

PROJECT: 33281.1.1 ID: B-3830

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

STATE	CITY PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33281.1.1	1	35
CITY PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
B-3830	BRZ-1947(1)	P.E. CONST.	

STRUCTURE
SUBSURFACE INVESTIGATION

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CITY PROJECT 33281.1.1 I.D. NO. B-3830
 COUNTY COLUMBUS
 PROJECT DESCRIPTION REPLACEMENT OF
BRIDGES NO. 363 AND NO. 364 ON SR 1947
OVER FRIAR SWAMP
 SITE DESCRIPTION BRIDGE No. 363 OVER
BIG CREEK ON SR 1947

FOR LETTING

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.
 CHECKED BY J. VEITH
 SUBMITTED BY B. DEOBALD
 DATE 10/30/07
 REVISED 11/12/07

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NORTH CAROLINA
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SEAL
1927
MICHAEL B. LEAR
GEOLOGIST



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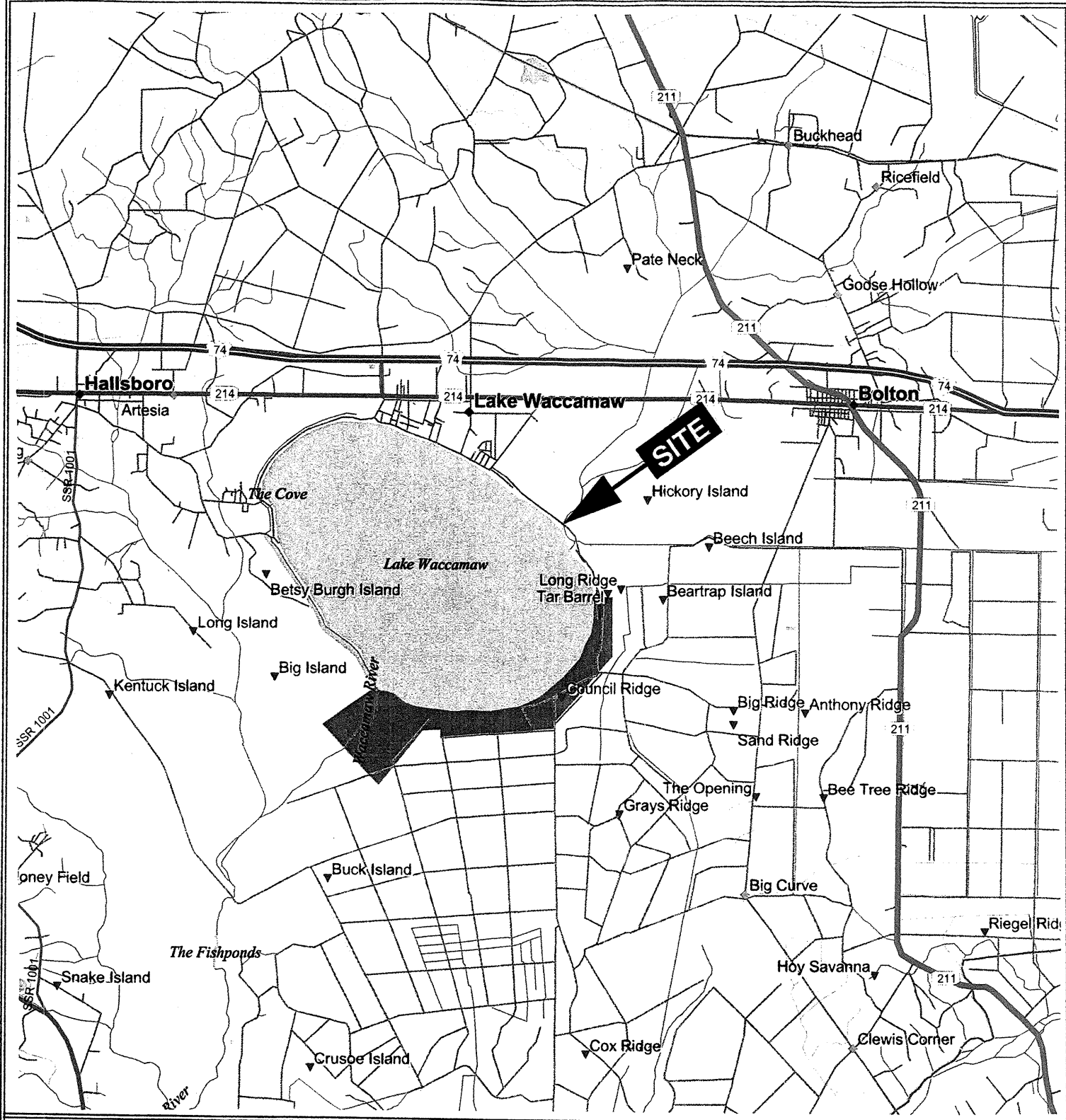
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3830	33281.1.1	2	35

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS									
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6		WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH 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 DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.									
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		ROCK HARDNESS									
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		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. 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. 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.		COMPRESSIBILITY SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 LIQUID LIMIT 31-50 LIQUID LIMIT GREATER THAN 50		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.		PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SILT-CLAY OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE		GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. STATIC WATER LEVEL AFTER 24 HOURS. PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA SPRING OR SEEPAGE		ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.	
CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBOLS		ROCK HARDNESS		BEDDING									
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS INFERRED SOIL BOUNDARIES INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP/DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		SPT DMT TEST BORING AUGER BORING BULK SAMPLE LOCATION CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE		TERM SPACING TERM THICKNESS 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 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									
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		INDURATION		BENCH MARK									
U.S. STD. SIEVE SIZE OPENING (MM) BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)		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 U - UNIT WEIGHT U ₁ - DRY UNIT WEIGHT V. - VERY VST - VANE SHEAR TEST W - MOISTURE CONTENT		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.		NCDOT BASELINE STATION -BL2- PINC 12+19.56, ELEV.=46.11R							
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		NOTES									
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CORE SIZE: HAND TOOLS:		INDURATION		Geotechnical Exploration Performed By:									
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT		<input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input checked="" type="checkbox"/> CME-45C <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> OTHER <input type="checkbox"/> OTHER		<input type="checkbox"/> AUTOMATIC <input checked="" type="checkbox"/> MANUAL <input type="checkbox"/> -B <input type="checkbox"/> -N <input checked="" type="checkbox"/> -H <input type="checkbox"/> -Q <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> OTHER		MACTEC ENGINEERING AND CONSULTING, INC. 3301 ATLANTIC AVENUE RALEIGH, NORTH CAROLINA 27604 (919) 876-0416									
PLASTICITY		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		NOTES									
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		<input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input checked="" type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE 4" STEEL TEETH <input type="checkbox"/> TRICONE TUNG-CARB. <input type="checkbox"/> CORE-BIT <input type="checkbox"/> OTHER		INDURATION		Geotechnical Exploration Performed By:									
COLOR		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		NOTES									
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		<input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> OTHER <input type="checkbox"/> OTHER		INDURATION		Geotechnical Exploration Performed By:									

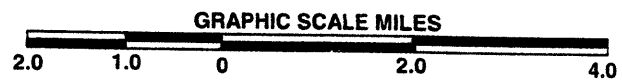


REFERENCE: Delorme Street Atlas

NOTE: SITE LOCATION IS APPROXIMATE

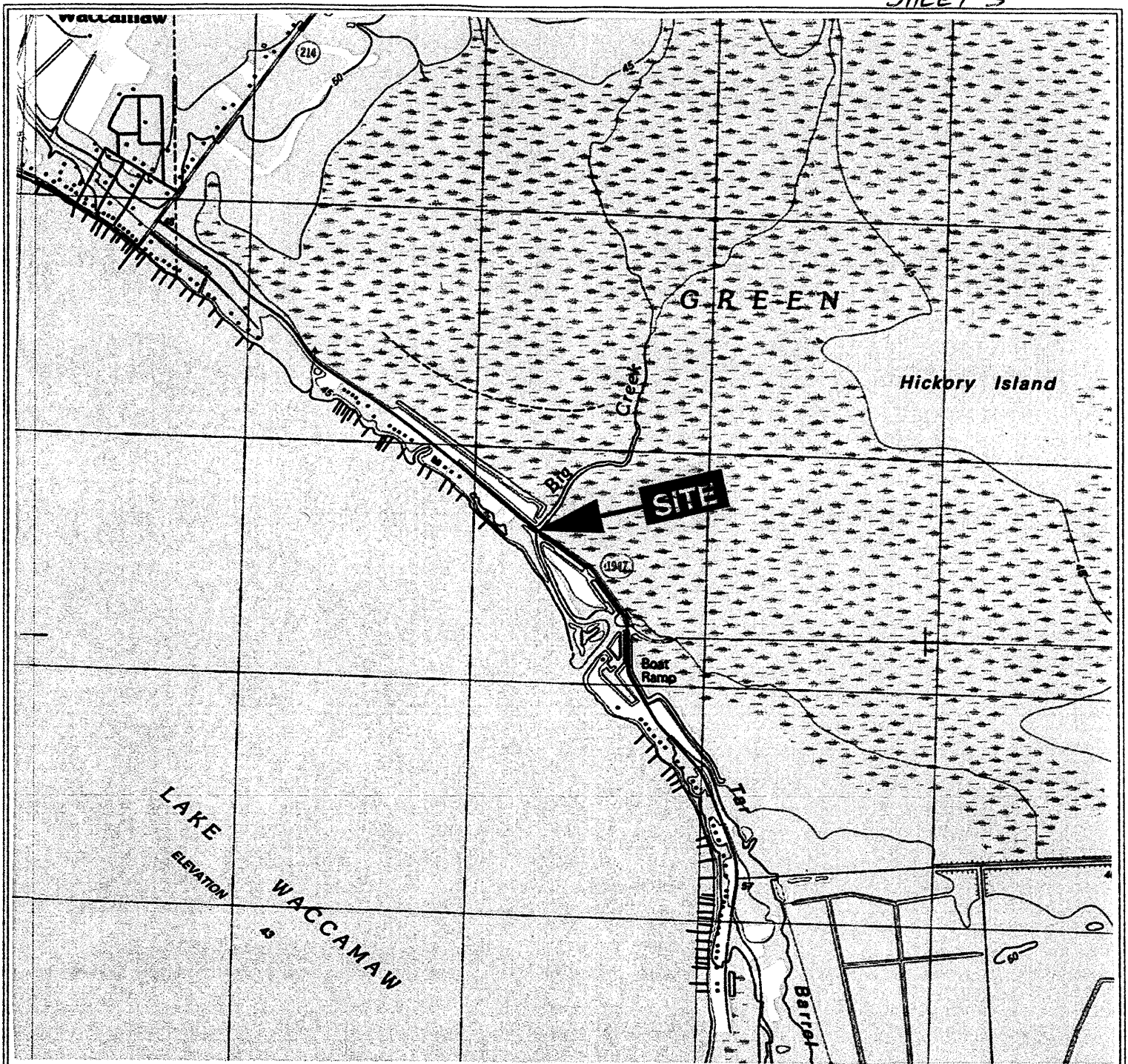


MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA



SITE LOCATION MAP
BRIDGE NO. 363 OVER BIG CREEK ON SR 1947
NCDOT PROJ. NO. 33281.1.1 (B-3830)
COLUMBUS COUNTY, NORTH CAROLINA

DRAWN: MBL	DATE: OCTOBER 2007	1
ENG CHECK:	SCALE: 1" = 2 miles	
APPROVAL: <i>WFD</i>	JOB: 6468-07-1889	



LAKE WACCAMAW EAST, N.C.

SW/4 BOLTON 15' QUADRANGLE
34078-C4-TF-024
1986
DMA 5352 IV SW - SERIES V842

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



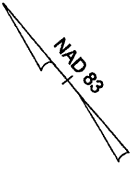
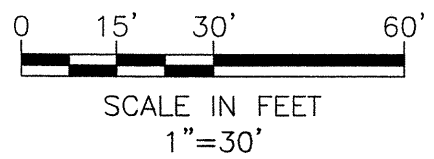
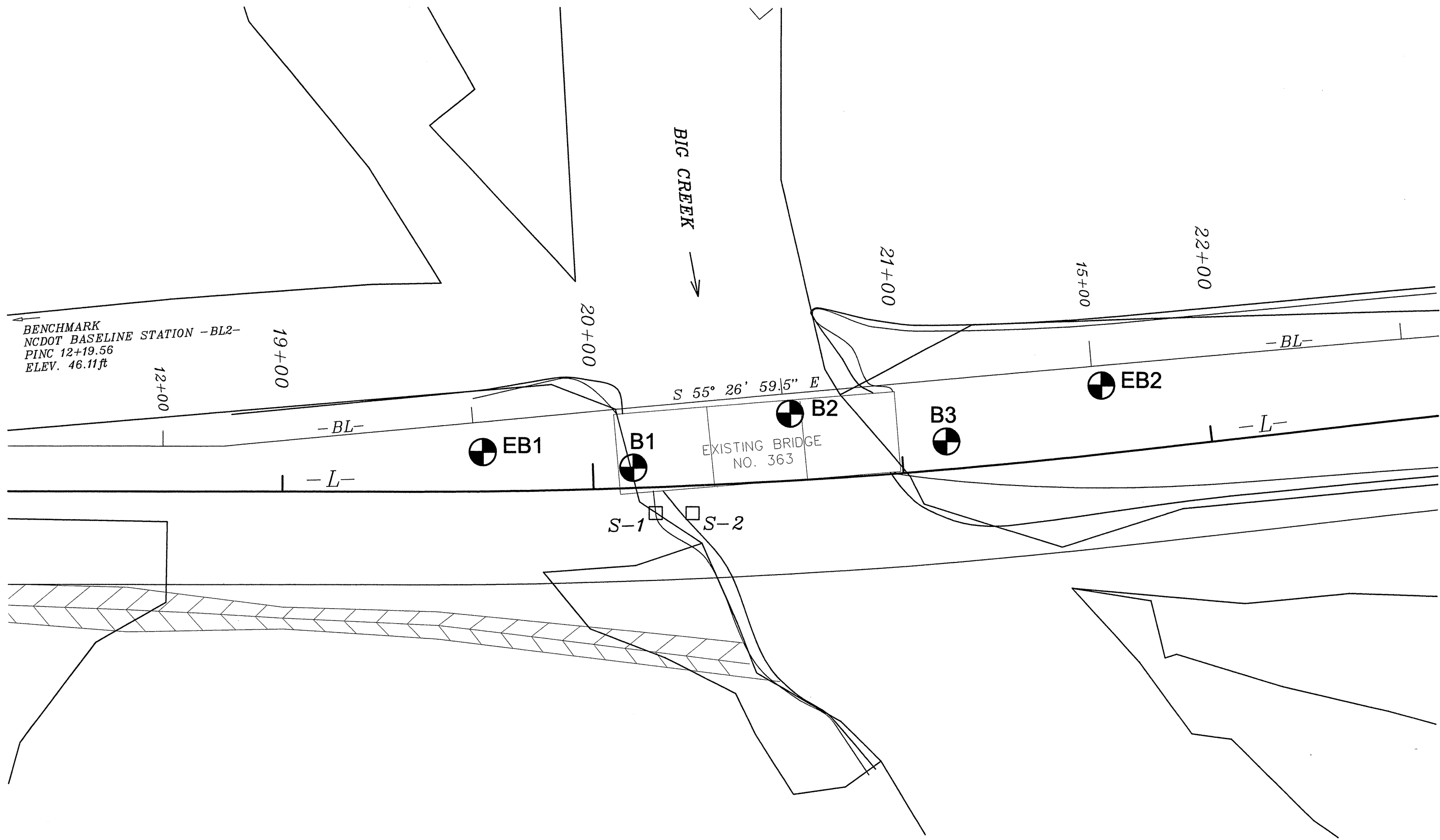
TOPOGRAPHIC SITE MAP
BRIDGE NO. 363 OVER BIG CREEK ON SR 1947
NCDOT PROJ. NO. 33281.1.1 (B-3830)
COLUMBUS COUNTY, NORTH CAROLINA

NOTE: SITE LOCATION IS APPROXIMATE



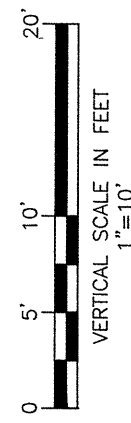
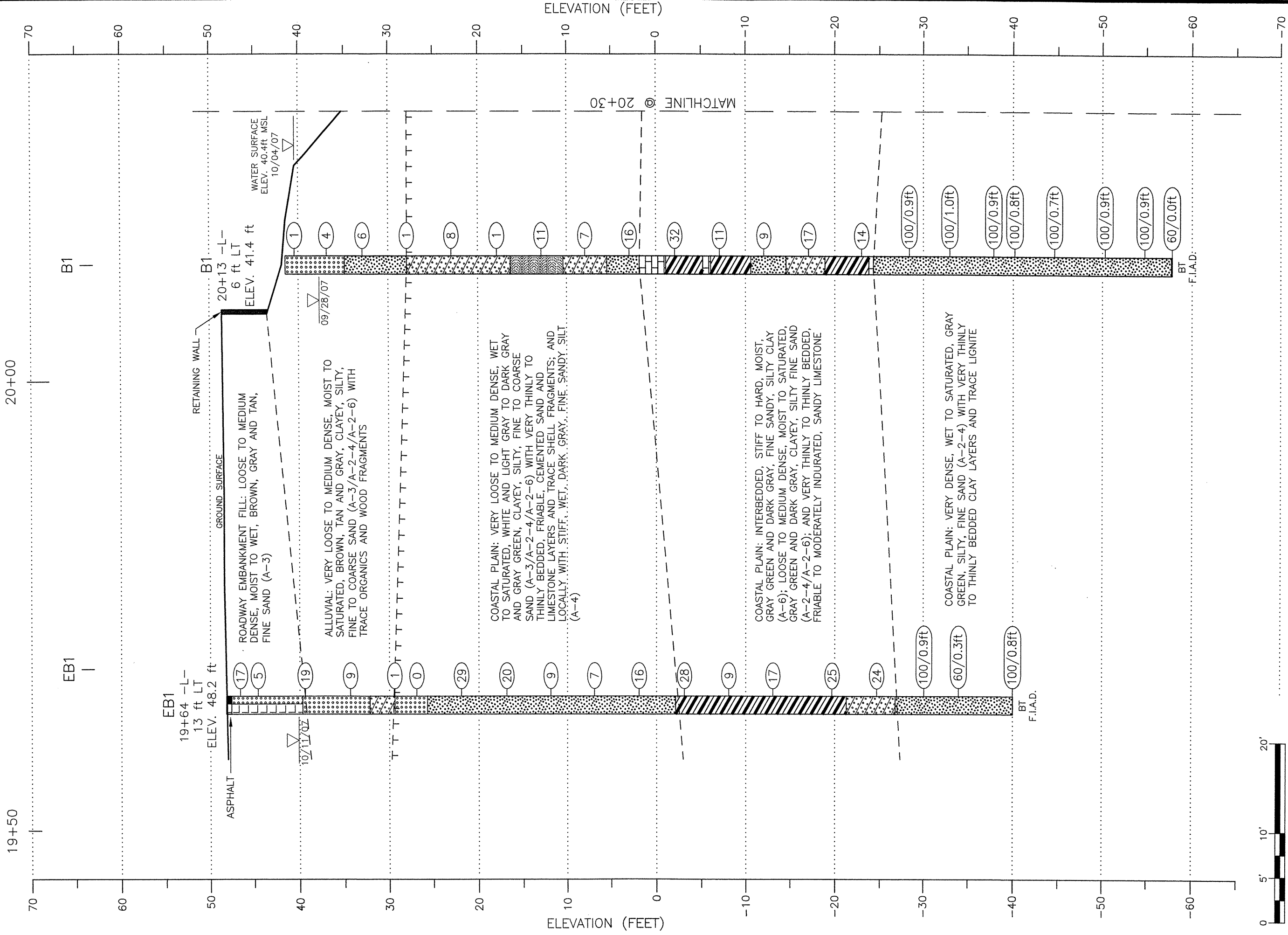
MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

DRAWN: MBL	DATE: OCTOBER 2007	2
ENG CHECK:	SCALE: 1" = 24000	
APPROVAL: <i>WFD</i>	JOB: 6468-07-1889	



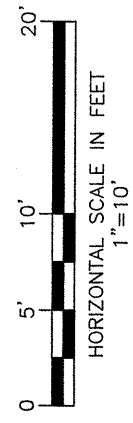
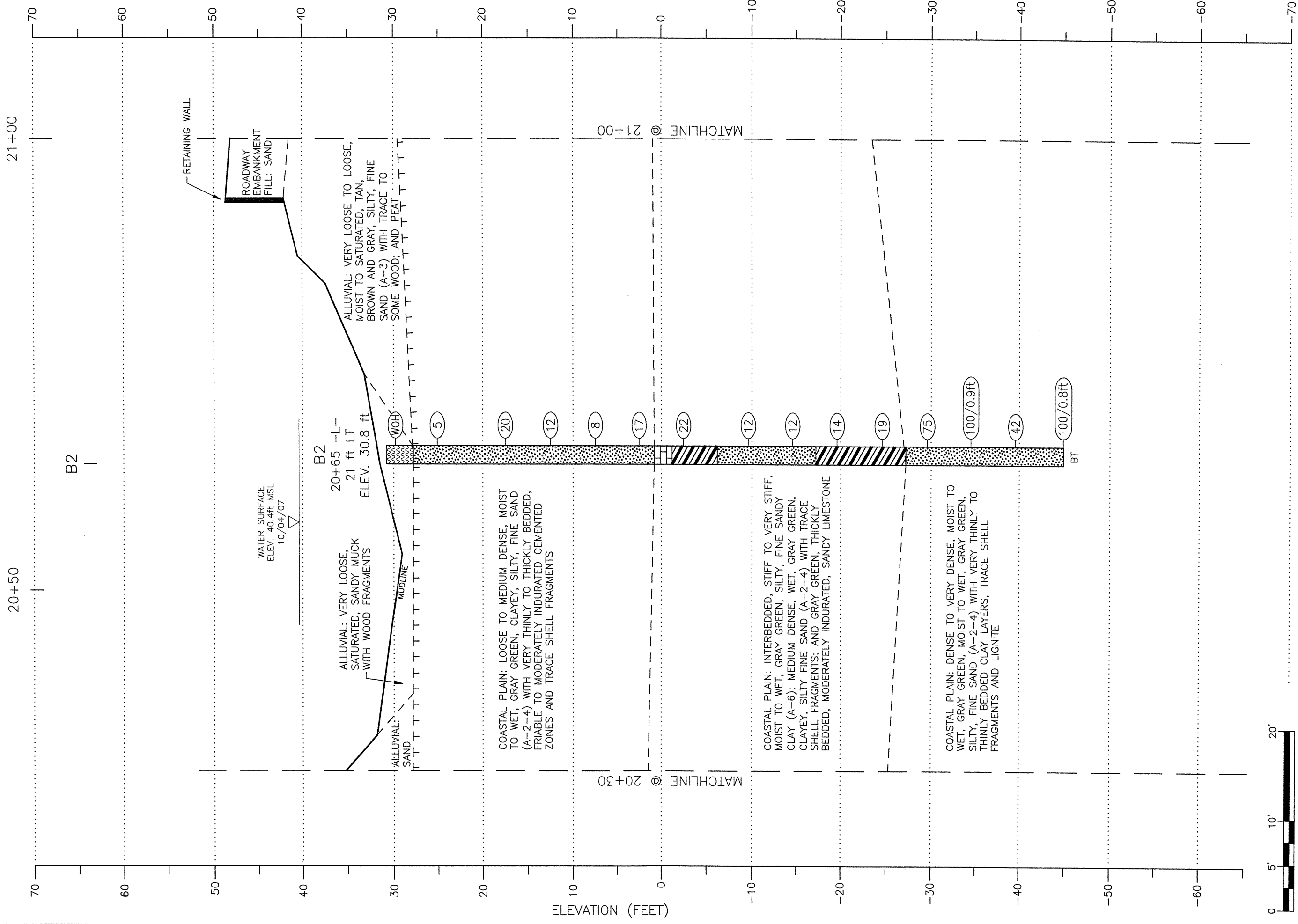
BORING LOCATION PLAN
 BRIDGE No. 363 OVER BIG CREEK ON SR 1947
 NCDOT PROJECT NO. 33281.1.1 (B-3830)
 F.A. No. BRZ-1947(1)
 COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 10/30/07
11/12/07	DFT CHECK:	W.B.D.	JOB: 6468-07-1889
	ENG CHECK:	J.E.V.	DWG: 3



PROFILE ALONG -L-
 BRIDGE No. 363 OVER BIG CREEK ON SR 1947
 NCDOT PROJECT NO. 33281.1.1 (B-3830)
 F.A. No. BRZ-1947(1)
 COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 10/30/07
	11/12/07	DFT CHECK: W.B.D.	JOB: 6468-07-1889
		ENG CHECK: J.E.V.	DWG: 4

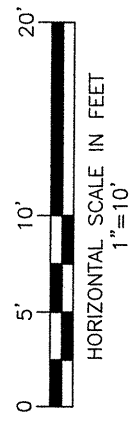
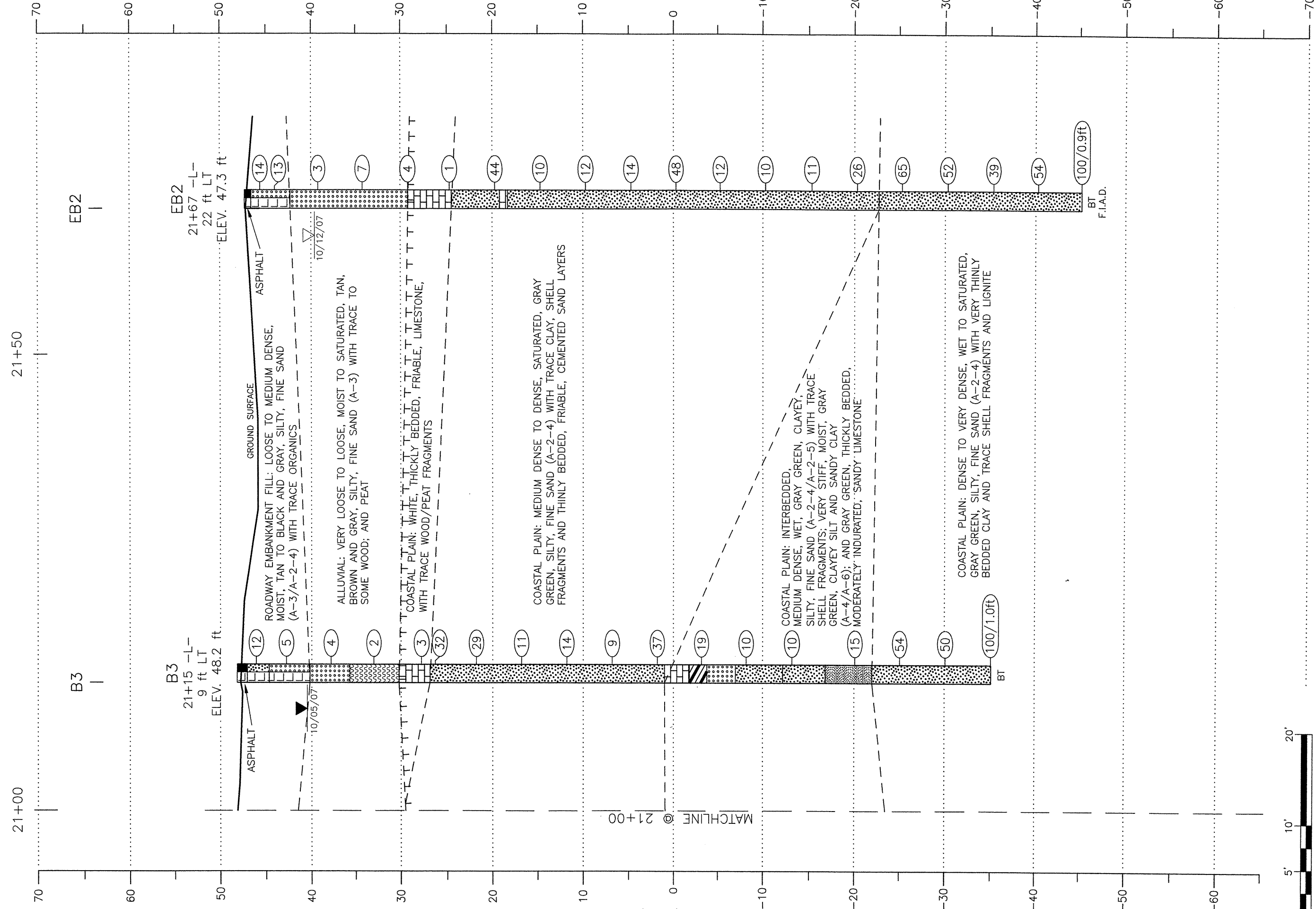


PROFILE ALONG -L-
 BRIDGE No. 363 OVER BIG CREEK ON SR 1947
 NCDOT PROJECT NO. 33281.1.1 (B-3830)
 F.A. No. BRZ-1947(1)
 COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 10/30/07
11/12/07	DFT CHECK:	W.B.D.	JOB: 6468-07-1889
	ENG CHECK:	J.E.V.	DWG: 5

ELEVATION (FEET)

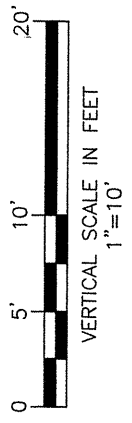
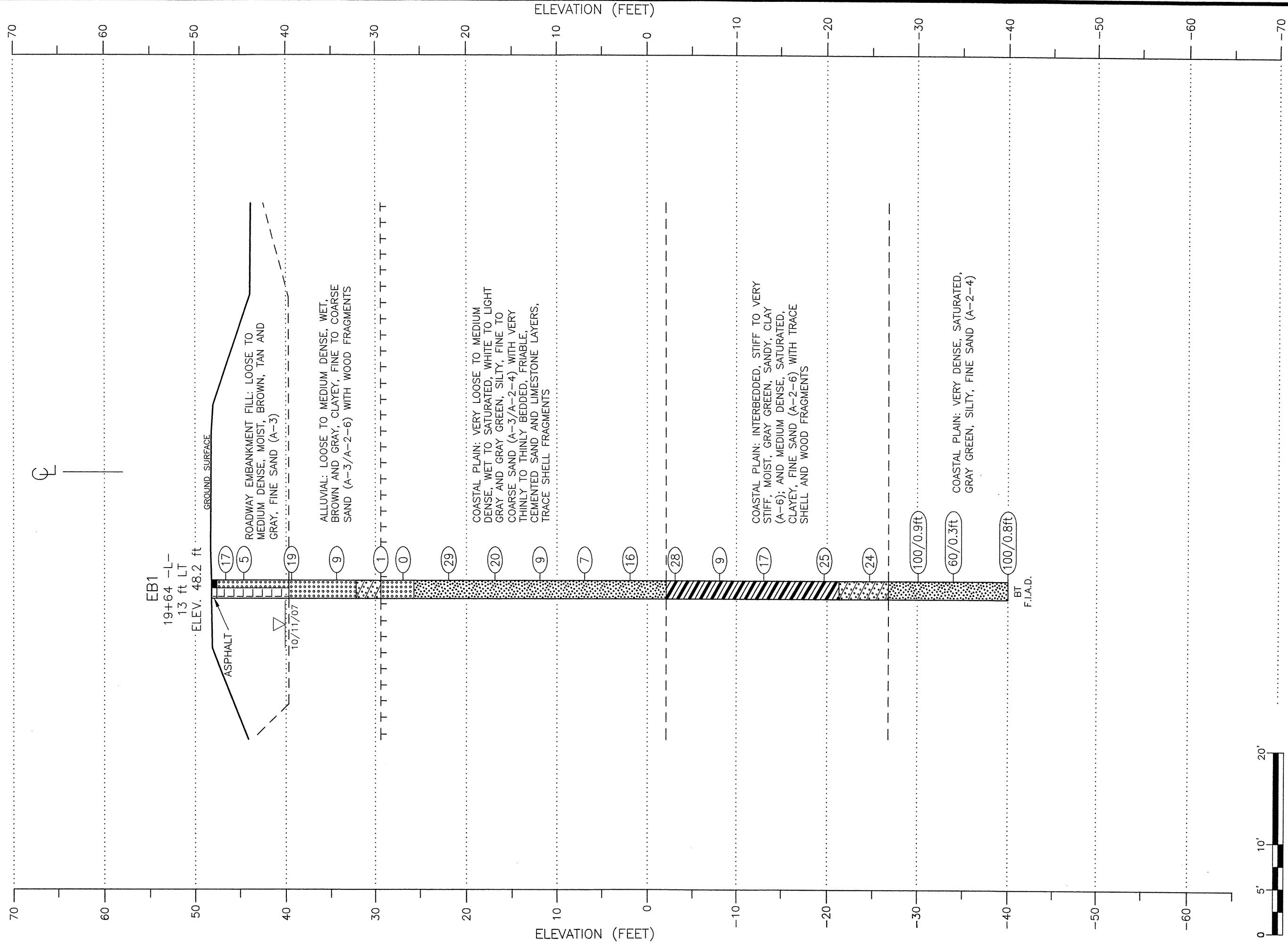
ELEVATION (FEET)



PROFILE ALONG -L-
BRIDGE No. 363 OVER BIG CREEK ON SR 1947
NCDOT PROJECT NO. 33281.1.1 (B-3830)
F.A. No. BRZ-1947(1)
COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

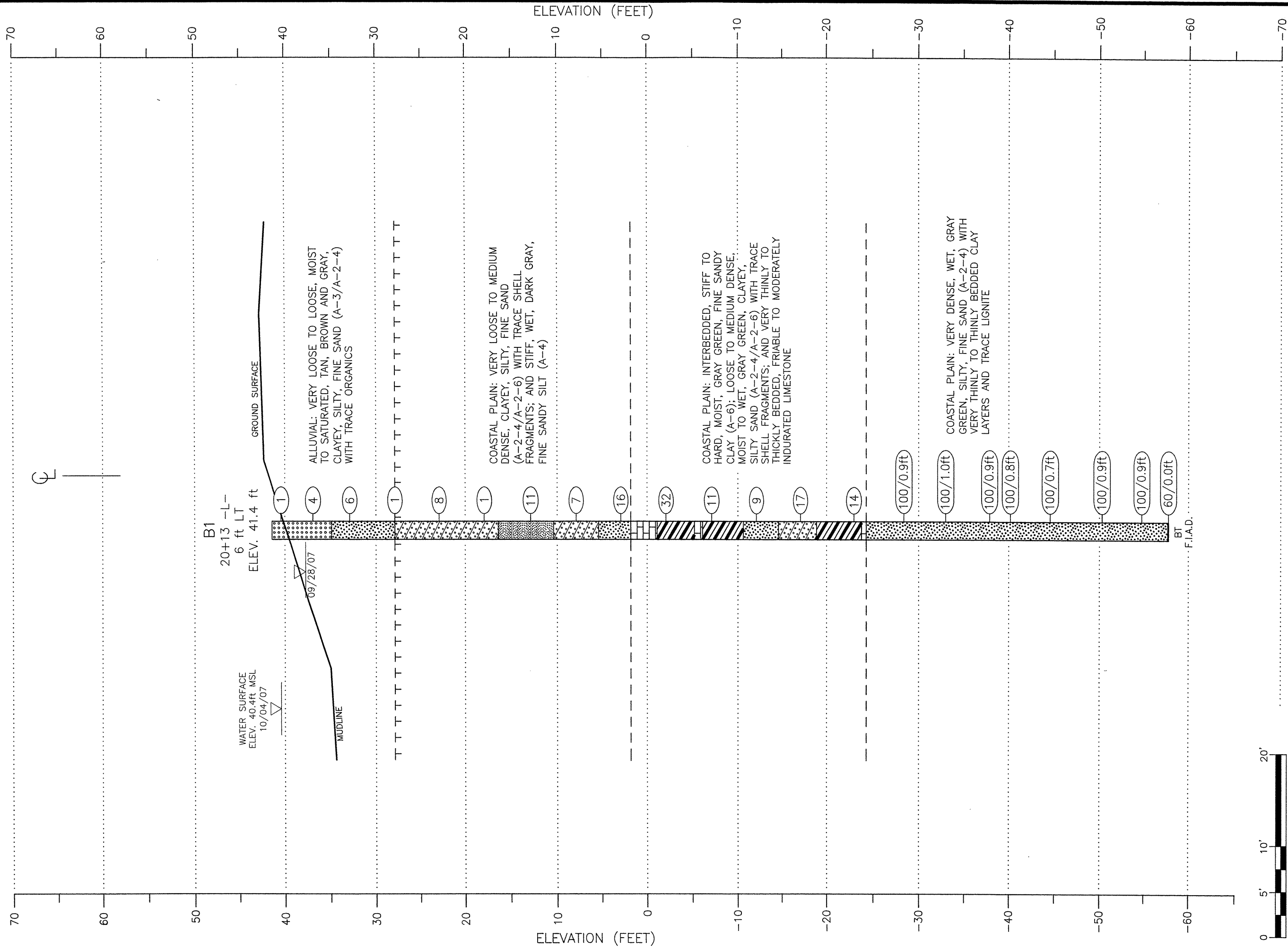
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11/12/07	DFT CHECK:	W.B.D.	JOB:	6468-07-1889
	ENG CHECK:	J.E.V.	DWG:	6



CROSS SECTION ALONG END BENT 1
BRIDGE No. 363 OVER BIG CREEK ON SR 1947
NCDOT PROJECT NO. 33281.1.1 (B-3830)
F.A. No. BRZ-1947(1)
COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

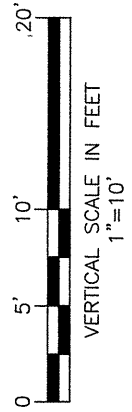
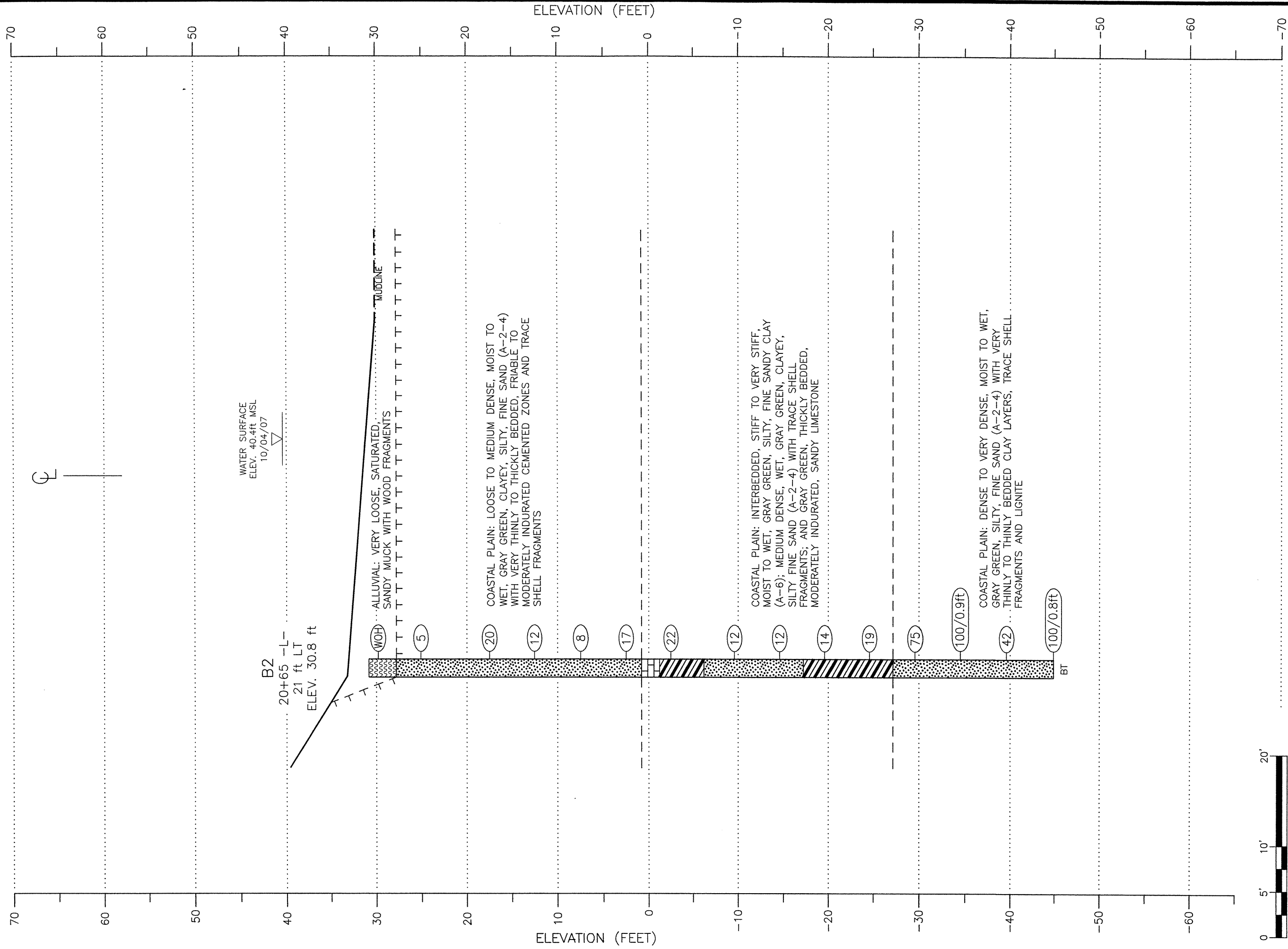
REVISIONS	DRAWN:	R.R.	DATE:	10/30/07
11/12/07	DFT CHECK:	W.B.D.	JOB:	6468-07-1889
	ENG CHECK:	J.E.V.	DWG:	7



CROSS SECTION ALONG BENT 1
 BRIDGE No. 363 OVER BIG CREEK ON SR 1947
 NCDOT PROJECT NO. 33281.1.1 (B-3830)
 F.A. No. BRZ-1947(1)
 COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
 RALEIGH, NORTH CAROLINA

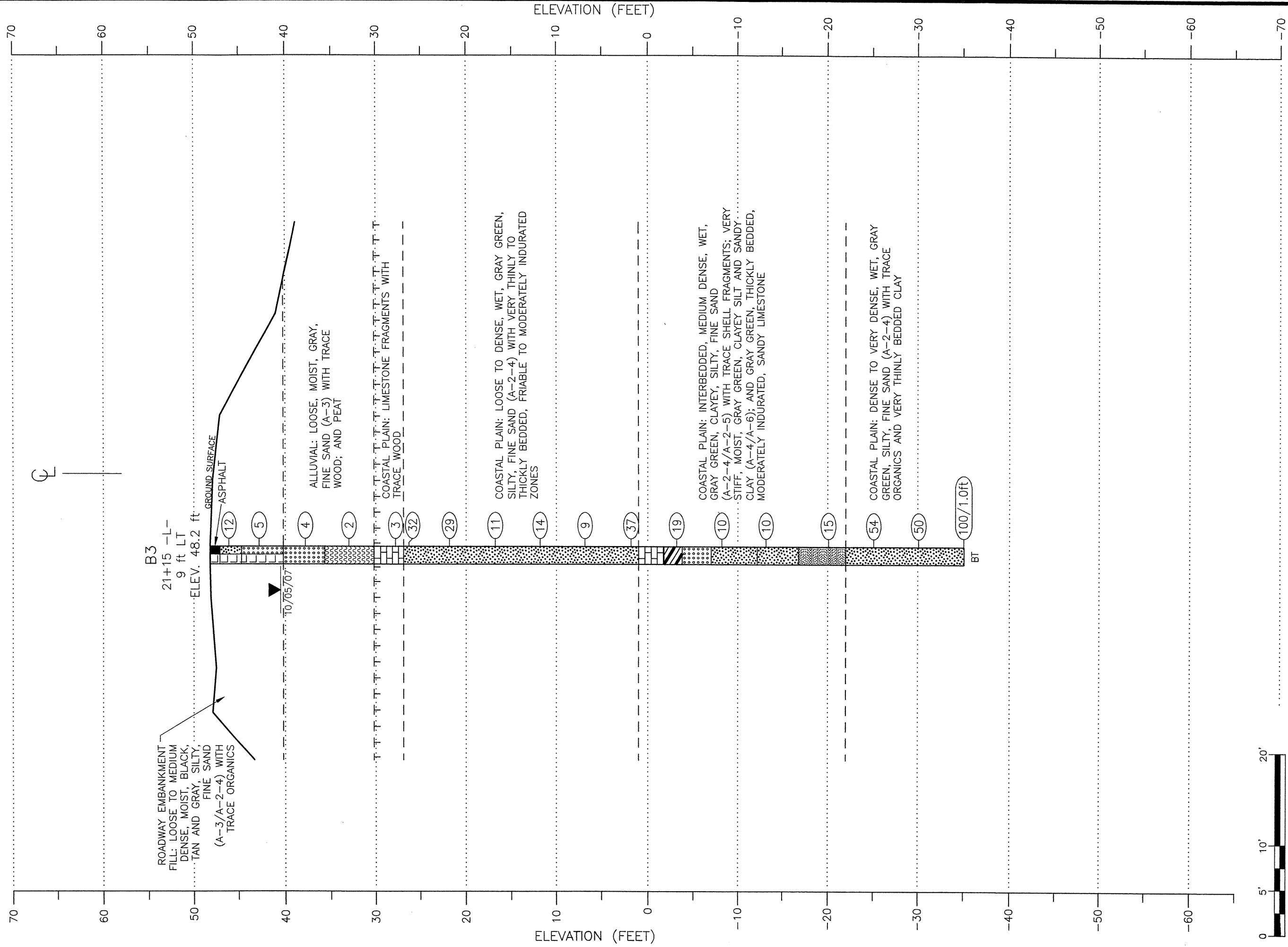
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11/12/07	DFT CHECK:	W.B.D.	JOB: 6468-07-1889
	ENG CHECK:	J.E.V.	DWG: 8



CROSS SECTION ALONG BENT 2
BRIDGE No. 363 OVER BIG CREEK ON SR 1947
NCDOT PROJECT NO. 33281.1.1 (B-3830)
F.A. No. BRZ-1947(1)
COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN:	R.R.	DATE:
11/12/07	DFT CHECK:	W.B.D.	10/30/07
	ENG CHECK:	J.E.V.	JOB: 6468-07-1889
			DWG: 9



CROSS SECTION ALONG BENT 3
 BRIDGE No. 363 OVER BIG CREEK ON SR 1947
 NCDOT PROJECT NO. 33281.1.1 (B-3830)
 F.A. No. BRZ-1947(1)
 COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN: R.R.	DATE:	10/30/07
11/12/07	DFT CHECK: W.B.D.	JOB:	6468-07-1889
	ENG CHECK: J.E.V.	DWG:	10

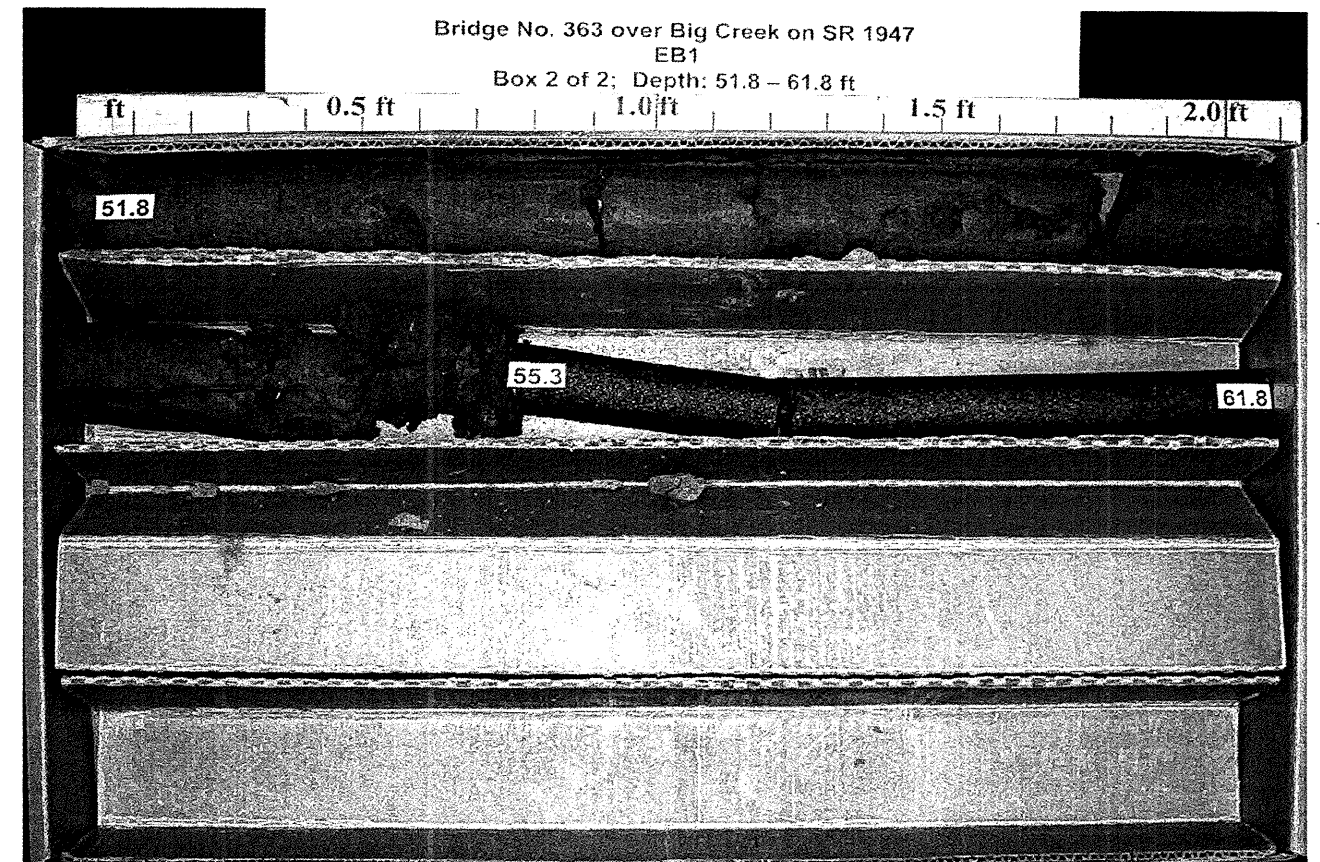
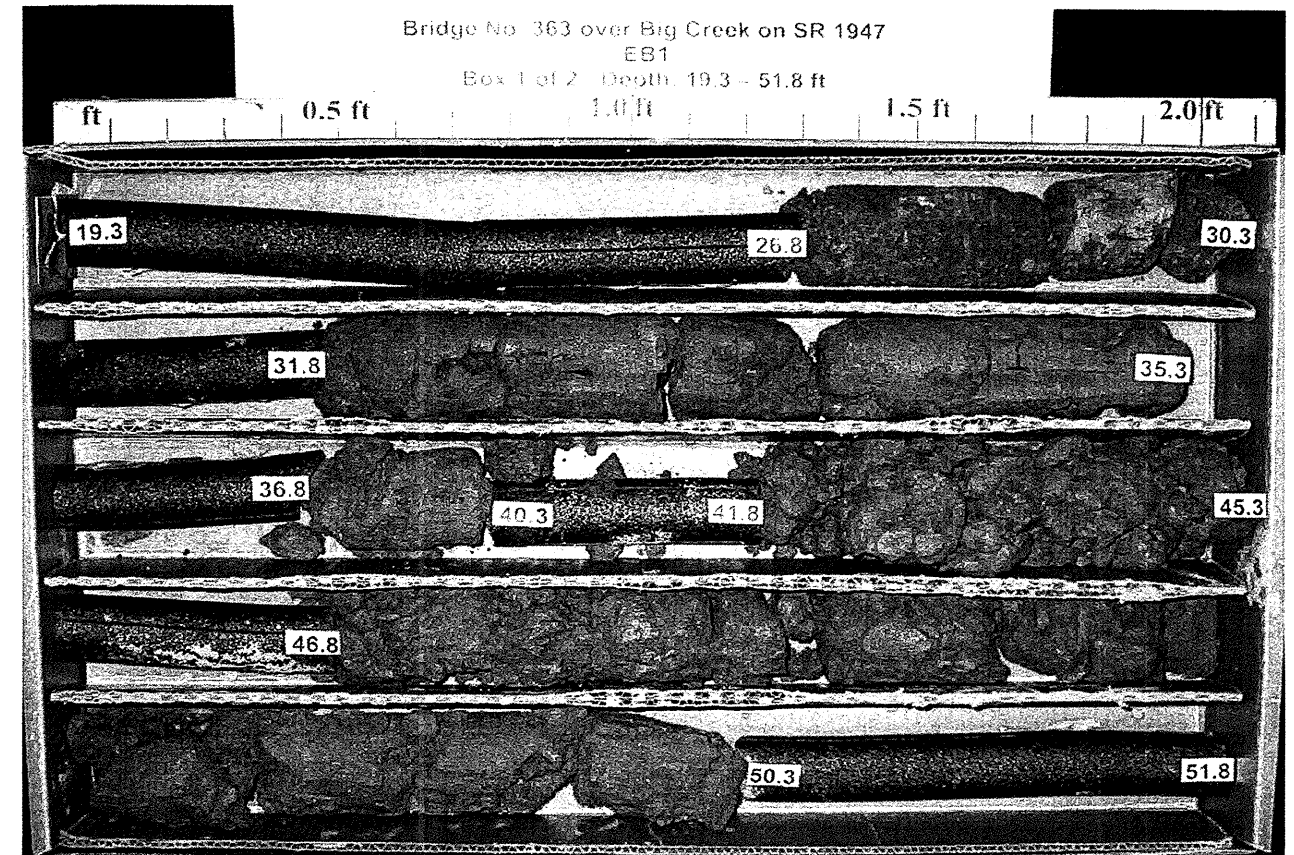
PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)			GROUND WTR (ft)
BORING NO. EB1	STATION 19+64	OFFSET 13ft LT	ALIGNMENT -L-
COLLAR ELEV. 48.2 ft	TOTAL DEPTH 88.2 ft	NORTHING 199,176	EASTING 2,158,176
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/10/07	COMP. DATE 10/11/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)			GROUND WTR (ft)
BORING NO. EB1	STATION 19+64	OFFSET 13ft LT	ALIGNMENT -L-
COLLAR ELEV. 48.2 ft	TOTAL DEPTH 88.2 ft	NORTHING 199,176	EASTING 2,158,176
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/10/07	COMP. DATE 10/11/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
50														
47.6	0.6												GROUND SURFACE	0.0
45.6	2.6		8	8	9								ROADWAY EMBANKMENT	0.8
45			3	2	3								Asphalt to 0.6 feet	
40.4	7.8												ROADWAY EMBANKMENT	
40			6	8	11								Brown, gray, and tan, fine SAND (A-3)	
35.4	12.8												ALLUVIAL	8.5
35			4	4	5								Dark brown, fine to coarse SAND (A-3)	
30.4	17.8												ALLUVIAL	16.0
30			WOH	1	WOH								Gray-brown, clayey, SAND (A-2-6) with wood fragments	18.8
27.9	20.3		WOH	WOH	WOH								COASTAL PLAIN	22.5
25			4	7	22								White to light gray, silty, coarse SAND (A-3) with LIMESTONE fragments	
22.9	25.3												COASTAL PLAIN	
20			1	11	9								Gray green, silty, fine SAND (A-2-4) with very thinly to thinly bedded, friable, cemented sand and limestone layers and trace shell fragments	
17.9	30.3		3	4	5									
15			2	3	4									
12.9	35.3		6	7	9									
10			11	12	16									
7.9	40.3		3	4	5									
5			5	7	10									
2.9	45.3		6	9	16									
0			5	9	15									
-2.1	50.3		16	40	60/0.4									
-5														
-7.1	55.3													
-10														
-12.1	60.3													
-15														
-18.7	66.9													
-20														
-23.7	71.9													
-25														
-28.7	76.9													
-30														

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-30													Match Line	
-35	81.9												COASTAL PLAIN	
			60/0.3										Gray green, silty, fine SAND (A-2-4) with trace mica (continued)	
-40	86.9		16	29	71/0.3									
-45														
-50														
-55														
-60														
-65														
-70														
-75														
-80														
-85														
-90														
-95														
-100														
-105														
-110														

NCDOT BORE DOUBLE MACTEC 6468-07-1889.GPJ NC_DOT_GDT_10/29/07





NCDOT GEOTECHNICAL ENGINEERING UNIT

CORE BORING REPORT

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard/M. Lear
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)			GROUND WTR (ft)
BORING NO. B1	STATION 20+13	OFFSET 6ft LT	ALIGNMENT -L-
COLLAR ELEV. 41.4 ft	TOTAL DEPTH 99.2 ft	NORTHING 199,141	EASTING 2,158,210
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 09/24/07	COMP. DATE 09/28/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 39.6 ft
CORE SIZE HQ	TOTAL RUN 29.5 ft	DRILLER E. Burkett	

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (%)		REC. (%)	ROD (%)			
	2.4										Begin Coring @ 39.0 ft	
0	2.4	39.0	3.5	1:00 0:45	(2.9) 83%	NA		(2.9) 100%	NA		COASTAL PLAIN Dark gray, silty, fine SAND (A-2-4) with trace limestone (continued)	39.6
	-1.1	42.5		1:15							COASTAL PLAIN	42.5
	-2.6	44.0		0:45/0.5 N=32			SS-7	(0.4) 15%	NA		Dark gray, medium hard to soft, very thinly to thinly bedded, friable, sandy LIMESTONE	
-5			3.5	2:15 2:30	(1.3) 37%	NA					COASTAL PLAIN Dark gray-green, sandy CLAY (A-6) with trace mica and shell fragments	46.6
	-6.1	47.5		3:45				(0.9) 100%	NA		COASTAL PLAIN	47.5
	-7.6	49.0		1:45/0.5 N=11				(0.0) 0%	NA		Dark gray, soft to medium hard, very thinly to thinly bedded, friable to moderately indurated, LIMESTONE	
-10			3.5	1:30 1:00	(0.0) 0%	NA					COASTAL PLAIN	52.0
	-11.1	52.5		1:00				(0.0) 0%	NA		Dark gray, sandy CLAY (A-6) with trace mica	52.0
	-12.6	54.0		0:30/0.5 N=9			SS-8				COASTAL PLAIN	56.0
-15			3.5	3:30 0:30	(1.4) 40%	NA		(1.4) 50%	NA		Dark gray, clayey, silty, SAND (A-2-4) with trace mica and shell fragments	56.0
	-16.1	57.5		0:30							COASTAL PLAIN	60.3
	-17.6	59.0		0:20/0.5 N=17			SS-9				Green gray, clayey, fine SAND (A-2-6) with trace shell fragments and very thinly bedded clay layers	
-20			3.5	3:30 5:15	(2.2) 63%	NA		(3.1) 91%	NA		COASTAL PLAIN Dark gray-green, fine sandy, silty CLAY (A-6)	60.3
	-21.1	62.5		9:15								65.2
	-22.0	63.4	0.9	2:45/0.5 8:32/0.9	(0.9) 100%	NA	SS-10				COASTAL PLAIN	65.2
-25			3.5	2:04 0:35	(0.5) 14%	NA		(0.5) 100%	NA		Dark gray-green, soft, thinly bedded, friable, fine to coarse sandy, clayey, LIMESTONE	65.7
	-27.0	68.4		1:25				(0.0) 0%	NA		COASTAL PLAIN	65.7
	-28.4	69.8		0:33/0.5 N=100/0.9			SS-11				Gray-green, silty, fine SAND (A-2-4) with trace very thinly to thinly bedded CLAY (A-7-6) layers and trace lignite	
-30			3.6	1:16 1:06	(0.0) 0%	NA						
	-32.0	73.4		1:45								
	-33.0	74.4		1:12/0.6 N=100/1.0								
-35			4.0	1:06 1:18	(0.0) 0%	NA						
	-37.0	78.4		1:27 1:21								
-40				N=100/0.8			SS-12					
-45				N=100/0.7								
-50				N=100/0.9			SS-13					
-55				N=100/0.9								
-60				N=60/0.0								
	-57.7	99.1									COASTAL PLAIN Very hard, indurated to extremely indurated, cemented SAND/LIMESTONE (No Recovery)	99.1
	-57.8	99.2									Boring Terminated with Standard Penetration Test Refusal at Elevation -57.8 ft in Coastal Plain: Very dense, cemented SAND/LIMESTONE	99.2

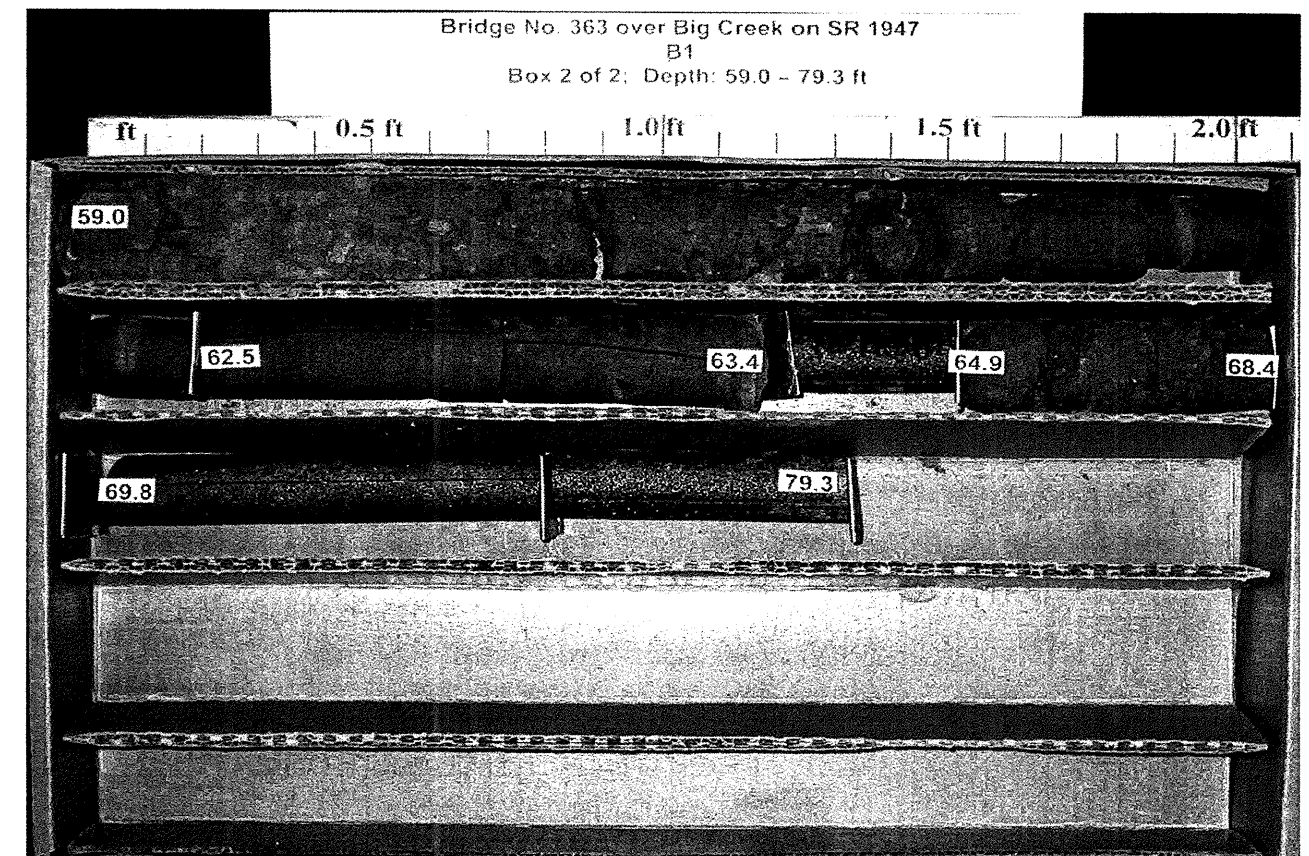
Bits Used: 4" Side-Discharge Wing Bit; 3" Side-Discharge Finger Bit

Drilling Fluid Properties: ND

Casing Depth: 32.5 ft (4")

Other Samples:
ST-1 (9.0 - 11.0)

NCDOT CORE DOUBLE MACTEC 6468-07-1889.GPJ NC_DOT.GDT 10/29/07

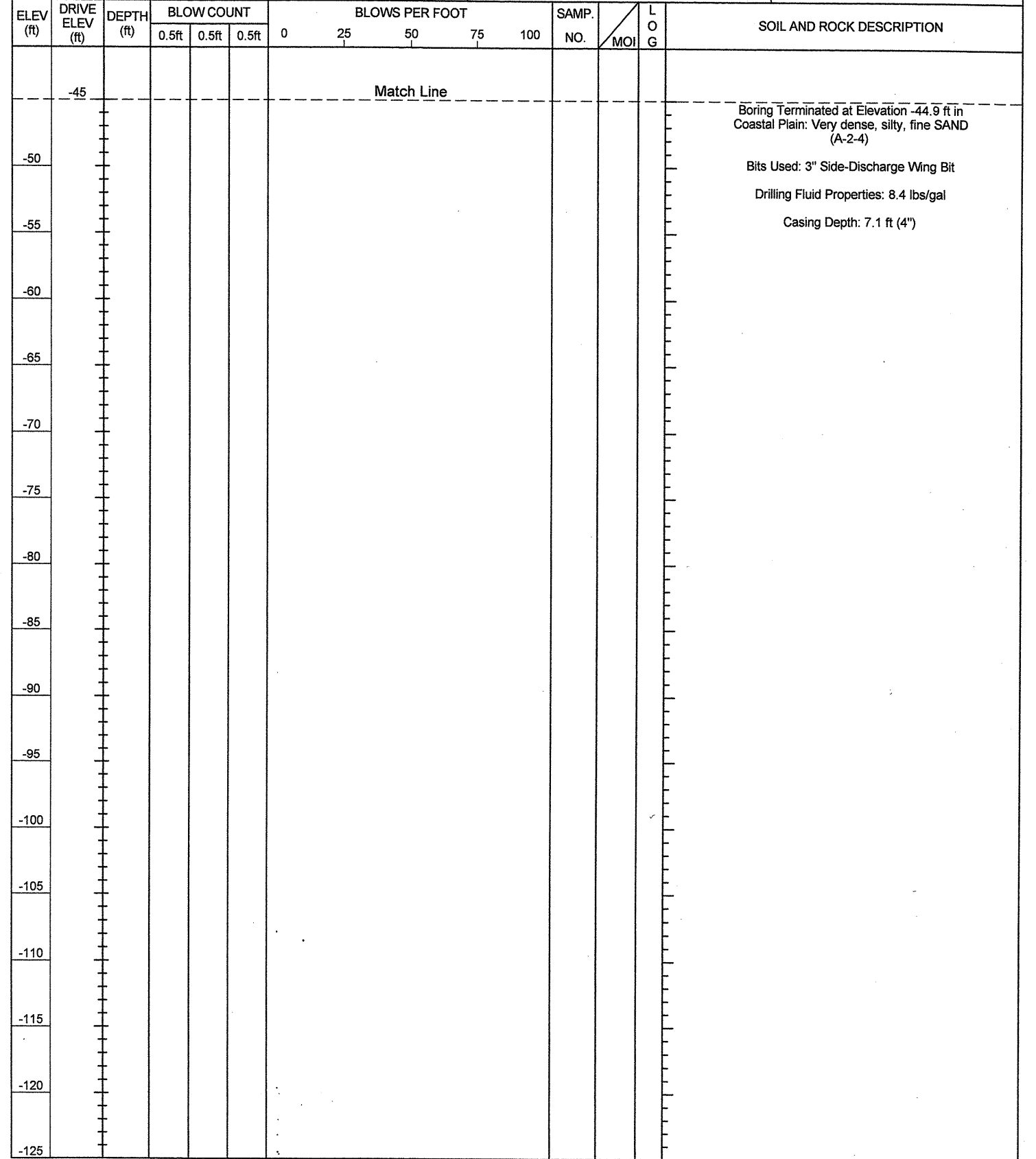
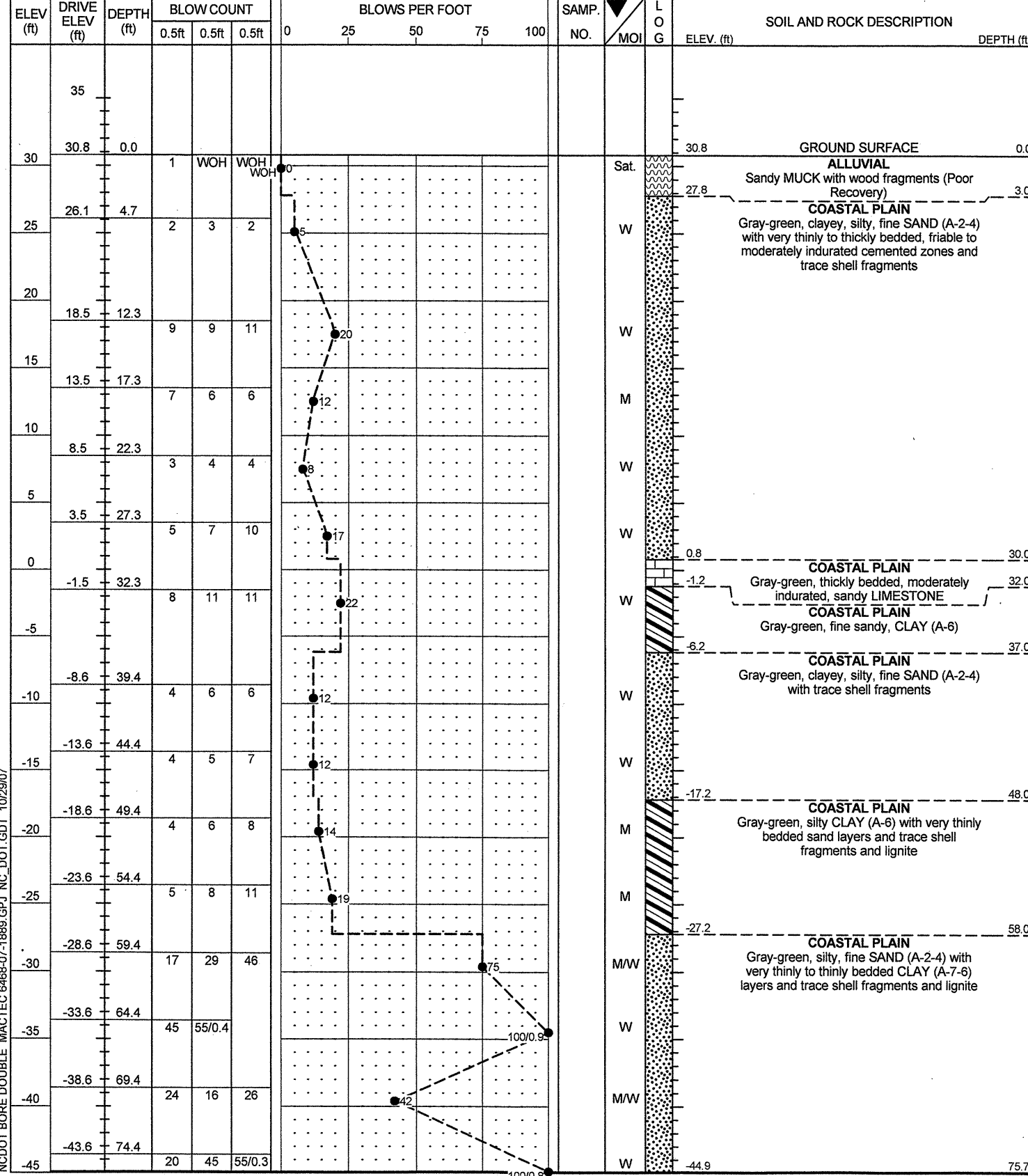




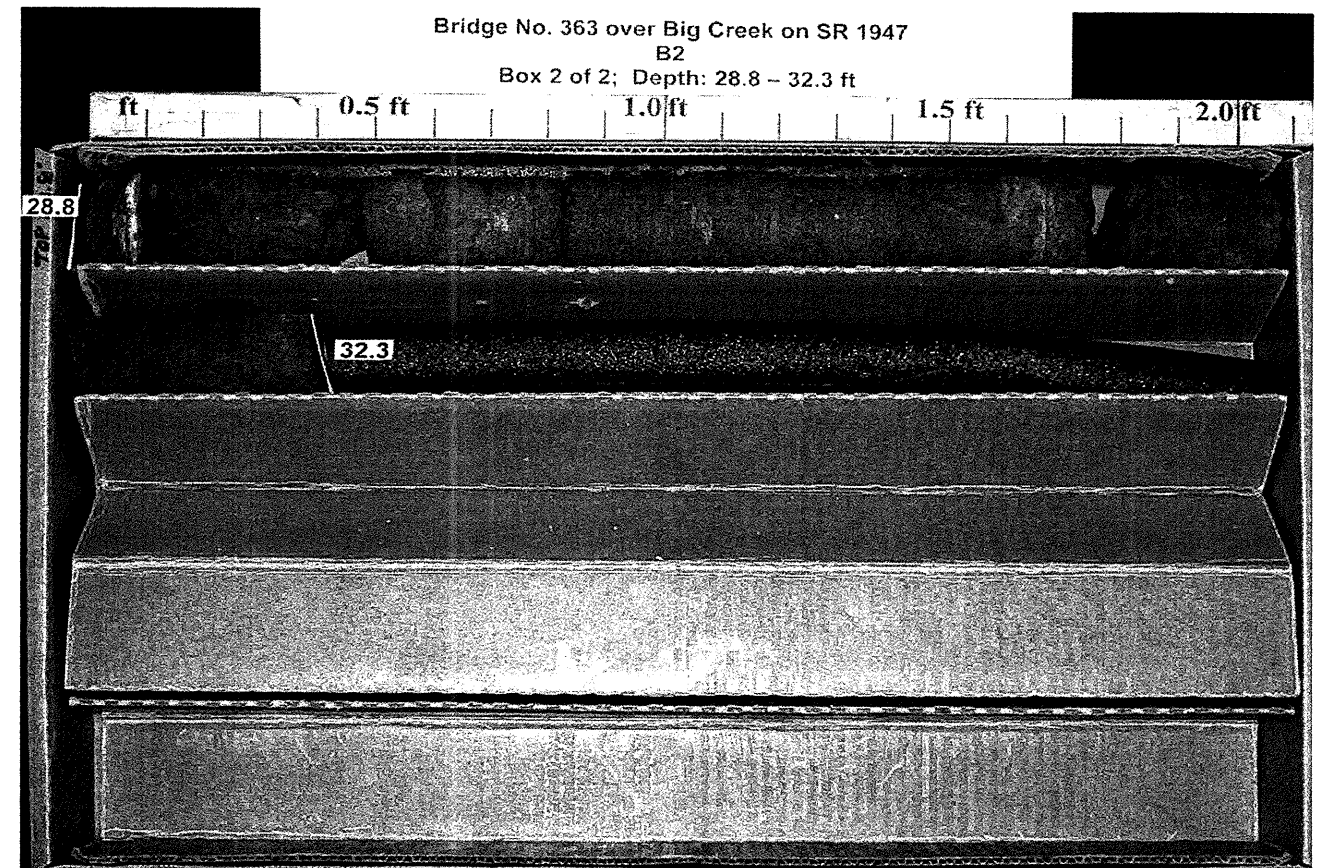
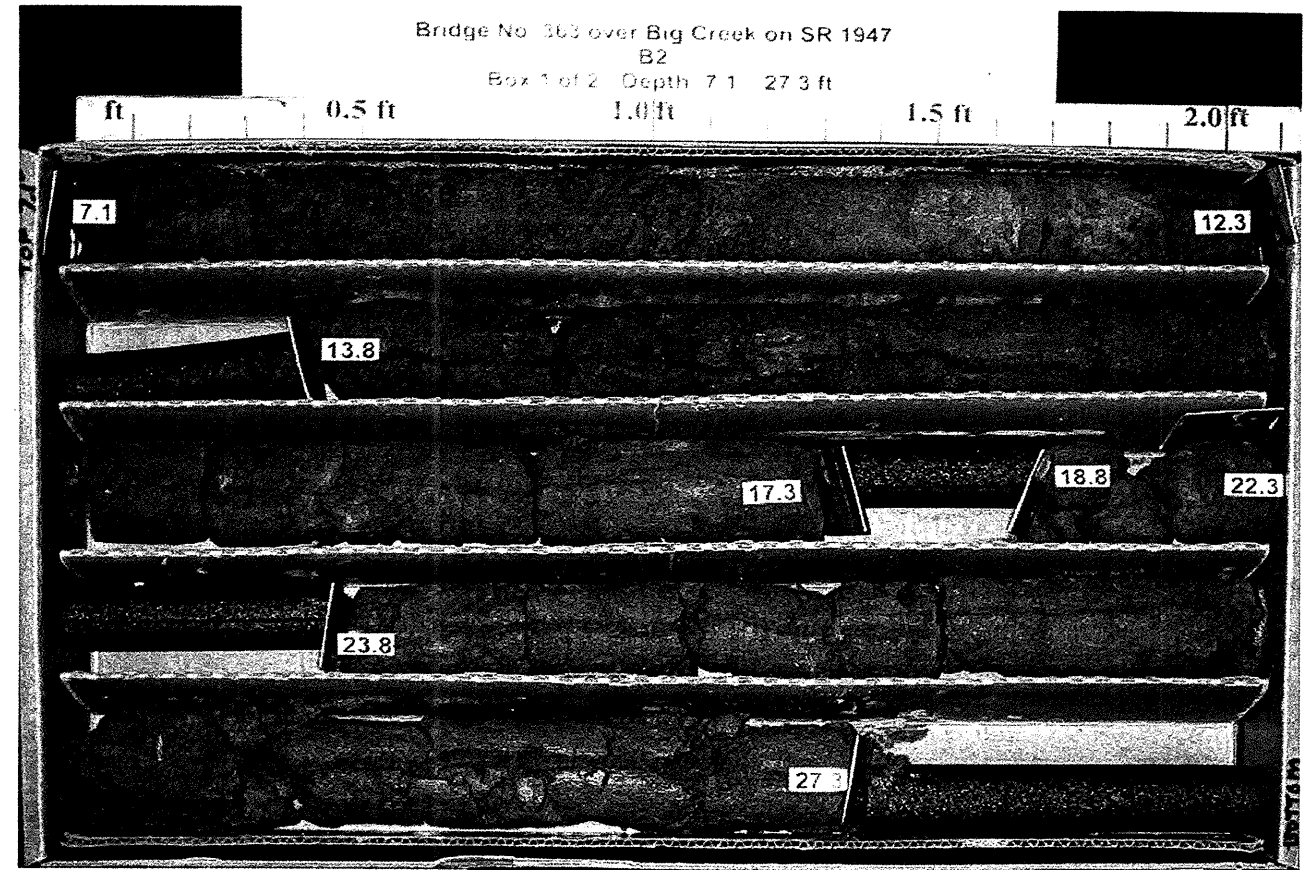
NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST B. Deobald
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)			GROUND WTR (ft)
BORING NO. B2	STATION 20+65	OFFSET 21ft LT	ALIGNMENT -L-
COLLAR ELEV. 30.8 ft	TOTAL DEPTH 75.7 ft	NORTHING 199,122	EASTING 2,158,260
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/04/07	COMP. DATE 10/05/07	SURFACE WATER DEPTH 9.6ft	DEPTH TO ROCK 30.0 ft

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST B. Deobald
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)			GROUND WTR (ft)
BORING NO. B2	STATION 20+65	OFFSET 21ft LT	ALIGNMENT -L-
COLLAR ELEV. 30.8 ft	TOTAL DEPTH 75.7 ft	NORTHING 199,122	EASTING 2,158,260
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/04/07	COMP. DATE 10/05/07	SURFACE WATER DEPTH 9.6ft	DEPTH TO ROCK 30.0 ft



NCDOT BORE DOUBLE MACTEC 6468-07-1889.GPJ NC_DOT.GDT 10/29/07

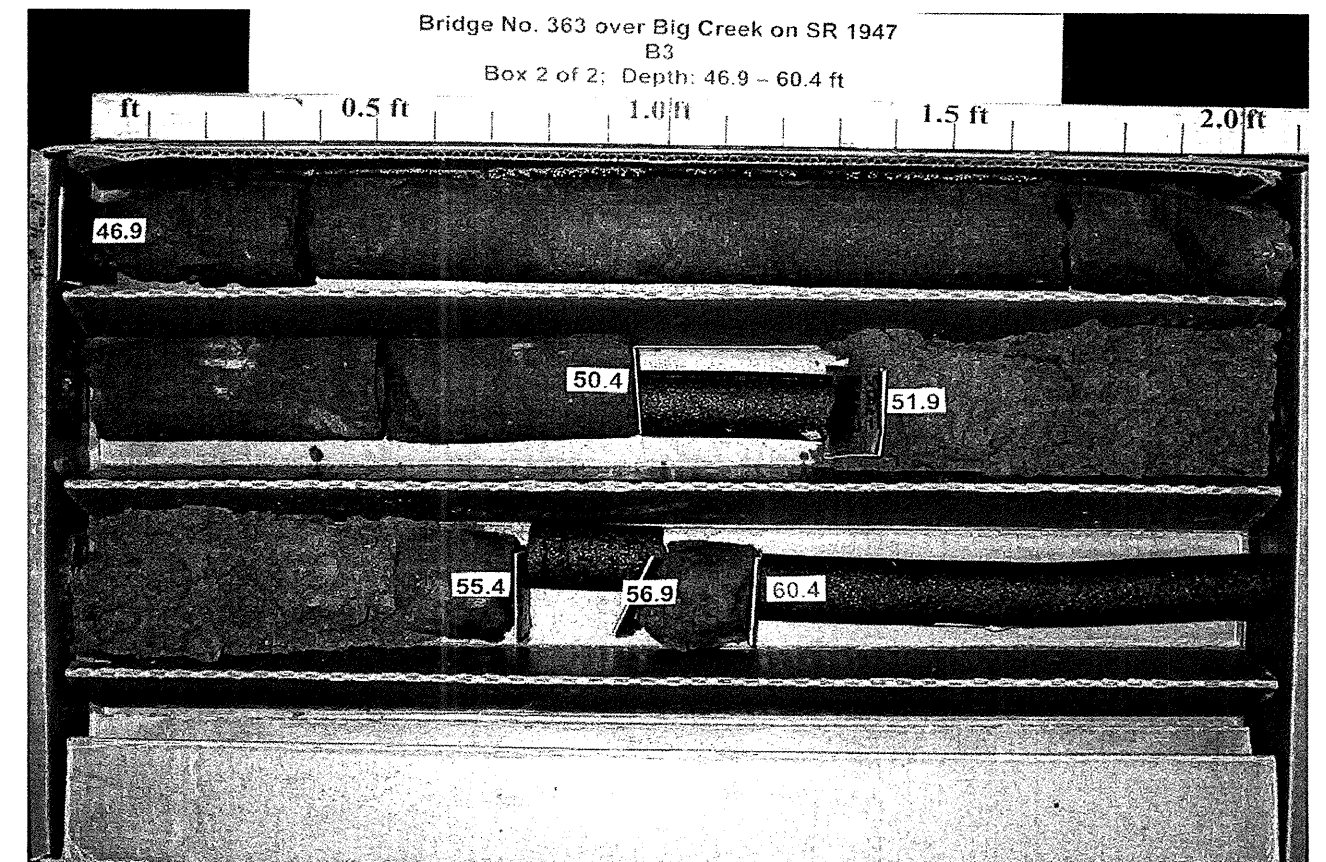
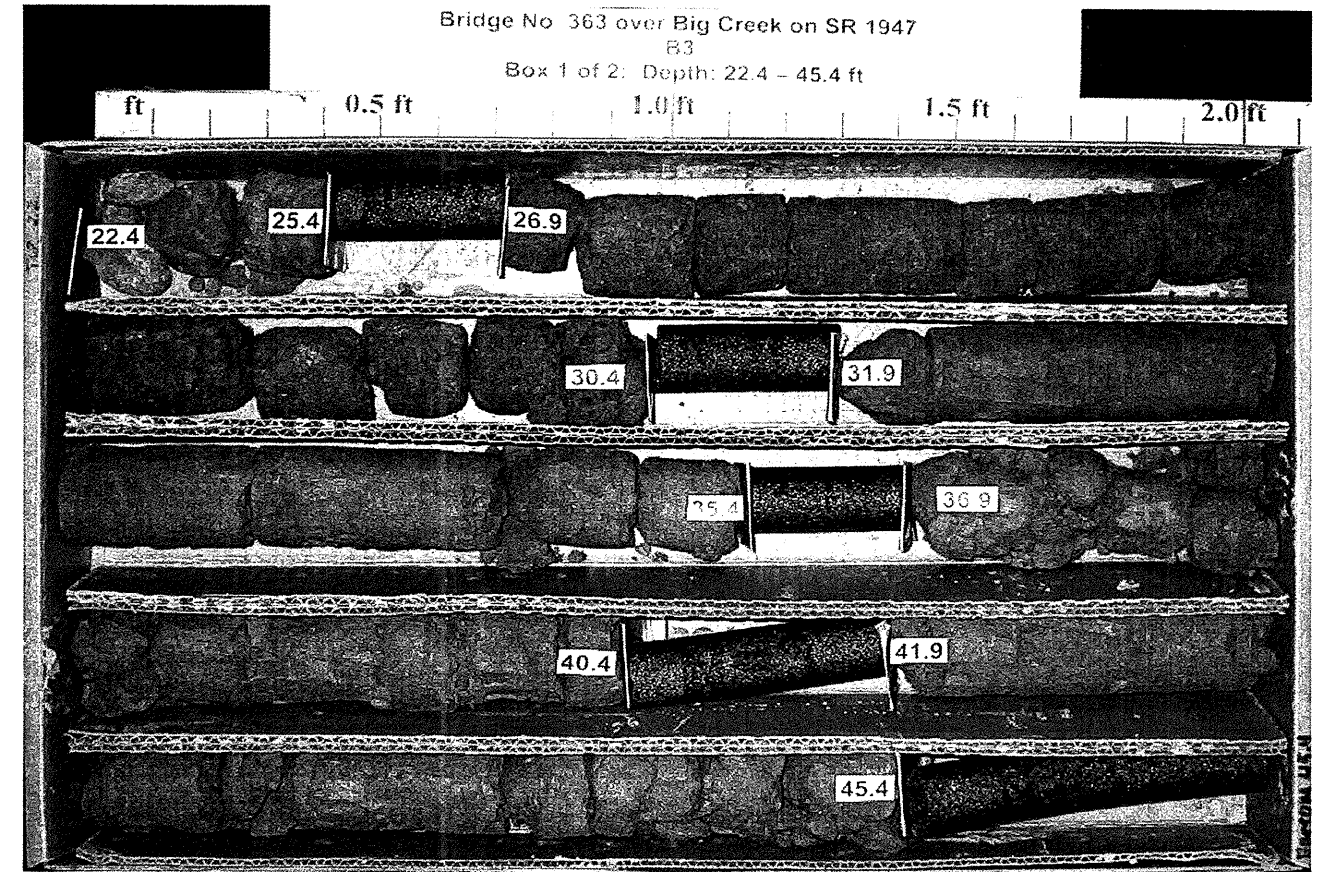




NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 33281.1.1		ID. B-3830		COUNTY Columbus		GEOLOGIST B. Deobald						
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)							GROUND WTR (ft)					
BORING NO. B3		STATION 21+15		OFFSET 9ft LT		ALIGNMENT -L-						
COLLAR ELEV. 48.2 ft		TOTAL DEPTH 83.3 ft		NORTHING 199,083		EASTING 2,158,293						
DRILL MACHINE CME-45C		DRILL METHOD Mud Rotary/Core				HAMMER TYPE Automatic						
START DATE 10/02/07		COMP. DATE 10/04/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 18.0 ft						
CORE SIZE HQ		TOTAL RUN 27.5 ft			DRILLER E. Burkett							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC (ft) %	RUN ROD (ft) %	SAMP. NO.	STRATA REC (ft) %	STRATA ROD (ft) %	LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
	25.8										Begin Coring @ 22.4 ft	
25	25.8	22.4	3.0	2:20 2:25 1:35 N=29	(0.4) 13%	NA					COASTAL PLAIN Gray-green, silty, fine SAND (A-2-4) with very thinly to thickly bedded, friable to moderately indurated zones (continued)	
20	21.3	26.9	3.5	0:35 0:35 0:35 0:20/0.5 N=11	(2.2) 63%	NA						
15	17.8	30.4	3.5	1:20 1:00 3:00 2:10/0.5 N=14	(1.8) 51%	NA	SS-17					
10	16.3	31.9	3.5	0:30 0:25 0:30 0:20/0.5 N=9	(1.5) 43%	NA						
5	12.8	35.4	3.5	1:20 1:15 1:20 1:20/0.5 N=37	(1.9) 54%	NA						
0	11.3	36.9	3.5	1:05 1:20 2:45 0:55/0.5 N=19	(2.8) 80%	NA		(2.8) NA			COASTAL PLAIN Gray-green, thickly bedded, moderately indurated, sandy LIMESTONE	47.2
-5	-2.2	50.4	3.5	0:45 1:05 2:05 1:00/0.5 N=10	(1.4) 40%	NA	SS-19	(0.0) NA			COASTAL PLAIN Gray-green, fine sandy CLAY (A-6)	50.0
-10	-3.7	51.9	3.5	0:45 1:05 2:05 1:00/0.5 N=10	(1.4) 40%	NA	SS-20	(1.2) NA			COASTAL PLAIN Gray-green, fine SAND (A-3)	52.0
-15	-7.2	55.4	3.5	1:25 1:30 1:10 0:20/0.5 N=10	(0.2) 6%	NA		(0.4) 11%			COASTAL PLAIN Gray-green, clayey, silty, fine SAND (A-2-4)	55.2
-20	-8.7	56.9	3.5	1:25 1:30 1:10 0:20/0.5 N=10	(0.2) 6%	NA	SS-21				COASTAL PLAIN Gray-green, silty, clayey, fine SAND (A-2-5) with trace shell fragments	60.4
-25	-12.2	60.4	3.5								COASTAL PLAIN Gray-green, clayey SILT (A-4) with trace shells and lignite	65.0
-30				N=15			SS-22					
-35				N=54			SS-23				COASTAL PLAIN Gray-green, silty, fine SAND (A-2-4) with trace shells, wood/lignite, shark teeth, and very thinly bedded CLAY (A-7-6)	70.2
-40				N=50								
-45				N=100/1.0			SS-24					
-50											Boring Terminated at Elevation -35.1 ft in Coastal Plain: Very dense, silty, fine SAND (A-2-4)	83.3
											Bits Used: 3" Side-Discharge Finger Bit; 3" Roller Cone	
											Drilling Fluid Properties: 8.4 lbs/gal	
											Casing Depth: 20.5 ft (4")	

NCDOT CORE DOUBLE MACTEC 6468-07-1889.GPJ NC_DOT.GDT 10/29/07



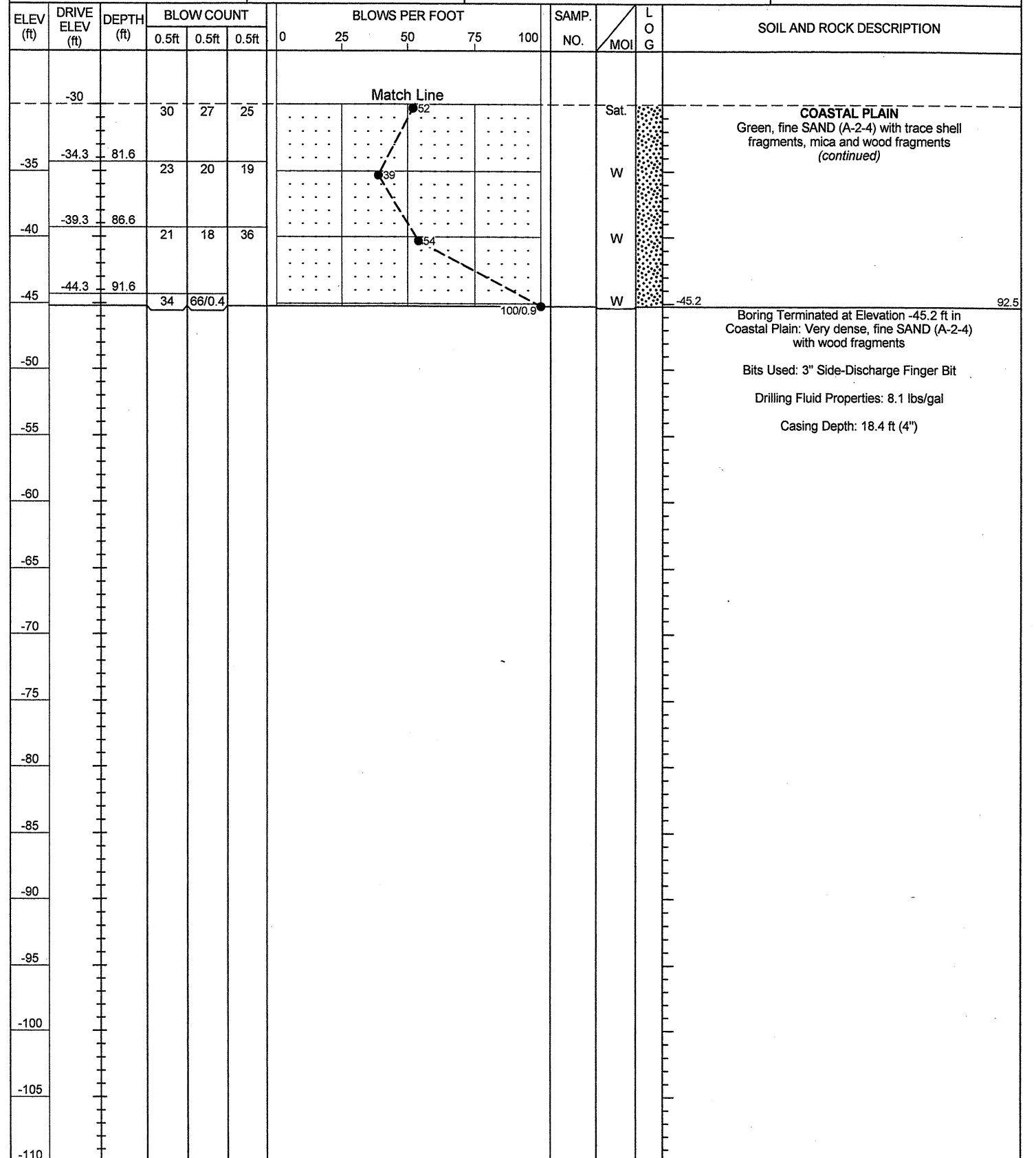
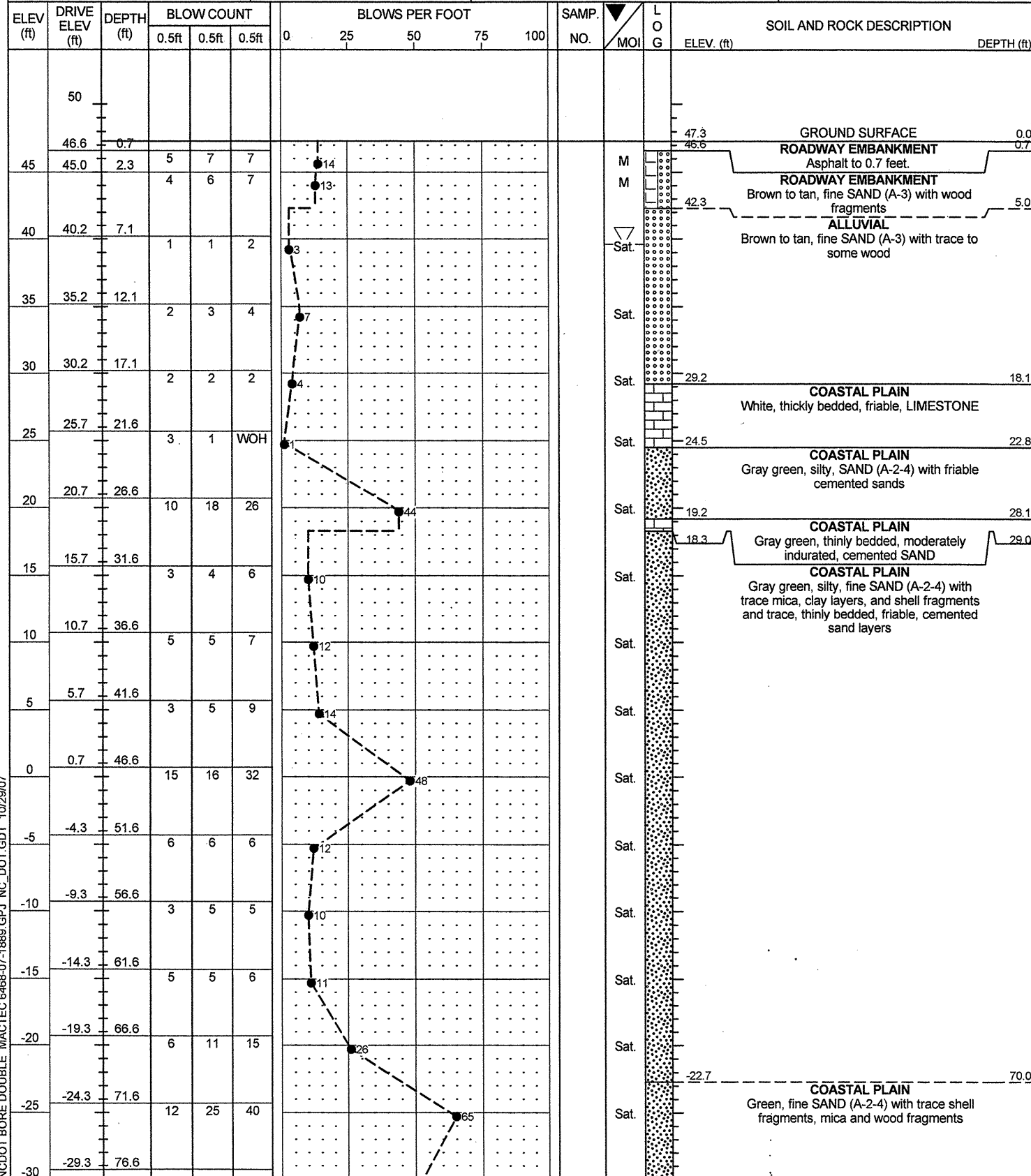


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)			GROUND WTR (ft)
BORING NO. EB2	STATION 21+67	OFFSET 22ft LT	ALIGNMENT -L-
COLLAR ELEV. 47.3 ft	TOTAL DEPTH 92.5 ft	NORTHING 199,065	EASTING 2,158,343
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/11/07	COMP. DATE 10/12/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 18.1 ft

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)			GROUND WTR (ft)
BORING NO. EB2	STATION 21+67	OFFSET 22ft LT	ALIGNMENT -L-
COLLAR ELEV. 47.3 ft	TOTAL DEPTH 92.5 ft	NORTHING 199,065	EASTING 2,158,343
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/11/07	COMP. DATE 10/12/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 18.1 ft

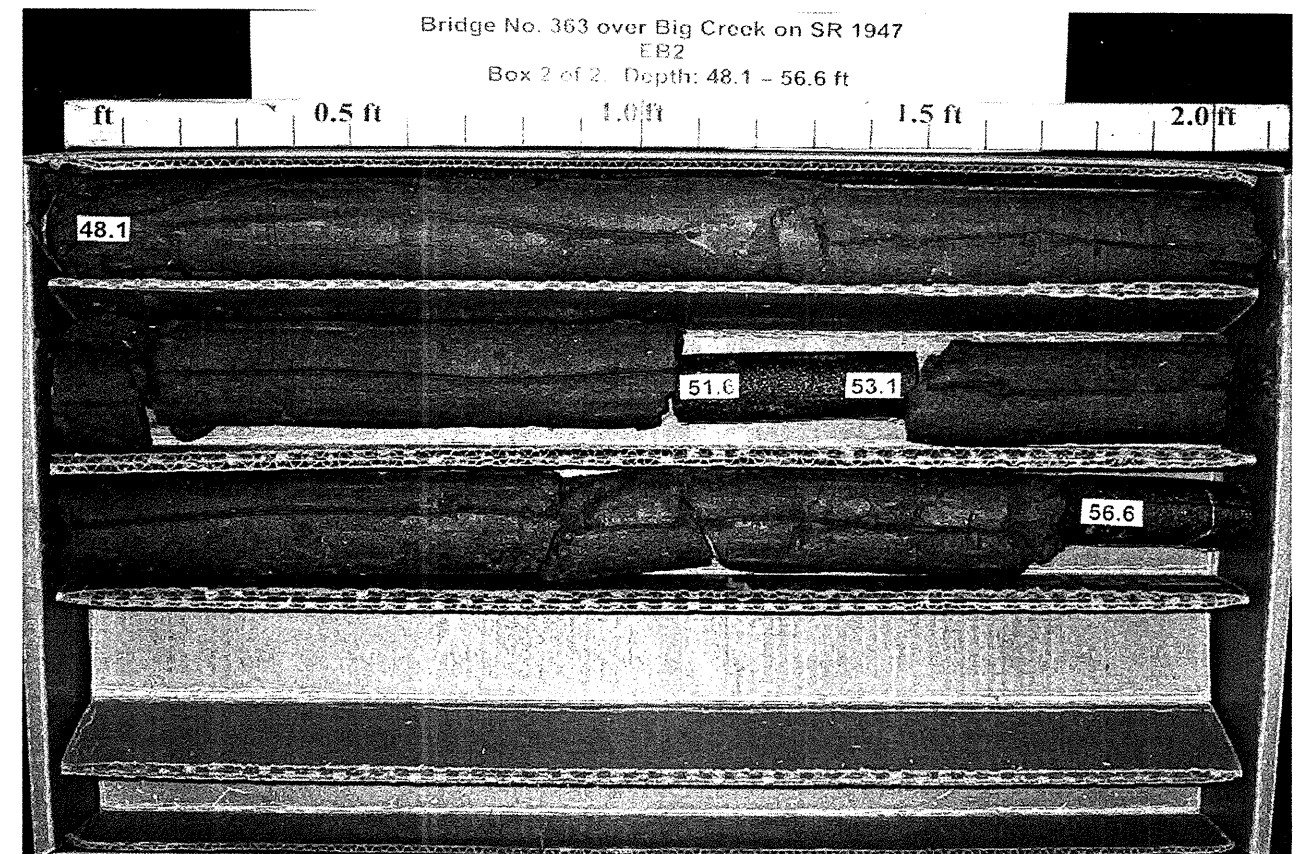
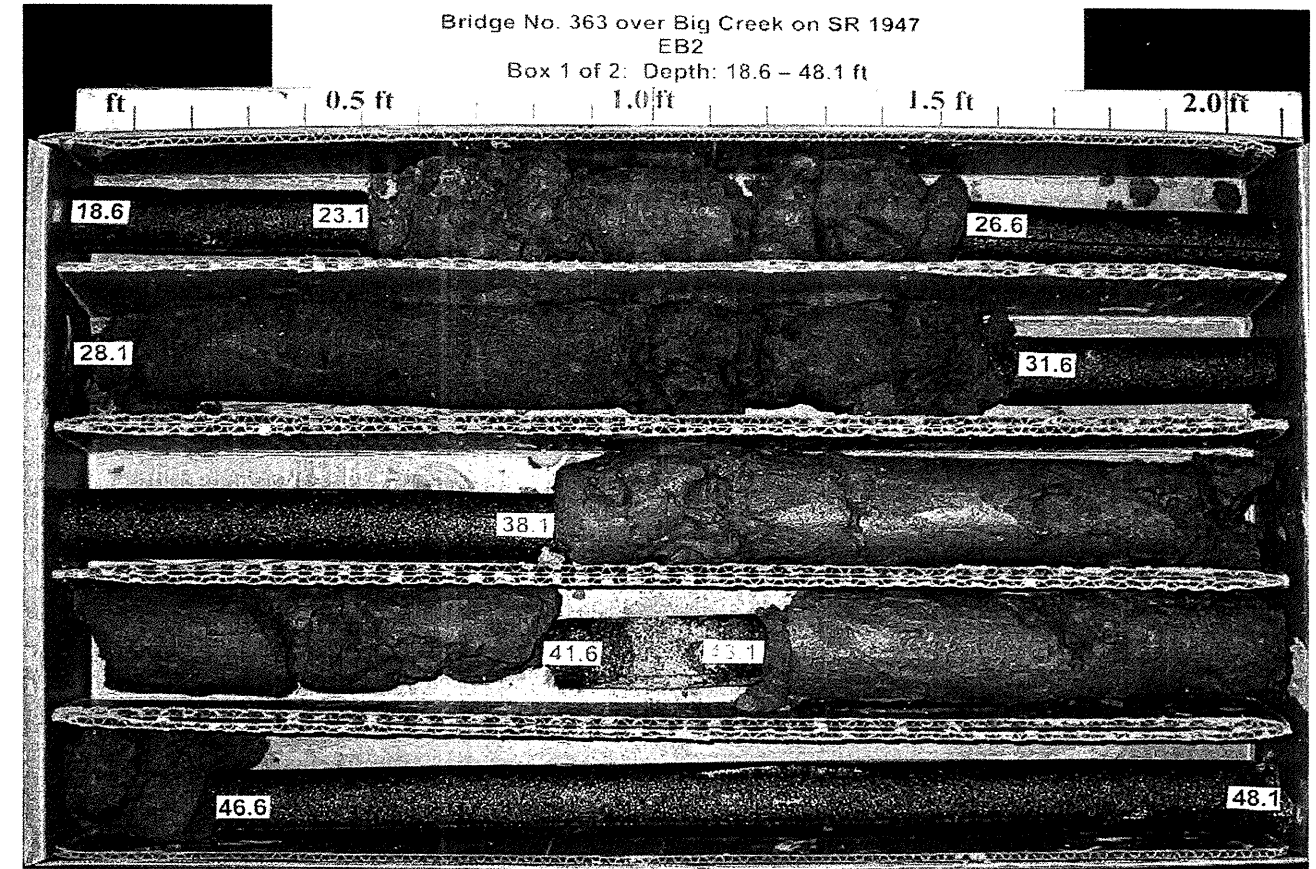


NCDOT BORE DOUBLE MACTEC 6468-07-1889.GPJ NC_DOT.GDT 10/29/07

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 33281.1.1			ID. B-3830			COUNTY Columbus			GEOLOGIST J. Howard			
SITE DESCRIPTION Bridge No. 363 Over Big Creek on SR 1947 (MACTEC Proj. No. 6468-07-1889)								GROUND WTR (ft)				
BORING NO. EB2		STATION 21+67		OFFSET 22ft LT		ALIGNMENT -L-		0 HR. 7.7				
COLLAR ELEV. 47.3 ft		TOTAL DEPTH 92.5 ft		NORTHING 199,065		EASTING 2,158,343		24 HR. FIAD				
DRILL MACHINE CME-45C			DRILL METHOD Mud Rotary/Core					HAMMER TYPE Automatic				
START DATE 10/11/07			COMP. DATE 10/12/07			SURFACE WATER DEPTH N/A			DEPTH TO ROCK 18.1 ft			
CORE SIZE HQ			TOTAL RUN 27.5 ft			DRILLER D. Rhodes						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC (ft) %	ROD (ft) %		REC (ft) %	ROD (ft) %			
	28.7											
Begin Coring @ 18.6 ft												
COASTAL PLAIN												
White, thinly bedded, friable, LIMESTONE (continued)												
	25	18.6	3.0	0:15 0:10 0:15	(0.0) 0%	NA						22.8
	25.7	21.6		N=1								
	24.2	23.1										
	20	26.6	3.5	0:45 0:45 1:00 0:15/0.5	(0.9) 26%	NA	(0.9) 26%	NA				28.1
	20.7	26.6		N=44								
	19.2	28.1										
	15	31.6	3.5	0:45 0:30 0:15 0:05/0.5	(1.5) 43%	NA	(0.9) 100% (9.2) 46%	NA				29.0
	15.7	31.6		N=10								
	14.2	33.1										
	10	36.6	3.5	0:45 0:30 0:30 0:15/0.5	(0.0) 0%	NA						
	10.7	36.6		N=12								
	9.2	38.1										
	5	41.6	3.5	1:15 0:15 0:15 0:05/0.5	(1.9) 54%	NA						
	5.7	41.6		N=14								
	4.2	43.1										
	0	46.6	3.5	0:30 0:30 0:30 0:10/0.5	(1.0) 29%	NA						
	0.7	46.6		N=48								
	-0.8	48.1										
	-5	51.6	3.5	1:00 1:30 1:00 0:30/0.5	(3.5) 100%	NA						
	-4.3	51.6		N=12								
	-5.8	53.1										
	-10	56.6	3.5	1:30 0:45 0:30 0:15/0.5	(2.2) 63%	NA						
	-9.3	56.6		N=10								
	-15			N=11								
	-20			N=26								
	-25			N=65								
	-30			N=52								
	-35			N=39								
	-40			N=54								
	-45			N=100/0.9								
	-50											
Boring Terminated at Elevation -45.2 ft in Coastal Plain: Very dense, fine SAND (A-2-4) with wood fragments												
Bits Used: 3" Side-Discharge Finger Bit												
Drilling Fluid Properties: 8.1 lbs/gal												

NCDOT CORE DOUBLE MACTEC 6468-07-1889.GPJ NC_DOT.GDT 10/29/07





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/No.: Bridge No. 363 over Big Creek on SR 1947 (6468-07-1889)

PROJECT: 33281.1.1 (B-3830)

COUNTY: Columbus

OWNER: N.C.D.O.T.

DATE SAMPLED: Sept./Oct. 2007

RECEIVED: 10/3/2007

REPORTED BY: MACTEC

SAMPLED FROM: B1

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

Lab Sample No.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Retained 4.75 mm Sieve (%)	0.0	0.1	0.2	0.0	0.0	0.2
Passing 2.00 mm Sieve (%)	100.0	99.3	99.7	98.9	100.0	99.4
Passing 425 µm Sieve (%)	53.4	74.4	93.7	94.1	84.3	85.1
Passing 75 µm Sieve (%)	6.6	31.0	29.0	36.9	22.5	27.9

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - 250 µm (%)	75.5	38.7	18.6	17.3	42.6	36.5
Fine Sand Ret - 53 µm (%)	18.1	32.4	60.9	47.2	36.0	38.1
Silt 0.05 - 0.005 mm (%)	6.4	7.8	5.3	4.6	3.7	7.6
Clay < 0.005 mm (%)	0.0	21.1	15.2	30.9	17.7	17.7

Moisture Content (%)	ND	32.7	20.5	14.0	23.4	20.9
Liquid Limit, L.L.	ND*	18	25	18	22	19
Plasticity Index, P.I.	ND*	9	13	5	13	NP
AASHTO Classification	A-3	A-2-4(0)	A-2-6(0)	A-4(0)	A-2-6(0)	A-2-4(0)
Organic Content (%)	ND	ND	ND	ND	ND	ND

Boring No.	B1	B1	B1	B1	B1	B1
Station	20+13	20+13	20+13	20+13	20+13	20+13
Offset	6 ft LT	6 ft LT	6 ft LT	6 ft LT	6 ft LT	6 ft LT
Alignment	-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft) From	3.5	7.5	17.5	27.5	32.5	37.5
to	5.0	9.0	19.0	29.0	34.0	39.0

REMARKS: ND=Not Determined, NP=Non-Plastic, *=Not Enough Sample

Submitted by:

Senior Geologist



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3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

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

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC Proj. Name/No.: Bridge No. 363 over Big Creek on SR 1947 (6468-07-1889)

PROJECT: 33281.1.1 (B-3830)

COUNTY: Columbus

OWNER: N.C.D.O.T.

DATE SAMPLED: Sept./Oct. 2007

RECEIVED: 10/3/2007

REPORTED BY: MACTEC

SAMPLED FROM: B1

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

Lab Sample No.	SS-7	SS-8	SS-9	SS-10	SS-11	SS-12
Retained 4.75 mm Sieve (%)	0.0	0.0	0.4	0.0	0.0	0.0
Passing 2.00 mm Sieve (%)	100.0	99.8	98.7	100.0	99.4	100.0
Passing 425 µm Sieve (%)	94.6	98.8	92.2	95.9	97.4	99.7
Passing 75 µm Sieve (%)	57.3	34.5	20.3	41.4	16.2	18.7

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - 250 µm (%)	13.3	19.1	15.3	19.8	10.0	14.0
Fine Sand Ret - 53 µm (%)	33.6	50.3	66.5	41.4	76.1	74.1
Silt 0.05 - 0.005 mm (%)	13.1	10.7	4.2	7.1	2.4	6.0
Clay < 0.005 mm (%)	40.0	19.8	14.1	31.7	11.6	5.9

Moisture Content (%)	17.6	22.6	23.5	28.8	ND	ND
Liquid Limit, L.L.	37	25	22	36	25	22
Plasticity Index, P.I.	21	10	13	22	6	10
AASHTO Classification	A-6(9)	A-2-4(0)	A-2-6(0)	A-6(4)	A-2-4(0)	A-2-4(0)
Organic Content (%)	ND	ND	ND	ND	ND	ND

Boring No.	B1	B1	B1	B1	B1	B1
Station	20+13	20+13	20+13	20+13	20+13	20+13
Offset	6 ft LT	6 ft LT	6 ft LT	6 ft LT	6 ft LT	6 ft LT
Alignment	-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft) From	42.5	52.5	57.5	63.4	68.4	80.3
to	44.0	54.0	59.0	64.9	69.8	81.6

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

Submitted by:

Senior Geologist



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/No.: Bridge No. 363 over Big Creek on SR 1947 (6468-07-1889)

PROJECT: 33281.1.1 (B-3830)

COUNTY: Columbus

OWNER: N.C.D.O.T.

DATE SAMPLED: Sept./Oct. 2007

RECEIVED: 10/3/2007

REPORTED BY: MACTEC

SAMPLED FROM: B1, B3

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

Lab Sample No.	SS-13	SS-14	SS-15	SS-16	SS-17	SS-18
Retained 4.75 mm Sieve (%)	0.0	1.6	0.0	0.9	0.0	0.0
Passing 2.00 mm Sieve (%)	99.9	98.1	99.7	98.9	99.8	99.9
Passing 425 µm Sieve (%)	99.4	86.2	92.1	82.5	95.6	85.7
Passing 75 µm Sieve (%)	18.0	12.5	9.3	2.4	28.2	29.5

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - 250 µm (%)	3.2	24.6	18.7	39.7	16.2	37.8
Fine Sand Ret - 53 µm (%)	84.1	64.5	73.7	58.4	60.5	34.0
Silt 0.05 - 0.005 mm (%)	3.8	4.0	2.1	-1.8	7.2	3.9
Clay < 0.005 mm (%)	8.9	6.9	5.5	3.6	16.0	24.2

Moisture Content (%)	ND	ND	ND	ND	ND	ND
Liquid Limit, L.L.	23	20	26	23	22	26
Plasticity Index, P.I.	NP	NP	NP	NP	2	7
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-3	A-3	A-2-4(0)	A-2-4(0)
Organic Content (%)	ND	ND	ND	ND	ND	ND

Boring No.	B1	B3	B3	B3	B3	B3
Station	20+13	21+15	21+15	21+15	21+15	21+15
Offset	6 ft LT	9 ft LT	9 ft LT	9 ft LT	9 ft LT	9 ft LT
Alignment	-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft) From	90.3	1.1	4.4	9.4	30.4	40.4
to	91.7	2.6	5.9	10.9	31.9	41.9

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

Submitted by:

Senior Geologist

SHEET 29



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/No.: Bridge No. 363 over Big Creek on SR 1947 (6468-07-1889)

PROJECT: 33281.1.1 (B-3830)

COUNTY: Columbus

OWNER: N.C.D.O.T.

DATE SAMPLED: Sept./Oct. 2007

RECEIVED: 10/3/2007

REPORTED BY: MACTEC

SAMPLED FROM: B3

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

Lab Sample No.	SS-19	SS-20	SS-21	SS-22	SS-23	SS-24
Retained 4.75 mm Sieve (%)	0.0	0.0	0.0	0.0	0.0	0.0
Passing 2.00 mm Sieve (%)	100.0	100.0	100.0	100.0	100.0	99.6
Passing 425 µm Sieve (%)	94.1	94.2	93.5	99.9	95.0	99.4
Passing 75 µm Sieve (%)	51.1	25.3	29.2	98.7	19.6	19.8

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - 250 µm (%)	20.9	18.9	29.1	0.4	39.8	0.5
Fine Sand Ret - 53 µm (%)	32.8	58.2	44.5	2.8	42.1	85.9
Silt 0.05 - 0.005 mm (%)	11.7	3.9	5.1	24.5	-0.2	4.4
Clay < 0.005 mm (%)	34.6	19.0	21.3	72.3	18.3	9.1

Moisture Content (%)	21.7	ND	27.3	ND	ND	ND
Liquid Limit, L.L.	34	27	66	27	26	24
Plasticity Index, P.I.	18	NP	7	5	4	NP
AASHTO Classification	A-6(6)	A-2-4(0)	A-2-5(0)	A-4(4)	A-2-4(0)	A-2-4(0)
Organic Content (%)	ND	ND	ND	ND	ND	ND

Boring No.	B3	B3	B3	B3	B3	B3
Station	21+15	21+15	21+15	21+15	21+15	21+15
Offset	9 ft LT	9 ft LT	9 ft LT	9 ft LT	9 ft LT	9 ft LT
Alignment	-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft) From	50.4	55.4	60.4	67.3	72.3	82.3
to	51.9	56.9	61.9	68.8	73.8	83.3

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

Submitted by:

Senior Geologist



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/No.: Bridge No. 363 over Big Creek on SR 1947 (6468-07-1889)

PROJECT: 33281.1.1 (B-3830)

COUNTY: Columbus

OWNER: N.C.D.O.T.

DATE SAMPLED: Sept./Oct. 2007

RECEIVED: 10/3/2007

REPORTED BY: MACTEC

SAMPLED FROM: Channel Bank, Channel Bed

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

Lab Sample No.		S-1	S-2			
Retained 4.75 mm Sieve (%)		0.0	0.2			
Passing 2.00 mm Sieve (%)		99.3	99.5			
Passing 425 µm Sieve (%)		94.5	75.9			
Passing 75 µm Sieve (%)		88.9	2.0			

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - 250 µm (%)		9.5	38.4			
Fine Sand Ret - 53 µm (%)		1.0	59.7			
Silt 0.05 - 0.005 mm (%)		85.7	0.5			
Clay < 0.005 mm (%)		3.8	1.4			

Moisture Content (%)		ND	ND			
Liquid Limit, L.L.		21	26			
Plasticity Index, P.I.		7	NP			
AASHTO Classification		A-4(3)	A-3			
Organic Content (%)		ND	ND			

Boring No.		Bank	Bed			
Station		20+20	20+31			
Offset		8 RT	9 RT			
Alignment		-L-	-L-			
Depth (ft)	From	0.0	0.0			
	to	0.5	0.5			

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

Submitted by: 
 Senior Geologist



**FIELD
 SCOUR REPORT**

WBS: 33281.1.1 TIP: B-3830 COUNTY: Columbus

DESCRIPTION(1): Bridge No. 363 over Big Creek on SR 1947 (at Friar Swamp)

EXISTING BRIDGE

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

Bridge No.: 363 Length: 91 feet Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
 Foundation Type: Concrete T-Beam, Concrete Cap, Timber Abutments and Timber Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Bank scoured back to the abutment wall on the up-stream side of end bent 1

Interior Bents: Not visible due to depth of Big Creek

Channel Bed: Not visible

Channel Bank: Banks well vegetated. Scour not apparent

EXISTING SCOUR PROTECTION

Type(3): Timber Abutments and wing walls. Small patch of concrete slope protection behind wing walls.

Extent(4): Wing walls extend approx. 5 feet left/right. Slope protection extends a few feet behind wing wall.

Effectiveness(5): Generally working

Obstructions(6): None

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 theoretical 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): Sand (A-3/A-2-4)

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

Channel Bank Cover(9): Brush and small to large hardwoods and pines.

Floodplain Width(10): Laterally extensive for hundreds of feet across Friar Swamp

Floodplain Cover(11): Grasses, brush, small to large hardwoods and pines.

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): Migration tendency toward end bent 1

Observations and Other Comments: Very low flow hydraulic environment during the time of investigation

Reported by: Michael B. W. Date: 9/13/2007
 MACTEC Engineering and Consulting, Inc.

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

BENTS

	B1	B2	B3										
Overtopping Scour (100 Year)	34	25	36										

Comparison of DSE to Hydraulics Unit theoretical scour:

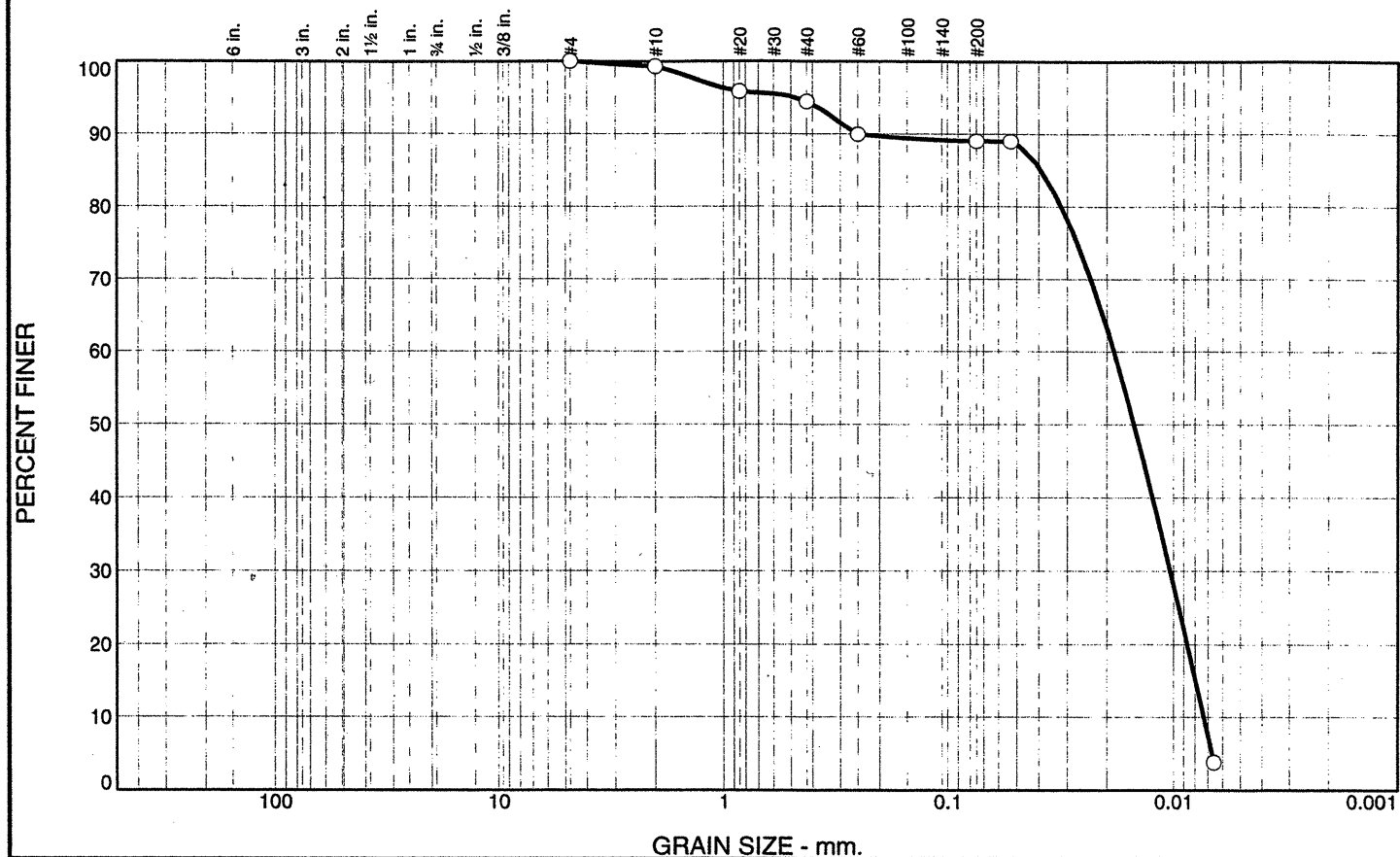
DSE is based on Bridge Survey and Hydraulics Report dated 5/23/07. Scour elevations at B1 and B3 will remain in alluvial layers. Scour elevation at B2 will penetrate into Coastal Plain layers.

DSE determined by: Chad M. Waddy Date: 11/6/2007

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bank	Bed	Bed	Bed				
Sample No.	S-1	S-2	SS-1	SS-2				
Retained #4	0	0.2	0	0.1				
Passed #10	99.3	99.5	100	99.3				
Passed #40	94.5	75.9	53.4	74.4				
Passed #200	88.9	2	6.6	31				
Coarse Sand	9.5	38.4	75.5	38.7				
Fine Sand	1	59.7	18.1	32.4				
Silt	85.7	0.5	6.4	7.8				
Clay	3.8	1.4	0	21.1				
LL	21	26	ND	18				
PI	7	NP	ND	9				
AASHTO	A-4(3)	A-3	A-3	A-2-4(0)				
Station	20+20	20+31	20+13	20+13				
Offset	8 ft RT	9 ft RT	6 ft LT	6 ft LT				
Depth	0.0-0.5 ft	0.0-0.5ft	3.5-5.0 ft	7.5-9.0 ft				

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	4.8	5.6	88.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.3		
#20	95.8		
#40	94.5		
#60	89.9		
#200	88.9		
#270	88.9		
0.0066 mm.	3.8		

Soil Description
Dark Brown sandy SILT with organics

Atterberg Limits
PL= 14 LL= 21 PI= 7

Coefficients
D₈₅= 0.0393 D₆₀= 0.0187 D₅₀= 0.0151
D₃₀= 0.0104 D₁₅= 0.0080 D₁₀= 0.0073
C_u= 2.55 C_c= 0.79

Classification
USCS= CL-ML AASHTO= A-4(3)

Remarks

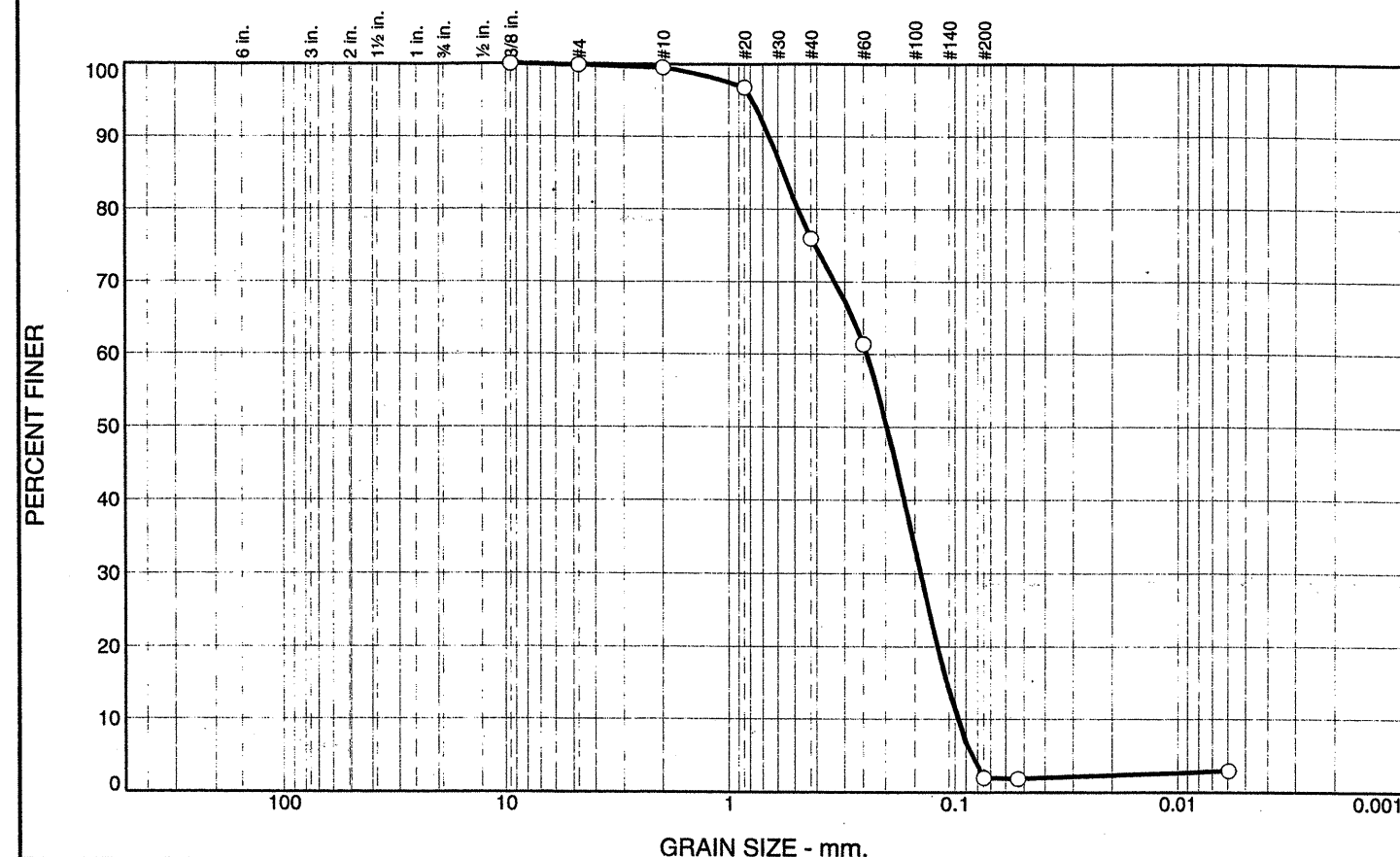
* (no specification provided)

Sample No.: S-1 Source of Sample: Channel Bank Date: 9-12-07
Location: Elev./Depth: 0.0-.5'

MACTEC, Inc. Raleigh, North Carolina	Client: NC DOT
	Project: Bridge No. 363 Over Big Creek on SR 1947
Project No: 6468-07-1889-Task 05	Figure

Tested By: CS Checked By: LBJ

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.3	23.6	73.9	2.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.8		
#10	99.5		
#20	96.8		
#40	75.9		
#60	61.3		
#200	2.0		
#270	1.9		
0.0059 mm.	3.0		

Soil Description
Dark brown silty sand with organic

Atterberg Limits
PL= NP LL= 26 PI= NP

Coefficients
D₈₅= 0.5663 D₆₀= 0.2422 D₅₀= 0.1978
D₃₀= 0.1416 D₁₅= 0.1088 D₁₀= 0.0978
C_u= 2.48 C_c= 0.85

Classification
USCS= SP AASHTO= A-3

Remarks

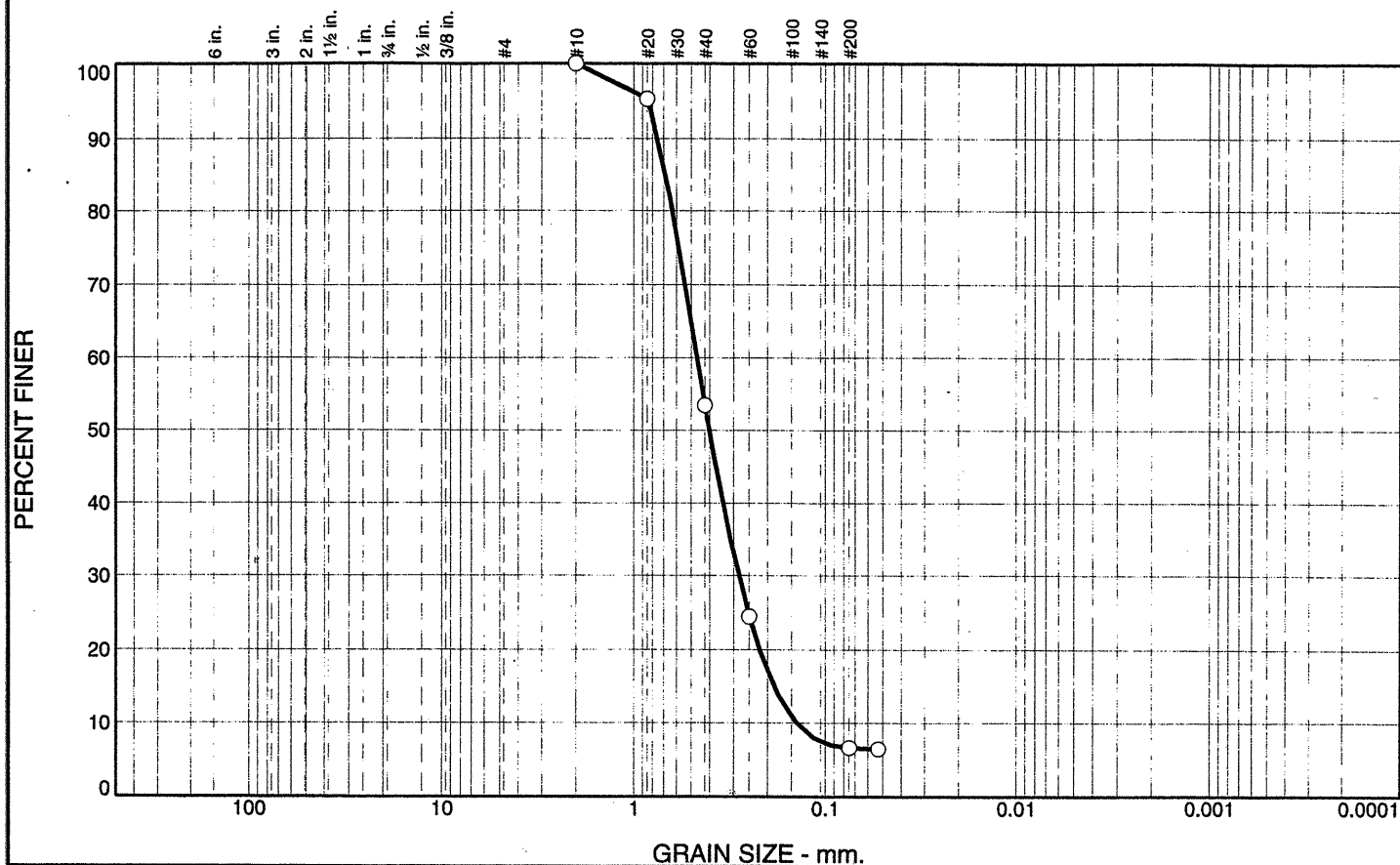
* (no specification provided)

Sample No.: S-2 Source of Sample: Channel Bed Date: 9-13-07
Location: Elev./Depth: 0.0-.5'

MACTEC, Inc. Raleigh, North Carolina	Client: NC DOT
	Project: Bridge No. 363 Over Big Creek on SR 1947
Project No: 6468-07-1889-Task 05	Figure

Tested By: CS Checked By: LBJ

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines		
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	0.0	0.0	46.6	46.8			6.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	95.3		
#40	53.4		
#60	24.5		
#200	6.6		
#270	6.4		

Soil Description
Dark Gray Silty SAND

Atterberg Limits
PL= ND LL= ND PI= ND

Coefficients
D₈₅= 0.6870 D₆₀= 0.4688 D₅₀= 0.4033
D₃₀= 0.2832 D₁₅= 0.1861 D₁₀= 0.1418
C_u= 3.31 C_c= 1.21

Classification
USCS= ND AASHTO= ND

Remarks
Did not have enough sample for PI testing.
ND=Not Determined.

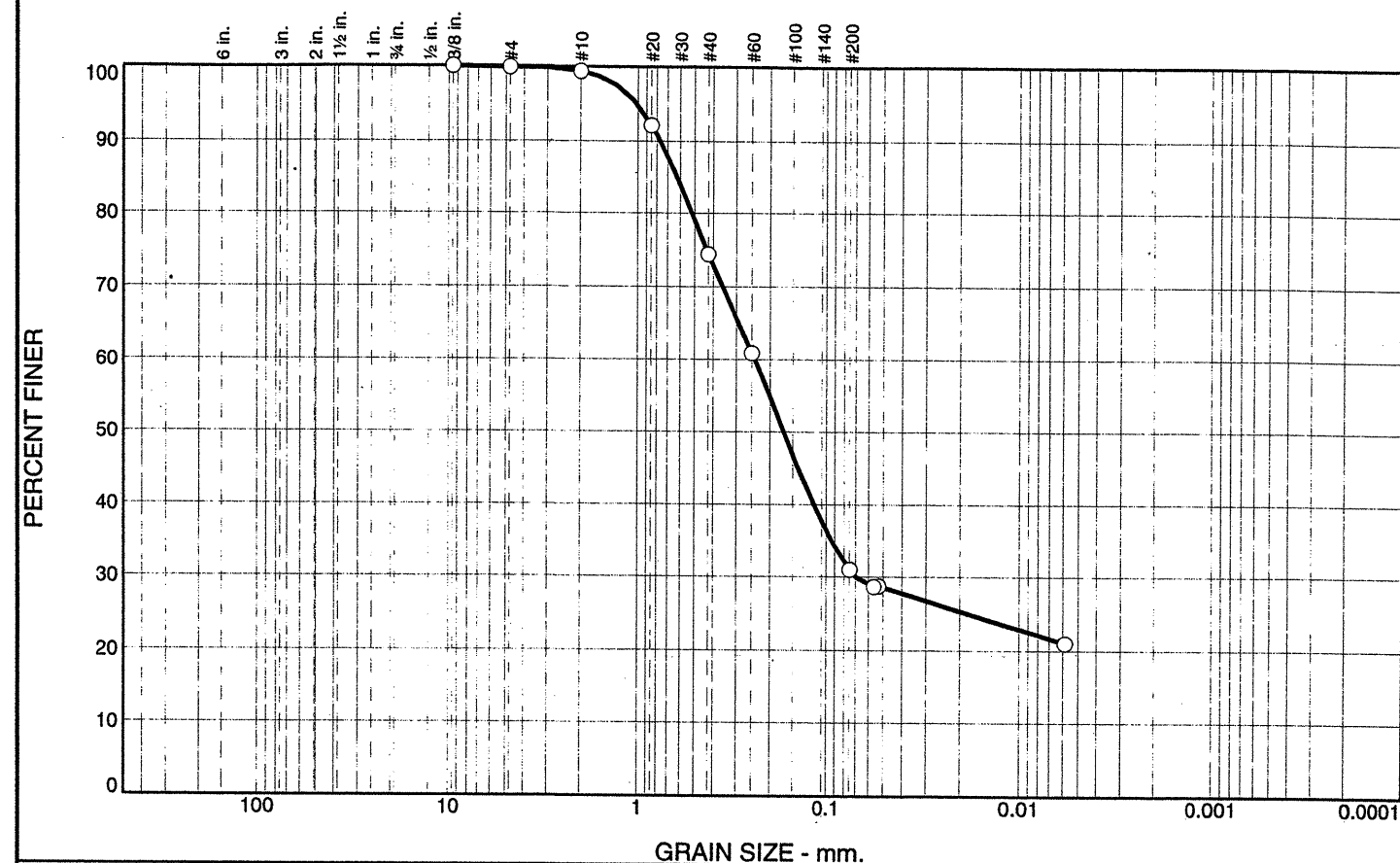
* (no specification provided)

Sample No.: SS-1 Source of Sample: Bridge 363 Boring B-1 Date: Sept-'07
Location: Elev./Depth: 3.5'-5.0'

MACTEC, Inc. Raleigh, North Carolina	Client: NC DOT
	Project: Bridge No. 363 over Big Creek on SR 1947
Project No: 6468071889 Task 05	Figure

Tested By: CS Checked By: LBJ

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines		
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay	
0.0	0.0	0.1	0.6	24.9	43.4			31.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.9		
#10	99.3		
#20	92.2		
#40	74.4		
#60	60.9		
#200	31.0		
0.0563 mm.	28.6		
#270	28.7		
0.0059 mm.	21.0		

Soil Description
Dark Silty SAND

Atterberg Limits
PL= 9 LL= 18 PI= 9

Coefficients
D₈₅= 0.6247 D₆₀= 0.2422 D₅₀= 0.1694
D₃₀= 0.0701 D₁₅= D₁₀=
C_u= C_c=

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

Remarks

* (no specification provided)

Sample No.: SS-2 Source of Sample: Bridge 363 Boring B-1 Date: Sept-'07
Location: Elev./Depth: 7.5'-9.0'

MACTEC, Inc. Raleigh, North Carolina	Client: NC DOT
	Project: Bridge No. 363 over Big Creek on SR 1947
Project No: 6468071889 Task 05	Figure

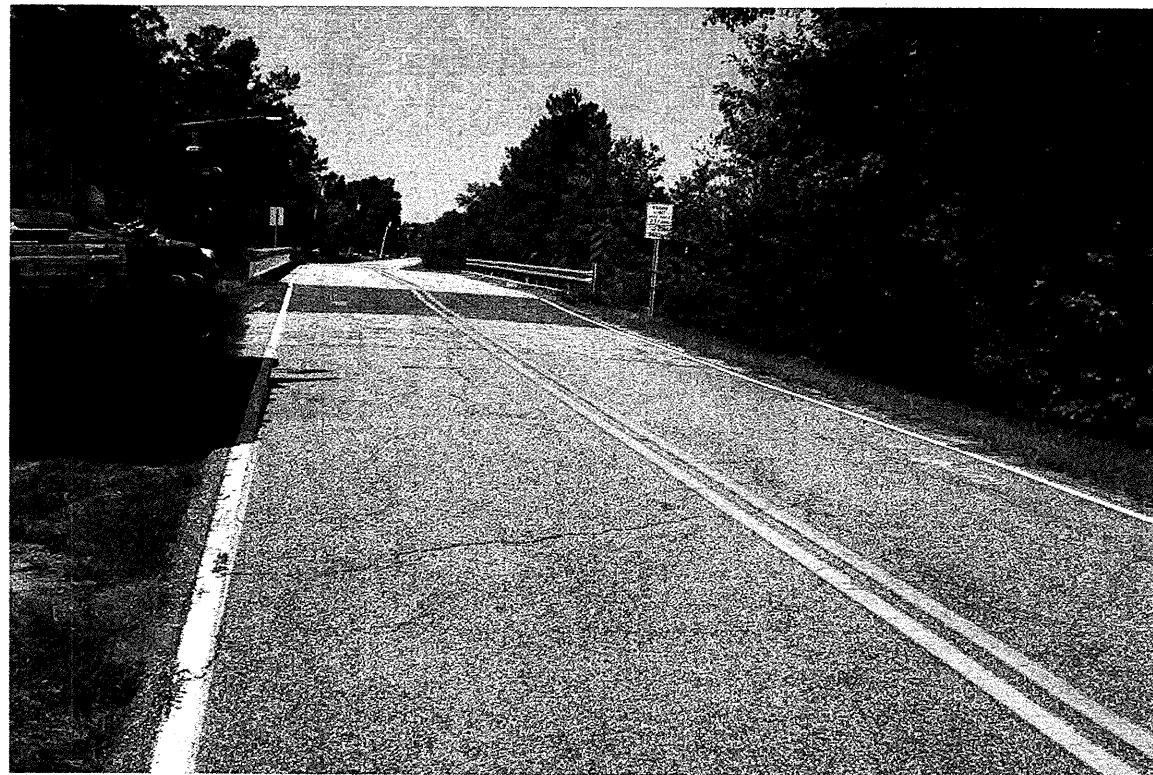
Tested By: CS Checked By: LBJ



View looking upstation along -L- from Station 19+50.



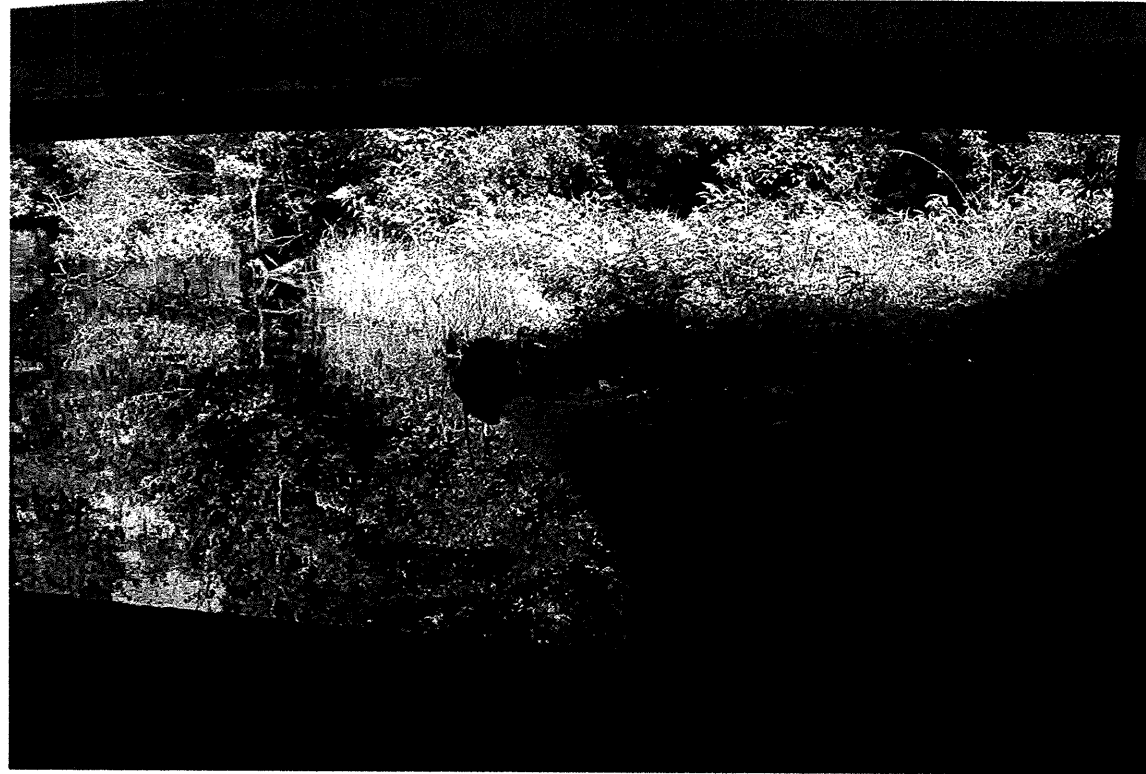
View looking right to left along End Bent 1.



View looking down station along -L- from End Bent 2.



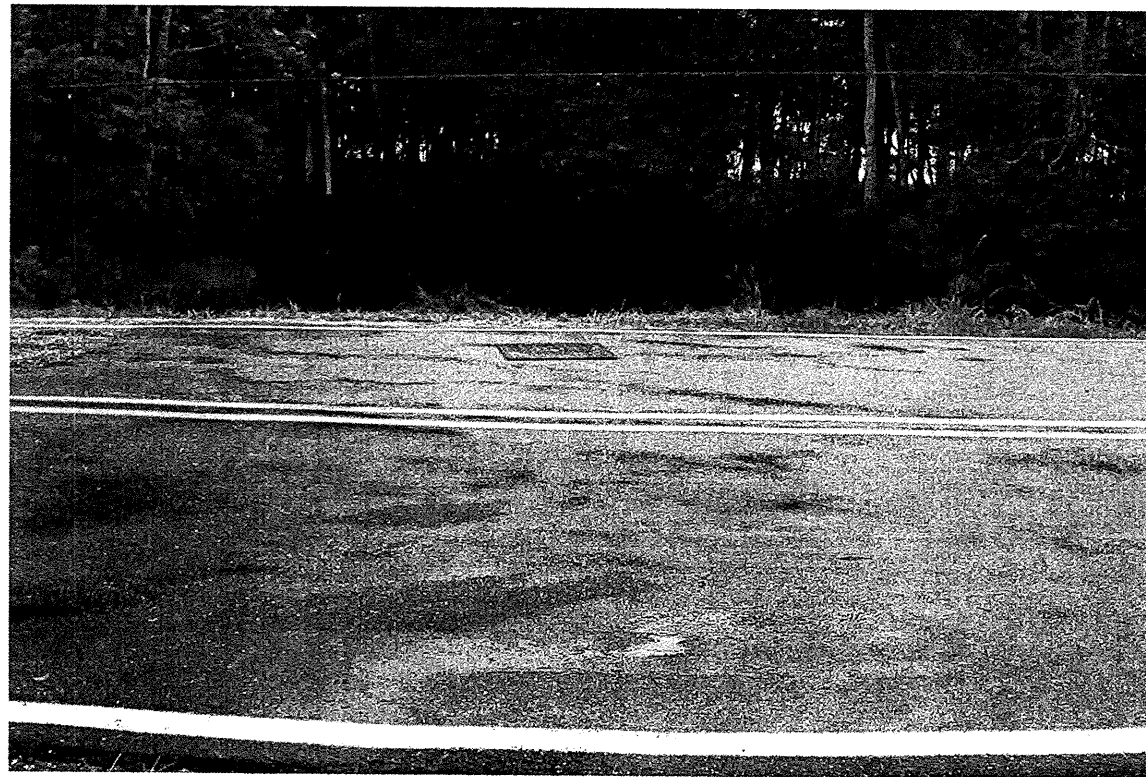
View looking right to left along Bent 1.



View looking right to left along Bent 2.



View looking left to right along End Bent 2.



View looking left to right along Bent 3.



View looking upstation at rig on boring B2.

PROJECT: 33281.1.1 ID: B-3830

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STATE	CITY PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33281.1.1	1	29
CITY PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
B-3830	BRZ-1947(1)	P.E. CONST.	

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STRUCTURE SUBSURFACE INVESTIGATION

CITY PROJECT 33281.1.1 I.D. NO. B-3830

COUNTY COLUMBUS

PROJECT DESCRIPTION REPLACEMENT OF

BRIDGES NO. 363 AND NO. 364 ON SR 1947

OVER FRIAR SWAMP

SITE DESCRIPTION BRIDGE NO. 364 OVER

MAINLINE CANAL ON SR 1947

LETTING

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.

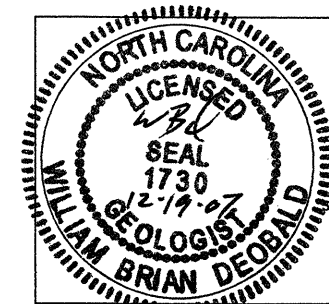
NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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.
 CHECKED BY J. VEITH
 SUBMITTED BY B. DEOBALD
 DATE 11/06/07
 REVISED 12/17/07

PERSONNEL J. HOWARD
B. DEOBALD
M. LEAR
E. BURKETT
D. RHODES



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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

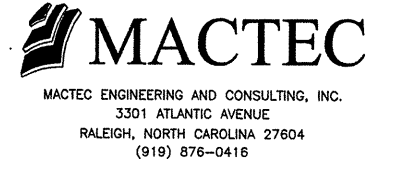
GEOTECHNICAL UNIT

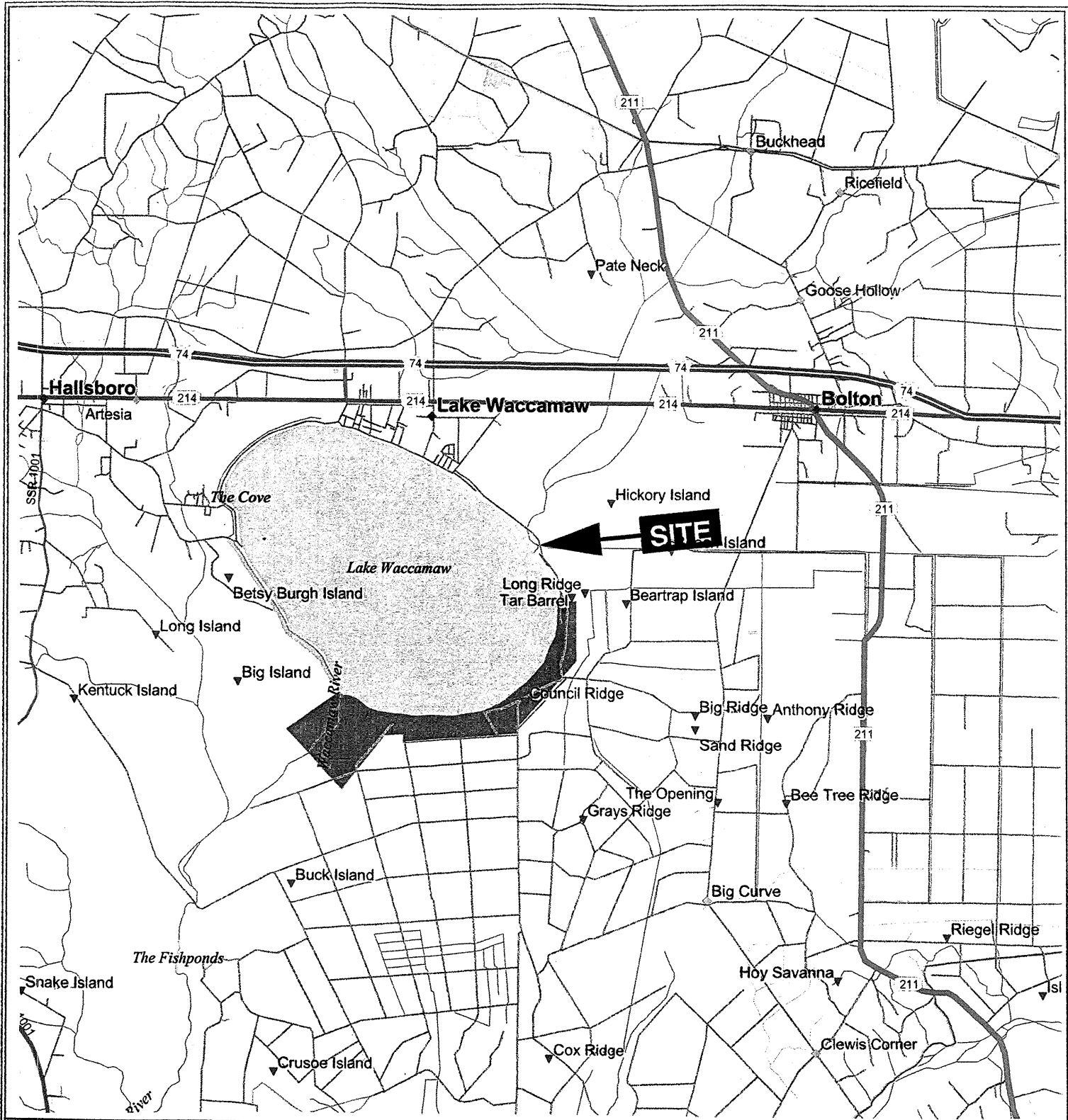
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

ID	PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3830	33281.1.1	2	29

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																							
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										WELL-GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: 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 YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.										ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																							
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING																																																	
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (>35% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.										FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V. SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) - SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL SEVERE (SEV.) - ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 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.										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 TRACE OF ORGANIC MATTER - 2-3% LITTLE ORGANIC MATTER - 3-5% MODERATELY ORGANIC - 5-10% HIGHLY ORGANIC - >10% SILT-CLAY SOILS 3-5% 5-12% 12-20% >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. ▽ PV 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 DIP/DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD SPT DPT DMT TEST BORING CPT DMT TEST BORING PMT TEST BORING SPT REFUSAL AUGER BORING BULK SAMPLE LOCATION CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE CBR - CBR SAMPLE									
CONSISTENCY OR DENSENESS										COMPRESSION										ROCK HARDNESS																																																	
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										GENERAL GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE										GENERAL SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD										VERY HARD - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT - CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT - CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.										TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 COBOLD (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)										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 UNIT WEIGHT γ - DRY UNIT WEIGHT V. - VERY VST - VANE SHEAR TEST W - MOISTURE CONTENT										ROCK HARDNESS VERY HARD - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT - CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT - CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.									
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING																																							
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST OTHER OTHER										ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE 4" STEEL TEETH TRICONE TUNG-CARB. CORE BIT OTHER										TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET										TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET																													
PLASTICITY										HAMMER TYPE										INDURATION																																																	
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH VERY LOW SLIGHT MEDIUM HIGH										X AUTOMATIC MANUAL CORE SIZE: B N H-a HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST OTHER										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.										BENCH MARK: NCDOT BASELINE STATION -BL6- PINC 32+07.04, ELEV.=46.78ft																																							
COLOR																														NOTES:																																							
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.																														Geotechnical Exploration Performed By:																																							



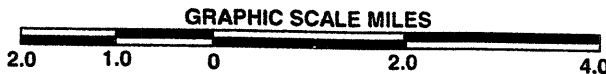


REFERENCE: Delorme Street Atlas

NOTE: SITE LOCATION IS APPROXIMATE

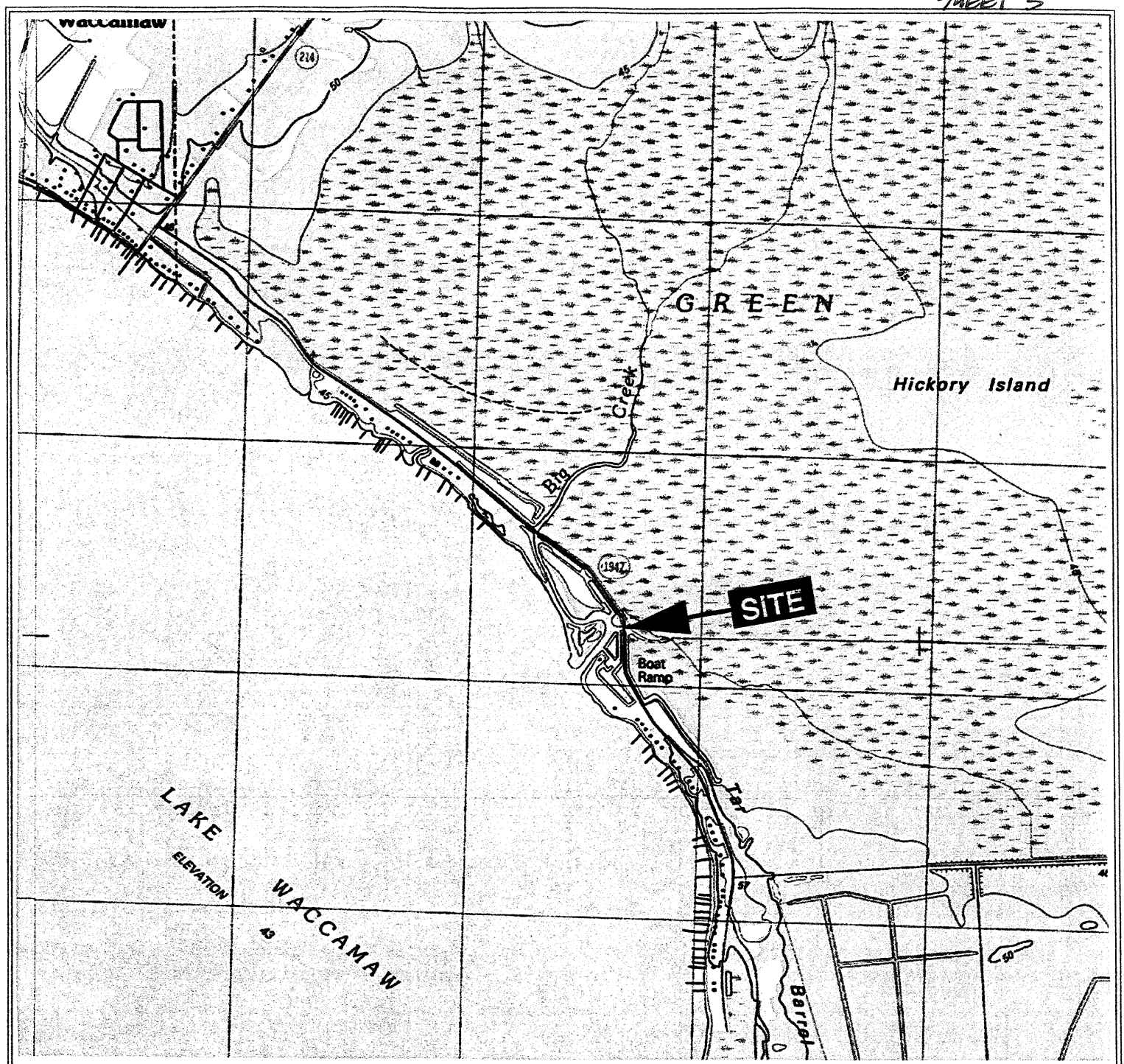


MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA



SITE LOCATION MAP
BRIDGE NO. 364 OVER MAINLINE CANAL ON SR 1947
NCDOT PROJ. NO. 33281.1.1 (B-3830)
COLUMBUS COUNTY, NORTH CAROLINA

DRAWN: MBL	DATE: OCTOBER 2007	DRAWING
ENG CHECK:	SCALE: 1" = 2 miles	1
APPROVAL: <i>WFC</i>	JOB: 6468-07-1890	



LAKE WACCAMAW EAST, N.C.

SW/4 BOLTON 15' QUADRANGLE

34078-C4-TF-024

1986

DMA 5352 IV SW - SERIES V842

CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929



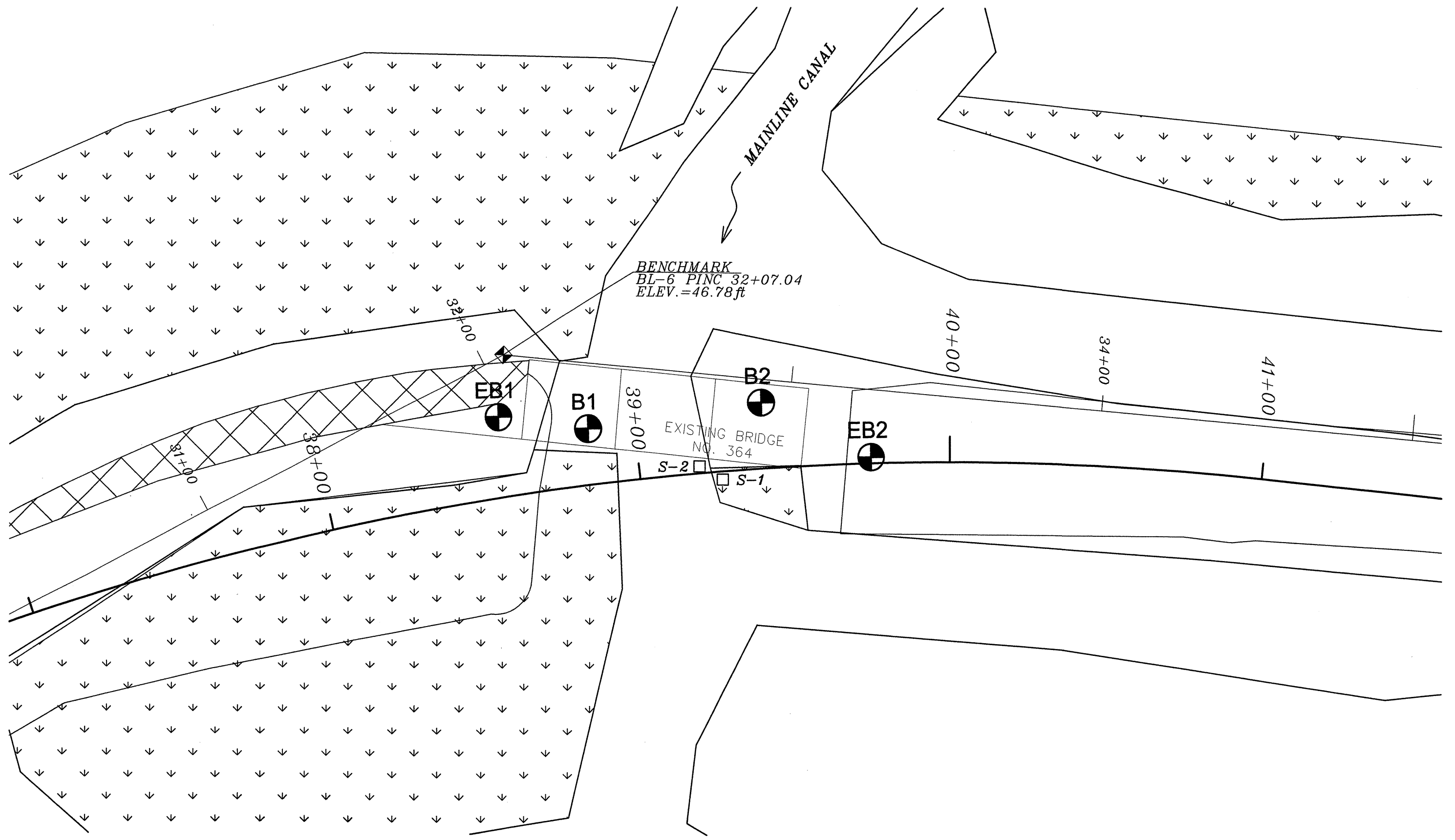
TOPOGRAPHIC SITE MAP
BRIDGE NO. 364 OVER MAINLINE CANAL ON SR 1947
NCDOT PROJ. NO. 33281.1.1 (B-3830)
COLUMBUS COUNTY, NORTH CAROLINA

NOTE: SITE LOCATION IS APPROXIMATE



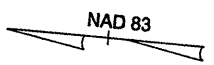
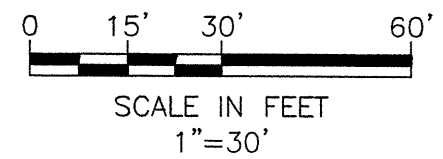
MACTEC ENGINEERING AND CONSULTING, INC.
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DRAWN: MBL	DATE: OCTOBER 2007	DRAWING
ENG CHECK:	SCALE: 1: 24000	2
APPROVAL: <i>WFC</i>	JOB: 6468-07-1890	



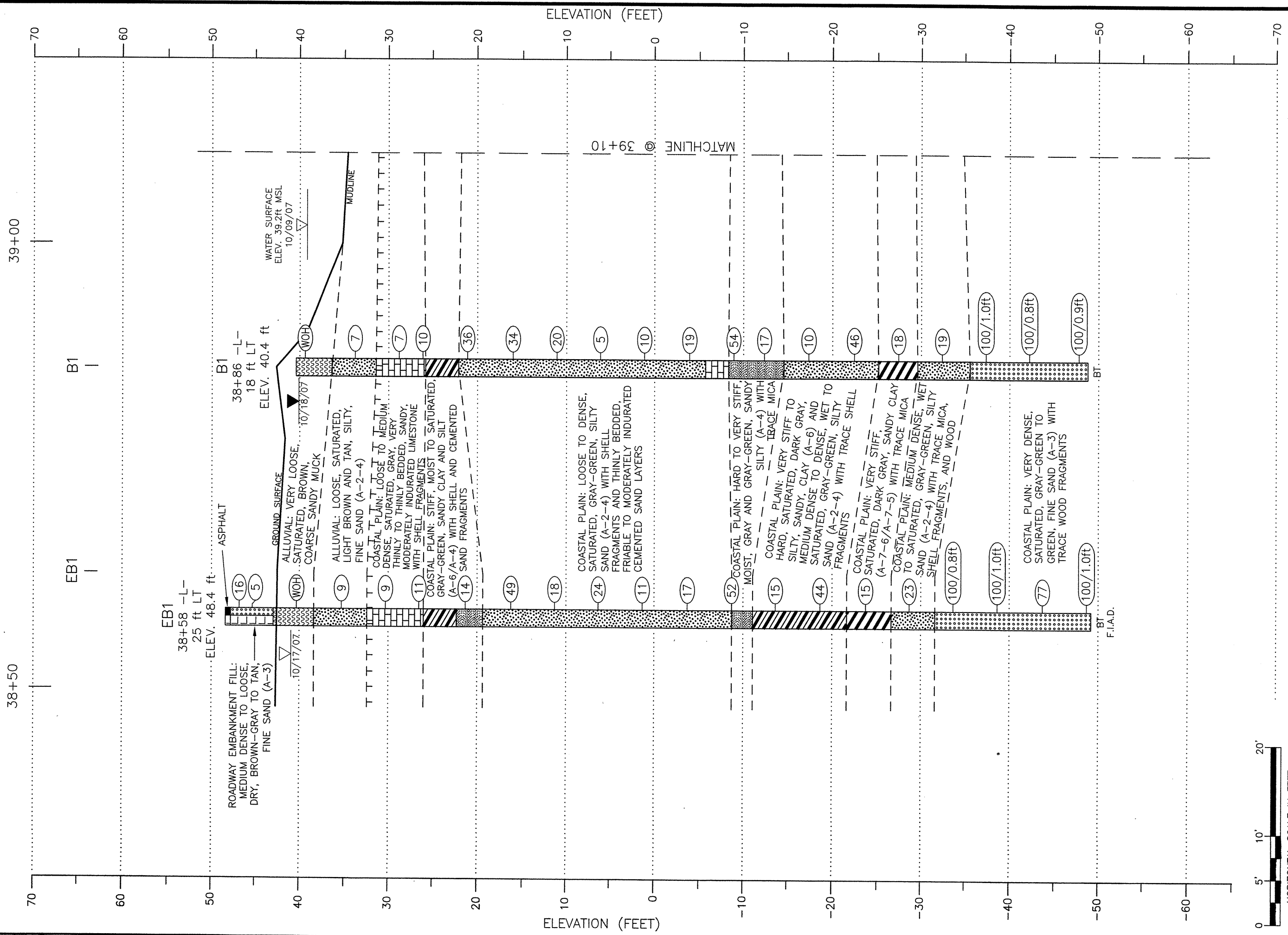
BENCHMARK
BL-6 PINC 32+07.04
ELEV.=46.78ft

EXISTING BRIDGE
NO. 364



BORING LOCATION PLAN
BRIDGE NO. 364 OVER MAINLINE CANAL ON SR 1947
NCDOT PROJECT NO. 33281.1.1 (B-3830)
F.A. No. BRZ-1947(1)
COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 11/06/07
12/17/07	DFT CHECK:	W.B.D.	JOB: 6468-07-1890
	ENG CHECK:	S.J.C.	DWG: 3



PROFILE ALONG -L-
 BRIDGE No. 364 OVER MAINLINE CANAL ON SR 1947
 NCDOT PROJECT NO. 33281.1.1 (B-3830)
 F.A. No. BRZ-1947(1)
 COLUMBUS COUNTY, NORTH CAROLINA

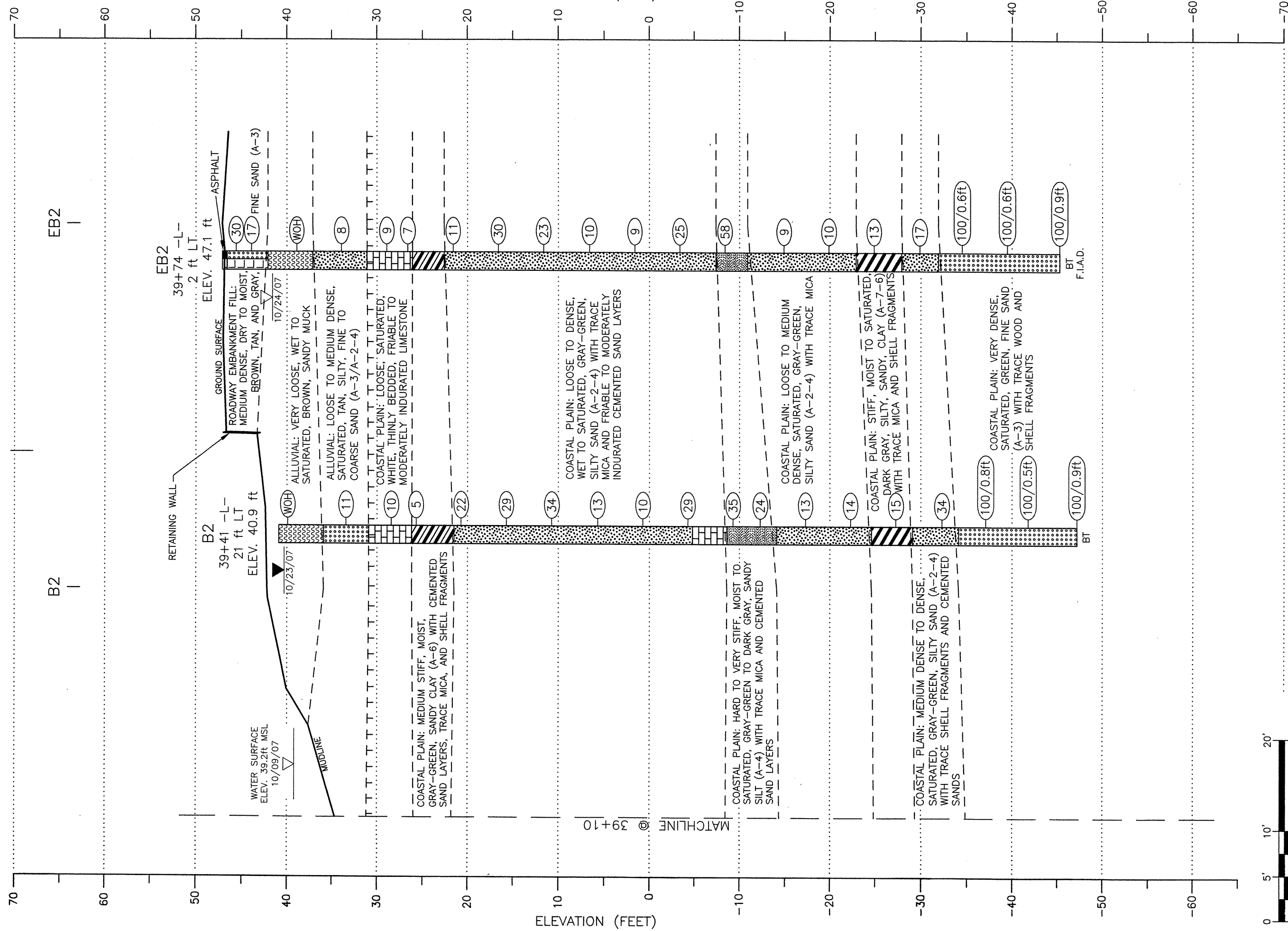
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12/17/07	DFT CHECK:	W.B.D.	JOB: 6468-07-1890
	ENG CHECK:	J.E.V.	DWG: 4

39+50

B2

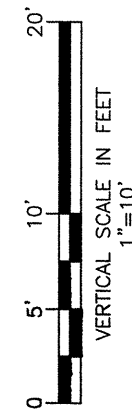
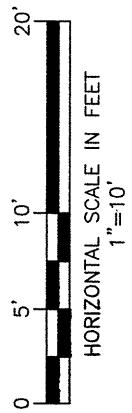
EB2



ELEVATION (FEET)

ELEVATION (FEET)

MATCHLINE @ 39+10

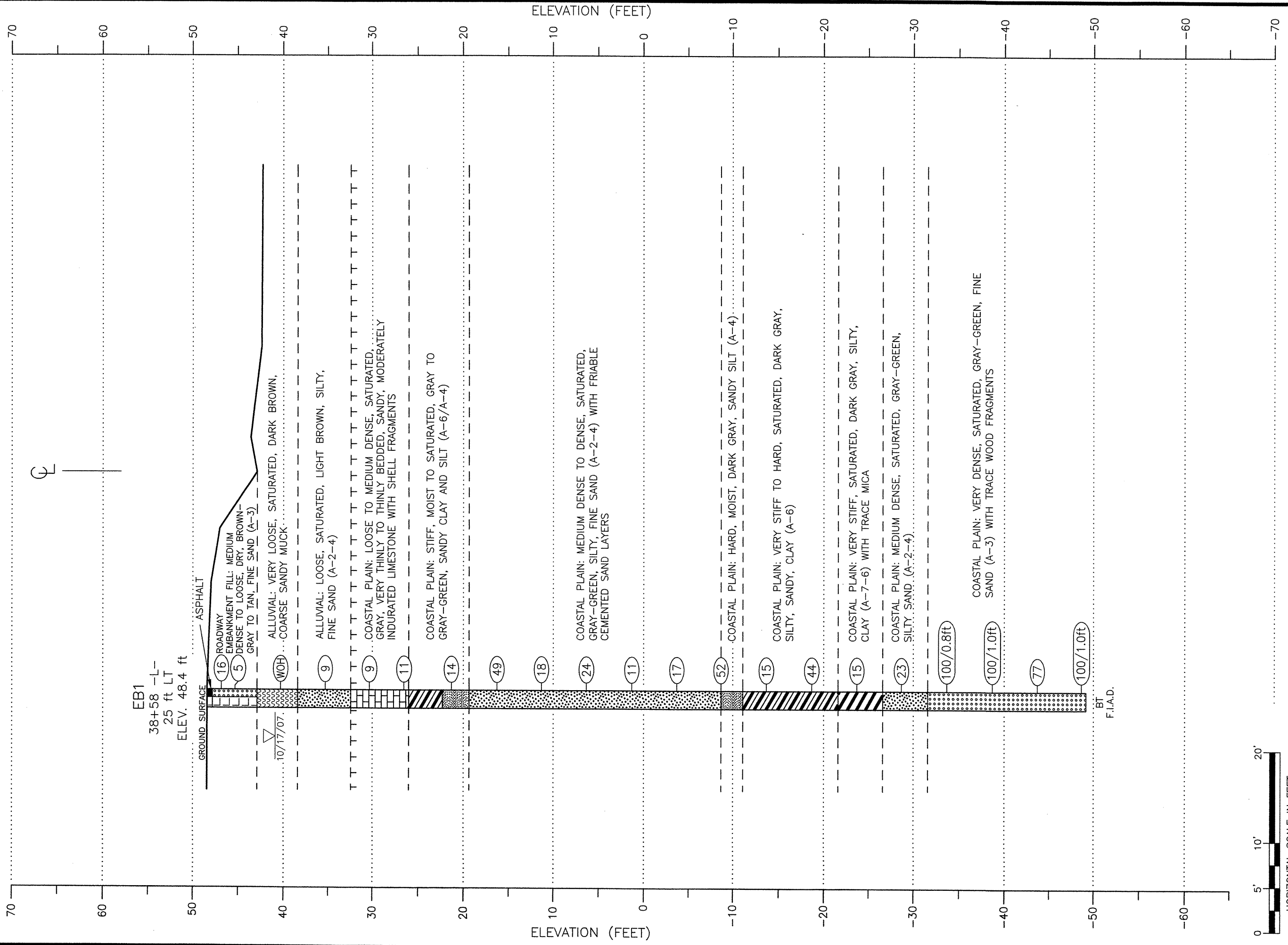


PROFILE ALONG -L-
BRIDGE No. 364 OVER MAINLINE CANAL ON SR 1947
NCDOT PROJECT NO. 33281.1.1 (B-3830)
F.A. No. BRZ-1947(1)
COLUMBUS COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN:	R.R.	DATE:
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	ENG CHECK:	J.E.Y.	DWG: 5

SHEET: 6



EB1
38+58 -L-
25 ft LT
ELEV. 48.4 ft

GROUND SURFACE
ASPHALT

(16) ROADWAY
EMBANKMENT FILL: MEDIUM
DENSE TO LOOSE, DRY, BROWN-
GRAY TO TAN, FINE SAND (A-3)

(5)

ALLUVIAL: VERY LOOSE, SATURATED, DARK BROWN,
COARSE SANDY MUCK

10/17/07

(WOH)

(9)

ALLUVIAL: LOOSE, SATURATED, LIGHT BROWN, SILTY,
FINE SAND (A-2-4)

(9)

COASTAL PLAIN: LOOSE TO MEDIUM DENSE, SATURATED,
GRAY, VERY THINLY TO THINLY BEDDED, SANDY, MODERATELY
INDURATED LIMESTONE WITH SHELL FRAGMENTS

(11)

COASTAL PLAIN: STIFF, MOIST TO SATURATED, GRAY TO
GRAY-GREEN, SANDY CLAY AND SILT (A-6/A-4)

(14)

(49)

(18)

(24)

COASTAL PLAIN: MEDIUM DENSE TO DENSE, SATURATED,
GRAY-GREEN, SILTY, FINE SAND (A-2-4) WITH FRIABLE
CEMENTED SAND LAYERS

(11)

(17)

(52)

COASTAL PLAIN: HARD, MOIST, DARK GRAY, SANDY SILT (A-4)

(15)

COASTAL PLAIN: VERY STIFF TO HARD, SATURATED, DARK GRAY,
SILTY, SANDY, CLAY (A-6)

(44)

(15)

COASTAL PLAIN: VERY STIFF, SATURATED, DARK GRAY, SILTY,
CLAY (A-7-6) WITH TRACE MICA

(23)

COASTAL PLAIN: MEDIUM DENSE, SATURATED, GRAY-GREEN,
SILTY SAND (A-2-4)

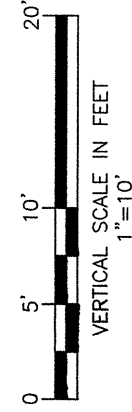
(100/0.8ft)

COASTAL PLAIN: VERY DENSE, SATURATED, GRAY-GREEN, FINE
SAND (A-3) WITH TRACE WOOD FRAGMENTS

(100/1.0ft)

(77)

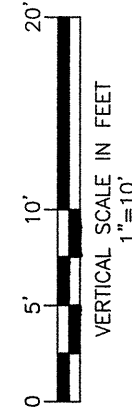
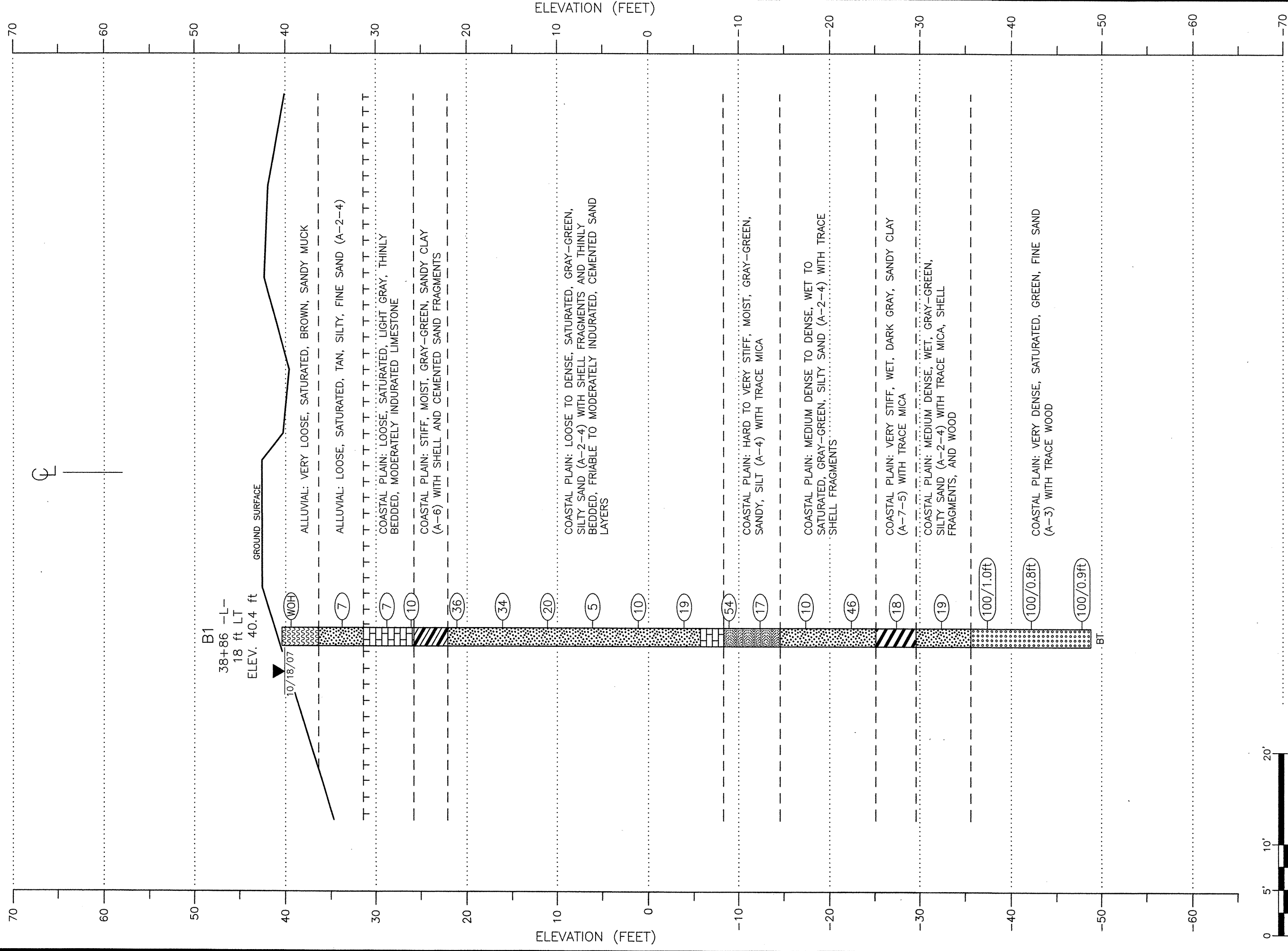
(100/1.0ft)



CROSS SECTION ALONG END BENT 1
BRIDGE No. 364 OVER MAINLINE CANAL ON SR 1947
NCDOT PROJECT NO. 33281.1.1 (B-3830)
F.A. No. BRZ-1947(1)
COLUMBUS COUNTY, NORTH CAROLINA

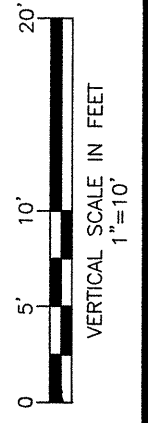
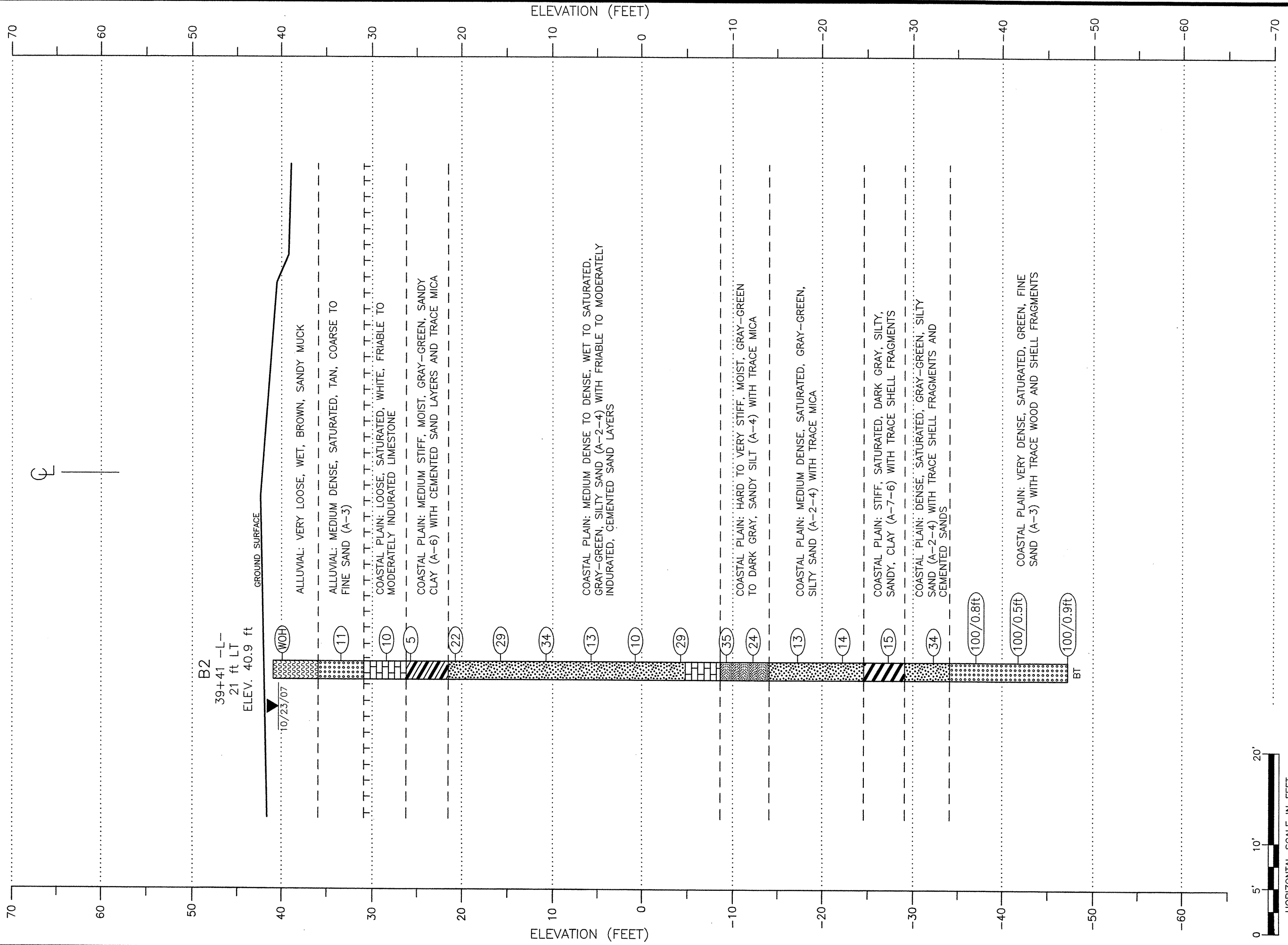
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	ENG CHECK:	J.E.V.	DWG: 6



CROSS SECTION ALONG BENT 1
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12/17/07	DFT CHECK:	W.B.D.	JOB: 6468-07-1890
	ENG CHECK:	J.E.Y.	DWG: 7

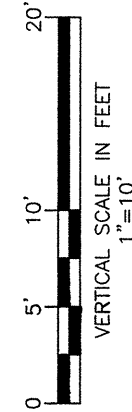
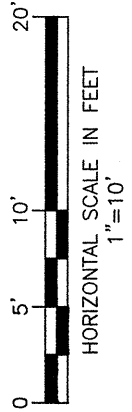
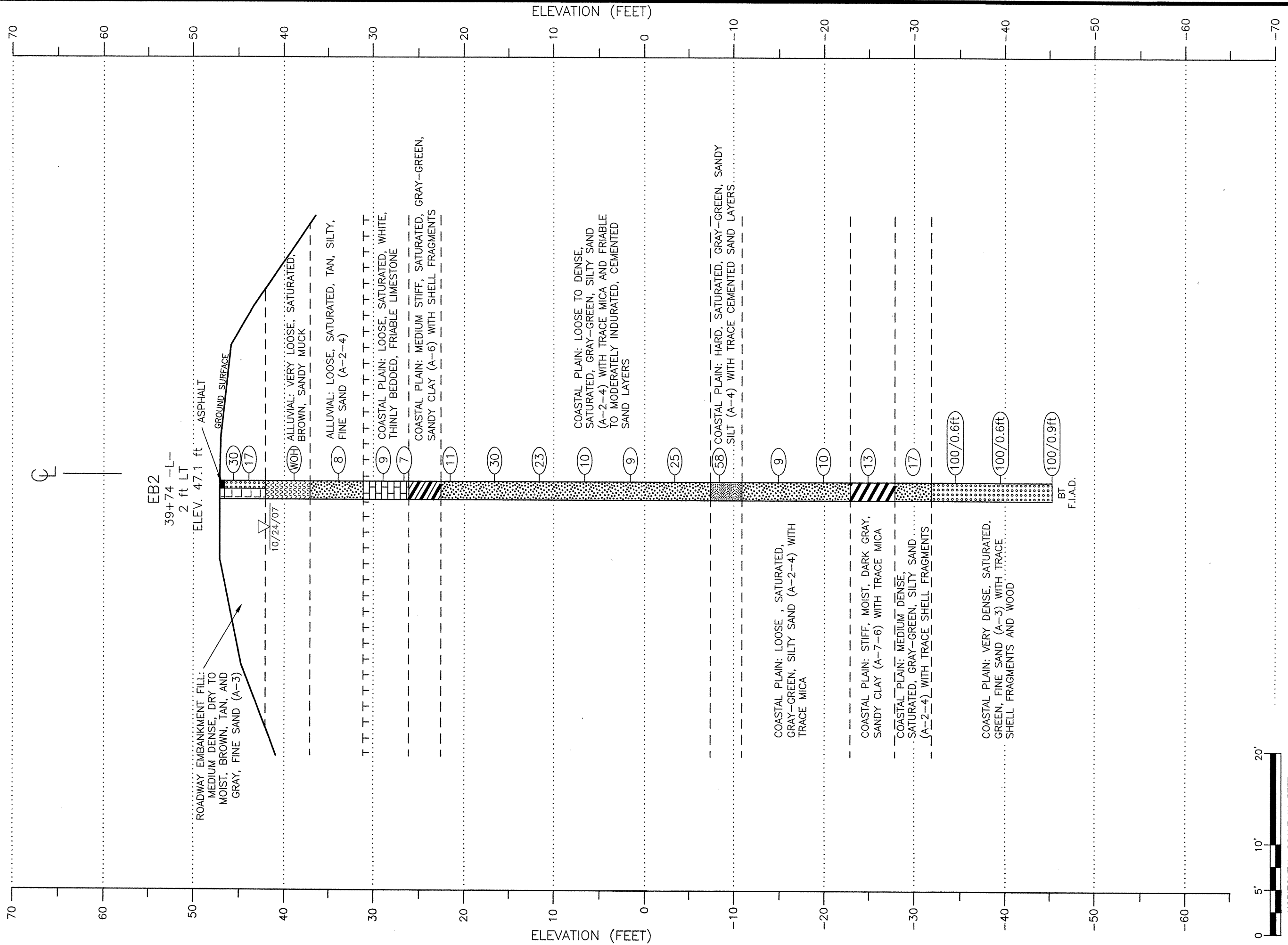


CROSS SECTION ALONG BENT 2
BRIDGE No. 364 OVER MAINLINE CANAL ON SR 1947
NCDOT PROJECT NO. 33281.1.1 (B-3830)
F.A. No. BRZ-1947(1)
COLUMBUS COUNTY, NORTH CAROLINA

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RALEIGH, NORTH CAROLINA

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12/17/07	DFT CHECK: W.B.D.	JOB: 6468-07-1890
	ENG CHECK: J.E.V.	DWG: 8

SHEET: 9



CROSS SECTION ALONG END BENT 2
BRIDGE No. 364 OVER MAINLINE CANAL ON SR 1947
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	ENG CHECK:	J.E.V.	DWG: 9

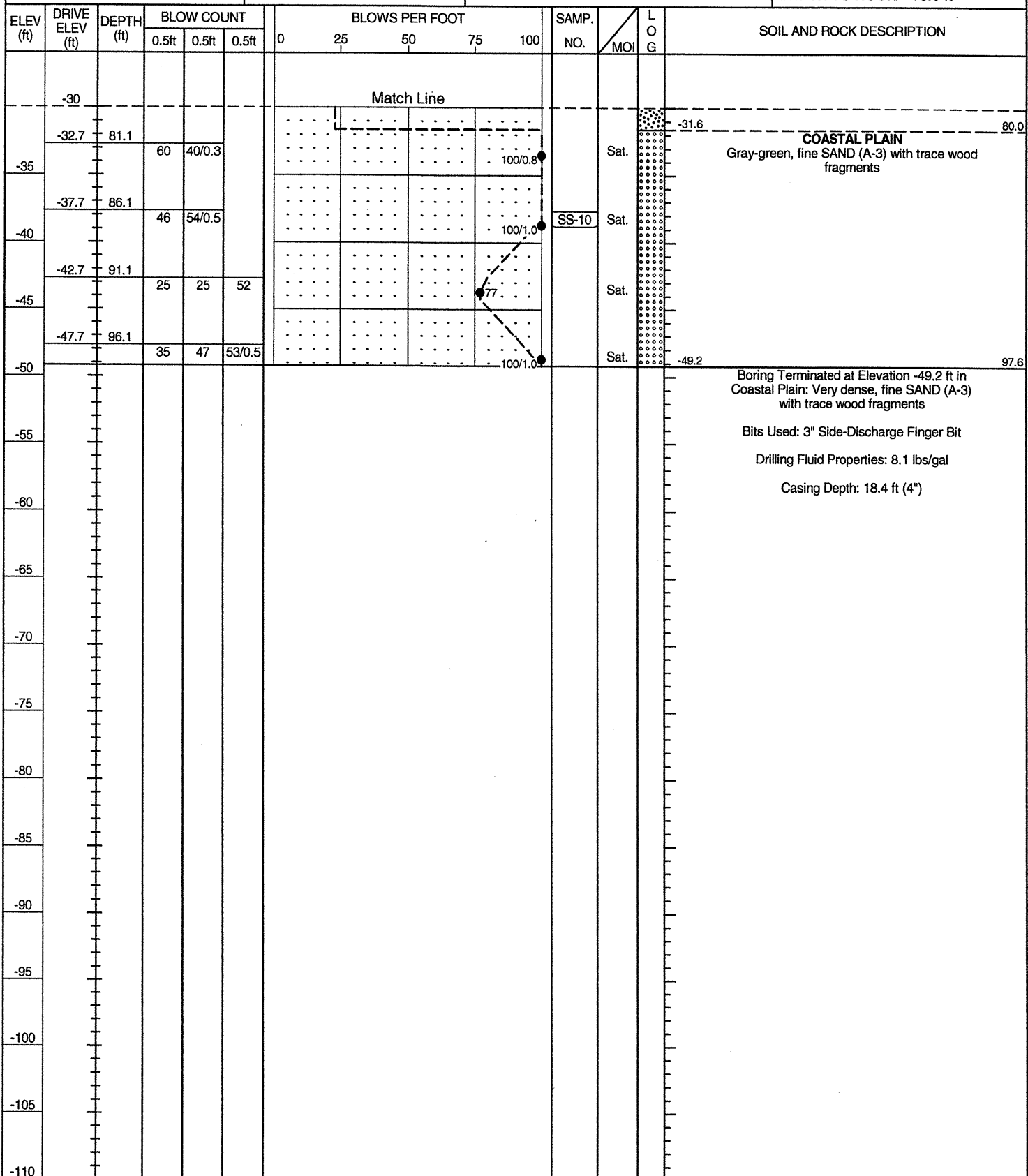
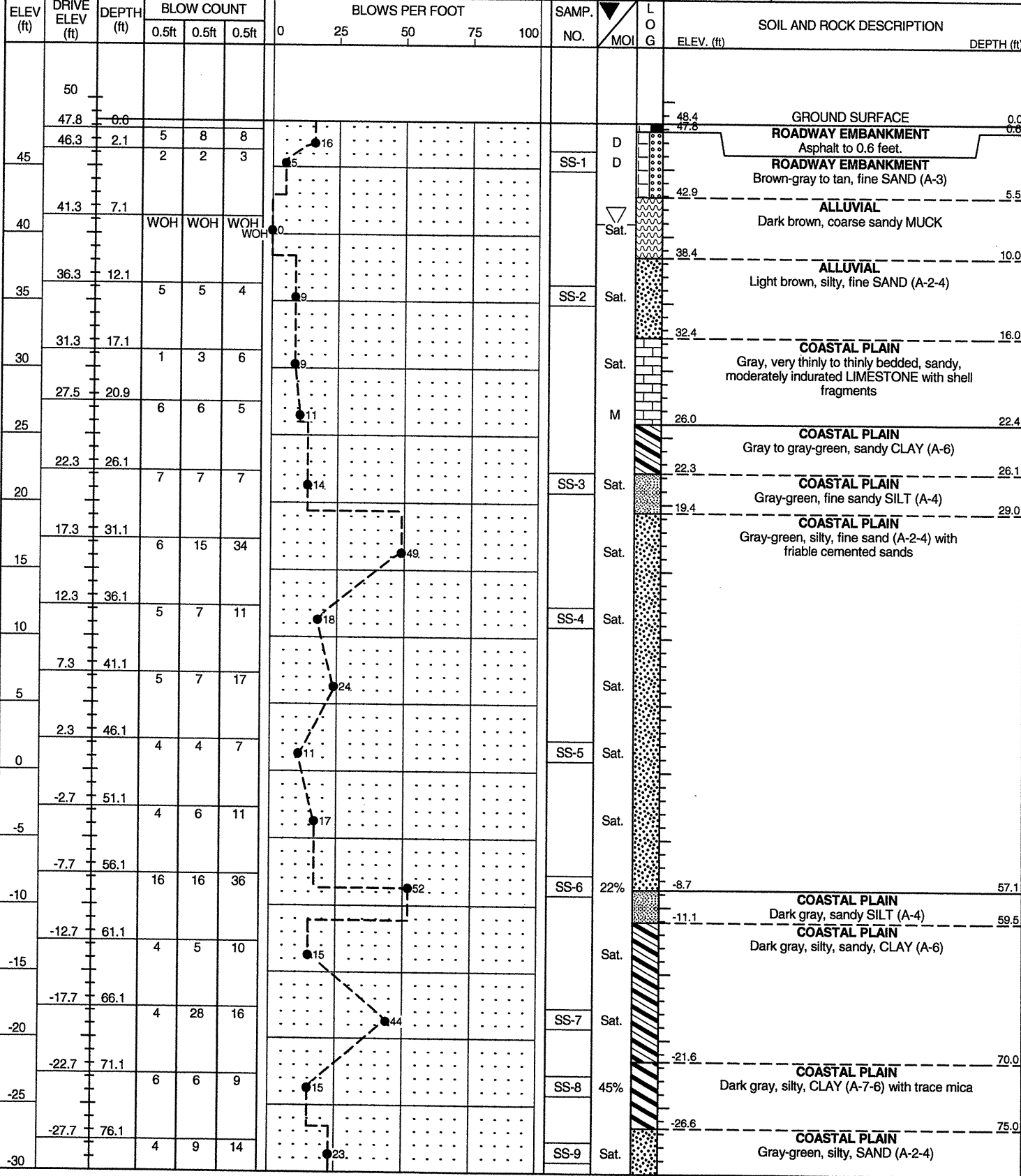


NCDOT GEOTECHNICAL ENGINEERING UNIT

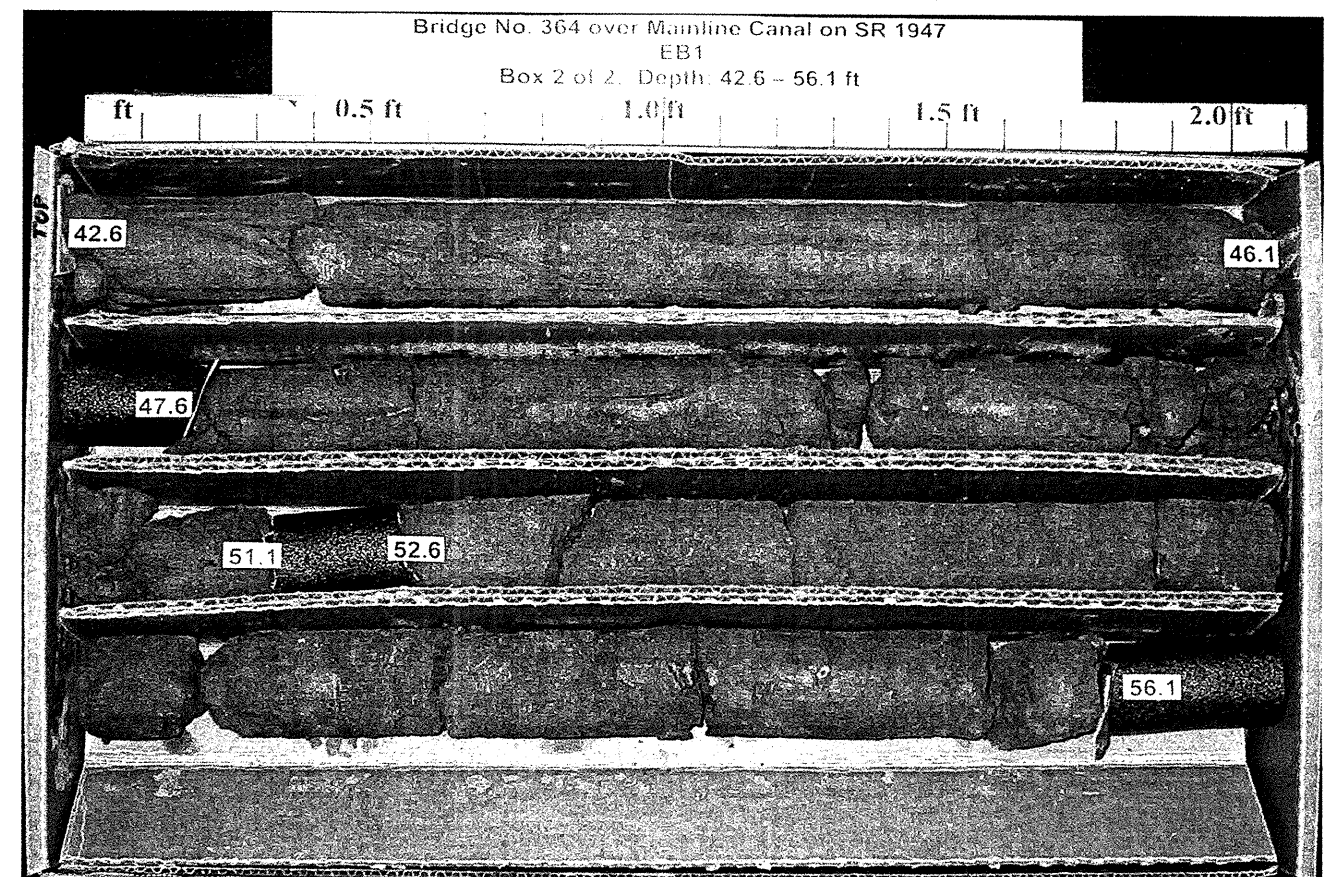
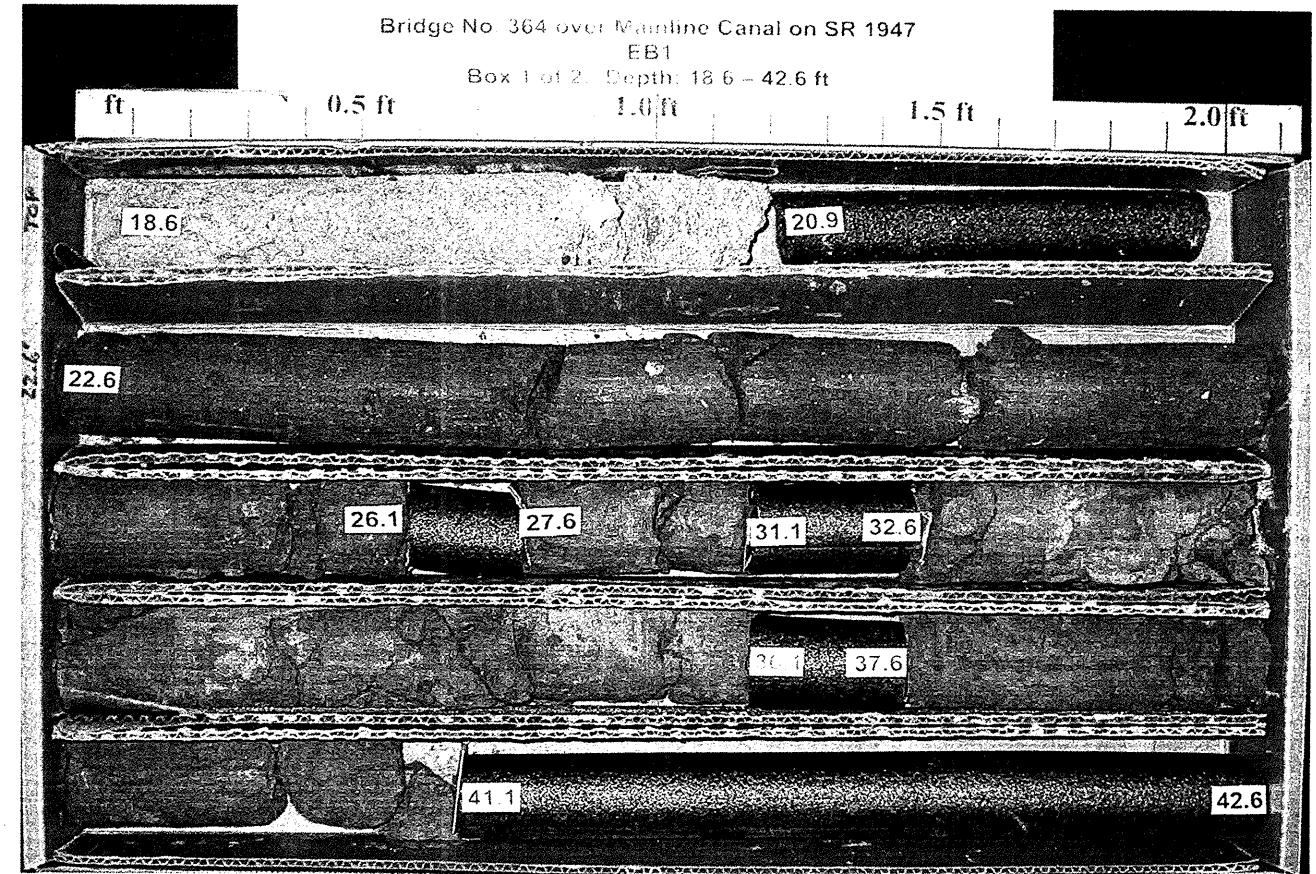
BORELOG REPORT

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)			GROUND WTR (ft)
BOHRING NO. EB1	STATION 38+58	OFFSET 25ft LT	ALIGNMENT -L-
COLLAR ELEV. 48.4 ft	TOTAL DEPTH 97.6 ft	NORTHING 197,854	EASTING 2,159,488
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/16/07	COMP. DATE 10/17/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 16.0 ft

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)			GROUND WTR (ft)
BOHRING NO. EB1	STATION 38+58	OFFSET 25ft LT	ALIGNMENT -L-
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DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/16/07	COMP. DATE 10/17/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 16.0 ft



NCDOT BORE DOUBLE MACTEC 6468-07-1890.GPJ NC_DOT.GDT 11/5/07



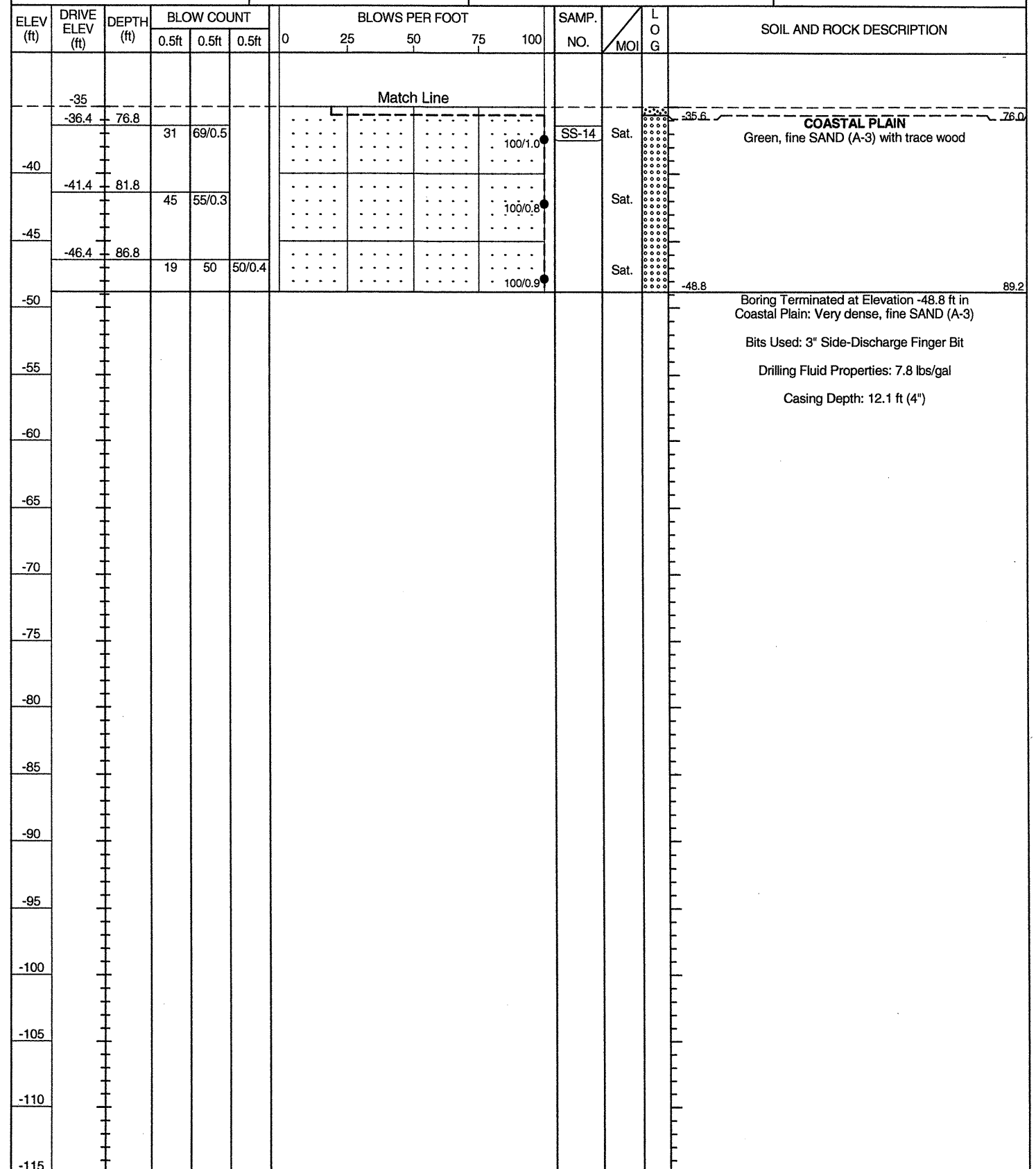
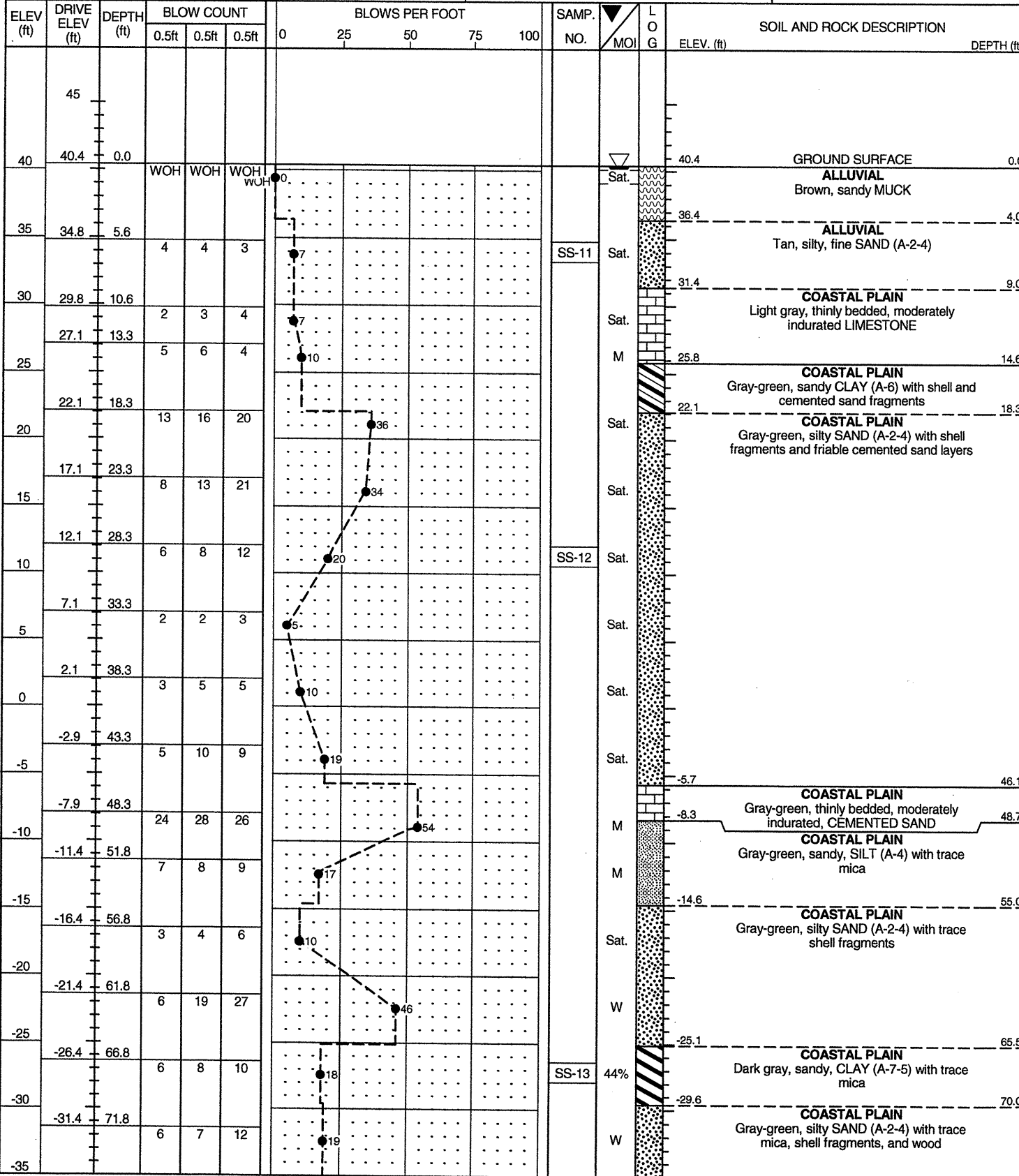


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)			GROUND WTR (ft)
BORING NO. B1	STATION 38+86	OFFSET 18ft LT	ALIGNMENT -L-
COLLAR ELEV. 40.4 ft	TOTAL DEPTH 89.2 ft	NORTHING 197,825	EASTING 2,159,487
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/17/07	COMP. DATE 10/18/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 9.0 ft

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)			GROUND WTR (ft)
BORING NO. B1	STATION 38+86	OFFSET 18ft LT	ALIGNMENT -L-
COLLAR ELEV. 40.4 ft	TOTAL DEPTH 89.2 ft	NORTHING 197,825	EASTING 2,159,487
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/17/07	COMP. DATE 10/18/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 9.0 ft



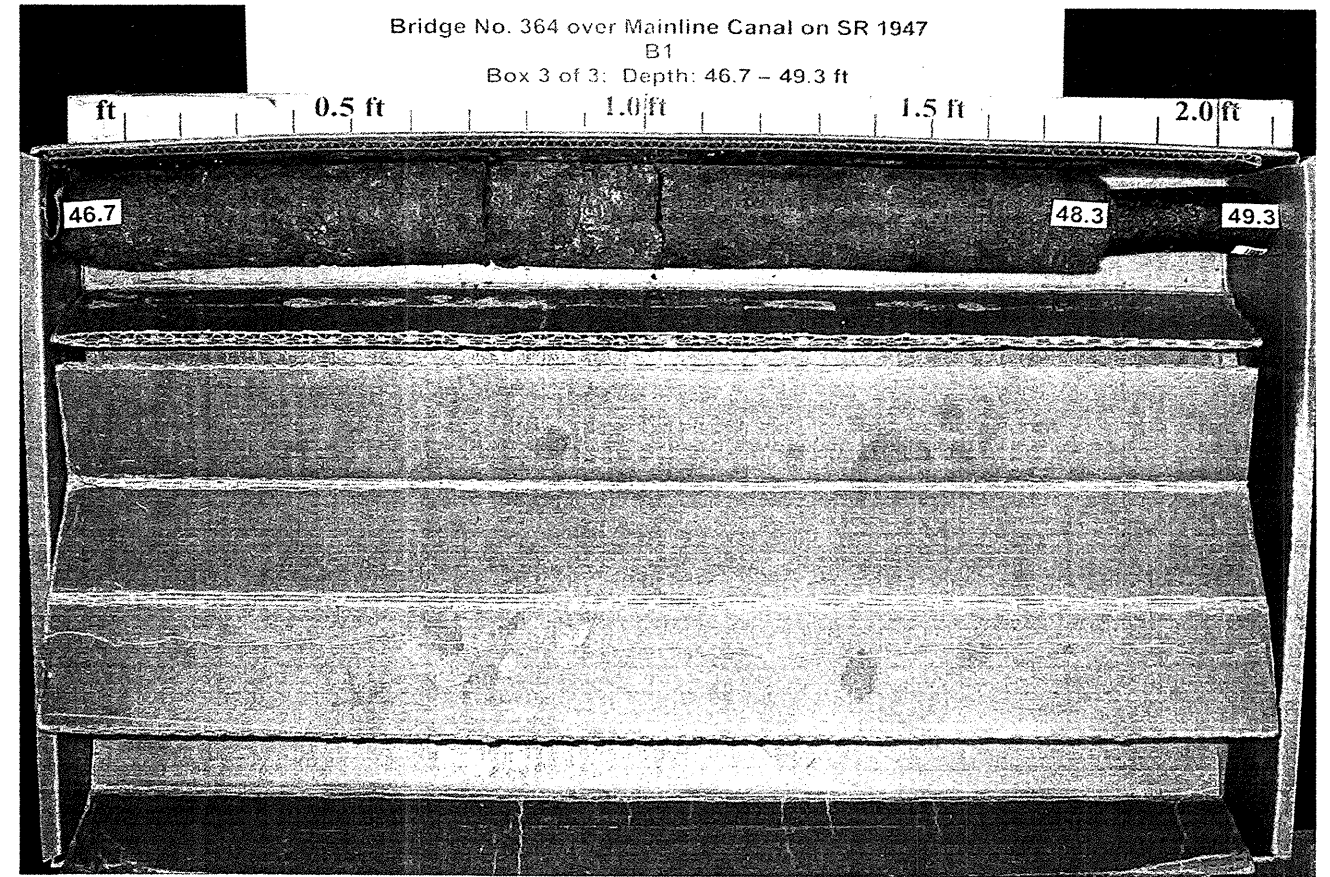
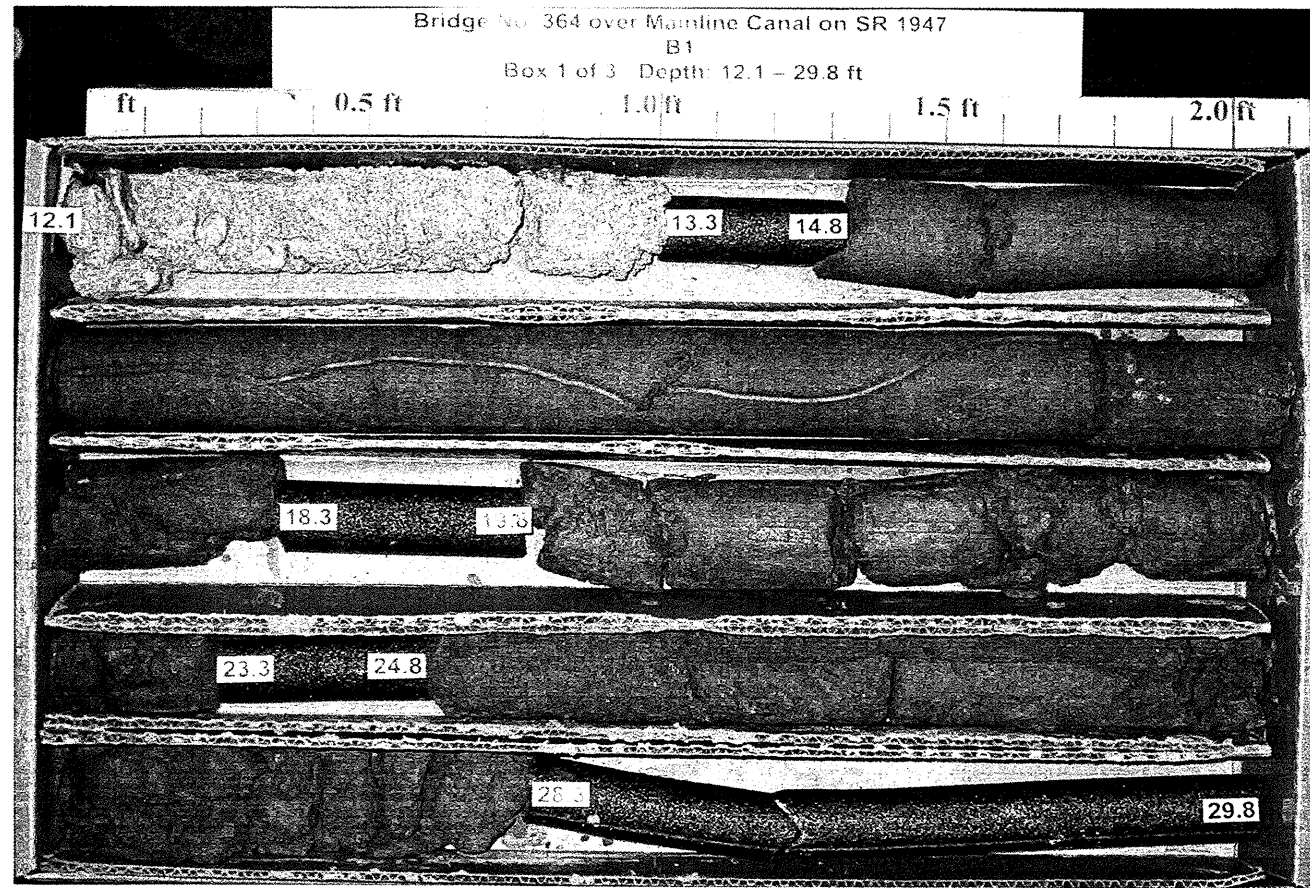
NCDOT BORE DOUBLE MACTEC 6468-07-1890.GPJ NC_DOT.GDT 12/14/07

Boring Terminated at Elevation -48.8 ft in Coastal Plain: Very dense, fine SAND (A-3)
 Bits Used: 3" Side-Discharge Finger Bit
 Drilling Fluid Properties: 7.8 lbs/gal
 Casing Depth: 12.1 ft (4")



PROJECT NO. 33281.1.1		ID. B-3830		COUNTY Columbus		GEOLOGIST J. Howard						
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)							GROUND WTR (ft)					
BORING NO. B1		STATION 38+86		OFFSET 18ft LT		ALIGNMENT -L-						
COLLAR ELEV. 40.4 ft		TOTAL DEPTH 89.2 ft		NORTHING 197,825		EASTING 2,159,487						
DRILL MACHINE CME-45C		DRILL METHOD Mud Rotary/Core				HAMMER TYPE Automatic						
START DATE 10/17/07		COMP. DATE 10/18/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 9.0 ft						
CORE SIZE HQ		TOTAL RUN 25.7 ft		DRILLER D. Rhodes								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	ROD REC. (ft) %	SAMP. NO.	STRATA REC. (ft) %	ROD (ft) %	L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
	28.3										Begin Coring @ 12.1 ft	
	28.3	12.1	1.2	0:45/1.2	(1.0)	NA					COASTAL PLAIN	
	27.1	13.3			83%						Light gray, thinly bedded, moderately indurated LIMESTONE (continued)	14.6
	25.6	14.8			N=70						COASTAL PLAIN	
25			3.5	3:15	(3.2)	NA		(3.2)	91%		Gray-green, sandy CLAY (A-6) with shell and cemented sand fragments	
	22.1	18.3		0:45							COASTAL PLAIN	
	20.6	19.8		0:15/0.5				(10.4)	55%		Gray-green, silty SAND (A-2-4) with shell fragments and friable cemented sand layers	18.3
20			3.5	0:30	(1.5)	NA					COASTAL PLAIN	
	17.1	23.3		0:15	43%						COASTAL PLAIN	
	15.6	24.8		0:30							COASTAL PLAIN	
15			3.5	0:10/0.5							COASTAL PLAIN	
	12.1	28.3		0:30	(2.1)	NA					COASTAL PLAIN	
	10.6	29.8		0:15/0.5	60%		SS-12				COASTAL PLAIN	
10			3.5	0:45	(1.0)	NA					COASTAL PLAIN	
	7.1	33.3		0:30	29%						COASTAL PLAIN	
	5.6	34.8		0:45							COASTAL PLAIN	
5			3.5	0:15/0.5							COASTAL PLAIN	
	2.1	38.3		0:30	(3.4)	NA					COASTAL PLAIN	
	0.6	39.8		0:15	97%						COASTAL PLAIN	
0			3.5	0:05/0.5							COASTAL PLAIN	
	-2.9	43.3		1:15	(1.1)	NA					COASTAL PLAIN	
	-4.4	44.8		0:45	31%						COASTAL PLAIN	
-5			3.5	0:30/0.5							COASTAL PLAIN	
	-7.9	48.3		0:45	(3.5)	NA					COASTAL PLAIN	
				0:30	100%			(2.2)	100%		COASTAL PLAIN	
-10				0:30/0.5							COASTAL PLAIN	
				N=54							Gray-green, thinly bedded, moderately indurated, CEMENTED SAND	48.7
				N=17							COASTAL PLAIN	
				N=10							Gray-green, sandy, SILT (A-4) with trace mica	
-15				N=10							COASTAL PLAIN	
				N=46							Gray-green, silty SAND (A-2-4) with trace shell fragments	55.0
-20				N=18							COASTAL PLAIN	
				N=18			SS-13				Dark gray, sandy, CLAY (A-7-5) with trace mica	65.5
-25				N=19							COASTAL PLAIN	
				N=19							Gray-green, silty SAND (A-2-4) with trace mica, shell fragments, and wood	70.0
-30				N=100/1.0							COASTAL PLAIN	
				N=100/0.8							Green, fine SAND (A-3) with trace wood	76.0
-35				N=100/0.9							COASTAL PLAIN	
				N=100/0.9							Green, fine SAND (A-3) with trace wood	89.2
-40											COASTAL PLAIN	
											Green, fine SAND (A-3) with trace wood	89.2
-45											COASTAL PLAIN	
											Green, fine SAND (A-3) with trace wood	89.2
-50											COASTAL PLAIN	
											Boring Terminated at Elevation -48.8 ft in Coastal Plain: Very dense, fine SAND (A-3)	89.2

NCDOT CORE SINGLE MACTEC 6468-07-1890.GPJ NC_DOT.GDT 12/14/07



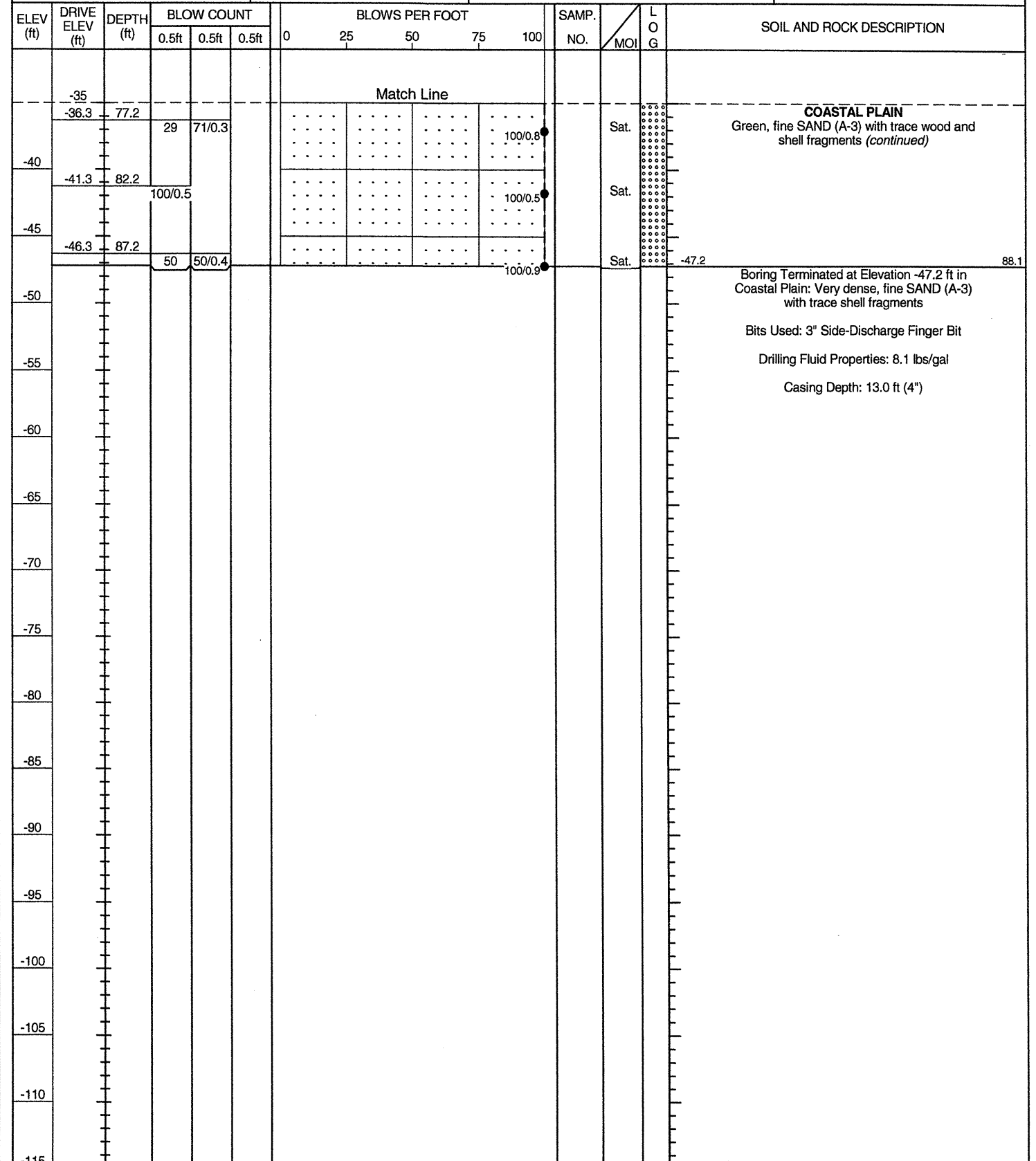
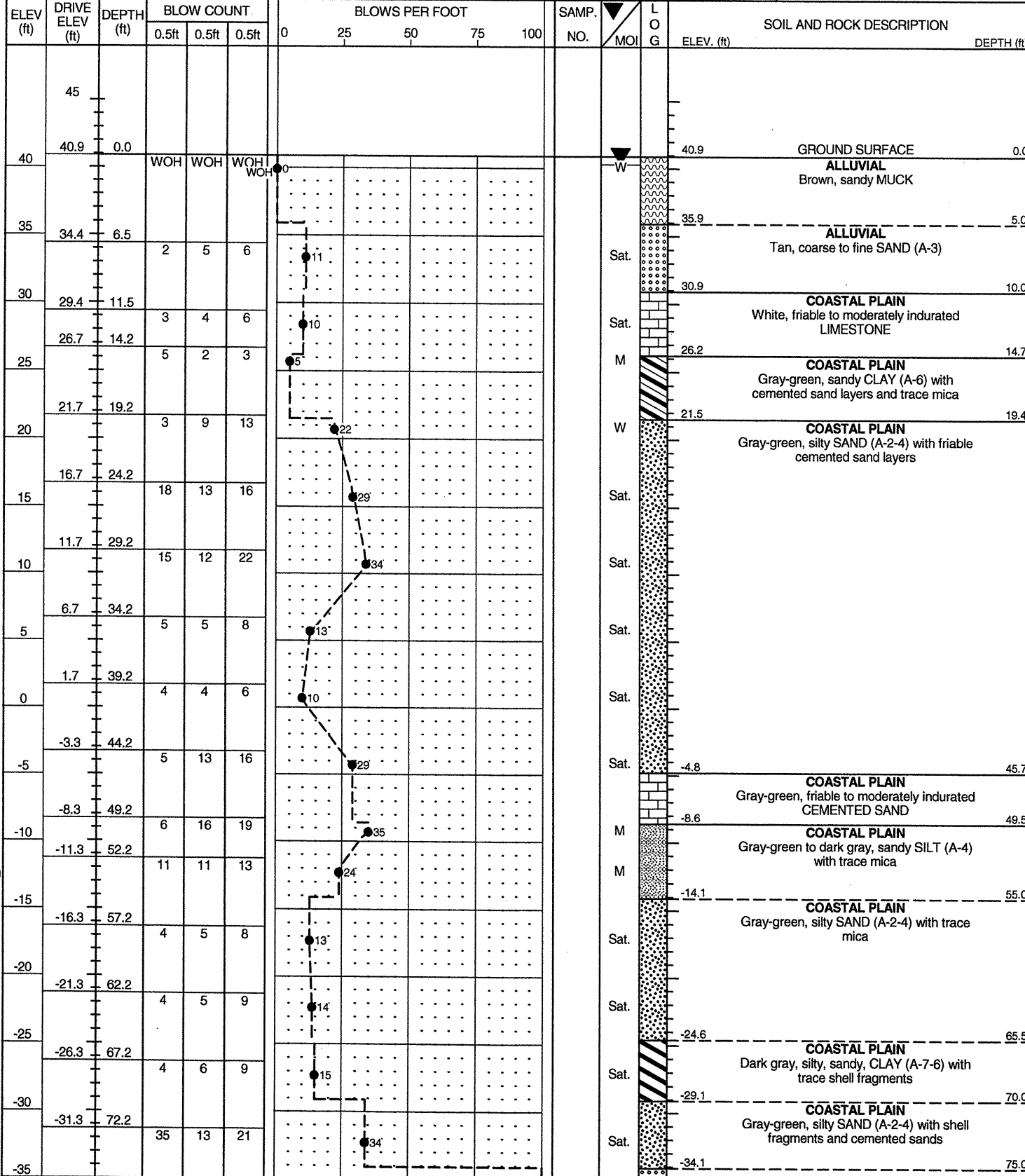


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)			GROUND WTR (ft)
BORING NO. B2	STATION 39+41	OFFSET 21ft LT	ALIGNMENT -L-
COLLAR ELEV. 40.9 ft	TOTAL DEPTH 88.1 ft	NORTHING 197,771	EASTING 2,159,501
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/19/07	COMP. DATE 10/23/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 10.0 ft

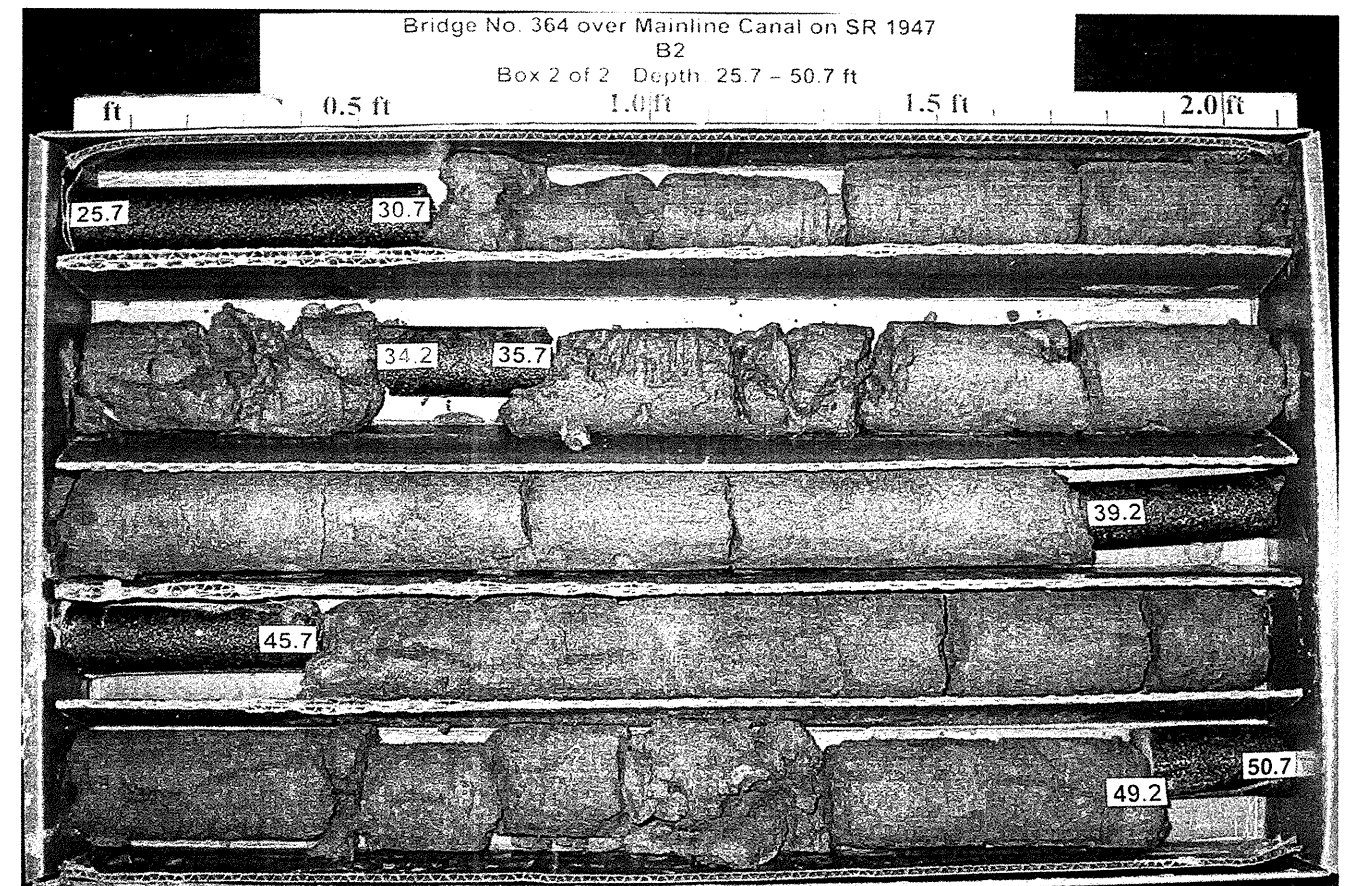
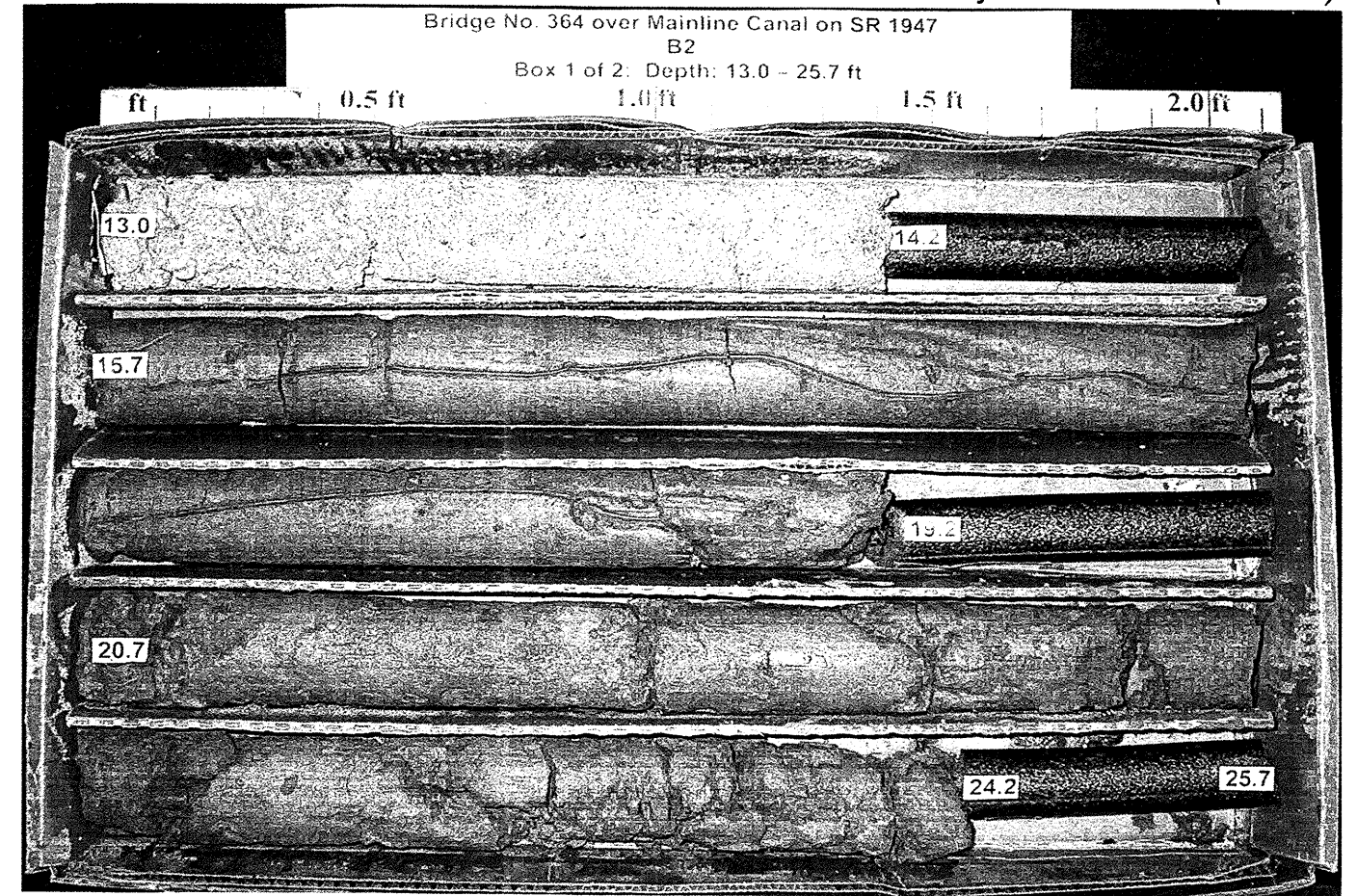
PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)			GROUND WTR (ft)
BORING NO. B2	STATION 39+41	OFFSET 21ft LT	ALIGNMENT -L-
COLLAR ELEV. 40.9 ft	TOTAL DEPTH 88.1 ft	NORTHING 197,771	EASTING 2,159,501
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/19/07	COMP. DATE 10/23/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 10.0 ft



NCDOT BORE DOUBLE MACTEC 6468-07-1890.GPJ NC_DOT.GDT 12/14/07



PROJECT NO. 33281.1.1		ID. B-3830		COUNTY Columbus		GEOLOGIST J. Howard						
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)							GROUND WTR (ft)					
BORING NO. B2		STATION 39+41		OFFSET 21ft LT		ALIGNMENT -L-						
COLLAR ELEV. 40.9 ft		TOTAL DEPTH 88.1 ft		NORTHING 197,771		EASTING 2,159,501						
DRILL MACHINE CME-45C		DRILL METHOD Mud Rotary/Core				HAMMER TYPE Automatic						
START DATE 10/19/07		COMP. DATE 10/23/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 10.0 ft						
CORE SIZE HQ		TOTAL RUN 25.7 ft		DRILLER D. Rhodes								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RCD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RCD (ft) %	L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
	27.9										Begin Coring @ 13.0 ft	
	27.9	13.0	1.2	0:45/1.2	(1.2)	NA						
	26.7	14.2										
	25.2	15.7		N=5	100%							
25			3.5	1:30	(3.2)	NA		(3.2)	91%	NA	White, friable to moderately indurated LIMESTONE (continued)	14.7
				3:00								
				1:00								
	21.7	19.2		0:15/0.5								
	20.2	20.7		N=22								
20			3.5	1:00	(3.4)	NA		(8.1)	46%	NA	Gray-green, silty SAND (A-2-4) with friable cemented sand layers	19.4
				1:15								
				0:45	97%							
	16.7	24.2		0:15/0.5								
	15.2	25.7		N=29								
15			3.5	0:45	(0.0)	NA						
				0:30								
				0:30	0%							
	11.7	29.2		0:15/0.5								
	10.2	30.7		N=34								
10			3.5	0:45	(1.9)	NA						
				0:30								
				1:00	54%							
	6.7	34.2		0:15/0.5								
	5.2	35.7		N=13								
5			3.5	0:30	(2.8)	NA						
				1:15								
				0:30	80%							
	1.7	39.2		0:15/0.5								
	0.2	40.7		N=10								
0			3.5	0:45	(0.0)	NA						
				0:45								
				1:15	0%							
	-3.3	44.2		0:15/0.5								
	-4.8	45.7		N=29								
-5			3.5	0:45	(3.2)	NA		(3.2)	91%	NA	Gray-green, friable to moderately indurated CEMENTED SAND	45.7
				0:30								
				0:30	91%							
	-8.3	49.2		0:15/0.5								
				N=35								
-10				N=24								
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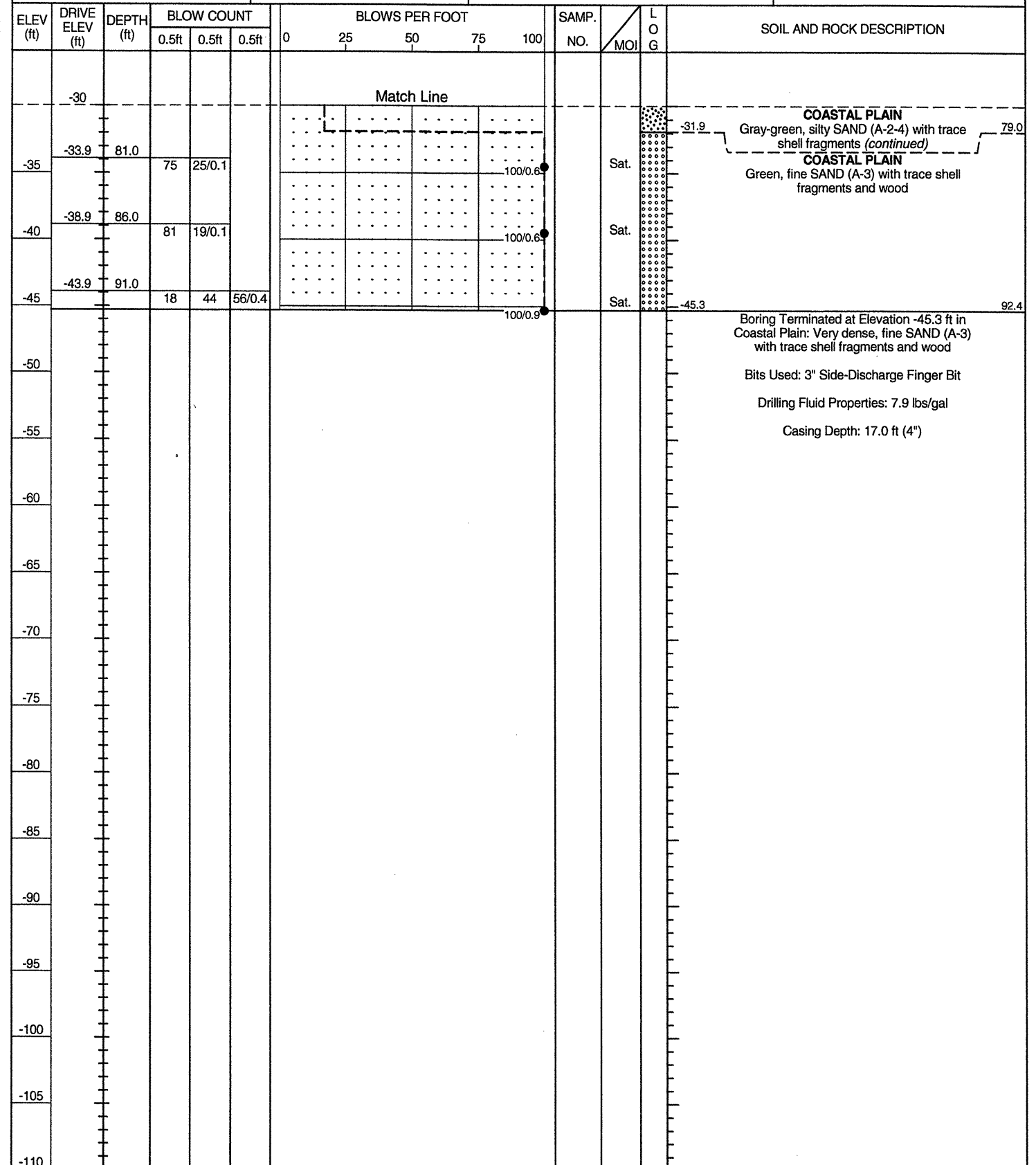
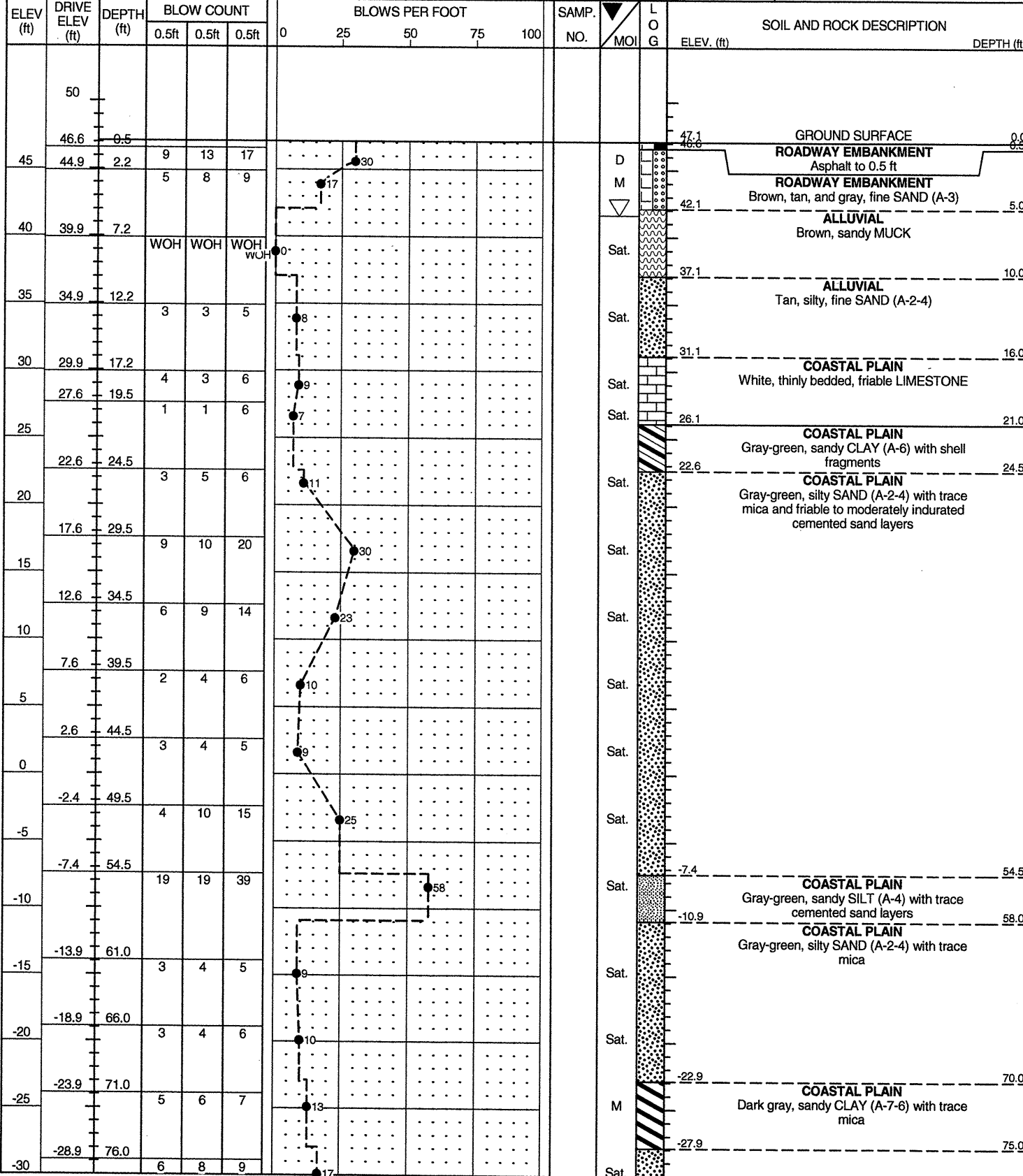




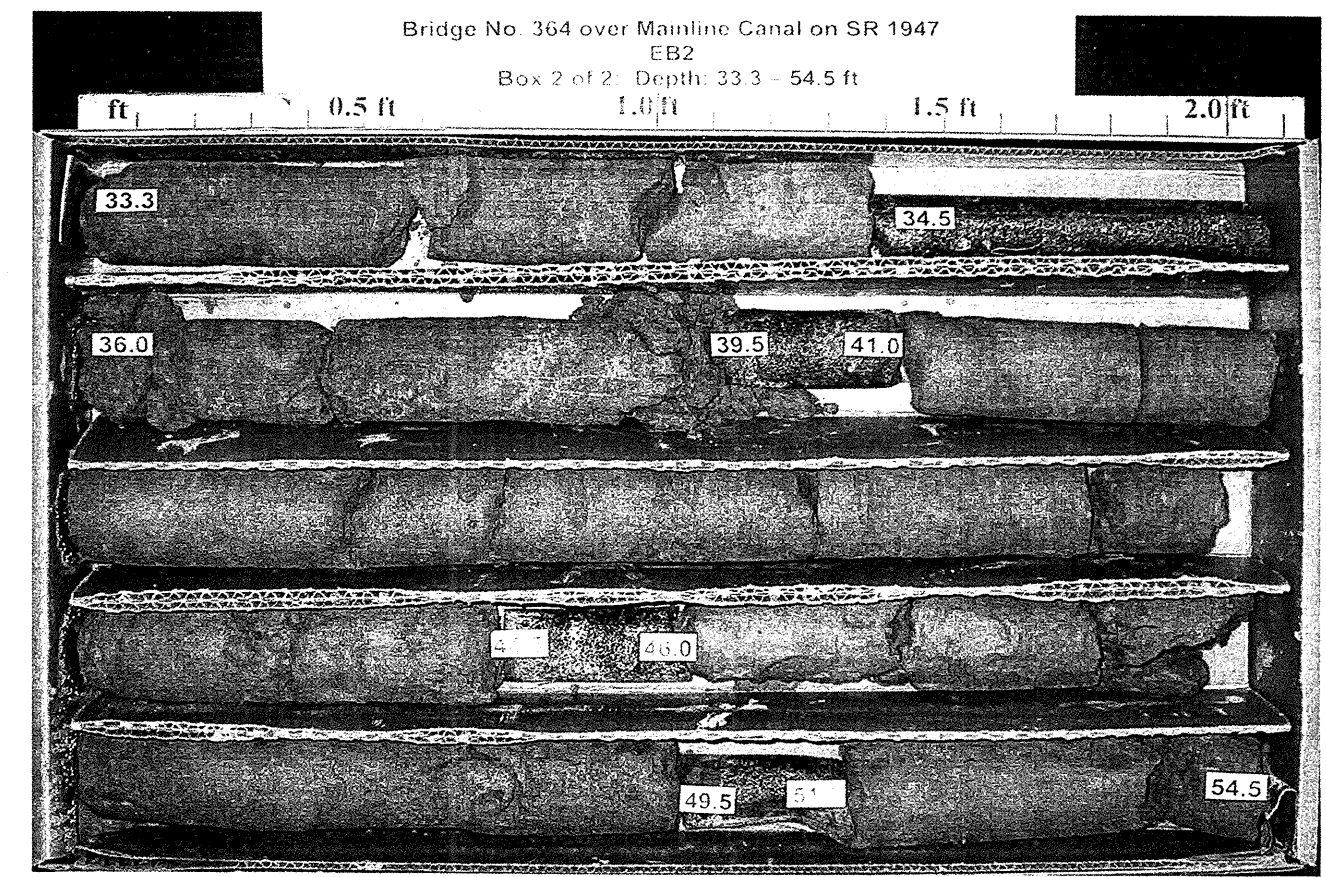
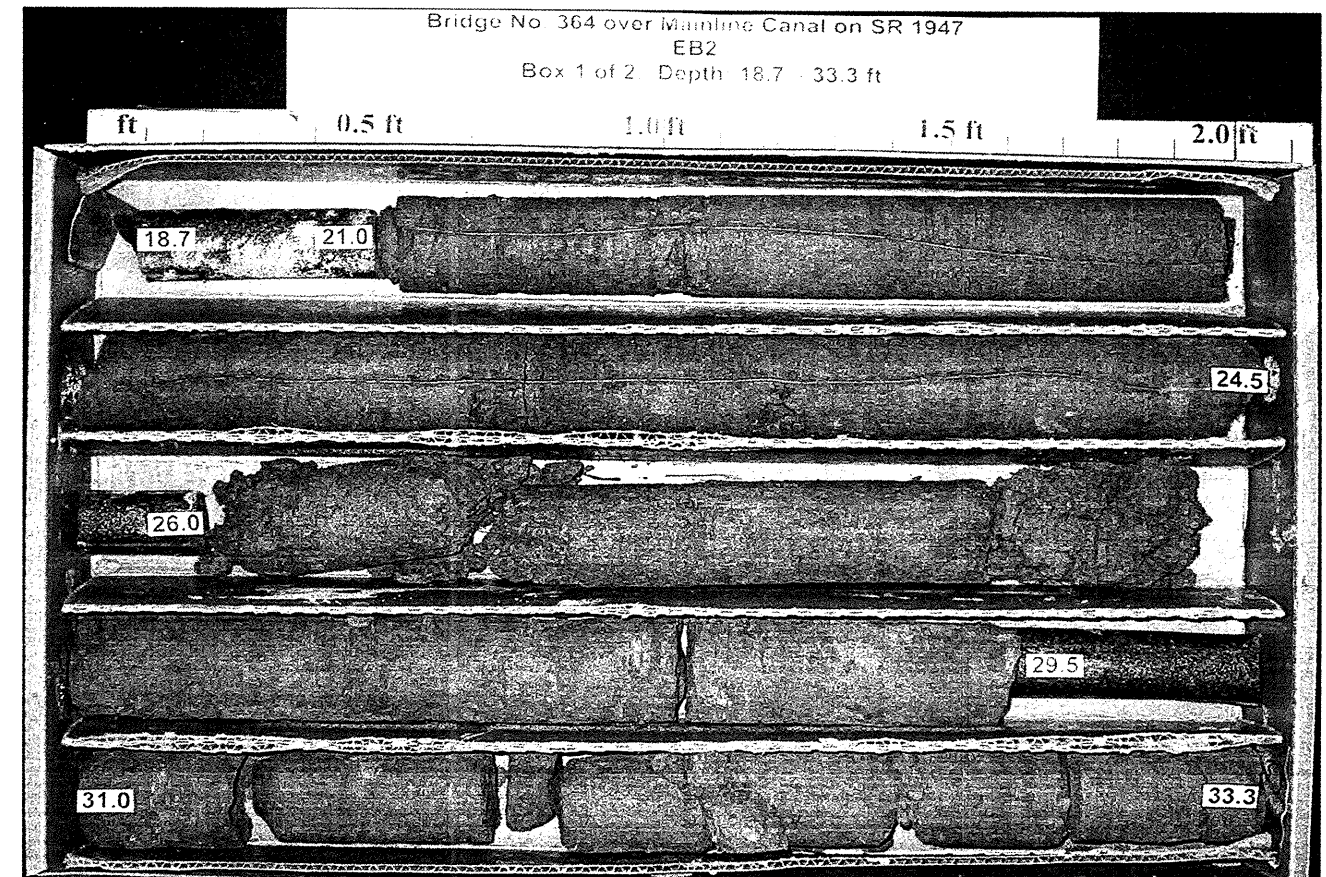
NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)			GROUND WTR (ft) 0 HR. 5.5 24 HR. FIAD
BORING NO. EB2	STATION 39+74	OFFSET 2ft LT	ALIGNMENT -L-
COLLAR ELEV. 47.1 ft	TOTAL DEPTH 92.4 ft	NORTHING 197,734	EASTING 2,159,487
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/23/07	COMP. DATE 10/24/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 16.0 ft

PROJECT NO. 33281.1.1	ID. B-3830	COUNTY Columbus	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge No. 364 Over Mainline Canal on SR 1947 (MACTEC Proj. No. 6468-07-1890)			GROUND WTR (ft) 0 HR. 5.5 24 HR. FIAD
BORING NO. EB2	STATION 39+74	OFFSET 2ft LT	ALIGNMENT -L-
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DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary/Core	HAMMER TYPE Automatic	
START DATE 10/23/07	COMP. DATE 10/24/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 16.0 ft



NCDOT BORE DOUBLE MACTEC 6468-07-1890.GPJ NC_DOT.GDT 11/5/07





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/No.: Bridge No. 364 over Mainline Canal on SR 1947 (6468-07-1890)

PROJECT: 33281.1.1 (B-3830)

COUNTY: Columbus

OWNER: N.C.D.O.T.

DATE SAMPLED: October 2007

RECEIVED: 10/17/2007

REPORTED BY: MACTEC

SAMPLED FROM: EB1

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

Lab Sample No.		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Retained 4.75 mm Sieve (%)		0.0	0.0	0.0	0.0	0.0	2.7
Passing 2.00 mm Sieve (%)		99.8	100.0	100.0	100.0	100.0	95.4
Passing 425 µm Sieve (%)		94.1	91.1	93.4	85.6	96.6	85.2
Passing 75 µm Sieve (%)		5.0	14.1	37.1	26.9	27.6	50.0

MINUS 2.00mm FRACTION


SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm (%)		17.0	17.9	18.4	38.6	13.6	21.2
Fine Sand Ret - 53 µm (%)		79.7	71.2	48.8	35.6	63.7	30.2
Silt 0.05 - 0.005 mm (%)		0.6	1.5	4.5	2.9	1.0	2.4
Clay < 0.005 mm (%)		2.7	9.4	28.3	22.9	21.7	46.2

Moisture Content (%)		ND	ND	ND	ND	ND	22.0
Liquid Limit, L.L.		16	29	18	23	26	32
Plasticity Index, P.I.		NP	9	NP	NP	8	NP
AASHTO Classification		A-3	A-2-4(0)	A-4(0)	A-2-4(0)	A-2-4(0)	A-4(0)
Organic Content (%)		ND	ND	ND	ND	ND	ND

Boring No.		EB1	EB1	EB1	EB1	EB1	EB1
Station		38+58	38+58	38+58	38+58	38+58	38+58
Offset		25 ft LT	25 ft LT	25 ft LT	25 ft LT	25 ft LT	25 ft LT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	2.1	12.1	26.1	36.1	46.1	56.1
	to	3.6	13.6	27.6	37.6	47.6	57.6

REMARKS: ND=Not Determined, NP=Non-Plastic, *=Not Enough Sample

Submitted by:


Senior Geologist



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/No.: Bridge No. 364 over Mainline Canal on SR 1947 (6468-07-1890)

PROJECT: 33281.1.1 (B-3830)

COUNTY: Columbus

OWNER: N.C.D.O.T.

DATE SAMPLED: October 2007

RECEIVED: 10/17/2007

REPORTED BY: MACTEC

SAMPLED FROM: EB1, B1

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

Lab Sample No.		SS-7	SS-8	SS-9	SS-10	SS-11	SS-12
Retained 4.75 mm Sieve (%)		0.0	0.0	0.0	0.0	0.2	0.0
Passing 2.00 mm Sieve (%)		99.4	100.0	100.0	99.9	99.6	100.0
Passing 425 µm Sieve (%)		88.9	99.9	99.2	78.6	78.6	96.2
Passing 75 µm Sieve (%)		40.2	98.3	28.9	6.8	15.6	25.8

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm (%)		21.9	0.3	4.4	74.4	37.1	14.5
Fine Sand Ret - 53 µm (%)		41.8	4.2	68.4	20.1	50.9	64.6
Silt 0.05 - 0.005 mm (%)		6.1	18.1	0.9	0.7	3.6	1.5
Clay < 0.005 mm (%)		30.2	77.4	26.3	4.8	8.3	19.4

Moisture Content (%)		ND	45.3	ND	ND	ND	ND
Liquid Limit, L.L.		30	94	30	17	17	21
Plasticity Index, P.I.		11	66	6	NP	NP	NP
AASHTO Classification		A-6(1)	A-7-6(76)	A-2-4(0)	A-3	A-2-4(0)	A-2-4(0)
Organic Content (%)		ND	ND	ND	ND	ND	ND

Boring No.		EB1	EB1	EB1	EB1	B1	B1
Station		38+58	38+58	38+58	38+58	38+86	38+86
Offset		25 ft LT	25 ft LT	25 ft LT	25 ft LT	18 ft LT	18 ft LT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (ft)	From	66.1	71.1	76.1	86.1	5.6	28.3
	to	67.6	72.6	77.6	87.1	7.1	29.8

REMARKS: ND=Not Determined, NP=Non-Plastic, *=Not Enough Sample

Submitted by:


Senior Geologist



SHEET 24

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/No.: Bridge No. 364 over Mainline Canal on SR 1947 (6468-07-1890)

PROJECT: 33281.1.1 (B-3830)

COUNTY: Columbus

OWNER: N.C.D.O.T.

DATE SAMPLED: October 2007

RECEIVED: 10/17/2007

REPORTED BY: MACTEC

SAMPLED FROM: B1, Channel Bank, Channel Bed

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

Lab Sample No.		SS-13	SS-14	S-1	S-2		
Retained 4.75 mm Sieve	(%)	0.0	0.1	0.0	0.3		
Passing 2.00 mm Sieve	(%)	100.0	99.8	99.6	99.1		
Passing 425 µm Sieve	(%)	99.8	96.7	58.7	66.1		
Passing 75 µm Sieve	(%)	97.1	8.3	6.2	3.9		

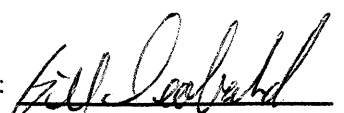
MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - 250 µm	(%)	0.7	32.3	64.0	58.9		
Fine Sand Ret - 53 µm	(%)	5.5	60.6	30.7	37.5		
Silt 0.05 - 0.005 mm	(%)	8.1	0.5	2.0	2.1		
Clay < 0.005 mm	(%)	85.7	6.6	3.3	1.4		

Moisture Content	(%)	43.9	ND	ND	ND		
Liquid Limit, L.L.		95	21	21	21		
Plasticity Index, P.I.		54	NP	NP	NP		
AASHTO Classification		A-7-5(66)	A-3	A-3	A-3		
Organic Content	(%)	ND	ND	ND	ND		

Boring No.		B1	B1	Bank	Bed		
Station		38+86	38+86	39+26	39+19		
Offset		18 ft LT	18 ft LT	3 ft RT	2 ft LT		
Alignment		-L-	-L-	-L-	-L-		
Depth (ft)	From	66.8	76.8	0.0	0.0		
	to	68.3	78.3	0.5	0.5		

REMARKS: ND=Not Determined, NP=Non-Plastic, *=Not Enough Sample

Submitted by: 
Senior Geologist



**FIELD
 SCOUR REPORT**

WBS: 33281.1.1 TIP: B-3830 COUNTY: Columbus

DESCRIPTION(1): Bridge No. 364 over Mainline Canal on SR 1947 (at Friar Swamp)

EXISTING BRIDGE

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

Bridge No.: 364 Length: 90 feet Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
 Foundation Type: Concrete deck on T-beams, onconcrete caps, timber piles, and timber abutments

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Minimal scour at End Bent slopes

Interior Bents: Not visible due to depth of Big Creek

Channel Bed: Not visible

Channel Bank: Banks well vegetated. Scour not apparent

EXISTING SCOUR PROTECTION

Type(3): Timber Abutments and wing walls with asphalt slope protection.

Extent(4): Wing walls extend approx. 8 feet left/right. Slope protection extends a few feet behind wing wall.

Effectiveness(5): Generally working

Obstructions(6): Trace debris at Bent 2

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 theoretical 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): Sand (A-3/A-2-4)

Channel Bank Material(8): Sand (A-3/A-2-4)

Channel Bank Cover(9): Grasses, brush, young to mature pines and hardwoods

Floodplain Width(10): Laterally extensive for hundreds of feet across Friar Swamp

Floodplain Cover(11): Grasses, brush, young to mature pines and hardwoods

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): Migration tendency toward end bent 1

Observations and Other Comments: Very low flow hydraulic environment during the time of investigation

Reported by: *Michael B. V.* Date: 11/5/2007
 MACTEC Engineering and Consulting, Inc.

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

	BENTS									
	B1	B2								
Overtopping Scour (10 Year)	33.9	34.7								

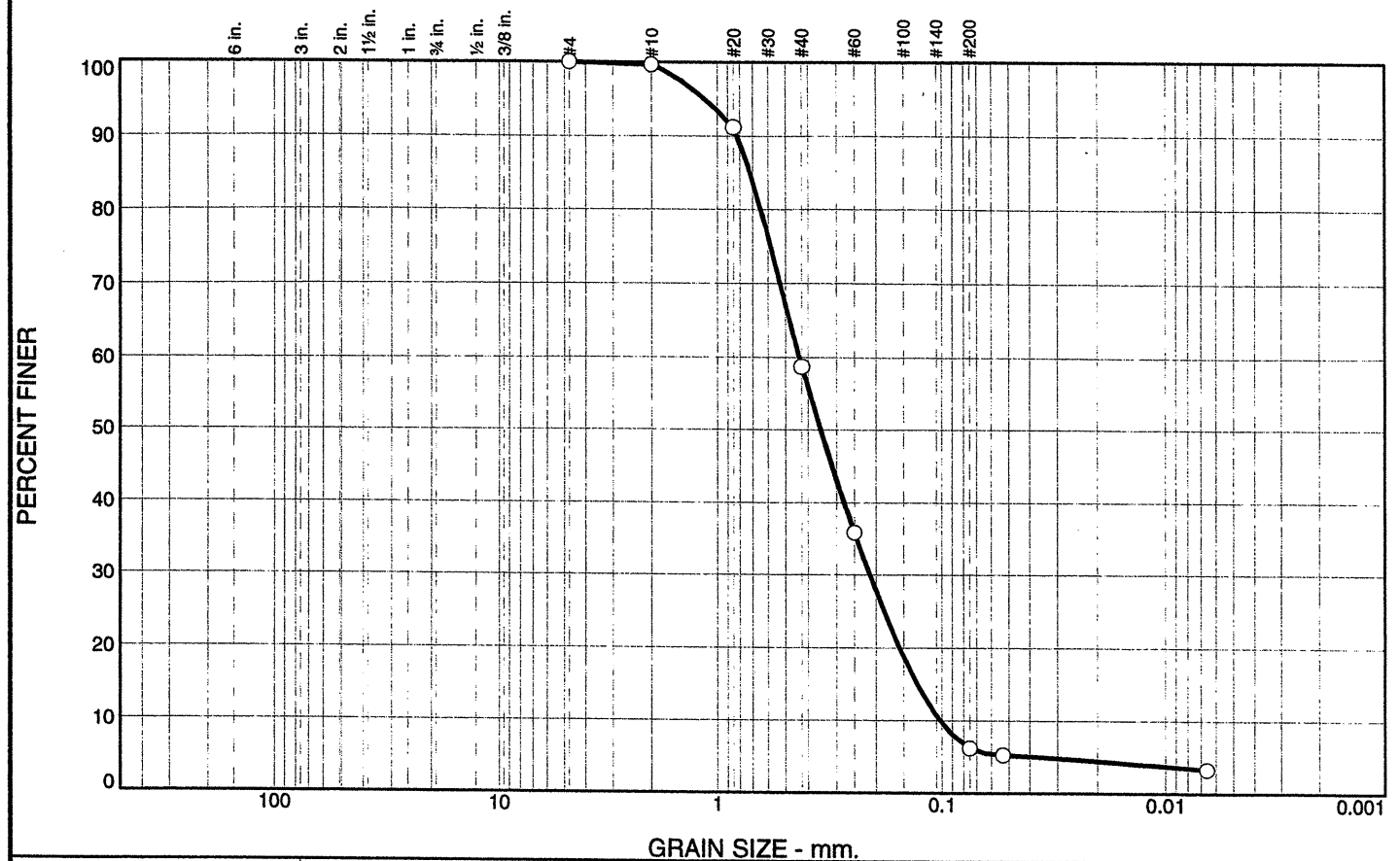
Comparison of DSE to Hydraulics Unit theoretical scour:
 DSE is based on the Bridge Survey and Hydraulics Report dated 5/23/07. Scour elevations at B1 and B2 will remain in alluvial layers.

DSE determined by: *Chad M. Wulfsberg* Date: 3 Dec 2007

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bank	Bed	Bed	Bed		
Sample No.	S-1	S-2	SS-2	SS-11		
Retained #4	0	0.3	0	0.2		
Passed #10	99.6	99.1	100	99.6		
Passed #40	58.7	66.1	91.1	78.6		
Passed #200	6.2	3.9	14.1	15.6		
Coarse Sand	64	58.9	17.9	37.1		
Fine Sand	30.7	37.5	71.2	50.9		
Silt	2	2.1	1.5	3.6		
Clay	3.3	1.4	9.4	8.3		
LL	21	21	29	17		
PI	NP	NP	9	NP		
AASHTO	A-3	A-3	A-2-4(0)	A-2-4(0)		
Station	39+26	39+19	38+58	38+86		
Offset	3 ft RT	2 ft LT	25 ft LT	18 ft LT		
Depth	0.0-0.5 ft	0.0-0.5ft	12.1-13.6ft	5.6-7.1ft		

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	40.9	52.5	6.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.6		
#20	91.2		
#40	58.7		
#60	35.9		
#200	6.2		
#270	5.3		
0.0066 mm.	3.3		

Soil Description
Dark brown silty SAND with organic

Atterberg Limits
PL= NP LL= 21 PI= NP

Coefficients
D₈₅= 0.7208 D₆₀= 0.4359 D₅₀= 0.3528
D₃₀= 0.2130 D₁₅= 0.1296 D₁₀= 0.1020
C_u= 4.27 C_c= 1.02

Classification
USCS= SP-SM AASHTO= A-3

Remarks

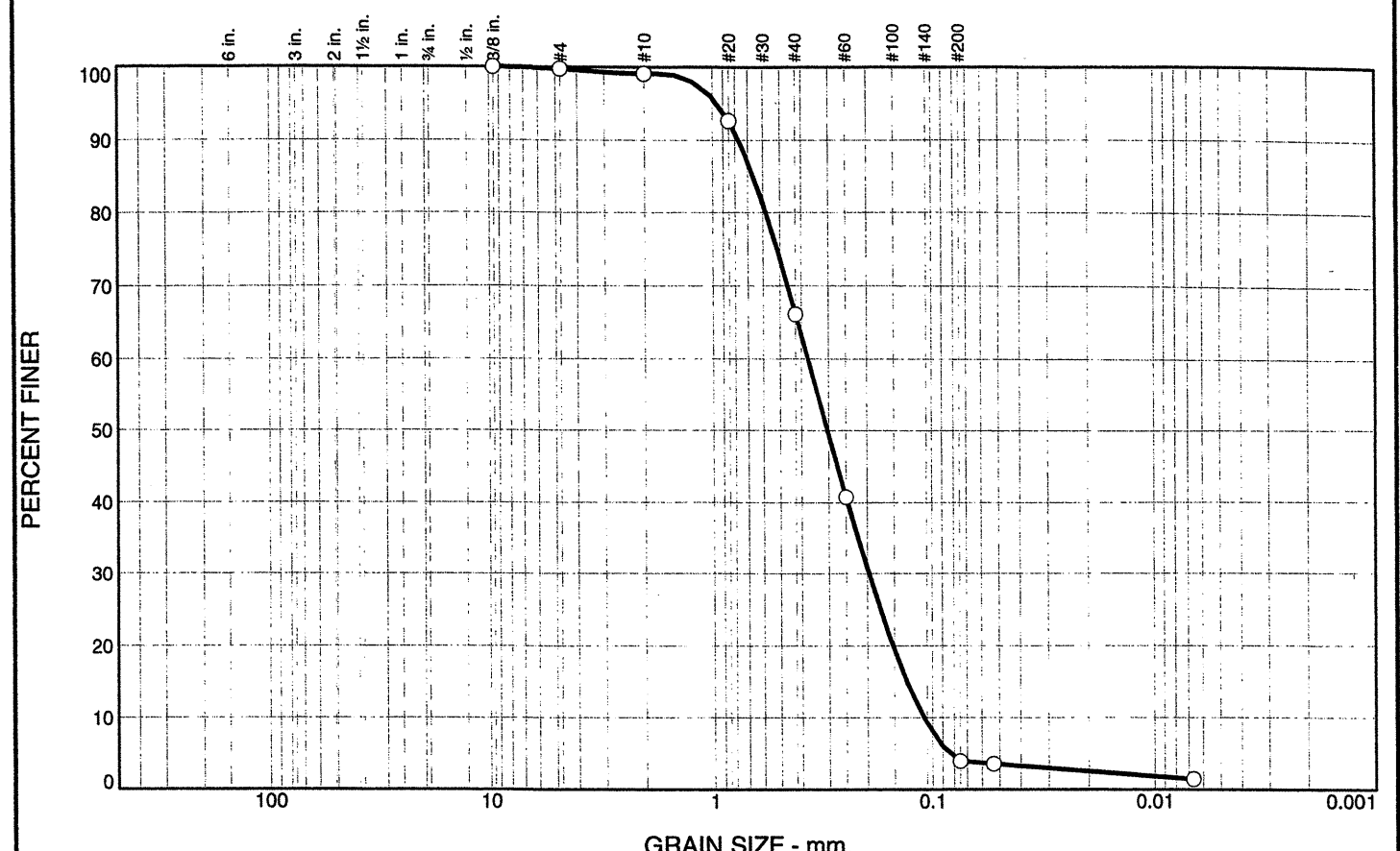
* (no specification provided)

Sample No.: S-1 Source of Sample: Channel Bank Date: 7-13-07
Location: Elev./Depth: 0.0-0.5'

MACTEC, Inc. Raleigh, North Carolina	Client: NC DOT
	Project: Bridge No. 364 over mainline Canal on SR 1947
Project No: 6468-07-1890 Task 5	Figure

Tested By: CS Checked By: LBJ

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.6	33.0	62.2	3.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.7		
#10	99.1		
#20	92.7		
#40	66.1		
#60	40.7		
#200	3.9		
#270	3.5		
0.0067 mm.	1.4		

Soil Description
Dark brown silty SAND with organic

Atterberg Limits
PL= NP LL= 21 PI= NP

Coefficients
D₈₅= 0.6604 D₆₀= 0.3741 D₅₀= 0.3040
D₃₀= 0.1963 D₁₅= 0.1310 D₁₀= 0.1095
C_u= 3.42 C_c= 0.94

Classification
USCS= SP AASHTO= A-3

Remarks

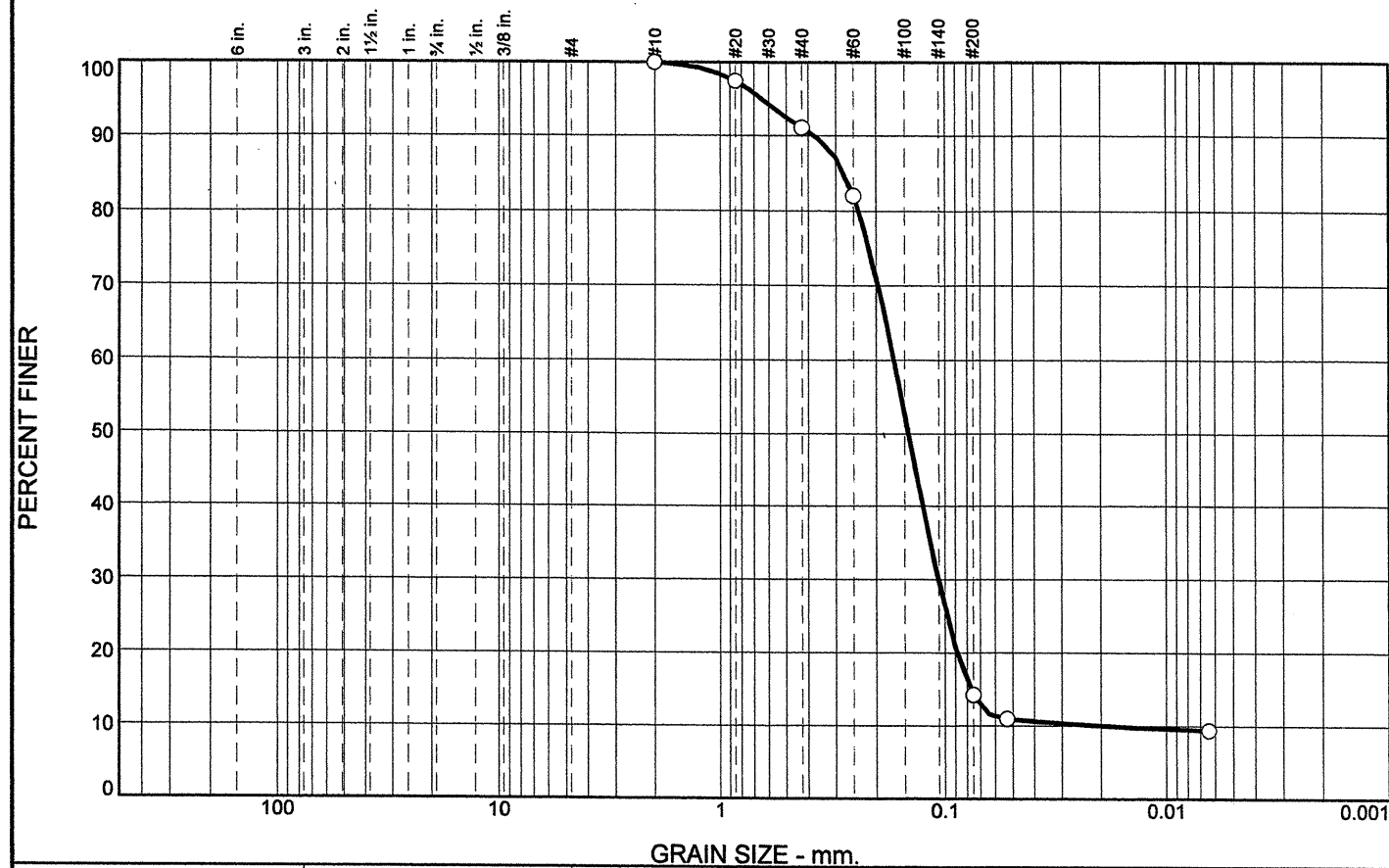
* (no specification provided)

Sample No.: S-2 Source of Sample: Channel Bed Date: 7-13-07
Location: Elev./Depth: 0.0-0.5'

MACTEC, Inc. Raleigh, North Carolina	Client: NC DOT
	Project: Bridge No. 364 over mainline Canal on SR 1947
Project No: 6468-07-1890 Task 5	Figure

Tested By: CS Checked By: LBJ

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	8.9	77.0		14.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	97.5		
#40	91.1		
#60	82.1		
#200	14.1		
#270	10.9		
0.0064 mm.	9.4		

Soil Description
Tan Gray SAND

Atterberg Limits
PL= 20 LL= 29 PI= 9

Coefficients
D₈₅= 0.2739 D₆₀= 0.1669 D₅₀= 0.1443
D₃₀= 0.1068 D₁₅= 0.0774 D₁₀= 0.0199
C_u= 8.38 C_c= 3.43

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

Remarks

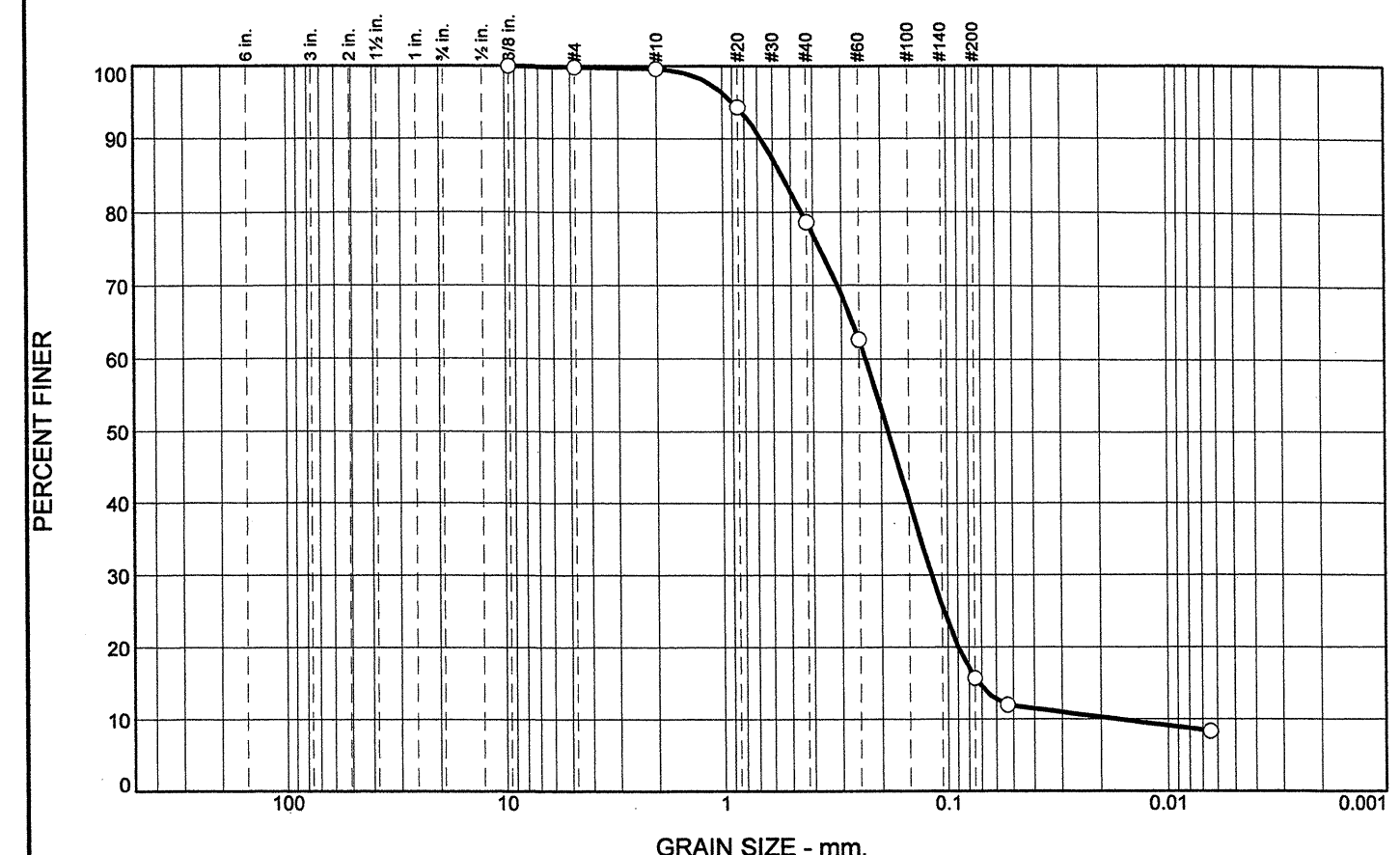
* (no specification provided)

Sample No.: EB1 SS-2 Source of Sample: Canal on SR 1947 Date: 10-17-07
Location: Elev./Depth: 12.1-13.6'

MACTEC, Inc. Raleigh, North Carolina	Client: NC DOT
	Project: Bridge No. 364 over mainline Canal on SR 1947
Project No: 6468071890 Task 05	Figure

Tested By: BKS Checked By: LBJ

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.2	21.0	63.0		15.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.8		
#10	99.6		
#20	94.3		
#40	78.6		
#60	62.6		
#200	15.6		
#270	11.9		
0.0065 mm.	8.3		

Soil Description
Greenish Gray SAND

Atterberg Limits
PL= NP LL= 17 PI= NP

Coefficients
D₈₅= 0.5430 D₆₀= 0.2339 D₅₀= 0.1851
D₃₀= 0.1183 D₁₅= 0.0726 D₁₀= 0.0173
C_u= 13.51 C_c= 3.45

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

Remarks

* (no specification provided)

Sample No.: B1 SS-11 Source of Sample: Canal on SR 1947 Date: 10-18-07
Location: Elev./Depth: 5.6-7.1'

MACTEC, Inc. Raleigh, North Carolina	Client: NC DOT
	Project: Bridge No. 364 over mainline Canal on SR 1947
Project No: 6468071890 Task 05	Figure

Tested By: BKS Checked By: LBJ



View looking upstation along -L- from near End Bent 1.



View looking left to right along End Bent 1.



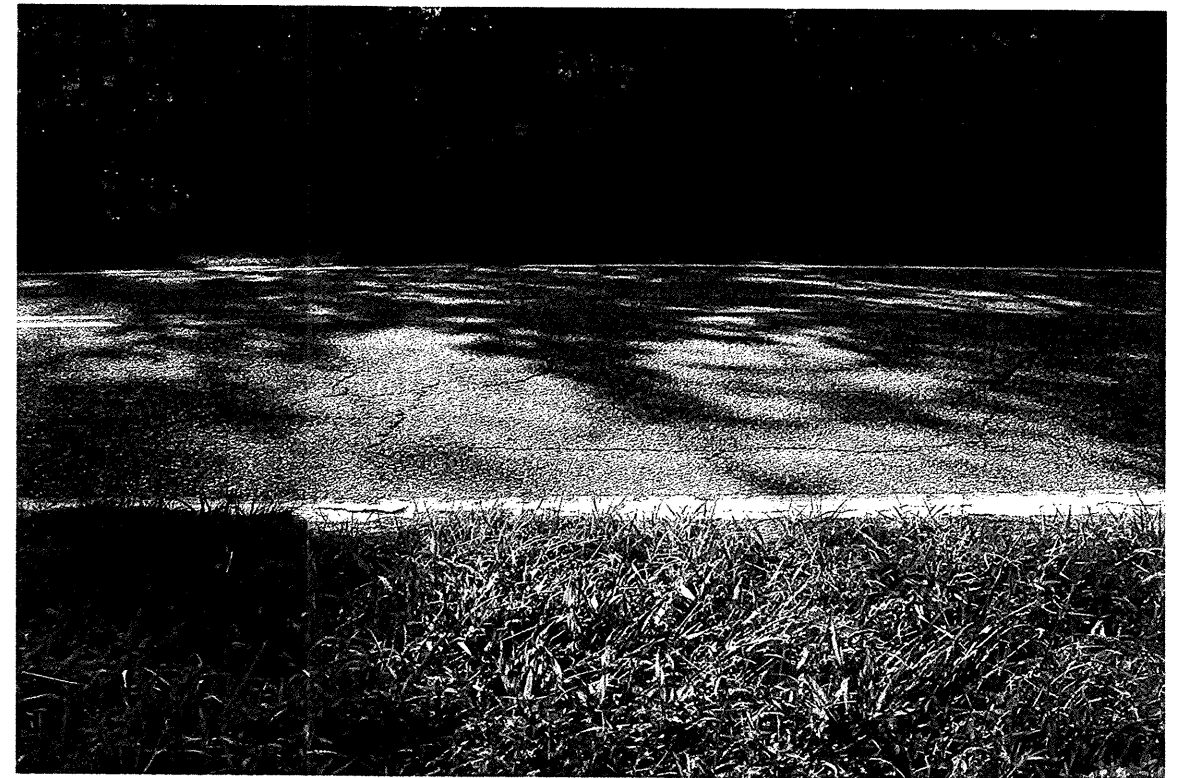
View looking down station along -L- from near End Bent 2.



View looking left to right along Bent 1.



View looking left to right along Bent 2.



View looking left to right along End Bent 2.

PROJECT: 33281.1.1 ID: B-3830

CONTENTS:

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3-4	PLAN SHEETS
5-7	PROFILE(S)

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33281.1.1 (B-3830) F.A. PROJ. BRZ-1947(1)

COUNTY COLUMBUS

PROJECT DESCRIPTION BRIDGE NO. 363 AND NO. 364 OVER GREEN SWAMP ON SR 1947

SITE DESCRIPTION RETAINING WALL 1 LEFT OF -L- STA. 17+00

RETAINING WALL 2 RIGHT OF -L- STA. 21+50

RETAINING WALL 3 RIGHT OF -L- STA. 40+00

RETAINING WALL 4 LEFT OF -L- STA. 40+00

RETAINING WALL INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33281.1.1 (B-3830)	1	7
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33281.1.1	BRZ-1947(1)	P.E.	
		RW & UTIL.	

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS 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 ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN 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.

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PERSONNEL

TJB
JRS
WNC
RES

INVESTIGATED BY J.L. STONE

CHECKED BY D.N. ARGENBIRGHT

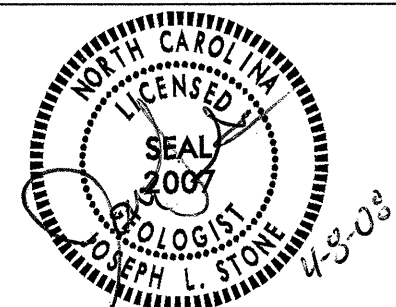
SUBMITTED BY D.N. ARGENBRIGHT

DATE APRIL 2008

DRAWN BY: J.L. STONE, C.P. TURNER, C.R. SUMNER

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

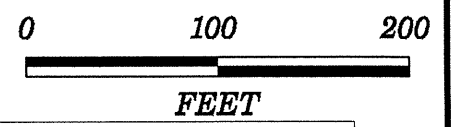
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																							
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLES:</p> <p style="text-align: center;"><i>VERY STIFF, GRANULY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>	<p>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)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u>, <u>SUBANGULAR</u>, <u>SUBROUNDED</u>, OR <u>ROUNDED</u>.</p>	<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>	<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (RQD) - 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.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) 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 PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																							
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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </table> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p style="text-align: center;">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP</p>	ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p style="text-align: center;">WEATHERING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>WEATHERED ROCK (WR)</th> <th>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</th> </tr> <tr> <th>CRYSTALLINE ROCK (CR)</th> <th>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. 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IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>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.</p> <p>MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KADOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p>SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KADOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i></p> <p>VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i></p> <p>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.</p>	WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. 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MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.																																																																																																																																																																									
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.																																																																																																																																																																									
SOFT	CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.																																																																																																																																																																									
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.																																																																																																																																																																									
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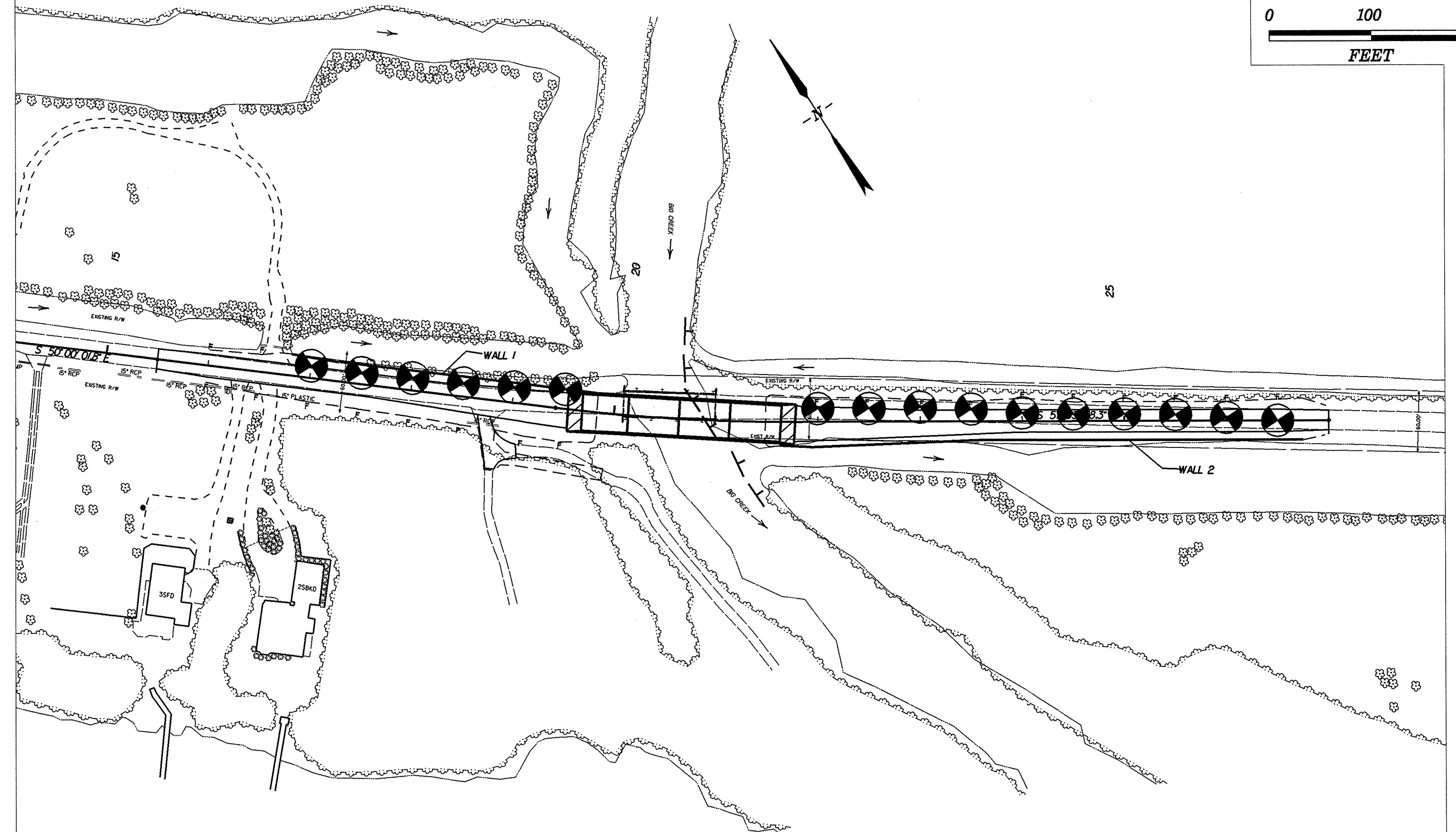
SITE PLAN

PROJECT REFERENCE NO. <i>B3830</i>	SHEET NO. 3
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



REVISIONS

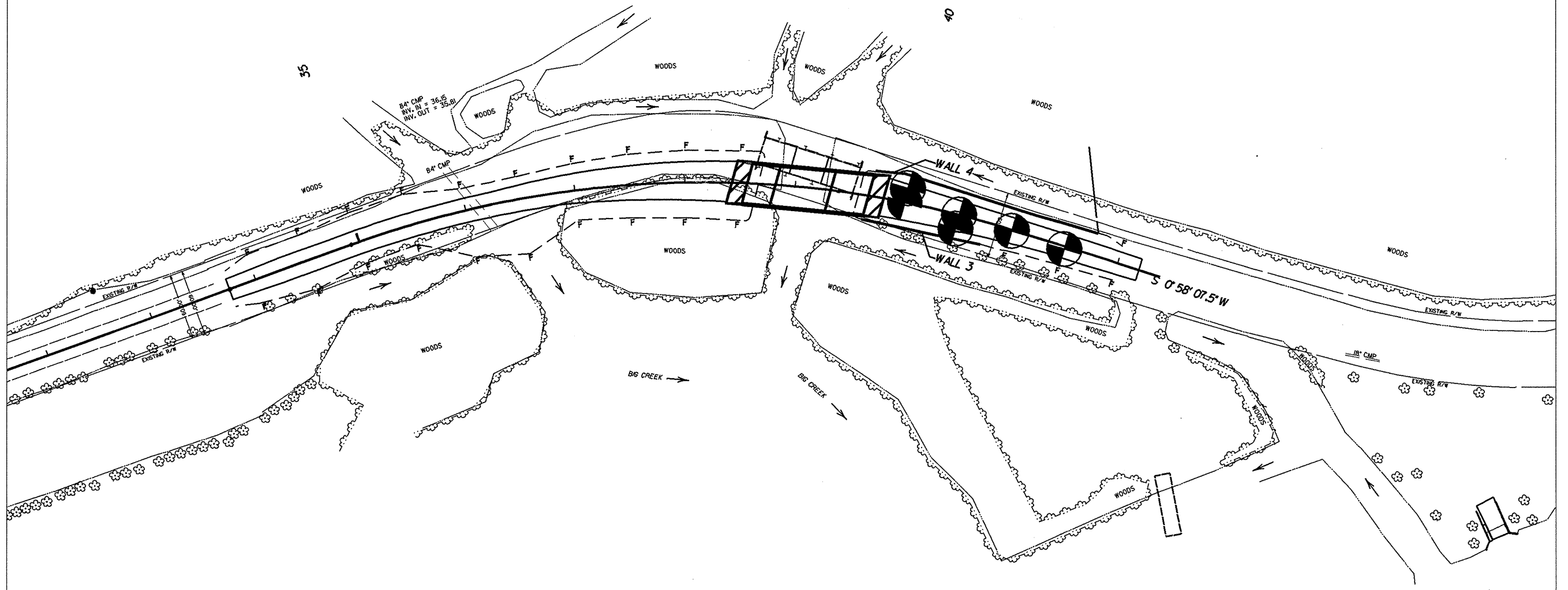
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SITE PLAN

PROJECT REFERENCE NO. <i>B3830</i>	SHEET NO. <i>4</i>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
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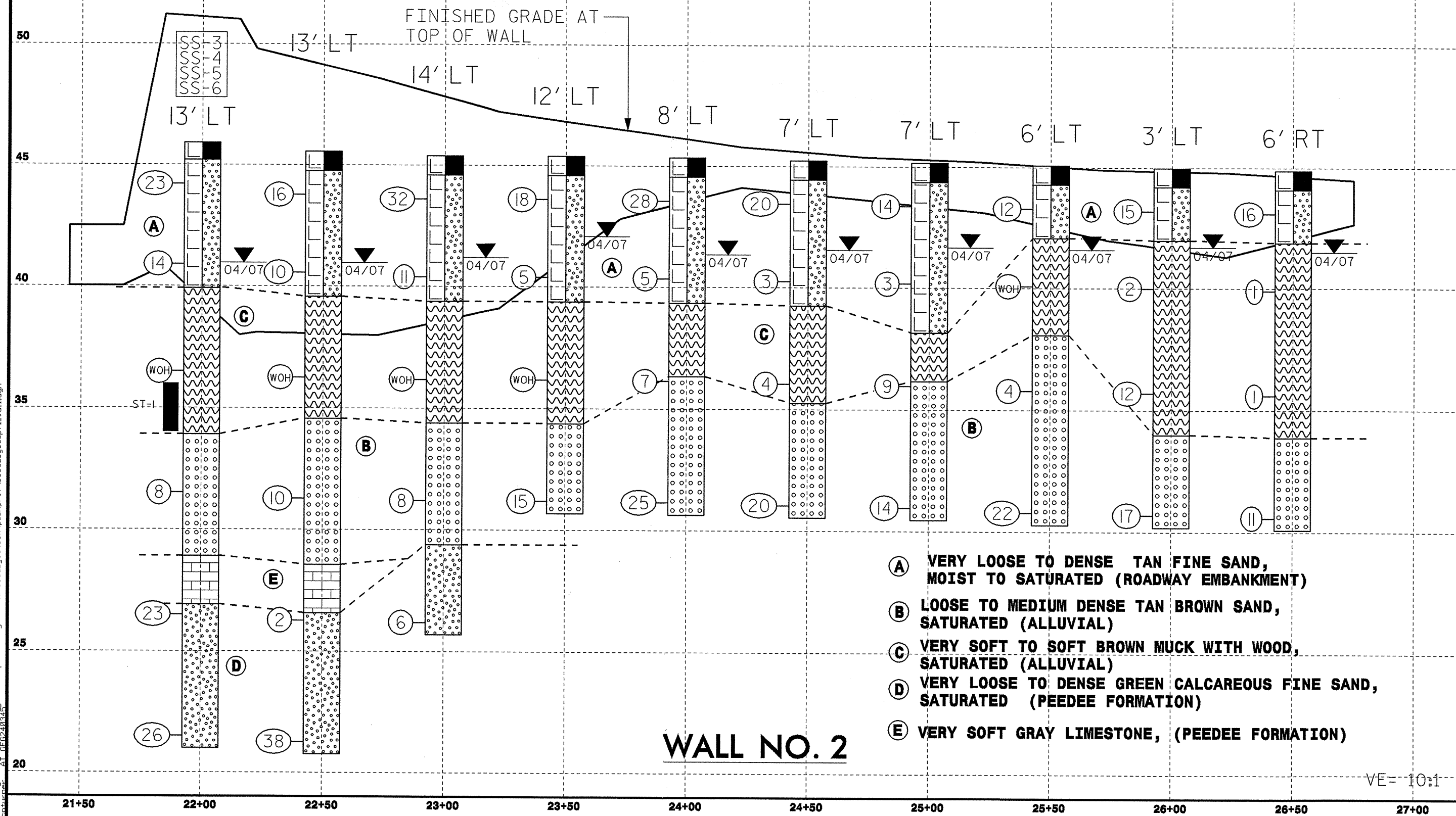
0 100 200
FEET



RETAINING WALL AT -L- STA. 21+50

PROJECT REFERENCE NO. 33281JJ(B-3830)	SHEET NO. 6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C.SAND	F.SAND	SILT	CLAY	10	40	200			
																10
SS-3	13' Lt	22+00	0.70-2.20	A-2-4(0)	19	NP	6.5	51.3	7.7	4.5	100	79	13	-	-	
SS-4	13' LT	22+00	8.40-9.90	NOT ENOUGH SAMPLE												30.3
ST-1	13' LT	22+00	9.9-11.9	A-2-5(0)	43	NP	4.8	81.0	9.2	5.1	99	97	17	-	12.1	
SS-5	13' Lt	22+00	13.40-14.90	A-3(0)	16	NP	70.7	29.2	0.1	0.0	100	60	1	-	-	
SS-6	13' Lt	22+00	23.40-24.90	A-2-4(0)	19	NP	16.2	61.7	14.0	8.1	100	95	24	-	-	



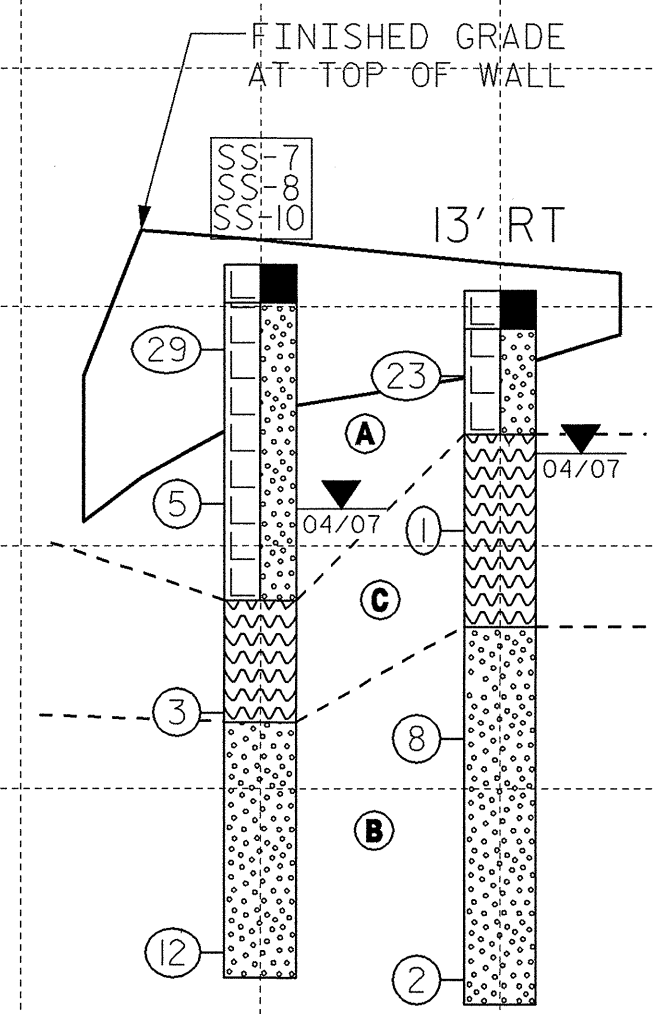
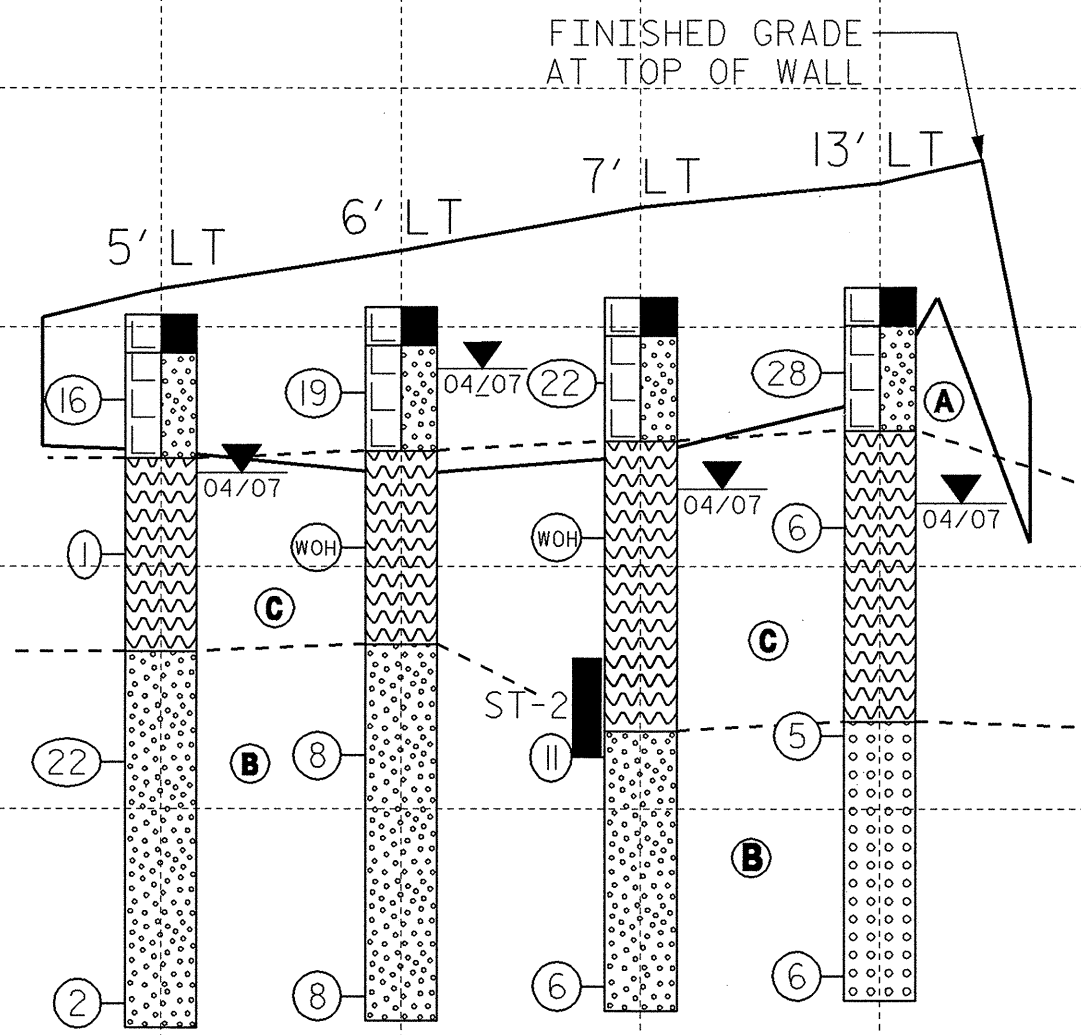
- (A)** VERY LOOSE TO DENSE TAN FINE SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
- (B)** LOOSE TO MEDIUM DENSE TAN BROWN SAND, SATURATED (ALLUVIAL)
- (C)** VERY SOFT TO SOFT BROWN MUCK WITH WOOD, SATURATED (ALLUVIAL)
- (D)** VERY LOOSE TO DENSE GREEN CALCAREOUS FINE SAND, SATURATED (PEEDEE FORMATION)
- (E)** VERY SOFT GRAY LIMESTONE, (PEEDEE FORMATION)

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RETAINING WALLS NO. 4 AND NO. 3 AT -L- STA. 40+00

PROJECT REFERENCE NO. 3328111(B-3830)	SHEET NO. 7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	CL	40+00	0.80-2.30	A-2-4(0)	21	NP	22.1	66.9	6.5	4.5	100	90	12	-	-
SS-8	CL	40+00	4.00-5.50	A-2-4(0)	21	5	46.9	22.9	13.6	16.6	100	67	31	-	-
SS-10	CL	40+00	13.30-14.80	A-2-4(0)	16	NP	50.2	35.9	8.7	5.2	100	70	15	-	-



- (A)** LOOSE TO MEDIUM DENSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
- (B)** LOOSE TO MEDIUM DENSE TAN BROWN SAND, SATURATED (ALLUVIAL)
- (C)** VERY SOFT TO SOFT BROWN MUCK WITH WOOD, SATURATED (ALLUVIAL)

WALL NO. 4

VE= 10:1

WALL NO. 3

VE= 10:1

42+50 42+00 41+50 41+00 40+50 40+00 39+50 39+50 40+00 40+50 41+00 41+50

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