PROJECT: 32773.1.1 ID: B-2950

STATE	STATE PROJECT REFERENCE NO.		SHEET NO.	TOTAL SHEETS
N.C.	32773.1.1		1	33
STATE PROJ. NO.	F.A. PROJ. NO.		DESCRIPTION	
B-2950	BRZ-1222(2)		P.E.	
			CONST.	

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

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 32773.1.1 I.D. NO. B-2950

COUNTY CURRITUCK F.A. NO. BRZ-1222(2)

PROJECT DESCRIPTION REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222 (TULLS CREEK RD.)

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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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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: R.RAHIE

INVESTIGATED BY	MACTEC ENGINEERING AND CONSULTING, INC.
CHECKED BY	J. VEITH
SUBMITTED BY	M. LEAR
DATE	06/6/06
REVISED	06/20/06

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For Letting

NORTH CAROLINA LICENSED SEAL 1927 GEOLOGIST MICHAEL B. LEAR — SEAL — 6/20/06

MACTEC

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SIGNATURE

ID	PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-2950	32773.1.1	2	33

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/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>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
	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		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR 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 (fireextinguisher)

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
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER CME-45C
- [ ] OTHER D-50

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [X] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 4" STEEL TEETH
- [ ] TRICONE ____ * TUNG.-CARB.
- [ ] CORE BIT SERIES 6
- [ ] OTHER ____

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

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

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] OTHER ____

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 SURVEY POINT BL-5, ELEV. 9.25 ft MSL

NOTES:

- SPLIT SYMBOL- CLAY (A-6) AND SAND (A-3)
- ASPHALT

Subject: **Geotechnical Report**

Description: **Replacement of Bridge No. 4 over Tulls Creek on SR 1222 (Tulls Creek Road)**

Project Number:	**32773.1.1**
Tip Number:	**B-2950**
F.A. Number:	**BRZ-1222 (2)**
MACTEC Project Number:	**6468-06-1377**

Project Information

The purpose of this investigation was to obtain geotechnical information for design and construction of the proposed replacement of Bridge No. 4 over Tulls Creek on SR 1222, Currituck County, North Carolina (Drawings 1 and 2). Our understanding of this project comes from conversations with NCDOT Geotechnical Engineering Unit personnel and from documents and drawings provided by the Geotechnical Engineering Unit, including a Request for Proposal dated March 28, 2006, a Bridge Survey and Hydraulic Design Report dated February 8, 2006, and electronic drawings obtained via the NCDOT file transfer website.

In July and August of 2003, MACTEC completed a structure investigation at the subject site. We drilled a total of 14 soil borings along an adjacent alignment. The length of the proposed structure has since been reduced, the alignment has been moved back to the footprint of the existing alignment, and retaining walls are proposed for each side of the roadway approach to End Bent 1.

The project consists of a proposed replacement bridge, approximately 300 feet long and 34 feet wide, consisting of six bents and five, 60 foot spans. The bents are skewed 90° to the alignment (-L-). The proposed structure will be constructed approximately 6 feet above the existing grade at the existing end bents.

This report contains data from our previous investigation at the project site, specifically borings numbered B14-B, B14-C, B16-C, B18-C, B20-C, and EB2-B. Stations and offsets for these borings have been recalculated to reflect their location relative to the alignment (-L-) for this project.

Field Testing

During April, 2006, MACTEC advanced 4 borings at locations shown on the Boring Location Plan (Drawing 3). The borings were drilled with a CME-550 ATV drill rig. The borings were advanced using rotary-wash drilling techniques. All borings were advanced into the Yorktown Formation. End bent borings (EB1-Rev and EB2-Rev) were advanced to depths that satisfy criteria for concrete pile embedment according to the NCDOT Ultimate Pile Capacity Charts. Interior bent borings (B1-Rev and B2-Rev) were advance through the existing bridge deck to depths that satisfy drilled shaft criteria. Additional borings shown on the Boring Location Plan (B14-B, B14-C, B16-C, B18-C, B20-C, and EB2-B) were drilled during our previous investigation at the site, utilizing a CME-45 Marsh Buggy-mounted drill rig or a CME-550 ATV drill rig, using rotary-wash drilling techniques. These borings were drilled to depths that satisfy criteria for concrete pile embedment according to the NCDOT Ultimate Pile Capacity Charts.

Proposed boring locations were established at the project site utilizing GPS equipment. End bent borings performed during this investigation were drilled through the asphalt pavement of SR 1222, and interior bent borings were advanced through the existing deck of Bridge 4. Borings were offset from proposed locations due to the fish moratorium in effect for Tulls Creek and the associated wetlands, as well as overhead and underground utilities located along the shoulders of SR 1222 and adjacent to the existing bridge. Actual boring location coordinates were captured with GPS equipment. The collected coordinates were corrected as necessary using post-processing differential correction.

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 11). Base Line Survey point BL-5, 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. Samples were collected from within the soil profile using a split-barrel sampler and a 140 lb. manual hammer.

Laboratory Testing

Laboratory testing consisting of AASHTO classification and grain-size distribution tests were performed on split-barrel samples SS-101 through SS-113. Results for samples SS-14 to SS-19 and SS-21 to SS-23, from our previous investigation, are included with this report. The moisture content was determined in cohesive soils.

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

Physiography

The site is located in a generally flat, low-lying, coastal setting near the mouth of Tulls Creek at Tulls Bay. The existing bridge spans a distance of approximately 200 feet between the eastern bank of the creek and a causeway. The eastern bank of the creek is wooded. The causeway extends approximately 1800 feet to the west. The causeway is flanked on the north by marsh-land and on the south by a canal. Marsh-land extends to the south beyond the canal. The marsh-land is vegetated with grasses.

The elevation of the roadway surface at the western end of the existing bridge is approximately 10 feet mean sea level (MSL). The causeway levels-out to the elevation of approximately 2 to 3 feet MSL west of the existing bridge. The marsh-land is at an elevation of approximately 1 feet MSL. Tulls Creek is tidally-influenced. We observed fluctuations in the water level of Tulls Creek of up to a foot during the time of our fieldwork. The water surface elevation of the Tulls Creek was 0.3 feet MSL on April 28, 2006. Site photographs included in this report show site conditions during our field investigation.

Geology

The project site is located within the Carolina Coastal Plain Physiographic Province. Sediments of the Carolina Coastal Plain were deposited during depositional cycles caused by fluctuating sea-levels, and the processes in existence today. Younger sediments lie at the surface near the coast. Older sediments, which underlie these younger sediments, lie at or near the surface further inland. The 1985 Geologic Map of North Carolina, compiled by the N.C. Geologic Survey, indicates the geology at the site consists of surficial deposits of sand, clay, gravel and peat, deposited in marine, fluvial, eolian and lacustrine environments. Older sediments of the Yorktown Formation underlie the surficial deposits. The Yorktown Formation consists of shelly clays with sand lenses. The Yorktown Formation is marine in origin. Our investigation at the site identified roadway embankment fill underlain by alluvial/coastal plain sediments, underlain by the Yorktown Formation.

Alluvial sediments identified during this investigation consist of an upper layer of clay (A-7-6/A-7-5/A-6) with trace to moderate amounts of organic matter, underlain by silty, fine to coarse sand (A-3/A-2-4) with trace organics, wood fragments, and gravel and locally with interbedded clay layers. We interpret these soils to be Quaternary-aged (<2 million years ago) sediments. The alluvial sediments are underlain by coastal plain sediments consisting of clay (A-6/A-7-6) with sand lenses, underlain by silty, fine to coarse sand (A-3/A-2-4). These coastal plain sediments are somewhat characteristic of the Yorktown Formation sediments. However, without additional evidence to identify these soils as part of the Yorktown Formation, we interpreted them as a transitional stratigraphic unit between the overlying alluvium and the underlying Yorktown Formation, and grouped them as Coastal Plain Undivided (CPU).

We found the geology to be generally consistent along the length of the proposed structure and in general agreement with the results of our 2003 investigation.

Soils

Roadway Embankment Fill was encountered at the surface or below asphalt in all borings performed during this investigation, and extends to elevations 3.2 to -10.4 ft MSL. Fill consists of loose to dense, dry to wet, clayey, silty, fine to coarse sand (A-2-4) with wood fragments and trace organics, and soft to stiff, dry to wet, sandy, clay and silt (A-6/A-4) with trace gravel and brick fragments. Wood fragments encountered in the fill at borings B1-Rev and B4-Rev may be part of or debris from a former structure at the project site. Fill was not encountered in borings B14-C, B16-C, B18-C, and B20-C.

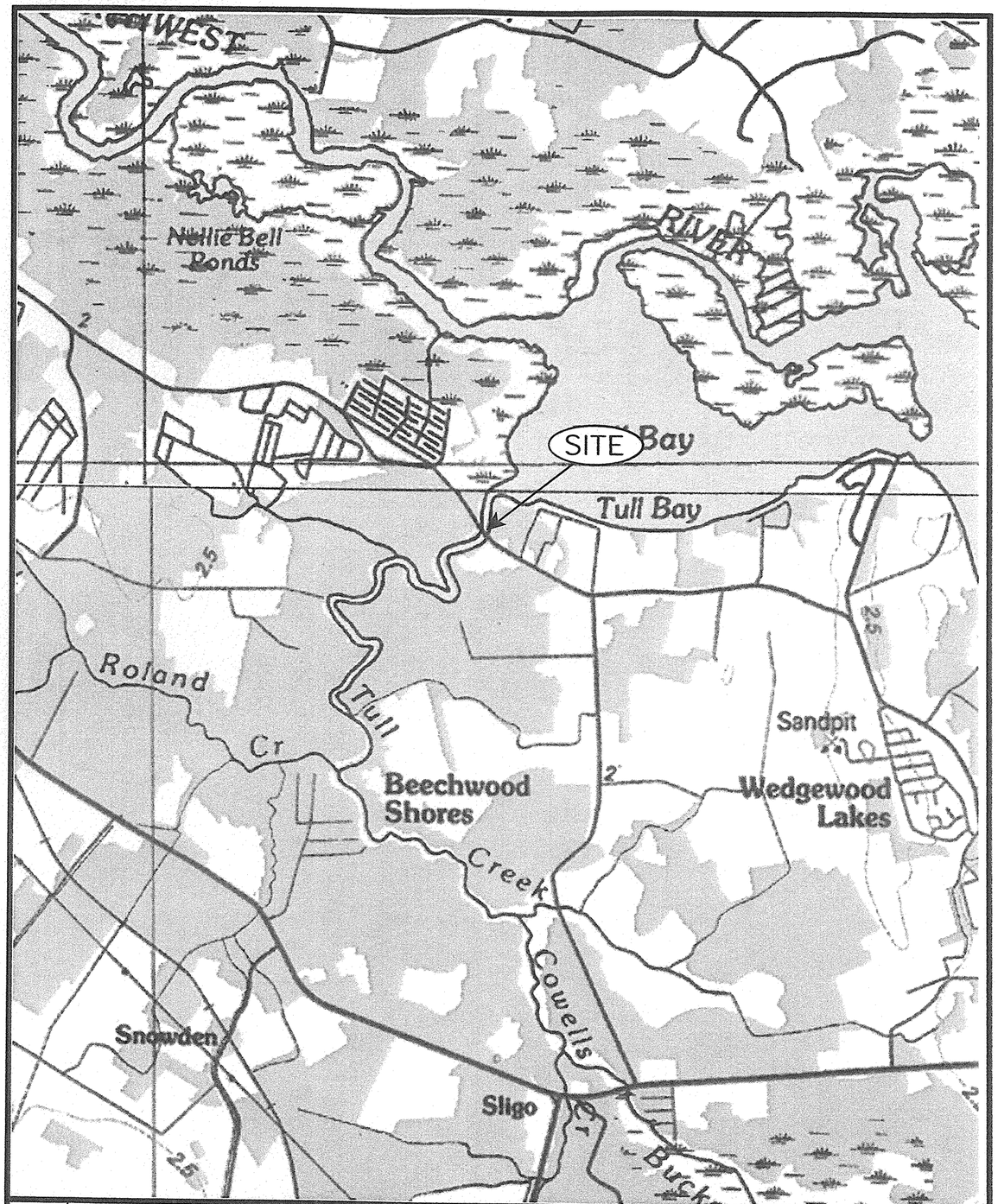
Alluvium was encountered at the surface in borings B14-C, B16-C, B18-C, and B20-C and below roadway embankment fill in borings EB1-Rev, B1-Rev, B4-Rev, and EB2-Rev, at elevations -0.3 to -10.4 ft MSL. Alluvium consists of an upper layer of very soft to soft, wet to saturated, fine sandy, silty clay (A-6/A-7-6/A-7-5) with trace to moderate amounts of organics and includes muck and peat. The upper alluvium layer, where encountered, extends to elevations -7.4 to -23.7 ft MSL and was not encountered in borings B4-Rev, B20-C, EB2-Rev, and EB2-B. The lower alluvium layer consists of very loose to medium dense, moist to saturated, silty, fine to coarse sand (A-3/A-2-4) with trace organics and gravel. The lower alluvium layer, where encountered, extends to elevations 3.2 to -30.1 ft MSL and was not encountered in boring B14-C.

Coastal Plain Undivided sediment was encountered below alluvium at elevations -21.8 to -30.1 ft MSL. Coastal Plain Undivided sediment consists of an upper layer of very soft to stiff, moist to saturated, fine to coarse sandy, clay and silt (A-6/A-7-6/A-4) with trace organics and locally with very thinly to thinly bedded sand layers, and extends to elevations -40.3 to -50.4 ft MSL. The lower Coastal Plain Undivided sediment layer consists of medium dense to very dense, wet, silty, fine to coarse sand (A-3/A-2-4) and extends to elevations -61.2 to -69.1ft MSL.

The Yorktown Formation was encountered below coastal plain undivided sediment at elevations -61.2 to -69.1 ft MSL and consists of medium stiff to very stiff, moist to wet, sandy, silty, clay (A-7-6) with trace shell fragments.

Groundwater

Due to their location within the pavement of SR 1222, 24-hour groundwater levels were not measured in any borings performed during this investigation. Groundwater level elevations from applicable borings performed during the 2003 investigation ranged from 2.1 to -0.2 ft MSL and are likely to be representative of current groundwater conditions at the site.

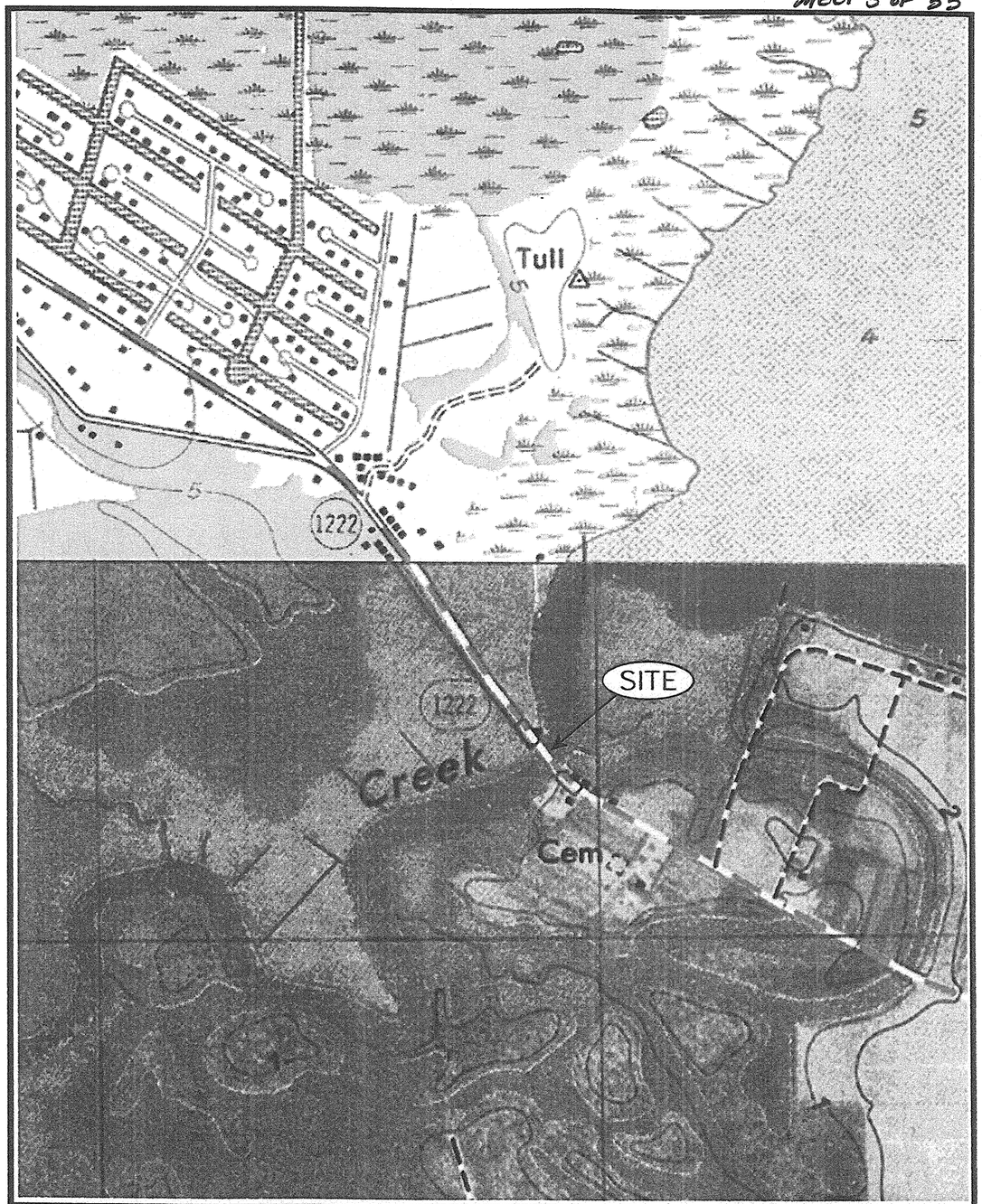


N

SITE LOCATION MAP
Replacement of Bridge No. 4 over Tulls Creek
on SR 1222 (Tulls Creek Road)
N.C. DOT Project No. 32773.1.1 (B-2950)
F.A. No. BRZ-1222(2)
Currituck County, North Carolina

MACTEC
ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REF: USGS Elizabeth City 1:100,000 sheet	SCALE: 1":3600'	MACTEC JOB NO: 6468-06-1377
	DWG: 1	DATE: May, 2006



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TOPOGRAPHIC SITE MAP
Replacement of Bridge No. 4 over Tulls Creek
on SR 1222 (Tulls Creek Road)
N.C. DOT Project No. 32773.1.1 (B-2950)
F.A. No. BRZ-1222(2)
Currituck County, North Carolina

MACTEC
ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REF: USGS Quad - Currituck; Creeds, VA-NC	SCALE: 1":900'	MACTEC JOB NO: 6468-06-1377
	DWG: 2	DATE: May, 2006

WOODED SWAMP

WLB

TULLS CREEK

(HUNTING CAMP)

DOCK

1?SFD

B14–C

B18–C

B16–C

B20–C

EB1–REV

EB2–REV

B14–B

B1–REV

B4–REV

EB2–B

30+00

–L–

WLB

SOIL

BST

T

18"–24" U/G

W

8" DIP 3' +/– U/G

8" DIP 5' +/– U/W 10'–16' +/– OFF BRIDGE

EXIST R/W

DOCK

PORCH

DECK

3' WW

HTR W/ WOOD SIDING

S

WW

18' SOIL DR.

BL– 5
PINC 21+53.07
–L– STA 31+74.06
13.90' RT.

SCATTERED TREES

TULLS CREEK

SKEW=90°

0 20' 40' 80'

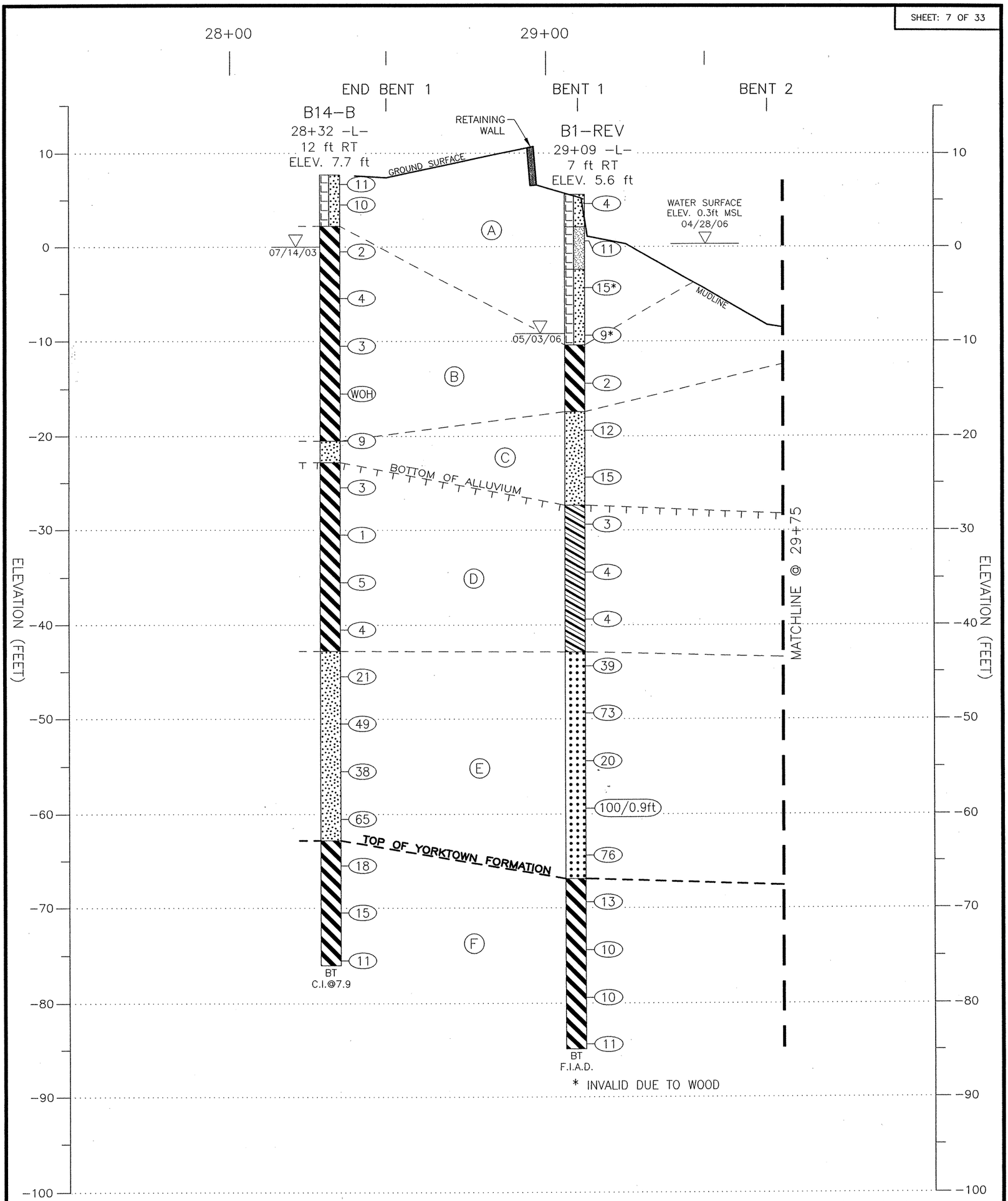
SCALE (FEET)
1" : 40'

NAD 83

BORING LOCATION PLAN
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B–2950)
F.A. PROJECT NO. BRZ–1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 06/6/06
06/20/06	DFT CHECK: M.B.L.	JOB: 6468–06–1377
	ENG CHECK: J.E.V.	DWG: 3



(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, DRY TO WET, TAN, BROWN, AND GRAY, CLAYEY, SILTY, FINE SAND (A–2–4) WITH WOOD FRAGMENTS AND TRACE ORGANICS, AND STIFF, DRY, TAN, SANDY, CLAYEY, SILT (A–4)

(B) ALLUVIUM: VERY SOFT TO SOFT, WET, DARK GRAY, GRAY, BLACK, AND BROWN, FINE SANDY, SILTY, CLAY (A–7–6) WITH TRACE ORGANICS

(C) ALLUVIUM: LOOSE TO MEDIUM DENSE, WET, DARK GRAY TO GRAY, SILTY, FINE TO COARSE SAND (A–2–4)

(D) COASTAL PLAIN UNDIVIDED: VERY SOFT TO MEDIUM STIFF, WET, DARK GRAY TO GRAY, FINE TO COARSE SANDY, SILTY, CLAY (A–7–6/A–6) WITH TRACE SAND LENSES

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, DARK GRAY TO GRAY, SILTY, FINE TO COARSE SAND (A–2–4/A–3)

(F) YORKTOWN FORMATION: STIFF TO VERY STIFF, MOIST TO WET, GRAY–GREEN, SANDY, SILTY, CLAY (A–7–6) WITH TRACE SHELL FRAGMENTS

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

0 15' 30' 60'
HORIZONTAL SCALE IN FEET
1"=30'

PROFILE 15 ft RIGHT OF –L–
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B–2950)
F.A. PROJECT NO. BRZ–1222(2)
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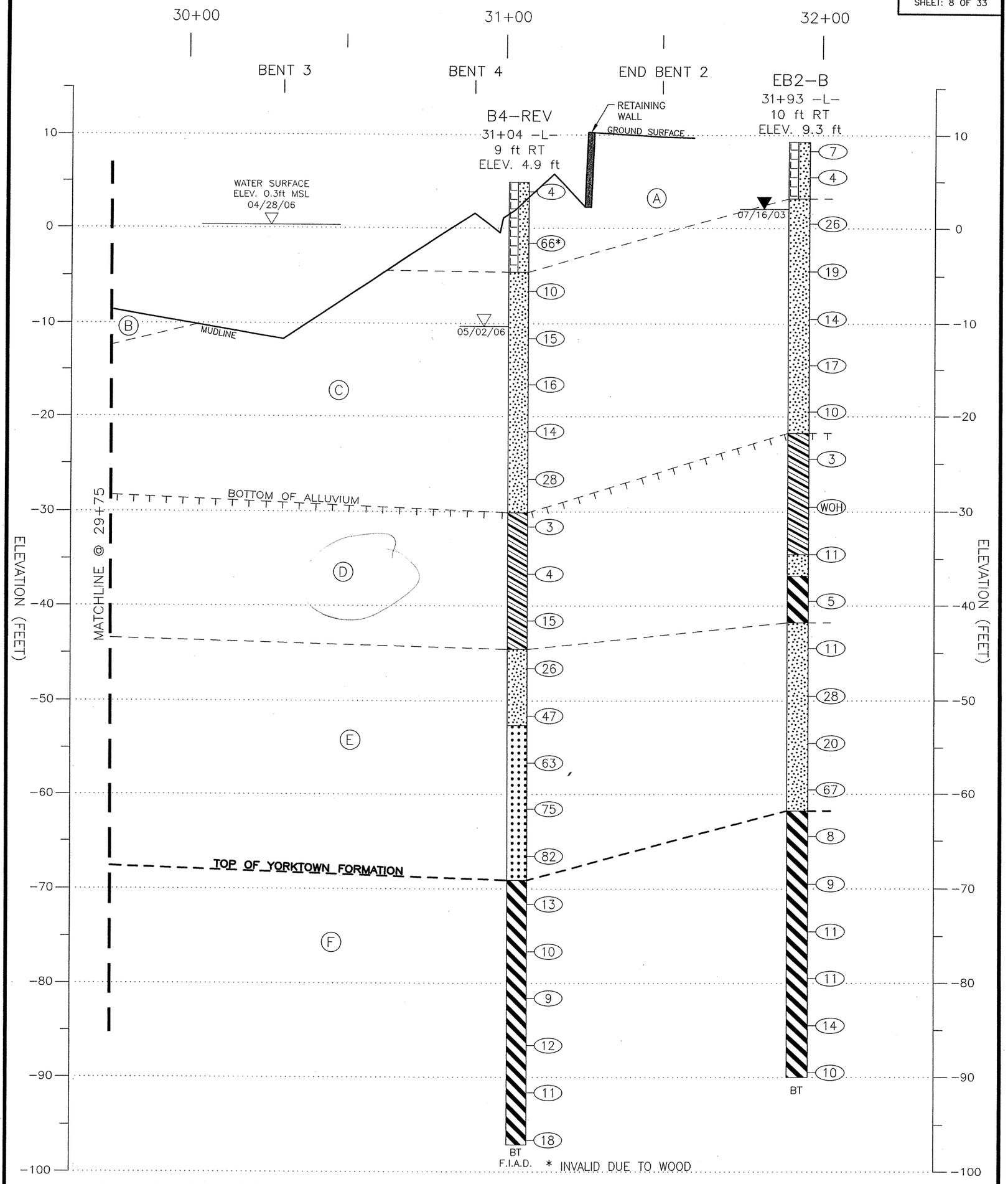

(A) ROADWAY EMBANKMENT FILL: LOOSE, DRY TO WET, TAN, BROWN, AND GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH WOOD FRAGMENTS AND TRACE ORGANICS

(B) ALLUVIUM: VERY SOFT TO SOFT, WET TO SATURATED, BROWN, FINE SANDY, SILTY, CLAY (A-7-6) WITH TRACE ORGANICS

(C) ALLUVIUM: MEDIUM DENSE, WET, TAN, BROWN, GRAY, AND ORANGE, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE ORGANICS

(D) COASTAL PLAIN UNDIVIDED: VERY SOFT TO STIFF, MOIST TO WET, DARK GRAY AND GRAY, FINE SANDY, SILTY, CLAY (A-6/A-7-6) WITH SILTY SAND (A-2-4) LAYERS

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, DARK GRAY, GRAY, AND BROWN-TAN, SILTY, FINE TO COARSE SAND (A-2-4/A-3)

(F) YORKTOWN FORMATION: STIFF TO VERY STIFF, MOIST TO WET, GRAY-GREEN, SANDY, SILTY, CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

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

0 15' 30' 60'
HORIZONTAL SCALE IN FEET
1"=30'

PROFILE 15 ft RIGHT OF -L-
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

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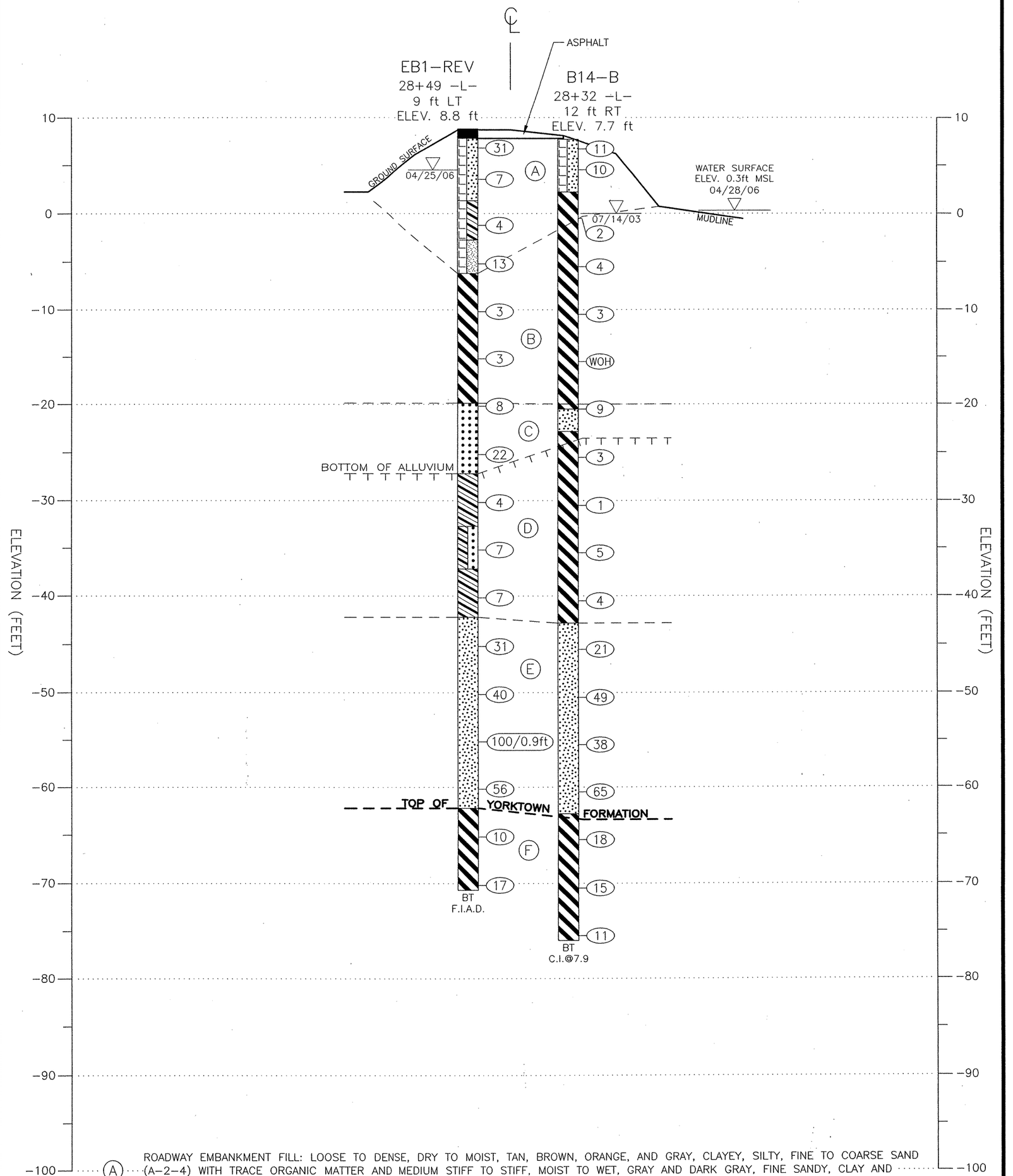

(A) ROADWAY EMBANKMENT FILL: LOOSE TO DENSE, DRY TO MOIST, TAN, BROWN, ORANGE, AND GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE ORGANIC MATTER AND MEDIUM STIFF TO STIFF, MOIST TO WET, GRAY AND DARK GRAY, FINE SANDY, CLAY AND SILT (A-6/A-4) WITH TRACE GRAVEL AND BRICK FRAGMENTS

(B) ALLUVIUM: VERY SOFT TO SOFT, WET, DARK GRAY, GRAY, AND BLACK, FINE SANDY, SILTY CLAY (A-7-5/A-7-6) WITH TRACE ORGANICS

(C) ALLUVIUM: LOOSE TO MEDIUM DENSE, WET, DARK GRAY AND GRAY, SILTY, FINE TO COARSE SAND (A-3/A-2-4) WITH TRACE GRAVEL AND ORGANICS

(D) COASTAL PLAIN UNDIVIDED: VERY SOFT TO MEDIUM STIFF, WET, DARK GRAY AND GRAY, FINE TO COARSE SANDY, SILTY, CLAY (A-6/A-7-6), LOCALLY WITH THINLY BEDDED, FINE TO COARSE SAND (A-3)

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, DARK GRAY TO GRAY, SILTY, FINE SAND (A-2-4)

(F) YORKTOWN FORMATION: STIFF TO VERY STIFF, MOIST, GRAY-GREEN, SILTY CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

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

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION ALONG END BENT 1 REVISED
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

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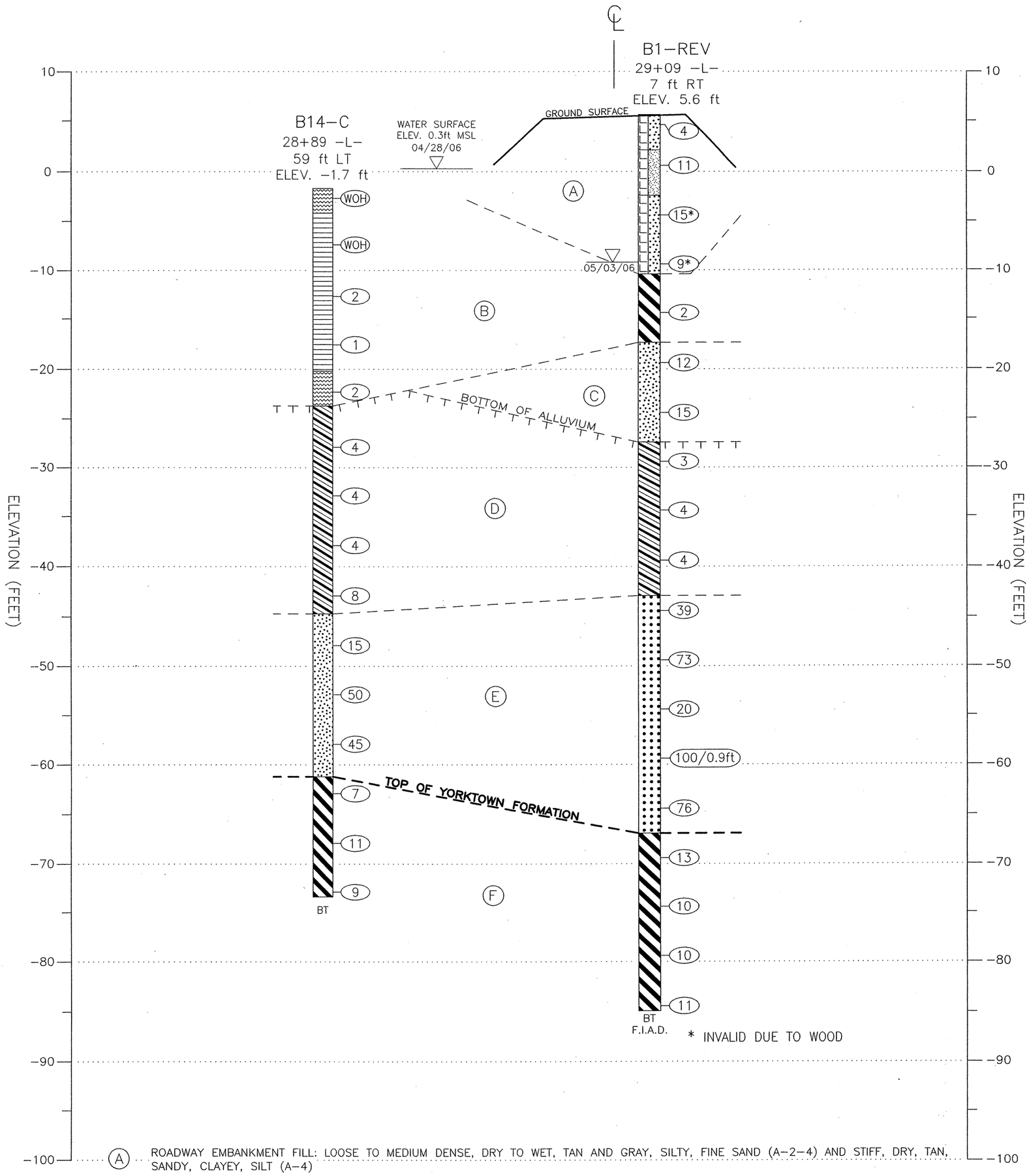

(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, DRY TO WET, TAN AND GRAY, SILTY, FINE SAND (A–2–4) AND STIFF, DRY, TAN, SANDY, CLAYEY, SILT (A–4)

(B) ALLUVIUM: VERY SOFT TO SOFT, BLACK, BROWN, AND GRAY, FINE SANDY, SILTY CLAY (A–7–6) WITH TRACE TO LITTLE ORGANICS AND MUCK AND PEAT

(C) ALLUVIUM: MEDIUM DENSE, WET, GRAY, SILTY, FINE SAND (A–2–4)

(D) COASTAL PLAIN UNDIVIDED: SOFT TO MEDIUM STIFF, WET TO SATURATED, GRAY, SANDY CLAY (A–6), MICACEOUS, WITH TRACE WOOD FRAGMENTS AND SAND LENSES

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A–2–4/A–3)

(F) YORKTOWN FORMATION: MEDIUM STIFF TO STIFF, MOIST TO WET, GRAY–GREEN, SANDY, SILTY, CLAY (A–7–6) WITH TRACE SHELL FRAGMENTS

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

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION ALONG BENT 1 REVISED
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B–2950)
F.A. PROJECT NO. BRZ–1222(2)
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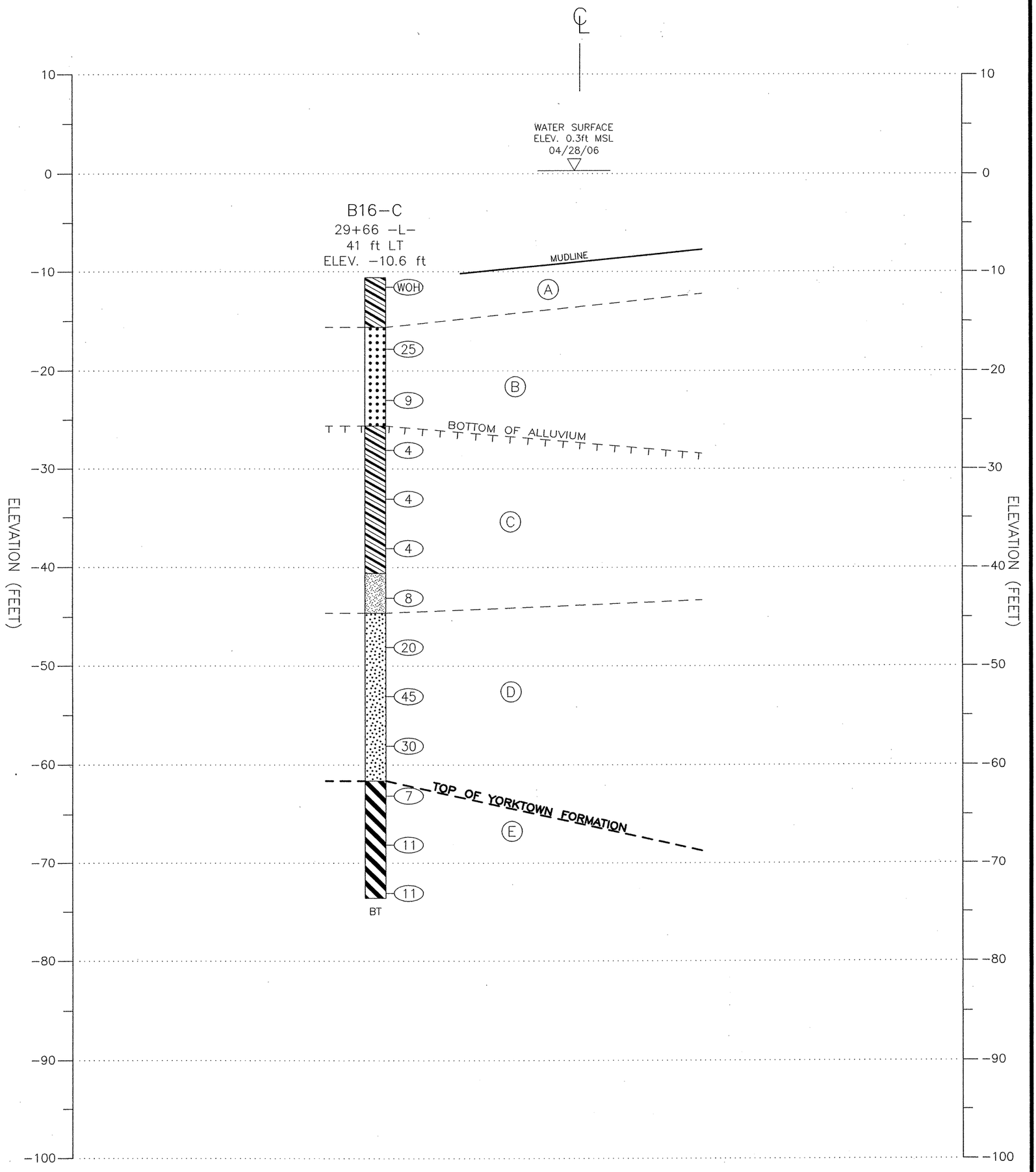


(A) ALLUVIUM: VERY SOFT, SATURATED, BROWN, FINE SANDY, SILTY CLAY (A-6)

(B) ALLUVIUM: LOOSE TO MEDIUM DENSE, SATURATED, GRAY AND TAN, SILTY, FINE TO COARSE SAND (A-3)

(C) COASTAL PLAIN UNDIVIDED: MEDIUM STIFF, SATURATED, GRAY, FINE SANDY, SILTY CLAY (A-6) AND SILT (A-4)

(D) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-2-4)

(E) YORKTOWN FORMATION: MEDIUM STIFF TO STIFF, MOIST, GRAY-GREEN, SILTY, CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

0 5' 10' 20'

VERTICAL SCALE IN FEET
1"=10'

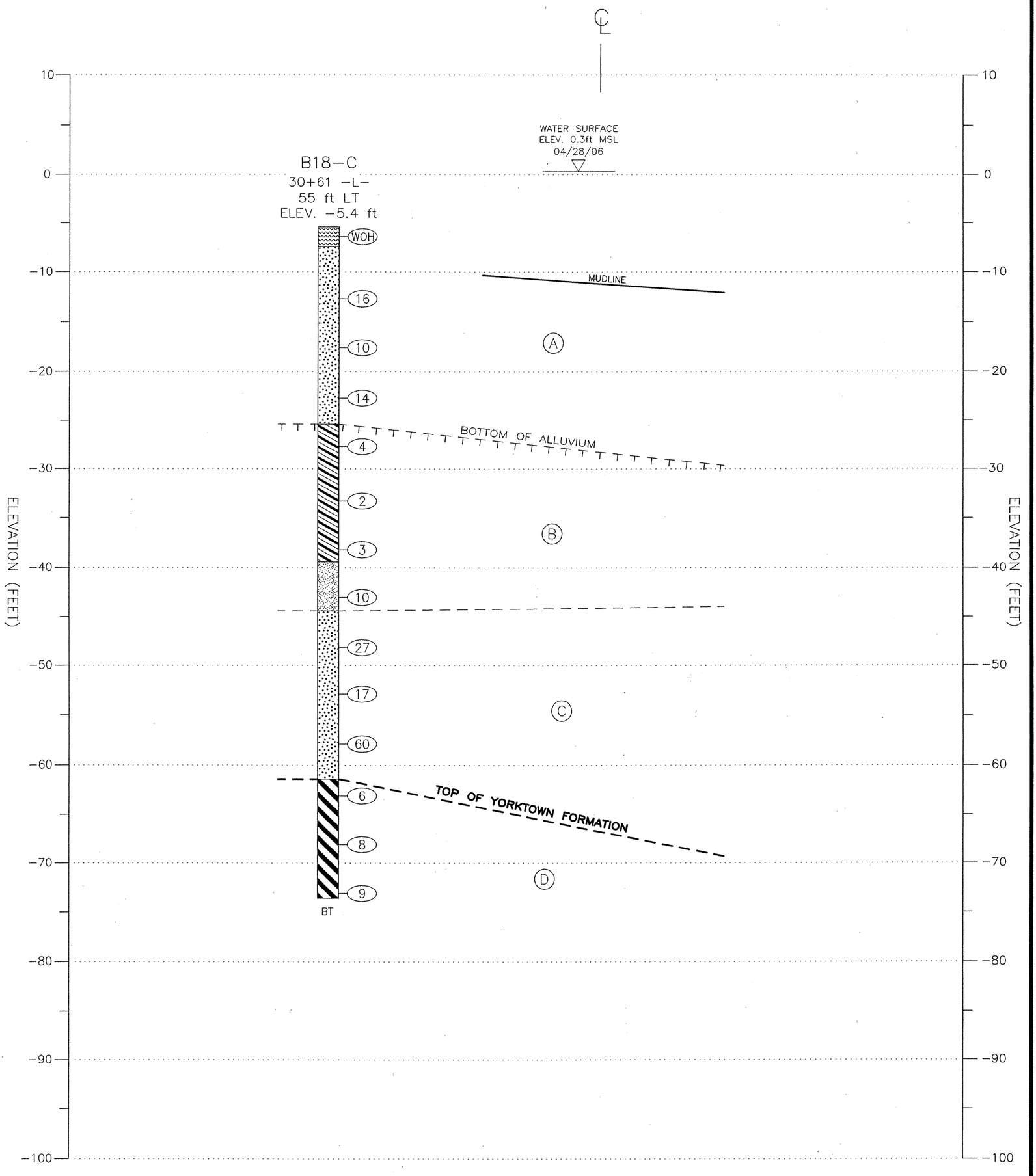
0 10' 20' 40'

HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION ALONG BENT 2 REVISED
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 06/6/06
06/20/06	DFT CHECK: M.B.L.	JOB: 6468-06-1377
	ENG CHECK: J.E.V.	DWG: 8



(A) ALLUVIUM: MEDIUM DENSE, SATURATED, GRAY AND TAN, SILTY, FINE TO COARSE SAND (A–2–4) WITH TRACE GRAVEL

(B) COASTAL PLAIN UNDIVIDED: SOFT TO STIFF, SATURATED, GRAY, FINE SANDY, MICACEOUS, CLAY AND SILT (A–6/A–4) WITH TRACE WOOD FRAGMENTS

(C) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A–2–4)

(D) YORKTOWN FORMATION: MEDIUM STIFF TO STIFF, MOIST, GRAY–GREEN, SILTY CLAY (A–7–6) WITH TRACE SHELL FRAGMENTS

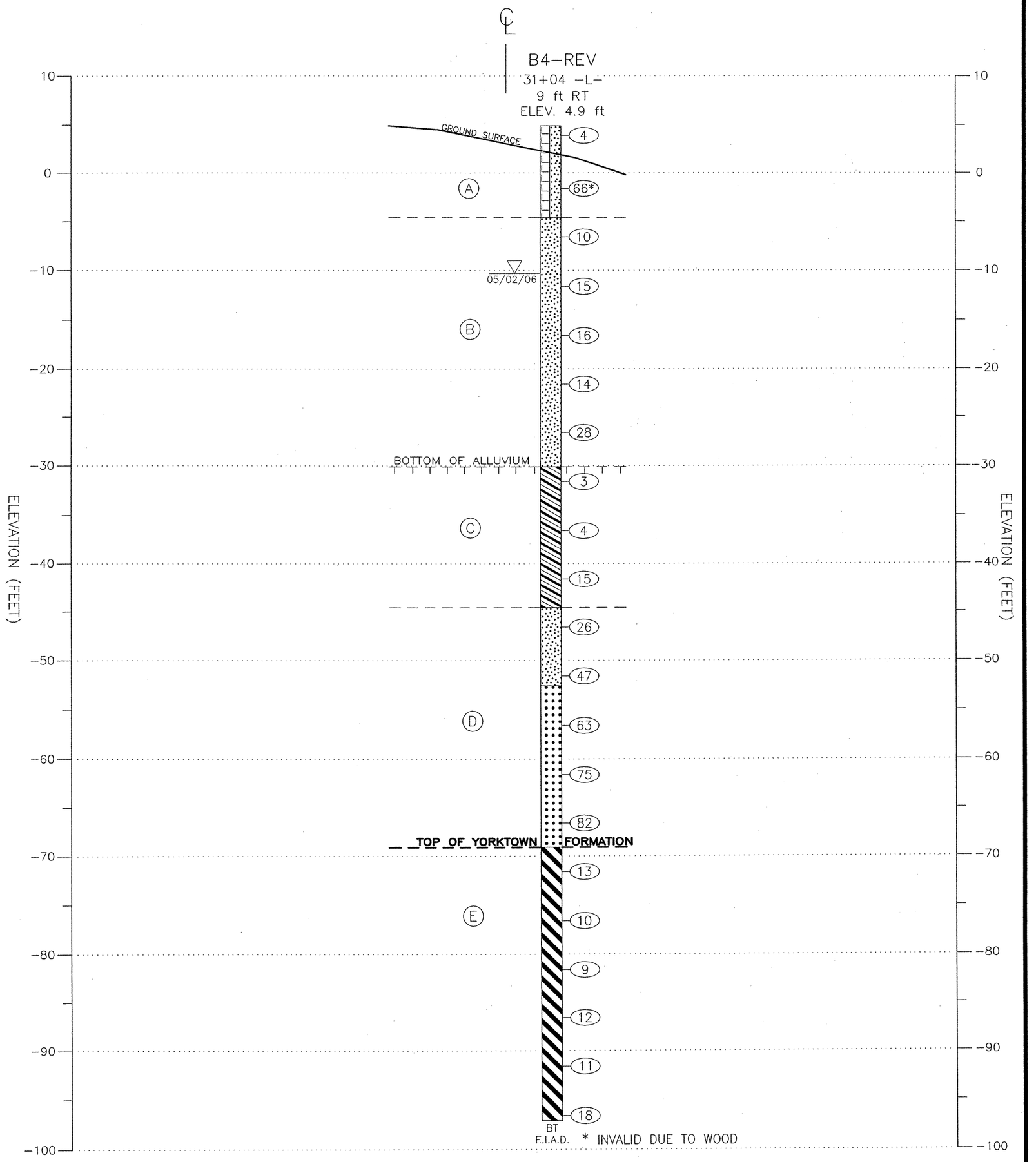
0 5' 10' 20'
VERTICAL SCALE IN FEET
1"=10'

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION ALONG BENT 3 REVISED
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B–2950)
F.A. PROJECT NO. BRZ–1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 06/6/06
06/20/06	DFT CHECK: M.B.L.	JOB: 6468–06–1377
	ENG CHECK: J.E.V.	DWG: 9



(A) ROADWAY EMBANKMENT FILL: LOOSE, DRY TO WET, TAN-GRAY, SILTY, SAND (A-2-4) WITH WOOD FRAGMENTS

(B) ALLUVIUM: LOOSE TO MEDIUM DENSE, WET, TAN, GRAY, AND ORANGE, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE ORGANICS

(C) COASTAL PLAIN UNDIVIDED: SOFT TO STIFF, MOIST TO WET, GRAY, FINE SANDY, SILTY CLAY (A-6)

(D) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, GRAY AND BROWN-TAN, SILTY, FINE TO COARSE SAND (A-2-4/A-3)

(E) YORKTOWN FORMATION: STIFF TO VERY STIFF, WET, GREEN-GRAY, SANDY CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

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

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION ALONG BENT 4 REVISED
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 06/6/06
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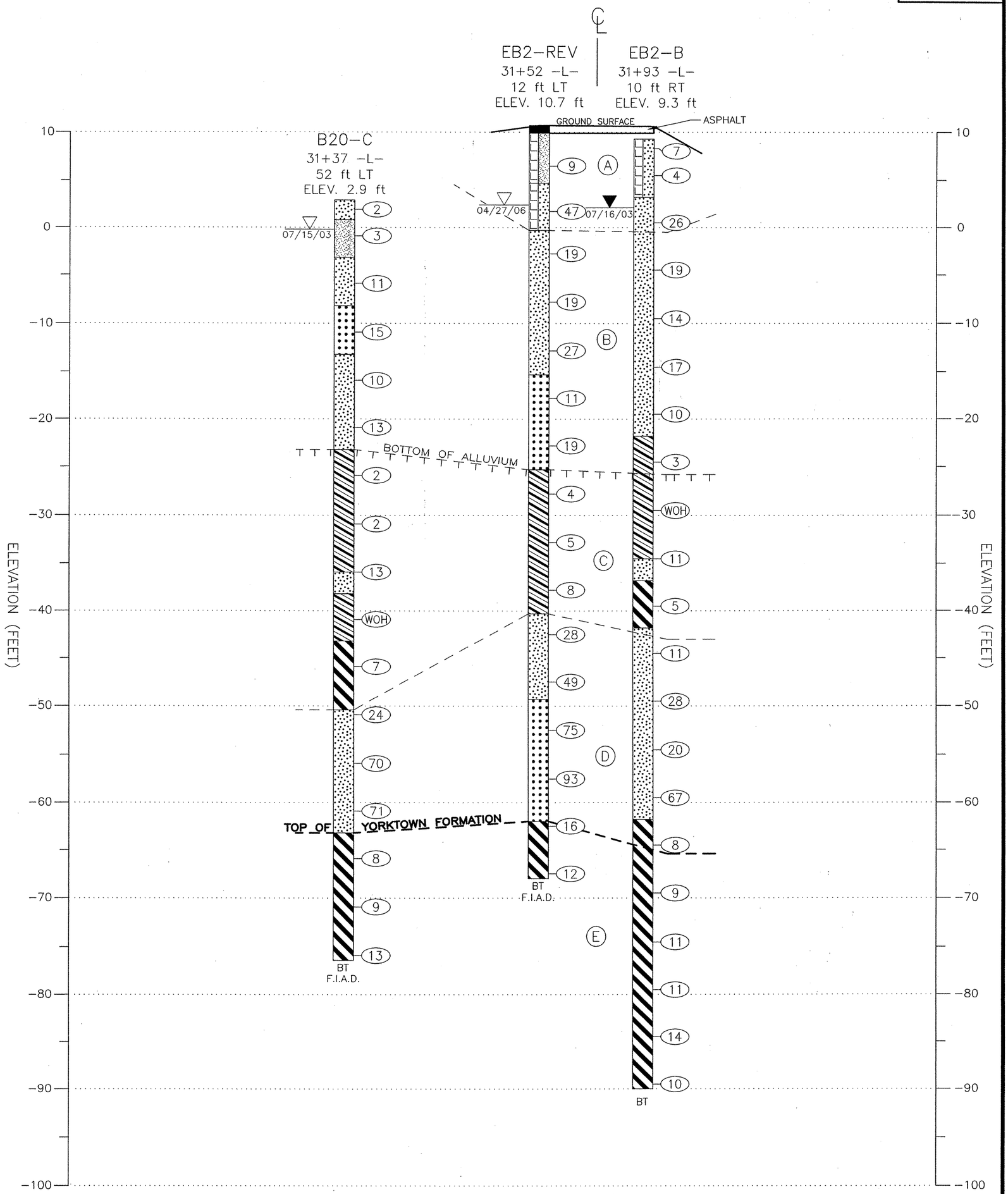
	ENG CHECK: J.E.V.	DWG: 10



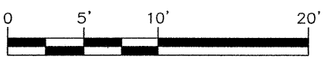
(A) ROADWAY EMBANKMENT FILL: LOOSE TO DENSE, DRY TO MOIST, TAN, BROWN, AND GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE ORGANICS AND TAN, STIFF, MOIST, CLAYEY, FINE TO COARSE SANDY SILT (A-4)

(B) ALLUVIUM: VERY LOOSE TO MEDIUM DENSE, WET, TAN, BROWN, ORANGE, GRAY, AND BLACK, MOIST TO WET, SILTY, FINE TO COARSE SAND (A-2-4/A-3) WITH TRACE ORGANICS AND SOFT, MOIST, GRAY, FINE SANDY, CLAYEY, SILT (A-4)

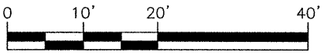
(C) COASTAL PLAIN UNDIVIDED: VERY SOFT TO STIFF, WET, GRAY, FINE SANDY, SILTY CLAY (A-6/A7-6) WITH MEDIUM DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-2-4) LAYERS

(D) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-2-4/A-3)

(E) YORKTOWN FORMATION: STIFF TO VERY STIFF, MOIST, GRAY-GREEN, SILTY CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS



VERTICAL SCALE IN FEET
1"=10'



HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION ALONG END BENT 2 REVISED
REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK
ON SR 1222 (TULLS CREEK RD.)
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 06/6/06
06/20/06	DFT CHECK: M.B.L.	JOB: 6468-06-1377
	ENG CHECK: J.E.V.	DWG: 11

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B14-B	**BORING LOCATION** 28+32	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.7
COLLAR ELEV. 7.7 ft	**NORTHING** 1,012,444 **US ft**	**EASTING** 2,857,079 **US ft**		**24 HR.** CI at 7.9
TOTAL DEPTH 83.7 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/11/03	**COMPLETED** 7/14/03	**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
7.7					Ground Surface				7.7
7.7	0.0	2	4	7	11		D		Roadway Embankment Fill: Tan-brown, to orange-brown and gray, silty, clayey SAND (A-2-4) with trace organic matter
5.5	2.2					SS-14			SS-14: 1.1% organic content
		5	6	4	10		M		2.2 5.5 Alluvium: Dark gray to gray and black, f. sandy, silty CLAY (A-7-6)
0.5	7.2								
		1	1	1	2		W		
-4.5	12.2								
		1	2	2	4		W		
-9.5	17.2								
		WOH	1	2	3		W		
-14.5	22.2								
		WOR	WOH	WOH	WOH 0		W		
-19.5	27.2								-20.5 28.2 Alluvium: Dark gray to gray, silty, f. to cse. SAND (A-2-4)
		1	4	5	9		W		-22.8 30.5 CPU: Dark gray to gray, f. to cse. sandy, silty, CLAY (A-7-6)
-24.5	32.2								
		1	2	1	3		W		
-29.5	37.2								
		1	0	1	1		W		
-34.5	42.2								
		4	2	3	5		W		
-39.5	47.2								
		2	2	2	4		W		-42.8 50.5 CPU: Dark gray to gray, silty, f. SAND (A-2-4)
-44.5	52.2								
		11	8	13	21		W		
-49.5	57.2								
		14	23	26	49		W		
-54.5	62.2								
		9	18	20	38		W		
-59.5	67.2								
		25	27	38	65		W		-62.8 70.5 Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
-64.5	72.2								
		6	8	10	18		M		

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 15 OF 33

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B14-B	**BORING LOCATION** 28+32	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.7
COLLAR ELEV. 7.7 ft	**NORTHING** 1,012,444 **US ft**	**EASTING** 2,857,079 **US ft**		**24 HR.** CI at 7.9
TOTAL DEPTH 83.7 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/11/03	**COMPLETED** 7/14/03	**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
-67.1					Continued from previous page				
-69.5	77.2								
		6	6	9	15		M		Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments *(continued)*
-74.5	82.2								
		3	5	6	11		M		-76.0 83.7 Boring terminated at 83.7 ft (elev. -76.0 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments

Bits Used: 0.3' side-discharge wing bit and 0.3' side-discharge finger bit.

Drilling Fluid Properties: 8.9 lbs/gal

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. EB1-REV	**BORING LOCATION** 28+49	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 4.3
COLLAR ELEV. 8.8 ft	**NORTHING** 1,012,444 **US ft**	**EASTING** 2,857,107 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 79.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual
DATE STARTED 4/25/06	**COMPLETED** 4/25/06	**SURFACE WATER DEPTH** NA	

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
8.8					Pavement				8.8 0.0
7.8	1.0						M		7.8 Asphalt Pavement to 1.0 ft 1.0
4.5	4.3	9	14	17	31		M		Roadway Embankment Fill: Brown, silty, f. to cse. SAND (A-2-4)
-0.2	9.0	10	4	3	7		M		1.3 7.5 Roadway Embankment Fill: Gray, sandy, silty CLAY (A-6)
-4.2	13.0	2	2	2	4		W		-2.7 11.5 Roadway Embankment Fill: Dark gray, f. sandy, clayey, SILT (A-4) w/ trace gravel and brick fragments
-9.2	18.0	7	6	7	13	SS-101	15.0%		-6.2 15.0 Alluvium: Dark gray, silty, CLAY (A-7-5) w/ trace organics
-14.2	23.0	1	1	2	3	SS-102	80.1%		
-19.2	28.0	1	1	2	3		W		-19.9 28.7 Alluvium: Gray, silty, f. to cse. SAND (A-3) w/ trace gravel and organics
-24.2	33.0	2	4	4	8		W		
-29.2	38.0	13	14	8	22		W		-27.2 36.0 Coastal Plain Undivided (CPU): Gray, f. sandy, silty CLAY (A-6)
-34.2	43.0	2	2	2	4		W		-32.7 41.5 CPU: Gray, thinly interbedded, silty CLAY (A-6) and fine to coarse SAND (A-3)
-39.2	48.0	3	4	3	7		W		-37.2 46.0 CPU: Gray, f. sandy, silty CLAY (A-6)
-44.2	53.0	3	3	4	7		W		-42.2 51.0 CPU: Gray, silty, f. SAND (A-2-4)
-49.2	58.0	12	17	14	31		W		
-54.2	63.0	12	16	24	40		W		
-59.2	68.0	18	47	53/0.4'	100/0.9'	SS-103	W		
-64.2	73.0	14	26	30	56		W		-62.2 71.0 Yorktown Fm: Gray-green, silty, CLAY (A-7-6) w/ trace shell fragments
		3	5	5	10		M		

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 6/6/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 16 OF 33

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. EB1-REV	**BORING LOCATION** 28+49	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 4.3
COLLAR ELEV. 8.8 ft	**NORTHING** 1,012,444 **US ft**	**EASTING** 2,857,107 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 79.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual
DATE STARTED 4/25/06	**COMPLETED** 4/25/06	**SURFACE WATER DEPTH** NA	

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
-66.0					Continued from previous page				
-69.2	78.0	6	7	10	17	SS-104	41.0%		Yorktown Fm: Gray-green, silty, CLAY (A-7-6) w/ trace shell fragments *(continued)*
									-70.7 79.5 Boring terminated at 79.5ft (Elev. -70.7 ft) in Yorktown Fm: Very stiff, silty, CLAY (A-7-6) with trace shell fragments

Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit

Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 6/6/06

MACTEC

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B14-C	**BORING LOCATION** 28+89	**OFFSET** 59 ft LT	**ALIGNMENT** -L- — **0 HR.** Water
COLLAR ELEV. -1.7 ft	**NORTHING** 1,012,443 **US ft**	**EASTING** 2,857,171 **US ft**	**24 HR.** Boring
TOTAL DEPTH 71.7 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/15/03	**COMPLETED** 7/15/03	**SURFACE WATER DEPTH** 3.2 ft	

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
-1.7					Mudline				
-1.7	0.0	WOH	WOH	WOH	WOH		Sat.		-1.7 Alluvium: Black Muck 0.0
-6.4	4.7								-4.2 Alluvium: Gray and brown-black, f. sandy, silty, CLAY (A-7-6) w/little organic matter 2.5
		WOH	WOH	WOH	WOH		Sat.		
-11.7	10.0								
		1	1	1	2	SS-21	96.6%		SS-21: 6.4% organic content
-16.6	14.9								
		WOH	WOH	1	1		Sat.		
-21.3	19.6								-20.2 Alluvium: Brown Peat 18.5
		1	1	1	2		Sat.		-23.7 CPU: Gray, f. sandy, silty CLAY (A-6) micaceous with trace wood fragments 22.0
-26.9	25.2								
		2	2	2	4		Sat.		
-31.9	30.2								
		1	2	2	4		Sat.		
-36.9	35.2								
		2	2	2	4		Sat.		
-41.9	40.2								
		2	3	5	8		Sat.		-44.7 CPU: Gray, silty, f. to cse. SAND (A-2-4) 43.0
-46.9	45.2								
		6	4	11	15		W		
-51.9	50.2								
		11	21	29	50		W		
-56.9	55.2								
		20	23	22	45		W		
-61.9	60.2								-61.2 Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments 59.5
		3	3	4	7		M		
-66.9	65.2								Bits Used: 0.3' roller cone
		3	5	6	11		M		Drilling Fluid Properties: 9.0 lbs/gal
-71.9	70.2								
		3	4	5	9		M		-73.4 Boring terminated at 71.7 ft (elev. -73.4 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments 71.7

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** J. Howard
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. B1-REV	**BORING LOCATION** 29+09	**OFFSET** 7 ft RT	**ALIGNMENT** -L-	**0 HR.** 14.8
COLLAR ELEV. 5.6 ft	**NORTHING** 1,012,387 **US ft**	**EASTING** 2,857,131 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 90.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 5/3/06	**COMPLETED** 5/3/06	**SURFACE WATER DEPTH** NA		

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
5.6					Ground Surface				5.6 0.0
5.6	0.0	4	3	1	4		D		Roadway Embankment Fill: Tan-gray, silty, fine SAND (A-2-4)
1.6	4.0								2.1 3.5
		5	5	6	11	SS-105	12.2%		Roadway Embankment Fill: Tan, sandy, clayey, SILT (A-4)
-3.4	9.0								-2.4 8.0
		8	9	6	15 Invalid due to wood fragments		W		Roadway Embankment Fill: Wood with trace silty, fine SAND (A-2-4)
-8.4	14.0								
		5	4	5	9 Invalid due to wood fragments		W		-10.4 16.0
-13.4	19.0								Alluvium: Brown, fine sandy, silty CLAY (A-7-6) w/ trace organics
		2	1	1	2		W		
-18.4	24.0								-17.4 23.0
		6	4	8	12		W		Alluvium: Gray, silty, fine SAND (A-2-4)
-23.4	29.0								
		9	4	11	15	SS-106	W		
-28.4	34.0								-27.4 33.0
		1	2	1	3		W		Coastal Plain Undivided (CPU): Gray, sandy CLAY (A-6) with trace sand lenses
-33.4	39.0								
		WOH	1	3	4	SS-107	30.1%		
-38.4	44.0								
		1	2	2	4		W		
-43.4	49.0								-42.9 48.5
		3	9	30	39		W		CPU: Gray, silty, f. to cse. SAND (A-3)
-48.4	54.0								
		16	27	46	73		W		
-53.4	59.0								
		16	12	8	28		W		
-58.4	64.0								
		33	67/0.4'		100/0.9'		W		
-63.4	69.0								
		30	46	30	76		W		
-68.4	74.0								-66.9 72.5

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 6/6/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 18 OF 33

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** J. Howard
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. B1-REV	**BORING LOCATION** 29+09	**OFFSET** 7 ft RT	**ALIGNMENT** -L-	**0 HR.** 14.8
COLLAR ELEV. 5.6 ft	**NORTHING** 1,012,387 **US ft**	**EASTING** 2,857,131 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 90.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 5/3/06	**COMPLETED** 5/3/06	**SURFACE WATER DEPTH** NA		

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
-69.2					Continued from previous page				
		5	6	7	13				Yorktown Fm: Green-gray, sandy, CLAY (A-7-6) w/ trace shell fragments *(continued)*
-73.4	79.0						W		
		4	5	5	10				
-78.4	84.0						W		
		4	4	6	10				
-83.4	89.0								
		4	4	7	11	SS-108	45.3%		-84.9 90.5
									Boring terminated at 90.5 ft (Elev. -84.9 ft) in Yorktown Fm: Stiff, sandy, CLAY (A-7-6) with trace shell fragments
									Bits Used: 3" Side-Discharge Finger Bit
									Drilling Fluid Properties: Not Determined

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 6/6/06

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

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B16-C	**BORING LOCATION** 29+66	**OFFSET** 41 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. -10.6 ft	**NORTHING** 1,012,371 **US ft**	**EASTING** 2,857,204 **US ft**		**24 HR.** Boring
TOTAL DEPTH 63.0 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/16/03	**COMPLETED** 7/16/03	**SURFACE WATER DEPTH** 12.0 ft	

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
-10.6					Mudline				
-10.6	0.0	WOH	WOH	WOH	WOH		Sat.		Alluvium: Brown, f. sandy, silty CLAY (A-6)
-15.6	5.0								Alluvium: Gray and tan, silty, f. to cse. SAND (A-3)
-16.8	6.2	12	13	12	25		Sat.		
-22.0	11.4	5	5	4	9	SS-15	Sat.		
-25.6	15.0								CPU: Gray, f. sandy, silty CLAY (A-6)
-27.1	16.5	1	2	2	4		Sat.		
-32.1	21.5	1	2	2	4		Sat.		
-37.1	26.5	2	2	2	4		Sat.		
-40.6	30.0								CPU: Gray, f. sandy, clayey SILT (A-4)
-42.1	31.5	2	2	6	8		Sat.		
-44.6	34.0								CPU: Gray, silty, f. to cse. SAND (A-2-4)
-47.1	36.5	8	8	12	20		W		
-52.1	41.5	9	16	29	45		W		
-57.1	46.5	10	10	20	30		W		
-61.6	51.0								Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
-62.1	51.5	3	3	4	7		M		
-67.1	56.5	3	5	6	11		M		
-72.1	61.5	4	5	6	11		M		
-73.6	63.0								Boring terminated at 63.0 ft (elev. -73.6 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments

Bits Used: 0.3' roller cone

Drilling Fluid Properties: 9.1 lbs/gal

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 19 OF 33

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B18-C	**BORING LOCATION** 30+61	**OFFSET** 55 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. -5.4 ft	**NORTHING** 1,012,305 **US ft**	**EASTING** 2,857,274 **US ft**		**24 HR.** Boring
TOTAL DEPTH 68.2 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/16/03	**COMPLETED** 7/16/03	**SURFACE WATER DEPTH** 6.8 ft	

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
-5.4					Mudline				
-5.4	0.0	WOH	WOH	WOH	WOH		Sat.		Alluvium: Brown, sandy MUCK
-7.4	2.0								Alluvium: Gray and tan, silty, f. to cse. SAND (A-2-4) with trace gravel
-11.7	6.3	7	7	9	16		Sat.		
-16.6	11.2	4	5	5	10		Sat.		
-21.7	16.3	4	8	6	14		Sat.		
-25.4	20.0								CPU: Gray, f. sandy, silty CLAY (A-6) micaceous with trace wood fragments
-26.7	21.3	2	2	2	4		Sat.		
-32.3	26.9	1	1	1	2		Sat.		
-37.2	31.8	1	1	2	3		Sat.		
-39.4	34.0								CPU: Gray, micaceous, f. sandy, clayey SILT (A-4)
-42.0	36.6	3	6	4	10	SS-16	31.3%		
-44.4	39.0								CPU: Gray, silty, f. to cse. SAND (A-2-4)
-47.2	41.8	4	9	18	27		W		
-51.9	46.5	9	8	9	17		W		
-56.9	51.5	19	28	32	60		W		
-61.4	56.0								Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
-62.1	56.7	3	3	3	6		M		
-67.1	61.7	4	4	4	8		M		
-72.1	66.7	3	4	5	9		M		
-73.6	68.2								Boring terminated at 68.2 ft (elev. -73.6 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments

Bits Used: 0.3' roller cone

Drilling Fluid Properties: 8.9 lbs/gal

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** J. Howard
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. B4-REV	**BORING LOCATION** 31+04	**OFFSET** 9 ft RT	**ALIGNMENT** -L-	**0 HR.** 15.2
COLLAR ELEV. 4.9 ft	**NORTHING** 1,012,232 **US ft**	**EASTING** 2,857,250 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 102.0 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 5/1/06	**COMPLETED** 5/2/06	**SURFACE WATER DEPTH** NA		

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
4.9					Ground Surface				4.9 / 0.0
4.9	0.0	2	2	2	4		D		Roadway Embankment Fill: Tan-gray, silty, SAND (A-2-4) w/ wood fragments
-0.6	5.5	38	43	23	Invalid due to wood 66		W		
-5.6	10.5	4	5	5	10		W		-4.6 / 9.5 Alluvium: Tan, gray, and orange, silty, f. to cse. SAND (A-2-4) w/ trace organics
-10.6	15.5	7	7	8	15		▽ W		
-15.6	20.5	7	8	8	16		W		
-20.6	25.5	4	6	8	14		W		
-25.6	30.5	7	8	20	28		W		-30.1 / 35.0 Coastal Plain Undivided (CPU): Gray, f. sandy, silty CLAY (A-6)
-30.6	35.5	2	1	2	3		W		
-35.6	40.5	WOH	1	3	4		W		
-40.6	45.5	12	9	6	15		M		
-45.6	50.5	9	14	12	26		W		-44.6 / 49.5 CPU: Gray, silty, f. to cse. SAND (A-2-4)
-50.6	55.5	13	20	27	47		W		-52.6 / 57.5 CPU: Gray and brown-tan, silty, f. to cse. SAND (A-3)
-55.6	60.5	17	28	35	63		W		
-60.6	65.5	20	32	43	75		W		
-65.6	70.5	34	54	28	82		W		-69.1 / 74.0

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 6/6/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 20 OF 33

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** J. Howard
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. B4-REV	**BORING LOCATION** 31+04	**OFFSET** 9 ft RT	**ALIGNMENT** -L-	**0 HR.** 15.2
COLLAR ELEV. 4.9 ft	**NORTHING** 1,012,232 **US ft**	**EASTING** 2,857,250 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 102.0 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 5/1/06	**COMPLETED** 5/2/06	**SURFACE WATER DEPTH** NA		

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
-69.9					Continued from previous page				
-70.6	75.5	4	5	8	13		W		Yorktown Fm: Green-gray, sandy, CLAY (A-7-6) w/ trace shell fragments *(continued)*
-75.6	80.5	4	4	6	10		W		
-80.6	85.5	3	4	5	9		W		
-85.6	90.5	5	5	7	12		W		
-90.6	95.5	4	4	7	11		W		
-95.6	100.5	7	8	10	18		W		-97.1 / 102.0 Boring terminated at 102.0 ft (Elev. -97.1 ft) in Yorktown Fm: Very stiff, sandy, CLAY (A-7-6) with trace shell fragments

Bits Used: 3" Side-Discharge Finger Bit

Drilling Fluid Properties: Not Determined

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 6/6/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B20-C	**BORING LOCATION** 31+37	**OFFSET** 52 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.1
COLLAR ELEV. 2.9 ft	**NORTHING** 1,012,244 **US ft**	**EASTING** 2,857,318 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 79.3 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/15/03	**COMPLETED** 7/15/03	**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
2.9					Ground Surface				2.9 0.0
2.9	0.0	1	1	1	2		M		Alluvium: Tan brown to black, silty, SAND (A-2-4) with trace organics 0.8 2.1
0.1	2.8	1	1	2	3	SS-22	M		Alluvium: Light gray to gray, f. sandy, clayey, SILT (A-4); Shelby tube pushed adjacent to boring from 2.9 ft to 5.0 ft, recovery=1.6 ft. Tube submitted to NCDOT for EFA analysis. -3.2 6.1
-4.9	7.8	3	5	6	11	SS-23	W		Alluvium: Light gray to gray, silty, f. to cse. SAND (A-2-4)
-9.9	12.8	6	7	8	15		W		-8.2 11.1 Alluvium: Light gray to tan and brown, silty, f. SAND (A-3)
-14.9	17.8	5	4	6	10		W		-13.2 16.1 Alluvium: Tan brown to brown and orange, silty, f. to cse. SAND (A-2-4) with quartz gravel
-19.9	22.8	5	6	7	13		W		-23.2 26.1 CPU: Light gray to gray silty, f. sandy, CLAY (A-6)
-24.9	27.8	1	1	1	2		W		
-29.9	32.8	WOH	WOH	2	2		W		
-34.9	37.8	WOH	2	11	13		W		-35.9 38.8 CPU: Gray silty, f. SAND (A-2-4)
-39.9	42.8	WOH	WOH	WOH	WOH 0		W		-38.2 41.1 CPU: Light gray to gray, f. sandy, silty, CLAY (A-6)
-44.9	47.8	2	3	4	7		W		-43.2 46.1 CPU: Light gray to gray, silty, f. sandy, CLAY (A-7-6)
-49.9	52.8	4	10	14	24		W		-50.4 53.3 CPU: Light gray to gray, silty, f. to cse. SAND (A-2-4)
-54.9	57.8	22	30	40	70		W		
-59.9	62.8	18	30	41	71		W		-63.2 66.1 Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
-64.9	67.8	3	4	4	8		M		
-69.9	72.8	4	4	5	9		M		

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 21 OF 33

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B20-C	**BORING LOCATION** 31+37	**OFFSET** 52 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.1
COLLAR ELEV. 2.9 ft	**NORTHING** 1,012,244 **US ft**	**EASTING** 2,857,318 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 79.3 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/15/03	**COMPLETED** 7/15/03	**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
-71.9					Continued from previous page				
-74.9	77.8	5	6	7	13		M		Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments *(continued)* -76.4 79.3
									Boring terminated at 79.3 ft (elev. -76.4 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments
									Bits Used: 0.3' side-discharge wing bit and 0.3' side-discharge finger bit.
									Drilling Fluid Properties: 8.8 lbs/gal

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

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

MACTEC

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. EB2-REV	**BORING LOCATION** 31+52	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** 8.3
COLLAR ELEV. 10.7 ft	**NORTHING** 1,012,207 **US ft**	**EASTING** 2,857,296 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 78.7 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/25/06	**COMPLETED** 4/27/06	**SURFACE WATER DEPTH** NA		

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
10.7					Pavement				10.7 / 0.0
					9				9.9 Asphalt Pavement to 0.8 ft / 0.8
7.5	3.2	6	5	4		SS-109	M		Roadway Embankment Fill: Tan, clayey, f. to cse. sandy, SILT (A-4)
					47				4.7 / 6.0
2.7	8.0	10	17	30			M		Roadway Embankment Fill: Tan, clayey, silty, f. to cse. SAND (A-2-4)
					19				-0.3 / 11.0
-1.8	12.5	9	9	10			W		Alluvium: Gray, silty, f. to cse. SAND (A-2-4)
					19	SS-110			
-6.8	17.5	9	9	10			W		
					27				
-11.8	22.5	7	12	15			W		
					11				
-16.8	27.5	5	4	7			W		
					19	SS-111			
-21.8	32.5	8	10	9			W		
					4	SS-112	40.1%		-15.3 / 26.0
-26.8	37.5	2	2	2			W		Alluvium: Orange-tan, silty, f. to cse. SAND (A-3)
					5				
-31.8	42.5	2	2	3			W		
					8				
-36.8	47.5	2	3	5			W		
					28	SS-113			-25.3 / 36.0
-41.5	52.2	5	13	15			W		Coastal Plain Undivided (CPU): Gray, f. sandy, silty CLAY (A-6)
					49				
-46.5	57.2	14	23	26			W		
					75				-40.3 / 51.0
-51.5	62.2	20	25	50			W		CPU: Gray, silty, f. SAND (A-2-4)
					93				
-56.5	67.2	27	43	50			W		-49.3 / 60.0
					16				CPU: Gray to light gray, silty, f. to cse. SAND (A-3)
-61.5	72.2	15	9	7			M		-62.0 / 72.7

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 6/6/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 22 OF 33

MACTEC

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. EB2-REV	**BORING LOCATION** 31+52	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** 8.3
COLLAR ELEV. 10.7 ft	**NORTHING** 1,012,207 **US ft**	**EASTING** 2,857,296 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 78.7 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/25/06	**COMPLETED** 4/27/06	**SURFACE WATER DEPTH** NA		

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
-64.1					Continued from previous page				
-66.5	77.2	4	6	6	12		M		Yorktown Fm: Gray-green, silty, CLAY (A-7-6) w/ trace shell fragments *(continued)*
									-68.0 / 78.7
									Boring terminated at 78.7 ft (Elev. -68.0 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) with trace shell fragments
									Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit
									Drilling Fluid Properties: Not Determined

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 6/6/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. EB2-B	**BORING LOCATION** 31+93	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** 6.8
COLLAR ELEV. 9.3 ft	**NORTHING** 1,012,162 **US ft**	**EASTING** 2,857,307 **US ft**		**24 HR.** 7.2
TOTAL DEPTH 99.3 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual	
DATE STARTED 7/15/03	**COMPLETED** 7/15/03	**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
9.3					Ground Surface				9.3 0.0
9.3	0.0	3	4	3	7		D		Roadway Embankment Fill: Tan-brown, brown and gray, silty, clayey, fine to coarse SAND (A-2-4) with trace organic matter
6.5	2.8	2	2	2	4	SS-17	M		
1.5	7.8								3.2 6.1 Alluvium: Tan brown to brown and orange, silty, f. to cse. SAND (A-2-4)
		17	15	11	26		W		
-3.5	12.8	7	10	9	19		W		
-8.5	17.8	5	6	8	14		W		
-13.5	22.8	6	8	9	17		W		
-18.5	27.8	7	6	4	10		W		
-23.5	32.8	1	2	1	3		W		
-28.5	37.8	WOH	WOH	WOH	WOH 0		W		
-33.5	42.8	1	3	8	11		W		-34.5 43.8 CPU: Dark gray, silty, f. to cse. SAND (A-2-4)
-38.5	47.8	2	2	3	5		W		-36.8 46.1 CPU: Dark gray, silty, f. sandy, CLAY (A-7-6)
-43.5	52.8	2	5	6	11		W		-41.8 51.1 CPU: Dark gray to gray, silty, f. to cse. SAND (A-2-4)
-48.5	57.8	5	10	18	28		W		
-53.5	62.8	9	9	11	20	SS-18	W		
-58.5	67.8	14	27	40	67		W		-61.8 71.1 Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
-63.5	72.8	3	3	5	8		M		

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 23 OF 33

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. EB2-B	**BORING LOCATION** 31+93	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** 6.8
COLLAR ELEV. 9.3 ft	**NORTHING** 1,012,162 **US ft**	**EASTING** 2,857,307 **US ft**		**24 HR.** 7.2
TOTAL DEPTH 99.3 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual	
DATE STARTED 7/15/03	**COMPLETED** 7/15/03	**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
-65.5					Continued from previous page				
-68.5	77.8	3	3	6	9		M		Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments *(continued)*
-73.5	82.8	3	5	6	11	SS-19	40.3%		
-78.5	87.8	3	5	6	11		M		
-83.5	92.8	4	6	8	14		M		
-88.5	97.8	3	4	6	10		M		-90.0 99.3 Boring terminated at 99.3 ft (elev. -90.0 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments

Bits Used: 0.3' side-discharge wing bit

Drilling Fluid Properties: 8.8 lbs/gal

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/19/06

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 PROJ. NAME AND NO.: Replacement of Bridge No. 4 over Tulls Creek on SR 1222 (6468-06-1377)

PROJECT: 32773.1.1 (B-2950) **COUNTY: Currituck** **OWNER: N.C.D.O.T.**

DATE SAMPLED: April/May 2006 **RECEIVED:** 5/11/2006 **REPORTED BY: MACTEC**

SAMPLED FROM: EB1-REV, B1-REV

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-101	SS-102	SS-103	SS-104	SS-105	SS-106
Retained 4.75 mm Sieve	(%)	0.4	0.0	0.0	1.1	1.0	0.0
Passing 2.00 mm Sieve	(%)	99.6	100.0	99.9	97.4	98.8	100.0
Passing 425 µm Sieve	(%)	99.2	99.8	94.7	88.7	97.0	99.8
Passing 75 µm Sieve	(%)	68.0	95.1	10.8	86.2	80.5	14.2

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	2.5	0.6	19.9	10.4	4.5	6.0
Fine Sand Ret - 53 µm	(%)	34.6	6.3	71.8	1.5	22.1	83.4
Silt 0.05 - 0.005 mm	(%)	36.6	50.2	4.8	45.3	41.9	4.0
Clay < 0.005 mm	(%)	26.2	42.9	3.5	42.8	31.6	6.6
		100.0	100.0	100.0	100.0	100.0	100.0

Moisture Content	(%)	15.0	80.1	ND	41.0	12.2	ND
Liquid Limit, L.L.		24	74	NP	50	25	17
Plasticity Index, P.I.		7	38	NP	28	10	NP
AASHTO Classification		A-4(2)	A-7-5(45)	A-2-4(0)	A-7-6(26)	A-4(6)	A-2-4(0)
Organic Content	(%)	ND	ND	ND	ND	ND	ND

Boring No.		EB1-REV	EB1-REV	EB1-REV	EB1-REV	B1-REV	B1-REV
Station		28+49	28+49	28+49	28+49	29+09	29+09
Offset		9 ft LT	9 ft LT	9 ft LT	9 ft LT	7 ft RT	7 ft RT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	13.0	18.0	63.0	78.0	4.0	29.0
	to	14.5	19.5	64.5	79.5	5.5	30.5

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. [illegible]

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 PROJ. NAME AND NO.: Replacement of Bridge No. 4 over Tulls Creek on SR 1222 (6468-06-1377)

PROJECT: 32773.1.1 (B-2950) **COUNTY: Currituck** **OWNER: N.C.D.O.T.**

DATE SAMPLED: April/May 2006 **RECEIVED:** 5/11/2006 **REPORTED BY: MACTEC**

SAMPLED FROM: B1-REV, EB2-REV

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-107	SS-108	SS-109	SS-110	SS-111	SS-112
Retained 4.75 mm Sieve	(%)	0.0	0.1	0.0	0.0	0.0	0.0
Passing 2.00 mm Sieve	(%)	100.0	99.8	99.9	100.0	100.0	100.0
Passing 425 µm Sieve	(%)	97.3	99.3	98.5	99.3	93.6	99.0
Passing 75 µm Sieve	(%)	54.7	95.7	43.3	17.3	8.9	67.6

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	10.9	0.9	8.8	10.7	13.4	3.6
Fine Sand Ret - 53 µm	(%)	40.0	5.6	50.5	75.9	79.6	40.4
Silt 0.05 - 0.005 mm	(%)	19.0	44.0	15.1	9.5	1.0	26.2
Clay < 0.005 mm	(%)	30.1	49.5	25.6	3.9	6.0	29.8
		100.0	100.0	100.0	100.0	100.0	100.0

Moisture Content	(%)	30.1	45.3	ND	ND	ND	40.1
Liquid Limit, L.L.		32	62	22	NP	NP	32
Plasticity Index, P.I.		17	37	5	NP	NP	15
AASHTO Classification		A-6(6)	A-7-6(41)	A-4(0)	A-2-4(0)	A-3	A-6(8)
Organic Content	(%)	ND	ND	ND	ND	ND	ND

Boring No.		B1-REV	B1-REV	EB2-REV	EB2-REV	EB2-REV	EB2-REV
Station		29+09	29+09	31+52	31+52	31+52	31+52
Offset		7 ft RT	7 ft RT	12 ft LT	12 ft LT	12 ft LT	12 ft LT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	39.0	89.0	3.2	17.5	32.5	37.5
	to	40.5	90.5	4.7	19.0	34.0	39.0

REMARKS: ND=NOT DETERMINED; NP=NOT PLASTIC

Reviewed by: Michael B. [illegible]

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 PROJ. NAME AND NO.: Replacement of Bridge No. 4 over Tulls Creek on SR 1222 (6468-06-1377)

PROJECT: 32773.1.1 (B-2950) **COUNTY:** Currituck **OWNER:** N.C.D.O.T.

DATE SAMPLED: April 2006/July 2003 **RECEIVED:** 5/11/2006-8/5/2003 **REPORTED BY:** MACTEC

SAMPLED FROM: EB2-REV, B14-B, B16-C, B18-C, EB2-B

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-113	SS-14	SS-15	SS-16	SS-17	SS-18
Retained 4.75 mm Sieve	(%)	0.0	0.0	0.0	0.0	4.2	0.0
Passing 2.00 mm Sieve	(%)	100.0	99.8	99.8	99.9	94.4	100.0
Passing 425 µm Sieve	(%)	99.5	65.5	90.4	99.2	86.8	99.1
Passing 75 µm Sieve	(%)	16.1	16.4	9.9	44.2	21.3	21.5

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	6.8	62.7	18.4	1.8	30.0	2.5
Fine Sand Ret - 53 µm	(%)	82.3	21.7	73.4	66.5	49.2	82.7
Silt 0.05 - 0.005 mm	(%)	5.2	8.0	2.9	18.0	9.0	7.9
Clay < 0.005 mm	(%)	5.7	7.5	5.2	13.7	11.9	6.9
		100.0	100.0	100.0	100.0	100.0	100.0

Moisture Content	(%)	ND	ND	ND	31.3	ND	ND
Liquid Limit, L.L.		NP	15	22	32	19	28
Plasticity Index, P.I.		NP	NP	NP	6	NP	NP
AASHTO Classification		A-2-4(0)	A-2-4(0)	A-3	A-4(0)	A-2-4(0)	A-2-4(0)
Organic Content	(%)	ND	1.1	ND	ND	ND	ND

Boring No.		EB2-REV	B14-B	B16-C	B18-C	EB2-B	EB2-B
Station		31+52	28+32	29+66	30+61	31+93	31+93
Offset		12 ft LT	12 ft RT	41 ft LT	55 ft LT	10 ft RT	10 ft RT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	52.2	2.2	11.4	36.6	2.8	62.8
	to	53.7	3.7	12.9	38.1	4.3	64.3

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. L

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 PROJ. NAME AND NO.: Replacement of Bridge No. 4 over Tulls Creek on SR 1222 (6468-06-1377)

PROJECT: 32773.1.1 (B-2950) **COUNTY:** Currituck **OWNER:** N.C.D.O.T.

DATE SAMPLED: July 2003 **RECEIVED:** 8/5/2003 **REPORTED BY:** MACTEC

SAMPLED FROM: EB2-B, B14-C, B20-C

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-19	SS-21	SS-22	SS-23		
Retained 4.75 mm Sieve	(%)	0.0	ND	0.5	0.0		
Passing 2.00 mm Sieve	(%)	100.0	ND	99.0	100.0		
Passing 425 µm Sieve	(%)	99.3	ND	97.9	99.7		
Passing 75 µm Sieve	(%)	98.5	ND	50.6	16.7		

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	0.9	ND	2.8	1.3		
Fine Sand Ret - 53 µm	(%)	1.4	ND	53.4	84.3		
Silt 0.05 - 0.005 mm	(%)	51.4	ND	23.7	2.4		
Clay < 0.005 mm	(%)	46.3	ND	20.0	12.0		
		100.0	0.0	100.0	100.0		

Moisture Content	(%)	40.3	96.6	ND	ND		
Liquid Limit, L.L.		48	ND	23	23		
Plasticity Index, P.I.		27	ND	4	NP		
AASHTO Classification		A-7-6(29)	ND	A-4(0)	A-2-4(0)		
Organic Content	(%)	ND	6.4	ND	ND		

Boring No.		EB2-B	B14-C	B20-C	B20-C		
Station		31+93	28+89	31+37	31+37		
Offset		10 ft RT	59 ft LT	52 ft LT	52 ft LT		
Alignment		-L-	-L-	-L-	-L-		
Depth (ft)	From	82.8	10.0	2.8	7.8		
	to	84.3	11.5	4.3	9.3		

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. L

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 32773.1.1 TIP: B-2950 COUNTY: Currituck

DESCRIPTION(1): Replacement of Bridge No. 4 over Tulls Creek on SR 1222 (Tulls Creek Rd.)

EXISTING BRIDGE

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

Bridge No.: 4 Length: 236 ft Total Bents: 8 Bents in Channel: 6 Bents in Floodplain: 2
Foundation Type: Timber piles reinforced with steel "H" beams and steel and timber pile caps

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Loss of embankment at end bent abutments/slopes

Interior Bents: No scour observed

Channel Bed: No scour observed

Channel Bank: Minor undercutting and sloughing of channel banks

EXISTING SCOUR PROTECTION

Type(3): Wooden wing walls, retaining walls, rip-rap

Extent(4): At end bents and embankment slopes

Effectiveness(5): Seem to be effective though starting to rot/fall apart

Obstructions(6): None observed

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 design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): CLAY (A-7-5/A-7-6) and SAND (A-2-4/A-3)

Channel Bank Material(8): SILT (A-4)

Channel Bank Cover(9): Marsh grasses, small to large bushes, scattered trees

Floodplain Width(10): 2000 feet

Floodplain Cover(11): Marsh grasses, small to large bushes, scattered trees

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

Channel Migration Tendency(13): Migration of Tulls Creek is unlikely and no preferential direction is observed

Observations and Other Comments: ____

Reported by: Michael B. [illegible] **Date:** 6/6/2006
MACTEC Engineering and Consulting, Inc.

DESIGN SCOUR ELEVATIONS(14) Feet ✓ Meters ____

BENTS										
B1	B2	B3	B4							
-6.5	-16.5	-16.5	-8.5							

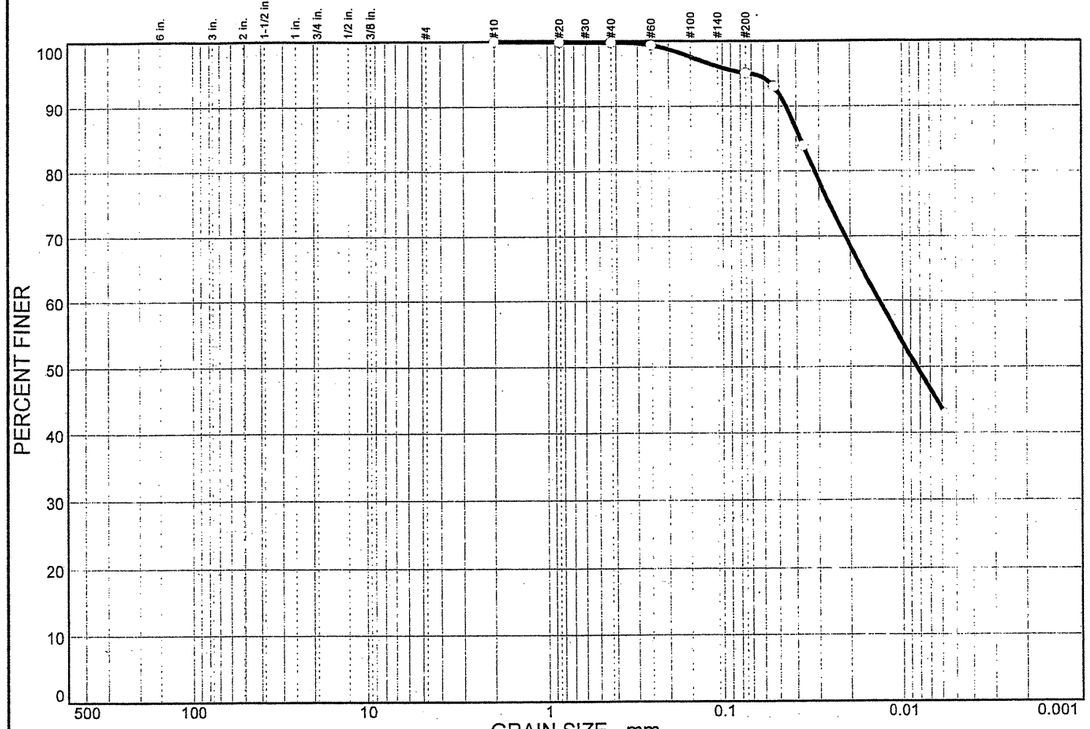
Comparison of DSE to Hydraulics Unit theoretical scour:
DSE is equivalent to maximum theoretical scour provided in the Bridge Survey and Hydraulic Design Report dated 2/8/06.

DSE determined by: Brad Worley **Date:** 6/14/2006

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bed	Bed	Bed	Bank		
Sample No.	SS-102	SS-110	SS-15	SS-23	SS-22		
Retained #4	0	0	0	0	0.5		
Passed #10	100	100	99.8	100	99		
Passed #40	99.8	99.3	90.4	99.7	97.9		
Passed #200	95.1	17.3	9.9	16.7	50.6		
Coarse Sand	0.6	10.7	18.4	1.3	2.8		
Fine Sand	6.3	75.9	73.4	84.3	53.4		
Silt	50.2	9.5	2.9	2.4	23.7		
Clay	42.9	3.9	5.2	12	20		
LL	74	NP	22	23	23		
PI	38	NP	NP	NP	4		
AASHTO	A-7-5(45)	A-2-4(0)	A-3	A-2-4(0)	A-4(0)		
Station	28+49	31+52	29+66	31+37	31+37		
Offset	9 ft LT	12 ft LT	41 ft LT	52 ft LT	52 ft LT		
Depth	18.0-19.5 ft	17.5-19.0 ft	11.4-12.9 ft	7.8-9.3	2.8-4.3 ft		

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	6.9	93.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.8		
#60	99.4		
#200	95.1		
#270	93.1		

* (no specification provided)

Soil Description

NATURAL MOISTURE=80.1%

Atterberg Limits

PL= 36 LL= 74 PI= 38

Coefficients

D_{85}= 0.0378 D_{60}= 0.0136 D_{50}= 0.0083
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= MH AASHTO= A-7-5(45)

Remarks

SPECIFIC GRAVITY IS ASSUMED
ND=NOT DETERMINED

Sample No.: EB1-REV SS-102 **Source of Sample:** **Date:** 5/31/06
Location: ND **Elev./Depth:** 18.0-19.5'

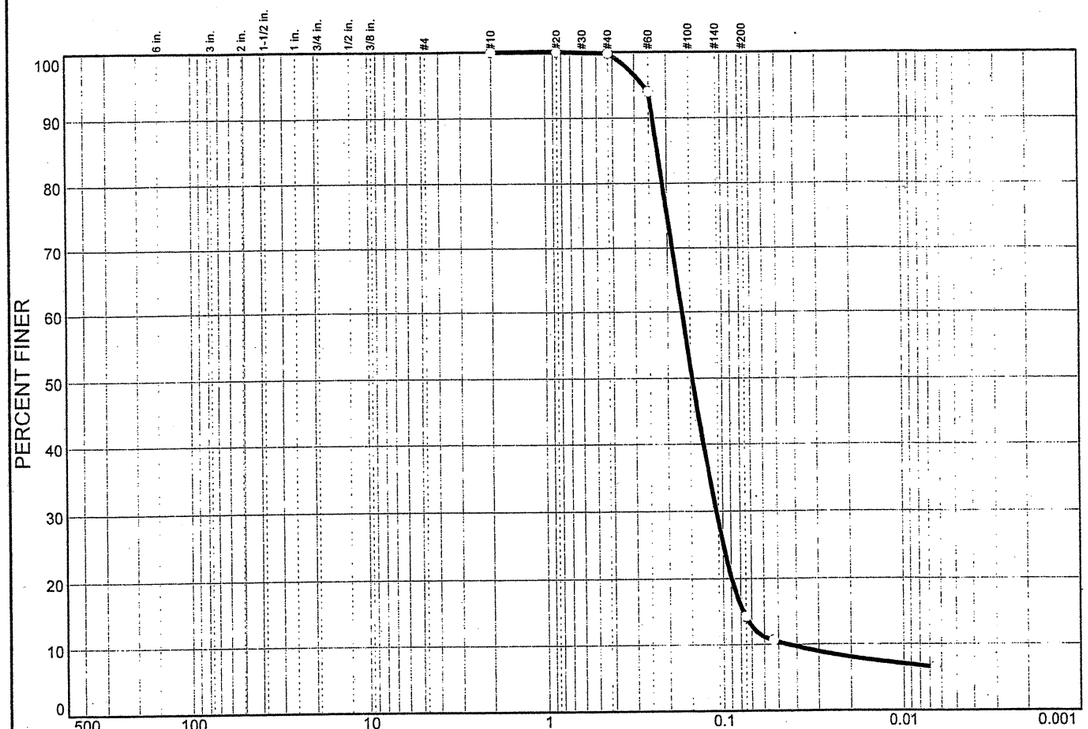
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NC DEPARTMENT OF TRANSPORTATION
Project: REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK

Project No: 6468061377

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	89.4	10.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.8		
#60	94.0		
#200	14.2		
#270	10.6		

* (no specification provided)

Soil Description

Atterberg Limits

PL= NP LL= 17 PI= NP

Coefficients

D_{85}= 0.224 D_{60}= 0.166 D_{50}= 0.146
D_{30}= 0.109 D_{15}= 0.0774 D_{10}= 0.0441
C_u= 3.76 C_c= 1.62

Classification

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

Remarks

SPECIFIC GRAVITY IS ASSUMED
ND=NOT DETERMINED
NP=NON-PLASTIC

Sample No.: B1-REV SS-106 **Source of Sample:** **Date:** 5/31/06
Location: ND **Elev./Depth:** 29.0-30.5'

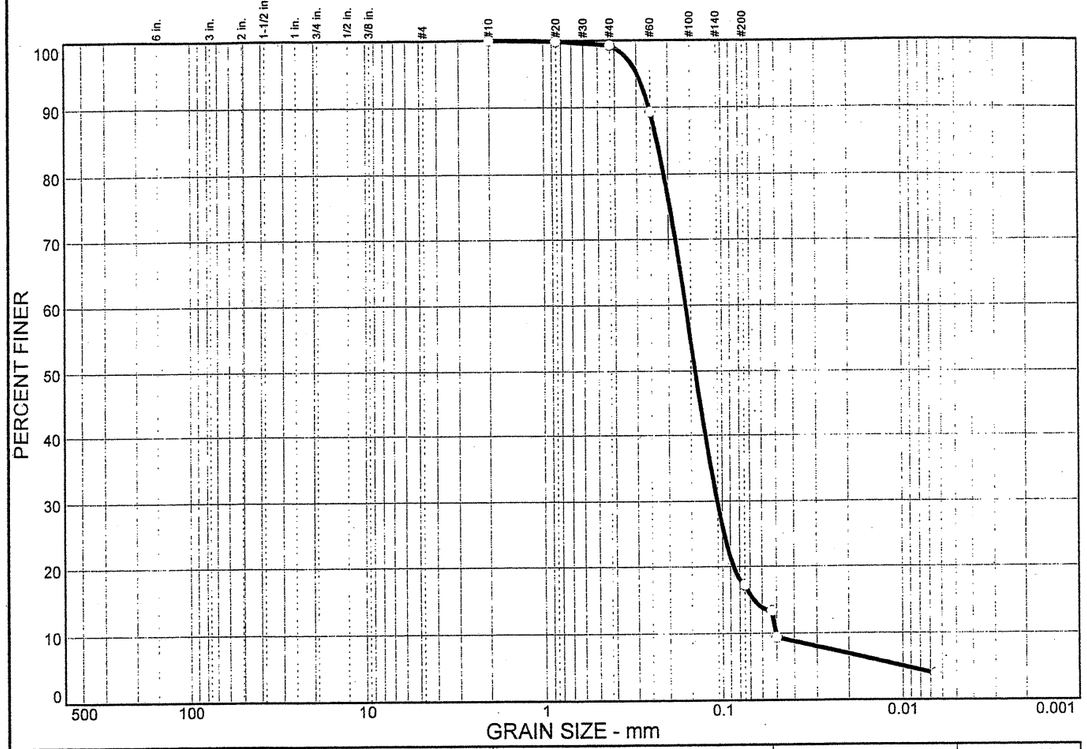
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NC DEPARTMENT OF TRANSPORTATION
Project: REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK

Project No: 6468061377

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	86.6	13.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.3		
#60	89.3		
#200	17.3		
#270	13.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.229 D_{60}= 0.160 D_{50}= 0.141
D_{30}= 0.107 D_{15}= 0.0661 D_{10}= 0.0504
C_u= 3.18 C_c= 1.41

Classification

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

Remarks

SPECIFIC GRAVITY IS ASSUMED
ND=NOT DETERMINED
NP=NON-PLASTIC

Sample No.: EB2-REV SS-110 **Source of Sample:** **Date:** 5/31/06
Location: ND **Elev./Depth:** 17.5-19.0'

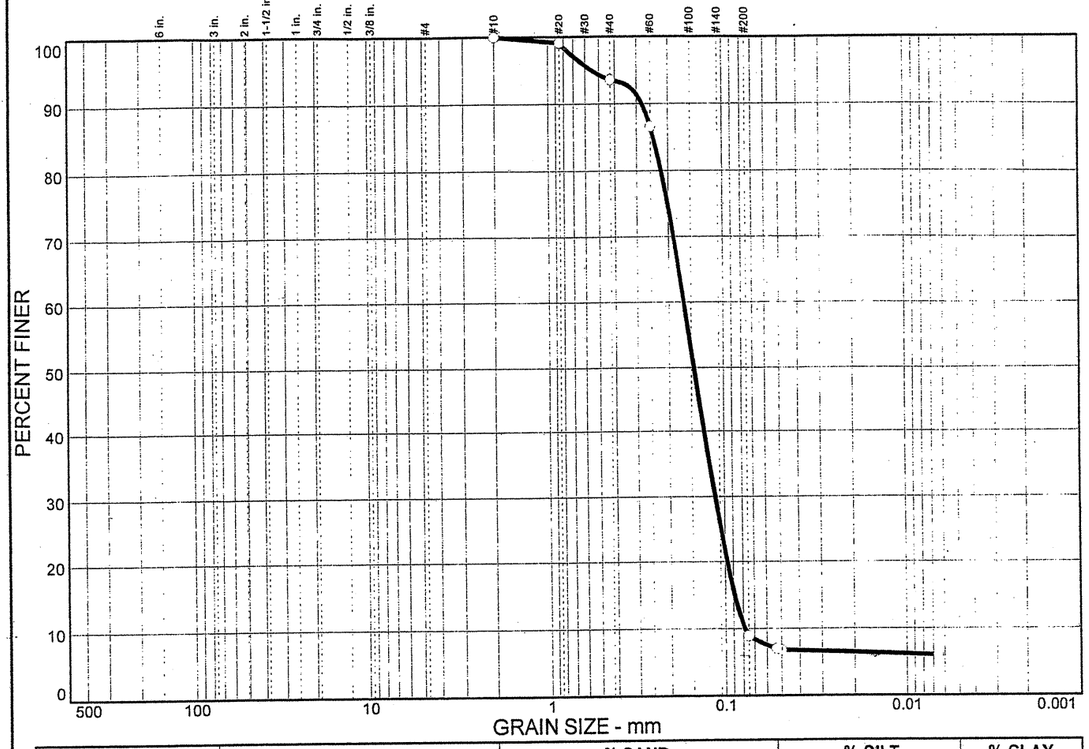
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NC DEPARTMENT OF TRANSPORTATION
Project: REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK

Project No: 6468061377

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	93.0	7.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.1		
#40	93.6		
#60	86.6		
#200	8.9		
#270	7.0		

* (no specification provided)

Soil Description

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{85}= 0.241 D_{60}= 0.164 D_{50}= 0.145
D_{30}= 0.113 D_{15}= 0.0886 D_{10}= 0.0782
C_u= 2.10 C_c= 0.99

Classification

USCS= SP-SM AASHTO= A-3

Remarks

SPECIFIC GRAVITY IS ASSUMED
NP=NON-PLASTIC
ND=NOT DETERMINED

Sample No.: EB2-REV SS-111 **Source of Sample:** **Date:** 5/31/06
Location: ND **Elev./Depth:** 32.5-34.0'

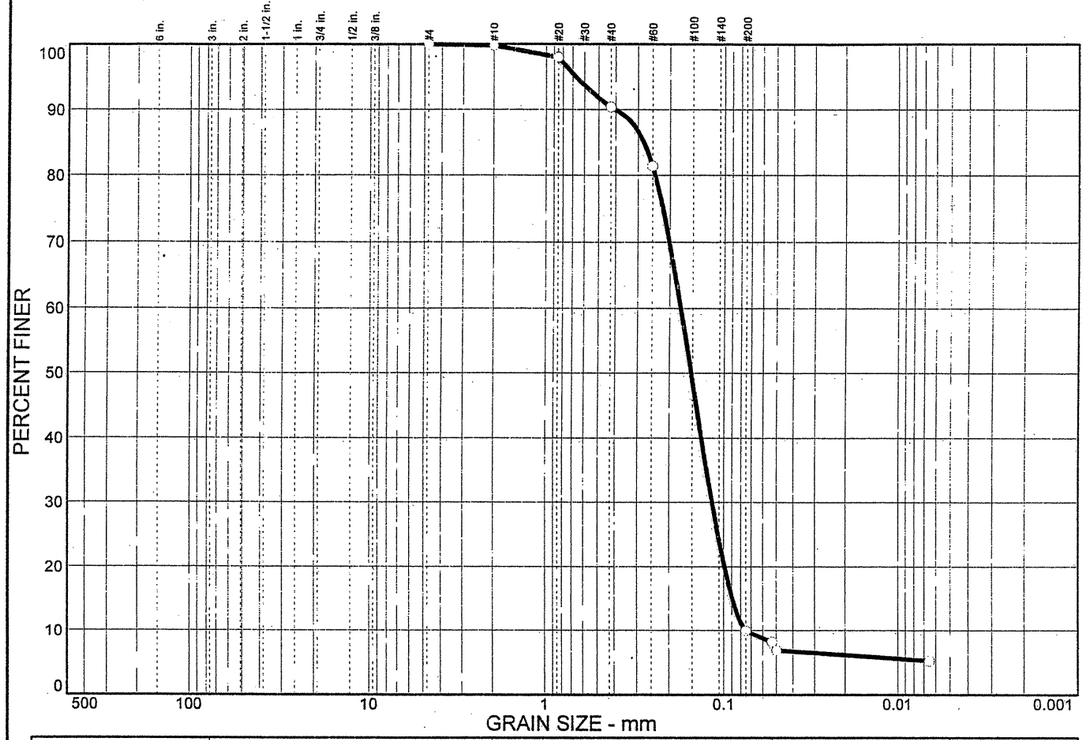
MACTEC

ENGINEERING & CONSULTING, INC.

Client: NC DEPARTMENT OF TRANSPORTATION
Project: REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK

Project No: 6468061377

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.2	91.7	8.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	98.0		
#40	90.4		
#60	81.4		
#200	9.9		
#270	8.1		

* (no specification provided)

Soil Description

Atterberg Limits

PL= NP LL= 22 PI= NP

Coefficients

D_{85}= 0.279 D_{60}= 0.174 D_{50}= 0.152
D_{30}= 0.116 D_{15}= 0.0893 D_{10}= 0.0755
C_u= 2.31 C_c= 1.03

Classification

USCS= ND AASHTO= A-3

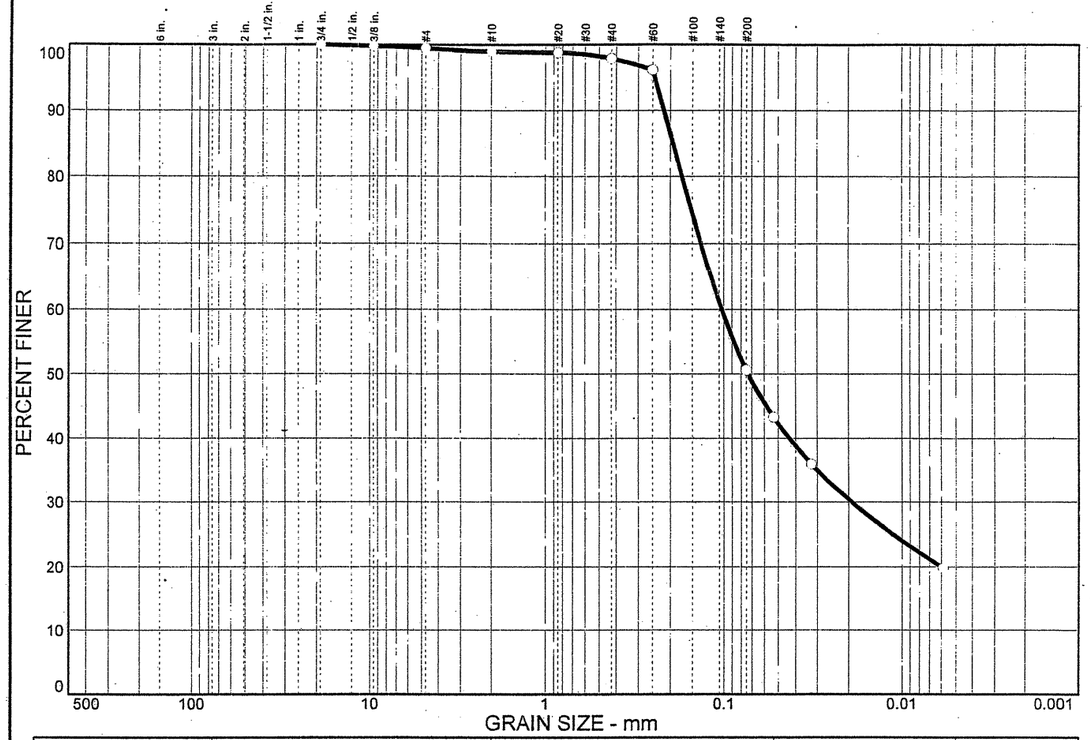
Remarks

NP=NON-PLASTIC
ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-15 **Source of Sample:** **Date:** 8/19/03
Location: B16-C **Elev./Depth:** 11.4 ft

MACTEC ENGINEERING & CONSULTING, INC.	**Client:** NCDOT **Project:** BRIDGE 4 OVER TULL'S CREEK ON SR 1222 **Project No:** 6468-03-0054 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.0	55.7	43.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	99.8		
#4	99.5		
#10	99.0		
#20	98.8		
#40	97.9		
#60	96.2		
#200	50.6		
#270	43.3		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 19 LL= 23 PI= 4

Coefficients

D_{85}= 0.193 D_{60}= 0.102 D_{50}= 0.0732
D_{30}= 0.0191 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ND AASHTO= A-4(0)

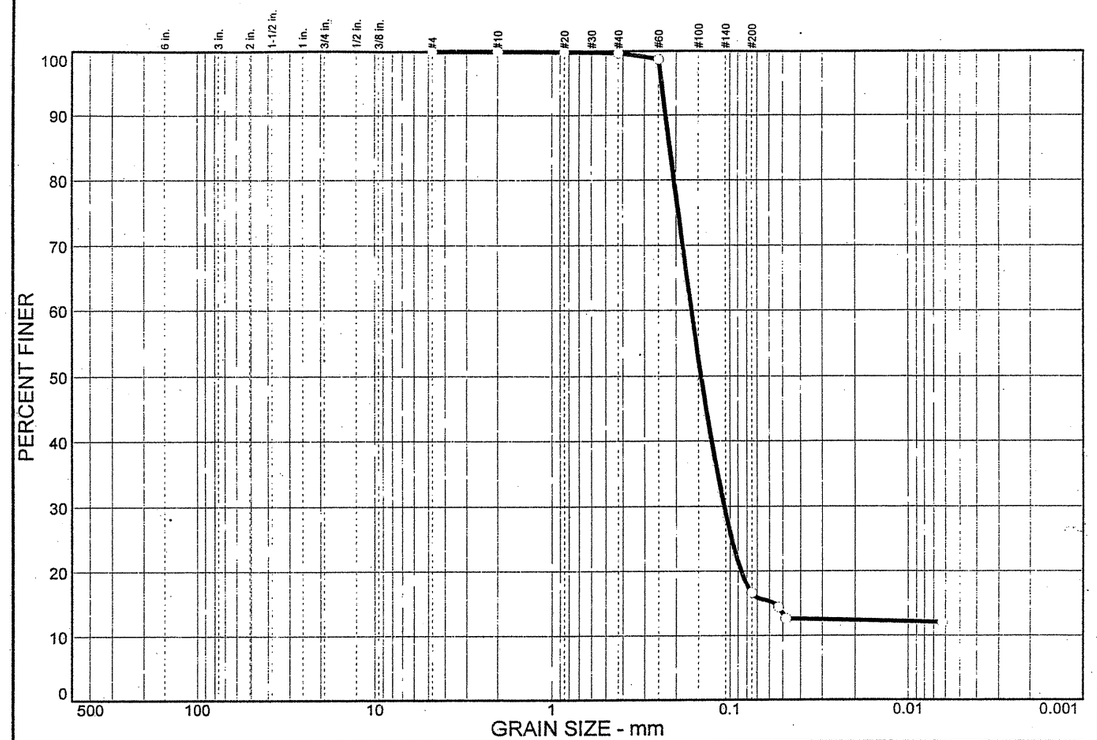
Remarks

ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-22 **Source of Sample:** **Date:** 8/19/03
Location: B-20 **Elev./Depth:** 2.8-4.3 ft

MACTEC ENGINEERING & CONSULTING, INC.	**Client:** NCDOT **Project:** BRIDGE 4 OVER TULL'S CREEK ON SR 1222 **Project No:** 6468-03-0054 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	85.6	14.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.7		
#60	98.7		
#200	16.7		
#270	14.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= NP LL= 23 PI= NP

Coefficients

D_{85}= 0.216 D_{60}= 0.164 D_{50}= 0.145
D_{30}= 0.108 D_{15}= 0.0559 D_{10}=
C_u= C_c=

Classification

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

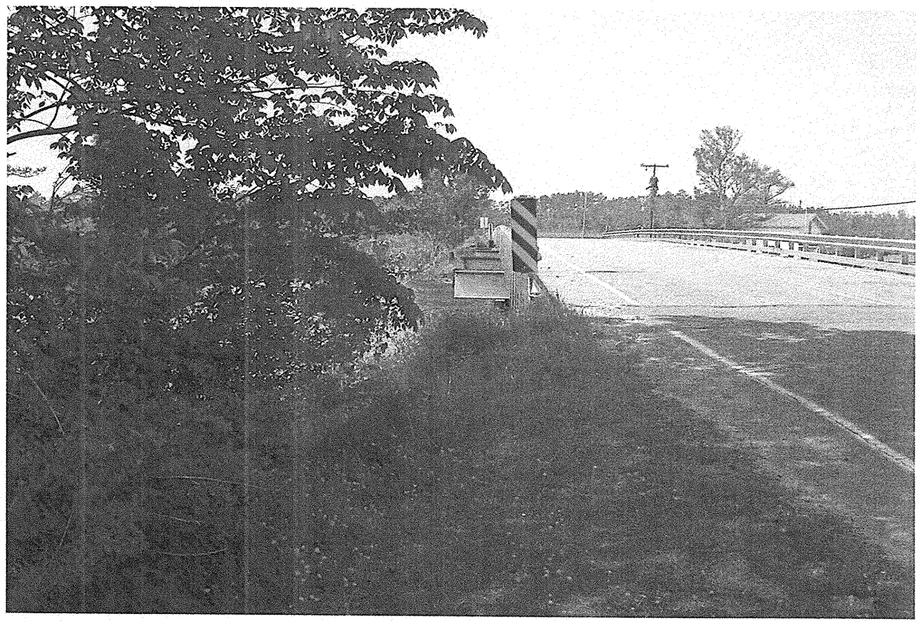
Remarks

NP=NON-PLASTIC
ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-23 **Source of Sample:** **Date:** 8/19/03
Location: B-20 **Elev./Depth:** 7.8-9.3 ft

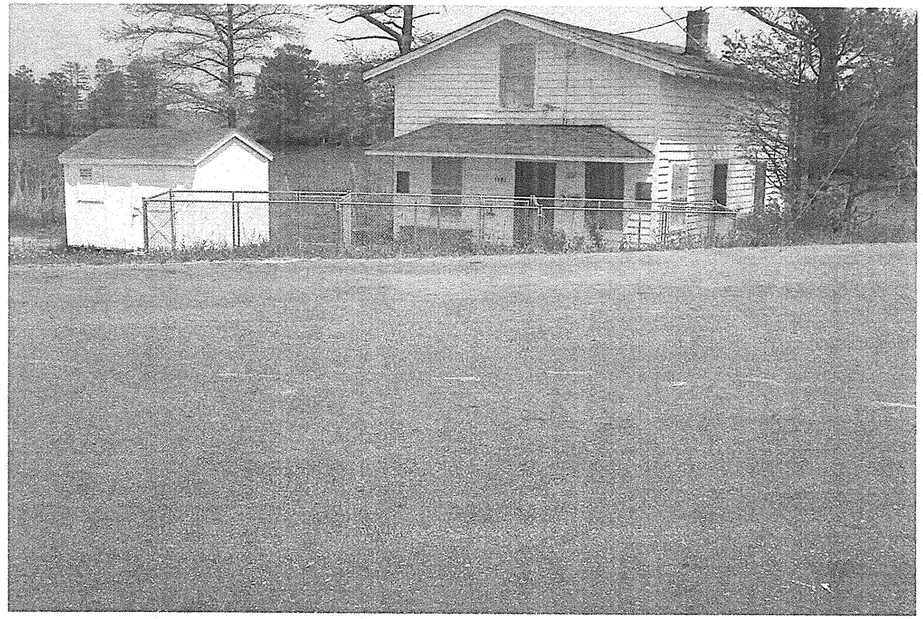
MACTEC ENGINEERING & CONSULTING, INC.	**Client:** NCDOT **Project:** BRIDGE 4 OVER TULL'S CREEK ON SR 1222 **Project No:** 6468-03-0054 Plate

View looking south from approximate station 28+40, 15 RT of -L-.

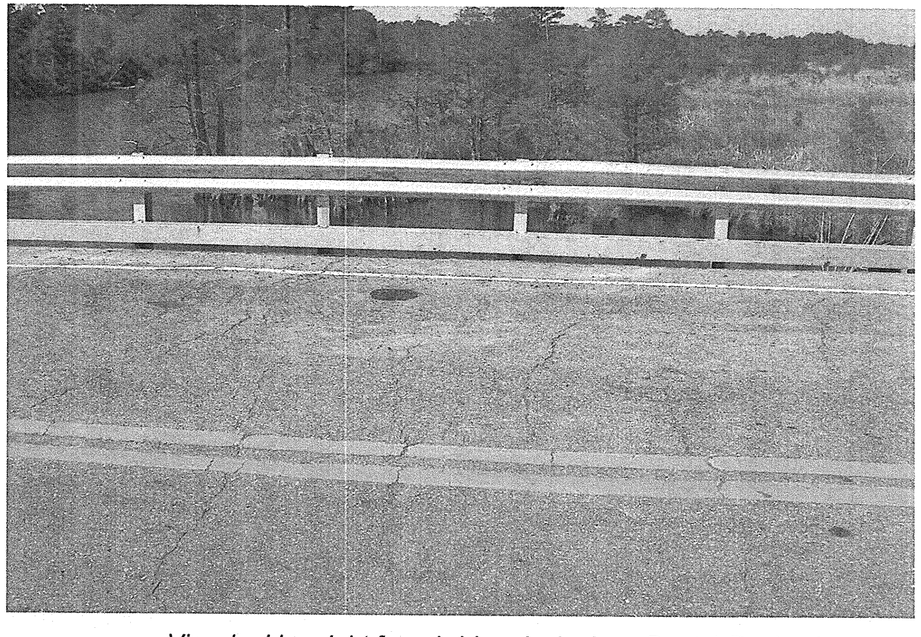


View looking north from approximate station 31+60, 15 RT of -L-.

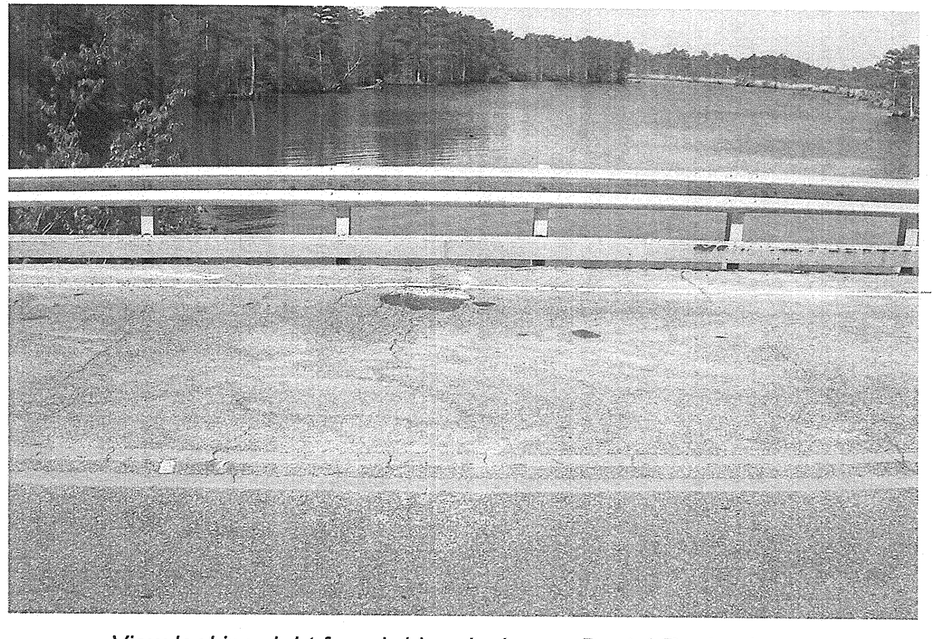
View looking right along End Bent 1 Revised.



View looking left along End Bent 1 Revised.

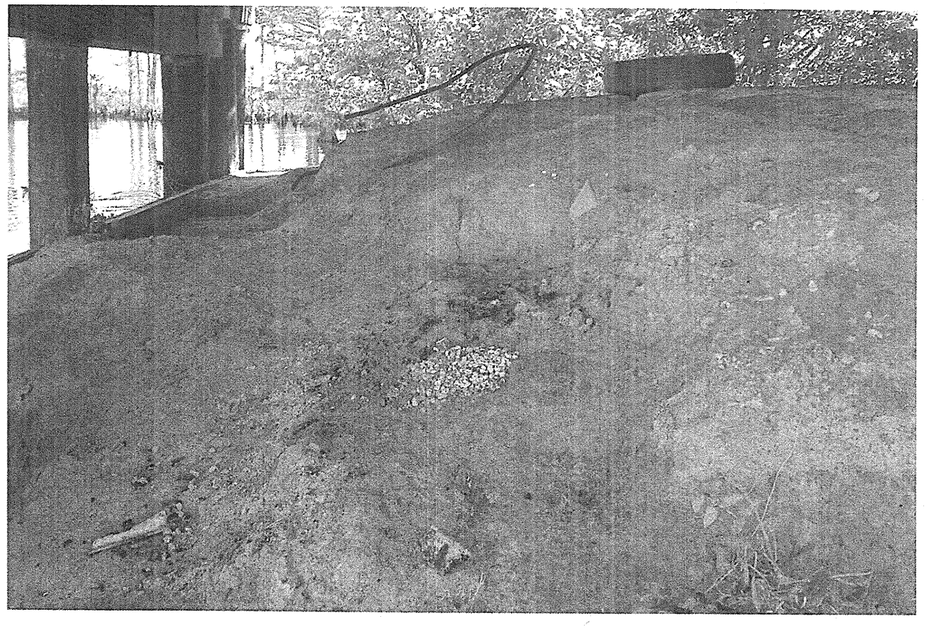


View looking right from bridge deck along Bent 1 Revised.



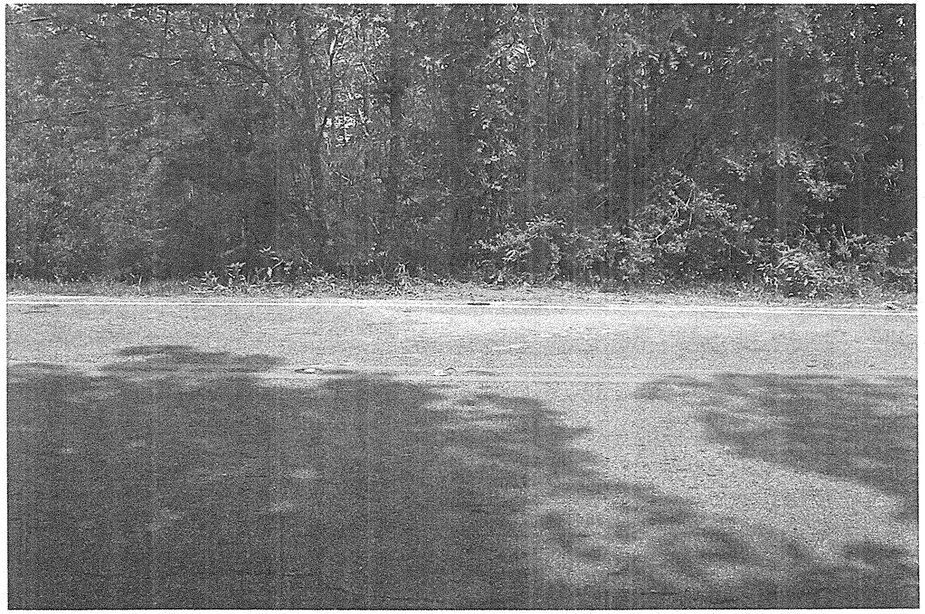
View looking right from bridge deck near Bent 4 Revised.

View looking left from under bridge deck along Bent 1 Revised.



View looking left from under bridge deck near Bent 4 Revised.

View looking right along End Bent 2 Revised.



View looking left along End Bent 2 Revised.

PROJECT: 32773.1.1 I.D.: B-2950

STATE	STATE PROJECT NO.		SHEET NO.	TOTAL SHEETS
N.C.	32773.1.1		1	58
PROJ. ID NO.	F. A. PROJ. NO.	DESCRIPTION		
B-2950	BRZ-1222(2)	P.E.		
		CONST.		

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

SUBSURFACE INVESTIGATION

STATE PROJECT NO. 32773.1.1 I.D. NO. B-2950

F.A. PROJECT BRZ-1222(2)

COUNTY CURRITUCK

PROJECT DESCRIPTION RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222 (TULLS CREEK ROAD)

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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.

NOTE – THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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: R. RAHIE

INVESTIGATED BY	MACTEC ENGINEERING AND CONSULTING, INC.	PERSONNEL	M. LEAR
CHECKED BY	J. VEITH		D. RHODES
SUBMITTED BY	M. LEAR		B. MILLER
DATE	05/10/06		M. LOUDERMILK
REVISED	05/31/06		T. HAHN
REVISED	06/7/06		

For Letting

NORTH CAROLINA LICENSED SEAL 1927 GEOLOGIST MICHAEL B. LEAR 6/7/06

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-2950	32773.1.1	2	58

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 # 40 # 200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
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
	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)	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
PL — PLASTIC LIMIT 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
CPU - COASTAL PLAIN UNDIVIDED
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-55
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER CME-45 BARGE
- [ ] OTHER D-50 ATV

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [X] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 3" & 4" STEEL TEETH
- [ ] TRICONE ___ TUNG.-CARB.
- [ ] CORE BIT
- [ ] OTHER ___

HAMMER TYPE:
- [ ] AUTOMATIC [X] MANUAL

CORE SIZE:
- [ ] -B ___
- [ ] -N WD4
- [ ] -H Q

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

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 SURVEY POINT BL-6, ELEV. = 2.19 ft MSL

NOTES:

- SPLIT SYMBOL- SAND (A-3) AND CLAY (A-7-6)
- SPLIT SYMBOL- CLAY (A-6) AND SAND (A-3)
- ASPHALT

Subject: **Geotechnical Report**

Description: **Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222 (Tulls Creek Road)**

Project Number: **32773.1.1**
Tip Number: **B-2950**
F.A. Number: **BRZ-1222 (2)**
MACTEC Project Number: **6468-06-1378**

Project Information

The purpose of this investigation was to obtain geotechnical information for design and construction of the proposed retaining walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222, Currituck County, North Carolina (Drawings 1 and 2). Our understanding of this project comes from conversations with NCDOT Geotechnical Unit personnel and from documents and drawings provided by the Geotechnical Unit, including a Request for Proposal dated March 28, 2006, a Bridge Survey and Hydraulic Design Report dated February 8, 2006, and electronic drawings obtained via the NCDOT file transfer website.

In July and August of 2003, MACTEC completed a structure investigation at the subject site. We drilled a total of 14 soil borings along an adjacent alignment. The length of the proposed structure has since been reduced, the alignment has been moved back to the footprint of the existing alignment, and retaining walls are proposed for each side of the roadway approach to End Bent 1.

The project consists of two proposed retaining walls, located approximately 23.5 ft Left and Right of the center line (-L-) respectively, along each side of the roadway embankment at the approach to End Bent 1. The wall left of -L- is approximately 330 feet long. The wall right of -L- is approximately 400 feet long.

This report contains data from our previous investigation at the project site, specifically borings numbered B6-B, B6-C, B8-C, B10-C, and B14-B. Stations and offsets for these borings have been recalculated to reflect their location relative to the alignment (-L-) for this project.

Field Testing

During April, 2006, MACTEC advanced 11 borings at locations shown on the Boring Location Plan (Drawing 3). The borings were drilled with a CME-550 ATV drill rig. The borings were advanced using rotary-wash drilling techniques. Eight borings, RW-1 to RW-8, were advanced into the Coastal Plain Undivided (CPU) sands to a depth of approximately 50 feet. Three borings, RW-1 VS, RW-5 VS, and RW-8 VS, were advanced into the alluvial, low N-value soil, immediately under the roadway embankment, to a depth of approximately 25 feet to facilitate in-situ vane shear testing. Additional borings shown on the Boring Location Plan (B6-B, B6-C, B8-C, B10-C, and B14-B) were drilled during our previous investigation at the site, utilizing a CME-45 Marsh Buggy-mounted drill rig or a CME-550 ATV drill rig, using rotary-wash drilling techniques. These borings were drilled to depths that satisfy criteria for concrete pile embedment according to the NCDOT Ultimate Pile Capacity Charts.

Proposed boring locations were established at the project site utilizing GPS equipment. All borings performed during this investigation were drilled through the asphalt pavement of SR 1222, except for boring RW-3, which was drilled on the shoulder at the edge of pavement. Borings RW-2, 3, 4, 6, and 7 were offset from proposed locations due to the fish moratorium in effect for Tulls Creek and the associated wetlands, as well as overhead and underground utilities located along the shoulders of SR 1222. Actual boring location coordinates were captured with GPS equipment. The collected coordinates were corrected as necessary using post-processing differential correction.

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 16). Base Line Survey point BL-6, established at the project site by NCDOT personnel, was used as a benchmark. A non-motorized John Boat was utilized to survey the ground surface/mudline at cross section locations in and beyond the canal that flanks the right side of the existing roadway.

Standard penetration tests (SPT) were conducted and soil samples collected at approximately five foot intervals. Samples were collected from within the soil profile using a split-barrel sampler and a 140 lb. manual hammer. Undisturbed samples of the roadway embankment and underlying alluvial, low N-value soil were collected from borings RW-1, RW-5, and RW-8, using a piston sampler, for consolidation testing and determination of unit weight. A drive-tube was used for collection of undisturbed samples in the upper portion of the roadway embankment at locations along the shoulder of SR 1222 adjacent to borings RW-1, RW-5, and RW-8 for determination of unit weight.

In-situ vane shear testing was performed in borings RW-1 VS, RW-5 VS, and RW-8 VS in the alluvial, low N-value soil immediately below the roadway embankment. Up to five vane shear tests were performed in each boring. Tests were performed at 4.0 ft intervals within the soil column. Vane shear testing was performed in general accordance with ASTM D 2573-01. Results of the vane shear testing are included with this report.

Laboratory Testing

Laboratory testing consisting of AASHTO classification and grain-size distribution tests were performed on split-barrel samples SS-1 Rev through SS-18 Rev. The moisture content was determined in cohesive soils. Organic content testing was performed on six samples. Consolidation testing was performed on undisturbed samples ST-1 Rev through ST-10 Rev.

Laboratory testing was performed in general accordance with applicable ASTM/AASHTO/ NCDOT specifications. Test results for AASHTO classification, grain-size distribution, moisture content, organic content, consolidation testing, and unit weight are included with this report.

Physiography

The site is located in a generally flat, low-lying, coastal setting near the mouth of Tulls Creek at Tulls Bay. The existing bridge spans a distance of approximately 200 feet between the eastern bank of the creek and a causeway. The eastern bank of the creek is wooded. The causeway extends approximately 1800 feet to the west. The causeway is flanked on the north by marsh-land

and on the south by a canal. Marsh-land extends to the south beyond the canal. The marsh-land is vegetated with grasses.

The elevation of the roadway-surface at the western end of the existing bridge is approximately 10 feet mean sea level (MSL). The causeway levels-out to the elevation of approximately 2 to 3 feet MSL west of the existing bridge. The marsh-land is at an elevation of approximately 1 feet MSL. Tulls Creek is tidally-influenced. We observed fluctuations in water levels within the canal south of the causeway of up to a foot during the time of our fieldwork. The water surface elevation of the canal was 0.3 feet MSL on April 28, 2006. Site photographs included in this report show site conditions during our field investigation.

Geology

The project site is located within the Carolina Coastal Plain Physiographic Province. Sediments of the Carolina Coastal Plain were deposited during depositional cycles caused by fluctuating sea-levels, and the processes in existence today. Younger sediments lie at the surface near the coast. Older sediments, which underlie these younger sediments, lie at or near the surface further inland. The 1985 Geologic Map of North Carolina, compiled by the N.C. Geologic Survey, indicates the geology at the site consists of surficial deposits of sand, clay, gravel and peat, deposited in marine, fluvial, eolian and lacustrine environments. Older sediments of the Yorktown Formation underlie the surficial deposits. The Yorktown Formation consists of shelly clays with sand lenses. The Yorktown Formation is marine in origin. Our investigation at the site identified roadway embankment fill underlain by alluvial/coastal plain sediments, underlain by the Yorktown Formation.

Alluvial sediments identified during this investigation consist of an upper layer of clay and silt (A-7-5/A-7-6/A-6/A-5/A-4) with trace to moderate amounts of organic matter, underlain by silty, fine to coarse sand (A-3/A-2-4) with trace organics, wood fragments, and gravel and locally with interbedded clay layers. We interpret these soils to be Quaternary-aged (<2 million years ago) sediments. The alluvial sediments are underlain by coastal plain sediments consisting of clay (A-6/A-7-6) with sand lenses, underlain by fine to coarse sand (A-3/A-2-4). These coastal plain sediments are somewhat characteristic of the Yorktown Formation sediments. However, without additional evidence to identify these soils as part of the Yorktown Formation, we interpreted them as a transitional stratigraphic unit between the overlying alluvium and the underlying Yorktown Formation, and grouped them as Coastal Plain Undivided (CPU).

We found the geology to be generally consistent across the project site and in general agreement with the results of our 2003 investigation.

Soils

Roadway Embankment Fill was encountered at the surface or below asphalt in all borings performed during this investigation, and extends to elevations -0.1 to -6.2 ft MSL. Fill consists of loose to dense, dry to wet, clayey, silty, fine to coarse sand (A-2-4) with trace organics and trace to little gravel, and soft to stiff, moist to wet, sandy, clay and silt (A-6/A-4) with trace gravel and brick fragments.

Retaining Walls associated with the replacement of
Bridge No. 4 over Tulls Creek on SR 1222(Tulls Creek Rd)
North Carolina Department. Of Transportation

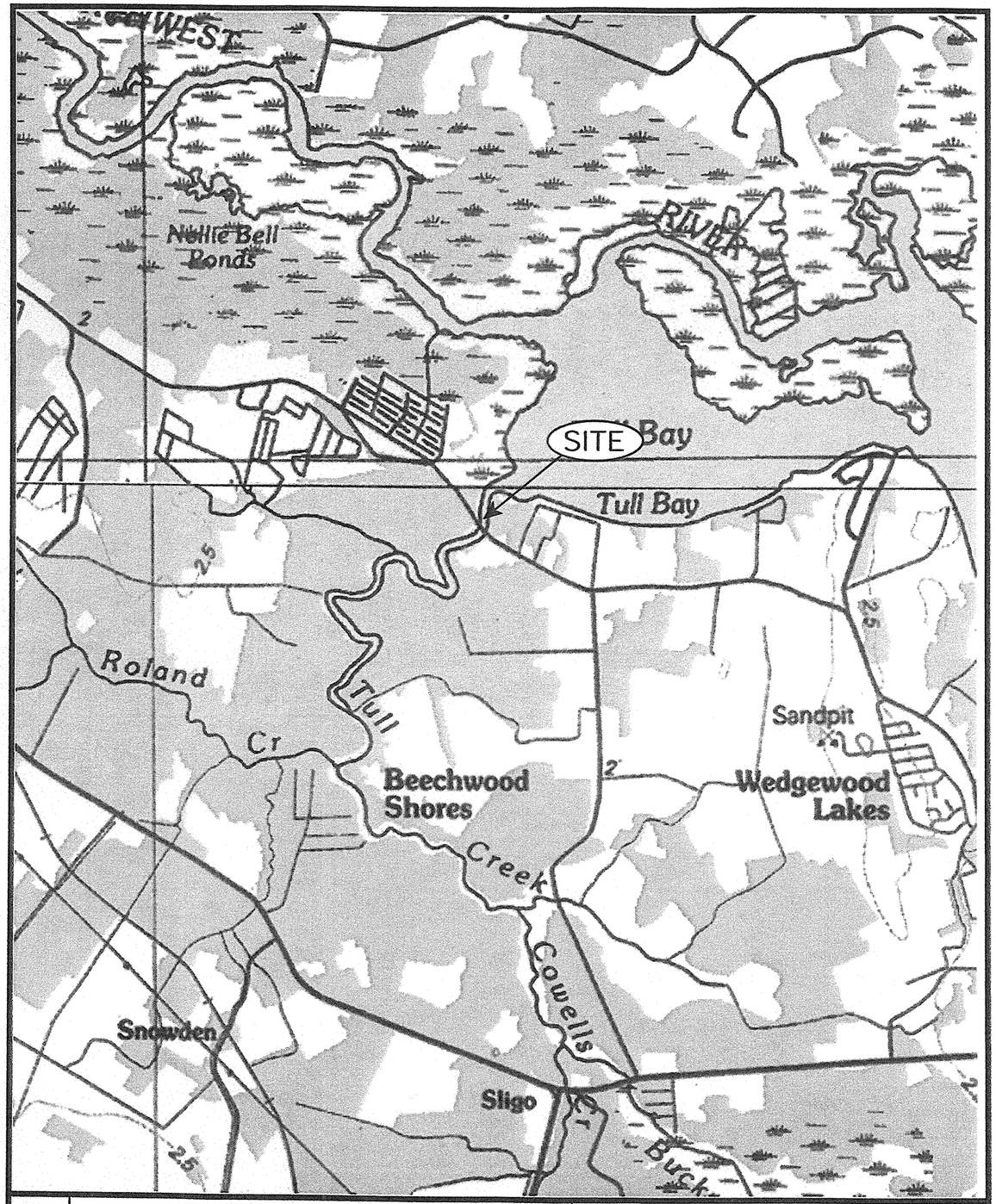
Alluvium was encountered at the surface in borings B6-C, B8-C, and B10-C and below roadway embankment fill at elevations -0.1 to -6.2 ft MSL. Alluvium consists of an upper layer of very soft to soft, wet to saturated, fine sandy, silty clay (A-6/A-7-6/A-7-5) and silt (A-4/A-5) with trace to moderate amounts of organics and includes muck and peat. The upper alluvium layer extends to elevations -19.9 to -25.5 ft MSL. The lower alluvium layer consists of loose to dense, wet to saturated, clayey, silty, fine to coarse sand (A-3/A-2-4) with trace organics, wood fragments, and gravel, and locally with thinly bedded clay layers. The lower alluvium layer extends to elevations -22.8 to -38.0 ft MSL.

Coastal Plain Undivided sediment was encountered below alluvium at elevations -22.8 to -38.0 ft MSL. Coastal Plain Undivided sediment consists of an upper layer of soft to stiff, wet to saturated, fine to coarse sandy, clay and silt (A-6/A-7-6/A-4) with trace organics and locally with very thinly to thinly bedded sand layers, and extends to elevations -37.7 to -46.9 ft MSL. The lower Coastal Plain Undivided sediment layer consists of medium dense to very dense, wet, silty, fine to coarse sand (A-3/A-2-4), locally with very thinly to thinly bedded clay layers, and extends to elevations -61.6 to -63.7 ft MSL. The upper layer of Coastal Plain Undivided sediment was not encountered in boring RW-1.

The Yorktown Formation was encountered below coastal plain undivided sediment at elevations -61.6 to -63.7 ft MSL and consists of medium stiff to very stiff, moist, silty clay (A-7-6) with trace shell fragments.

Groundwater

24-hour groundwater levels were not measured in any borings performed during this investigation due to their location within the pavement of SR 1222. 24-hour groundwater level elevations from applicable borings performed during the 2003 investigation ranged from 1.2 to -0.2 ft MSL and are likely to be representative of current groundwater conditions at the site.



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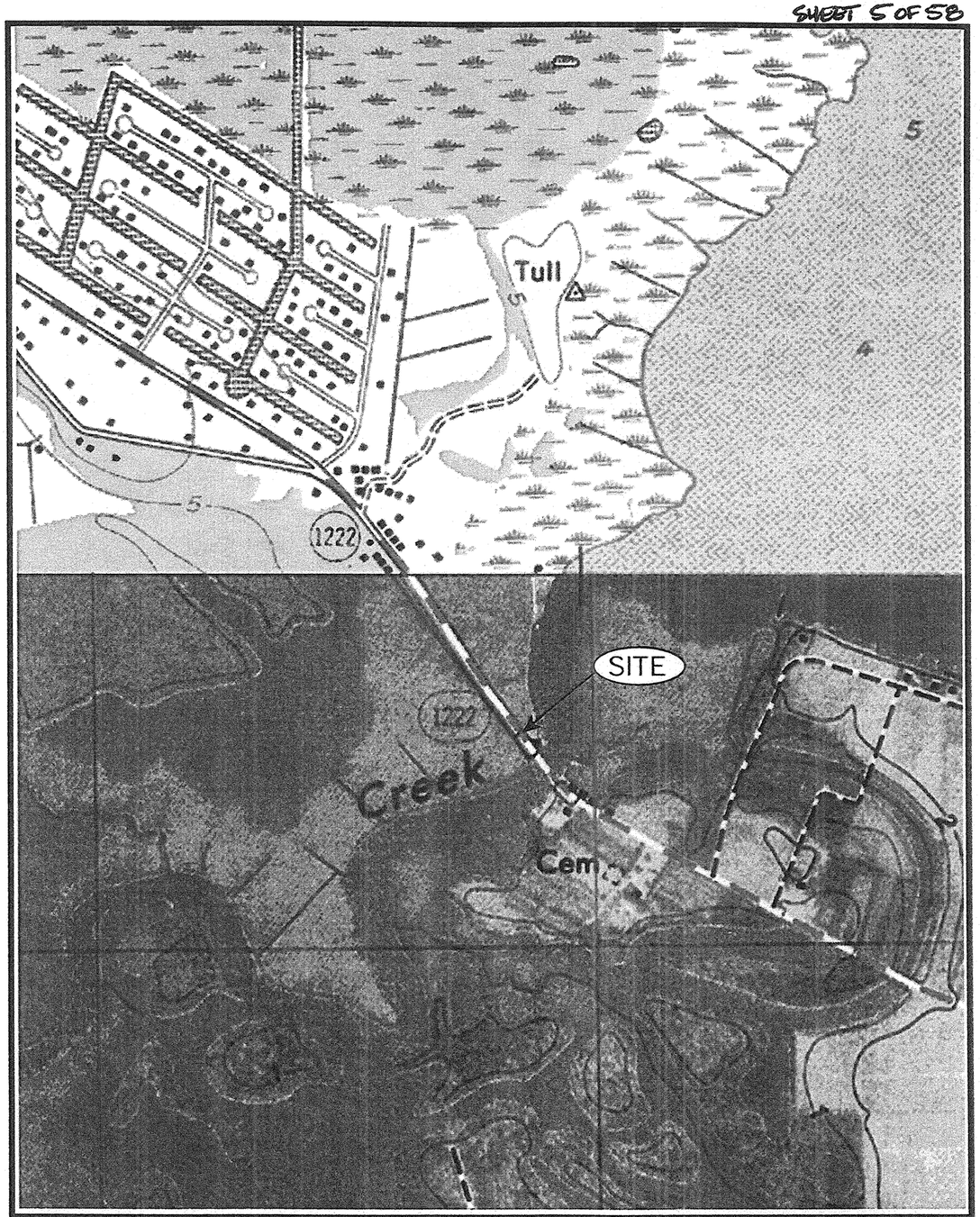
SITE LOCATION MAP
Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222 (Tulls Creek Road)
N.C. DOT Project No. 32773.1.1 (B-2950)
F.A. No. BRZ-1222(2)
Currituck County, North Carolina

MACTEC
ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REF: USGS Elizabeth City 1:100,000 sheet	SCALE: 1":3600'	MACTEC JOB NO: 6468-06-1378
	DWG: 1	DATE: April, 2006

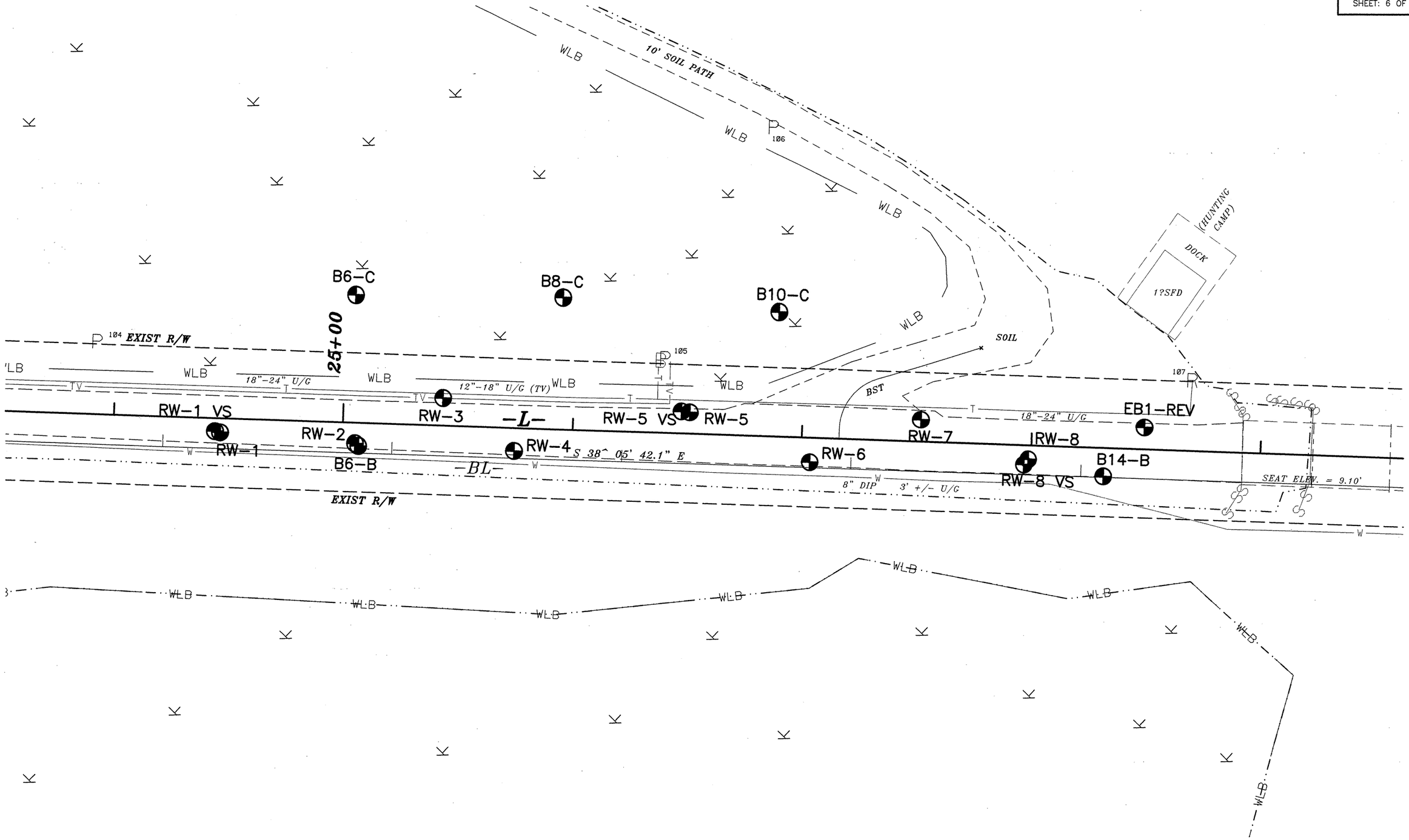


N

TOPOGRAPHIC SITE MAP
Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222 (Tulls Creek Road)
N.C. DOT Project No. 32773.1.1 (B-2950)
F.A. No. BRZ-1222(2)
Currituck County, North Carolina

MACTEC
ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REF: USGS Quad - Currituck; Creeds, VA-NC	SCALE: 1":900'	MACTEC JOB NO: 6468-06-1378
	DWG: 2	DATE: April, 2006



0 20' 40' 80'

SCALE (FEET)
1" : 40'

NAD 83

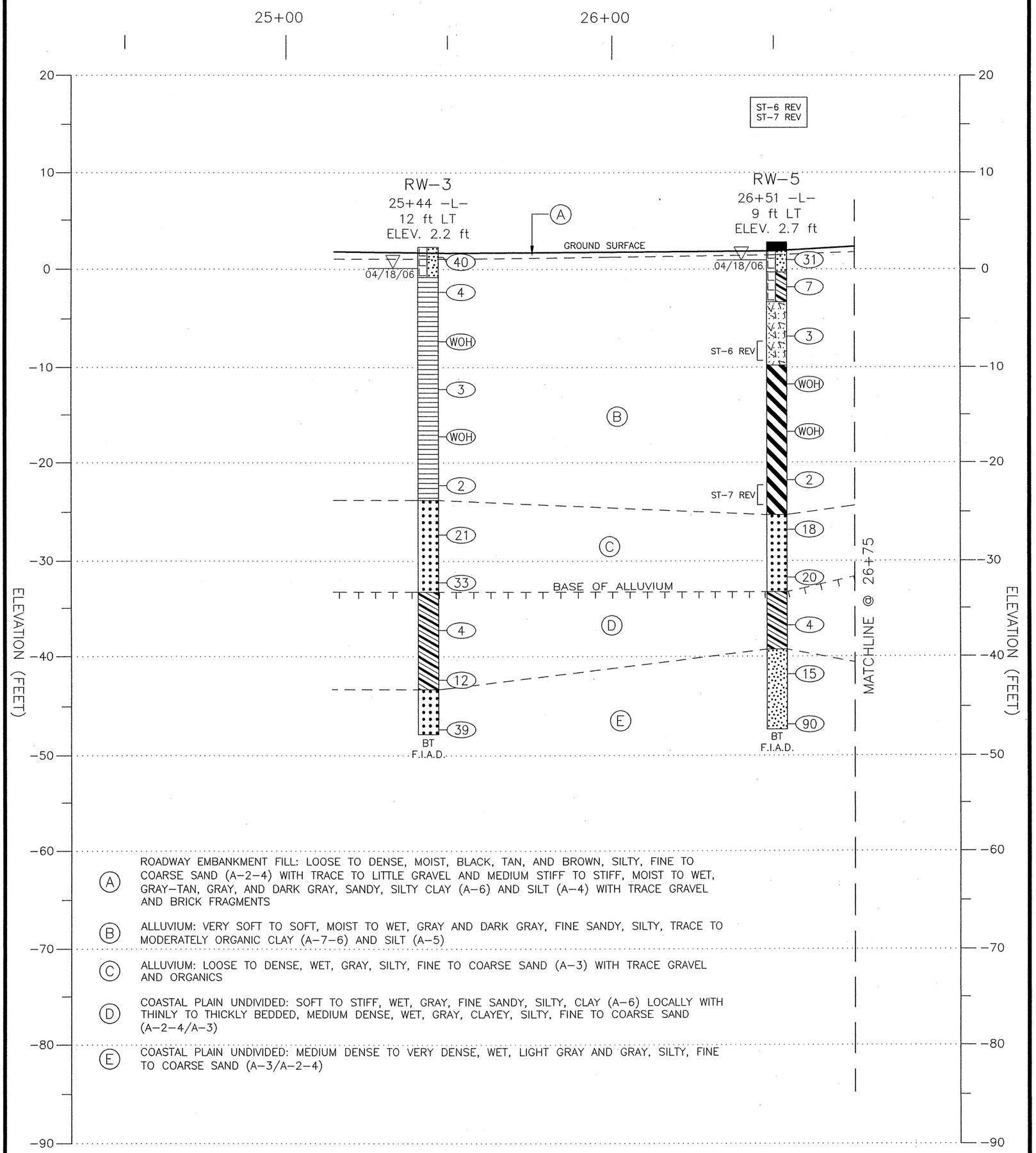
BORING LOCATION PLAN
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 3

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL.I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
ST-6 Rev	9 ft LT	26+51	10.0-12.0 ft	A-5(12)	57	4	2.5	7	45.5	45	100	98.5	92.6	105.8	ND
ST-7 Rev	9 ft LT	26+51	25.0-26.9 ft	A-7-6(9)	48	22	6.8	40.3	25.4	27.5	100	99	54.4	52.7	ND



(A) ROADWAY EMBANKMENT FILL: LOOSE TO DENSE, MOIST, BLACK, TAN, AND BROWN, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE TO LITTLE GRAVEL AND MEDIUM STIFF TO STIFF, MOIST TO WET, GRAY-TAN, GRAY, AND DARK GRAY, SANDY, SILTY CLAY (A-6) AND SILT (A-4) WITH TRACE GRAVEL AND BRICK FRAGMENTS

(B) ALLUVIUM: VERY SOFT TO SOFT, MOIST TO WET, GRAY AND DARK GRAY, FINE SANDY, SILTY, TRACE TO MODERATELY ORGANIC CLAY (A-7-6) AND SILT (A-5)

(C) ALLUVIUM: LOOSE TO DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-3) WITH TRACE GRAVEL AND ORGANICS

(D) COASTAL PLAIN UNDIVIDED: SOFT TO STIFF, WET, GRAY, FINE SANDY, SILTY, CLAY (A-6) LOCALLY WITH THINLY TO THICKLY BEDDED, MEDIUM DENSE, WET, GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4/A-3)

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, LIGHT GRAY AND GRAY, SILTY, FINE TO COARSE SAND (A-3/A-2-4)

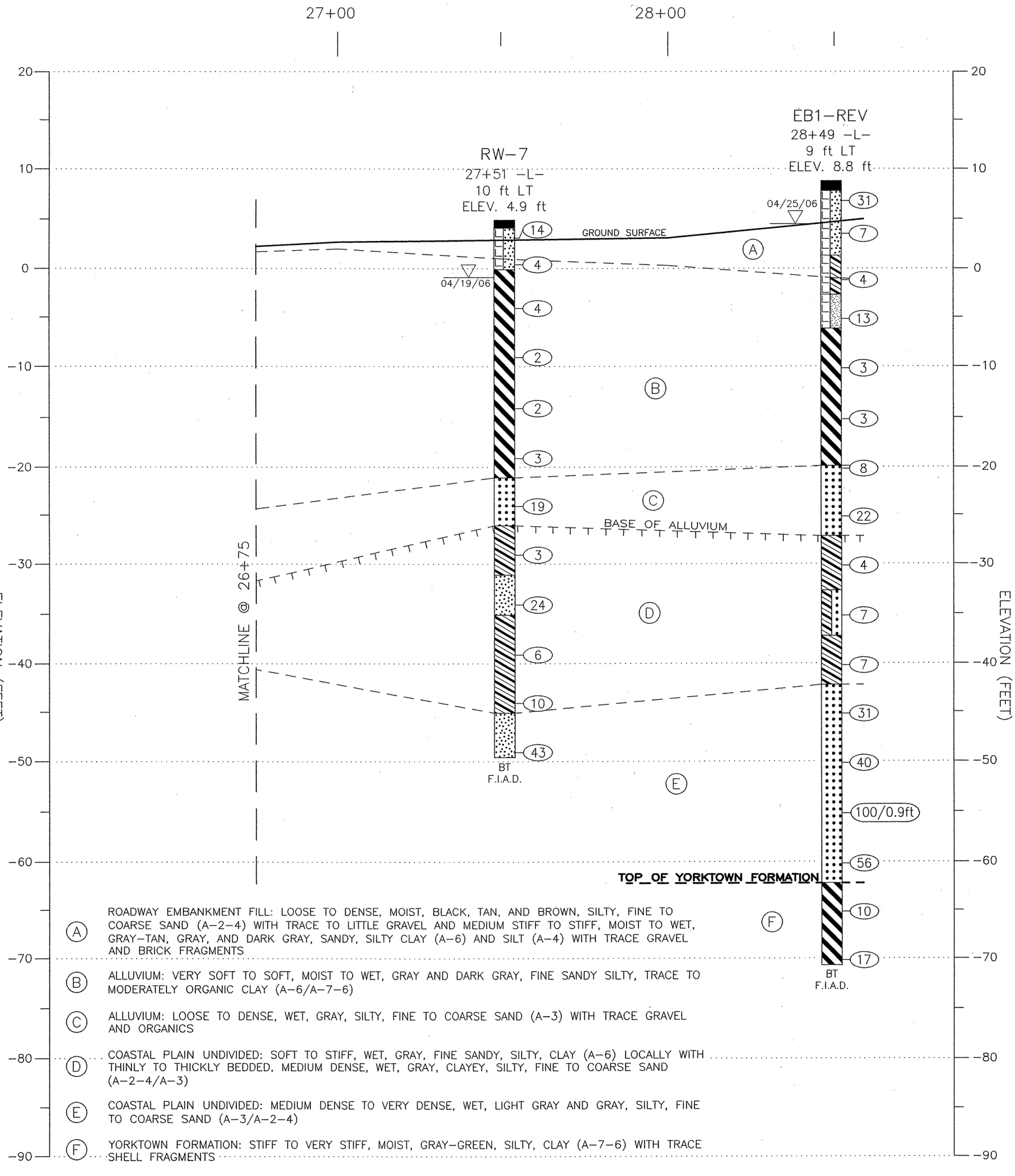
0 5' 10' 20'
VERTICAL SCALE IN FEET
1"=10'

0 15' 30' 60'
HORIZONTAL SCALE IN FEET
1"=30'

PROFILE 23.5 ft LEFT OF -L- FROM STATION 25+15 TO 28+62
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 4



(A) ROADWAY EMBANKMENT FILL: LOOSE TO DENSE, MOIST, BLACK, TAN, AND BROWN, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE TO LITTLE GRAVEL AND MEDIUM STIFF TO STIFF, MOIST TO WET, GRAY-TAN, GRAY, AND DARK GRAY, SANDY, SILTY CLAY (A-6) AND SILT (A-4) WITH TRACE GRAVEL AND BRICK FRAGMENTS

(B) ALLUVIUM: VERY SOFT TO SOFT, MOIST TO WET, GRAY AND DARK GRAY, FINE SANDY SILTY, TRACE TO MODERATELY ORGANIC CLAY (A-6/A-7-6)

(C) ALLUVIUM: LOOSE TO DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-3) WITH TRACE GRAVEL AND ORGANICS

(D) COASTAL PLAIN UNDIVIDED: SOFT TO STIFF, WET, GRAY, FINE SANDY, SILTY, CLAY (A-6) LOCALLY WITH THINLY TO THICKLY BEDDED, MEDIUM DENSE, WET, GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4/A-3)

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, LIGHT GRAY AND GRAY, SILTY, FINE TO COARSE SAND (A-3/A-2-4)

(F) YORKTOWN FORMATION: STIFF TO VERY STIFF, MOIST, GRAY-GREEN, SILTY, CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

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

0 15' 30' 60'
HORIZONTAL SCALE IN FEET
1"=30'

PROFILE 23.5 ft LEFT OF -L- FROM STATION 25+15 TO 28+62
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
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CURRITUCK COUNTY, NORTH CAROLINA

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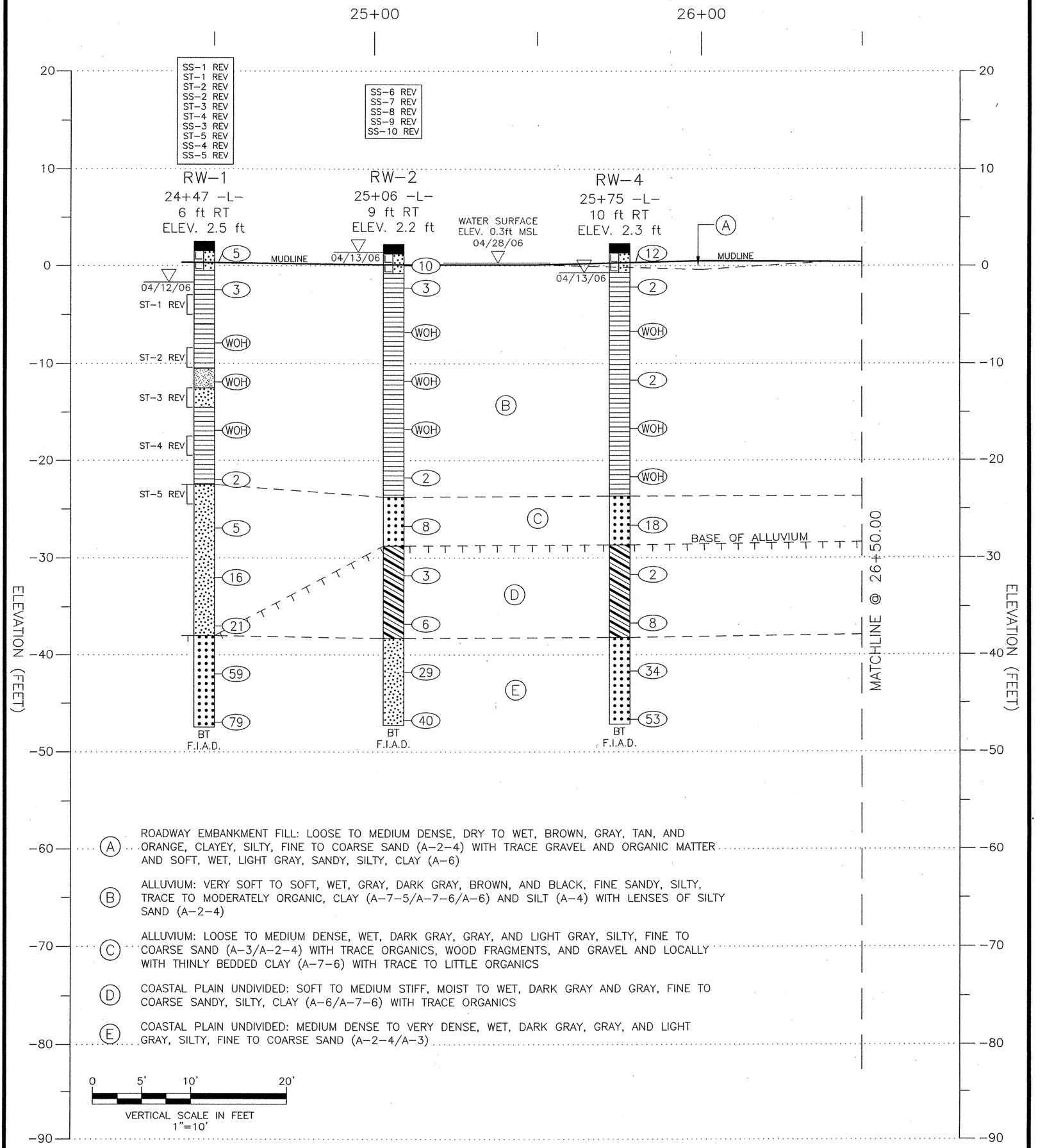
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 5

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL.I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1Rev	6 ft Rt	24+47	4.0-5.5 ft	A-7-5(33)	83	27	6.1	11.4	36.8	45.7	100	97.4	85.6	133.5	36.3
ST-1Rev	6 ft Rt	24+47	5.5-6.7 ft	A-7-5(24)	66	20	6.5	10	47.1	36.4	100	97.9	87.1	120.8	ND
ST-2 Rev	6 ft Rt	24+47	10.9-12.8 ft	A-6(7)	39	17	6.5	40.6	22.3	30.6	100	98.8	56	74.7	ND
SS-2 Rev	6 ft Rt	24+47	13.4-14.9 ft	A-4(1)	27	8	13.7	45.8	18.9	21.6	100	97.3	49.2	48.3	4.1
ST-3 Rev	6 ft Rt	24+47	15.0-16.4 ft	A-2-4(0)	21	1	8.8	66.1	8.2	16.9	100	99.3	26.6	ND	ND
ST-4 Rev	6 ft Rt	24+47	20.0-22.0 ft	A-7-5(34)	67	33	1.6	12.5	42.5	43.3	99.7	99.3	86.7	92.7	ND
SS-3 Rev	6 ft Rt	24+47	23.5-25.0 ft	A-7-5(25)	71	21	5.6	12.2	29.5	52.7	100	98.3	84.7	132.9	12.1
ST-5 Rev	6 ft Rt	24+47	25.0-25.8 ft	A-2-4(0)	20	NP	2.2	74.5	12.8	10.5	100	99.9	31.7	ND	ND
SS-4 Rev	6 ft Rt	24+47	28.5-30.0 ft	A-2-4(0)	NV	NP	9.3	82.3	6.3	2.1	100	98.9	11.6	ND	1.7
SS-5 Rev	6 ft Rt	24+47	48.5-50.0 ft	A-3	19	NP	19.3	75.6	3.2	1.9	100	95.9	7	ND	ND
SS-6 Rev	9 ft RT	25+06	1.2-2.7 ft	A-2-4(0)	15	NP	18.7	56.4	10.9	14	99.7	93.1	25.8	ND	ND
SS-7 Rev	9 ft RT	25+06	8.0-9.5 ft	A-7-5(39)	79	30	4.6	4.8	45.4	45.2	100	97.5	92.7	143.1	38.7
SS-8 Rev	9 ft RT	25+06	18.0-19.5 ft	A-7-5(37)	67	32	1.7	7.4	44	46.9	100	99.6	94.1	102	10.6
SS-9 Rev	9 ft RT	25+06	33.0-34.5 ft	A-6(4)	30	15	6.6	50.7	17.5	25.2	100	98.8	48.3	6.6	ND
SS-10 Rev	9 ft RT	25+06	43.0-44.5 ft	A-2-4(0)	20	NP	15.7	75.4	5.4	3.5	100	96.6	13.6	ND	ND



(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, DRY TO WET, BROWN, GRAY, TAN, AND ORANGE, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND ORGANIC MATTER AND SOFT, WET, LIGHT GRAY, SANDY, SILTY, CLAY (A-6)

(B) ALLUVIUM: VERY SOFT TO SOFT, WET, GRAY, DARK GRAY, BROWN, AND BLACK, FINE SANDY, SILTY, TRACE TO MODERATELY ORGANIC, CLAY (A-7-5/A-7-6/A-6) AND SILT (A-4) WITH LENSES OF SILTY SAND (A-2-4)

(C) ALLUVIUM: LOOSE TO MEDIUM DENSE, WET, DARK GRAY, GRAY, AND LIGHT GRAY, SILTY, FINE TO COARSE SAND (A-3/A-2-4) WITH TRACE ORGANICS, WOOD FRAGMENTS, AND GRAVEL AND LOCALLY WITH THINLY BEDDED CLAY (A-7-6) WITH TRACE TO LITTLE ORGANICS

(D) COASTAL PLAIN UNDIVIDED: SOFT TO MEDIUM STIFF, MOIST TO WET, DARK GRAY AND GRAY, FINE TO COARSE SANDY, SILTY, CLAY (A-6/A-7-6) WITH TRACE ORGANICS

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, DARK GRAY, GRAY, AND LIGHT GRAY, SILTY, FINE TO COARSE SAND (A-2-4/A-3)

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

0 15' 30' 60'
HORIZONTAL SCALE IN FEET
1"=30'

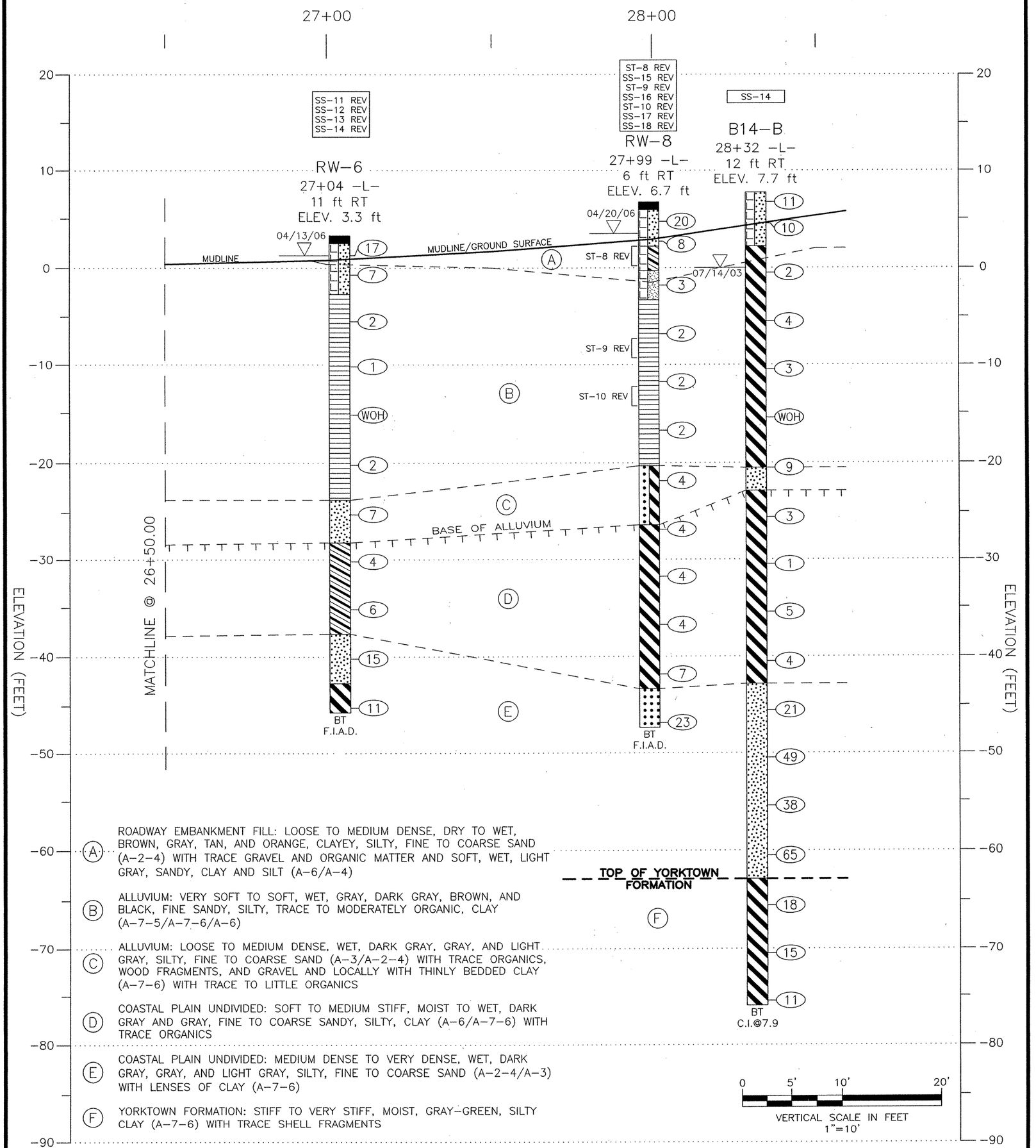
PROFILE 23.5 ft RIGHT OF -L- FROM STATION 24+40 TO 28+62
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 6

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL. I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-11 Rev	11ft RT	27+04	3.0-4.5 ft	A-2-4(0)	15	NP	24.1	49.6	12.1	14.1	99.9	90	27.2	ND	ND
SS-12 Rev	11ft RT	27+04	27.5-29.0 ft	A-2-4(0)	18	NP	23	57.9	10.5	8.6	99.1	91.3	22.4	ND	ND
SS-13 Rev	11ft RT	27+04	42.5-44.0 ft	A-2-4(0)	23	1	0.7	79.6	10.6	9	98.6	98.2	27.5	ND	ND
SS-14 Rev	11ft RT	27+04	47.5-49.0 ft	A-7-6(17)	44	22	0.7	30.1	37	32.2	100	99.8	78.2	30.5	ND
ST-8 Rev	6 ft Rt	27+99	4.5-6.1ft	A-6(6)	29	12	5.6	28.3	44	22.1	100	98	70.4	24.6	ND
SS-15 Rev	6 ft Rt	27+99	7.5-9.0 ft	A-4(6)	28	9	3.9	28.6	32.9	34.6	100	98.9	78.6	26.8	ND
ST-9 Rev	6 ft Rt	27+99	14.0-15.6 ft	A-7-5(49)	91	39	2.4	7.9	48.4	41.3	100	98.5	93	72.2	ND
SS-16 Rev	6 ft Rt	27+99	17.5-19.0 ft	A-7-6(6)	50	22	15.9	42.5	14.5	27.1	100	94.7	43.7	64.6	ND
ST-10 Rev	6 ft Rt	27+99	19.0-20.8 ft	A-7-5(39)	75	37	4.2	9.9	35.8	50.1	100	98.6	87.1	78.1	ND
SS-17 Rev	6 ft Rt	27+99	42.5-44.0 ft	A-7-6(15)	43	16	1	24	40.5	34.5	100	99.6	86.2	44.1	ND
SS-18 Rev	6 ft Rt	27+99	52.5-54.0 ft	A-3	ND	NP	2.6	92.4	4.6	0.4	100	99.8	7.2	ND	ND
SS-14	12 ft RT	28+32	2.2-3.7 ft	A-2-4(0)	15	NP	62.7	21.7	8	7.5	99.8	65.5	16.4	ND	ND



(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, DRY TO WET, BROWN, GRAY, TAN, AND ORANGE, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND ORGANIC MATTER AND SOFT, WET, LIGHT GRAY, SANDY, CLAY AND SILT (A-6/A-4)

(B) ALLUVIUM: VERY SOFT TO SOFT, WET, GRAY, DARK GRAY, BROWN, AND BLACK, FINE SANDY, SILTY, TRACE TO MODERATELY ORGANIC, CLAY (A-7-5/A-7-6/A-6)

(C) ALLUVIUM: LOOSE TO MEDIUM DENSE, WET, DARK GRAY, GRAY, AND LIGHT GRAY, SILTY, FINE TO COARSE SAND (A-3/A-2-4) WITH TRACE ORGANICS, WOOD FRAGMENTS, AND GRAVEL AND LOCALLY WITH THINLY BEDDED CLAY (A-7-6) WITH TRACE TO LITTLE ORGANICS

(D) COASTAL PLAIN UNDIVIDED: SOFT TO MEDIUM STIFF, MOIST TO WET, DARK GRAY AND GRAY, FINE TO COARSE SANDY, SILTY, CLAY (A-6/A-7-6) WITH TRACE ORGANICS

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, DARK GRAY, GRAY, AND LIGHT GRAY, SILTY, FINE TO COARSE SAND (A-2-4/A-3) WITH LENSES OF CLAY (A-7-6)

(F) YORKTOWN FORMATION: STIFF TO VERY STIFF, MOIST, GRAY-GREEN, SILTY CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

0 15' 30' 60'
HORIZONTAL SCALE IN FEET
1"=30'

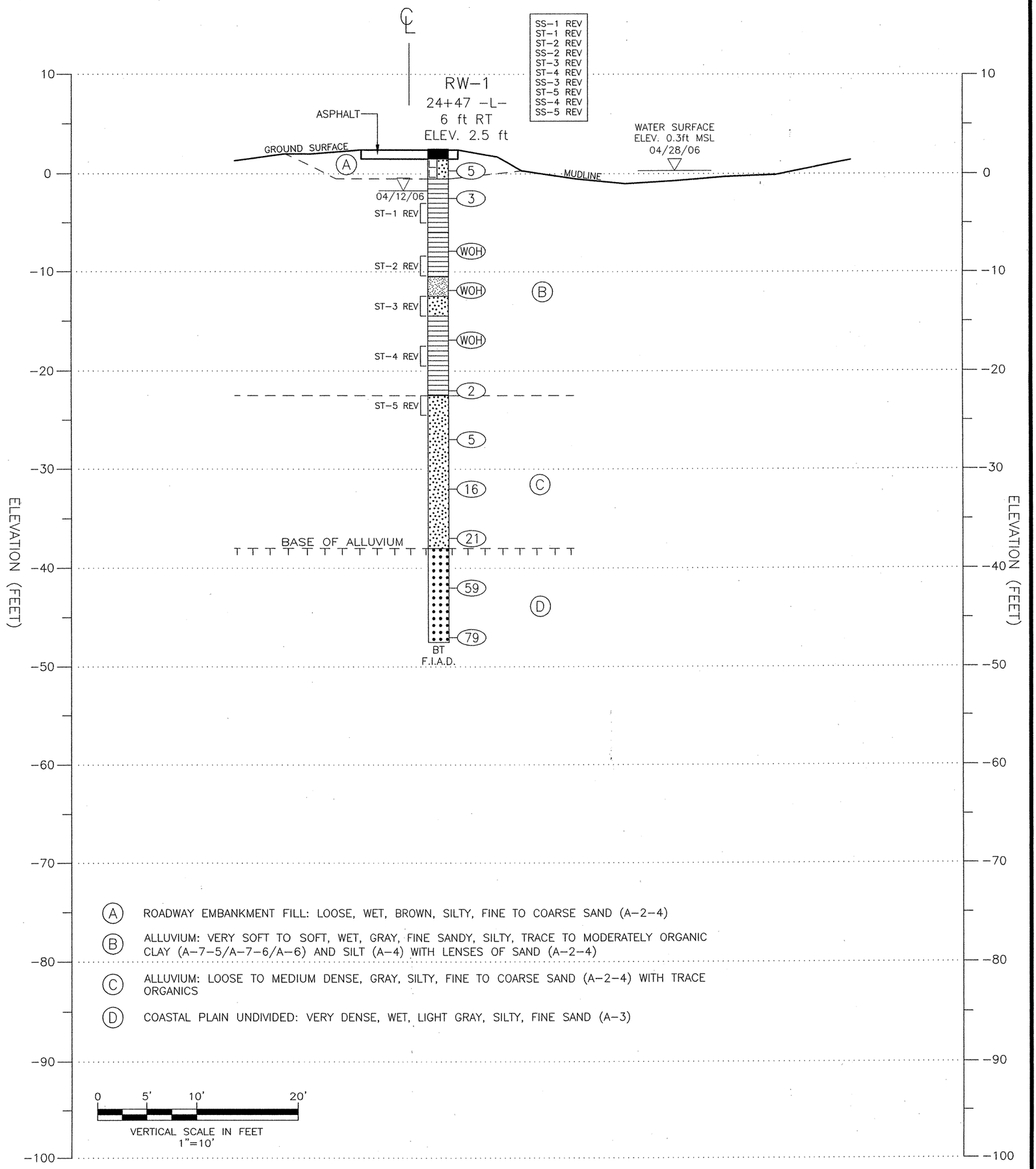
PROFILE 23.5 ft RIGHT OF -L- FROM STATION 24+40 TO 28+62
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 7

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL.I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1Rev	6 ft Rt	24+47	4.0-5.5 ft	A-7-5(33)	83	27	6.1	11.4	36.8	45.7	100	97.4	85.6	133.5	36.3
ST-1Rev	6 ft Rt	24+47	5.5-6.7 ft	A-7-5(24)	66	20	6.5	10	47.1	36.4	100	97.9	87.1	120.8	ND
ST-2 Rev	6 ft Rt	24+47	10.9-12.8 ft	A-6(7)	39	17	6.5	40.6	22.3	30.6	100	98.8	56	74.7	ND
SS-2 Rev	6 ft Rt	24+47	13.4-14.9 ft	A-4(1)	27	8	13.7	45.8	18.9	21.6	100	97.3	49.2	48.3	4.1
ST-3 Rev	6 ft Rt	24+47	15.0-16.4 ft	A-2-4(0)	21	1	8.8	66.1	8.2	16.9	100	99.3	26.6	ND	ND
ST-4 Rev	6 ft Rt	24+47	20.0-22.0 ft	A-7-5(34)	67	33	1.6	12.5	42.5	43.3	99.7	99.3	86.7	92.7	ND
SS-3 Rev	6 ft Rt	24+47	23.5-25.0 ft	A-7-5(25)	71	21	5.6	12.2	29.5	52.7	100	98.3	84.7	132.9	12.1
ST-5 Rev	6 ft Rt	24+47	25.0-25.8 ft	A-2-4(0)	20	NP	2.2	74.5	12.8	10.5	100	99.9	31.7	ND	ND
SS-4 Rev	6 ft Rt	24+47	28.5-30.0 ft	A-2-4(0)	NV	NP	9.3	82.3	6.3	2.1	100	98.9	11.6	ND	1.7
SS-5 Rev	6 ft Rt	24+47	48.5-50.0 ft	A-3	19	NP	19.3	75.6	3.2	1.9	100	95.9	7	ND	ND



0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

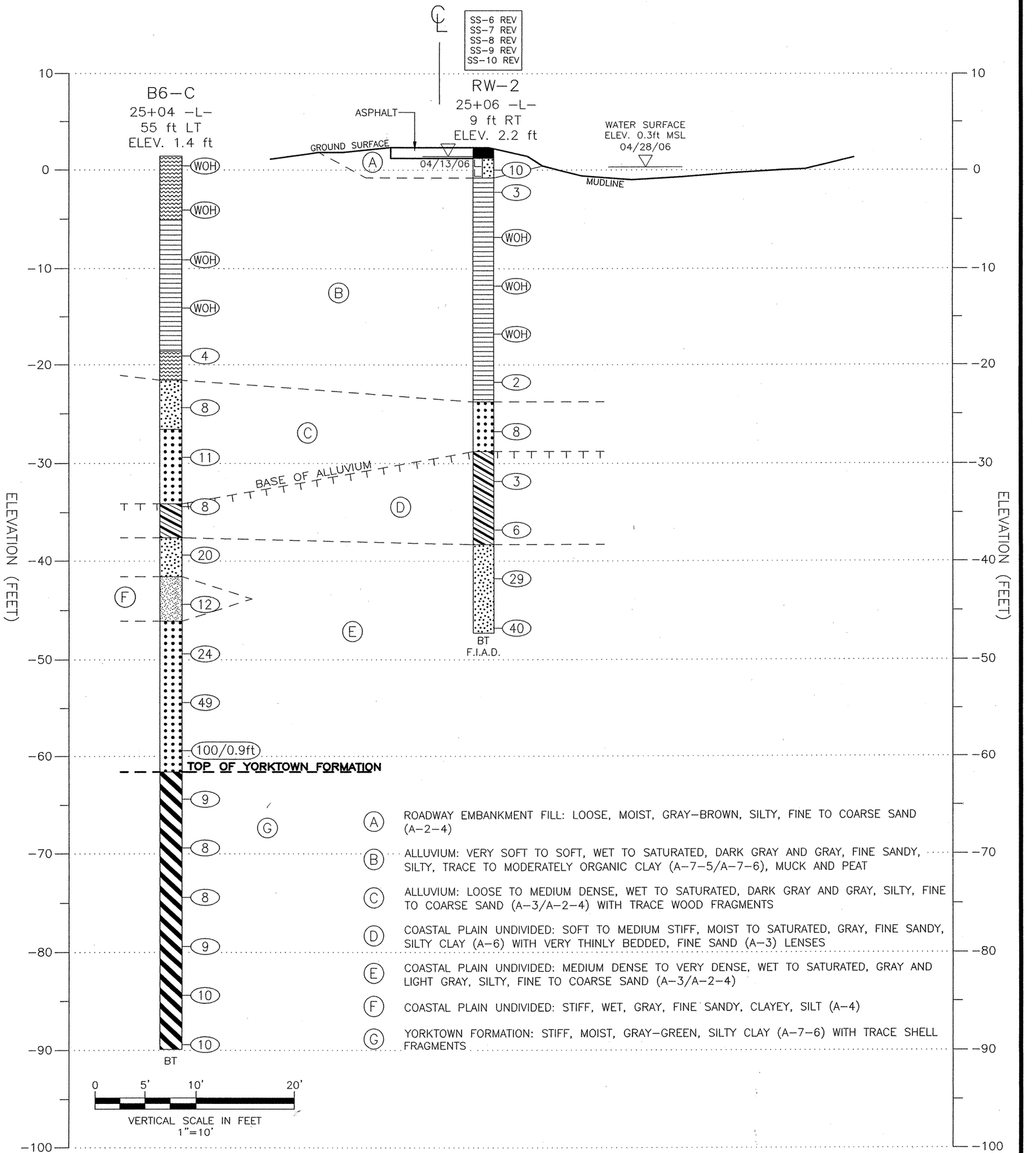
CROSS SECTION 1 THROUGH -L- STATION 24+50
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 8

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL.I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-6 Rev	9 ft RT	25+06	1.2-2.7 ft	A-2-4(0)	15	NP	18.7	56.4	10.9	14	99.7	93.1	25.8	ND	ND
SS-7 Rev	9 ft RT	25+06	8.0-9.5 ft	A-7-5(39)	79	30	4.6	4.8	45.4	45.2	100	97.5	92.7	143.1	38.7
SS-8 Rev	9 ft RT	25+06	18.0-19.5 ft	A-7-5(37)	67	32	1.7	7.4	44	46.9	100	99.6	94.1	102	10.6
SS-9 Rev	9 ft RT	25+06	33.0-34.5 ft	A-6(4)	30	15	6.6	50.7	17.5	25.2	100	98.8	48.3	6.6	ND
SS-10 Rev	9 ft RT	25+06	43.0-44.5 ft	A-2-4(0)	20	NP	15.7	75.4	5.4	3.5	100	96.6	13.6	ND	ND

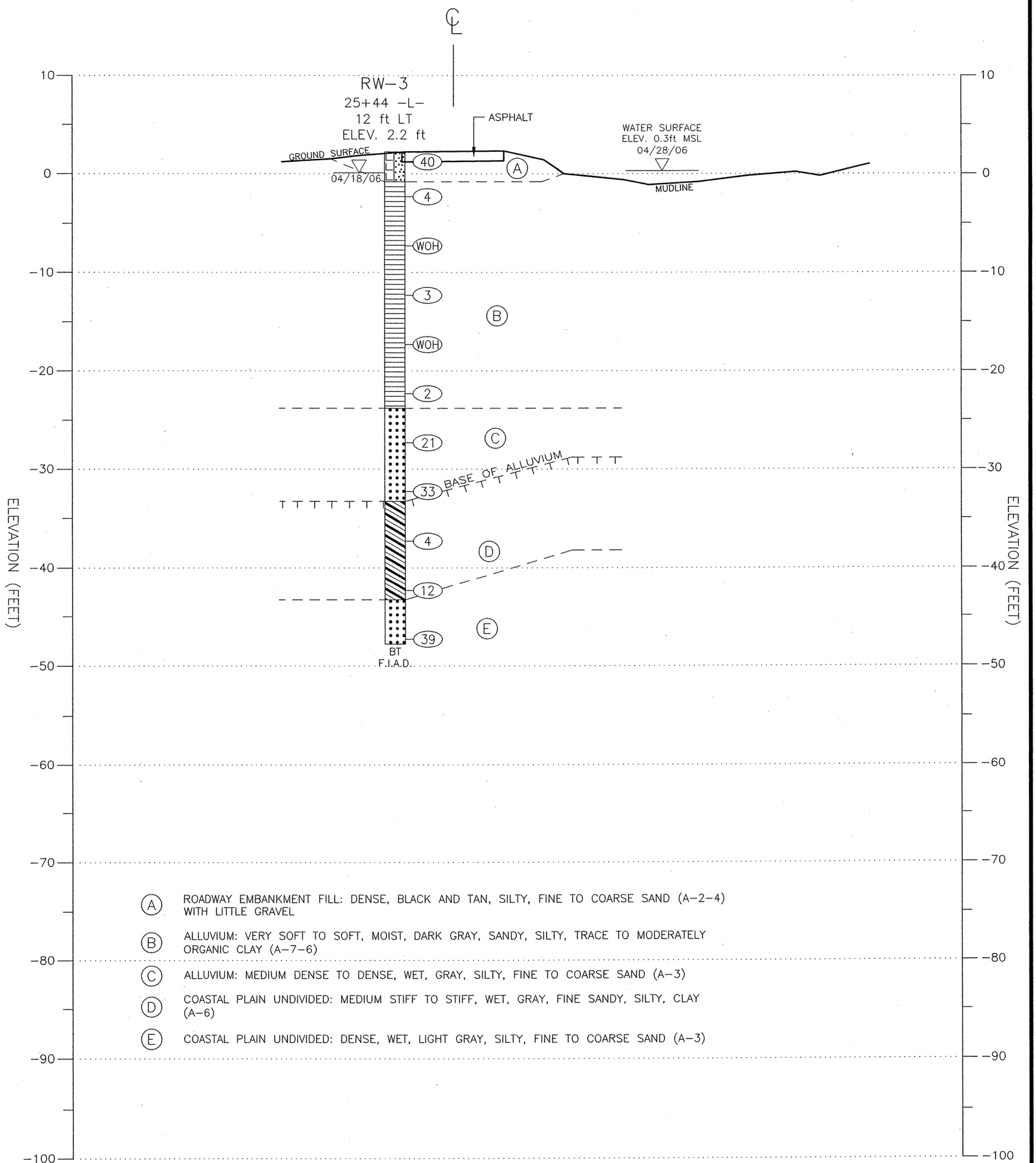


0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION 2 THROUGH -L- STATION 25+00
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 9



(A) ROADWAY EMBANKMENT FILL: DENSE, BLACK AND TAN, SILTY, FINE TO COARSE SAND (A–2–4) WITH LITTLE GRAVEL

(B) ALLUVIUM: VERY SOFT TO SOFT, MOIST, DARK GRAY, SANDY, SILTY, TRACE TO MODERATELY ORGANIC CLAY (A–7–6)

(C) ALLUVIUM: MEDIUM DENSE TO DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A–3)

(D) COASTAL PLAIN UNDIVIDED: MEDIUM STIFF TO STIFF, WET, GRAY, FINE SANDY, SILTY, CLAY (A–6)

(E) COASTAL PLAIN UNDIVIDED: DENSE, WET, LIGHT GRAY, SILTY, FINE TO COARSE SAND (A–3)

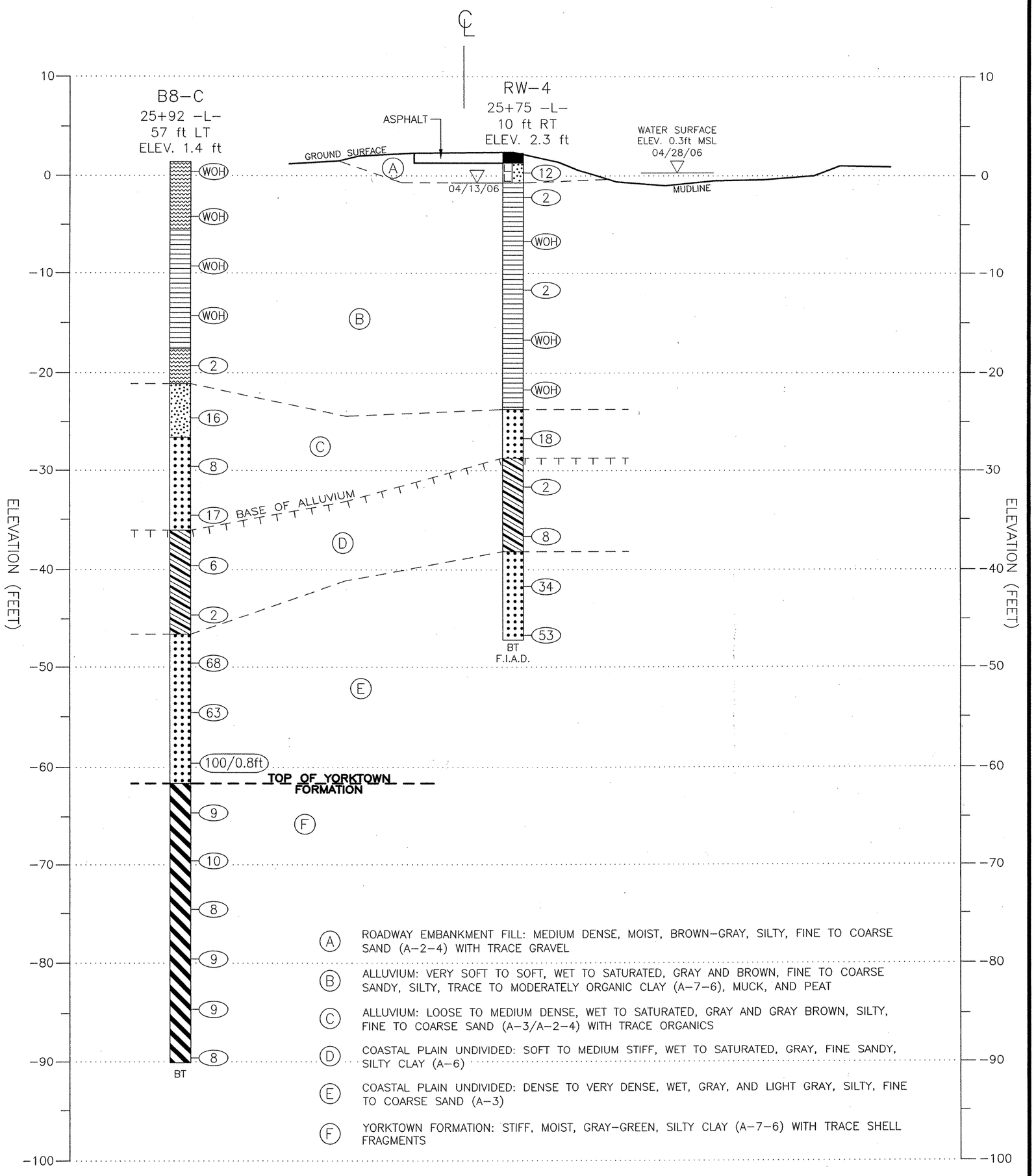
0 5' 10' 20'
VERTICAL SCALE IN FEET
1"=10'

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION 3 THROUGH –L– STATION 25+50
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B–2950)
F.A. PROJECT NO. BRZ–1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468–06–1378
06/7/06	ENG CHECK: J.E.V.	DWG: 10



(A) ROADWAY EMBANKMENT FILL: MEDIUM DENSE, MOIST, BROWN-GRAY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL

(B) ALLUVIUM: VERY SOFT TO SOFT, WET TO SATURATED, GRAY AND BROWN, FINE TO COARSE SANDY, SILTY, TRACE TO MODERATELY ORGANIC CLAY (A-7-6), MUCK, AND PEAT

(C) ALLUVIUM: LOOSE TO MEDIUM DENSE, WET TO SATURATED, GRAY AND GRAY BROWN, SILTY, FINE TO COARSE SAND (A-3/A-2-4) WITH TRACE ORGANICS

(D) COASTAL PLAIN UNDIVIDED: SOFT TO MEDIUM STIFF, WET TO SATURATED, GRAY, FINE SANDY, SILTY CLAY (A-6)

(E) COASTAL PLAIN UNDIVIDED: DENSE TO VERY DENSE, WET, GRAY, AND LIGHT GRAY, SILTY, FINE TO COARSE SAND (A-3)

(F) YORKTOWN FORMATION: STIFF, MOIST, GRAY-GREEN, SILTY CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

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

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

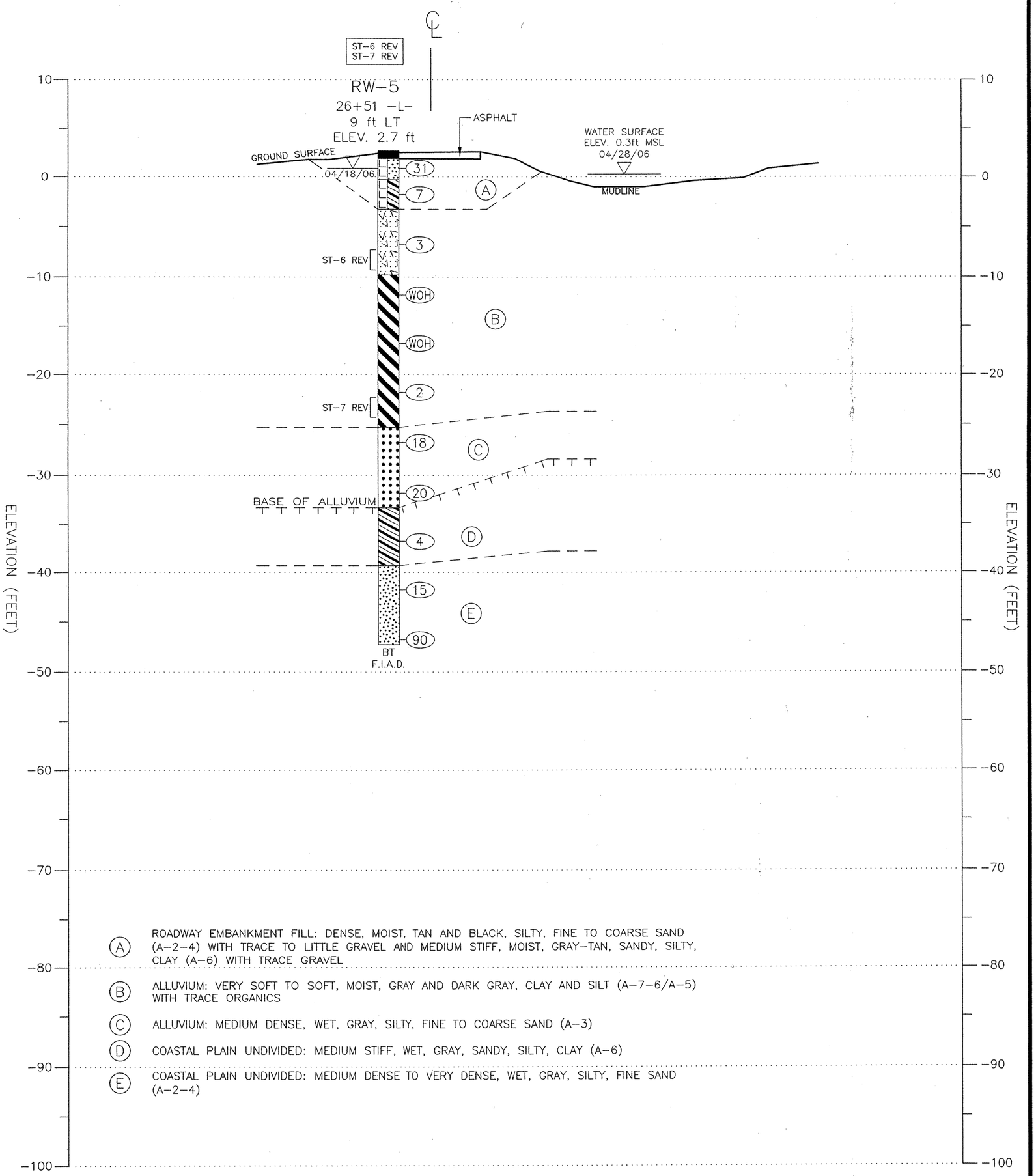
CROSS SECTION 4 THROUGH -L- STATION 26+00
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 11

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL. I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
ST-6 Rev	9 ft LT	26+51	10.0-12.0 ft	A-5(12)	57	4	2.5	7	45.5	45	100	98.5	92.6	105.8	ND
ST-7 Rev	9 ft LT	26+51	25.0-26.9 ft	A-7-6(9)	48	22	6.8	40.3	25.4	27.5	100	99	54.4	52.7	ND



(A) ROADWAY EMBANKMENT FILL: DENSE, MOIST, TAN AND BLACK, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE TO LITTLE GRAVEL AND MEDIUM STIFF, MOIST, GRAY-TAN, SANDY, SILTY, CLAY (A-6) WITH TRACE GRAVEL

(B) ALLUVIUM: VERY SOFT TO SOFT, MOIST, GRAY AND DARK GRAY, CLAY AND SILT (A-7-6/A-5) WITH TRACE ORGANICS

(C) ALLUVIUM: MEDIUM DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-3)

(D) COASTAL PLAIN UNDIVIDED: MEDIUM STIFF, WET, GRAY, SANDY, SILTY, CLAY (A-6)

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, GRAY, SILTY, FINE SAND (A-2-4)

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

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

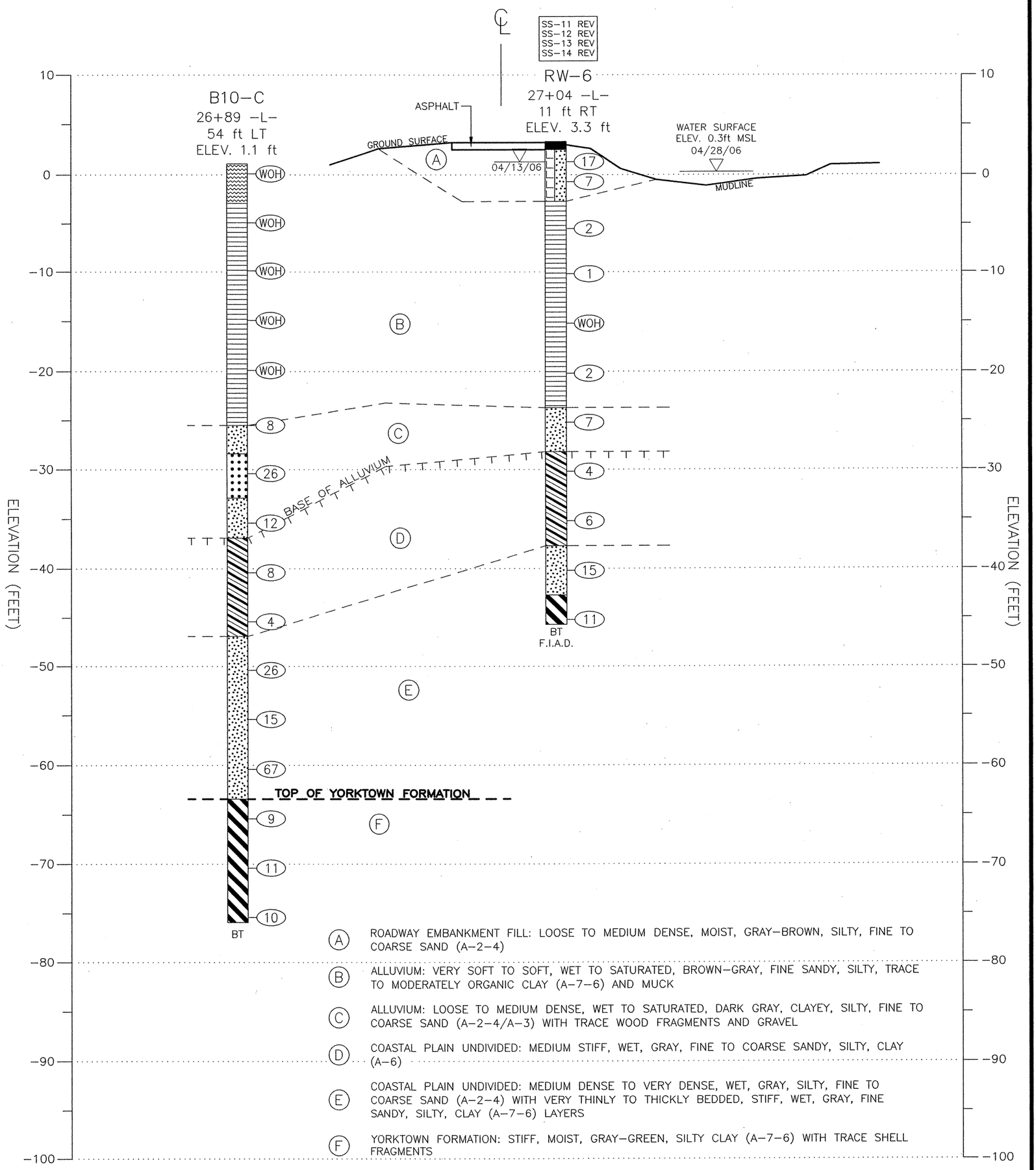
CROSS SECTION 5 THROUGH -L- STATION 26+50
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 12

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL.I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-11 Rev	11ft RT	27+04	3.0-4.5 ft	A-2-4(0)	15	NP	24.1	49.6	12.1	14.1	99.9	90	27.2	ND	ND
SS-12 Rev	11ft RT	27+04	27.5-29.0 ft	A-2-4(0)	18	NP	23	57.9	10.5	8.6	99.1	91.3	22.4	ND	ND
SS-13 Rev	11ft RT	27+04	42.5-44.0 ft	A-2-4(0)	23	1	0.7	79.6	10.6	9	98.6	98.2	27.5	ND	ND
SS-14 Rev	11ft RT	27+04	47.5-49.0 ft	A-7-6(17)	44	22	0.7	30.1	37	32.2	100	99.8	78.2	30.5	ND



(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, MOIST, GRAY-BROWN, SILTY, FINE TO COARSE SAND (A-2-4)

(B) ALLUVIUM: VERY SOFT TO SOFT, WET TO SATURATED, BROWN-GRAY, FINE SANDY, SILTY, TRACE TO MODERATELY ORGANIC CLAY (A-7-6) AND MUCK

(C) ALLUVIUM: LOOSE TO MEDIUM DENSE, WET TO SATURATED, DARK GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4/A-3) WITH TRACE WOOD FRAGMENTS AND GRAVEL

(D) COASTAL PLAIN UNDIVIDED: MEDIUM STIFF, WET, GRAY, FINE TO COARSE SANDY, SILTY, CLAY (A-6)

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-2-4) WITH VERY THINLY TO THICKLY BEDDED, STIFF, WET, GRAY, FINE SANDY, SILTY, CLAY (A-7-6) LAYERS

(F) YORKTOWN FORMATION: STIFF, MOIST, GRAY-GREEN, SILTY CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

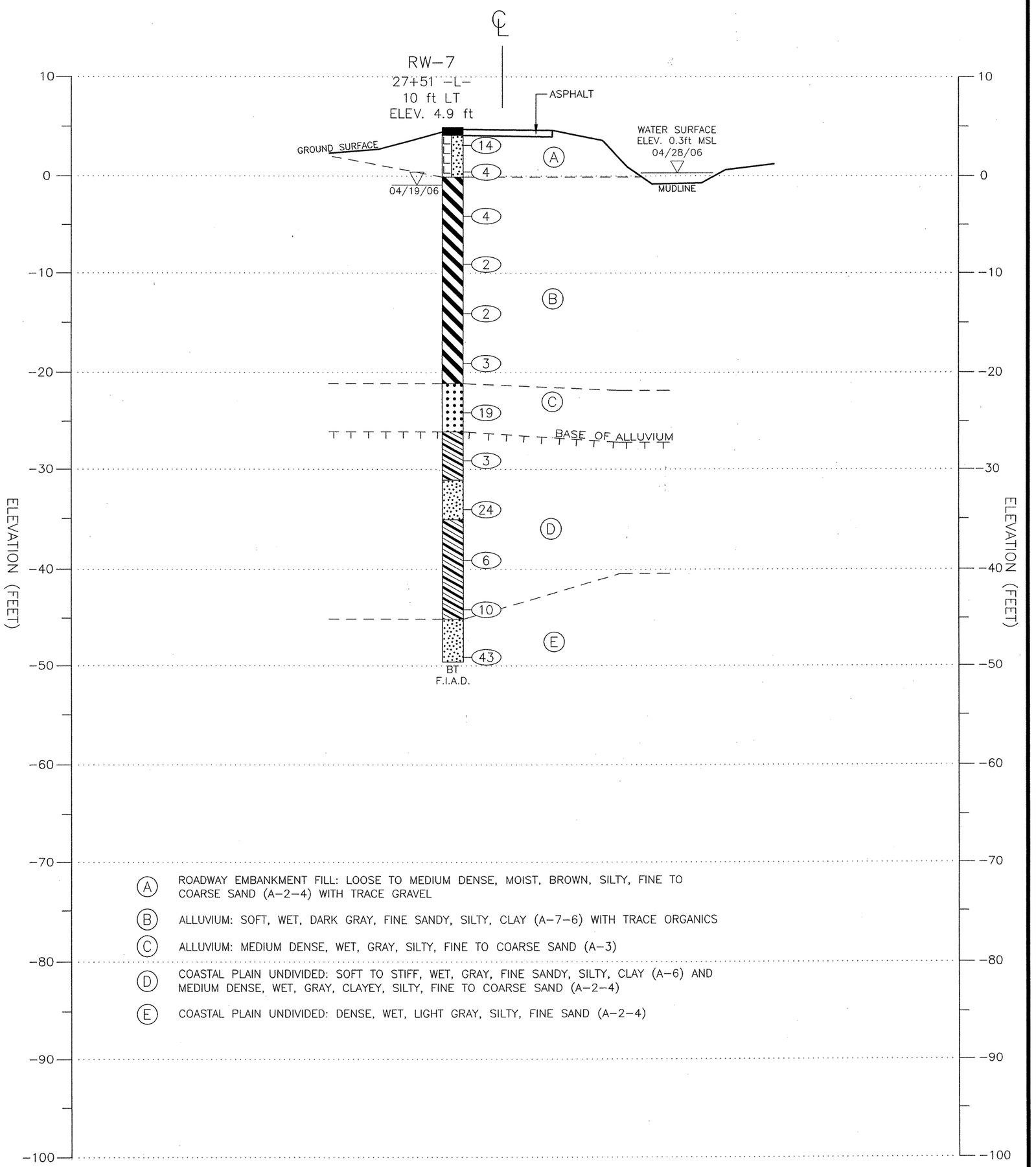
0 5' 10' 20'
VERTICAL SCALE IN FEET
1"=10'

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION 6 THROUGH -L- STATION 27+00
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 13



(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, MOIST, BROWN, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL

(B) ALLUVIUM: SOFT, WET, DARK GRAY, FINE SANDY, SILTY, CLAY (A-7-6) WITH TRACE ORGANICS

(C) ALLUVIUM: MEDIUM DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-3)

(D) COASTAL PLAIN UNDIVIDED: SOFT TO STIFF, WET, GRAY, FINE SANDY, SILTY, CLAY (A-6) AND MEDIUM DENSE, WET, GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4)

(E) COASTAL PLAIN UNDIVIDED: DENSE, WET, LIGHT GRAY, SILTY, FINE SAND (A-2-4)

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

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

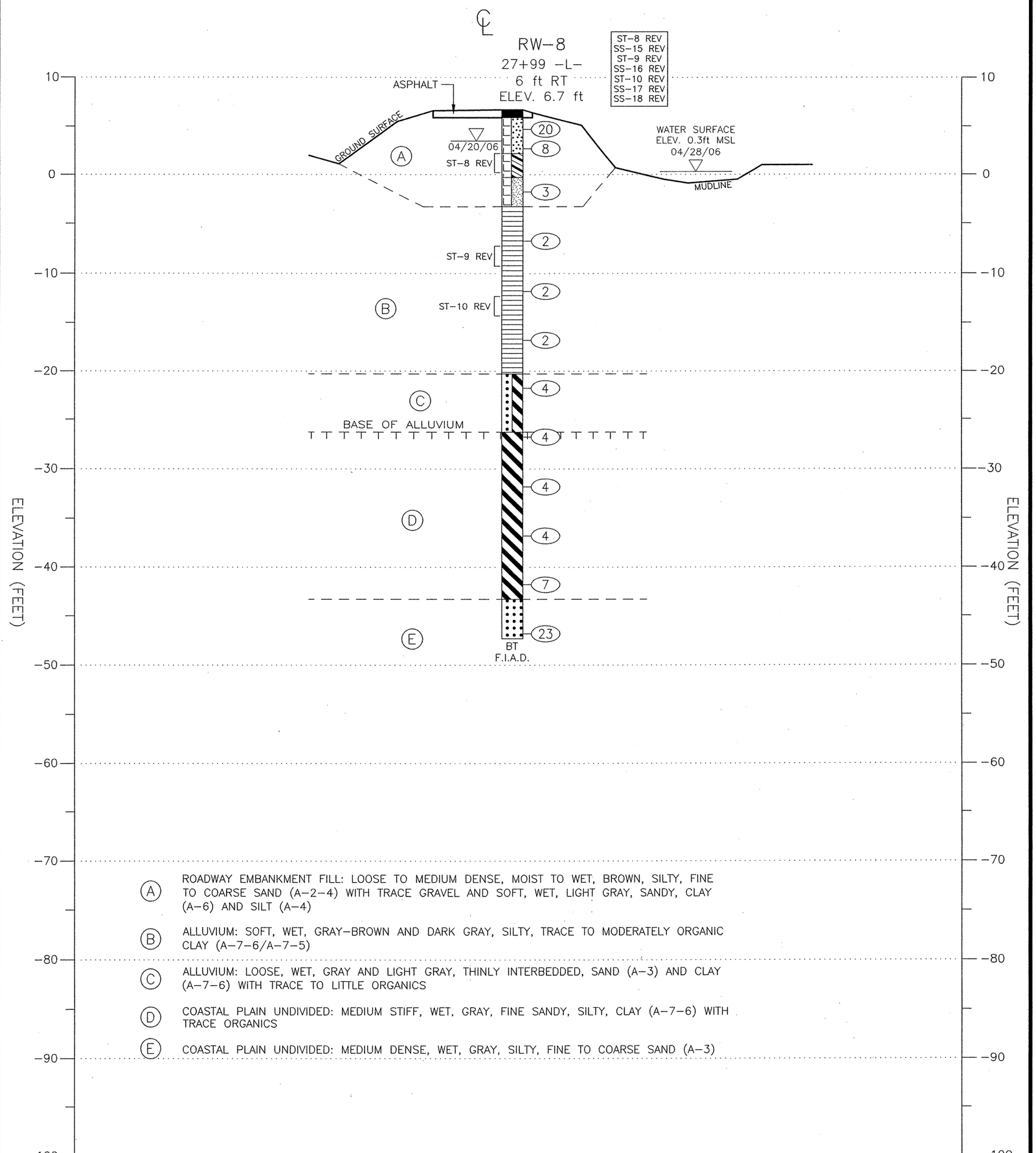
CROSS SECTION 7 THROUGH -L- STATION 27+50
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 14

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL.I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
ST-8 Rev	6 ft Rt	27+99	4.5-6.1ft	A-6(6)	29	12	5.6	28.3	44	22.1	100	98	70.4	24.6	ND
SS-15 Rev	6 ft Rt	27+99	7.5-9.0 ft	A-4(6)	28	9	3.9	28.6	32.9	34.6	100	98.9	78.6	26.8	ND
ST-9 Rev	6 ft Rt	27+99	14.0-15.6 ft	A-7-5(49)	91	39	2.4	7.9	48.4	41.3	100	98.5	93	72.2	ND
SS-16 Rev	6 ft Rt	27+99	17.5-19.0 ft	A-7-6(6)	50	22	15.9	42.5	14.5	27.1	100	94.7	43.7	64.6	ND
ST-10 Rev	6 ft Rt	27+99	19.0-20.8 ft	A-7-5(39)	75	37	4.2	9.9	35.8	50.1	100	98.6	87.1	78.1	ND
SS-17 Rev	6 ft Rt	27+99	42.5-44.0 ft	A-7-6(15)	43	16	1	24	40.5	34.5	100	99.6	86.2	44.1	ND
SS-18 Rev	6 ft Rt	27+99	52.5-54.0 ft	A-3	ND	NP	2.6	92.4	4.6	0.4	100	99.8	7.2	ND	ND



(A) ROADWAY EMBANKMENT FILL: LOOSE TO MEDIUM DENSE, MOIST TO WET, BROWN, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND SOFT, WET, LIGHT GRAY, SANDY, CLAY (A-6) AND SILT (A-4)

(B) ALLUVIUM: SOFT, WET, GRAY-BROWN AND DARK GRAY, SILTY, TRACE TO MODERATELY ORGANIC CLAY (A-7-6/A-7-5)

(C) ALLUVIUM: LOOSE, WET, GRAY AND LIGHT GRAY, THINLY INTERBEDDED, SAND (A-3) AND CLAY (A-7-6) WITH TRACE TO LITTLE ORGANICS

(D) COASTAL PLAIN UNDIVIDED: MEDIUM STIFF, WET, GRAY, FINE SANDY, SILTY, CLAY (A-7-6) WITH TRACE ORGANICS

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE, WET, GRAY, SILTY, FINE TO COARSE SAND (A-3)

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

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

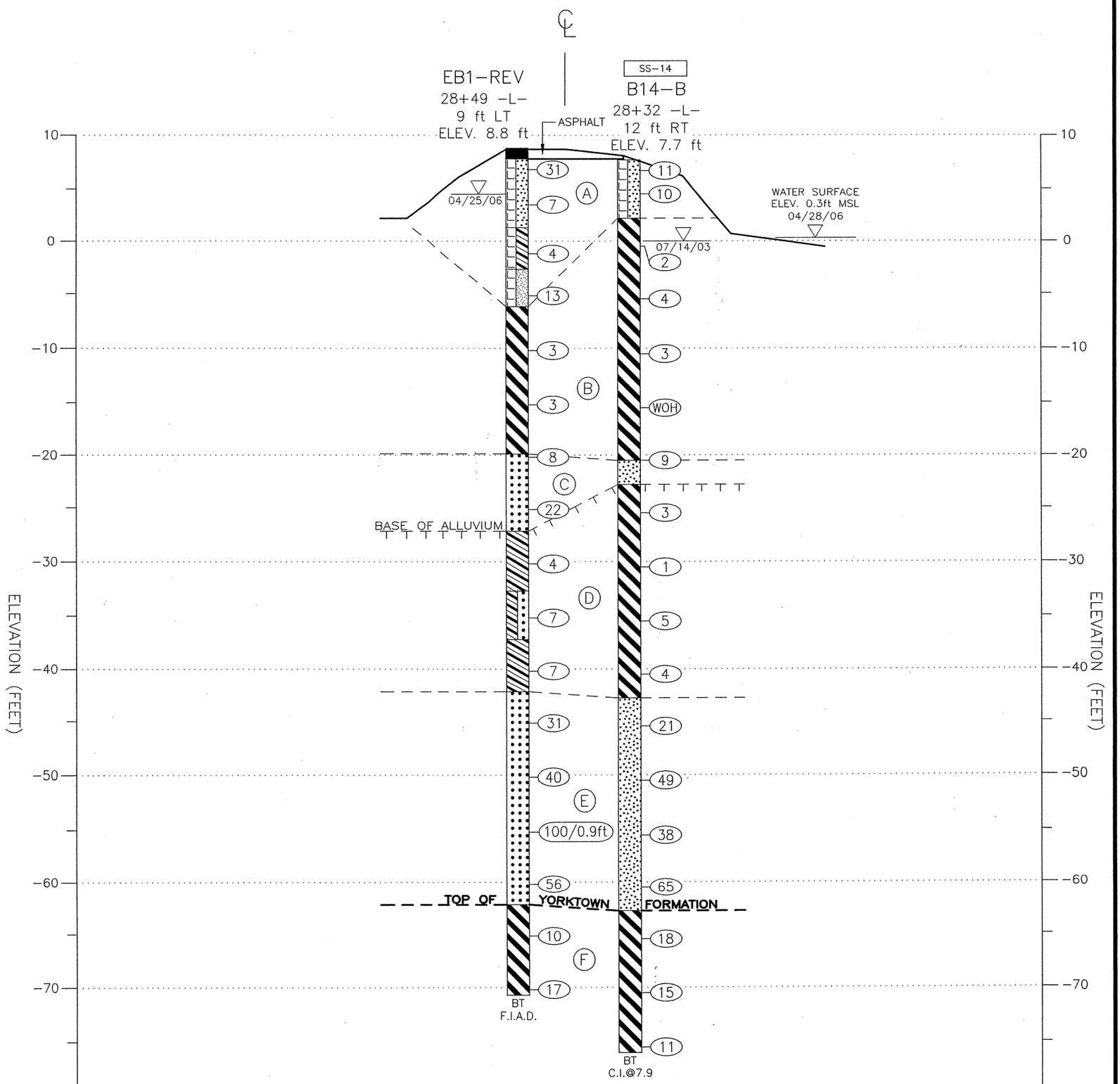
CROSS SECTION 8 THROUGH -L- STATION 28+00
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 15

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL. I.	%BY WEIGHT (-2.00mm=100%)				%PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-14	12 ft RT	28+32	2.2-3.7 ft	A-2-4(0)	15	NP	62.7	21.7	8	7.5	99.8	65.5	16.4	ND	ND



(A) ROADWAY EMBANKMENT FILL: LOOSE TO DENSE, DRY TO MOIST, TAN, BROWN, ORANGE, AND GRAY, CLAYEY, SILTY, FINE TO COARSE SAND (A-2-4) WITH TRACE ORGANIC MATTER AND MEDIUM STIFF TO STIFF, MOIST TO WET, GRAY AND DARK GRAY, FINE SANDY, CLAY AND SILT (A-6/A-4) WITH TRACE GRAVEL AND BRICK FRAGMENTS

(B) ALLUVIUM: VERY SOFT TO SOFT, WET, DARK GRAY, GRAY, AND BLACK, FINE SANDY, SILTY CLAY (A-7-6) WITH TRACE ORGANICS

(C) ALLUVIUM: LOOSE TO MEDIUM DENSE, WET, DARK GRAY AND GRAY, SILTY, FINE TO COARSE SAND (A-3/A-2-4) WITH TRACE GRAVEL AND ORGANICS

(D) COASTAL PLAIN UNDIVIDED: VERY SOFT TO MEDIUM STIFF, WET, DARK GRAY AND GRAY, FINE TO COARSE SANDY, SILTY, CLAY (A-6/A-7-6), LOCALLY WITH THINLY BEDDED, FINE TO COARSE SAND (A-3)

(E) COASTAL PLAIN UNDIVIDED: MEDIUM DENSE TO VERY DENSE, WET, DARK GRAY TO GRAY, SILTY, FINE SAND (A-3/A-2-4)

(F) YORKTOWN FORMATION: STIFF TO VERY STIFF, MOIST, GRAY-GREEN, SILTY CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS

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

0 10' 20' 40'
HORIZONTAL SCALE IN FEET
1"=20'

CROSS SECTION 9 THROUGH -L- STATION 28+50
RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT
OF BRIDGE NO. 4 OVER TULLS CREEK ON SR 1222
PROJECT NCDOT NO. 32773.1.1 (B-2950)
F.A. PROJECT NO. BRZ-1222(2)
CURRITUCK COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN: R.R.	DATE: 05/10/06
05/31/06	DFT CHECK: M.B.L.	JOB: 6468-06-1378
06/7/06	ENG CHECK: J.E.V.	DWG: 16

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

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-1 VS	**BORING LOCATION** 24+45	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** ND
COLLAR ELEV. 2.5 ft	**NORTHING** 1,012,753 **US ft**	**EASTING** 2,856,846 **US ft**	**24 HR.** FIAD
TOTAL DEPTH 23.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** N/A
DATE STARTED 4/21/06	**COMPLETED** 4/21/06	**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
2.5					Pavement				2.5 0.0
									1.5 Asphalt Pavement to 1.0 ft 1.0
									-0.5 Roadway Embankment Fill: SAND (A-2-4)-Not sampled, based on drill cuttings 3.0
									Alluvium: Trace to moderately organic CLAY (A-7-6)-Not sampled, based on drill cuttings
									Vane shear tests conducted at 6.5 ft, 10.5 ft, 14.5 ft, 19.5 ft, and 23.5 ft
									-21.0 23.5
									Boring terminated at 23.5 ft (Elev. -21.0 ft) in Alluvium: Very soft to soft, silty, trace to moderately organic CLAY (A-7-6)
									Bits Used: 4" Roller Cone
									Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 20 OF 58

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-1	**BORING LOCATION** 24+47	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.2
COLLAR ELEV. 2.5 ft	**NORTHING** 1,012,751 **US ft**	**EASTING** 2,856,847 **US ft**	**24 HR.** FIAD
TOTAL DEPTH 50.0 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual
DATE STARTED 4/12/06	**COMPLETED** 4/12/06	**SURFACE WATER DEPTH** NA	

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
2.5					Pavement				2.5 0.0
									1.5 Asphalt pavement to 1.0 ft 1.0
1.3	1.2								-0.5 Roadway Embankment Fill: Brown, silty, f. to cse. SAND (A-2-4) 3.0
-1.5	4.0	6	3	2	5		W		Alluvium: Gray, silty, mod. to highly organic, CLAY (A-7-5) Organic Content=36.3%
		WOH	1	2	3	SS-1 Rev	133.5%		
						ST-1 Rev	120.8%		Shelby tube collected with piston sampler from 5.5 ft- 7.5 ft, Rec=1.2 ft (60%)
-6.9	9.4								-6.0 Alluvium: Gray, silty, mod. organic CLAY (A-6) 8.5
		WOH	WOH	WOH	0 WOH		W		
						ST-2 Rev	74.7%		Shelby tube collected with piston sampler from 10.9 ft - 12.9 ft, Rec=1.9 ft (95%)
-10.9	13.4								-10.5 13.0
		WOH	WOH	WOH	0 WOH	SS-2 Rev	48.3%		Alluvium: Gray, clayey, f. sandy, SILT (A-4) w/ trace organics-Organic Content=4.1%
						ST-3 Rev			-12.5 15.0
									Alluvium: Gray, silty, f. SAND (A-2-4)
-15.9	18.4								-14.5 Shelby tube collected with piston sampler from 15.0 ft- 17.0 ft, Rec=1.4 ft (70%) 17.0
		WOH	WOH	WOH	0 WOH		W		Alluvium: Gray, silty, mod. organic, CLAY (A-7-5) Organic Content=12.1%
						ST-4 Rev	92.7%		Shelby tube collected with piston sampler from 20.0 ft - 22.0 ft, Rec=2.0 ft (100%)
-21.0	23.5								
		WOH	WOH	2	2	SS-3 Rev	132.9%		-22.5 25.0
						ST-5 Rev			Alluvium: Gray, silty, f. to cse. SAND (A-2-4) w/ trace organics-Organic Content=1.7%
-26.0	28.5								Shelby tube collected with piston sampler from 25.0 ft- 27.0 ft, Rec=0.8 ft (40%)
		2	2	3	5	SS-4 Rev	W		
-31.0	33.5								
		10	10	6	16		W		
-36.0	38.5								
		10	11	10	21		W		
-41.0	43.5								-38.0 40.5
		22	29	30	59		W		Coastal Plain Undivided (CPU): Light gray, silty, f. SAND (A-3)
-46.0	48.5								
		25	37	42	79	SS-5 Rev	W		-47.5 50.0
									Boring terminated at 50.0 ft (Elev. -47.5 ft) in CPU: Very dense, silty, fine SAND (A-3)
									Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit
									Drilling Fluid Properties: 8.6 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 6/7/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B6-C	**BORING LOCATION** 25+04	**OFFSET** 55 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 1.4 ft	**NORTHING** 1,012,743 **US ft**	**EASTING** 2,856,930 **US ft**		**24 HR.** Boring
TOTAL DEPTH 91.3 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/9/03	**COMPLETED** 7/10/03	**SURFACE WATER DEPTH** 0.4 ft	

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
1.4					Mudline				
1.4	0.0	WOH	WOH	WOH	0 WOH		Sat.		Alluvium: Muck
-3.1	4.5								1.4 / 0.0
		WOH	WOH	WOH	0 WOH		Sat.		Alluvium: Dark gray, f. sandy, mod. organic CLAY (A-7-6)
-8.1	9.5								-5.1 / 6.5
		WOH	WOH	WOH	0 WOH		Sat.		
-13.1	14.5								
		WOH	WOH	WOH	0 WOH		Sat.		
-18.1	19.5								
		WOH	2	2	4		Sat.		Alluvium: Peat
-23.4	24.8								-18.6 / 20.0
		2	4	4	8		Sat.		Alluvium: Dark gray, silty, f. SAND (A-2-4)
-28.4	29.8								-21.6 / 23.0
		4	4	7	11		Sat.		Alluvium: Gray, f. to cse. SAND (A-3) with trace wood fragments
-33.4	34.8								-26.6 / 28.0
		6	5	3	8		Sat.		
-38.4	39.8								
		6	10	10	20		Sat.		CPU: Gray, f. sandy, silty CLAY (A-6) with v. thinly bedded f. sand (A-3) lenses
-43.4	44.8								-34.1 / 35.5
		3	6	6	12		W		CPU: Gray, silty, f. SAND (A-2-4)
-48.4	49.8								-37.6 / 39.0
		4	11	13	24		Sat.		CPU: Gray, f. sandy, clayey SILT (A-4)
-53.4	54.8								-41.6 / 43.0
		23	22	27	49		W		CPU: Gray, silty, f. to cse. SAND (A-3)
-58.4	59.8								-46.1 / 47.5
		28	47	53/0.4	100/0.9		W		
-63.4	64.8								
		3	4	5	9		W		
-68.4	69.8								
		3	4	4	8		M		Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
-73.4	74.8						M		-61.6 / 63.0

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 21 OF 58

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B6-C	**BORING LOCATION** 25+04	**OFFSET** 55 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 1.4 ft	**NORTHING** 1,012,743 **US ft**	**EASTING** 2,856,930 **US ft**		**24 HR.** Boring
TOTAL DEPTH 91.3 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/9/03	**COMPLETED** 7/10/03	**SURFACE WATER DEPTH** 0.4 ft	

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
-73.4					Continued from previous page				
		4	4	4	8		M		Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments *(continued)*
-78.4	79.8								
		4	4	5	9		M		
-83.4	84.8								
		4	4	6	10		M		
-88.4	89.8								
		4	4	6	10		M		
-89.9	91.3								Boring terminated at 91.3 ft (elev. -89.9 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments

Bits Used: 0.3' roller cone

Drilling Fluid Properties: 9.0 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 22 OF 58

MACTEC

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-2	**BORING LOCATION** 25+06	**OFFSET** 9 ft RT	**ALIGNMENT** -L-
COLLAR ELEV. 2.2 ft	**NORTHING** 1,012,703 **US ft**	**EASTING** 2,856,881 **US ft**	**24 HR.** FIAD
TOTAL DEPTH 49.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual
DATE STARTED 4/13/06	**COMPLETED** 4/13/06	**SURFACE WATER DEPTH** NA	

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
2.2					Pavement				2.2 0.0
1.0	1.2								1.2 Asphalt Pavement to 1.0 ft 1.0
-1.3	3.5	6	6	4	10	SS-6 Rev	M		-0.8 Roadway Embankment Fill: Gray-brown, silty. f. to cse. SAND (A-2-4) 3.0
-5.8	8.0	1	1	2	3		W		Alluvium: Dark gray and gray, silty, trace to mod. organic CLAY (A-7-5)
-10.8	13.0	WOH	WOH	WOH	0 WOH	SS-7	143.1%		
-15.8	18.0	WOH	WOH	WOH	0 WOH		W		
-20.8	23.0	WOH	WOH	WOH	0 WOH	SS-8 Rev	102.0%		
-25.8	28.0	WOH	WOH	2	2		W		-23.8 26.0 Alluvium: Gray, silty, f. to cse. SAND (A-3)
-30.8	33.0	3	4	4	8		W		-28.8 31.0 Coastal Plain Undivided (CPU): Gray, f. sandy, silty, CLAY (A-6)
-35.8	38.0	WOH	1	2	3	SS-9 Rev	40.9%		
-40.8	43.0	WOH	3	3	6		M		-38.3 40.5 CPU: Light gray, silty, f. SAND (A-2-4)
-45.8	48.0	6	12	17	29	SS-10 Rev	W		
		12	17	23	40		W		-47.3 49.5 Boring terminated at 49.5 ft (Elev. -47.3 ft) in CPU: Dense, silty, fine SAND (A-2-4)

Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit

Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B6-B	**BORING LOCATION** 25+07	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.4
COLLAR ELEV. 2.2 ft	**NORTHING** 1,012,701 **US ft**	**EASTING** 2,856,881 **US ft**		**24 HR.** 1.0
TOTAL DEPTH 94.2 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual	
DATE STARTED 7/10/03	**COMPLETED** 7/10/03	**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
2.2					Ground Surface				
2.2	0.0	3	10	8	18		D		Roadway Embankment Fill: Tan-brown, brown and gray, silty, clayey, f. to cse. SAND (A-2-4) with trace organics
-0.8	3.0								
-0.5	2.7	1	1	1	2		M		Alluvium: Gray to black and brown, f. sandy, silty, CLAY (A-7-6) w/little organic matter
-5.5	7.7	WOH	WOH	WOH	0 WOH		W		
-10.5	12.7	WOR	WOR	WOH	0 WOH		W		
-15.5	17.7	WOR	WOR	WOR	0 WOR		W		
-18.8	21.0								Alluvium: Dark gray to black PEAT
-20.5	22.7	WOR	WOR	WOR	0 WOR		W		
-23.8	26.0								Alluvium: Light gray to gray, silty, f. SAND (A-3)
-25.5	27.7	4	2	7	9		W		
-28.8	31.0								CPU: Light gray, silty, f. sandy, CLAY (A-7-6)
-30.5	32.7	1	2	1	3		W		
-35.5	37.7	WOH	WOH	2	2	SS-11	43.8%		
-38.7	40.9								CPU: Light gray to gray, silty, f. SAND (A-3)
-40.5	42.7	7	8	15	23		W		
-45.5	47.7	13	20	24	44		W		
-50.5	52.7	12	17	24	41	SS-12	W		
-55.5	57.7	15	25	35	60		W		
-60.5	62.7	14	21	22	43		W		
-63.7	65.9								Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
-65.5	67.7	2	4	6	10		W		
-70.5	72.7	3	4	6	10	SS-13	42.3%		

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 23 OF 58

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B6-B	**BORING LOCATION** 25+07	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.4
COLLAR ELEV. 2.2 ft	**NORTHING** 1,012,701 **US ft**	**EASTING** 2,856,881 **US ft**		**24 HR.** 1.0
TOTAL DEPTH 94.2 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual	
DATE STARTED 7/10/03	**COMPLETED** 7/10/03	**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
-72.6					Continued from previous page				
-75.5	77.7	3	3	4	7		M		Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments *(continued)*
-80.5	82.7	3	4	5	9		M		
-85.5	87.7	3	5	6	11		M		
-90.5	92.7	4	4	7	11		M		
-92.0	94.2								Boring terminated at 94.2 ft (elev. -92.0 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments

Bits Used: 0.3' side-discharge wing bit

Drilling Fluid Properties: 8.9 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

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

MACTEC

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-3	**BORING LOCATION** 25+44	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** 2.1
COLLAR ELEV. 2.2 ft	**NORTHING** 1,012,686 **US ft**	**EASTING** 2,856,921 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 50.0 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/18/06	**COMPLETED** 4/18/06	**SURFACE WATER DEPTH** NA		

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
2.2					Ground Surface				2.2 / 0.0
2.2 / -1.3	0.0 / 3.5	24	26	14	40		M		Roadway Embankment Fill: Black and tan, silty, f. to cse. SAND (A-2-4) w/ little gravel
									-0.8 / 3.0
		2	2	2	4		M		Alluvium: Dark gray, sandy, silty, trace to mod. organic CLAY (A-7-6)
-6.3	8.5								
		WOH	WOH	WOH	0 WOH		M		
-11.3	13.5								
		WOH	2	1	3		M		
-16.3	18.5								
		WOH	WOH	WOH	0 WOH		M		
-21.3	23.5								
		WOH	WOH	2	2		M		
-23.8	26.0								Alluvium: Gray, silty, f. to cse. SAND (A-3)
-26.3	28.5	8	9	12	21		W		
-31.3	33.5								
		9	18	15	33		W		
-33.3	35.5								Coastal Plain Undivided (CPU): Gray, f. sandy, silty CLAY (A-6)
-36.3	38.5	2	2	2	4		W		
-41.3	43.5								
		WOH	1	11	12		W		
-43.3	45.5								CPU: Light gray, silty, f. to cse. SAND (A-3)
-46.3	48.5								
		17	21	18	39		W		
-47.8	50.0								Boring terminated at 50.0 ft (Elev. -47.8 ft) in CPU: Dense, silty, fine to coarse SAND (A-3)

Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit

Drilling Fluid Properties: 8.6 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 24 OF 58

MACTEC

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-4	**BORING LOCATION** 25+75	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** 3.0
COLLAR ELEV. 2.3 ft	**NORTHING** 1,012,648 **US ft**	**EASTING** 2,856,923 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 49.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/13/06	**COMPLETED** 4/13/06	**SURFACE WATER DEPTH** NA		

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
2.3					Pavement				2.3 / 0.0
1.3	1.0						M		1.3 Asphalt Pavement to 1.0 ft / 1.0
-1.2	3.5	10	6	6	12				-0.7 Roadway Embankment Fill: Brown-gray, silty, f. to cse. SAND (A-2-4) w/ trace gravel / 3.0
		1	1	1	2		W		Alluvium: Dark gray-brown and gray, f. sandy, silty, trace to mod. organic CLAY (A-7-6)
-5.7	8.0								
		WOH	WOH	WOH	0 WOH		W		
-10.7	13.0								
		WOH	WOH	2	2		W		
-15.7	18.0								
		WOH	WOH	WOH	0 WOH		W		
-20.7	23.0								
		WOH	WOH	WOH	0 WOH		W		
-23.7	26.0								Alluvium: Gray, f. to cse. SAND (A-3) w/ trace organics
-25.7	28.0	6	8	10	18		W		
-28.7	31.0								Coastal Plain Undivided (CPU): Gray, f. sandy, silty, CLAY (A-6)
-30.7	33.0	WOH	WOH	2	2		W		
-35.7	38.0	3	3	5	8		W		
-38.2	40.5								CPU: Light gray, silty, f. to cse. SAND (A-3)
-40.7	43.0	19	23	11	34		W		
-45.7	48.0	13	23	30	53		W		
-47.2	49.5								Boring terminated at 49.5 ft (Elev. -47.2 ft) in CPU: Dense, silty, fine to coarse SAND (A-3)

Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit

Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B8-C	**BORING LOCATION** 25+92	**OFFSET** 57 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 1.4 ft	**NORTHING** 1,012,674 **US ft**	**EASTING** 2,856,987 **US ft**		**24 HR.** Boring
TOTAL DEPTH 91.5 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/10/03	**COMPLETED** 7/11/03	**SURFACE WATER DEPTH** 0.2 ft	

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
1.4					Mudline				
1.4	0.0	WOH	WOH	WOH	WOH 0		Sat.		Alluvium: Muck
-3.2	4.6								
		WOH	WOH	WOH	WOH 0		Sat.		
-8.3	9.7								
		WOH	WOH	WOH	WOH 0		Sat.		
-13.3	14.7								
		WOH	WOH	WOH	WOH 0		Sat.		
-18.3	19.7								
		1	1	1	2		Sat.		
-23.6	25.0								
		3	8	8	16		Sat.		
-28.6	30.0								
		4	4	4	8		Sat.		
-33.6	35.0								
		9	10	7	17		Sat.		
-38.6	40.0								
		1	3	3	6		Sat.		
-43.6	45.0								
		WOH	WOH	2	2		Sat.		
-48.6	50.0								
		27	34	34	68		W		
-53.6	55.0								
		14	32	31	63		W		
-58.6	60.0								
		29	55	45/0.3	100/0.8ft		W		
-63.6	65.0								
		3	4	5	9		M		
-68.6	70.0								
		3	5	5	10		M		
-73.6	75.0								

1.4 — 0.0 — Alluvium: Muck

-5.6 — 7.0 — Alluvium: Gray and brown, f. to cse. sandy, silty, CLAY (A-7-6) w/little organic matter

-17.6 — 19.0 — Alluvium: Peat

-21.1 — 22.5 — Alluvium: Gray brown, silty, f. to cse. SAND (A-2-4)

-26.6 — 28.0 — Alluvium: Gray, silty, f. to cse. SAND (A-3)

-36.1 — 37.5 — CPU: Gray, f. sandy, silty CLAY (A-6)

-46.6 — 48.0 — CPU: Gray, silty, f. to cse. SAND (A-3)

-61.6 — 63.0 — Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 25 OF 58

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B8-C	**BORING LOCATION** 25+92	**OFFSET** 57 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 1.4 ft	**NORTHING** 1,012,674 **US ft**	**EASTING** 2,856,987 **US ft**		**24 HR.** Boring
TOTAL DEPTH 91.5 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/10/03	**COMPLETED** 7/11/03	**SURFACE WATER DEPTH** 0.2 ft	

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
-73.4					Continued from previous page				
		3	4	4	8		M		Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments *(continued)*
-78.6	80.0								
		3	4	5	9		M		
-83.6	85.0								
		4	4	5	9		M		
-88.6	90.0								
		3	4	4	8		M		
-90.1	91.5								Boring terminated at 91.5 ft (elev. -90.1 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments

Bits Used: 0.3' roller cone

Drilling Fluid Properties: 9.1 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

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

SHEET 1 OF 1

MACTEC

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-5 VS	**BORING LOCATION** 26+47	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** ND
COLLAR ELEV. 2.7 ft	**NORTHING** 1,012,603 **US ft**	**EASTING** 2,856,983 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 25.6 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** N/A	
DATE STARTED 4/19/06	**COMPLETED** 4/19/06	**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
2.7					Pavement				2.7 0.0
									1.7 Asphalt Pavement to 1.0 ft 1.0
									Roadway Embankment Fill: SAND (A-2-4)-Not sampled, based on drill cuttings
									-3.3 6.0
									Alluvium: Trace to moderately organic CLAY (A-7-6)-Not sampled, based on drill cuttings
									Vane shear tests conducted at 9.6 ft, 13.6 ft, 17.6 ft, 21.6 ft, and 25.6 ft
									-22.9 25.6
									Boring terminated at 25.6 ft (Elev. -22.9 ft) in Alluvium: Very soft, silty, trace to moderately organic CLAY (A-7-6)
									Bits Used: 4" Roller Cone
									Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 26 OF 58

MACTEC

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-5	**BORING LOCATION** 26+51	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 1.8
COLLAR ELEV. 2.7 ft	**NORTHING** 1,012,600 **US ft**	**EASTING** 2,856,985 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 50.0 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/18/06	**COMPLETED** 4/18/06	**SURFACE WATER DEPTH** NA		

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
2.7					Pavement				2.7 0.0
1.9	0.8						M		1.9 Asphalt pavement to 0.8 ft 0.8
-0.8	3.5	12	19	12	31		M		-0.3 Roadway Embankment Fill: Tan and black, silty, f. to cse. SAND (A-2-4) w/ trace to little gravel 3.0
-5.8	8.5	4	3	4	7		M		-3.3 Roadway Embankment Fill: Gray-tan, sandy, silty, CLAY (A-6) w/ trace gravel 6.0
-10.8	13.5	2	2	1	3	ST-6 Rev	105.8%		Alluvium: Gray, clayey, SILT (A-5) w/ trace organics
-15.8	18.5	WOH	WOH	WOH	0 WOH		M		Pushed shelby tube with piston sampler from 10.0 - 12.0 ft, Recovery=2.0 ft (100%)
-20.8	23.5	WOH	WOH	WOH	0 WOH		M		-9.8 12.5
-25.8	28.5	WOH	WOH	2	2	ST-7 Rev	52.7%		Alluvium: Dark gray, silty, CLAY (A-7-6) w/ trace organics
-30.8	33.5	6	7	11	18		M		Pushed shelby tubes with piston sampler from 15.0 - 17.0 ft, Recovery=1.5 ft (75%); 20.0 - 22.0 ft, Recovery=1.4 ft (70%); and 25.0 - 27.0 ft, Recovery=1.9 ft (95%)
-35.8	38.5	9	10	10	20		W		-25.3 28.0
-40.8	43.5	WOH	2	2	4		W		Alluvium: Gray, silty, f. to cse. SAND (A-3)
-45.8	48.5	6	7	8	15		W		-33.3 36.0
		12	37	53	90		W		Coastal Plain Undivided (CPU): Gray, sandy, silty, CLAY (A-6)
									-39.3 42.0
									CPU: Gray, silty, f. SAND (A-2-4)
									-47.3 50.0
									Boring terminated at 50.0 ft (Elev. -47.3 ft) in CPU: Very dense, silty, fine SAND (A-2-4)
									Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit
									Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

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

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B10-C	**BORING LOCATION** 26+89	**OFFSET** 54 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 1.1 ft	**NORTHING** 1,012,597 **US ft**	**EASTING** 2,857,043 **US ft**		**24 HR.** Boring
TOTAL DEPTH 77.0 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/14/03	**COMPLETED** 7/15/03	**SURFACE WATER DEPTH** 0.5 ft	

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
1.1					Mudline				
1.1	0.0	WOH	WOH	WOH	WOH		Sat.		Alluvium: Muck, Poor Recovery
-2.9	4.0								Alluvium: Gray and brown, f. sandy, silty, CLAY (A-7-6) w/little organic matter
-3.9	5.0	WOH	WOH	WOH	WOH		Sat.		
-8.9	10.0	WOH	WOH	WOH	WOH		Sat.		
-13.9	15.0	WOH	WOH	WOH	WOH		Sat.		
-18.9	20.0	WOH	WOH	WOH	WOH		Sat.		
-24.5	25.6	2	2	6	8		Sat.		
-25.5	26.6								Alluvium: Dark gray, silty, f. SAND (A-2-4)
-28.4	29.5								Alluvium: Dark gray, silty, f. to cse. SAND (A-3)
-29.4	30.5	9	12	14	26		W		
-32.9	34.0								Alluvium: Dark gray, clayey, silty, f. to cse. SAND and gravel (A-2-4)
-34.4	35.5	4	6	6	12		Sat.		
-36.9	38.0								CPU: Gray, f. sandy, silty CLAY (A-6)
-39.4	40.5	4	5	3	8		W		
-44.4	45.5	1	2	2	4		W		
-46.9	48.0								CPU: Gray, silty, f. to cse. SAND (A-2-4) w/ v. thinly to thinly bedded CLAY (A-6) layers
-49.4	50.5	9	8	18	26		W		
-54.4	55.5	13	10	5	15		W		
-59.4	60.5	25	34	33	67		W		
-63.4	64.5								Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
-64.4	65.5	3	4	5	9		M		
-69.4	70.5	4	5	6	11		M		

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 27 OF 58

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B10-C	**BORING LOCATION** 26+89	**OFFSET** 54 ft LT	**ALIGNMENT** -L-	**0 HR.** Water
COLLAR ELEV. 1.1 ft	**NORTHING** 1,012,597 **US ft**	**EASTING** 2,857,043 **US ft**		**24 HR.** Boring
TOTAL DEPTH 77.0 ft	**DRILL MACHINE** CME-45 on M. Buggy	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/14/03	**COMPLETED** 7/15/03	**SURFACE WATER DEPTH** 0.5 ft	

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
-73.7					Continued from previous page				
-74.4	75.5	3	4	6	10		M		
-75.9	77.0								Boring terminated at 77.0 ft (elev. -75.9 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments Bits Used: 0.3' roller cone Drilling Fluid Properties: 9.1 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

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

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-6	**BORING LOCATION** 27+04	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** 2.0
COLLAR ELEV. 3.3 ft	**NORTHING** 1,012,546 **US ft**	**EASTING** 2,857,002 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 49.0 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/13/06	**COMPLETED** 4/13/06	**SURFACE WATER DEPTH** NA		

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
3.3					Pavement				3.3 / 0.0
2.3	1.0						M		2.5 / 0.8 Asphalt Pavement to 0.8 ft
0.3	3.0	7	8	9	17				Roadway Embankment Fill: Gray-brown, silty, f. to cse. SAND (A-2-4)
		3	3	4	7	SS-11 Rev	M		
-4.5	7.8								-2.7 / 6.0 Alluvium: Brown-gray and gray, silty, trace to mod. organic CLAY (A-7-6)
		1	1	1	2		W		
-9.2	12.5								
		WOH	WOH	1	1		W		
-14.2	17.5								
		WOH	WOH	WOH	WOH 0		W		
-19.2	22.5								
		WOH	1	1	2		W		
-24.2	27.5								-23.7 / 27.0 Alluvium: Dark gray, clayey, silty, f. to cse. SAND (A-2-4) w/ trace wood fragments and gravel
		2	3	4	7	SS-12 Rev	W		-28.2 / 31.5 Coastal Plain Undivided (CPU): Gray, f. to cse. sandy, silty CLAY (A-6)
-29.2	32.5								
		2	2	2	4		W		
-34.2	37.5								
		3	3	3	6		W		-37.7 / 41.0 CPU: Gray, silty, f. SAND (A-2-4)
-39.2	42.5								
		8	7	8	15	SS-13 Rev	W		-42.7 / 46.0 CPU: Gray, f. sandy, silty CLAY (A-7-6)
-44.2	47.5								
		4	5	6	11	SS-14 Rev	30.5%		-45.7 / 49.0 Boring terminated at 49.0 ft (Elev. -45.7 ft) in CPU: Stiff, fine sandy, silty, CLAY (A-7-6)

Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit

Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 28 OF 58

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-7	**BORING LOCATION** 27+51	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** 5.8
COLLAR ELEV. 4.9 ft	**NORTHING** 1,012,521 **US ft**	**EASTING** 2,857,047 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 54.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/19/06	**COMPLETED** 4/19/06	**SURFACE WATER DEPTH** NA		

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
4.9					Pavement				4.9 / 0.0
4.1	0.8								4.1 / 0.8 Asphalt pavement to 0.8 ft
		10	7	7	14		M		Roadway Embankment Fill: Brown, silty, f. to cse. SAND (A-2-4) w/ trace gravel
1.4	3.5						M		-0.1 / 5.0 Alluvium: Dark gray, f. sandy, silty, CLAY (A-7-6) w/ trace organics
		2	2	2	4				
-3.1	8.0						W		
		2	2	2	4				
-8.1	13.0						W		
		WOH	1	1	2				
-13.1	18.0						W		
		WOH	1	1	2				
-18.1	23.0						W		
		1	1	2	3				-21.1 / 26.0 Alluvium: Gray, silty, f. to cse. SAND (A-3)
-23.1	28.0						W		
		4	10	9	19				-26.1 / 31.0 Coastal Plain Undivided (CPU): Gray, f. sandy, silty, CLAY (A-6)
-28.1	33.0						W		
		WOH	WOH	3	3				-31.1 / 36.0 CPU: Gray, clayey, silty, f. to cse. SAND (A-2-4)
-33.1	38.0						W		
		2	8	16	24				-35.1 / 40.0 CPU: Gray, f. sandy, silty CLAY (A-6)
-38.1	43.0						W		
		3	3	3	6				
-43.1	48.0						W		
		5	5	5	10				-45.1 / 50.0 CPU: Light gray, silty, f. SAND (A-2-4)
-48.1	53.0						W		
		26	22	21	43				-49.6 / 54.5 Boring terminated at 54.5 ft (Elev. -49.6 ft) in CPU: Dense, silty, fine SAND (A-2-4)

Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit

Drilling Fluid Properties: 8.6 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

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

SHEET 1 OF 1

MACTEC

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-8 VS	**BORING LOCATION** 27+97	**OFFSET** 8 ft RT	**ALIGNMENT** -L-	**0 HR.** ND
COLLAR ELEV. 6.7 ft	**NORTHING** 1,012,474 **US ft**	**EASTING** 2,857,061 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 25.0 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** N/A	
DATE STARTED 4/20/06	**COMPLETED** 4/20/06	**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
6.7					Pavement				6.7 / 0.0
5.9	0.8								Asphalt Pavement to 0.8 ft
									Roadway Embankment Fill: SAND (A-2-4)-Not sampled, based on drill cuttings
0.7	6.0								Roadway Embankment Fill: CLAY (A-6)-Not sampled, based on drill cuttings
-3.3	10.0								Alluvium: Trace to moderately organic CLAY (A-7-6)-Not sampled, based on drill cuttings
									Vane shear tests conducted at 13.0 ft, 17.0 ft, 21.0 ft, and 25.0 ft
-18.3	25.0								Boring terminated at 25.0 ft (Elev. -18.3 ft) in Alluvium: Very soft to soft, silty, trace to moderately organic, CLAY (A-7-6)
									Bits Used: 4" Roller Cone
									Drilling Fluid Properties: 8.6 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 29 OF 58

MACTEC

SHEET 1 OF 1

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Retaining Walls Associated with the Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC Proj. 6468-06-1378)			**GROUND WATER (ft)**
BORING NO. RW-8	**BORING LOCATION** 27+99	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 3.2
COLLAR ELEV. 6.7 ft	**NORTHING** 1,012,474 **US ft**	**EASTING** 2,857,064 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 54.0 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/20/06	**COMPLETED** 4/20/06	**SURFACE WATER DEPTH** NA		

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
6.7					Pavement				6.7 / 0.0
5.9	0.8								Asphalt pavement to 0.8 ft
									Roadway Embankment Fill: Brown, silty, f. to cse. SAND (A-2-4) w/ trace gravel
2.2	4.5								Roadway Embankment Fill: Light Gray, sandy, silty, CLAY (A-6)
-0.3	7.0								Pushed shelby tube with piston sampler from 4.5 - 6.5 ft, Recovery=1.6 ft (80%)
-3.3	10.0								Roadway Embankment Fill: Light Gray, sandy, clayey, SILT (A-4)
									Alluvium: Gray-brown and dark gray, silty, trace to mod. organic CLAY (A-7-6/A-7-5)
									Pushed shelby tubes with piston sampler from 14.0 - 16.0 ft, Recovery=1.6 ft (80%); 19.0 - 21.0 ft, Recovery=1.8 ft (90%); and 24.0 -26.0 ft, Recovery=1.5 ft (75%)
5.7	1.0								
3.7	3.0	12	10	10	20				
		6	4	4	8	ST-8 Rev	M	24.6%	
-0.8	7.5						W		
		1	1	2	3	SS-15 Rev		26.8%	
-5.8	12.5								
		1	1	1	2	ST-9 Rev	W	72.2%	
-10.8	17.5								
		WOH	1	1	2	SS-16 Rev		64.6%	
-15.8	22.5					ST-10 Rev		78.1%	
		1	1	1	2		W		
-20.8	27.5								
-20.3	27.0								Alluvium: Gray and light gray, thinly bedded SAND (A-3) and CLAY (A-7-6) w/ trace to little organics
		2	2	2	4		W		
-25.8	32.5								
		5	2	2	4		W		
-26.3	33.0								Coastal Plain Undivided (CPU): Gray, f. sandy, silty, CLAY (A-7-6) w/ trace organics
-30.8	37.5								
		1	1	3	4		W		
-35.8	42.5								
		1	2	2	4	SS-17 Rev		44.1%	
-40.8	47.5								
		1	3	4	7		W		
-43.3	50.0								CPU: Gray, silty, f. to cse. SAND (A-3)
-45.8	52.5	9	10	13	23	SS-18 Rev	W		
-47.3	54.0								Boring terminated at 54.0 ft (Elev. -47.3 ft) in CPU: Medium dense, silty, fine to coarse SAND (A-3)
									Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit
									Drilling Fluid Properties: 8.6 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 6/7/06

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

MACTEC

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B14-B	**BORING LOCATION** 28+32	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.7
COLLAR ELEV. 7.7 ft	**NORTHING** 1,012,444 **US ft**	**EASTING** 2,857,079 **US ft**	**24 HR.** Cl at 7.9
TOTAL DEPTH 83.7 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/11/03	**COMPLETED** 7/14/03	**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
7.7					Ground Surface				7.7 / 0.0
7.7 – 5.5	0.0 – 2.2	2	4	7	11		D		Roadway Embankment Fill: Tan-brown, to orange-brown and gray, silty, clayey SAND (A-2-4) with trace organic matter
0.5	7.2	5	6	4	10	SS-14	M		SS-14: 1.1% organic content — 2.2 / 5.5
-4.5	12.2	1	1	1	2		W		Alluvium: Dark gray to gray and black, f. sandy, silty CLAY (A-7-6)
-9.5	17.2	1	2	2	4		W		
-14.5	22.2	WOH	1	2	3		W		
-19.5	27.2	WOR	WOH	WOH	WOH 0		W		-20.5 / 28.2
-24.5	32.2	1	4	5	9		W		Alluvium: Dark gray to gray, silty, f. to cse. SAND (A-2-4)
-29.5	37.2	1	2	1	3		W		-22.8 / 30.5 CPU: Dark gray to gray, f. to cse. sandy, silty, CLAY (A-7-6)
-34.5	42.2	1	0	1	1		W		
-39.5	47.2	4	2	3	5		W		
-44.5	52.2	2	2	2	4		W		-42.8 / 50.5 CPU: Dark gray to gray, silty, f. SAND (A-2-4)
-49.5	57.2	11	8	13	21		W		
-54.5	62.2	14	23	26	49		W		
-59.5	67.2	9	18	20	38		W		
-64.5	72.2	25	27	38	65		W		-62.8 / 70.5 Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments
		6	8	10	18		M		

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 30 OF 58

MACTEC

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** B. Parks
SITE DESCRIPTION Bridge 4 over Tulls Creek on SR 1222			**GROUND WATER (ft)**
BORING NO. B14-B	**BORING LOCATION** 28+32	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.7
COLLAR ELEV. 7.7 ft	**NORTHING** 1,012,444 **US ft**	**EASTING** 2,857,079 **US ft**	**24 HR.** Cl at 7.9
TOTAL DEPTH 83.7 ft	**DRILL MACHINE** CME 550	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb Manual
DATE STARTED 7/11/03	**COMPLETED** 7/14/03	**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
-67.1					Continued from previous page				
-69.5	77.2	6	6	9	15		M		Yorktown Fm: Gray-green, silty CLAY (A-7-6) w/trace shell fragments *(continued)*
-74.5	82.2	3	5	6	11		M		-76.0 / 83.7
									Boring terminated at 83.7 ft (elev. -76.0 ft) in Yorktown Fm: Stiff, silty, CLAY (A-7-6) w/trace shell fragments
									Bits Used: 0.3' side-discharge wing bit and 0.3' side-discharge finger bit.
									Drilling Fluid Properties: 8.9 lbs/gal

NCDOT BORE SINGLE 1378 RETAINING WALLS.GPJ NC_DOT.GDT 5/31/06

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

MACTEC

SHEET 1 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. EB1-REV	**BORING LOCATION** 28+49	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 4.3
COLLAR ELEV. 8.8 ft	**NORTHING** 1,012,444 **US ft**	**EASTING** 2,857,107 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 79.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/25/06	**COMPLETED** 4/25/06	**SURFACE WATER DEPTH** NA		

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
8.8					Pavement				8.8 0.0
7.8	1.0						M		7.8 Asphalt Pavement to 1.0 ft 1.0
4.5	4.3	9	14	17	31		M		Roadway Embankment Fill: Brown, silty, f. to cse. SAND (A-2-4)
-0.2	9.0	10	4	3	7		W		1.3 7.5 Roadway Embankment Fill: Gray, sandy, silty CLAY (A-6)
-4.2	13.0	2	2	2	4		M		-2.7 11.5 Roadway Embankment Fill: Dark gray, f. sandy, clayey, SILT (A-4) w/ trace gravel and brick fragments
-9.2	18.0	7	6	7	13		W		-6.2 15.0 Alluvium: Dark gray, silty, CLAY (A-7-6) w/ trace organics
-14.2	23.0	1	1	2	3		W		
-19.2	28.0	1	1	2	3		W		-19.9 28.7 Alluvium: Gray, silty, f. to cse. SAND (A-3) w/ trace gravel and organics
-24.2	33.0	2	4	4	8		W		
-29.2	38.0	13	14	8	22		W		-27.2 36.0 Coastal Plain Undivided (CPU): Gray, f. sandy, silty CLAY (A-6)
-34.2	43.0	2	2	2	4		W		-32.7 41.5 CPU: Gray, thinly interbedded, silty CLAY (A-6) and fine to coarse SAND (A-3)
-39.2	48.0	3	4	3	7		W		-37.2 46.0 CPU: Gray, f. sandy, silty CLAY (A-6)
-44.2	53.0	3	3	4	7		W		-42.2 51.0 CPU: Gray, silty, f. SAND (A-3)
-49.2	58.0	12	17	14	31		W		
-54.2	63.0	12	16	24	40		W		
-59.2	68.0	18	47	53/0.4'	100/0.9'		W		
-64.2	73.0	14	26	30	56		W		-62.2 71.0 Yorktown Fm: Gray-green, silty, CLAY (A-7-6) w/ trace shell fragments
		3	5	5	10		M		

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/31/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG SHEET 31 OF 58

MACTEC

SHEET 2 OF 2

PROJECT NO. 32773.1.1	**ID.** B-2950	**COUNTY** Currituck	**GEOLOGIST** M. Lear
SITE DESCRIPTION Replacement of Bridge No. 4 Over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1377)			**GROUND WATER (ft)**
BORING NO. EB1-REV	**BORING LOCATION** 28+49	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 4.3
COLLAR ELEV. 8.8 ft	**NORTHING** 1,012,444 **US ft**	**EASTING** 2,857,107 **US ft**		**24 HR.** FIAD
TOTAL DEPTH 79.5 ft	**DRILL MACHINE** CME-550 ATV	**DRILL METHOD** Mud Rotary	**HAMMER TYPE** 140 lb. Manual	
DATE STARTED 4/25/06	**COMPLETED** 4/25/06	**SURFACE WATER DEPTH** NA		

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
-66.0					Continued from previous page				
-69.2	78.0	6	7	10	17		M		Yorktown Fm: Gray-green, silty, CLAY (A-7-6) w/ trace shell fragments *(continued)*
									-70.7 79.5 Boring terminated at 79.5ft (Elev. -70.7 ft) in Yorktown Fm: Very stiff, silty, CLAY (A-7-6) with trace shell fragments

Bits Used: 4" Roller Cone; 3" Side-Discharge Finger Bit

Drilling Fluid Properties: 8.7 lbs/gal

NCDOT BORE SINGLE 1377 BRIDGE NO. 4.GPJ NC_DOT.GDT 5/31/06

Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222 (Tulls Creek Road)

NCDOT Proj. No.: 32773.1.1 (B-2950) **MACTEC Proj. No.: 6468-06-1378**

Field Vane Shear Test Data Summary

Boring No.	Test Depth (ft)	Peak Shear Strength (psf)	Peak Remolded Shear Strength (psf)	Sensitivity
RW-1 VS	6.5	332	43	8
RW-1 VS	10.5	292	48	6
RW-1 VS	14.5	392	53	7
RW-1 VS	19.5	542	103	5
RW-1 VS	23.5	862	183	5
RW-5 VS	9.6*	68	13	5
RW-5 VS	13.6*	110	53	2
RW-5 VS	17.6	203	43	5
RW-5 VS	21.6	662	108	6
RW-5 VS	25.6	567	83	7
RW-8 VS	13.0	982	322	3
RW-8 VS	17.0	702	128	5
RW-8 VS	21.0	822	153	5
RW-8 VS	25.0	962	188	5

* = Test may be invalid due to improper set-up

The above data are raw field results.

For remolded tests: Vane was turned rotated rapidly through 10 revolutions and immediately retested.

Friction test conducted at RW-5 VS with 20 feet of AW rod + Vane in open hole to measure friction of the bearings. Friction found to be negligible.

All tests were performed such that the torque rods were completely isolated from the soil. No rod friction tests were conducted.

Vane used was double tapered with the following dimensions:H=7.25", D=3.625", and d=0.5"

Testing performed in general accordance with ASTM D 2573-01.

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-1 VS
TEST DEPTH (ft): 6.5

Time start of test: 8:38 AM
Time start of remold test: 8:46 AM

Date: 4/21/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	10	103	
0.50	3	15	153	
0.75	4.5	19	193	
1.00	6	20	203	
1.25	7.5	21	213	
1.50	9	22	223	
1.75	10.5	23	233	
2.00	12	23	233	
2.25	13.5	24	243	
2.50	15	26	263	
2.75	16.5	26	263	
3.00	18	28	282	
3.25	19.5	29	292	
3.50	21	30	302	
3.75	22.5	31	312	
4.00	24	32	322	
4.25	25.5	32	322	
4.50	27	33	332	
4.75	28.5	33	332	
5.00	30	33	332	
5.25	31.5	33	332	
5.50	33	33	332	
0.25	1.5	4	43	**Remold**
0.50	3	4	43	
0.75	4.5	4	43	
1.00	6	4	43	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-1 VS
TEST DEPTH (ft): 10.5

Time start of test: 9:07 AM
Time start of remold test: 9:12 AM

Date: 4/21/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	12	123	
0.50	3	19	193	
0.75	4.5	24	243	
1.00	6	26	263	
1.25	7.5	29	292	
1.50	9	29	292	
1.75	10.5	29	292	
2.00	12	29	292	
2.25	13.5	29	292	
2.50	15	29	292	
0.25	1.5	4.5	48	**Remold**
0.50	3	4.5	48	
0.75	4.5	4.5	48	
1.00	6	4.5	48	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-1 VS
TEST DEPTH (ft): 14.5

Time start of test: 9:27 AM
Time start of remold test: 9:34 AM

Date: 4/21/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	18	183	
0.50	3	25	253	
0.75	4.5	30	302	
1.00	6	33	332	
1.25	7.5	36	362	
1.50	9	38	382	
1.75	10.5	38	382	
2.00	12	39	392	
2.25	13.5	39	392	
2.50	15	39	392	
2.75	16.5	39	392	
0.25	1.5	3	33	**Remold**
0.50	3	4	43	
0.75	4.5	5	53	
1.00	6	5	53	
1.25	7.5	5	53	
1.50	9	5	53	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-1 VS
TEST DEPTH (ft): 19.5

Time start of test: 9:50 AM
Time start of remold test: 9:59 AM

Date: 4/21/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	16	163	
0.50	3	22	223	
0.75	4.5	27	273	
1.00	6	32	322	
1.25	7.5	37	372	
1.50	9	39	392	
1.75	10.5	43	432	
2.00	12	48	482	
2.25	13.5	52	522	
2.50	15	54	542	
2.75	16.5	54	542	
3.00	18	54	542	
3.25	19.5	54	542	
0.25	1.5	5	53	**Remold**
0.50	3	9	93	
0.75	4.5	10	103	
1.00	6	10	103	
1.25	7.5	10	103	
1.50	9	10	103	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-1 VS
TEST DEPTH (ft): 23.5

Time start of test: 10:18 AM
Time start of remold test: 10:27 AM

Date: 4/21/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	24	243	
0.50	3	31	312	
0.75	4.5	37	372	
1.00	6	42	422	
1.25	7.5	45	452	
1.50	9	50	502	
1.75	10.5	53	532	
2.00	12	59	592	
2.25	13.5	63	632	
2.50	15	67	672	
2.75	16.5	70	702	
3.00	18	74	742	
3.25	19.5	77	772	
3.50	21	80	802	
3.75	22.5	82	822	
4.00	24	85	852	
4.25	25.5	86	862	
4.50	27	86	862	
4.75	28.5	86	862	
5.00	30	86	862	
0.25	1.5	13	133	**Remold**
0.50	3	18	183	
0.75	4.5	18	183	
1.00	6	18	183	
1.25	7.5	18	183	
1.50	9	18	183	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-5 VS
TEST DEPTH (ft): 9.6

Time start of test: 11:42 AM
time start of remold test: 11:46 AM

Date: 4/19/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	4	43	Test may be invalid due to improper set-up
0.50	3	4.5	48	
0.75	4.5	5	53	
1.00	6	6	63	
1.25	7.5	6.5	68	
1.50	9	6.5	68	
1.75	10.5	6.5	68	
0.25	1.5	1	13	**Remold**
0.50	3	1	13	
0.75	4.5	1	13	
1.00	6	1	13	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-5 VS
TEST DEPTH (ft): 13.6

Time start of test: 12:10 PM
Time start of remold test: 12:15 PM

Date: 4/19/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	10	103	Test may be invalid due to improper set-up
0.50	3	10.75	110	
0.75	4.5	10.75	110	
1.00	6	10.75	110	
1.25	7.5	10.75	110	
1.50	9	10.75	110	
1.75	10.5	10.75	110	
2.00	12	10.5	108	
0.25	1.5	3.75	40	**Remold**
0.50	3	4	43	
0.75	4.5	5	53	
1.00	6	5	53	
1.25	7.5	5	53	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-5 VS
TEST DEPTH (ft): 17.6

Time start of test: 12:26 PM
Time start of remold test: 12:34 PM

Date: 4/19/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	5	53	
0.50	3	6	63	
0.75	4.5	6	63	
1.00	6	6	63	
1.25	7.5	6	63	
1.50	9	9	93	
1.75	10.5	10	103	
2.00	12	12	123	
2.25	13.5	12.5	128	
2.50	15	12.5	128	
2.75	16.5	14	143	
3.00	18	15	153	
3.25	19.5	16	163	
3.50	21	18	183	
3.75	22.5	19	193	
4.00	24	20	203	
4.25	25.5	20	203	
4.50	27	20	203	
0.25	1.5	4	43	**Remold**
0.50	3	4	43	
0.75	4.5	4	43	
1.00	6	4	43	
1.25	7.5	4	43	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-5 VS
TEST DEPTH (ft): 21.6

Time start of test: 12:54 PM
Time start of remold test: 1:00 PM

Date: 4/19/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	21	213	
0.50	3	35	352	
0.75	4.5	41	412	
1.00	6	45	452	
1.25	7.5	53	532	
1.50	9	60	602	
1.75	10.5	63	632	
2.00	12	65	652	
2.25	13.5	66	662	
2.50	15	66	662	
2.75	16.5	66	662	
3.00	18	66	662	
0.25	1.5	10	103	**Remold**
0.50	3	10	103	
0.75	4.5	10.5	108	
1.00	6	10.5	108	
1.25	7.5	10.5	108	
1.50	9	10.5	108	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)
BORING NO: RW-5 VS
TEST DEPTH (ft): 25.6

Time start of test: 1:37 PM
Time start of remold test: 1:45 PM
Date: 4/19/2006

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	7	73	
0.50	3	13.5	138	
0.75	4.5	20	203	
1.00	6	26	263	
1.25	7.5	35	352	
1.50	9	40	402	
1.75	10.5	43	432	
2.00	12	47	472	
2.25	13.5	49	492	
2.50	15	53	532	
2.75	16.5	56	562	
3.00	18	56.5	567	
3.25	19.5	56.5	567	
3.50	21	56.5	567	
3.75	22.5	56.5	567	
4.00	24	56.5	567	
0.25	1.5	5.5	58	**Remold**
0.50	3	6.5	68	
0.75	4.5	6.5	68	
1.00	6	6.5	68	
1.25	7.5	8	83	
1.50	9	8	83	
1.75	10.5	8	83	
2.00	12	8	83	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)
BORING NO: RW-8 VS
TEST DEPTH (ft): 13.0

Time start of test: 1:51 PM
Time start of remold test: 2:12 PM
Date: 4/20/2006

Time	Rotation	Gauge Reading	Shear Strength
(min)	degrees		(lb/ft^2)
0.25	1.5	5	53
0.50	3	5.5	58
0.75	4.5	6	63
1.00	6	6	63
1.25	7.5	6	63
1.50	9	6.5	68
1.75	10.5	6.5	68
2.00	12	6.5	68
2.25	13.5	7	73
2.50	15	7	73
2.75	16.5	7	73
3.00	18	8	83
3.25	19.5	8	83
3.50	21	9	93
3.75	22.5	9	93
4.00	24	10	103
4.25	25.5	12	123
4.50	27	14	143
4.75	28.5	15	153
5.00	30	16	163
5.25	31.5	17.5	178
5.50	33	19	193
5.75	34.5	20	203
6.00	36	21	213
6.25	37.5	22	223
6.50	39	25	253
6.75	40.5	28	282
7.00	42	30	302
7.25	43.5	32	322
7.50	45	34	342
7.75	46.5	35.5	357
8.00	48	38	382
8.25	49.5	40	402
8.50	51	42	422
8.75	52.5	44	442
9.00	54	46	462
9.25	55.5	50	502
9.50	57	53	532
9.75	58.5	56	562
10.00	60	58	582

Time	Rotation	Gauge Reading	Shear Strength
(min)	degrees		(lb/ft^2)
10.25	61.5	63	632
10.50	63	66	662
10.75	64.5	69	692
11.00	66	71	712
11.25	67.5	73	732
11.50	69	76	762
11.75	70.5	80	802
12.00	72	84	842
12.25	73.5	86	862
12.50	75	90	902
12.75	76.5	93	932
13.00	78	98	982

READINGS EXCEEDED GAUGE LIMIT; NO DATA AVAILABLE

0.25	1.5	15	153	**Remold**
0.50	3	25	253	
0.75	4.5	29	292	
1.00	6	31	312	
1.25	7.5	32	322	
1.50	9	32	322	
1.75	10.5	32	322	
2.00	12	32	322	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-8 VS
TEST DEPTH (ft): 17.0

Time start of test: 2:36 PM
Time start of remold test: 2:42 PM

Date: 4/20/06

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	11	113	
0.50	3	18	183	
0.75	4.5	28	282	
1.00	6	32	322	
1.25	7.5	38	382	
1.50	9	42	422	
1.75	10.5	46	462	
2.00	12	51	512	
2.25	13.5	58	582	
2.50	15	63	632	
2.75	16.5	66	662	
3.00	18	69	692	
3.25	19.5	70	702	
3.50	21	70	702	
3.75	22.5	68	682	
0.25	1.5	9	93	**Remold**
0.50	3	11	113	
0.75	4.5	11	113	
1.00	6	12	123	
1.25	7.5	12.5	128	
1.50	9	12.5	128	
1.75	10.5	12.5	128	
2.00	12	12.5	128	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-8 VS
TEST DEPTH (ft): 21.0

Time start of test: 3:06 PM
Time start of remold test: 3:15 PM

Date: 4/20/06

Time	Rotation	Gauge Reading	Shear Strength	
(min)	degrees		(lb/ft^2)	
0.25	1.5	5	53	
0.50	3	14	143	
0.75	4.5	18	183	
1.00	6	21	213	
1.25	7.5	25	253	
1.50	9	27.5	277	
1.75	10.5	32	322	
2.00	12	37	372	
2.25	13.5	42	422	
2.50	15	45	452	
2.75	16.5	48	482	
3.00	18	54	542	
3.25	19.5	58	582	
3.50	21	61	612	
3.75	22.5	64	642	
4.00	24	70	702	
4.25	25.5	76	762	
4.50	27	78	782	
4.75	28.5	82	822	
5.00	30	82	822	
5.25	31.5	82	822	
0.25	1.5	9	93	**Remold**
0.50	3	14	143	
0.75	4.5	15	153	
1.00	6	15	153	
1.25	7.5	15	153	

MACTEC - FIELD VANE SHEAR TEST DATA SHEET

PROJECT: Retaining Walls-Bridge No. 4 over Tulls Creek on SR 1222
NCDOT No. 32773.1.1 (B-2950)
MACTEC JOB No. 6468-06-1378
VANE SIZE: 7.25" x 3.625" (double tapered)

BORING NO: RW-8 VS
TEST DEPTH (ft): 25.0

Time start of test: 3:37 PM
Time start of remold test: 3:45 PM

Date: 4/20/06

Time	Rotation	Gauge Reading	Shear Strength
(min)	degrees		(lb/ft^2)
0.25	1.5	12	123
0.50	3	18	183
0.75	4.5	25	253
1.00	6	30	302
1.25	7.5	38	382
1.50	9	45	452
1.75	10.5	53	532
2.00	12	59	592
2.25	13.5	64	642
2.50	15	70	702
2.75	16.5	74	742
3.00	18	78	782
3.25	19.5	82	822
3.50	21	88	882
3.75	22.5	92	922
4.00	24	96	962
READINGS EXCEEDED GAUGE LIMIT; NO DATA AVAILABLE			
0.25	1.5	14	143
0.50	3	18	183
0.75	4.5	18.5	188
1.00	6	18.5	188
1.25	7.5	18.5	188
1.50	9	18.5	188

Remold

MACTEC

FIELD DENSITY TEST WORK SHEET
SHELBY TUBE METHOD
(ASTM 2937)

DATE: 5/09/2006

CLIENT: NCDOT Project 32773.1.1 (B-2950)

PROJECT: Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222 (MACTEC No. 6468-06-1378)

Test No.	W.W. Sample & Mold (lbs)	Wt. Mold (lbs)	W.W. Sample (lbs)	W.W. (pcf)	W.W. Soil Sample (grams)	D.W. Soil Sample (grams)	W Water (grams)	% Moist*	Dry Density (pcf)	Location	Depth Ft.
1	5.88	1.37	4.51	135.4	300.0	259.1	40.9	15.8	116.9	Adjacent to RW-1, 1 ft from edge of pavement	1.5
2	5.96	1.37	4.59	137.8	300.0	256.6	43.4	16.9	118.8	Adjacent to RW-5, 1 ft from edge of pavement	1.5
3	5.65	1.37	4.28	128.5	300.0	267.4	32.6	12.2	114.5	Adjacent to RW-8, 1 ft from edge of pavement	1.5

* Determined in field by hot plate method
Mold Volume Factor:30.03

Test Performed by: Greg A. Sita
Checked by: _____
Pound Scale ID # 3.1.129 Date of Calibration: 8/9/05
Gram Scale ID # 3.1.128 Date of Calibration: 8/9/05

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 PROJ. NAME AND NO.: Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222

PROJECT: 32773.1.1 (B-2950) **COUNTY: Currituck** **OWNER: N.C.D.O.T.**

DATE SAMPLED: April 2006 **RECEIVED:** 4/14/2006 **REPORTED BY: MACTEC**

SAMPLED FROM: RW-1, RW-2

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-1 Rev	SS-2 Rev	SS-3 Rev	SS-4 Rev	SS-5 Rev	SS-6 Rev
Retained 4.75 mm Sieve	(%)	0.0	0.0	0.0	0.0	0.0	0.1
Passing 2.00 mm Sieve	(%)	100.0	100.0	100.0	100.0	100.0	99.7
Passing 425 µm Sieve	(%)	97.4	97.3	98.3	98.9	95.9	93.1
Passing 75 µm Sieve	(%)	85.6	49.2	84.7	11.6	7.0	25.8

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	6.1	13.7	5.6	9.3	19.3	18.7
Fine Sand Ret - 53 µm	(%)	11.4	45.8	12.2	82.3	75.6	56.4
Silt 0.05 - 0.005 mm	(%)	36.8	18.9	29.5	6.3	3.2	10.9
Clay < 0.005 mm	(%)	45.7	21.6	52.7	2.1	1.9	14.0
		100.0	100.0	100.0	100.0	100.0	100.0

Moisture Content	(%)	133.5	48.3	132.9	ND	ND	ND
Liquid Limit, L.L.		83	27	71	NV	19	15
Plasticity Index, P.I.		27	8	21	NP	NP	NP
AASHTO Classification		A-7-5(33)	A-4(1)	A-7-5(25)	A-2-4(0)	A-3	A-2-4(0)
Organic Content	(%)	36.3	4.1	12.1	1.7	ND	ND

Boring No.		RW-1	RW-1	RW-1	RW-1	RW-1	RW-2
Station		24+47	24+47	24+47	24+47	24+47	25+06
Offset		6 ft RT	6 ft RT	6 ft RT	6 ft RT	6 ft RT	9 ft RT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	4.0	13.4	23.5	28.5	48.5	1.2
	to	5.5	14.9	25.0	30.0	50.0	2.7

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. L

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 PROJ. NAME AND NO.: Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222

PROJECT: 32773.1.1 (B-2950) **COUNTY: Currituck** **OWNER: N.C.D.O.T.**

DATE SAMPLED: April 2006 **RECEIVED:** 4/14/2006 **REPORTED BY: MACTEC**

SAMPLED FROM: RW-2, RW-6

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-7 Rev	SS-8 Rev	SS-9 Rev	SS-10 Rev	SS-11 Rev	SS-12 Rev
Retained 4.75 mm Sieve	(%)	0.0	0.0	0.0	0.0	0.0	0.3
Passing 2.00 mm Sieve	(%)	100.0	100.0	100.0	100.0	99.9	99.1
Passing 425 µm Sieve	(%)	97.5	99.6	98.8	96.6	90.0	91.3
Passing 75 µm Sieve	(%)	92.7	94.1	48.3	13.6	27.2	22.4

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	4.6	1.7	6.6	15.7	24.1	23.0
Fine Sand Ret - 53 µm	(%)	4.8	7.4	50.7	75.4	49.6	57.9
Silt 0.05 - 0.005 mm	(%)	45.4	44.0	17.5	5.4	12.1	10.5
Clay < 0.005 mm	(%)	45.2	46.9	25.2	3.5	14.1	8.6
		100.0	100.0	100.0	100.0	100.0	100.0

Moisture Content	(%)	143.1	102.0	40.9	ND	ND	ND
Liquid Limit, L.L.		79	67	30	20	15	18
Plasticity Index, P.I.		30	32	15	NP	NP	NP
AASHTO Classification		A-7-5(39)	A-7-5(37)	A-6(4)	A-2-4(0)	A-2-4(0)	A-2-4(0)
Organic Content	(%)	38.7	10.6	ND	ND	ND	ND

Boring No.		RW-2	RW-2	RW-2	RW-2	RW-6	RW-6
Station		25+06	25+06	25+06	25+06	27+04	27+04
Offset		9 ft RT	9 ft RT	9 ft RT	9 ft RT	11 ft RT	11 ft RT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	8.0	18.0	33.0	43.0	3.0	27.5
	to	9.5	19.5	34.5	44.5	4.5	29.0

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. L

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 PROJ. NAME AND NO.: Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222

PROJECT: 32773.1.1 (B-2950) **COUNTY: Currituck** **OWNER: N.C.D.O.T.**

DATE SAMPLED: April 2006 **RECEIVED:** 4/14/2006 **REPORTED BY: MACTEC**

SAMPLED FROM: RW-6, RW-8

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-13 Rev	SS-14 Rev	SS-15 Rev	SS-16 Rev	SS-17 Rev	SS-18 Rev
Retained 4.75 mm Sieve	(%)	0.9	0.0	0.0	0.0	0.0	0.0
Passing 2.00 mm Sieve	(%)	98.6	100.0	100.0	100.0	100.0	100.0
Passing 425 µm Sieve	(%)	98.2	99.8	98.9	94.7	99.6	99.8
Passing 75 µm Sieve	(%)	27.5	78.2	78.6	43.7	86.2	7.2

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	0.7	0.7	3.9	15.9	1.0	2.6
Fine Sand Ret - 53 µm	(%)	79.6	30.1	28.6	42.5	24.0	92.4
Silt 0.05 - 0.005 mm	(%)	10.6	37.0	32.9	14.5	40.5	4.6
Clay < 0.005 mm	(%)	9.0	32.2	34.6	27.1	34.5	0.4
		100.0	100.0	100.0	100.0	100.0	100.0

Moisture Content	(%)	ND	30.5	26.8	64.6	44.1	ND
Liquid Limit, L.L.		23	44	28	50	43	ND
Plasticity Index, P.I.		1	22	9	22	16	NP
AASHTO Classification		A-2-4(0)	A-7-6(17)	A-4(6)	A-7-6(6)	A-7-6(15)	A-3
Organic Content	(%)	ND	ND	ND	ND	ND	ND

Boring No.		RW-6	RW-6	RW-8	RW-8	RW-8	RW-8
Station		27+04	27+04	27+99	27+99	27+99	27+99
Offset		11 ft RT	11 ft RT	6 ft RT	6 ft RT	6 ft RT	6 ft RT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	42.5	47.5	7.5	17.5	42.5	52.5
	to	44.0	49.0	9.0	19.0	44.0	54.0

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. L

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 PROJ. NAME AND NO.: Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222

PROJECT: 32773.1.1 (B-2950) **COUNTY: Currituck** **OWNER: N.C.D.O.T.**

DATE SAMPLED: July 2003 **RECEIVED:** 8/5/2003 **REPORTED BY: MACTEC**

SAMPLED FROM: B6-B, B14-B

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-11	SS-12	SS-13	SS-14		
Retained 4.75 mm Sieve	(%)	0.0	0.0	0.0	0.0		
Passing 2.00 mm Sieve	(%)	100.0	99.9	100.0	99.8		
Passing 425 µm Sieve	(%)	99.9	89.2	99.2	65.5		
Passing 75 µm Sieve	(%)	93.3	4.5	98.1	16.4		

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	0.3	73.6	1.3	62.7		
Fine Sand Ret - 53 µm	(%)	10.6	22.7	1.3	21.7		
Silt 0.05 - 0.005 mm	(%)	41.1	1.4	51.0	8.0		
Clay < 0.005 mm	(%)	48.0	2.3	46.4	7.5		
		100.0	100.0	100.0	100.0		

Moisture Content	(%)	43.8	ND	42.3	ND		
Liquid Limit, L.L.		47	21	52	15		
Plasticity Index, P.I.		21	NP	30	NP		
AASHTO Classification		A-7-6(22)	A-3	A-7-6(33)	A-2-4(0)		
Organic Content	(%)	ND	ND	ND	ND		

Boring No.		B6-B	B6-B	B6-B	B14-B		
Station		25+07	25+07	25+07	28+32		
Offset		11 ft RT	11 ft RT	11 ft RT	12 ft RT		
Alignment		-L-	-L-	-L-	-L-		
Depth (ft)	From	37.7	52.7	72.7	2.2		
	to	39.2	54.2	74.2	3.7		

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. L

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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 PROJ. NAME AND NO.: Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222

PROJECT: 32773.1.1 (B-2950) **COUNTY: Currituck** **OWNER: N.C.D.O.T.**

DATE SAMPLED: April 2006 **RECEIVED:** 4/14/2006 **REPORTED BY: MACTEC**

SAMPLED FROM: RW-1, RW-5

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		ST-1 Rev	ST-2 Rev	ST-3 Rev	ST-4 Rev	ST-5 Rev	ST-6 Rev
Retained 4.75 mm Sieve	(%)	0.0	0.0	0.0	0.2	0.0	0.0
Passing 2.00 mm Sieve	(%)	100.0	100.0	100.0	99.7	100.0	100.0
Passing 425 µm Sieve	(%)	97.9	98.8	99.3	99.3	99.9	98.5
Passing 75 µm Sieve	(%)	87.1	56.0	26.6	86.7	31.7	92.6

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	6.5	6.5	8.8	1.6	2.2	2.5
Fine Sand Ret - 53 µm	(%)	10.0	40.6	66.1	12.5	74.5	7.0
Silt 0.05 - 0.005 mm	(%)	47.1	22.3	8.2	42.5	12.8	45.5
Clay < 0.005 mm	(%)	36.4	30.6	16.9	43.3	10.5	45.0
		100.0	100.0	100.0	100.0	100.0	100.0

Moisture Content	(%)	120.8	74.7	ND	92.7	ND	105.8
Liquid Limit, L.L.		66	39	21	67	20	57
Plasticity Index, P.I.		20	17	1	33	NP	4
AASHTO Classification		A-7-5(24)	A-6(7)	A-2-4(0)	A-7-5(34)	A-2-4(0)	A-5(12)
Organic Content	(%)	ND	ND	ND	ND	ND	ND

Boring No.		RW-1	RW-1	RW-1	RW-1	RW-1	RW-5
Station		24+47	24+47	24+47	24+47	24+47	26+51
Offset		6 ft RT	6 ft RT	6 ft RT	6 ft RT	6 ft RT	9 ft LT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	5.5	10.9	15.0	20.0	25.0	10.0
	to	6.7	12.8	16.4	22.0	25.8	12.0

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. L

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 PROJ. NAME AND NO.: Retaining Walls associated with the replacement of Bridge No. 4 over Tulls Creek on SR 1222

PROJECT: 32773.1.1 (B-2950) **COUNTY: Currituck** **OWNER: N.C.D.O.T.**

DATE SAMPLED: April 2006 **RECEIVED:** 4/24/2006 **REPORTED BY: MACTEC**

SAMPLED FROM: RW-5, RW-8

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		ST-7 Rev	ST-8 Rev	ST-9 Rev	ST-10 Rev		
Retained 4.75 mm Sieve	(%)	0.0	0.0	0.0	0.0		
Passing 2.00 mm Sieve	(%)	100.0	100.0	100.0	100.0		
Passing 425 µm Sieve	(%)	99.0	98.0	98.5	98.6		
Passing 75 µm Sieve	(%)	54.4	70.4	93.0	87.1		

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	6.8	5.6	2.4	4.2		
Fine Sand Ret - 53 µm	(%)	40.3	28.3	7.9	9.9		
Silt 0.05 - 0.005 mm	(%)	25.4	44.0	48.4	35.8		
Clay < 0.005 mm	(%)	27.5	22.1	41.3	50.1		
		100.0	100.0	100.0	100.0		

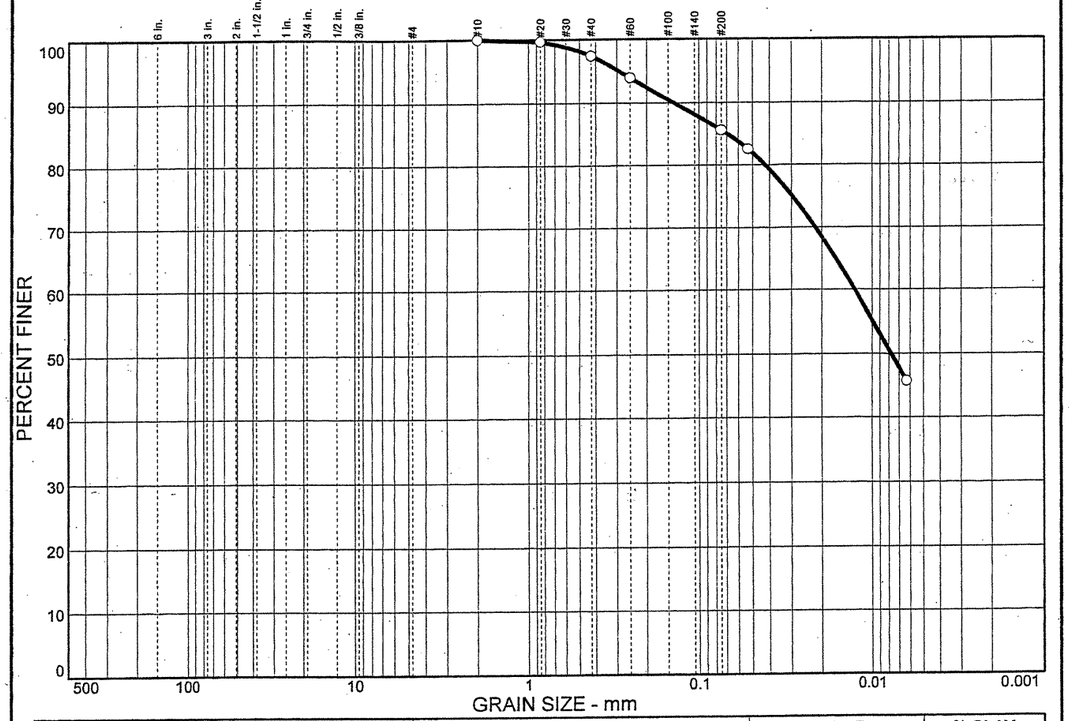
Moisture Content	(%)	52.7	24.6	72.2	78.1		
Liquid Limit, L.L.		48	29	91	75		
Plasticity Index, P.I.		22	12	39	37		
AASHTO Classification		A-7-6(9)	A-6(6)	A-7-5(49)	A-7-5(39)		
Organic Content	(%)	ND	ND	ND	ND		

Boring No.		RW-5	RW-8	RW-8	RW-8		
Station		26+51	27+99	27+99	27+99		
Offset		9 ft LT	6 ft RT	6 ft RT	6 ft RT		
Alignment		-L-	-L-	-L-	-L-		
Depth (ft)	From	25.0	4.5	14.0	19.0		
	to	26.9	6.1	15.6	20.8		

REMARKS: ND=NOT DETERMINED

Reviewed by: Michael B. L

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	17.5	82.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	97.4		
#60	93.9		
#200	85.6		
#270	82.5		

Material Description

Moisture content = 133.5 %
Organic Content = 36.3 %

Atterberg Limits

PL= 56 LL= 83 PI= 27

Coefficients

D_{85}= 0.0696 D_{60}= 0.0127 D_{50}= 0.0078
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-7-5(33)

Remarks

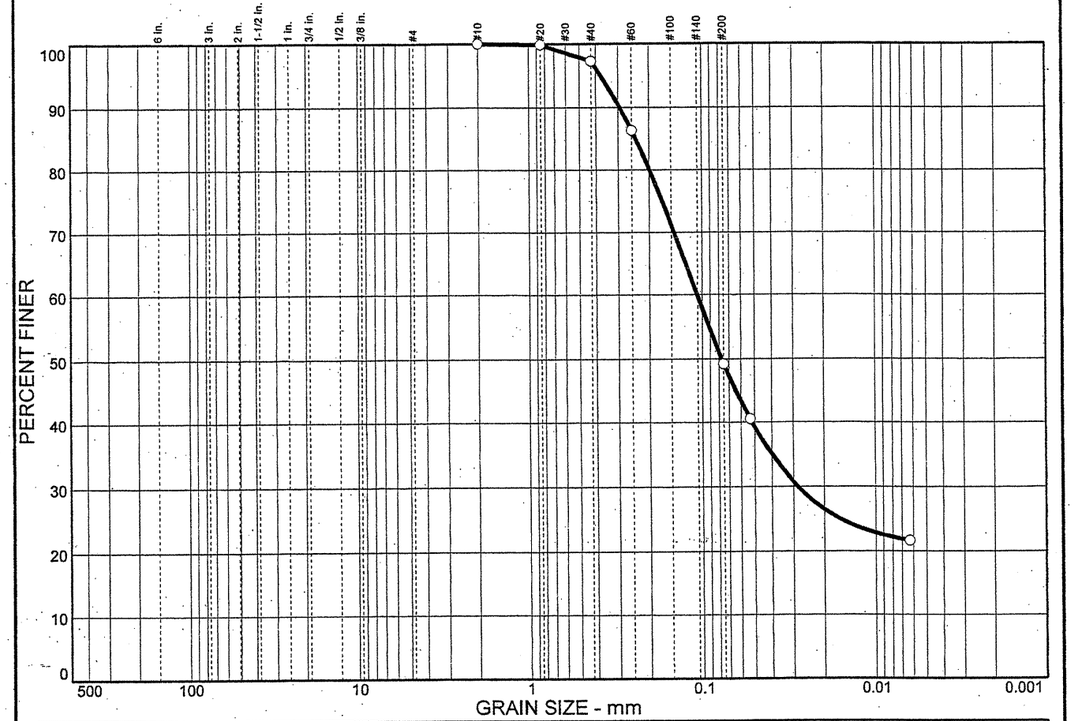
* (no specification provided)

Sample No.: SS-1 REVISED **Source of Sample:** **Date:**
Location: RW-1 **Elev./Depth:** 4.0' - 5.5'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	59.5	40.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	97.3		
#60	86.3		
#200	49.2		
#270	40.5		

Material Description

Moisture Content = 48.3 %
Organic Content = 4.1 %

Atterberg Limits

PL= 19 LL= 27 PI= 8

Coefficients

D_{85}= 0.238 D_{60}= 0.107 D_{50}= 0.0771
D_{30}= 0.0282 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-4(1)

Remarks

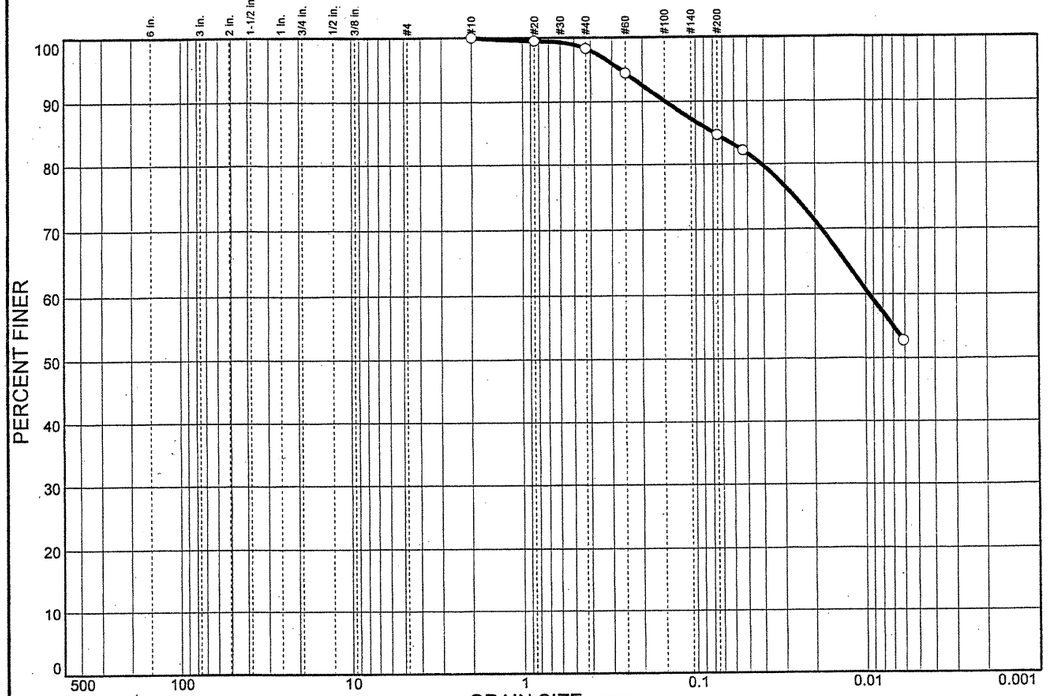
* (no specification provided)

Sample No.: SS-2 REVISED **Source of Sample:** **Date:**
Location: RW-1 **Elev./Depth:** 13.4' - 14.9'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	17.8	82.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.5		
#40	98.3		
#60	94.4		
#200	84.7		
#270	82.2		

Material Description

Moisture Content = 132.9 %
Organic Content = 12.1 %

Atterberg Limits

PL= 50 LL= 71 PI= 21

Coefficients

D_{85}= 0.0782 D_{60}= 0.0095 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-7-5(25)

Remarks

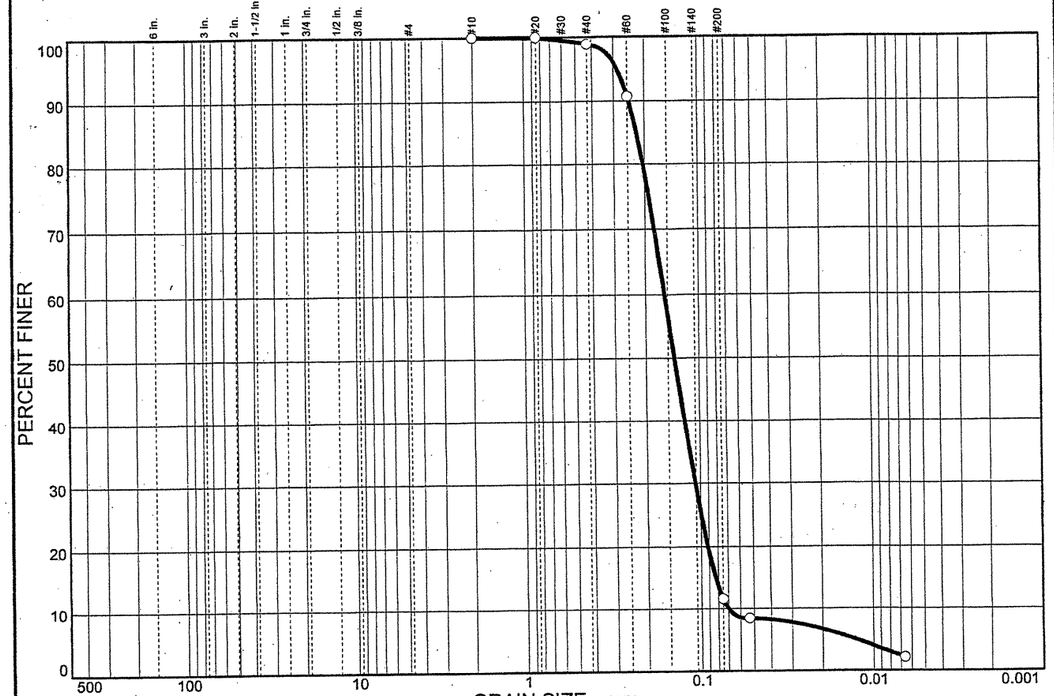
* (no specification provided)

Sample No.: SS-3 REVISED **Source of Sample:** **Date:**
Location: RW-1 **Elev./Depth:** 23.5' - 25.0'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	88.4	11.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	98.9		
#60	90.7		
#200	11.6		
#270	8.4		

Material Description

Moisture Content = 38.0 %
Organic Content = 1.7 %

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 0.223 D_{60}= 0.156 D_{50}= 0.138
D_{30}= 0.107 D_{15}= 0.0825 D_{10}= 0.0699
C_u= 2.24 C_c= 1.04

Classification

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

Remarks

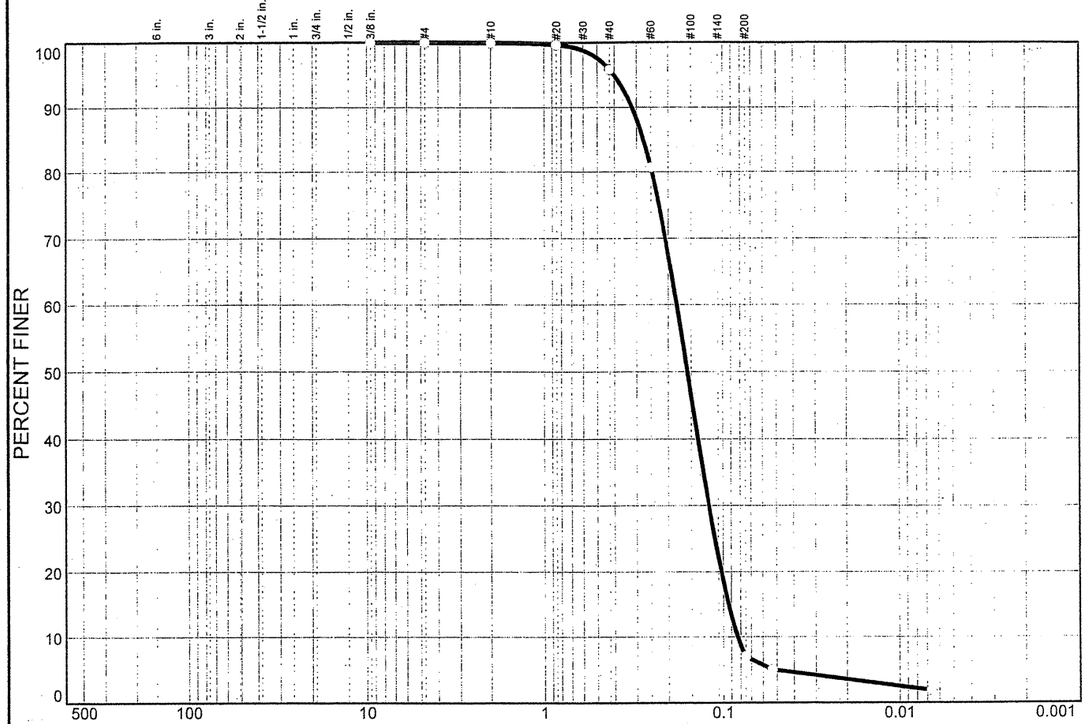
* (no specification provided)

Sample No.: SS-4 REVISED **Source of Sample:** **Date:**
Location: RW-1 **Elev./Depth:** 28.5' - 30.0'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	94.9	5.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	100.0		
#10	100.0		
#20	99.7		
#40	95.9		
#60	80.7		
#200	7.0		
#270	5.1		

Soil Description

Atterberg Limits

PL= ND LL= 19 PI= NP

Coefficients

D_{85}= 0.275 D_{60}= 0.180 D_{50}= 0.157
D_{30}= 0.120 D_{15}= 0.0932 D_{10}= 0.0830
C_u= 2.17 C_c= 0.96

Classification

USCS= ND AASHTO= A-3

Remarks

ND=NOT DETERMINED.
NP=NON-PLASTIC.
SPECIFIC GRAVITY IS ASSUMED.

* (no specification provided)

Sample No.: RW-1 SS-5 REV.MAC **Source of Sample:** **Date:** 5/22/06
Location: RW-1 SS-5 48.5-50.0' **Elev./Depth:** 48.5-50.0'

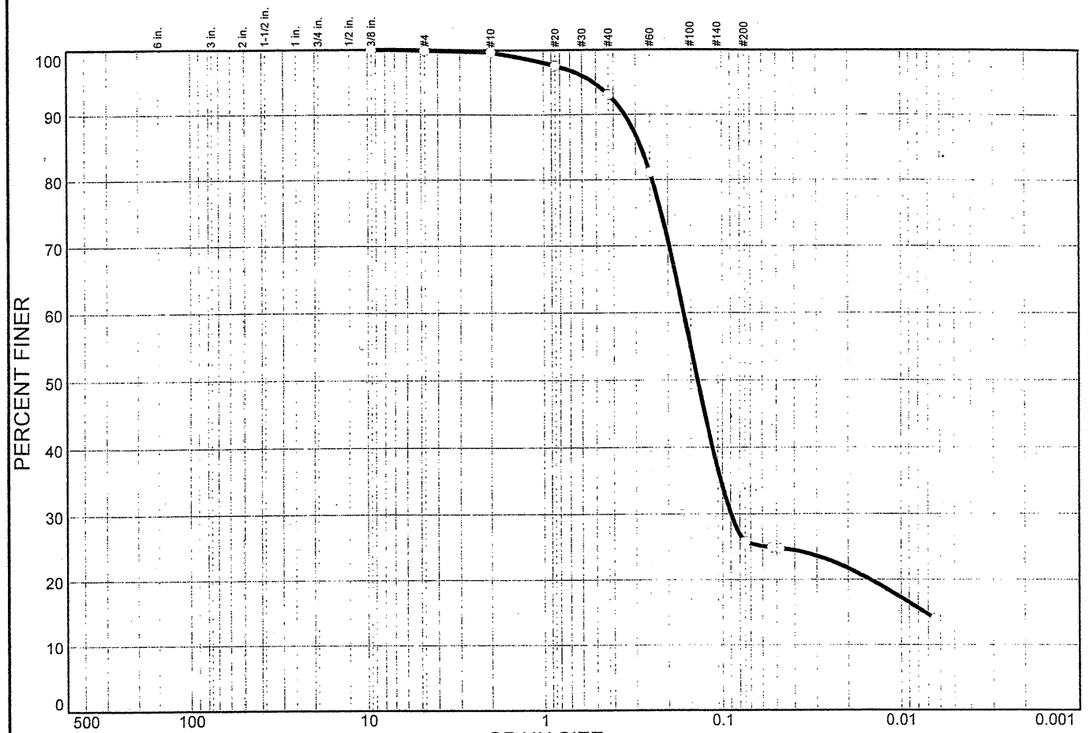
REV.MAC

MACTEC

ENGINEERING & CONSULTING, INC.

Client:
Project: RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4
Project No: 6468-06-1378

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.3	74.8	24.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.9		
#10	99.7		
#20	97.6		
#40	93.1		
#60	81.1		
#200	25.8		
#270	24.9		

Soil Description

Atterberg Limits

PL= ND LL= 15 PI= NP

Coefficients

D_{85}= 0.280 D_{60}= 0.164 D_{50}= 0.137
D_{30}= 0.0895 D_{15}= 0.0073 D_{10}=
C_u= C_c=

Classification

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

Remarks

ND=NOT DETERMINED.
NP=NON-PLASTIC.
SPECIFIC GRAVITY IS ASSUMED.

* (no specification provided)

Sample No.: RW-2 SS-6 REV.MAC **Source of Sample:** **Date:** 5/22/06
Location: RW-2 SS-6 1.2-2.7' **Elev./Depth:** 1.2-2.7'

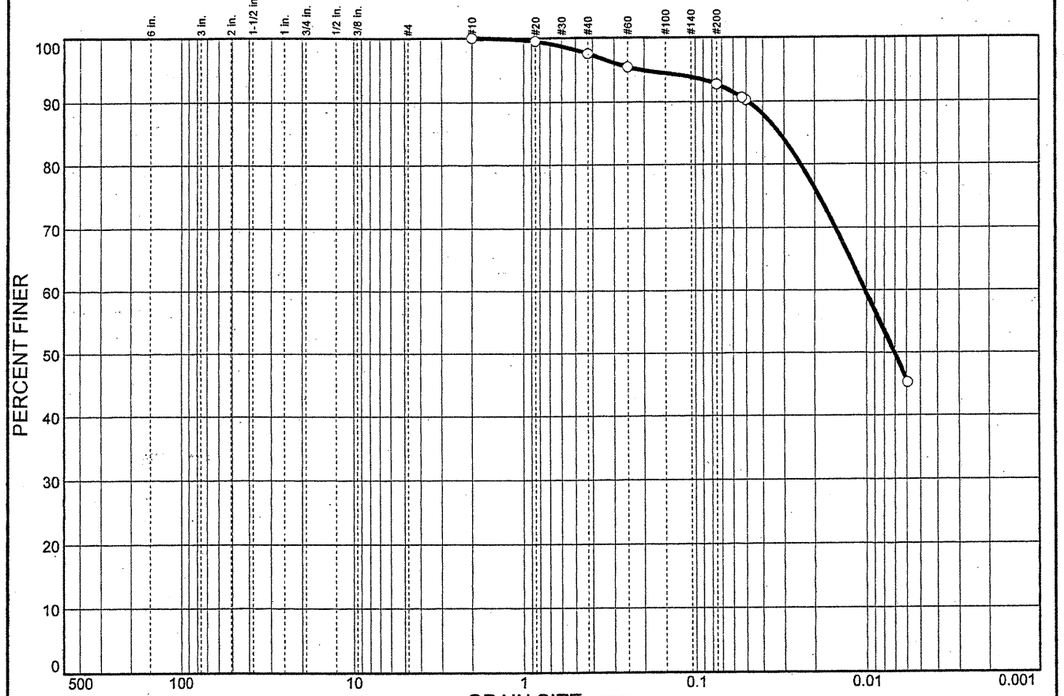
REV.MAC

MACTEC

ENGINEERING & CONSULTING, INC.

Client:
Project: RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4
Project No: 6468-06-1378

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	7.3	92.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.5		
#40	97.5		
#60	95.4		
#200	92.7		
#270	90.6		

* (no specification provided)

Material Description

Moisture Content = 143.1 %
Organic Content = 38.7 %

Atterberg Limits

PL= 49 LL= 79 PI= 30

Coefficients

D_{85}= 0.0321 D_{60}= 0.0102 D_{50}= 0.0070
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-7-5(39)

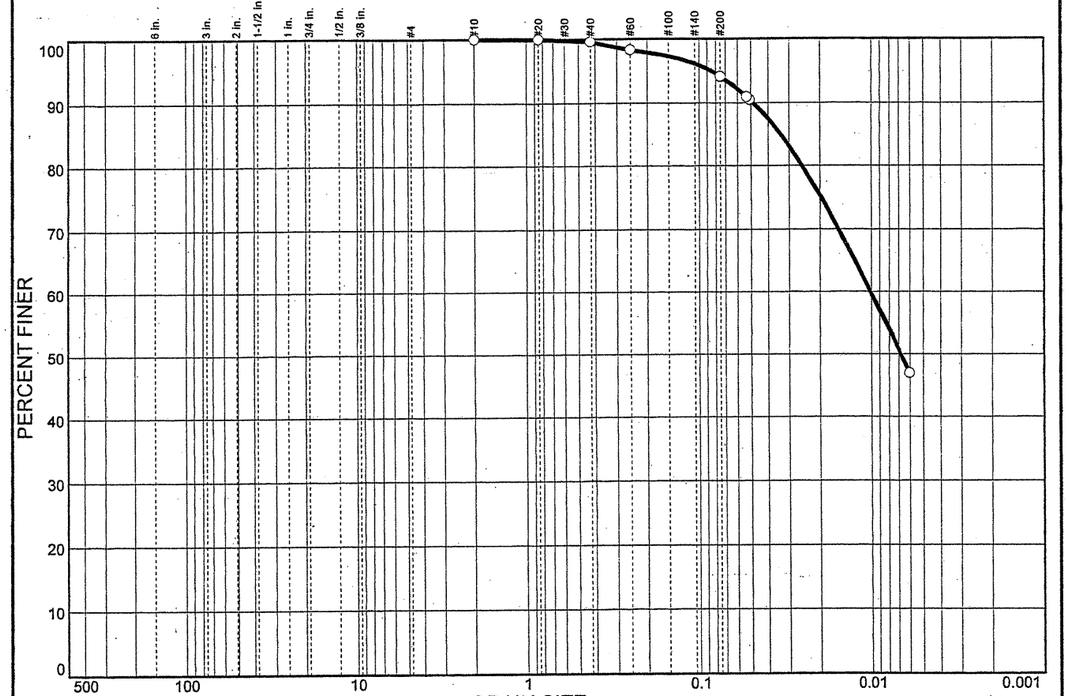
Remarks

Sample No.: SS-7 Revised **Source of Sample:** **Date:**
Location: RW-2 **Elev./Depth:** 8.0' - 9.5'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	9.1	90.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.6		
#60	98.3		
#200	94.1		
#270	90.9		

* (no specification provided)

Material Description

Moisture Content = 102.0 %
Organic Content = 10.6 %

Atterberg Limits

PL= 35 LL= 67 PI= 32

Coefficients

D_{85}= 0.0338 D_{60}= 0.0102 D_{50}= 0.0068
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-7-5(37)

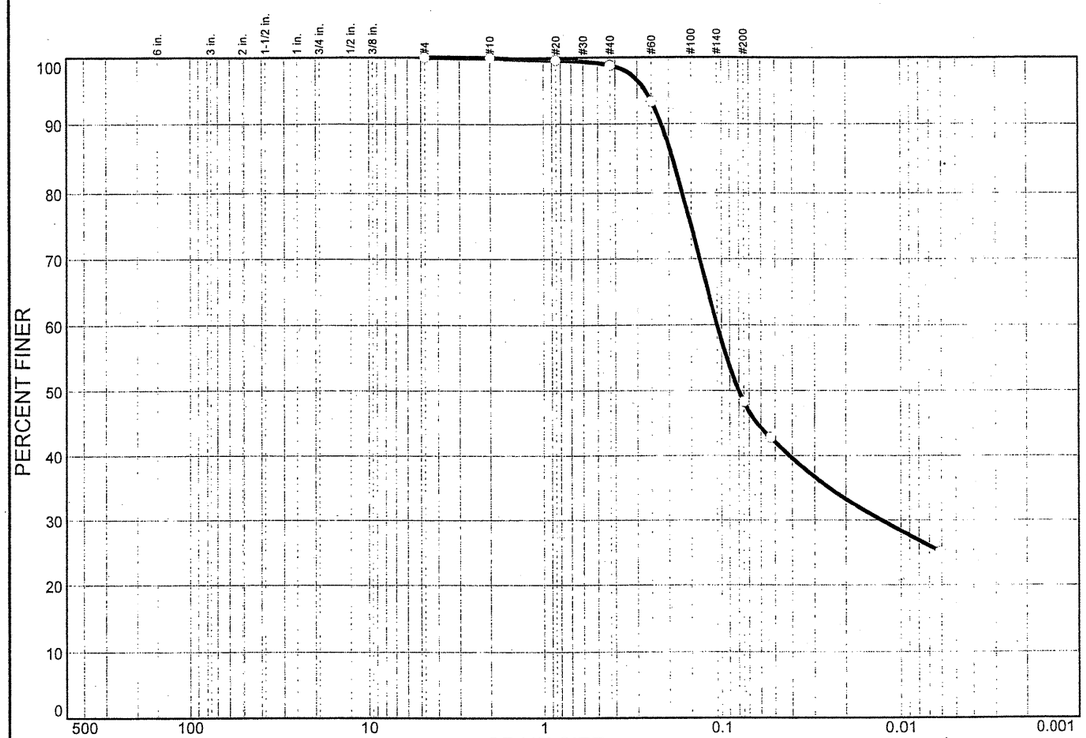
Remarks

Sample No.: SS-8 Revised **Source of Sample:** **Date:**
Location: RW-2 **Elev./Depth:** 18.0 - 19.5'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	57.3	42.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.6		
#40	98.8		
#60	93.4		
#200	48.3		
#270	42.7		

* (no specification provided)

Soil Description

Natural moisture content= 40.9%

Atterberg Limits

PL= 15 LL= 30 PI= 15

Coefficients

D_{85}= 0.191 D_{60}= 0.106 D_{50}= 0.0800
D_{30}= 0.0127 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO= A-6(4)

Remarks

ND=NOT DETERMINED.
SPECIFIC GRAVITY IS ASSUMED.

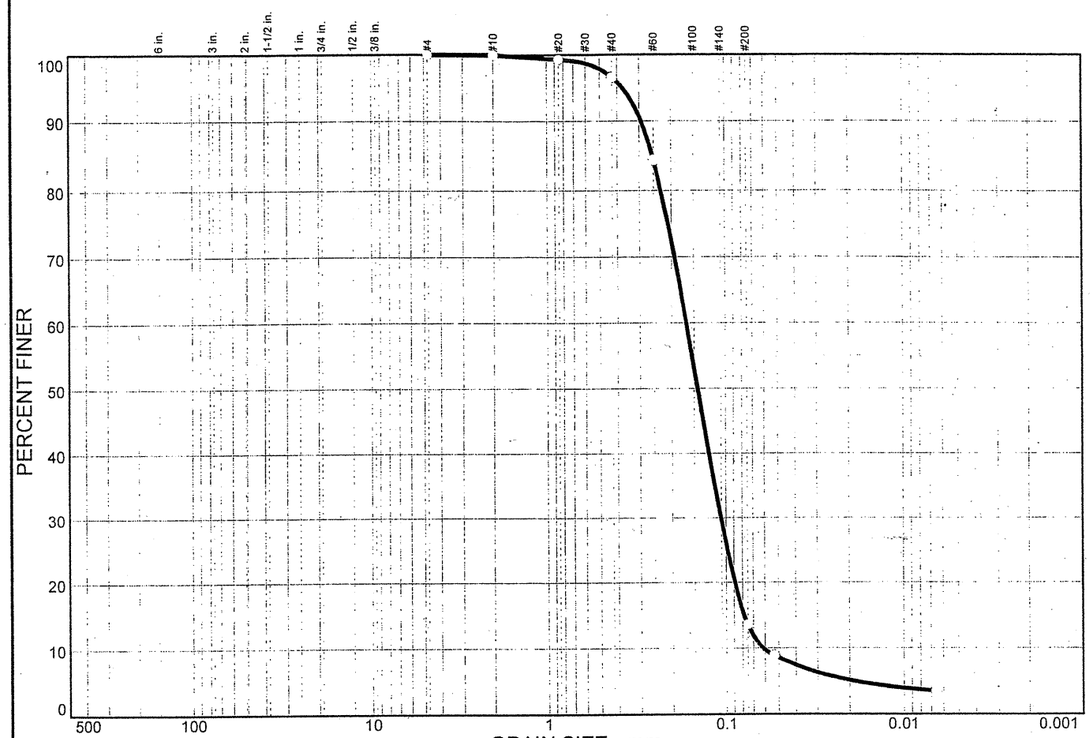
Sample No.: RW-2 SS-9 **Source of Sample:** **Date:** 05-23-06
Location: RW-2 SS-9 33.0-34.5' **Elev./Depth:** 33.0-34.5'

MACTEC

ENGINEERING & CONSULTING, INC.

Client:
Project: RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4
Project No: 6468-06-1378

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	91.1	8.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.3		
#40	96.6		
#60	84.3		
#200	13.6		
#270	8.9		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 20 PI= NP

Coefficients

D_{85}= 0.254 D_{60}= 0.165 D_{50}= 0.144
D_{30}= 0.107 D_{15}= 0.0784 D_{10}= 0.0616
C_u= 2.69 C_c= 1.11

Classification

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

Remarks

ND=NOT DETERMINED.
NP=NON-PLASTIC.
SPECIFIC GRAVITY IS ASSUMED.

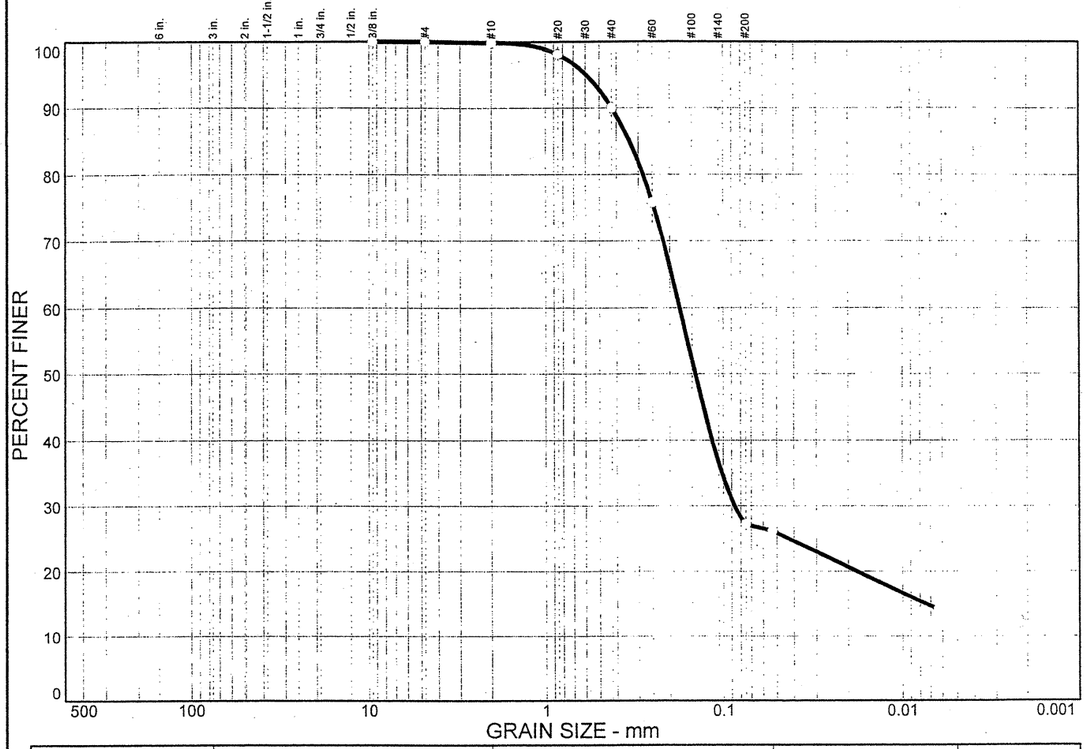
Sample No.: RW-2 SS-10 **Source of Sample:** **Date:** 5/22/06
Location: RW-2 SS-10 43.0-44.5' **Elev./Depth:** 43.0-44.5'

MACTEC

ENGINEERING & CONSULTING, INC.

Client:
Project: RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4
Project No: 6468-06-1378

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.1	73.7	26.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	100.0		
#10	99.9		
#20	98.1		
#40	90.0		
#60	75.8		
#200	27.2		
#270	26.2		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 15 LL= 15 PI= NP

Coefficients

D_{85}= 0.336 D_{60}= 0.176 D_{50}= 0.143
D_{30}= 0.0866 D_{15}= 0.0074 D_{10}=
C_u= C_c=

Classification

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

Remarks

ND=NOT DETERMINED.
NP=NON-PLASTIC.
SPECIFIC GRAVITY IS ASSUMED.

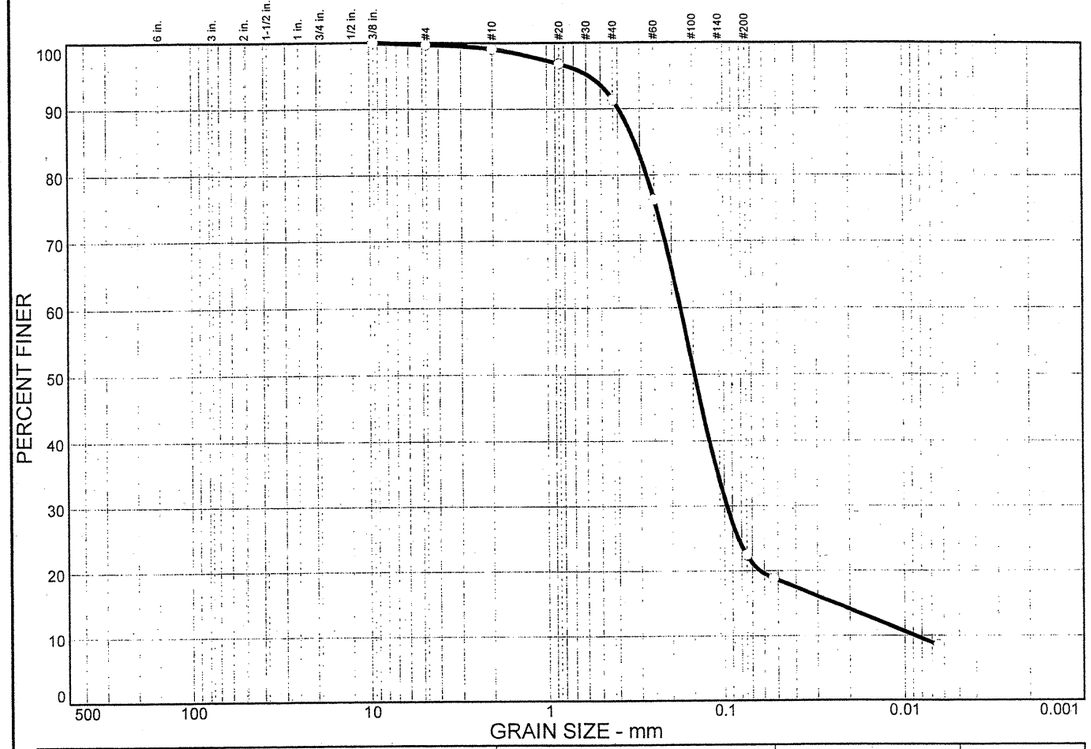
Sample No.: RW-6 SS-11 REV MW **Source of Sample:** **Date:** 05-23-06
Location: RW-6 SS-11 3.0-4.5' **Elev./Depth:** 3.0-4.5'

REV MW

MACTEC
ENGINEERING & CONSULTING, INC.

Client:
Project: RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4
Project No: 6468-06-1378

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.9	80.2	18.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.7		
#10	99.1		
#20	96.8		
#40	91.3		
#60	76.3		
#200	22.4		
#270	18.9		

* (no specification provided)

Soil Description

Atterberg Limits

PL= ND LL= 18 PI= NP

Coefficients

D_{85}= 0.321 D_{60}= 0.178 D_{50}= 0.147
D_{30}= 0.0966 D_{15}= 0.0242 D_{10}= 0.0087
C_u= 20.34 C_c= 6.00

Classification

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

Remarks

ND=NOT DETERMINED.
NP=NON-PLASTIC.
SPECIFIC GRAVITY IS ASSUMED.

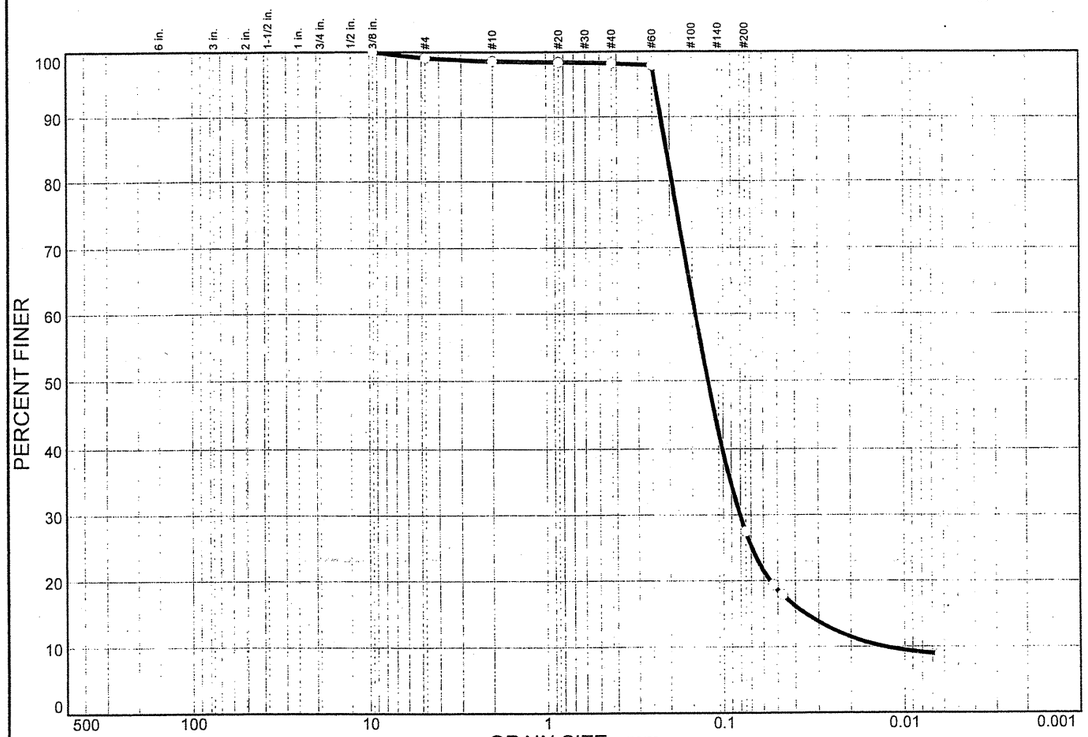
Sample No.: RW-6 SS-12 REV MW **Source of Sample:** **Date:** 5/22/06
Location: RW-6 SS-12 27.5-29.0' **Elev./Depth:** 27.5-29.0'

REV MW

MACTEC
ENGINEERING & CONSULTING, INC.

Client:
Project: RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4
Project No: 6468-06-1378

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.4	79.2	19.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.1		
#10	98.6		
#20	98.4		
#40	98.2		
#60	97.9		
#200	27.5		
#270	19.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 22 LL= 23 PI= 1

Coefficients

D_{85}= 0.208 D_{60}= 0.144 D_{50}= 0.122
D_{30}= 0.0805 D_{15}= 0.0350 D_{10}= 0.0130
C_u= 11.07 C_c= 3.48

Classification

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

Remarks

ND=NOT DETERMINED.
SPECIFIC GRAVITY IS ASSUMED.

Sample No.: RW-6 SS-13 REV, MR **Source of Sample:** **Date:** 05-23-06
Location: RW-6 SS-13 42.5-44.0' **Elev./Depth:** 42.5-44.0'

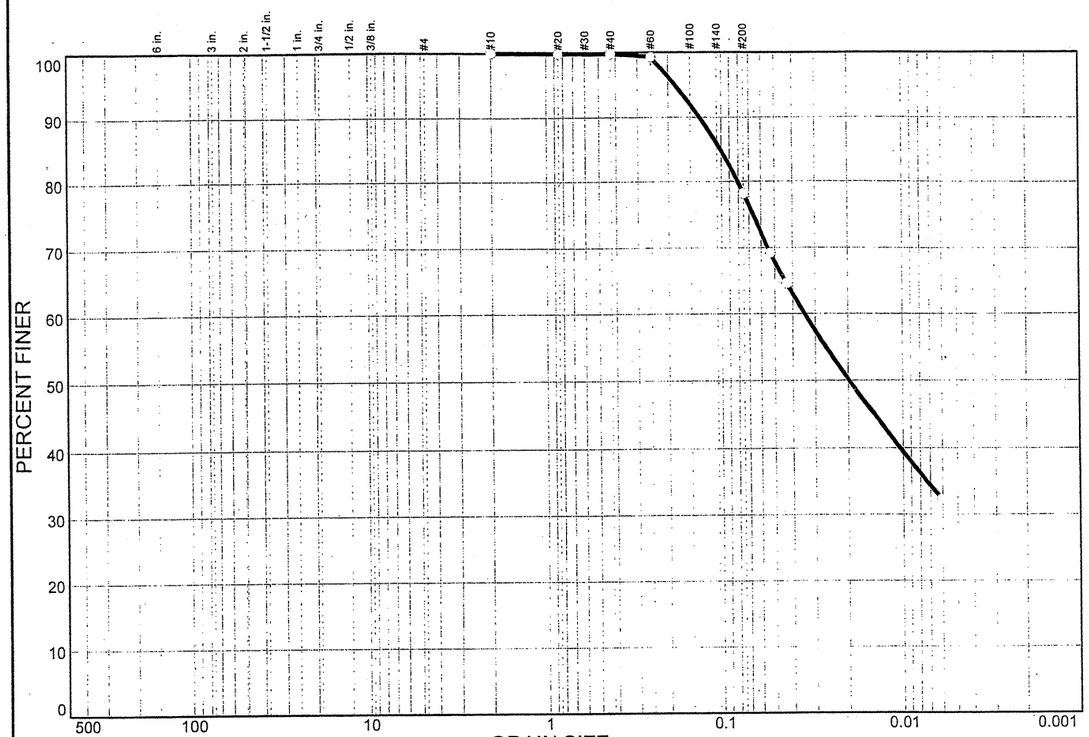
REV, MR

MACTEC

ENGINEERING & CONSULTING, INC.

Client:
Project: RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4
Project No: 6468-06-1378

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	30.8	69.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.8		
#60	99.3		
#200	78.2		
#270	69.2		

* (no specification provided)

Soil Description

Natural moisture content= 30.5%

Atterberg Limits

PL= 22 LL= 44 PI= 22

Coefficients

D_{85}= 0.101 D_{60}= 0.0343 D_{50}= 0.0197
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(17)

Remarks

ND=NOT DETERMINED.
SPECIFIC GRAVITY IS ASSUMED.

Sample No.: RW-6 SS-14 REV, MR **Source of Sample:** **Date:** 05-23-06
Location: RW-6 SS-14 47.5-49.0' **Elev./Depth:** 47.5-49.0'

REV, MR

MACTEC

ENGINEERING & CONSULTING, INC.

Client:
Project: RETAINING WALLS ASSOCIATED WITH THE REPLACEMENT OF BRIDGE NO. 4
Project No: 6468-06-1378

Particle Size Distribution Report

% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	21.4	78.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	98.9		
#60	96.1		
#140	88.6		
#200	78.6		
#270	67.5		

Material Description

Moisture Content = 26.8%

Atterberg Limits

PL= 19 LL= 28 PI= 9

Coefficients

D_{85}= 0.0916 D_{60}= 0.0317 D_{50}= 0.0160
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-4(6)

Remarks

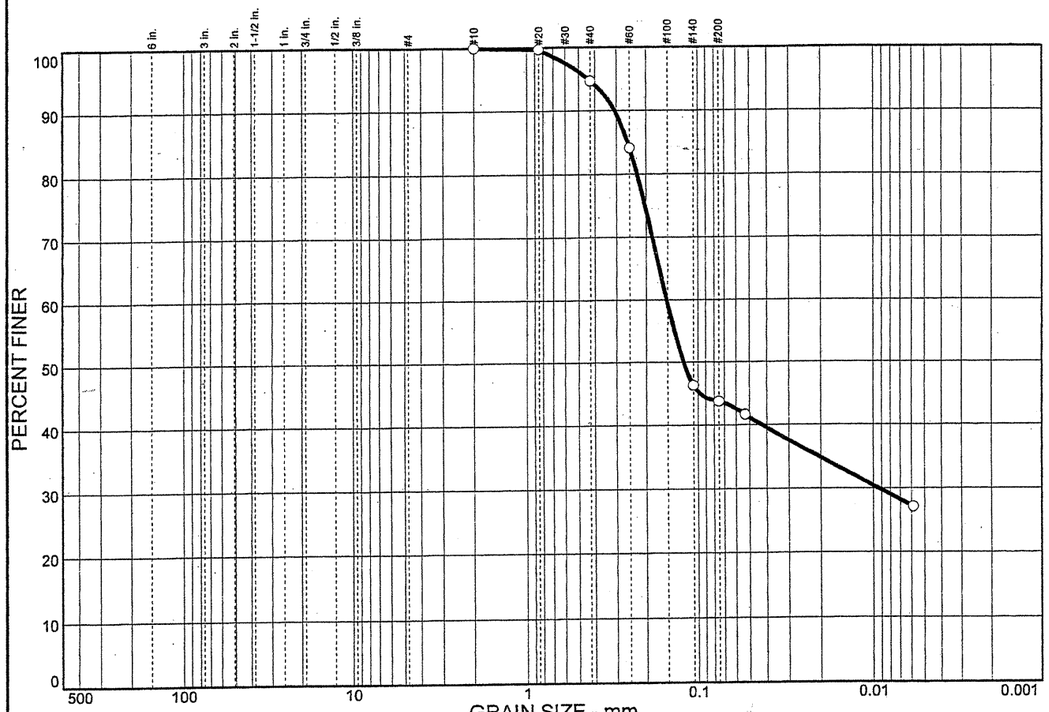
* (no specification provided)

Sample No.: SS-15 REV MM **Source of Sample:** **Date:** 5-24-06
Location: RW-8 **Elev./Depth:** 7.5' - 9'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	56.3	43.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	94.7		
#60	84.1		
#140	46.3		
#200	43.7		
#270	41.6		

Material Description

Moisture Content = 64.6%

Atterberg Limits

PL= 28 LL= 50 PI= 22

Coefficients

D_{85}= 0.256 D_{60}= 0.152 D_{50}= 0.121
D_{30}= 0.0093 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-7-6(6)

Remarks

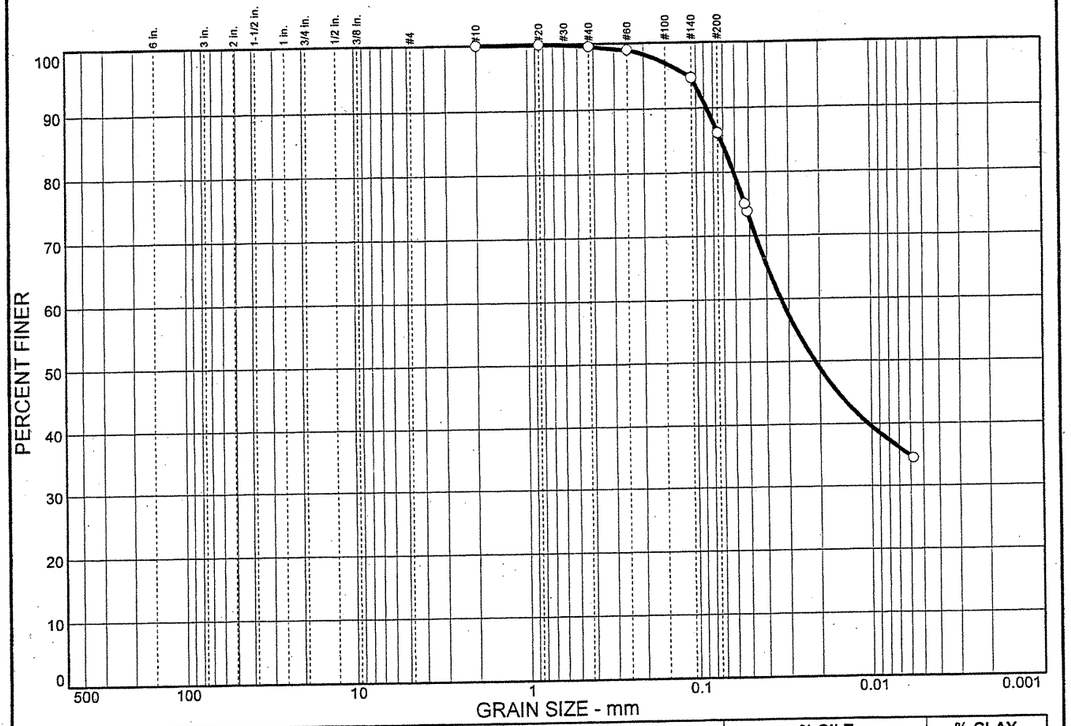
* (no specification provided)

Sample No.: SS-16 REV MM **Source of Sample:** **Date:** 5-24-06
Location: RW-8 **Elev./Depth:** 17.5' - 19'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	13.8	86.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.6		
#60	99.0		
#140	94.6		
#200	86.2		
#270	75.0		

* (no specification provided)

Material Description

Moisture Content = 44.1%

Atterberg Limits

PL= 27 LL= 43 PI= 16

Coefficients

D_{85}= 0.0719 D_{60}= 0.0332 D_{50}= 0.0213
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO= A-7-6(15)

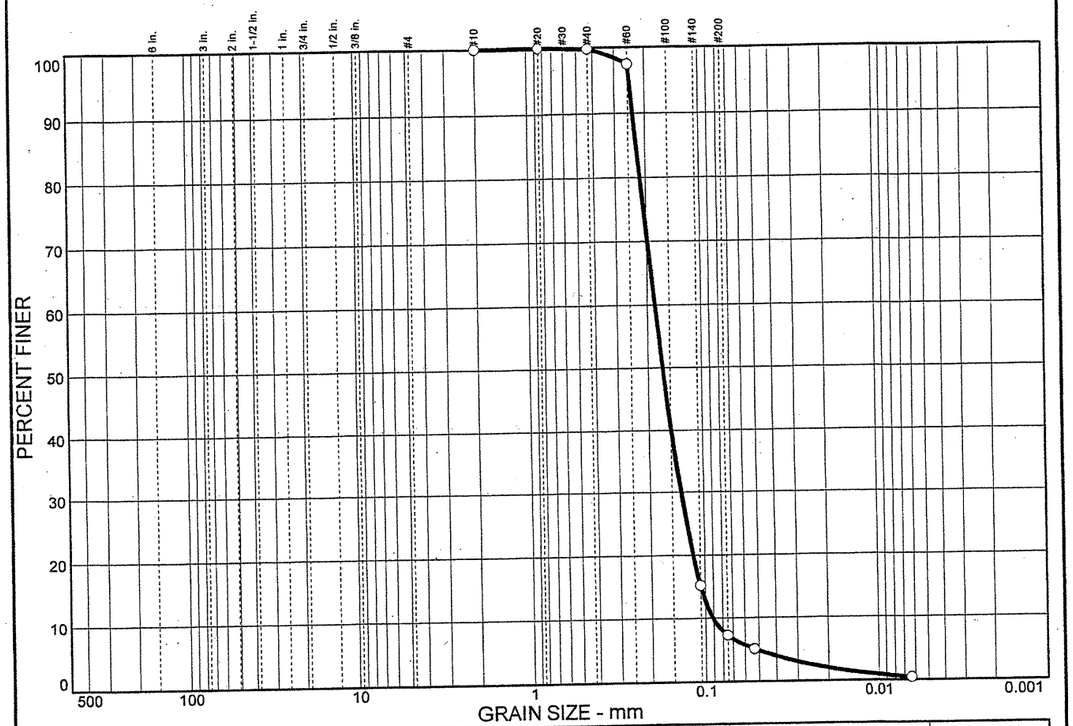
Remarks

Sample No.: SS-17 Revised **Source of Sample:** **Date:** 5-24-06
Location: RW-8 **Elev./Depth:** 42.5' - 44'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	92.8	7.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.8		
#60	97.4		
#140	15.2		
#200	7.2		
#270	5.0		

* (no specification provided)

Material Description

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{85}= 0.225 D_{60}= 0.182 D_{50}= 0.165
D_{30}= 0.133 D_{15}= 0.106 D_{10}= 0.0906
C_u= 2.00 C_c= 1.08

Classification

USCS= AASHTO= A-3

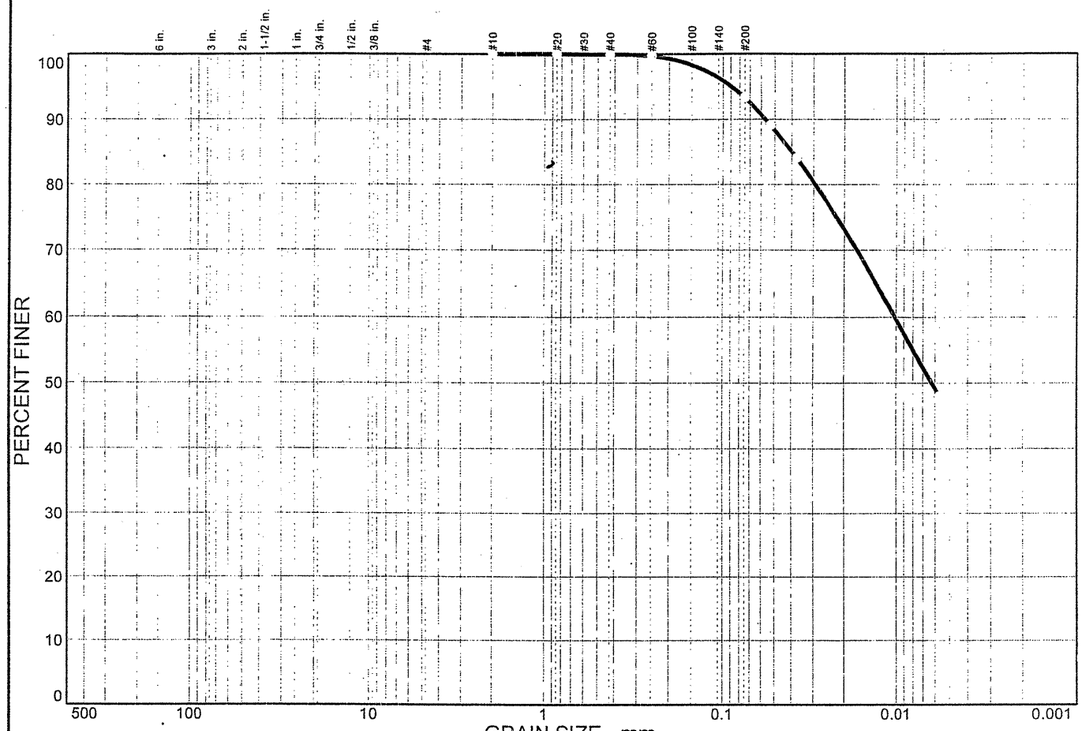
Remarks

Sample No.: SS-18 Revised **Source of Sample:** **Date:** 5-24-06
Location: RW-8 **Elev./Depth:** 52.5'-54'

MACTEC, INC.
Charlotte, North Carolina

Client:
Project: Retaining wall associated with the replacement of bridge #4 over tulls creek on SR 1222
Project No: 6468-06-1378 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	10.9	89.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.9		
#60	99.7		
#200	93.3		
#270	89.1		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 26 LL= 47 PI= 21

Coefficients

D_{85}= 0.0400 D_{60}= 0.0102 D_{50}= 0.0062
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ND AASHTO= A-7-6(22)

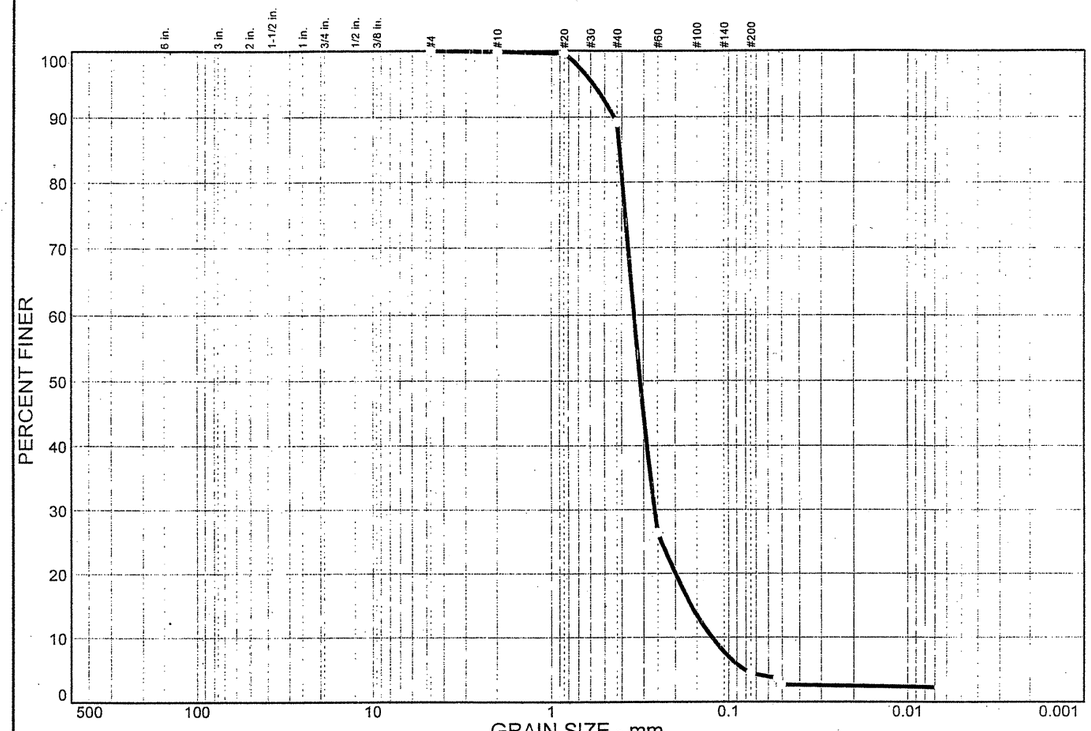
Remarks

ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-11 **Source of Sample:** **Date:** 8/19/03
Location: B6-B **Elev./Depth:** 37.7 ft

MACTEC ENGINEERING & CONSULTING, INC.	**Client:** NCDOT **Project:** BRIDGE 4 OVER TULL'S CREEK ON SR 1222 **Project No:** 6468-03-0054 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.1	96.2	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.6		
#40	89.2		
#60	26.4		
#200	4.5		
#270	3.7		

* (no specification provided)

Soil Description

Atterberg Limits

PL= NP LL= 21 PI= NP

Coefficients

D_{85}= 0.412 D_{60}= 0.340 D_{50}= 0.313
D_{30}= 0.260 D_{15}= 0.161 D_{10}= 0.124
C_u= 2.75 C_c= 1.61

Classification

USCS= ND AASHTO= A-3

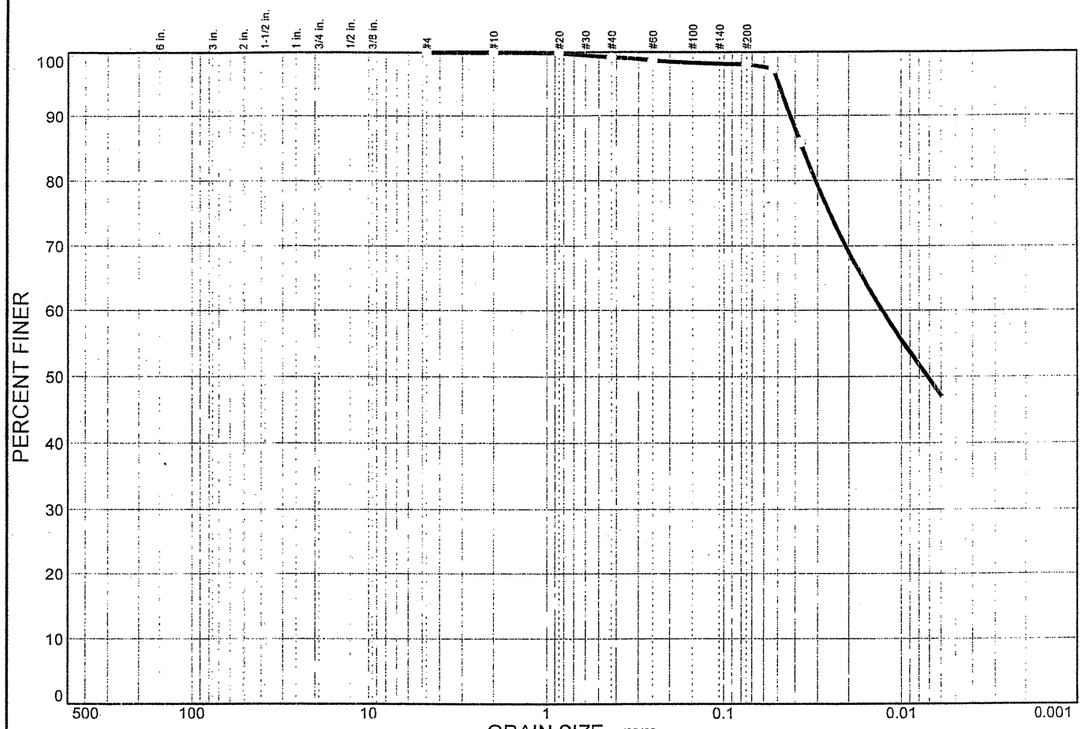
Remarks

NP=NON-PLASTIC
ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-12 **Source of Sample:** **Date:** 8/19/03
Location: B6-B **Elev./Depth:** 52.7 ft

MACTEC ENGINEERING & CONSULTING, INC.	**Client:** NCDOT **Project:** BRIDGE 4 OVER TULL'S CREEK ON SR 1222 **Project No:** 6468-03-0054 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	2.6	97.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.2		
#60	98.7		
#200	98.1		
#270	97.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= 22 LL= 52 PI= 30

Coefficients

D_{85}= 0.0364 D_{60}= 0.0128 D_{50}= 0.0072
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ND AASHTO= A-7-6(33)

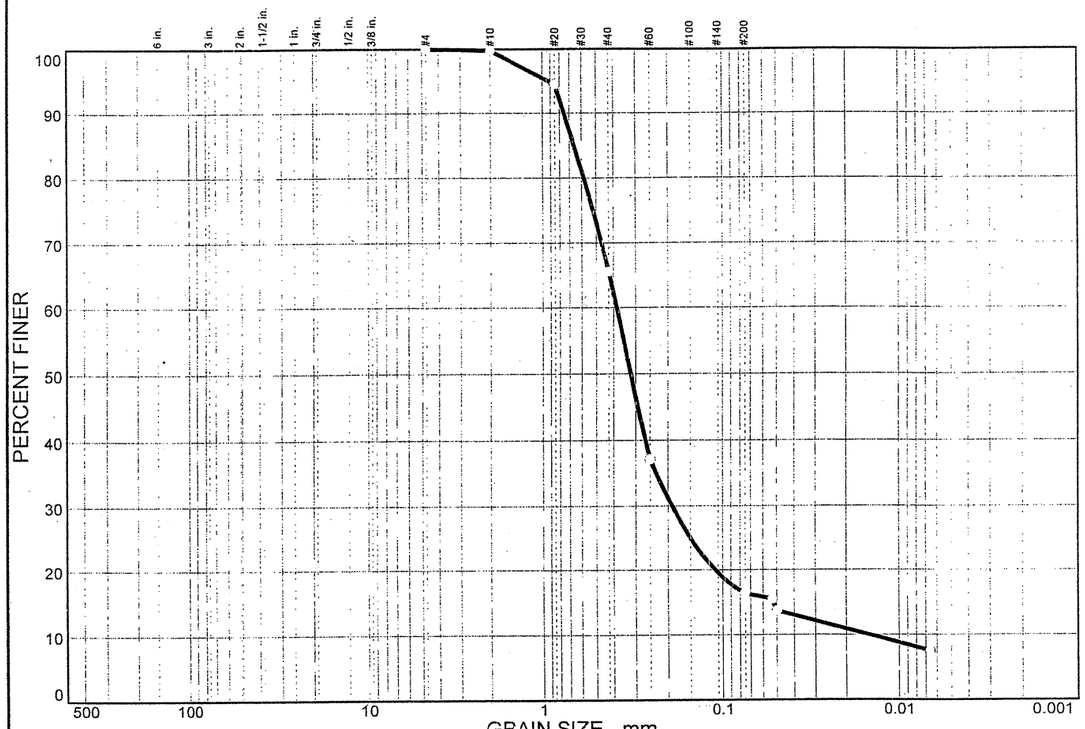
Remarks

ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

Sample No.: SS-13 **Source of Sample:** **Date:** 8/19/03
Location: B6-B **Elev./Depth:** 72.7 ft

MACTEC **ENGINEERING & CONSULTING, INC.**	**Client:** NCDOT **Project:** BRIDGE 4 OVER TULL'S CREEK ON SR 1222 **Project No:** 6468-03-0054 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.2	84.3	15.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	94.5		
#40	65.5		
#60	37.2		
#200	16.4		
#270	15.5		

* (no specification provided)

Soil Description

Atterberg Limits

PL= NP LL= 15 PI= NP

Coefficients

D_{85}= 0.661 D_{60}= 0.383 D_{50}= 0.320
D_{30}= 0.190 D_{15}= 0.0521 D_{10}= 0.0149
C_u= 25.72 C_c= 6.30

Classification

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

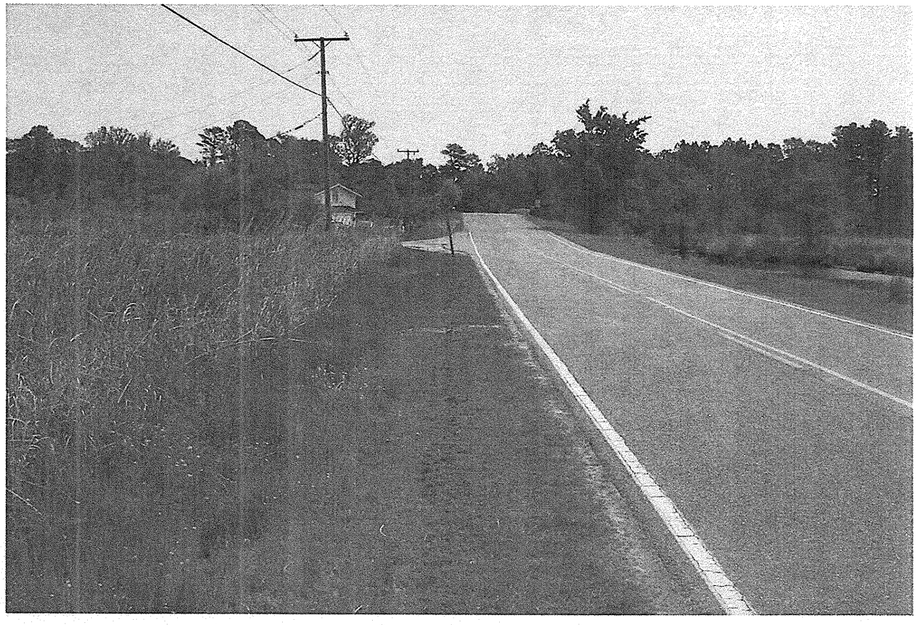
Remarks

NP=NON-PLASTIC
ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED

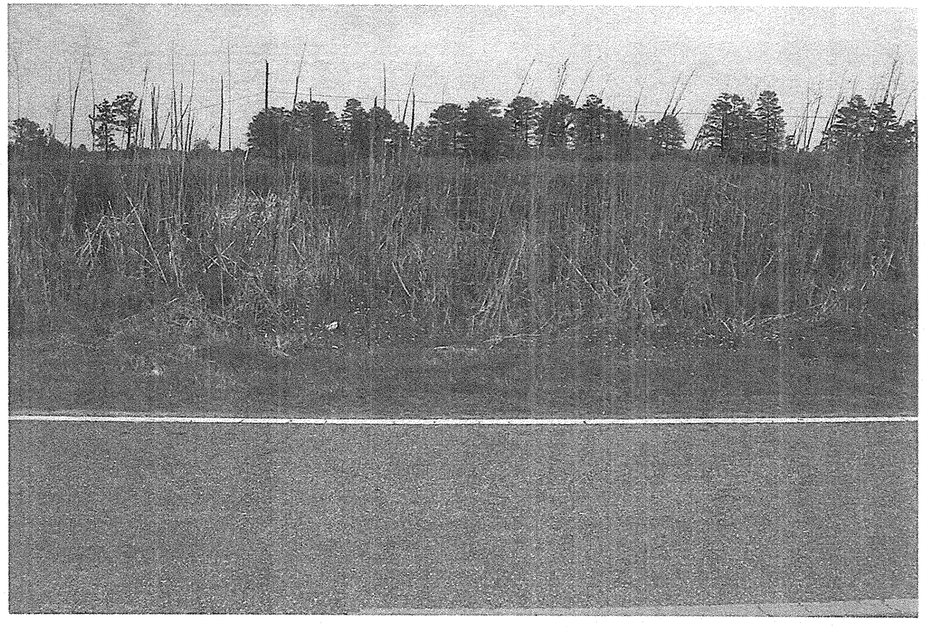
Sample No.: SS-14 **Source of Sample:** **Date:** 8/19/03
Location: B14-B **Elev./Depth:** 12.2 ft

MACTEC **ENGINEERING & CONSULTING, INC.**	**Client:** NCDOT **Project:** BRIDGE 4 OVER TULL'S CREEK ON SR 1222 **Project No:** 6468-03-0054 **Plate**

Site Photos
MACTEC Proj. No. 6468-06-1378

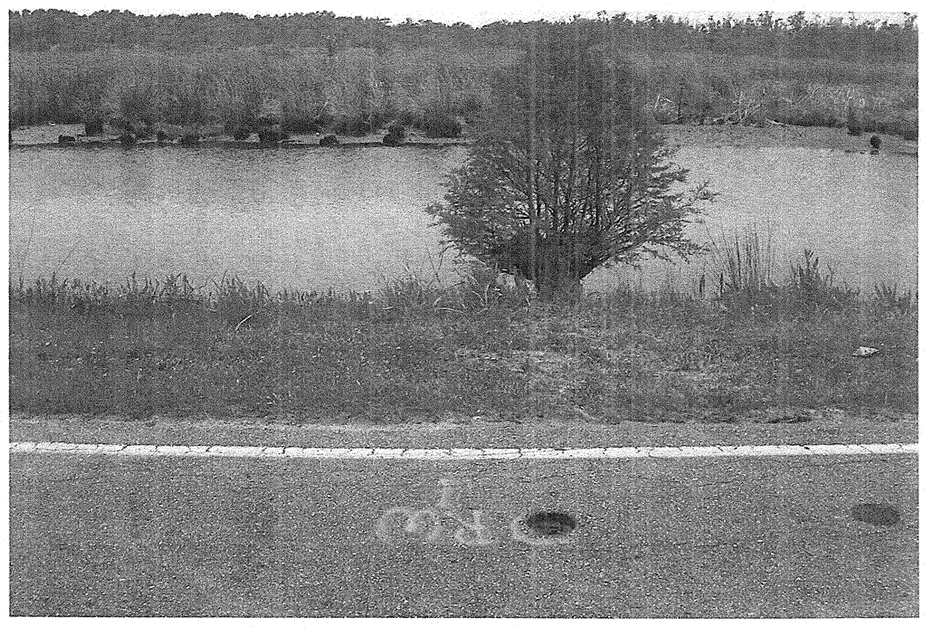


View looking south from approximate station 25+00, 12 LT of -L-.



View looking left from approximate station 24+50 -L-.

View looking south from approximate station 24+25, 12 RT of -L-.



View looking right from approximate station 24+50 -L-.

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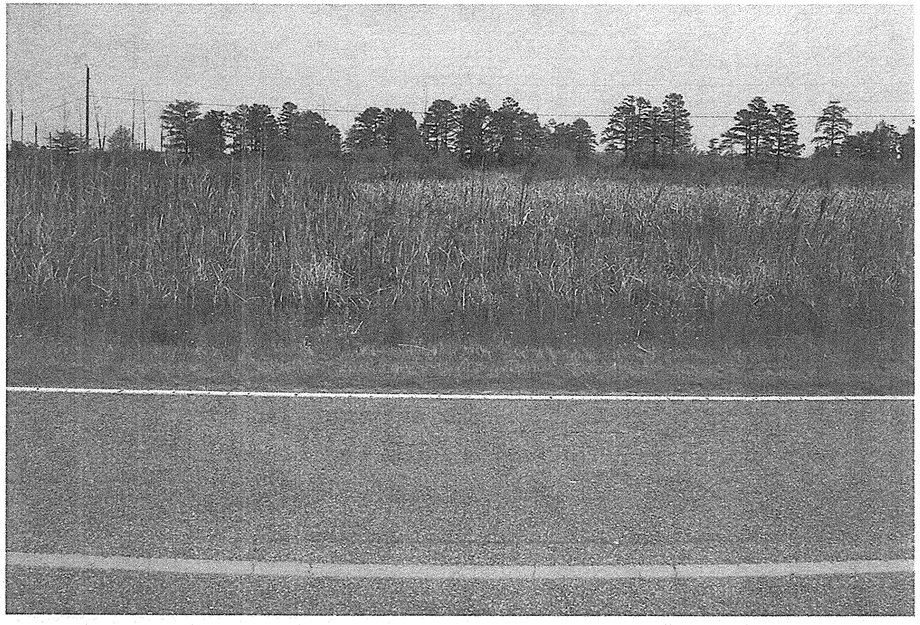
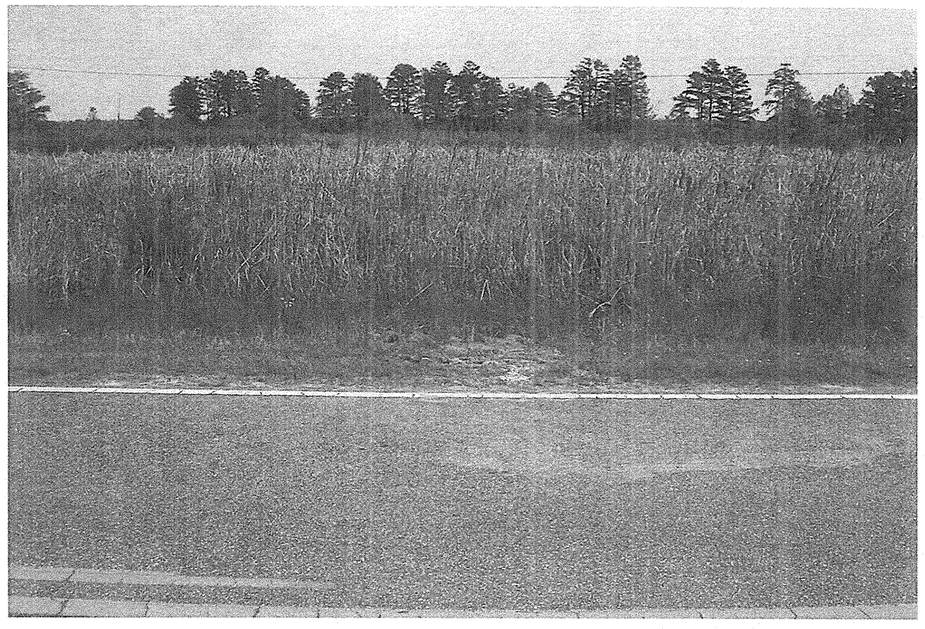
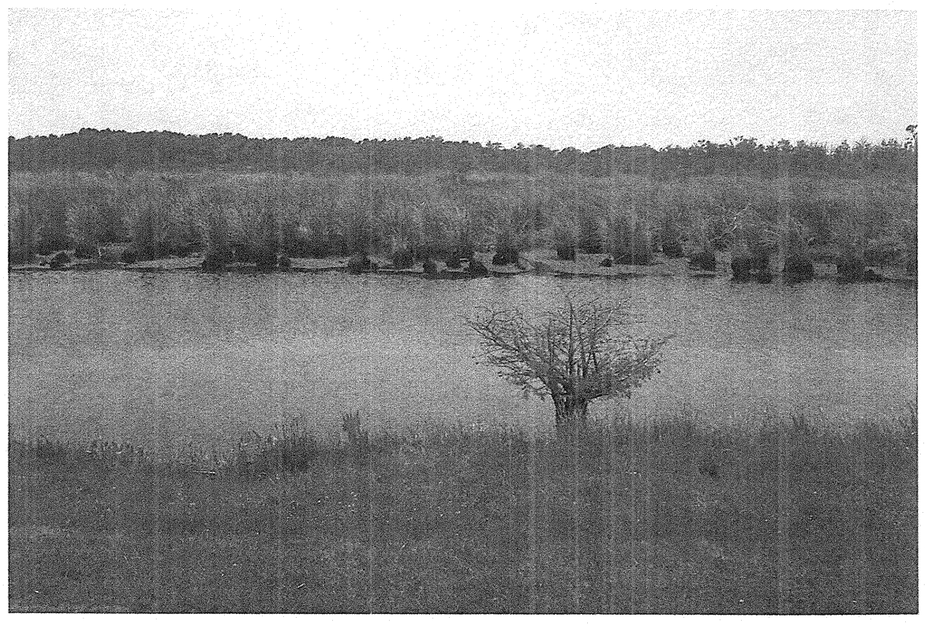


View looking left from approximate station 25+00 -L-.



View looking left from approximate station 25+50 -L-.

View looking right from approximate station 25+00 -L-.



View looking right from approximate station 25+50 -L-.

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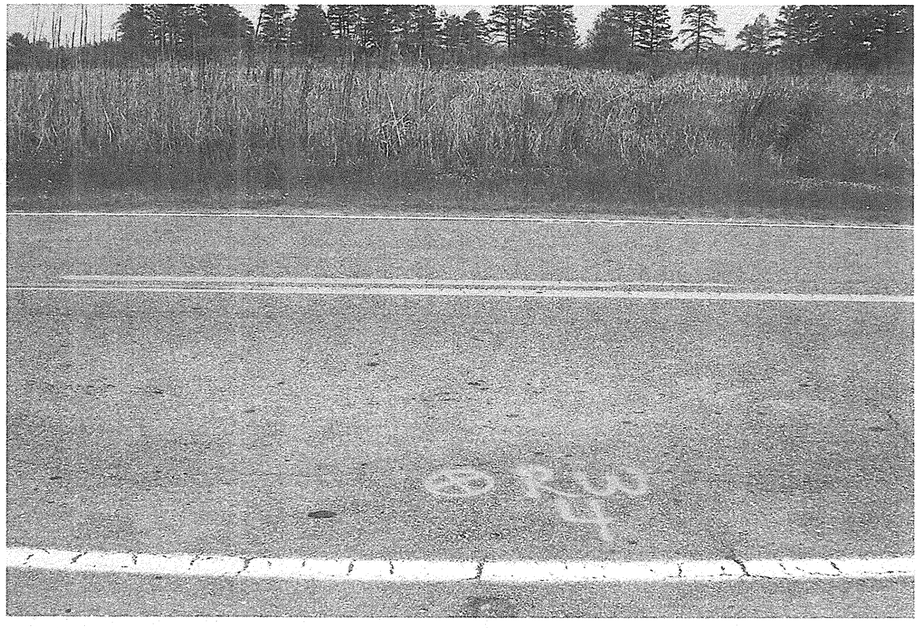
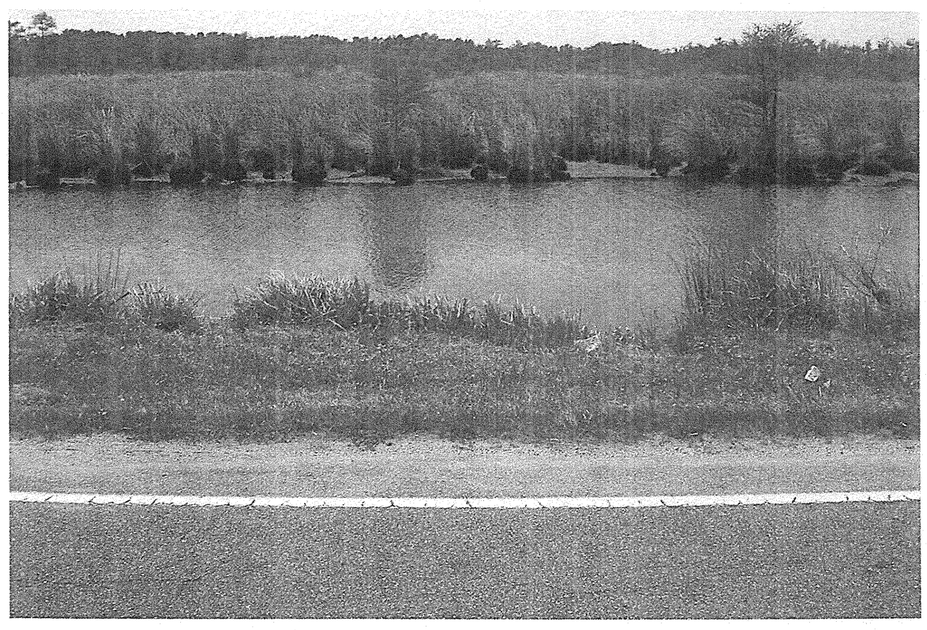


View looking left from approximate station 26+00 -L-.

View looking left from approximate station 26+50 -L-.

View looking right from approximate station 26+00 -L-.



View looking right from approximate station 26+50 -L-.

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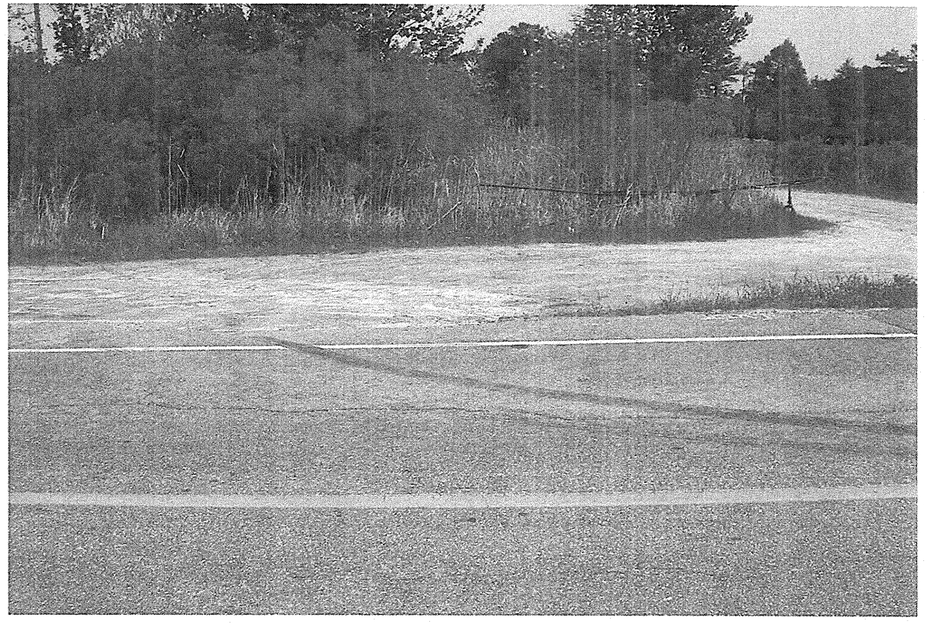
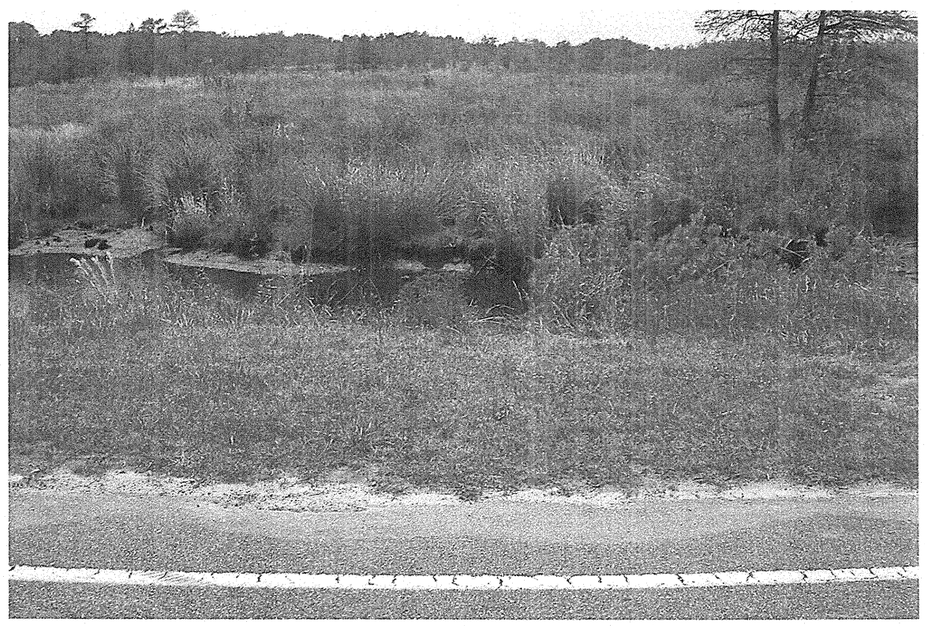
View looking left from approximate station 27+00 -L-.



View looking left from approximate station 27+50 -L-.

View looking right from approximate station 27+00 -L-.



View looking right from approximate station 27+50 -L-.

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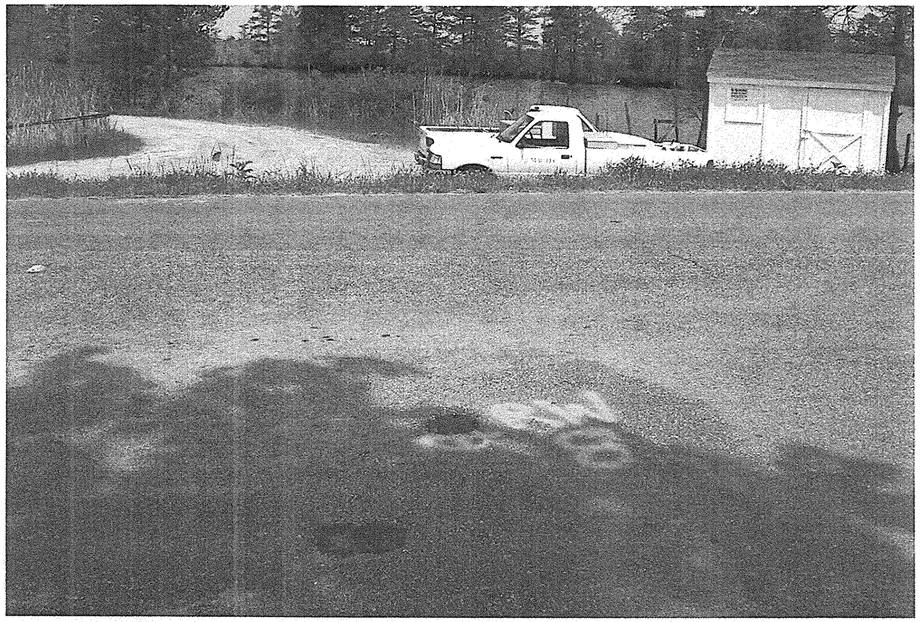
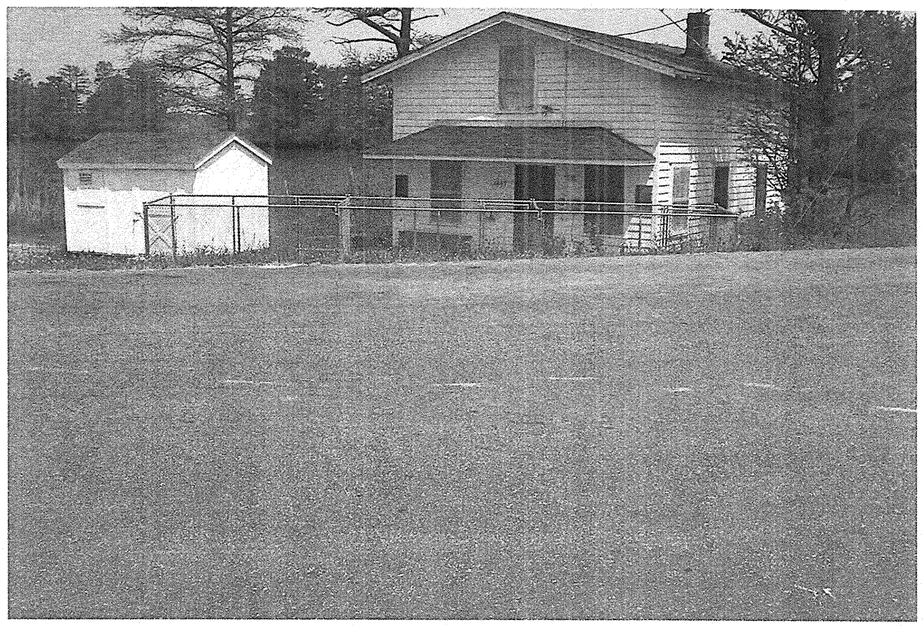
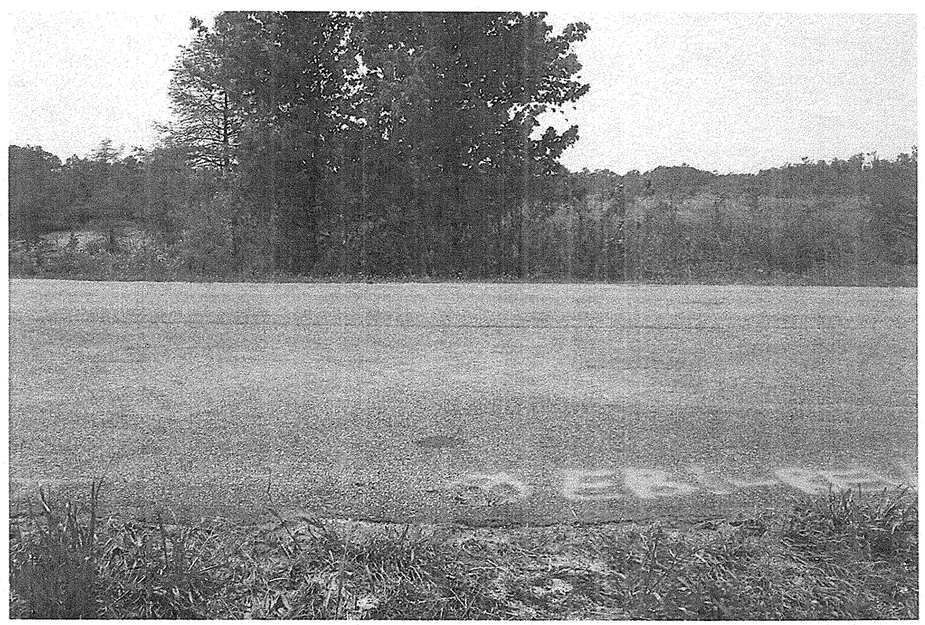


View looking left from approximate station 28+00 -L-.



View looking left from approximate station 28+50 -L-.

View looking right from approximate station 28+00 -L-.



View looking right from approximate station 28+50 -L-.