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

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STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REF			3469.1.1 (1	B-4114)	F.A.	PROJ. <u>BR</u>	Z-1146(5)
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PROJECT	DESCRIP	TION 🚣	BRIDGE	NO. 151 (ON -L- (S.	R 1146) O	VER
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MAY 2007



PROJECT: 33469.

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CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

	SOIL AND ROCK LEGEND, TERM	IS, SYMBOLS, AND ABBREVIATIONS	
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <u>UNIFORM</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, 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.
THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 1206, ASTM D-1586). SOIL	POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEDOS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED WINDOWS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION AS SHALE, SLATE, ETC.
VERY STIFF, GRAN, SULTY CLAN, LONGST WITH MIERGELOED FINE SAND LATERS, MIGHLY PLASTIC, A-7-6	MINERALOGICAL COMPOSITION	ROCK (WR) BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANICAL WATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE,	AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (≤ 35% PASSING #200) (> 35% PASSING #200) UNGANIC MATERIALS	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	CNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS, A-1-DA-1-b A-2-4A-2-5IA-2-7 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRISTHLLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED, ROCK TYPE	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7 SYMBOL SOCIETION SYMBOL SYMBOL	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
500000000000000000000000000000000000000	HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
7. PASSING GRANULAR SILT- MUCK.	PERCENTAGE OF MATERIAL GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
* 40 38 MX 56 MX 51 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 18%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
LTOUR COURT	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.
PLASTIC INDEX 6 MX NP 18 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI) CRYSTALLS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	DIP_DIRECTION (DIP_AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 6 6 6 4 MX 8 MX 12 MX 16 MX No MX MODERATE AMOUNTS OF SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	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. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SUILS SUILS	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS, MDDERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS, IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	$ abla_{E} $ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.
SUBSIGNAL:	- OM- SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS LL - 30 :PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
COMPACTIVES OF RANGE OF STANDARD RANGE OF UNCONFINED	SPT CPT	(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	THE FIELD.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-YALUE) (TONS/F1 ²)	WITH SOIL DESCRIPTION VST PHT LEST BURING DESIGNATIONS	IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY LOOSE 4 TO 16	S - BULK SAMPLE AUGER BORING OR OF THE PROPERTY OF THE PROPE	(SEV.) IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KADLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
MATERIAL MEDIUM DENSE 10 TO 30 N/A	SS - SPLIT SPOON ARTIFICIAL FILL (AF) OTHER SAMPLE	EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED YIELDS SPT N VALUES > 100 BPF	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE >50	THAN ROADWAY EMBANKMENT - CORE BORING ST - SHELBY TUBE	VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AFRATION AND LACK OF GOOD DRAINAGE.
VERY SOFT <2 <0.25	INFERRED SOIL BOUNDARY MONITORING WELL SAMPLE MONITORING WELL SAMPLE	(V SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK- REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
GENERALLY SOFT 2 TO 4 0.25 TO 0.50 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE A PIEZOMETER	VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF	INTERVENING IMPERVIOUS STRATUM.
MATERIAL STIFF 8 TO 15 1 TO 2	INSTALLATION RT - RECOMPACTED TRIAXIAL SAMPLE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD >30 >4	25/825 DIP & DIP DIRECTION OF SLOPE INDICATOR INSTALLATION CBR - CALIFORNIA BEARING	ALSO AN EXAMPLE.	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 AN
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES RATIO SAMPLE SPT N-VALUE	ROCK HARDNESS	EXPRESSED AS A PERCENTAGE.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	SOUNDING ROD (REF)— SPT REFUSAL	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	ABBREVIATIONS	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	AR - AUGER REFUSAL HI HIGHLY # - MOISTURE CONTENT	TO DETACH HAND SPECIMEN.	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.) GRAIN MM 305 75 2,0 0.25 0.05 0.005	BT - BORING TERMINATED MED MEDIUM V - VERY CL CLAY MICA MICACEOUS VST - VANE SHEAR TEST	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	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
SIZE IN 12 3	CPT - CONE PENETRATION TEST MOD MODERATELY WEA WEATHERED CSE COARSE NP - NON PLASTIC Y- UNIT WEIGHT	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST ORG ORGANIC 7d- DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	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 TO DR LESS
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST • - VOID RATIO SAP SAPROLITIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	THAN Ø1 FOOT PER 60 BLOWS.
	F - FINE SD SAND, SANDY FOSS FOSSILIFEROUS SL SILT, SILTY	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	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 (SAT.) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED, FRACTURES SLI SLIGHTLY	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY
PLASTIC LIQUID LIMIT	FRAGS FRAGMENTS TCR - TRICONE REFUSAL	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE - WET - (W) SEMISOLID; REDUIRES DRYING TO	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING	<u>IOPSOIL (TS.)</u> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PL PLASTIC LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	TERM SPACING IERM IHICKNESS	BENCH MARK: BM# 200, -L- STA. I6+32.64, 63.6' RT
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	X AUTOMATIC MANUAL	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET	
SL SHRINKAGE LIMIT	MOBILE B- CLAY BITS	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	ELEVATION: 236.68' FT.
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6° CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE VISE THAN BIG EFFT THICKLY LAMINATED 0.008 - 0.03 FEET	NOTES:
	→ B——	INDURATION 4.0008 FEET	
PLASTICITY PLASTICITY INDEX (P) DRY STRENGTH	CME-45C HARD FACED FINGER BITS -N	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW	X CME-550 X TUNGCARBIDE INSERTS -H	DUDDING WITH FINCED EDEED ANNUFORM CONTROL	
LOW PLASTICITY 6-15 SLIGHT	CASING W/ ADVANCER HAND TOOLS:	FRIABLE ROBBING WITH FINGER PREES NOMEROUS GRAINS! GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
COLOR	TRICONE TUNG,-CARB, HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	

PROJECT REFERENCE NO. 33469.I.I (B-4II4)

SHEET NO.

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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT SECRETARY

May 14, 2007

STATE PROJECT:

33469.1.1 (B-4114)

F.A. PROJECT:

BRZ-1146(1)

COUNTY:

Franklin

DESCRIPTION:

Bridge No. 151 on -L- (SR 1146) over Camping Creek at Station 14+89

SUBJECT:

Geotechnical Report – Structure Inventory

Project Description

A single-span bridge, 70-feet in length with a 75° skew, is proposed on -L- (SR 1146) over Camping Creek. The project is located in central Franklin County between Louisburg and Youngsville.

The subsurface investigation was conducted during April of 2007 using a CME-550X ATV-mounted drill machine. Standard Penetration Test borings were performed at each of the proposed bent locations. All borings were advanced to crystalline rock using hollow stem augers. Representative soil samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis.

Physiography and Geology

The project is located in the gently rolling terrain of the Piedmont Physiographic province. Geologically, the site is underlain by foliated to massive granitic rock of the Raleigh belt. The area is predominantly rural in nature with a mixture of residential homes, agriculture, and forestry operations.

Soil Properties

Soils encountered at the project site include roadway embankment, alluvial and residual soils.

Roadway embankment soils were encountered at all bent locations. The embankment soils range in thickness from 5.5 to 8.0 feet. These soils consist of brown, very soft to medium stiff, moist, silty clay (A-7-6) and sandy clay (A-6). Alluvial soils underlie roadway embankment soils.

Alluvial soils range from 4.5 to 8.0 feet in thickness. These soils predominantly consist of light and dark gray, very loose to loose, moist to saturated, silty sand (A-2-4) and coarse sand (A-1-b). Other soils present in smaller quantities are gray, very soft to stiff, moist, sandy silt (A-4) and sandy clay (A-6). The alluvial soils were deposited on residual soil and weathered rock.

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Residual soils were encountered on the B-side of both bent locations, and are 2.5 to 3.2 feet thick. These soils consist of orange-brown, dense to very dense, moist, saprolitic, coarse sand (A-1-b). The residual soils are underlain by weathered rock.

Rock Properties

Weathered rock was derived from the underlying intrusive granitic rock, and ranges in thickness from 0.4 feet at EB2-A to as much as 11.4 feet at EB1-A. Weathered rock was encountered in all of the borings. The top of weathered rock ranges in elevation from 220.2 feet at EB1-B to 229.4 feet at EB1-A.

Crystalline rock was encountered at both bent locations. Rock present at the site predominantly consists of orange-brown and white, severely weathered to slightly weathered, moderately hard to hard, granite. The top of crystalline rock ranges in elevation from 216.6 feet at EB2-B to 226.4 feet at EB2-A.

Groundwater

Groundwater was encountered at each of the boring locations except for EB2-A. The groundwater elevations range from 229.3 feet at EB1-B to 230.7 feet at EB1-A. The water in Camping Creek was at an elevation of 230.0 feet (1-07).

Temporary Detour Structure

A temporary detour structure will be constructed approximately 45 feet upstream of the existing bridge at -DET-Station 14+23. The structure has a total length of 65 feet, and is on a 60° skew. Borings EB1-B (DET) and EB2-B (DET) were drilled along the -DET- alignment to provide additional information for the detour structure. Geologic conditions along the detour alignment correlate directly to those encountered along the main-line structure.

Notice

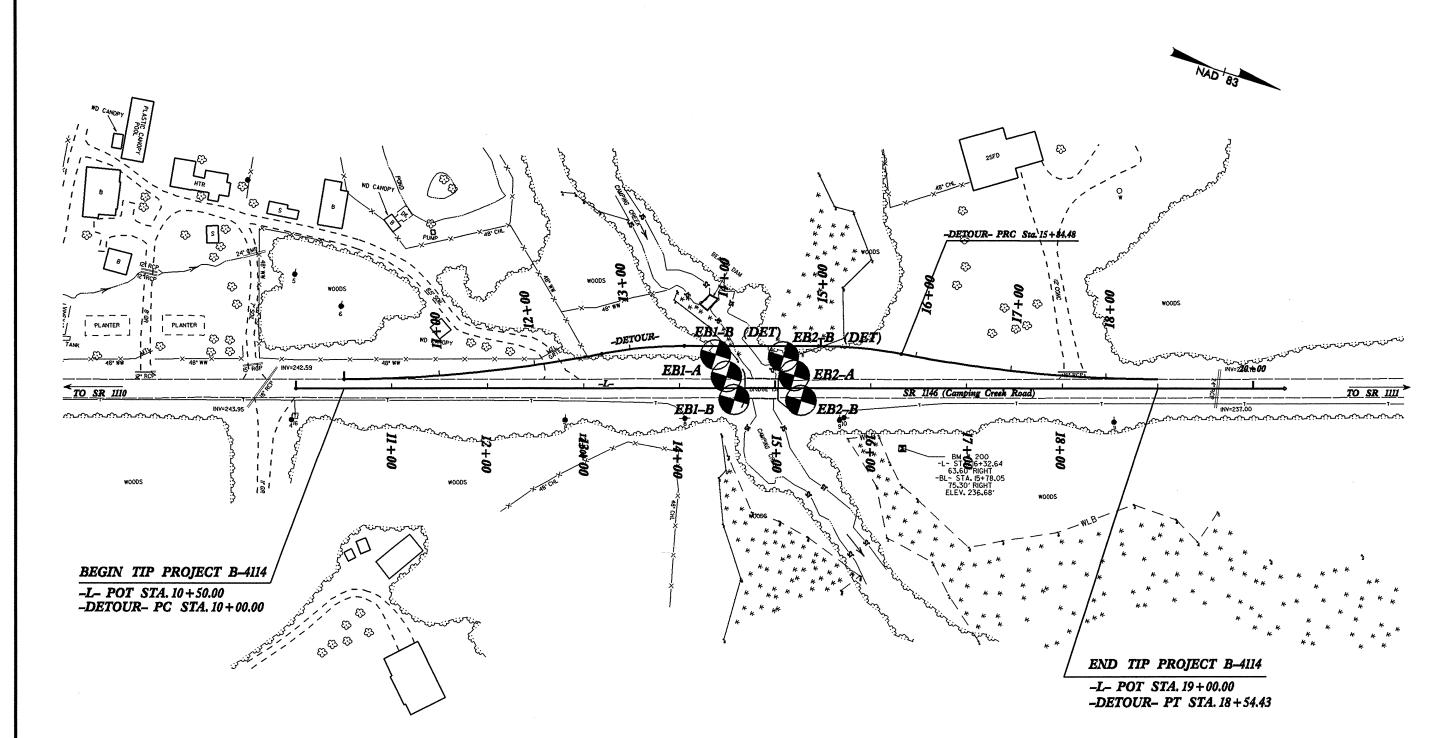
This Geotechnical foundation report is based on the Preliminary General Drawing dated January 2007 and the Hydraulics Bridge Report dated January 10, 2007. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

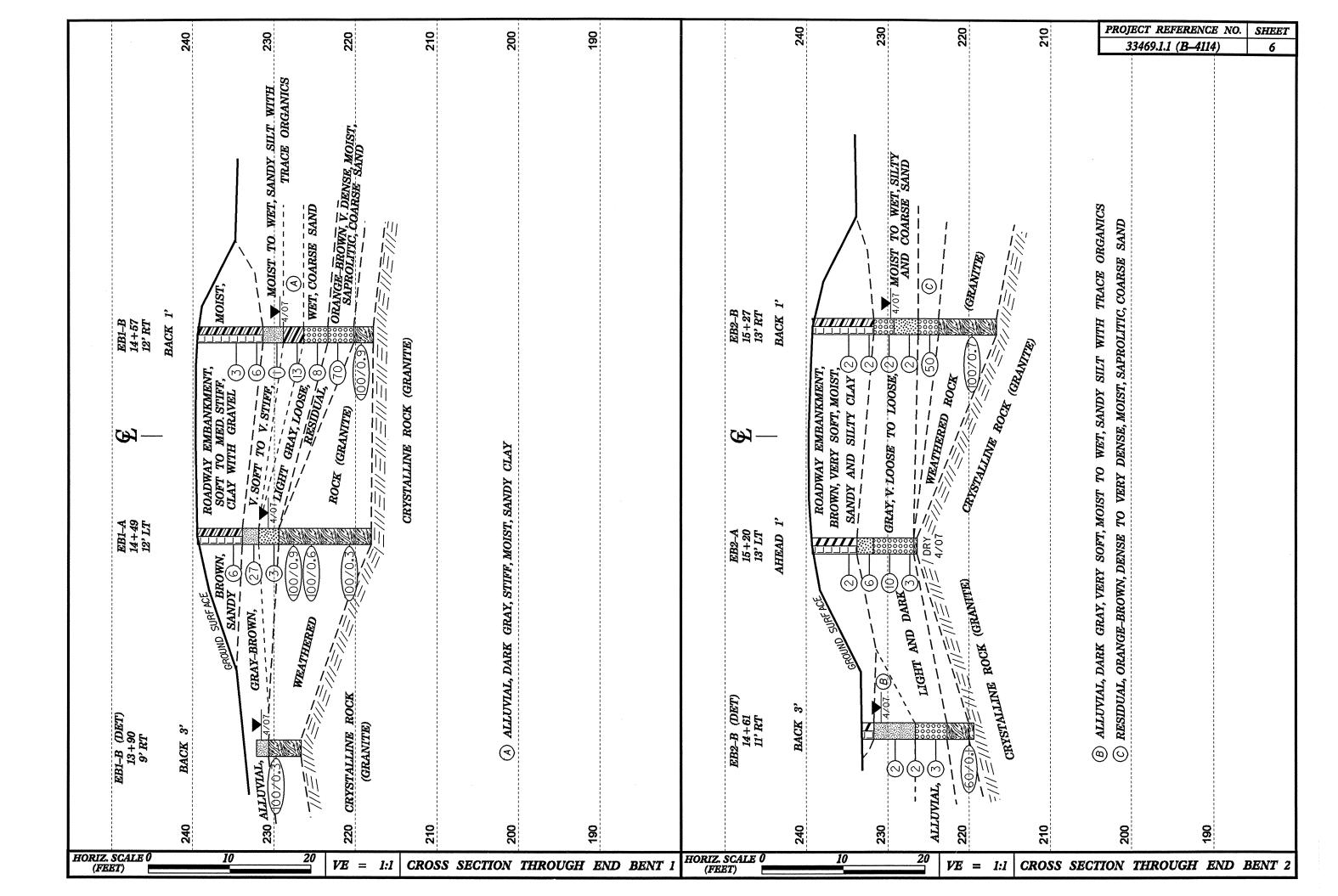
Jaime Love Pedro
Engineering Geologist

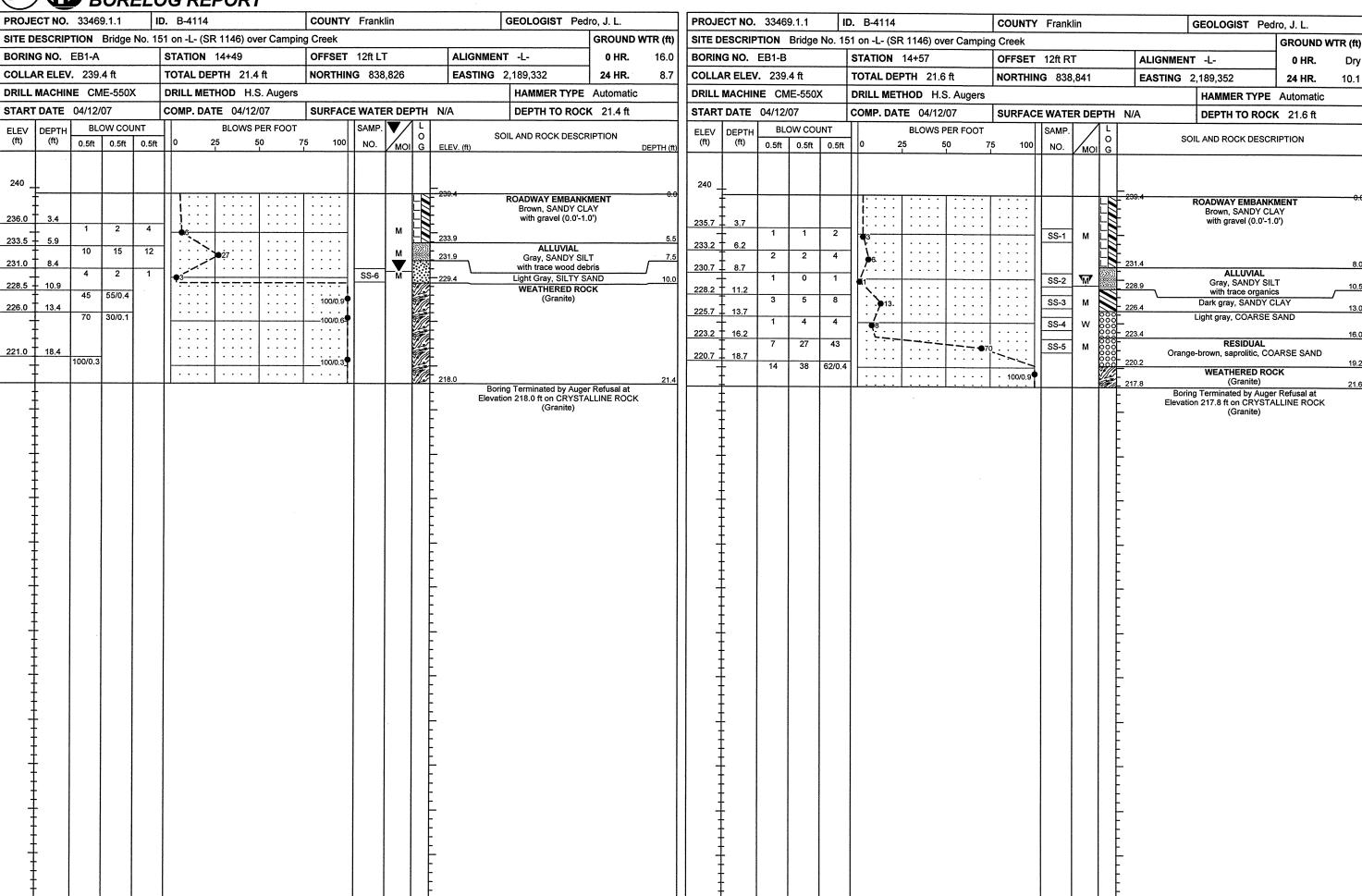
PROJECT REFERENCE NO.	SHEET
33469.1.1 (B-4114)	4
SITE PLA	4N
0 50	100
FEET	

SKEW ANGLE = 75



									0	10	20	PROJECT REFERENCE		SHEE
		FENCE DIAG	RAM THRO	OUGH B	ORINGS P	ROJECTEĐ	ALONG	-L-		FEET VE =1:1		33469,1.1 (B-411	4)	5
250				EB1–I 14+51						! ! !	EB2 15+		1 1 4 1 1	0.5
.50				12' RT							13'			25
40	EXISTING GROUND				12 12 12 12 12 12 12 12		 						<u> </u> 	24
·	ROADWAY EME		T, SANDY CLAY			1 1 1 1 1 1 1				WAY EMBANI T, SANDY CLA	: 1-1	BROWN, VERY WITH GRAVE		
230		ALLUVIAL, GRAY LIGHT GR	VERY SOFT TO	<u>6</u>	STIFF, MOIS' SANDY SI	LT	1/07		 		2		— — /ET, CSE.	. 23
		GR.	VERY SOFT TO TO WET, AY, LOOSE, WET,	(1)	AND CLAY COARSE SAND	CC	GRAY, LOOS ARSE AND S	E, WET, ILTY SAND	ALLUV	TAL, GRAY, VEI — —	2 2 - 50) - 50	AND SILTY	SAND — -	
220		WEATHE	RED ROCK	(70)—	Pro	1	DENG.	TOTAL MOIST,		- SE SAND	———			22
, , ,				//=/////	GRANITE)		TO V.	DENSE, MOSS	WEATH	ERED ROCK	1/1=1/1/	(GRANITE)	+ •	
210			CRYSTALLI	NE ROCK ((GRANITE)		/// <u>=</u> /// <u>=</u> /	N/=///=//		CRYSTAL	LINE ROCK	(GRANITE) (GRANITE)	 	21
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190														46
100			-			 	 			 				19
180														18
170														17
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+1	10 +20	+30 +	40 14+5		+60 +7	70 +	80 +	90 15-		10 4	+20	+30 +	40	





PROJECTION 390-11 0 0 0 1 0 0 0 0 0						G RI		<u> DRT</u>		COL	INTV	Eronk	lin			10	SEOLOGIS	ST Ded	ro I I	y	PPO	IECT	NO 3	33460	1 1	lin	D B 41	14			COL	NTV	Eronk	lin	····			CEOLO	CIST Do	dra 1 I	
BORING NO. EB2-A STATION 15+20 OFFSET 13ft LT ALIGNMENT -L. 0 HR. Dry	L							46) 01	er Camp			1 10111	.1111					- 100		WTR (ff	┥ ├──								146) o	er Cam			ı ıalık					GEOLO	PE		D WTR (ff)
COLLAR ELEV. 239.3 ft TOTAL DEPTH 12.9 ft NORTHING 838,894 EASTING 2.189,310 24 HR. Dry DRILL MACHINE CME-55OX DRILL METHOD H.S. Augers HAMMERTYPE Automatic START DATE 04/12/07 COMP. DATE 04/12/07 SURFACE WATER DEPTH N/A DEPTH TO ROCK 12.9 ft (b) 6/19 0.5ft	<u> </u>			Driuge					or ournp			13ft L7			ALIGN	MENT	-L-		-	•										- Cum	` 		13ft R	 Т		AL	IGNME	NT -l-		⊣	
DRILL MACHINE CME-550X DRILL METHOD H.S. Augers DRILL METHOD H.S. Aug				3 ft					ft										-		1				ft					 6 ft									33	-	
START DATE													,				r	R TYPE	L	·	┥┝──													,						1	
ELEV DEPTH BLOW COUNT (ft) 0.5ft 0											RFACE	E WATE	R DE	PTH	N/A		DEPTH 1	O ROC	K 12.9 ft		STAF	RT DA	TE 04	4/13/07	7							FACE	WATE	R DE	PTH	N/A					
(ft) (ft) 0.5ft 0.	 		·	*************						<u></u> г	T	SAMP.	V /	L	-		L AND DOG	L DESCE	DIDTION		ELEV	DEF	тн	BLOV	w coul	INT	П		BLOWS	PER FOO)T	П	SAMP.	7	L						
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228.3 11.0 7 6 4 7 10 7 8 4 7 10 7 8 4 7 10 7 8 4 7 10 8 10 8 10 8 10 8 10 8 10 8 10 8 10			1	3	3	6.	: :			.		SS-8	М	000	231.8		Gray, S	ILTY SAN	ID		5	Ī	٧	NOH	WOH	2	• 2 .			: : :		1 1	SS-10	18%		231.7					7.5
28.3 11.0 2 1 2 0 3 11.0 2 1 2 0 3 12.5 0 226.8 12.5 0 226.8 12.5 0 226.8 12.5 0 226.8 13.4 WEATHERED ROCK (Granite) 225.8 13.4 2 18 32	-	-	7	6	4	10	<u>: :</u>	• • •	ļ				w	0000	_		Light gray, (with tra	COARSE ce organic	SAND			+		2	1	1	2			 				_W_	0000 0000 0000 0000	229.2.		Gray,	ALLUVIAL COARSE S	AND	10.
WEATHERED ROCK 12.9 225.8 13.4	228.3	11.0	2	1	2	/::	. .		: : :	3	1		1	ŏŏŏ	-					40		10).9 V	NOH	1	1	11:	1		:::		• •	SS-11	j		F					
Boring Terminated by Auger Refusal at Elevation 226.4 ft on CRYSTALLINE ROCK (Granite) Boring Terminated by Auger Refusal at 220.8 18.4 6 50 50/0.2 100/0.7 100/0.7 216.6 Elevation 216.6 ft on CRYSTALLINE ROCK (Elevation 216.6 ft on CRYSTALLINE ROCK)		-	-			1 25	<u>-+-</u>		+	<u>·+</u>		 	1	922	226.4				СК			13	3.4			32	1	:::		<u> </u>		: :		1	000	226.2		F	RESIDUAL		
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The state of the s		ļ.													F 8	Elevatio	n 226.4 ft or (G	n CRYST/ ranite)	ALLINE ROC	K	220.8	I 18	3.4								.	۱۱ - ۰				F				CK	
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The state of the s		E																				†									1	1 1				216.6					22.0
(Constitution of the content of the	-	Ł													_							#															Bo Elev:	oring Termination 216.6 f	ated by Aug	er Refusal at	}
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	ID. B-4114	COUNTY Franklin	GEOLOGIST Pe		PROJECT NO.		ID. B-4114	COUNTY Franklin	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 1				GROUND WTR (ft)			——————————————————————————————————————		
BORING NO. EB1-B (DET)	STATION 13+90	OFFSET 9ft RT	ALIGNMENT -DET-	0 HR. Dry	BORING NO.		STATION 14+61		
COLLAR ELEV. 232.2 ft	TOTAL DEPTH 5.5 ft	NORTHING 838,808	EASTING 2,189,313	24 HR. 0.6			TOTAL DEPTH 13.8 ft		<u> </u>
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers		HAMMER TYPE		 	NE CME-550X	DRILL METHOD H.S. Augers	7	
START DATE 04/13/07 FLEV DEPTH BLOW COUNT	COMP. DATE 04/13/07 BLOWS PER FOOT	SURFACE WATER DEPTH N	A DEPTH TO ROC	ΣΚ 5.5 π	START DATE	7	COMP. DATE 04/13/07		/A DEPTH TO ROCK 13.1 ft
ELEV DEPTH BLOW COUNT (ft) (ft) 0.5ft 0.5ft 0.5ft		75 100 NO. MOI G EI	SOIL AND ROCK DESC	RIPTION DEPTH (ft)	ELEV DEPTH (ft)	0.5ft 0.5ft 0.5			SOIL AND ROCK DESCRIPTION
				DEI III (II)				T THE PROTECT	
235					235				
					===				33.2
	 	M 23	ALLUVIAL	0.0				23	ROADWAY EMBANKMENT
230.1		100/0.3	Gray-brown, SAND) WEATHERED RO	Y SILT	230.1 7 3.1	WOH WOH 2			ALLUVIAL
1 1 1 1			(Granite) 6.7	5.5	227.6 5.6	WOH 1 1			with trace organics
			Boring Terminated by Aug- Elevation 226.7 ft on CRYST	er Refusal at 'ALLINE ROCK	225.1 8.1		\square	000	Light gray, COARSE SAND
			(Granite)			2 1 2			22.7
					220.1 13.1				WEATHERED ROCK (Granite)
					- 10.1	60/0.1		60/0.1	19.4 CRYSTALLINE ROCK 13.1
									Boring Terminated by Auger Refusal at
									Elevation 219.4 ft on CRYSTALLINE ROCK (Granite)
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ž T					L			DEPTH 13.8 ft	

PROJ. NO. - 33469.1.1 ID NO. - B-4114 COUNTY - Franklin

SHEET 10 OF 12

EB1-A (-L-)

			S	OIL T	ES	ST	RE	SUL	TS						
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-6	10' LT	14+49	8.4-9.9	A-2-4(0)	29	10	40.9	24.9	16.0	18.2	90	62	34	-	-

EB1-B (-L-)

	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-1	12' RT	14+57	3.7-5.2	A-6(1)	34	16	42.7	20.2	12.8	24.3	89	61	36	•	-
SS-2	12' RT	14+57	8.7-10.2	A-4(0)	26	7	45.1	19.4	17.2	18.2	97	67	36		-
SS-3	12' RT	14+57	11.2-12.7	A-6(4)	31	15	24.9	27.5	15.2	32.4	99	86	50	-	-
SS-4	12' RT	14+57	13.7-15.2	A-1-b(0)	25	NP	56.1	25.7	12.1	6.1	86	49	18		•
SS-5	12' RT	14+57	16.2-17.7	A-1-b(0)	21	NP	67.2	18.4	10.3	4.0	70	32	12	-	-

EB2-A (-L-)

			S	OIL T	ES	ST	RE	SUL	TS						
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-7	13' LT	15+20	3.5-5.0	A-7-6(7)	48	25	35.8	16.6	17.2	30.4	87	63	44		-
SS-8	13' LT	15+20	6.0-7.5	A-2-4(0)	16	NP	51.6	23.1	15.2	10.1	94	56	27	-	-

EB2-B (-L-)

SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO				% BY WI	EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-9	13' RT	15+27	3.4-4.9	A-6(4)	37	17	38.5	18.4	14.8	28.3	95	68	44	•	-
SS-10	13' RT	15+27	5.9-7.4	A-6(6)	40	21	34.8	17.8	17.0	30.4	95	69	48	18.4	
SS-11	13' RT	15+27	10.9-12.4	A-2-4(0)	29	NP	50.0	30.4	9.5	10.1	95	69	21	•	3.9

EB2-B (-DET-)

SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO				% BY W	EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-12	11' RT	14+61	3.1-4.6	A-4(2)	25	6	6.5	29.8	35.4	28.3	100	99	70	•	•



FIELD SCOUR REPORT

WBS:	33469.1.1 TIP: B-4114 COUNTY: Franklin					
DESCRIPTION(1):	Bridge No. 151 on -L- (SR 1146) over Camping Creek at Station 14+89					
	EXISTING BRIDGE					
Information from:	Field Inspection x Microfilm (reel pos:) Other (explain) hydro report					
	151 Length: 36 Total Bents: 5 Bents in Channel: 3 Bents in Floodplain: 2 Timber piles and steel crutch bents between interior B1 and both End Bents					
EVIDENCE OF	` '					
Abutments or I	End Bent Slopes: Bottom left of abutment wall exposed at End Bent 2					
Interior Bents:	None visible					
Channel Bed:	Local scour					
Channel Bank:	Contraction scour along banks upstream on End Bent 2 side					
lii.	UR PROTECTION Wing walls and concrete boxes have been added around various piles					
	30'L x 10'H					
, ,						
Effectiveness(5):	Effective					
Obstructions(6):	Obstructions(6): Lots of limbs underneath bridge					
L						

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).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 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, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 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.

							SHEET 11 OF 12	
			DESIGN IN	FORMATIC)N			
Channel	Bed Material(7	'): <u>Alluvial, li</u>	ght gray, loose,			* 10		
Channel E	Channel Bank Material(8): Alluvial, dark gray, very soft to soft, sandy silt with trace organics (SS-12)							
Channe	l Bank Cover(9	9): Grass, tre	es, and brush					
Flood	Floodplain Width(10): +/- 250'							
Flood	Iplain Cover(11): Grass, tre	es, and brush					
	Stream is(12	?): Agg	rading	Degrading	X	Static		
Channel Migi	ration Tend.(13	3): Northeast	towards End B	ent 2				
Observations a	and Other Con	nments: Old obstructin	crossing has fa g water flow	llen in creek 1	00' upstrean	n from existing l	oridge and is	
DESIGN SCO	UR ELEVATIO	DNS(14)	·	Fe	eet X	Meters	_	
	nical Engineerir		eoretical scour: s with the Hydr	aulic Unit's the	eoretical ove	rtopping scour		
SOIL ANALYS	SIS RESULTS	FROM CHA	NNEL BED AN	D BANK MAT	ERIAL			
Bed or Bank		Bank						
Sample No.	SS-4	SS-12						
Retained #4	3	-						
Passed #10	86	100						
Passed #40	49	99						
Passed #200	18	70						
Coarse Sand	56.1	6.5						
Fine Sand Silt	25.7	29.8						
Clav	12.1 6.1	35.4 28.3						

Template Revised 02/07/06

Reported by:	Jaime Love Pedro
	Jalme Love Pedro

25

NP

A-1-b(0)

14+57(L)

12' Rt

Depth 13.7'-15.2'

AASHTO

Station

Offset

25

6

A-4(2)

14+61 (Det)

11' Rt

3.1'-4.6'

Date: 4/3/2007

SITE PHOTOGRAPH

Bridge No. 151 on -L- (SR 1146) over Camping Creek

