# This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.

This file or an individual page shall not be considered a certified document.

REFERENCE

**CONTENTS** 

**DESCRIPTION** 

TITLE SHEET

BORE LOGS SOIL TEST RESULTS

**CROSS SECTIONS** 

SITE PHOTOGRAPHS

LEGEND SITE PLAN

SHEET NO.

8-11

12

STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG

PROJECT DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY

**IMPROVEMENTS** 

SITE DESCRIPTION BRIDGE ON TRACK 2 (-S2-) OVER WEST 5TH STREET (-Y3-) BETWEEN WEST TRADE STREET AND WEST 6TH STREET

STATE PROJECT REFERENCE NO. 13 P-5705B

#### **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 707-680. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS OF THE INVESTIGATION. THE STATEM LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE INVESTIGATION. THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AS WELL AS A CALLED NOW CHARTSE CACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- IES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
  FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
  CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

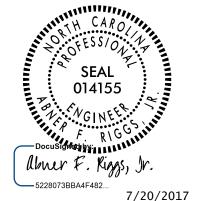
#### PERSONNEL

RIGGS, A. F.	DUGGINS, W. T.
WERITZ, M. A.	J. R. TURNAGE
WEAVER, L. A.	EKLUND, M. A.
COGAR, T. E.	MASHBURN, S. R.
McMILLIAN, M.	STUDNICKY, R. T.

INVESTIGATED BY TERRACON CONSULTANTS FIELDS, W. D. DRAWN BY RIGGS, A. F. CHECKED BY \_ SUBMITTED BY TERRACON CONSULTANTS JULY 2017

> Prepared in the Office of: Consulting Engineers & Scientists

2401 BRENTWOOD ROAD, SUITE 107 RALEIGH. NORTH CAROLINA 27604 PHONE: (919) 873-2211 FAX: (919) 873-9555 NC REGISTERED FIRM: F-0869



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

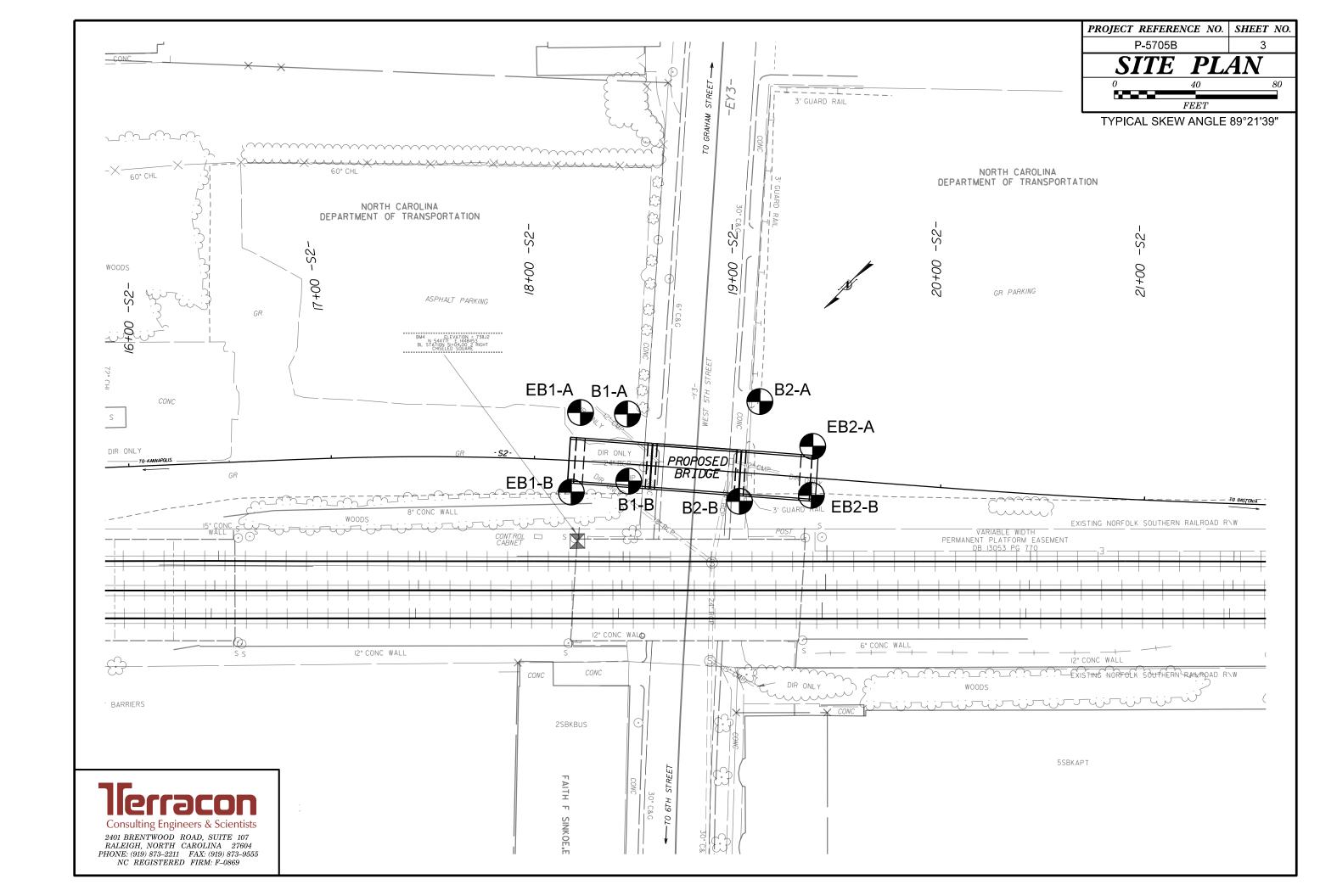
P-5705B 2

# 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 ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DISB66, SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:  CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINAT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANDULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SULTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6  SOIL LEGEND AND AASHTO CLASSIFICATION  GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS OPERANCE MATERIALS	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 ROUNDIESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.  MINERALOGICAL COMPOSITION	HARD ROCK IS NON-COASTAL PLAIN MATERIAL. THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.  ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:  WEATHERED  ROCK (WR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  AQUIFER - A WATER BEARING FORMATION OR STRATA.  ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.  ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CROUP   A-1	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.  COMPRESSIBLE IL < 31  SSILGHTLY COMPRESSIBLE LL = 31 - 50  HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL  ORGANIC MATERIAL SOILS SOILS SOILS TRACE 1 - 102  LITTLE ORGANIC MATTER 2 - 32 3 - 5% TRACE 1 - 102  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	NON-CRYSTALLINE ROCK (CR)  NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTARY ROCK (CP) SPT REFUSAL ROCK TYPE INCLUDES LIMESTONE, SHOW NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP)  WEATHERING  FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.  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 OF A CRYSTALLINE NATURE.  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	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.  CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.  DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.  DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.  DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO DNE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STORM FRAGS. OF MAJOR SAND SAND SAND SILTY OR CLAYEY SOILS SOILS SOILS  GRAVEL, AND SAND SAND SAND SOILS SOILS SOILS  GEN. RATING AS SUBGRADE  FIG. 6A-7-5 SUBGROUP IS   LI - 38 :PI OF A-7-6 SUBGROUP IS > LL - 38  CONSISTENCY OR DENSENESS  PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY CONSISTENCY CONSISTENCY CONSISTENCY CONSISTENCY COMPRESSIVE STRENGTH	water level in Bore Hole Immediately after Drilling  This static water level after 24 Hours  The perched water, saturated zone, or water bearing strata  Spring or seep  MISCELLANEOUS SYMBOLS  ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  MODERATE (MOD.)  SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.  MODERATELY SEVERE (MOD. SEV.)  AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK,  IF TESTED, WOULD YIELD SPT REFUSAL	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.  FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.  FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.  JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.  LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY SOFT   CENERALLY   CONSTITENT   CONST	WITH SOIL DESCRIPTION  SOIL SYMBOL  ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  INFERRED SOIL BOUNDARY  INFERRED ROCK LINE  MW  MONITORING WELL  TEST  OF ROCK STRUCTURES  SLOPE INDICATOR INSTALLATION  COME PENETROMETER TEST  TEST  TEST  TEST BORING WITH CORE  WITH CORE  PIEZOMETER INSTALLATION  SPT N-VALUE	SEVERE  ALL ROCK EXCEPT QUARIZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT  REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED  TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY  ALL ROCK EXCEPT QUARIZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE  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  VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF  COMPLETE  ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, ONLY IN SMALL AND  SCATTERED CONCENTRATIONS. QUARIZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS  ALSO AN EXAMPLE.	ITS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.  RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
SOL MOISTURE   CORRELATION OF TERMS	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLOR SITE TO POSCION UNEL TO TOOL SE UNEL TOOP SHEAR TEST  UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVENED UNCLES U	VERY HARD  CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES  SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED  TO DETACH HAND SPECIMEN.  MODERATELY  CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE  EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED  BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT,  HARD  CAN BE GROOVED OR GOUGED DEADILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS  FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN  PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  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  FINGERMAIL.  FRACTURE SPACING  TERM  VERY WIDE  MORE THAN 10 FEET  WIDE  3 TO 10 FEET  WIDE  MODERATELY CLOSE  1 TO 3 FEET  THICKLY BEDDED  1.5 - 4 FEET  WIDE  MODERATELY CLOSE  1 TO 3 FEET  THICKLY BEDDED  0.03 - 0.16 FEET  THICKLY BEDDED  0.04 - 1.5 FEET  THICKLY BEDDED  0.06 - 0.03 FEET  THICKLY LAMINATED  CRAINS CAN BE SEPARATED BY CEMENTING, HEAT, PRESSURE, ETC.  FRIABLE  RUBBING WITH FINGER FREES NUMEROUS GRAINS;  GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.  MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
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	INDURATED DIFFICULT TO BREAK WITH HAMMER.  EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14



OLIEET	$\sim$	$\sim$ $\sim$	40
SHEET	8	OF	13

		5					<i>E</i>	BORE	<u>LOG</u>																						
WB	4447	75.1.2		Т	<b>IP</b> P-5705	В	COUN	TY MECKL	ENBURG		GEOL	OGIST WEAVER, L. A.		WB	<b>S</b> 44475	.1.2			TIP	P-5705B	}	COUNT	Y MECKLE	ENBURG	i		GEOLO	GIST WEA	VER, L. A.	_	
SITI	DESC	RIPTION	CHARLO	OTTE GA	ATEWAY S	TATION A	ND SAFE	TY IMPROV	EMENTS	- WEST 5	TH STREE	T BRIDGE ON -S2-	GROUND WTR (ft	) SITE	E DESCR	IPTION	CHAF	RLOTT	E GAT	EWAY STA	AN NOITA	ID SAFET	Y IMPROVE	EMENTS	- WE	ST 5TH	STREET	BRIDGE ON	N -S2-	GROUN	ID WTR
BOF	ING N	<b>O.</b> EB1-	Ą	s	TATION 1	8+21		OFFSET	24 ft LT		ALIGN	IMENT -S2-	<b>0 HR.</b> 24.0	BOF	RING NO	EB1-E	3		ST	ATION 18	3+19		OFFSET	15 ft RT			ALIGNN	IENT -S2-		0 HR.	2
COL	LAR EI	LEV. 72	23.5 ft	Т	OTAL DEP	<b>TH</b> 64.6	ft	NORTHIN	<b>IG</b> 544,7	'26	EAST	<b>ING</b> 1,448,498	<b>24 HR.</b> 22.0	COL	LLAR EL	<b>EV</b> . 72	1.9 ft		то	TAL DEPT	<b>H</b> 58.3 f	t	NORTHIN	<b>G</b> 544,7	<b>'</b> 56		EASTIN	<b>G</b> 1,448,47	73	24 HR.	2:
DRIL	RIG/HA	AMMER EF	F./DATE T	ER92-0 A	CKER RENEC	GADE 94% 0	3/09/2017		DRILL N	METHOD	H.S. Augers	HAMM	ER TYPE Automatic	DRIL	L RIG/HAN	IMER EF	F./DATE	TER9	92-0 AC	KER RENEGA	ADE 94% 03	3/09/2017		DRILL N	METHO	DD H.S.	. Augers		HAM	TER TYPE	Automatio
		DUGGIN	,		TART DAT	E 03/07/	17	COMP. D	<b>ATE</b> 03/	08/17	SURF	ACE WATER DEPTH N	'A	DRII	ILLER D	UGGIN	S, W. T		ST	ART DATE	03/06/1	7	COMP. DA	<b>ATE</b> 03/	/07/17	7	SURFAC	CE WATER	DEPTH N	/A	
ELE\ (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft 0.5		0		PER FOC	75 10		MOI G	ELEV. (ft	SOIL AND ROCK DES	CRIPTION DEPTH (	(ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft		0 2		PER FOOT 50	Γ 75 100	SAMP.	1 /	L O OI G		SOIL AND	ROCK DES	CRIPTION	
725		<u> </u>									_ - <del>72</del> 3:5	PAVEMENT SUR		<u>725</u>		_											-				
	722.5 720.9	1.0	2 2	5	- - - - - - - - - - - - - - - - - - -					М	722.5	PAVEMENT ASPHALT 0.2		0	720.9	1.0					1	1		-	+		721.9		OUND SURI		
720	720.9	+ 2.0	9 14	20	1	34				м	<b>*</b>	ROADWAY EMBAN BLACK AND GRAY, SILT		720	719.1	L	5	8	6	14				$\parallel$	М		719.9	GRAY, SILTY	FINE SANI		ME
	717.6	5.9	E 10	10	] ::::	:/: : :				J 🖹	<b>*</b>	RESIDUAL	·				8	12	16		28				М		_		GRAVEL RESIDUAL		
715	715.4	8.1		19	] ::::	<b>∮</b> 31			SS-1	18%	<b>}</b>	TAN, FINE SANDY	CLAY	715	716.0	5.9	5	9	12	/	( : : : :				<sub>M</sub>			TAN TO BRO	OWN, FINE	SANDY CL	AY
		Ŧ	5   12	2   16		●28				M	<b>F</b>				714.1	7.8	7	8	11		1			11	M		•				
		Ŧ						:   : : : :			712.5	WHITE TO GRAY, SILTY		0		-									"		711.9	TAN TO BE	ROWN, SIL	TV FINE TO	<del></del>
710	710.4	13.1	16 37	7 57	<del>                                     </del>	+	+		94 SS-2	⊢ м 🔛		WITH TRACE OF ROCK	FRAGMENTS	710	709.1	12.8						ļ · · · ·		$\parallel$			-	COARSE SA	AND WITH T	RACE ROO	
		Ŧ									<u></u>					-	13	18	16		34				М			ſ	FRAGMENT	3	
705	705.4	18.1		<u> </u>	] ::::	: : : :			\					705	.   .	F					: :\: :										
		Ŧ	33 55	5   44				,	99	M					704.1	17.8	7	17	26					11	<sub>M</sub>		•				
		Ŧ														-						3									
700	700.4	23.1	14 35	5 30	<del>                                     </del>				_	l M	699 <u>.5</u>		24	<u>700</u>	699.1	22.8						ļ · · · ·		41		<u> </u>	-				
		‡								"	<b>\$</b>	TAN, FINE SANDY	CLAY				10	18	22		40				w						
695	695.4	28.1					;/:::				695 <u>.5</u>		28	0 695							: : 3:										
093		+	10 17	7 22	1	39				М	*	TAN AND WHITE, SILT COARSE SAND WITH TRA	Y, FINE TO	093	694.1	27.8	14	21	25		'			11	١.,,		•				
		‡				::::::						FRAGMENTS					14	21	25		: : : •	46			l w						
690	690.4	33.1	13 15	5 25	<u> </u>	· · · ·			<b></b>	M	<u>.</u>			690		<u> </u>								<b>∐</b>		L	_				
		±		,   23	:::::	•40	)			IVI	*				689.1	32.8	18	31	49			: : : `:	80		l w						
	005.4	+ 20.4			:::::	\	.				<u>::</u>					-															
685	685.4	38.1	15 24	23	1 <del> </del>	<del> </del>	47		-	М	<u>+</u>			685	684.1	37.8				<del></del>	<del></del>	<del>  /</del> .	<u> </u>				-				
		±			::::	/										-	16	27	34			- €61 -			l w						
680	680.4	43.1		40		/								680		-											_				
		Ŧ	9 9	12	9	121				M					679.1	42.8	12	27	47				74		l w		677.9				
		Ŧ								М						F							. 🏻		''			BRO	WN, SILTY	CLAY	
675	675.4	+ 48.1 +	12 23	34			57			1 1:00	· · · ·			675	674.1	478							<u> </u>	<del>-</del>			674.9	WE	ATHERED F	UCK	
2		Ŧ					.   . <b>T</b> ., .				<b>#</b>					[ <u> </u>	68	34/0.2						ullet					A-GRANODI		
670	670.4	53.1			] ::::	: : : :					— - - - - - - 669.4			670	,   :	<b>†</b>										1/2=1					
	1	Ŧ	22 47	53/0.4				1 100/0.	9		<u>∵</u> = 669.4	WEATHERED R		4   5.5	669.1	52.8	57 4	43/0.3				1	I	1			•				
N N		‡				: : : :			11		661.5	(META-GRANODIC				‡		5. 3.3		: : : :			.	7							
ල් <u>665</u>	665.4	58.1	31 62	2 38/0.2					$\downarrow \mid$		<b></b>			665	664.1	57 0								4			-				
N.		‡							11		計				004.1	- Jr.0	100/0.5	$\rightarrow$					100/0.5			7/7	663.6 E	Boring Termin	ated at Elev	ation 663.6	ft IN
SHT 660	660.4	63.1							۲   ۱		∷⊹	RESIDUAL	62	0		‡												WE	ATHERED F A-GRANODI	OCK	
900 90		+	33 52	2 45		1:::::			97	М	658.9	TAN AND WHITE, SILT COARSE SAND WITH TRA		6	-	<b>†</b>										-	*	( 17	2	<del>-</del> /	
AR R		‡									ļ '	FRAGMENTS	S																		
OEO CEO		‡									Ļ	Boring Terminated at Eleva RESIDUAL SILTY, FINE			-	‡											-				
990		‡									ţ.	SAND				‡															
P57		‡									ţ					<u> </u>															
BLE		‡									-				-	<u> </u>										-					
<u> </u>		‡									E					<u> </u>										1 -					
ORE		<u></u>									Ł					<u> </u>										1 E	_				
OT B		İ									Ł				-	<u> </u>										1 E					
9		+									F					+										1 F					



SHEET	9	OF	13
-------	---	----	----

WBS	44475.	1.2			TI	<b>P</b> P-5705B	COUNT	Y MECKLEI	NBURG		GEOLOGIST WEAVER, L. A.		WBS
SITE D	ESCRI	PTION	CHA	ARLOTT	E GA	TEWAY STATION A	ND SAFET	Y IMPROVE	MENTS - WES	T 5TH	H STREET BRIDGE ON -S2-	GROUND WTR (ft)	SITE
BORIN	IG NO.	B1-A			ST	<b>FATION</b> 18+44		OFFSET 2	25 ft LT		ALIGNMENT -S2-	<b>0 HR.</b> 19.0	BOR
COLLA	AR ELE	<b>V.</b> 72	3.4 ft		тс	OTAL DEPTH 78.3	t	NORTHING	544,710		<b>EASTING</b> 1,448,481	<b>24 HR.</b> 19.6	COL
ORILL R	IG/HAMI	MER EF	F./DAT	E TER	92-0 AC	CKER RENEGADE 94% 0	3/09/2017		DRILL METHO	) Wa	ish Boring HAMM	ER TYPE Automatic	DRILL
DRILLE	ER DU	JGGIN	S, W.	Т.	ST	TART DATE 03/08/	17	COMP. DA	<b>FE</b> 03/09/17		SURFACE WATER DEPTH N	A	DRIL
	DRIVE	DEPTH	BLC	OW COL	JNT	BLOWS	PER FOOT	-	SAMP.	1 L			ELEV
(ft)	ELEV (	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO. MOI	O G	SOIL AND ROCK DES	CRIPTION  DEPTH (ft)	(ft)
725													725
	700 /										- 723.4 GROUND SURF - 722.4 <b>ARTIFICIAL FI</b>		
	722.4	•	4	10	15	25			М		GRAY TO BLACK, SILTY		
	720.4	-	7	16	17		+	+	М			AY	720
	718.2 ] ]	5.2	8	13	19				М				
715	715.4	8.0	7	10	14	/					<del>-</del>		715
	Ī	-	'	10	14	24			M				
	<sub>710</sub> , [	. 12.0				: : : :  \: : : :	: : : :						
10	710.4	13.U -	16	14	16	1 0 30	+	+	М		<del>_</del> ·		710
	1					:::: ::::	. [ : : : :				TAN AND WHITE, CLAY	EY, FINE TO 15.5	
705	705.4	18.0	10	35	38						COARSE SAND WITH TRAFF FRAGMENTS AND	ACE OF ROCK	705
	‡	.	'0	"	55	:::: ::::	:/:/?	73		$\nearrow$			
	700.4	- 23 N				:::: ::,>:	<b>-</b>  ::::			$\sim$			700
00		-	5	9	13	<b>Q</b> 22	<b> </b>		М		<del>-</del> •		700
	‡	• •				::::\\::::	: : : :			$\sim$			
95_4	695.4	28.0	6	15	20	\	<u> </u>			<b>////</b>	<del>-</del>		695
	‡	- -		"	_~	35	: : : :			<b>*</b>			
	690.4 -	- 33 U				:::: ::\:	: : : :			<b>/</b> //			
90	~~~ <del>-</del>	-	11	21	25	<del>    )</del>	<b>1</b> 46		W	<b>/</b> //	<u> </u>		690
	‡					:::: :::::	: : : :			$\frac{1}{2}$			
85_6	685.4	38.0	11	20	24		1::::			//	<del>-</del>		685
	‡			-		:::: ::::	44			$\sim$	•		
80	680.4 -	43.0	L			:::: ::::	`\ : : : :			$\frac{1}{2}$	•		680
,50	7	-	13	22	31		53		W	$\frac{1}{2}$	<del>-</del> ·		000
	‡						<i>/</i> ::::			$\sim$	•		
675£	675.4	48.0	13	21	25		<u>/</u>			$\sim$	• <del>-</del>		675
	‡	•							''		· ·		
570	670.4	53.0				:::: ::::	::::	`\:::		$\sim$	•		670
	7	•	23	46	52			1	8 W	$\nearrow$	<del>-</del> ·		3.0
	. ‡					:::: ::::		: : : ;		<b>\</b>	•		
65	665.4	58.0	26	42	51		+	93	l w	$\sim$	• <del>-</del>		665
	‡	-								<del>////</del>	•		
60	660.4	63.0	200	1 20	60						- -		660
	7		26	32	68			100	l w		658.9 WEATHERED R	64.5 OCK	
_	, <u> </u>										(META-GRANODIC		
,00	655.4 653.5	68.0 -	52	48/0.2			+	_ 100/0.7			<del>-</del>		655
ľ	<u> </u>	. 09.9	73	29/0.1				100/0.6					
550	650.4	73.0	83	17/0.4							-		650
	1		03	17/0.4				- 100/0.9			• •		
,	645.4 645.4	- 70 0											
۲	U43.4	70.0	100/0.:	4				100/0.3		<i>Y//-7</i> 2	645.1 Boring Terminated at Eleva		
1	I								1 1	ΙĘ	WEATHERED R (META-GRANODIO		1

WBS	44475	.1.2			Т	I <b>P</b> P-5	705B		COUN	TY I	MECK	LEN	NBURG			GEOLOGIST WERITZ, M. A.	
SITE	DESCR	IPTION	СНА	RLOT	TE GA	TEWAY	′ STA	TION AN	D SAFE	TY IN	/IPRO	VEN	MENTS -	WES	T 5TH	STREET BRIDGE ON -S2-	GROUND WTR (ft)
BOR	ING NO.	B1-B			S	TATION	l 18+	+47		OI	FFSE	<b>T</b> 8	3 ft RT			ALIGNMENT -S2-	<b>0 HR</b> . N/A
COL	LAR ELI	<b>EV.</b> 72	1.7 ft		T	OTAL D	EPTH	<b>1</b> 73.7 ft		N	ORTH	ING	544,73	32		<b>EASTING</b> 1,448,457	<b>24 HR.</b> 18.3
DRILL	. RIG/HAN	IMER EF	F./DATE	E TER	346 DI	IEDRICH	D-50 9	0% 03/10	/2017				DRILL N	IETHOL	) Was	sh Boring HAMME	ER TYPE Automatic
DRIL	LER E	KLUND	, M. A.		S	TART D	ATE	03/07/1	7	C	OMP.	DA	<b>TE</b> 03/0	08/17		SURFACE WATER DEPTH N/	4
ELEV	DRIVE ELEV	DEPTH	BLO	w co	UNT			BLOWS	PER FOO	)T			SAMP.		L	SOIL AND ROCK DESC	CRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	j .	50	75 	1	100	NO.	МОІ			
725	_	_															
	-	<u> </u>													-	704.7 CDOUND SUDE	NCE 0.0
720						H						-				721.7 GROUND SURFA	L
720	719.8 <b>–</b> 718.2		5	6	8	1	14			-		-		М		GRAY AND BROWN, SILT WITH SOME GRAVEL ANI	
	-	Į	8	9	12	1 ::	21				: : :	:		М		WOOD FRAGME RESIDUAL	NTS
715	715.7 -	-	8	11	15	<b>┤</b> ├∷	\	26				_	SS-4	М	$\sim$	BROWN, SILTY C	
	713.6 -	8.1	8	12	12	::		24			: : :			М	///	BROWN AND WHITE, CLA COARSE, SAN	
710	-	‡					$\Box$					:			///		
7.10	708.6 -	13.1			47	]	- '	<u> </u>				•			<del>///</del>	•	
	-	‡	11	14	17		: :	31				:		M	<del>///</del>		
705		<b>.</b>						1		-		-			<del>///</del>		
	703.6	18.1	9	16	16	::						:		_M_	$\sim$		
700	-	ļ.					: :	.1	: : :						<i>///</i>		
	698.6 -	23.1	10	45	00			\							<b>/</b> //	•	
	-	ļ.	10	15	26		: :	41	: : :			:		M	<del>////</del>		
695	-	F						· · · /				-			<del>////</del>		
	693.6	28.1	10	21	30	::			●51 · ·			:		М	<del>///</del>		
690	-	F					: :		/ :::			:			///		
	688.6	33.1	11	16	26		-	/						١	<u> </u>	•	
	-	F	''	16	20			42				:		M	<b>/</b> //		
685	683.6 -	20.4								-		-				-	
	003.0	30.1	11	24	37				61			•		м	$\sim$		
680	_	E								`\.					//	_	
	678.6	43.1	26	46	50	: :	: :							١.,	///		
	-	Ł	20	"		: :	: :				/.	96	6	M	<b>/</b> /		
675	673.6 -	_ - 48.1				<del> </del>			<del> </del>		<u> </u>	$\pm$			<del>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</del>	•	
	- 075.0	70.1	22	24	41	11 : :	: :		: : •	65				М	///		
670	_	<u> </u>							• •								
	668.2	53.5	26	46	54/0.4	::	::		1::			:			<b>//</b>	667.2	5.5
605	-	‡	20	40	J-4/U.4		: :			-:- -	100/	0.9				WEATHERED RO	
665	662.0	F.O.F							<del> </del>	$\pm$		$\exists$				_ (META-GRANODIC	rkiie)
	663.2	26.5	100/0.4				::		: : :	:	100/	0.4			财		
660	_	-				• •											
	658.2	63.5	17	34	66/0.4	::	::				: : :						
655	-	‡	''		35,0.4		: :				100/	0.9	)		鰯		
000	653.2	68.5								$\Box$		$\exists$				•	
	<u>∪ວა.∠</u> -	UO.5	100.0/4				::		: : :		100/	0.4			勮		
650	_	‡				• •			<u> </u>	-		_			黨		
	648.2	73.5	100/0.2			: :			<u> </u>		100/	• c 0	,			648.0	73.7
	-	‡	. 50, 0.2								100/	J.L				Boring Terminated at Elevat WEATHERED RO	OCK
	-	‡														- (META-GRANODIC	•
	-	‡														1) HSA TO 50.5', TRICOI	NE TO 73.5'



	SHEET	10	OF	13
--	-------	----	----	----

/BS 4447	5.1.2			TIE	P-5705B	COUNT	Y MECKLE	NBURG			GEOLOGIST RIGGS, A	۸. F.		
ITE DESC	RIPTION	СНА	RLOT	TE GAT	TEWAY STATION AN	ID SAFET	Y IMPROVE	MENTS -	- WES	T 5TH	STREET BRIDGE ON -S2	2-	GROUND WT	R (ft)
ORING NO	<b>).</b> B2-A			ST	<b>ATION</b> 19+08		OFFSET 3	35 ft LT			ALIGNMENT -S2-		0 HR.	N/A
OLLAR EI	FV 72	3 6 ft		ТС	OTAL DEPTH 73.4 f	it	NORTHING	544.6	 59		<b>EASTING</b> 1,448,440		24 HR.	13.8
			F TFR		EDRICH D-50 99% 03/09		HORTIMO	1		) Wa	sh Boring	Тнамм	ER TYPE Automa	
							COMB DA			) vva				ilic
RILLER	DEPTH		W COI		ART DATE 03/10/	PER FOOT	COMP. DA	SAMP.		1	SURFACE WATER DEP	IH N/	A	
ft)   LLL V	DEPTH		0.5ft		0 25	50	75 100	NO.	'/	ō	SOIL AND RO	CK DES		
(ft)	(1.7)	0.511	0.511	0.311	0 25	30	75 100	NO.	/MOI	G	ELEV. (ft)		DEF	PTH (ft)
25	+									-	_ - 7 <u>23,</u> ≨ GROUN	D GI IDE	ACE	0.0
722.6	1.0										ARTIF	ICIAL FI		<u>0:9</u>
20 720.4	‡ <sub>3.2</sub>	6	6	9	15				М			RAVEL SIDUAL		
	+ <sub>5.2</sub>	5	6	9	•15				М		BROWN-TAN AND		, FINE SANDY	
	‡	6	9	13	22				М			LAT		
15 715.4	<del>+</del> 8.2	8	12	14	\				М			WHITE	CLAYEY FINE	8.0
	‡						:		'''		TO COA	ARSE SA	ÁND	
10 710.4	† † 13.2								_					
10 710.4	+ 13-2	13	15	22	37	+			┍┻		<del>-</del>			
	‡				:::: :::\:	:	.			<b>/</b> /				
705.4	18.2	22	24	20				60.5			<del>-</del>			
	İ	22	21	30		<b>©</b> 51		SS-6	М	$\sim$				
	Ī													
700.4	<del>† 23.2</del> <del>†</del>	23	24	30		<b>1</b>			М	<b>**</b>	<del>-</del>			
	‡					<b>/</b> ~~::				<b>**</b>	•			
95 695.4	‡ 28.2				: : : :   : : : /:	<b>/</b>   : : : :								
95	‡	26	21	18	39				М		<del>-</del>			
	‡					√ : : : :	:							
690.4	33.2	21	24	38		\\			١.,	<b>\\</b>	<del>-</del>			
	<u> </u>	-	24	"		<b>→</b> 62	.		M	<b>/</b> ///				
005.4	±				:::: :::/:	1 : : : :	:   : : : :							
685.4	<del>‡ 38.2</del>	10	10	15	25	+	<del>                                     </del>		М		_			
	Ŧ													
680.4	43.2	00	00			7.5.								
	Ŧ	38	39	50		1	₽89		M	<b>\\\\</b>	<del>-</del> ·			
	Ŧ									<b>**</b>	075.0			40.0
75 675.4	<del>+ 48.2</del>	100/0.5				+	100/0.5	,			- 675.6 - <b>WEATHI</b>	ERED R	оск	48.0
	Ŧ									蘇	(META-GR	ANODIC	ORITE)	
70 670.4	† + 53.2									鰯	•			
	‡	78	22/0.4				- 100/0.9	•		黨	<del>-</del> ·			
	‡													
665.4	58.2	56	44/0.3			• • • •	]				<del>-</del>			
	‡		, ,,0.5				. 100/0.8	'						
	†						:   : : : :							
660.4	† 63.2 †	100/0.3				1	100/0.3	•			<del>-</del>			
	Ŧ													
55 655.4	68.2	400/5								梦				
	Ŧ	100/0.2	1				100/0.2				<del>-</del>			
	Ŧ									蘇				
650.4	73.2	100/0.2					100/0.2	+			650.2 Boring Terminated	at Fleva	ation 650 2 ft IN	73.4
	‡		1								WEATHI	ERED R	OCK	
	‡										(META-GR	ANUDIC	JKIIE)	
	‡										<del>-</del>			
	+							1		1 F				

WBS	44475	5.1.2			TI	IP	P-5705B	COUNT	Y MECK	LEN	NBURG			GEOLOGIST WERITZ, M. A.		
SITE	DESCR	IPTION	CHA	RLOT	TE GA	TE	WAY STATION AN	D SAFET	Y IMPRO	/EN	/IENTS -	WES	T 5TI	H STREET BRIDGE ON -S2-	GROUND W	TR (ft)
3OR	ING NO	B2-B			S	TA	TION 19+02		OFFSET	1	4 ft RT			ALIGNMENT -S2-	0 HR.	N/A
COLI	LAR EL	EV. 72	22.3 ft		T	ОТ	AL DEPTH 34.5 ft		NORTHI	NG	544,70	00		<b>EASTING</b> 1,448,412	24 HR.	17.0
DRILL	. RIG/HAN	MER EF	F./DAT	E TEF	R346 DI	EDI	RICH D-50 90% 03/10	/2017			DRILL M	ETHO	) Wa	ish Boring HAMM	ER TYPE Auto	matic
DRIL	LER E	KLUND	), M. A		S	TΑ	RT DATE 03/08/1	7	COMP. I	DAT	<b>ΓΕ</b> 03/0	)8/17		SURFACE WATER DEPTH N/	A	
LEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft		- (		PER FOOT		00	SAMP. NO.	MOI	L O G	SOIL AND ROCK DES	CRIPTION	
7 <u>25</u>														– · 722.3 GROUND SURF.	ACE	0.
720	721.1	1.2	11	11	8	Ħ						.,		ARTIFICIAL FII BROWN, SILTY, FINE TO C	_L	
_20_	718.8 -	3.5				╽┞	19					M	$\otimes$	WITH SOME GRA		4.0
	716.3	1 60	10	22	21		4:	3 :		:		M		RESIDUAL GRAY TO BROWN, FINE	SANDY CLAY	
715	_	İ	17	26	26	1		52		_		М		- GRAT TO BROWN, TINE	SANDI CLAI	
	714.1	8.2	10	14	22	11		:		:		М		•		
740		‡								:				•		
710	709.1	13.2	100	45	EE/0.0	╁┟								7004		44
		‡	26	45	55/0.2		· · · ·   · !++	<u> </u>	100/0	.7 <b>\</b>				708.1 WEATHERED RO		14.
705	<del>-</del>	<u> </u>				$\  \ $								(META-GRANODIC	ORITE)	
	704.1	18.2	100/0.3	3					100/0	.3						
		ŧ								:				•		
700	699.1	23.2				╟	<del>  </del>	<del> </del>	+	$\exists$				<del>-</del>		
		Ŧ	76	24/0.2	2				- 100/0	.7				•		
95		Ŧ														
	694.1	28.2	66	34/0.2	2									-		
		‡		0 ., 0.2					- 100/0	1.7				<u>.</u>		
690		‡				╟		: : : :						• <del>-</del>		
	689.1	33.2	36	45	55/0.3	Ш								- - 687.8		34.
		ŧ							100/0	.8♥				Boring Terminated at Eleva WEATHERED R		
	-	ł											1	- (META-GRANODIC		
		ł											1	•		
		Ŧ												-		
	-	Ŧ												-		
		‡												• •		
	_	‡												<del>.</del>		
		ŧ														
		ŧ											1			
	-	+												_		
		Ŧ														
		‡												•		
	-	‡												<del>-</del> •		
		‡												• •		
		ţ												<del>-</del>		
		ŧ														
		+												-		
	_	Ŧ												- -		
		Ŧ												•		
		‡												•		
	-	‡												<del>-</del> ·		
		‡												•		
		ŧ			1											
	-	Ŧ			1									<del>-</del> •		
		İ	1										[	•		

# Terracon

# GEOTECHNICAL BORING REPORT

RITZ, M. A.		WRS	4447	512			Т	<b>P</b> P-5705	2	COLINT	Y MECKLE	NRI IPG			GEOLOGIST WERITZ, M. A.		
N -S2-	GROUND WTR (ft)				I CHA	RI OT								T 5TL	STREET BRIDGE ON -S2-	GROUND WT	R (ft)
V -02-	0 HR. N/A	-	ING NO			INLOT		TATION 1		ID SALLI	OFFSET		- 00 LC	71 311	ALIGNMENT -S2-	0 HR.	N/A
	<del>- </del>												70			-	
06	<b>24 HR.</b> 20.8		LAR EL					TAL DEP			NORTHING	<u>,                                    </u>			<b>EASTING</b> 1,448,389	24 HR.	17.5
HAMM	IER TYPE Automatic	DRILL	_ RIG/HAI	MMER EF	F./DATI	E TER	346 DII	EDRICH D-50	90% 03/10	)/2017		DRILL N	/IETHOI	D Wa	sh Boring HAMM	ER TYPE Automa	atic
DEPTH N/	/A	DRIL	LER E		), M. A.		S	ART DAT	E 03/08/1	7	COMP. DA	TE 03/	08/17		SURFACE WATER DEPTH N/	Α	
ROCK DES	CRIPTION DEPTH (ft)	ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	<b>'</b> ——	0.5ft	JNT 0.5ft	0		PER FOOT 50	75 100	SAMP.	MO	0 I G	SOIL AND ROCK DES	CRIPTION	
OUND SURF		725		<u> </u>											723.8 GROUND SURF	ACE	0.0
<b>RTIFICIAL FI</b> / FINE SAND	WITH SOME 1.0		721.8	2.0										M:F	RAILROAD EMBAN 721.8 BROWN, SILTY FINE TO C		2.0
GRAVEL RESIDUAL		720	720.3		6	8	16		24				М		WITH SOME GRAVEL AN	D TRACE OF	
	E SANDY CLAY	720	1 -	Ī	12	15	24		39.			SS-8	21%		- WOOD FRAGME RESIDUAL	NTS	
			718.0	5.8	11	16	23						М		GRAY-BROWN AND WHIT	E, SILTY CLAY	
		715	715.3	8.5	1		40			<b></b>					_		
				Ŧ	16	26	46				<b>●</b> 72		M				
				‡													
		710	710.3	13.5	30	71	29/0.2				1				_709.8		14.0
	47.0			ł	30	'	29/0.2				100/0.7				WEATHERED RO 707.8 (META-GRANODIO		16.0
	LTY, FINE TO 17.0			Ŧ						: : : :		[ ]			RESIDUAL	JKIIL)	
SAND WIT		705	705.3	† 18.5 +	19	34	49				<u> </u>		М		_ GRAY-BROWN, SILT	ΓY CLAY	
RAGIVIENT	3			‡	"		10				.●83		IVI				
				+							- j						
		700	700.3	† 23.5 †	29	61/0.3			ļ	+					_699.8 WEATHERED R	00K	24.0
				‡											(META-GRANODIC		
				İ								<b>i</b>			`	,	
		695	695.3	† 28.5 †	30	70/0.4			<del> </del>	<del> </del>					-		
				Ŧ													
		000	690.3	† † 33.5								<b>i</b>					
	36.0	690	690.3	<u> </u>	100/0.4	-		<u> </u>	J	<u> </u>	100/0.4	<b>├</b>		V/25/1	_689.9 Boring Terminated at Eleva	tion 689.9 ft IN	33.9
VN, FINE S	ANDY CLAY 36.0			+										1 F	WEATHERED R		
				Ŧ											(META-GRANODIC	JRIIE)	
	41.0		-	‡											-		
THERED RO	OCK			+										1 h			
-GRANODIC	ORITE)			Ŧ										F			
			-	‡											-		
				+										<b> </b>			
				Ŧ										1 F			
			-	‡											-		
				±										1 - E			
	53.8			Ŧ										1 F			
ated at Eleva ATHERED R	ation 670.6 ft IN OCK		-	‡											-		
GRANODIC	ORITE)			±										1 -			
				Ŧ										l F			
			-	‡											=		
				İ										1 E			
				+										<b> </b>			
			-	Ŧ										F	_		
				‡													
				+										<b> </b>			
			-	Ŧ											-		
				<b>†</b>										<u> </u>			
				+										F			
			-	‡											-		
		1		İ										1			
				+										F			
			-	‡											-		
		1		İ													
		1	1	T	1	ı						1	1	1 F			

SHEET 11 OF 13

Consulting En	gineers &	Scientist	S				BOR	E L	OG																			
WBS 444	5.1.2			TI	<b>P</b> P-5705E	3 Co	DUNTY ME				GEOLO	GIST WERITZ, M. A.		WBS	<b>3</b> 4447	5.1.2		Т	<b>IP</b> P-570	5B	COUNT	Y MECKLEN	NBURG		GEOLOG	IST WERITZ	M. A.	
SITE DESC	RIPTIO	N CH	ARLOT	TE GA	TEWAY ST	ATION AND S	AFETY IMPI	ROVEM	ENTS -	· WES	T 5TH STREET	BRIDGE ON -S2-	GROUND WTR (ft)	SITE	DESC	RIPTION	CHARLO	OTTE GA	ATEWAY S	TATION AN	D SAFE	TY IMPROVE	MENTS	- WEST 5T	H STREET B	RIDGE ON -S	2- GRO	OUND WTR (ft
BORING N	<b>)</b> . EB2	?-A			TATION 19		OFF	SET 16	ft LT		ALIGNN	MENT -S2-	<b>0 HR.</b> N/A	BOR	RING NO	). EB2-E	3	s	TATION	19+37		OFFSET 9	9 ft RT		ALIGNMI	ENT -S2-	0 Н	<b>R.</b> N/A
COLLAR E					OTAL DEPT			THING				<b>G</b> 1,448,406	<b>24 HR.</b> 20.8			<b>EV.</b> 72				<b>PTH</b> 33.9 ft		NORTHING				1,448,389	24 H	
						90% 03/10/201					Wash Boring		MER TYPE Automatic							50 90% 03/10				METHOD W	<del></del>			PE Automatic
DRILLER					TART DATE			IP. DAT			SURFAC	CE WATER DEPTH N	V/A			KLUND			TART DA	TE 03/08/1		COMP. DA	_		SURFAC	E WATER DEF	TH N/A	
ELEV ELEV (ft) (ft)	DEPT (ft)		0.5ft			BLOWS PER	75	100	SAMP. NO.	MOI	0	SOIL AND ROCK DE		ELEV (ft)	ELEV (ft)		BLOW 0.5ft 0.5		$\left\  \cdot \right\ _{0}$	BLOWS I	PER FOO 50	75 100	SAMP.	MOI G		SOIL AND RO	CK DESCRIPT	ION
(11)		1	1							/ WOI	G ELEV. (ft)		DEPTH (ft)		(11)	+					1		1101	/ WOI G				
725												ODOLIND CLID	FACE	725														
723.4	1.0	11	10	13						<b>-</b>	-724.4 ★ 723.4	GROUND SUR ARTIFICIAL F	FILL 1.0			<del>]</del> —				.	T				723.8		D SURFACE EMBANKMEN	<u> </u>
720.9	3.5				: : : : <b>•</b>					М		GRAY, SILTY FINE SAN GRAVEL		720	721.8 720.3	1	6 8	16	<del> </del>   :::					м	<u>721.8</u> BR	OWN, SILTY FI	NE TO COARS	E SAND2
720	+ 6.0		13			27				М	В	<b>RESIDUAI</b> ROWN AND WHITE, FIN		720	718.0	Ī	12 1	5 24	1				SS-8	21%	F _	WOOD	RAGMENTS SIDUAL	
715.9	1	7	10	14		24		· · ·		М						+	11 10	3 23	11	39				м	GR GR	AY-BROWN AN		ΓY CLAY
715	Ŧ	12	16	22		38				М				715	715.3	8.5	16 20	6 46	<del>                                     </del>			72		м	<u> </u>			
	‡					: : :\;   :										‡				:   : : : :		:			<b>t</b>			
710	<u>+ 13.5</u> +	15	20	28		48-				М				710	710.3	13.5	30 7	1 29/0.2	1					Son.	709.8	VA/E A TIL	FDED DOOK	14
	ŧ					: : : :   :		· · ·			707.4		<u></u>			‡						- 100/0.7	<b>'</b>		707.8	(META-GF	ERED ROCK ANODIORITE	16
705.9	18.5	14	24	25								BROWN AND WHITE, S COARSE SAND WI	TH ROCK	705	705.3	18.5	19 34	1 49							E		<b>SIDUAL</b> VN, SILTY CLA	ΑY
	‡											FRAGMEN	IS			‡	19 3	+   49				•83		M	-			
700.9	23.5	15	22	21		: : : :   \ :								700	700.3	23.5									699.8			24
700	‡	15	22	31		• • • • • • • • • • • • • • • • • • •	3			W				700		+	29 61/	0.3				. 100/0.8	•		699.8		ERED ROCK	24
695.9	28.5					: : : : / :										Ī									Ē	(IVIE I A-GF	(ANODIORITE)	
695	Ŧ	21	26	21		47				W				695	695.3	28.5	30 70/	0.4				1	,					
	‡					:::: :	`\\; ::									‡									1			
690.9	33.5		29	52				1	SS-7	w	<u>-</u>			690	690.3	33.5	100/0.4		:::			100/0.4	<b>,</b>			oring Terminated	at Floration 69	33
	‡					.		: : :   [			688.4	GRAY-BROWN, FINE	SANDY CLAY 36.0			‡						100/011				WEATH	ERED ROCK ANODIORITE	
685.9	38.5	26	35	45		1				м						Ī									E	(IVIE I A-GF	ANODIORITE,	
	‡						· · ·   <u>L</u> :				683.4	WEATHERED F	41.0			‡									-			
680	43.5	76	24/0.4					: : : [			670.6	(META-GRANOD	IORITE)			‡									<u> </u>			
000	‡	/6	24/0.1					100/0.6								‡									F			
675.9	1 48.5	;				.										Ī									E			
675	+	100/0.	4				1	100/0.4								<del> </del>												
7 108	‡							: : :								‡									-			
670.9	53.5	100/0.	3					100/0.3			670.6 E	Boring Terminated at Elev	vation 670.6 ft IN			‡									Ė.			
NC	Ī										E	WEATHERED I (META-GRANOD	ROCK IORITE)			Ī									E			
.GPJ	Ξ										E					1									_			
T_S2	‡															‡									<u> </u>			
THE	‡															‡									<u> </u>			
DG E	‡															‡									F			
O_BR	Ī										E					Ī									E			
B GE	‡										-					‡									-			
92205	‡															‡									‡			
3LE F	‡															‡									Ė.			
DOOL	Ī										l E					Ī									E			
ORE	<u> </u>										<u>E</u>					<u> </u>									Ł			
CDOT BORE DOUBLE P57068 GEO_BRDG_5TH ST_S2.GPJ NC_DOT.GDT 7/19/17	‡															‡									<u> </u>			
Ö	<u> </u>															<u> †</u>									<u> </u>			

#### LABORATORY TESTING SUMMARY

PROJECT NUMBER:	44475.1.2	<b>TIP:</b> P-5705B	COUNTY:	MECKLENBURG

DESCRIPTION: Charlotte Gateway Station and Track and Safety Improvements - West 5th Street Bridge on -S2-

				Depth					% by V	Veight		%	%	Passing (siev	/es)			Ave. Wet		Shear Strer	ngth Values	
Sample No.		Station	Offset (feet)	Interval (feet)	AASHTO Class.	L.L.	P.I.	Coarse Sand	Fine Sand	Silt	Clay	Retained #4 Sieve	#10	#40	#200	% Moisture	Organic	Unit Wt. (pcf)	Total Cohesion (psf)	Total Friction (φ)	Effective Cohesion (psf)	Effective Friction (φ')
SS-1	-S2-	18+21	24 LT	5.9-7.4	A-6 (8)	39	14	14.8	26.7	41.7	16.8	0	100	92	67	17.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-2	-S2-	18+21	24 LT	13.1-14.6		19	NP	58.7	19.6	13.4	8.3	1	94	52	24	N/D	N/D	N/D	N/D	N/D	N/D	N/D
SS-4 SS-6	-S2- -S2-	18+47 19+08	8 RT 35 LT	6.0-7.5	A-2-6 (0) A-2-6 (0)	34 34	12 12	46.9 51.5	24.1 22.5	17.8 17.4	11.2 8.6	0	92 94	60 57	32 29	N/D N/D	N/D N/D	N/D N/D	N/D N/D	N/D N/D	N/D N/D	N/D N/D
SS-6	-S2-	19+08	16 LT	33 5-35 O	A-2-6 (0) A-2-4 (0)	28	9	57.8	20.1	14.2	7.9	12	68	36	18	N/D	N/D	N/D	N/D	N/D	N/D	N/D
SS-8	-S2-	19+37	9 RT	3.5-5.0	A-7-6 (10)	41	14	11.4	21.0	46.9	20.7	1	98	91	73	21.1	N/D	N/D	N/D	N/D	N/D	N/D
N/D - NOT DE																						

N/D - NOT DETERMINED

Stephanie H. Huffman

Certified Lab Technician Signature

114-01-1203 Certification Number

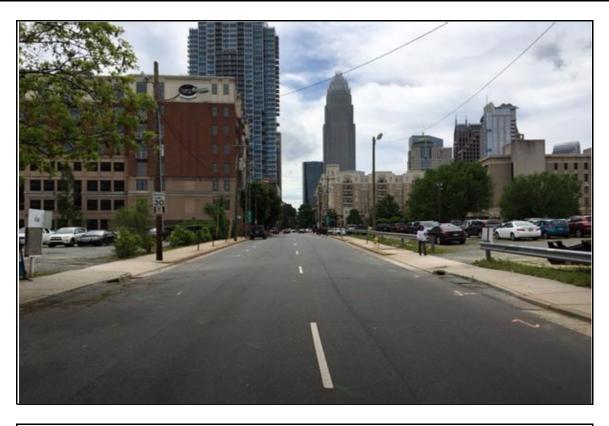
# SITE PHOTOGRAPHS CHARLOTTE GATEWAY STATION AND TRACK IMPROVEMENTS - WEST 5th STREET BRIDGE ON -S2-



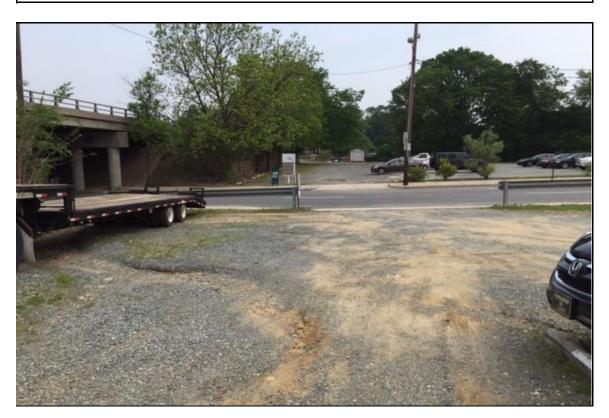
PHOTOGRAPH NO. 1: EAST APPROACH TO END BENT NO. 1 ON -S2-ALIGNMENT, LOOKING WEST



PHOTOGRAPH NO. 2: ON WEST 5TH STREET (-Y3-), SOUTHEAST OF -S2-ALIGNMENT, LOOKING NORTHWEST



PHOTOGRAPH NO. 3: ON WEST 5TH STREET (-Y3-), NORTHWEST OF -S2-ALIGNMENT, LOOKING SOUTHEAST



PHOTOGRAPH NO. 4: WEST APPROACH TO END BENT NO.2 ON -S2-ALIGNMENT, LOOKING EAST

J. REFERENCE **CONTENTS** 

**DESCRIPTION** 

SUPPLEMENTAL LEGEND (GSI)

BORE LOGS, CORE REPORTS, AND CORE PHOTOGRAPHS

LEGEND (SOIL & ROCK)

TITLE SHEET

SHEET NO.

2A

4-23

STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG

PROJECT DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY

*IMPROVEMENTS* 

SITE DESCRIPTION PROPOSED CANOPY ON CHARLOTTE GATEWAY AT STATION 21+39 TO 27+53 -SI- BETWEEN WEST 5TH STREET AND WEST 4TH STREET

STATE PROJECT REFERENCE NO. 23 P-5705B

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOL. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE OR INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS, AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

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

2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES BY 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** 

SCHLEMM, T. S.

EKLUND, M. A.

STUDNICKY, R. T.

COGAR, T. E.

INVESTIGATED BY TERRACON CONSULTANTS

DRAWN BY

FIELDS, W.D. RIGGS, Jr., A. F.

CHECKED BY SUBMITTED BY

TERRACON CONSULTANTS

NOVEMBER 2017



2401 BRENTWOOD ROAD, SUITE 107 RALEIGH, NORTH CAROLINA 27604 NC REGISTERED ENGINEERING FIRM: F-0869 NC REGISTERED GOELOGIC FIRM: C-367



11/16/2017

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

P-5705B 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	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  GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS	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,	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.	UNCISS, UABBRU, 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-7-5 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	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	0F SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SANDSTONE, CEMENTED	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 SILT- MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40   30 MX   50 MX   51 MN   PEAT   *200   15 MX   25 MX   10 MX   35 MX   35 MX   35 MX   36 MN   36	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 — — 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR 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.
CROIR INDEX A A A MY A MY 12 MY IS MY IND MY AMDINITS 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
USIAL TYPES STONE FRACS 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 MAJOR GRAVEL, AND CAND CRAVEL AND CAND COLIC COLIC	▼ STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU	<u> </u>	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	· · · · · · · · · · · · · · · · · · ·	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	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	SPRING OR SEEP	WITH FRESH ROCK.  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.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	I∏ 25/025	(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 CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  STORES  DIP & DIP DIRECTION  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL  SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED 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.
VERY LODGE 4.4	-  "- cor	(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.
GRANIII AR LOOSE 4 TO 10	SOIL SYMBOL  SOIL SYMBOL  SLOPE INDICATOR INSTALLATION	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 10 TO 30 N/A  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	A THE TOPONE ELIBRICATION OF TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT         < 2         < 0.25           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. <i>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</i>	OF AN INTERVENING IMPERVIOUS STRATUM,
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MN MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  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 DIEZOMETED	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	TTT ALLUVIAL SOIL BOUNDARY A FIEZUMETER SPT N-VALUE		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	UNSUITABLE WASTE  WASTE  WEED IN THE TOP 3 FEET OF  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	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT ONCLASSIFIED EXCAVATION -  ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(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	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.	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	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.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE 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 GOIDE FOR FIELD HOLSTONE DESCRIPTION	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 PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH	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 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   CEMICOLID DEGUIDES DOVING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: BM4; N:544,771, E:1,448,453
PLL PLASTIC LIMIT	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	BL STATION: 51+04.00, 2.0' RIGHT, CHISLED SQUARE CONCRETE WW
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	ELEVATION: 738.12 FEET
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN Ø.16 FEET THICKLY LAMINATED Ø.008 - 0.03 FEET	EIAD EILLED IMMEDIATELY AETER DRILLING
	CME-55	THINLY LAMINATED < 0.008 FEET  INDURATION	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	PROJECT WAS DRAFTED USING NCDOT PROVIDED TIN FILE FILE: p5705b_ls_tin (DATED: 01/12/2017)
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	CME-550 HARD FACED FINGER BITS -N	DURRING WITH FINGED EDEES NUMEROUS CRAINS.	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	X CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH	TRICONE 2% STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;  OIFFICULT TO BREAK WITH HAMMER.	
COLON			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS RECUIDED TO RREAK SAMPLE.	
		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO. P-5705B 2A

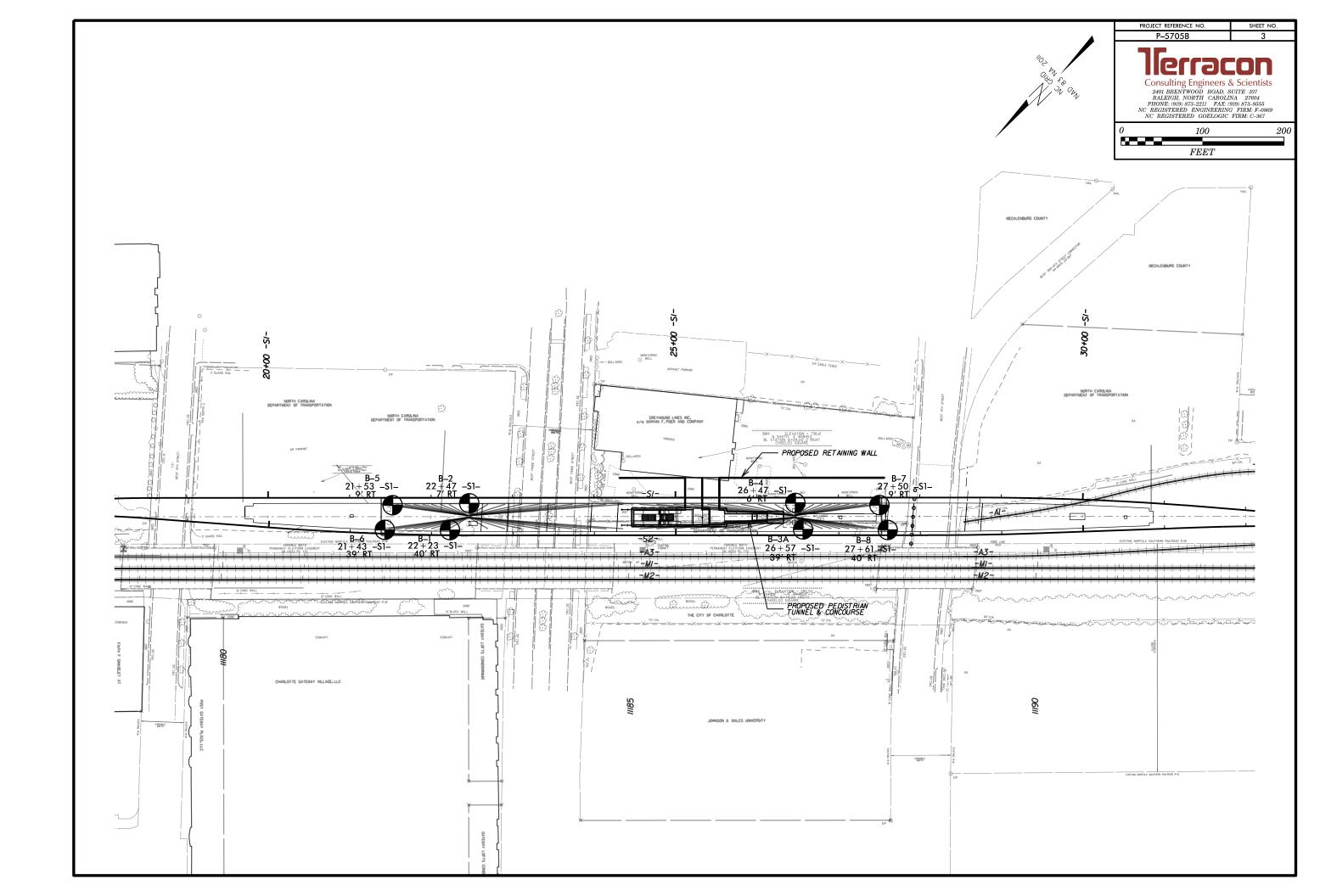
DATE: 8-19-16

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

## SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND GEOLOGICAL STRENGTH INDEX (CSI) TABLES

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Join	ted Rock Mass (Ma	rinos and Hoek,	2000)		T	AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deform	med Heterogeneous Rock	Masses (Marı	nos and Hoek	., 2000)
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)	s O O	σ ω		ν Φ Ο	8 0 0 0	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)				
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.	SURFACE CONDITIONS  VERY GOOD  Very rough, fresh unweathered surface	<b>GOOD</b> Rough, slightly weathered, iron staine surfaces	FAIR Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfac with compact coatings or fillings or angular fragments	VERY POOR Slickensided, highly weathered surfac with soft clay coatings or fillings	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.	VERY GOOD - Very Rough, fresh unweathered surfaces GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slicken- sided or highly weathered surfaces
STRUCTURE		ECREASING S	•		1	COMPOSITION AND STRUCTURE				
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities  BLOCKY - well interlocked un-	PIECES 80	$\mathbb{Z}/\mathbb{Z}$		N/A	N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass, in shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70 A			
disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets  VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks	OCKING OF ROCK	70 60	50			Stone with stone and stone with in inter-layers of layers of siltstone amounts  C. Sand- Stone and siltstone or silty shale with sand- siltstone layers shale with sandstone layers	50 B 40		E	
formed by 4 or more joint sets										
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity	ASING INTERL		40	30		C.D.E. and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.		30	F 20	
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces	DECREASING			20		O. Undisturbed silty or clayey shale with or without a few very thin sandstone layers  The Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Hin layers of	/ / /		/ 	10
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A			10	sandstone are transformed into small rock pieces.   Means deformation after tectonic disturbance				





COUNTY MECKLENBURG **WBS** 44475.1.2 **TIP** P-5705B **GEOLOGIST** SCHLEMM, T.S SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENT **GROUND WTR (ft)** BORING NO. B-1 **STATION** 22+23 **OFFSET** 40 ft RT ALIGNMENT -S1-0 HR. N/A **EASTING** 1,448,190 COLLAR ELEV. 727.3 ft TOTAL DEPTH 97.9 ft **NORTHING** 544,468 24 HR. 24.0 HAMMER TYPE Automatic DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017 DRILL METHOD SPT Core Boring DRILLER EKLUND, M.A. **START DATE** 09/28/17 **COMP. DATE** 10/03/17 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH **BLOW COUNT** SAMP. **BLOWS PER FOOT** ELEV SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 50 75 100 NO. DEPTH (ft) 730 **GROUND SURFACE** ARTIFICIAL FILL 26 725 ASPHALT DEBRIS BROWN, SILTY FINE SAND M BROWN AND BLACK, FINE SANDY SILT М 720 М RESIDUAL 715 714.3 13.0 BROWN AND BLACK, CLAYEY SILT Μ 710 708.3 1 19.0 11 М 705  $\blacksquare$ 703.3 1 24.0 700 698.3 1 29.0 18 20 33 М 695 23 M 690 - - -687.7 + 39.6 WEATHERED ROCK 80 20/0.1 100/0.6 (BROWN, DIABASE, WITH DUNITE 685 . . . . 680.6 + 46.7 . . . 100/0.2 -100/0.2 675 675.4 + 51.9 100/0.3 CRYSTALLINE ROCK . . . - - -BROWN, DIABASE . . . . . . . . 670 670.1 **5**7.2 60/0.0 . . . . . . . . . . . . . . . 665 665.1 <u>1</u> 62.2 60/0.1 - - - -660 660.0 7 67.3 100/0.4 WEATHERED ROCK 100/0.4 . . . . . . . . (BROWN AND WHITE, GRANITOID, WITH DUNITE VEINS) . . . 655 654.6 + 72.7 100/0.2 100/0.2 . . . .

## GEOTECHNICAL BORING REPORT

SHEET 4 OF 23

WBS	44475	5.1.2			Т	IP P-5705E	3		ORE L				GEOLOGIST SCHLE	MM, T.S		
			I CHA	RLOT					AND SAFET		OVEM	IENT	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	, 7.0		ND WTR (ft
	ING NO.					TATION 22			OFFSET 4				ALIGNMENT -S1-		0 HR.	N/A
	LAR ELI		77.3 ft			OTAL DEPT			NORTHING		 68		<b>EASTING</b> 1,448,190		24 HR.	24.0
				F TFR		IEDRICH D-50		<u> </u>				) SP	T Core Boring	HAMM		Automatic
	LER E					TART DATE			COMP. DA				SURFACE WATER DE	_		7 tatornatio
LEV	DRIVE	DEPTH		W COL	_		BLOWS P			SAMP.	<b>V</b> /	1 [				
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft		0 2	25 5	0	75 100	NO.	МОІ	0 G	SOIL AND RO	OCK DES	CRIPTION	l DEPTH
	, ,								•				=== : : (:)			
550_							Match	n Line								
	649.4	77.9	60/0.0			T			60/0.0	·T	Γ			ALLINE F		
	-	F											BROW	/N, DIAB/	ASE	
45	644.4	82.9	00/00						1	,			<del>-</del>			
	-	ļ.	60/0.0						60/0.0				•			
40	-	F											•			
	639.4 87.9 60/0.0								60/0.0	,			<del>-</del>			
													•			
35	634.4	92.9								,			<u> </u>			92
	-	<u> </u>	60/0.0						60/0.0					ALLINE F /N, DIAB/		
30	-	ļ.											•			
	629.4	97.9	60/0.0					• • • •	60/0.0	+			- 629.4 Boring Termina	ted WITH	STANDAI	97 RD
	-	ļ.											PENETRATIO Elevation 629.4 ft	NTESTE	REFUSAL	at
	_	‡												/N, DIAB/		
	-	‡											•			
	-	‡											•			
	-	<u> </u>											<del>-</del>			
	-	+										-				
	-	F											•			
	-	F											<del>-</del>			
	-	ļ.											•			
	_	‡											<del>-</del>			
	-	<u> </u>											•			
	-	‡											•			
	-	‡											<del>-</del> ·			
	-	_														
	-	_											<del>-</del>			
	-	_											•			
	-	t														
	_	-											- -			
	-	Ī											•			
	-	F											•			
	-	F											<del>-</del> ·			
	-	ļ.											•			
	-	‡											<del>-</del>			
	<del>-</del>	‡											•			
	-	‡														
	-	‡											<del>-</del>			
	_	<u> </u>										[	<u>.</u>			
	-	Ł										F				
	-	F											<del>-</del> ·			
	-	ļ.											•			
	-	t								1		ı F	•			

GEOTECHNICAL BORING REPORT

SHEET 5 OF 23

**CORE LOG** COUNTY MECKLENBURG GEOLOGIST SCHLEMM, T.S. **TIP** P-5705B **WBS** 44475.1.2 SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENT **GROUND WTR (ft)** OFFSET 40 ft RT BORING NO. B-1 **STATION** 22+23 ALIGNMENT -S1-0 HR. N/A COLLAR ELEV. 727.3 ft TOTAL DEPTH 97.9 ft **NORTHING** 544,468 **EASTING** 1,448,190 24 HR. 24.0 DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017 DRILL METHOD SPT Core Boring HAMMER TYPE Automatic **START DATE** 09/28/17 DRILLER EKLUND, M.A. **COMP. DATE** 10/03/17 SURFACE WATER DEPTH N/A CORE SIZE HQ3 TOTAL RUN 57.1 ft STRATA L REC. RQD O (ft) (ft) G ELEV (ft) DEPTH RUN (ft) (ft) SAMP. RQD (ft) RATE ELEV DESCRIPTION AND REMARKS NO. (ft) (Min/ft) (ft) ELEV. (ft) DEPTH (ft) Begin Coring @ 39.6 ft

WEATHERED ROCK
(BROWN, DIABASE, WITH DUNITE VEINS) (continued) 0:15/0.1 (0.3) (0.0) 2:58/1.0 4% 0% 3:21/1.0 4% 0% 4:35/1.0 5:15/1.0 6:47/1.0 7:16/1.0 6:17/1.0 7:16/1.0 6:17/1.0 6:17/1.0 3:02/1.0 3:0 685 680.6 + 46.7 680.4 + 46.9 680 3.02/1.0 V=100/0.3 3.57/1.0 5.51/1.0 62% 14% 5.19/1.0 2.39/1.0 675.4 + 51.9 675.1 - 52.2 CRYSTALLINE ROCK
BROWN, MODERATELY SEVERE WEATHERING, VERY SOFT TO
SOFT, VERY CLOSELY FRACTURED, DIABASE, WITH DUNITE VEINS (3.4) 24% `5%´ 2:15/1.0 \( \lambda = \frac{60/0.0}{4:33/1.0} \) (0.0) (0.0) 4:13/1.0 670 670.1 **5**7.2 665.1 <del>+</del> 62.2 665.0 <del>+</del> 62.3 5.0 (N=60/0.1/) (0.4) (0.0) 4:06/1.0 8% 0% 4:42/1.0 3:54/1.0 4:25/1.0 3:53/1.0 660 660.0 <del>T</del> 67.3 3:53/1 0

N=100/03
3:1071.0 0% 0%
3:1071.0 0%
3:1071.0 0%
3:1071.0 0%
3:1071.0 0%
3:1071.0 0%
3:1071.0 0%
1:27/1 0 6%
1:23/1.0 0%
1:23/1.0 0%
1:26/1.0 0%
1:37/1.0 0%
1:37/1.0 0%
1:37/1.0 0%
1:37/1.0 0%
1:37/1.0 0%
1:37/1.0 0%
1:37/1.0 0% WEATHERED ROCK (BROWN AND WHITE, GRANITOID, WITH DUNITE VEINS) 655 654.6 <del>72</del>.7 650 649.4 77.9 (0.4) 3% 5.0 (0.0) 0% CRYSTALLINE ROCK BROWN, MODERATELY SEVERE WEATHERING, VERY SOFT TO SOFT, VERY CLOSELY FRACTURED, DIABASE, WITH DUNITE VEINS 645 GSI 40 - 45 5.0 N=60/0.0 (0.2) (0.0) 6:34/1.0 4% 0% 644.4 + 82.9 640 639.4 + 87.9 5.0 N=60/0.0/ (0.2) (0.0) 5:28/1.0 4% 0% 634.4 + 92.9 5:04/1.0 N=60/0.0 (4.3) (0.0) (4.3) (0.0) 86% 0% CRYSTALLINE ROCK 5:41/1.0 6:59/1.0 8:52/1.0 3:55/1.0 3:37/1.0 *N=60/0.0*/ 86% BROWN, MODERATELY SEVERE TO MODERATELY WEATHERED, MEDIUM HARD TO MODERATELY HARD, VERY CLOSELY FRACTURED, DIABASE, WITH DUNITE VEINS 629.4 + 97.9 GSI 45 - 50 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 629.4 ft IN CRYSTALLINE ROCK (BROWN, DIABASE)

## Project No. 44475.1.2 (P-5705B) Charlotte Gateway Station and Track and Safety Improvements

## **CORE PHOTOGRAPHS**

**B-1**BOX 1: 39.6 - 87.9 FEET



FEET

**B-1**BOX 2: 87.9 - 97.9 FEET



**FEET** 



**WBS** 44475.1.2 **TIP** P-5705B COUNTY MECKLENBURG **GEOLOGIST** SCHLEMM, T.S SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENT **GROUND WTR (ft) BORING NO.** B-2 **STATION** 22+47 **OFFSET** 7 ft RT ALIGNMENT -S1-0 HR. N/A COLLAR ELEV. 723.2 ft TOTAL DEPTH 83.7 ft **NORTHING** 544,428 **EASTING** 1,448,197 24 HR. 20.0 DRILL METHOD SPT Core Boring DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017 HAMMER TYPE Automatic DRILLER EKLUND, M.A. COMP. DATE 09/27/17 **START DATE** 09/27/17 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH **BLOW COUNT** SAMP. **BLOWS PER FOOT** ELEV SOIL AND ROCK DESCRIPTION (ft) (ft) 0.5ft 0.5ft 0.5ft 50 75 100 NO. DEPTH (ft 725 **GROUND SURFACE** ARTIFICIAL FILL 722.2 10 GRAVEL . . . . . . . 720 RED-BROWN, SILTY CLAY, TRACE 7197 GRAVEL M RESIDUAL 717.2 BROWN, FINE SANDY SILT M 715 GRAY AND BROWN, SILTY CLAY BROWN AND BLACK, CLAYEY SILT 710 710.2 13.0 BROWN AND WHITE, CLAYEY FINE TO . . . 705 705.2 18.0 5 BROWN AND WHITE, FINE TO COARSE SANDY SILT, WITH CLAYEY SILT 700 700.2 23.0 12 10 М WHITE AND BROWN, SILTY FINE TO COARSE SAND, PETROLEUM ODOR IN 695 695.2 28.0 18 DRILLING FLUID RETURN FROM 26' TO 690 690.2 33.0 17 22 M 685 685.2 38.0 26 45 55/0.4 WEATHERED ROCK 100/0.9 (BROWN AND WHITE, GRANITOID) 680 676.7 38 62/0.3 . . . WEATHERED ROCK 675 100/0.8 (BROWN, DIABASE) WEATHERED ROCK 670.9 \( \dagger 52.3 (BROWN AND WHITE, GRANITOID) 100/0.5 -100/0.5 . . . . . . . . . . . . . . . . 665 665.4 † 57.8 100/0.3 . . . . . . . . . . . . . . 660 660.1 63.1 CRYSTALLINE ROCK 60/0. BROWN AND WHITE, GRANITOID . . . 655 655.0 68.2 100/0.3 WEATHERED ROCK 100/0.3 . . . . . . . (BROWN AND WHITE, GRANITOID) 650 649.7 + 73.5 60/0.1 . 60/0.1 CRYSTALLINE ROCK BROWN AND WHITE, GRANITOID . . .

## GEOTECHNICAL BORING REPORT BORF LOG

SHEET 6 OF 23

						D	ORE L	UG							
WBS	44475.1.2			TIE	<b>P</b> P-5705B	COUNT	Y MECKLEI	NBURG			GEOLOGI	ST SCHLE	MM, T.S		
SITE	DESCRIPTION	CHAF	RLOTTI	E GAT	TEWAY STATION AN	ID TRACK	AND SAFET	Y IMPR	OVEMEN	١T				GROU	ND WTR (ft)
BOR	ING NO. B-2			ST	<b>TATION</b> 22+47		OFFSET	ft RT			ALIGNME	<b>NT</b> -S1-		0 HR.	N/A
COL	LAR ELEV. 72	3.2 ft		TC	OTAL DEPTH 83.7 f	t	NORTHING	544,42	28		EASTING	1,448,197		24 HR.	20.0
DRIL	L RIG/HAMMER EF	F./DATE	TER3	46 DIE	EDRICH D-50 90% 03/10	0/2017	,	DRILL M	ETHOD	SPT C	ore Boring		HAMM	ER TYPE	Automatic
DRIL	LER EKLUND	, M.A.		ST	TART DATE 09/27/	17	COMP. DA	TE 09/2	27/17	;	SURFACE	WATER DE	PTH N/	Ά	
ELEV (ft)	DRIVE ELEV (ft) DEPTH (ft)		W COUI	NT 0.5ft	BLOWS 0 25	PER FOOT 50	75 100	SAMP. NO.	MOI	)	LEV. (ft)	SOIL AND R	OCK DES	CRIPTION	N DEPTH (f
645	639.6 - 83.6	60/0.1			Mat	ch Line	60/0.1				39.5 B Elev	CRYST RK GREEN-G  oring Termina PENET RATIO ration 639.5 ft RK GREEN-G	ted WITH N TEST F IN CRYST	STANDA REFUSAL	RD at ROCK



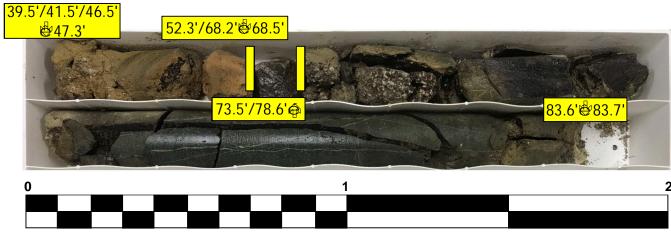
۱,	Const	ilting Engi	neers & s	cientists	5					C	0	RE L	OG					
7	WBS	44475	5.1.2			TIP	P-570	5B	С	OUNT	ΥN	/IECKLEI	NBURG	GEOLOGI	ST SCHLEN	MM, T.S		
2	SITE	DESCR	IPTION	I CHA	RLOTTE	GATE	WAY S	STATION	AND T	RAC	( AN	D SAFET	Y IMPROVEMENT				GROU	ND WTR (ft
	BOR	ING NO	. B-2			STA	TION	22+47			OF	FSET	7 ft RT	ALIGNME	<b>NT</b> -S1-		0 HR.	N/A
	COL	LAR EL	<b>EV</b> . 72	23.2 ft		тот	AL DE	<b>PTH</b> 83	.7 ft		NC	RTHING	544,428	EASTING	1,448,197		24 HR.	20.0
	DRILL	. RIG/HAN	/IMER EF	F./DAT	E TER34	6 DIEDI	RICH D-	50 90% 0	3/10/201	17			DRILL METHOD SP	T Core Boring		HAMME	R TYPE	Automatic
	DRIL	LER E	KLUND	, M.A.		STA	RT DA	TE 09/2	27/17		CC	MP. DA	<b>TE</b> 09/27/17	SURFACE	WATER DE	PTH N/	4	
	COR	E SIZE	HQ3					<b>N</b> 42.0 f										
	ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)		UN RQD (ft) %	SAMP. NO.	REC. (ft) %	RATA RQD (ft) %	L O G	ELEV. (		DESCRIPTION	AND REMAR	KS		DEPTH (
	683.7														ng @ 39.5 ft			
	680	681.7	39.5 41.5	5.0	1:46/1.0 1:28/1.0 0:57/1.0 1:20/1.0 1:15/1.0 0:54/1.0	(0.0) 0%	(0.0) 0% (0.0) 0%					- - - - -	(BROW	<b>WEATH</b> 'N AND WHITE	ERED ROCK E, GRANITOID	) (continue	ed)	
	675	676.7 675.9	46.5 47.3	5.0	0:43/1.0 N=100/0. 1:43/1.0	(0.7)	(0.0)					<u>676.2</u> _			ERED ROCK			47
			+		1:48/1.0 1:25/1.0 0:56/1.0		0%					672.2		`	N, DIABASE) — — — — — —			51.
	670	678.9 678.4	52.3 52.8		1:18/1.0 N=100/0.	5 (2.2)	(0.0)						(B	WEATH ROWN AND V	ERED ROCK VHITE, GRAN	IITOID)		
	665	665.4 665.1	57.8 58.1	5.0	1:20/1.0 0:58/1.0 1:01/1.0 1:08/1.0 0:57/1.0	0.0)	(0.0)					- - -						
	660	660.1 660.0	63.1	5.0	1:00/1.0 1:35/1.0 0:52/1.0 1:12/1.0 1:04/1.0	(0.0) 0%	(0.0)					- - - - 660.1						63
	655	655.0 654.7	63.2 68.2 68.5	5.0	N=60/0.1 1:52/1.0 2:36/1.0 1:24/1.0 1:32/1.0 1:27/1.0	(0.0) 0%	(0.0) 0%		(0.0) 0%	(0.0) 0%		- - - 655.0	BROWN AND V WEATHERED, \$	VHITE, MODE SOFT, VERY C GR				Y
	650		† · · · · ·	5.0	N=100/0. 2:47/1.0 1:56/1.0 1:16/1.0 1:08/1.0 1:05/1.0	(0.1) 2%	(0.0) 0%					- - - - 649.7	(В	<b>WEATH</b> ROWN AND V	<b>ERED ROCK</b> VHITE, GRAN	IITOID)		73
	645	649.7 649.6 644.6		5.0	N=60/0.1 0:52/1.0 1:39/1.0 2:36/1.0 2:48/1.0	0%	(0.0) 0%		(0.0) 0%	(0.0) 0%		- -	BROWN AND WHI VERY CLO	TE, MODERA SELY FRACTI				
	640		78.6	5.0	2:15/1.0 N=60/0.0 2:25/1.0 2:31/1.0 5:38/1.0 9:03/1.0 10:32/1.0 N=60/0.1	(2.8)	(0.0) 0%		(2.8) 76%	(0.0)		643.2 -	DARK GREEN-					
:DOT CORE SINGLE CANOPY GINT LOGS:GPJ NC_DOT.GDT 11/14/17		639.6-	83.6		10.32/1.0								Boring Terminated at Elevation 639.5	GS WITH STAND ft IN CRYSTA	180 - 85 ARD PENETR	ATION TE	ST REF	

SHEET 7 OF 23

# Project No. 44475.1.2 (P-5705B) Charlotte Gateway Station and Track and Safety Improvements

## **CORE PHOTOGRAPHS**

**B-2** BOX 1: 39.5 - 83.7 FEET



FEET



COUNTY MECKLENBURG **WBS** 44475.1.2 **TIP** P-5705B **GEOLOGIST** SCHLEMM, T.S SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENT **GROUND WTR (ft)** BORING NO. B-3A **STATION** 26+57 OFFSET 39 ft RT ALIGNMENT -S1-0 HR. N/A **EASTING** 1,447,888 COLLAR ELEV. 724.0 ft TOTAL DEPTH 90.3 ft **NORTHING** 544,187 24 HR. FIAD DRILL METHOD SPT Core Boring DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017 HAMMER TYPE Automatic DRILLER EKLUND, M.A. **START DATE** 10/13/17 **COMP. DATE** 10/18/17 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH **BLOW COUNT** SAMP. **BLOWS PER FOOT** ELEV SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 50 75 100 NO. DEPTH (ft) 725 **GROUND SURFACE** ARTIFICIAL FILL 723.0 1.0 BROWN AND BLACK, FINE TO COARSE W SANDY SILT, LITTLE GRAVEL 720.5 . . . . 720 BROWN, SILTY CLAY, TRACE GRAVEL W 718.0 T 6.0 M . . . 715.5 715 М RESIDUAL 710.5 + 13.5 BROWN, FINE SANDY SILT 4 М . . . . 705 705.5 18.5 16 700 700.5 23.5 19 25 40 M 695.5 + 28.5 13 M 690 690.5 + 33.5 . . . . 35 65/0.4 WEATHERED ROCK 100/0.9 (BROWN, META INTRUSIVE) . . . . . . . 685 . . . . . . . . . . . 681.5 80 20/0.1 100/0.6 680 . . . . 675.9 48.1 . . . . . . 675 CRYSTALLINE ROCK BROWN, META INTRUSIVE 670.8 + 53.2 60/0.0 . . . 665 8  $\pm$  58 2 . . . . WEATHERED ROCK 70 30/0.1 100/0.6 (BROWN, META INTRUSIVE) 660.2 . . . . 660 660.2 63.8 660.2 RESIDUAL 65.3 BROWN AND GRAY, CLAYEY SILT, TRACE ROCK FRAGMENTS CRYSTALLINE ROCK 655 LIGHT GRAY TO BROWN AND WHITE, 653.7 + 70.3 . . . . . . . 60/0.0 60/0.0 . . . . . . 650 648.7 + 75.3 60/0.0 . . . . . . . .

## GEOTECHNICAL BORING REPORT

SHEET 8 OF 23

WRS	44475	.1.2			Т	IP P	-5705E	 3		ORE L				GEOLOGIST SCHLEMN	И. T.S	
			I CHA	RI OT						AND SAFET			1ENT	JESESSIO: OOI ILLIVIII		UND WTR (f
	ING NO.		0117	I (LO)			ON 26		D THUROIT	OFFSET :				ALIGNMENT -S1-	0 HF	
	LAR ELE		24 0 ft		_			<b>TH</b> 90.3 ft		NORTHING				<b>EASTING</b> 1,447,888	24 HI	
				F TER				90% 03/10/					) SP		HAMMER TYP	
	LER E				-			10/13/1°		COMP. DA			<i>3</i> 31	SURFACE WATER DEPT		L //diomatic
LEV	DDIVE.	DEPTH		w co			DAIL		PER FOOT		SAMP.		1 [	OOKI AGE WATER BEI	II IVA	
(ft)	ELEV (ft)	(ft)	0.5ft		1	0	2		50	75 100	NO.	MO	O     G	SOIL AND ROC	K DESCRIPTI	ON DEPTH
	,								1			1		ELEV. (II)		DET III
645_								Mato	h Line							
	643.7	80.3	60/0.0							60/0.0	,			CRYSTAL LIGHT GRAY TO B	LINE ROCK	
		F	00/0.0											GRANITOII	(continued)	VIIII E,
40		- 				<u>  -</u>								• <del>-</del>		
	638.7	85.3	60/0.0							60/0.0	)			•		
35	, ‡	ļ												•		
55	633.7	90.3	00/0.0						::::	60/0.0				- 633.7		90
	- 60/0.0									60/0.0				Boring Terminated PENETRATION		
	<u> </u>													<ul> <li>Elevation 633.7 ft IN</li> <li>(LIGHT GRAY TO B</li> </ul>		
		_													IITOID)	,
	, ‡	_												• •		
	-	_												<del>-</del>		
	}	_												•		
		Ł												•		
	, 7	F											F	-		
	, I	F											F	•		
	, 1	-												<del>-</del>		
		<u> </u>												•		
	, ‡	-												•		
		-												<del>-</del>		
	, ‡	_												• •		
	_	Ė											1 -			
		Ĺ														
	-	-											-	-		
	<sub>1</sub> -	F												- -		
		F												•		
	, ‡	ļ												•		
		-												<del>-</del> -		
		_												<u>.</u>		
														<del>-</del>		
	, <del>]</del>	Ė											1	•		
	-	-											-	-		
	, J	-												<del>-</del>		
		-												• •		
	, ‡	-												•		
	, †	-												<del>-</del>		
	<sub> </sub>	‡												<u>.</u>		
	. ]	_											F	<b>.</b>		
	¹ I	•	1	l		1					1	I	ı h	_		
	-	F											F	-		
														• •		
	- - - -													· · ·		
	-   -   -   -   -	- - - -														

0012DEL\_P28



# GEOTECHNICAL BORING REPORT CORE LOG

SHEET 9 OF 23

WBS	44475	.1.2			TIP	P-570	5B	С			RE LOG ECKLENBURG	GEOLOGIST SCHLEM	IM, T.S		
			CHA	RLOTTE							SAFETY IMPROVEMENT			GROUND	WTR (ft
	NG NO.						26+57			1	FSET 39 ft RT	ALIGNMENT -S1-		0 HR.	N/A
COLL	AR ELI	<b>EV.</b> 72	4.0 ft		тот	AL DE	<b>PTH</b> 90.	3 ft		NO	RTHING 544,187	<b>EASTING</b> 1,447,888		24 HR.	FIAD
DRILL	RIG/HAN	IMER EF	F./DAT	E TER346	5 DIEDF	RICH D-	50 90% 03	3/10/201	7	<u> </u>	DRILL METHOD SPT		HAMMI	ER TYPE A	utomatic
DRIL	LER E	KLUND	, M.A.		STAI	RT DA	<b>TE</b> 10/1	3/17		СО	MP. DATE 10/18/17	SURFACE WATER DEF	TH N//	Α	
CORI	E SIZE	HQ3			тоти	AL RU	<b>N</b> 52.5 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	DE	ESCRIPTION AND REMARK	(S		DEPTH (f
689												Begin Coring @ 35.0 ft			,
	689.0	35.0	7.5	4:31/1.0 6:30/1.0	(5.2) 69%	(1.8) 24%					- (BRO	WEATHERED ROCK WN, META INTRUSIVE) (co	ntinued)		
685	- - - - - 681 5	- 42 5		4:09/0.5 7:27/1.0 4:00/1.0 3:00/1.0 3:44/1.0 4:18/1.0		2170					- (EKC	····, in [ ] / (iii ) (iii )			
680	681.5 - 680.5 -	43:5	5.0	N=100/0.6	(3.0)	(1.7)					<del>-</del>				
	675.0	40.4		3:56/1.0 5:24/1.0 3:32/1.0 4:23/1.0 4:19/1.0	60%	34%					- - - 075 0				40
675	675.8 675.8	48.2	5.0	N = 60/0.1	(2.7)	(0.7)		(5.2)	(1.3) 13%		_ 675.9	CRYSTALLINE ROCK			48.
	670.8 -	53.2		4:35/1.0 6:05/1.0 5:11/1.0 6:20/1.0 4:51/1.0	54%	14%		51%	13%			TELY SEVERE WEATHERI RACTURED, META INTRUS GSI 40 - 45		I, CLOSEL	<i>(</i>
670	-		5.0	N=60/0.0 6:53/1.0	(2.5) 50%	(0.6) 12%					<u>-</u> .				
	-			6:51/1.0 3:52/1.0 4:49/1.0	0070	,					-				
665	665.8 665.2	58.2 58.8		3:43/1.0 V=100/0.6							- 665.8	WEATHERED ROCK			58.
	-	F	5.0	2:49/1.0 4:12/1.0	(1.7) 34%	(1.2) 24%					-	(BROWN, META INTRUSIV	E)		
	-	F		4:20/1.0 4:33/1.0							• •				
660	660.2	63.8		3:55/1.0 N=24	<del> </del>					<b>1</b> 1 7	660.2	RESIDUAL			63.
İ	658.7 -	- 65.3 -	5.0	5:01/1.0		(0.6)		(19.9)	(4.1)		- 658.7 - BR	OWN AND GRAY, CLAYEY CRYSTALLINE ROCK	SILT		65.
655	653.7 -	70.3		5:28/1.0 5:19/1.0 5:20/1.0 5:12/1.0	44%	12%		80%	16%		MODERATELY	D BROWN AND WHITE, VE SEVERELY WEATHERED, CLOSELY FRACTURED,	VERY H	ARD TO	DID
Ī	-		5.0	5:12/1.0 \ <u>N=60/0.0</u> 8:15/1.0		(0.9) 18%						GREEN INTRUSTIVE DIAB BELOW 80.3' DEPTH			
650	-	L		10:26/1.0   19:40/1.0		1070					•	GSI 45 - 50			
	648.7 -	75.3	5.0	2:28/1.0 3:12/1.0 <i>N=60/0.0</i>		(2.6)									
	-	F	5.0	4:04/1.0 4:51/1.0	(4.8) 96%	(2.6) 52%					• •				
645	642.7			4:04/1.0 4:51/1.0 4:53/1.0 4:15/1.0 4:57/1.0 N=60/0.0							• <del>-</del> -				
	643.7 -	- 80.3 -	5.0	4:57/1.0 \ <u>N=60/0.0</u>	(4.9)	(0.0)					•				
640	-	‡		6:31/1.0 2:37/1.0 11:49/1.0 3:27/1.0 4:19/1.0 N=60/0.0	98%	0%					<del>-</del> -				
040	638.7 -	85.3		3:27/1.0 4:19/1.0							<del>-</del> •				
	-	<u> </u>	5.0	3:33/1.0	(3.1) 62%	(0.0) 0%					•				
635	_	_		3:33/1.0 4:40/1.0 5:57/1.0 6:02/1.0 5:49/1.0 N=60/0.0							<del>-</del>				
+	633.7 -	- 90.3 -		5:49/1.0 N=60/0.0							- 633.7 - Boring Terminated W	/ITH STANDARD PENETRA	TION TE	ST REFUS	90. AL
	-	ŀ										OCRYSTALLINE ROCK (LIG AND WHITE, GRANITOID	HT GRA		
	-										_	THE WITTE, CHARTOE	,		
	-	-									-				
	-	F									•				
	-	F									<del>-</del> ·				
	-	-									<u>.</u>				
	_	<u> </u>									<del>-</del>				
	-	<u> </u>									• •				
	-	-									- -				
	-	<u> </u>									<del>-</del>				
	_	<u> </u>									• •				
	-	ļ									-				

# Project No. 44475.1.2 (P-5705B) Charlotte Gateway Station and Track and Safety Improvements

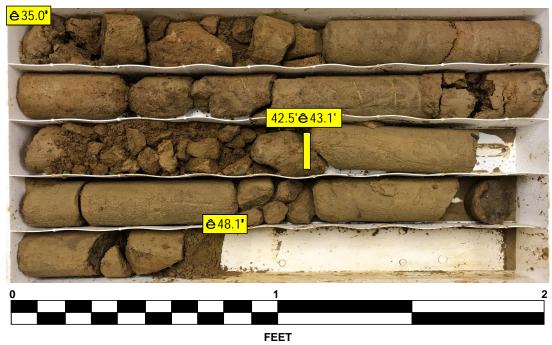
## **CORE PHOTOGRAPHS**

B-3A

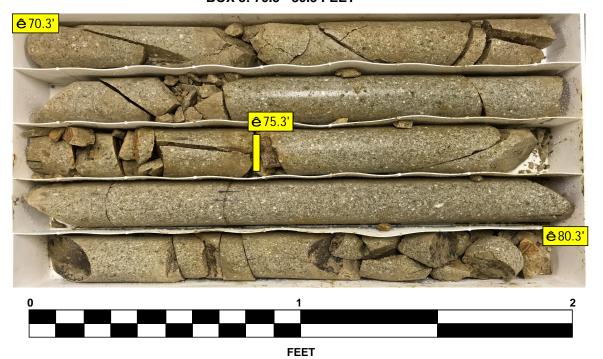
BOX 1: 35.0 - 48.1 FEET

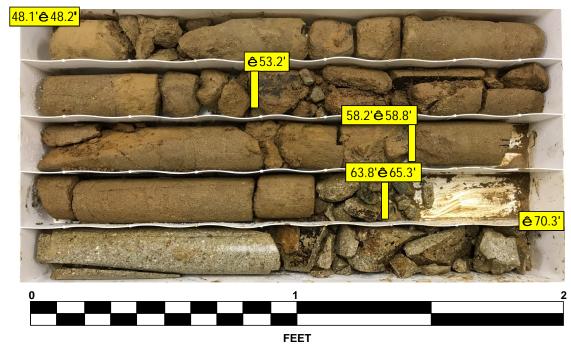
B-3A

BOX 2: 48.1 - 70.3 FEET

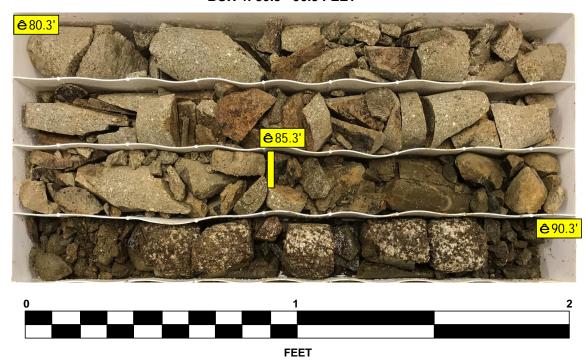


**B-3A** BOX 3: 70.3 - 80.3 FEET





**B-3A** BOX 4: 80.3 - 90.3 FEET





	saiding	5 -11511	iccis a s	C.CITEI3C					B	ORE	L	<u>OG</u>							
WI SI	BS 4	4475	.1.2			Т	<b>IP</b> P-5705E	3	COUNT	Y MECK	LEN	IBURG			GEOLOGI	ST SCHLE	MM, T.S		
SI	TE DE	SCRI	IPTION	CHA	RLOTT	E G/	ATEWAY ST	ation an	D TRACK	AND SA	FET	Y IMPR	OVEN	/ENT				GROUN	ID WTR (ft)
	DRING	NO.	B-4			s	STATION 26	6+47		OFFSE	<b>r</b> 6	ft RT			ALIGNME	NT -S1-		0 HR.	N/A
CC	LLAR	RELE	<b>EV.</b> 72	23.5 ft		Т	OTAL DEPT	<b>TH</b> 93.6 ft	t	NORTH	ING	544,14	41		EASTING	1,447,918		24 HR.	FIAD
DR	ILL RIG	HAM/	MER EF	F./DAT	E TERS	346 D	IEDRICH D-50	90% 03/10	/2017			DRILL M	ETHO	D SP	T Core Boring		HAMN	MER TYPE	Automatic
DF	RILLEF	R El	KLUND	, M.A.		s	TART DATE	09/21/1	7	COMP.	DAT	E 09/2	26/17		SURFACE	WATER DE	PTH N	/A	
ELE	- V   FI	RIVE LEV	DEPTH	BLC	W COL	JNT			PER FOO			SAMP.	lacktriangledown/			SOIL AND R	OCK DES	CRIPTION	
(ft		ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	75 1	00	NO.	<u>/mo</u>		ELEV. (ft)				DEPTH (ft
72	5		-													DAY (514			
	72	2.5	1.0	_			<del>  </del>				+				· 723.5 · 722.0	P/	ENT SUR AVEMENT		0.0
72	0 70	20.02	- - - 3.5	7	14	9	:::::::::::	23			:					ASPHALT (6"	) CABC S <b>ESIDUAL</b>		)
1	<u> </u>	-0.0	- 3.5 -	5	2	2	4		1		-				<del>-</del> :		N, SILTY		
	71	7.5	6.0	5	5	5	10.1				:		М		•				
71	5 71	5.0	- - 8.5	3	5	5	. <b>♥</b> 10 .				_				715.0	<u></u>	I, CLAYE	<del>.</del>	
		‡	-	3		5	- 10 -						М		• •	BROWN	I, CLAYE	Y SILI	
-,		‡	-				:/::::				:				· 711.5	W DNA NWC	HITE FIN	F TO COA	<u>12.0</u> RSF
71	<u>U 71</u>	0.0	_ 13.5 -	3	2	3	<b>6</b> 5· · ·		<del> </del>				М		-		NDY SIL		
		‡	-								:				:				
70	5 70	)5.0	- - 18.5				<u>                                   </u>								<del>-</del>				
		1	-	3	2	5	7						М						
		}	-				::::								•				
70	0 70	0.0	23.5	2	2	3	<b> </b>	<del> </del>	1	<del>                                     </del>	_		М		_				
		}	_																
69	5 69	95 O ]	28.5								•								
		-	-	7	8	11	•1	9			-		М		<u>-</u>				
		- 1	-				:::/				•					ROWN AND V			
69	0 69	0.0	33.5	6	9	15	i = i + i				-		М		- CC	ARSE SAND I	, WITH C _AYERS	LAY AND S	SILT
		1	<del>-</del> -				: : : : •	24			-		IVI		•				
68	5 60	35.0	- - - 38.5					<u> </u>							•				
00	5 60	55.0_	- 30.5	15	23	20	1	4	3		-		М		<del>-</del>				
		1	-					: : : :			:				•				
68	0 68	30.0	- 43.5	12	16	26					_				<del>-</del>				
		1	<b>-</b> -	12	10	20		42			-		М						
67	_	1													• •				
67	5 67	75.0	_ 48.5 -	11	21	37	1		->58-				М		<del>-</del>				
/14/1		1	-											-	<u>671.5                                    </u>				52.0
<del>-</del> 67	0 67	70.0	- - 53.5	44	40	04		/.			•				- В	ROWN, CLAY	EY SILT, ID LAYER		ГҮ — — —
<u>6</u>		‡	-	11	13	21		₹34					М		:	<b>5</b> 7			
	_	1	-					/			:			111	666.5	W DNA NWC	HITE EIN	E TO COA	<u>57</u> .0
S 66	5 66	55.0_	_ 58.5 -	12	17	24	<del>                                     </del>		1		_		М		_		NDY SIL		NOL .
S.GP		}	-					: : } ;							•				
9 66	0 66	50.0	- - 63.5						<u> </u>						660.0				63.5
GINT		-	-	100/0.5						- 100/	0.5				658.5 (WI	WEAT HITE AND LIG	HERED R		OID) / 65.0
PP	65	]	- 67.7					: : : :			-				. 655.8	CRYST	ALLINE F	ROCK	<del>5.27</del> 7 67.7
CANOPY GINT LOGS.GPJ NC_DOT.GDT 11/14/17  9 9 9 9 9	5 65	55.8 -	- 67.7 -	55	45/0.1					100/	0.6				-654.5		HERED R	OCK	69.0
GLE		1	-					: : : :			-						VN, DIAB ALLINE F		
N 65	0 65	50.2	- 73.3												•		VN, DIAB		
BORE		7	-	60/0.0						60/	0.0				-				
NCDOT BORE SINGLE		‡	-												•				
팅 <u>64</u>	5 64	5.2	78.3							60/	1•				•				

# GEOTECHNICAL BORING REPORT

SHEET 11 OF 23

								В	ORE L	_(	OG						
	44475						P-5705B		Y MECKLE	_				GEOLOGIST SCHLEM	M, T.S	1	
-			I CHA	RLOT			EWAY STATION A	AND TRACK				OVEN	IENT	T		╡	O WTR (ft)
	ING NO.						ATION 26+47		OFFSET	_				ALIGNMENT -S1-		0 HR.	N/A
	LAR ELI						TAL DEPTH 93.6		NORTHING					<b>EASTING</b> 1,447,918		24 HR.	FIAD
				E TER			ORICH D-50 90% 03.			_			) SP	T Core Boring		IER TYPE	Automatic
DRIL	LER E		i			TA	ART DATE 09/21		COMP. DA	_		_	1	SURFACE WATER DEP	TH N	/A	
ELEV (ft)	LLEV	DEPTH (ft)	0.5ft	W CO		$\  \ $	BLOW 0 25	S PER FOOT 50	T 7 <u>5</u> 100	ΙI	SAMP.	/	O	SOIL AND RO	CK DES	CRIPTION	
(17)	(ft)	(1-7)	0.511	0.511	0.511	H	23	J0	75 100	Н	NO.	/MOI	G	ELEV. (ft)			DEPTH (ft)
								atch Line									
645	<u>-</u>		60/0.1			$\dagger \dagger$		·	.	<b>!</b>				CRYSTA			
	:	<u> </u>												. BROWN, DIA	BASE (	continued)	
640	640.1_	83.4	60/0.1						60/0.1					<del>-</del>			
	-	<u> </u>	00/0.1														
625		<u> </u>															
635	635.0_	88.5	60/0.1						60/0.1					<del>-</del> :			
	:	<u> </u>															
630	629.9	93.6	00/0.0			Ц			60/0.0					_629.9			93.6
	-	<u> </u>	60/0.0						60/0.0					Boring Terminate PENETRATION	TEST F	REFUSAL at	:
	:	‡												Elevation 629.9 ft IN (BROWN			CK
	-	-												<del>-</del>		•	
		_															
	-	<u> </u>												<del>-</del>			
	-	ļ															
	-	‡															
	-	<u> </u>												<del>-</del>			
	-	<u> </u>															
	-	<u> </u>												<del>-</del>			
	-	-															
	:	_												•			
	-	<u> </u>												<del>-</del>			
	-	<u> </u>															
	-	<u> </u>												<del>-</del>			
	-	<u> </u>															
	:	<u> </u>															
	-	<u> </u>												<u> </u>			
	-	<u> </u>															
	-	<u> </u>												<del>-</del>			
	-	<u> </u>															
	:	<u> </u>															
	-	<u> </u>												<del>-</del>			
	-	<u> </u>															
	-	<u> </u>												<del>-</del>			
	:	‡															
	:	‡															
	-	<u> </u>											[	<del>_</del>			
	-	ł											F				
	-	É												· •			
	-	F												<del>-</del> ·			
	-	F												•			
		<u> </u>												•			

0012DEL\_P28



# GEOTECHNICAL BORING REPORT CORE LOG

SHEET 12 OF 23

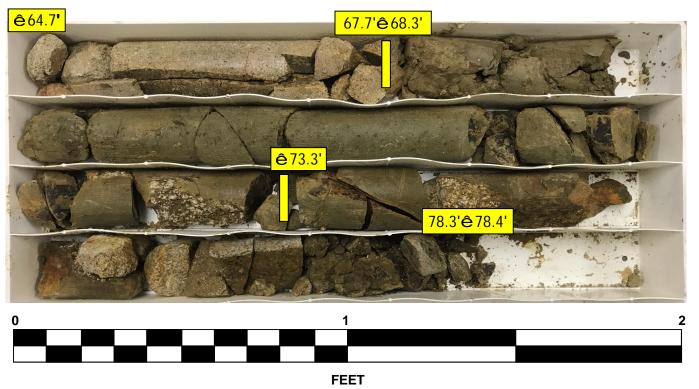
WBS	44475	5.1.2			TIP	P-570	5B	С		<b>:О</b> Г Y м	ECKLEN		GEOLOGIST SCHLEN	им, т.s		
SITE	DESCR	IPTION	СНА	RLOTTE	GATE	WAY S	STATION	AND T	RAC	( ANE	SAFET	Y IMPROVEMENT	1		GROUNI	WTR (f
BORI	NG NO.	B-4			STA	TION	26+47			OFI	FSET 6	ft RT	ALIGNMENT -S1-		0 HR.	N/
COLL	AR ELI	<b>EV.</b> 72	3.5 ft		TOT	AL DE	<b>PTH</b> 93.	6 ft		NO	RTHING	544,141	<b>EASTING</b> 1,447,918	2	24 HR.	FIA
DRILL	RIG/HAN	MER EF	F./DAT	E TER34	6 DIEDI	RICH D-	50 90% 03	3/10/201	7			DRILL METHOD SPT	Core Boring	HAMMER	R TYPE A	Automatic
DRIL	LER E	KLUND	, M.A.		STAI	RT DA	<b>TE</b> 09/2	1/17		СО	MP. DAT	<b>E</b> 09/26/17	SURFACE WATER DE	PTH N/A		
CORI	E SIZE	HQ3			тот	AL RU	<b>N</b> 28.0 f	t								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	ELEV. (fi		ESCRIPTION AND REMAR	KS		DEPTH
658.8													Begin Coring @ 64.7 ft			
	658.8 _	64.7	3.0	2:42/1.0 5:36/1.0	(1.1) 37%	(0.0) 0%		(1.1) 41%	(0.0) 0%		658.5_/ -	(WHITE AN	WEATHERED ROCK ID LIGHT GRAY, GRANITO	ID) (continu	ued)	<u> </u>
655	655.8 655.2	67:7 68:3		4.10/1.0				4176	0 /6		<u>655.8</u> 654.5		CRYSTALLINE ROCK SLIGHTLY WEATHERED, Y			67 1 Y 69
	-	<u> </u>	5.0	N=100/0. 3:13/1.0 5:58/1.0	(3.6) 72%	(0.9) 18%		(17.1) 70%	(8.4) 34%		-		ACTURED, MASSIVE, GRAI		J, CLUSE	
	-			8:55/1.0 7:34/1.0				10%	34%		-		GSI 75 - 80 WEATHERED ROCK			
650	650.2	73.3	5.0	7:31/1.0 <i>N=60/0.0</i>	И (2.3)	(0.5)					-		(BROWN, DIABASE)  CRYSTALLINE ROCK			
	-	F		8:00/1.0 6:38/1.0	46%	10%					•		TE TO MODERATELY SEV TO HARD, CLOSELY FRAC			D,
645	645.2 - 645.1 <del>-</del>	78.3 78.4		8:00/1.0 6:38/1.0 6:11/1.0 7:40/1.0 6:28/1.0							-		GRANITOID CONTACT AT		MADASE,	
	\_645.1 <del>_7</del> -	<del>* 78.4</del> /	5.0	N N=60/0 1	// (3.5)	(2.4) 48%					-		GSI 45 - 50			
	-	F		6:31/1.0 8:12/1.0 4:59/1.0 3:33/1.0 5:11/1.0	. 0,0	1.070					-					
640	640.1 640.0	83.4 83.5	5.0	N NI-60/0 1	N (3 O)	(2.4)					-					
	-	ļ	3.0	4:10/1.0 3:38/1.0 3:36/1.0 4:26/1.0 3:28/1.0	78%	48%					-					
635	635.0	99.5		3:36/1.0 4:26/1.0							-					
033	635.9	88.5	5.0	N=60/0.1	(3.8)	(2.2)					-					
	-	<u> </u>		N=60/0.1 4:26/1.0 4:19/1.0 5:52/1.0 4:35/1.0 3:30/1.0	76%	44%					- -					
630	629.9	93.6		4:35/1.0 3:30/1.0							- 629.9					93
	-	Ĺ		\ <u>N=60/0.0</u>	9/						-		/ITH STANDARD PENETR ft IN CRYSTALLINE ROCK			
	-	ŀ									-			(=::;	,	,
	-	ŀ									<del>-</del>					
	-	F									•					
	-	F									-					
	-	F									-					
	-	ļ.									-					
	_	ļ									-					
	-	ļ.									-					
	-	‡									- -					
	-	<u> </u>									<del>-</del>					
	-	<u> </u>									-					
	-	_									<u>.</u>					
	-	<u> </u>									<b>-</b>					
	-	ŀ									-					
	_	F									-					
	-	F									-					
	-	ļ									-					
	-	<u> </u>									-					
	-	‡									-					
	-	ţ									-					
	-	<u> </u>									-					
	-	Ł									-					
	_	F									-					
	-	Ţ.									-					
	_	_			4											

## Project No. 44475.1.2 (P-5705B)

## **Charlotte Gateway Station and Track and Safety Improvements**

## **CORE PHOTOGRAPHS**

**B-4** BOX 1: 64.7 - 78.4 FEET



**B-4** BOX 3: 88.6 - 93.6 FEET



**B-4** BOX 2: 78.4 - 88.6 FEET





COUNTY MECKLENBURG **WBS** 44475.1.2 **TIP** P-5705B GEOLOGIST SCHLEMM, T.S. SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENT **GROUND WTR (ft) BORING NO.** B-5 **STATION** 21+53 OFFSET 9 ft RT ALIGNMENT -S1-0 HR. N/A **EASTING** 1,448,261 COLLAR ELEV. 727.6 ft TOTAL DEPTH 88.1 ft **NORTHING** 544,497 24 HR. 24.0 HAMMER TYPE Automatic DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017 DRILL METHOD SPT Core Boring DRILLER EKLUND, M.A. **START DATE** 10/05/17 **COMP. DATE** 10/06/17 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH **BLOW COUNT** SAMP. **BLOWS PER FOOT** ELEV SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 75 100 NO. DEPTH (ft) 730 **GROUND SURFACE** 726.6 + 1.0 ARTIFICIAL FILL . . . . . . . . . . . . М 725 BROWN AND GRAY, SILTY CLAY, М RESIDUAL 721.6 BROWN AND GRAY, CLAYEY SILT M 720 718.1 M BROWN AND WHITE, SILTY FINE TO 715 714.1 13.5 11 М 710 709.1 T 18.5 15 M 705  $\blacksquare$ 704.1 T 23.5 16 20 27 700 699.1 T 28.5 20 W 695 694.1 33.5 27 W 690 689.1 T 38.5 18 33 67 100/1.0 WEATHERED ROCK (BROWN AND WHITE, GRANITOID) 685 680 680.6 + 47.0 . . . 50 43 57/0.4 100/0.9 675 675.2 52.4 CRYSTALLINE ROCK 60/0.1 BROWN AND WHITE, GRANITOID . . . . . . . <u>9</u> 670 670.1 57.5 CRYSTALLINE ROCK 60/0.1 . . . . 665 665.0 62.6 WEATHERED ROCK 100/0.3 (BROWN, DIABASE) 660 659.7 + 67.9 60/0.1 . 60/0.1 CRYSTALLINE ROCK . . . . - - - -BROWN, DIABASE . . . 655 654.6 + 73.0 60/0.1 - 60/0.1 . . . .

## GEOTECHNICAL BORING REPORT

**SHEET 14 OF 23** 

									<u>B</u>	BORE	LOG						
WBS	44475	.1.2			T	P	P-5705B		COUNT	Y MECKL	ENBURG			GEOLOGIST SCHLEM	M, T.S		
SITE	DESCRI	IPTION	I CHA	RLOT	TE GA	TEV	WAY STA	TION AN	D TRACK	AND SAFE	TY IMPE	ROVEN	1ENT			ROUN	ID WTR (ft)
BORI	NG NO.	B-5			S	TAT	<b>ΓΙΟΝ</b> 21-	+53		OFFSET	9 ft RT			ALIGNMENT -S1-		0 HR.	N/A
COLL	AR ELE	EV. 72	27.6 ft		T	OTA	AL DEPTI	<b>H</b> 88.1 f	t	NORTHIN	<b>G</b> 544,4	97		<b>EASTING</b> 1,448,261	2	<b>24 HR</b> . 24	
DRILL	RIG/HAM	MER EF	F./DAT	E TEF	R346 DI	EDR	RICH D-50	90% 03/10	/2017		DRILL	NETHO	D SP1	Core Boring HAMMER TYPE Automatic			Automatic
DRILI	LER E	KLUND	, M.A.		S	TAR	RT DATE	10/05/1	7	COMP. D	ATE 10	06/17		SURFACE WATER DEP	TH N/A		
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	O.5ft	0.5ft		0	2.5		PER FOO' 50	T 75 10	SAMP NO.	MOI	L O I G	SOIL AND ROC	CK DESCR	RIPTION	DEPTH (ft
	ELEV	(ft)	0.5ft	0.5ft			2:	5			NO.	17	0	ELEV. (ft)  649.5 CRYSTAL  BROWN AND W  641.3 CRYSTAL  639.5 BROWN  Boring Terminater  PENETRATION  Elevation 639.5 fi IN	LINE ROC HITE, GR LINE ROC I, DIABASE d WITH ST TEST REF	ANITOI	DEPTH (fr
		-												-			



#### GEOTECHNICAL BORING REPORT CORFIGG

	0 0		Cientist						<u>C</u>	<u>;O</u>	RE LOG							
WBS	<b>3</b> 44475	5.1.2			TIP	P-570	5B	С	OUNT	ΥN	MECKLENBURG		GEOLOGIST SCHLEMM, T.S					
SITE	DESCR	IPTION	CHA	RLOTTE	GATE	WAY S	STATION	AND T	RACK	( AN	O SAFETY IMPRO\	/EMENT				GROU	ND WTR (ft)	
BOR	RING NO.	B-5			STA	TION	21+53			OF	FSET 9 ft RT		ALIGNME	<b>NT</b> -S1-		0 HR.	N/A	
COL	LAR ELI	<b>EV.</b> 72	7.6 ft		TOT	AL DE	PTH 88.	.1 ft		NC	<b>RTHING</b> 544,497		EASTING	1,448,261		24 HR.	24.0	
DRIL	L RIG/HAM	MER EF	F./DAT	E TER34	6 DIEDI	RICH D-	50 90% 0	3/10/201	7		DRILL MET	HOD SPT	Core Boring		HAMM	ER TYPE	Automatic	
DRII	LER E	KLUND	, M.A.		STA	RT DA	TE 10/0	5/17		CC	MP. DATE 10/06/	17	SURFACE	WATER DE	PTH N/	A		
COR	RE SIZE	HQ3					<b>N</b> 46.0 f	t										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	UN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	ELEV. (ft)	D	ESCRIPTION	AND REMAR	KS		DEPTH (f	
687.6	687.6 -	40.0		0.50//.0	(2.2)	(0.0)				Sam				ng @ 40.0 ft				
685	681.6 -	46.0	6.0	0:59/1.0 1:31/1.0 2:09/1.0 2:31/1.0 1:50/1.0 1:45/1.0	(0.0)	(0.0)					- - - - -	(BROWN		<b>ERED ROCK</b> E, GRANITOID	) (continu	red)		
680	680.2	47.4	5.0	N=100/0.9 0:58/1.0 1:10/1.0 2:55/1.0 1:07/1.0 1:53/1.0	(0.0)	(0.0)											52	
675	675.2 - 675.1 - - - - 670.0 -		5.0	N=60/0.1 1:28/1.0 1:39/1.0 2:31/1.0 1:55/1.0 2:12/1.0	(0.0) 0%	(0.0) 0%		(0.0) 0%	(0.0) 0%		_		E, MODERAT Y FRACTURE GSI	LLINE ROCK FELY SEVERE ED, MASSIVE, I 40 - 45			•	
665	665.9 665.9		5.0	N=60/0.1 5:55/1.0 8:10/1.0 7:08/1.0 5:46/1.0 5:51/1.0	(4.0) 80%	(1.9) 38%		(4.0) 78%	(1.9) 37%				RATE TO MOI RD TO SOFT GSI	LLINE ROCK DRATELY SEV , CLOSELY FI I 40 - 50				
660	659.7	02.0	5.0	V=100/0. 3:41/1.0 2:29/1.0 1:04/1.0 1:59/1.0 1:48/1.0	(0.5) 10%	(0.0) 0%					- - - - - 659.7		(BROWI	ERED ROCK N, DIABASE)			67.	
655	654.6 654.5		5.0	N=60/0.1 5:14/1.0 5:54/1.0 7:09/1.0 6:46/1.0 6:29/1.0 N=60/0.1 4:13/1.0 5:55/1.0	(1.6) 32% (3.4) 68%	(0.0) 0% (1.4) 28%		(4.9) 48%	(1.4) 14%		BROWN,		ELY SEVERE FT, CLOSELY	LLINE ROCK WEATHEREI FRACTURED 145 - 50			HARD	
650	649.5	78.1	5.0	5:55/1.0 5:22/1.0 12:29/1.0 6:13/1.0 <i>N=60/0.0</i> 4:24/1.0 4:33/1.0 6:00/1.0	(1.3) 26%	(0.0)		(3.9) 48%	(1.5) 18%		- 649.5 BROWN CLOSEL	AND WHIT	E, MODERAT RED, MASSIV	LLINE ROCK FELY SEVERE E, GRANITOI	— — — — E WEATH D, VERTI	- — — — ERED, S CAL DIAE	<u> </u>	
645	644.5	83.1	5.0	6:00/1.0 4:54/1.0 5:01/1.0 <i>N=60/0.0</i> 4:23/1.0 4:50/1.0 5:03/1.0	84%	(2.0) 40%		(4.0)	(0.5)				GSI	1 40 - 45			86	
640	639.5	88.1		¥:29/1:0 - 3:10/10 N=60/0.c	7			(1.6) 89%	(0.5) 28%		MODER Boring Te	ATELY HA	TELY SEVER RD TO MEDII DI/ GSI VITH STAND/	LLINE ROCK  IE TO MODER  WM HARD, CL  ABASE  145 - 50  ARD PENETR  ALLINE ROCK	OSELY F	RACTUR	JSAL	

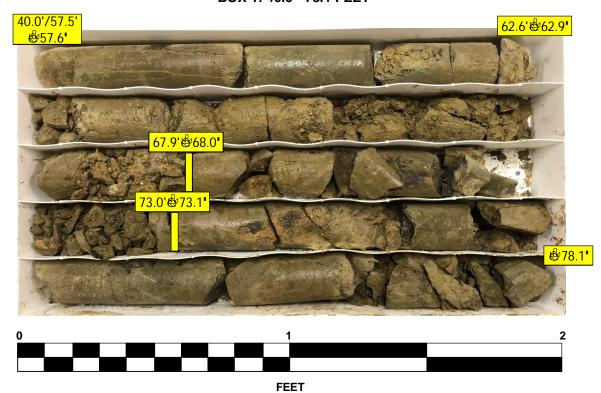
**SHEET 15 OF 23** 

Project No. 44475.1.2 (P-5705B)

**Charlotte Gateway Station and Track and Safety Improvements** 

## **CORE PHOTOGRAPHS**

**B-5** BOX 1: 40.0 - 78.1 FEET



**B-5** BOX 2: 78.1 - 88.1 FEET



FEET



<b>WBS</b> 44475.1.2	TIP P-5705B COU	NTY MECKLENBURG	GEOLOGIST SCHLEMM, T.S		<b>WBS</b> 44475.1.2	TIP P-5705B COUN	ITY MECKLENBURG	GEOLOGIST SCHLEMM, T.S
SITE DESCRIPTION CHARLOTTE	GATEWAY STATION AND TRA	CK AND SAFETY IMPROVEMENT	1	GROUND WTR (ft)	SITE DESCRIPTION CHARL	LOTTE GATEWAY STATION AND TRAC	CK AND SAFETY IMPROVEMENT	GROUND WTR (ft)
BORING NO. B-6	STATION 21+43	OFFSET 39 ft RT	ALIGNMENT -S1-	<b>0 HR.</b> N/A	BORING NO. B-6	<b>STATION</b> 21+43	OFFSET 39 ft RT	ALIGNMENT -S1- 0 HR. N/A
COLLAR ELEV. 727.3 ft	TOTAL DEPTH 98.3 ft	<b>NORTHING</b> 544,525	<b>EASTING</b> 1,448,246	<b>24 HR.</b> 23.0	COLLAR ELEV. 727.3 ft	TOTAL DEPTH 98.3 ft	NORTHING 544,525	<b>EASTING</b> 1,448,246 <b>24 HR.</b> 23.0
DRILL RIG/HAMMER EFF./DATE TER34	46 DIEDRICH D-50 90% 03/10/2017	DRILL METHOD SPT	Core Boring HAMM	IER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE	TER346 DIEDRICH D-50 90% 03/10/2017	DRILL METHOD SE	PT Core Boring HAMMER TYPE Automatic
DRILLER EKLUND, M.A.	<b>START DATE</b> 10/03/17	COMP. DATE 10/05/17	SURFACE WATER DEPTH N/	/A	DRILLER EKLUND, M.A.	<b>START DATE</b> 10/03/17	<b>COMP. DATE</b> 10/05/17	SURFACE WATER DEPTH N/A
ELEV (ft) DRIVE ELEV (ft) DEPTH BLOW COUNTY (ft) 0.5ft 0.5ft 0		OOT SAMP. V L O NO. MOI G	SOIL AND ROCK DES	CRIPTION DEPTH (ft)	=== ·   E  E(/   = · · · ·	COUNT         BLOWS PER FO           0.5ft         0.5ft           0         25           50	OT SAMP. L O NO. MOI G	SOIL AND ROCK DESCRIPTION
730 726.3 1.0 8 9 727.3 3.5 8 9	3 12		727.3 GROUND SURF 726.3 ARTIFICIAL FI GRAVEL BLACK TO RED-BROWN,	LL	650 649.2 78.1 60/0.1 645 644.1 83.2	Match Line	· · · · · · · · · · · · · · · · · · ·	CRYSTALLINE ROCK BROWN, BLACK, AND WHITE, GRANITOID (continued)
720 71.8 = 8.5 5 6 71.8 = 13.5	9	M M	TO COARSE SAND, SOI 721.8  RESIDUAL BROWN, FINE TO COARSI	5.5	639.1 88.2 60/0.1 635 634.0 93.3 60/0.0			
710 708.8 18.5 10 15	22	· ·   · · · · ·	710.3 BROWN AND WHITE, SII COARSE SAN		630 98.3 60/0.0		60/0.0	629.0 98.3 Boring Terminated WITH STANDARD
705 703.8 + 23.5	33	w w	-					PENĚTRATION TEST REFUSAL at LElevation 629.0 ft IN CRYSTALLINE ROCK (BROWN, BLACK, AND WHITE, GRANITOID) L
695	53	83° : W	695.3 BROWN AND WHITE, FINI	32.0				-
693.8 + 33.5 11 19 690 688.8 + 38.5			SANDY SILT					- - - - -
685	7/0.4		WEATHERED D	OCK				- - - -
680 680.9 46.4 100/0.4		100/0.4	-					- - - - -
675 675.5 51.8 100/0.4			-					- - - - -
670 670.1 57.2 100/0.4			-					- - - - -
665 664.7 62.6 100/0.3 660 050.4 070.0		100/0.3	-					<del>-</del> - - -
559.4 67.9 60/0.1			-659.4  CRYSTALLINE R  BROWN, BLACK, ANI GRANITOID	D WHITE,				- - - -
654.3 73.0 60/0.1		60/0.1	_					- - - -



# GEOTECHNICAL BORING REPORT

_    -	Consu	ulting Engi	neers & S	cientists						C	O	RE L	.00	}							
ק ק	WBS	44475	5.1.2			TIP	P-570	5B	С	OUNT	<b>Y</b> N	IECKLEI	NBUR	G		GEOLOG	SIST	SCHLI	EMM, T.	.S	
3	SITE	DESCR	IPTION	I CHA	RLOTTE	GATE	WAY S	STATION	AND 7	ΓRAC	( ANI	SAFE1	TY IME	PROVEN	1ENT					GROU	JND WTR (ft)
	BOR	ING NO	. B-6			STA	TION	21+43			OF	FSET :	39 ft R	RT		ALIGNMI	ENT	-S1-		0 HR	. N/A
	COL	LAR EL	<b>EV</b> . 72	27.3 ft		TOT	AL DE	<b>PTH</b> 98	.3 ft		NC	RTHING	544	,525		EASTING	<b>3</b> 1,4	448,246	i	24 HR	. 23.0
	DRILL	RIG/HAN	MER EF	F./DAT	E TER34	5 DIEDI	RICH D-	50 90% 0	3/10/20	17			DRIL	L METHOD	D SPT	Core Boring			HAN	MMER TYPE	Automatic
	DRIL	LER E	KLUND	, M.A.		STA	RT DA	TE 10/0	3/17		CC	MP. DA	TE 1	0/05/17		SURFAC	E W	ATER D	EPTH	N/A	
	COR	E SIZE	HQ3					<b>N</b> 56.5 f		) A T A	ļ.,										
	ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft)	UN RQD (ft) %	SAMP. NO.	REC. (ft)	RATA RQD (ft) %	L O G	ELEV. (	ft)		DI	ESCRIPTIO	N AN	D REMA	RKS		DEPTH (f
	687.4		39.9	6.5	4:01/1.0	(0.0)	(0.0)				¥770	_				Begin Co		@ 39.9 D ROCK			
	685	680.9	48.4	0.5	1:37/0.5 2:37/1.0 3:27/1.0 2:44/1.0	0%	0%					- - - -		(В	BROWN	I AND WHIT				inued)	
	675	675.5 ·	51.8 52.2	5.0	1:55/1.0 N=100/0.4 1:08/1.0 3:55/1.0 1:26/1.0 3:40/1.0 3:22/1.0		(0.0)					-									
	670	670.1 - 669.7	57.2 57.6	5.0	2:17/1.0 2:57/1.0 3:51/1.0 3:21/1.0 4:50/1.0	(0.0)	(0.0)					-									
	665	664.7 664.7	62:8	5.0	2:07/1.0 2:15/1.0 2:13/1.0 2:42/1.0 2:46/1.0 V=100/0.3	0%	(0.0)					- - - -									
	660	659.4 659.3	67:8 68:8	5.0	1:10/1.0 2:26/1.0 3:22/1.0 2:35/1.0 2:03/1.0 N=60/0.1	(0.0)	(0.0)		(3.2)	(0.9)		- - 659.4		DDOM	WAL DIA			NE ROCI		/ OEVEDE	67.
	655	654.3 654.3	73.9 73.9	5.0	2:03/1.0 N=60/0.1 2:07/1.0 4:19/1.0 4:40/1.0 3:59/1.0 4:10/1.0 N=60/0.1 2:51/1.0	/I (O.E.)	(0.0) 0%		11%	3%		- - - -	W			ACK, AND V FT TO MED MASSIV G	DIUM I	HARD, C RANITOI	CLOSELY		RED,
	650	649.2 649.1	78.1 78.2	5.0	2:51/1.0 4:14/1.0 3:59/1.0 6:25/1.0 3:05/1.0 \N=60/0.1 2:42/1.0 3:06/1.0	(0.9)	(0.5)					- - - -									
	645	644.1	83.2	5.0	2:51/1.0 3:31/1.0 3:40/1.0 <i>N=60/0.0</i>		(0.0)					- - - -									
	640	639.1 639.0	88.2 88.3	5.0	3:54/1.0 3:38/1.0 3:24/1.0 4:35/1.0 3:18/1.0 N=60/0.1	(0.0)	(0.0)					- - - -									
11/14/17	635	634.0	93.3	5.0	3:36/1.0 5:28/1.0 5:07/1.0 5:45/1.0 5:37/1.0 N=60/0.0	0%	(0.4)					- - -									
C DOT.GDT	630	629.0	98.3		4:50/1.0 8:12/1.0 4:08/1.0 5:15/1.0 2:26/1.0 N=60/0.0	30%	8%					629.0	Bori	ng Termir	nated W	/ITH STANI	DARD	PENET	RATION	TEST REF	98. FUSAL
SDOT CORE SINGLE CANOPY GINT LOGS.GPJ NC DOT.GDT 11/14/17																IN CRYSTA	ALLIN		(BROW		

**SHEET 17 OF 23** 

## Project No. 44475.1.2 (P-5705B) Charlotte Gateway Station and Track and Safety Improvements

## **CORE PHOTOGRAPHS**

**B-6 BOX 1: 39.9 - 98.3 FEET** 



FEET



COUNTY MECKLENBURG **WBS** 44475.1.2 **TIP** P-5705B **GEOLOGIST** SCHLEMM, T.S SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENT **GROUND WTR (ft)** BORING NO. B-7 **STATION** 27+50 OFFSET 9 ft RT ALIGNMENT -S1-0 HR. N/A **EASTING** 1,447,844 COLLAR ELEV. 721.7 ft TOTAL DEPTH 88.5 ft **NORTHING** 544,069 24 HR. FIAD HAMMER TYPE Automatic DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017 DRILL METHOD SPT Core Boring DRILLER EKLUND, M.A. **START DATE** 10/09/17 **COMP. DATE** 10/11/17 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH **BLOW COUNT** SAMP. **BLOWS PER FOOT** SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 75 100 NO. DEPTH (ft) 725 PAVEMENT SURFACE 720 720.7 1.0 PAVEMENT ASPHALT (6") CABC (6") RESIDUAL 718.2 BROWN AND GRAY, CLAYEY SILT M 715.7 + 6.0 715 M 713.2 T 8.5 M 710 708.2 13.5 M 705 703.2 <u>18.5</u> 10 M 700 GRAY, FINE SANDY SILT 698.2 1 23.5 15 M 695 693.2 1 28.5 18 22 M 690 688.2 1 33.5 5 BROWN, CLAYEY SILT 685 683.2 38.5 100/0.5 WEATHERED ROCK 100/0.5 (BROWN, META INTRUSIVE) 680 676.2 45.5 RESIDUAL 675 M GRAY-BROWN TO BROWN, CLAYEY 670 669.4 52.3 WEATHERED ROCK 100/0.3 100/0.3 (BROWN, META INTRUSIVE) 일 665 664.4 57.3 58 42/0.3 100/0.8 660 658.6 - 63.1 - 60/0.1 CRYSTALLINE ROCK BROWN AND WHITE TO LIGHT GRAY, GRANITOID GANOP 655 . . . . 653.5 + 68.2 - 60/0.1 650 648.4 † 73.3 - 60/0.1 . . . .

## GEOTECHNICAL BORING REPORT

**SHEET 18 OF 23** 

									<u>RE L</u>				-				
WBS 4447	5.1.2			TII	<b>P</b> P-570	5B	COU	NTY N	/IECKLE	NBUR	3		GEOLOG	IST SCH	ILEMM, T.S		
SITE DESCR		CHA	RLOTT	E GA	TEWAY S	TATION	AND TRA	CK AN	D SAFE	TY IMP	ROVE	MENT	1			GROUNI	WTR (ft)
BORING NO	<b>).</b> B-7			ST	TATION	27+50		OF	FSET	9 ft RT			ALIGNME	NT -S1-		0 HR.	N/A
COLLAR EL	.EV. 72	21.7 ft		TC	OTAL DE	<b>PTH</b> 88	.5 ft	NC	ORTHING	544	069		EASTING	1,447,8		24 HR.	FIAD
DRILL RIG/HA	MMER EF	F./DATI	E TER	346 DIE	EDRICH D-	50 90% 0	3/10/2017			DRILL	METHO	D SP	T Core Boring		HAMI	MER TYPE /	Automatic
DRILLER E					TART DA				MP. DA	_		<del></del>	SURFACE	WATER	<b>DEPTH</b> N	/A	
ELEV DRIVE ELEV (ft)	DEPTH (ft)	<b>'</b> ——	W COL	JNT 0.5ft	0	BLOV 25	VS PER FO	OT 75	100	SAM NO	MC MC	O G	ELEV. (ft)	SOIL AND	D ROCK DES	SCRIPTION	DEPTH (ft)
640	83.4	60/0.0 60/0.0					Match Line		60/0.0				633.2	ROWN ANI GRA Boring Tern PENET RA vation 633.	ninated WITH TION TEST T fill CRYS GRAY, GRA	LIGHT GRA tinued) I STANDARI REFUSAL at TALLINE RC	Y, 88.5

0012DEL\_P28



# GEOTECHNICAL BORING REPORT CORE LOG

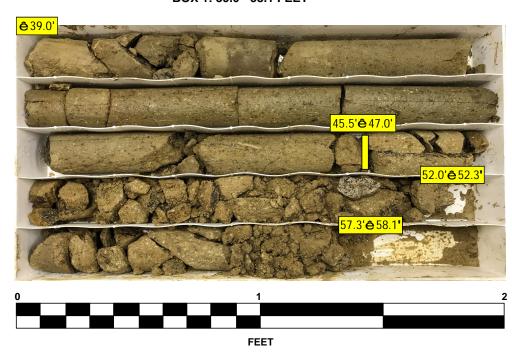
SHEET 19 OF 23

VBS	44475	.1.2			TIP	P-570	5B	C	OUNT	Y N	ECKLENBURG	GEOLOGIST SCHLEN	ИМ, T.S			
ITE	DESCRI	PTION	СНА	RLOTTE	GATE	WAY S	STATION	AND T	RACK	( ANE	SAFETY IMPROVEMENT	<u> </u>		GROUN	D WTR (ft	
	NG NO.				_		27+50			_	F <b>SET</b> 9 ft RT	ALIGNMENT -S1-		0 HR.	N/A	
OLL	AR ELE	<b>V</b> . 72	1.7 ft		тот	AL DE	PTH 88.	5 ft		NO	RTHING 544,069	<b>EASTING</b> 1,447,844		24 HR.	FIAD	
RILL	RIG/HAM	MER EF	F./DATI	E TER34			50 90% 03		7		DRILL METHOD SPT		HAMM	HAMMER TYPE Automatic		
	ER E				_		<b>TE</b> 10/0			СО	MP. DATE 10/11/17	SURFACE WATER DE	-			
	SIZE		,		+		<b>N</b> 46.5 f									
LEV	RUN	DEPTH	RUN	DRILL	R	ŲN	SAMP.	STR		L						
(ft)	ELEV (ft)	(ft)	(ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft) %	NO.	REC. (ft)	RQD (ft) %	O G	DI ELEV. (ft)	ESCRIPTION AND REMAR	KS		DEPTH (	
32.7												Begin Coring @ 39.0 ft			,	
	682.7	39.0	6.5	4:05/1.0 1:58/0.5	(5.5) 85%	(4.1) 63%					- (BRO	WEATHERED ROCK WN, META INTRUSIVE) (C	ontinued)	ı		
088	-	-		1:58/0.5 3:13/1.0 3:36/1.0		0070						VVII, ME 17 (111111001112) (01	orrana ay			
				3:54/1.0	;						- -					
375	676.2 <b>1</b> 674.7 <b>-</b>	-		3:25/1.0 N=83	)					. V	676.2	RESIDUAL			45	
	0/4./-	- 47.0	5.0	6:30/1.0		(0.0)				1 V	-					
		-		4:52/1.0 3:17/1.0	)	0%				17.7	•					
570	669.7 669.4	- <u>52.0</u>		3:37/1.0 2:20/1.0	)					7 1	<b>-</b> 669.7	WEATHERED DOOK			52	
	-	- 02.0	5.0	V=100/0. 9:07/1.0 3:26/1.0 6:51/1.0 6:41/1.0	3 (1.4) 28%	(0.0)					• •	WEATHERED ROCK (BROWN, META INTRUSIV	/E)			
65	1	-		3:26/1.0 6:51/1.0 6:41/1.0							<del>-</del> -					
05	664.4 <del>-</del> 663.6 -	57.3 58.1		3:11/1.0 N=100/0.	8						<del>-</del> •					
	-	-	5.0	1:44/1.0 8:30/1.0	(1.9)	(0.0)					• •					
60		-		8:10/1.0 4:33/1.0	)	***					-					
	658.6 658.5	63.1 63.2	5.0	4.51/1.0	)	(0.8)		(14.5)	(3.4)		- 658.6 -	CRYSTALLINE ROCK			63	
		-	3.0	5:43/1.0 2:29/1.0	94%	16%		57%	13%			ΓΕ ΤΟ LIGHT GRAY, MODE ΓHERED, MEDIUM HARD T				
555	653.5	- 68.2		N=60/0. 5:43/1.0 2:29/1.0 2:02/1.0 2:10/1.0 1:46/1.0								), GRANITOID, DIABASE SI				
	653.5 653.4	- 68.2 - 68.3 -	5.0	N=60/0.	(2.2)	(0.0)						GSI 50 - 60				
550	-	-		N=60/0. 2:05/1.0 2:04/1.0 5:53/1.0 4:55/1.0	44%	0%					<u>.</u>					
	648.4	- - <u>7</u> 3.3		3.02/1.0												
	- 040.5	-	5.0	\ <u>N=60/0.</u> 7:37/1.0 8:54/1.0	½ (2.1) 42%	(1.4) 28%					•					
345	- 4	-		4:27/1.0 3:39/1.0	)						• <del>-</del>					
H	643.3	78.4 -	5.0	3:52/1.0 N=60/0.0	2 (3.5)	(1.2)					•					
640	- 1	-		4:10/1.0 3:13/1.0 3:46/1.0 1:34/1.0 5:37/1.0	70%	24%					<del>.</del> •					
, 10	638.3 638.2	- - 83.4 - 83.5		3:46/1.0 1:34/1.0 5:37/1.0												
	638.2 +	€83.5/ -	5.0	N/1—6(1)(1)	1/I <i>(つ</i> ())	(0.0) 0%					<del>.</del>					
35	- 1	-		2:51/1.0 12:42/1.0 6:32/1.0 5:21/1.0	) 10%	0,0					• <del>-</del>					
-	633.2	88.5		5:21/1.0 5:57/1.0 \ <i>N=60/0.</i> 0							633.2 Boring Terminated M	/ITH STANDARD PENETRA	TION T	EQT DEFIIG	88	
	-	-		11-00/0.0								3.2 ft IN CRYSTALLINE RO			DAL	
	-	<u>-</u>									<del>-</del> ·	GRANITOID)				
	1	<b>-</b>									•					
		-									• <del>-</del>					
	1	-									•					
	-	-									<u>.</u>					
	-	-									<u>-</u>					
	}	-									-					
	-	<u>-</u>									-					
	7	-									<del>-</del> ·					
	‡	-									• •					
	4	-									• <del>-</del>					
	-	- -									• •					
	1	-									<u>.</u>					
	_	-									_					

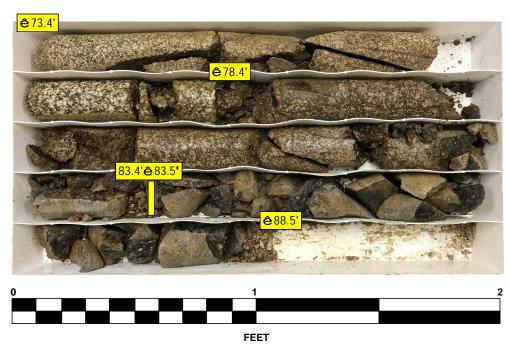
# Project No. 44475.1.2 (P-5705B) Charlotte Gateway Station and Track and Safety Improvements

## **CORE PHOTOGRAPHS**

**B-7** BOX 1: 39.0 - 58.1 FEET



**B-7** BOX 3: 73.4 - 88.5 FEET



**B-7** BOX 2: 58.1 - 73.3 FEET



FEET



COUNTY MECKLENBURG **WBS** 44475.1.2 **TIP** P-5705B **GEOLOGIST** SCHLEMM, T.S SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENT **GROUND WTR (ft) BORING NO.** B-8 **STATION** 27+61 **OFFSET** 40 ft RT ALIGNMENT -S1-0 HR. N/A **EASTING** 1,447,815 FIAD COLLAR ELEV. 722.7 ft TOTAL DEPTH 85.8 ft **NORTHING** 544,083 24 HR. DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017 DRILL METHOD SPT Core Boring HAMMER TYPE Automatic DRILLER EKLUND, M.A. **START DATE** 10/11/17 **COMP. DATE** 10/13/17 SURFACE WATER DEPTH N/A ELEV DRIVE DEPTH **BLOW COUNT** SAMP. **BLOWS PER FOOT** SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 50 75 100 NO. DEPTH (ft) 725 **GROUND SURFACE** ARTIFICIAL FILL 721.7 RED, BROWN, AND GRAY, SILTY CLAY, . . . . . . . . 720 TRACE GRAVEL RESIDUAL W BROWN AND GRAY, SILTY CLAY 716.7 715.7 M 715 BROWN, CLAYEY SILT М 710 M 705 BROWN, FINE SANDY SILT 703.9 18.8 25 М 700 698.9 4 23.8 29 М 695 BROWN, CLAYEY SILT 693.9 28.8 M 690 688.9 33.8 60/0.0 CRYSTALLINE ROCK BROWN, WHITE, AND BLACK, GRANITOID 685 681.9 40.8 60/0.0 60/0.0 680 676.9 <del>45.8</del> 60/0.0 . . . 675 671.9 1 50.8 60/0.0 670 666.9  $\downarrow$  55.8 60/0.0 60/0.0 665 661.9 4 60.8 60/0.0 60/0.0 655 . . . . 651.9 4 70.8 60/0.0 60/0.0 650 . . . . 60/0.0

## GEOTECHNICAL BORING REPORT

**SHEET 21 OF 23** 

	GROUND WTR (			
STATION 27+61   OFFSET 40 ft RT   ALIGNMENT -S1-	-			
COLLAR ELEV. 722.7 ft	<b>0 HR</b> . N			
DRILL RIG/HAMMER EFF./DATE   TER346   DIEDRICH D-50   90%   03/10/2017   DRILL METHOD   SPT Core Boring   HAMMER EFF./DATE   TER346   DIEDRICH D-50   90%   03/10/2017   DRILL METHOD   SPT Core Boring   HAMMER EFF./DATE   TER346   DIEDRICH D-50   90%   03/10/2017   DRILL METHOD   SPT Core Boring   HAMMER EFF./DATE   TO.13/17   SURFACE WATER DEPTH   NO.   NO.   MOI   GELEV. (ft)   SOIL AND ROCK DESCRIPTION   GRANITOID (core of the cor				
DRILLER   EKLUND, M.A.   START DATE   10/11/17   COMP. DATE   10/13/17   SURFACE WATER DEPTH   N	<b>24 HR</b> . FIA			
DRIVE   CITY   DEPTH   BLOW COUNT   DEPTH   BLOW COUNT   D.5ft   0.5	MER TYPE Automatic			
(ft) (ft) (ft) (0.5ft   0.5ft   0.5ft   0.5ft   0   25   50   75   100   NO.   MOI   G   ELEV. (ft)    Match Line   CRYSTALLINE   BROWN, WHITE, AN GRANITOID (continue)   Go/0.0    636.9   85.8   60/0.0   Boring Terminated WITH-PENETRATION TEST   Elevation 636.9 ft IN CRYS (BROWN, WHITE, AN GROW	SURFACE WATER DEPTH N/A			
645   Match Line   CRYSTALLINE   BROWN, WHITE, AN GRANITOID (con 636.9   Boring Terminated WITH PENETRATION TEST   Elevation 636.9   In CRYSTALLINE   BROWN, WHITE, AN GROWN, WH	SCRIPTION			
640  640  640  636.9  60/0.0  60/0.0  60/0.0  60/0.0  60/0.0  60/0.0  60/0.0  60/0.0  60/0.0  60/0.0  60/0.0  60/0.0	DEPTH			
640  640  640  640  640  640  640  640				
640  640  640  640  640  640  640  640	==			
640  636.9  636.9  60/0.0  60/0.0  60/0.0  636.9  636.9  60/0.0  Boring Terminated WITH PENETRATION TEST Elevation 636.9 ft IN CRYS (BROWN, WHITE, AN	ID BLACK			
636.9 85.8 60/0.0 60/0.0 60/0.0 60/0.0 636.9 Boring Terminated WITH PENETRATION TEST Elevation 636.9 ft IN CRYS (BROWN, WHITE, AN	tinued)			
636.9				
60/0.0  Boring Terminated WITH PENETRATION TEST Elevation 636.9 ft IN CRYS (BROWN, WHITE, AN	8			
Legislation 636.9 ft IN CRYS  Blevation 636.9 ft IN CRYS  (BROWN, WHITE, AN	STANDARD			
	TALLINE ROCK			
	ND BLACK, ))			
<del>                                    </del>				

## GEOTECHNICAL BORING REPORT

**CORE LOG** COUNTY MECKLENBURG GEOLOGIST SCHLEMM, T.S. **TIP** P-5705B **WBS** 44475.1.2 GROUND WTR (ft) SITE DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENT OFFSET 40 ft RT ALIGNMENT -S1-BORING NO. B-8 **STATION** 27+61 0 HR. N/A COLLAR ELEV. 722.7 ft TOTAL DEPTH 85.8 ft **NORTHING** 544,083 **EASTING** 1,447,815 24 HR. FIAD DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017 DRILL METHOD SPT Core Boring HAMMER TYPE Automatic DRILLER EKLUND, M.A. **START DATE** 10/11/17 **COMP. DATE** 10/13/17 SURFACE WATER DEPTH N/A CORE SIZE HQ3 TOTAL RUN 52.0 ft DRILL RATE (Min/ft) 
 STRATA
 L

 REC.
 RQD
 O

 (ft)
 (ft)
 G
 ELEV (ft) DEPTH RUN (ft) (ft) SAMP. RQD (ft) % ELEV DESCRIPTION AND REMARKS (ft) NO. (ft) DEPTH (ft) Begin Coring @ 33.8 ft

CRYSTALLINE ROCK

BROWN, WHITE, AND BLACK, TO BLACK, WHITE, AND GRAY,
MODERATELY WEATHERED TO FRESH, MODERATELY HARD TO 688.9 33.8 1:31/1.0 (4.0) (1.0) 3:53/1.0 57% 14% 2:54/1.0 (16.8) 32% 685 2:53/1.0 2:53/1.0 3:17/1.0 6:10/1.0 2:15/1.0 VERY HARD, CLOSELY FRACTURED, MASSIVE, GRANITOID, COMPLETELY WEATHERED DIABASE SILL INTRUSION AT 48.0' 49.0' GSI 50 - 55 681.9 5.0 <u>N=60/0.0</u> (4.4) (0.8) 3:22/1.0 88% 16% | N=60/0.0| (4.4) (0.8) | 3:22/1.0| 88% | 16% | 3:12/1.0| 2:22/1.0| | 16% | 5:01/1.0| | 3:45/1.0| | (3.3) (0.6) | 4:15/1.0| 666% | 12% | 2:34/1.0| | 2:32/1.0| | (4.2) (1.6) | 3:22/1.0| (4.2) (1.6) | 3:28/1.0| 84% | 32% | 4:44/1.0| 3:52/1.0| (6:48/1.0| 5:17/1.0| 680 676.9 675 671.9 670 5:17/1.0 \( \bar{N} = 60/0.0 \) (4.7) (3.4) 5:31/1.0 94% 68% 5:15/1.0 665 5.0 4:56/1.0 4/07/1.0 (2.3) 0.0 0/060/0.0 (4.7) (2.3) 0.0 0/060/0.0 (4.7) (2.3) 0.0 0/060/0.0 (4.7) (2.3) 0.0 0/060/0.0 (4.7) (2.3) 0.0 0/060/0.0 (4.7) (2.3) 0.0 0/060/0.0 (4.7) (4 661.9 660 10:12/1.0 5:14/1.0 N=60/0.0 (4.9) (1.9) 6:50/1.0 98% 38% 5:42/1.0 6:52/1.0 655 5.0 (0.6) (0 651.9 650 646.9 75.8 5.0 N=60/0.0 (4.7) (2.1) 5.0 N=60/0.0 (4.7) (2.1) 10:33/1.0 94% 42% 8:20/1.0 4:29/1.0 4:29/1.0 3:50/1.0 (4.8) (2.5) 9:09/1.0 96% 50% 645 641.9 I 80.8 640 9:09/1.0 5:04/1.0 2:51/1.0 3:07/1.0 3:51/1.0 N=60/0.0 636.9 <u>I</u> 85.8 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 636.9 ft IN CRYSTALLINE ROCK (BROWN, WHITE, AND BLACK, GRANITOID)

**SHEET 22 OF 23** 

Project No. 44475.1.2 (P-5705B) **Charlotte Gateway Station and Track and Safety Improvements** 

#### **CORE PHOTOGRAPHS**

**B-8 BOX 1: 33.8 - 45.8 FEET** 



**B-8 BOX 2: 45.8 - 55.8 FEET** 



FEET

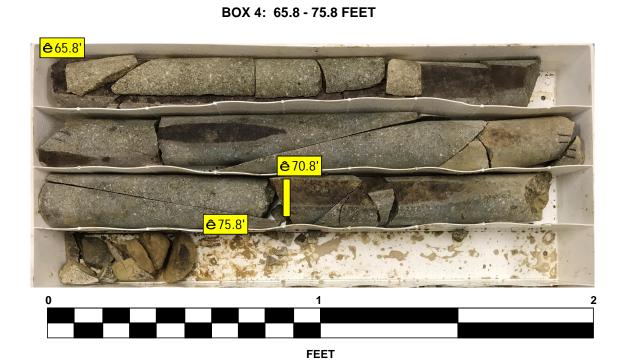
# Project No. 44475.1.2 (P-5705B) Charlotte Gateway Station and Track and Safety Improvements

### **CORE PHOTOGRAPHS**

B-8 BOX 3: 55.8 - 65.8 FEET



**B-8** 



B-8 BOX 5: 75.8 - 85.8 FEET



J. REFERENCE

STATE OF NORTH CAROLINA

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

#### **CONTENTS**

SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND 3-8 SITE PLAN PROFILE(S) LABORATORY SUMMARY REPORT

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG

PROJECT DESCRIPTION CHARLOTTE GATEWAY STATION AND TRACK AND SAFETY IMPROVEMENTS

SITE DESCRIPTION RETAINING WALL #1 AT STA. 13+11 TO 14 + 52 ON -SI

RETAINING WALL #2 AT STA. 19+35 TO 22+57 ON -S2-RETAINING WALL #3 AT STA. 24 + 25 TO 27 + 52 ON -S2-RETAINING WALL #4 AT STA. 28 + 72 TO 35 + 88 ON -SI-RETAINING WALL #5 AT STA. 38+60 TO 40+50 ON -A1-RETAINING WALL #6 AT STA. 44+49 TO 45+99 ON -A1-RETAINING WALL #7 AT STA. 24+30 TO 27+34 ON -S1STATE PROJECT REFERENCE NO. 16 P-5705B

#### **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 BORNOS 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 DECREE OF RELIBBILITY 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 WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

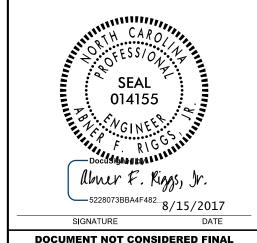
- IES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
  FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
  CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

EKLUND, M. A. STUDNIKY, R. T. TURNAGE, J. R. WERITZ, M. A. COGAR, T. E. DUGGINS, W. T. MASHBURN, S. R. McMILLIN, M. F. INVESTIGATED BY TERRACON CONSULTANTS FIELDS, W. D. DRAWN BY RIGGS, A. F. CHECKED BY SUBMITTED BY TERRACON CONSULTANTS AUGUST 2017

**PERSONNEL** 

RIGGS, A. F.

WEAVER, L. A.



UNLESS ALL SIGNATURES COMPLETED



2401 BRENTWOOD ROAD, SUITE 107 RALEIGH, NORTH CAROLINA 27604 PHONE: (919) 873-2211 FAX: (919) 873-9555 NC REGISTERED FIRM: F-0869

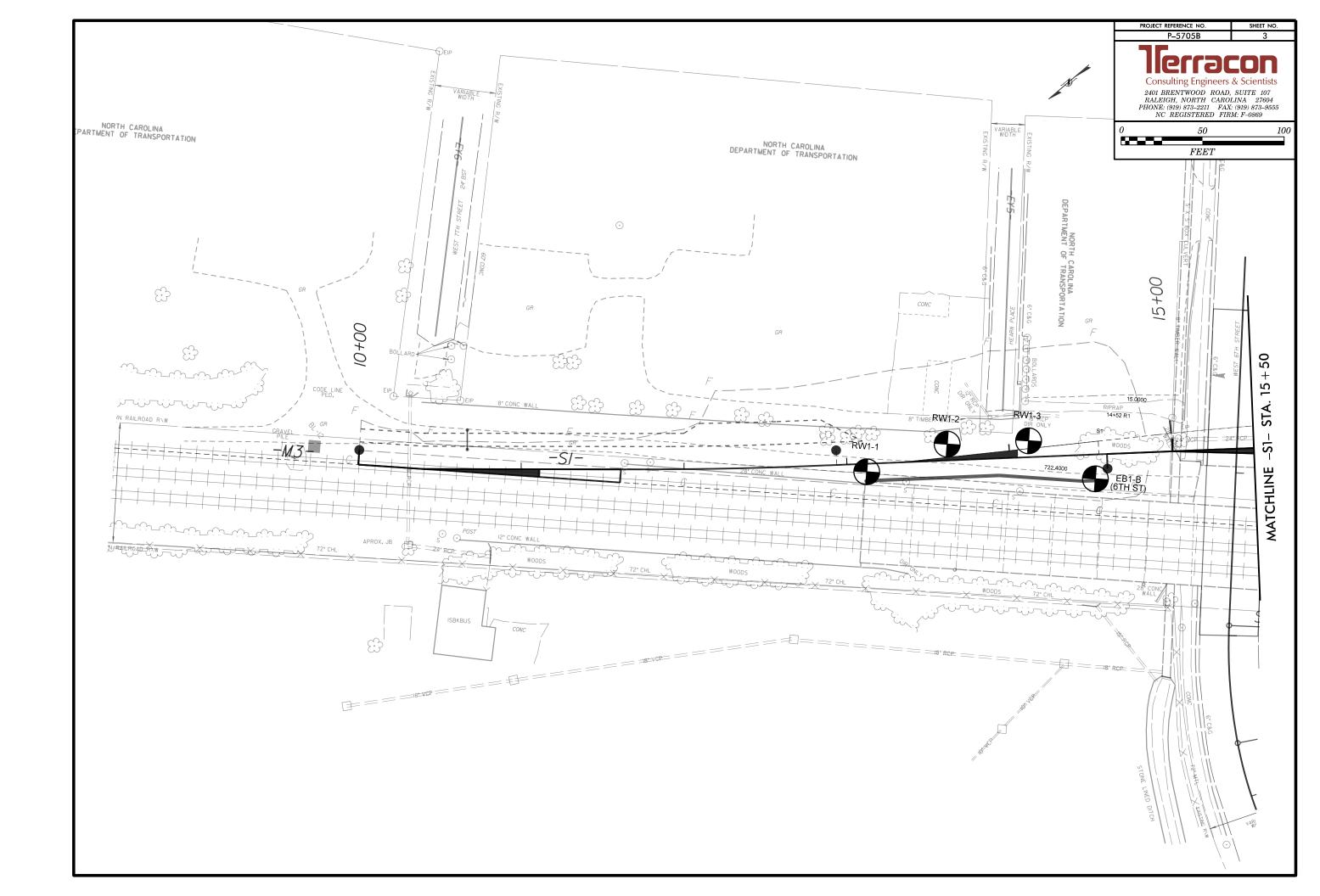
P-5705B 2

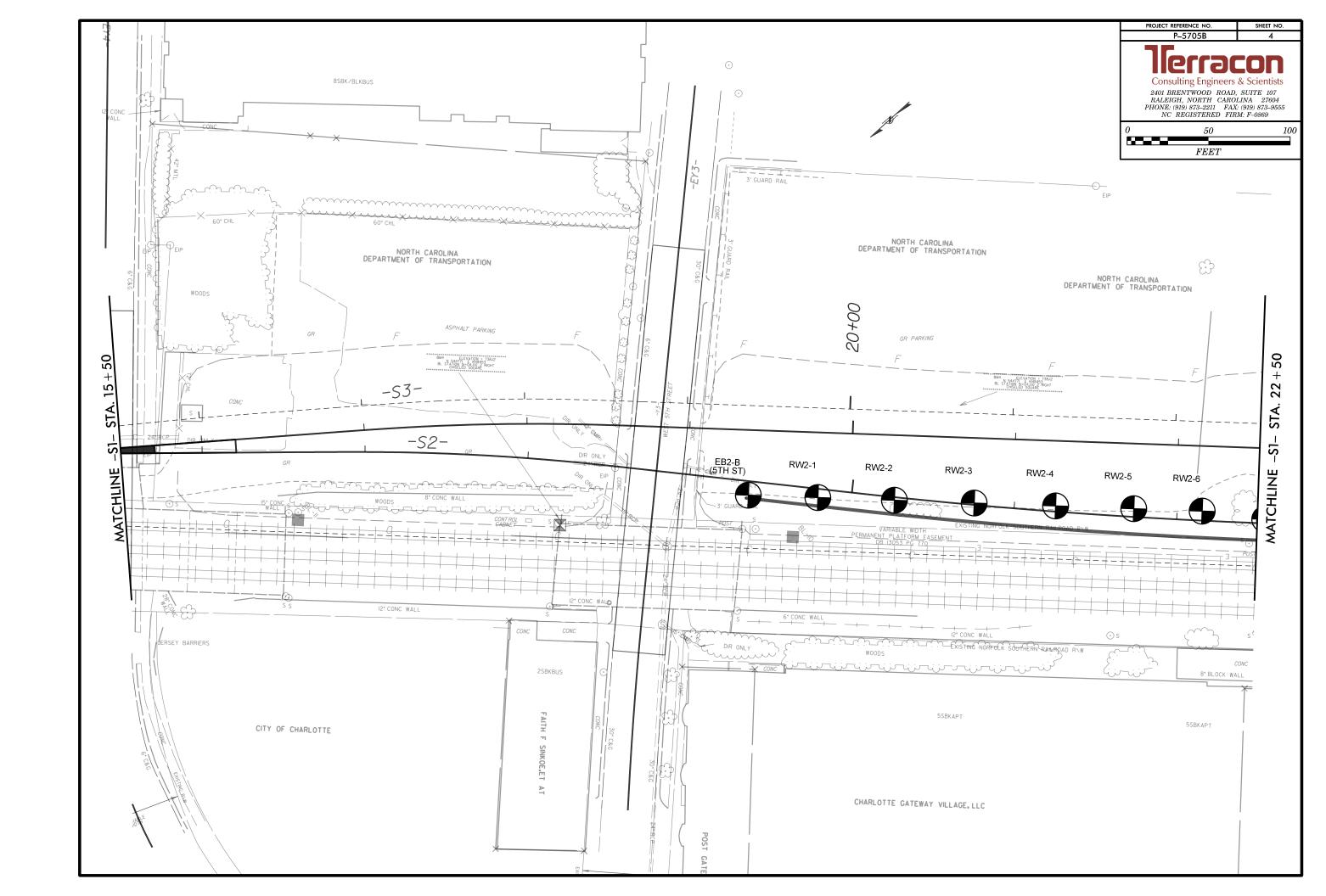
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

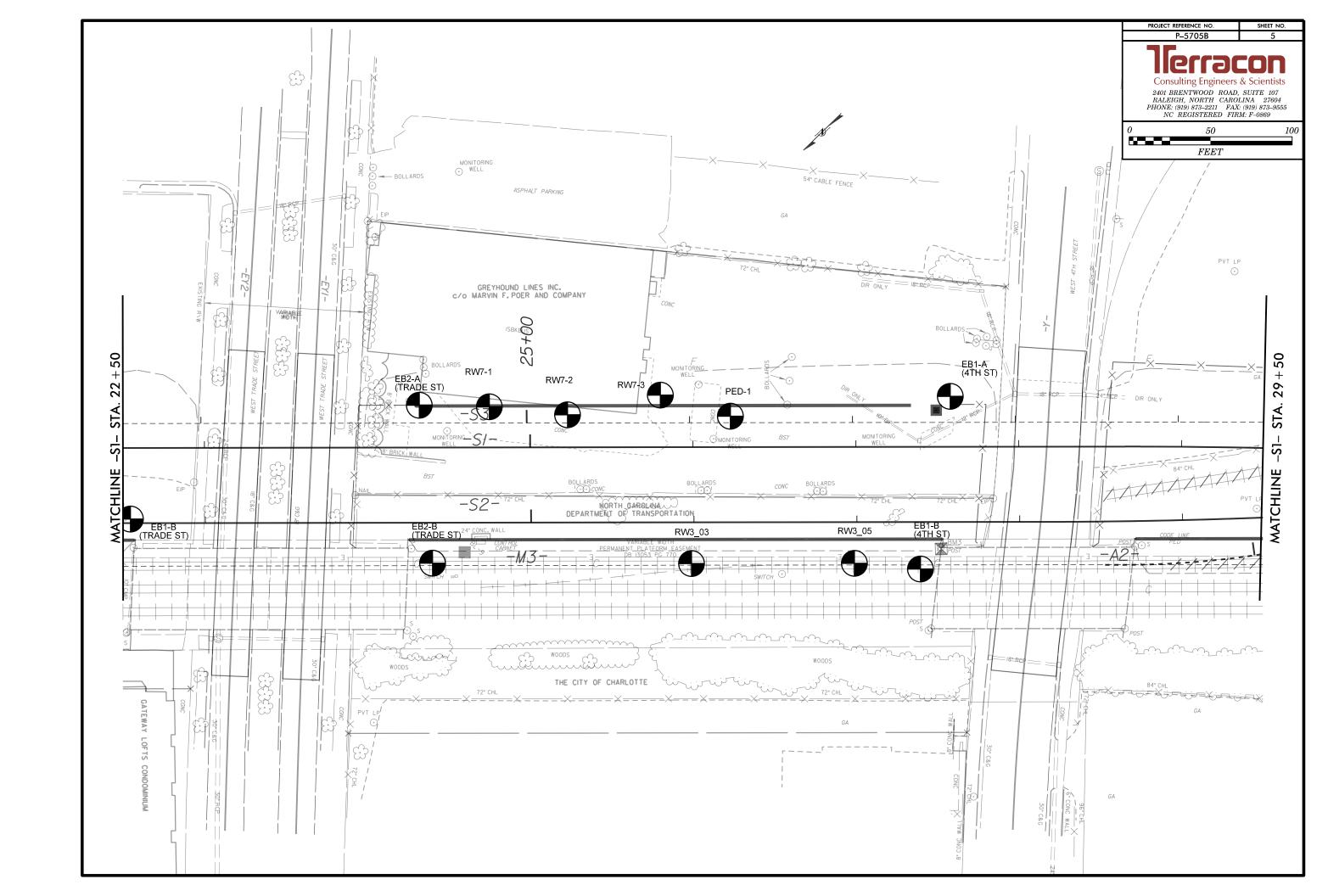
## SUBSURFACE INVESTIGATION

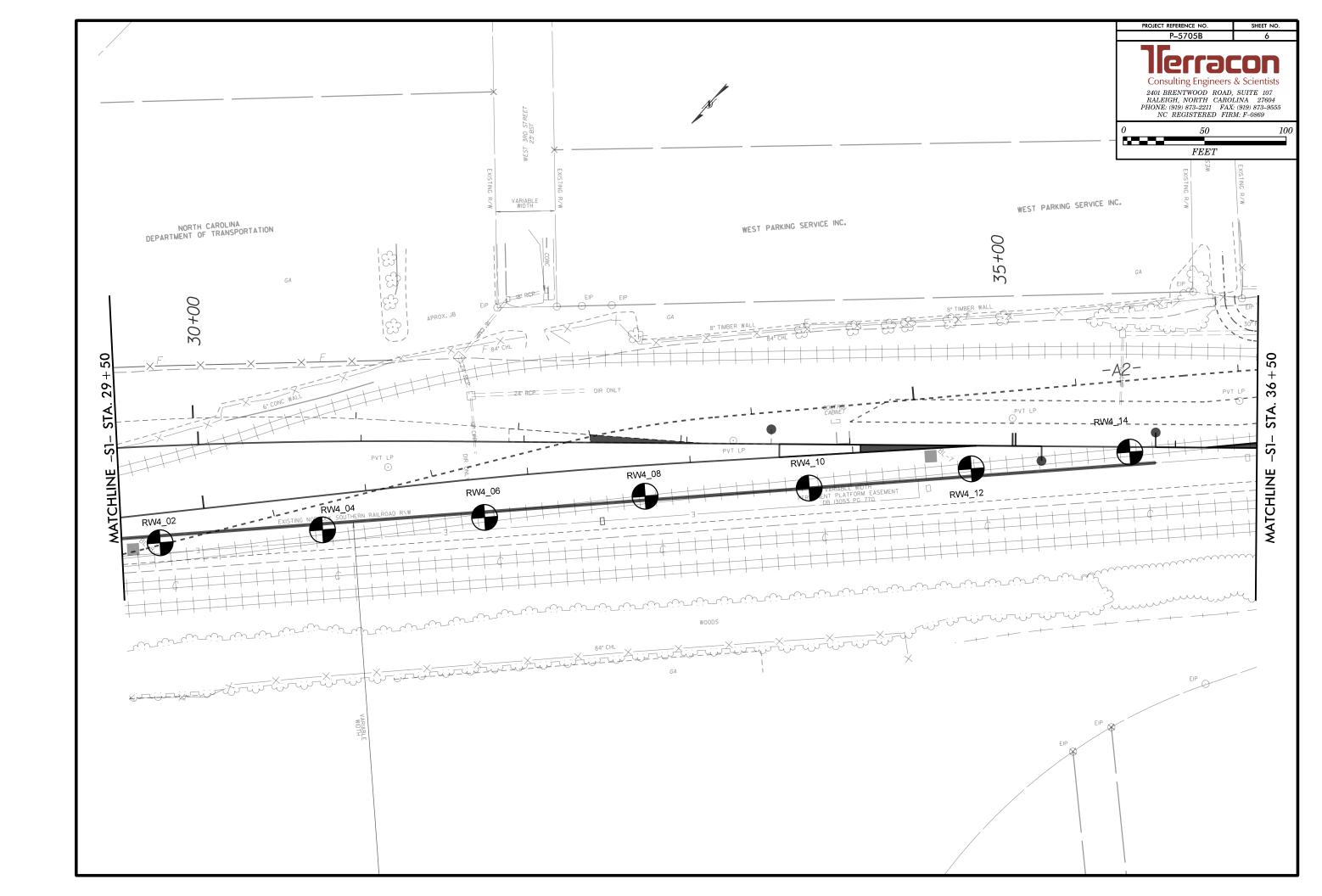
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

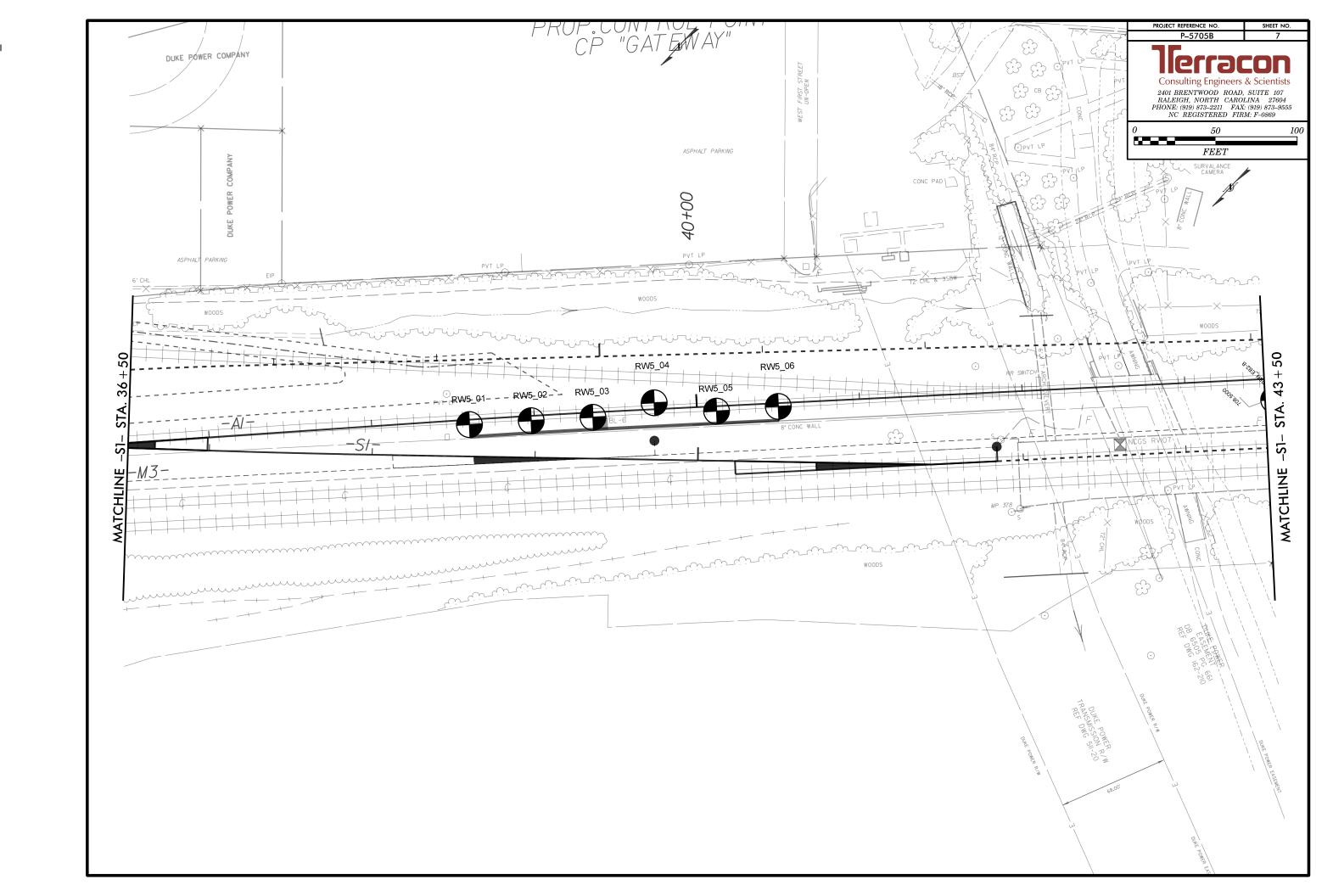
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS						
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF 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.						
CEMERAL CRAMILLAR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	EINE TO COARSE CRAIN ICNEOUS AND METAMORPHIC POCK THAT	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						
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.						
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ONEISS, GABBRO, SCHIST, ETC.  NON-CRYSTALLINE  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN  FOR TOP TO THE TO	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.						
CLASS. A-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 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						
2 PASSING 10 56 MX SILT MUCK,	HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPIT 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 SOILS COLS PEAT	GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.						
260 15 M 26 M 26 M 26 M 26 M 26 M 26 M 26 M 2	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE						
MATERIAL PASSING *40	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.  VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.						
LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35%         AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	<u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.						
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 11 MN 11 MN MODERATE NEGATIVE NEGATIVE	GROUND WATER	OF A CRYSTALLINE NATURE.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE						
CHOUP INDEX U U U 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 ITPES 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 GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.						
GEN, RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	VPW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.  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	SPRING OR SEEP	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE						
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	EIELD.						
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED	TT 25,025	(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 CONTRETNESS ON CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  25/025  DIP & DIP DIRECTION  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL  SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	<u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.						
VERY LODGE 44	SPT SPT TEST POPING / SLOPE INDICATOR	(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.						
GENERALLY LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	VSI PMI	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						
MAILERIAL 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.						
VERT DENSE 7 30		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.						
VERY SOFT	— INFERRED SOIL BOUNDARY — CORE BORING SOUNDING ROD	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	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	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER 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	INSTRUCTION —	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.						
BUDLDER CUBBLE GRAVEL SAND SAND SILI 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						
(USE, SU,) (F SU,)	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 $\gamma$ - 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						
SOUR MOLETURE SCALE FIELD MOLETURE	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 <sub>d</sub> - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  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>	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	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 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 SEMISOLIDE REQUIRES DRYING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.						
ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS $w$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK:						
" " PL L + PLASTIC LIMIT	HI HIGHLY V - VERY RATIO  EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	EL FULTION SEET						
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	ELEVATION: FEET						
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:						
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE CLIFE	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING						
	CME-55 CONTINUOUS FLIGHT HOUSE CORE SIZE:  8' HOLLOW AUGERS	INDURATION C 0.008 FEET	BL-5; N: 542,885.1262, E: 1,446,655.7118, ELEV. 706.95 @ STA. 24+97.62						
PLASTICITY	HADD EACED SINCED BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	BL-6; N: 543,246.8513, E: 1,446,984.0832, ELEV. 713.51 @ STA. 29+86.19						
PLASTICITY INDEX (PI)  NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	BL-9; N: 543,315.6877, E: 1,448,007.2578, ELEV. 737.60 @ STA. 44+66.30						
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST X CASING W/ ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	BM3; N: 544,105, E: 1,447,804, ELEV. 737.50 @ BL STA. 41+74.00 1' RIGHT CHISELED SQUARE						
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	V ACKED (TERRO &) V TRICONE 25 CTELL TEETH POST HOLE DIGGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE:  PROACE FASTLY MUSE HIT WITH HAMMED	BM4; N: 544,771, E: 1,448,453, ELEV. 738.12 @ BL STA. 51+04.00						
COLOR	TRICONS ATTUNG CARD	BREAKS EASILY WHEN HIT WITH HAMMER.	2' RIGHT CHISELED SQUARE						
	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).  MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X DRAG BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:							
	X D-50 (TER373)   X 3¼" HSA	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14						

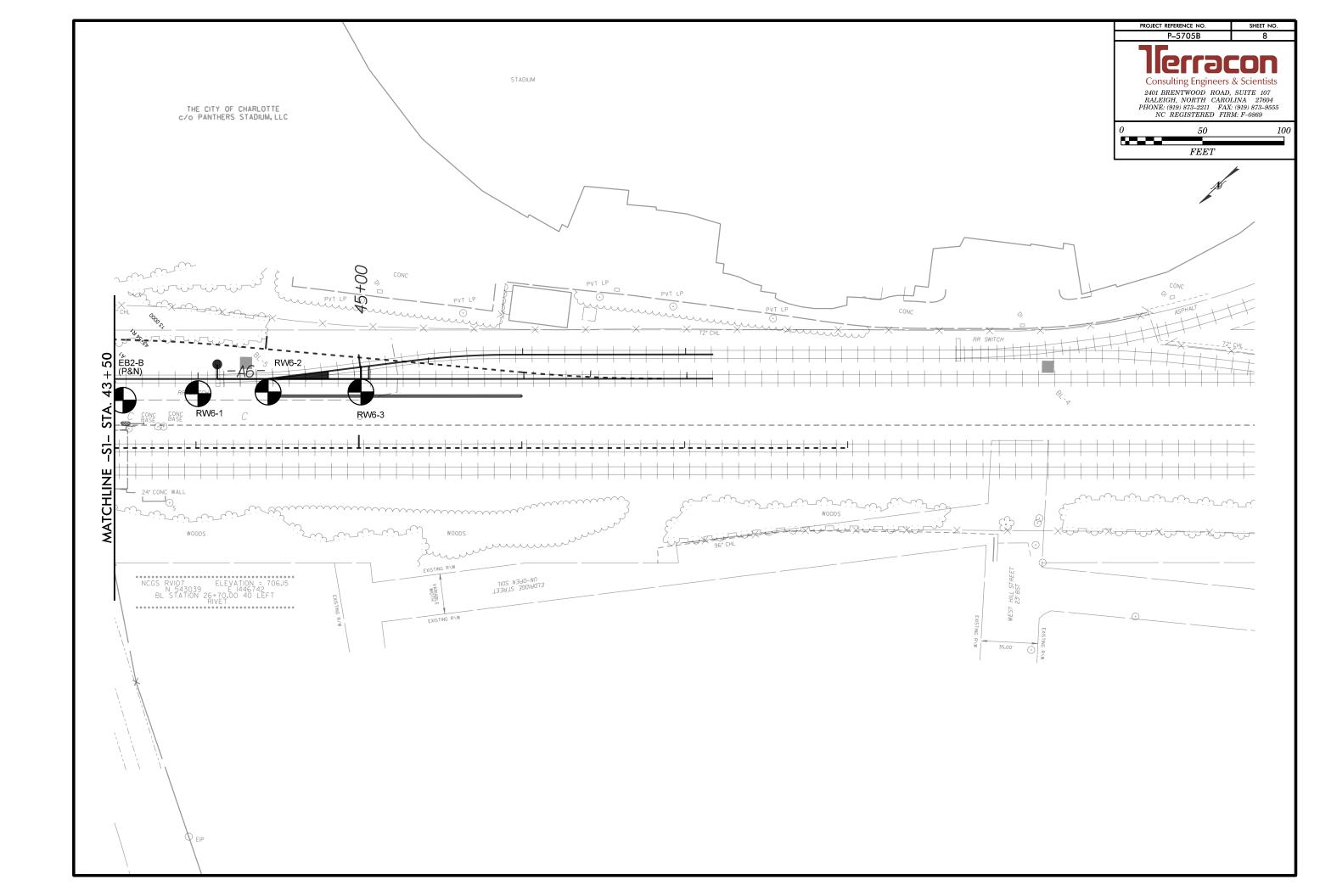


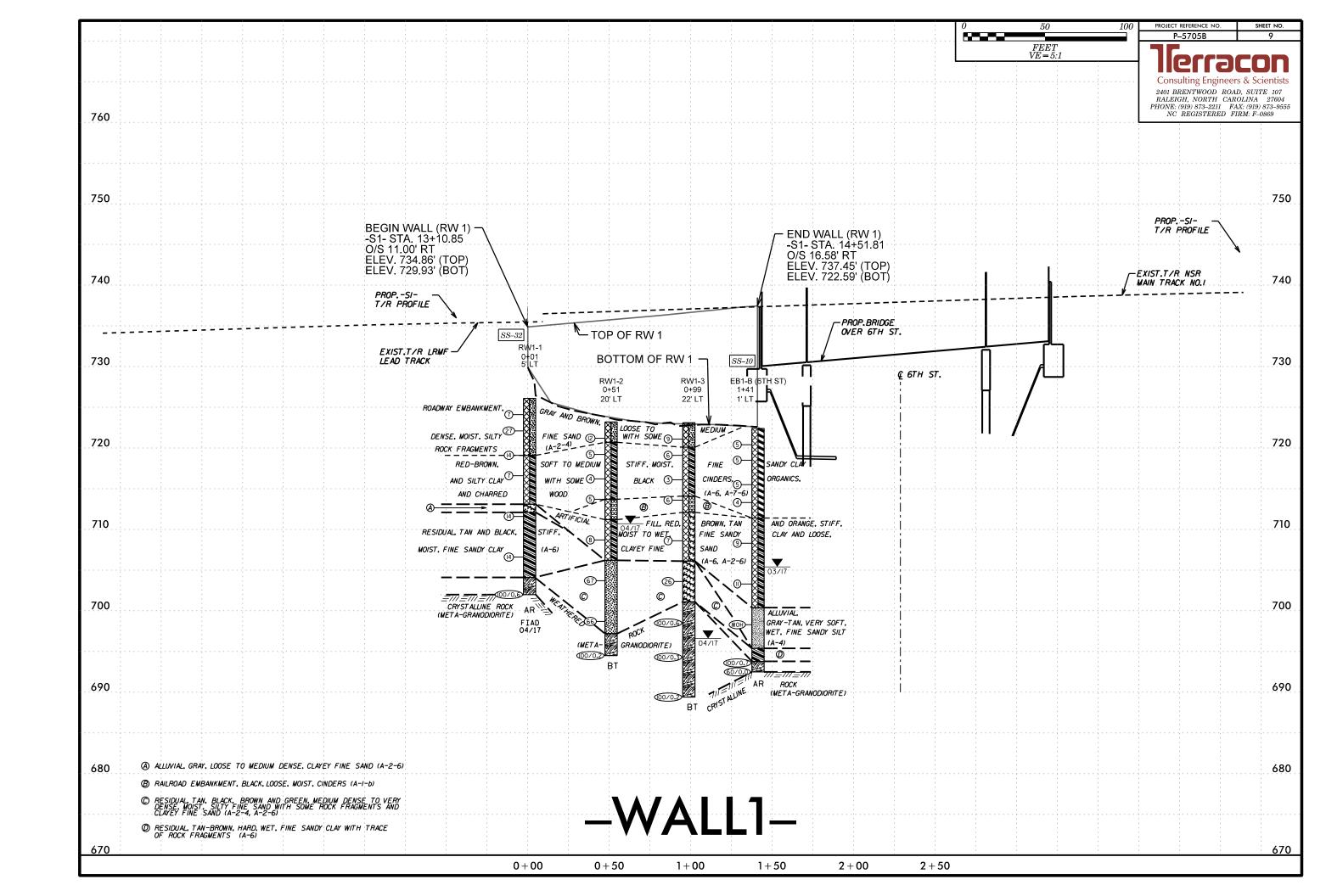


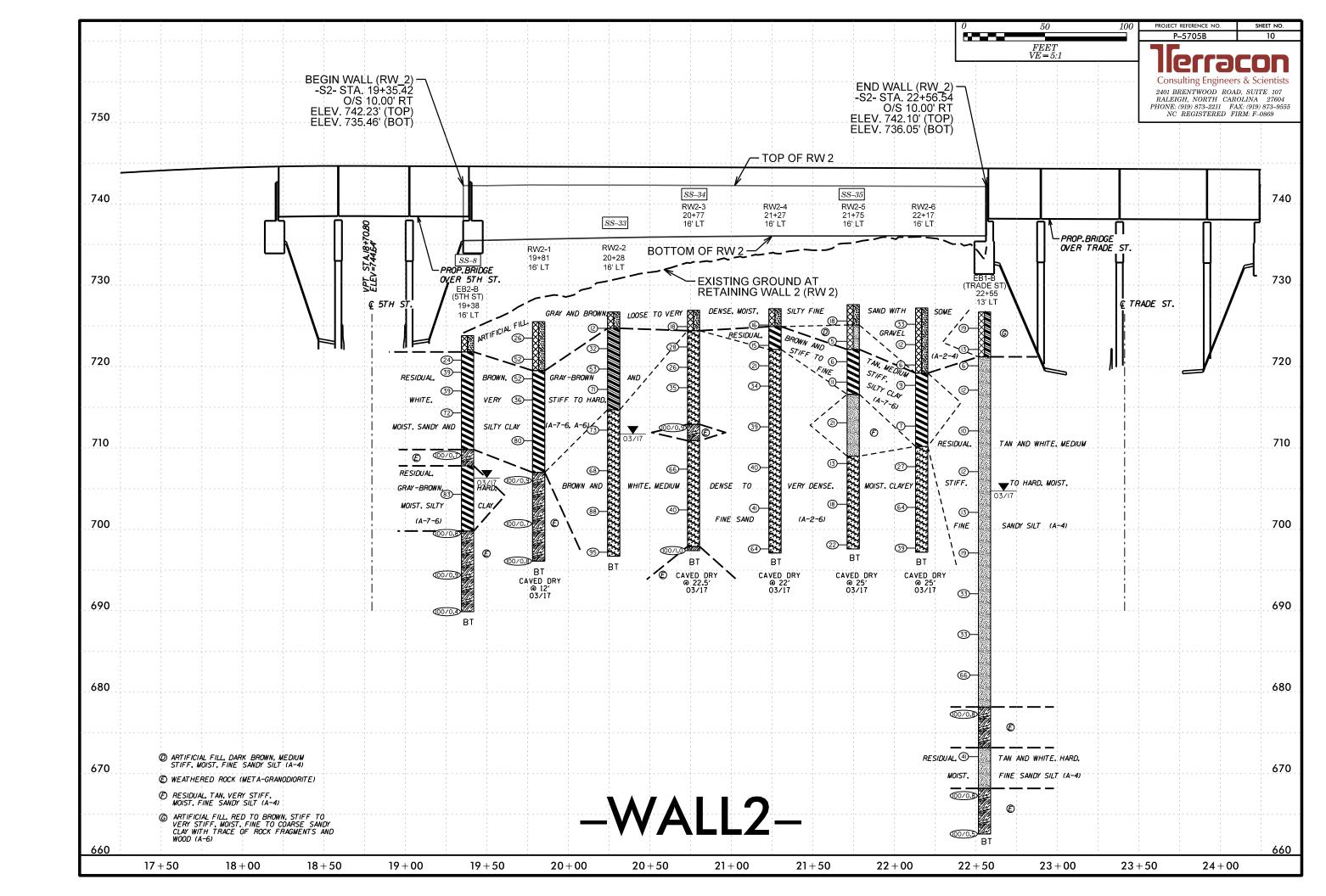


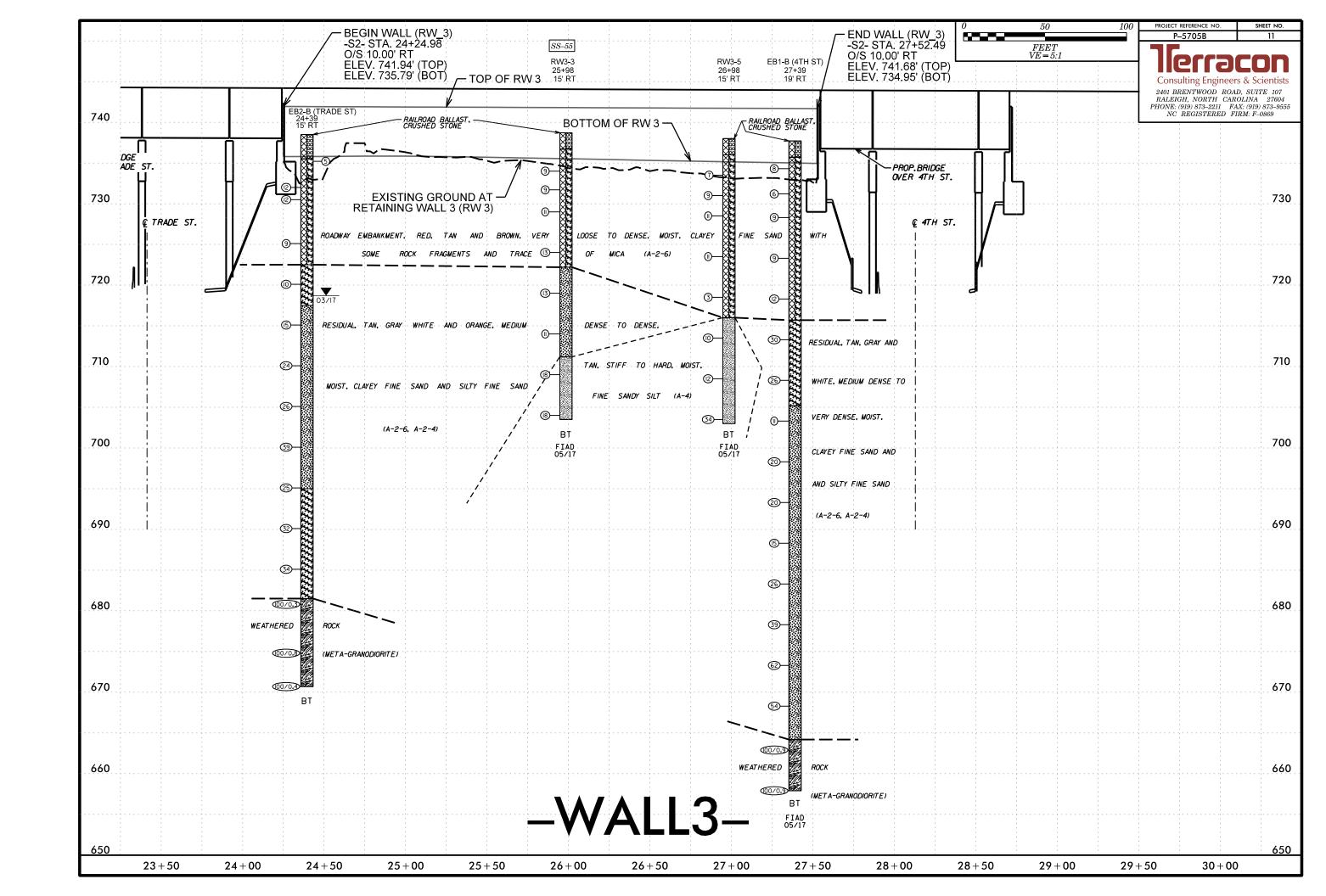


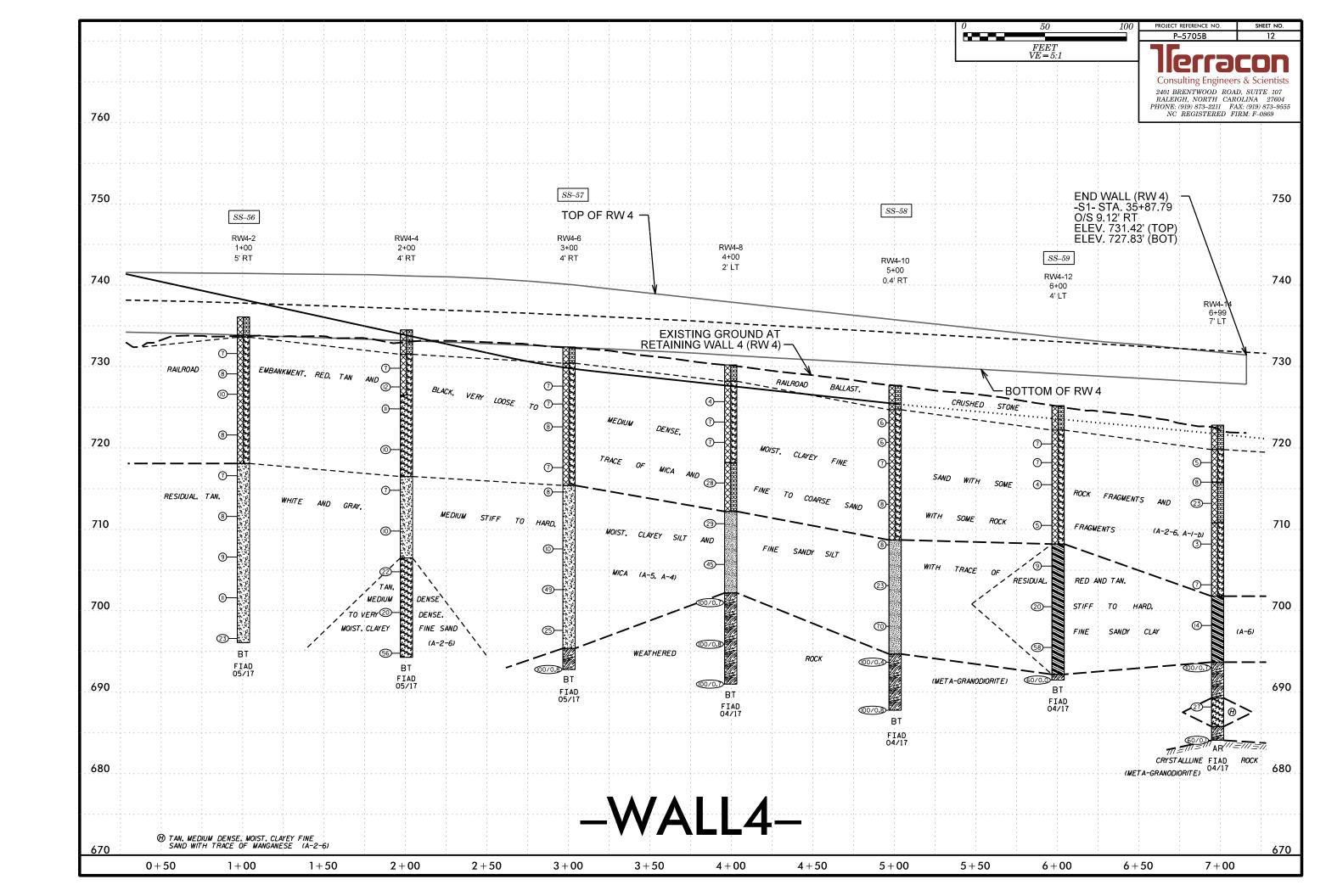


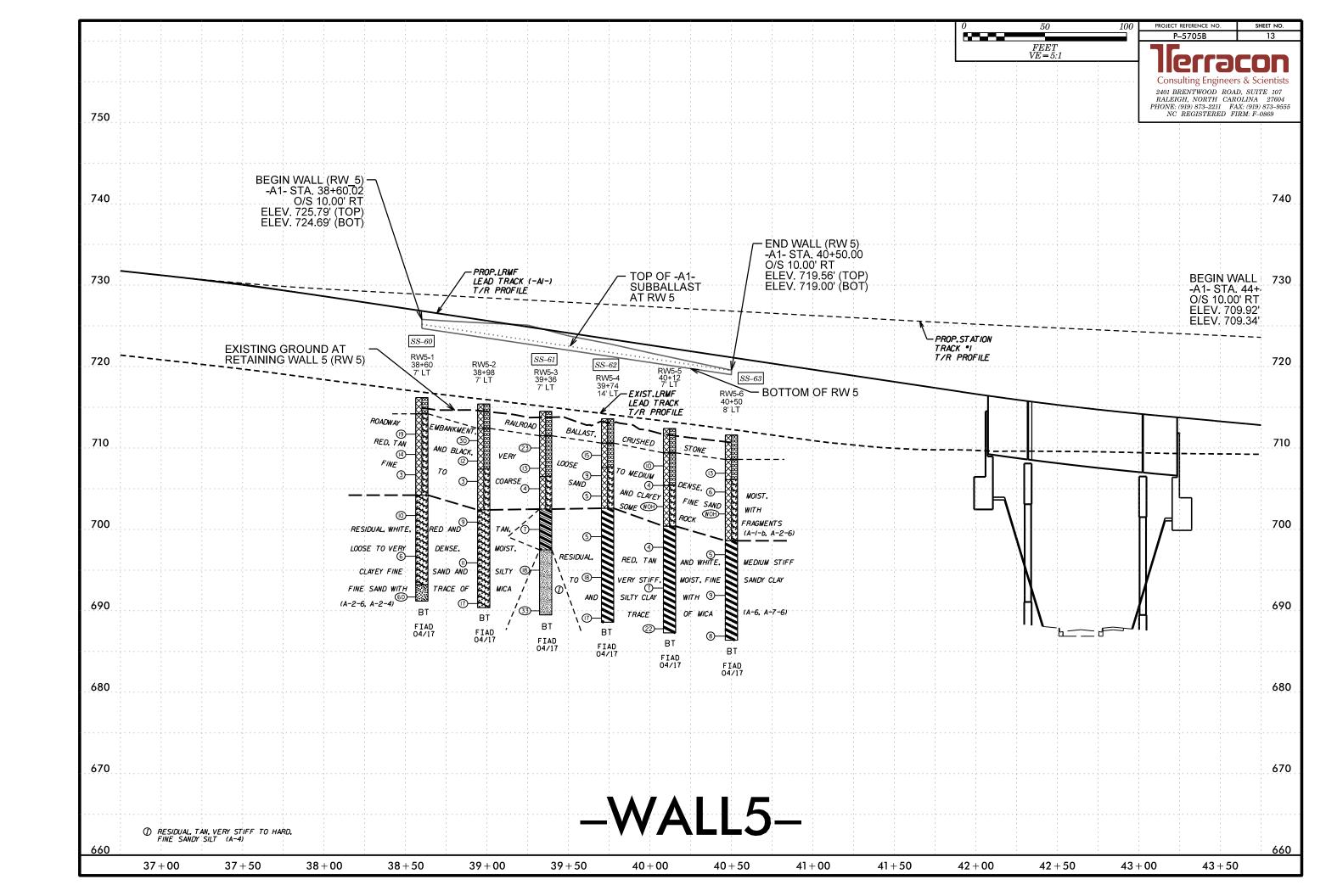


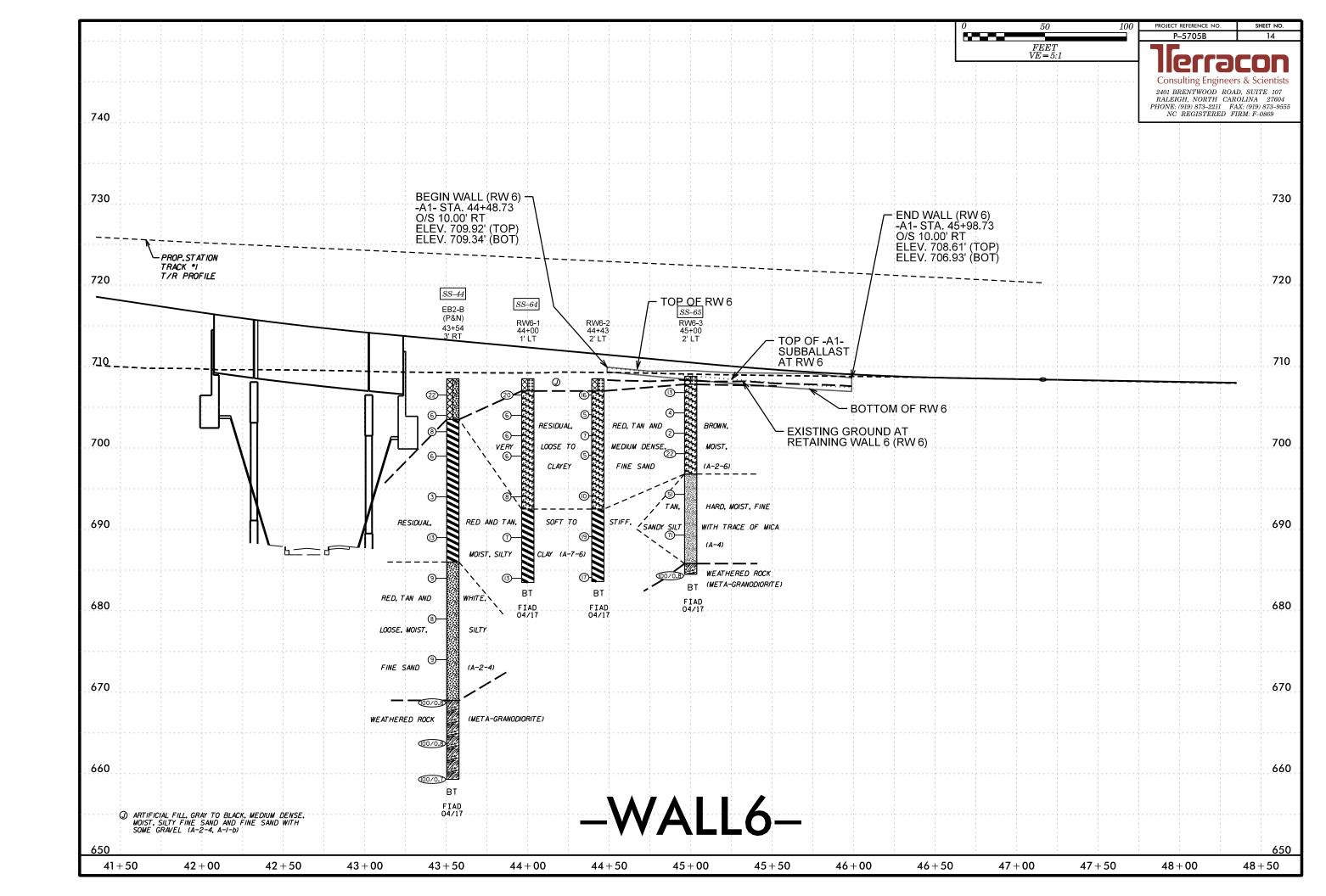


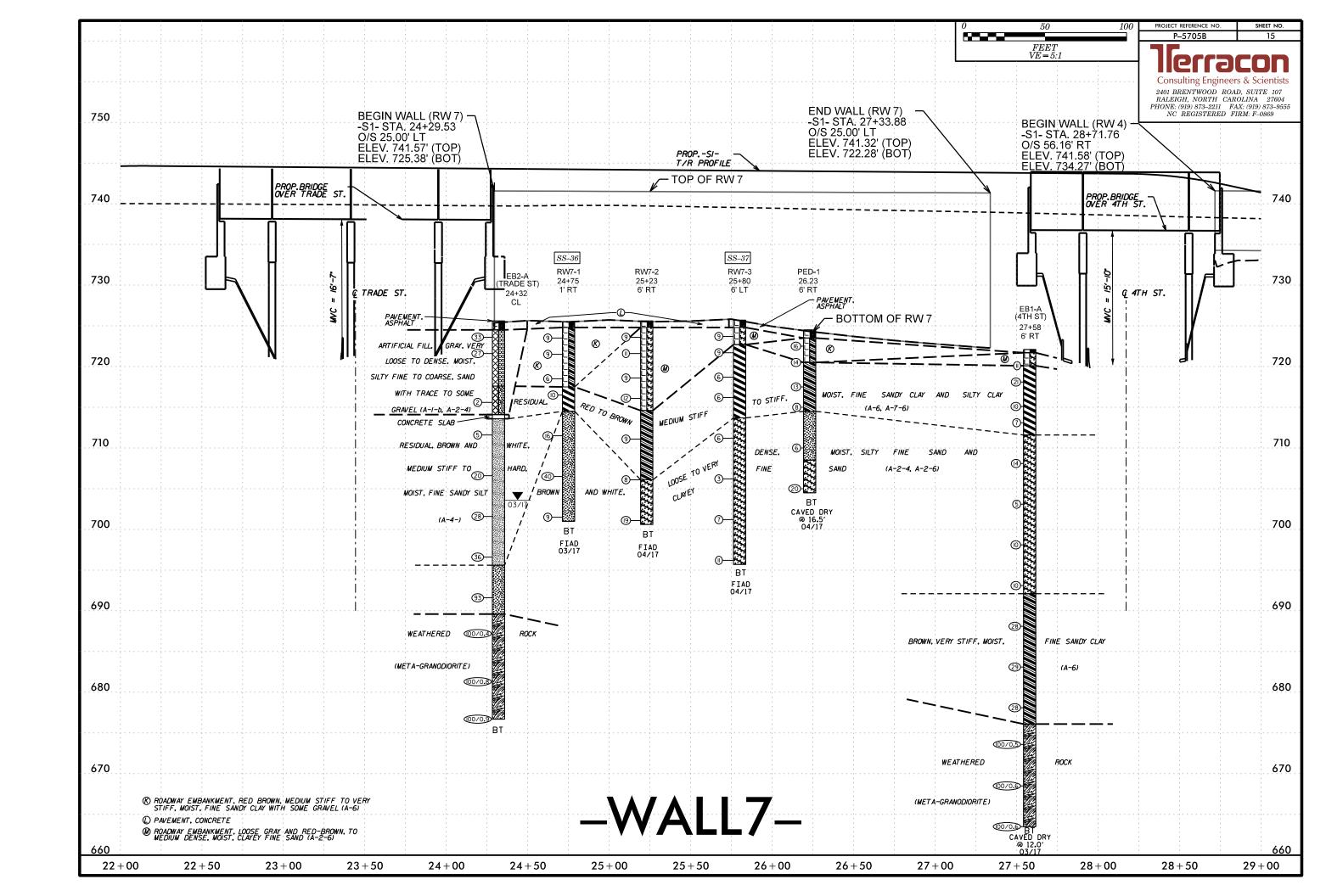












#### LABORATORY TESTING SUMMARY

PROJECT NUMBER:	44475.1.2	TIP:	P-5705B	COUNTY:	MECKLENBURG

**DESCRIPTION:** Retaining Walls 1, 2, 3, 4, 5, 6 and 7 -Charlotte Gateway Station and Track and Safety Improvements

Sample No. Aligni		nt Station		Depth Interval (feet) AASHTO Class.			1	% by Weight %				%	% Passing (sieves)					Ave. Wet	Shear Strength Values			
	Alignment		Offset (feet)		AASHTO Class.	L.L.	P.I.	Coarse Sand	Fine Sand	Silt	Clay	Retained #4 Sieve	#10	#40	#200	% Moisture	% Organic	Unit Wt.	Total Cohesion (psf)	Total Friction (φ)	Effective Cohesion (psf)	Effective Friction (φ')
SS-8	-S2-	19+37	9' RT	3.5-5.0	A-7-6 (10)	41	14	11.4	21.0	46.9	20.7	1	98	91	73	21.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-10	-S1-	14+52	15' RT	23.1-24.6	A-4 (0)	16	NP	33.3	25.5	29.2	12.0	0	99	77	47	19.9	N/D	N/D	N/D	N/D	N/D	N/D
SS-32	-S1-	13+12	5' RT	18.5 - 20.0'		28	13	34.7	22.2	12.9	30.2	3	96	77	45	17.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-33	-S2-	20+26	2' RT	8.5 - 10.0'	A-6 (8)	39	14	16.6	24.7	44.1	14.6	0	100	92	66	13.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-34	-S2-	20+75	1' LT	3.5 - 5.0'	A-2-6 (0)	31	12	45.1	22.4	20.9	11.6	0	90	60	34	N/D	N/D	N/D	N/D	N/D	N/D	N/D
SS-35	-S2-	21+73	5' LT	8.5 - 10.0'		41	20	2.5	16.2	51.9	29.4	5	94	93	83	20.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-36	-S1-	24+75	25' LT	8.0 - 9.5'	A-7-5 (6)	47	16	33.9	18.3	32.6	15.2	0	94	68	50	22.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-37	-S1-	25+80	32' LT	3.0 - 4.5'	A-7-6 (38)	69	40	10.5	6.3	25.8	57.4	1	99	91	84	32.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-38	-S1-	26+09	51' LT	13.5 - 15.0'	A-5 (8)	44	8	1.6	31.8	57.9	8.7	0	100	99	79	24.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-44 SS-55	-A1- -S2-	43+54	13' RT 25' RT	13.5-15.0 28.7-30.2		61	36	5.4 2.6	15.9	26.6	52.1	0	100	97	83	34.1	N/D	N/D	N/D N/D	N/D	N/D	N/D
SS-55 SS-56	-S2- -S1-	25+98 29+74	59' RT	28.7-30.2	A-4 (4) A-5 (10)	35 43	9	2.0	24.9 22.6	62.1 60.8	10.4 14.6	0	100 100	99 98	84 85	23.7 33.3	N/D N/D	N/D N/D	N/D	N/D N/D	N/D N/D	N/D N/D
SS-56 SS-57	-S1- -S1-	29+74 31+76	47' RT	23.5-25.0	A-5 (10) A-5 (8)	43	9	2.0	39.2	49.9	8.5	0	100	98	72	33.3	N/D N/D	N/D	N/D	N/D	N/D	N/D
SS-58	-S1-	33+75	27' RT	23.6-25.1	A-3 (6) A-4 (1)	36	NP	15.2	9.3	60.1	15.4	0	100	89	78	21.3	N/D	N/D	N/D	N/D	N/D	N/D
SS-56	-S1-	34+75	14' RT	23.7-25.2	A-4 (1) A-6 (4)	32	11	12.5	39.0	25.2	23.3	0	100	98	55	17.9	N/D	N/D	N/D	N/D	N/D	N/D
SS-60	-A1-	38+60	3' RT	23.5-25.0		21	NP	39.8	33.5	18.7	8.0	3	97	75	30	N/D	N/D	N/D	N/D	N/D	N/D	N/D
SS-61	-A1-	39+36	3' RT	18.5-20.0	A-4 (1)	36	NP	4.9	28.7	54.2	12.2	0	100	97	77	24.5	N/D	N/D	N/D	N/D	N/D	N/D
SS-62	-A1-	39+74	4' LT	18.5-20.0		59	33	7.9	18.3	28.0	45.8	0	100	95	79	33.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-63	-A1-	40+50	2' RT	23.7-25.2		49	23	27.3	17.7	28.3	26.7	0	100	79	60	29.3	N/D	N/D	N/D	N/D	N/D	N/D
SS-64	-A1-	44+00	9' RT	18.5-20.0	A-7-5 (6)	48	17	34.9	19.8	26.1	19.2	0	99	73	50	27.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-65	-A1-	45+00	8' RT	18.5-20.0	A-4 (1)	30	7	30.1	31.7	28.8	9.4	0	100	82	45	10.1	N/D	N/D	N/D	N/D	N/D	N/D
					` '																	
																						<b>_</b>
							1															
							+											+				<u> </u>
											<u> </u>				<u> </u>	<u> </u>				<u> </u>		<b>!</b>
											<u> </u>				<u> </u>	<u> </u>				<u> </u>		<b>!</b>
				1	+	+	+	+	+		<b> </b>	+		<u> </u>	<b> </b>			1				+
							1															<del> </del>
								+	1		<u> </u>	+			<u> </u>							<u> </u>
							1	1			1				1							<u> </u>
							1		1		İ				İ			1				
									†													
									<u> </u>													
																	-					
																						1

N/D - NOT DETERMINED

Certified Lab Technician Signature

114-01-1203
Certification Number