(D: B-4244

OJECT: 33587.1.1

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

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STRUCTURE SUBSURFACE INVESTIGATION

ROJ. REI			F.A. PROJ. BRZ-2215(1)							
COUNTY PROJECT GABRI	DESCRI	PTION	BRIDGE	#140	ON	SR	2215	OVER	UT	TO
(-L- ST	ATION	18+10								
SITE DES	CRIPTION	ν								

 STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4244	1	12
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CAUTION NOTICE

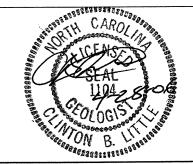
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FILED BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 250-4088. NOTHERS THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD 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 BORNOS OF 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 MOSTURE CONDITIONS NOTICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION 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 THIS 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.

-	J.K. STICKNEY
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	K. WISE
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INVESTIGATED E	BY J.E. BEVERLY
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DATE	APRIL 2006
CHECKED BYSUBMITTED BY_	C.B. LITTLE

PERSONNEL



PROJECT REFERENCE NO. SHEET NO. B-4244 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 TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR VEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 1980 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AGSHTO T.206, ASTM D-1566L SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTITENT FACTORS SUCH AS MINERAL GOIGLAL COMPOSITION, AND MAIRTY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. JUNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR.	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. 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 WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100	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, AS SHALE, SLATE, ETC.							
VER STIFF, GRAV, SUTY CLA, MOST WITH INTERGEDOED FINE SAND LIVERS, HIGHEY PLASTIC, 4-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS OPERANIC MATERIALS	SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KADLIN, ETC. ARE USED IN DESCRIPTIONS	RÖCK (WR) BLOWS PER FOOT IF TESTED. CRYSTALLINE CRYS	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.							
GENERAL UHANULAR MAIEMALS SILI-LLAT MAIEMALS ORGANIC MATERIALS	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIDUID LIMIT LESS THAN 31	NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE ROCK (NCR) INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	CALCAREOUS CCALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.							
SYMBOL OCCOROCCO	MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK CP 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.							
Z PASSING 10 50 MX GRANULAR CLAY MUCK,	PERCENTAGE OF MATERIAL GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEDUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.							
40 38 MX 58 MX 51 MX 10 MX 25 MX 35 MX 35 MX 35 MX 35 MX 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	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.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.							
LIDUID LIMIT	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.	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							
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	□ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO MUCK OF TO (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 DNE 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 MATTER GEN. RATING FAIR TO DOOD WARNINGTON	STATIC WATER LEVEL AFTER 24 HOURS VPW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	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.							
AS A EXCELLENT TO GOOD FAIR TO POUR POOR OWNITHBUT	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.							
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 :PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENSE RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KADLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE (N-VALUE) (TONS/F12)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION PSPT CPT CMT TEST BORING DESIGNATIONS SAMPLE 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 GRANULAR LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	S - BULK SAMPLE AUGER BORING SS - SPLIT SPOON SAMPLE SAMPLE	(SEV.) IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELOSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, VIELDS SPI N VALUES 1/80 BPF	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.							
MATERIAL DENSE 30 TO 50 VERY DENSE >50 VERY DENSE C2 (0.25 C5) C5 C5 C5 C5 C5 C5	THAN ROADWAY EMBANKMENT CORE BORING ST - SHELBY TUBE SAMPLE INFERRED SOIL BOUNDARY MONITORING WELL RS - ROCK SAMPLE	VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT (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 VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. JETESTED, YHLDS 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. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.							
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY SUPE INDICATOR PIEZUMELER INSTALLATION RT - RECOMPACTED TRIA SAMPLE SLOPE INDICATOR	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK DUALITY 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							
TEXTURE OR GRAIN SIZE	25/025 DIP & DIP DIRECTION OF INSTALLATION CBR - CALIFORNIA BEAR RATIO SAMPLE SPT N-VALUE	ROCK HARDNESS	EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE							
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	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. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND							
DOUBLE CORRE FINE SUT CLAY	ABBREVIATIONS AR - AUGER REFUSAL HI HIGHLY ## - MDISTURE CONTENT	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.							
GRAIN MM 305 75 2.0 0.25 0.05 0.005	BT - BORING TERMINATED MED MEDIUM V - VERY CL CLAY MICA MICA MICACEOUS VST - VANE SHEAR TES' CPT - CONE PENETRATION TEST MOD MODERATELY VEA VEATHERED	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. COUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	SLICKENSIDE - POLJSHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF							
SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS	CSE COARSE NP - NON PLASTIC 7 - UNIT WEIGHT DMT - DILATOMETER TEST ORG ORGANIC 7 - DRY UNIT WEIGHT DPT - DYNAMIC PENETRATION TEST PMT - PRESSUREMETER TEST	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK PDINT. 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 OR LESS THAN 0.1 FOOT PER 60 BLOWS.							
(ATTERBERG LIMITS) DESCRIPTION GOIDE FOR FILES MOISTONE BESCRIPTION	e - VOID RATIO SAP SAPROLITIC F - FINE SD SAND, SANDY FOSS FOSSILIFEROUS SL SILT, SILTY	SOFT CAN BE GROVED OR GOUGED READLY 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.	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 PLASTIC - USUALLY LIQUID, VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE GROUND WATER TABLE - SATURATED - USUALLY FROM BELOW THE	FRAC FRACTURED, FRACTURES SLI SLIGHTLY FRAGS FRAGMENTS TCR - TRICONE REFUSAL	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 FINGERNAIL.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.							
RANGE - WET - (W) SEMISOLIO, REDUIRES DATING TO	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING TERM SPACING IERM IHICKNESS	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.							
PL PLASTIC LIMIT OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: X AUTOMATIC MANU		BENCH MARK: BM #2 - RAILROAD SPIKE IN BASE OF PP 90.12' RT. OF STA. 19+90.63 -L- ELEVATION: 607.25 FT.							
SL SHRINKAGE LIMIT	MOBILE B- CLAY BITS CORE SIZE: BK-51 X 8*HOLLOW AUGERS	MODERATELY CLOSE	NOTES:							
PLASTICITY	CME-45C HARD FACED FINGER BITS -N	INDURATION								
PLASTICITY INDEX (PI) DRY STRENGTH	TING -CARRIDE INSERTS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.								
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT	X CME-550 CASING W/ ADVANCER HAND TOOLS:	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.								
MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH	POST HOLE DIGGER TRICONE STEEL TEETH POST HOLE DIGGER TRICONE TUNG-CARB. HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.								
COLOR 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.								
DESCRIPTIONS MAY INCLUDE CULUR OR COLOR COMBINATIONS (TAN, RED, TELLOW-BROWN, BLOE-GRATZ, MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	U vane shear test	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.								



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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SECRETARY

GOVERNOR

April 17, 2006

STATE PROJECT: 33587.1.1 (B-4244)

COUNTY:

Randolph

DESCRIPTION:

Bridge #140 on SR 2215 (Henley Country Rd.) over unnamed

tributary to Gabriel's Creek (-L-Station 18+10)

SUBJECT:

Geotechnical Report – Bridge Foundation Investigation

This is a proposed bridge replacement for bridge number 140 on SR 2215 (Henley Country Rd.) over UT to Gabriel's Creek. The new structure will occupy the same location as the existing structure. The proposed structure will be an 80-foot single span steel I-Beam design on a 75-degree skew angle. Total bridge width is 43' 2" and proposed end bent slopes are 1.5:1 (H:V) with class II rip rap for slope protection.

Four foundation test borings were performed utilizing a CME-550X drill machine, hollow stem augers, and an automatic drop hammer. The field investigation for this project was conducted in April of 2006.

Physiography/Geology

The project is located in central Randolph County just NE of the city of Asheboro. The site area is gently sloping with wooded areas bounding the creek. Geologically this area is part of the Carolina Slate Belt and is likely underlain by Cenozoic age felsic metavolcanic rock.

Site specific soils noted during our investigation include existing roadway fill, alluvial, and residual types. Roadway fill soils associated with Henley Country Rd. consist of soft to medium stiff sandy silty clay (A-7-6, A-6). Alluvial soils are very soft to medium stiff silty sandy or sandy silty clay (A-7-6, A-6), medium dense clayey silty sand with gravel (A-2-6) or medium stiff to stiff sandy clayer silt (A-4). Residual soils are stiff to hard silty sandy clay (A-7-6).

Sheet 3

2

Foundation Materials

End Bent 1:

Two borings were performed NW of the creek for this bent location. Borings encountered 6 feet of roadway fill consisting of soft tan sandy silty clay (A-6). Around elevation 596 – 597 feet alluvial soil is encountered. Alluvium is approximately 4 feet in thickness and consists of very soft gray sandy silty clay (A-6) or medium dense brown-gray clayey silty sand (A-2-6) with gravel. Below alluvium at elevation 592 feet residual soil is encountered. The residual layer is 1-3 feet in thickness and consists of stiff to hard gray silty sandy clay (A-7-6). Each boring location encountered weathered rock followed by auger refusal on hard crystalline rock. The following is a list of weathered and hard rock elevations at each boring location:

Boring Location	Weathered Rock Elev. (feet)	Hard Rock Elev. (feet)
EB1-A	591.70	589.11
EB1-B	589.85	588.96

End Bent 2:

Two borings were performed SE of Gabriel's Creek for this bent location. Borings encountered 6 feet of roadway fill consisting of soft to medium stiff tan-brown-gray sandy silty clay (A-7-6) overlying alluvial soil. Alluvium begins between elevation 596 – 597 feet and consists of 3 to 4.5 feet of medium stiff to stiff gray-tan sandy clayey silt (A-4) or medium stiff to stiff brown-gray silty sandy clay (A-7-6). At this bent location alluvial soil rests directly on weathered rock. Each boring location terminated with auger refusal on hard crystalline rock. The following is a list of weathered and hard rock elevations at each boring location:

Boring Location	Weathered Rock Elev. (feet)	Hard Rock Elev. (feet)
EB2-A	592.05	590.66
EB2-B	593.25	591.82

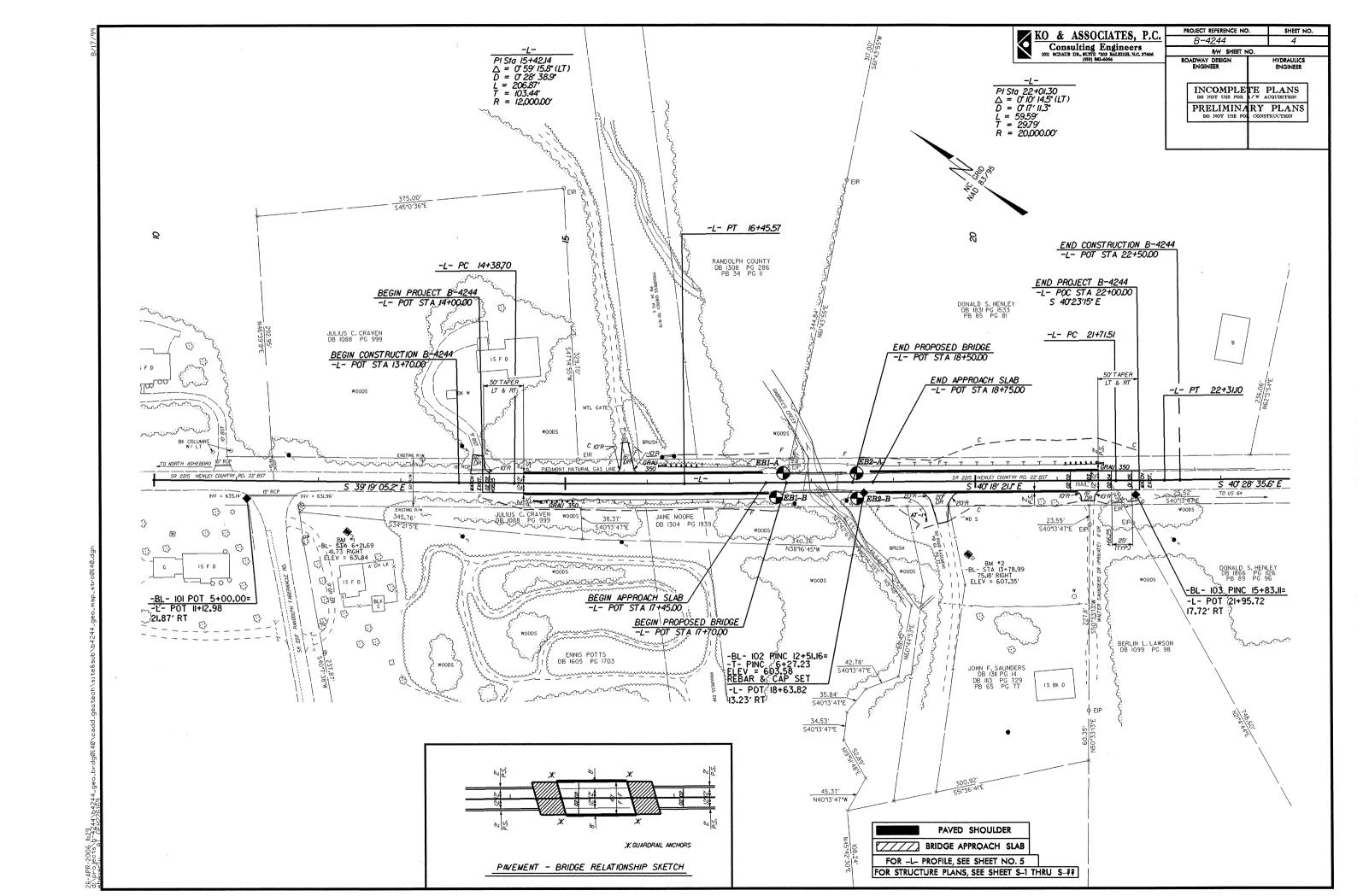
Groundwater

Groundwater measurements were made at each boring location after a period greater than 24 hours. Measurements indicate a static groundwater table at approximate elevation 593 feet. This coincides closely to the creeks water surface elevation of 592.5 feet at the time of this investigation.

Respectfully submitted,

IE Beverly

J.E. Beverly, Project Geologist

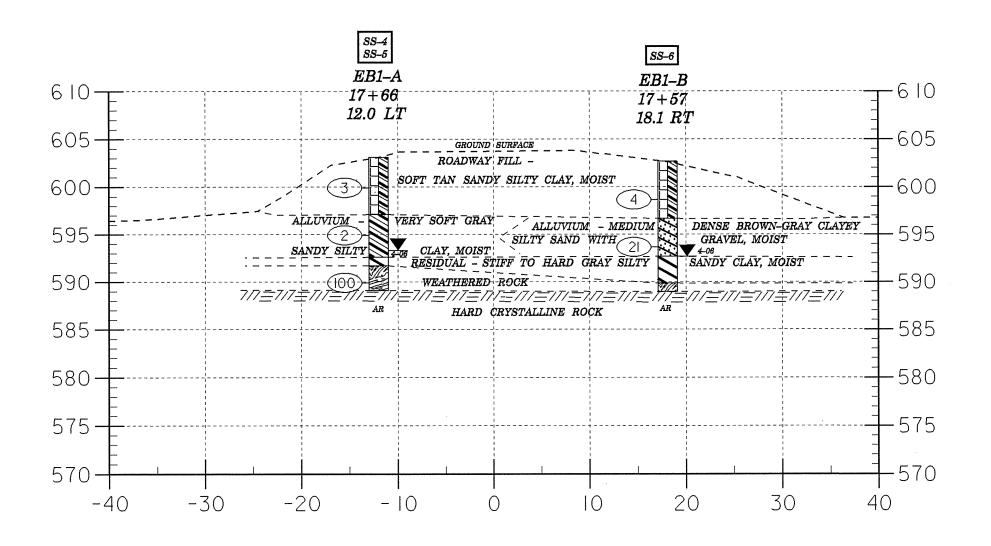


PROJECT REF. NO. SHEET NO. TOTAL SHEETS

B-4244

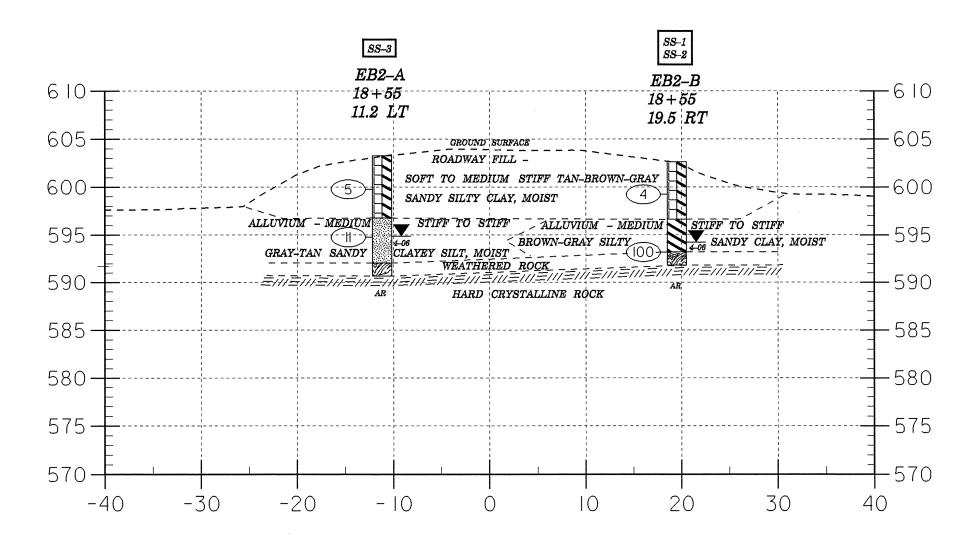
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SECTION THROUGH EB1-A AND EB1-B



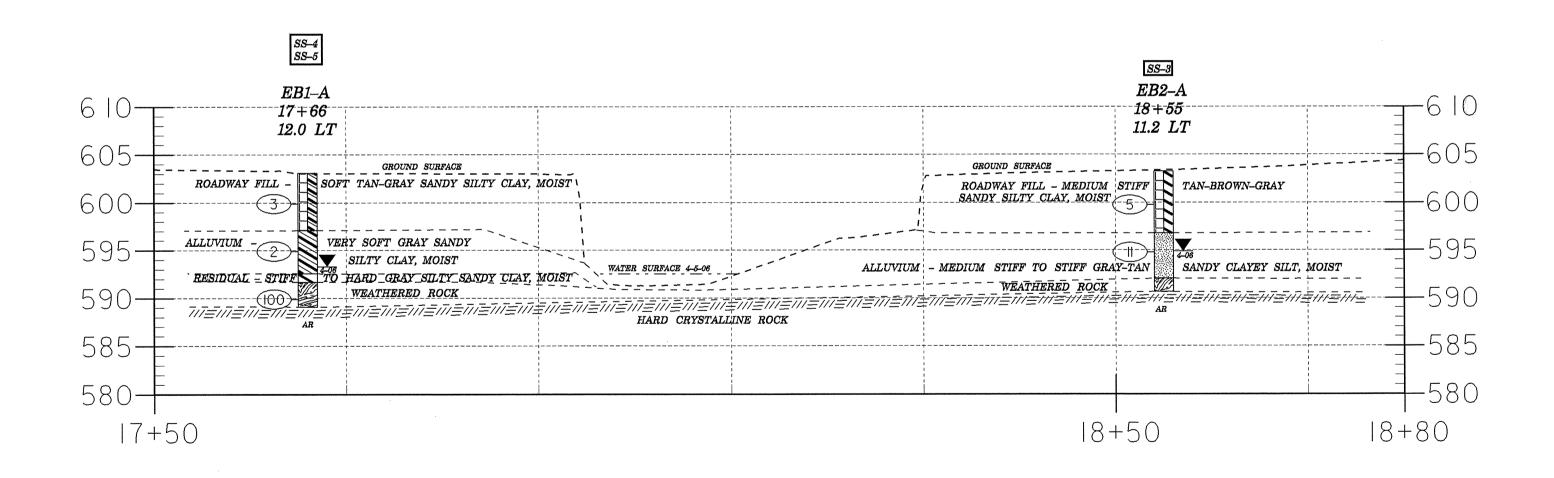
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SECTION THROUGH EB2-A AND EB2-B



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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

	NO 3358				ID B-4				NDOLPH		GEO	LOG	IST J.K. STICKNE	
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

GEOTECHNICAL UNIT BORING LOG															
PROJECT NO 33587.1.1 ID B-4244 COUNTY RANDOLPH GEOLOGIST J.K. STICKNEY									Y						
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

PROJECT	NO 2250	711		Τ,	D B-4				NDOLPH	OIMINO	,		GIST J.K. STICKNE	·/
			DCE:							CCN	GEU	LUG	131 J.N. STICKNE	GND WATER
	NO EB2-A		DGE :			***************************************	2 2215 OVER UT TO GABRIELS CREE							OHR N/A
ALIGNMI		<u> </u>				G LOCAT		-EE 000		EASTING		1 T		24 HR 8.40ft
	ELEV 60:	2 264				L DEPTH			TOTAL TOTAL TO	OFFSET 11.20ft LT ATE 4/05/06 COMPLETION				
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				··			 						HAMMER TYPE	AUTOWATIC
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL UNIT BORING LOG PROJECT NO 33587.1.1 ID B-4244 COUNTY RANDOLPH GEOLOGIST J.K. STICKNEY SITE DESCRIPTION BRIDGE #140 ON SR 2215 OVER UT TO GABRIELS CREEK GND WATER **BORING NO EB2-B** NORTHING 0.00 EASTING 0.00 OHR N/A ALIGNMENT L **BORING LOCATION 18+55.000** OFFSET 19.50ft RT 24 HR 8.40ft **COLLAR ELEV 602.62ft** TOTAL DEPTH 10.80ft **START DATE 4/05/06 COMPLETION DATE 04/05/06 DRILL MACHINE CME-550X** DRILL METHOD H.S. AUGERS HAMMER TYPE AUTOMATIC SURFACE WATER DEPTH N/A DEPTH TO ROCK 10.80ft Log EB2-B, Page 1 of 1 SAMPLE V **BLOW CT** PEN SOIL AND ROCK **BLOWS PER FOOT** DEPTH **ELEV** MOI G 6in 6in 6in (ft) NO DESCRIPTION Ground Surface .602.62 **ROADWAY FILL - SOFT** 600.00_ TAN-BROWN-GRAY SANDY SILTY -3.402 2 2 | 1.0 CLAY SS-1 MOIST ALLUVIUM - MEDIUM STIFF TO ¥ MOIS 7 93 0.8 STIFF BROWN-GRAY SILTY SS-2 SANDY CLAY 591.82 WEATHERED ROCK -- CRYSTALLINE ROCK AT ----- ELEVATION 591.82 FEET ---

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAY MATERIALS & TESTS UNIT SOILS LABORATORY

T. I. P. No.	B-4244				
	REPORT ON SAMI	PLES OF	SOILS FOR QUALITY		
Project	33587.1.1	County	RANDOLPH	Owner	
Date: Sampled		Received	4/12/06	Reported	4/17/06
Sampled from	BRIDGE		Ву	J E BEVER	XLY
Submitted by	N WAINAINA			1995	Standard Specifications

729188 TO 729193 4/19/06

TEST RESULTS

Proj. Sample No.		SS-1	SS-2	SS-3	SS-4	SS-5	88-6
Lab. Sample No.		729188	729189	729190	729191	729192	729193
Retained #4 Sieve	%	4	19	***	***	***	41
Passing #10 Sieve	%	94	67	100	99	100	48
Passing #40 Sieve	%	86	50	99	90	100	34
Passing #200 Sieve	%	81.	39	83	76	83	22

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	10.4	30.2	3.3	12.7	2.7	38.6
Fine Sand Ret - #270	%	5.7	14.7	21.0	15.7	20.4	20.4
Silt 0.05 - 0.005 mm	%	45.1	22.4	47.1	36.9	48.4	22.7
Clay < 0.005 mm	%	38.8	32.7	28.6	34.7	28.6	18.4
Passing #40 Sieve	%	-	-				-
LOCATION	%	EB2-B	EB2-B	EB2-A	EB1-A	EB1-A	EB1-B

L. L.		42	45	29	38	33	34
P. I.		16	18	9	14	11	16
AASHTO Classification		A-7-6(14)	A-7-6(3)	A-4(6)	A-6(10)	A-6(9)	A-2-6(0)
Station		18+55	18+55	18+55	17+66	17+66	17+57
		19.5 RT	19.5 RT	11.2 LT	12 LT	12 LT	18.1RT
Hole No.		L	L	L	L	L	L
Depth (Ft)		3.90	8.40	9.00	3.70	8.70	9.50
	to	4.90	9.40	10.00	4.70	9.70	10.50

cc: JEBEVERLY
Soils File

Soils Engineer

Page 1

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 33587.1.1 TIP NO.: B-4244 COUNTY: Randolph					
DESCRIPTION(1): Bridge #140 on SR 2215 over UT to Gabriels Creek					
INFORMATION ON EXISTING BRIDGES Information obtained from ☐ Field Inspection ☐ Microfilm (Reel: Position:) Other					
COUNTY BRIDGE NO. 140 BRIDGE LENGTH 36 NO. BENTS 3 NO. BENTS IN: CHANNEL 2 FLOODPLAIN 3					
FOUNDATION TYPE: Concrete encased timber piles and timber caps					
EVIDENCE OF SCOUR(2):					
ABUTMENTS OR END BENT SLOPES: None					
INTERIOR BENTS: None					
CHANNEL BED: None					
CHANNEL BANKS: Undermined at meanders in creek, banks steep and stable					
* EXISTING SCOUR PROTECTION:					
TYPE(3): Old ashphalt placed on EB1-A					
EXTENT(4): Fill slope to floodplain					
EFFECTIVENESS(5): good					
OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): None					
* DESIGN INFORMATION					
CHANNEL BED MATERIAL(7) (Sample Results Attached): Silty coarse sand with rocks					
CHANNEL BANK MATERIAL(8) (Sample Results Attached): Silty clay (A-7-6) (ref SS-1)					
CHANNEL BANK COVER(10): Mature trees and grass					
FLOOD PLAIN WIDTH(11): appx. 300' (16+00 to 19+00)					
FLOOD PLAIN COVER(12): Mature trees and shrubs					
STREAM IS: DEGRADING AGGRADING (13)					
OTHER OBSERVATIONS AND COMMENTS:					

SHEET // OF /Z

♦ DESIGN INFORMATION CONT.

CHANNEL MIGRATION TENDENCY(14): moderate to high

GEOTECHNICAL ADJUSTED SCOUR ELEVATIONS (15):

NCDOT Hydro Report places 500 year maximum channel scour at elevation591 feet. Proposed bridge is a larger single span design. No End Bent scour is anticipated.

REPORTED BY: JKS/JEB DATE: April 2006

INSTRUCTIONS

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIPRAP, ETC.)
 (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- (7) DESCRIBE THE CHANNEL BED MATERIAL; A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
 (8) DESCRIBE THE CHANNEL BANK MATERIAL; A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- (9) DESCRIBE THE FOUNDATION BEARING MATERIAL
 (10) DESCRIBE THE BANK COVERING (GRASS, TREES, RIPRAP, NONE, ETC.)
- (11) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (12) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (13) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING.
- (14) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY
- (15) GIVE THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
 THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE: PERCENT ROD; DIFFERENTIAL WEATHERING; SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

rev. 9-03

33587.1.1 (B-4244) RANDOLPH COUNTY BRIDGE # 140 ON SR 2215 OVER UT TO GABRIELS CREEK

SITE PHOTOS



Looking NW (down station)



Looking downstream (North)