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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. <u>33599.1.1 (B-4257)</u> COUNTY <u>ROWAN</u>	F.A. PROJ. <u>BRSTP-1004(15)</u>
PROJECT DESCRIPTION BRIDGE NO. 143 ON CHURCH CREEK	SR 1004 OVER
SITE DESCRIPTION <u>BRIDGE</u> NO. 143 ON SE	R 1004 OVER

| STATE | STATE PROJECT REPERENCE NO. | SHEET | STATE | N.C. | 33599.1.1 (B-4257) | 1 | 10

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 BORRIG LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEGHE BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1993 250-408B, REITHER THE SUSSURFACE PLANS AND REPORTS. NOR THE FELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN STU UN-PLACED 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 MOICTOR IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MOST VARY CONDITIONS MORE CONDITIONS AND VARY VARY CONSIDERABLY 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 INTERFACTATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE EXCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HAWEELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT, THE CONTRACTOR SHALL HAVE NO CLAM 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.

PERSONNEL

J. K. STICKNEY

C. L. SMITH

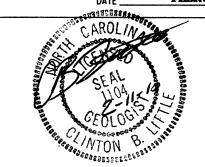
J. E. ROLFSMEYER

INVESTIGATED BY *J. E. BEVERLY*

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

FEBRUARY 2010



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

NOTE - 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.

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

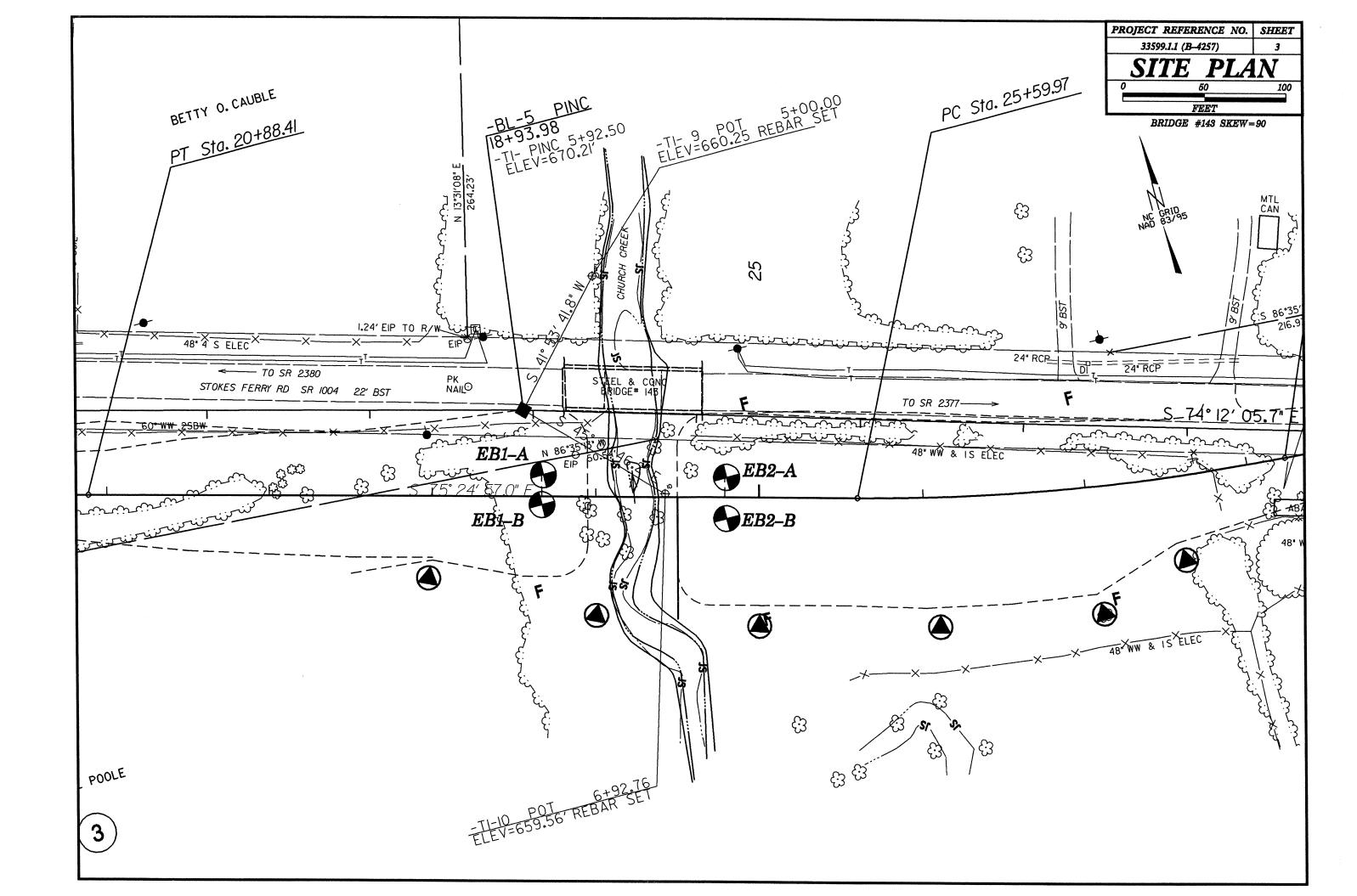
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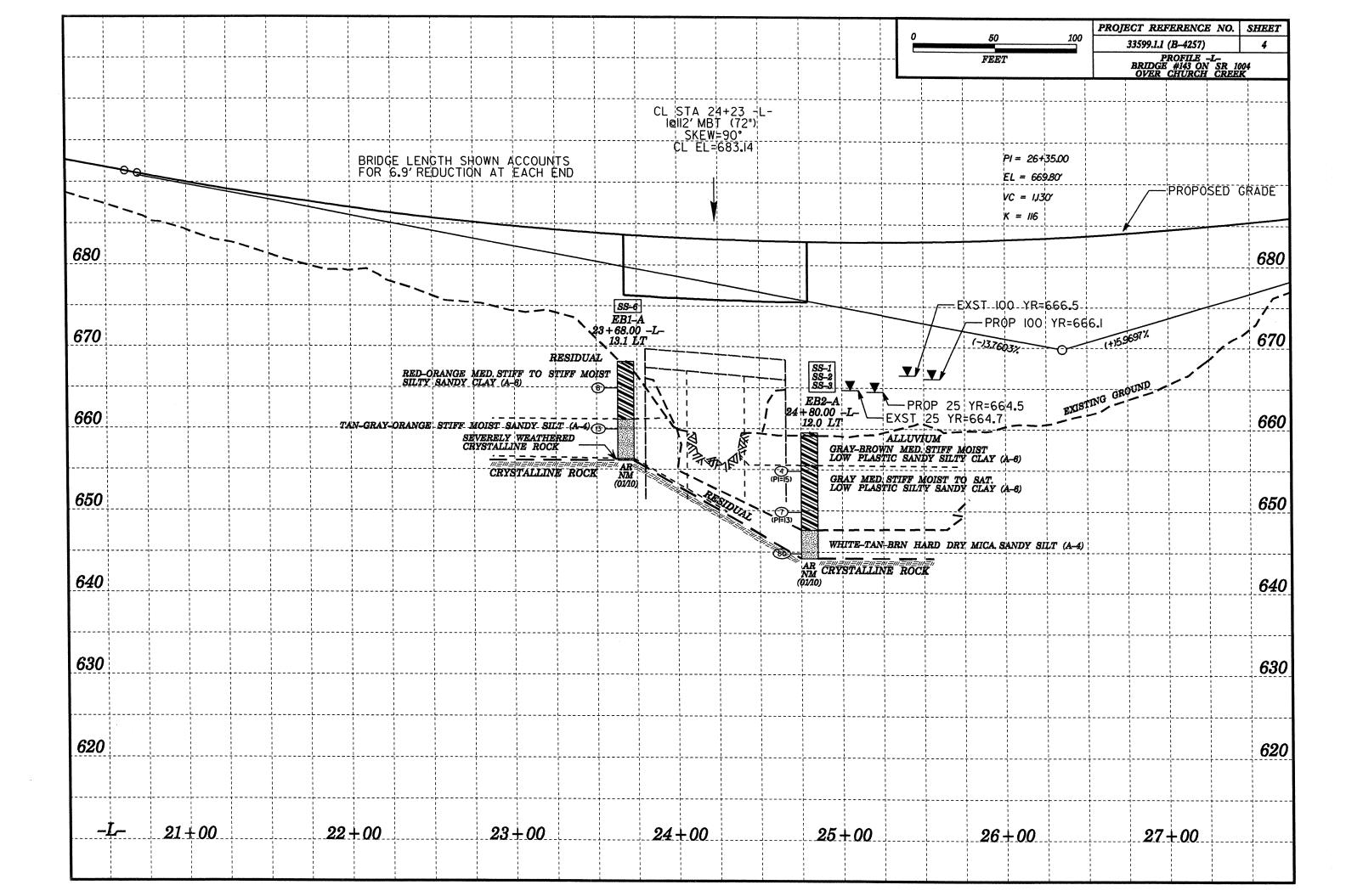
	SOIL AND ROCK LEGEND, TERMS	S, SYMBOLS, AND ABBREVIATIONS	
SOIL DESCRIPTION SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR MEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 188 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GEMERALLY SHALL INCLUDE; CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO DLASSIFICATION, AND DITHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANDULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VER SIFF, GRASULY CLA, MOST WITH WITEREDOED FIRE SHOULD PLASTC, A7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	CRADATION VELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE, (ALSO PODRLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDRESS OF FOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION	SPT REFUSAL IS PENETHATION BY A SPLIT SPOON SAMPLER EQUAL TO 0 R LESS THAN DIFFORM. IN NON-COASTAL PLAIN MATERIAL. THE TRANSTITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS. WEATHERED ROCK (WR) BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	TERMS AND DEFINITIONS ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. SOUJFER - A WATER BEARING FORMATION OR STRATA. RERINGCEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. REGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. RATESIAN - 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
GENERAL CLASS. (\$\(\frac{2}{35}\)X PASSING = 200) (MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE LIDUID LIMIT EDUAL TO 31-50 LIDUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL GRANLLAR SILT - CLAY SOILS SOILS TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	MOUL OF THE PROCK (CR) MOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, ONEISS, GABBRA, SCHIST, ETC. NON-CRYSTALLINE FINE TO COARSE GRAIN METAHORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELL SPT REFUSAL IF TESTED. ROCK TYPE SEDIMENTARY ROCK THAT WOULD YELL SPT REFUSAL IF TESTED. ROCK TYPE COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SHELL BEDS, ETC. 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.	CROUND SUFFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM F SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL CENGTH 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
PLOSTIC MOCK 6 MX NP 18 MX 18 MX 18 MX 18 MX 18 MX 11 MN 11	HIGHLY ORGANIC STATE SPRING OR SEEP	OR SLIJ CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF DF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE 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 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	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. 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
PRIMARY SOIL TYPE	ROADWAY EMBANKHENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKHENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE PIEZOMETER INSTALLATION ROADWAY EMBANKHENT THOM ROADWAY EMBANKHENT INFERRED ROCK LINE PIEZOMETER INSTALLATION RS - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHULK SAMPLE ST - SHULK SAMPLE RS - ROCK SAMPLE SAMPLE RS - ROCK SAMPLE RS - ROCK SAMPLE SAMPLE SAMPLE	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT. N. VALUES > 180 BPF VERY SEVERE AL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT (V SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH DNLY FRAGMENTS OF STRONG ROCK REMAININD. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IT TESTED, VIELDS SPT. N. VALUES < 180 BPF COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE DNLY IN SMALL AND SCATTERED CONCENTRATIONS. DUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPPOLITE IS	THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTITIED (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
HARD 388 34 34 34 34 34 34 3	SOUNDING ROD AR - AUGER REFUSAL BT - BORING TERMINATED MED MICACEOUS AR - CALIFORNIA BEARING RATIO SAMPLE SPT N-VALUE SPT N-VALUE ABBREVIATIONS AR - AUGER REFUSAL HI HIGHLY MICA MICACEOUS VST - VANE SHEAR TEST CPT - CONE PENETRATION TEST MOD MODERATELY VEA WEATHERED	ALSO AN EXAMPLE. ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL. HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 8.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPPOLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SUIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (GPT) - NUMBER OF BLOWS (N OR BPF) OF
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE LIQUID LIMIT PLASTIC RANGE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	CSE COARSE NP - NON PLASTIC 7 - UNIT WEIGHT OHT - DILATOMETER TEST ORG ORGANIC 7 _d - DRY UNIT WEIGHT OPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST • - VOID RATIO SAP SAPROLITIC F - FINE SD SAND, SANDY FOSS FOSSILIFEROUS SL SILT, SILTY FRAC FRACTURED, FRACTURES SLI SLIGHTLY FRAGS FRAGMENTS TCR - TRICOME REFUSAL EQUIPMENT USED ON SUBJECT PROJECT	MEDIUM HARD CAN BE ERROWED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. 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 PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH OR HORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNALL. FRACTURE SPACING BEDDING	A 140 LB. HAWMER FALLING 38 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION OF 100T INTO SOIL WITH HAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY ISREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION ISROD A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC LIMIT OM OPTIMUM MOISTURE - MOIST - (M) SOLID: AT DR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE PLASTICITY	DRILL UNITS: ADVANCING TOOLS: CLAY BITS CS* CONTINUOUS FLIGHT AUGER CORE SIZE: BK-51 WARP FORD FUNCE DIVE	TERM	BENCH MARK: BYI-7 & BL STA. 5+00, N 682336.68 E I5872I7.57 ELEVATION: 717.65 FT. NOTES:
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 8-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED, PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	CME-45C	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS, GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS,	

PROJECT REFERENCE NO.

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		GRAY-BRN MED. STIFF MOIST LOW PLASTIC SANDY SILTY CLAY (A-6)	ALLUVIUM				
		(PI=I5)		(a)			
650		GRAY MED. STIFF MOIST TO SAT. (1-5) LOW PLASTIC SILTY SANDY CLAY (A-6)		000/3 SEVERELY WE	ATHERED OPVOTATIONE POOR		650
		(PI=I3)	PESIDUAL	NM CRYST	WENENENENENENENENENENENENENENENEN	=	
		WHITE-TAN-BRN HARD DRY MICA SANDY SILT (A-4) (80)		(01/10)	ATHERED CRYSTALLINE ROCK \(\frac{1}{2} \ \)		! ! !
240	W=W=W=W=	CRYSTALLINE ROCK	R ///=///=///				1 1 1 1
640		(6					640
630							630
620							60
							620
							1
610	50		-10	1020	3040	50	
			1 1 1				1



SHEET

		O. 335				B-4257		COUNTY	Rowan				GEOLOGIST St	ickney, J. K.	
SITE	DESCR	IPTIO	1 Brid	ge No	. 143 c	on SR 1004	over Church Cree	k						GROUND V	WTR (f
BORI	NG NO.	. EB1-	Α		SI	TATION 23	+68	OFFSET	13ft LT			ALIGNMEN	IT -L-	0 HR.	Dry
COLI	AR ELI	EV . 66	8.1 ft		TC	OTAL DEPT	H 12.0 ft	NORTHING	682,2	52		EASTING	1,586,436	24 HR.	FIAD
DRIL	L MACH	HINE C	ME-5	50X	DF	RILL METH	OD H.S. Augers						HAMMER TYP	E Automatic	
STAF	RT DATI	E 01/2	0/10		CC	OMP. DATE	01/20/10	SURFACE	WATER	R DEP	1 HT	N/A	DEPTH TO RO	OCK 12.0 ft	***************************************
ELEV	DRIVE ELEV	DEPTH	BLO	w co	UNT		BLOWS PER FOO	т	SAMP.	$\mathbf{V}/$	LO		SOIL AND ROCK DE	CODIDITION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5 50	75 100	NO.	MOI		ELEV. (ft)			DEPTH (
670	-	-										668.1	GROUND SUF	RFACE	c
	665.9	22				1						RE	RESIDUA D-ORANGE MED. S	L	
665			3	3	5	8		.		м			MOIST SILTY SAND		
	-	‡				:\:::		: : : : :				<u></u>			
660	660.9	72] : 1::		: : : : :				661.1	5501511		
660	-	‡	4	6	7	13			SS-6	М		TAN-0	RESIDUA GRAY-ORANGE STI	FF MOIST SAND	DY
	-	t						.				L	SILT (A-4)	
655		<u> </u>	 	 	ļ				<u> </u>	<u> </u>		656.3 656.1_/	WEATHERED		<u> 1</u>
	-	F										F SEV	ERELY WEATHERE ROCK	D CRYSTALLIN	4
	-	Ŧ										Boi	ring Terminated by A	Auger Refusal at	
650	_	‡										- 5	evation 656.1 ft On C	rystalline Rock	
	-	‡										_			
C 4 E] :	‡					•					-			
645	-	±										E			
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SHEET 7

	/ U	ر س	5U	KE	_0	G REPORT								1
	JECT N					B-4257	COUNTY	Rowan			0	GEOLOGIST Stic	kney, J. K.	
SITE	DESCR	RIPTIO	N Brid	ge No	. 143 (on SR 1004 over Church Cree	k						GROUND V	VTR (ft)
BORI	NG NO	. EB1-	В		S	TATION 23+67	OFFSET 5	oft RT			ALIGNMENT	-L-	0 HR.	Dry
COLI	AR EL	EV . 66	8.2 ft		TO	OTAL DEPTH 10.5 ft	NORTHING	682,2	35		EASTING 1	,586,430	24 HR.	FIAD
DRIL	L MACI	HINE C	ME-5	50X	DI	RILL METHOD H.S. Augers						HAMMER TYPE	Automatic	
STAF	RT DAT	E 01/2	0/10		CC	OMP. DATE 01/20/10	SURFACE	WATER	R DEP	1 HT	N/A	DEPTH TO ROO		
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	UNT 0.5ft	BLOWS PER FOOT 0 25 50	T 75 100	SAMP. NO.	/	L O I G	S(ELEV. (ft)	OIL AND ROCK DES	SCRIPTION	DEPTH (ft)
670	_	-	,								 - 668.2	GROUND SURF	FACE	0.0
665	664.4	3.8	4	7	10	17		SS-4	м		RED-0	RESIDUAL ORANGE MED. STII IST LOW (PI=11) PL SANDY CLAY (FF TO V. STIFF ASTIC SILTY	
660	659.4	8.8	7	32	46		78	SS-5	D		661.2 GRAY-	RESIDUAL GRN-WHITE DENS DRY SILTY SAND	E TO V. DENSI	
655	-	-					<u>. 15.5 4</u>				SEVE	WEATHERED R RELY WEATHERED ROCK ng Terminated by Au	OCK CRYSTALLINE	10.3
650	- - -	-									- Elev - - 	vation 657.7 ft On Cr	ystalline Rock	
645	-	-									- - - -			
640	- - -										- - -			
635	-										- - - - -			
630	-										- - - -			
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595	-	<u> </u>									- - -			
590		<u> </u>									<u> </u>			



SHEET

2	Y	D E	30 <i>l</i>	REL	.00	G	REPO	ORT										
PROJ	ECT NO						3-4257			COUNT	ΥF	Rowan				GEOLOGIST Sti	ckney, J. K.	
SITE	DESCRI	PTION	Brid	ge No.	143	on	SR 1004 c	ver Churc	ch Creek								GROUND W	/TR (ft)
BORI	NG NO.	EB2-	Α		S	TA	ATION 24+	r80		OFFSE	T 1:	2ft LT			ALIGNMENT	· -L-	0 HR.	12.8
COLL	AR ELE	V . 65	9.5 ft		T	01	TAL DEPTH	l 15.3 ft		NORTH	ING	682,2	23		EASTING 1	,586,544	24 HR.	FIAD
DRILI	L MACH	INE C	ME-5	50X	D	RI	ILL METHO	D H.S. A	Augers							HAMMER TYPE	Automatic	
STAR	T DATE	01/2	0/10		С	Ol	MP. DATE	01/20/10		SURFA	CE V	VATER	DEPT	H	N/A	DEPTH TO ROO	K 15.3 ft	
ELEV	DRIVE ELEV	DEPTH	<u> </u>	W CO				BLOWS PI			400	SAMP.	V /	0	S	OIL AND ROCK DES	CRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	+	0 25	5 50	<u> </u>	75 <i>′</i>	100	NO.	MOI	G	ELEV. (ft)			DEPTH (ft)
660	-					\perp	<u> </u>					ļ			 659.5	GROUND SURI		0.0
	-	F				١									GR	ALLUVIAL AY-BRN MED. STIFF	MOIST LOW	
655	655.8	3.7	2	2	2	4			• • • •	:::	-	SS-1	м		F) PLASTIC SANDY S	ILTY CLAY (A-6) 5.0
		F	-	_	-	۱	4			T	\exists	33-1	1 1	3	654.5 	ALLUVIAL		
	650.8	8.7		١.		١			: : : :		-					Y MED. STIFF MOIS' I) PLASTIC SILTY SA		
650	000.0	-0./	1	3	4	1	7			<u> </u>	\dashv	SS-2	Sat.		_			
		‡				١	11		: : : :	: : :					647.6			11.9
645	645.8	13.7	11	27	53	4							_		- wi	RESIDUAI HITE-TAN-BRN HAR	D DRY MICA.	
	ļ <u>-</u>	‡	 ''-	21	33	+				₩80	二	SS-3	D		644.2 Bori	SANDY SILT (ing Terminated by A		15.3
		‡													Ele	evation 644.2 ft On Co	ystalline Rock	
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SHEET 8

2	ツU	U	BO	RE	LO	G	REPORT								8
PRO.	JECT N	O. 335	99.1.1		ID.	В	3-4257	COUNT	ΥF	Rowan				GEOLOGIST Stie	ckney, J. K.
SITE	DESCR	RIPTIO	N Brid	ge No	. 143	on	n SR 1004 over Church Cre	ek							GROUND WTR (ff
BOR	ING NO	. EB2-	В		s	TA	ATION 24+80	OFFSET	Γ 1	3ft RT			ALIGNME	NT -L-	0 HR. CV@3.0
COL	LAR EL	EV. 65	9.2 ft		T	ОТ	TAL DEPTH 9.7 ft	NORTH	ING	682,1	99		EASTING	1,586,538	24 HR. FIAD
DRIL	L MACH	HINE C	ME-5	50X	D	RI	ILL METHOD H.S. Augers							HAMMER TYPE	E Automatic
STAF	RT DAT					ON	MP. DATE 01/20/10	SURFA	CE	WATER	DEP	ТΗΝ	N/A	DEPTH TO RO	CK 9.7 ft
ELEV (ft)	LLLLV	DEPTH (ft)		W CO		$\left \cdot \right $	BLOWS PER FOO			SAMP.	lacktriangledown/			SOIL AND ROCK DE	SCRIPTION
(1.1)	(ft)	(11)	0.5ft	0.5ft	0.5ft	\mathbb{H}	0 25 50	75 1	00	NO.	MOI	G	ELEV. (ft)		DEPTH (ft)
									Ì						
660						Ш							659.2	GROUND SURI	FACE 0.0
	-												- GR	ALLUVIAL AY-BRN MED. STIFF	
655	656.0	3.2	1	2	2	$\ \ $					١.,		-	SILTY CLAY (A-6)
	-	F				\prod	1		-		М		-		
	651.0	8.2				$\ $	1						- - 651.4		7.8
650			100/.3			Ш		100)i.3		D		- 649.5 SEV	WEATHERED F ERELY WEATHERED	ROCK
	-	F				l							- 1	ROCK	
645	-	F											_ E	ring Terminated by Ai levation 649.5 ft On Cr	ystalline Rock
	-	F											-		
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAY MATERIALS & TESTS UNIT SOILS LABORATORY

T.	I. P.	No.	B-4257	
			DEDODE ON C	

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project	335991	County	ROWAN		Owner
Date: Sampled	1/20/10	Received	1/25/10		Reported 1/27/10
Sampled from	BRIDGE			Ву	J E BEVERLY
Submitted by	N WAINAINA		,		1995 Standard Specifications

761711 TO 761716 2/11/10

TEST RESULTS

Proj. Sample No.		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Lab. Sample No.		761711	761712	761713	761714	761715	761716
Retained #4 Sieve	%	-	2		-	-	-
Passing #10 Sieve	%	98	90	96	100	80	100
Passing #40 Sieve	%	91	75	75	97	60	82
Passing #200 Sieve	%	76	54	36	67	26	-39

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							, , , , , , , , , , , , , , , , , , ,
Coarse Sand Ret - #60	%	10.9	23.6	35.6	8.9	40.4	30.3
Fine Sand Ret - #270	%	17.4	20.4	33.3	33.1	32.7	39.4
Silt 0.05 - 0.005 mm	%	43.4	31.7	23.0	35.8	20.8	22.2
Clay < 0.005 mm	%	28.3	24.2	8.1	22.2	6.1	8.1
Passing #40 Sieve	%	-	•	-	-	-	
Passing #200 Sieve	%	-	-	-	-	-	-

L. L.	39	28	27	38	22	29
P. I.	15	13	NP	11	4	2
AASHTO Classification	A-6(11)	A-6(4)	A-4(0)	A-6(7)	A-2-4(0)	A-4(0)
Station						
OFFSET	L	L	L	L	L	L
LOCATION	EB2-A	EB2-A	EB2-A	EB1-B	EB1-B	EB1-A
Depth (Ft)	4.20	9.20	14.20	4.30	9.30	7.70
to	5.20	10.20	15.20	5.30	10.30	8.70
	·	· .				

cc: JEBEVERLY Soils File

Soils Engineer



FIELD SCOUR REPORT

WBS: _	33599.1.1 TIP:	B-4257	COUNTY: Rowan						
DESCRIPTION(1): Bridge No. 143 on SR 1004 over Church Creek									
EXISTING BRIDGE									
Information from:	Field Inspection _ Other (explain) _	X Microfi	ilm (reel p	oos:)					
	43 Length: 85.6' Concrete encased piles or		Bents in Channel: 2	Bents in Floodplain:	4				
EVIDENCE OF S Abutments or E	COUR(2) nd Bent Slopes: Abutmen	ts and wingwalls a	re concrete		end on the date of the second				
Interior Bents:	None observed								
Channel Bed:	None observed								
Channel Bank:	Undercutting of banks, tre	es lean toward cha	annel						
11	IR PROTECTION None								
Extent(4):									
Effectiveness(5):									
Obstructions(6):	Tree limbs, branches, deb	oris							

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- Describe extent of existing scour protection.
- Describe whether or not the scour protection appears to be working.
- Note obstructions such as dams, fallen trees, debris at bents, etc.
- Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- **9** Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, or aggrading.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

			DES	IGN IN	FORM	ATION					
Channel Bed N	(laterial/7)	· eilt and a									
Chainlei beu n	vialerial(1)	. Siit and s	anu	W.A							
		V								W	
Channel Bank N	Material(8)	: Sandy si	Ity clay	Ref SS-	1)						
		-									
Channel Bank Cover(9): Mature trees and grass											
Floodplain Width(10): Appx sta. 23+75 - 27+25 (350')											
Floodplain Cover(11): Grass fields											
Stre	eam is(12)): Ag	grading	Χ	Degra	ading	Une	determin	ed		
					3.	···3					
nannel Migration Ten	idency(13)): Moderat	е	***************************************						***************************************	
Observations and C	Other Com	ments: Are	ea verv i	orone to	floodina						

DESIGN SCOUR E	LEVATIO	NS(14)				Fee	t	Meta	ers		
		(17)				1 66		141016	<u> </u>		
	BENT	<u>s</u>									
No interior ber	nte -					r	т	ı		T	 1
No intentor per	11.5										
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Comparison of DSE	= to Wydro	ulioo I Init i	hoorotic								
Comparison of DSE Single span - no inf											
emgio opair tio mi	COLICE DOLLE	o no aba	anon se	our armic	ipateu.				-		
											
SOIL ANALYSIS R	RESULTS	FROM CH	IANNEL	BED AN	ID BANK	MATE	RIAL				
Bed or Bank								T		T	
Sample No.	1									 	
Retained #4	1								***************************************		-
Passed #10											
Passed #40		eet # 9 for									
Passed #200	│ "Soil Te	est Results	**								
Coarse Sand	1										
Fine Sand	1										
Silt	4									ļ	
Clay	4									_	
LL PI					<u>T</u>					1	
AASHTO					<u> </u>					 	
Station			_	V	 						
Offset					 					 	
Depth					†					 	
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										Template R	Revised 02/07/0

Date: 2/10/2010