

CONTRACT: ID: B-4168

# STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

## STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33516.1.1 I.D. NO. B-4168  
F.A. PROJECT BRSTP-41(23)  
COUNTY JONES  
PROJECT DESCRIPTION BRIDGE NO. 13 ON  
NC 41 OVER MUSSEL SHELL CREEK  
AT -L- STATION 17+30.6

**CONTENTS:**

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	STRUCTURE INVENTORY REPORT
4	SITE PLAN
5	PROFILE
6-7	BORE LOGS
8	SOIL TEST RESULTS
9	SCOUR REPORT
10	SITE PHOTOGRAPH

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33516.1.1(B-4168)	1	10
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
	BRSTP-41(23)	P.E. CONST.	

### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

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

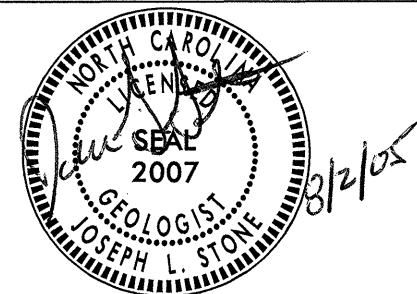
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE 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.

INVESTIGATED BY J.L. STONE PERSONNEL JLS  
 CHECKED BY D.N. ARGENBRIGHT KBM  
 SUBMITTED BY D.N. ARGENBRIGHT MMH  
 DATE AUGUST 2005 LWD  
JNJ

DRAWN BY: T.T. WALKER

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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.

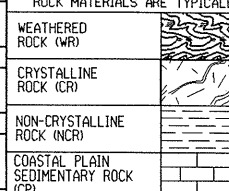


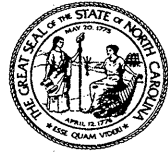
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL UNIT**

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4168	33516.1.1	2	10

## 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 WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, BRN SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM. 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 ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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:  NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		ALLUVIUM (ALLUV.) - SOILS WHICH 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. 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. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE 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 (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH 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, WHICH 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 SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR B.P.F.) OF 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 LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.			
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>		<b>MINERALOGICAL COMPOSITION</b>		<b>WEATHERING</b>		<b>ROCK HARDNESS</b>			
GENERAL CLASS. GRANULAR MATERIALS (>35% PASSING #200) SILT-CLAY MATERIALS (>85% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V. SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI.) - 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 (MOD.) - SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL. SEVERE (SEV.) - ALL ROCKS 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 > 100 B.P.F. VERY SEVERE (V. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT 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. IF TESTED, YIELDS SPT N VALUES < 100 B.P.F. 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 ALSO AN EXAMPLE.		<b>COMPRESSIONIBILITY</b> SLIGHTLY COMPRESSIBLE - LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE - LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE - LIQUID LIMIT GREATER THAN 50		<b>ROCK HARDNESS</b> 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 HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 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 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.	
<b>PERCENTAGE OF MATERIAL</b>		<b>GROUND WATER</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>			
ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. STATIC WATER LEVEL AFTER 24 HOURS. PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA SPRING OR SEEPAGE		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 HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 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 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.		<b>ROCK HARDNESS</b> 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 HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 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 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.			
<b>MISCELLANEOUS SYMBOLS</b>		<b>ABBREVIATIONS</b>		<b>FRACURE SPACING</b>		<b>BEDDING</b>			
ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS INFERRED SOIL BOUNDARIES INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP/DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC - FRACTURED FRAGS - FRAGMENTS MED - MEDIUM PMT - PRESSUREMETER TEST SD - SAND, SANDY SL - SILT, SILTY SLI - SLIGHTLY TCR - TRICONE REFUSAL U - UNIT WEIGHT U <sub>d</sub> - DRY UNIT WEIGHT W - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST		TERM SPACING VERY WIDE - MORE THAN 10 FEET WIDE - 3 TO 10 FEET MODERATELY CLOSE - 1 TO 3 FEET CLOSE - 0.16 TO 1 FEET VERY CLOSE - LESS THAN 0.16 FEET		TERM THICKNESS VERY THICKLY BEDDED - > 4 FEET THICKLY BEDDED - 1.5 - 4 FEET THINLY BEDDED - 0.16 - 1.5 FEET VERY THINLY BEDDED - 0.03 - 0.16 FEET THICKLY LAMINATED - 0.008 - 0.03 FEET THINLY LAMINATED - < 0.008 FEET			
<b>TEXTURE OR GRAIN SIZE</b>		<b>ABBREVIATIONS</b>		<b>INDURATION</b>		<b>INDURATION</b>			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.0 0.42 0.25 0.075 0.053		AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC - FRACTURED FRAGS - FRAGMENTS MED - MEDIUM PMT - PRESSUREMETER TEST SD - SAND, SANDY SL - SILT, SILTY SLI - SLIGHTLY TCR - TRICONE REFUSAL U - UNIT WEIGHT U <sub>d</sub> - DRY UNIT WEIGHT W - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST		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.		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.			
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>		<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		<b>INDURATION</b>		<b>INDURATION</b>			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT - SATURATED - (SAT.) - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) - SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE - MOIST - (M) - SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) - REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		DRILL UNITS: MOBILE B-____ BK-51 CME-45C CME-550 PORTABLE HOIST OTHER _____ OTHER _____		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 1/8" * STEEL TEETH TRICONE _____ * TUNG-CARB. CORE BIT OTHER _____		HAMMER TYPE: AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> CORE SIZE: -B- -N- -H- HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST OTHER _____			
<b>PLASTICITY</b>		<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		<b>INDURATION</b>		<b>INDURATION</b>			
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH		DRILL UNITS: MOBILE B-____ BK-51 CME-45C CME-550 PORTABLE HOIST OTHER _____ OTHER _____		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 1/8" * STEEL TEETH TRICONE _____ * TUNG-CARB. CORE BIT OTHER _____		HAMMER TYPE: AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> CORE SIZE: -B- -N- -H- HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST OTHER _____			
<b>COLOR</b>		<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		<b>INDURATION</b>		<b>INDURATION</b>			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		DRILL UNITS: MOBILE B-____ BK-51 CME-45C CME-550 PORTABLE HOIST OTHER _____ OTHER _____		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 1/8" * STEEL TEETH TRICONE _____ * TUNG-CARB. CORE BIT OTHER _____		HAMMER TYPE: AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> CORE SIZE: -B- -N- -H- HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST OTHER _____			



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

LYNDO TIPPETT  
SECRETARY

August 2, 2005

STATE PROJECT: 33516.1.1 B-4168  
F.A. PROJECT: BRSTP-41 (23)  
COUNTY: Jones  
DESCRIPTION: Bridge No. 13 on NC 41 Over Mussel Shell Creek  
SUBJECT: Geotechnical Report - Bridge Foundation Investigation for  
NC 41 over Mussel Shell Creek at -L- Sta. 17+30.60

Site Description

The proposed bridge site is located at the existing NC 41 bridge over Mussel Shell Creek, approximately 1 mile north of Trenton. The replacement structure will be constructed along the existing alignment. Based on the proposed design, the new structure will have three spans having a total length of 105 feet. The bents will have a skew of 90 degrees.

One Standard Penetration Test (SPT) boring was made at or near each proposed bent location to provide subsurface information relative to foundation design. The borings were made with an ATV mounted CME 45B and CME 45C drill machine. All were advanced by rotary drill methods using bentonite drilling fluid.

The bridge site is located in the Coastal Plain Physiographic Province and is underlain by recent alluvial deposits and Tertiary age marine sediments of the Castle Hayne Formation. Mussel Shell Creek is a slow flowing stream typically 15± feet wide and 3 to 5 feet deep. Topography along the project is nearly flat to gently sloping. Elevations at the site range from 12± feet along the streambed to 22± feet along the existing NC 41 embankment.

Ground water elevations were found to be 16± feet, whereas the surface of Mussel Shell Creek was at an elevation of 15± feet.

Soil Description

Surficial soils generally consist of 7 to 10 feet of very loose alluvial fine sandy silt (A-4). These soils are underlain by marine sediments of the Tertiary age Castle Hayne Formation. This contact is quite distinct and lies at an elevation of 8± feet. The Castle Hayne Formation consists of pale green/gray, calcareous, medium dense silty sand (A-2-4) with thin calcareous sandstone layers. Trace amounts of shell material and phosphate were found throughout the unit.

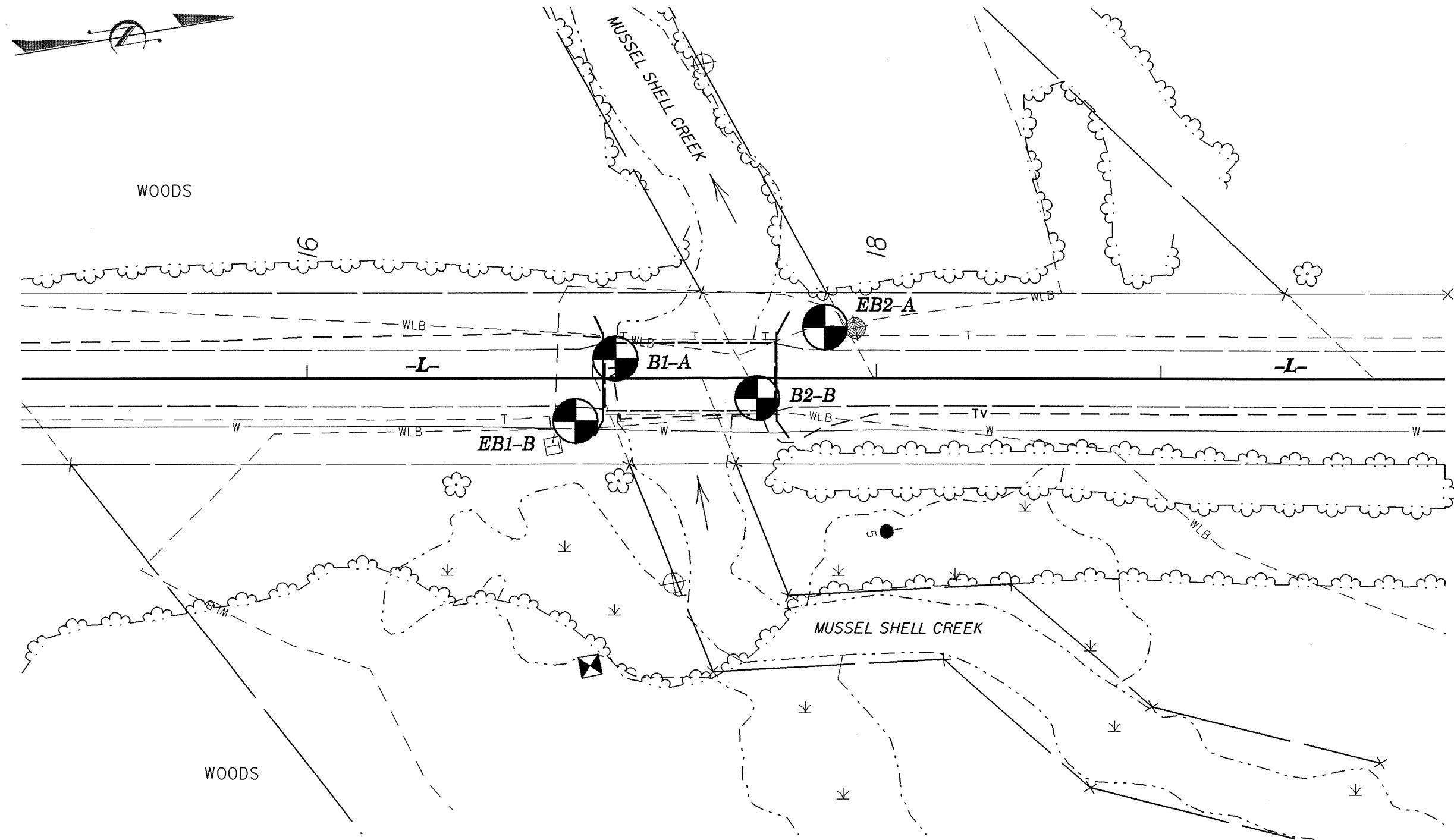
Based on the proposed design, the existing grade will be maintained at the bridge site. The existing fill at the end bents primarily consists of 5± feet of very loose to loose silty sand (A-2-4). The proposed end bent slopes will be mainly constructed within the existing embankment. Some additional fill will be required for construction of the end bent and side slopes. Borrow meeting Coastal Plain criteria is available in nearby areas.

This Geotechnical Foundation Report is based on the Bridge Survey and Hydraulic Design Report for Mussel Shell Creek dated March 7, 2005. 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:

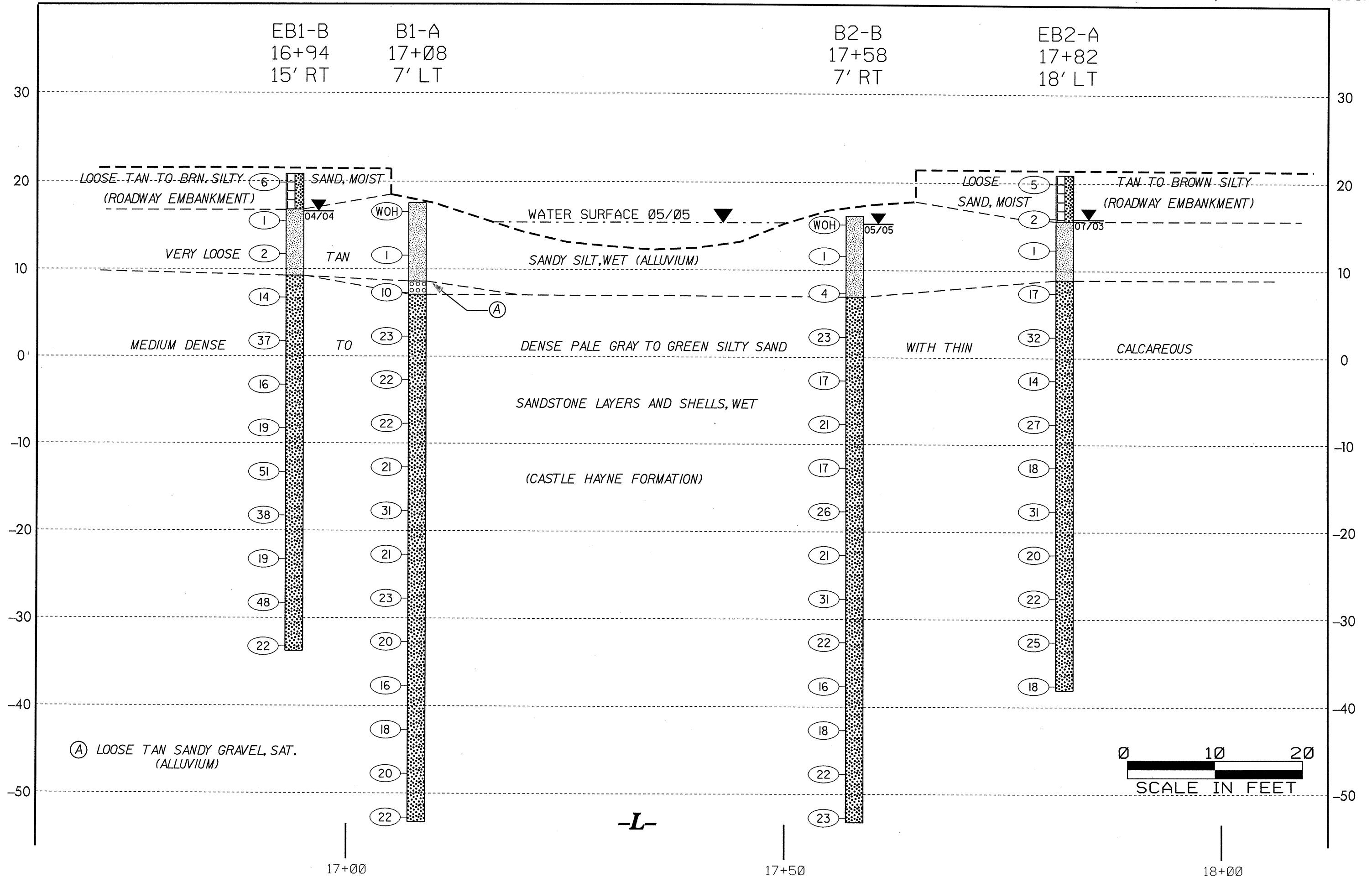
Joseph L Stone, L.G.  
Assistant Project Engineering Geologist

# TEST SITE PLAN



0 40 80  
 SCALE IN FEET

# PROFILE THROUGH BORINGS PROJECTED ALONG -L-



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 6 OF 10

PROJECT NO. 33516.1.1	ID. B-4168	COUNTY JONES	GEOLOGIST J.L. STONE
SITE DESCRIPTION BRIDGE NO. 13 ON NC 41 OVER MUSSEL SHELL CREEK			GROUND WATER
BORING NO. EBI-B	BORING LOCATION 16+94	OFFSET 15' RT	ALIGNMENT -L-
COLLAR ELEVATION 20.8'	NORTHING 0.00	EASTING 0.00	24 HR. 4.2'
TOTAL DEPTH 54.6'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 7/8/03	COMPLETION DATE 7/9/03	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100					
20.8	0.0	WOH	2	4	1.0										
	4.3	WOH	1	0	1.0										TAN BROWN SILTY SAND, MOIST (ROADWAY EMBANKMENT)
15.0	8.1	3	1	1	1.0										TAN BROWN SANDY SILT WITH WOOD, SATURATED (ALLUVIUM)
	13.1	5	7	7	1.0										SS-8
	18.1	26	21	16	1.0										SS-9
	23.1	12	7	9	1.0										
	28.1	6	9	10	1.0										
	33.1	13	28	23	1.0										
	38.1	14	23	15	1.0										SS-10
	43.1	7	9	10	1.0										
	48.1	25	20	28	1.0										SS-11
	53.1	8	9	13	1.0										
															BOHRING TERMINATED AT ELEVATION -33.8 FEET IN MEDIUM DENSE SILTY SAND

PROJECT NO. 33516.1.1	ID. B-4168	COUNTY JONES	GEOLOGIST J.L. STONE
SITE DESCRIPTION BRIDGE NO. 13 ON NC 41 OVER MUSSEL SHELL CREEK			GROUND WATER
BORING NO. BI-A	BORING LOCATION 17+08	OFFSET 7' LT	ALIGNMENT -L-
COLLAR ELEVATION 17.6'	NORTHING 0.00	EASTING 0.00	24 HR. NM
TOTAL DEPTH 70.8'	DRILL MACHINE CME-45B	DRILL METHOD ROTARY W/MUD	HAMMER TYPE AUTOMATIC
START DATE 5/24/05	COMPLETION DATE 5/25/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75	100					
17.6	0.0	WOH	WOH	WOH	1.0										
15.0	5.0	WOH	WOH	1	1.0										TAN SANDY SILT WITH WOOD, SATURATED (ALLUVIUM)
10.0	9.3	3	6	4	1.0										SS-13
	14.3	13	12	11	1.0										SS-14
	19.3	8	8	14	1.0										
	24.3	5	12	10	1.0										SS-15
	29.3	5	11	10	1.0										
	34.3	5	16	15	1.0										
	39.3	6	9	12	1.0										SS-16
	44.3	8	9	14	1.0										
	49.3	6	8	12	1.0										
	54.3	5	6	10	1.0										SS-17
	59.3	4	7	11	1.0										
	64.3	7	9	11	1.0										
	69.3	7	10	12	1.0										SS-18
															BOHRING TERMINATED AT ELEVATION -53.2 FEET IN MEDIUM DENSE SILTY SAND

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 7 OF 10

PROJECT NO. 33516.1.1		ID. B-4168		COUNTY JONES		GEOLOGIST J.L. STONE	
SITE DESCRIPTION BRIDGE NO.13 ON NC 410 OVER MUSSEL SHELL CREEK							GROUND WATER
BORING NO. B2-B		BORING LOCATION 17+58		OFFSET 7' RT		ALIGNMENT -L-	
COLLAR ELEVATION 16.2'		NORTHING 0.00		EASTING 0.00		0 HR. NM	
TOTAL DEPTH 69.4'		DRILL MACHINE CME-45B		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC	
START DATE 5/24/05		COMPLETION DATE 5/24/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A	
ELEV.	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5' 0.5' 0.5'		0 25 50 75 100			
16.2	0.0	WOH	WOH	WOH	1.0	X WOH	
15.0	3.6	1	0	1	1.0	X 1	SS-19 TAN SANDY SILT WITH WOOD, WET (ALLUVIUM)
10.0	7.9	2	2	2	1.0	X 4	
5.0	12.9	14	13	10	1.0	X 23	SS-20
0.0	17.9	10	8	9	1.0	X 17	SS-21
-5.0	22.9	7	9	12	1.0	X 21	
-10.0	27.9	5	7	10	1.0	X 17	SS-22 PALE GRAY TO GREEN SILTY SAND WITH THIN CALCAREOUS SANDSTONE LAYERS. WET (CASTLE HAYNE FORMATION)
-15.0	32.9	6	15	11	1.0	X 26	
-20.0	37.9	7	9	12	1.0	X 21	
-25.0	42.9	10	14	17	1.0	X 31	SS-23
-30.0	47.9	6	9	13	1.0	X 22	
-35.0	52.9	6	6	10	1.0	X 16	
-40.0	57.9	6	8	10	1.0	X 18	SS-24
-45.0	62.9	7	9	13	1.0	X 22	
-50.0	67.9	6	10	13	1.0	X 23	
-55.0							BORING TERMINATED AT ELEVATION -53.2 FEET IN MEDIUM DENSE SILTY SAND
-60.0							

PROJECT NO. 33516.1.1		ID. B-4168		COUNTY JONES		GEOLOGIST K.B. MILLER	
SITE DESCRIPTION BRIDGE NO.13 ON NC 410 OVER MUSSEL SHELL CREEK							GROUND WATER
BORING NO. EB2-A		BORING LOCATION 17+82		OFFSET 18' LT		ALIGNMENT -L-	
COLLAR ELEVATION 20.9'		NORTHING 0.00		EASTING 0.00		0 HR. NM	
TOTAL DEPTH 59.0'		DRILL MACHINE CME-45C		DRILL METHOD ROTARY W/MUD		HAMMER TYPE AUTOMATIC	
START DATE 7/8/03		COMPLETION DATE 7/9/03		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A	
ELEV.	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT	SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5' 0.5' 0.5'		0 25 50 75 100			
20.9	0.0	1	2	3	1.0	X 5	
20.0	3.9	1	1	1	1.0	X 2	SS-1 TAN, BROWN SILTY SAND, MOIST (ROADWAY EMBANKMENT)
15.0	7.5	WOH	WOH	1	1.0	X 1	TAN SANDY SILT WITH WOOD, SATURATED (ALLUVIUM)
10.0	12.5	4	10	7	1.0	X 17	SS-2
5.0	17.5	13	16	16	1.0	X 32	
0.0	22.5	5	6	8	1.0	X 14	SS-5
-5.0	27.5	6	9	18	1.0	X 27	
-10.0	32.5	5	8	10	1.0	X 18	PALE GRAY TO GREEN SILTY SAND WITH THIN CALCAREOUS SANDSTONE LAYERS, WET (CASTLE HAYNE FORMATION)
-15.0	37.5	6	17	14	1.0	X 31	SS-4
-20.0	42.5	7	9	11	1.0	X 20	
-25.0	47.5	8	10	12	1.0	X 22	SS-5
-30.0	52.5	7	10	15	1.0	X 25	
-35.0	57.5	6	8	10	1.0	X 18	SS-6
-40.0							BORING TERMINATED AT ELEVATION -38.1 FEET IN MEDIUM DENSE SILTY SAND
-45.0							
-50.0							
-55.0							

## BRIDGE NO. 13 ON NC 41 OVER MUSSEL SHELL CREEK

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.
EB1-B	SS-7	100	99	40	2.8	62.8	14.2	20.2	21	5	A-4(0)	4.3-5.8	
	SS-8	100	99	25	1.8	81.1	7.0	10.1	24	NP	A-2-4(0)	13.1-14.6	
	SS-9	85	71	29	21.2	49.6	15.0	14.1	20	NP	A-2-4(0)	18.1-19.6	
	SS-10	100	97	26	4.6	75.3	10.0	10.1	21	NP	A-2-4(0)	38.1-39.6	
	SS-11	100	85	31	25.0	47.6	11.2	16.1	22	NP	A-2-4(0)	48.1-49.6	
B1-A	SS-12	100	99	45	2.8	57.2	17.8	22.2	23	7	A-4(0)	1.0-1.5	23.5
	SS-13	13	83	21	2.0	85.9	11.9	2.2	19	NP	A-1-b(0)	9.3-10.5	
	SS-14	93	100	79	30.0	21.4	51.3	15.2	20	NP	A-2-4(0)	14.3-15.8	
	SS-16	100	75	31	41.0	32.5	16.4	10.1	22	NP	A-2-4(0)	39.3-40.3	
	SS-15	100	98	21	4.0	80.4	9.5	6.1	22	NP	A-2-4(0)	24.3-25.8	
	SS-17	100	99	26	2.0	74.7	11.1	12.1	21	NP	A-2-4(0)	54.3-55.8	
	SS-18	100	100	26	0.4	81.8	9.7	8.1	23	NP	A-2-4(0)	69.3-70.8	
B2-B	SS-19	100	99	36	2.6	67.9	13.3	16.2	20	2	A-4(0)	3.6-4.1	
	SS-20	80	66	27	23.0	47.9	19.0	10.1	18	NP	A-2-4(0)	12.9-14.4	
	SS-21	100	98	21	3.2	82.2	10.5	4.0	21	NP	A-2-4(0)	17.9-19.4	
	SS-22	100	99	18	1.4	86.7	5.9	6.1	24	NP	A-2-4(0)	27.9-29.4	
	SS-23	100	80	34	32.7	36.4	18.8	12.1	21	NP	A-2-4(0)	42.9-44.4	
	SS-24	100	100	26	0.8	82.0	7.1	10.1	23	NP	A-2-4(0)	57.9-59.4	
EB2-A	SS-1	100	98	25	5.0	75.1	11.8	8.1	20	NP	A-2-4(0)	1.0-1.5	
	SS-2	100	97	34	6.2	68.1	15.6	10.1	19	NP	A-2-4(0)	12.5-14.0	
	SS-3	100	99	20	3.0	84.0	6.0	7.1	23	NP	A-2-4(0)	22.5-24.0	
	SS-4	100	98	22	3.8	79.7	8.5	8.1	23	NP	A-2-4(0)	37.5-39.0	
	SS-5	99	75	31	39.3	33.0	15.6	12.1	22	NP	A-2-4(0)	47.5-49.0	
	SS-6	100	99	24	1.5	77.1	7.3	14.1	21	NP	A-2-4(0)	57.5-59.0	



PROJECT: 33516.1.1 ID: B-4168 COUNTY: Jones

DESCRIPTION(1): Bridge No. 13 on NC 41 over Mussel Shell Creek

**INFORMATION ON EXISTING BRIDGE**

Information obtained from:  field inspection  
 microfilm (Reel: \_\_\_\_\_ Pos: \_\_\_\_\_)  
 other: \_\_\_\_\_

BR. NO.: 13 BR. LENGTH: 60 NO. BENTS: 3 NO. BENTS IN: CHANNEL: 1 FLOODPLAIN: 2

FOUNDATION TYPE: timber piles

**EVIDENCE OF SCOUR(2):**

ABUTMENTS OR END BENT SLOPES: none noted

INTERIOR BENTS: none noted

CHANNEL BED: none noted

CHANNEL BANKS: none noted

**EXISTING SCOUR PROTECTION:**

TYPE(3): wooden endwalls

EXTENT(4): 15 feet outside edge of bridge

EFFECTIVENESS(5): appears satisfactory

OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): none noted

**DESIGN INFORMATION**

CHANNEL BED MATERIAL(7): sandy silt (SS-12)

CHANNEL BANK MATERIAL(8): sandy silt (SS-7)

CHANNEL BANK COVER(9): wooded

FLOOD PLAIN WIDTH(10): 500 +/- feet

FLOOD PLAIN COVER(11): wooded

**DESIGN INFORMATION CONT.**

STREAM IS: X DEGRADING \_\_\_\_\_ AGGRADING \_\_\_\_\_ EQUILIBRIUM

OTHER OBSERVATIONS AND COMMENTS: none

CHANNEL MIGRATION TENDENCY (13): moderate to the south

**GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14):**

Analysis of the scourability of the Upper Castle Hayne Formation in this area results in  
a geotechnically adjusted shallowing of the predicted scour elevation to 7.1 feet for B1 and 6.9  
feet for B2. This is approximately 10 feet shallower than the respective maximum theoretical  
scour elevations provided by the Bridge Survey and Hydraulic Design Report.

REPORTED BY: *Jan J. St...* DATE: 08-02-05

**INSTRUCTIONS**

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE, INCLUDING 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 (RIP RAP, 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 BASED ON OBSERVATION AND/OR SAMPLES.
- (8) DESCRIBE THE CHANNEL BANK MATERIAL BASED ON OBSERVATION AND/OR SAMPLES.
- (9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.)
- (10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING.
- (13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE Laterally DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (14) GIVE THE GEOTECHNICALLY 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 THE RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY, CORE RECOVERY PERCENTAGE, PERCENTAGE RQD, DIFFERENTIAL WEATHERING, SHEAR STRENGTH, OBSERVATIONS AT EXISTING STRUCTURES, OTHER TESTS DEEMED APPROPRIATE, AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

**33516.1.1  
B-4168  
Jones Co.**

**Bridge No. 13 on NC 41 Over Mussel Shell Creek**



**Looking South Toward End Bent 1**