5600 Z REFERENCE **CONTENTS**

DESCRIPTION

LEGEND (SOIL & ROCK)

TITLE SHEET

CROSS SECTIONS BORE LOG(S)

SOIL TEST RESULTS

SITE PLAN

PROFILE(S)

SHEET NO.

5-6

7-10

00056 S **PROIEC**

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY **JOHNSTON**

PROJECT DESCRIPTION US 70 IMPROVEMENTS FROM EAST OF US 70 BUSINESS TO WEST OF THE **NEUSE RIVER**

SITE DESCRIPTION DUAL BRIDGES ON US 70 (-L-) OVER WILSON'S MILL ROAD (-Y9-, SR 1913) BETWEEN SR 1501 AND SR 1915

STATE PROJECT REPERENCE NO. W = 5600

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 NSPECTED 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.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (INP-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS NIDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE TOTAL 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 SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:

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

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

M. DURWAY S. DAVIS D. AIELLO T. SHARPE A. STURCHIO M. ARNOLD

INVESTIGATED BY $_F \& R$, Inc.DRAWN BY _T.T. WALKER CHECKED BY _C. WANG

SUBMITTED BY _P. ALTON

DATE MARCH 2018



Prepared in the Office of:

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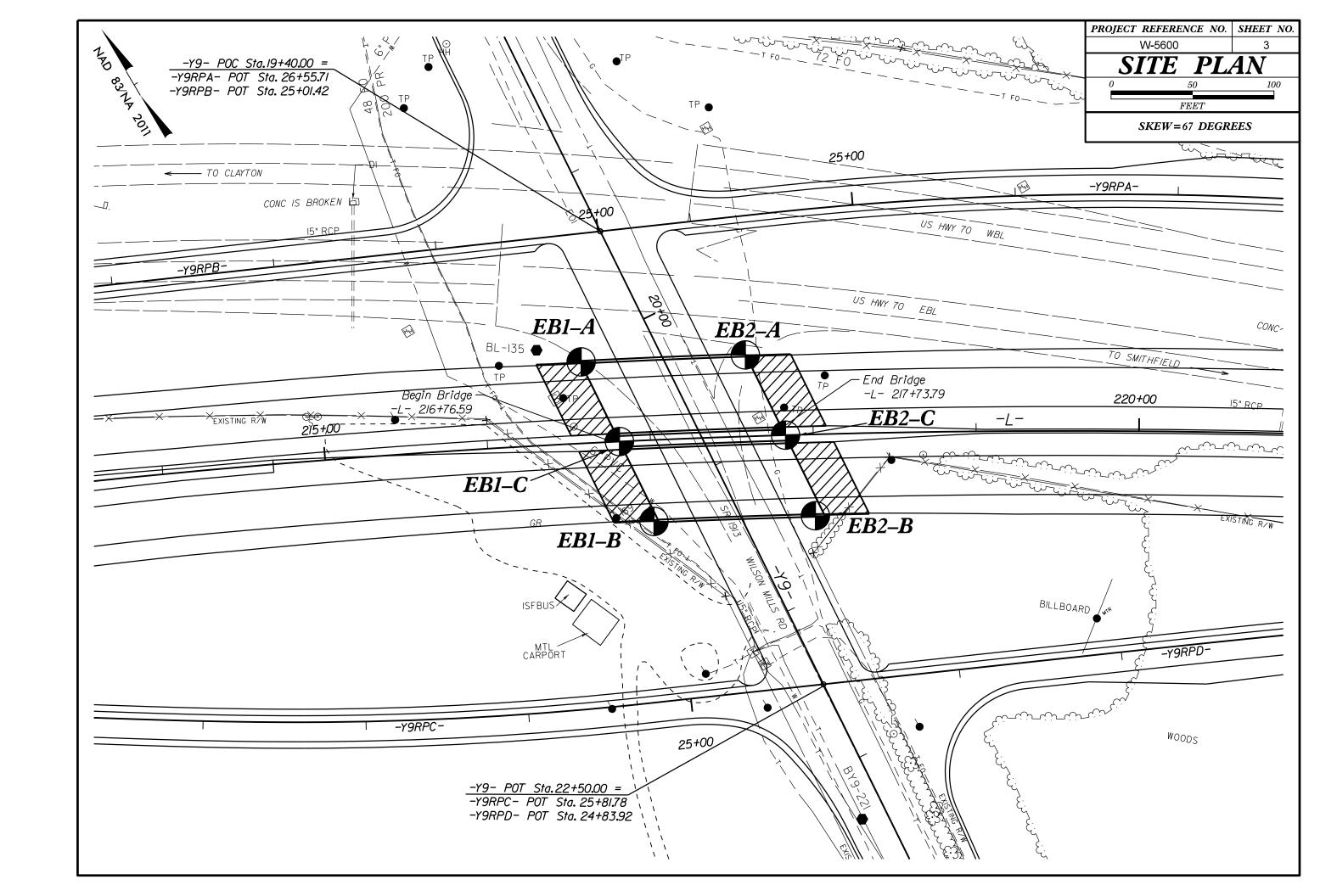
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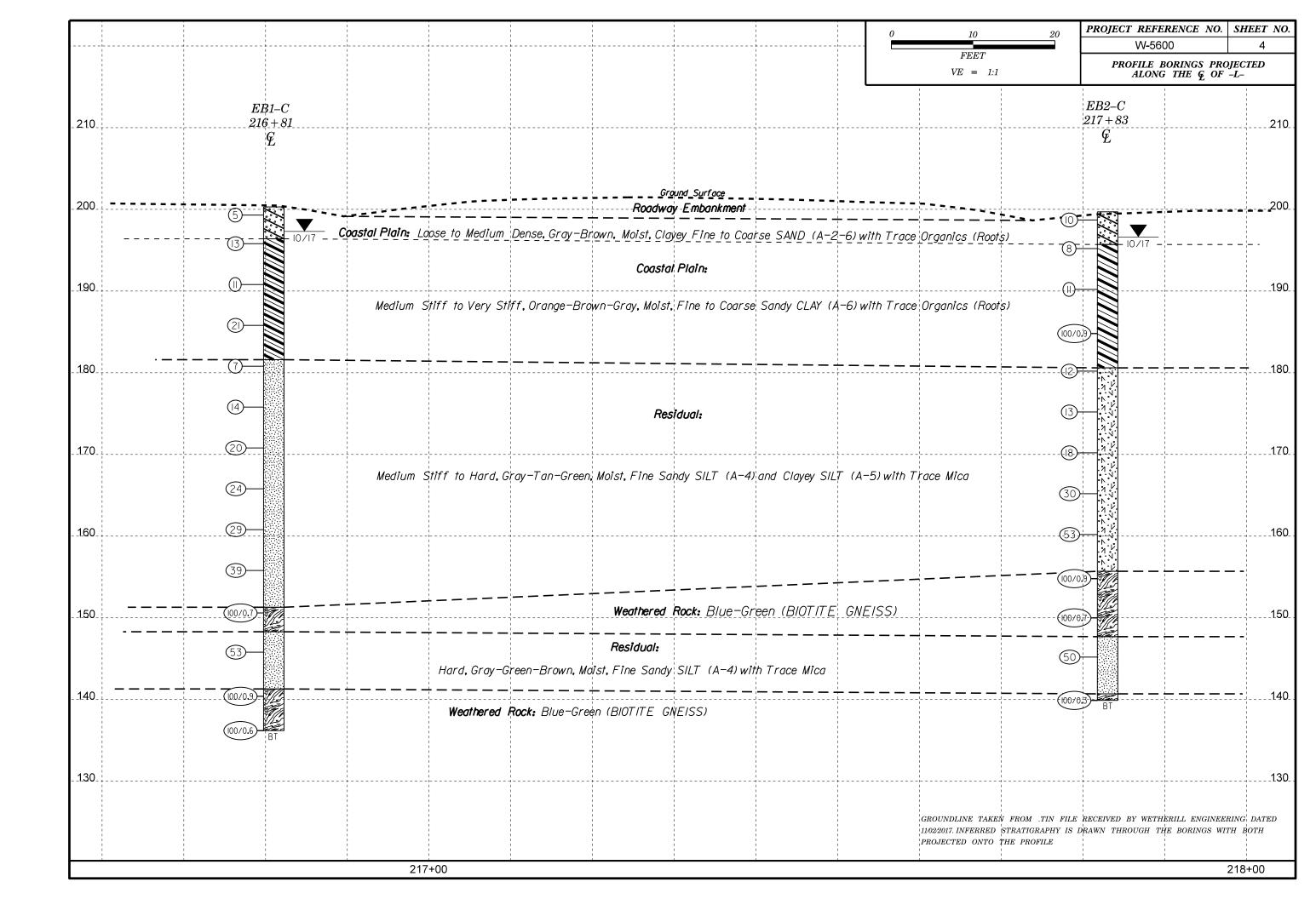
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

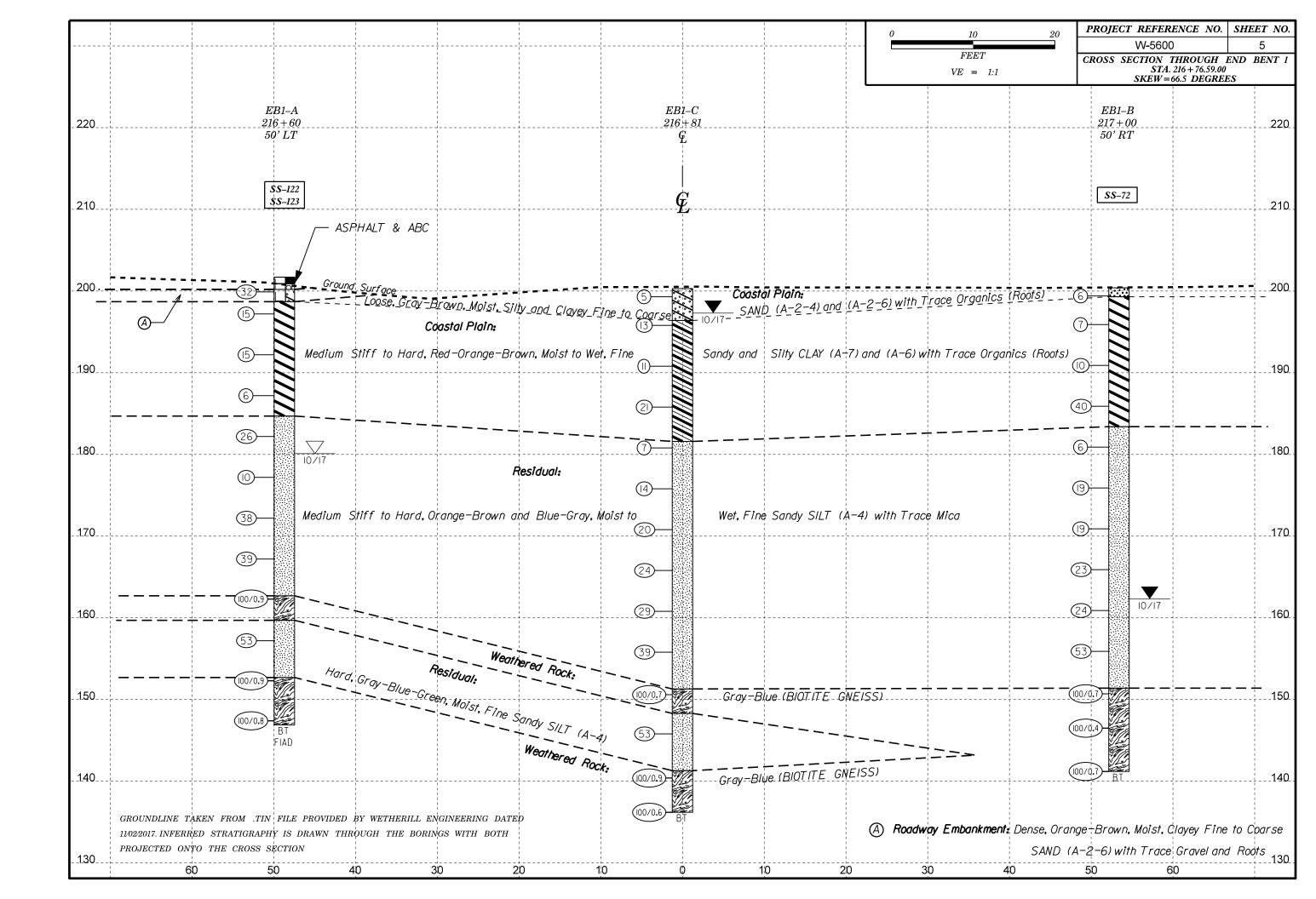
SUBSURFACE INVESTIGATION

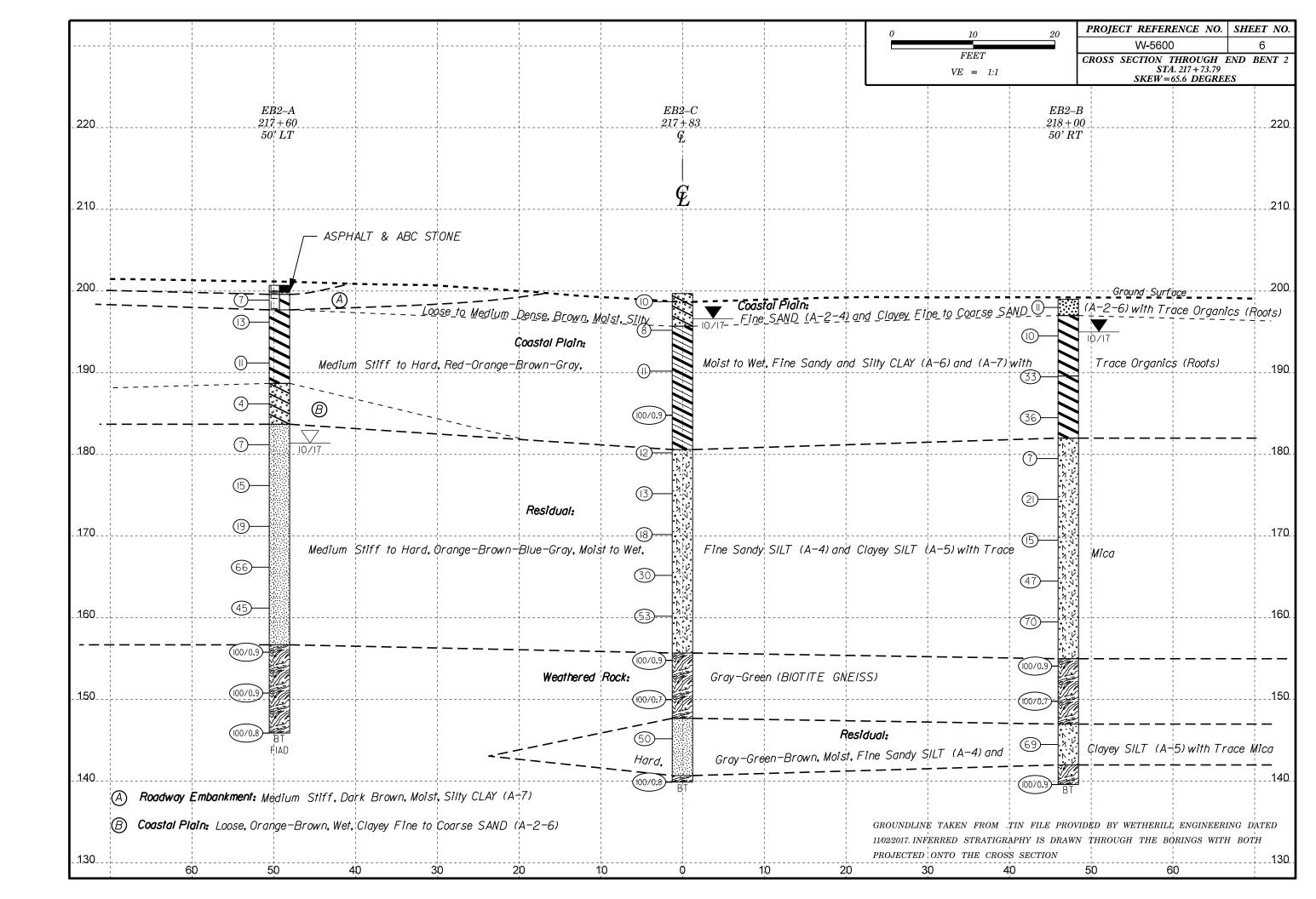
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

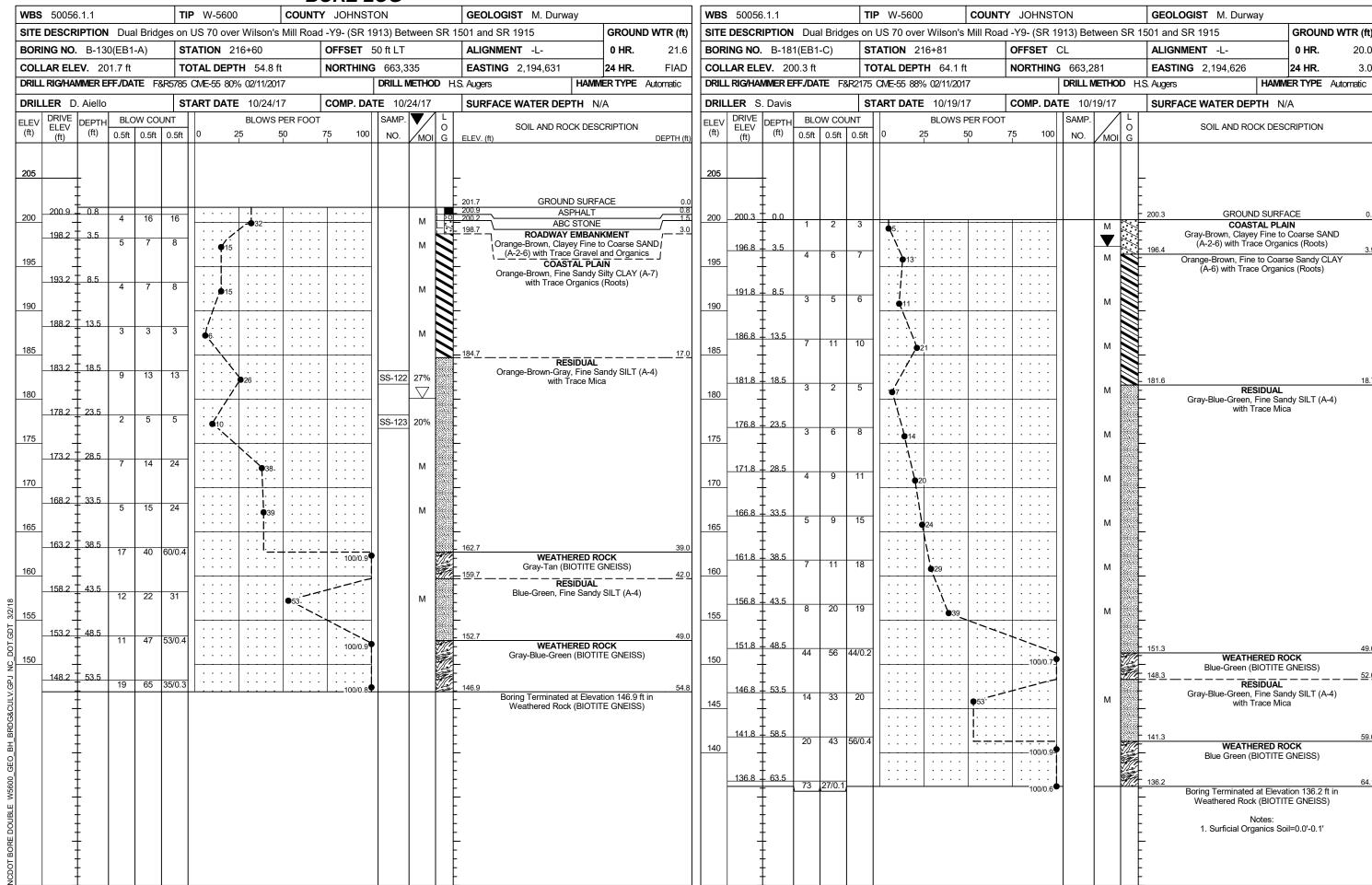
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS			
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE 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 Ø.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.			
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	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.			
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC. A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED WINDOWS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.			
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) NON-CORSTAL PLAIN MATERIAL THAT WOULD FIELD SPI'N VALUES >	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT			
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE CRYSTALLINE WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.			
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.			
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM			
SAMBOT 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED			
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
*10 50 MX CLAY MULK, SOILS SOI	PERCENTAGE OF MATERIAL GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.			
15 MZ 23 MZ 10 MZ 13 MZ 25 MZ 13 MZ 13 MZ 13 MZ 13 MZ 13 MZ 15 MZ 15 MZ 15 MZ	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE			
MATERIAL PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	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 LITTLE OR HIGHLY	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 OF A CRYSTALLINE NATURE.	<u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.			
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOIL S	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE			
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI,) 1 INCH, OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.			
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM			
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	<u> </u>	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.			
AS SUBGRADE	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE			
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.			
COMPACTNIESS OR RANGE OF STANDARD RANGE OF UNCONFINED	III 25 (25)	(MOD, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK, IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.			
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) STACES DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	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.			
GENERALLY VERY LOOSE < 4 CONTRACT	SOIL SYMBOL SPT ONT TEST BORING SLOPE INDICATOR INSTALLATION	(SEY.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.			
HATEPIAI MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGED DORING ONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.			
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE			
VERY SOFT	— INFERRED SOIL BOUNDARY — CORE BORING ● SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.			
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - 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	PIEZOMETER COT NOT NOT NOT NOT NOT NOT NOT NOT NOT N	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE			
HARD > 30 > 4	INSTALLATION	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE 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 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO			
BOULDER CORRLE CRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.			
(BLDR,) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.)	ABBRE VIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.			
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF			
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL			
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.			
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.			
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY			
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.			
PLASTIC SEMISOLIDA DEGLIDES DEVING 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.			
RANGE - WET - (W) SEMI-SOLITIFICATION TO ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING TERM SPACING TERM THICKNESS	BENCH MARK: BL-135= N: 663354.9350, E: 2194610.616, -L- STA, 216+33.31			
- MOIST - (M) COLIDAT OR NEAR ORTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET				
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:			
REQUIRES ADDITIONAL WATER TO	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD= FILLED IMMEDIATELY AFTER DRILLING			
ATTAIN UPTIMUM MUISTURE	X CME-55 S PURIL ON AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	NM= NOT MEASURED			
PLASTICITY	X 8' HULLOW AUGERS L-B L-H	INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.				
<u>PLASTICITY INDEX (PI)</u> NON PLASTIC PLASTICITY INDEX (PI) VERY LOW	CME-550 HARD FACED FINGER BITS TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;				
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING WY ADVANCER HAND TOOLS:	GENILE BLUW BY HAMMER DISINTEGRATES SAMPLE.				
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	TRICONS 15TEST TEST	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.				
COLOR	TRICONE TUNGCARB. SOUNDING ROD	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;				
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT SOUNDING NOD	DIFFICULT TO BREAK WITH HAMMER.				
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14			





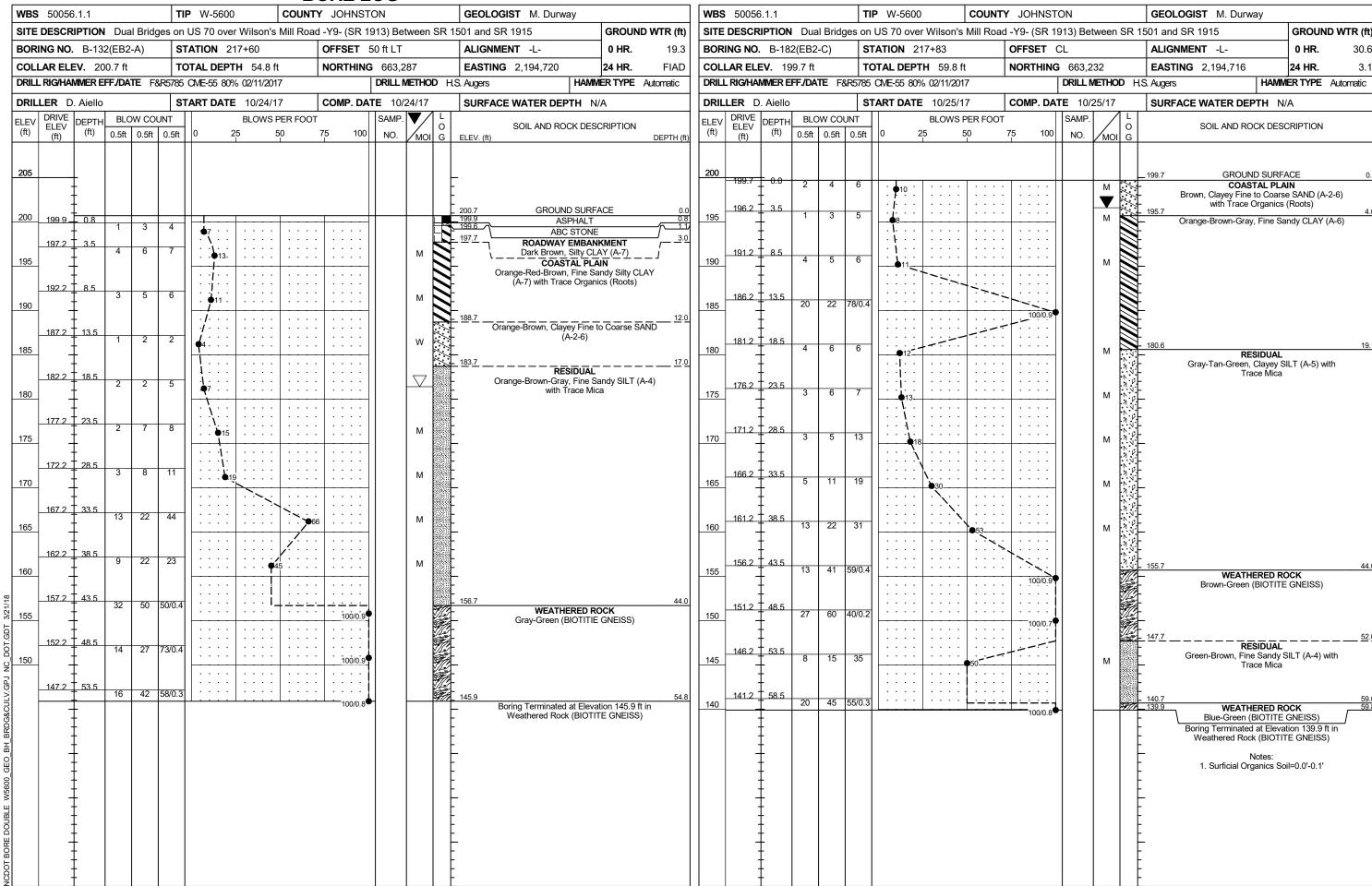






SHEET 8

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								Mill Road	· · · · · · · · · · · · · · · · · · ·		tween	SR 1	501 and SR 1915		1	ID WTR (ft)
	ING NO.			-B)		TATION 21			OFFSET !				ALIGNMENT -L-	0 HR.	58.0	
	LAR ELE			TF =		OTAL DEPT			NORTHING			<u> </u>	EASTING 2,194,619	1	24 HR.	38.1
			FF./DA	IE F		CME-55 80%							S. Augers			Automatic
DRIL	LER D	. Aiello				ΓART DATE			COMP. DA		10/17	1 1 1	SURFACE WATER DEP	TH N	A	
ELEV (ft)	DRIVE ELEV	DEPTH (ft)		0.5ft		0 2		PER FOOT	75 100	SAMP.	MO	O G	SOIL AND RO	CK DES	CRIPTION	DEDTH (ft)
	(ft)		0.010	0.010	0.010		1	Ī		140.	/ MO	l G	ELEV. (ft)			DEPTH (ft)
205																
203	_	-											- ·			
	-	-											· ·			
200	200.4	- 0.0	1	3	3	6				+	М	-	- 200.4 GROUN - 199.3 COAS	D SURFA FAL PLA		0.0
	400.0	- 0.5				 Y °					141		Gray-Brown, Silty F	ine SAN	D (A-2-4)	with
195	196.9 -	- 3.5 -	4	4	3	7					W		Red-Orange-Brown		Coarse Sa	andy
155	-	-				 							_ Silly C	LAI (A-)	
	191.9	- - 8.5	1	5	5	: ; : : :							•			
190	-	_	'			• •10 •					W		-			
	186.9	- - - 13.5				::::							•			
185	100.9 -	- 13.5	10	17	23		• • • • • • • • • • • • • • • • • • • •				М		•			
	-	-					·						_ <u>183.4</u>			17.0_
	181.9	18.5	2	3	3			: : : :		SS-72	20%		Blue-Gray, Fine San		A-4) with	Trace
180	_	<u></u>				6			+	33-12	20%		· _	Mica		
	176.9	23.5				: .\. :							•			
175	- 170.0	-	4	7	12)				W		•			
	-	Ī				[.							-			
	171.9	28.5	4	9	10						W		•			
170	_						, · · · · · · · · · · · · · · · · · · ·				''		-			
	166.9	- - 33.5				l l							•			
165	_		4	10	13		23				W		_			
	-	_									_					
	161.9 -	_ 38.5 -	5	11	13		24				W					
160	-	-					. <u> </u>		1				- ·			
	156.9	- - 43.5			<u> </u>		::``.`									
155	_	_	11	22	31			53			М		-			
									`\:\:\							
150	151.9 -	<u>48.5</u>	17	47	53/0.2							477	· 151.4 · WEATHI	ERED RO	СК	49.0
150	-	-							100/0.7				Blue-Gray (B	IOTITE (ENEISS)	
	146.9	- - 53.5	100/0										•			
145	-	_	100/0.4	1					- 100/0.4				• -			
	444 0	- 50 5						: : : :	: : : :				•			
	141.9 -	<u>- 58.5</u>	50	50/0.2	 		• • • •	• • • •	100/0.7	-			141.2 Boring Terminated	at Eleva	tion 141.2	59.2 ft in
	-	-											_ Weathered Rock	(BIOTIT	E GNEISS	5)
	-													lotes: anics So	il=0.0'-0 1'	
	_	_													2.0 0.1	
	-												•			
	-	-											•			
	-												-			
		[F	• •			





SHEET 10

WDG	50050				1-	IP W-5600	1	ORE L				CEOLOGIST M Amada	
	WBS 50056.1.1 TI SITE DESCRIPTION Dual Bridges on									4	. CD	GEOLOGIST M. Arnold	GROUND WTR (ff
							15 WIII ROAG	OFFSET			IOK	ALIGNMENT -L-	-
	BORING NO. B-133 (EB2-B) COLLAR ELEV. 199.0 ft				TATION 218+00 OTAL DEPTH 59.	4.64	NORTHING				EASTING 2,194,706	\dashv	
				TE E		5 CME-55 80% 02/11/2		NORTHING			ר מנ		24 HR. 4.0 MER TYPE Automatic
								COMP. DA					
	LER D DRIVE	l .	DI G	OW CO		TART DATE 10/1	'S PER FOOT	COMP. DA	_	11/1/	1	SURFACE WATER DEPTH N	I/A
ELEV (ft)	ELEV	DEPTH (ft)	0.5ft		0.5ft	0 25	50	75 100	SAMP.	\ V	0	SOIL AND ROCK DES	
	(ft)	. ,	0.511	0.510	0.511	7	T	,	110.	/MO	I G	ELEV. (ft)	DEPTH (
200	199.0	0.0				<u> </u>						199.0 GROUND SURF	
	-	<u> </u>	3	7	4	1 - 11				М		COASTAL PL. 197.0 Brown, Silty Fine SAND (A	-2-4) with Trace2
195	195.5	3.5	4	4	6	-						Organics (Roo Gray-Orange-Brown, Fine t	ots)
	-	F	4	4	0	. •10				Fw-		Silty CLAY (A	-7)
	-	F											
190	190.5	8.5	4	23	10	•33				w			
	-	ļ										-	
185	185.5 ⁻	13.5] :::: ::::						- -	
100	-	<u> </u>	10	20	16	36				W		-	
	-	‡				:::;/:::						182.0	17
180	180.5	18.5	3	3	4	· · · / · · · · ·				l w	ν γ γ	RESIDUAL Blue-Gray, Clayey SILT (A	
	-	<u> </u>								"	ν ν ν ν	L Mica	
	- 175.5 -	23.5				:::\					ν. γ. γ.	_	
175	173.3	23.3	5	10	11	21	. 	 		w	, N		
	-	F				:::/ :::					, , , , , , , , , , , , , , , , , , ,	_	
170	170.5	28.5			40] :::;7: ::::					7.7.		
	-	ļ.	4	5	10	15				W	, V	- -	
	-	ļ									, y	- -	
165	165.5	33.5	11	19	28					М	, 7. 	-	
	-	ţ									, 7 , 7	-	
400	160.5 ⁻	38.5									, 7 , 7	-	
160	-	- 00.0	14	27	43	1	· · · · · •	70		М	, 7, 7,	_	
	-	<u> </u>					-	:			ν, γ,	_	
155	155.5	43.5	22	40	60/0.4						λ'. '	155.0	44
	-	Ł	22	40	00/0.4	1		100/0.9	•			WEATHERED R Gray-Green-Brown (BIO	
	-	[<u> </u>	,
150	150.5	F 48.5	52	48/0.2	1			100/0.7	•				
	-	F										147.0	52
150	145.5	53.5			1.5] :::: :::					, Z	RESIDUAL	
	-	F	22	26	43			69		М	, 7.	Gray-Green, Clayey SILT (Mica	, . J with Hade
	-	ļ.					: :::i				1 7	142.0 WEATHERED R	<u>57</u>
140	140.5	58.5	36	64/0.4				· · · · ·				139.6 Blue-Gray (BIOTITE	GNEISS) 59
	-	<u> </u>			1			100/0.9				Boring Terminated at Elev Weathered Rock (BIOT	
	-	<u> </u>										Notes:	,
	-	ŀ										1. Surficial Organics S	oil=0.0'-0.1'
	-	<u> </u>										_	
	-	Ł										Ł	
	-	F											
	-	F										F	
	_	ļ.										<u>-</u>	
	-	‡										-	
	-	‡										<u> </u>	
L	i	i	i	1	1	1			1	1	1		

North Carolina Department of Transportation Division of Highways Materials and Test Unit Soils Laboratory

T.I.P. ID NO.: W-5600

DESCRIPTION: Dual Bridges on US 70 over Wilson's Mill Road -Y9- (SR 1913) between SR 1501 and SR 1915

REPORT ON SAMPLES OF: SOIL FOR QUALITY

F&R PROJECT #: 66U-0197 COUNTY: Johnston

 DATE SAMPLED:
 9/17 to 10/17
 RECEIVED:
 10/17 to 12/17

 SAMPLED FROM:
 Various
 REPORTED:
 10/17 to 12/17

SUBMITTED BY: Cheng Wang BY: D. Jenks

Cert No. 101-02-0603

TEST RESULTS

PROJ. SAMPLE NO.	SS-122	SS-123	SS-72						
BORING NO.	B-130	B-130	B-131						
	EB1-A	EB1-A	EB1-B						
Retained #4 Sieve %	0.0	0.0	0.0						
Passing #10 Sieve %	99.9	100.0	100.0						
Passing #40 Sieve %	94.1	99.7	99.2						
Passing #200 Sieve %	57.3	68.6	57.8						

SOIL MORTAR - 100%									
Coarse Sand Ret - #60 %	11.8	3.1	6.6						
Fine Sand Ret - #270 %	44.4	40.1	46.0						
Silt 0.053 - 0.010 mm %	29.0	44.5	25.2						
Clay < 0.010 mm %	14.8	12.3	22.2						
L.L.	27	34	38						
P.L.	NP	NP	33						
P.I.	NP	NP	5						
AASHTO Classification	A-4	A-4	A-4(2)						
Station	216+60	216+60	217+00						
Offset	50'Lt	50'Lt	50'Rt						
Depth (ft)	18.5	23.5	18.5						
to	20.0	25.0	20.0						
Alignment	-L-	-L-	-L-						
Moisture Content (%)	27.1	19.7	20.4						
Organic Content (%)	NT	NT	NT						

NP = Not plastic

NT = Not tested

ND = Not Determined

CL = Centerline

W.P. Alton, P.E.

Soils Engineer