X 35 M	x 35 MX	36 MN	36 MN	36 MN 36 MN	SOILS	CLAY SOILS	PEAT	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL			
MATERIAL PASSING *40													TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%			
LL PI	- 6 MX	– NP							40 MX 41 MN		S WITH LE OR	HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE			
GROUP INDEX	вмх	NP	שו	יי שון xm	_	MX MX		_	11 MN 11 MN 16 MX NO MX		erate NTS of	ORGANIC	GROUND WATER			
USUAL TYPES	STONE FRAM	GS. FINE	+	SII TV	OR CLAY		SIL		CLAYEY	ORG	GANIC TTER	SOILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING			
OF MAJOR MATERIALS	GRAVEL, AN SAND	ND SAN			. AND S		SOIL		SOILS	MH	IIEN		▼ STATIC WATER LEVEL AFTER 24 HOURS			
GEN. RATING		EALE	LLENT	TO GOO	ın			FAIR TO	n poop	FAIR TO	POOR	UNSUITABLE	$\sqrt{{ t Pw}}$ Perched water, saturated zone, or water bearing strata			
AS SUBGRADE										POOR	i uun	UNSUITHBLE	O-MG+ SPRING OR SEEP			
		PI UF							SUBGROUP IS				MISCELLANEOUS SYMBOLS			
PRIMARY	SOIL TYP	E		PACTN DNSIST					STANDARD RESISTENCI		GE OF UNC PRESSIVE S (TONS/F)	STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION FOR ROCK STRUCTURES			
GENERA	VIIV		v	ERY L				<					SPT SPT TEST POPING SLOPE INDICATOR			
GRANUL	.AR		ME	LOOS DIUM I				4 TO			N/A		V 151 PM1 =			
MATERI (NON-CI	OHESIVE)			DENS ERY DI	ENSE			30 TO 50 > 50					THAN ROADWAY EMBANKMENT THOUSER BURING TEST			
GENERA	ALLY		١	ERY S				∠ 2 T	2 0 4		< 0.25 0.25 TO		INFERRED SOIL BOUNDARY     CORE BORING     SOUNDING ROD			
SILT-C MATERI	LAY		ME	DIUM	STIFF			4 T	0 8		0.5 TO 1	1.0	INFERRED ROCK LINE MNONITORING WELL TEST BORING WITH CORE			
COHES			٧	ERY S	TIFF		8 TO 15 15 TO 30 > 30				2 TO 4		TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER SPT N-VALUE			
				HAR	XTU	RE O	R GE		SIZE		> 4		RECOMMENDATION SYMBOLS			
U.S. STD. SI	IEVE SIZE				4	10	40		60 201	270			UNCLASSIFIED EXCAVATION - TATA UNCLASSIFIED EXCAVATION -			
OPENING (M	1M)	COBBLE	. T		76 AVEL	2.00	0.42 COARS		0.25 0.07 FIN	5 <b>0.0</b> 53	SILT	CLAY	UNSUITABLE WASTE  UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF  UNDERCUT  UNDERCUT  UNDERCUT  UNDERCUT  UNDERCUT  UNDERCUT  UNDERCUT  UNDERCUT  UNDERCUT  OR BACKFILL			
(BLDR		(COB.)			iR.)		SAND CSE.S		SAN (F S	ן ט	(SL.)	(CL.)	ABBREVIATIONS			
GRAIN M	м 305		75			2.0			<b>0.</b> 25	0.05	0.005	5	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST			
SIZE IN	i. 12		3										BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT			
	MOTOTUE	SOII		<u> 10151</u>		.D MOIS		LAT	ION OF	TERMS			CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC			
	MOISTUR TERBERG					SCRIPT			GUIDE FOR	FIELD MOI	STURE DES	SCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>			
						TURATE	ED -		USUALLY L				DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON			
LL	. 丄 LIQU	ID LIM	ΙT	_		(SAT.)			FROM BELO	W THE GRO	OUND WATE	R TABLE	F - FINE SL, - SILT, SILTY ST - SHELBY TUBE FOSS, - FOSSILIFEROUS SLI, - SLIGHTLY RS - ROCK			
PLASTIC RANGE <					- WI	ET - (W	')		SEMISOLID:			)	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING			
(PI) PL	. <del> </del> PLAS	STIC LI	MIT	-						anon MUIS	J. UIL		HI HIGHLY V - VERY RATIO			
nn	1 _ OPTI	мим м	OIST	URE	- M	DIST -	(M)		SOLID; AT	OR NEAR OF	PTIMUM MO	DISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:			
SL	OM OPTIMUM SL SHRINKA(			т _									DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:  CME-45C CLAY BITS X AUTOMATIC MANUAL			
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE											CME-55  G * CONTINUOUS FLIGHT AUGER CORE SIZE:  X 8 * HOLLOW AUGERS  -B -H					
						PLAS							X 8*HOLLOW AUGERS			
NO	N PLASTI	C			<u>P</u>	_ASTICI	TY IND 0-5	DEX (	PI)	DI	RY STRENC VERY LOW		TUNG,-CARBIDE INSERTS			
SL	IGHTLY PI	LASTIC					6-15 16-25				SLIGHT MEDIUM		VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS:			
	SHLY PLAS		. 10				OR MO	RE			HIGH		POST HOLE DIGGER			
						CC	DLOR						TRICONE TUNG,-CARB. COUNDING DOD			
DESCRIP	TIONS MA	Y INCL	.UDE	COLOR	OR C	OLOR C	OMBINA	ATIONS	S (TAN, RED	, YELLOW-B	BROWN, BLUI	E-GRAY).	X DIEDRICH D-50 CORE BIT VANE SHEAR TEST			
									USED TO							

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		(PAGE 2	OF 2)			
	DUCK	DESCRIPTION	TERMS AND DEFINITIONS			
ROCK LINE I SPT REFUSA BLOWS IN N REPRESENTE	IS NON-COASTAL PLAIN MATERIAL THI INDICATES THE LEVEL AT WHICH NON- IL IS PENETRATION BY A SPLIT SPOOM	T WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL, SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 RANSITION BETWEEN SOIL AND ROCK IS OFTEN	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.			
WEATHERED ROCK (WR)	NON-COASTAL I	LAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	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.			
CRYSTALLINE ROCK (CR)	FINE TO COARS	E GRAIN IGNEOUS AND METAMORPHIC ROCK THAT PT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	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.			
NON-CRYSTA ROCK (NCR)	LLINE FINE TO COARS	CONTINUE OF THE STATE OF T	— 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.			
COASTAL PL SEDIMENTAR (CP)		SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED C.	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDE BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
		THERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.			
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW S HAMMER IF CRYSTALLINE.	DINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.			
VERY SLIGHT (V SLI.)		ED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.			
SLIGHT (SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN CL	ED AND DISCOLORATION EXTENDS INTO ROCK UP TO AY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.			
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW	CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  DISCOLORATION AND WEATHERING EFFECTS. IN  E DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.			
	WITH FRESH ROCK.	D SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	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			
MODERATELY SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORITY SH	O OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL  W KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH  DGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK,	FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.			
SEVERE	IF TESTED, WOULD YIELD SPT REFUSA  ALL ROCK EXCEPT QUARTZ DISCOLORE	) OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.			
(SEV.)		L. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.			
	<u>IF TESTED, WOULD YIELD SPT N VALU</u>	S > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.			
VERY SEVERE (V SEV.)	BUT MASS IS EFFECTIVELY REDUCED REMAINING. SAPROLITE IS AN EXAMPLI	DOR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE O SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	<u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.			
COMPLETE		REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	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			
	SCATTERED CONCENTRATIONS. QUARTZ ALSO AN EXAMPLE.	MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK SECTION DESIGNATION (NOD) - MERODRE OF NOCK WORLTH DESCRIBED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
VERY HARD		HARDNESS SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PAREN ROCK.			
HARD	SEVERAL HARD BLOWS OF THE GEOLOG CAN BE SCRATCHED BY KNIFE OR PICE		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.			
MODERATELY HARD	EXCAVATED BY HARD BLOW OF A GEOL	. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE OGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.			
MEDIUM HARD		HES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. O PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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 SOI WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.			
SOFT	CAN BE GROVED OR GOUGED READILY FROM CHIPS TO SEVERAL INCHES IN	Y KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS IZE 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.			
VERY SOFT		ESSURE. EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH N BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	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.			
	FRACTURE SPACING	BEDDING	_BENCH MARK: N/A			
TERM VERY WID		TERM THICKNESS  VERY THICKLY BEDDED 4 FEET  THICKLY BEDDED 15 - 4 FEET	ELEVATION: FEET			
WIDE MODERATI CLOSE VERY CLO	3 TO 10 FEET 1 TO 3 FEET 0.16 TO 1 FOOT 0SE LESS THAN 0.16 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	NOTES: ROADWAY DESIGN FILES DATED 7/II/2021 PROVIDED BY TGS ENGINEERS			
		URATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING			
EUD CEUTME	NITARY ROCKS INDURATION IS THE HAS	DENING OF MATERIAL BY CEMENTING HEAT DESCRIPE FTC	1			

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS: FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. MODERATELY INDURATED

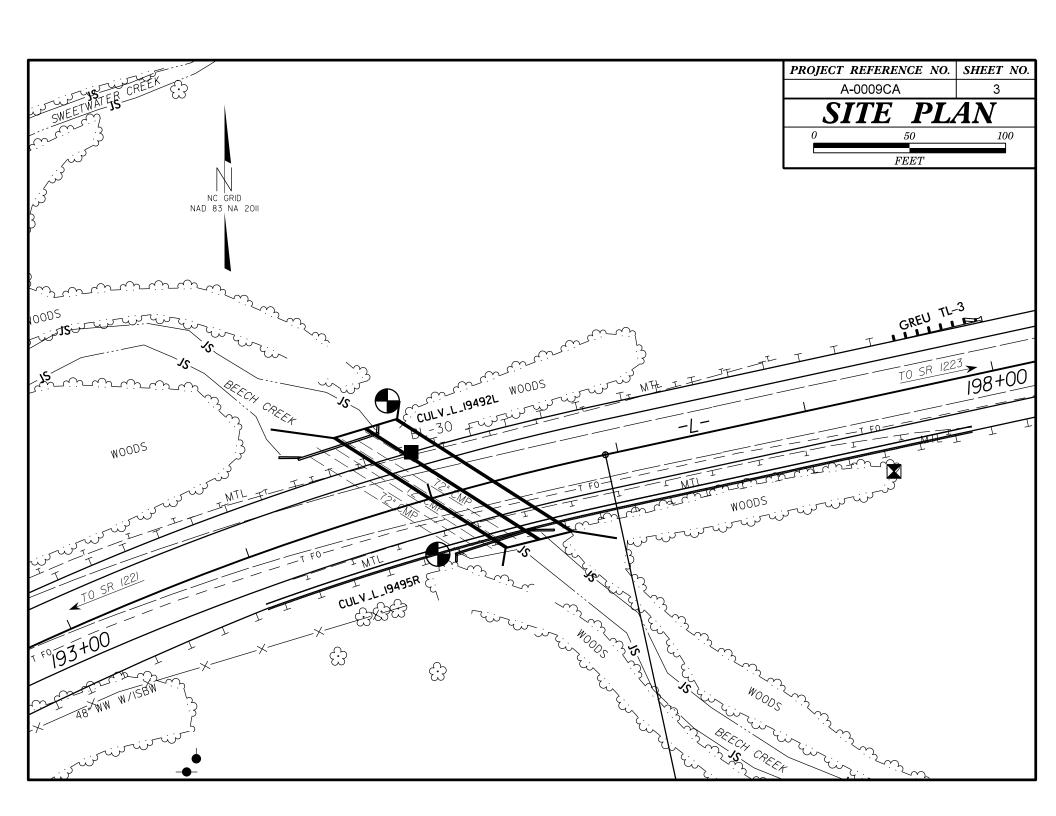
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:

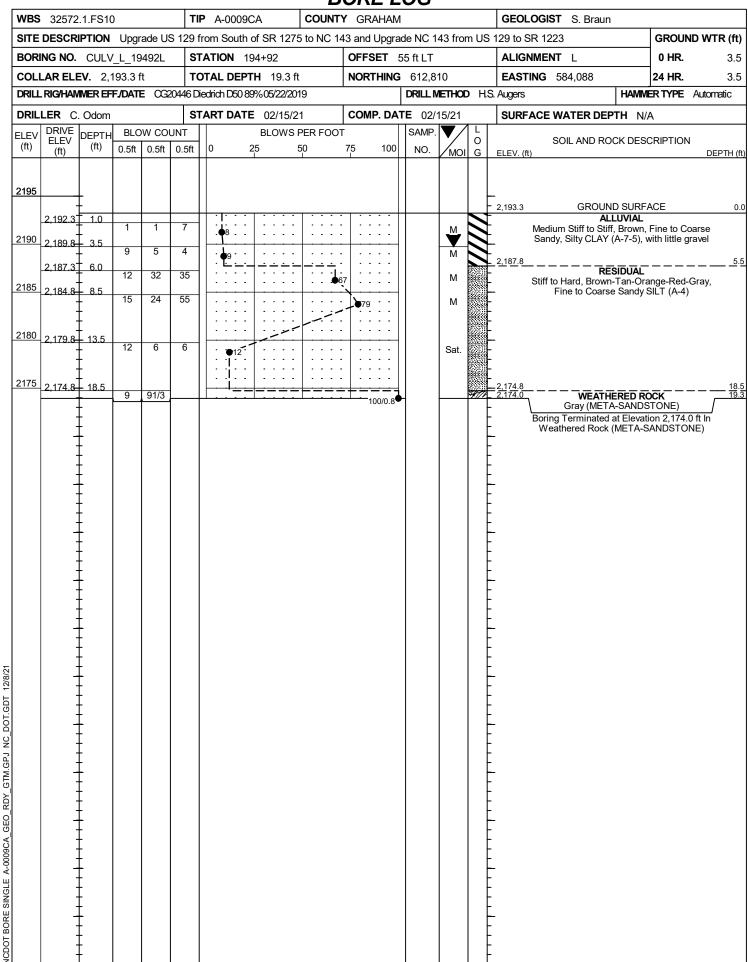
INDURATED

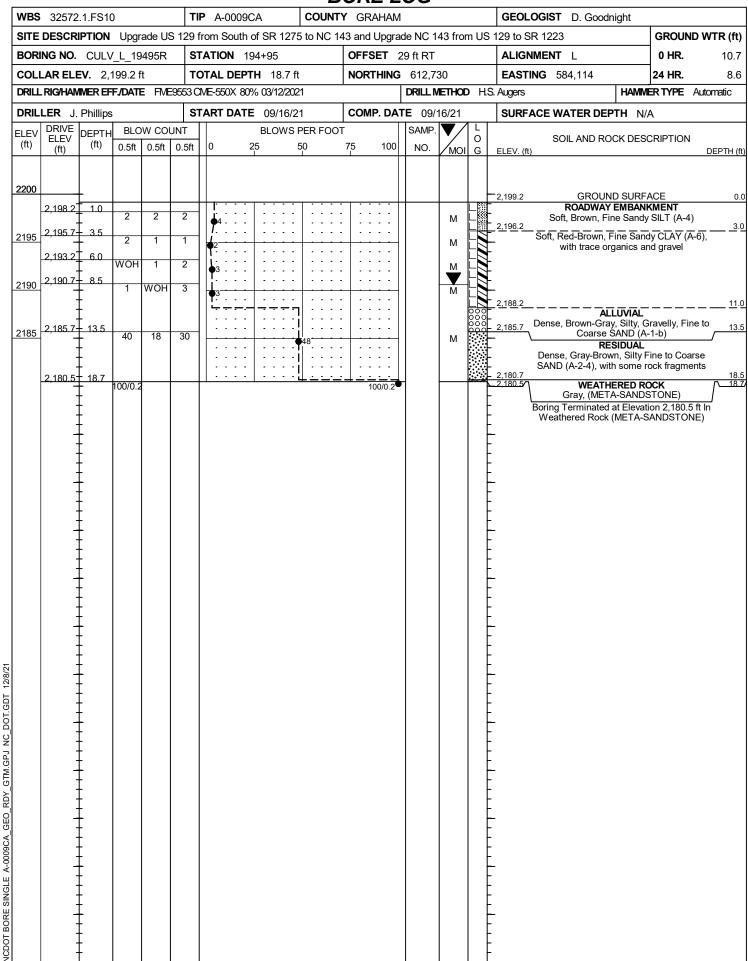
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.

DIFFICULT TO BREAK WITH HAMMER.

DATE: 8-15-14







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

#### STATE OF NORTH CAROLINA

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

# STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GRAHAM

PROJECT DESCRIPTION <u>UPGRADE US</u> 129 FROM SOUTH OF SR 1275 TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223

SITE DESCRIPTION STRUCTURE ON NC 143 OVER OVER SWEETWATER CREEK AT -L- STATION 46+41 - CULVERT EXTENSION

#### **CONTENTS**

SHEET NO.

2. 2A 3 4-7

**DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN BORE LOGS

CG2 EXPLORATION N. MCLAREN

PERSONNEL

INVESTIGATED BY  $\underline{CG}_2$ 

DRAWN BY \_\_M. BREWER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY CG2

DATE \_DECEMBER 2021

#### **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 1(99) 707-850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL 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 (INP-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 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 DEEM NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED TO 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:

  I. 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.



(980) 339-8684



DocuSigned by:

D. Matthew Brewer 1/20/2022

386129C0A4C1462... SIGNATURE

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

PROJECT REFERENCE NO.	SHEET NO.
A-0009CA	2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 1 OF 2)

										(PA	4GE	1 <b>OF</b> 2)
				S	OIL D	<u>ESC</u> F	IPT:	ION				GRADATION
BE PENE ACCORD IS CONSIST	TRATED WIT DING TO THE BASED ON TENCY, COLOR	TH A C E STAN THE AA R, TEXT	CONTINUO IDARD PI ASHTO S TURE, MO	DUS FL ENETRA YSTEM. ISTURE	IGHT POW TION TES BASIC D AASHTO	ER AUG T (AAS ESCRIP CLASSI	ER AN HTO T TIONS IFICAT	WEATHERED D YIELD LE 206, ASTM GENERALLY ION, AND OT RE, PLASTIC	SS THAN 10 D1586). SOI INCLUDE TH HER PERTIN	Ø BLOWS PE L CLASSIFI HE FOLLOWI ENT FACTOR	ER FOOT CATION NG: RS SUCH	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
	VERY STIFF	.GRAY.S	ILTY CLAY	,MOIST	WITH INTE	RBEDDE	D FINE	SAND LAYE	RS,HIGHLY PL	ASTIC, A-7-6	•	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:  ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.
GENERAL			LEG ILAR MATE		AND A	_		CLASSIF MATERIALS				MINERALOGICAL COMPOSITION
CLASS.		(≤ 35%	PASSING	*200)		(>	35% PA	SSING *200)		RGANIC MATERI	IALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.
GROUP CLASS.	A-1-a A-1-b	A-3	A-2-4		-2-6 A-2-		A-5	A-6 A-7 A-7-5. A-7-6	A-1, A-2 A-3	A-4, A-5 A-6, A-7		COMPRESSIBILITY
SYMBOL	000000000	9				3	777				***************************************	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50
% PASSING *10	50 MX								GRANULAR	SILT-	MUCK,	HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL
*40 *200	30 MX 50 MX		35 MX	35 MX 3	5 MX 35 M	x 36 MN	36 MN	36 MN 36 MI	SOILS	CLAY SOILS	PEAT	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL
MATERIAL PASSING *40 LL PI	_ 6 MX	– NP			Ø MX 41 MM 1 MN 11 MN			40 MX 41 MN 11 MN 11 MN	LITT	S WITH 'LE OR ERATE	HIGHLY	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
GROUP INDEX	0	0	0		4 MX	8 MX	12 MX	16 MX NO M	AMOU	NTS OF GANIC	ORGANIC SOILS	GROUND WATER
OF MAJOR MATERIALS	STONE FRAGS GRAVEL, AND SAND			TY OR I			LTY	CLAYEY SOILS		TTER		
GEN. RATING AS SUBGRADE	CEN. RATING EYELLENT TO COOD EAR TO POOP FAIR TO POOP UNIX									POOR	UNSUITABLE	<u>▽PW</u> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA  O-MY SPRING OR SEEP
	PI 0F A-7-5 SUBGROUP IS ≤ LL - 30 ; PI 0F A-7-6 SUBGROUP IS > LL - 30  CONSISTENCY OR DENSENESS											
		$\top$				RAN	IGE OF	STANDARD	RAN	GE OF UNC		MISCELLANEOUS SYMBOLS  FI BOADWAY EMBANKMENT (DE) 25/025 DIP & DIP DIRECTION
PRIMARY	PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETHATION RESISTENCE (N-VALUE) RAINOUS OF SINCUPRINE (TONS/FT <sup>2</sup> )							ALUE)	E COMF			WITH SOIL DESCRIPTION → OF ROCK STRUCTURES
GRANUL	GENERALLY VERY LOOSE							0 10		N/A		SUIL STIMBUL INSTALLATION
	MATERIAL DENSE 10 10 30 N/A  DENSE 30 TO 50  VERY DENSE > 50					TO 5Ø		1,77		ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT		
GENERA SILT-C			S	Y SOFT OFT M STI			2 1	2 10 4 10 8		< 0.25 0.25 TO 0.5 TO 1	0.5	INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD  TEST BORING  MONITORING WELL - TEST BORING
MATER] (COHES			VERY	TIFF 'STIFI IARD	-		15 1	0 15 0 30 30		1 TO 2 2 TO 4 > 4		TIME CORE SINCE SOLL BOUNDARY ALLUVIAL SOIL BOUNDARY APPEZOMETER INSTALLATION SPT N-VALUE
					URE (	OR G		SIZE		, ,		RECOMMENDATION SYMBOLS
U.S. STD. SI OPENING (M				4 4.76	10 2 <b>.</b> 00	40 0.4		60 20 0.25 0.0				UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE  SHALLOW  SHALLOW  SHALLOW  UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - BUT TO BE  UNCLASSIFIED EXCAVATION - UNCLA
BOULDE (BLDR.		OBBLE		GRAVEI (GR.)	-	COAR SAN (CSE.	ID	FIN SAN (F. S	1D	SILT (SL.)	CLAY (CL.)	SHALLOW UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL  ABBREVIATIONS
GRAIN M	M 305		75		2.0	(CJL.		0.25	0.05	0.005	 5	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST
SIZE IN			3									BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT
SOIL	MOISTURE	SOIL SCAL			<u> </u>			TION OF				CPT - CONE PENETRATION TEST NP - NON PLASTIC $\hat{\gamma}_d$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC
(AT	TERBERG L	IMITS)			DESCRIF	TION		USUALLY L				DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON
LL <sub>F</sub>	. LIQUII	) LIMI	т		(SAT.)			FROM BELI				e - VOID RATIO   SD SAND, SANDY   SS - SPLIT SPOON   F - FINE
PLASTIC RANGE < (PI) PL	. PLAST	IC LIN	міт		WET - (	W)		SEMISOLID ATTAIN OP			)	FRACI, - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRADMENTS # - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO
OM	"" PL L PLASTIC LIMIT MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE					SOLID; AT	OR NEAR O	PTIMUM MO	DISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:		
SL	SL _ SHRINKAGE LIMIT						D	CME-45C CLAY BITS X AUTOMATIC MANUAL				
						STIC	ΙΤΥ	HITAIN OP	IIMUM MUI!	5 I UKE		CME-55    CME-55   CORE SIZE:
					PLASTI			(PI)	D	RY STRENG	<u>STH</u>	CME-550 HARD FACED FINGER BITS
	N PLASTIC IGHTLY PLA	ASTIC				Ø-5 6-15			_	VERY LOW	1	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:
MO	DERATELY GHLY PLASI	PLAST	IC		26	16-25 OR M				MEDIUM HIGH		CASING W/ ADVANCER POST HOLE DIGGER
	COLOR											TRICONE TUNGCARB. SOUNDING ROD
	SCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRA' MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.											X MOBILE B-29 CORE BIT VANE SHEAR TEST
Щ	HOUR IERS SOUTHOUTING DRING STITEMENDS LIGHTE USED TO DESURIDE HEFEHRHINGE.											

### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		(PAGE 2	<b>OF</b> 2)					
	BUCK	DESCRIPTION	TERMS AND DEFINITIONS					
ROCK LINE II SPT REFUSAL BLOWS IN NO REPRESENTED	S NON-COASTAL PLAIN MATERIAL T NDICATES THE LEVEL AT WHICH NO . IS PENETRATION BY A SPLIT SPO	IAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED -COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. N SAMPLER EQUAL TO OR LESS THAN Ø.1FOOT PER 60 TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	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					
WEATHERED ROCK (WR)	NON-COASTAL 100 BLOWS P	PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > R 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					
CRYSTALLINE ROCK (CR)	WOULD YIELD	SE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, O,SCHIST,ETC.	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.					
NON-CRYSTAL ROCK (NCR)	LINE FINE TO COA SEDIMENTARY ROCK TYPE I	SE GRAIN METAMORPHIC AND NON-COASTAL PLAIN ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. CLUDES PHYLLITE, SLATE, SANDSTONE, ETC. N SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.					
SEDIMENTARY (CP)		ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDE BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.					
		ATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.					
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW HAMMER IF CRYSTALLINE.	JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.					
VERY SLIGHT (V SLI.)		INED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, ACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.					
SLIGHT (SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN	INED AND DISCOLORATION EXTENDS INTO ROCK UP TO LAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.					
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHO	D. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  W DISCOLORATION AND WEATHERING EFFECTS. IN  ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.					
	WITH FRESH ROCK.	AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE ST FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN TI					
MODERATELY SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORITY S AND CAN BE EXCAVATED WITH A GE	EO OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL 10W KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH LOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.					
SEVERE		ED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.					
(SEV.)	TO SOME EXTENT. SOME FRAGMENTS  IF TESTED, WOULD YIELD SPT N VAL		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					
VERY SEVERE	ALL ROCK EXCEPT QUARTZ DISCOLOR	TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE					
(V SEV.)	REMAINING. SAPROLITE IS AN EXAMP	TO SOLE STRINGS, WITH ONLY MEDICAL OF STRONG ROCK  E OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR  REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM.					
COMPLETE	ROCK REDUCED TO SOIL, ROCK FABR	C NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	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					
		CHARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PAREN					
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OF SEVERAL HARD BLOWS OF THE GEOL	SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.					
HARD		CK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	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.					
MODERATELY HARD		CK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE BLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.					
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 I	CHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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 SOI WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.					
SOFT	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.					
VERY SOFT		RESSURE. EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH KEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	STRATA ROCK QUALITY DESIGNATION ISROD) - 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.					
F	FRACTURE SPACING	BEDDING	BENCH MARK: N/A					
TERM VERY WID		TERM THICKNESS  VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET					
WIDE MODERATE	3 TO 10 FEET LY CLOSE 1 TO 3 FEET	THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET						
CLOSE VERY CLO	Ø.16 TO 1 FOOT	VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:					
ACK! CTO		THINLY LAMINATED < 0.008 FEET	ROADWAY DESIGN FILES DATED 7/II/2021 PROVIDED BY TGS ENGINEERS					
	II.	DURATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING					

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS: FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. MODERATELY INDURATED

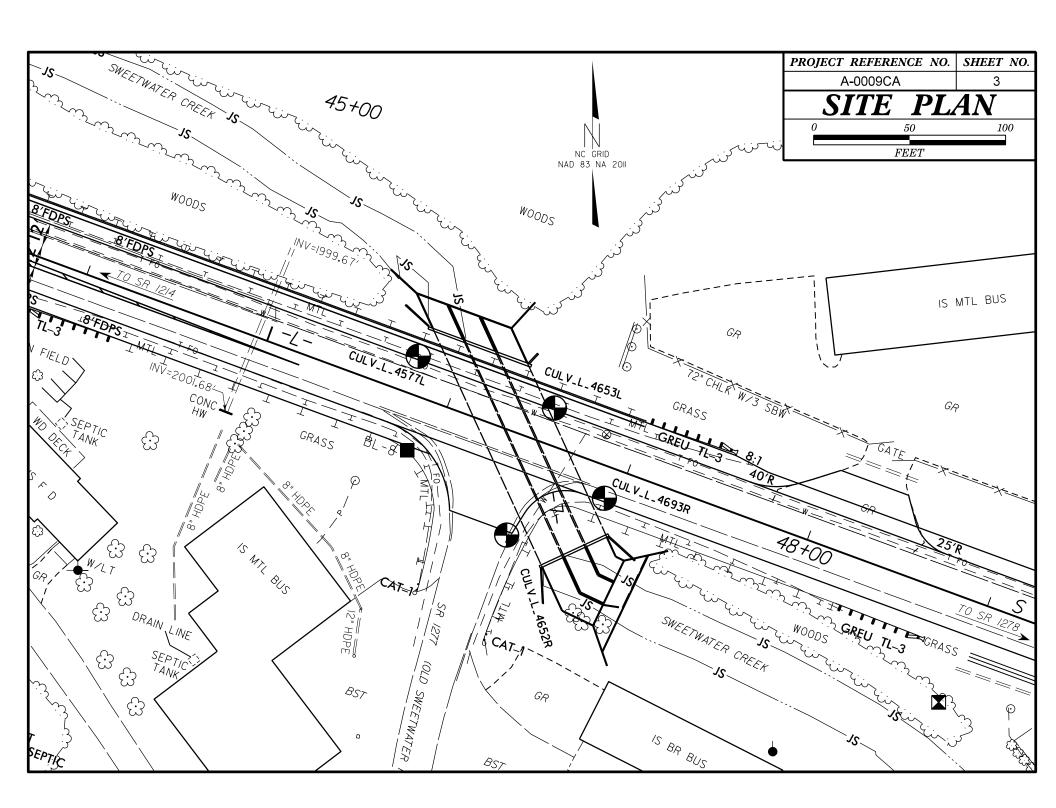
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:

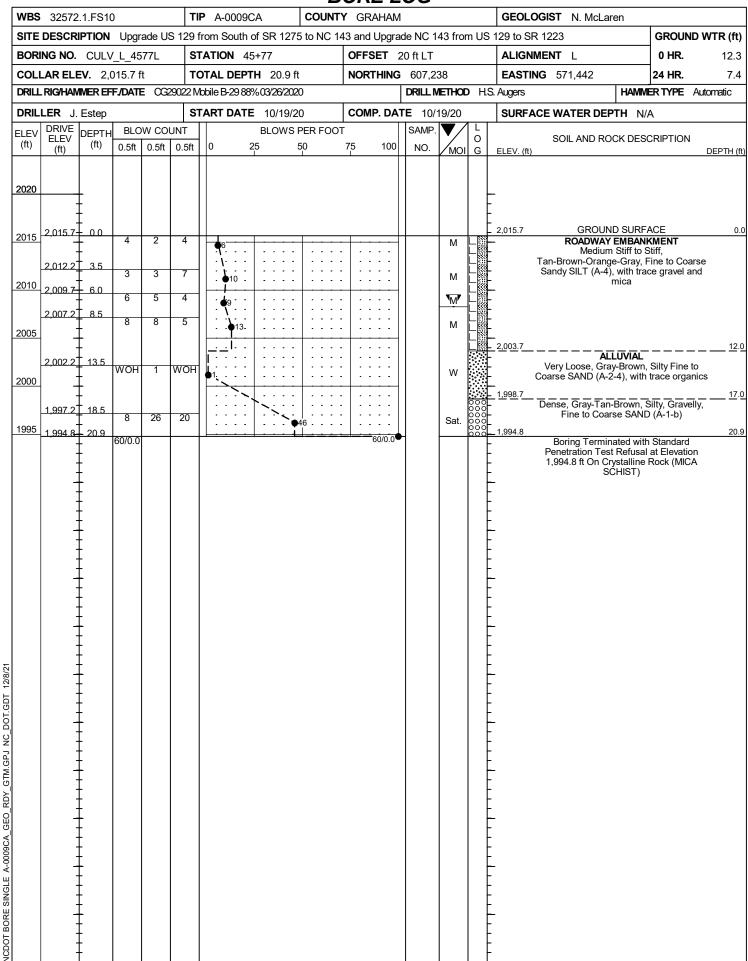
INDURATED DIFFICULT TO BREAK WITH HAMMER.

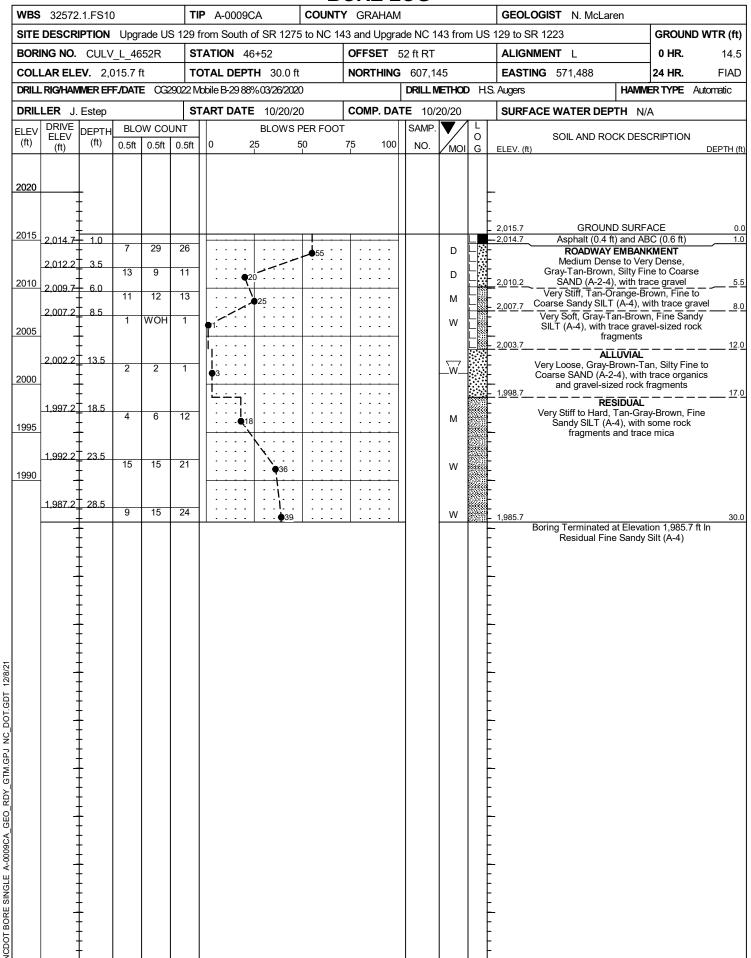
EXTREMELY INDURATED

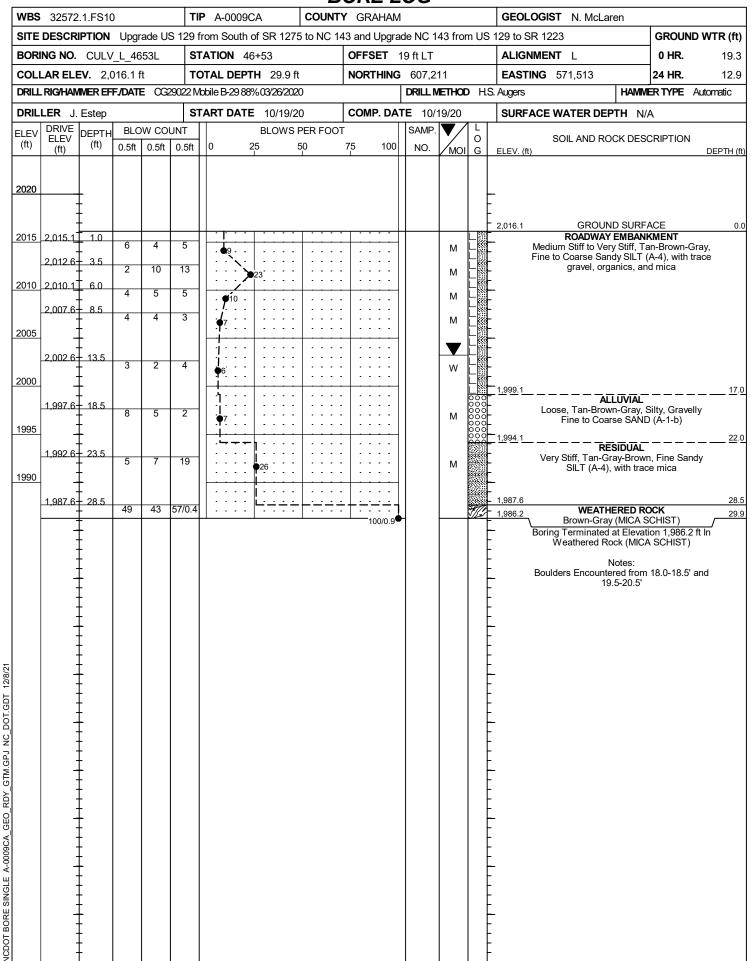
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: SAMPLE BREAKS ACROSS GRAINS.

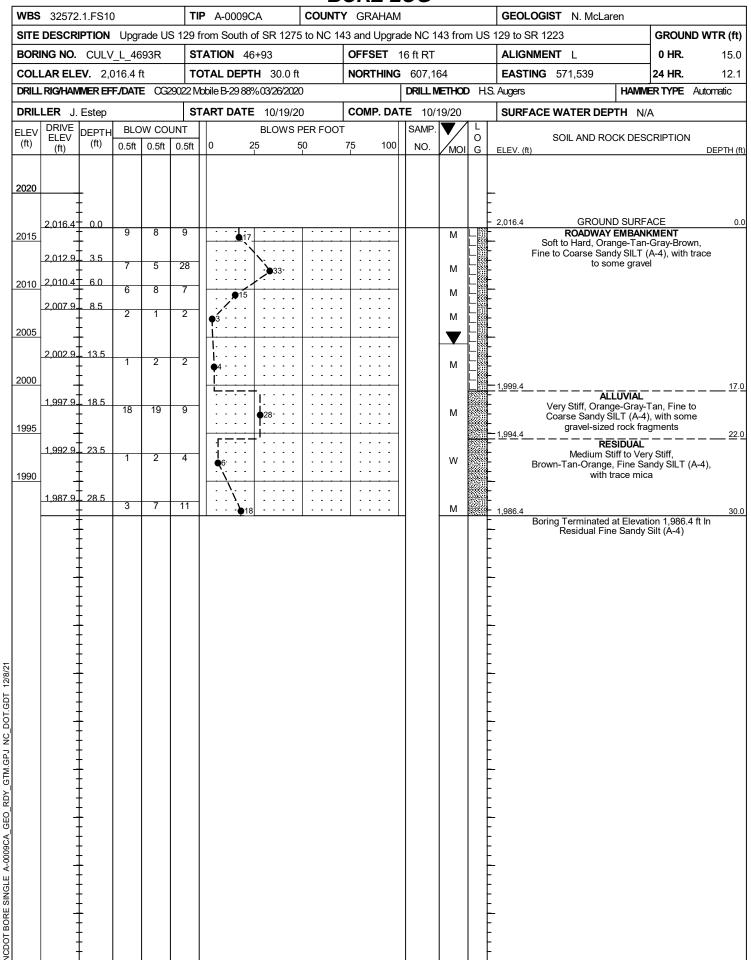
DATE: 8-15-14











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

### STATE OF NORTH CAROLINA

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

# STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GRAHAM

PROJECT DESCRIPTION <u>UPGRADE</u> US 129 FROM SOUTH OF SR 1275 TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223

SITE DESCRIPTION STRUCTURE ON NC 143 OVER UT TO SWEETWATER CREEK AT -L- STATION 57+14 - TRENCHLESS INSTALLATION

### **CONTENTS**

4-6

SHEET NO. **DESCRIPTION** 

TITLE SHEET 2. 2A 3

LEGEND (SOIL & ROCK) SITE PLAN BORE LOGS

PERSONNEL CG2 EXPLORATION

S. BRAUN

D. GOODNIGHT

INVESTIGATED BY \_CG2

DRAWN BY \_\_M. BREWER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY CG2

DATE \_DECEMBER 2021

### **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 (99) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL 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 (INP-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 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 DEEM NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED TO 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:

  I. 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.



**CHARLOTTE. NC 28227** (980) 339-8684



SIGNATURE

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

PROJECT REFERENCE NO.	SHEET NO.
A-0009CA	2

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

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 1 OF 2)

	(TAGE TOP 2)																	
					SOI	L DES	SCR)	PTI	ON				GRADATION					
BE PENE ACCORD IS	TRATED W DING TO TH BASED ON	TH A ( E STAM THE A	CONTIN NDARD ASHTO	IDATED UOUS I PENET SYSTE	, SEMI FLIGHT RATIO	I-CONSOL T POWER N TEST SIC DES	IDATE AUGE (AASH CRIPT	D.OR R AND TO T	WEATHERE YIELD LI 206, ASTM GENERALLY	D EARTH MA SS THAN 10 D1586). SOI INCLUDE TI HER PERTIN	10 BLOWS F IL CLASSIF HE FOLLOW	PER FOOT ICATION ING:	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					
	AS MINERA	_OGICAL	COMF	POSITIO	ON, AND	GULARIT	Y, STR	UCTUR	E, PLASTIC	ITY, ETC. FO RS, HIGHLY PL	OR EXAMPLE	Ε,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:					
										ICATIO		·	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.					
GENERAL CLASS.			JLAR MA						MATERIALS SING #200)	06	RGANIC MATER	RIALS	MINERALOGICAL COMPOSITION  MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.					
GROUP	A-1	A-3		Α	1-2		A-4	A-5	A-6 A-7		A-4, A-5		ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.					
CLASS.	A-1-a A-1-		A-2-4	A-2-5	A-2-6	A-2-7	3183331		A-7-9 A-7-9	A-3	A-6, A-7		COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LL < 31					
SYMBOL	00000000							1.7.1					MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50					
% PASSING *10	50 MX	.								GRANULAR	SILT- CLAY	MUCK,	PERCENTAGE OF MATERIAL					
*40 *200	30 MX 50 M 15 MX 25 M	1X   51 MN 1X   10 M)	1 ( 35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN 36 N	SOILS IN	SOILS	PEAT	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL					
MATERIAL PASSING *40													TRACE OF ORGANIC MATTER 2 - 3%, 3 - 5%, TRACE 1 - 10%, LITTLE ORGANIC MATTER 3 - 5%, 5 - 12%, LITTLE 10 - 20%,					
LL PI	_ 6 MX	– NP							40 MX 41 M 11 MN 11 M	N	S WITH TLE OR	HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE					
GROUP INDEX	0	0	+	0	_		_	_	16 MX NO N	MUL	Derate Ints of	ORGANIC	GROUND WATER					
USUAL TYPES	STONE FRAC			SILTY O	R CLAY	EY	SIL	ΤY	CLAYEY		GANIC ATTER	SOILS	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING					
OF MAJOR MATERIALS	GRAVEL, AN SAND	SAND		GRAVEL			SOII		SOILS				▼ STATIC WATER LEVEL AFTER 24 HOURS					
GEN, RATING		EXCEL	LENT T	O GOOD				FAIR TO	) POOR	FAIR TO	POOR	UNSUITABLE						
43 SOBORHUE	AS SUBGRADE										1	1	SPRING OR SEEP					
	CONSISTENCY OR DENSENESS												MISCELLANEOUS SYMBOLS					
PRIMARY	PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )								RESISTEN		PRESSIVE	STRENGTH	ROADWAY EMBANKMENT (RE)  25/025  DIP & DIP DIRECTION  WITH SOIL DESCRIPTION  OF ROCK STRUCTURES					
	GENERALLY VERY LOOSE							4 T(	10				SOIL SYMBOL  SOIL SYMBOL  SPET OMT TEST BORING  SLOPE INDICATOR INSTALLATION					
MATERI	ORIGINAL					0 50		N/A		ARTIFICIAL FILL (AF) OTHER								
GENERA	W 1 V		۷E	RY SO	FT			( 2 T			< 0.25 0.25 TO		→ INFERRED SOIL BOUNDARY → CORE BORING SOUNDING ROD					
SILT-C	LAY			SOFT IUM S				4 T	0 8		Ø.5 TO	1.0	TEST BORING WELL TEST BORING WITH CORE					
MATER) (COHES				STIFF RY STI				8 TO	0 30		1 TO 1		→→→→→ ALLUVIAL SOIL BOUNDARY \( \triangle \text{PIEZOMETER INSTALLATION} \( \triangle \text{SPT N-VALUE} \)					
				HARD TEX	KTUF	RE OF	R GF	: < NIA	SIZE		> 4		RECOMMENDATION SYMBOLS					
U.S. STD. SI				4		10	40		60 21	0 270			UNCLASSIFIED EXCAVATION - TAN UNCLASSIFIED EXCAVATION					
OPENING (M	ER I	COBBLE	:	GRAV	/EL	2.00	0.42 COARS	Ε	0.25 0.0 FI SA		SILT	CLAY	UNSUITABLE WASTE  UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK  ACCEPTABLE DEGRADABLE ROCK  ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL					
(BLDR.		(COB.)		(GR			CSE.S		(F		(SL.)	(CL.)	ABBREVIATIONS					
GRAIN MI SIZE IN		COIL	75 3	ICTI		2.0	DDE		3.25	0.05	0.00	15	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY \( \sum_{\cup} \) - UNIT WEIGHT					
	MOISTUR		.E	1310	FIEL	D MOIS	TURE			TERMS		SCRIPTION	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\hat{\gamma}_d$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC					
(AT	TERBERG	LIMITS	)		- SA	SCRIPTI TURATE			USUALLY	LIQUID; VER	Y WET, USL	UALLY	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON					
LL	. 🗼 LIQU	ID LIM	ΙT	_	(	SAT.)			FROM BEL	OW THE GR	OUND WAT	ER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK					
PLASTIC RANGE < (PI) PL	. PLAS	TIC LT	міт	_	- WE	T - (W)				REQUIRES		0	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRACMENTS #* - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO					
40	OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTUR							SOLID; AT	OR NEAR O	PTIMUM M	IOISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:						
SL	SL _ SHRINKAGE LIMIT								го	CME-45C CLAY BITS X AUTOMATIC MANUAL  6 CONTINUOUS FLIGHT AUGER CONTINUOUS FLIGHT AUGER								
						PLAS	TICI						CME-55					
						ASTICI			PI)	<u>c</u>	RY STREN	<u>GTH</u>	X CME-550X HARD FACED FINGER BITS					
	N PLASTIC						Ø-5 6-15			-	VERY LO		VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:					
MO	DERATELY SHLY PLAS	PLAST	IC			1	6-25 OR MO	RE			MEDIUM HIGH		CASING W/ ADVANCER POST HOLE DIGGER					
							LOR						PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER TRICONE TUNGCARB. SQUADING BOD					
	ESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.												X MOBILE B-29 CORE BIT SOUNDING ROD VANE SHEAR TEST					
	MUDIFIERS SUCH AS LIGHT, DAKK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																	

### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

		(PAGE 2	<b>OF</b> 2)					
	BUCK	DESCRIPTION	TERMS AND DEFINITIONS					
ROCK LINE II SPT REFUSAL BLOWS IN NO REPRESENTED	S NON-COASTAL PLAIN MATERIAL T NDICATES THE LEVEL AT WHICH NO . IS PENETRATION BY A SPLIT SPO	IAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED -COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. N SAMPLER EQUAL TO OR LESS THAN Ø.1FOOT PER 60 TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	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					
WEATHERED ROCK (WR)	NON-COASTAL 100 BLOWS P	PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > R 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					
CRYSTALLINE ROCK (CR)	WOULD YIELD	SE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, O,SCHIST,ETC.	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.					
NON-CRYSTAL ROCK (NCR)	LINE FINE TO COA SEDIMENTARY ROCK TYPE I	SE GRAIN METAMORPHIC AND NON-COASTAL PLAIN ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. CLUDES PHYLLITE, SLATE, SANDSTONE, ETC. N SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.					
SEDIMENTARY (CP)		ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDE BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.					
		ATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.					
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW HAMMER IF CRYSTALLINE.	JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.					
VERY SLIGHT (V SLI.)		INED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, ACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.					
SLIGHT (SLI.)	1 INCH. OPEN JOINTS MAY CONTAIN	INED AND DISCOLORATION EXTENDS INTO ROCK UP TO LAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.					
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHO	D. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  W DISCOLORATION AND WEATHERING EFFECTS. IN  ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.					
	WITH FRESH ROCK.	AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE ST FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN TI					
MODERATELY SEVERE (MOD. SEV.)	AND DISCOLORED AND A MAJORITY S AND CAN BE EXCAVATED WITH A GE	EO OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL 10W KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH LOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.					
SEVERE		ED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.					
(SEV.)	TO SOME EXTENT. SOME FRAGMENTS  IF TESTED, WOULD YIELD SPT N VAL		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					
VERY SEVERE	ALL ROCK EXCEPT QUARTZ DISCOLOR	TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE					
(V SEV.)	REMAINING. SAPROLITE IS AN EXAMP	TO SOLE STRINGS, WITH ONLY MEDICAL OF STRONG ROCK  E OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR  REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM.					
COMPLETE	ROCK REDUCED TO SOIL, ROCK FABR	C NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	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					
		CHARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PAREN					
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OF SEVERAL HARD BLOWS OF THE GEOL	SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.					
HARD		CK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	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.					
MODERATELY HARD		CK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE BLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.					
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 I	CHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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 SOI WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.					
SOFT	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.					
VERY SOFT		RESSURE. EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH KEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	STRATA ROCK QUALITY DESIGNATION ISROD) - 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.					
F	FRACTURE SPACING	BEDDING	BENCH MARK: N/A					
TERM VERY WID		TERM THICKNESS  VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET					
WIDE MODERATE	3 TO 10 FEET LY CLOSE 1 TO 3 FEET	THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET						
CLOSE VERY CLO	Ø.16 TO 1 FOOT	VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:					
ACK! CTO		THINLY LAMINATED < 0.008 FEET	ROADWAY DESIGN FILES DATED 7/II/2021 PROVIDED BY TGS ENGINEERS					
	- IN	DURATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING					

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS: FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. MODERATELY INDURATED

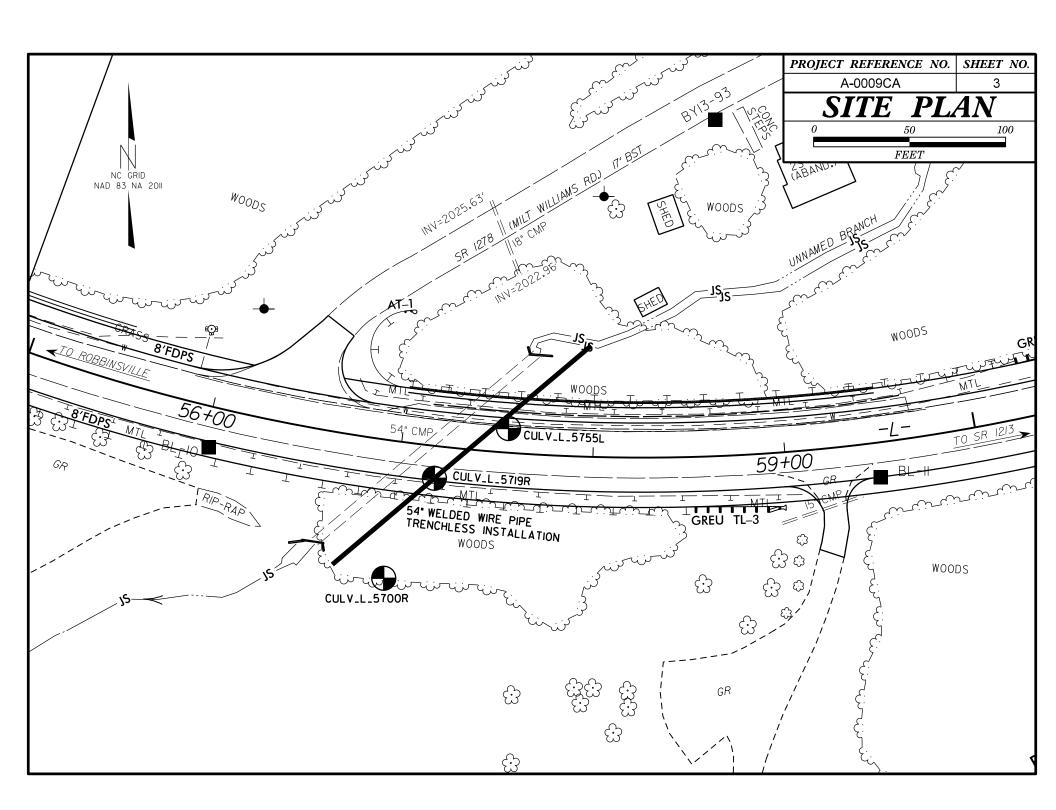
GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:

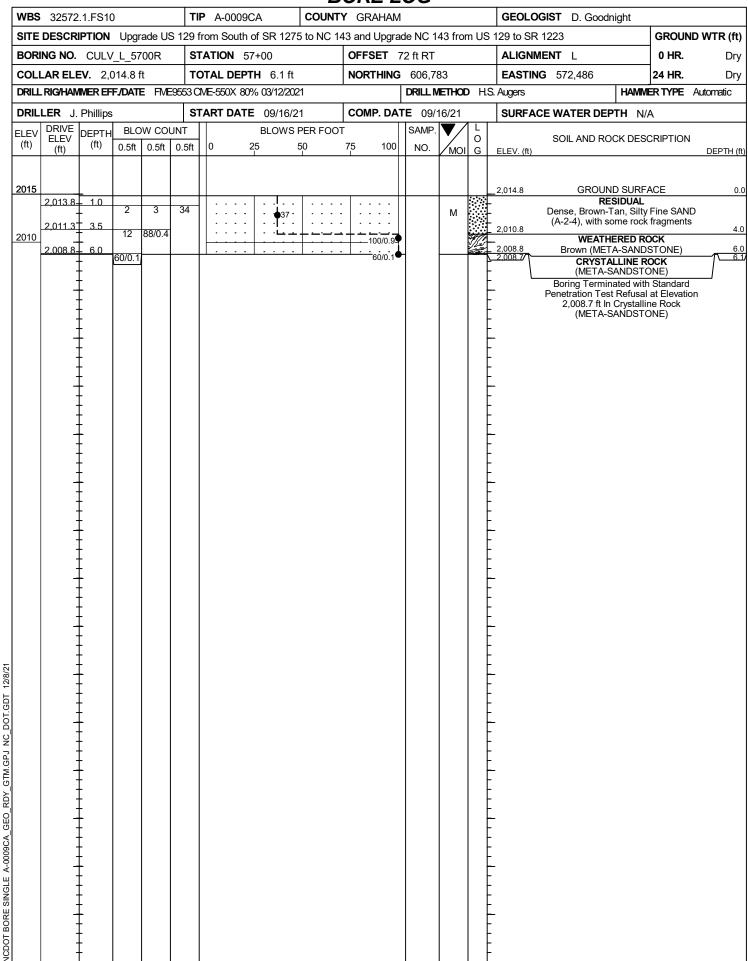
INDURATED DIFFICULT TO BREAK WITH HAMMER.

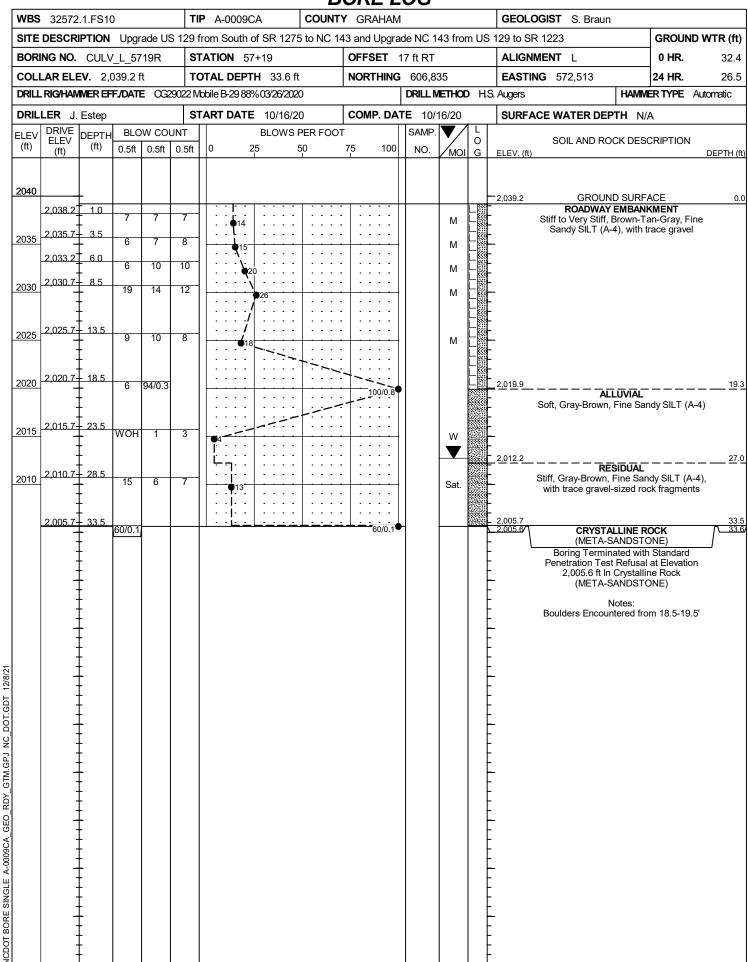
EXTREMELY INDURATED

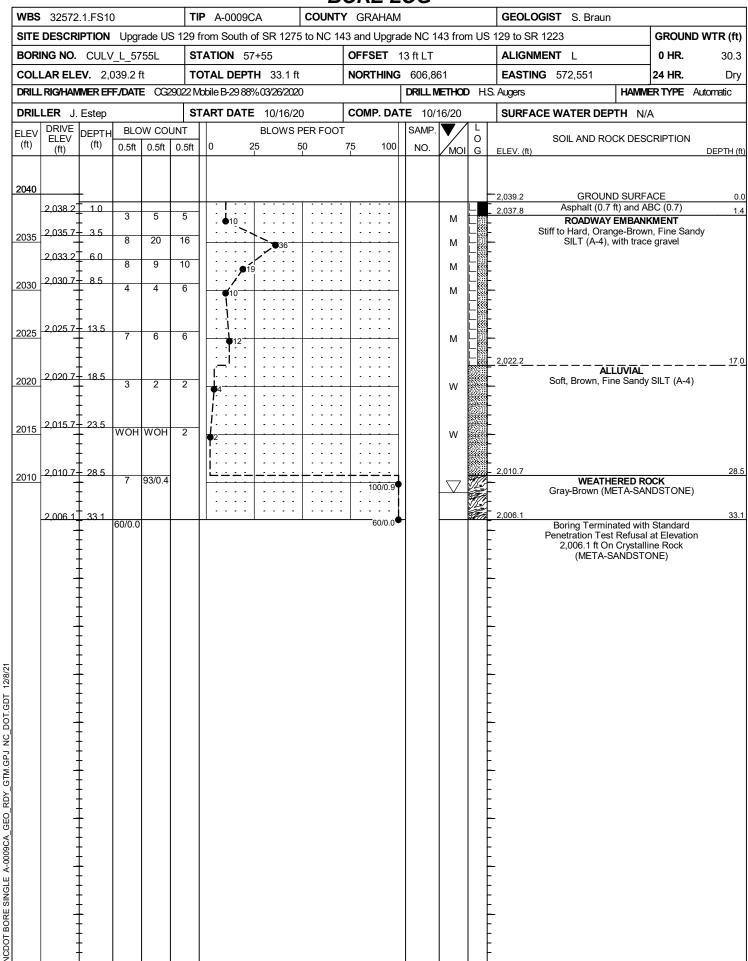
SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE: SAMPLE BREAKS ACROSS GRAINS.

DATE: 8-15-14









REFERENCE

**CONTENTS** 

**DESCRIPTION** 

LEGEND (SOIL & ROCK)

TITLE SHEET

WALL ENVELOPE

SITE PLAN

BORE LOGS

SHEET NO.

5-6

3

STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_GRAHAM PROJECT DESCRIPTION UPGRADE US 129 FROM SOUTH OF SR 1275 (FIVE POINTS ROAD) TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223 (BEECH CREEK ROAD) SITE DESCRIPTION **RETAINING WALL #1**: CAST-IN-PLACE CONCRETE GRAVITY WALL ON -YI - FROM 32 + 55 RT TO 34 + 15 RT

STATE PROJECT REFERENCE NO. A-0009CA 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 (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 SUBSURFACE 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 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 INCLORDED TO CLIMATIC CONDITIONS INCLORDED TO CLIMATIC CONDITIONS INCLORDING TO CLIMATIC CONDITIONS INCLORDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

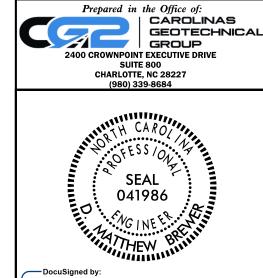
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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.

S. BRAUN CG2 EXPLORATION INVESTIGATED BY \_\_CG2 DRAWN BY \_\_M. BREWER, P.E. CHECKED BY R. KRAL, P.E. SUBMITTED BY <u>M. Brewer</u>, P.E. DATE MARCH 2022



D. Matthew Brewer

3/22/2022

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

PROJECT REFERENCE NO. SHEET NO.

A-0009CA

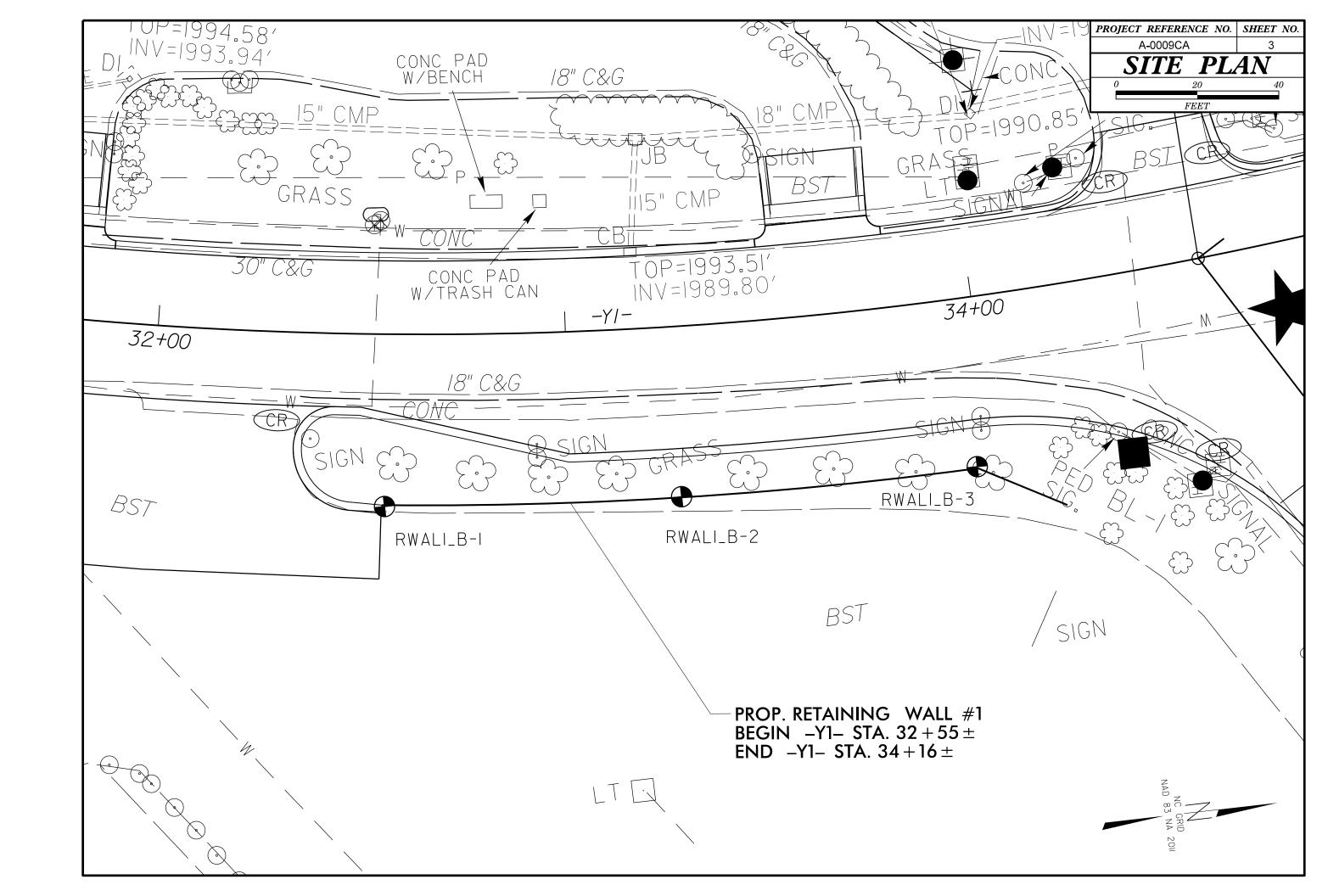
2

# 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.  UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	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 DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - 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 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.		
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	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:	SI//AI//A	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.		
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED VIGORIAN NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT		
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTA	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND		
LLASS. (\$\(\sigma\) 50% PASSING *200) (> 30% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE.		
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 B-2-6 A-2-7 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE - FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.		
000000000	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 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED		
7. PASSING SINT SILT- GRANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.		
*40 30 MX 50 MX 51 MN CLAY SOILS SOILS SOILS		- WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.		
-200 15 MX 25 MX BI MX 25 MX 25 MX 25 MX 25 MX 35 MX 36 MX 36 MX 36 MX 36 MX	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3%, 3 - 5%, TRACE 1 - 10%	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.	HORIZONTAL.		
LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 11TIE OB	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	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 IW MX 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 0 0 4 MX 8 MX 12 MX 16 MX NU MX AMUUNIS UF 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 TYPES 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 GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> 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 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.		
AS SUBURHUE PUUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.		
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	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.		
PANCE OF STANDARD PANCE OF UNCONFINED		(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 CONSIDERS UP PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	<u>IF TESTED, WOULD YIELD SPT REFUSAL</u>	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO		
(N-VALUE) (TUNS/FT-)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	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 VERY LOOSE < 4  CRANN OR LOOSE 4 TO 10	SOIL SYMBOL  Opt ont test boring  SLOPE INDICATOR 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.		
GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.		
(NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT THAN ROADWAY EMBANKMENT TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE 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 ————————————————————————————————————	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	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 MN MONITORING WELL TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> 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	WITH CORE	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		
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	→ → → → → → → → ALLUVIAL SOIL BOUNDARY \( \triangle \) PIEZOMETER INSTALLATION \( \triangle \) SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.		
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT		
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK.  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	UNSUITABLE WASTE  ACCEPTABLE, BUT NOT TO BE	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		
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.		
(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	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.		
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED 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	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL		
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{\rm d}$ - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	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 SCALE FIELD MOISTURE CHINE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY		
(ATTERBERG LIMITS) DESCRIPTION ON PIECE PROTECTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.		
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY		
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.		
PLASTIC CEMISOLID, REQUIRES ORVING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.		
RANGE  - WET - (W) SEMISULIS REGULARS DATING TO ATTAIN OPTIMUM MOISTURE  (PI) PL PLASTIC LIMIT	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: N/A		
"" PLL + PLASTIC LIMIT	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION FEET		
OMOPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET		
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:		
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CI CONTINUOUS FLICHT AUGED	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021		
	CME-55   CORE SIZE:	THINLY LAMINATED < 0.008 FEET  INDURATION	014 11/13/2021		
PLASTICITY	<b></b>	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1		
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	CME-550 HARD FACED FINGER BITS TUNG,-CARBIDE INSERTS	PURRING WITH FINGER EREES NUMEROUS CRAINS.			
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST   HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;			
	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.			
COLOR	X MOBILE B-29 TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:  DIFFICULT TO BREAK WITH HAMMER.			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST	CHARD HAMMED BLOWS DECITION TO BREAK SAMPLE.			
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14		
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	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	C. SAND		$\frac{WEIGHT}{SILT}$	CL			$\frac{IG}{40}$ (SIEV		%	% ORGANI	rc				
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	O -ALLU	VIAL - VERY LO	OSE TO DENSE.	BROWN-RED-BLACK	K-TAN-YELLOW	, MOIST, S	SILTY FIN	NE TO CO	ARSE SA	ND (A-2-4	4) WITH	TRACE GR	AVEL AN	ID FINE T	O COARSE	SANDY	GRAVEL (A	<b>√-I-∀</b> )		1		
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SITE DESCRIPTION Upgrade US  BORING NO. RWAL1_B-1	STATION 32+56	OFFSET 42 ft RT	ALIGNMENT Y1 0 HR.	` '	-	RING NO. RW			STATION 33+26	143 and Upgrade NC 143 from US  OFFSET 42 ft RT	ALIGNMENT Y1	O HR. Dr
COLLAR ELEV. 1,993.6 ft	TOTAL DEPTH 10.0 ft	NORTHING 607,296	EASTING 568,138 24 HR.	, i		LAR ELEV.			OTAL DEPTH 10.0 ft	NORTHING 607,369	<b>EASTING</b> 568,144	24 HR. Di
DRILL RIG/HAMMER EFF/DATE CG290		DRILL METHOD H		•			12		Mobile B-29 88% 03/26/2020	DRILL METHOD H.S		MER TYPE Automatic
DRILLER J. Estep	<b>START DATE</b> 10/12/20	COMP. DATE 10/12/20	SURFACE WATER DEPTH N/A			LLER J. Ester			START DATE 10/12/20	COMP. DATE 10/12/20	SURFACE WATER DEPTH	
ELEV DRIVE DEPTH BLOW COUN						DRIVE DEPT			BLOWS PER FOO	OT		
(ft) ELEV (ft) 0.5ft 0.5ft (	0.5ft 0 25 50	75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)	(ft)	(ft) (ft)	0.5ft 0.		0 25 50	75 100 NO. MOI G	SOIL AND ROCK DE	SCRIPTION
1995			_		1995						_	
1.992.6+ 1.0			- 1,993.6 GROUND SURFACE - ALLUVIAL	0.0		<u> </u>					1,992.8 GROUND SUR	
1990 1,990.1 3.5	2   \$5	IVI GASSAS	- Medium Stiff, Red-Brown, Fine Sand - 1,990.6 (A-4)	ly SILT	1990	1,991.8 1.0	3 4	4 3	$- \mid \mid \stackrel{1}{\blacktriangleright}_{7} \cdot \cdot \cdot \mid \cdot \cdot \cdot \cdot \cdot \mid \cdot \cdot \cdot \cdot \mid$		. ALLUVIAI Very Loose to Mediu	ım Dense,
T   3   4	2 6		- 1,990.6 (A-4) / Loose to Medium Dense,  Red-Yellow-Brown-Tan, Silty Fine		1990	1,989.3 3.5	1 W	OH 1	- <del>[    </del>		Brown-Tan-Red-Black, Sil SAND (A-2-4(0)), with	ty Fine to Coarse trace gravel
1,987.6 + 6.0	9   . \ 12.	м	Coarse SAND (A-2-4), with trace gi	ıravel		1,986.8 6.0	1 1				•	
1985 1,985.1 8.5	13		- <u>1,985.6</u> - <u>Medium Dense, Brown-Tan, Fine to C - 1,983.6</u> Sandy Gravel (A-1-a)		1985	1,984.3 8.5			1			Fine to Coarse
	24		Boring Terminated at Elevation 1 983	3.6 ft In		<u> </u>	20 1	8 16	34	M 000	Sandy Gravel (.  Boring Terminated at Elev	A-1-a)1
			Alluvial Fine to Coarse Sandy Gra (A-1-a)	avel							Alluvial Fine to Coarse (A-1-a)	Sandy Gravel
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					S 129 f	rom South	of SR 127	5 to NC 14	43 and Upgra	ide NC 1	43 fror	n US 1	129 to SR 1223		D WTR (ft)
BOR	NG NO.	RWAL	_1_B-3		ST	ATION 3	33+96		OFFSET	42 ft RT			ALIGNMENT Y1	0 HR.	Dry
COL	LAR ELE	<b>V.</b> 1,9	92.5 f	t	TC	TAL DEP	<b>TH</b> 10.01	 `t	NORTHING	607,4	42		<b>EASTING</b> 568,145	24 HR.	Dry
DRILL	.RIG/HAM	MER EF	F./DATE	CG2	9022 M	obile B-298	8%03/26/20	20		DRILL N	<b>IETHOD</b>	H.S.	Augers HAMM	ER TYPE	Automatic
DRIL	LER J.	Estep			ST	ART DAT	E 10/12/2	20	COMP. DA	TE 10/	12/20		SURFACE WATER DEPTH N/A	4	
ELEV (ft)	DDIVE I	DEPTH (ft)		W COL		0	BLOWS 25	PER FOOT	75 100	SAMP. NO.	MOI	L O G	SOIL AND ROCK DESC ELEV. (ft)	CRIPTION	DEPTH (ft)
199 <u>5</u>	1,991.5	3.5 - - - 6.0	2 5 1 3	2 5 1 3	3 4 2 12	\$ 15					M M M M		1,992.5 GROUND SURFA ROADWAY EMBANI Medium Stiff, Red, Fine Sar 1,989.5 ALLUVIAL Soft to Stiff, Red-Orange-Bla Sandy SILT (A- 1,984.5 Medium Dense, Brown-Red, Sandy GRAVEL (A Boring Terminated at Elevati Alluvial Fine to Coarse S (A-1-a)	ck-Brown,  Fine to Co -1-a) on 1,982.5	3.0 Fine 8.0 parse 10.0

SHEET 6

REFERENCE

3

STATE OF NORTH CAROLINA

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

# **CONTENTS**

SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN WALL ENVELOPE BORE LOGS

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_GRAHAM PROJECT DESCRIPTION UPGRADE US 129 FROM SOUTH OF SR 1275 (FIVE POINTS ROAD) TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223 (BEECH CREEK ROAD) SITE DESCRIPTION RETAINING WALL #2: CAST-IN-PLACE CONCRETE GRAVITY WALL ON -L- FROM 11+79 LT TO 12+50 LT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CA	1	5

### **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 SUBSURFACE 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 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 INCLORDED TO CLIMATIC CONDITIONS INCLORDED TO CLIMATIC CONDITIONS INCLORDING TO CLIMATIC CONDITIONS INCLORDING 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.

S. BRAUN CG2 EXPLORATION INVESTIGATED BY \_\_CG2 DRAWN BY \_\_M. BREWER, P.E. CHECKED BY R. KRAL, P.E. SUBMITTED BY M. BREWER, P.E. DATE MARCH 2022



D. Matthew Brewer

3/22/2022

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

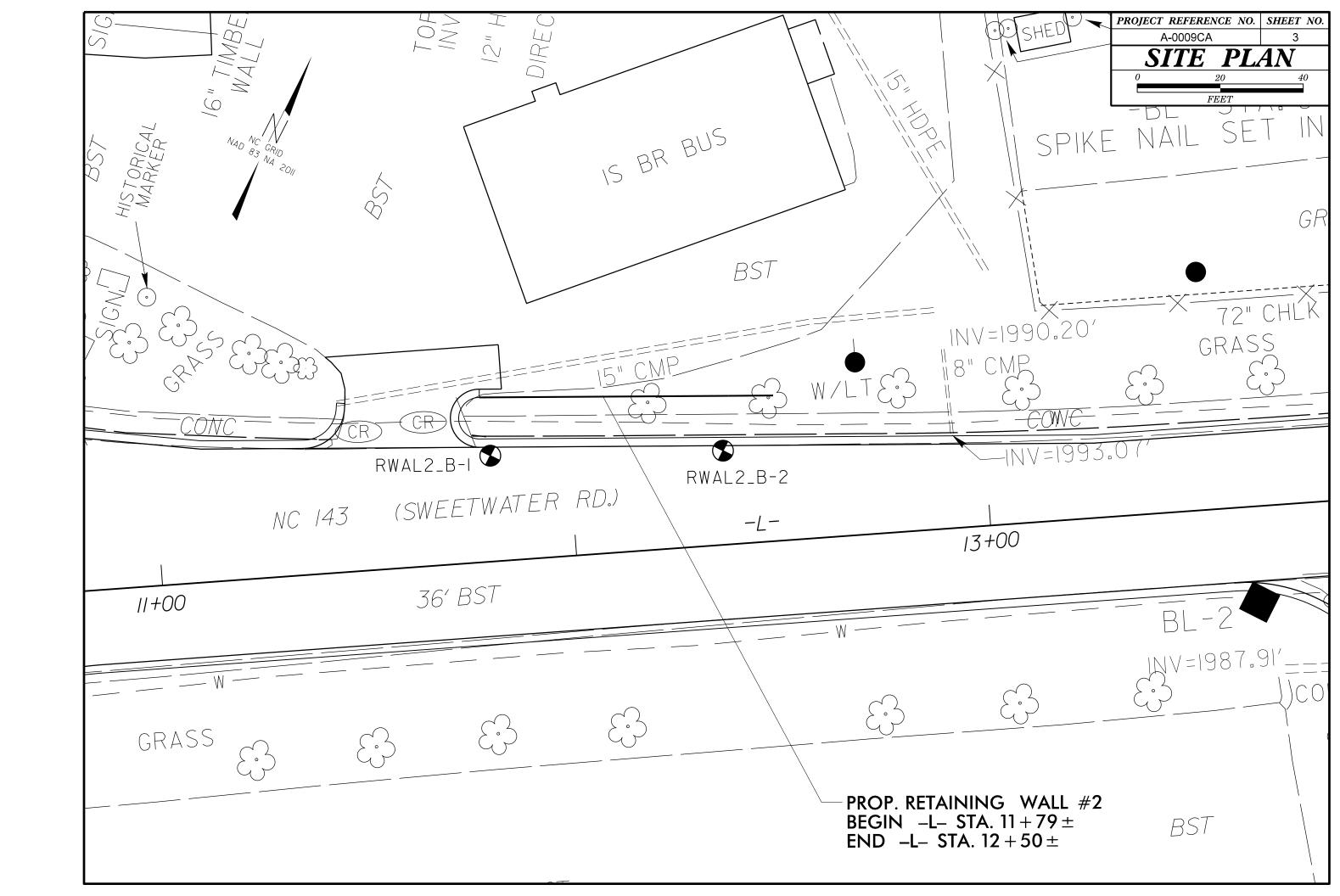
PROJECT REFERENCE NO. SHE
A-0009CA

# 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.  GAP-GRADED - 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:		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.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
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:  ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION		ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
ULASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-1, A-2 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
00000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)  SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
SYMBOL GOOGGOOGG ATT	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
% PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR GLAY HUCK, SOILS CLAY PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200   15 MX   25 MX   10 MX   35 MX   35 MX   35 MX   36 MN   36 MN   36 MN   36 MN   36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CROIP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
HEIM TYPE CTOME EPAGE ORGANIC SUILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAIOR GRAVEL AND FINE SILIT OR CLATET SILIT CLATET MAILER		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	STATIC WATER LEVEL AFTER 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 UNSUITABLE		(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.
AS SUBURALE POUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM,
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	<u> </u>	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (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 PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL STATE TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	NT VSI FMI	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	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	THE TOPONAL EMBRICALETT CO. 1531	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 &lt; 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 MW MONITORING WELL TEST BORING	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	WITH CORE	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
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4  TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE ON OWNER SIZE		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNDERCUT  UNDERCUT  UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	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		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 UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. 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	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY  MOD MODERATELY  7 - UNIT WEIGHT  CPT - CONE PENETRATION TEST  NP - NON PLASTIC  7- DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
COTI MOISTINE COLE FIELD MOISTINE	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	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
(SAT.) FROM BELOW THE GROUND WATER TABLE	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 SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC LIQUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISOLID; REGUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRAGS FRAGMENTS TCR - TRICONE REFUSAL W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: N/A
(PI) PL PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	DENCTI PHAN: 197 A
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET
OM OPTIMUM MOISTURE - MOIST - (M) SOLID: AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	
SL _ SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	G' CONTINUOUS ELIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021
111111111	CME -55   CORE 312E:	INDURATION ( 0.008 FEET	014 11/13/2021
PLASTICITY		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNG,-CARBIDE INSERTS HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER POST HOLE DIGGER	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED  ORANINS CHIN BE SEPARATED FROM SAMPLE WITH STEEL FROME;  BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG-CARR. Securetre per	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
OFFICE PROPERTY AND	X  MOBILE B-29   H	INDURATED DIFFICULT TO BREAK WITH HAMMER.	
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.	CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	



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														GROU	P			C = 2.5:1	PRO	RETAINING WALL OFILE BORINGS PRO ALONG WALL ENVE	OJECTED
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							TES	ST R								T					
	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L	. P.I.	C SAND	% BY F. SAN	$egin{array}{c c} WEIGHT \ \hline D & SILT \ \hline \end{array}$	CLAY	% PA	$\frac{SSING}{40}$	(SIEVES		% ORGANIO	ا بر				
	SS-86	25' LT	11+81 -L-	3.5 - 5.0'	A-2-4(0)	27		25.0	49.0	14.0	12.0	95.0	82.0	34.	0 11.0	-	<u> </u>				
	SS-92	23' LT	12+37 -L-	6.0 - 7.5'	A-4(0)	27	1	21.0	40.0	21.0	18.0	88.0	77.0	42.	0 16.0	-			1		
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				END 12 + 3	<u>RETAINING</u> 50.00 .72	WALL	#2			RWAL2_B-2	\	RWAL2_B-I									
.2000				36′L1	ř		; ;			12+37 23' L T		II+8I 25′ LT			— EXISTING (	GROUND	LINE				2000
							· · ·	_		SS-92		SS-86	<u> </u>	_							
1990									(A		) }(	<b>D</b> (4)			BEGIN RETAI 11 + 79.37	VING WA	LL #2	2			1990
1980		:					, , ,		<del>-</del>	000		- 13 4 000 19	<del>- ;</del>		1990.50 39.67'LT						1980
										BT DRY		BT			:	· · · · · · · · · · · · · · · · · · ·					
1970								· · ·	; - <del>;</del>	FIAD 10/20		DRY FIAD 10/20				<u>.</u>					1970
	<b>A BO A D W</b>	A.V. E.AD A.L.V.A.	NT MEDIUM CT	TIEE TO VEDY STIE	E MOIST BROW	WAL COAY	DED E	INE CAND		4/033 14/17	TDACE C	DAVE	:	:	:						
19.60	B -ROADW	AY EMBANKMI AY EMBANKMI	NT-LOOSE TO	TIFF TO VERY STIF MEDIUM DENSE, MC	F, MUIST, BROWN-W	HITE, SIL	TY FINI	E SAND (A	1 SILT (A 1-2-4(0)),	WITH TRAC	E GRAVEL	AND ORGA	NICS						<del>.</del> :		1960
	C -ALLUV	AL - MEDIUM (	ENSE TO VERY	DENSE, MOIST TO	SATURATED	TAN-BRO	WN-BRO	OWN-GRAY	, SILTY, GI	RAVELLY, F	INE TO CO	ARSE SANI	(A-I-B)	)							:
1950	① -RESIDU	AL - STIFF, MC	IST, TAN-BROWN	N, FINE SANDY SILT	(A-4), WITH T	RACE M	ICA									<u></u>					1950
1940		! ! !		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			· · · · · ·	1													1940
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		<u> </u>											A	IPPROXI	IMATE EXISTII IS DRAWN T	NG GROUN HROUGH 1	D LIN THE E	NE IS DRAWN BORING BORING WITH BOTH	3 IO BORI. PROJECTED	NG. INFERRED STRA ONTO THE PROFII	411GRAPHY LE
					13 +	50	13	3+00	12	+50	12 + 0	0	11 + 50	0	11 + 00	10 + 5	50	10+00			

WISH 2007-LF8/TO   TP A-COURT   COUNTY (CRAMAD)   CECLOGET   S. Brand   CRAMAD   C	
BORING NO. RWALZ B-1   STATION 11+81   OFFSET 25 ft LT   ALIGNMENT L   O HR. Dry COLLAR ELEV. 1,992.8 ft   TOTAL DEPTH 15.0 ft   NORTHING 607,617   EASTING 568,243   24 Hr. FIAD	
COLLAR ELEV. 1,992.8 ft TOTAL DEPTH 15.0 ft NORTHING 607,617 EASTING 568,243 24 HR. FIAD DIRLINGHAWMER EFF/DATE C323022 Mabile B29 89%/03262020 DIRLINGHAWMER EFF/DATE C323022 M	OUND WTR (ft)
DRILLER J. Estop   START DATE   101/41/20   COMP. DATE   101/41/20   SURFACE WATER DEPTH   N/A	I <b>R.</b> Dry
DRILLER J. Estep  START DATE 10/14/20  COMP. DATE 10/14/20  SURFACE WATER DEPTH N/A  ELEV CITY (II) SURFACE WATER DEPTH N/A  ELEV CITY (III) SURFACE WATER DEPTH N/A  ELEV CITY (	
DRIVE   DEPTH   BLOW COUNT   ELEV   (ft)   0.5ft   0	*E Automatic
1995   1995   1995   1996   1996   1996   1996   1996   1997   1996	
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10 I BOONEE CA AGROCA GEO RIDY, GIAM-GRU NC, DOT GOTT 427  11	T

REFERENCE

**CONTENTS** 

**DESCRIPTION** 

LEGEND (SOIL & ROCK)

TITLE SHEET

WALL ENVELOPE

CROSS SECTIONS

SITE PLAN

BORE LOGS

SHEET NO.

5-9

10-12

3

STATE OF NORTH CAROLINA

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

# **STRUCTURE**

SUBSURFACE INVESTIGATION

COUNTY \_GRAHAM

PROJECT DESCRIPTION UPGRADE US 129 FROM SOUTH OF SR 1275 (FIVE POINTS ROAD) TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223 (BEECH CREEK ROAD)

SITE DESCRIPTION RETAINING WALL #4: SHORED MECHANICALLY STABILIZED EARTH (SMSE) WALL ON -L- FROM 167+75 LT TO 171+75 LT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CA	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 (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 SUBSURFACE 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 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 INCLORDED TO CLIMATIC CONDITIONS INCLORDED TO CLIMATIC CONDITIONS INCLORDING TO CLIMATIC CONDITIONS INCLORDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

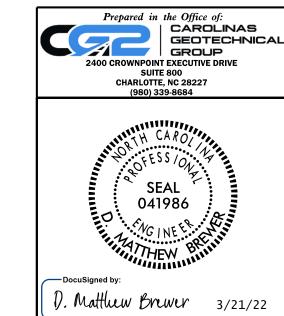
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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.

S. BRAUN CG2 EXPLORATION INVESTIGATED BY \_\_CG2 DRAWN BY \_\_M. BREWER, P.E. CHECKED BY R. KRAL, P.E. SUBMITTED BY M. BREWER, P.E. DATE MARCH 2022



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

PROJECT REFERENCE NO. SHEET NO.

A-0009CA

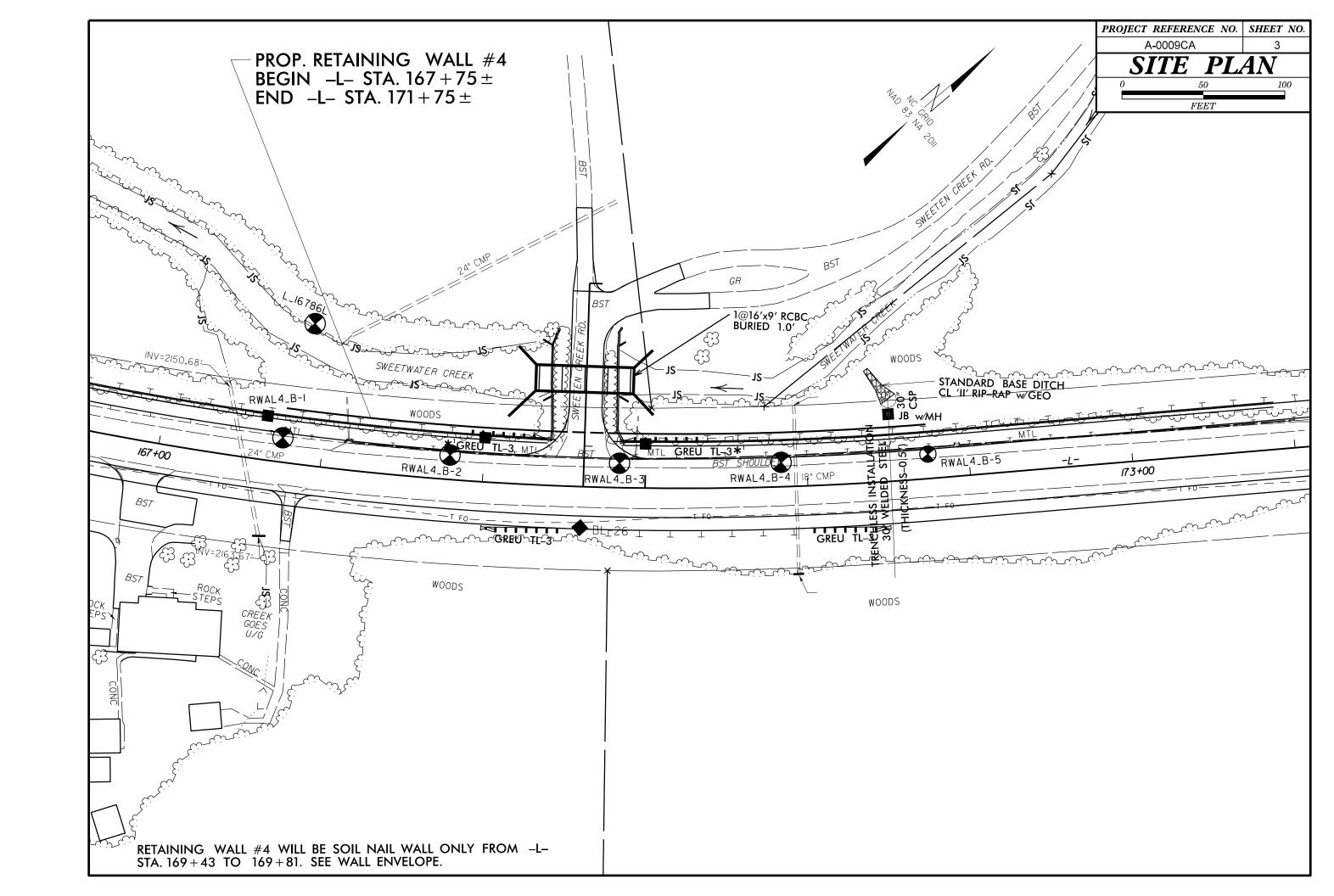
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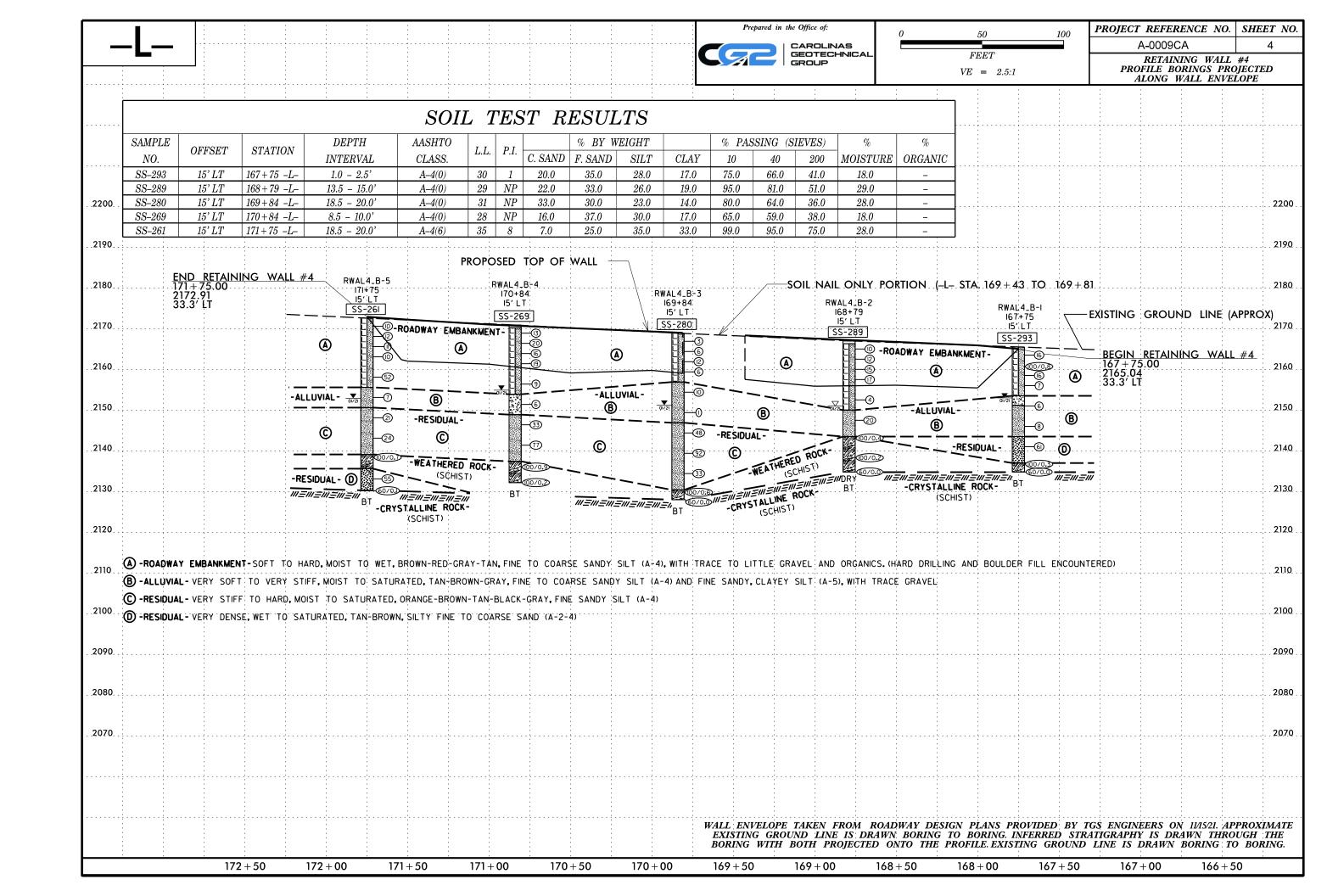
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

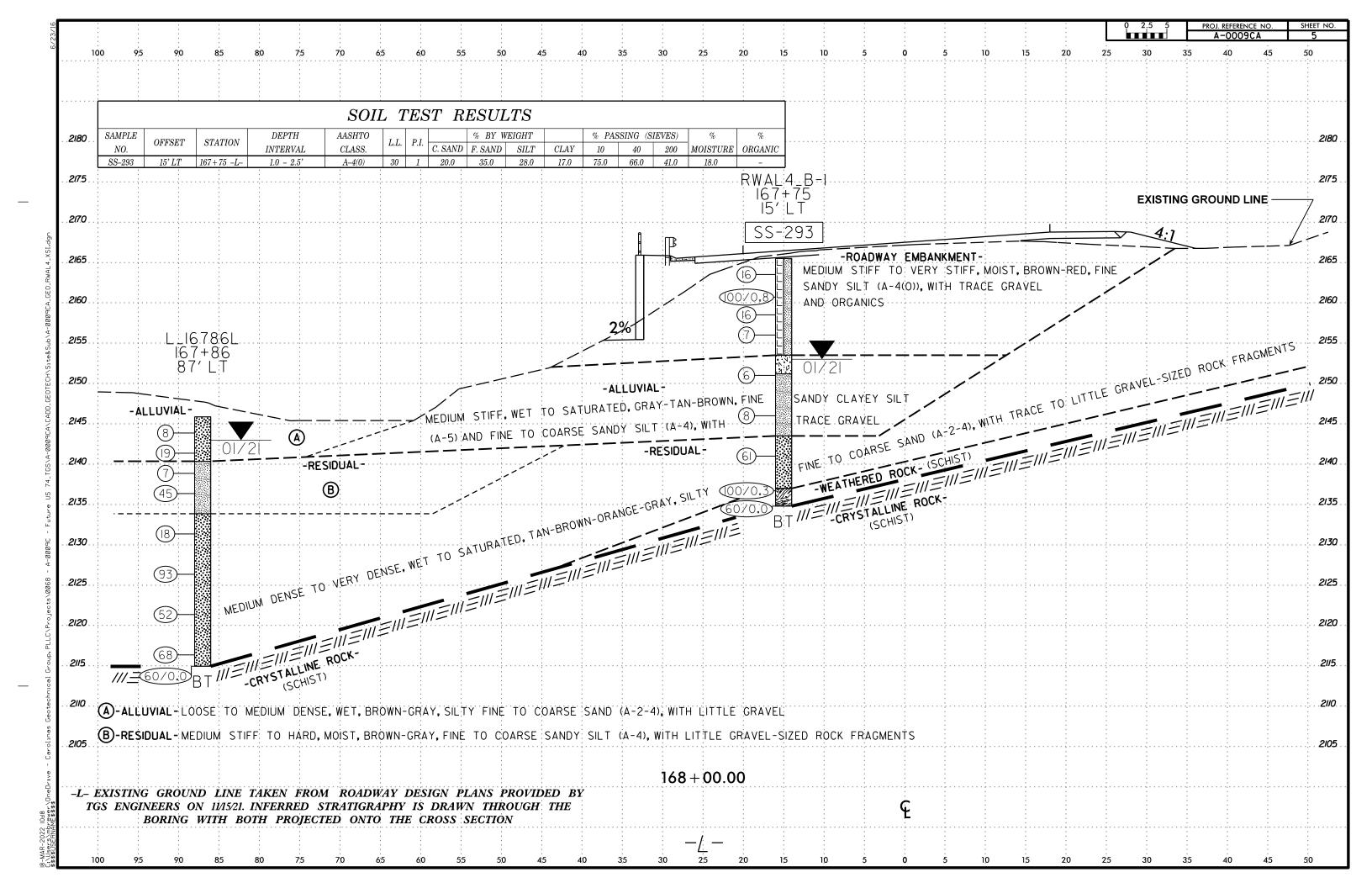
# SUBSURFACE INVESTIGATION

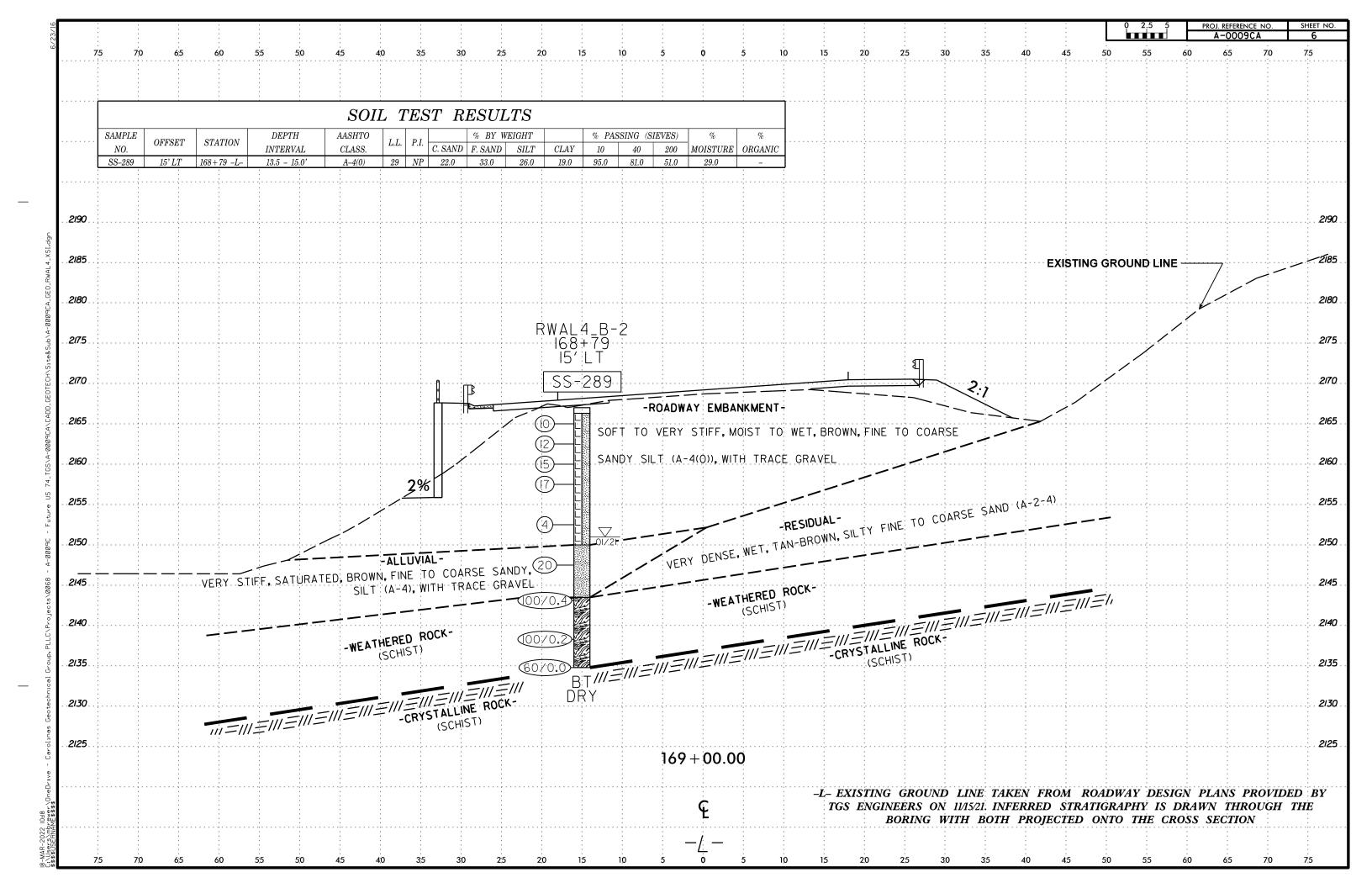
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

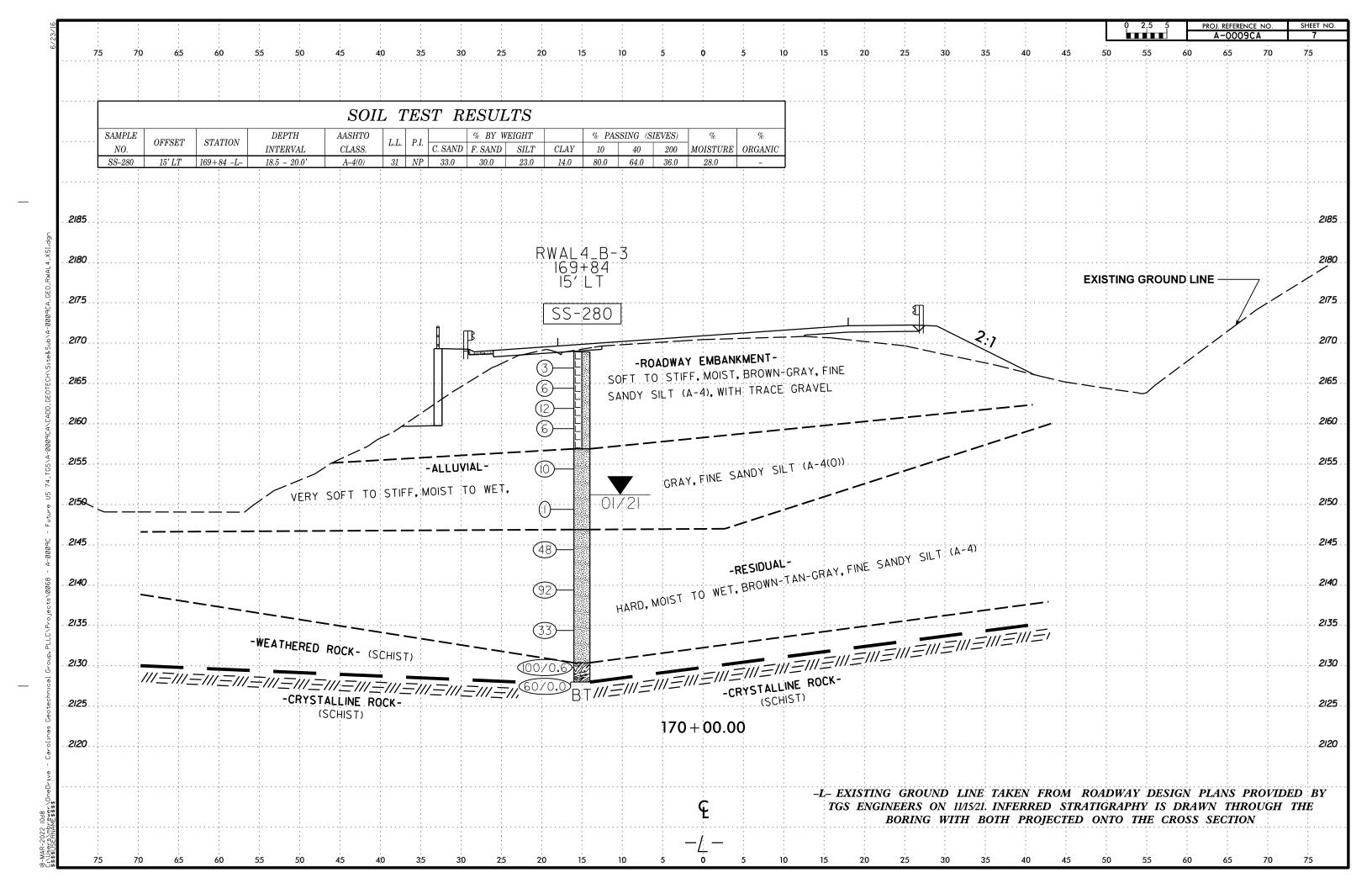
COLL DECEDIBIION	CDADATION	I DOCK DECEDIATION	TEDMC AND DEFINITIONS		
SOIL DESCRIPTION  SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	GRADATION  WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	ROCK DESCRIPTION  HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS		
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	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	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	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  AQUIFER - A WATER BEARING FORMATION OR STRATA.		
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.		
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING		
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: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.		
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT		
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS CLASS. (≤35% PASSING *200) (>35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE CRYSTALLINE WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND 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.	GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.		
CLASS. A-1-0 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPIT REFUSAL IF TESTED.  PORT TARE INCLUSED BY INCLUSED B	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM		
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.		
% PASSING CILT.	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	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.		
*10 50 MX   GRANULAR SILS CLAY   CLAY   PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT		
■200   15 MX   25 MX   10 MX   35 MX   35 MX   35 MX   35 MX   36 MN   36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.		
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.		
PASSING *40 48 MX 41 MN	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	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 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN MODERATE ORGANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,		
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.		
OF MA TOR GRAVEL AND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER		(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR 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	▼ STATIC WATER LEVEL AFTER <u>24</u> 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 FAIR TO POOR UNSUITABLE	∇PW     PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(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.		
AS SUBGRADE PUUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.		
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	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.		
PANCE OF STANDARD PANCE OF LINCONFINED		(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 (IN-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  ROADWAY EMBANKMENT (RE)  POR 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	1 LJ	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.		
CRANIII AR LOOSE 4 TO 10	SOIL SYMBOL  SOIL SYMBOL  SOIL SYMBOL  SLUPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	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 30 10 50 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	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 > 5Ø	THE THE ROME WHITE EMISHING THE TENT	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           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	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 &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.  RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.		
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	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF		
MATERIAL   STIFF   8 TO 15   1 TO 2     COHESIVE)   VERY STIFF   15 TO 30   2 TO 4	A ALLINIAL COTI POLINDARY A PIEZOMETER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE		
HARD > 30 → 4	INSTALLATION	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE		
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.		
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	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		
COARSE FINE	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.		
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT		
(CSE. SD.) (F SD.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE.		
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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		
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY  MOD MODERATELY  7 - UNIT WEIGHT  CPT - CONE PENETRATION TEST  NP - NON PLASTIC  7 - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.		
SOU MOISTURE SCALE FIELD MOISTURE	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY		
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.		
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY		
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.		
PLASTIC   SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.		
(PI) PL PLASTIC LIMIT	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING  TERM SPACING TERM THICKNESS	BENCH MARK: N/A		
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET		
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET			
DECUMPES ADDITIONAL WATER TO	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	NOTES:		
- DRY - (D)  ATTAIN OPTIMUM MOISTURE	CME-55 G* CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021		
PLASTICITY	X 8" HOLLOW AUGERS	INDURATION			
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST UTUNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;  GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			
MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER POST HOLE DIGGER	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;			
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED			
COLOR	X DIEDRICH D50 TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:  OFFICULT TO BREAK WITH HAMMER.			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO RREAK SAMPLE.			
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X MOBILE B-29	EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1		
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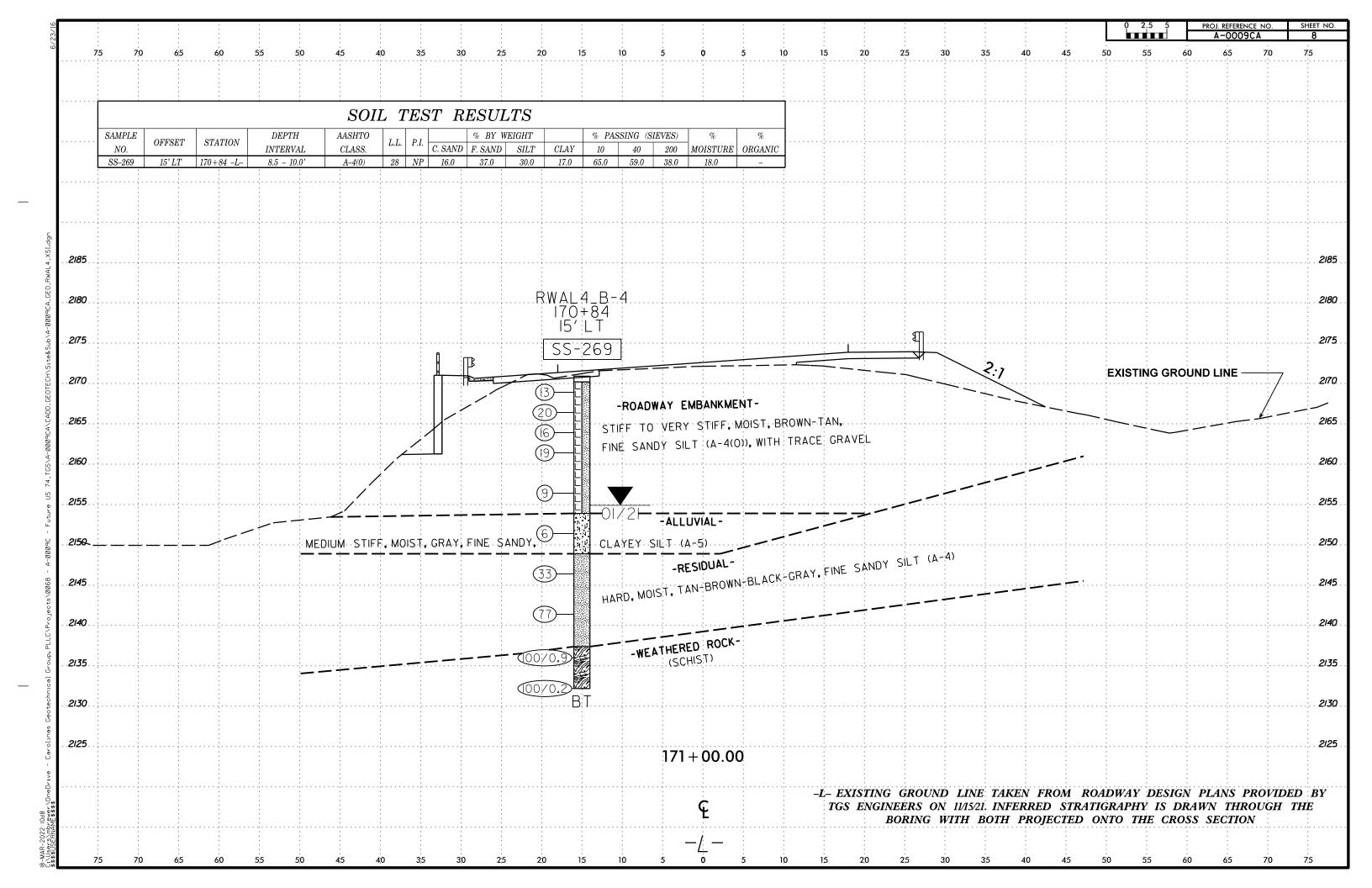


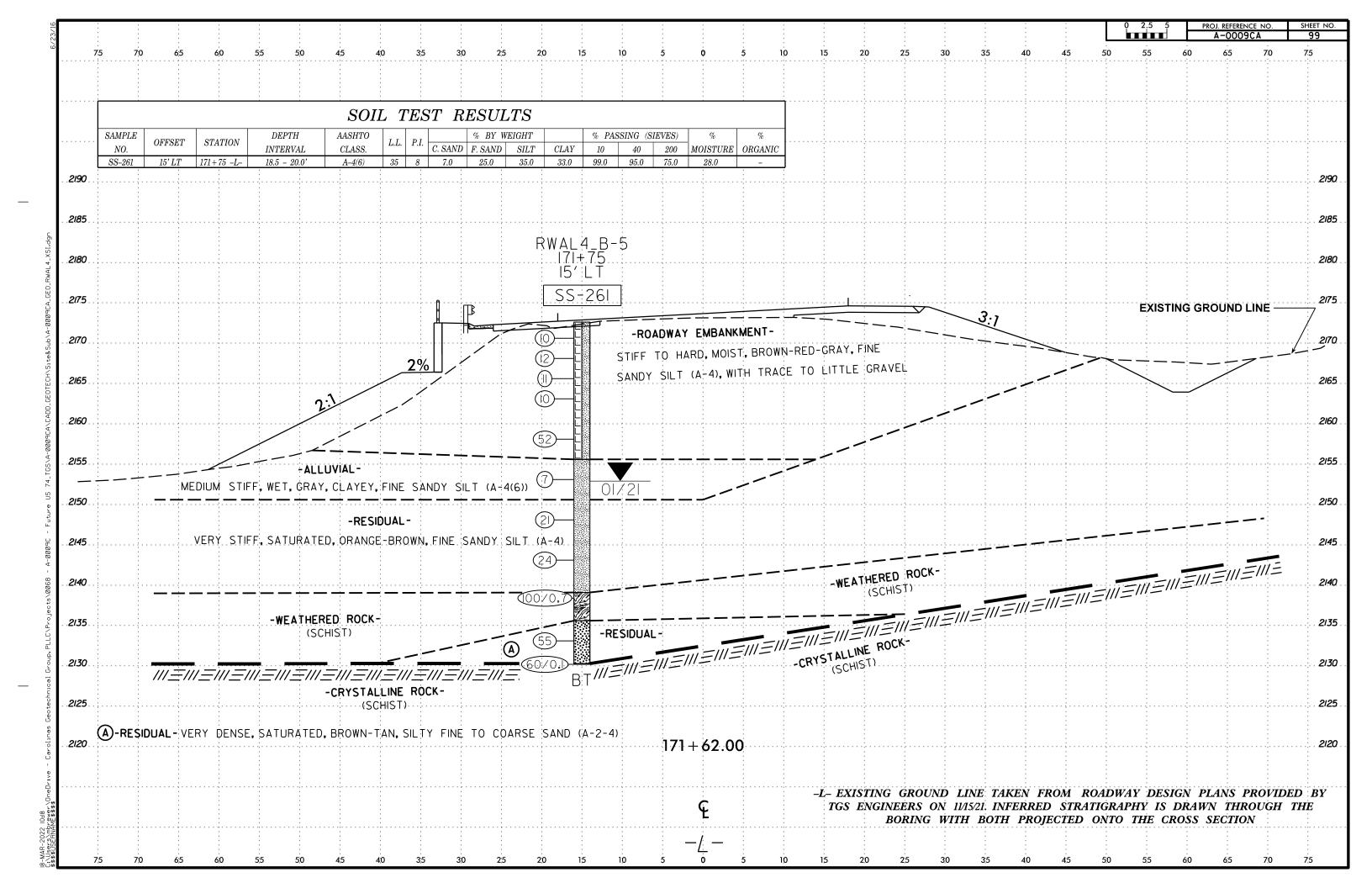


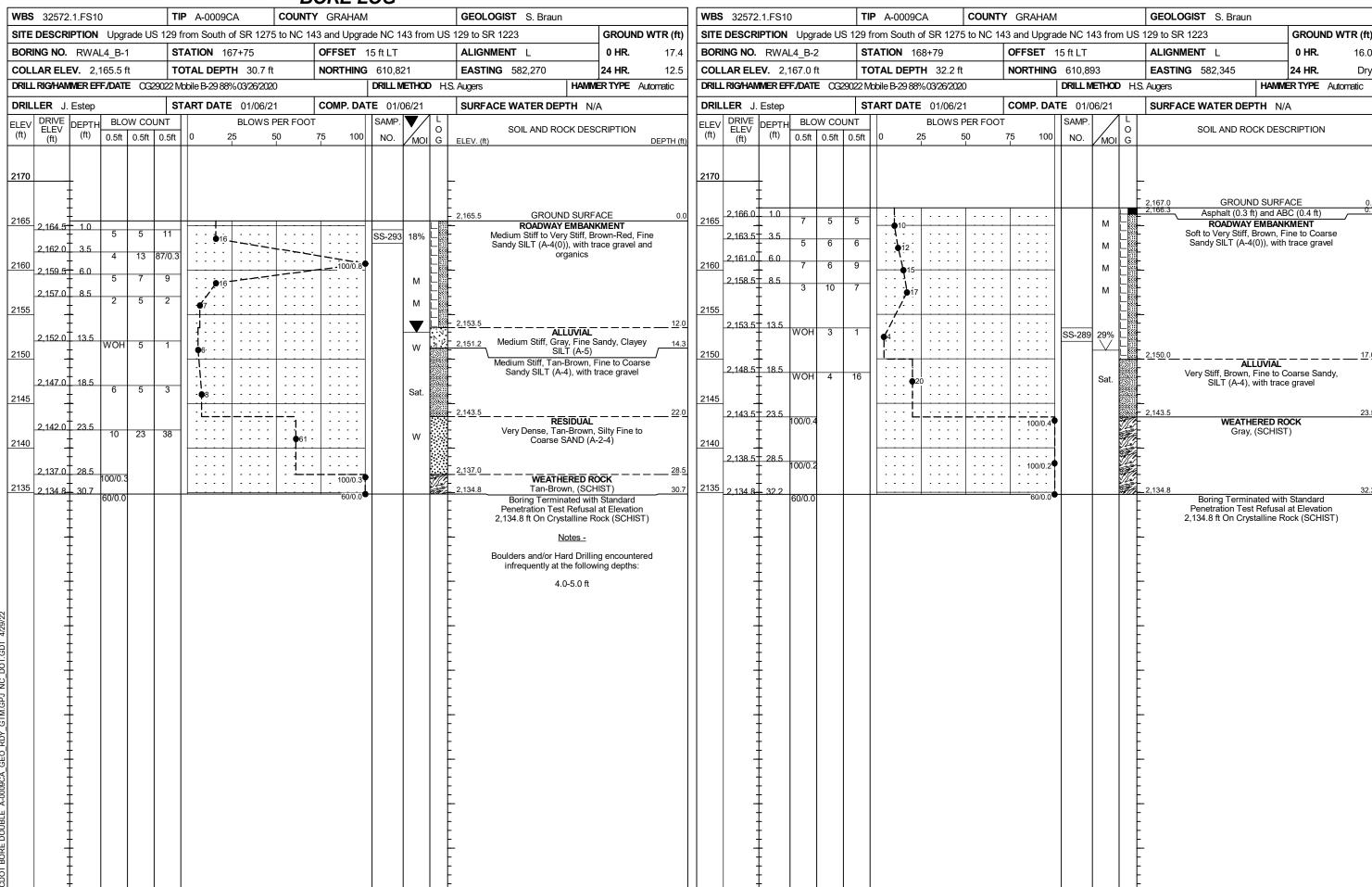


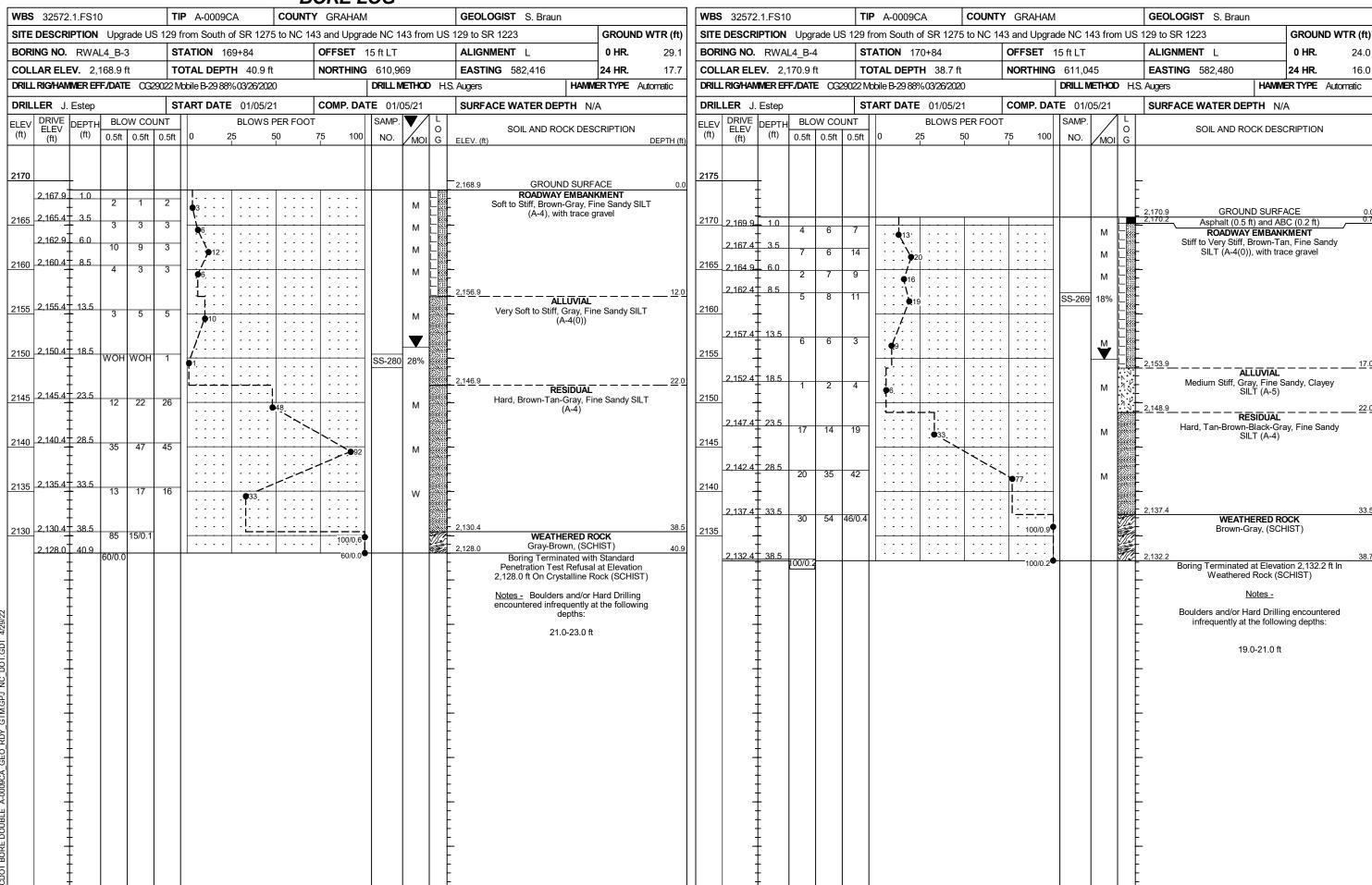












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WBS	32572	2.1.FS10	0		TI	<b>P</b> A-000	9CA	COUNT	Y GRAHAN	М			GEOLOGIST S. Braun	
SITE	DESCR	IPTION	Upg	rade U	S 129 1	from Sou	th of SR 12	75 to NC 1	43 and Upgr	ade NC 1	143 fro	m US	129 to SR 1223	GROUND WTR (ft)
3OR	NG NO.	RWA	L4_B-	5	S	TATION	171+75		OFFSET	15 ft LT			ALIGNMENT L	<b>0 HR.</b> 23.0
OLI	LAR ELE	<b>EV.</b> 2,	172.6	ft	TO	OTAL DE	<b>PTH</b> 42.4	ft	NORTHING	<b>G</b> 611,1	17		<b>EASTING</b> 582,534	<b>24 HR.</b> 19.7
RILL	.RIG/HAN	MER EF	F/DAT	E CG	29022 IV	obile B-29	88%03/26/20	20		DRILL	METHO	) HS	. Augers HAMI	MER TYPE Automatic
DRIL	LER J.	Estep			S	TART DA	TE 01/05/	21	COMP. DA	<b>ATE</b> 01/	05/21		SURFACE WATER DEPTH N	/A
LEV	DRIVE ELEV	DEPTH	<b>'</b>	ow co				PER FOO		SAMP	. 🔻	LO	SOIL AND ROCK DES	SCRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	MOI	G	ELEV. (ft)	DEPTH (f
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	-												2,172.6 GROUND SURI	
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170	2,169.1	3.5	5	8	4	- 10				1			SILT (A-4), with trace t	
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165	_	ţ	7	5	6	11				]	М	F	-	
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155	-	F											2,155.6 <b>ALLUVIA</b> L	<u>17</u> .
	2,154.1	18.5	4	4	3	.				SS-26 <sup>2</sup>	1 28%	F	Medium Stiff, Gray, Claye	ey, Fine Sandy
	-	F								100 20		₩F	SILT (A-4(6	
150	2.149.1	23.5					1			-		F	2,150.6 RESIDUAL	22.
	-		8	11	10		<b>Q</b> 21				Sat.	<b>F</b>	Very Stiff, Orange-Brown, (A-4)	-ine Sandy SIL1
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	-	‡	"	"			- •24				Sat.			
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	2,139.1	33.5	53	47/0.2				+	- 100/0.7	∳			WEATHERED F	ROCK
405	-	‡											Brown-Tan, (SC 2,135.6	HIST) 37.
2135	2,134.1	38.5	26	18	37			+		1			- <b>RESIDUAL</b> Very Dense, Brown-Tar	
	-	‡	20	10	31			<b>∳</b> 55 -			Sat.		Coarse SAND (A	
	2.130.3	42.3	60/0.1					.   }	60/0.1	$\blacksquare$			2,130.3 -2,130.2 <b>\ CRYSTALLINE</b> I	42. ROCK \_42.
	-	<u> </u>	00/0.1	4					00/0.1				(SCHIST)	
	-	t										<u> </u>	Boring Terminated wi Penetration Test Refusa	al at Elevation
	-	ł										lE	2,130.2 ft In Crystalline F	Rock (SCHIST)
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	-	Ł										F	Boulders and/or Hard Drill infrequently at the follo	
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SHEET 11

**CONTENTS** 

**DESCRIPTION** 

LEGEND (SOIL & ROCK)

TITLE SHEET

SITE PLAN

WALL ENVELOPE BORE LOGS

SHEET NO.

STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY GRAHAM

PROJECT DESCRIPTION <u>UPGRADE</u> <u>US 129 FROM</u> SOUTH OF SR 1275 (FIVE POINTS ROAD) TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223 (BEECH CREEK ROAD) SITE DESCRIPTION RETAINING WALL #5: CAST-IN-PLACE CONCRETE GRAVITY WALL ON -L- FROM 175+35 RT TO 176+65 RT

STATE PROJECT REFERENCE NO. A-0009CA

## **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 FILED 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 (9)9) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL 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 MICHORY WAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICHORY DESCRIPTIONS 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 MICHORY DESCRIPTIONS AND AS MICH. AS OTHER POONLY WATER EACTORS 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 DESOR NOT WARRANT OR GUARNITEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION 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.

PERSONNEL

	S. BRAUN
	CG2 EXPLORATION
INVESTIGATED	BY CG2

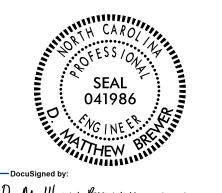
Prepared in the Office of: CAROLINAS GEOTECHNICAL GROUP 2400 CROWNPOINT EXECUTIVE DRIVE

SUBMITTED BY M. BREWER, P.E.

DATE MARCH 2022

DRAWN BY M. BREWER, P.E. CHECKED BY <u>R. KRAL</u>, P.E.

> SUITE 800 **CHARLOTTE, NC 28227** (980) 339-8684



D. Matthew Brewer 03/22/2022 -386129C0A4C1462

SIGNATURE

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

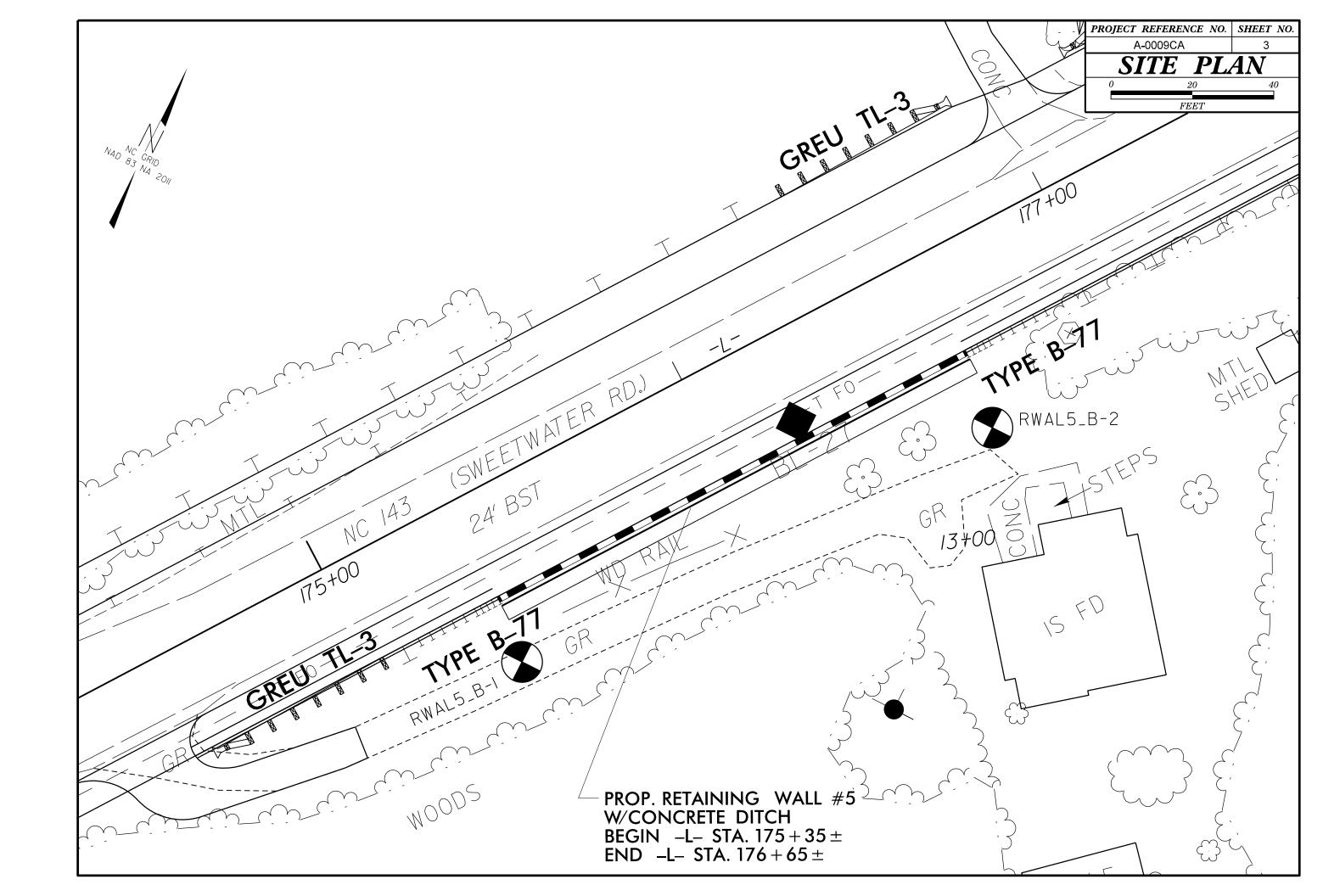
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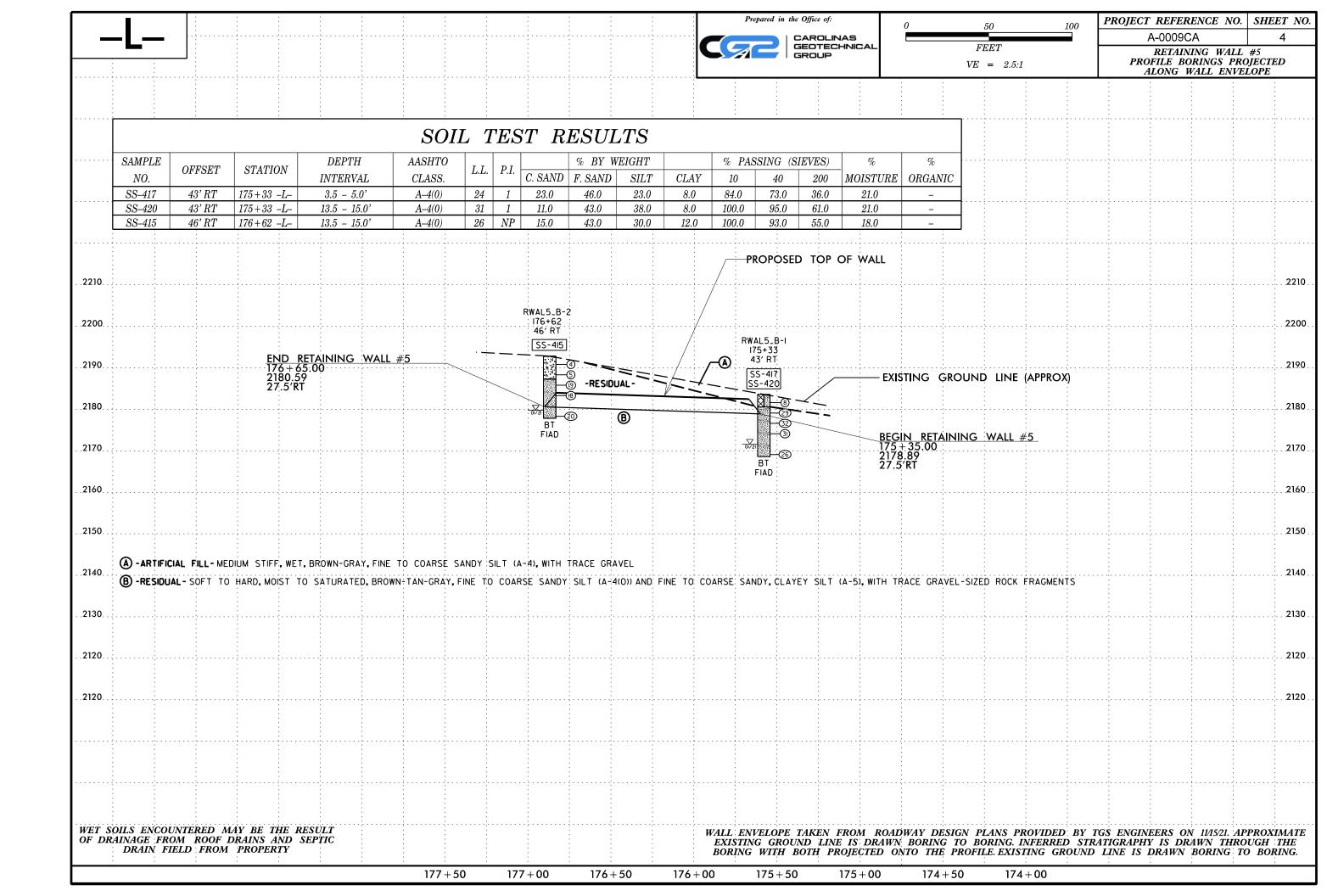
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

# 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	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	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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	<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.	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	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,	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
VERY STIFF,GRAY,SILTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, OUTLING AND COUNTY STATES	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.	UNCLOSE, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CHYSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUYIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	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.
*10 50 MX   GRANULAR   GRANULAR   CLAY   MUCK, CLAY   PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
■ 200   15 MX   25 MX   10 MX   35 MX   35 MX   35 MX   36 MN   36 MN   36 MN   36 MN   36 MN	GRANULAR SILT - CLAY  ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITILE UK HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOUS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. EINE SUITY OR CLAYEY SUITY CLAYEY MATTER	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH, OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN PATING	─────────────────────────────────────	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABL	E	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	- STAING ON SEEF	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	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
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	WITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL  SOIL SYMBOL  SPT DAT TEST BORING  SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED 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.
GRANULAR LUUSE 4 10 10 10 N/A	<b>人</b> 图	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50 (NON-COHESIVE) NEDWORK DENSE	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE         > 50           VERY SOFT         < 2	INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	WW - TEST PORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	INFERRED ROCK LINE MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER INSTALLATION - SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	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	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND SILI CLAY	ONDERCOT LAST HOLE DECEMBED NOCK	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	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 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
	$oldsymbol{\bot}$ CL CLAY MOD MODERATELY $oldsymbol{\gamma}$ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE FIELD MOISTURE COURS FOR FIELD MOISTURE PROPERTY AND ADMINISTRATION OF TERMS	☐ CPT - CONE PENETRATION TEST NP - NON PLASTIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS)	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.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(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 I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	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.
PLASTIC PLOUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNALL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISULID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS \( \omega \) - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: N/A
(PI) PL PLASTIC LIMITATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENOT TIMING
- 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 SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
REQUIRES ADDITIONAL 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	G*CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021
PLASTICITY	X 8' HULLUW AUGERS	INDURATION	-
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 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 DE CEDADATED EDOM CAMBLE WITH CIFEL DROPE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED  ORNING CHIN BE SEPHANTED FROM SHIPLE WITH STEEL PROBE;  BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG-CARB.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X DIEDRICH D50 CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	





BORE LOG				
WBS         32572.1.FS10         TIP         A-0009CA         COUNTY         GRAHAM	GEOLOGIST S. Braun	WBS         32572.1.FS10         TIP         A-0009CA         COL	UNTY GRAHAM	GEOLOGIST S. Braun
SITE DESCRIPTION Upgrade US 129 from South of SR 1275 to NC 143 and Upgrade NC 143 from US	GROUND WTR (ft)	SITE DESCRIPTION Upgrade US 129 from South of SR 1275 to No	C 143 and Upgrade NC 143 from US	S 129 to SR 1223 GROUND WTR (ft)
BORING NO. RWAL5_B-1 STATION 175+33 OFFSET 43 ft RT	ALIGNMENT L 0 HR. 12.0	BORING NO. RWAL5_B-2 STATION 176+62	OFFSET 46 ft RT	ALIGNMENT L 0 HR. 13.0
COLLAR ELEV. 2,183.6 ft         TOTAL DEPTH 15.0 ft         NORTHING 611,375	<b>EASTING</b> 582,789 <b>24 HR.</b> FIAD	COLLAR ELEV. 2,192.8 ft TOTAL DEPTH 15.0 ft	<b>NORTHING</b> 611,478	<b>EASTING</b> 582,866 <b>24 HR.</b> FIAD
DRILL RIG/HAMMER EFF/DATE CG20446 Diedrich D50 89% 05/22/2019 DRILL METHOD H.	S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF/DATE CG20446 Diedrich D50 89% 05/22/2019	DRILL METHOD H	H.S. Augers HAMMER TYPE Automatic
DRILLER C. Odom START DATE 01/26/21 COMP. DATE 01/26/21	SURFACE WATER DEPTH N/A	DRILLER C. Odom START DATE 01/26/21	COMP. DATE 01/26/21	SURFACE WATER DEPTH N/A
ELEV   DRIVE   ELEV (ft)   O.5ft   O	SOIL AND ROCK DESCRIPTION  ELEV. (ft) DEPTH (ft)		75 100 SAMP. O NO. MOI G	
(#)   ELEV   (#)	ELEV. (ft)  DEPTH (ft)  2,183.6 GROUND SURFACE 0.0  ARTIFICIAL FILL  Medium Stiff, Brown-Gray, Fine to Coarse 2,180.6 Sandy SILT (A-4), with trace gravel 3.0  RESIDUAL  Very Stiff to Hard, Brown-Tan-Gray, Fine to Coarse Sandy SILT (A-4(0)), with trace gravel-sized rock fragments	2195  2,191 8 1.0 2 2 2 2  2,189 3 3.5 2 2 3  2,186 8 6.0 4 8 11  2185  2,184 3 8.5 6 8 10  2180  2170 3 13 5	75 100 NO. MOI G	
DOT BORE DOUBLE Advisor, GEO, TOUT				- - - - - - - - - - - - - - - -

REFERENCE

# STATE OF NORTH CAROLINA

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

### **CONTENTS**

SHEET NO.	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	WALL ENVELOPE
5-10	CROSS SECTIONS
11-16	BORE LOGS, CORE LOGS, ROCK CORE PHOTOGRAPHS

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_GRAHAM PROJECT DESCRIPTION UPGRADE US 129 FROM SOUTH OF SR 1275 (FIVE POINTS ROAD) TO NC 143 AND UPGRADE NC 143 FROM US 129 TO SR 1223 (BEECH CREEK ROAD) SITE DESCRIPTION RETAINING WALL #6: SOIL NAIL WALL WITH ARCHITECTURAL FINISH ON -L- FROM 186+75 RT TO 192+05 RT

STATE PROJECT REFERENCE NO. 16 A-0009CA

### **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 SUBSURFACE 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 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 INCLORDED TO CLIMATIC CONDITIONS INCLORDED TO CLIMATIC CONDITIONS INCLORDING TO CLIMATIC CONDITIONS INCLORDING 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.

S. BRAUN D. GOODNIGHT N. MCLAREN CG2 EXPLORATION INVESTIGATED BY \_\_CG2 DRAWN BY \_\_M. BREWER, P.E. CHECKED BY R. KRAL, P.E. SUBMITTED BY <u>M. Brewer</u>, P.E. DATE MARCH 2022



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

3/22/2022

PROJECT REFERENCE NO. SHEET NO.

A-0009CA

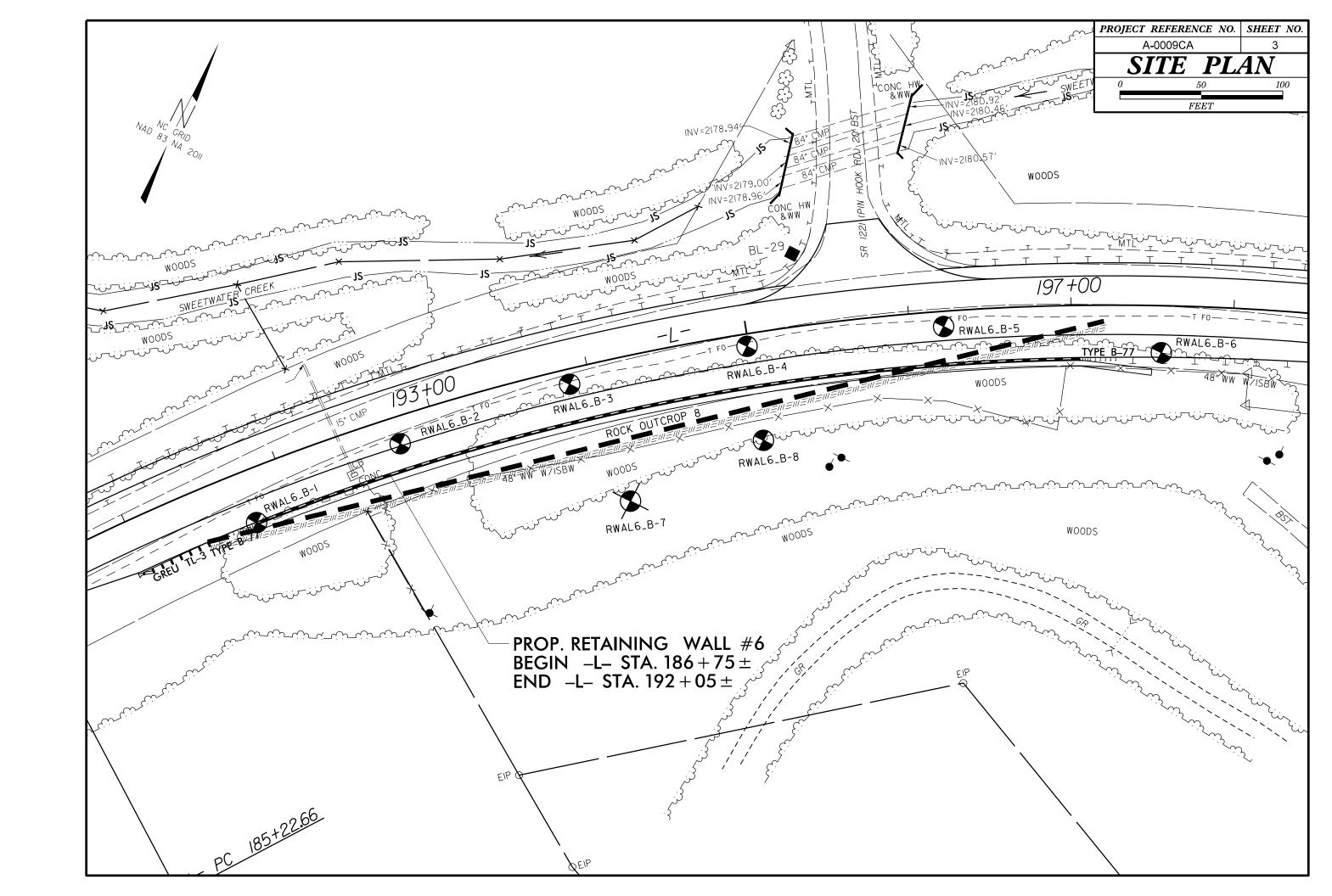
2

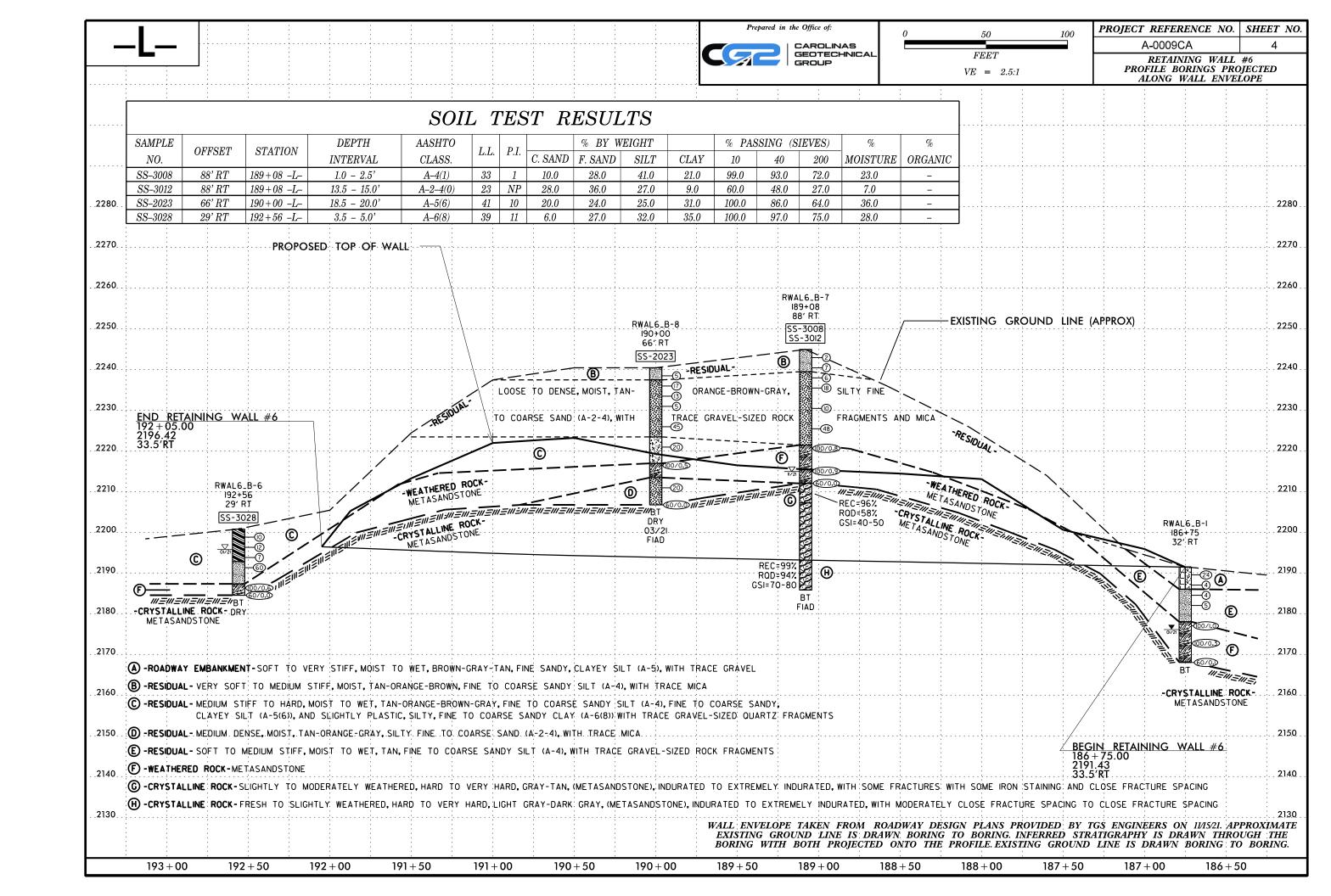
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

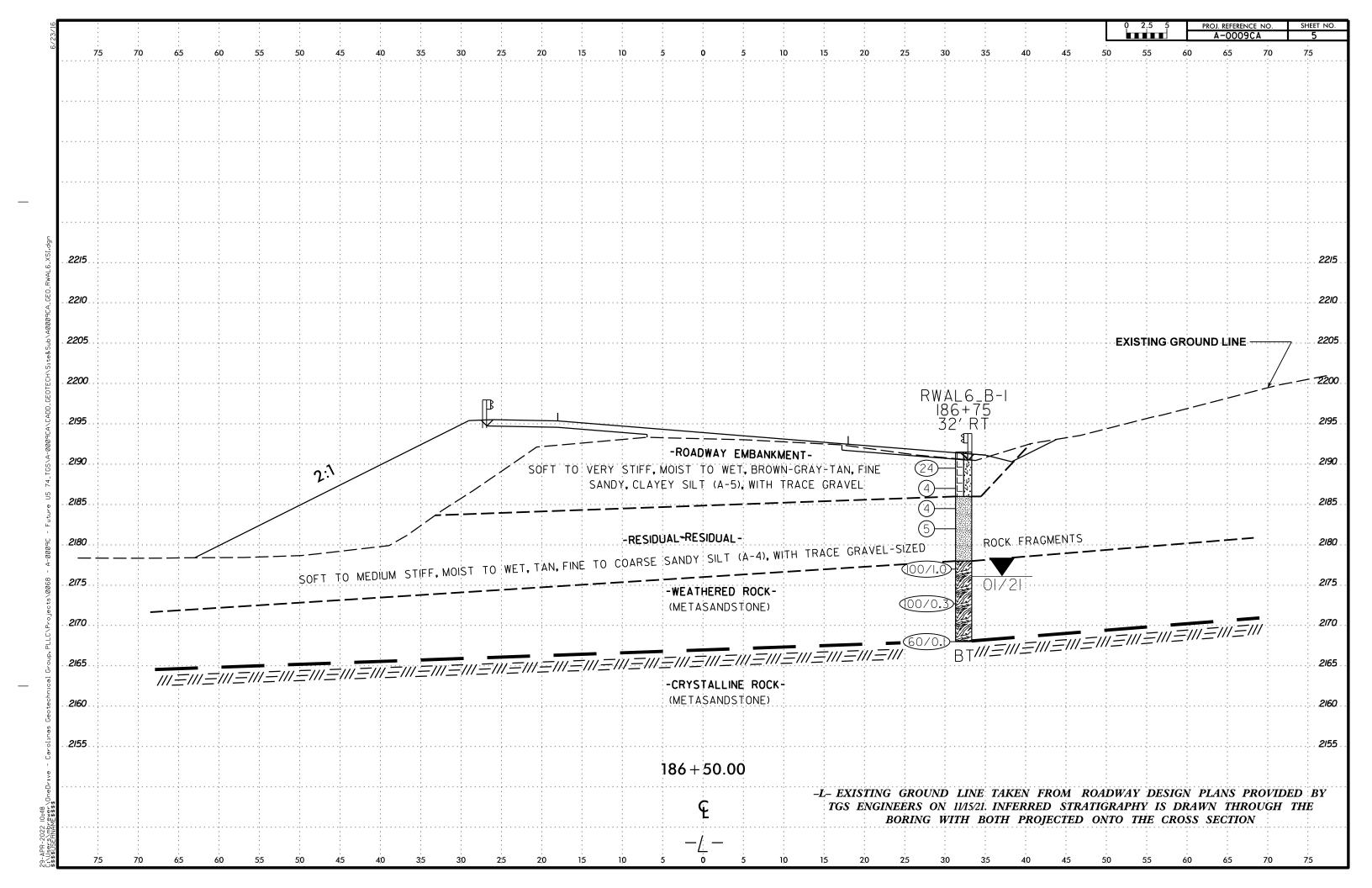
# SUBSURFACE INVESTIGATION

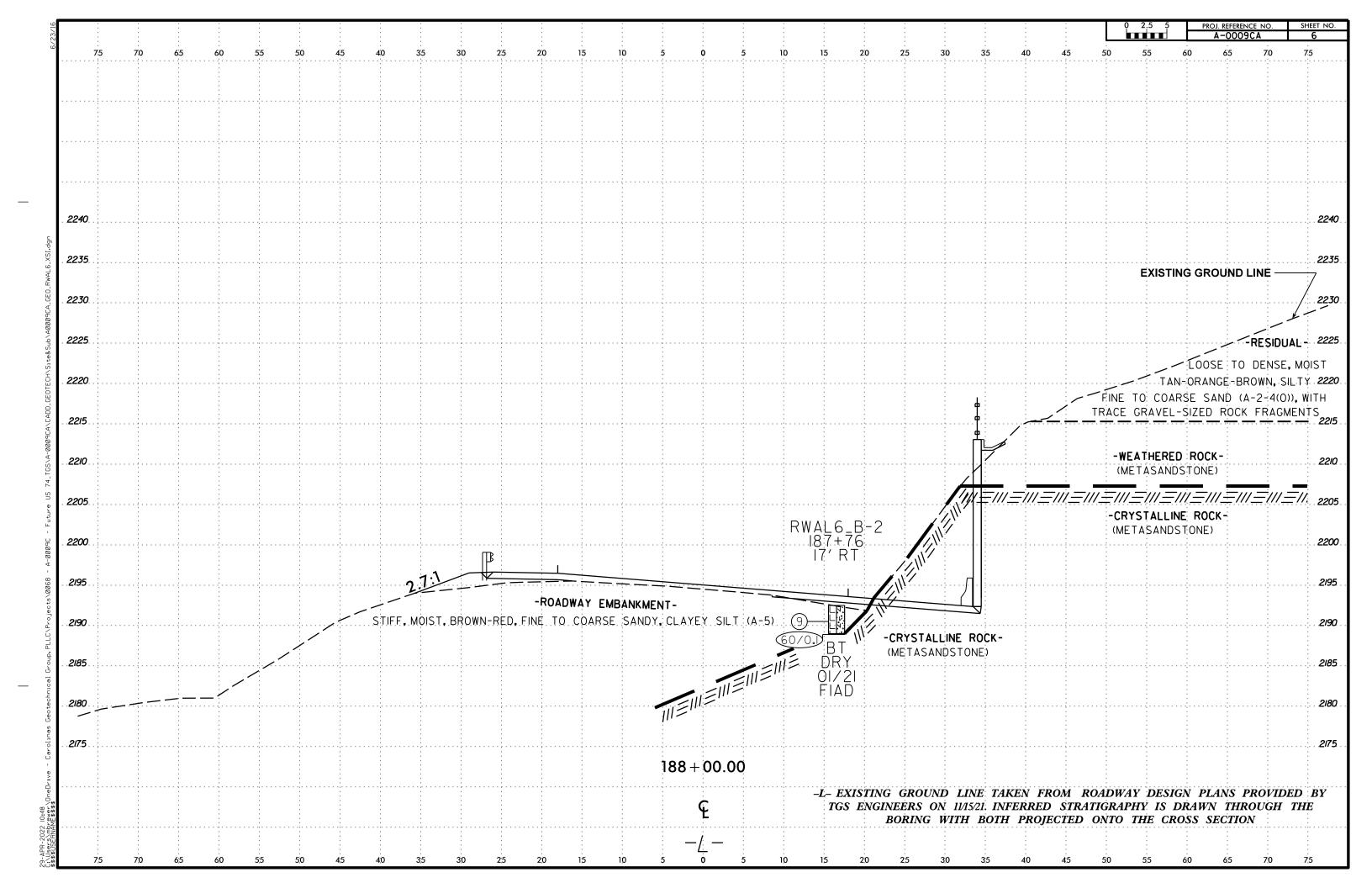
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

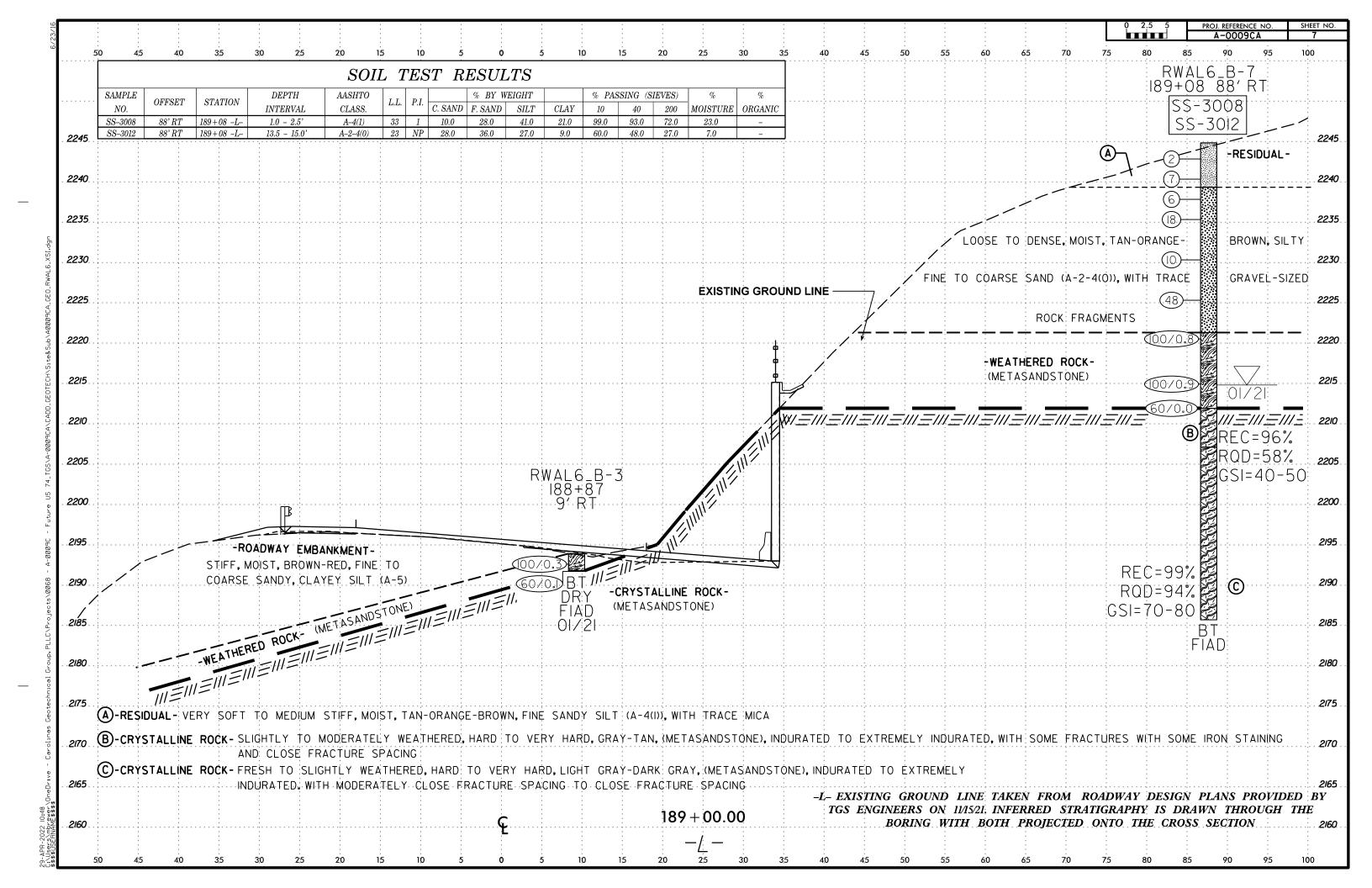
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS		
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE 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,	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		
VERY STIFF.GRAY.SILTY CLAY.MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6 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 ICNEOUS AND METAMORPHIC POCK 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, KAQLIN, ETC.	ROCK (CP) 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 FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	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-7-6 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 000000000000000000000000000000000000	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		
% PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.		
"10   50 MX   GRANULAR   GRANULAR   CLAY   MUCK,   CLAY   PEAT	PERCENTAGE OF MATERIAL  GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.		
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	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.	HORIZONTAL.		
LL 40 MX 41 MN LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	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,		
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	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE 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	STATIC WATER LEVEL AFTER 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		(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.		
AS SUBURAUE POUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.		
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	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.		
DANCE OF CTANDARD DANCE OF UNICONSTITUT	THISCELE HINEOUS STRIBULS	(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 <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  25/025  DIP & DIP DIRECTION  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	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 ONT TEST BORING  INSTALLATION  SECRET INDICATION	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 THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	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	THAN RUADWAY EMBANKMENT \$\frac{1}{2}\$	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 &lt; 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	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 DIEZOMETED	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		
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTT 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	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	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES 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	USED 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		
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - SEED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.		
(BLDR.) (COB.) (GR.) (GSE. 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	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.		
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM YST - 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 7- DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.		
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  OFFICE OF SOURCE OF SOU	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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY		
(HITERBERG LIMITS) DESCRIPTION	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SRQD) - 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	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING			
(PI) PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: N/A		
- MOIST - (M) COLID. AT OR NEAR ORTIMIN MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET		
OM OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE			
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	NOTES:		
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	SURVEY AND ROADWAY DESIGN FILES PROVIDED BY TGS ENGINEERS ON 11/15/2021		
PLASTICITY	X 8* HOLLOW AUGERSBH	INDURATION			
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X-N Q	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS:  POST HOLE DIGGER	CDAING CAN BE CEDADATED FROM CAMPLE WITH CIFEL BRODE.			
HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER  POST HOLE DIGGER  STEEL TEETH HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.			
COLOR	TRICONE 'TUNG,-CARB, COUNDING DOD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X DIEDRICH D50 X CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.			
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X MOBILE B-29	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	DATE O JE 1		
	<u>                                     </u>	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1		

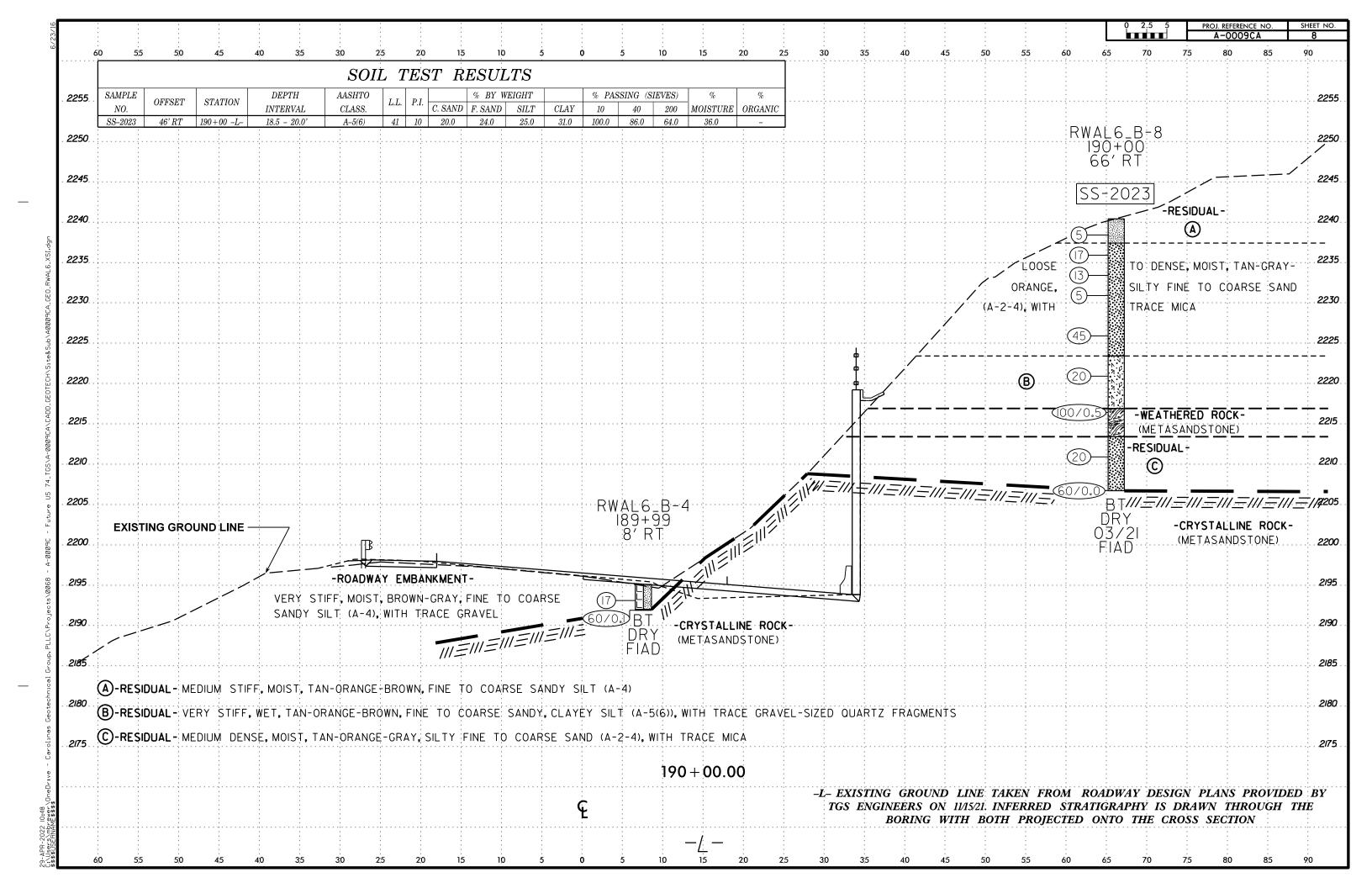


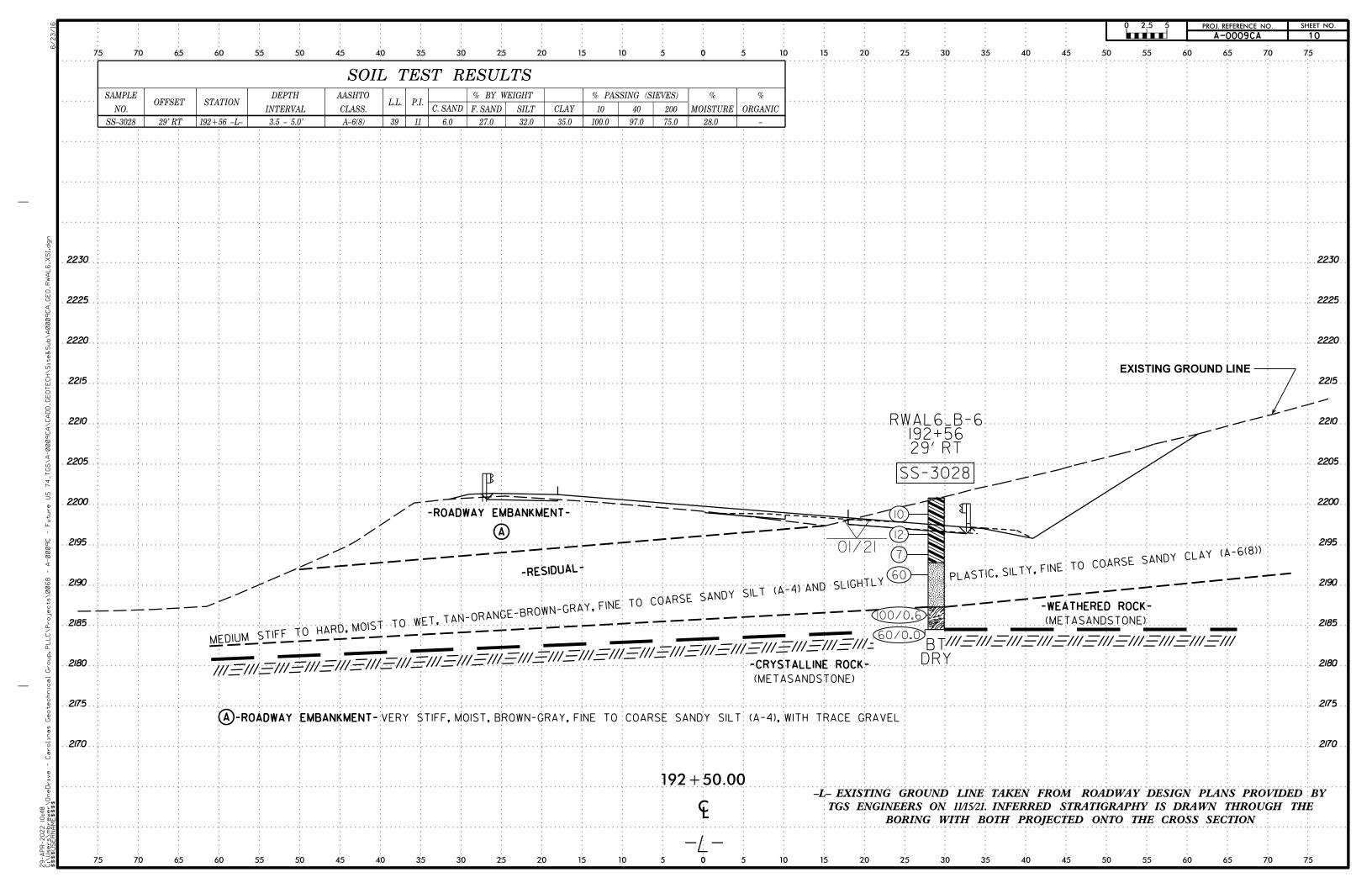


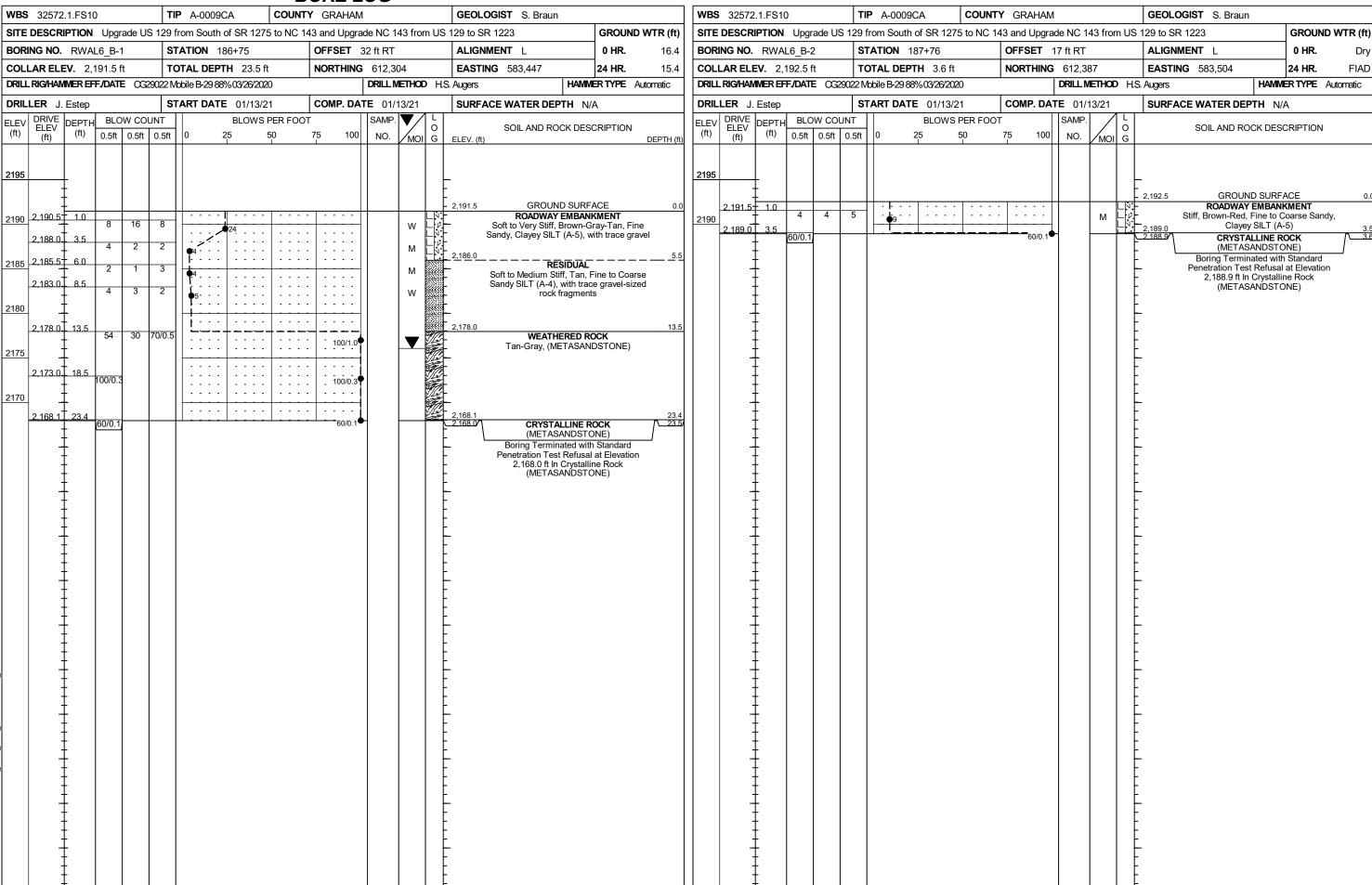




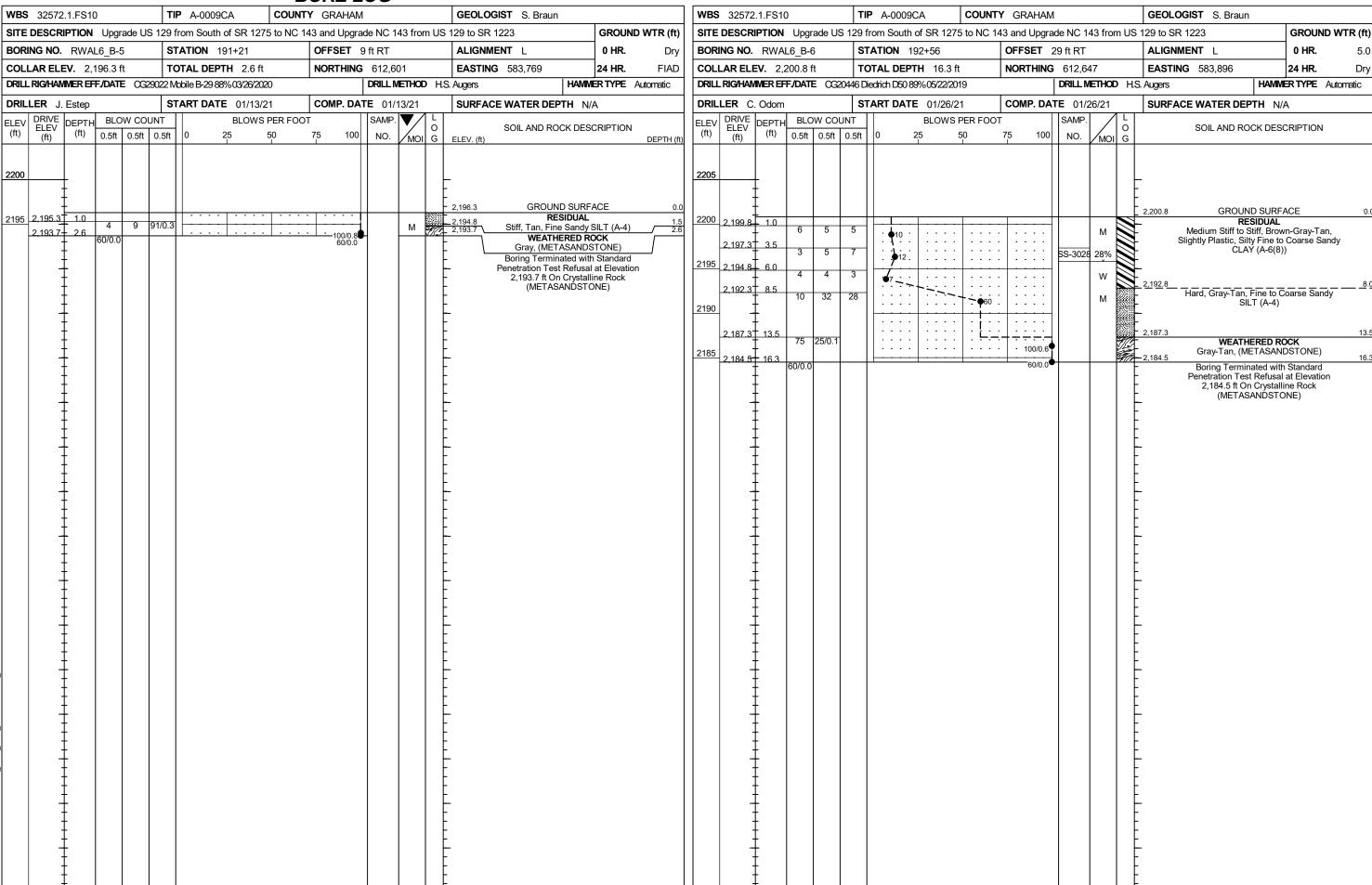








	<b></b>	BORE LOG								
<b>WBS</b> 32572.1.FS10	TIP A-0009CA COUN	TY GRAHAM	GEOLOGIST S. Braun		<b>WBS</b> 32572.1.FS <sup>2</sup>	0	TIP A-0009CA COUN	TY GRAHAM	GEOLOGIST S. Braun	
SITE DESCRIPTION Upgrade U	JS 129 from South of SR 1275 to NC	143 and Upgrade NC 143 fro	om US 129 to SR 1223	GROUND WTR (ft)	SITE DESCRIPTION	Upgrade US 12	29 from South of SR 1275 to NC	143 and Upgrade NC 143 from US	S 129 to SR 1223	GROUND WTR (ft)
BORING NO. RWAL6_B-3	<b>STATION</b> 188+87	OFFSET 9 ft RT	ALIGNMENT L	<b>0 HR</b> . Dry	BORING NO. RWA	L6_B-4	<b>STATION</b> 189+99	OFFSET 8 ft RT	ALIGNMENT L	<b>0 HR</b> . Dry
<b>COLLAR ELEV.</b> 2,194.0 ft	TOTAL DEPTH 2.2 ft	<b>NORTHING</b> 612,466	<b>EASTING</b> 583,580	24 HR. FIAD	COLLAR ELEV. 2	195.1 ft	TOTAL DEPTH 3.2 ft	<b>NORTHING</b> 612,536	<b>EASTING</b> 583,667	24 HR. FIAD
DRILL RIG/HAMMER EFF/DATE CG	29022 Mobile B-29 88% 03/26/2020	DRILL METHO	D H.S. Augers HAMM	ER TYPE Automatic	DRILL RIG/HAMMER E	FF/DATE CG2902	22 Mobile B-29 88% 03/26/2020	DRILL METHOD H	.S. Augers HAV	IMER TYPE Automatic
DRILLER J. Estep	<b>START DATE</b> 01/13/21	COMP. DATE 01/13/21	SURFACE WATER DEPTH N/	A	DRILLER J. Estep		<b>START DATE</b> 01/13/21	<b>COMP. DATE</b> 01/13/21	SURFACE WATER DEPTH	N/A
ELEV (ft) DEPTH BLOW CO (5t) 0.5ft 0.5ft    2195	DUNT BLOWS PER FOO	75 100 NO. MO	O SOIL AND ROCK DESC I G ELEV. (ft)  2,194.0 GROUND SURF. WEATHERED RO Gray, (METASANDS	DEPTH (ft)  ACE 0.0  OCK  STONE) 2.1  OCK  -2.2	ELEV DRIVE ELEV (ft)  2200	BLOW COUNT 0.5ft 0.5ft 0.5		75 100 NO. MOI G	SOIL AND ROCK DE	
NCDOT BORE DOUBLE A-0009CA_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/29/22		60/0.1	CRYSTALLINE R (METASANDSTC  Boring Terminated with Penetration Test Refusal 2,191.8 ft In Crystallin (METASANDSTC)  METASANDSTC  METASANDSTC	DNE)  n Standard  at Elevation ne Rock	2195 2,194.1 1.0 2,192.0 3.1	13 8 9			2,195.1 GROUND SUF ROADWAY EMBA Very Stiff, Brown-Gray, Sandy SILT (A-4), with Boring Terminated w Penetration Test Refus 2,191.9 ft In Crysta (METASANDS'	Fine to Coarse h trace gravel  SOCK DSTONE) with Standard sal at Elevation alline Rock



		BORE LOG					ORE LOG	
<b>WBS</b> 32572.1.FS10	TIP A-0009CA COUNT	Y GRAHAM	GEOLOGIST N. McLaren / D. Goodnight		<b>WBS</b> 32572.1.FS10	TIP A-0009CA COUNT	TY GRAHAM	GEOLOGIST N. McLaren / D. Goodnight
SITE DESCRIPTION Upgrade US 129	9 from South of SR 1275 to NC 1	43 and Upgrade NC 143 from US	129 to SR 1223 GROUND \	WTR (ft)	SITE DESCRIPTION Upgrade US	129 from South of SR 1275 to NC 1	143 and Upgrade NC 143 from U	JS 129 to SR 1223 GROUND WTR (ft)
BORING NO. RWAL6_B-7	<b>STATION</b> 189+08	OFFSET 88 ft RT	ALIGNMENT L 0 HR.	30.0	BORING NO. RWAL6_B-7	<b>STATION</b> 189+08	OFFSET 88 ft RT	ALIGNMENT L 0 HR. 30.0
COLLAR ELEV. 2,244.9 ft	TOTAL DEPTH 59.1 ft	<b>NORTHING</b> 612,419	<b>EASTING</b> 583,646 <b>24 HR.</b>	FIAD	COLLAR ELEV. 2,244.9 ft	TOTAL DEPTH 59.1 ft	<b>NORTHING</b> 612,419	<b>EASTING</b> 583,646 <b>24 HR.</b> FIAD
DRILL RIG/HAMMER EFF/DATE CG20446	6 Diedrich D50 83% 06/16/2020	DRILL METHOD NW	Casing W/SPT & Core HAMMER TYPE Au	tomatic	DRILL RIG/HAMMER EFF/DATE CG204	146 Diedrich D50 83% 06/16/2020	DRILL METHOD	WCasing WSPT & Core HAMMER TYPE Automatic
	<b>START DATE</b> 01/26/21	COMP. DATE 11/01/21	SURFACE WATER DEPTH N/A		DRILLER C. Odom	<b>START DATE</b> 01/26/21	<b>COMP. DATE</b> 11/01/21	SURFACE WATER DEPTH N/A
ELEV CRIP DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5f		'/   0	SOIL AND ROCK DESCRIPTION		CORE SIZE NQ	TOTAL RUN 26.2 ft		
(ft) (ft) (ft) 0.5ft 0.5ft 0.5f	ft 0 25 50	75 100 NO. MOI G	ELEV. (ft)	DEPTH (ft)	ELEV RUN DEPTH RUN DRILL RATE	RUN   STRATA   REC.   RQD   (ft)   (ft)	- L	DESCRIPTION AND REMARKS
					(ft) (ft) (ft) (ft) (Min/ft)	(ft) (ft) NO. (ft) (ft) (ft)	G <sub>ELEV. (ft)</sub>	DEPTH (fi
2,243.9 1.0	<del>  </del>		2,244.9 GROUND SURFACE RESIDUAL	0.0	2212	2 (1 1) (0 0) (4 6) (2 8)	2 212 0	Begin Coring @ 32.9 ft CRYSTALLINE ROCK 32.9
		[20033]	Very Soft to Medium Stiff, Tan-Orange-Brown, Fine Sandy SILT		+   5.0   00:32/0:3	$\begin{pmatrix} 1.1 & 0.0 \\ 92\% & 0\% \\ (4.0) & (4.3) \end{pmatrix}$ $\begin{pmatrix} 4.6 \\ 96\% \\ 58\% \end{pmatrix}$	2,212.0 Slightly to Mo	oderately Weathered, Hard to Very Hard, Gray-Tan, DNE), Indurated to Extremely Indurated, with some iron
2240 7 2 3 4		:   : : : :       <sub>M</sub>	(A-4(1)), with trace mica			96% 58% (4.9) (4.2) 98% 84% (21.1) (20.2) 99% 94% (5.0) (5.0) (5.0) 0 (5.0) (4.8) 0 100% 96% 0 (5.0) (4.8) 0 100% 96% 0 (5.0) (4.8) 0 100% 96%	2,207.2	staining and close fracture spacing
2,238.9 6.0 3 4 2	1		2,239.4 Loose to Dense, Tan-Orange-Brown, Silts	y <u>5.5</u>	2,205.8 39.1 02:38/1.0 2205 5.0 07:03/1.0	(21.1) (20.2 99% 94%	Fresh to Slightly (METASANDSTC	Weathered, Hard to Very Hard, Light Gray-Dark Gray, DNE) Indurated to Extremely Indurated, with moderately
2.236.4 8.5		-	Fine to Coarse SAND (A-2-4(0)), with trac gravel-sized rock fragments	e	5.0 05:00/1.0 03:15/1.0 03:37/1.0 03:02/1.0	0 (4.7) (4.2) 94% 84% 99% 94%	close	e fracture spacing to close fracture spacing
2235 6 4 14	18	M			2,200.8 44.1 02:37/1.0 03:02/1.0 04:31/1.0			
‡					2200 44.1 04.31/1.0 - 5.0 04.11/1.0 03:52/1.0	0 (5.0) (5.0) 0 100% 100%		
2,231.4	—	SS-3012 7%			03.52/1.0 04:00/1.0 03:45/1.0	0 100% 100%		
<del>                                      </del>					2,195.8 49.1 03:44/1.0	0 (5.0) (4.9)		
2,226.4 18.5	_  :::: `\\_:: :::				5.0   03:14/1.0   04:04/1.0   03:35/1.0	0 (5.0) (4.8) 0 100% 96%		
2225 22 18 30	<b>1 9</b> 48	M M			2,190.8 54.1 03.35/1.0 03:47/1.0 03:21/1.0			
					2190	0 (5.0) (4.8)		
2,221.4	:::: :::: +:-	100/0.8	2,221.4 WEATHERED ROCK	23.5	03:09/1.0 02:43/1.0	0 100% 96%		
<del></del>		- 100/0.8	Tan-Gray, (METASANDSTONE)		2,185.8 59.1 02:53/1.0 02:53/1.0		2,185.8	59.
2.216.4		100/0.8					Boring Fern	minated at Elevation 2,185.8 ft In Crystalline Rock (METASANDSTONE)
2215 11 27 73/0.		100/0.9						
2.212.0 32.9			2,212.0	32.9				
2210		60/0.0	CRYSTALLINE ROCK Gray-Tan, (METASANDSTONE)	32.3				
+			• • •					
			2,207.2 REC: 96% RQD: 58% GSI: 40-50	37.7			-	
2205			Light to Dark Gray (METASANDSTONE)					
			REC: 99%	, l				
			RQD: 94% GSI: 70-80					
2200								
							-	
275 2195 -								
<u> </u>								
CDO BOKE DOUBLE A-0009CA_GEO RDY_GIM.GPJ NC_DO CDO I BOKE DOUBLE A-0009CA_GEO RDY_GIM.GPJ NC_DO I CDO								
				_			-	
		-	2,185.8  Boring Terminated at Elevation 2,185.8 ft Crystalline Rock (METASANDSTONE)	59.1 In				
			Crystalline Rock (METASANDSTONE)					
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# Upgrade US 129 from South of SR 1275 to NC 143 and Upgrade NC 143 from US 129 to SR 1223

# Rock Core Photographs Boring: RWAL6\_B-7

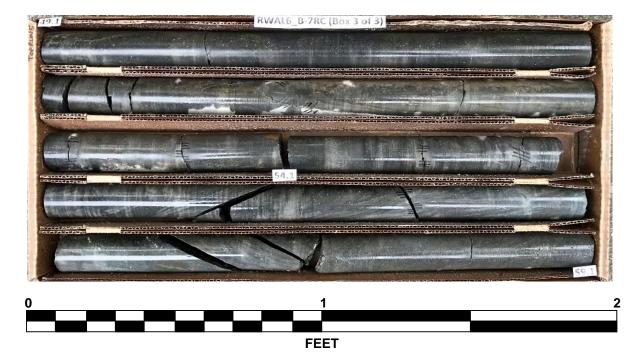
32.9 to 49.1 Feet



FEET

# Rock Core Photographs Boring: RWAL6\_B-7

49.1 to 59.1 Feet



WBS	32572	2.1.FS10	)		TI	<b>P</b> A-000	9CA		COUNT	<b>Y</b> GR	AHAM				GEOLOGIST N. McLaren		
SITE	DESCR	IPTION	Upgr	ade U	S 129 f	from Sou	th of S	R 1275	to NC 14	13 and	Upgrad	de NC 1	43 fro	m US	129 to SR 1223	GROUN	D WTR (ft)
BOR	ING NO.	RWAI	_6_B-8	3	ST	TATION	190+0	00		OFFS	SET 6	6 ft RT			ALIGNMENT L	0 HR.	Dry
COL	LAR ELE	<b>EV</b> . 2,2	240.4 f	ft	TO	OTAL DE	PTH	33.7 ft		NOR	THING	612,48	39		<b>EASTING</b> 583,702	24 HR.	FIAD
DRILL	.RIG/HAN	MER EF	F./DATI	E CG	29022 IV	obile B-29	88%03	/26/2020	)			DRILL IV	ETHO	) HS	. Augers HAMM	R TYPE	Automatic
DRIL	LER C	. Odom			S1	TART DA	TE 0	3/26/2	1	СОМ	P. DAT	E 03/2	26/21		SURFACE WATER DEPTH N/A	A	
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT		BL	OWS F	PER FOOT			SAMP.	<b>V</b> /	1 L 0	SOIL AND ROCK DESC	PDIDTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	50	75	100	NO.	MOI		ELEV. (ft)	JAIF HON	DEPTH (ft)
2245		L													_		
	-	<u> </u>												l E			
	-	ŀ												l E	2,240.4 GROUND SURFA	VCE	0.0
2240	2,239.4	1.0	1	2	3	+	-				-				RESIDUAL		
	2.236.9	3.5			٥	<b>•</b> 5							M		Medium Stiff, Tan-Orange-l 2,237.4 Coarse Sandy SILT	(A-4)	
2235	_	-	3	8	9	: : }	17 -		: : : :	: :			М	F	Loose to Dense, Tan-Gray Fine to Coarse SAND (A-2	Orange, S 4), with tra	silty
	2,234.4	6.0	4	7	6		3 .						М	F	mica	,,	
	2,231.9	8.5	4	2	3								.,				
2230	-	‡	-	_		<b>Q</b> 5				ļ::			M		-		
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0005	2,226.9	13.5	7	16	29		:   :`	4					М				
2225	-	<u> </u>						/		+					- 2,223.4		17.0
	2,221.9	18.5					: /.							7.7.E	Very Stiff, Tan-Orange-Br Coarse Sandy, Clayey SILT	own, Fine	to
2220	<u> </u>	Ł	3	4	16		<b>4</b> 20 -					SS-2023	36%	1.1.E	trace gravel-sized quartz		
	-	F					1 .			T				1.1 F			
	2,216.9	23.5	100/0.5	ļ			<u> </u>				00/0.5			7 1	2,216.9 WEATHERED RO	CK	23.5
2215	_	‡	.00,0.0	]						- 1	00/0.5				Tan-Brown (METASAN		
	2,211.9	200.5					i+÷	:-	<del></del> :	- -:-:	÷÷				.2,213.4 <b>RESIDUAL</b>		27.0
2210	2,211.9.	28.5	6	8	12		<b>1</b>		: : : :				М		Medium Dense, Tan-Oran Fine to Coarse SAND (A-2	ge-Gray, S -4) with tra	ilty
2210	-	‡					<del>    :</del>			<b> </b>					mica	.,,	
	2.206.7-	33.7					·	 		<u> </u>					2,206.7		33.7
	-		60/0.0								60/0.0			E	Boring Terminated with Penetration Test Refusal		on
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SHEET 16