

PROJECT: 33561.1.1 ID: B-4215

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33561.1.1 I.D. NO. B-4215
 F.A. PROJECT BRSTP-0210(3)
 COUNTY ONslow
 PROJECT DESCRIPTION REPLACEMENT OF BRIDGE
No. 19 OVER STONES CREEK ON NC 210

CONTENTS:

NCDOT Geotechnical Unit Soil and Rock Classification Sheet	Sheet 2
Geotechnical Report	Sheets 3 & 4
Site Vicinity Map	Sheet 5
Boring Location Plan	Sheet 6
Generalized Subsurface Profile 15.0' RT. of -L-	Sheet 7
Test Boring Logs	Sheets 8 & 9
Summary of Laboratory Test Data	Sheet 10
Field Scour Report (Performed May 10, 2005)	Sheets 11 & 12
Grain Size Curves	Sheets 13 & 14
Site Photographs	Sheets 15 - 17

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4215	1	17
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33561.1.1	BRSTP-0210(3)	P.E. CONST.	

CAUTION NOTICE

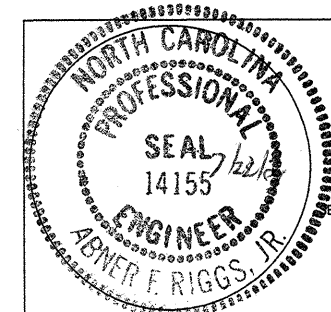
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING 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 (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 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.

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For Letting

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SIGNATURE

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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.



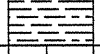
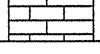
DRAWN BY: T. PEREZ

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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B-4215	33561.1.1	2	17



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, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY 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: <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .		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:  WEATHERED ROCK (WR)  CRYSTALLINE ROCK (CR)  NON-CRYSTALLINE ROCK (NCR)  COASTAL PLAIN SEDIMENTARY ROCK (CP) 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 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 (N 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 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.					
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING							
GENERAL CLASS. GRANULAR MATERIALS (<85% 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. SL.) 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 (SL.) 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> 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.		COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		WEATHERING			
GROUP CLASS. A-1, A-1.5, A-2, A-2.5, A-2.6, A-2.7, A-3, A-4, A-5, A-6, A-7		PERCENTAGE OF MATERIAL		FRESH							
SYMBOL		ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL		VERY SLIGHT (V. SL.)							
% PASSING #10 #40 #200		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		SLIGHT (SL.)							
LIQUID LIMIT PLASTIC INDEX		GROUND WATER		MODERATE (MOD.)							
GROUP INDEX		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. STATIC WATER LEVEL AFTER 24 HOURS. PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA HOLE CAVE SPRING OR SEEPAGE		MODERATELY SEVERE (MOD. SEV.)							
USUAL TYPES OF MAJOR MATERIALS		MISCELLANEOUS SYMBOLS		SEVERE (SEV.)							
GEN. RATING AS A SUBGRADE		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		VERY SEVERE (V. SEV.)							
P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30		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		COMPLETE							
CONSISTENCY OR DENSENESS		ABBREVIATIONS		ROCK HARDNESS							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		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 γ - UNIT WEIGHT γ _d - DRY UNIT WEIGHT w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST		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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED 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.							
GENERAL GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE		SOUNDING ROD		VERY HARD							
GENERAL SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD		SOUNDING ROD		HARD							
TEXTURE OR GRAIN SIZE		SOUNDING ROD		MODERATELY HARD							
U.S. STD. SIEVE SIZE OPENING (MM)		SOUNDING ROD		MEDIUM HARD							
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)		SOUNDING ROD		SOFT							
GRAIN SIZE MM 305 75 2.0 0.25 0.075 0.005		SOUNDING ROD		VERY SOFT							
SOIL MOISTURE - CORRELATION OF TERMS		SOUNDING ROD		VERY HARD							
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		SOUNDING ROD		HARD							
LL - LIQUID LIMIT (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE		SOUNDING ROD		MODERATELY HARD							
PL - PLASTIC LIMIT SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		SOUNDING ROD		MEDIUM HARD							
OM - OPTIMUM MOISTURE SOLID; AT OR NEAR OPTIMUM MOISTURE		SOUNDING ROD		SOFT							
SL - SHRINKAGE LIMIT REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		SOUNDING ROD		VERY SOFT							
PLASTICITY		SOUNDING ROD		VERY HARD							
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		SOUNDING ROD		HARD							
PLASTICITY INDEX (PI) DRY STRENGTH		SOUNDING ROD		MODERATELY HARD							
0-5 VERY LOW 6-15 SLIGHT 16-25 MEDIUM 26 OR MORE HIGH		SOUNDING ROD		MEDIUM HARD							
COLOR		SOUNDING ROD		SOFT							
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.		SOUNDING ROD		VERY SOFT							

NOTES:

ADDITIONAL SOIL/ROCK DESCRIPTIONS

	SILTY SAND INTERBEDDED WITH COASTAL PLAIN SEDIMENTARY ROCK: LIMESTONE
	SAND INTERBEDDED WITH COASTAL PLAIN SEDIMENTARY ROCK: LIMESTONE

REVISION: 09/15/00

STATE PROJECT NO.: 33561.1.1
 I.D. NO.: B-4215
 FEDERAL PROJECT NO.: BRSTP-0210(3)
 COUNTY: Onslow

DESCRIPTION: Bridge No. 19 over Stones Creek on NC 210

SUBJECT: Structure Subsurface Investigation – Inventory Report

Project Description

The project site is located on NC Highway 210 approximately 1 mile east of its intersection with US Highway 17 in Onslow County, North Carolina at the crossing of Stones Creek (See Site Vicinity Map, Sheet 5). The proposed project consists of a replacement bridge structure. Based on the Bridge Survey and Hydraulic Design Report, the center of the structure will be at Station 20+22.75 along the -EL- survey line. The new bridge structure will have a clear roadway width of 42 feet. The new bridge structure will be 130 feet long with the bents constructed on a skew angle of 90° to the -L- survey line. The new bridge structure will consist of two spans of 65 feet in length. The structure will have three bents (two end bents and one interior bent).

Based upon the structural drawings provided by NCDOT, the finished grade elevations for the new bridge structure, at the approaches, will be approximately 18 feet. This will require fill depths of up to approximately 14 feet at the approaches. Fill slopes will be constructed at a slope of 1.5:1 (horizontal to vertical) with 2 feet of class II Rip Rap erosion protection.

A geotechnical investigation was conducted between June 27 and June 30, 2005. Borings EB1-A and EB2-B were drilled within the existing pavement or roadway shoulder on roadway embankment fill at the northwest and southeast approaches and boring B1-B was drilled from the existing bridge deck in the creek channel (See Site Plan, Sheet 4). NCDOT provided traffic control and cut and patched the hole in the bridge deck and pavement. All borings were performed with a CME-750 drill rig mounted on an all-terrain carrier. Representative soil samples were collected for visual classification in the field and for laboratory classification analysis by the NCDOT accredited S&ME soil testing laboratory. A Shelby tube was obtained at boring B1-B between the depth of 0 to 2 feet to be provided to NCDOT for Erosion Function Apparatus testing.

Physiography and Geology

The project site is located on NC Highway 210 approximately 1 mile east of its intersection with US Highway 17 in Onslow County, North Carolina at the crossing of Stones Creek. The existing bridge structure is approximately 90 feet long with a bridge deck width of approximately 26 feet (outside to outside). The existing bridge is situated within the flood plain of Stones Creek along a two lane paved road (NC Highway 210) and consists of a reinforced concrete deck overlain with asphalt on steel girders supported on reinforced concrete pile caps and timber piles. North Carolina Highway 210 runs approximately northwest and southeast and has roadway embankment shoulders. The flood plain extends approximately 200 feet on the northwest side of the creek and is covered with large to small trees and dense undergrowth. The flood plain extends approximately 550 feet on the southeast side of the creek and is

covered with large to small trees and dense undergrowth. Buried fiber optic/communication cables are located along the north roadway shoulder and cross overhead approximately 25 feet to the north of the existing bridge at the creek crossing. Overhead power lines cross the creek approximately 40 feet north of the existing bridge. Two water lines are located along the southern roadway shoulder and cross the creek on a utility bridge located just south of the existing bridge. A sewer line is located along the northern roadway shoulder and cross the creek on a utility bridge just north of the existing bridge.

The site is located within the eastern portion of the Coastal Plain Physiographic and Geologic Province of North Carolina in Onslow County. The Coastal Plain Province is typically characterized by marine and eolian sediments that were deposited during the transgressive and regressive depositional sequences of the oceans moving into and out of North Carolina. As such, the Coastal Plain Province is characterized by subdued topographic features and flat, low-lying terrain. The geology of the southeastern quadrant of Onslow County, near the project site, primarily consists of recent alluvial sediments. Typically, the recent alluvial sediments consists of silty coarse to fine sands and silty clays. These deposits are underlain by the River Bend Formation of the Middle Tertiary Age. The River Bend Formation consists of a thin limestone layer underlain by gray-green silty fine sands and sandy silts and clays.

Foundation Materials

The borings were advanced to depths ranging from 62.2 to 70.6 feet (elevations -53.7 to -64.7 feet) at collar elevations ranging from 16.9 to -2.5 feet.

Roadway embankment fill materials were encountered in borings EB1-A and EB2-B to depths ranging from about 11 to 12 feet (elevations 4.9 to 3.9 feet) below the collar elevation. The fill material encountered in these borings consists of loose to very loose gray to tan silty fine sand (A-2-4) and loose tan coarse to fine sand (A-3) with trace of silt and clay. Standard penetration test (SPT) N-values in the fill materials ranged from 3 to 9.

Alluvial deposits were encountered beneath the embankment fill materials in borings EB1-A and EB2-B and in the creek channel in boring B1-B to depths ranging from about 9.5 to 33.1 feet (elevations -16.9 to -12.0 feet) beneath collar elevations. Typically, alluvial deposits encountered consist of very loose to loose gray to dark gray and brown coarse to fine sands (A-2-4) with moderate to trace amounts of organic material. A layer of medium stiff gray and orange slightly silty fine sandy clay (A-6) was encountered in boring EB2-B from a depth of 11 to 17 feet (elevations 3.9 to -2.1 feet) beneath the collar elevation. Based on boring B1-B, the creek channel typically consists of very loose brown slightly clayey silty coarse to fine sand (A-2-4) with little organic material. The standard penetration test (SPT) N-values for the alluvial deposits range from Weight-of-Hammer (WOH) to 9 blow per foot.

Beneath the alluvium in all of the borings, soils common to the River Bend Formation were encountered and extended to the termination of borings. The River Bend Formation was encountered at depths ranging from about 9.5 to 33.1 feet (elevations -12.0 to -16.9 feet) beneath the collar elevations. Borings were advanced to termination depths ranging from 62.2 to 70.6 feet (elevations -53.7 to -64.7 feet) below the collar elevations.

Near the top of the River Bend Formation, medium dense to very dense gray silty fine to coarse sands (A-2-4, A-1-b) with moderately indurated thinly bedded limestone layers was encountered at depths ranging from approximately 9.5 to 33.1 feet (elevations -12.0 to -16.9 feet) beneath the collar elevation and extends to

depths ranging from about 18.0 to 37 feet (elevations -20.1 to -22.1 feet) beneath collar elevations. An indurated thinly to thickly bedded (approximately 0.6 to 1.8 feet thick) gray sandy limestone layer was encountered at depths ranging from about 14.2 to 33.1 feet (elevations -16.2 to -16.9 feet) beneath the collar elevation. Beneath the upper sand and limestone layers, very dense to medium dense gray-green silty fine sands (A-2-4) were encountered to boring termination in all of the borings except for boring B1-B. A layer of very stiff gray-green silty fine sandy clay (A-6) was encountered in boring B1-B beneath the silty sands at a depth of about 48.0 feet (elevation -50.5 feet) and extended to a depth of about 53.0 feet (elevation -55.5 feet) beneath the collar elevation. This clay is underlain by hard gray-green clayey fine sandy silts (A-4) and extends to the boring termination depth of 62.2 feet (elevation -64.7 feet). The N-values in the upper sand and limestone layers range from 16 to 85 blows per foot. The N-values in the silty sands ranged from 15 to 56 blows per foot and the N-values in the lower clays and silts range from 30 to 50 blows per foot.

Notes to Designer

The CME-750 drill rig is equipped with a hydraulic automatic hammer. Standard Penetration tests were performed with the attached Autohammer and not with a traditional rope, cathead and Safety Hammer.

Groundwater

Groundwater depths were not measured at the time of drilling operations since mud rotary drilling procedures were used. Stabilized groundwater depths were not measured in the borings due to borings being performed in the existing roadway or roadway shoulder. The borings were backfilled at the time of boring termination due to safety concerns. The creek level at the time of our field investigation was elevation 2.6 feet on June 30, 2005.


QUALIFICATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty, expressed or implied, is made.

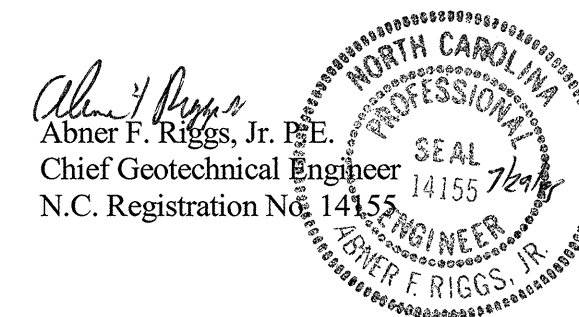
The conclusions submitted in this report are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of subsurface variations between the borings may not become evident until construction. If variations appear evident, then the conclusions contained in this report may need to be re-evaluated. In the event that any changes in the nature, design, or location of the structure are planned, the conclusions contained in this report will not be considered valid unless the changes are reviewed by S&ME, and the conclusions of the report are modified or verified in writing.

S&ME appreciates the opportunity to be your geotechnical consultant on this project. If you have any questions or need additional information in regard to this report, please contact us.

Very truly yours,
S&ME, Inc.

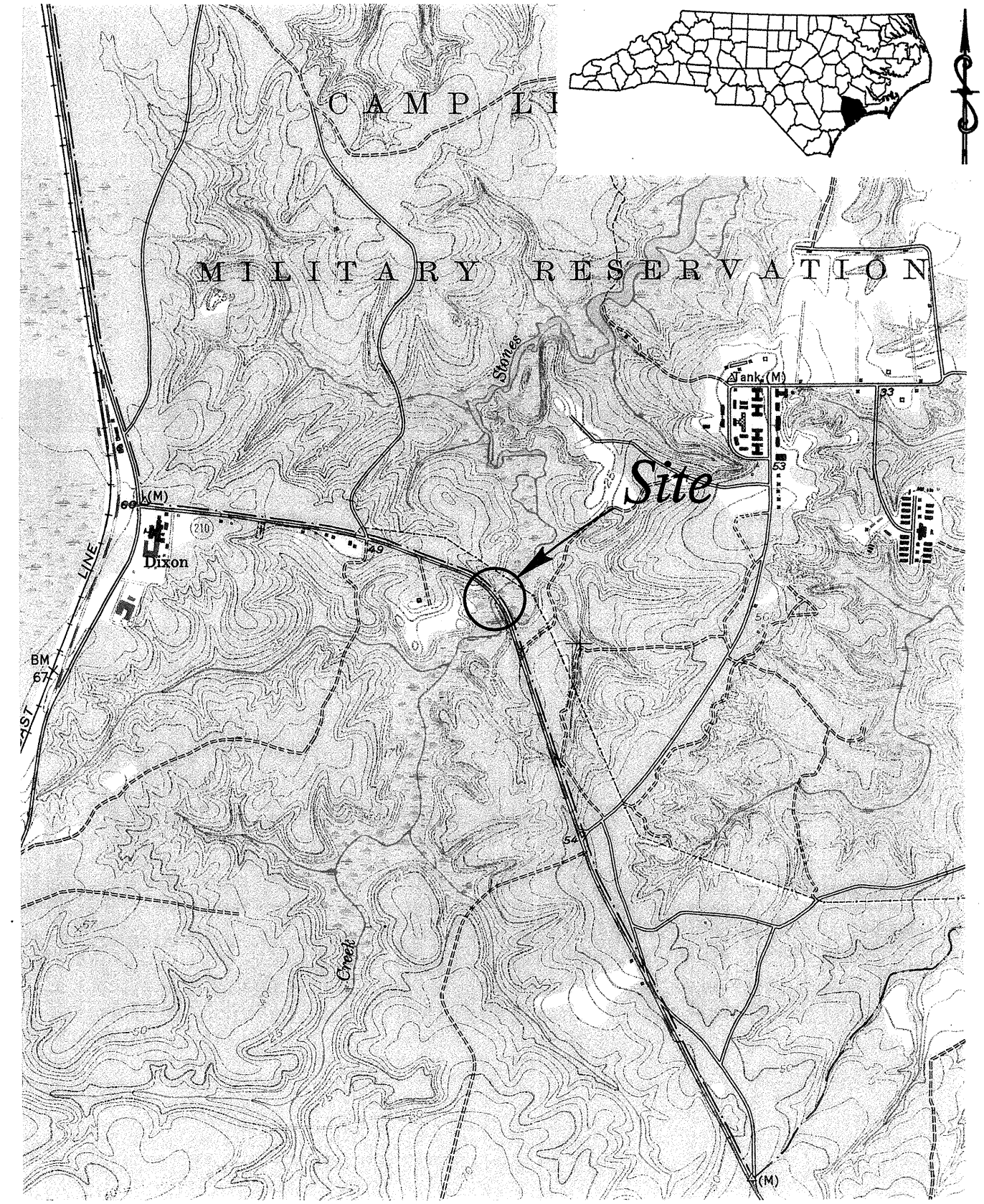

J. Shane Johnson, P.G.
Project Geologist
N.C. Registration No. 1753

Attachments



PROJECT: 33561.1.1 ID: B-4215

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4215	33561.1.1	5	17



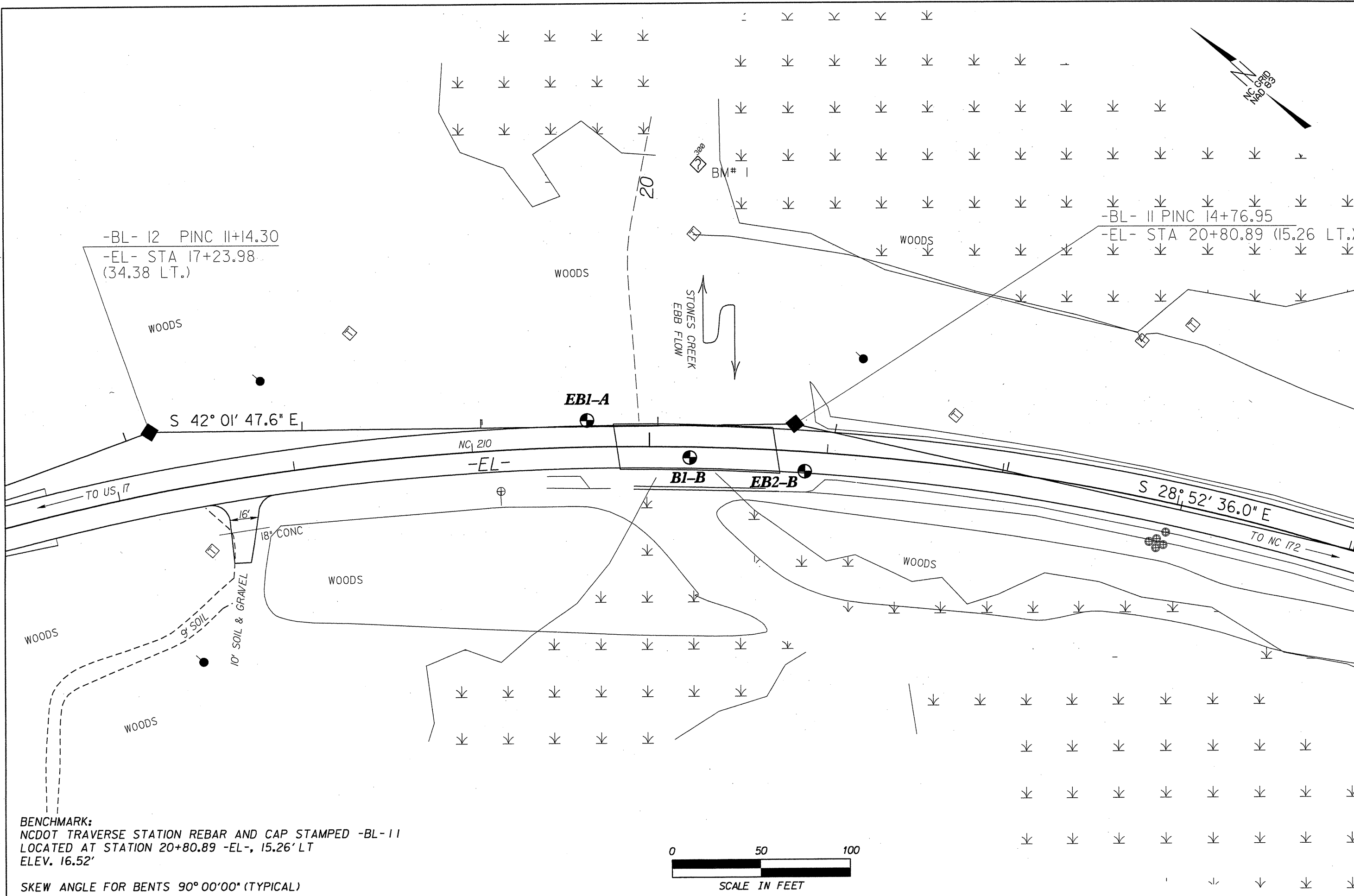
SPROJECTS/2005/05-152/GEOTECHNICAL/CADD/B-4215 - SITEVIC

SCALE:	1:24,000
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	JULY 2005
JOB NO.	1051-05-152



SITE VICINITY MAP
REPLACEMENT OF BRIDGE No. 19
ON NC 210 OVER STONES CREEK
STATE PROJECT NO. 33561.1.1 TIP NO. B-4215
FEDERAL I.D. NO. BRSTP-0210 (3)
ONSLow COUNTY, NORTH CAROLINA

S:\PROJECTS\2005\05-152\GEO\TECH\CADD\B-42.15 SITEPLAN



-BL- 12 PINC 11+14.30
-EL- STA 17+23.98
(34.38 LT.)

-BL- 11 PINC 14+76.95
-EL- STA 20+80.89 (15.26 LT.)

S 42° 01' 47.6" E

S 28° 52' 36.0" E

NC 210

-EL-

BI-B

EB2-B

EB1-A

WOODS

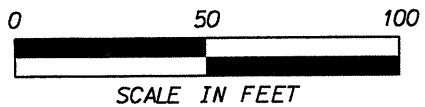
WOODS

WOODS

WOODS

BENCHMARK:
NCDOT TRAVERSE STATION REBAR AND CAP STAMPED -BL-11
LOCATED AT STATION 20+80.89 -EL-, 15.26' LT
ELEV. 16.52'

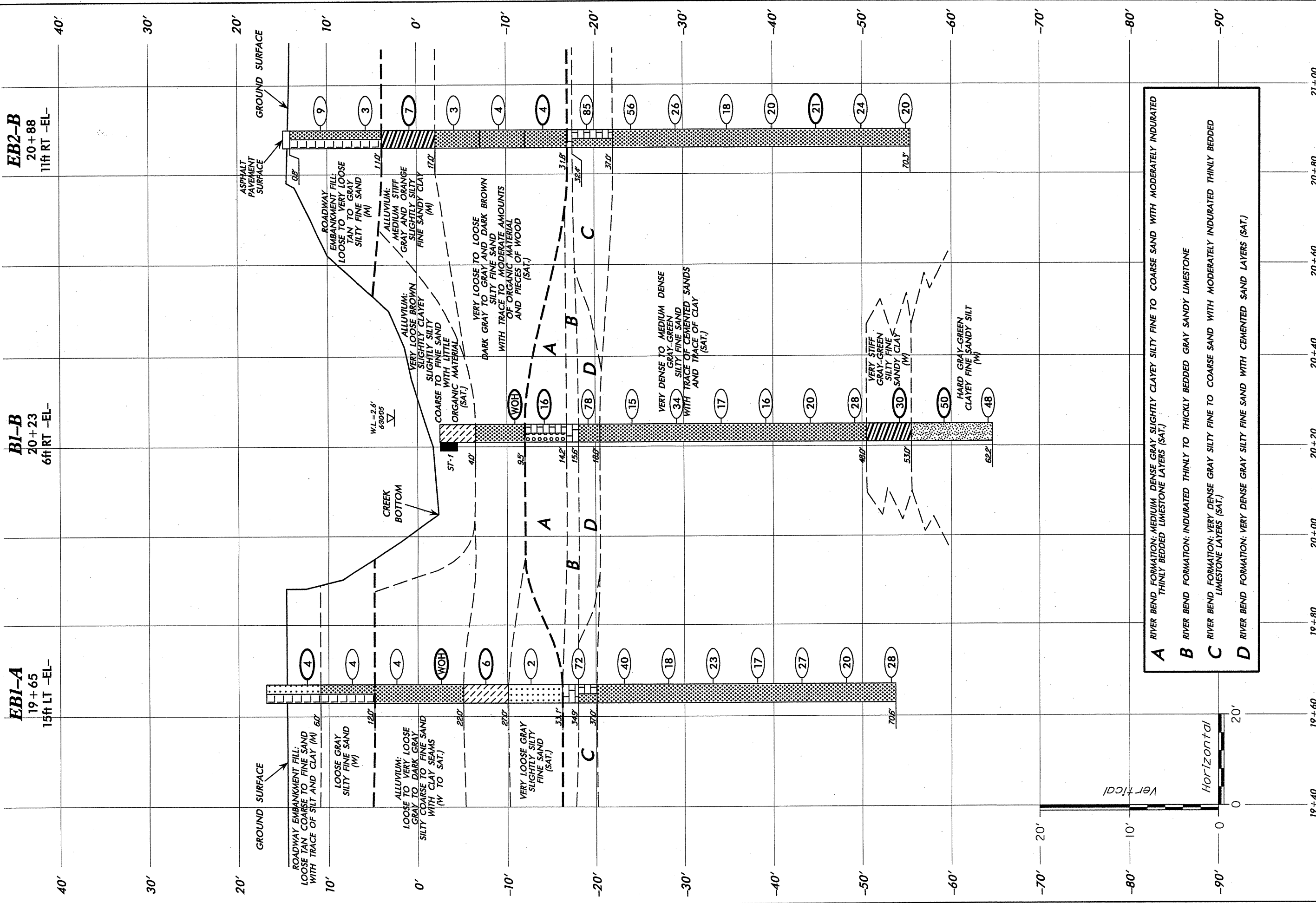
SKW ANGLE FOR BENTS 90° 00' 00" (TYPICAL)



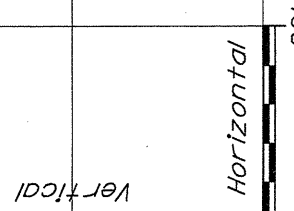
	APPROVED BY:	AFR
	DRAWN BY:	TRP
	SHEET	6 OF 17
SCALE:	1" = 50'	
DATE:	JULY 2005	
JOB NO.	1051-05-152	

BORING LOCATION PLAN

REPLACEMENT OF BRIDGE No. 19
OVER STONES CREEK ON NC 210
WBS No. 3356 I.I. ID. No. B-42.15 FEDERAL ID. BRSTP-02 10(3)
ON SLOW COUNTY, NORTH CAROLINA



- A** RIVER BEND FORMATION: MEDIUM DENSE GRAY SLIGHTLY CLAYEY SILTY FINE TO COARSE SAND WITH MODERATELY INDURATED THINLY BEDDED LIMESTONE LAYERS (SAT.)
- B** RIVER BEND FORMATION: INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE
- C** RIVER BEND FORMATION: VERY DENSE GRAY SILTY FINE TO COARSE SAND WITH MODERATELY INDURATED THINLY BEDDED LIMESTONE LAYERS (SAT.)
- D** RIVER BEND FORMATION: VERY DENSE GRAY SILTY FINE SAND WITH CEMENTED SAND LAYERS (SAT.)



GENERALIZED SUBSURFACE PROFILE 15.0' RIGHT OF -EL-

FROM STA. 19+40 TO STA. 21+00
 REPLACEMENT OF BRIDGE NO. 19
 ON NC 210 OVER STONES CREEK
 STATE PROJECT NO. 3356 I.I. FEDERAL I.D. BRSTP-02 10(3)
 ONSLOW COUNTY, NORTH CAROLINA



SCALE:	(V) 1" = 10' (H) 1" = 20'
DATE:	JULY 2005
JOB NO.	105 I-05-152
APPROVED BY:	AFR
DRAWN BY:	TRP
SHEET	7 OF 17



PROJECT NO.	33561.1.1	ID.	B-4215	COUNTY	Onslow	GEOLOGIST	S. JOHNSON						
SITE DESCRIPTION							GROUND WATER (ft)						
Bridge 19 over Stones Creek on NC 210							0 HR.	N/A					
BORING NO.	EB1-A	BORING LOCATION		19+65	OFFSET	15.0 ft LT	ALIGNMENT	-EL-					
COLLAR ELEV.							24 HR.	N/M					
16.9 ft							NORTHING 307,667.4						
EASTING 2,462,819.8							TOTAL DEPTH 70.6 ft						
DRILL MACHINE			CME-750	DRILL METHOD		3-1/4" HSA/Rotary Wash w/2 7/8" Tri-cone Roller/Drag bit							
DATE STARTED			6/28/05	COMPLETED		6/28/05							
SURFACE WATER DEPTH			N/A										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
16.9													GROUND SURFACE
13.4	3.5	2	2	2							SS-1	M	ROADWAY EMBANKMENT FILL: LOOSE TAN COARSE TO FINE SAND (A-3) WITH TRACE OF SILT AND CLAY
8.4	8.5	2	2	2								W	LOOSE GRAY SILTY FINE SAND (A-2-4)
3.4	13.5	2	2	2								W	ALLUVIUM: LOOSE TO VERY LOOSE GRAY TO DARK GRAY SILTY COARSE TO FINE SAND (A-2-4) WITH CLAY SEAMS
-1.6	18.5	WOH	WOH	WOH							SS-2	Sat.	LOOSE DARK GRAY MODERATELY ORGANIC SILTY COARSE TO FINE SAND (A-2-4) WITH THIN SILT SEAMS (ORGANIC CONTENT = 8.9%) VERY LOOSE GRAY SLIGHTLY SILTY FINE SAND (A-3)
-6.6	23.5	WOH	2	4							SS-3	Sat.	RIVER BEND FORMATION: INDURATED THICKLY BEDDED GRAY SANDY LIMESTONE VERY DENSE GRAY SILTY FINE TO COARSE SAND (A-2-4) WITH MODERATELY INDURATED THINLY BEDDED SANDY LIMESTONE LAYERS DENSE TO MEDIUM DENSE GRAY-GREEN SILTY FINE SAND (A-2-4)
-11.6	28.5	WOH	1	1								Sat.	
-17.0	33.9	33	35	37								Sat.	
-22.2	39.1	15	20	20								Sat.	
-27.2	44.1	6	6	12								Sat.	
-32.2	49.1	6	10	13								Sat.	
-37.2	54.1	5	7	10								Sat.	
-42.2	59.1	7	11	16								Sat.	
-47.2	64.1	7	9	11								Sat.	
-52.2	69.1	7	10	18								Sat.	
												Sat.	

- 1) ADVANCED 3-1/4" H.S.A. TO 28.5 FEET.
- 2) ADVANCED 2-7/8" DRAG BIT TO 33.9 FEET.
- 3) ADVANCED 2-7/8" TRI-CONE ROLLER BIT TO 69.1 FEET.
- 4) CREEK WATER WITH QUICK GEL ADDED USED AS DRILLING FLUID.
- 5) APPROXIMATE DRILLING FLUID DENSITY 66 pcf.
- 6) SOME LOSS OF DRILLING FLUID OBSERVED.

BORING TERMINATED AT ELEVATION -53.7 FEET IN MEDIUM DENSE SILTY FINE SAND

PROJECT NO.	33561.1.1	ID.	B-4215	COUNTY	Onslow	GEOLOGIST	S. JOHNSON						
SITE DESCRIPTION							GROUND WATER (ft)						
Bridge 19 over Stones Creek on NC 210							0 HR.	N/A					
BORING NO.	B1-B	BORING LOCATION		20+23	OFFSET	6.0 ft RT	ALIGNMENT	-EL-					
COLLAR ELEV.							24 HR.	N/A					
-2.5 ft							NORTHING 307,609.9						
EASTING 2,462,842.5							TOTAL DEPTH 62.2 ft						
DRILL MACHINE			CME-750	DRILL METHOD		Rotary Wash w/NW Casing/2-7/8" Tri-cone Roller							
DATE STARTED			6/30/05	COMPLETED		6/30/05							
SURFACE WATER DEPTH			5.1 ft										
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
2.6													CREEK LEVEL
-2.5	7.4												CREEK BOTTOM
-9.9	7.4	WOH	WOH	WOH									ALLUVIUM: VERY LOOSE BROWN SLIGHTLY CLAYEY SLIGHTLY SILTY COARSE TO FINE SAND (A-2-4) WITH LITTLE ORGANIC MATERIAL (ORGANIC CONTENT = 4.3%) VERY LOOSE GRAY SILTY FINE SAND (A-2-4)
-13.2	10.7	2	8	8									WITH TRACE OF ORGANIC MATERIAL (ORGANIC CONTENT = 1.5%)
-18.2	15.7	50	35	43									RIVER BEND FORMATION: MEDIUM DENSE GRAY SLIGHTLY CLAYEY SILTY FINE TO COARSE SAND (A-1-b)
-23.2	20.7	6	7	8									WITH MODERATELY INDURATED THINLY BEDDED SANDY LIMESTONE LAYERS INDURATED THINLY BEDDED GRAY SANDY LIMESTONE VERY DENSE GRAY SILTY FINE SAND (A-2-4)
-28.2	25.7	5	14	20									WITH CEMENTED SAND LAYERS DENSE TO MEDIUM DENSE GRAY-GREEN SILTY FINE SAND (A-2-4)
-33.2	30.7	6	7	10									
-38.2	35.7	6	7	9									
-43.2	40.7	8	8	12									
-48.2	45.7	6	8	20									
-53.2	50.7	7	10	20									
-58.2	55.7	16	25	25									
-63.2	60.7	8	18	30									

- 1) SET NW CASING TO 18.3 FEET.
- 2) (17.8 TEMP CASING).
- 3) ADVANCED 2-7/8" TRI-CONE ROLLER TO 60.7 FEET.
- 4) CREEK WATER WITH QUICK GEL ADDED USED AS DRILLING FLUID.
- 5) APPROXIMATE DRILLING FLUID DENSITY 65 pcf.
- 6) SOME LOSS OF DRILLING FLUID OBSERVED.
- 7) LOST NW CASING IN BOREHOLE.

BORING TERMINATED AT ELEVATION -64.7 FEET IN HARD FINE SANDY SILT

NCDOT BORE SINGLE 05-152.GPJ NCDOT.GDT 7/12/05

NCDOT BORE SINGLE 05-152.GPJ NCDOT.GDT 7/12/05



PROJECT NO.		ID.		COUNTY		GEOLOGIST									
33561.1.1		B-4215		Onslow		S. JOHNSON									
SITE DESCRIPTION							GROUND WATER (ft)								
Bridge 19 over Stones Creek on NC 210							0 HR.	N/A							
BORING NO.		BORING LOCATION		OFFSET		ALIGNMENT									
EB2-B		20+88		11.0 ft RT		-EL-									
COLLAR ELEV.		NORTHING		EASTING		24 HR.									
14.9 ft		307,556.4		2,462,879.2		N/M									
TOTAL DEPTH		DRILL MACHINE		DRILL METHOD		HAMMER TYPE									
70.3 ft		CME-750		3-1/4" HSA/Rotary Wash w/2 7/8" Tri-cone Roller/Drage Bit		Automatic									
DATE STARTED		COMPLETED		SURFACE WATER DEPTH											
6/27/05		6/28/05		N/A											
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100		
14.9					ASPHALT PAVEMENT SURFACE								14.9	0.00	
11.7	3.2	2	5	4	9						M	ASPHALT (0.3') / ABC STONE (0.5')	14.1	0.8	
6.7	8.2	1	2	1	3						M	ROADWAY EMBANKMENT FILL: LOOSE TO VERY LOOSE TAN TO GRAY SILTY FINE SAND (A-2-4)	3.9		
1.8	13.1	2	3	4	7						SS-8	28.6% ALLUVIUM: MEDIUM STIFF GRAY AND ORANGE SLIGHTLY SILTY FINE SANDY CLAY (A-6)	-2.1	11.0	
-3.2	18.1	1	2	1	3						Sat.	VERY LOOSE GRAY SILTY FINE SAND (A-2-4)	-7.1	17.0	
-8.2	23.1	2	1	3	4						W	LOOSE DARK BROWN AND GRAY SILTY FINE SAND (A-2-4) WITH TRACE OF ORGANIC MATERIAL AND PIECES OF WOOD	-12.1	22.0	
-13.2	28.1	2	1	3	4						SS-9	Sat.	LOOSE GRAY SILTY FINE SAND (A-2-4) WITH TRACE OF ORGANIC MATERIAL (ORGANIC CONTENT = 2.7%)	-16.9	27.0
-18.2	33.1	23	12	73	85						Sat.	RIVER BEND FORMATION: INDURATED THINLY BEDDED GRAY SANDY LIMESTONE	-17.3	31.9	
-23.2	38.1	20	25	31	56						Sat.	VERY DENSE GRAY SILTY FINE SAND (A-2-4) WITH MODERATELY INDURATED THINLY BEDDED SANDY LIMESTONE LAYERS	-22.1	37.0	
-28.2	43.1	8	11	15	26						Sat.	VERY DENSE TO MEDIUM DENSE GRAY-GREEN SILTY FINE SAND (A-2-4) WITH TRACE OF CEMENTED SANDS AND TRACE OF CLAY			
-33.9	48.8	7	8	10	18						Sat.				
-38.9	53.8	6	8	12	20						Sat.				
-43.9	58.8	6	9	12	21						SS-10	Sat.			
-48.9	63.8	7	10	14	24						Sat.				
-53.9	68.8	5	9	11	20						Sat.				
					BORING TERMINATED AT ELEVATION -55.4 FEET IN MEDIUM DENSE SILTY FINE SAND										

NCDOT BORE SINGLE 05-152.GPJ NCDOT.GDT 7/12/05

- 1) ADVANCED 3-1/4" H.S.A. TO 8.2 FEET.
- 2) SET 25.1 FEET OF NW CASING.
- 3) ADVANCED 2-7/8" DRAG BIT TO 43.1 FEET.
- 4) ADVANCED 2-7/8" TRI-CONE ROLLER BIT TO 68.8 FEET.
- 5) CREEK WATER WITH QUICK GEL ADDED USED AS DRILLING FLUID.
- 6) APPROXIMATE DRILLING FLUID DENSITY 67 pcf.
- 7) SOME LOSS OF DRILLING FLUID OBSERVED.

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

Boring No.	Sample No.	Sample Depth Feet	AASHTO Classification	% Passing Sieve #			Coarse Sand	Fine Sand	Silt	Clay	LL	PL	PI	Organic Content %	Moisture Content %
				10	40	60									
EB1-A	SS-1	3.5-5.0	A-3 (0)	100	99	85	6	81	1	3	13	N.P.	N.P.	--	--
EB1-A	SS-2	18.5-20.0	A-2-4 (0)	100	98	91	32	63	10	18	12	N.P.	N.P.	--	--
EB1-A	SS-3	23.5-25.0	A-2-4 (0)	100	90	68	16	55	3	10	10	N.P.	N.P.	8.9	--
B1-B	ST-1	0.0-2.0	A-2-4 (0)	98	95	89	11	83	4	4	8	N.P.	N.P.	4.3	--
B1-B	SS-4	7.4-8.9	--	--	--	--	--	--	--	--	--	--	--	1.5	--
B1-B	SS-5	10.7-12.2	A-1-b (0)	89	46	39	25	18	19	7	11	N.P.	N.P.	--	--
B1-B	SS-6	50.7-52.2	A-6 (7)	100	100	99	63	1	20	27	35	20	15	--	27.4
B1-B	SS-7	55.7-57.2	A-4 (3)	100	100	100	52	61	18	21	31	21	10	--	25.1
EB2-B	SS-8	13.1-14.6	A-6 (5)	100	100	100	52	62	9	29	33	18	15	--	28.6
EB2-B	SS-9	28.1-29.6	--	--	--	--	--	--	--	--	--	--	--	2.7	--
EB2-B	SS-10	58.8-60.3	A-2-4 (0)	100	100	99	15	86	4	9	11	N.P.	N.P.	--	--

Project Name: BRIDGE NO. 19 OVER STONES CREEK ON NC 210

S&ME Project No.: 1051-05-152

State Project No.: 33561.1.1

County: ONSLOW

Federal ID No.: BRSTP-0210(3)

TIP No.: B-4215

Checked By: JSJ & AFR

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 33561.1.1 ID: B-4215 COUNTY: Onslow

DESCRIPTION(1): Replacement of Bridge No. 19 over Stones Creek on NC 210

INFORMATION ON EXISTING BRIDGES Information obtained from: field inspection
 microfilm(Reel: _____ Pos: _____)
 other Bridge Survey and Hydraulic Design Report

COUNTY BRIDGE NO. 19 BRIDGE LENGTH 90' NO. BENTS IN: CHANNEL 3 FLOOD PLAIN 3

FOUNDATION TYPE: Timber Piles

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: Minor evidence of erosion was observed on both sides of the creek beneath the existing bridge.

INTERIOR BENTS: None observed at Interior Bents due to bents being located in the channel.

Concrete has been cast in-place to repair lower portion of interior timber pile at Interior Bent No. 1.

CHANNEL BED: None observed

CHANNEL BANKS: None observed

EXISTING SCOUR PROTECTION:

TYPE(3): Concrete abutments with small concrete wingwalls.

EXTENT(4): Concrete wingwalls extend a few feet from the concrete abutments.

EFFECTIVENESS(5): Relatively effective with some minor erosion at both abutments.

OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): Organic debris collected on the south side of Interior Bent No. 2.

DESIGN INFORMATION:

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Brown slightly clayey slightly silty coarse to fine sand (A-2-4)(0) with little organic matter.

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Brown slightly clayey slightly silty coarse to fine sand (A-2-4)(0) with little organic matter, gray to dark gray silty coarse to fine sand (A-2-4)(0) with clay seams and gray and orange slightly silty fine sandy clay (A-6)(5).

CHANNEL BANK COVER(9): Trees and underbrush

FLOOD PLAIN WIDTH(10): 200 +/- feet on northwest side of creek and 550 +/- feet on southeast side of creek

FLOOD PLAIN COVER(11): wooded areas

DESIGN INFORMATION CONT.

STREAM IS DEGRADING AGGRADING (12)

OTHER OBSERVATIONS AND COMMENTS: Two water lines cross the creek on an utility bridge just south of the existing bridge and a sewer line crosses the creek on an utility bridge located just north of the existing bridge.

Underground telephone and overhead power lines exist on north side of bridge.

CHANNEL MIGRATION TENDENCY (13): Migration tendency to the northwest

REPORTED BY: J. Shane Johnson S&ME, Inc. DATE: 5/10/2005

GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (14):

	Bent 1
100-year	-14.96'
500-year	-17.81'

REPORTED BY: *Bradley J. Jolly* DATE: 7-15-05

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 (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: 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 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 RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. 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.

PROJECT #: 33561.1.1

COUNTY: Onslow

DESCRIPTION: Replacement of Bridge No.19 Over Stones Creek on NC 210

SAMPLE #	CHANNEL BED MATERIAL			CHANNEL BANK MATERIAL		
	ST-1			SS-2	SS-3	SS-8
RETAINED #4	3.13			0	0	0
PASSING #10	98			100	100	100
PASSING #40	95			98	90	100
PASSING #200	11			32	16	52
COARSE SAND	9			9	32	0
FINE SAND	83			63	55	62
SILT	4			10	3	9
CLAY	4			18	10	29
LL	8			12	10	33
PL	N.P.			N.P.	N.P.	18
AASHTO CLASSIFICATION	A-2-4(0)			A-2-4 (0)	A-2-4 (0)	A-6(5)
STATION	20+23			19+65	19+65	20+88
OFFSET	6 RT			15 LT	15 LT	11 RT
DEPTH	0.0-2.0			18.5-20.0	23.5-25.0	13.1-14.6

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

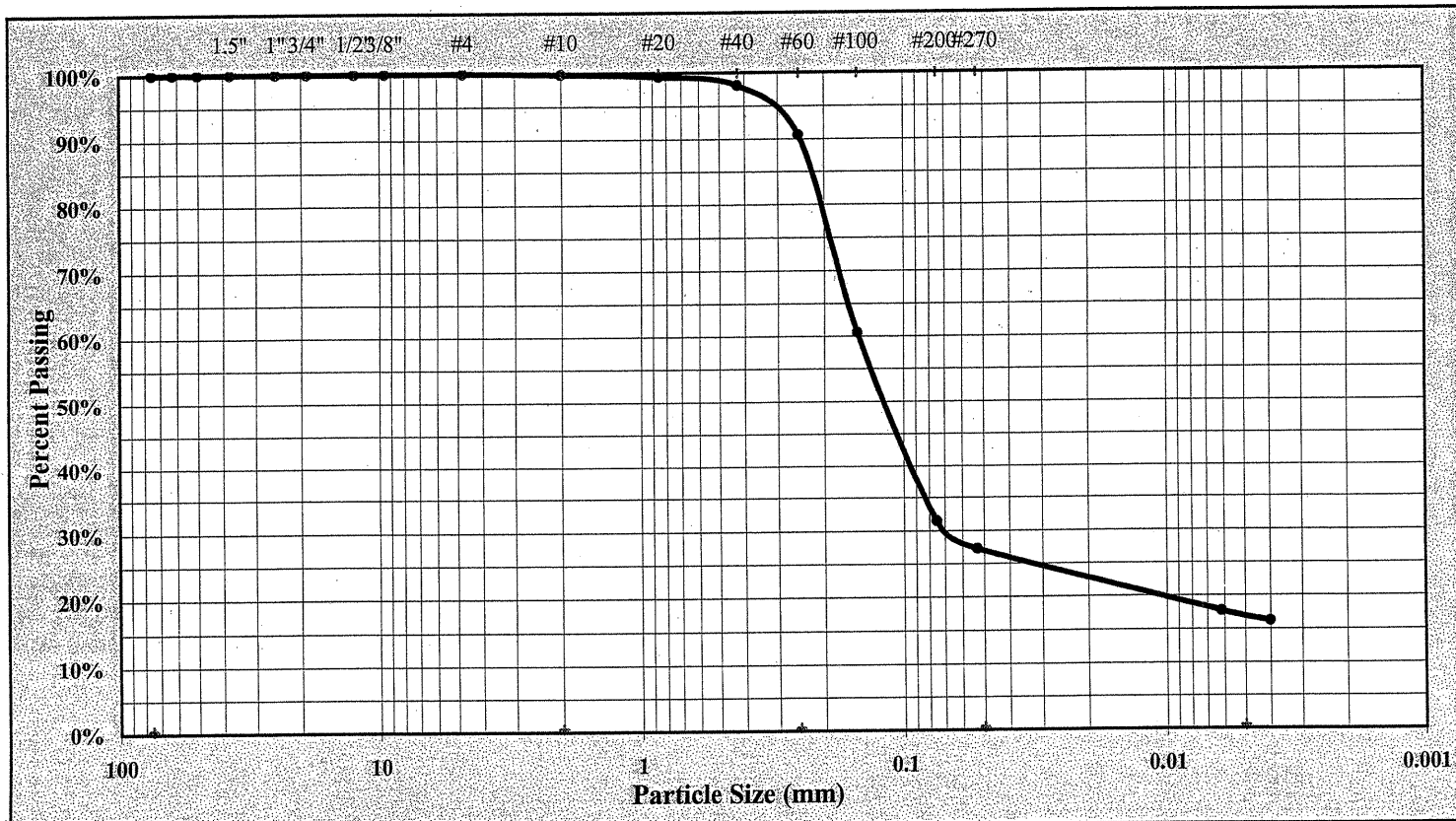


S&ME Project #: **1051-05-152**
 Project Name: **Bridge No. 19 over Stones Creek on NC 210**
 Client Name: **NCDOT**
 Client Address:
 State Project #: **33561.1.1**

Report Date: **7/8/2005**
 Test Date(s): **07/01 - 07/07/2005**

F.A. Project No: **BRSTP-0210 (3)** TIP NO: **B-4215**

Boring #: **EB1-A** Sample #: **SS-2** Sample Date: **6/28/2005**
 Location: **19+65** Offset: **15 LT** Depth: **18.5 - 20.0'**
 Sample Description: **Dark Gray Silty Fine Sand A-2-4 (0)**



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm	
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm	
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm	

Maximum Particle Size	#10	Coarse Sand	9.2%	Silt	10.0%
Gravel	0.2%	Fine Sand	63.3%	Clay	18.0%
Apparent Relative Density		Moisture Content		% Passing #200	31.5%
Liquid Limit	12	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	9.2%	Fine Sand	63.4%	Silt	9.7%	Clay	17.7%
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Description of Sand & Gravel Particles: Rounded Angular Hard & Durable Soft Weathered & Friable
 Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g / Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test AASHTO T89: Determining the Liquid Limit of Soils
 AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
 AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan Laboratory Supervisor
Signature Signature

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

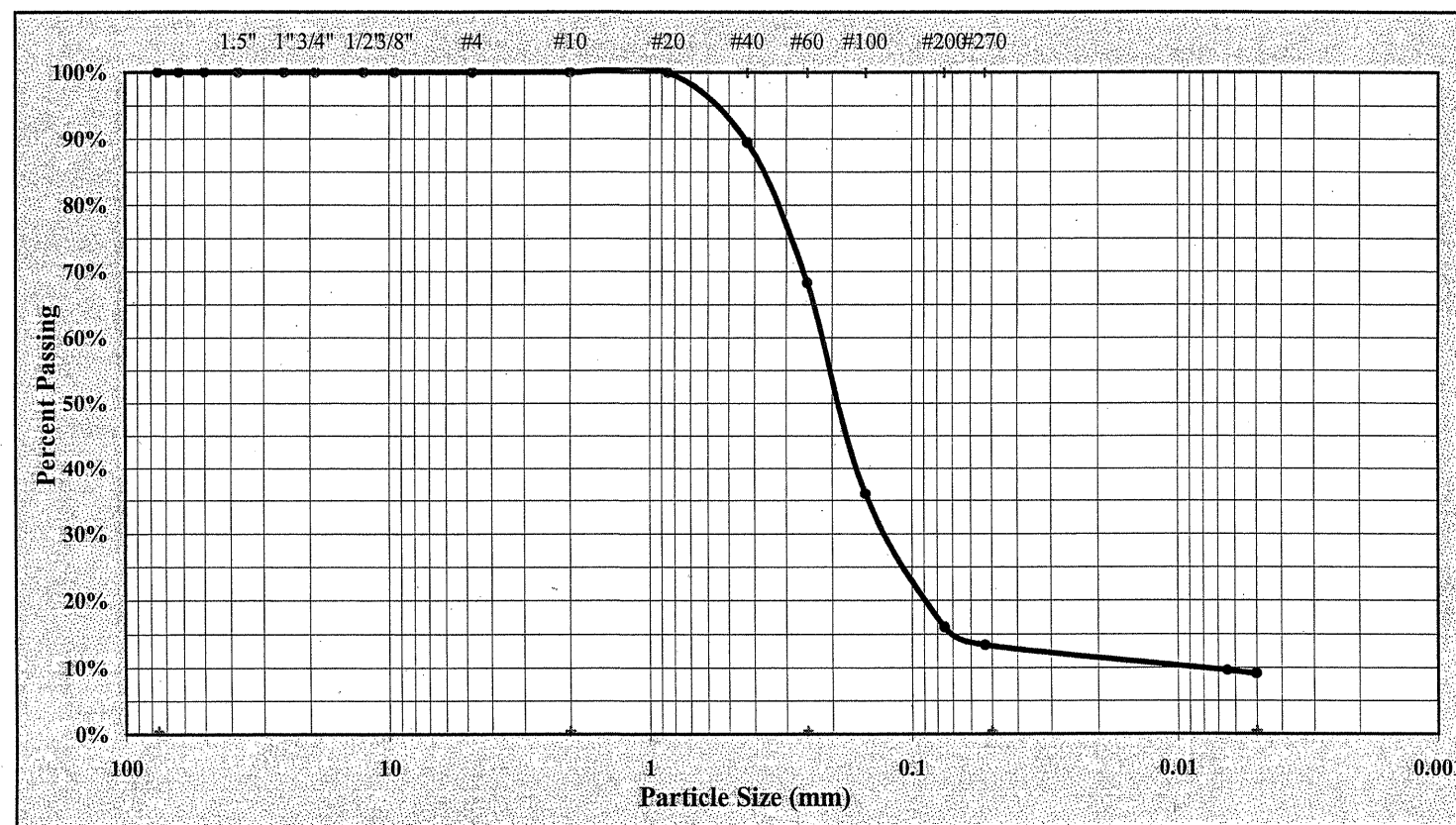


S&ME Project #: **1051-05-152**
 Project Name: **Bridge No. 19 over Stones Creek on NC 210**
 Client Name: **NCDOT**
 Client Address:

Report Date: **7/8/2005**
 Test Date(s): **07/01 - 07/07/2005**

State Project #: **33561.1.1** F.A. Project No: **BRSTP-0210 (3)** TIP NO: **B-4215**

Boring #: **EB1-A** Sample #: **SS-3** Sample Date: **6/28/2005**
 Location: **19+65** Offset: **15 LT** Depth: **23.5 - 25.0'**
 Sample Description: **Dark Gray Moderately Organic Silty Fine Sand A-2-4 (0)**



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm	
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm	
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm	

Maximum Particle Size	#10	Coarse Sand	31.7%	Silt	4.0%
Gravel	0.0%	Fine Sand	54.9%	Clay	10.0%
Apparent Relative Density		Moisture Content		% Passing #200	16.1%
Liquid Limit	10	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	31.7%	Fine Sand	54.9%	Silt	3.8%	Clay	9.6%
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Description of Sand & Gravel Particles: Rounded Angular Hard & Durable Soft Weathered & Friable
 Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g / Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test AASHTO T89: Determining the Liquid Limit of Soils
 AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
 AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan Laboratory Supervisor
Signature Signature

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

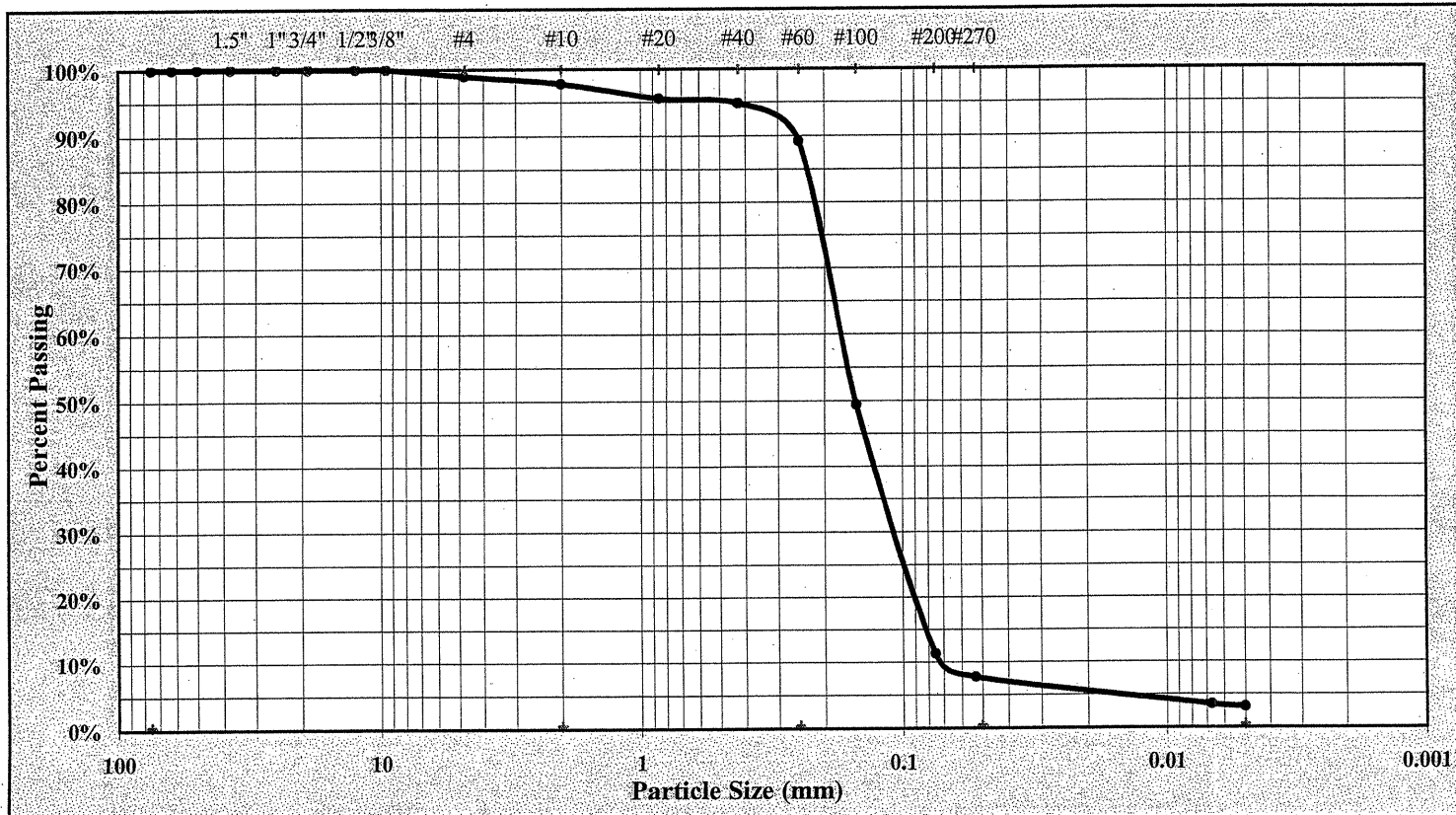


S&ME Project #: **1051-05-152**
 Project Name: **Bridge No. 19 over Stones Creek on NC 210**
 Client Name: **NCDOT**
 Client Address:
 State Project #: **33561.1.1**

Report Date: **7/8/2005**
 Test Date(s): **07/01 - 07/07/2005**

F.A. Project No: **BRSTP-0210 (3)** TIP NO: **B-4215**

Boring #: **B1-B** Sample #: **ST-1** Sample Date: **6/30/2005**
 Location: **20+23** Offset: **6 RT** Depth: **0 - 2'**
 Sample Description: **Brown Slightly Clayey Silty Coarse to Fine Sand A-2-4 (0)**



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm	
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm	
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm	
Maximum Particle Size	3/8"	Coarse Sand	8.6%	Silt 4.0%
Gravel	2.2%	Fine Sand	81.5%	Clay 4.0%
Apparent Relative Density		Moisture Content		% Passing #200 11.3%
Liquid Limit	8	Plastic Limit	0	Plastic Index N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	8.8%	Fine Sand	83.3%	Silt	4.3%	Clay	3.6%
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Description of Sand & Gravel Particles: Rounded Angular Hard & Durable Soft Weathered & Friable

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT
 AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
 AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan Laboratory Supervisor

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

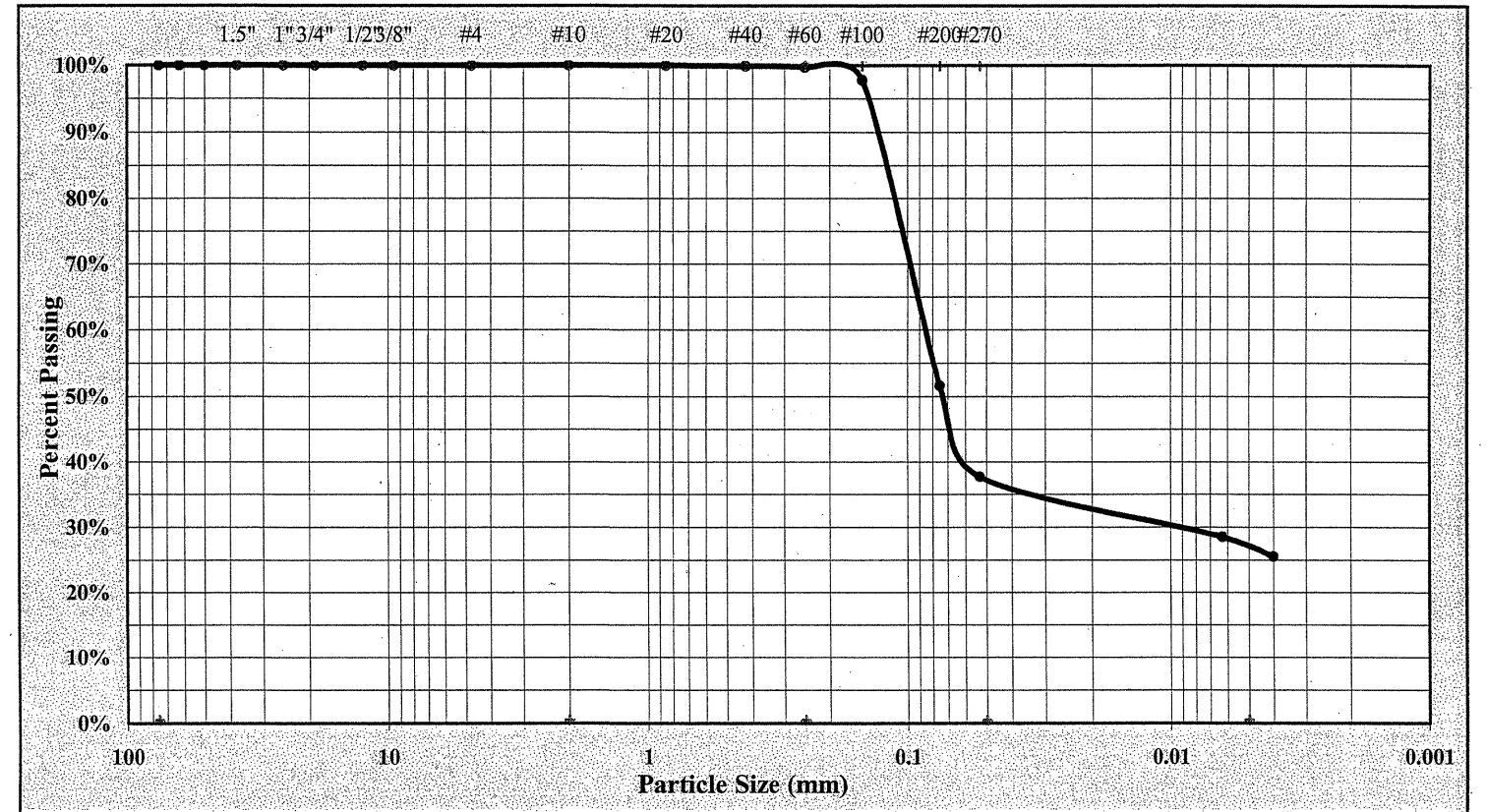


S&ME Project #: **1051-05-152**
 Project Name: **Bridge No. 19 over Stones Creek on NC 210**
 Client Name: **NCDOT**
 Client Address:
 State Project #: **33561.1.1**

Report Date: **7/8/2005**
 Test Date(s): **07/01 - 07/07/2005**

F.A. Project No: **BRSTP-0210 (3)** TIP NO: **B-4215**

Boring #: **EB2-B** Sample #: **SS-8** Sample Date: **6/27/2005**
 Location: **20+88** Offset: **11 RT** Depth: **13.1 - 14.6'**
 Sample Description: **Gray and Orange Fine Sandy Silty Clay A-6 (5)**



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm	
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm	
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm	
Maximum Particle Size	#10	Coarse Sand	0.3%	Silt 9.0%
Gravel	0.0%	Fine Sand	62.0%	Clay 29.0%
Apparent Relative Density		Moisture Content	28.6%	% Passing #200 51.6%
Liquid Limit	33	Plastic Limit	18	Plastic Index 15

Soil Mortar (-#10 Sieve)

Coarse Sand	0.3%	Fine Sand	62.0%	Silt	9.2%	Clay	28.5%
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Description of Sand & Gravel Particles: Rounded Angular Hard & Durable Soft Weathered & Friable

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT
 AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test AASHTO T265: Laboratory Determination of Moisture Content of Soils
 AASHTO T89: Determining the Liquid Limit of Soils AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
 AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes ASTM D 854: Specific Gravity of Soils

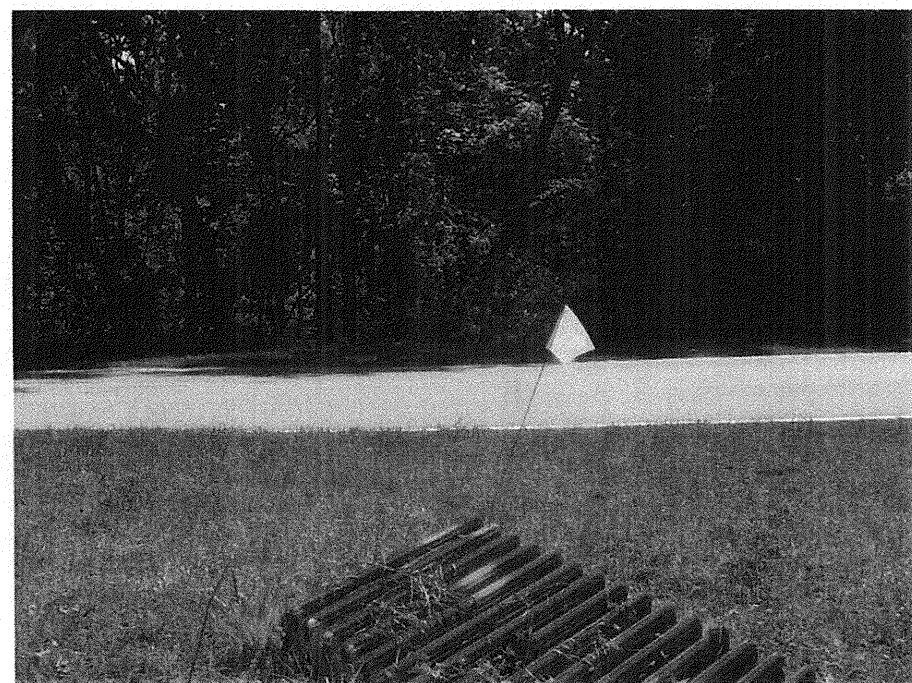
Technical Responsibility: Mal Karajan Laboratory Supervisor



Photograph No. 1:
This photograph was taken from the northwest approach, looking southeast along the -EL- alignment.



Photograph No. 3:
This photograph was taken from the right side of the -EL- alignment, looking northeast, across proposed End Bent No.1.



Photograph No. 2:
This photograph was taken from the left side of the -EL- alignment, looking southwest, across proposed End Bent No.1.



Photograph No. 4:
This photograph was taken from the right side of the -EL- alignment, looking southeast, along the right side of the existing bridge.



Photograph No. 5:
This photograph was taken from the existing bridge, looking northeast (downstream).



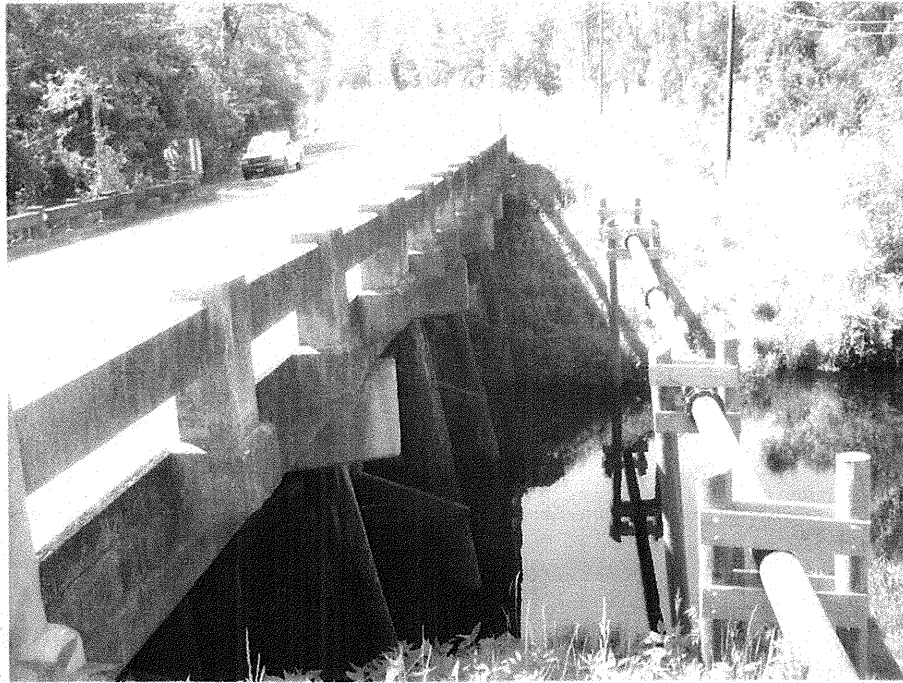
Photograph No. 7:
This photograph was taken from the right side of the -EL- alignment, looking northwest, along the right side of the existing bridge.



Photograph No. 6:
This photograph was taken from the existing bridge, looking southwest (upstream).



Photograph No. 8:
This photograph was taken from the right side of the -EL- alignment, looking north at proposed Interior Bent No. 1.



Photograph No. 9:
This photograph was taken from the left side of the -EL- alignment, looking northwest, along the left side of the existing bridge.



Photograph No. 11:
This photograph was taken from the right side of the -EL- alignment, looking northeast, across proposed End Bent No.2.



Photograph No. 10:
This photograph was taken from the left side of the -EL- alignment, looking southwest, across proposed End Bent No.2.



Photograph No. 12:
This photograph was taken from the southeast approach, looking northwest along the -EL- alignment.