PROJECT: 33478.1.1 I.D.: B-4125

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33478.1.1	1	27
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
B-4125	BRZ-1091(1)	P.E.	
		CONST.	

For Letting

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

STRUCTURE SUBSURFACE INVESTIGATION

CONTENTS: SHEET

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.

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DRAWN BY: R.RAHIE

STATE PROJECT 33478.1.1 I.D. NO. B-4125

F.A. PROJECT BRZ-1091(1)

COUNTY GREENE

PROJECT DESCRIPTION BRIDGE NO. 46 OVER WHEAT SWAMP CREEK ON SR 1091

SITE DESCRIPTION

INVESTIGATED BY	MACTEC ENGINEERING AND CONSULTING, INC.	PERSONNEL	W. DEOBALD
CHECKED BY	S. CRISCENZO		W. GRIMES
SUBMITTED BY	W. DEOBALD		T. HAHN
DATE	12/21/05		W. BURKETT
REVISED	01/12/06		
REVISED	01/31/06		

NORTH CAROLINA LICENSED 1-31-06 SEAL 1730 GEOLOGIST WILLIAM BRIAN DEOBALD

MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604
(919) 876-0416

SIGNATURE

ID	PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4125	33478.1.1	2	27

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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:

VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING # 10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT				40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX	6 MX		N.P.	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 ≥ L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.0	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)
GRAIN SIZE MM	305	75	2.0	0.25	0.05	0.005
GRAIN SIZE IN.	12"	3"				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PLASTIC RANGE (PI)		
PL — PLASTIC LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

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.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.
- STATIC WATER LEVEL AFTER 24 HOURS.
- PW — PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
- SPRING OR SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP/DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- BULK SAMPLE LOCATION
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS

S - BULK SAMPLE
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE
RS - ROCK SAMPLE
RT - RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
C.I. - CAVE IN
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e -VOID RATIO
F. - FINE
FIAD - FILLED IMMEDIATELY AFTER DRILLING
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
V. - VERY
VST - VANE SHEAR TEST
W - MOISTURE CONTENT

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B- ___
- [ ] BK-51
- [ ] CME-45
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] OTHER CME-45C
- [X] OTHER D-50

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 3" STEEL TEETH
- [ ] TRICONE ____" TUNG.-CARB.
- [X] CORE BIT SERIES 2&6
- [ ] OTHER ____

HAMMER TYPE:
- [ ] AUTOMATIC
- [X] MANUAL

CORE SIZE:
- [ ] -B ____
- [ ] -N Q
- [X] -H Q

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [X] OTHER METAL DET.

ROCK DESCRIPTION

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 FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD 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.

WEATHERING

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 BPF*
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 BPF*
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.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS 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 GEOLOGISTS 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 GEOLOGISTS 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 FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

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.

TERMS AND DEFINITIONS

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 IS 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.

BENCH MARK: NCDOT BASELINE REFERENCE POINT BL-1, ELEV. 34.72 ft MSL

NOTES:
Geotechnical Exploration Performed By:

MACTEC
MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604
(919) 876-0416

Subject: **Revised Geotechnical Report**

Description: **Bridge No. 46 over Wheat Swamp Creek on SR 1091**
Project Number: 33478.1.1
Tip Number: B-4125
F.A. Number: BRZ-1091(1)
MACTEC Project Number: 6468-05-1241

Project Information

The purpose of this investigation was to obtain geotechnical information for foundation design and construction of the proposed replacement bridge over Wheat Swamp Creek on SR 1091, Greene County, North Carolina (Drawings 1 and 2). Our understanding of this project comes from a site visit by MACTEC personnel; conversations with NCDOT Geotechnical Unit personnel; and from documents and drawings provided by the Geotechnical Unit, including a Request for Proposal dated October 21, 2005, Bridge Survey and Hydraulic Design Report dated August 17, 2005, a field log of a preliminary boring completed at the site by NCDOT; and electronic files of site plan drawings obtained via the NCDOT file transfer website.

The proposed structure is approximately 100 feet in length, 36 feet wide, and will be constructed at the approximate grade of the existing bridge. The proposed structure will consist of three spans (four bents) approximately 25 feet, 50 feet, and 25 feet in length. The length of the span to end bent 2 was still under consideration at the time of our investigation. The bents are skewed 90° to the alignment (-L-).

Field Testing

During November, 2005, MACTEC advanced 7 borings at locations shown on the Boring Location Plan (Drawing 3). The borings were drilled with a CME 45C trailer-mounted drill rig or a D-50 ATV-mounted drill rig. All borings were advanced using rotary wash drilling techniques. HQ-size rock/soil coring techniques were also used to core selected intervals at interior bent borings. All borings were drilled to depths that satisfy the minimum criteria for the NCDOT Ultimate Pile Capacity Chart for 12-inch steel piles. Interior bent borings were drilled to depths that also satisfy the minimum criteria for drilled shaft foundations.

Proposed boring locations were established at the project site utilizing GPS equipment and existing site features. Boring location coordinates were determined from the provided electronic files. Three borings were drilled at end bent 1. Two borings were drilled at end bent 2. One boring was drilled at each of bents 1 and 2. Boring at bents 1 and 2 were drilled through the deck of the existing bridge. The bridge deck was patched upon completion of the borings. Actual boring location coordinates were captured with GPS equipment.

Conventional survey techniques were used to establish the collar elevations at all boring locations and selected ground surface points depicted on the subsurface profile and cross section drawings included with this report (Drawings 4 to 8). Reference Survey point BL-1, established at the project site by NCDOT personnel, was used as a benchmark.

Standard penetration tests (SPT) were conducted and soil samples collected at approximately five foot intervals or 2.5 foot intervals, as directed by NCDOT. Samples were collected from within the soil profile using a split-barrel sampler and a 140 lb. manual hammer. SPT's were also performed between core runs.

Sheet pile retaining walls exist at both end bents of the existing bridge. We located the sheet piles with a metal detector and mapped the locations with GPS equipment. Locations are shown on the inset drawing of the Boring Location Plan.

In July 2002, NCDOT advanced one preliminary boring at the site. The location of NCDOT's preliminary boring is shown on the Boring Location Plan (Drawing 3).

Laboratory Testing

Laboratory testing consisting of AASHTO classification and grain-size distribution tests were performed on split-barrel samples SS-1 through SS-12, and bulk samples S-1 and S-2 which were collected from Wheat Swamp Creek's channel bank and channel bed, respectively.

Laboratory testing was performed in accordance with applicable ASTM/AASHTO/NCDOT specifications. Test results for AASHTO classification and grain-size distribution are included with this report.

Physiography

The project site is located in the North Carolina Coastal Plain Physiographic Province. The roadway surface at the existing bridge is at elevation 32± feet mean sea level (msl). The natural ground surface varies from 6 to 11 below grade at the existing bridge. The creek bed is at elevation 18± feet msl. The creek banks are moderately sloped to steep and are wooded with small to large trees both up- and down-stream. The ground surface is relatively flat approaching the site from the west. The ground surface slopes gradually upward to elevation 65± feet msl one-quarter mile to the east.

Geology

The 1985 Geologic Map of North Carolina, compiled by the N.C. Geological Survey, indicates that the Yorktown, Peedee and Black Creek Formations may be at or near the surface at the project site. Our investigation identified surficial soils consisting of roadway embankment fill and/or alluvium, underlain by marine soil interlayered with sedimentary rock. Without additional evidence to distinguish marine soil/sedimentary rock as part of one formation or another, we have grouped the marine soil and sedimentary rock and referred to them as the Yorktown Formation.

Boring and coring logs describing subsurface conditions at each of the boring locations, including NCDOT's preliminary boring, are included with this report. A generalized profile, Drawing 4, depicts subsurface conditions 15 feet left of alignment -L-. Generalized cross-sections, Drawings 5 to 8, depict subsurface conditions along each bent.

Soils

Roadway Embankment Fill was encountered at the surface and extends to elevations 24 to 21± feet msl. Fill consists of very loose to medium dense, clayey, silty, fine to coarse sand and gravel (A-1-b/A-2-4), and medium stiff, fine to coarse sandy silt (A-4) with trace organics and cemented shells. A surficial layer of rip-rap covers embankment slopes to the creek.

Alluvium was encountered at the surface and beneath roadway embankment fill at elevations 24 to 18± feet msl, and extends to elevations 20 to 16± feet msl. Alluvium consists of very loose to medium dense, clayey, silty, fine to coarse sand (A-3/A-2-4), and is trace to moderately organic.

Yorktown Formation was encountered at elevations 20 to 16± feet msl. All borings were terminated in the Yorktown Formation, with the deepest boring extending to elevation -30± feet msl. Yorktown Formation primarily consists of loose to very dense, glauconitic, clayey, silty, fine to coarse sand (A-3/A-2-4) with trace to little shell fragments, lignite and clay lenses; and stiff to very stiff, clayey, fine to coarse sandy silt (A-4). Soil density increases with depth. Soils encountered below elevation 0± feet msl are typically very dense. The soils are interlayered with sedimentary rock.

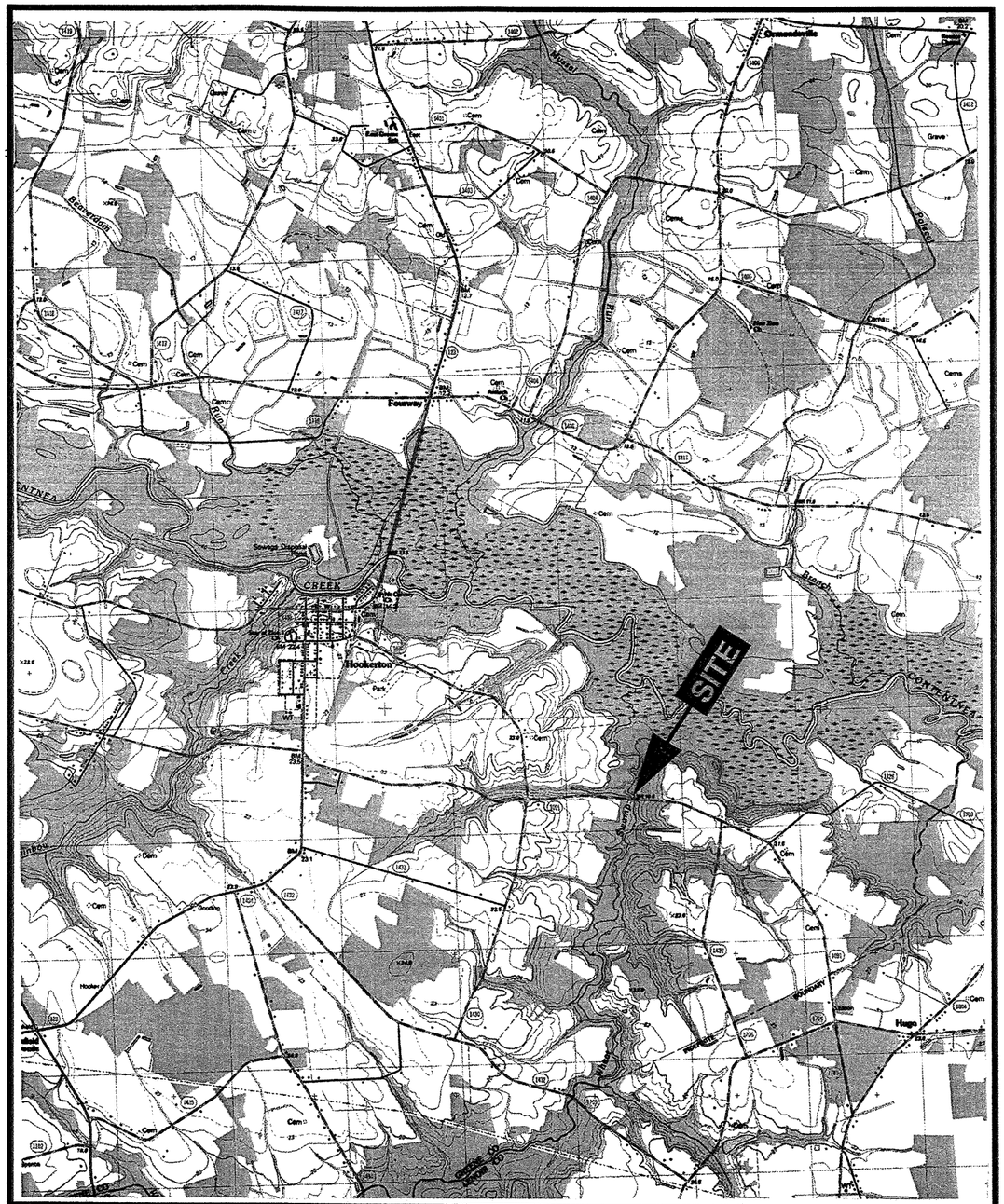
Rock

Two primary sedimentary rock layers were encountered within the Yorktown Formation; an upper layer at 16± feet msl and a lower layer at -16± feet msl. Both layers consist of friable to extremely indurated, fossiliferous sandstone. The upper layer is thinly bedded and was not encountered at boring EB2-A. The lower layer is thinly to thickly bedded and was not encountered at boring EB1-B, although soils in its place remain very dense.

Thinly bedded, friable to moderately indurated sandstone was also encountered at elevation 5± feet msl at boring B2-B.

Groundwater

24-hour groundwater levels were measured at elevation 24± feet msl in borings at end bent 1. 24-hour groundwater level elevations ranged from 23± feet msl to 27± feet msl in borings at end bent 2. Surface water in Wheat Swamp Creek was measured at elevation 21.3 feet msl on November 19, 2005.



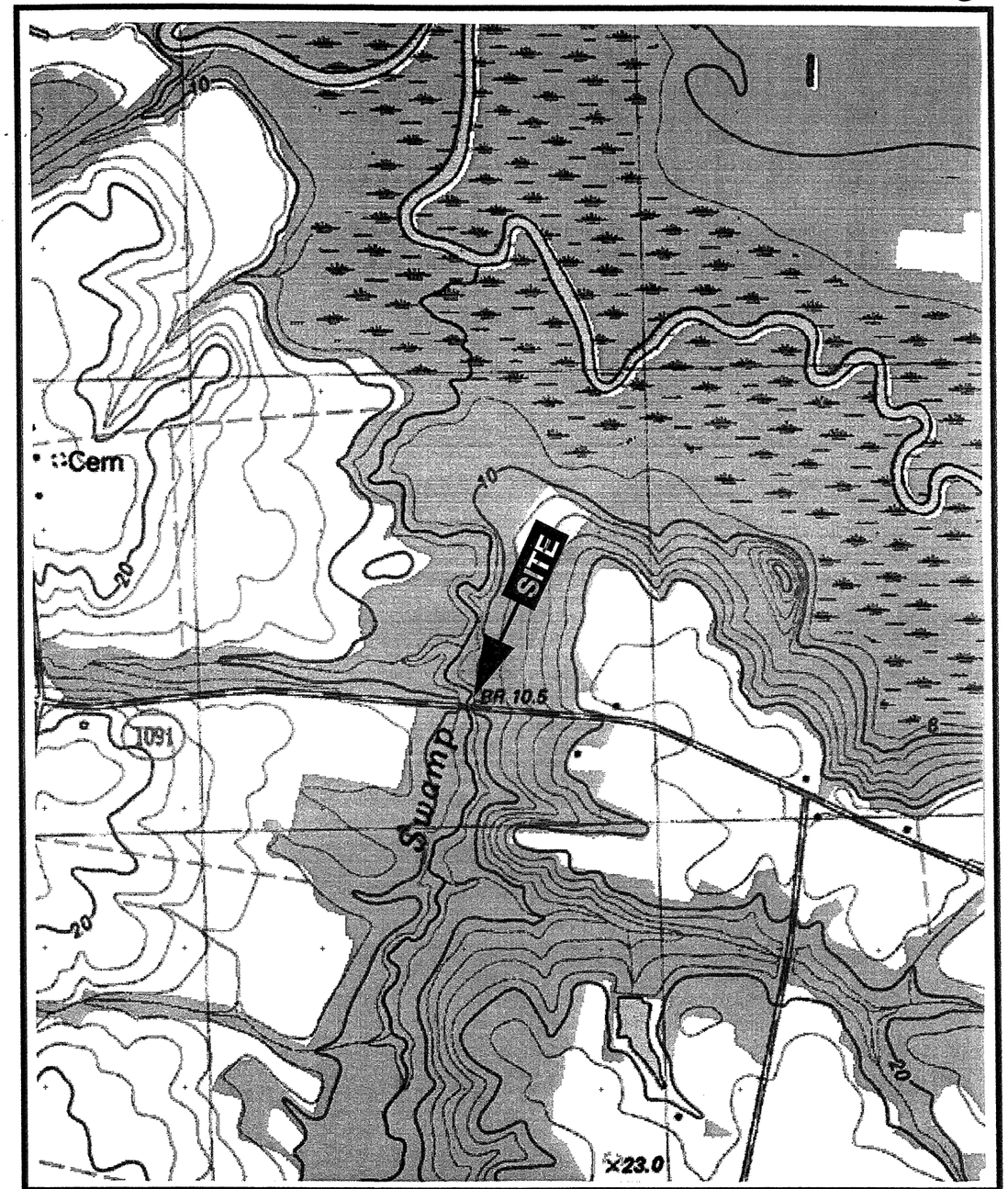
SITE LOCATION MAP
Bridge No. 46 Over Wheat Swamp Creek on SR 1091
N.C. DOT Project No. 33478.1.1 (B-4125)
F.A. No. BRZ-1091(1)
Greene County, North Carolina

N

MACTEC
ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

DWG: 1 | DATE: December 2005

REF: USGS QUAD.: Hookerton, NC | SCALE: 1"= 4000' | MACTEC JOB NO: 6468-05-1241



TOPOGRAPHIC SITE MAP
Bridge No. 46 Over Wheat Swamp Creek on SR 1091
N.C. DOT Project No. 33478.1.1 (B-4125)
F.A. No. BRZ-1091(1)
Greene County, North Carolina

N

MACTEC
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RALEIGH, NORTH CAROLINA

DWG: 2 | DATE: December 2005

REF: USGS QUAD.: Hookerton, NC | SCALE: 1"= 1000' | MACTEC JOB NO: 6468-05-1241

-T1-100 POT 5+00.00
ELEV=27.13 IP SET
-L- 15+16.90 (149.50' LT)

-T1-101 POT 6+16.85
ELEV=28.42 IP SET
-L- 16+24.57 (104.11' LT)

WHEAT SWAMP CREEK

BM-A
-L- STA 15+13.57
108.61' LT
ELEV. 32.91'

S 62° 46' 24.1" E

WOODS

-BL-2 PINC 11+44.11
ELEV=31.83 IP&CAP SET
-L- 16+47.91 (17.59' LT)
-T1-102 POT 7+06.46

WOODS

WOODS

SOIL DR

GRAVEL DR

S 10° 43' 26.8" E

15+00

20+00

S-1 S-2

EB1-A OS

EB2-A

B1-A

EB1-A

B2-B

DOT-PRELIM

-L-

-L-

BRIDGE #46

EB1-B

EB2-B

S 9° 20' 34.6" W

WOODS

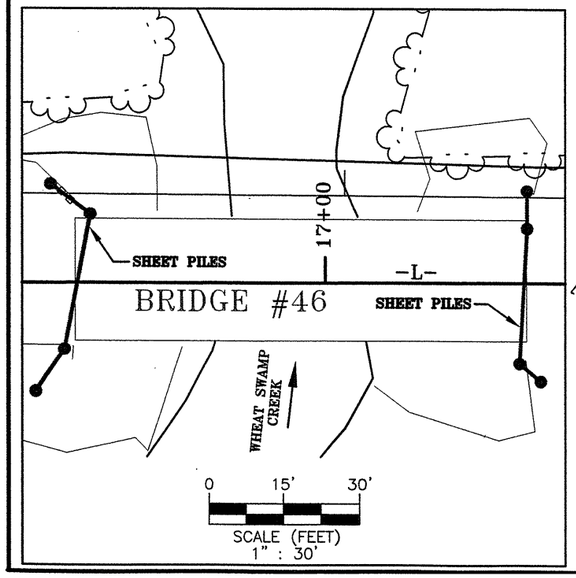
S 86° 51' 30.0" W

WOODS

-T1-103 POT 8+17.98
ELEV=27.13 IP SET
-L- 16+74.34 (90.75' RT)

1SFD
ABANDONED
& UNINHABITABLE

-T1-104 POT 9+36.00
ELEV=27.70 IP SET
-L- 15+57.34 (106.17' RT)



0 25' 50' 100'
SCALE (FEET)
1" : 50'

NAD 83

SKEW=90°

BORING LOCATION PLAN
BRIDGE NO. 46 OVER WHEAT SWAMP CREEK ON SR 1091
NCDOT PROJECT NO. 33478.1.1(B-4125)
F.A. No. BRZ-1091(1)
GREENE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 12/21/05
01/12/06	DFT CHECK: S.J.C.	JOB : 6468-05-1241
01/31/06	ENG CHECK: W.B.D.	DWG: 3

16+50 | 17+00 | 17+50

EB1 | B1 | B2 | EB2

EB1–A OS
16+41 –L–
18 ft LT
ELEV. 31.8 ft

EB1–A
16+44 –L–
16 ft LT
ELEV. 31.6 ft

B1–A
16+86 –L–
10 ft LT
ELEV. 19.5 ft

B2–B
17+06 –L–
6 ft RT
ELEV. 18.3 ft

EB2–A
17+51 –L–
18 ft LT
ELEV. 32.6 ft

RIP–RAP ON EMBANKMENT SLOPE

RIP–RAP ON EMBANKMENT SLOPE

GROUND SURFACE

GROUND SURFACE

EXISTING TIMBER RETAINING WALL

EXISTING TIMBER RETAINING WALL

WATER SURFACE ELEV. 21.3ft MSL 11/20/05

MUDLINE

TOP OF YORKTOWN FORMATION

TOP OF YORKTOWN FORMATION

11/20/05

11/18/05

11/21/05

BT

BT

BT

BT

ELEVATION (FEET)

40 30 20 10 0 –10 –20 –30 –40

(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, DRY TO SATURATED, RED, GRAY, BROWN AND TAN, CLAYEY, SILTY, FINE TO COARSE SAND AND GRAVEL (A–1–b/A–2–4); AND MEDIUM STIFF, MOIST TO SATURATED, TAN, FINE TO COARSE SANDY SILT (A–4) WITH TRACE ORGANICS, CEMENTED SHELLS AND A SURFICIAL LAYER OF RIP–RAP ON SLOPES TO THE CREEK

(B) ALLUVIUM: VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, GRAY, GREEN, RED, BROWN AND TAN, CLAYEY, SILTY, FINE TO COARSE SAND (A–3/A–2–4), TRACE TO MODERATELY ORGANIC

(C) YORKTOWN FORMATION: LOOSE TO VERY DENSE, MOIST TO SATURATED, GREEN–, BROWN–, DARK–GRAY, TO GRAY, GLAUCONITIC, CLAYEY, SILTY, FINE TO COARSE SAND (A–3/A–2–4) WITH TRACE TO LITTLE SHELL FRAGMENTS, TRACE LIGNITE AND CLAY LENSES; AND STIFF TO VERY STIFF, WET, GREEN–GRAY AND GRAY, CLAYEY, FINE TO COARSE SANDY SILT (A–4)

(D) YORKTOWN FORMATION: GRAY, THINLY TO THICKLY BEDDED, FRIABLE TO EXTREMELY INDURATED, FOSSILIFEROUS SANDSTONE

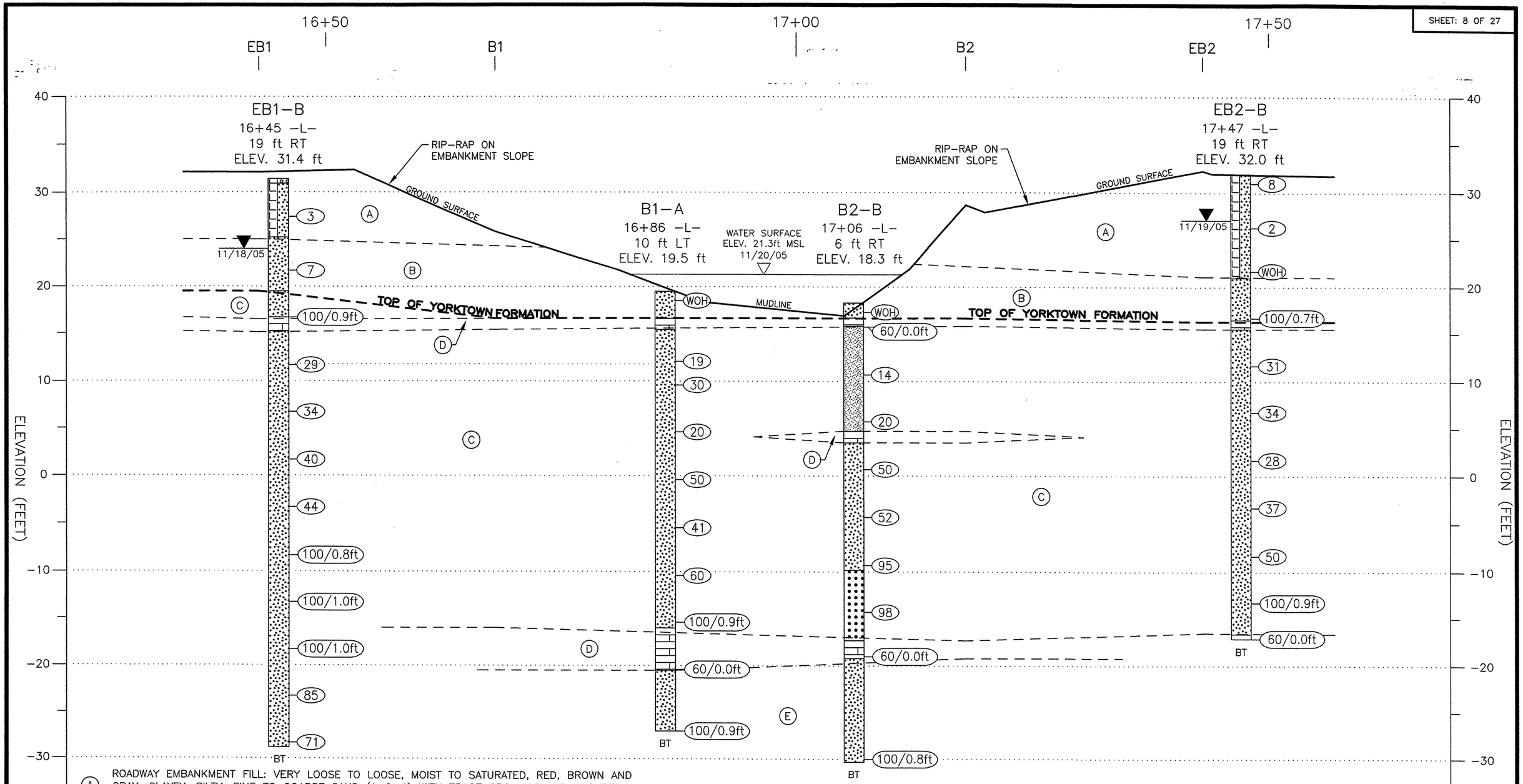
(E) YORKTOWN FORMATION: VERY DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A–2–4) WITH TRACE SHELL FRAGMENTS AND TRACE LIGNITE

0 5' 10' 20'
SCALE IN FEET
1"=10'

PROFILE 15 ft LT OF –L–
BRIDGE NO. 46 OVER WHEAT SWAMP CREEK ON SR 1091
NCDOT PROJECT NO. 33478.1.1(B–4125)
F.A. No. BRZ–1091(1)
GREENE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 12/21/05
01/12/06	DFT CHECK: W.B.D.	JOB: 6468–05–1241
01/31/06	ENG CHECK: S.J.C.	DWG: 4



(A) ROADWAY EMBANKMENT FILL: VERY LOOSE TO LOOSE, MOIST TO SATURATED, RED, BROWN AND GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A–2–4) WITH TRACE ORGANICS AND A SURFICIAL LAYER OF RIP–RAP ON SLOPES TO THE CREEK

(B) ALLUVIUM: VERY LOOSE TO LOOSE, SATURATED, BROWN, RED AND GRAY, SILTY, FINE TO COARSE SAND (A–2–4), LITTLE TO MODERATELY ORGANIC

(C) YORKTOWN FORMATION: MEDIUM TO VERY DENSE, MOIST TO SATURATED, GREEN–, DARK–GRAY, TO GRAY, GLAUCONITIC, CLAYEY, SILTY, FINE TO COARSE SAND (A–3/A–2–4) WITH TRACE TO LITTLE SHELL FRAGMENTS, TRACE LIGNITE; AND STIFF TO VERY STIFF, WET, GREEN–GRAY AND GRAY, AND CLAYEY, FINE TO COARSE SANDY SILT (A–4)

(D) YORKTOWN FORMATION: GRAY, THINLY TO THICKLY BEDDED, FRIABLE TO EXTREMELY INDURATED, FOSSILIFEROUS SANDSTONE

(E) YORKTOWN FORMATION: VERY DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A–2–4) WITH TRACE SHELL FRAGMENTS AND TRACE LIGNITE

0 5' 10' 20'
SCALE IN FEET
1"=10'

PROFILE 11 ft RT OF –L–
BRIDGE NO. 46 OVER WHEAT SWAMP CREEK ON SR 1091
NCDOT PROJECT NO. 33478.1.1(B–4125)
F.A. No. BRZ–1091(1)
GREENE COUNTY, NORTH CAROLINA

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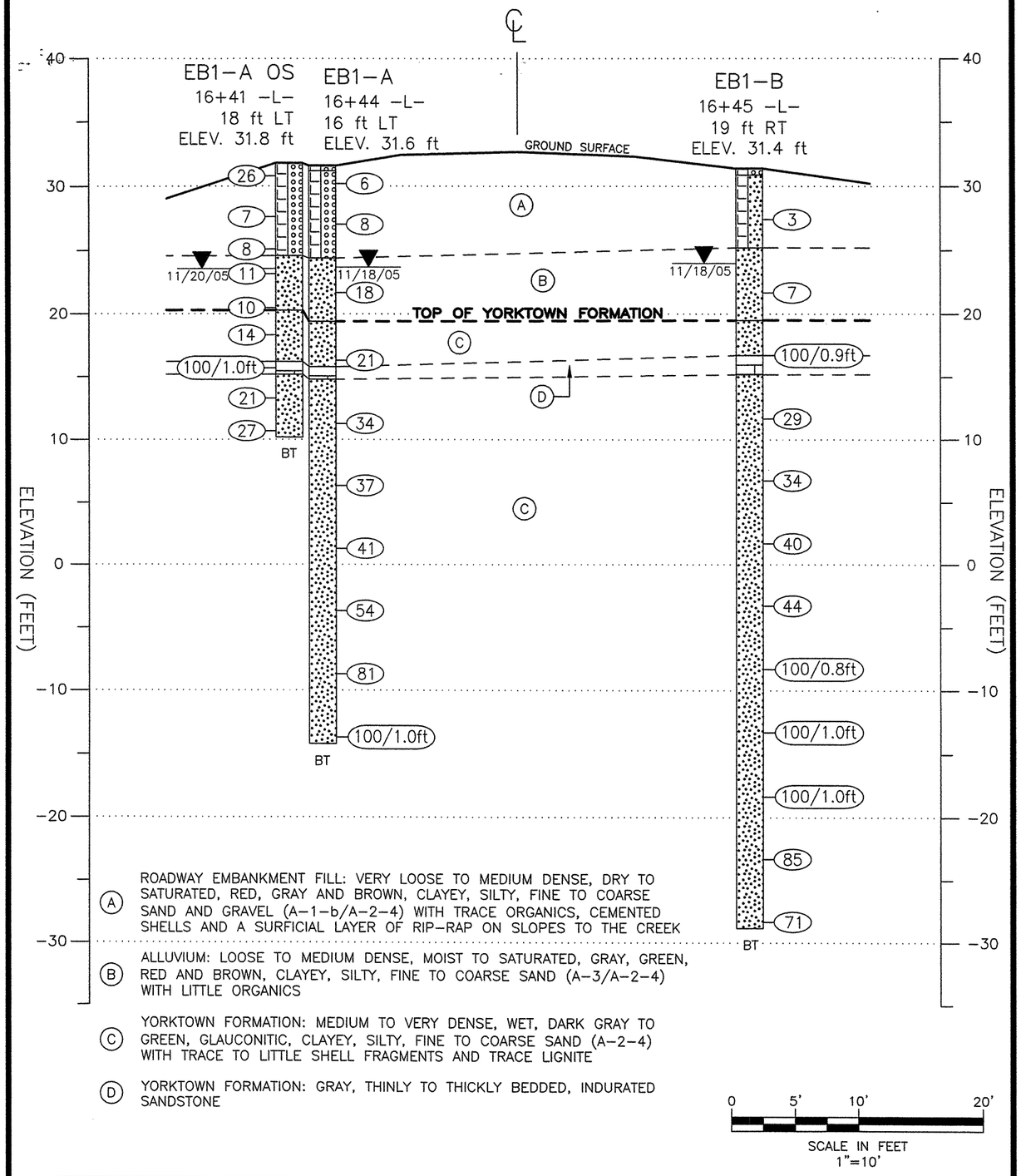

(A) ROADWAY EMBANKMENT FILL: VERY LOOSE TO MEDIUM DENSE, DRY TO SATURATED, RED, GRAY AND BROWN, CLAYEY, SILTY, FINE TO COARSE SAND AND GRAVEL (A-1-b/A-2-4) WITH TRACE ORGANICS, CEMENTED SHELLS AND A SURFICIAL LAYER OF RIP-RAP ON SLOPES TO THE CREEK

(B) ALLUVIUM: LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, GRAY, GREEN, RED AND BROWN, CLAYEY, SILTY, FINE TO COARSE SAND (A-3/A-2-4) WITH LITTLE ORGANICS

(C) YORKTOWN FORMATION: MEDIUM TO VERY DENSE, WET, DARK GRAY TO GREEN, GLAUCONITIC, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE TO LITTLE SHELL FRAGMENTS AND TRACE LIGNITE

(D) YORKTOWN FORMATION: GRAY, THINLY TO THICKLY BEDDED, INDURATED SANDSTONE

0 5' 10' 20'

SCALE IN FEET
1"=10'

CROSS SECTION ALONG END BENT 1
BRIDGE NO. 46 OVER WHEAT SWAMP CREEK ON SR 1091
NCDOT PROJECT NO. 33478.1.1(B-4125)
F.A. No. BRZ-1091(1)
GREENE COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

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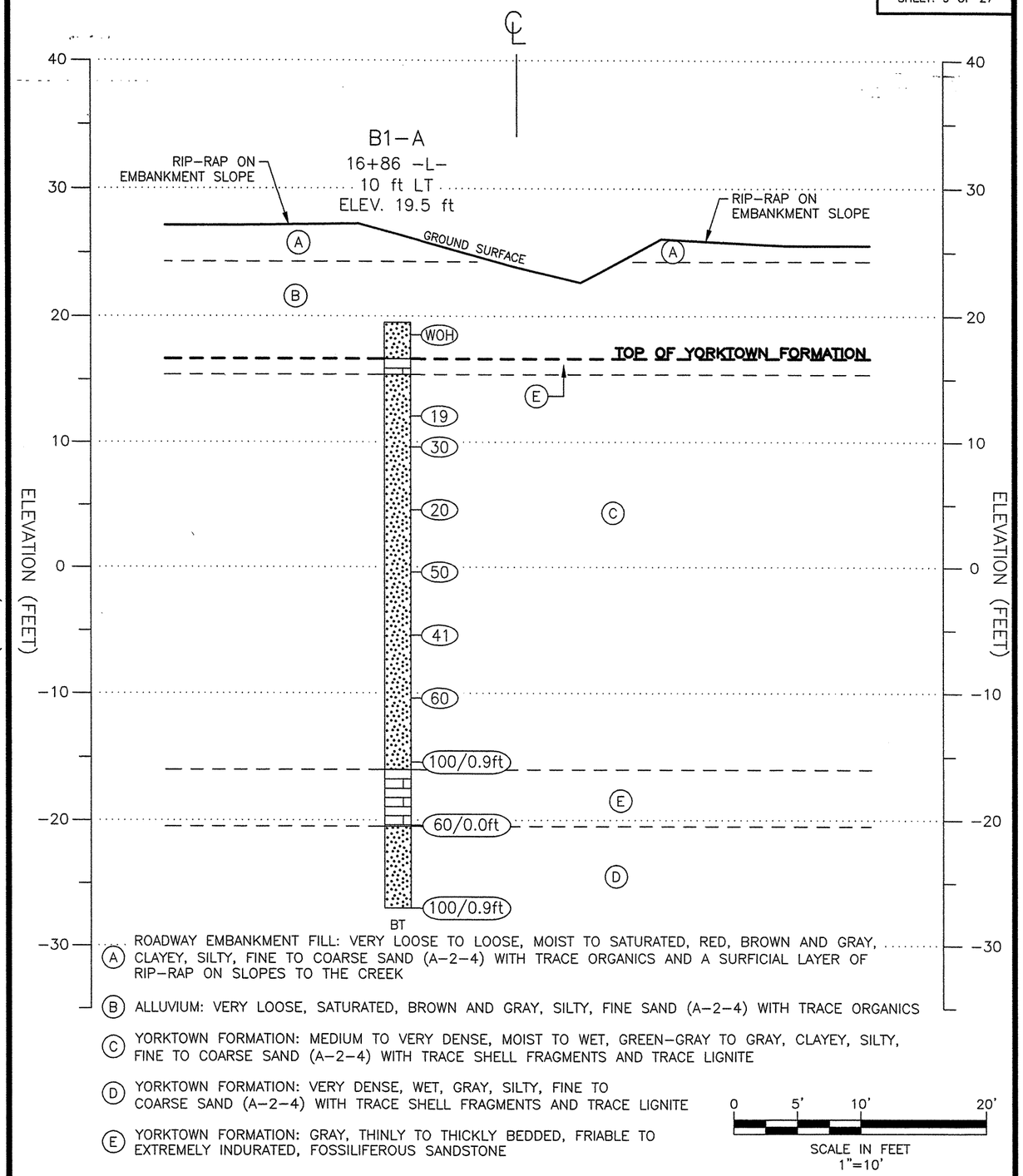

(A) ROADWAY EMBANKMENT FILL: VERY LOOSE TO LOOSE, MOIST TO SATURATED, RED, BROWN AND GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE ORGANICS AND A SURFICIAL LAYER OF RIP-RAP ON SLOPES TO THE CREEK

(B) ALLUVIUM: VERY LOOSE, SATURATED, BROWN AND GRAY, SILTY, FINE SAND (A-2-4) WITH TRACE ORGANICS

(C) YORKTOWN FORMATION: MEDIUM TO VERY DENSE, MOIST TO WET, GREEN-GRAY TO GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE SHELL FRAGMENTS AND TRACE LIGNITE

(D) YORKTOWN FORMATION: VERY DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE SHELL FRAGMENTS AND TRACE LIGNITE

(E) YORKTOWN FORMATION: GRAY, THINLY TO THICKLY BEDDED, FRIABLE TO EXTREMELY INDURATED, FOSSILIFEROUS SANDSTONE

0 5' 10' 20'

SCALE IN FEET
1"=10'

CROSS SECTION ALONG BENT 1
BRIDGE NO. 46 OVER WHEAT SWAMP CREEK ON SR 1091
NCDOT PROJECT NO. 33478.1.1(B-4125)
F.A. No. BRZ-1091(1)
GREENE COUNTY, NORTH CAROLINA

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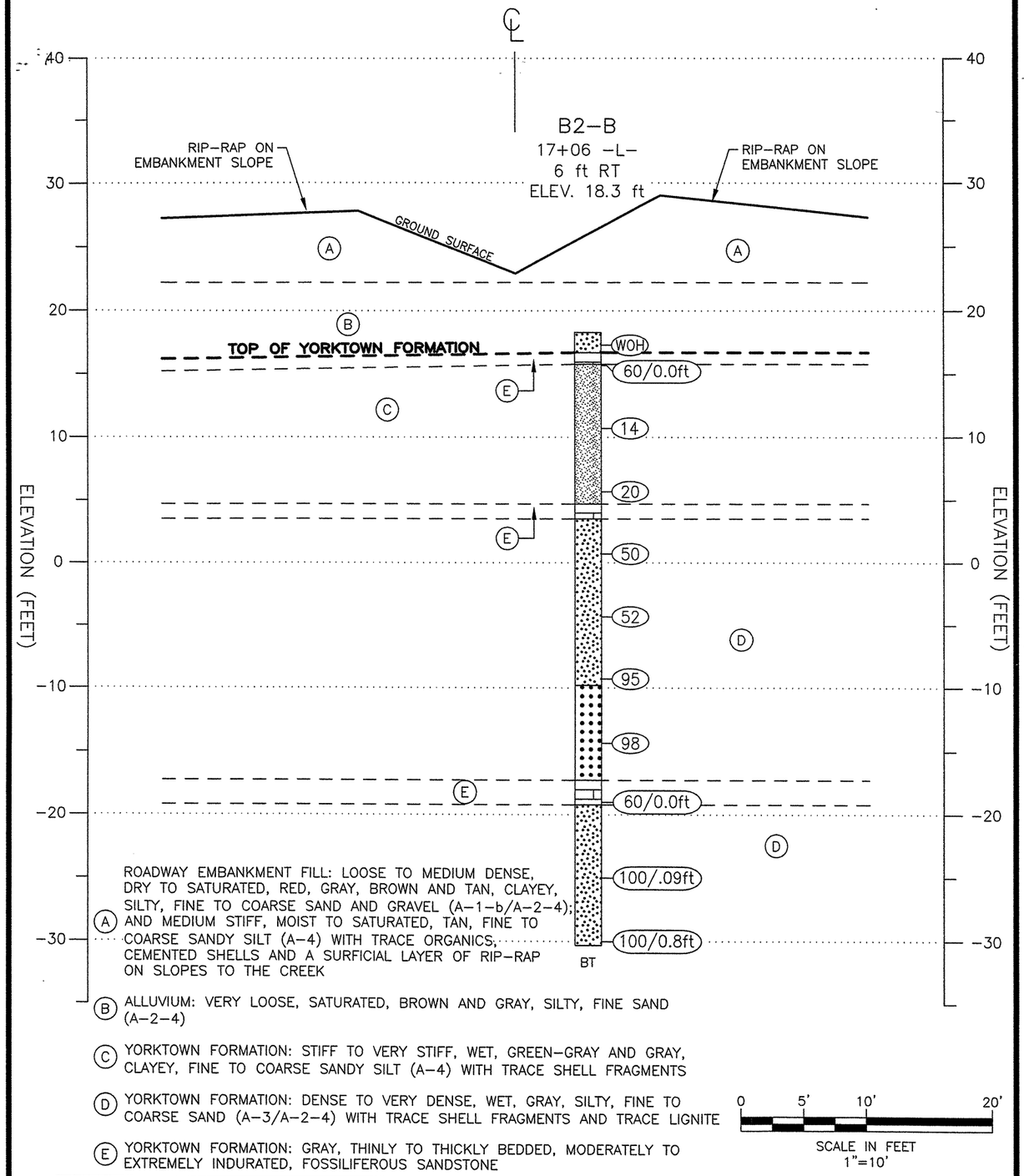

(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, DRY TO SATURATED, RED, GRAY, BROWN AND TAN, CLAYEY, SILTY, FINE TO COARSE SAND AND GRAVEL (A–1–b/A–2–4); AND MEDIUM STIFF, MOIST TO SATURATED, TAN, FINE TO COARSE SANDY SILT (A–4) WITH TRACE ORGANICS, CEMENTED SHELLS AND A SURFICIAL LAYER OF RIP–RAP ON SLOPES TO THE CREEK

(B) ALLUVIUM: VERY LOOSE, SATURATED, BROWN AND GRAY, SILTY, FINE SAND (A–2–4)

(C) YORKTOWN FORMATION: STIFF TO VERY STIFF, WET, GREEN–GRAY AND GRAY, CLAYEY, FINE TO COARSE SANDY SILT (A–4) WITH TRACE SHELL FRAGMENTS

(D) YORKTOWN FORMATION: DENSE TO VERY DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A–3/A–2–4) WITH TRACE SHELL FRAGMENTS AND TRACE LIGNITE

(E) YORKTOWN FORMATION: GRAY, THINLY TO THICKLY BEDDED, MODERATELY TO EXTREMELY INDURATED, FOSSILIFEROUS SANDSTONE

0 5' 10' 20'

SCALE IN FEET
1"=10'

CROSS SECTION ALONG BENT 2
BRIDGE NO. 46 OVER WHEAT SWAMP CREEK ON SR 1091
NCDOT PROJECT NO. 33478.1.1(B–4125)
F.A. No. BRZ–1091(1)
GREENE COUNTY, NORTH CAROLINA

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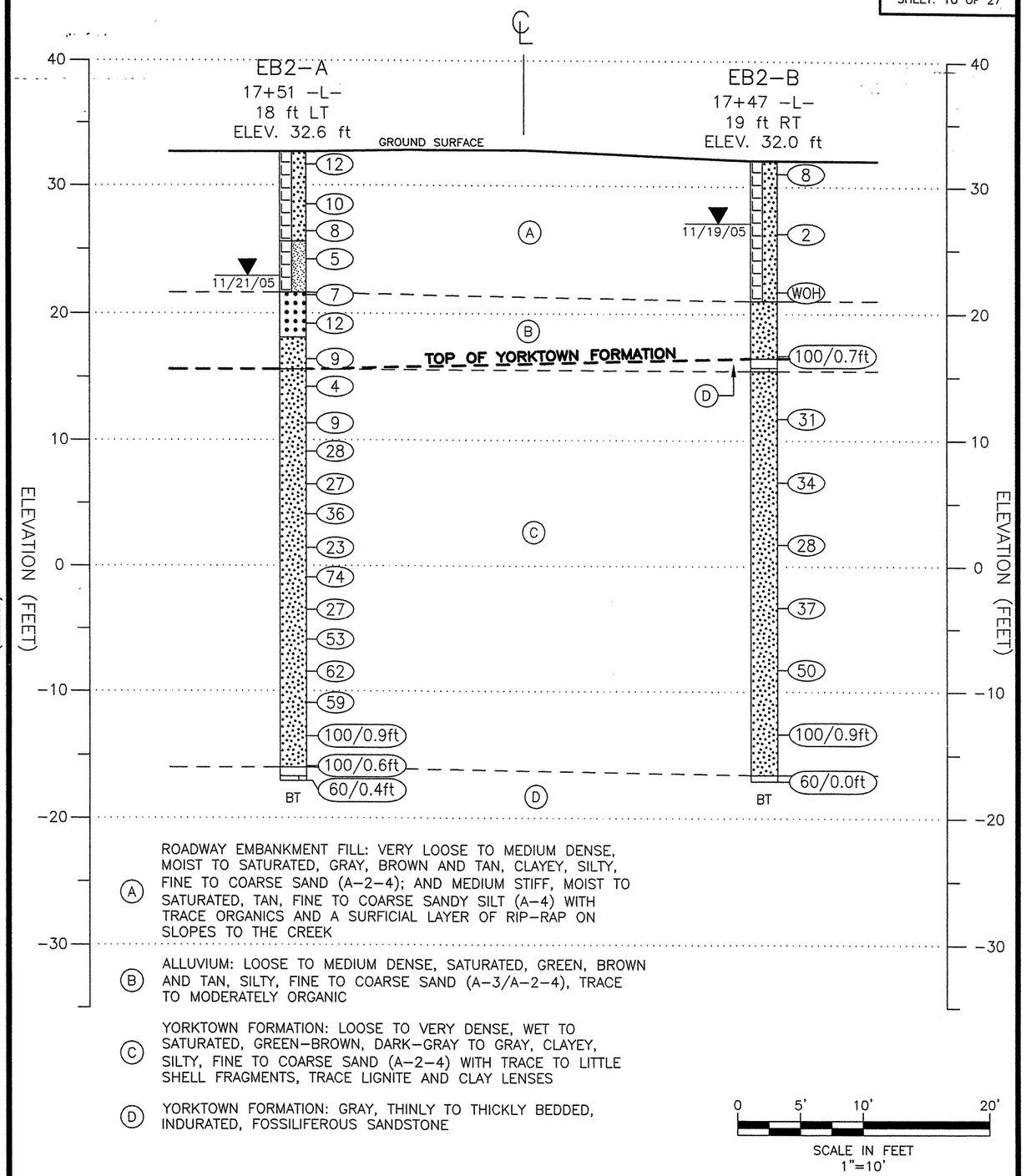

(A) ROADWAY EMBANKMENT FILL: VERY LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, GRAY, BROWN AND TAN, CLAYEY, SILTY, FINE TO COARSE SAND (A–2–4); AND MEDIUM STIFF, MOIST TO SATURATED, TAN, FINE TO COARSE SANDY SILT (A–4) WITH TRACE ORGANICS AND A SURFICIAL LAYER OF RIP–RAP ON SLOPES TO THE CREEK

(B) ALLUVIUM: LOOSE TO MEDIUM DENSE, SATURATED, GREEN, BROWN AND TAN, SILTY, FINE TO COARSE SAND (A–3/A–2–4), TRACE TO MODERATELY ORGANIC

(C) YORKTOWN FORMATION: LOOSE TO VERY DENSE, WET TO SATURATED, GREEN–BROWN, DARK–GRAY TO GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A–2–4) WITH TRACE TO LITTLE SHELL FRAGMENTS, TRACE LIGNITE AND CLAY LENSES

(D) YORKTOWN FORMATION: GRAY, THINLY TO THICKLY BEDDED, INDURATED, FOSSILIFEROUS SANDSTONE

0 5' 10' 20'

SCALE IN FEET
1"=10'

CROSS SECTION ALONG END BENT 2
BRIDGE NO. 46 OVER WHEAT SWAMP CREEK ON SR 1091
NCDOT PROJECT NO. 33478.1.1(B–4125)
F.A. No. BRZ–1091(1)
GREENE COUNTY, NORTH CAROLINA

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01/31/06	ENG CHECK: S.J.C.	DWG: 9

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** W. Grimes
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)			**GROUND WATER (ft)**
BORING NO. EB1-A OS	**BORING LOCATION** 16+41	**OFFSET** 18 ft LT	**ALIGNMENT** -L-	**0 HR.** 2.2
COLLAR ELEV. 31.8 ft	**NORTHING** 607,150 **US ft**	**EASTING** 2,429,267 **US ft**		**24 HR.** 8.2
TOTAL DEPTH 21.6 ft	**DRILL MACHINE** CME-45C trailer	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140-lb. Manual	
DATE STARTED 11/19/05	**COMPLETED** 11/19/05	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
31.8					Ground Surface				
31.8	0.0	8	17	9	26		W		Roadway Embankment Fill: Red to brown, clayey, silty, f. to cse. SAND and GRAVEL (A-1-b) w/ trace organics
28.6	3.2	7	3	4	7		M		
26.1	5.7	3	4	4	8		M		
24.2	7.6	5	6	5	11	SS-2			31.8 0.0 / 24.6 7.2
21.5	10.3	5	3	7	10		M		Alluvium: Gray and red-brown, silty, f. SAND (A-2-4)
19.3	12.5	4	6	8	14	SS-3	M		20.3 11.5
16.7	15.1	15	85/0.5'		100/1.0				Yorktown Fm: Dark gray to green, clayey, silty, f. to cse. SAND (A-2-4) w/ cemented sand layers and trace shell fragments
14.3	17.5	9	9	12	21		Sat.		16.2 15.6
11.7	20.1	9	11	16	27		W		15.2 16.6 / 10.2 21.6
									Yorktown Fm: Thinly bedded, indurated, SANDSTONE
									Yorktown Fm: Dark green to dark gray, silty, f. to cse. SAND (A-2-4) w/ trace shell fragments, lignite, and clay lenses
									Boring terminated at 21.6 ft (Elev. 10.2 ft) in Yorktown Fm: Med. dense, silty, f. to cse. SAND (A-2-4)
									Bits Used: 3" Roller Cone
									Drilling Fluid Properties: 8.5 lbs/gal

NCDOT BORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 12/20/05

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene		**GEOLOGIST** W. Grimes
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)				**GROUND WATER (ft)**
BORING NO. EB1-A	**BORING LOCATION** 16+44	**OFFSET** 16 ft LT	**ALIGNMENT** -L-	**0 HR.** 0.0
COLLAR ELEV. 31.6 ft	**NORTHING** 607,147 **US ft**	**EASTING** 2,429,269 **US ft**		**24 HR.** 7.9
TOTAL DEPTH 45.8 ft	**DRILL MACHINE** D-50 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140-lb. Manual	
DATE STARTED 11/17/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
31.6					Ground Surface				
31.2	0.4	4	3	3	6	SS-1	D		Roadway Embankment Fill: Rip Rap
28.0	3.6	5	4	4	8		Sat.		Roadway Embankment Fill: Red, gray, and brown, clayey, silty, f. to cse. SAND and GRAVEL (A-1-b) w/ cemented shells
22.7	8.9	9	9	9	18		Sat.		31.6 0.0 / 31.2 0.4 / 24.4 7.2
17.3	14.3	8	9	12	21		W		Alluvium: Gray and brown, clayey, silty, f. SAND (A-2-4)
12.3	19.3	12	16	18	34		W		19.4 12.2
7.3	24.3	12	16	21	37		W		Yorktown Fm: Dark gray, silty, clayey, f. SAND (A-2-4) w/ little shell fragments
2.3	29.3	10	18	23	41		W		15.8 15.8 / 14.8 16.8
-2.7	34.3	30	26	28	54		W		Yorktown Fm: Thinly bedded, indurated, SANDSTONE (Not sampled - Indicated by drilling)
-7.7	39.3	26	28	53	81		W		Yorktown Fm: Dark gray to green, glauconitic, clayey, silty, f. to cse. SAND (A-2-4) w/ trace to little shell fragments and lignite
-12.7	44.3	26	47	53/0.5'	100/1.0		W		-14.2 45.8
									Boring terminated at 45.8 ft (Elev. -14.2 ft) in Yorktown Fm: V. dense, clayey, silty, f. to cse. SAND (A-2-4)
									Bits Used: 3" Roller Cone
									Drilling Fluid Properties: 8.6 lbs/gal

NCDOT BORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 12/20/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

/2

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** W. Grimes
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)			**GROUND WATER (ft)**
BORING NO. EB1-B	**BORING LOCATION** 16+45	**OFFSET** 19 ft RT	**ALIGNMENT** -L- — **0 HR.** 0.0
COLLAR ELEV. 31.4 ft	**NORTHING** 607,113 **US ft**	**EASTING** 2,429,268 **US ft**	**24 HR.** 7.4
TOTAL DEPTH 60.2 ft	**DRILL MACHINE** D-50 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140-lb. Manual
DATE STARTED 11/17/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
31.4					Ground Surface		▽		
30.9	0.5								Roadway Embankment Fill: Rip Rap
28.4	3.0								Roadway Embankment Fill: Brown and red, silty, f. to cse. SAND (A-2-4)
		5	2	1	3		M		
25.2	6.2								Alluvium: Brown and red, silty, f. SAND (A-2-4) w/ little organics
22.7	8.7	3	4	3	7		Sat.		
19.5	11.9								Yorktown Fm: Dark gray, clayey, f. SAND (A-2-4) w/ shell fragments
17.7	13.7	9	14	86/0.4'	100/0.9		W		
16.7	14.7								Yorktown Fm: Thinly bedded, indurated, SANDSTONE
15.2	16.2								Yorktown Fm: Dark gray to green, glauconitic, clayey, silty, f. to cse. SAND (A-2-4) w/ trace to little shell fragments
12.7	18.7	8	14	15	29		W		
7.7	23.7	12	16	18	34	SS-4	W		
2.7	28.7	7	17	23	40		W		
-2.3	33.7	20	20	24	44		W		
-7.3	38.7	25	48	52/0.3'	100/0.8		W		
-12.3	43.7	41	59/0.5'		100/1.0		W		
-17.3	48.7	39	61/0.5'		100/1.6		W		
-22.3	53.7	25	43	42	85		W		
-27.3	58.7	37	33	38	71	SS-5	W		
-28.8	60.2								Boring terminated at 60.2 ft (Elev. -28.8 ft) in Yorktown Fm: V. dense, silty, f. to cse. SAND (A-2-4)

Bits Used: 3" Roller Cone

Drilling Fluid Properties: 8.5 lbs/gal

NCDOT BORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 12/20/05

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** W. Grimes/B. Deobald
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)			**GROUND WATER (ft)**
BORING NO. B1-A	**BORING LOCATION** 16+86	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 19.5 ft	**NORTHING** 607,138 **US ft**	**EASTING** 2,429,311 **US ft**		**24 HR.** Boring
TOTAL DEPTH 46.5 ft	**DRILL MACHINE** D-50 ATV	**DRILL METHOD** Mud Rotary/Core	**HAMMER TYPE** 140-lb. Manual
DATE STARTED 11/19/05	**COMPLETED** 11/20/05	**SURFACE WATER DEPTH** 1.8	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
19.5					Mudline				
19.5	0.0	WOH	WOH	WOH	WOH		Sat.		Alluvium: Brown and gray, silty, f. SAND (A-2-4) w/ trace organics
16.6	2.9								
15.4	4.1								Yorktown Fm: Gray, thinly bedded, indurated, fossiliferous, SANDSTONE
13.1	6.4	6	9	10	19		W		Yorktown Fm: Green-gray and gray, clayey, silty, f. to cse. SAND (A-2-4) w/ trace shell fragments and lignite
10.6	8.9	14	15	15	30		W		
5.6	13.9	8	9	11	20		W		
0.6	18.9	7	17	33	50		W		
-4.4	23.9	9	16	25	41		W		
-9.4	28.9	15	20	40	60		M		
-14.4	33.9	33	67/0.4'		100/0.9		M		
-16.0	35.5								Yorktown Fm: Gray, thickly bedded, friable to extremely indurated, fossiliferous, SANDSTONE w/ lignite
-19.4	38.9	60/0.0'			60/0.0				
-20.5	40.0								Yorktown Fm: Gray, silty, f. to cse. SAND (A-2-4) w/ trace shell fragments and lignite
-26.1	45.6	60	40/0.4'		100/0.9		W		
-27.0	46.5								Boring terminated at 46.5 ft (Elev. -27.0 ft) in Yorktown Fm: V. dense, silty, f. to cse. SAND (A-2-4) w/ trace shells and lignite

Bits Used: 3" Roller Cone; HQ Surface Set Core Bit

Drilling Fluid Properties: 8.8 lbs/gal

Loss of drilling fluids drilling from 34.8 to 38.9 ft (~30 Gallons)

NCDOT BORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 12/20/05

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

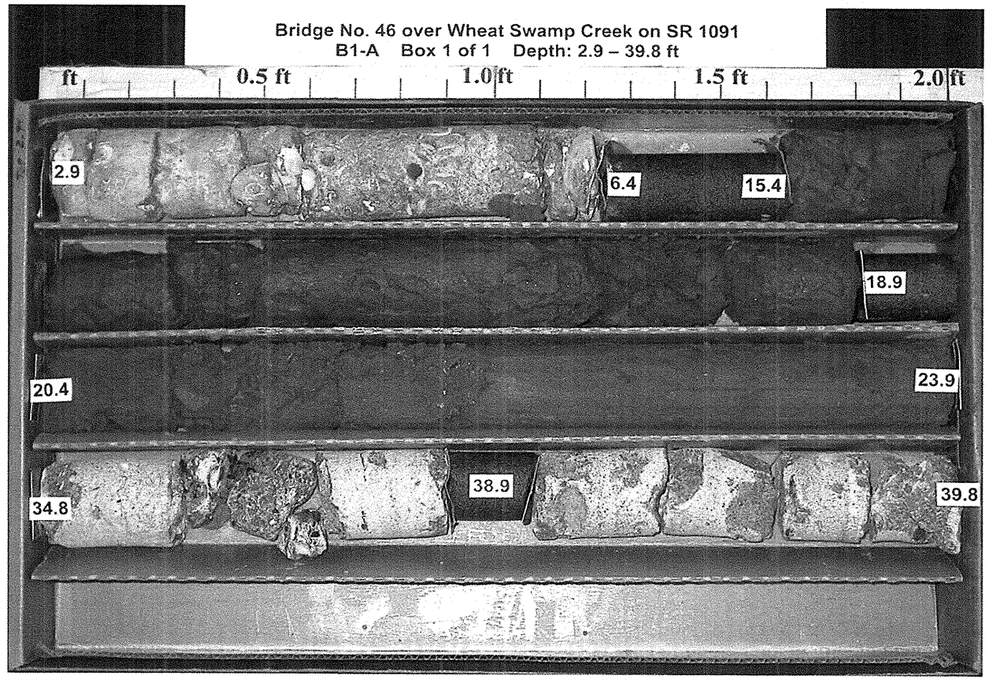
13

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** W. Grimes/B. Deobald
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)			**GROUND WATER (ft)**
BORING NO. B1-A	**BORING LOCATION** 16+86	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 19.5 ft	**NORTHING** 607,138 **US ft**	**EASTING** 2,429,311 **US ft**		**24 HR.** Boring
TOTAL DEPTH 46.5 ft	**DRILL MACHINE** D-50 ATV	**DRILL METHOD** Mud Rotary/Core	**HAMMER TYPE** 140-lb. Manual
DATE STARTED 11/19/05	**COMPLETED** 11/20/05	**SURFACE WATER DEPTH** 1.8	
CORE SIZE HQ	**TOTAL RUN** 27.0 ft	**DRILLER** T. Hahn	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 2.9 ft
16.6	2.9	3.5	1:45 0:40 0:40 0:20/0.5 N=19	(1.2) 34%	(N/A)		(1.2) 100% (4.1) 19%	(N/A) (N/A)		16.6 2.9 Yorktown Fm: Gray, thinly bedded, indurated, fossiliferous, SANDSTONE 15.4 4.1 Yorktown Fm: Green-gray and gray, clayey, silty, f. to cse. SAND (A-2-4) w/ trace shell fragments and lignite
13.1	6.4									
11.6	7.9	1.0	0:35 N=30	(0.0) 0%	(N/A)					
10.6	8.9									
9.1	10.4	3.5	0:35 0:15 0:15 0:15/0.5 N=20	(0.0) 0%	(N/A)					
5.6	13.9									
4.1	15.4	3.5	1:40 0:50 0:50 0:20/0.5 N=50	(2.1) 60%	(N/A)					
0.6	18.9									
-0.9	20.4	3.5	0:25 0:25 0:30 0:11/0.5 N=41	(2.0) 57%	(N/A)					
-4.4	23.9									
-5.9	25.4	3.5	0:40 0:25 0:20 0:12/0.5 N=60	(0.0) 0%	(N/A)					
-9.4	28.9									
-10.9	30.4	3.5	0:18 0:14 0:14 0:10/0.5 N=100/0.9'	(0.0) 0%	(N/A)					
-14.4	33.9									
-15.3	34.8	4.1	1:00 6:00 0:55 4:00 0:05/0.1 N=60/0.0' 7:30/0.9	(0.9) 22%	(N/A)		(1.8) 42%	(N/A)		16.0 Yorktown Fm: Gray, thickly bedded, friable to extremely indurated, fossiliferous, SANDSTONE w/ lignite 20.3 Coring terminated at 39.8 ft (Elev. -20.3 ft) in Yorktown Fm: Thickly bedded, extremely indurated, fossiliferous, SANDSTONE w/ lignite Due to technical difficulties coring, the remainder of the boring was drilled by roller cone
-19.4	38.9									
-20.3	39.8	0.9		(0.9) 100%	(N/A)					

NCDOT CORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 12/20/05


Bridge No. 46 over Wheat Swamp Creek on SR 1091
B1-A Box 1 of 1 Depth: 2.9 – 39.8 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
2.9
6.4
15.4
18.9
20.4
23.9
34.8
38.9
39.8

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** B. Deobald
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)			**GROUND WATER (ft)**
BORING NO. B2-B	**BORING LOCATION** 17+06	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 18.3 ft	**NORTHING** 607,121 **US ft**	**EASTING** 2,429,332 **US ft**		**24 HR.** Boring
TOTAL DEPTH 48.6 ft	**DRILL MACHINE** CME-45C trailer/D-50	**DRILL METHOD** Mud Rotary/Core	**HAMMER TYPE** 140-lb. Manual	
DATE STARTED 11/17/05	**COMPLETED** 11/19/05	**SURFACE WATER DEPTH** 2.8		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
18.3					Mudline				
18.3 / 16.7	0.0 / 1.6	WOH	WOH	WOH	WOH		Sat.		Alluvium: Brown and gray, silty, f. SAND (A-2-4) 18.3 / 0.0 / 16.7 / 1.6
		60/0.0'			60/0.0'				Yorktown Fm: Gray, thinly bedded, indurated, SANDSTONE w/ some shell fragments 15.8 / 2.5
11.7	6.6								Yorktown Fm: Green-gray and gray, clayey, f. to cse. sandy SILT (A-4) w/ trace shell fragments 11.7 / 6.6
		12	6	8	14		W		
6.7	11.6								
		7	8	12	20	SS-6	W		4.7 / 13.6
1.7	16.6								Yorktown Fm: Gray, thinly bedded, friable to mod. indurated, SANDSTONE 3.5 / 14.8
		15	20	30	50		W		Yorktown Fm: Gray, silty, f. to cse. SAND (A-2-4) w/ trace shell fragments and lignite
-3.3	21.6								
		5	20	32	52	SS-7	W		
-8.3	26.6								
		8	45	50	95		W		-9.8 / 28.1
-13.3	31.6								Yorktown Fm: Gray, silty, f. to cse. SAND (A-3) w/ trace shell fragments and lignite
		42	45	53	98	SS-8	W		
-19.0	37.3								-17.3 / 35.6
		60/0.0'			60/0.0				-19.2 / 37.5
-24.0	42.3								Yorktown Fm: Gray, thickly bedded, indurated to extremely indurated, fossiliferous, SANDSTONE
		40	60/0.4'		100/0.9	SS-9	W		Yorktown Fm: Gray, silty, f. to cse. SAND (A-2-4) w/ trace shell fragments and lignite
-29.0	47.3								
		28	45	55/0.3'	100/0.8		W		-30.3 / 48.6
									Boring terminated at 48.6 ft (Elev. -30.3 ft) in Yorktown Fm: V. dense, silty, f. to cse. SAND (A-2-4) w/ trace shells and lignite

Bits Used: HQ Surface Set Core Bit

Drilling Fluid Properties: 8.5-9.0 lbs/gal

NCDOT BORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 1/30/06

MACTEC

N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

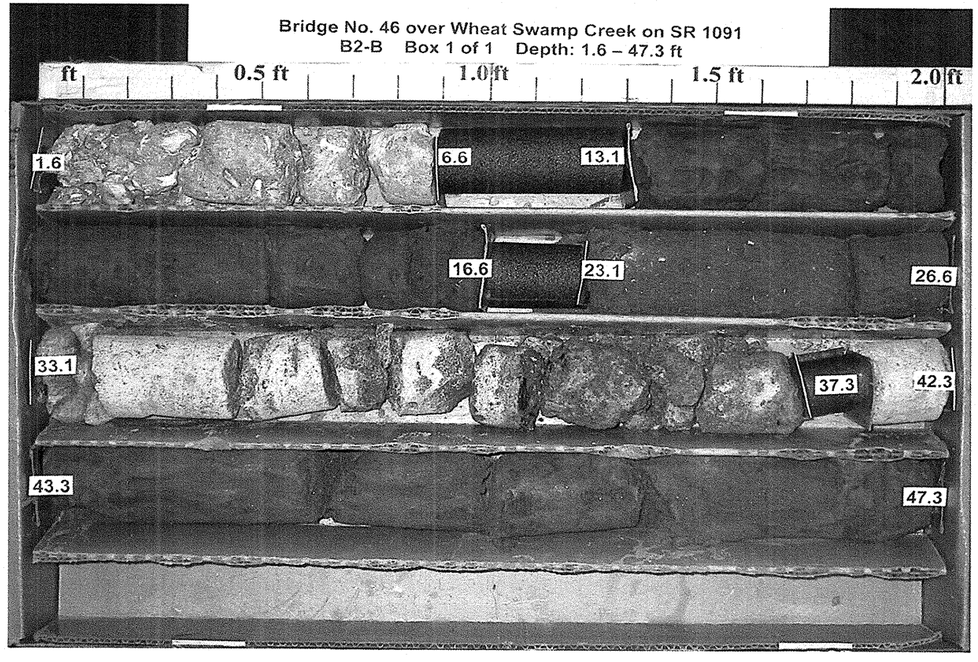
15

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** B. Deobald	
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)				**GROUND WATER (ft)**
BORING NO. B2-B	**BORING LOCATION** 17+06	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 18.3 ft	**NORTHING** 607,121 **US ft**	**EASTING** 2,429,332 **US ft**		**24 HR.** Boring
TOTAL DEPTH 48.6 ft	**DRILL MACHINE** CME-45C trailer/D-50	**DRILL METHOD** Mud Rotary/Core	**HAMMER TYPE** 140-lb. Manual	
DATE STARTED 11/17/05	**COMPLETED** 11/19/05	**SURFACE WATER DEPTH** 2.8		
CORE SIZE HQ	**TOTAL RUN** 35.7 ft	**DRILLER** T. Hahn		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 1.6 ft
16.7	1.6	5.0	N=60/0.0' 1:30 0:45 0:35 0:40 1:40	(0.9) 18%	(N/A)		(0.9) 100% (0.5) 6%	(N/A) (N/A)		15.8 / 2.5 Yorktown Fm: Gray, thinly bedded, indurated, SANDSTONE w/ some shell fragments
11.7	6.6		N=14							Yorktown Fm: Green-gray and gray, clayey, f. to cse. sandy SILT (A-4) w/ trace shell fragments
10.2	8.1	3.5	0:45 1:40 1:55 1:05/0.5	(0.0) 0%	(N/A)					
6.7	11.6		N=20			SS-6				
5.2	13.1	3.5	0:45 1:40 1:35 0:33/0.5	(1.7) 49%	(N/A)		(1.2) 100% (0.8) 9%	(N/A) (N/A)		4.7 / 13.6 / 3.5 / 14.8 Yorktown Fm: Gray, thinly bedded, friable to mod. indurated, SANDSTONE; Yorktown Fm: Gray, silty, f. to cse. SAND (A-2-4) w/ trace shell fragments and lignite
1.7	16.6		N=50							
0.2	18.1	3.5	0:25 0:54 1:15 0:40/0.5	(0.0) 0%	(N/A)					
-3.3	21.6		N=52			SS-7				
-4.8	23.1	3.5	0:20 0:30 0:30 0:22/0.5	(0.8) 23%	(N/A)					
-8.3	26.6		N=95							
-9.8	28.1	3.5	0:10 0:15 0:25 0:20/0.5	(0.0) 0%	(N/A)		(0.0) 0%	(N/A)		-9.8 / 28.1 Yorktown Fm: Gray, silty, f. to cse. SAND (A-3) w/ trace shell fragments and lignite
-13.3	31.6		N=98			SS-8				
-14.8	33.1	4.2	0:15 0:10 3:50 4:00 1:30/0.2	(1.7) 40%	(N/A)					-17.3 / 35.6
-19.0	37.3						(1.9) 100%	(N/A)		Yorktown Fm: Gray, thickly bedded, indurated to extremely indurated, fossiliferous, SANDSTONE
		5.0	N=60/0.0' 0:38 0:10 0:10 0:10 0:10	(0.2) 4%	(N/A)		(2.0) 23%	(N/A)		-19.2 / 37.5 Yorktown Fm: Gray, silty, f. to cse. SAND (A-2-4) w/ trace shell fragments and lignite
-24.0	42.3					SS-9				
-25.0	43.3	4.0	N=100/0.9' 0:17 0:15 0:11 0:15	(2.0) 50%	(N/A)					-29.0 / 47.3 Coring terminated at 47.3 ft (Elev. -29.0 ft) in Yorktown Fm: V. dense, silty, f. to cse. SAND (A-2-4) w/ trace shells and lignite
-29.0	47.3									

NCDOT CORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 12/20/05


Bridge No. 46 over Wheat Swamp Creek on SR 1091
B2-B Box 1 of 1 Depth: 1.6 – 47.3 ft
ft
0.5 ft
1.0 ft
1.5 ft
2.0 ft
1.6
6.6
13.1
16.6
23.1
26.6
33.1
37.3
42.3
43.3
47.3

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** W. Grimes/B. Deobald
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)			**GROUND WATER (ft)**
BORING NO. EB2-A	**BORING LOCATION** 17+51	**OFFSET** 18 ft LT	**ALIGNMENT** -L-	**0 HR.** 4.5
COLLAR ELEV. 32.6 ft	**NORTHING** 607,142 **US ft**	**EASTING** 2,429,377 **US ft**		**24 HR.** 9.7
TOTAL DEPTH 49.7 ft	**DRILL MACHINE** CME-45C trailer	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140-lb. Manual	
DATE STARTED 11/19/05	**COMPLETED** 11/20/05	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
32.6					Ground Surface				
32.6	0.0	6	6	6	12		M		Roadway Embankment Fill: Tan, silty, f. to cse. SAND (A-2-4)
29.5	3.1	3	3	7	10		M		
27.4	5.2	2	4	4	8		M		
25.2	7.4	2	2	3	5	SS-10	M		Roadway Embankment Fill: Tan, f. to cse. sandy SILT (A-4)
22.4	10.2	3	3	4	7		Sat.		Alluvium: Green, silty, f. SAND (A-3)
20.2	12.4	4	5	7	12	SS-11	Sat.		
17.4	15.2	4	4	5	9	SS-12	Sat.		Alluvium: Tan, silty, f. to cse. SAND (A-2-4)
15.2	17.4	3	2	2	4		Sat.		Yorktown Fm: Green, brown-green, dark gray to gray, clayey, silty, f. to cse. SAND (A-2-4) w/ trace to little shell fragments, trace clay lenses, and trace lignite
12.3	20.3	3	4	5	9		Sat.		
10.1	22.5	7	11	17	28		Sat.		
7.5	25.1	8	12	15	27		Sat.		
5.1	27.5	11	17	19	36		Sat.		
2.4	30.2	6	9	14	23		W		
0.1	32.5	7	26	48	74		W		
-2.5	35.1	9	12	15	27		W		
-4.9	37.5	11	22	31	53		W		
-7.5	40.1	9	16	46	62		W		
-9.9	42.5	15	30	29	59		W		
-12.5	45.1	19	45	55/0.4'	100/0.9		Sat.		
-14.9	47.5	7	56	44/0.1'	100/0.6		W		
-16.7	49.3	60/0.4"			60/0.4				
								-16.0	48.6
								-17.1	Yorktown Fm: Gray, thinly bedded, indurated, fossiliferous, SANDSTONE 49.7

Boring terminated at SPT refusal at 49.7 ft (Elev. -17.1 ft) in Yorktown Fm: Thinly bedded, indurated, fossiliferous, SANDSTONE

Bits Used: 3" Roller Cone

Drilling Fluid Properties: 8.5 lbs/gal

NCDOT BORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 12/20/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

17

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** W. Grimes	
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091 (MACTEC Proj. No. 6468-05-1241)				**GROUND WATER (ft)**
BORING NO. EB2-B	**BORING LOCATION** 17+47	**OFFSET** 19 ft RT	**ALIGNMENT** -L-	**0 HR.** 3.4
COLLAR ELEV. 32.0 ft	**NORTHING** 607,105 **US ft**	**EASTING** 2,429,370 **US ft**		**24 HR.** 4.9
TOTAL DEPTH 49.1 ft	**DRILL MACHINE** D-50 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140-lb. Manual	
DATE STARTED 11/18/05	**COMPLETED** 11/18/05	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
32.0					Ground Surface				
32.0	0.0	4	4	4	8		M		Roadway Embankment Fill: Brown and gray, clayey, silty, f. to cse. SAND (A-2-4) w/ trace organics
27.3	4.7	2	1	1	2		M		
22.7	9.3	1	WOH	WOH	WOH 0		Sat.		Alluvium: Light brown, silty, f. to cse. SAND (A-2-4) w/ little to mod. wood fragments
17.7	14.3	4	2	98/0.2'	100/9.7		Sat.		
12.7	19.3	10	15	16	31		W		Yorktown Fm: Thinly bedded, indurated, SANDSTONE
7.7	24.3	12	16	18	34		Sat.		Yorktown Fm: Dark-gray to green, clayey, silty, f. to cse. SAND (A-2-4) w/ trace to little shell fragments and lignite
2.7	29.3	8	11	17	28		W		
-2.3	34.3	11	16	21	37		W		
-7.3	39.3	13	23	27	50		W		
-12.3	44.3	24	54	46/0.4'	100/0.9		W		
-17.1	49.1	60/0.0'			60/0.0				
								-16.6	48.6
								-17.1	Yorktown Fm: Thinly bedded, indurated, SANDSTONE 49.1

Boring terminated at SPT refusal at 49.1 ft (Elev. -17.1 ft) in Yorktown Fm: Thinly bedded, indurated, fossiliferous, SANDSTONE

Bits Used: 3" Roller Cone

Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 12/20/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

18

SHEET 1 OF 1

PROJECT NO. 33478.1.1	**ID.** B-4125	**COUNTY** Greene	**GEOLOGIST** F.M.W.
SITE DESCRIPTION Bridge No. 46 Over Wheat Swamp Creek on SR 1091			**GROUND WATER (ft)**
BORING NO. NCDOT Prelim	**BORING LOCATION** 17+60	**OFFSET** 15 ft LT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV.	**NORTHING** 607,138 **US ft**	**EASTING** 2,429,385 **US ft**		**24 HR.** 10.2
TOTAL DEPTH 60.1 ft	**DRILL MACHINE** CME-45B	**DRILL METHOD** Rotary Mud	**HAMMER TYPE** Auto	
DATE STARTED 7/17/02	**COMPLETED** 7/17/02	**SURFACE WATER DEPTH** N/A		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
					Ground Surface				0.0
	0.0	2	2	5	7				Roadway Embankment Fill: Tan, fine to coarse SAND (A-2-4) - moist to saturated
	4.0	4	3	3	6				
	8.6	2	2	2	4		▼		
	13.6	3	2	3	5				
	18.6	2	1	1	2				17.0
	23.6	6	12	13	25				Alluvium: Greenish-brown, phosphatic, silty, fine to coarse SAND (A-2-4) - saturated
	28.6	4	5	8	13				22.0
	33.6	20	25	20	45				Gray, phosphatic, slightly clayey, silty, fine to coarse SAND (A-2-4) with shells and lignite - saturated
	38.6	7	11	17	28				
	43.6	14	17	23	40				
	48.6	60/0.1'			60/0.1'				47.6
	53.6	20	25	41	66				Harder drilling from 47.6 to 50.2 ft
	58.6	27	32	32	64				50.2
									Gray, micaceous, silty, fine to coarse SAND (A-2-4) with thin rock layers
									60.1
									Boring Terminated at 60.1 ft.
									Note: Boring collar elevation not provided

NCDOT BORE SINGLE BRIDGE 46.GPJ NC_DOT.GDT 1/30/06

MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.

3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME AND NUMBER: BRIDGE N0. 46 OVER WHEAT SWAMP CREEK ON SR 1091 (6468-05-1241)

PROJECT: 33478.1.1 (B-4125) **COUNTY:** Greene **OWNER:** N.C.D.O.T.

DATE SAMPLED: November, 2005 **RECEIVED:** 11/28/2005 **REPORTED BY:** MACTEC

SAMPLED FROM: EB1-A, B2-B

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Retained 4.75 mm Sieve	(%)	17.5	0.0	0.0	0.0	0.0	0.0
Passing 2.00 mm Sieve	(%)	72.3	100.0	100.0	100.0	100.0	100.0
Passing 425 µm Sieve	(%)	44.4	97.8	90.0	95.2	98.7	98.3
Passing 75 µm Sieve	(%)	17.4	17.3	31.6	14.9	21.2	37.8

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	53.3	17.1	32.4	35.2	1.8	16.0
Fine Sand Ret - 53 µm	(%)	25.0	68.9	39.3	50.8	82.8	49.0
Silt 0.05 - 0.005 mm	(%)	8.4	4.1	7.4	4.6	7.0	13.6
Clay < 0.005 mm	(%)	13.3	9.9	20.9	9.4	8.4	21.4

Moisture Content	(%)	ND	ND	ND	ND	ND	ND
Liquid Limit, L.L.		18	21	29	21	27	31
Plasticity Index, P.I.		NP	NP	NP	NP	NP	NP
AASHTO Classification		A-1-b	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-4(0)
Organic Content	(%)	ND	ND	ND	ND	ND	ND

Boring No.		EB1-A	EB1-A 0S	EB1-A 0S	EB1-B	EB1-B	B2-B
Station		16+44	16+41	16+41	16+45	16+45	17+06
Offset		16 LT	18 LT	18 LT	19 RT	19 RT	6 RT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	0.4'	7.6'	12.5'	23.7'	58.7'	11.6'
	to	1.9'	9.1'	14.0'	25.2'	60.2'	13.1'

REMARKS: ND=Not Determined, NP=Non-Plastic

Submitted by: DZUNG NGUYEN

MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.

3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME AND NUMBER: BRIDGE N0. 46 OVER WHEAT SWAMP CREEK ON SR 1091 (6468-05-1241)

PROJECT: 33478.1.1 (B-4125) **COUNTY:** Greene **OWNER:** N.C.D.O.T.

DATE SAMPLED: November, 2005 **RECEIVED:** 11/28/2005 **REPORTED BY:** MACTEC

SAMPLED FROM: B2-B, EB2-A

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-7	SS-8	SS-9	SS-10	SS-11	SS-12
Retained 4.75 mm Sieve	(%)	0.0	0.0	0.0	0.0	0.0	0.0
Passing 2.00 mm Sieve	(%)	100.0	100.0	100.0	100.0	100.0	100.0
Passing 425 µm Sieve	(%)	78.8	70.8	83.4	99.3	98.0	98.8
Passing 75 µm Sieve	(%)	16.9	5.9	14.9	62.2	5.5	11.5

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	57.9	66.2	29.8	12.8	42.7	16.1
Fine Sand Ret - 53 µm	(%)	26.0	28.7	58.4	25.3	52.6	74.5
Silt 0.05 - 0.005 mm	(%)	2.8	0.2	4.7	55.6	0.8	2.2
Clay < 0.005 mm	(%)	13.3	4.9	7.1	6.3	3.9	7.2

Moisture Content	(%)	ND	ND	ND	ND	ND	ND
Liquid Limit, L.L.		31	33	41	23	43	23
Plasticity Index, P.I.		NP	NP	NP	NP	NP	NP
AASHTO Classification		A-2-4(0)	A-3	A-2-4(0)	A-4(0)	A-3	A-2-4(0)
Organic Content	(%)	ND	ND	ND	ND	ND	ND

Boring No.		B2-B	B2-B	B2-B	EB2-A	EB2-A	EB2-A
Station		17+06	17+06	17+06	17+51	17+51	17+51
Offset		6 RT	6 RT	6 RT	18 LT	18 LT	18 LT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	21.6'	31.6'	42.3'	7.4'	12.4'	15.2'
	to	23.1'	33.1'	43.2'	8.9'	13.9'	16.7'

REMARKS: ND=Not Determined, NP=Non-Plastic

Submitted by: DZUNG NGUYEN

MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME AND NUMBER: BRIDGE N0. 46 OVER WHEAT SWAMP CREEK ON SR 1091 (6468-05-1241)

PROJECT: 33478.1.1 (B-4125) **COUNTY:** Greene **OWNER:** N.C.D.O.T.

DATE SAMPLED: November, 2005 **RECEIVED:** 11/28/2005 **REPORTED BY:** MACTEC

SAMPLED FROM: CHANNEL BANK

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		S-1	S-2				
Retained 4.75 mm Sieve	(%)	0.2	0.1				
Passing 2.00 mm Sieve	(%)	99.2	99.8				
Passing 425 µm Sieve	(%)	97.2	98.7				
Passing 75 µm Sieve	(%)	6.4	22.1				

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	15.7	10.6				
Fine Sand Ret - 53 µm	(%)	78.6	69.9				
Silt 0.05 - 0.005 mm	(%)	1.2	5.4				
Clay < 0.005 mm	(%)	4.4	14.0				

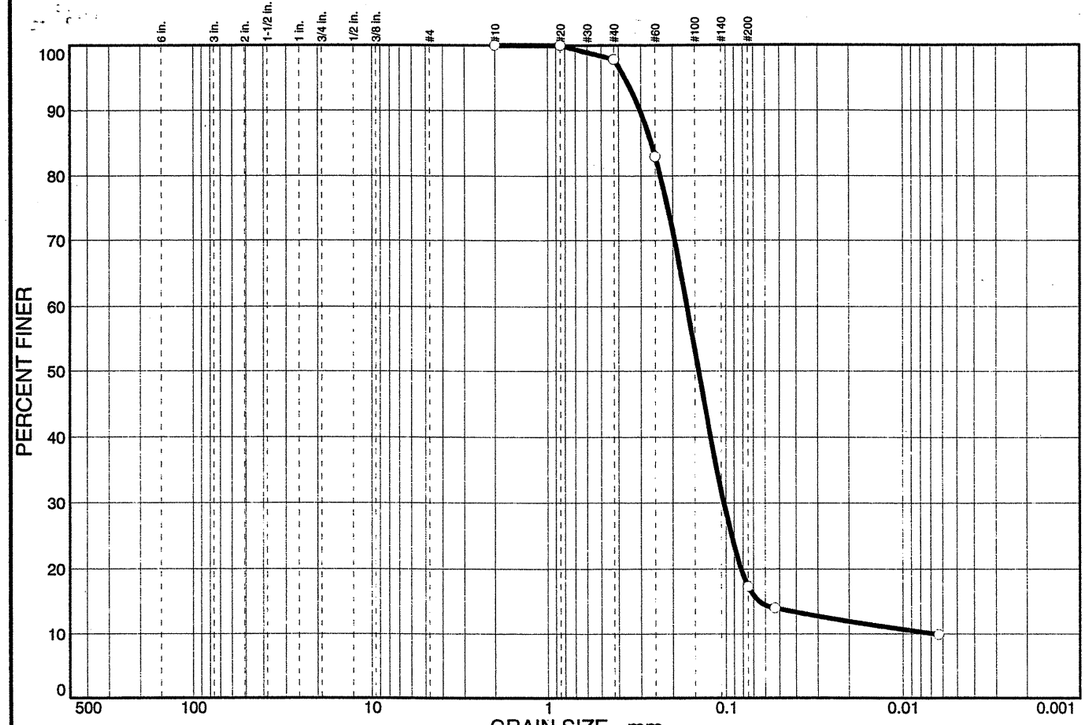
Moisture Content	(%)	ND	ND				
Liquid Limit, L.L.		24	23				
Plasticity Index, P.I.		NP	NP				
AASHTO Classification		A-3	A-2-4(0)				
Organic Content	(%)	ND	ND				

Boring No.		Channel Bank	Channel Bed				
Station		16+77	16+85				
Offset		28 LT	27 LT				
Alignment		-L-	-L-				
Depth (ft)	From	0.0'	0.0'				
	to	0.5'	0.5'				

REMARKS: ND=Not Determined, NP=Non-Plastic

Submitted by: DZUNG NGUYEN

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	86.0	14.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	97.8		
#60	82.9		
#200	17.3		
#270	14.0		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 21 PI= NP

Coefficients

D_{85}= 0.263 D_{60}= 0.167 D_{50}= 0.143
D_{30}= 0.103 D_{15}= 0.0650 D_{10}= 0.0067
C_u= 24.82 C_c= 9.49

Classification

USCS= AASHTO= A-2-4(0)

Remarks

Sample No.: SS-2 **Source of Sample:** **Date:** 12/13/2005
Location: EB1-A 05 **Elev./Depth:** 7.6' - 9.1'

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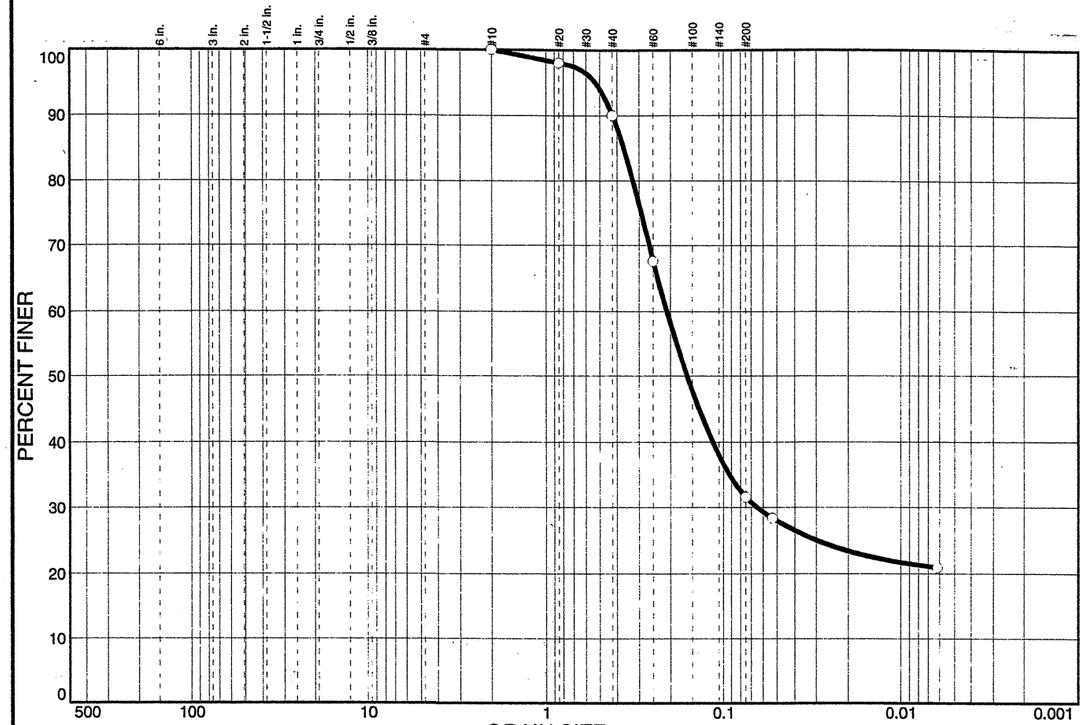
ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: Bridge Number 46 Over Wheat Swamp Creek on SR 1091
Project No: 6468-05-1241

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	71.7	28.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	98.0		
#40	90.0		
#60	67.6		
#200	31.6		
#270	28.3		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 29 PI= NP

Coefficients

D_{85}= 0.369 D_{60}= 0.210 D_{50}= 0.161
D_{30}= 0.0652 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-2-4(0)

Remarks

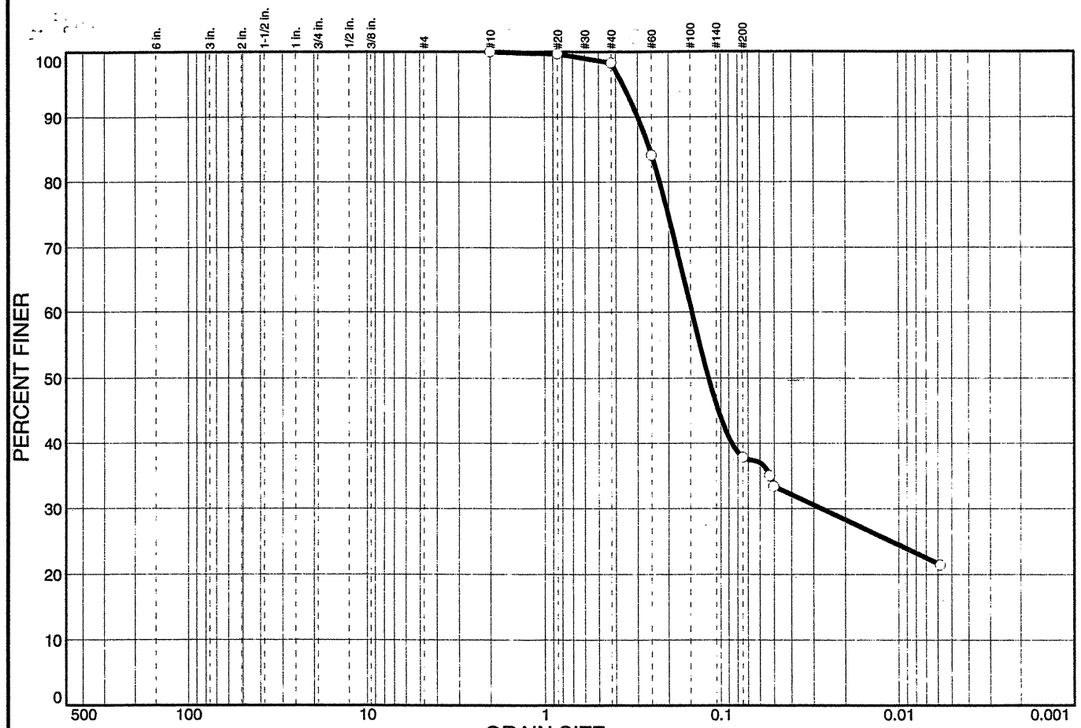
Sample No.: SS-3 **Source of Sample:** **Date:** 12/13/2005
Location: EB1-B **Elev./Depth:** 12.5' - 14.0'

MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: Bridge Number 46 Over Wheat Swamp Creek on SR 1091
Project No: 6468-05-1241

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	65.0	35.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	98.3		
#60	84.0		
#200	37.8		
#270	35.0		

Soil Description

Atterberg Limits

PL= ND LL= 31 PI= NP

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-4(0)

Remarks

* (no specification provided)

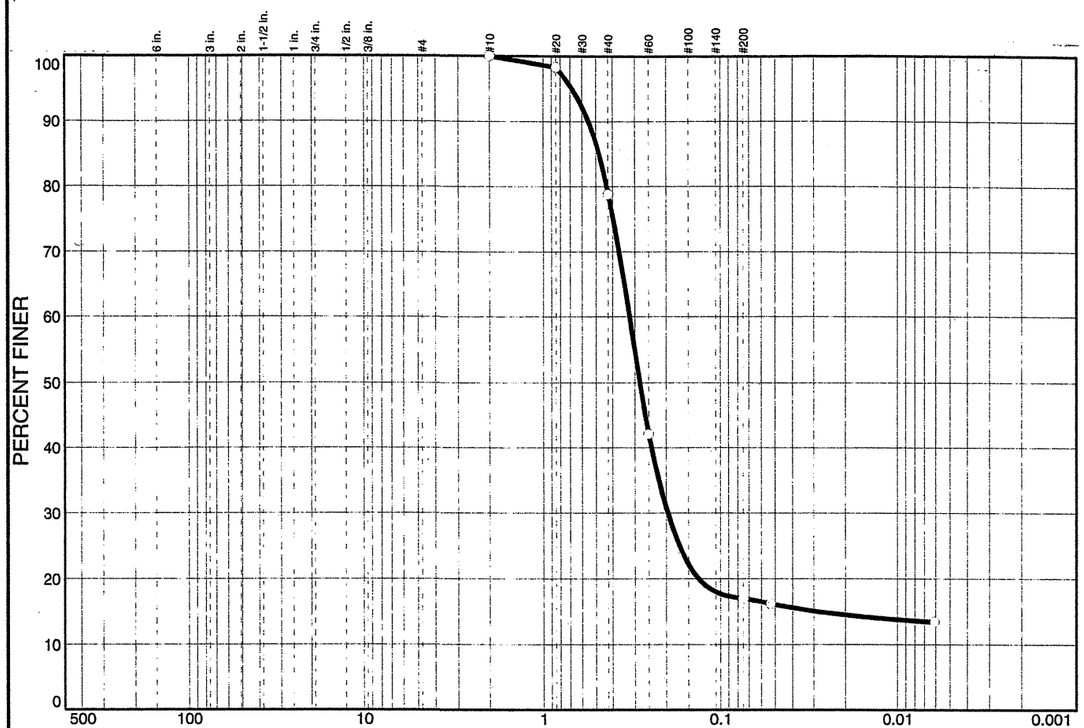
Sample No.: SS-6 **Source of Sample:** **Date:** 12/13/2005
Location: B2-B **Elev./Depth:** 11.6' - 13.1'

MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: Bridge Number 46 Over Wheat Swamp Creek on SR 1091
Project No: 6468-05-1241

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	83.9	16.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	98.3		
#40	78.8		
#60	42.1		
#200	16.9		
#270	16.1		

Soil Description

Atterberg Limits

PL= ND LL= 31 PI= NP

Coefficients

D_{85}= 0.482 D_{60}= 0.323 D_{50}= 0.281
D_{30}= 0.196 D_{15}= 0.0306 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-2-4(0)

Remarks

* (no specification provided)

Sample No.: SS-7 **Source of Sample:** **Date:** 12/13/2005
Location: B2-B **Elev./Depth:** 21.6' - 23.1'

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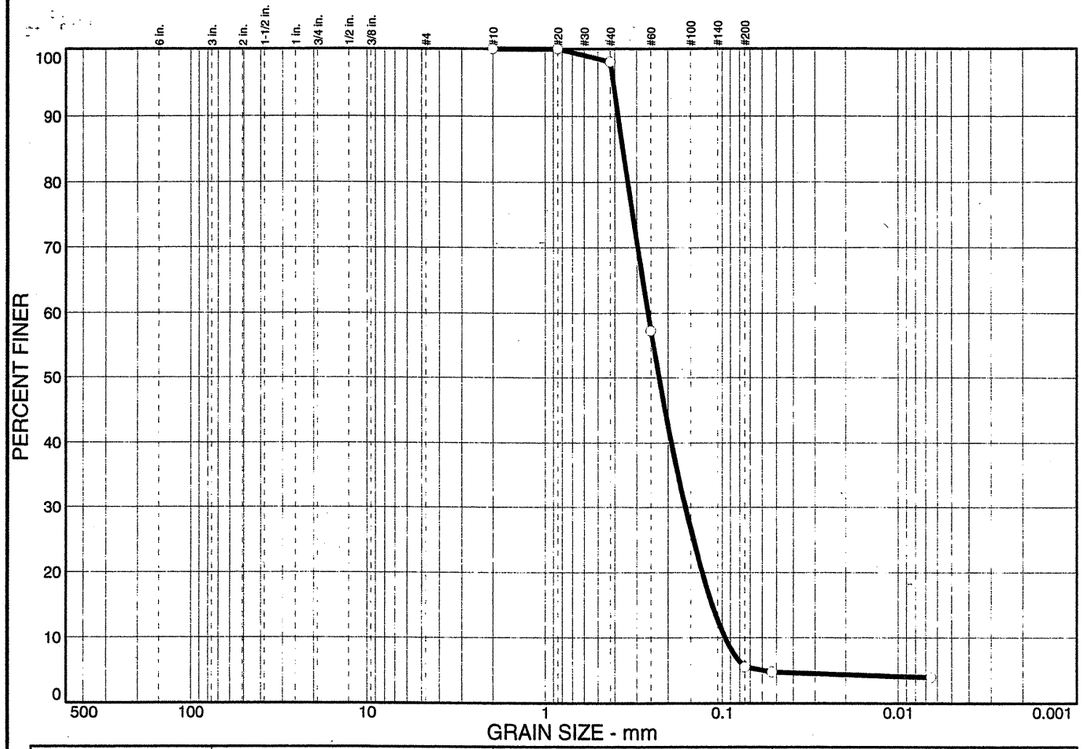
Client: NCDOT
Project: Bridge Number 46 Over Wheat Swamp Creek on SR 1091
Project No: 6468-05-1241

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	95.3	4.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	98.0		
#60	57.3		
#200	5.5		
#270	4.7		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 20 PI= NP

Coefficients

D_{85}= 0.361 D_{60}= 0.260 D_{50}= 0.225
D_{30}= 0.161 D_{15}= 0.114 D_{10}= 0.0967
C_u= 2.69 C_c= 1.03

Classification

USCS= AASHTO= A-3

Remarks

Sample No.: SS-11 **Source of Sample:** **Date:** 12/13/2005
Location: EB2-A **Elev./Depth:** 12.4' - 13.9'

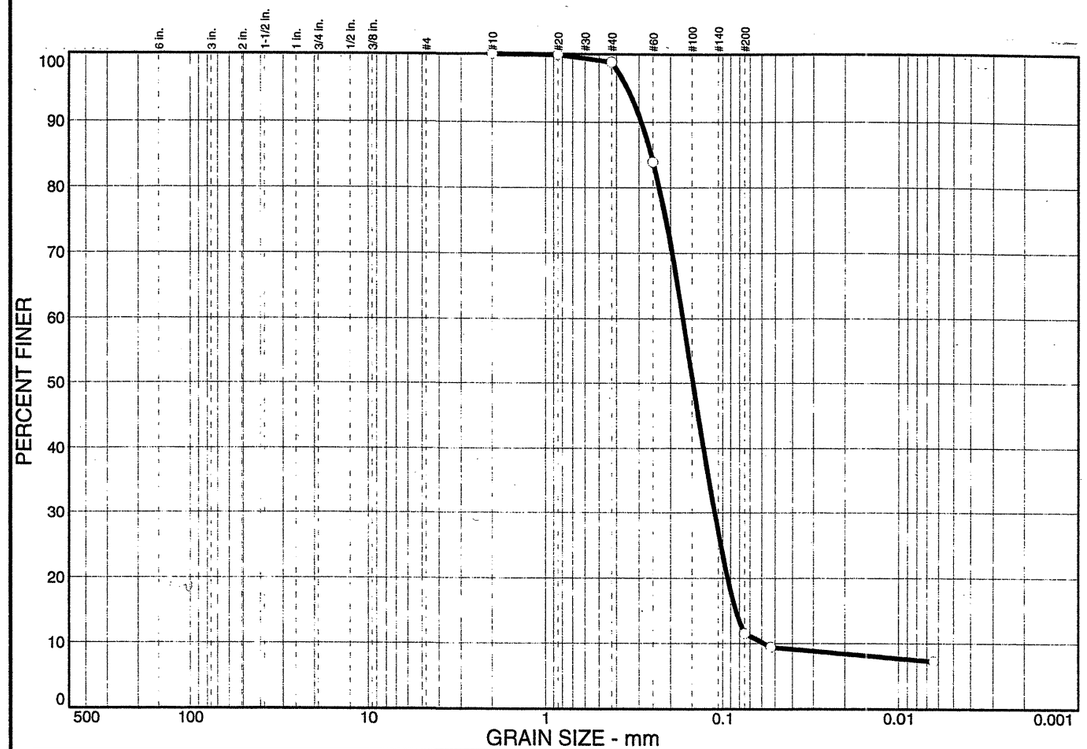
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: Bridge Number 46 Over Wheat Swamp Creek on SR 1091

Project No: 6468-05-1241

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	90.6	9.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	98.8		
#60	83.9		
#200	11.5		
#270	9.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 21 PI= NP

Coefficients

D_{85}= 0.256 D_{60}= 0.170 D_{50}= 0.148
D_{30}= 0.112 D_{15}= 0.0841 D_{10}= 0.0585
C_u= 2.91 C_c= 1.25

Classification

USCS= AASHTO= A-2-4(0)

Remarks

Sample No.: SS-12 **Source of Sample:** **Date:** 12/13/2005
Location: EB2-A **Elev./Depth:** 15.2' - 16.7'

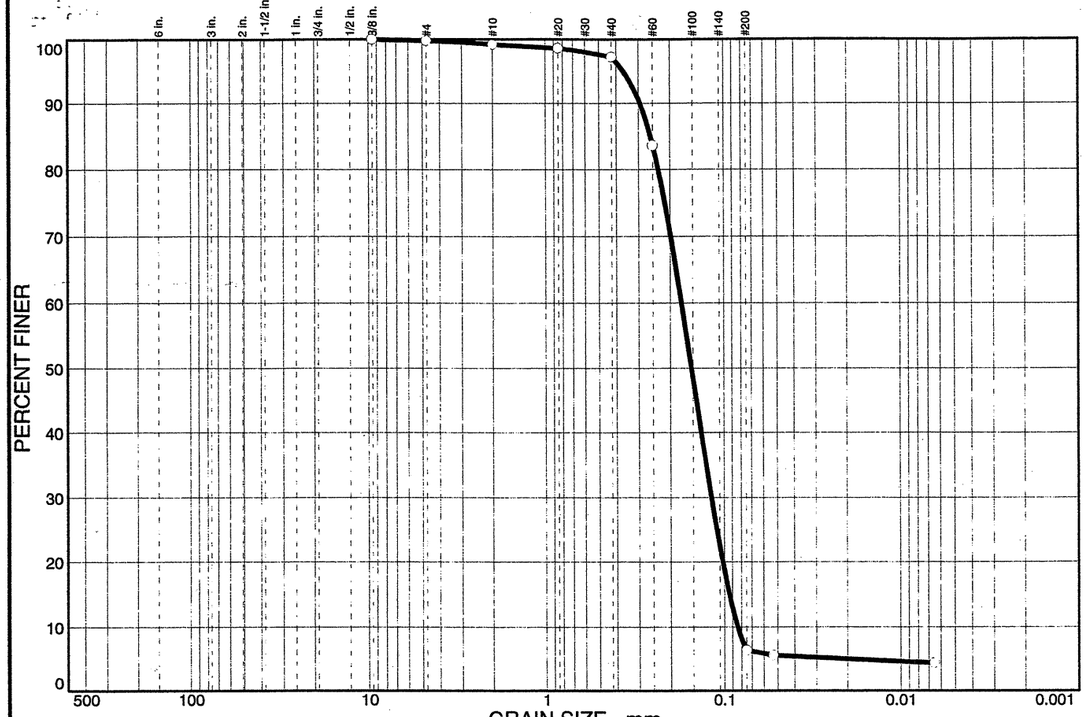
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: Bridge Number 46 Over Wheat Swamp Creek on SR 1091

Project No: 6468-05-1241

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.8	93.6	5.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.8		
#10	99.2		
#20	98.6		
#40	97.2		
#60	83.6		
#200	6.4		
#270	5.6		

Soil Description

Atterberg Limits

PL= ND LL= 24 PI= NP

Coefficients

D_{85}= 0.258 D_{60}= 0.174 D_{50}= 0.153
D_{30}= 0.119 D_{15}= 0.0939 D_{10}= 0.0843
C_u= 2.06 C_c= 0.96

Classification

USCS= AASHTO= A-3

Remarks

* (no specification provided)

Sample No.: S-1 **Source of Sample:** **Date:** 12/13/2005
Location: CHANNEL BANK **Elev./Depth:** 0.0' - 0.5'

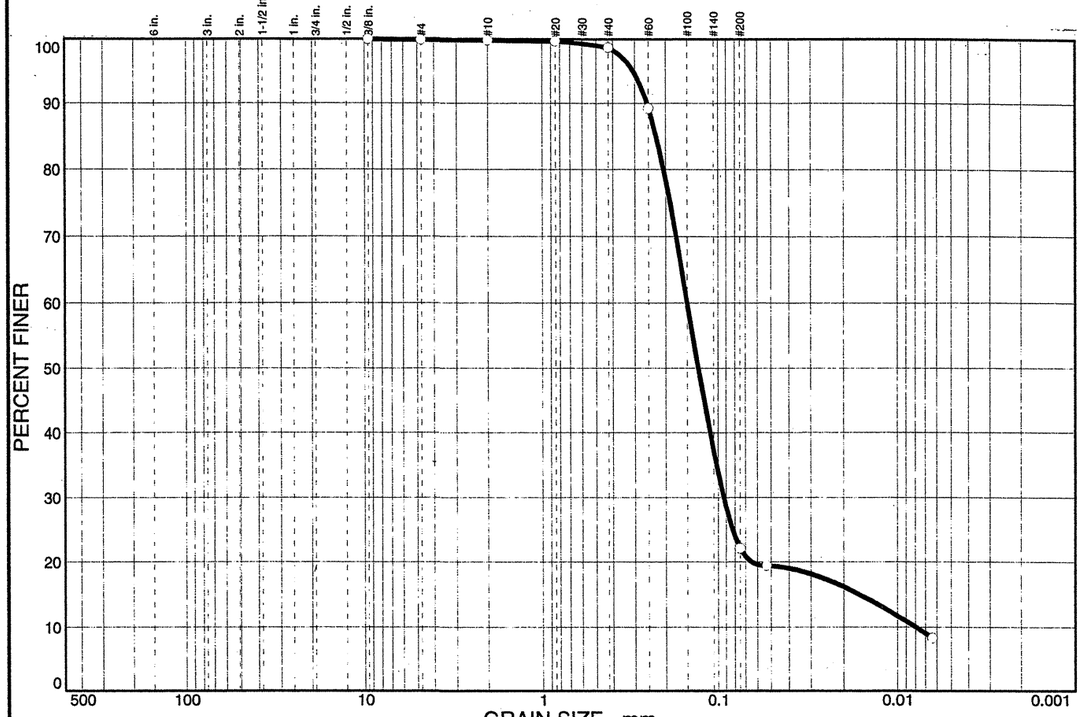
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: Bridge Number 46 Over Wheat Swamp Creek on SR 1091

Project No: 6468-05-1241

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.2	80.4	19.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in.	100.0		
#4	99.9		
#10	99.8		
#20	99.7		
#40	98.7		
#60	89.2		
#200	22.1		
#270	19.4		

Soil Description

Atterberg Limits

PL= ND LL= 23 PI= NP

Coefficients

D_{85}= 0.227 D_{60}= 0.151 D_{50}= 0.130
D_{30}= 0.0931 D_{15}= 0.0164 D_{10}= 0.0080
C_u= 18.88 C_c= 7.21

Classification

USCS= AASHTO= A-2-4(0)

Remarks

* (no specification provided)

Sample No.: S-2 **Source of Sample:** **Date:** 12/13/2005
Location: CHANNEL BED **Elev./Depth:** 0.0' - 0.5'

MACTEC

ENGINEERING & CONSULTING, INC.

Client: NCDOT
Project: Bridge Number 46 Over Wheat Swamp Creek on SR 1091

Project No: 6468-05-1241

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33478.1.1 TIP: B-4125 COUNTY: Greene

DESCRIPTION(1): Bridge No. 46 over Wheat Swamp Creek on SR 1091

EXISTING BRIDGE

Information from: Field Inspection X Microfilm ____ (reel ____ pos: ____)
Other (explain) ____

Bridge No.: 46 Length: 90 ft Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
Foundation Type: Timber piles and concrete caps, reinforced with steel "H" piles and "I" beams

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Directly under bridge from end bent 1 to bent

Interior Bents: Not Apparent

Channel Bed: Not Apparent

Channel Bank: Not Apparent

EXISTING SCOUR PROTECTION

Type(3): Sheet-piles driven below grade along end bents; Rip-rap slope protection

Extent(4): Sheet-piles extend approx. 10 ft left and right of bridge; Rip-rap doesn't extend under bridge

Effectiveness(5): Satisfactory, though some scour of bank evident from end bent 1 to bent 1

Obstructions(6): ____

INSTRUCTIONS

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

DESIGN INFORMATION

Channel Bed Material(7): Alluvium: Sand (A-2-4)

Channel Bank Material(8): Alluvium: Sand (A-3)

Channel Bank Cover(9): Small to large trees, brush and grasses

Floodplain Width(10): Approximately 300 ft

Floodplain Cover(11): Small to large trees, brush and grasses

Stream is(12): Aggrading ____ Degrading X Static ____

Channel Migration Tendency(13): Eastward; bridge crosses over eastward bend in creek channel

Observations and Other Comments: ____

Reported by: Bill Deaton **Date:** 11/21/2005
MACTEC Engineering and Consulting, Inc.

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS										
B1	B2	B3	B4							
16.6	16.7									

Comparison of GASE to Hydraulics Unit theoretical scour: ____

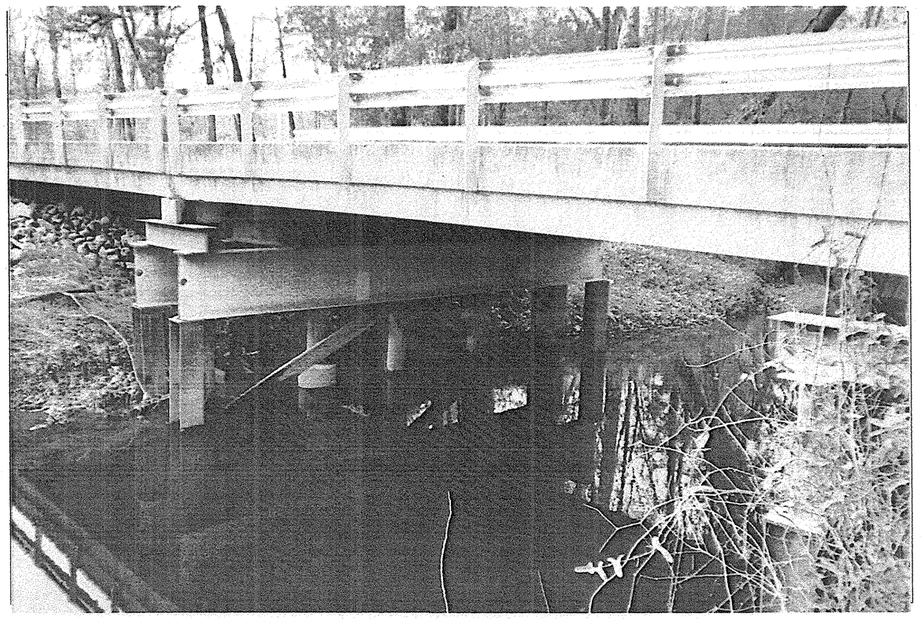
GASE determined by: Michael Valliquette **Date:** 1/27/06

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bank	Bed					
Sample No.	S-1	S-2					
Retained #4	0.2	0.1					
Passed #10	99.2	99.8					
Passed #40	97.2	98.7					
Passed #200	6.4	22.1					
Coarse Sand	15.7	10.6					
Fine Sand	78.6	69.9					
Silt	1.2	5.4					
Clay	4.4	14					
LL	24	23					
PI	NP	NP					
AASHTO	A-3	A-2-4					
Station	16+77	16+85					
Offset	28 ft LT	27 ft LT					
Depth	0.0-0.5 ft	0.0-0.5 ft					

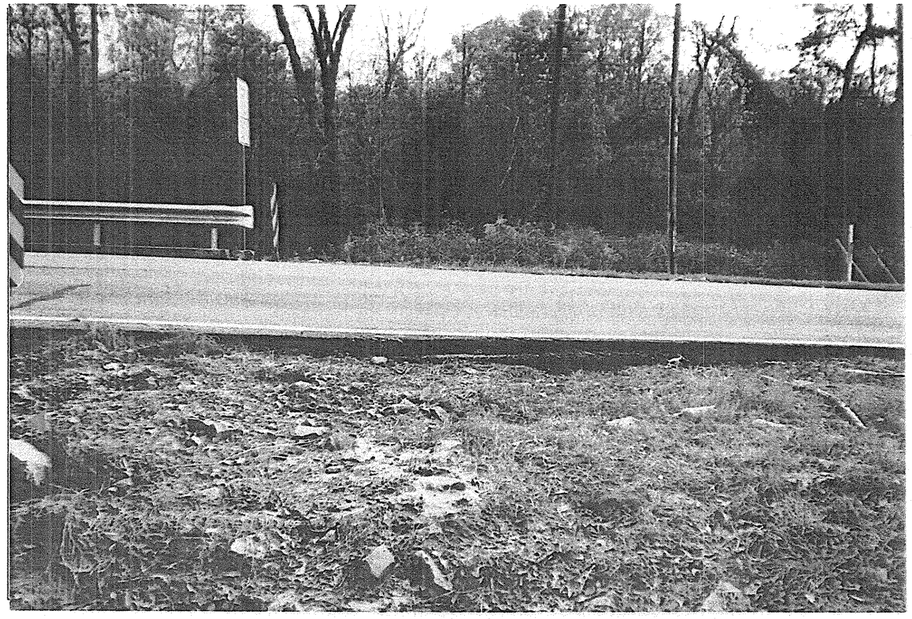
Photograph No. 1: Looking east along SR 1091.

Photograph No. 2: Looking west along SR 1091.



Photograph No. 3: Looking northwest from end bent 2.

Photograph No. 4: Looking southeast from end bent 1.



Photograph No. 5: Looking south along end bent 1.

Photograph No. 6: Looking south along bent 1.

Photograph No. 7: Looking north along bent 2.

Photograph No. 8: Looking south along end bent 2.