

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 35801.1.1 (U-3810) F.A. PROJ. STP-1406(4)
 COUNTY ONSLOW
 PROJECT DESCRIPTION BRIDGES ON SR 1406 AT -L- STATIONS
84+77 AND 234+34
 SITE DESCRIPTION BRIDGE ON SR 1406 AT -L- STATION 234+34

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.

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.

For Letting

PROJECT: 35801.1.1 ID: U-3810

PERSONNEL

C. FREDETTE

T. HAHN

P. PITTS

INVESTIGATED BY MACTEC

CHECKED BY B. DEOBALD

SUBMITTED BY S. JOHNSON

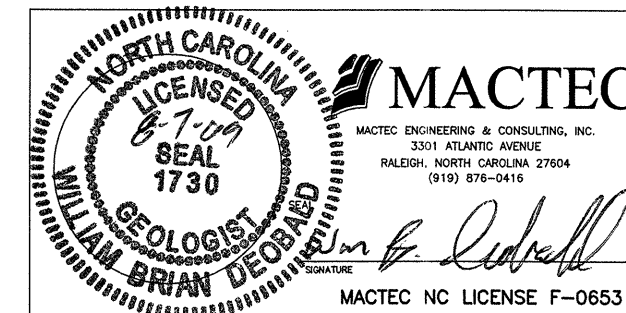
DATE JULY 10, 2009

REVISED AUGUST 7, 2009

DRAWN BY: R. RAHIE

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.

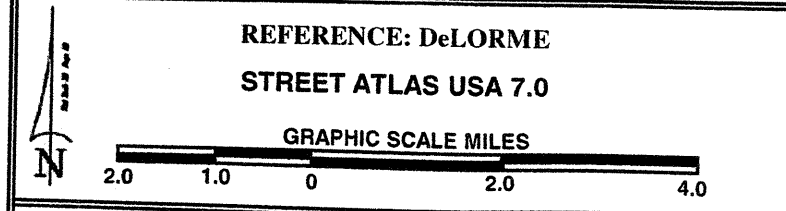
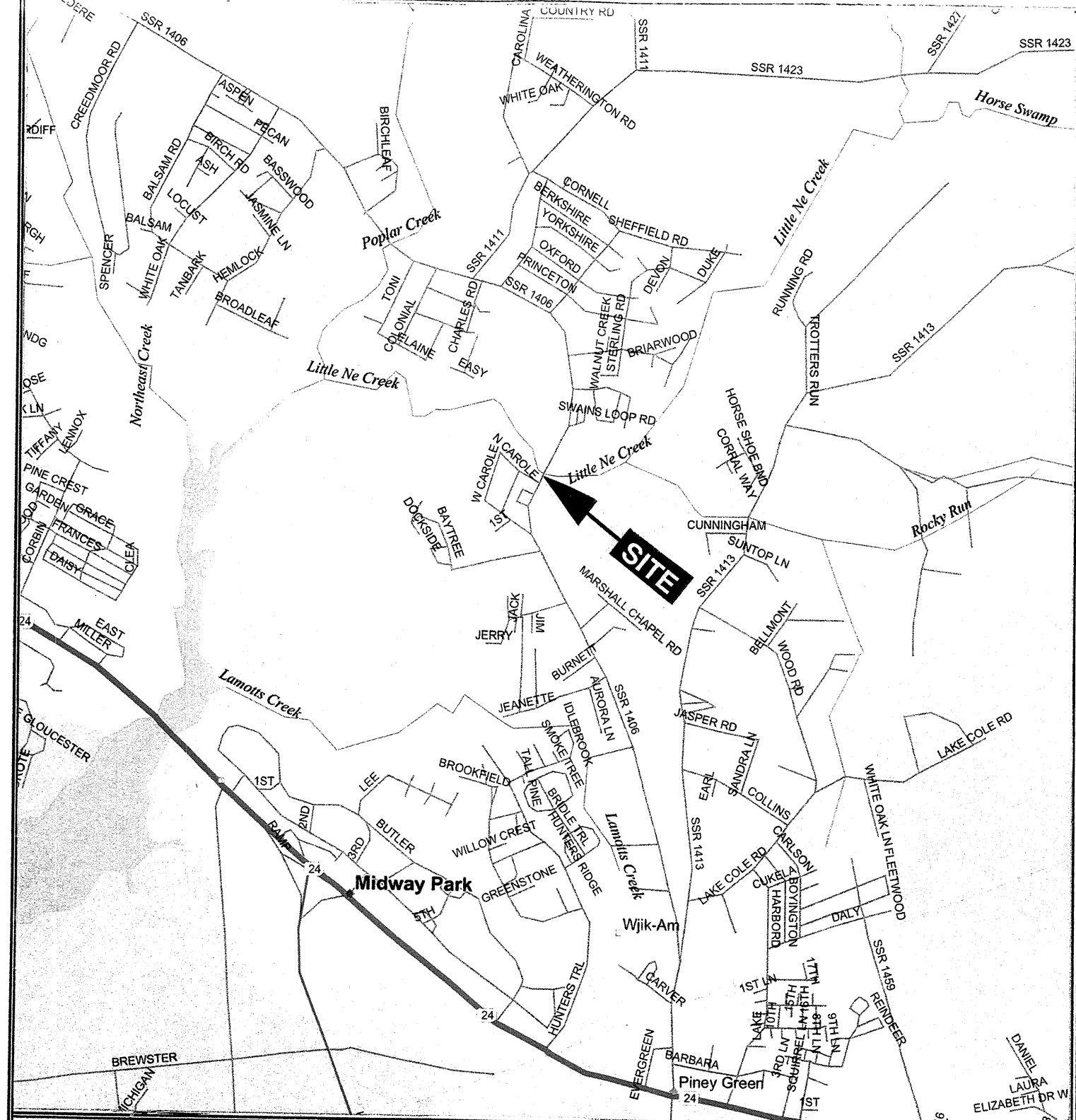


NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS	
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. 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.		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. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:		ALLUVIUM (ALLUV.) - SOILS THAT 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 THAT 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 (FP) - 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 (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - 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 THAT 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, THAT 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 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. 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 (SRQD) - 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 (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERED ROCK (WR)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	
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.		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.	
GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-4, A-5, A-6, A-7		COMPRESSIBILITY		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.	
SYMBOL		SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		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.	
% PASSING #10, #40, #200		PERCENTAGE OF MATERIAL		WEATHERING		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	
LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX		ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL		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.	
USUAL TYPES OF MAJOR MATERIALS		GROUND WATER		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.	
GEN. RATING AS A SUBGRADE		MISCELLANEOUS SYMBOLS		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.	
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION, SOIL SYMBOL, ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT, INFERRED SOIL BOUNDARY, INFERRED ROCK LINE, ALLUVIAL SOIL BOUNDARY, DIP & DIP DIRECTION OF ROCK STRUCTURES, SOUNDING ROD		SEVERE (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.	
CONSISTENCY OR DENSENESS		SPT DMT VST TEST BORING, AUGER BORING, CORE BORING, MONITORING WELL, PIEZOMETER INSTALLATION, SLOPE INDICATOR INSTALLATION, SPT N-VALUE, SPT REFUSAL		VERY SEVERE (V 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 KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF.	
PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		SAMPLE DESIGNATIONS: S - BULK SAMPLE, SS - SPLIT SPOON SAMPLE, ST - SHELBY TUBE SAMPLE, RS - ROCK SAMPLE, RT - RECOMPACTED TRIAXIAL SAMPLE, CBR - CALIFORNIA BEARING RATIO SAMPLE		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.	
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		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.	
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, CL - CLAY, CPT - CONE PENETRATION TEST, CSE. - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, e - VOID RATIO, F - FINE, FOSS. - FOSSILIFEROUS, FRAC. - FRACTURED, FRACTURES, FRAGS. - FRAGMENTS, HL - HIGHLY, MED. - MEDIUM, MICA. - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, ORG. - ORGANIC, PMT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILT, SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, w - MOISTURE CONTENT, v - VERY, VST - VANE SHEAR TEST, WEA. - WEATHERED, gamma - UNIT WEIGHT, gamma_d - DRY UNIT WEIGHT		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.	
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		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.	
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION		DRILL TYPES: MOBILE B-, BK-51, CME-45C, CME-55, PORTABLE HOIST; ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG.-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE 2 7/8" STEEL TEETH, TRICONE 3 7/8" STEEL TEETH; CORE BIT; HAMMER TYPE: AUTOMATIC, MANUAL; CORE SIZE: B, N, H; HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST		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.		FRACTURE SPACING: TERM, SPACING; BEDDING: TERM, THICKNESS	
PLASTICITY		NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY		INDURATION		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
PLASTICITY INDEX (PI), DRY STRENGTH		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.	
COLOR		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.		BENCH MARK: NCDOT REBAR AND CAP STAMPED BL-4I LOCATED AT STATION 235+14.12, 52.2 RT, -BL-. ELEVATION: 7.03 FT.		NOTES: BOLD CIRCLE INDICATES TESTED SAMPLE. FIAD - FILLED IMMEDIATELY AFTER DRILLING	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.							

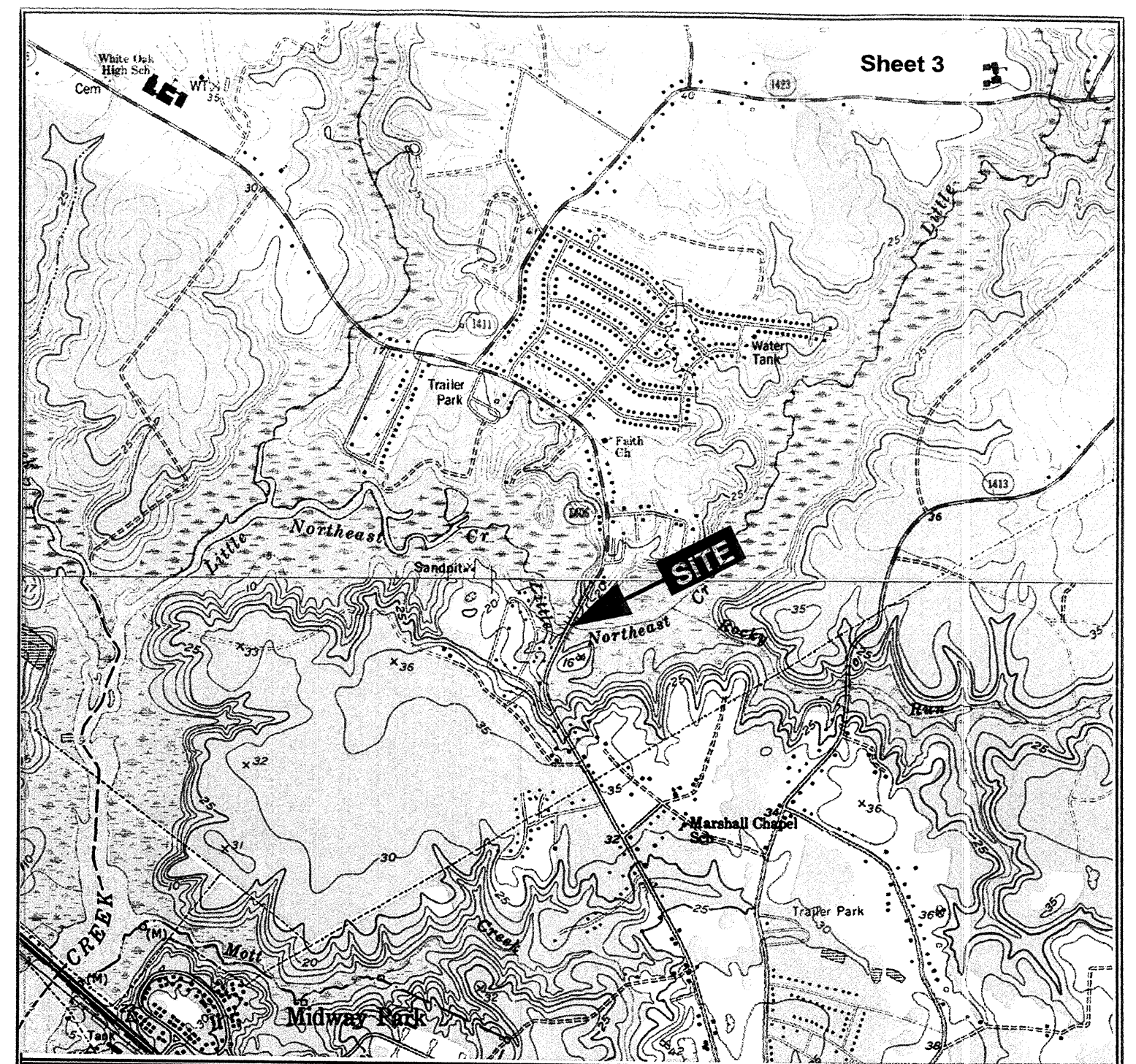


NOTE: SITE LOCATION IS APPROXIMATE

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

SITE LOCATION MAP
BRIDGE ON SR 1406 AT -L- STATION 234+34
NCDOT PROJ. NO. 35801.1.1 (U-3810)
ONSLOW COUNTY, NORTH CAROLINA

DRAWN: JPH	DATE: MAY 2009	DRAWING
APPROVAL: <i>WFD</i>	SCALE: 1" = 2 miles	1
REVISED:	JOB: 6468-09-2400	



CAMP LEJEUNE, N.C.
CAMP LEJEUNE QUARDANGLE
34077-F3-TF-024
1952
PHOTO REVISED 1971
DMA 5553 III NE-SERIES V842
CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

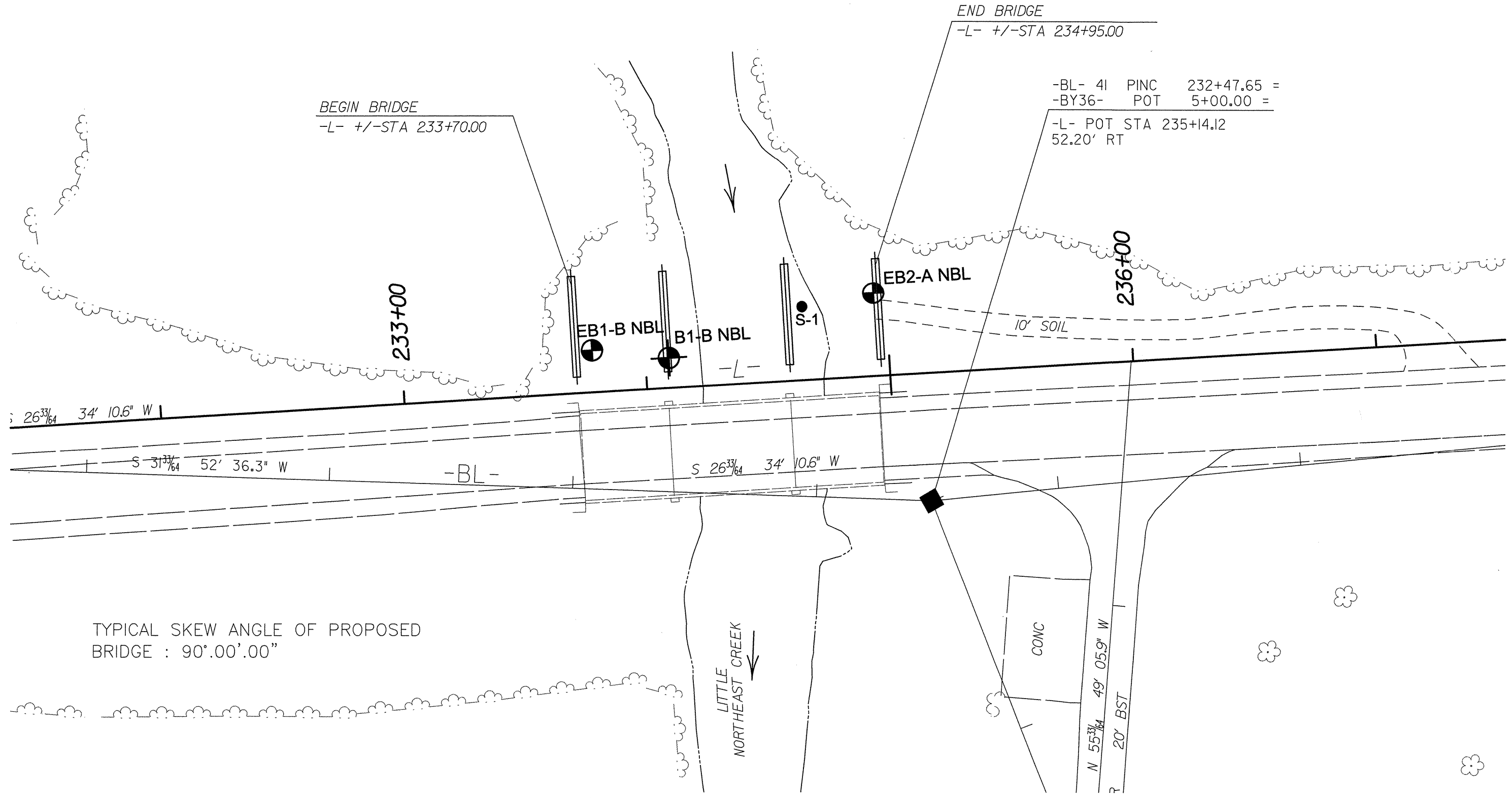
GRAPHIC SCALE FEET

NOTE: SITE LOCATION IS APPROXIMATE

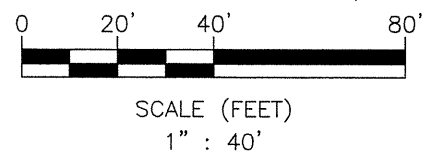
MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

TOPOGRAPHIC SITE MAP
BRIDGE ON SR 1406 AT -L- STATION 234+34
NCDOT PROJ. NO. 35801.1.1 (U-3810)
ONSLOW COUNTY, NORTH CAROLINA

DRAWN: JPH	DATE: MAY 2009	DRAWING
APPROVAL: <i>WFD</i>	SCALE: 1:24000	2
REVISED:	JOB: 6468-09-2400	



TYPICAL SKEW ANGLE OF PROPOSED BRIDGE : 90°.00'.00"



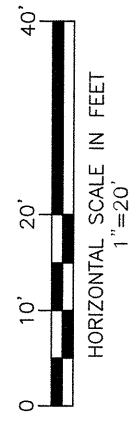
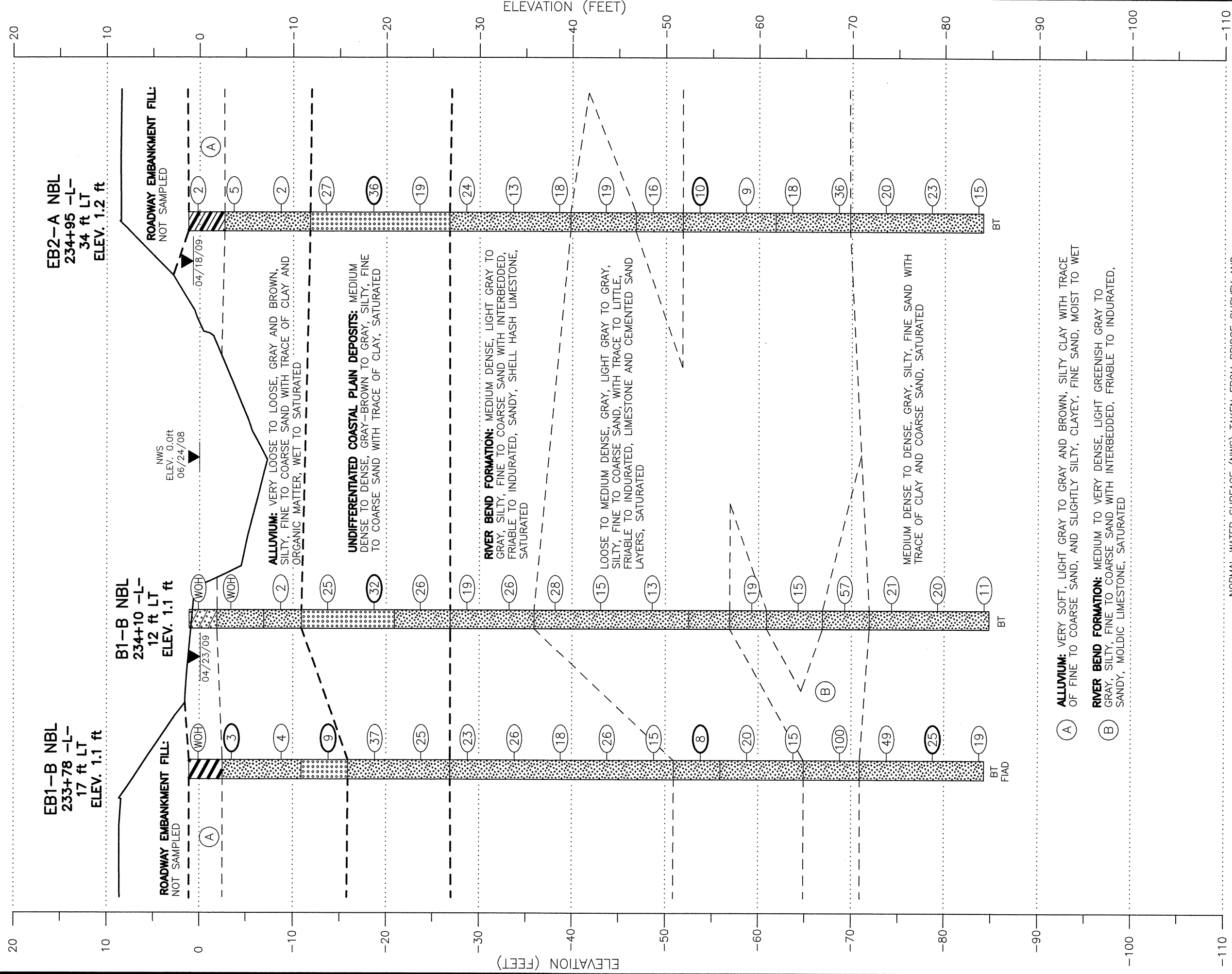
BORING LOCATION PLAN
 BRIDGE ON SR 1406 AT STATION 234+34
 NCDOT PROJECT NO. 35801.1.1 (U-3810)
 F.A. No. STP-1406(4)
 ONSLOW COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 07/10/09
08/7/09	DFT CHECK:	W.B.D.	JOB : 6468-09-2400
	ENG CHECK:	J.E.V.	DWG: 3

REFERENCE: NCDOT PRELIMINARY ROADWAY PLAN (SHEET 20) UNDATED DRAWING RECEIVED BY MACTEC 4/1/2009.

234+00

235+00



- NORMAL WATER SURFACE (NWS) TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT UNDATED.
- GROUND LINE PROFILE AT -L- TAKEN FROM PRELIMINARY GENERAL DRAWING DATED 2/17/09.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

PROFILE 54.5 FT LT OF -L-
BRIDGE ON SR 1406 AT STATION 234+34
NCDOT PROJECT NO. 35801.1.1 (U-3810)
F.A. No. STP-1406(4)
ONSLOW COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DATE	R.R.	DATE
08/7/09	07/10/09		
DFT CHECK:	W.B.D.	JOB:	6488-09-2400
ENG CHECK:	J.E.V.	DWG:	4



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Fredette, C.
SITE DESCRIPTION Bridges on SR 1406 at Station 234+34 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. EB1-B NBL	STATION 233+78	OFFSET 17ft LT	ALIGNMENT -L-
COLLAR ELEV. 1.1 ft	TOTAL DEPTH 85.4 ft	NORTHING 367,572	EASTING 2,501,920
DRILL MACHINE CME-55 TRACK	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/21/09	COMP. DATE 04/21/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Fredette, C.
SITE DESCRIPTION Bridges on SR 1406 at Station 234+34 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. EB1-B NBL	STATION 233+78	OFFSET 17ft LT	ALIGNMENT -L-
COLLAR ELEV. 1.1 ft	TOTAL DEPTH 85.4 ft	NORTHING 367,572	EASTING 2,501,920
DRILL MACHINE CME-55 TRACK	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/21/09	COMP. DATE 04/21/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
0	1.1	0.0	WOH	WOH	WOH									GROUND SURFACE	0.0
-5	-2.5	3.6	WOH	1	2						SS-1	Sat.		Alluvium: Gray and brown, silty CLAY (A-7-6)	-3.6
-10	-7.8	8.9		2	2							Sat.		Gray-brown, silty, fine to coarse SAND (A-2-4), with trace of clay and organic matter	-8.9
-15	-12.8	13.9		3	3							Sat.		Gray, fine to coarse SAND (A-3), with trace of silt	-13.9
-20	-17.8	18.9		18	17							Sat.		Undifferentiated Coastal Plain Deposits: Gray, silty, fine SAND (A-2-4)	-18.9
-25	-22.8	23.9		8	13							Sat.			-23.9
-30	-27.8	28.9		19	10							Sat.		River Bend Formation: Light gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to indurated, sandy shell hash limestone	-28.9
-35	-32.8	33.9		13	14							Sat.			-33.9
-40	-37.8	38.9		9	10							Sat.			-38.9
-45	-42.8	43.9		10	13							Sat.			-43.9
-50	-47.8	48.9		8	8							Sat.			-48.9
-55	-52.8	53.9		3	3						SS-3	Sat.		Gray, silty, fine to coarse SAND (A-2-4), with trace of clay	-53.9
-60	-57.8	58.9		6	9							Sat.		Gray, silty, fine to coarse SAND (A-2-4) with trace of cemented sand layers	-58.9
-65	-62.8	63.9		5	5							Sat.			-63.9
-70	-67.8	68.9		15	15							Sat.		Light greenish gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to moderately indurated, sandy moldic limestone	-68.9
-75	-72.8	73.9		60	25							Sat.		Gray, silty, fine SAND (A-2-4) with trace of clay and coarse sand	-73.9

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-75															
-80	-77.8	78.9		5	10							Sat.		Gray, silty, fine SAND (A-2-4) with trace of clay and coarse sand (continued)	-78.9
-85	-82.8	83.9		4	7							Sat.			-83.9
-90														Boring Terminated at Elevation -84.3 ft in gray silty fine sand.	-84.3
-95														1) Advanced 2-7/8" tricone roller to 83.9 feet.	
-100														2) Set 3.5 feet of NW casing.	
-105														3) Water with quickgel added used as drilling fluid.	
-110														4) Approximate drilling fluid density 8.5 lbs/gallon.	
-115														Other Samples: ST-1 (1.1 - 3.1)	
-120															
-125															
-130															
-135															
-140															
-145															
-150															
-155															

NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 234+34.GPJ NC_DOT.GDT 8/6/09

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Fredette, C.
SITE DESCRIPTION Bridges on SR 1406 at Station 234+34 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B1-B NBL	STATION 234+10	OFFSET 12ft LT	ALIGNMENT -L-
COLLAR ELEV. 1.1 ft	TOTAL DEPTH 85.9 ft	NORTHING 367,546	EASTING 2,501,902
DRILL MACHINE CME-55 TRACK	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/21/09	COMP. DATE 04/22/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

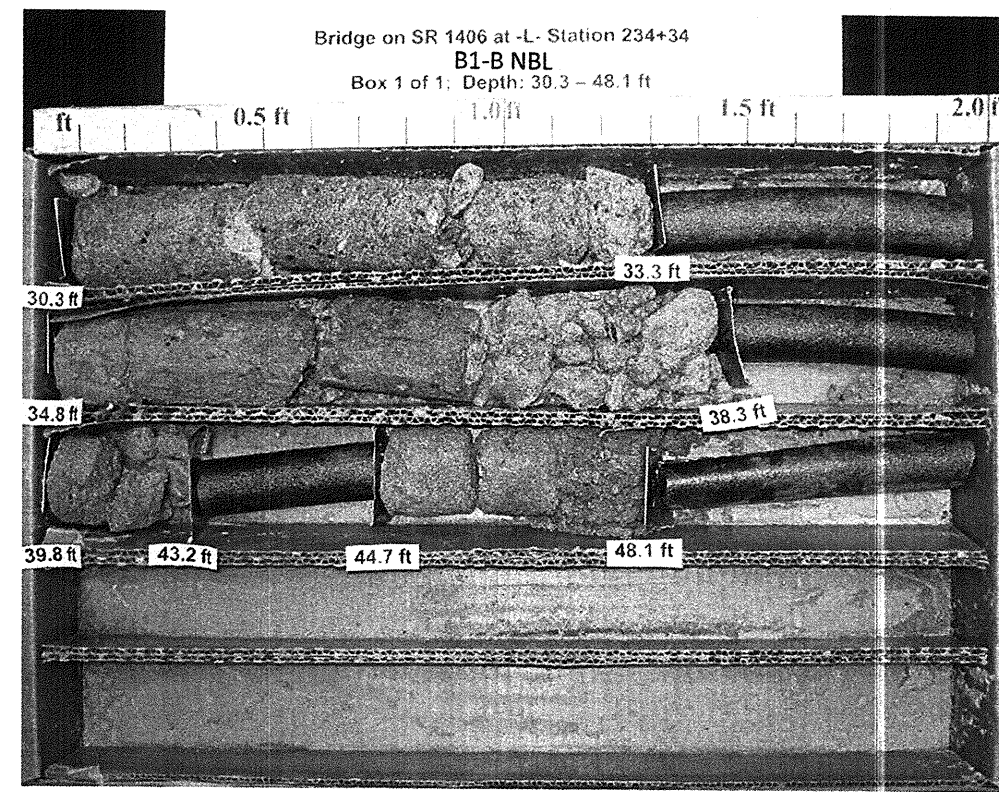
PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Fredette, C.
SITE DESCRIPTION Bridges on SR 1406 at Station 234+34 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B1-B NBL	STATION 234+10	OFFSET 12ft LT	ALIGNMENT -L-
COLLAR ELEV. 1.1 ft	TOTAL DEPTH 85.9 ft	NORTHING 367,546	EASTING 2,501,902
DRILL MACHINE CME-55 TRACK	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/21/09	COMP. DATE 04/22/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
5														
0	1.1	0.0												GROUND SURFACE 0.0
	-2.4	3.5	WOH	WOH	WOH									Alluvium: Gray, slightly silty, clayey, fine SAND (A-2-7)
-5			WOH	WOH	WOH									Gray, silty, fine SAND (A-2-4) with trace of clay
-10	-7.7	8.8	1	1	1									Gray, silty, fine to coarse SAND (A-2-4) with trace of organic matter
-15	-12.7	13.8	7	11	14									Undifferentiated Coastal Plain Deposits: Gray, fine to coarse SAND (A-3) with trace of silt
-20	-17.7	18.8	10	14	18									Gray, silty, fine SAND (A-2-4) with trace of clay
-25	-22.7	23.8	9	12	14									Gray, silty, fine SAND (A-2-4) with trace of clay
-30	-27.7	28.8	8	10	9									River Bend Formation: Light gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to indurated, sandy, shell hash limestone
-35	-32.2	33.3	7	12	14									Light gray, silty, fine to coarse SAND (A-2-4) with trace to little, friable to moderately indurated, limestone and cemented sand layers
-40	-37.2	38.3	7	10	18									Light gray, silty, fine to coarse SAND (A-2-4) with trace to little, friable to moderately indurated, limestone and cemented sand layers
-45	-42.1	43.2	5	6	9									Light gray, silty, fine to coarse SAND (A-2-4) with trace to little, friable to moderately indurated, limestone and cemented sand layers
-50	-47.6	48.7	4	4	9									Gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to indurated, moldic limestone
-55														Gray, silty, fine to coarse SAND (A-2-4) with trace of friable to indurated limestone/cemented sand layers
-60	-58.3	59.4	6	7	12									Gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to indurated, moldic limestone
-65	-63.3	64.4	5	7	8									Gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to indurated, moldic limestone
-70	-68.3	69.4	17	30	27									Gray, silty, fine to coarse SAND (A-2-4)
-75	-73.3	74.4	11	10	11									Gray, silty, fine sand (A-2-4)

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
	-75													Match Line
-80	-78.3	79.4	8	9	11									Gray, silty, fine sand (A-2-4) (continued)
-85	-83.3	84.4	3	4	7									Boring Terminated at Elevation -84.8 ft in gray silty fine sand.
														1) Advanced 3-7/8" tricone roller to 84.4 feet. 2) Set 3.5 feet of 4 inch casing. 3) Advanced HQ core barrel from 30.3 to 53.6 feet. 4) Water with quickgel added used as drilling fluid. 5) Approximate drilling fluid density 8.5 lbs/gallon.

NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 234+34.GPJ NC_DOT.GDT 8/6/09

PROJECT NO. 35801.1.1		ID. U-3810		COUNTY Onslow		GEOLOGIST Fredette, C.					
SITE DESCRIPTION Bridges on SR 1406 at Station 234+34 (MACTEC Project No. 6468-09-2400)							GROUND WTR (ft)				
BORING NO. B1-B NBL		STATION 234+10		OFFSET 12ft LT		ALIGNMENT -L-					
COLLAR ELEV. 1.1 ft		TOTAL DEPTH 85.9 ft		NORTHING 367,546		EASTING 2,501,902					
DRILL MACHINE CME-55 TRACK		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
START DATE 04/21/09		COMP. DATE 04/22/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A					
CORE SIZE HQ		TOTAL RUN 16.7 ft		DRILLER Hahn, T.							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
	-29.2									Begin Coring @ 30.3 ft	
-30	-29.2	30.3	3.0	0:23 0:21 0:25 N=26	(1.2) 40%	NA	(2.7) 52%	NA		River Bend Formation: Light gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to indurated, sandy, shell hash limestone	30.3 ft
-35	-32.2	33.3									
	-33.7	34.8	3.5	0:38 0:55 0:48 0:16/0.5 N=28	(1.5) 43%	NA	(0.0) 0%	NA		Light gray, silty, fine to coarse SAND (A-2-4) with trace to little, friable to moderately indurated, limestone and cemented sand layers	37.0
-40	-37.2	38.3									
	-38.7	39.8	3.4	0:42 0:41 0:24 0:12/0.4 N=15	(0.2) 6%	NA					
-45	-42.1	43.2									
	-43.6	44.7	3.4	0:46 0:40 0:36 0:10/0.4 N=13	(0.6) 18%	NA					
-50	-47.0	48.1									
	-49.1	50.2	3.4	0:36 0:35 0:33 0:06/0.4	(0.0) 0%	NA					
-55	-52.5	53.6								Light Gray, silty, fine to coarse SAND (A-2-4) with trace to little, friable to moderately indurated, limestone and cemented sand layers	53.6
-60											
										Gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to indurated, moldic limestone	58.0
-65											
										Gray, silty, fine to coarse SAND (A-2-4) with trace of friable to indurated limestone/cemented sand layers	62.0
-70											
										Gray, silty, fine to coarse SAND (A-2-4) with interbedded, friable to indurated, moldic limestone	68.0
-75											
										Gray, silty, fine sand (A-2-4)	73.0
-80											
-85											
-90											
-95											
-100											
-105											
Boring Terminated at Elevation -84.8 ft in gray silty fine sand.											
1) Advanced 3-7/8" tricone roller to 84.4 feet. 2) Set 3.5 feet of 4 inch casing. 3) Advanced HQ core barrel from 30.3 to 53.6 feet. 4) Water with quickgel added used as drilling fluid. 5) Approximate drilling fluid density 8.5 lbs/gallon.											



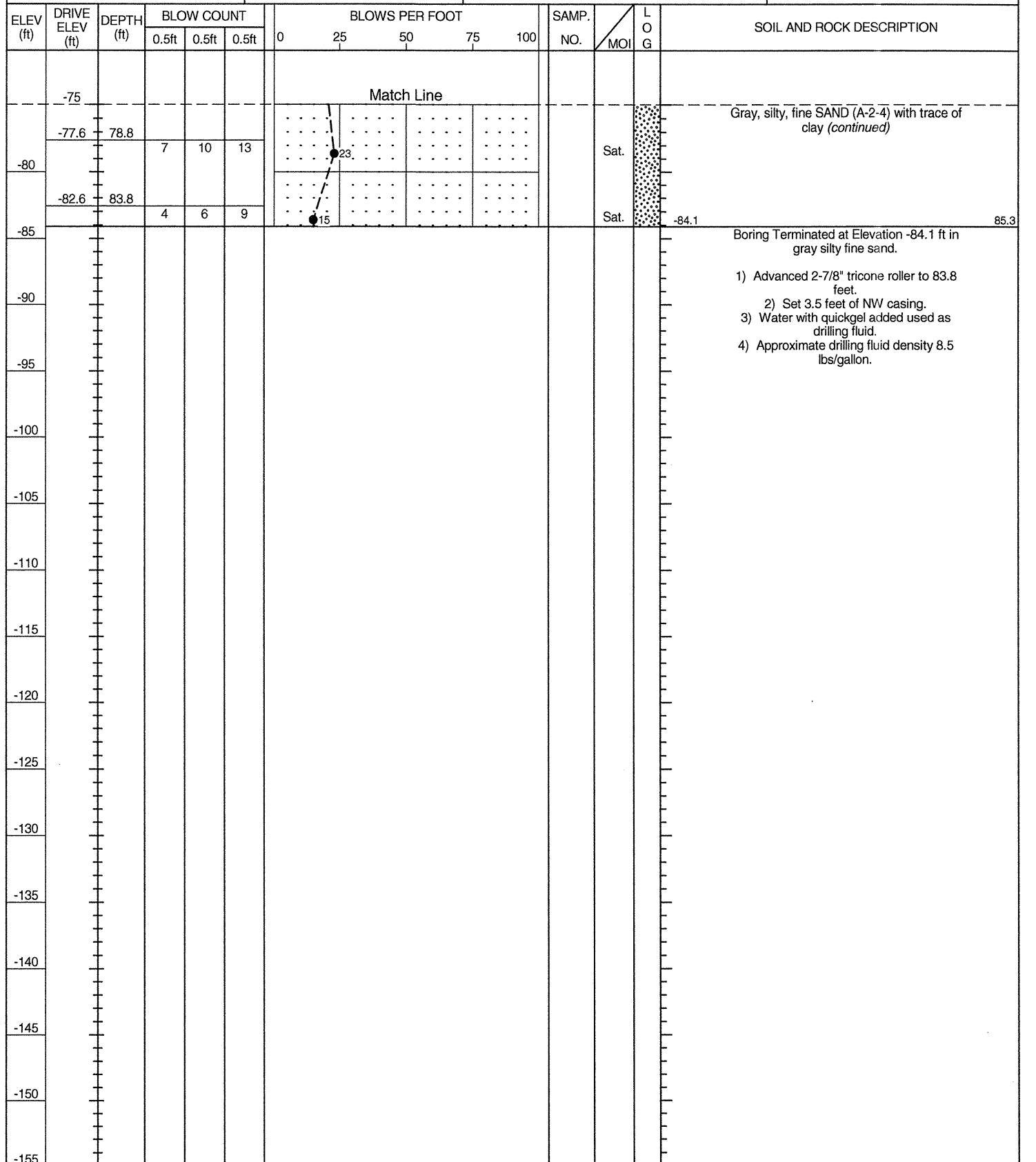
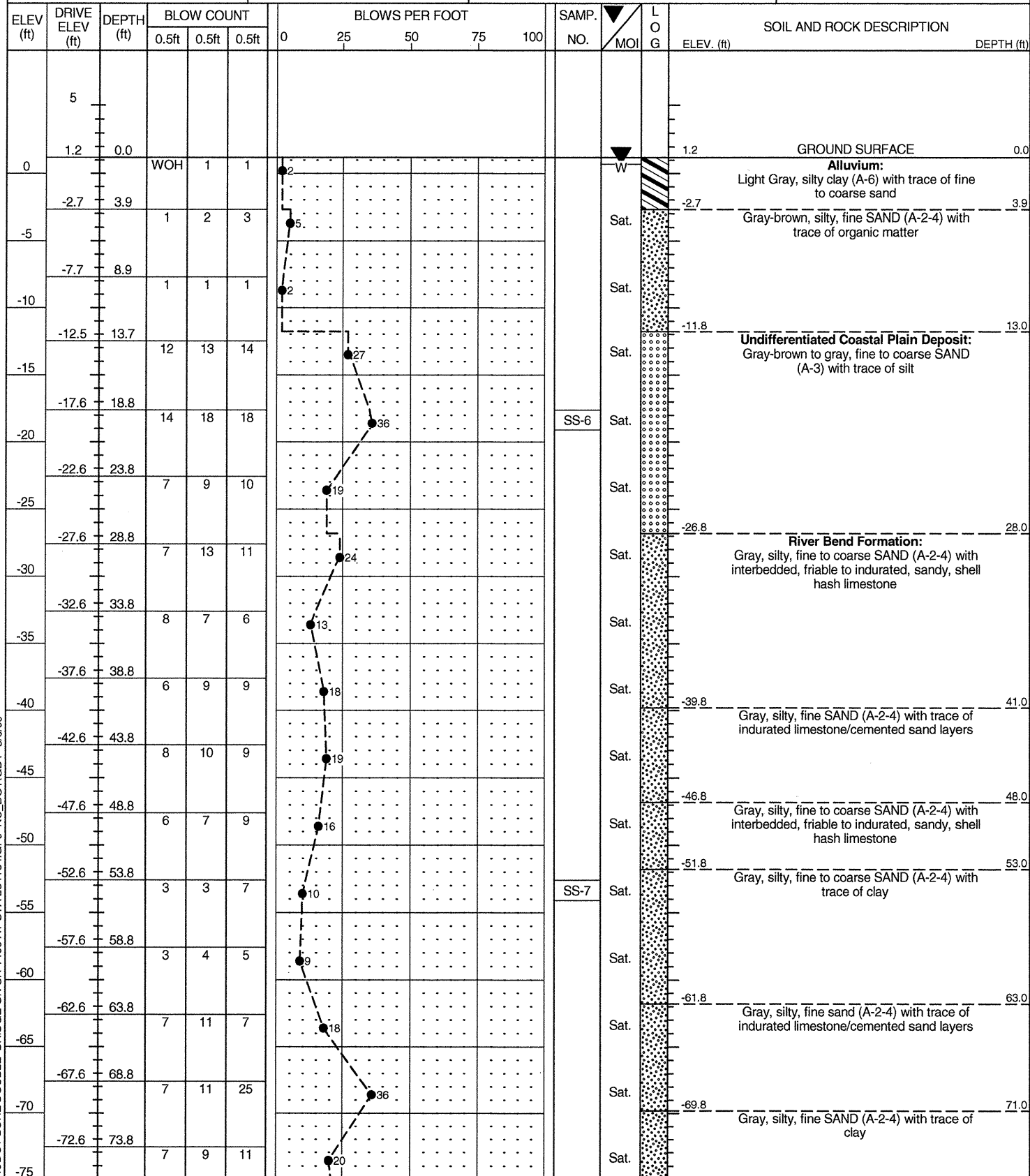
NCDOT CORE SINGLE BRIDGE ON SR 1406 AT STA. 234+34.GPJ NC_DOT_GDT 8/6/09



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Fredette, C.
SITE DESCRIPTION Bridges on SR 1406 at Station 234+34 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. EB2-A NBL	STATION 234+95	OFFSET 34ft LT	ALIGNMENT -L-
COLLAR ELEV. 1.2 ft	TOTAL DEPTH 85.3 ft	NORTHING 367,460	EASTING 2,501,883
DRILL MACHINE CME-55 TRACK	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/17/09	COMP. DATE 04/17/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Fredette, C.
SITE DESCRIPTION Bridges on SR 1406 at Station 234+34 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. EB2-A NBL	STATION 234+95	OFFSET 34ft LT	ALIGNMENT -L-
COLLAR ELEV. 1.2 ft	TOTAL DEPTH 85.3 ft	NORTHING 367,460	EASTING 2,501,883
DRILL MACHINE CME-55 TRACK	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/17/09	COMP. DATE 04/17/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 234+34.GPJ NC DOT.GDT 8/6/09



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

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

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: Bridge over Little Northeast Creek on SR 1406 Located at -L- Station 234+34

MACTEC Job No.: 6468-09-2400

NCDOT PROJ. NO.: 35801.1.1 (U-3810)

COUNTY: Onslow

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

DATE SAMPLED: April 2009

RECEIVED: 5/7/2009

REPORTED BY: MACTEC

SAMPLED FROM: EB1-A, B1-A, EB2-A

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Retained No. 4 Sieve (%)	0.0	0.0	0.2	0.0	0.0	0.0
Passing No. 10 Sieve (%)	100.0	99.8	98.5	100.0	99.9	100.0
Passing No. 40 Sieve (%)	99.6	91.0	92.7	99.7	98.7	99.7
Passing No. 200 Sieve (%)	21.3	2.6	27.7	11.8	5.2	8.8

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%						
Coarse Sand (%)	2.4	31.5	9.9	3.0	16.2	6.9
Fine Sand (%)	81.7	66.8	66.5	86.2	79.7	86.0
Silt (%)	10.8	1.7	14.5	6.3	4.1	7.1
Clay (%)	5.1	0.0	9.0	4.5	0.0	0.0

Moisture Content (%)	ND	ND	ND	ND	ND	ND
Liquid Limit, L.L.	NV	NV	20	NV	NV	NV
Plasticity Index, P.I.	NP	NP	1	NP	NP	NP
AASHTO Classification	A-2-4(0)	A-3(0)	A-2-4(0)	A-2-4(0)	A-3(0)	A-3(0)
Organic Content (%)	ND	ND	ND	ND	ND	ND

Boring No.	EB1-B NBL	EB1-B NBL	EB1-B NBL	EB1-B NBL	B1-B NBL	EB2-A NBL
Station	233+78	233+78	233+78	233+78	234+10	234+95
Offset	17 LT	17 LT	17 LT	17 LT	12 LT	34 LT
Alignment	-L-	-L-	-L-	-L-	-L-	-L-
Depth (FT) From	3.6	13.9	53.9	78.9	18.8	18.8
to	5.1	15.4	55.4	80.4	20.3	20.3

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504

Chana Savanapridi
 Signature



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

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

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: Bridge over Little Northeast Creek Located at Station 234+34

MACTEC Job No.: 6468-09-2400

NCDOT PROJ. NO.: 35801.1.1 (U-3810)

COUNTY: Onslow

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

DATE SAMPLED: April 2009

RECEIVED: 5/6/2009

REPORTED BY: MACTEC

SAMPLED FROM: EB2-A and Channel

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.	SS-7	S-1				
Retained No. 4 Sieve (%)	0.3	0.1				
Passing No. 10 Sieve (%)	99.0	99.3				
Passing No. 40 Sieve (%)	93.0	84.1				
Passing No. 200 Sieve (%)	24.9	3.1				

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%						
Coarse Sand (%)	9.8	38.8				
Fine Sand (%)	70.4	58.5				
Silt (%)	10.3	2.0				
Clay (%)	9.5	0.0				

Moisture Content (%)	ND	ND				
Liquid Limit, L.L.	18	NV				
Plasticity Index, P.I.	1	NP				
AASHTO Classification	A-2-4(0)	A-3(0)				
Organic Content (%)	ND	ND				

Boring No.	EB2-A NBL	Channel				
Station	234+95	234+65				
Offset	34 LT	30 LT				
Alignment	-L-	-L-				
Depth (FT) From	53.8	0.0				
to	55.3	1.0				

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504

Chana Savanapridi
 Signature



FIELD
SCOUR REPORT

WBS: 35801.1.1 TIP: U-3810 COUNTY: Onslow

DESCRIPTION(1): Bridge 121 on SR 1406 over Little Northeast Creek (at Station 234+34)

EXISTING BRIDGE

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

Bridge No.: 121 Length: 125' Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
Foundation Type: Cored slab supported on concrete cap and piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Stream widens at the bridge, but no apparent evidence of scour

Interior Bents: Not apparent. Bed not visible through the water.

Channel Bed: Not apparent. Bed not visible through the water.

Channel Bank: Not apparent. Banks are mostly covered by vegetation.

EXISTING SCOUR PROTECTION

Type(3): Rip rap

Extent(4): Across entire width of embankment at both end bents.

Effectiveness(5): Mostly effective.

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): Slightly silty fine to coarse sand

Channel Bank Material(8): Surficial layer of silty clay, underlain by silty fine to coarse sand

Channel Bank Cover(9): Grasses, bushes, cat tails, small to large trees

Floodplain Width(10): 400 feet

Floodplain Cover(11): Grasses, bushes, small to large trees, soil road approaching end bent 2

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): Southward toward End Bent 2

Observations and Other Comments: Low flow environment at time of investigation, concrete retaining wall along bank downstream from end bent 2

Reported by: James Howard Date: 4/24/2009

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

		BENTS											
		B1	B2										
NBL	-3.2 Ft	-11.1 Ft											

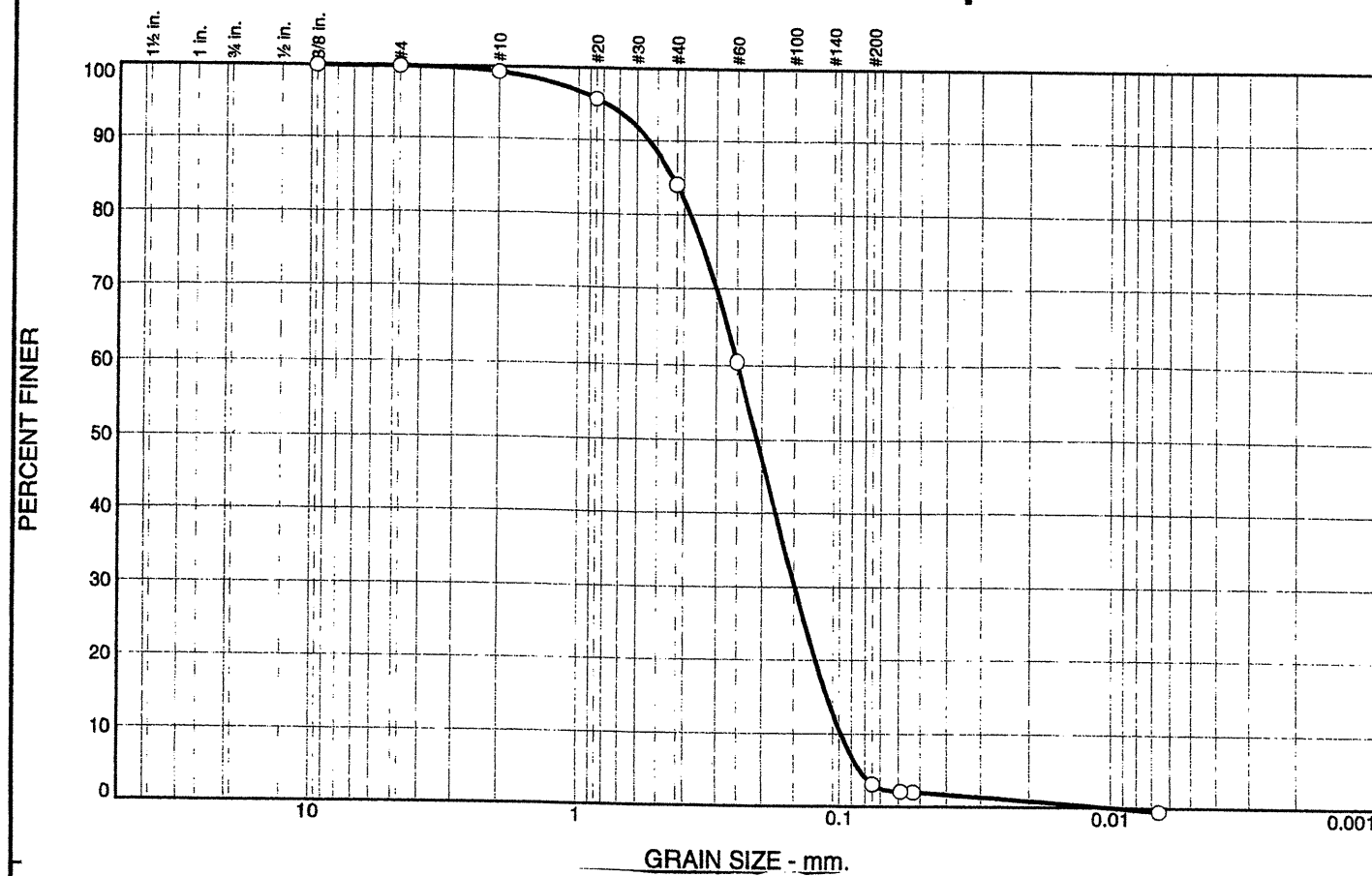
Comparison of DSE to Hydraulics Unit theoretical scour:
The Geotechnical Engineering Unit agrees with the Hydraulic Unit's theoretical scour elevations as noted above.

DSE determined by: *Chad M. Waddy* Date: 7/22/2009

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank	Bank				
Sample No.	S-1	SS-1	SS-2				
Retained #4	0.1	0	0				
Passed #10	99.3	100	99.8				
Passed #40	84.1	99.6	91				
Passed #200	3.1	21.3	2.6				
Coarse Sand	38.8	2.4	31.5				
Fine Sand	58.5	81.7	66.8				
Silt	2	10.8	1.7				
Clay	0	5.1	0				
LL	No Value	No Value	No Value				
PI	Non Plastic	Non Plastic	Non Plastic				
AASHTO	A-3(0)	A-2-4(0)	A-3(0)				
Station	234+65	233+78	233+78				
Offset	30 LT	17 LT	17 LT				
Depth	0.0-1.0	3.6-5.1	13.9-15.4				

Particle Size Distribution Report



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.9		
#10	99.3		
#20	95.6		
#40	84.1		
#60	60.5		
#200	3.1		
#270	2.0		

* (no specification provided)

Material Description
Fine to Coarse SAND with Trace of Silt

Atterberg Limits
PL= NP LL= NV PI= NP

Coefficients
D₉₀= 0.5375 D₈₅= 0.4376 D₆₀= 0.2479
D₅₀= 0.2087 D₃₀= 0.1491 D₁₅= 0.1115
D₁₀= 0.0987 C_u= 2.51 C_c= 0.91

Classification
USCS= SP AASHTO= A-3

Remarks
ND = Not Determined
Spatula Method
Specific Gravity is assume

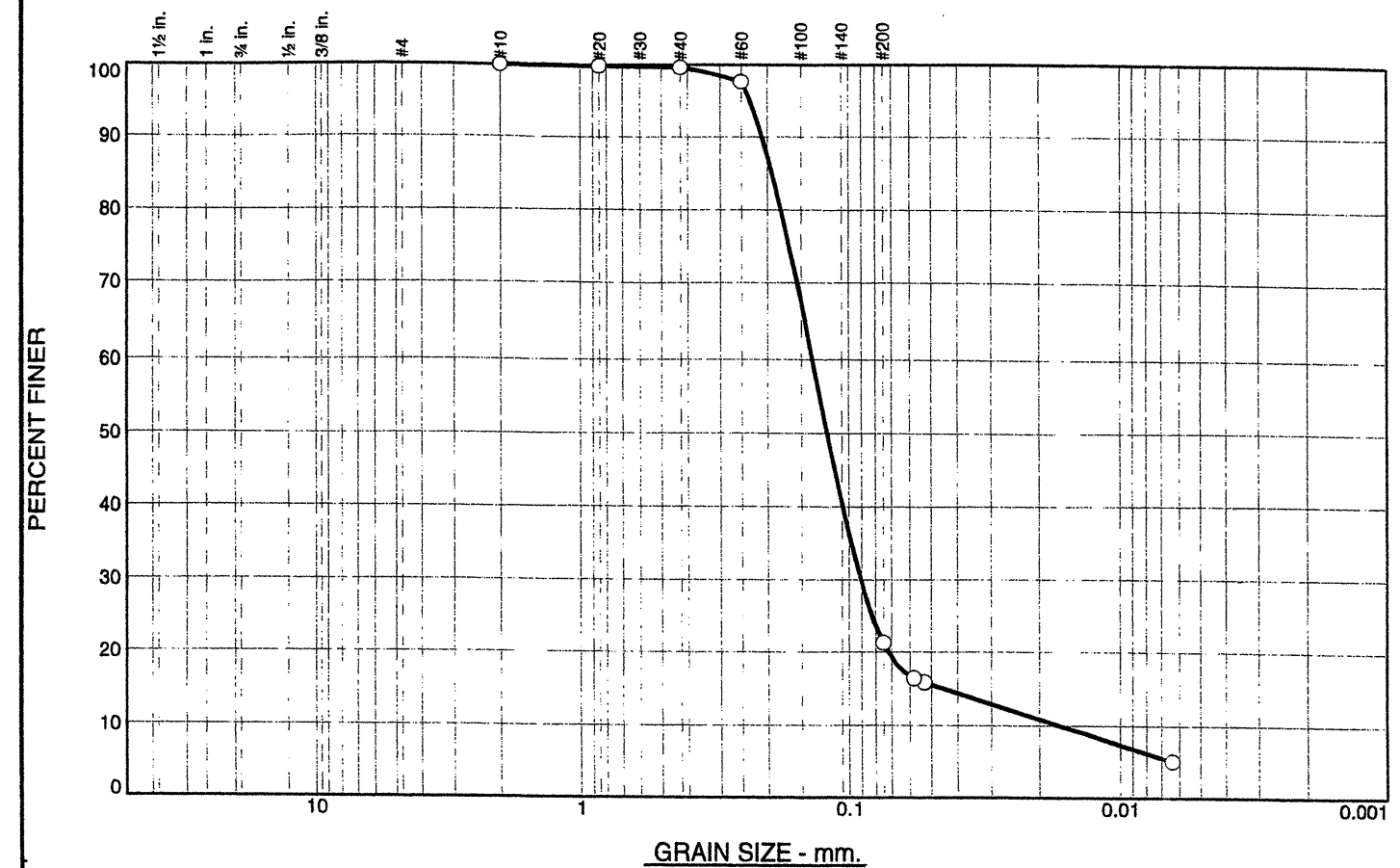
Source of Sample: Channel Bed Depth: 0.0-1.0'
Sample Number: S-1

Date: 5/7/09

MACTEC Engineering and Consulting, Inc. Raleigh, North Carolina	Client: NC DEPARTMENT OF TRANSPORTATION Project: Bridge on SR 1406 @ Station 234+34
	Project No: 6468092400 Figure

Tested By: CS (Cert# 104-04-0504) Checked By: MDC (Lab Manager)

Particle Size Distribution Report



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.6		
#60	97.6		
#200	21.3		
#270	15.9		

* (no specification provided)

Material Description
Gray-Brown Silty Fine to Coarse SAND with Trace of Clay & Organic Matter

Atterberg Limits
PL= NP LL= NV PI= NP

Coefficients
D₉₀= 0.2091 D₈₅= 0.1920 D₆₀= 0.1367
D₅₀= 0.1204 D₃₀= 0.0903 D₁₅= 0.0444
D₁₀= 0.0168 C_u= 8.16 C_c= 3.56

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

Remarks
ND = Not Determined
Spatula Method
Specific Gravity is assumed

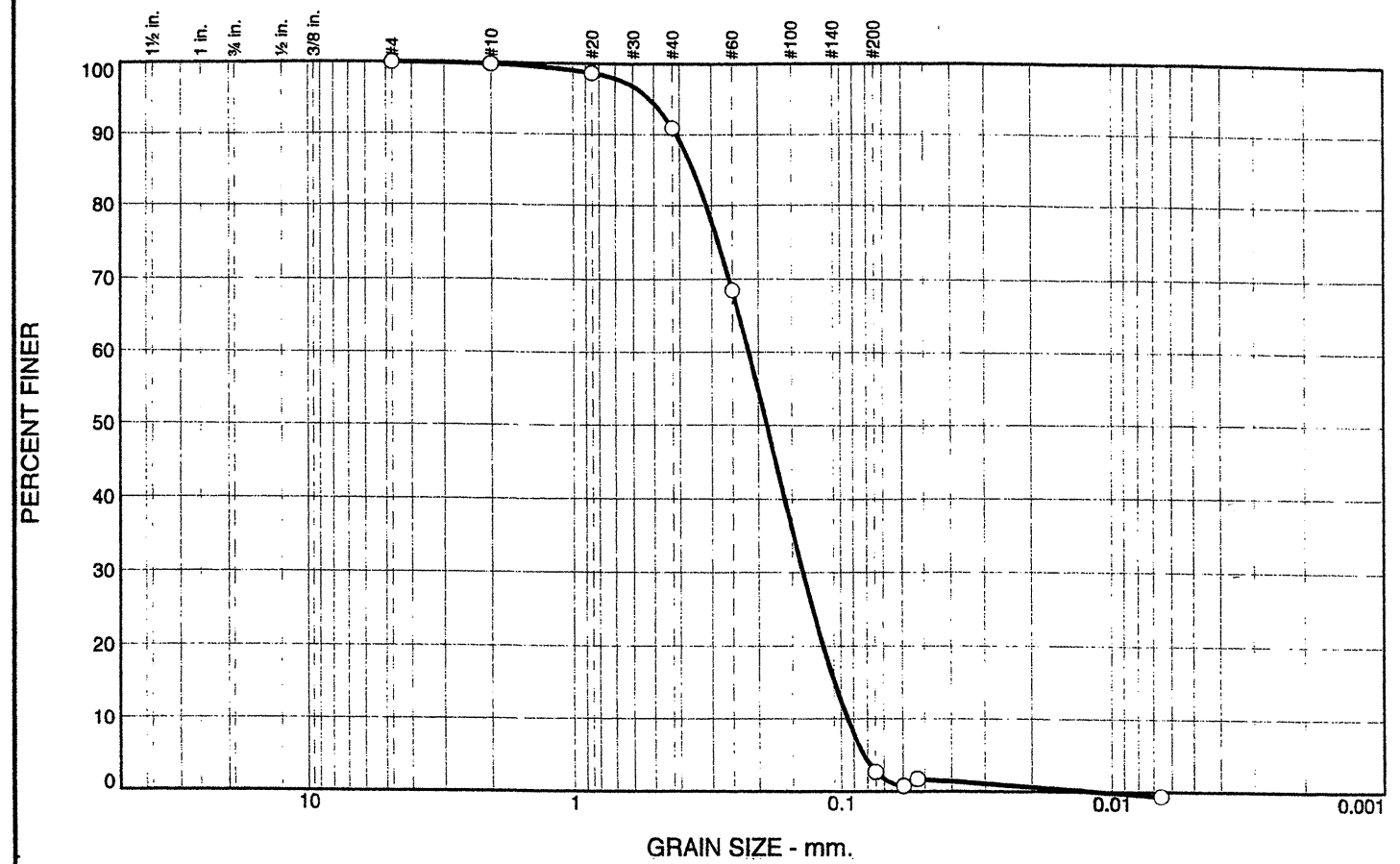
Source of Sample: Boring EB1-B NBL Depth: 3.6-5.1'
Sample Number: SS-1

Date: 5/7/09

MACTEC Engineering and Consulting, Inc. Raleigh, North Carolina	Client: NC DEPARTMENT OF TRANSPORTATION Project: Bridge on SR 1406 @ Station 234+34
	Project No: 6468092400 Figure

Tested By: CS (Cert# 104-04-0504) Checked By: MDC (Lab Manager)

Particle Size Distribution Report



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	98.7		
#40	91.0		
#60	68.4		
#200	2.6		
#270	1.7		

* (no specification provided)

Material Description
Gray, Fine to Coarse SAND with Trace of Silt

Atterberg Limits
 PL= NP LL= NV PI= NP

Coefficients
 D₉₀= 0.4107 D₈₅= 0.3537 D₆₀= 0.2171
 D₅₀= 0.1859 D₃₀= 0.1368 D₁₅= 0.1052
 D₁₀= 0.0944 C_u= 2.30 C_c= 0.91

Classification
 USCS= SP AASHTO= A-3

Remarks
 ND = Not Determined
 Specific Gravity is assumed

Source of Sample: Boring EB1-B NBL Depth: 13.9-15.4'
 Sample Number: SS-2

Date: 5/7/09

MACTEC Engineering and Consulting, Inc.	Client: NC DEPARTMENT OF TRANSPORTATION
Raleigh, North Carolina	Project: Bridge on SR 1406 @ Station 234+34
	Project No: 6468092400
	Figure

Tested By: CS (Cert# 104-04-0504) *CS* Checked By: MDC (Lab Manager)



View Looking Up Station from End Bent No. 1



View looking right to left of End Bent No. 1



View Looking Down Station from End Bent No. 2



View looking right to left of Bent No. 1



View looking right to left of Interior Bent No 2 (located in water)



View looking right to left of End Bent No. 2

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

STRUCTURE
SUBSURFACE INVESTIGATION

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE LOCATION/TOPO MAP (DWG 1 & 2)
4	BORING LOCATION PLAN (DWG 3)
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19-21	GRAIN SIZE CURVES
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PROJ. REFERENCE NO. 35801.1.1 (U-3810) F.A. PROJ. STP-1406(4)
 COUNTY ONslow
 PROJECT DESCRIPTION BRIDGES ON SR 1406 AT -L- STATIONS
84+77 AND 234+34
 SITE DESCRIPTION BRIDGE ON SR 1406 AT -L- STATION 84+77

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.

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.

For Letting

PROJECT: 35801.1.1 ID: U-3810

PERSONNEL

J. HOWARD

D. RHODES

D. WHITE

K. GUY

INVESTIGATED BY MACTEC

CHECKED BY B. DEOBALD

SUBMITTED BY S. JOHNSON

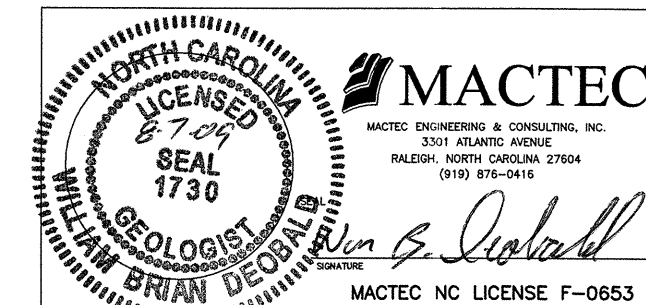
DATE JULY 10, 2009

REVISED AUGUST 7, 2009

DRAWN BY: R. RAHIE

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.

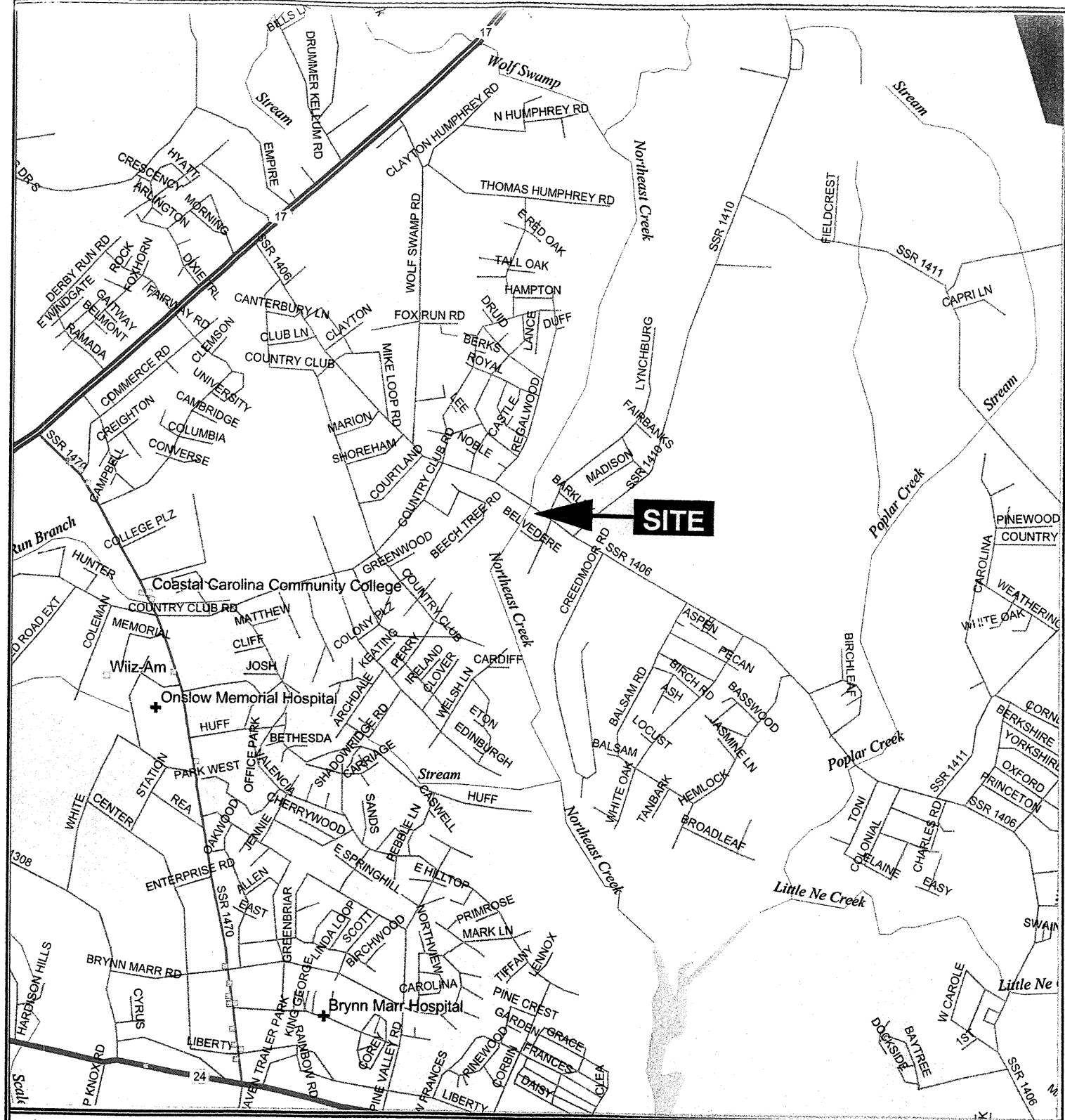
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.



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					
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 (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. 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 IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		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. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)		ALLUVIUM (ALLUV.) - SOILS THAT 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 THAT 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 (FP) - 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 (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - 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 THAT 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, THAT 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 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. 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 (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. TOPSOIL (TS.) - 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.		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL. 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 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.		PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.		BENCH MARK: NCDOT REBAR AND CAP STAMPED BL-16 LOCATED AT -BL- STATION 86+35, 5.6 RT ELEVATION: 12.05 FT.	
LIQUID LIMIT PLASTIC INDEX GROUP INDEX		GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-4, A-5, A-6, A-7		ROCK HARDNESS		NOTES:					
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		CONSISTENCY OR DENSENESS		ROCK HARDNESS		BOLD CIRCLE INDICATES TESTED SAMPLE					
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		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.					
U.S. STD. SIEVE SIZE OPENING (MM)		TEXTURE OR GRAIN SIZE		ROCK HARDNESS		INDURATION					
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)		U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.					
GRAIN SIZE MM IN.		GRAIN SIZE MM IN.		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		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.					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		SOIL MOISTURE - CORRELATION OF TERMS		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		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.					
LL LIQUID LIMIT PLASTIC RANGE (PI) PL PLASTIC LIMIT OM OPTIMUM MOISTURE SHrinkage LIMIT		SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		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.					
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH		SOIL MOISTURE - CORRELATION OF TERMS		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		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.					
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		SOIL MOISTURE - CORRELATION OF TERMS		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		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.					
COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		SOIL MOISTURE - CORRELATION OF TERMS		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD		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.					



REFERENCE: DeLORME

STREET ATLAS USA 7.0

GRAPHIC SCALE MILES



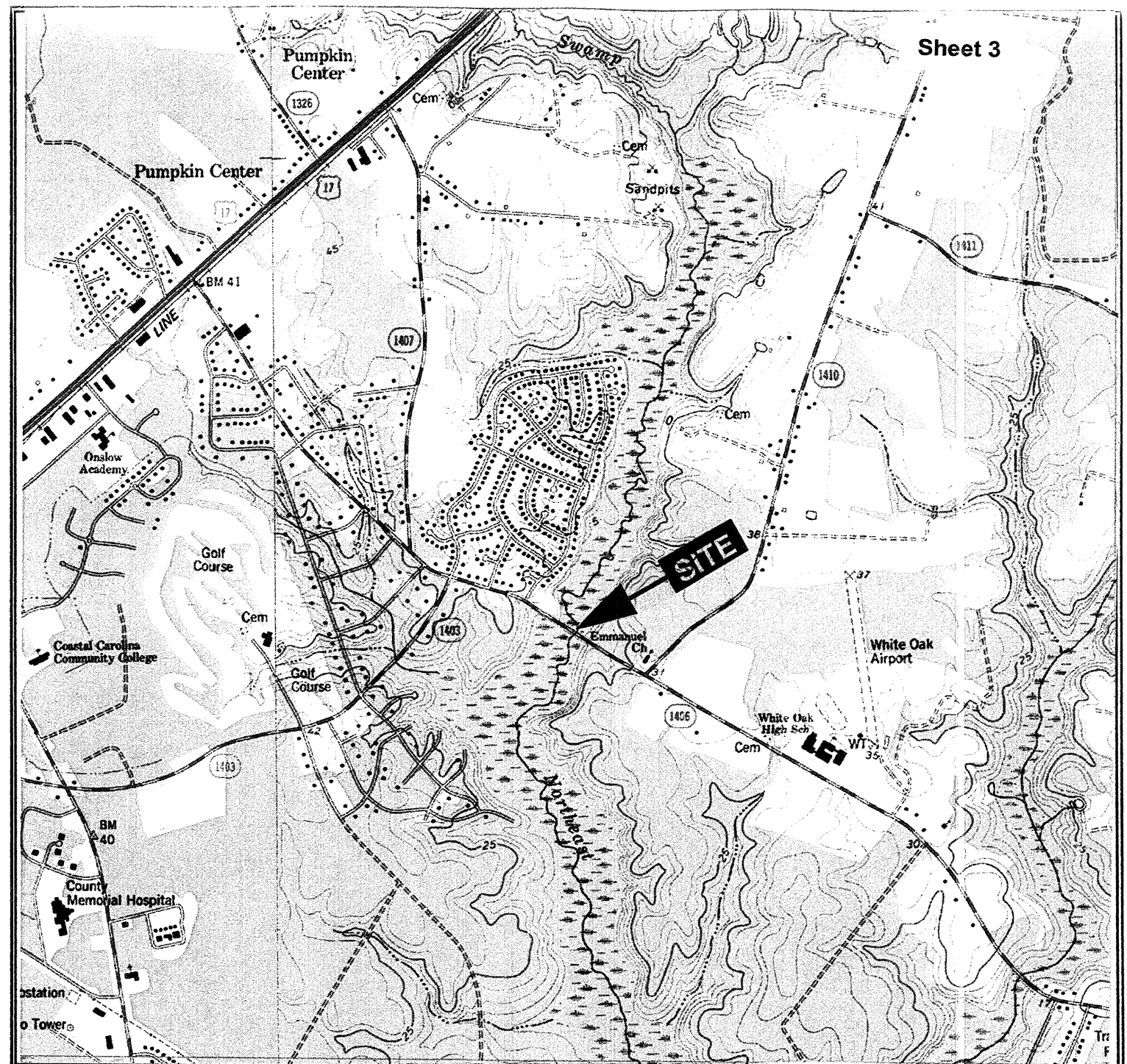
NOTE: SITE LOCATION IS APPROXIMATE

MACTEC

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

DRAWN: JPH	DATE: MAY 2009	DRAWING
APPROVAL: <i>WSD</i>	SCALE: 1" = 2 miles	1
REVISED:	JOB: 6468-09-2400	

SITE LOCATION MAP
BRIDGE ON SR 1406 AT -L- STATION 84+77
NCDOT PROJ. NO. 35801.1.1 (U-3810)
ONSLow COUNTY, NORTH CAROLINA



Sheet 3

JACKSONVILLE, N.C.

KELLUM QUARDANGLE

N3445-W7715/7.5

1977

AMS 5553 IV SE-SERIES V842

CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

GRAPHIC SCALE FEET



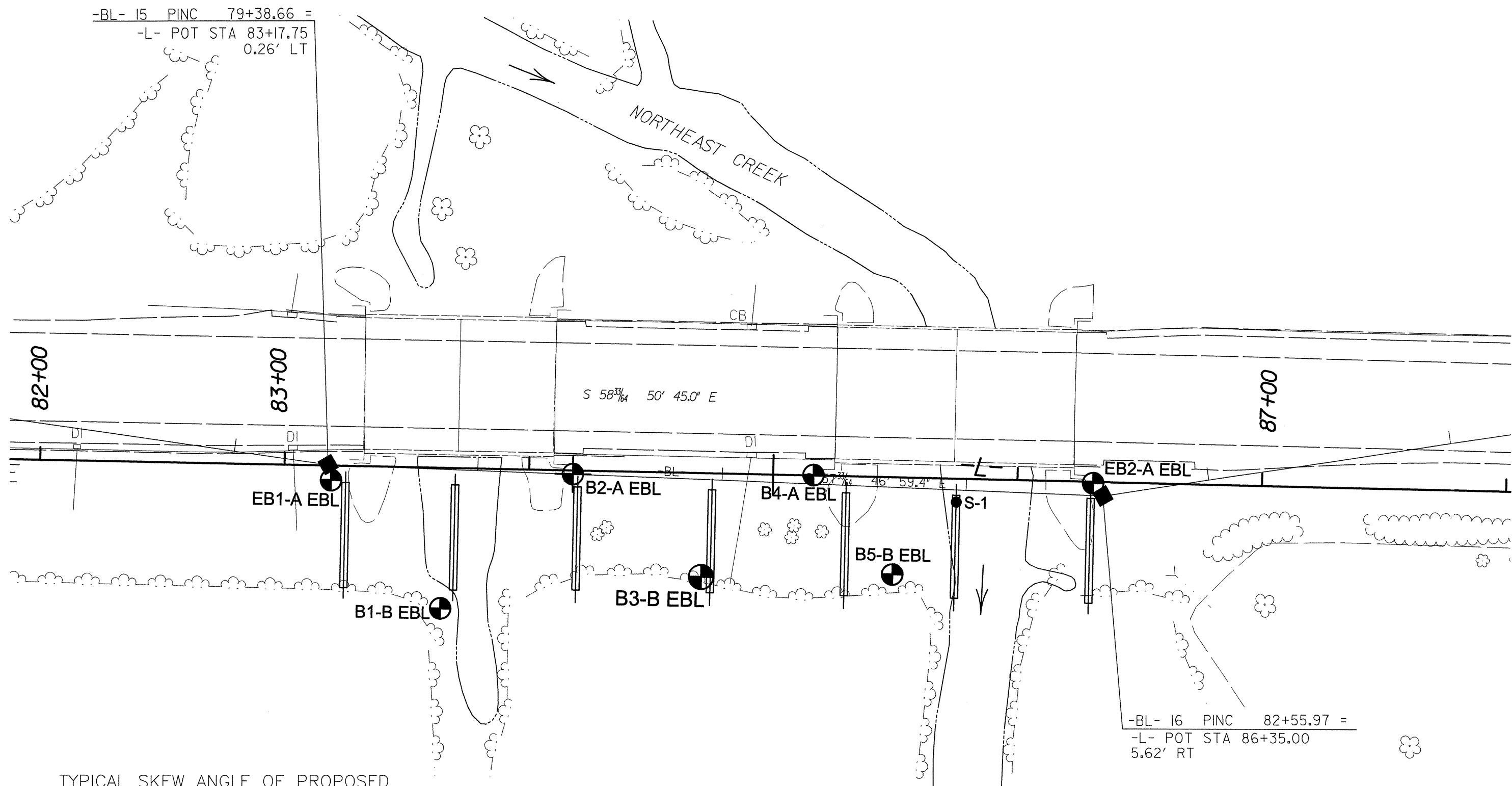
NOTE: SITE LOCATION IS APPROXIMATE

MACTEC

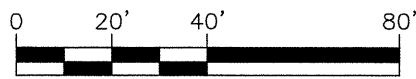
MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

DRAWN: JPH	DATE: MAY 2009	DRAWING
APPROVAL: <i>WSD</i>	SCALE: 1:24000	2
REVISED:	JOB: 6468-09-2400	

TOPOGRAPHIC SITE MAP
BRIDGE ON SR 1406 AT -L- STATION 84+77
NCDOT PROJ. NO. 35801.1.1 (U-3810)
ONSLow COUNTY, NORTH CAROLINA



TYPICAL SKEW ANGLE OF PROPOSED BRIDGE : 90°.00'.00"



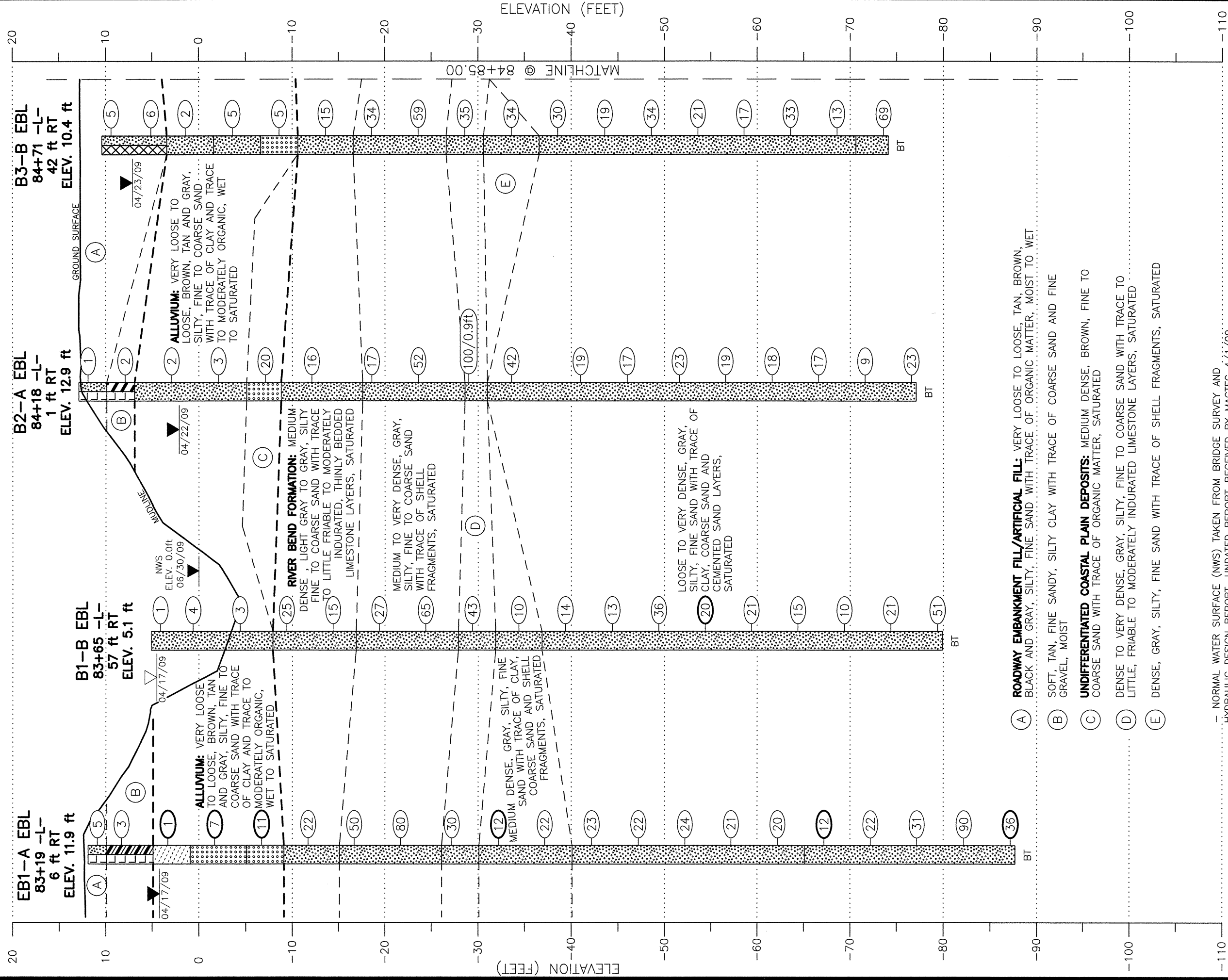
SCALE (FEET)
1" : 40'



BORING LOCATION PLAN
BRIDGE ON SR 1406 AT STATION 84+77
NCDOT PROJECT NO. 35801.1.1 (U-3810)
F.A. No. STP-1406(4)
ONSLow COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 07/10/09
08/7/09	DFT CHECK:	W.B.D.	JOB : 6468-09-2400
	ENG CHECK:	J.E.V.	DWG: 3

84+00

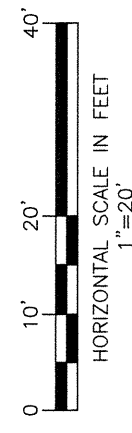


- (A) ROADWAY EMBANKMENT FILL/ARTIFICIAL FILL: VERY LOOSE TO LOOSE, TAN, BROWN, BLACK AND GRAY, SILTY, FINE SAND WITH TRACE OF ORGANIC MATTER, MOIST TO WET
- (B) SOFT, TAN, FINE SANDY, SILTY CLAY WITH TRACE OF COARSE SAND AND FINE GRAVEL, MOIST
- (C) UNDIFFERENTIATED COASTAL PLAIN DEPOSITS: MEDIUM DENSE, BROWN, FINE TO COARSE SAND WITH TRACE OF ORGANIC MATTER, SATURATED
- (D) DENSE TO VERY DENSE, GRAY, SILTY, FINE TO COARSE SAND WITH TRACE TO LITTLE, FRIABLE TO MODERATELY INDURATED LIMESTONE LAYERS, SATURATED
- (E) DENSE, GRAY, SILTY, FINE SAND WITH TRACE OF SHELL FRAGMENTS, SATURATED

— NORMAL WATER SURFACE (NWS) TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT. UNDATED REPORT RECEIVED BY MACTEC 4/1/09.

— GROUND LINE PROFILE AT -L TAKEN FROM HYDRAULIC DESIGN REPORT. UNDATED REPORT RECEIVED BY MACTEC 4/1/09.

— INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.



PROFILE 27.4 FT RT OF -L-
BRIDGE ON SR 1406 AT STATION 84+77
NCDOT PROJECT NO. 35801.1.1 (U-3810)
F.A. No. STP-1406(4)
ONSLow COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 07/10/09
	DFT CHECK:	W.B.D.	JOB: 6468-09-2400
	ENG CHECK:	J.E.V.	DWG: 4

85+00

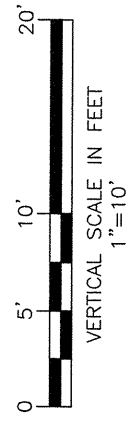
86+00



ELEVATION (FEET)

ELEVATION (FEET)

MATCHLINE @ 84+85.00



PROFILE 27.4 FT RT OF -L-
BRIDGE ON SR 1406 AT STATION 84+77
NCDOT PROJECT NO. 35801.1.1 (U-3810)
F.A. No. STP-1406(4)
ONSLOW COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REVISIONS	DRAWN:	R.R.	DATE:
08/7/09			07/10/09
DFT CHECK:	W.B.D.	J.E.V.	DWG:
			5

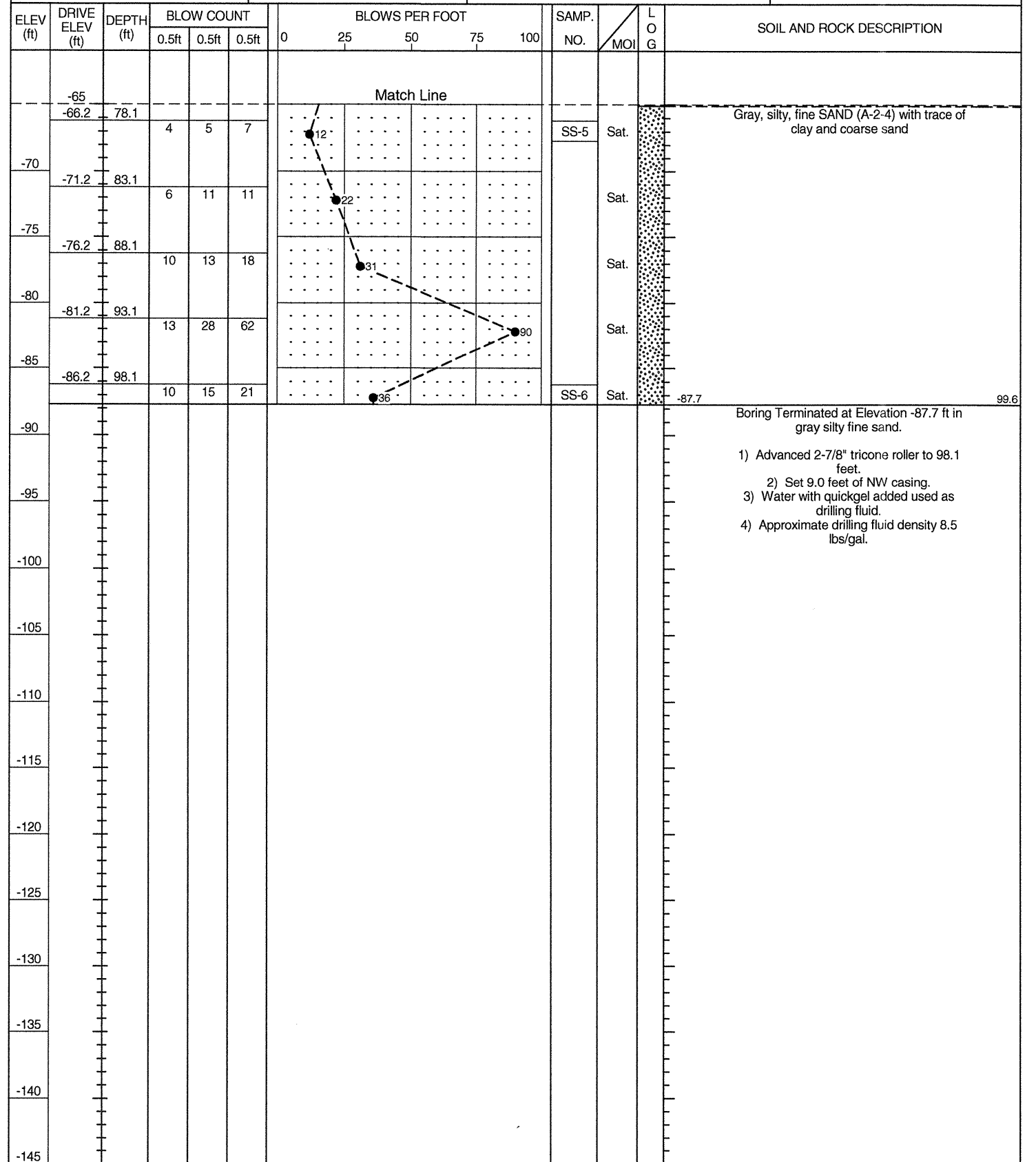
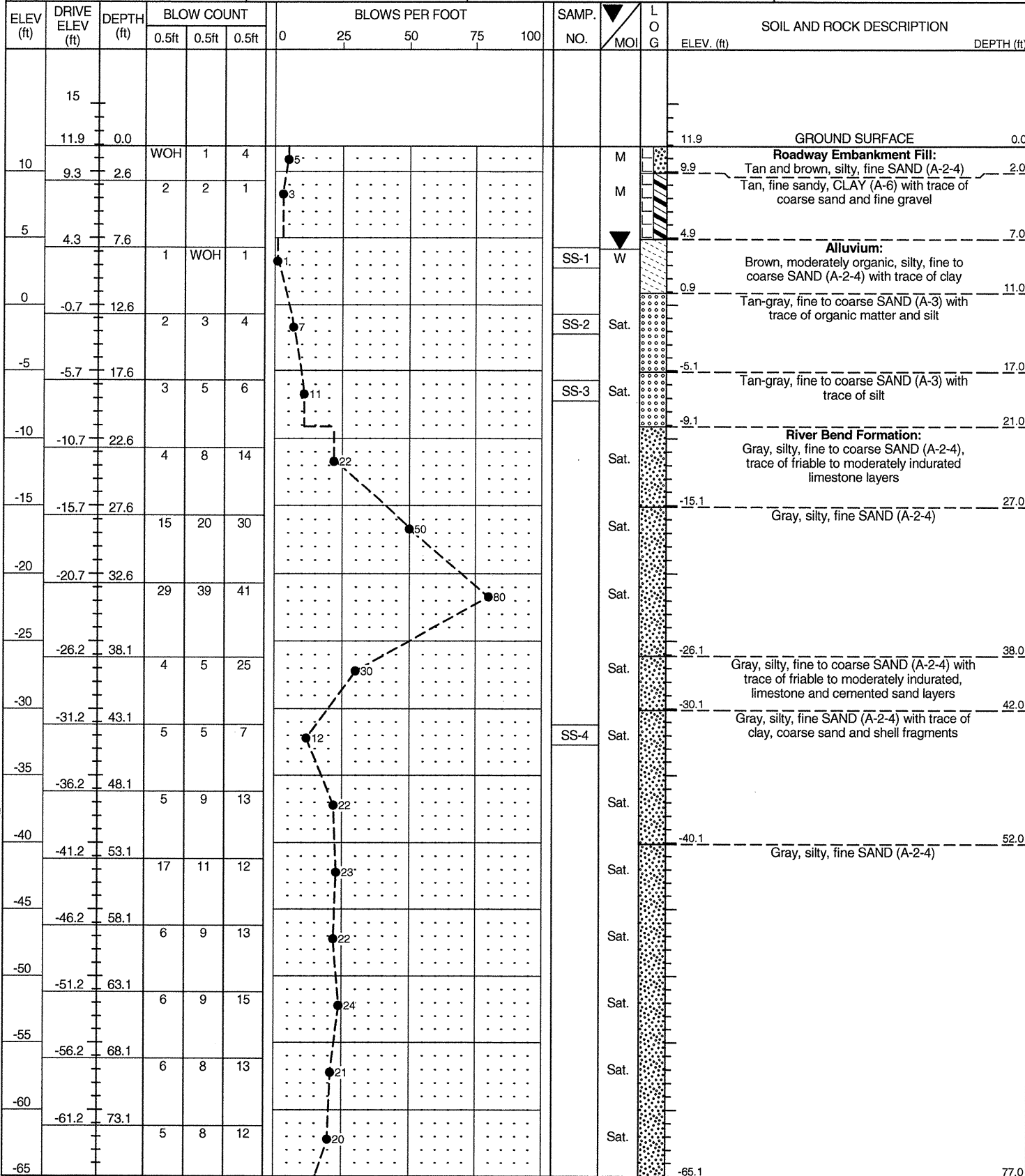


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. EB1-A EBL	STATION 83+19	OFFSET 6ft RT	ALIGNMENT -L-
			0 HR. 7.7
COLLAR ELEV. 11.9 ft	TOTAL DEPTH 99.6 ft	NORTHING 376,755	EASTING 2,492,056
			24 HR. 7.7
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/15/09	COMP. DATE 04/16/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. EB1-A EBL	STATION 83+19	OFFSET 6ft RT	ALIGNMENT -L-
			0 HR. 7.7
COLLAR ELEV. 11.9 ft	TOTAL DEPTH 99.6 ft	NORTHING 376,755	EASTING 2,492,056
			24 HR. 7.7
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/15/09	COMP. DATE 04/16/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 84+77.GPJ NC_DOT.GDT 8/6/09

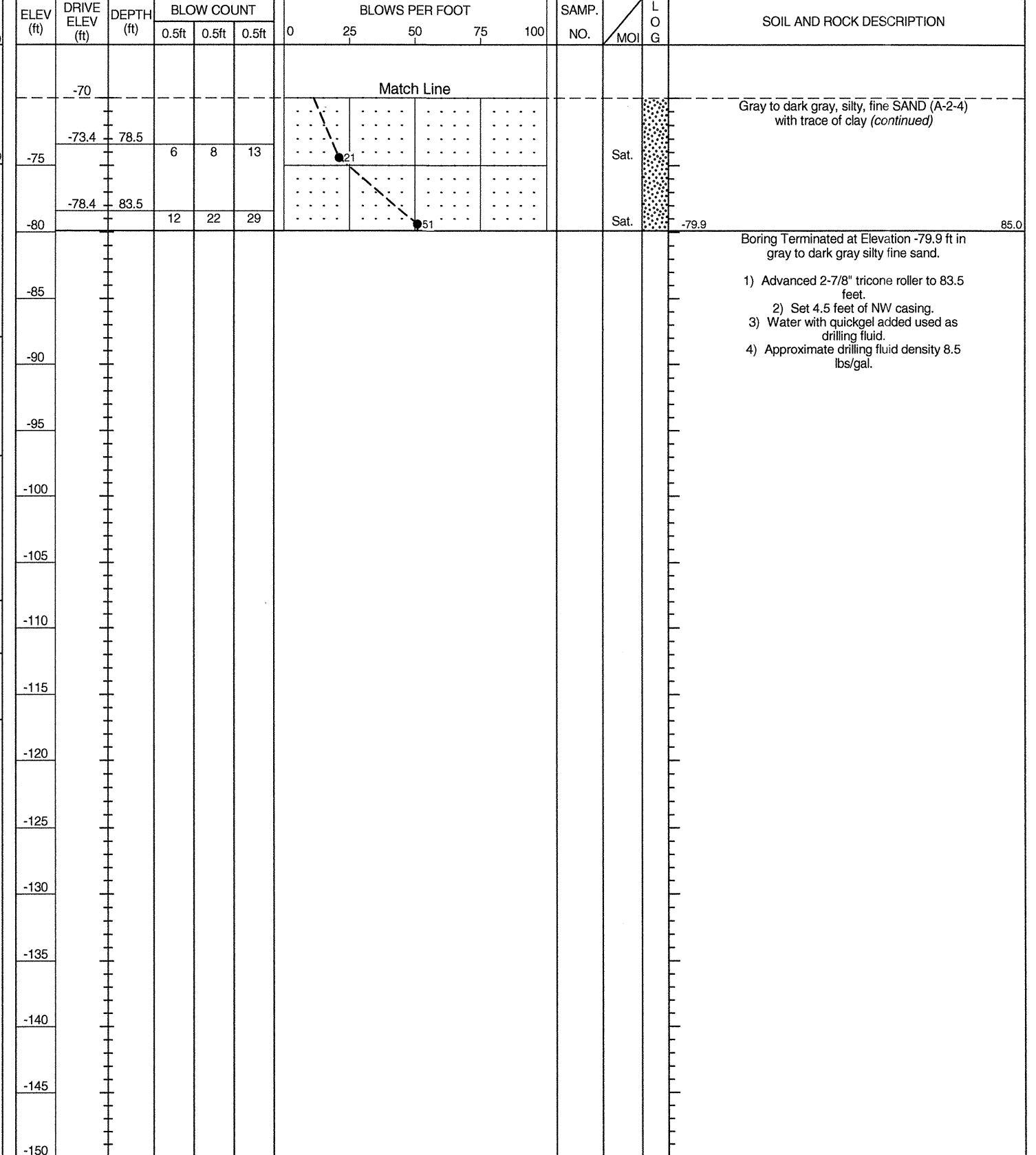
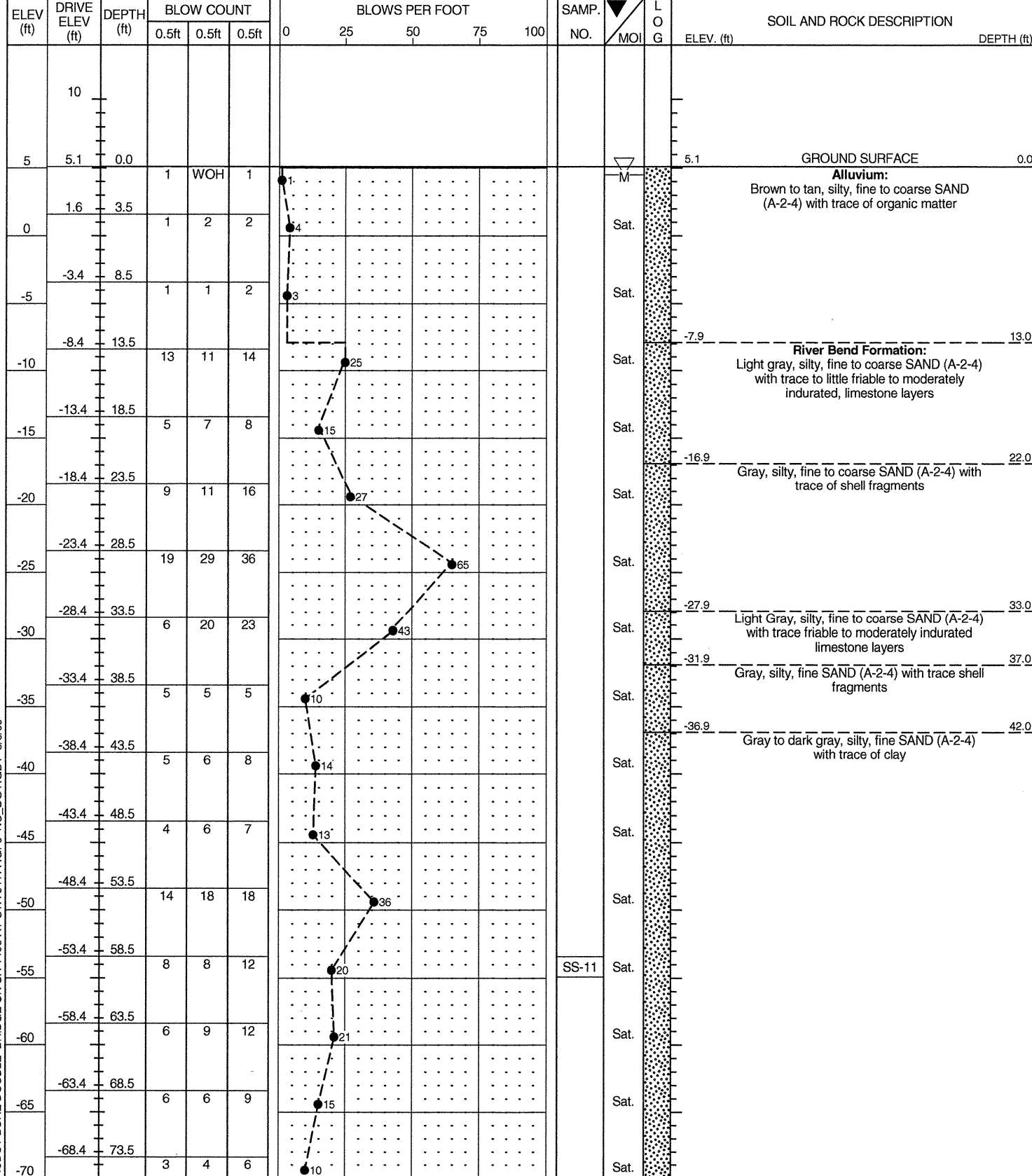


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B1-B EBL	STATION 83+65	OFFSET 57ft RT	ALIGNMENT -L-
COLLAR ELEV. 5.1 ft	TOTAL DEPTH 85.0 ft	NORTHING 376,688	EASTING 2,492,069
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/16/09	COMP. DATE 04/17/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B1-B EBL	STATION 83+65	OFFSET 57ft RT	ALIGNMENT -L-
COLLAR ELEV. 5.1 ft	TOTAL DEPTH 85.0 ft	NORTHING 376,688	EASTING 2,492,069
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/16/09	COMP. DATE 04/17/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



Gray to dark gray, silty, fine SAND (A-2-4) with trace of clay (continued)

- Boring Terminated at Elevation -79.9 ft in gray to dark gray silty fine sand.
- 1) Advanced 2-7/8" tricone roller to 83.5 feet.
 - 2) Set 4.5 feet of NW casing.
 - 3) Water with quickgel added used as drilling fluid.
 - 4) Approximate drilling fluid density 8.5 lbs/gal.

NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 84+77.GPJ NC_DOT.GDT 8/6/09



PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B2-A EBL	STATION 84+18	OFFSET 1ft RT	ALIGNMENT -L-
COLLAR ELEV. 12.9 ft	TOTAL DEPTH 90.0 ft	NORTHING 376,708	EASTING 2,492,143
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/21/09	COMP. DATE 04/21/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
15	12.9	0.0												GROUND SURFACE 0.0
10	8.9	4.0	1	WOH	1									Roadway Embankment Fill: Tan and brown, silty, fine SAND (A-2-4) with trace organic matter
5	3.9	9.0		WOH	1									Gray, fine sandy, silty CLAY (A-7-6)
0	-1.1	14.0		WOH	1									Alluvium: Dark brown and tan, silty, fine SAND (A-2-4) with trace of organic matter
-5	-6.1	19.0	1		2									
-10	-11.1	24.0	3	8	12									
-15	-17.6	30.5	9	7	9									
-20	-22.6	35.5	4	6	11									
-25	-27.6	40.5	15	23	29									
-30	-32.6	45.5	3	6	94/0.4									
-35	-40.0	52.9	10	13	29									
-40	-45.0	57.9	8	9	10									
-45	-50.6	63.5	5	7	10									
-50	-55.6	68.5	5	10	13									
-55	-60.6	73.5	5	8	11									
-60			5	8	10									
-65														

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B2-A EBL	STATION 84+18	OFFSET 1ft RT	ALIGNMENT -L-
COLLAR ELEV. 12.9 ft	TOTAL DEPTH 90.0 ft	NORTHING 376,708	EASTING 2,492,143
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/21/09	COMP. DATE 04/21/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-65	-65.6	78.5	5	7	10									Match Line
-70	-70.6	83.5	3	4	5									Gray, silty, fine SAND (A-2-4) (continued)
-75	-75.6	88.5	5	10	13									
-80														
-85														
-90														
-95														
-100														
-105														
-110														
-115														
-120														
-125														
-130														
-135														
-140														
-145														

NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 84+77.GPJ NC_DOT.GDT 8/6/09

Boring Terminated at Elevation -77.1 ft in gray silty fine sand.

- 1) Advanced 3-7/8" tricone roller to 88.5 feet.
- 2) Set 4.0 feet of 4 inch casing.
- 3) Advanced HQ core barrel from 25.5 to 45.5 feet.
- 3) Water with quickgel added used as drilling fluid.
- 4) Approximate drilling fluid density 8.5 lbs/gal.

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

Bridge on SR 1406 at -L- Station 84+77
 NCDOT Proj. No. 35801.1.1(U-3810)

Sheet 10

PROJECT NO. 35801.1.1		ID. U-3810		COUNTY Onslow		GEOLOGIST Howard, J.					
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)							GROUND WTR (ft)				
BORING NO. B2-A EBL		STATION 84+18		OFFSET 1ft RT		ALIGNMENT -L-	0 HR. 8.1				
COLLAR ELEV. 12.9 ft		TOTAL DEPTH 90.0 ft		NORTHING 376,708		EASTING 2,492,143	24 HR. 10.8				
DRILL MACHINE CME 45C		DRILL METHOD Mud rotary			HAMMER TYPE Automatic						
START DATE 04/21/09		COMP. DATE 04/21/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A					
CORE SIZE HQ		TOTAL RUN 15.6 ft		DRILLER Rhodes, D.							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	ROD (ft) %	REC. (ft) %	ROD (ft) %			
-12.6	-12.6	25.5	5.0	0:15/1.0	(0.3)	NA	(0.3)	NA		Begin Coring @ 25.5 ft	
-15				0:15/1.0	6%		6%			River Bend Formation: Gray, silty, fine to coarse SAND (A-2-4) with trace of friable to moderately indurated, thinly bedded, limestone layers	
	-17.6	30.5		0:15/1.0							
	-19.1	32.0		0:15/1.0			(0.0)	NA		Gray, silty, fine SAND (A-2-4) with trace of shell fragments	30.5
-20			3.5	0:15/1.0	(0.0)	NA	0%				
	-22.6	35.5		0:15/1.0							
	-24.1	37.0		0:07/0.5							
-25			3.5	0:15/1.0	(0.0)	NA	0%				
	-27.6	40.5		0:15/1.0							
	-29.0	41.9		0:10/0.5							
-30			3.6	1:15/1.0	(1.3)	NA	54%			Gray, silty, fine to coarse SAND (A-2-4) with trace to little friable to moderately indurated, thinly bedded, sandy moldic limestone	41.5
	-32.6	45.5		1:15/1.0	36%						
				0:15/1.0			(0.0)	NA		Gray, silty, fine SAND (A-2-4)	
-35				0:07/0.6			0%				
				N=42							
-40				N=19							
-45				N=17							
-50				N=23							
-55				N=19							
-60				N=18							
-65				N=17							
-70				N=9							
-75				N=23							
-80										Boring Terminated at Elevation -77.1 ft in gray silty fine sand.	90.0
-85										1) Advanced 3-7/8" tricone roller to 88.5 feet. 2) Set 4.0 feet of 4 inch casing. 3) Advanced HQ core barrel from 25.5 to 45.5 feet. 3) Water with quickgel added used as drilling fluid. 4) Approximate drilling fluid density 8.5 lbs/gal.	
-90											



Bridge on SR 1406 at -L- Station 84+77
 B2-A EBL
 Box 1 of 1; Depth: 25.5 - 45.5 ft

NCDOT CORE SINGLE BRIDGE ON SR 1406 AT STA 84+77.GPJ NC_DOT_GDT 8/6/09



PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B3-B EBL	STATION 84+71	OFFSET 42ft RT	ALIGNMENT -L-
COLLAR ELEV. 10.4 ft	TOTAL DEPTH 84.5 ft	NORTHING 376,645	EASTING 2,492,168
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/22/09	COMP. DATE 04/22/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
10	10.4	0.0												GROUND SURFACE 0.0
5	6.1	4.3	1	2	3									Artificial Fill: Black and gray, silty, fine SAND (A-2-4)
0	2.4	8.0	1	1	1									Alluvium: Gray, silty, fine SAND (A-2-4)
-5	-2.6	13.0	2	1	4									Tan-brown, silty, fine SAND (A-2-4) with trace of organic matter
-10	-7.6	18.0	6	3	2									Brown-gray, fine to coarse SAND (A-3) with trace of silt
-15	-12.6	23.0	5	5	10									River Bend Formation: Light gray, silty, fine to coarse SAND (A-2-4) with trace of friable to moderately indurated limestone layers
-20	-17.6	28.0	10	15	19									Gray, silty, fine SAND (A-2-4) with trace of shell fragments
-25	-22.6	33.0	15	24	35									Gray, silty, fine SAND (A-2-4) with trace to little friable to moderately indurated limestone layers
-30	-27.6	38.0	7	13	22									Gray, silty, fine SAND (A-2-4) with trace of shell fragments
-35	-32.6	43.0	23	22	12									Gray, silty, fine SAND (A-2-4)
-40	-37.6	48.0	8	15	15									Gray, silty, fine SAND (A-2-4)
-45	-42.6	53.0	15	8	11									Gray, silty, fine SAND (A-2-4)
-50	-47.6	58.0	5	15	19									Gray, silty, fine SAND (A-2-4)
-55	-52.6	63.0	8	9	12									Gray, silty, fine SAND (A-2-4)
-60	-57.6	68.0	4	5	12									Gray, silty, fine SAND (A-2-4)
-65	-62.6	73.0	5	5	28									Gray, silty, fine SAND (A-2-4)

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B3-B EBL	STATION 84+71	OFFSET 42ft RT	ALIGNMENT -L-
COLLAR ELEV. 10.4 ft	TOTAL DEPTH 84.5 ft	NORTHING 376,645	EASTING 2,492,168
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/22/09	COMP. DATE 04/22/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

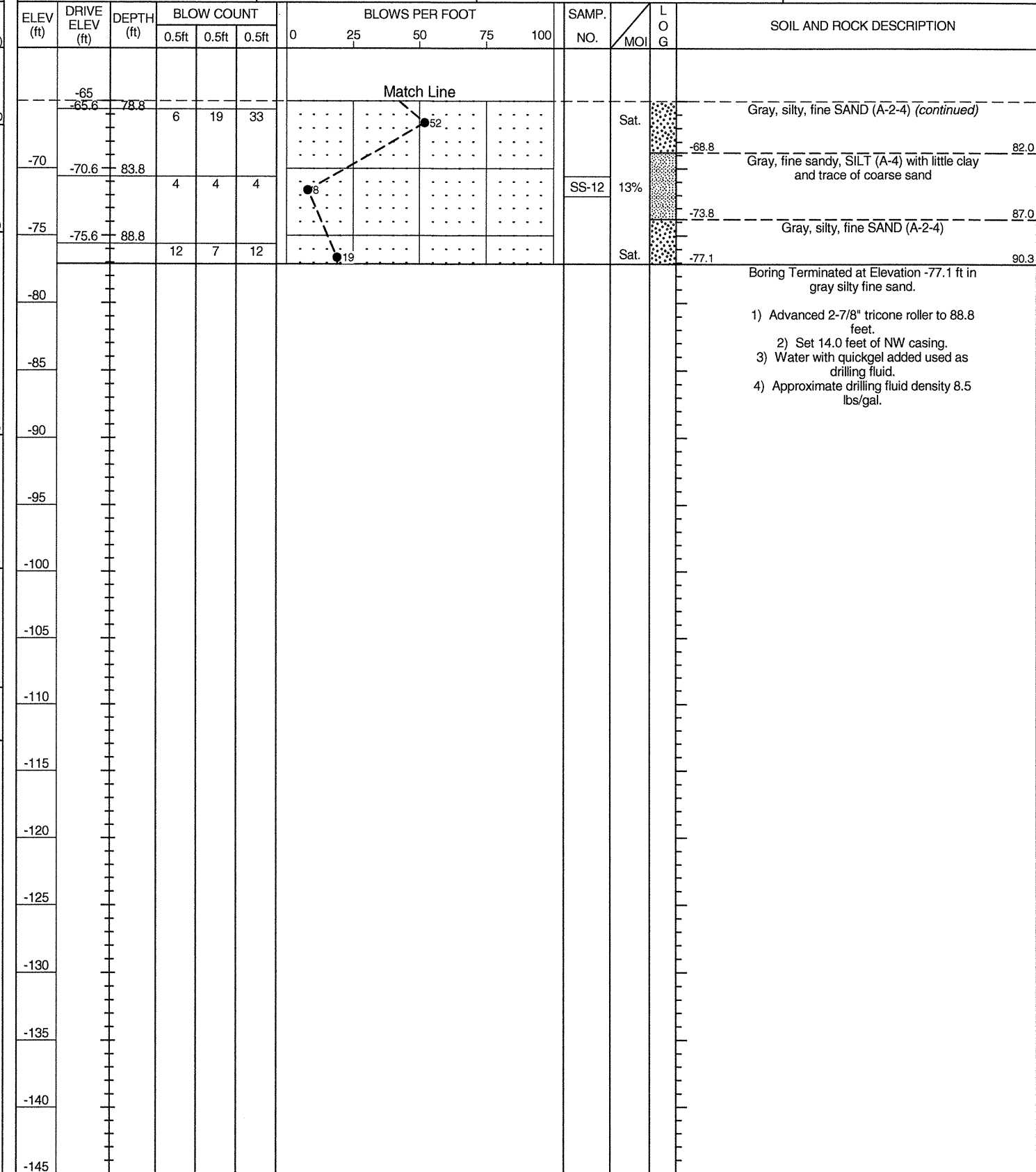
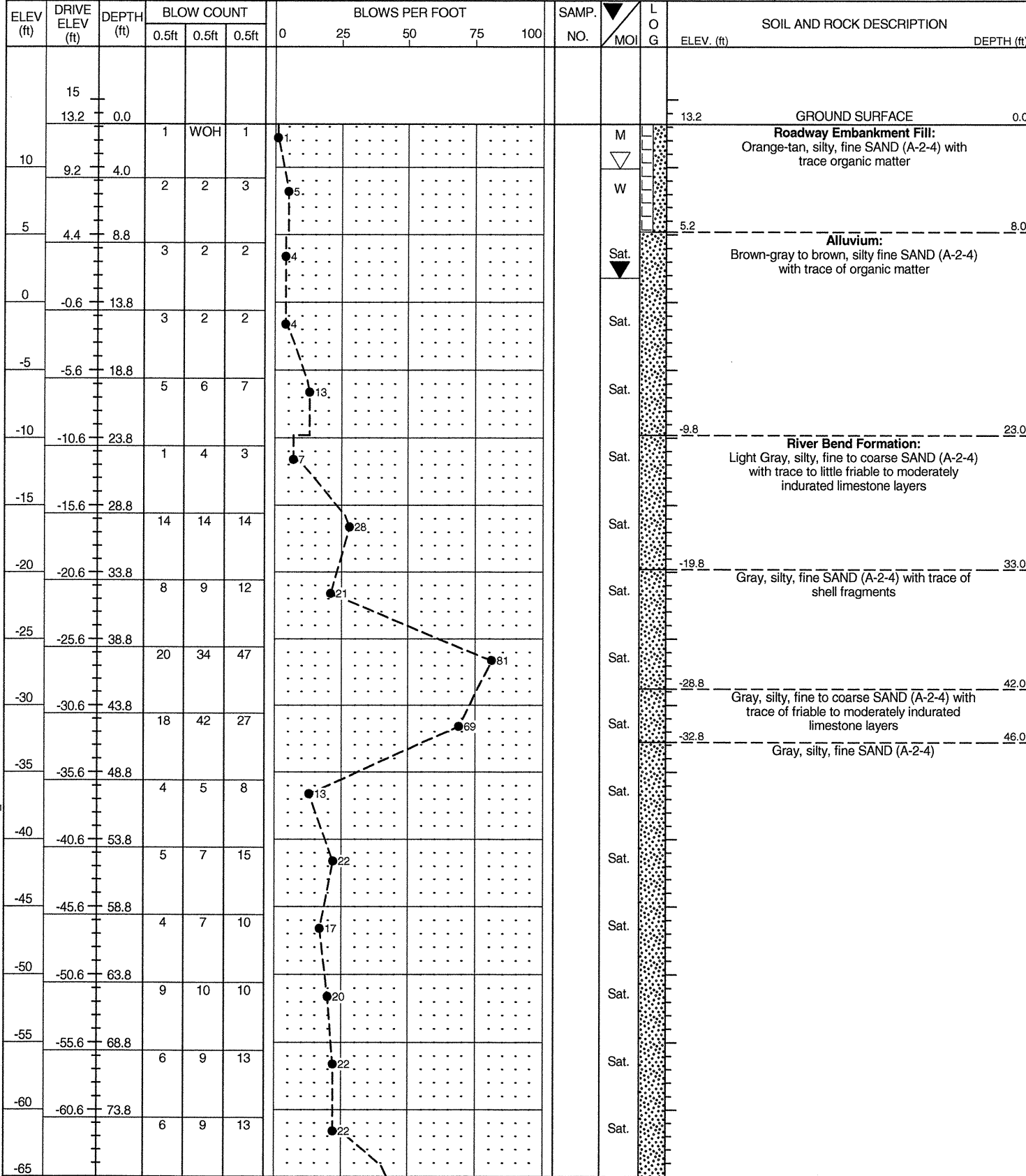
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-65														Gray, silty, fine SAND (A-2-4) (continued)
-70	-67.6	78.0	4	5	8									Gray, silty, fine SAND (A-2-4) with trace of cemented sand layers
-75	-72.6	83.0	5	21	48									Boring Terminated at Elevation -74.1 ft in gray silty fine sand.
-80														1) Advanced 2-7/8" tricone roller to 83.0 feet.
-85														2) Set 9.0 feet of NW casing.
-90														3) Water with quickgel added used as drilling fluid.
-95														4) Approximate drilling fluid density 8.5 lbs/gal.
-100														
-105														
-110														
-115														
-120														
-125														
-130														
-135														
-140														
-145														

NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 84+77.GPJ NC_DOT.GDT 8/6/09



PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B4-A EBL	STATION 85+17	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 13.2 ft	TOTAL DEPTH 90.3 ft	NORTHING 376,658	EASTING 2,492,228
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/22/09	COMP. DATE 04/23/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B4-A EBL	STATION 85+17	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 13.2 ft	TOTAL DEPTH 90.3 ft	NORTHING 376,658	EASTING 2,492,228
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/22/09	COMP. DATE 04/23/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

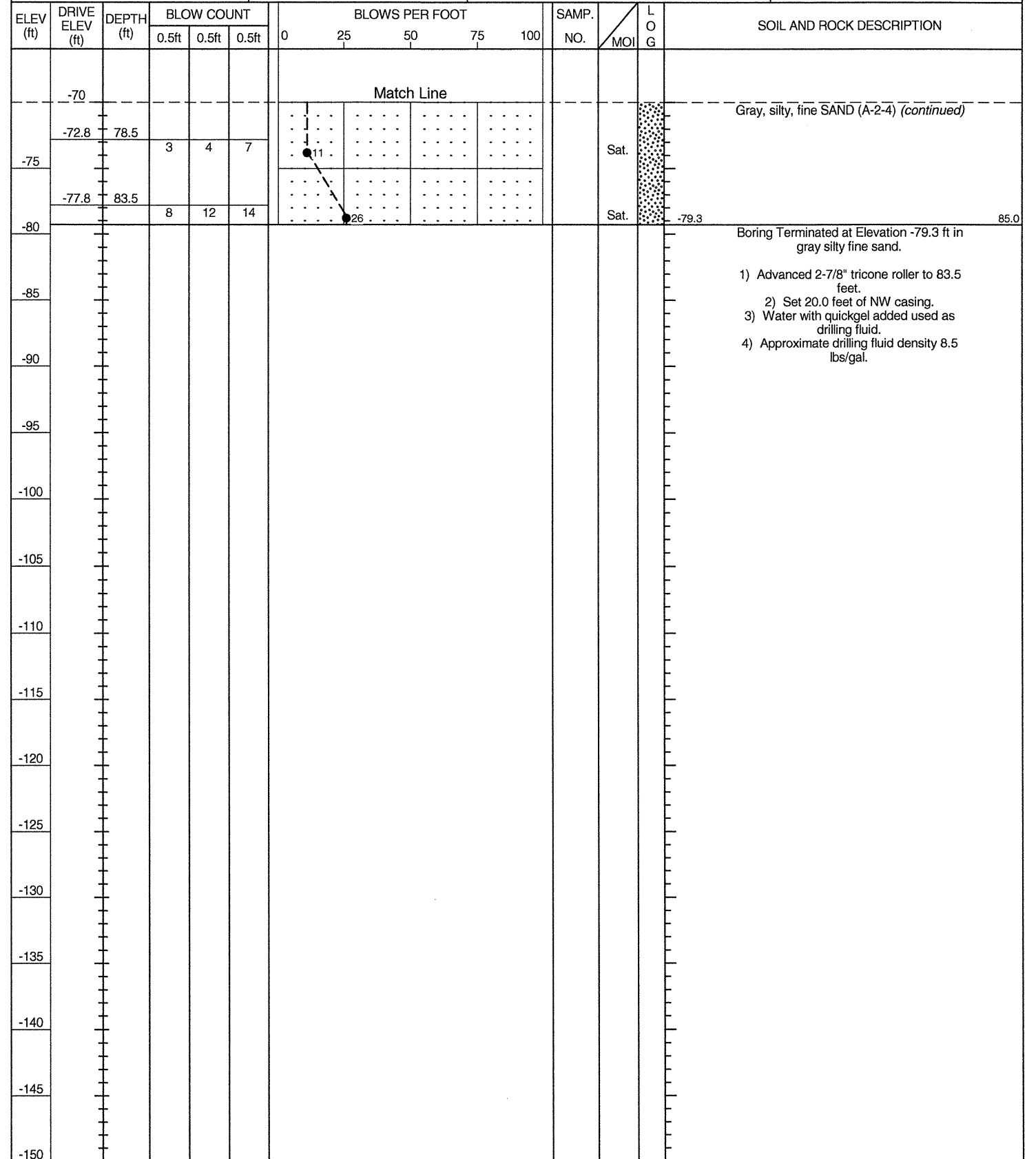
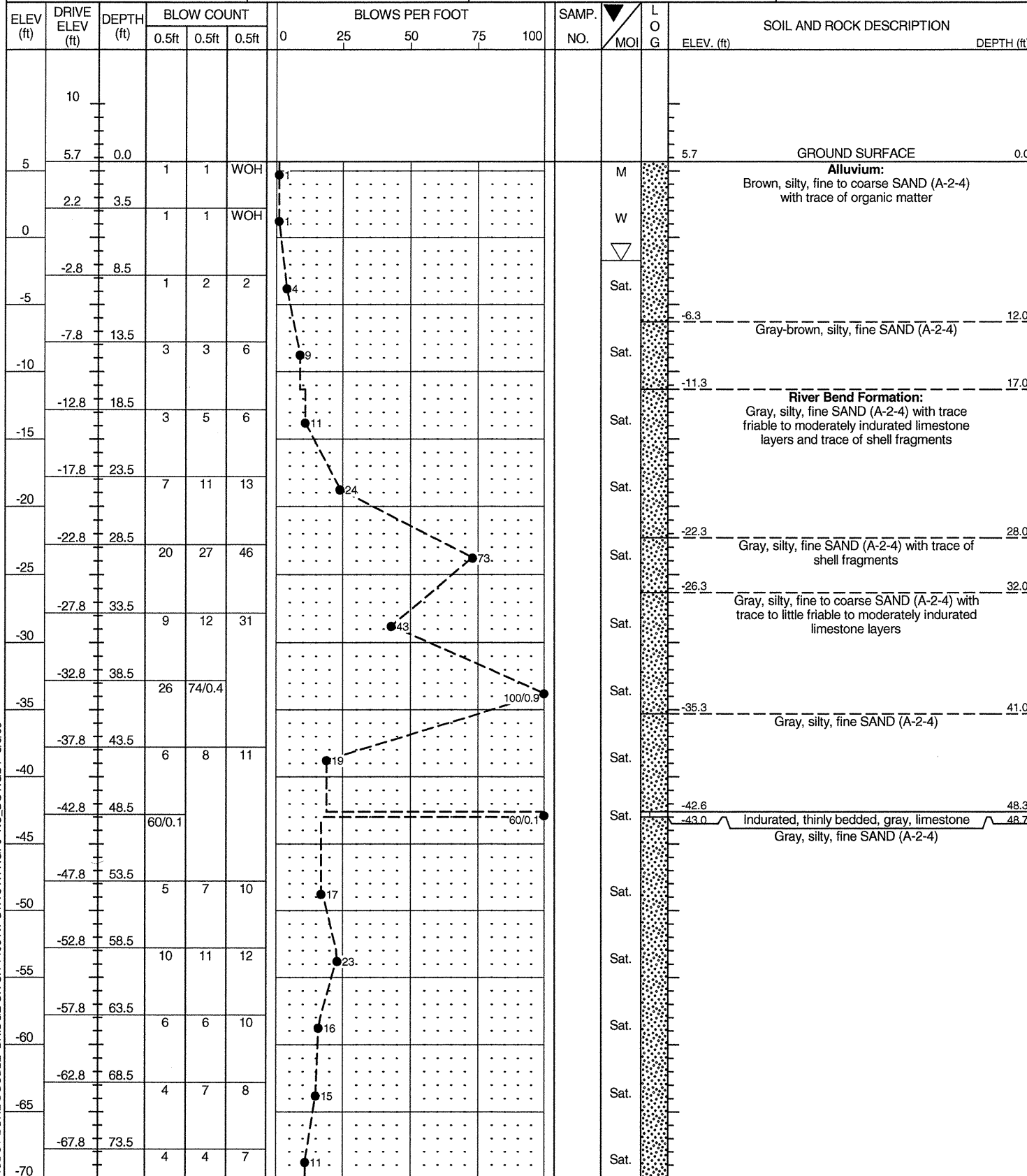


NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 84+77.GPJ NC_DOT.GDT 8/6/09



PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B5-B EBL	STATION 85+49	OFFSET 39ft RT	ALIGNMENT -L-
COLLAR ELEV. 5.7 ft	TOTAL DEPTH 85.0 ft	NORTHING 376,607	EASTING 2,492,236
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/23/09	COMP. DATE 04/24/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 48.3 ft

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. B5-B EBL	STATION 85+49	OFFSET 39ft RT	ALIGNMENT -L-
COLLAR ELEV. 5.7 ft	TOTAL DEPTH 85.0 ft	NORTHING 376,607	EASTING 2,492,236
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/23/09	COMP. DATE 04/24/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 48.3 ft



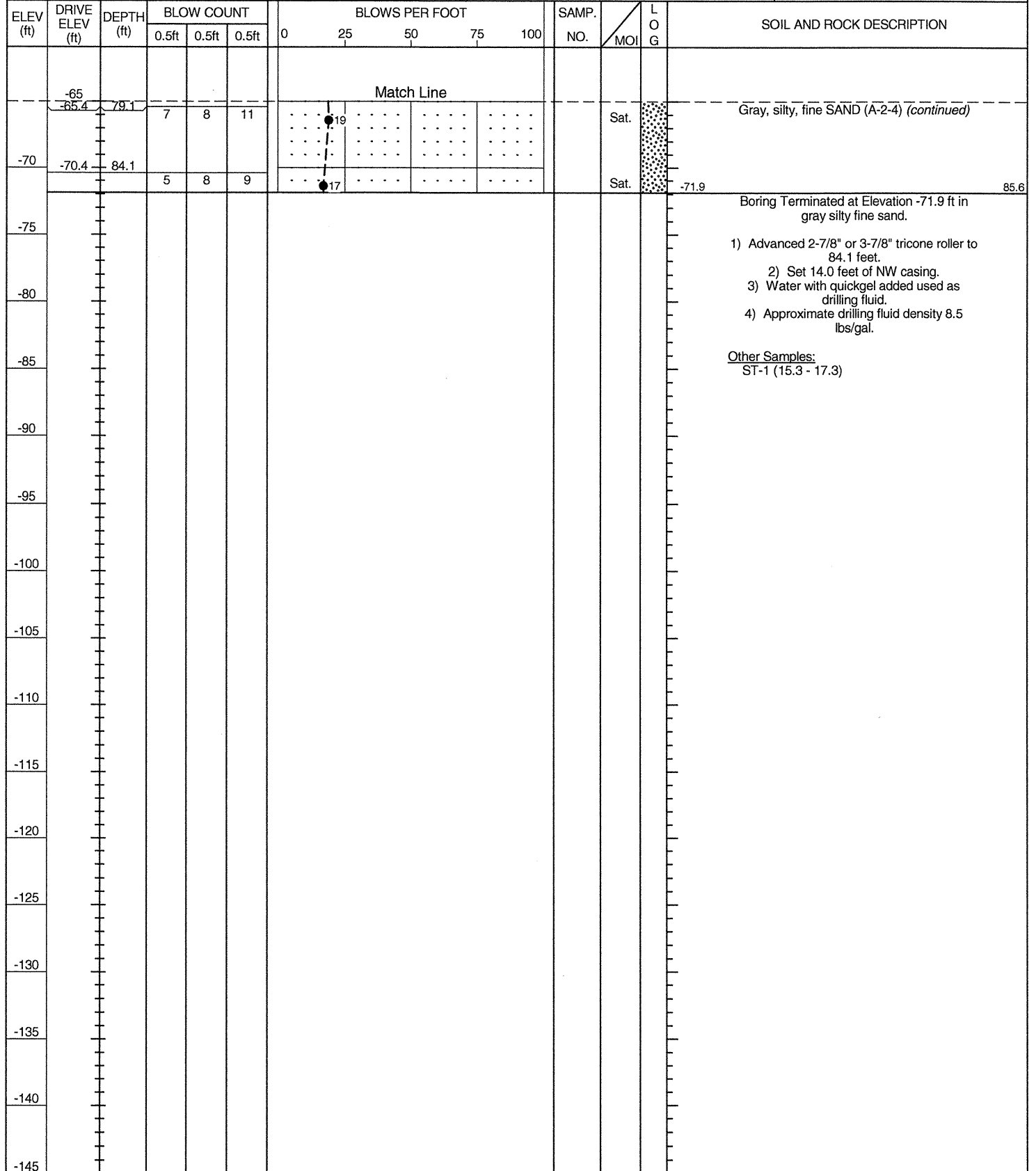
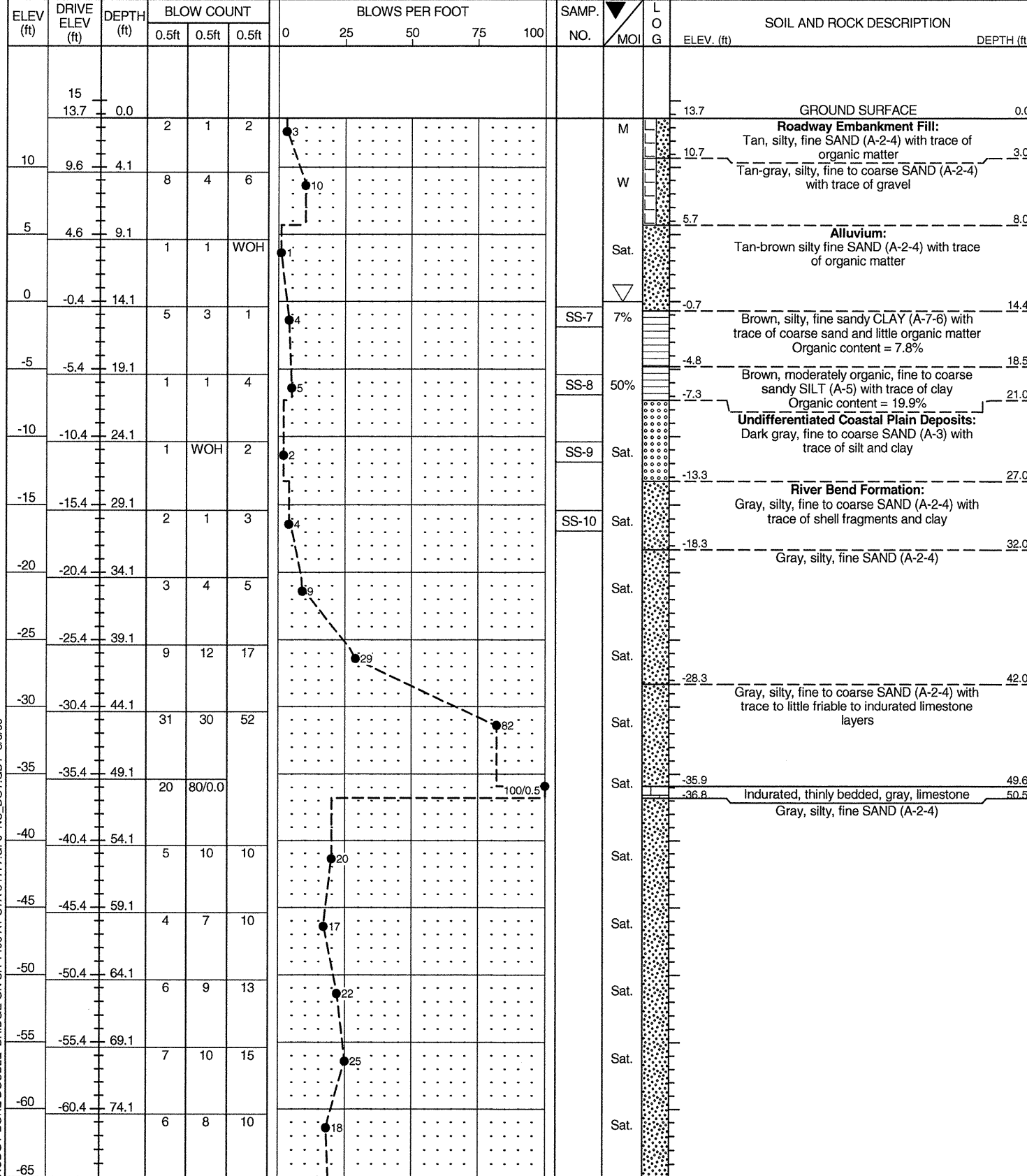
NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 84+77.GPJ NC_DOT.GDT 8/6/09

- 1) Advanced 2-7/8" tricone roller to 83.5 feet.
- 2) Set 20.0 feet of NW casing.
- 3) Water with quickgel added used as drilling fluid.
- 4) Approximate drilling fluid density 8.5 lbs/gal.



PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. EB2-A EBL	STATION 86+31	OFFSET 1ft RT	ALIGNMENT -L-
COLLAR ELEV. 13.7 ft	TOTAL DEPTH 85.6 ft	NORTHING 376,598	EASTING 2,492,326
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/27/09	COMP. DATE 04/29/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 49.6 ft

PROJECT NO. 35801.1.1	ID. U-3810	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridge on SR 1406 at Station 84+77 (MACTEC Project No. 6468-09-2400)			GROUND WTR (ft)
BORING NO. EB2-A EBL	STATION 86+31	OFFSET 1ft RT	ALIGNMENT -L-
COLLAR ELEV. 13.7 ft	TOTAL DEPTH 85.6 ft	NORTHING 376,598	EASTING 2,492,326
DRILL MACHINE CME 45C	DRILL METHOD Mud rotary	HAMMER TYPE Automatic	
START DATE 04/27/09	COMP. DATE 04/29/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 49.6 ft



NCDOT BORE DOUBLE BRIDGE ON SR 1406 AT STA 84+77.GPJ NC_DOT.GDT 8/6/09



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

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

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: Bridge over Northeast Creek on SR 1406 located at Station 84+77

MACTEC Job No.: 6468-09-2400

NCDOT PROJ. NO.: 35801.1.1 (U-3810)

COUNTY: Onslow

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

DATE SAMPLED: April 2009

RECEIVED: 5/7/2009

REPORTED BY: MACTEC

SAMPLED FROM: EB1-B

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Retained No. 4 Sieve	(%)	0.0	1.6	1.2	0.1	0.0	0.0
Passing No. 10 Sieve	(%)	99.9	97.6	96.7	99.7	100.0	100.0
Passing No. 40 Sieve	(%)	97.7	96.2	84.4	99.1	99.8	99.9
Passing No 200 Sieve	(%)	31.4	4.8	3.9	12.0	21.8	16.2

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand	(%)	5.3	13.2	37.4	3.4	3.0	0.3
Fine Sand	(%)	70.4	83.0	59.3	85.9	77.2	86.5
Silt	(%)	20.1	3.8	3.3	5.5	10.2	8.8
Clay	(%)	4.1	0.0	0.0	5.2	9.6	4.4

Moisture Content	(%)	ND	ND	ND	ND	ND	ND
Liquid Limit, L.L.		26	NV	NV	NV	NV	NV
Plasticity Index, P.I.		2	NP	NP	NP	NP	NP
AASHTO Classification		A-2-4(0)	A-3(0)	A-3(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)
Organic Content	(%)	5.5	1.4	ND	ND	ND	ND

Boring No.		EB1-A EBL	EB1-A EBL	EB1-A EBL	EB1-A EBL	EB1-A EBL	EB1-A EBL
Station		83+19	83+19	83+19	83+19	83+19	83+19
Offset		6 RT	6 RT	6 RT	6 RT	6 RT	6 RT
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (FT)	From	7.6	12.6	17.6	43.1	78.1	98.1
	to	9.1	14.1	19.1	44.6	79.6	99.6

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504

Chana Savanapridi
 Signature



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

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

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: Bridge over Northeast Creek on SR 1406 located at Station 84+77

MACTEC Job No.: 6468-09-2400

NCDOT PROJ. NO.: 35801.1.1 (U-3810)

COUNTY: Onslow

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

DATE SAMPLED: April 2009

RECEIVED: 5/7/2009

REPORTED BY: MACTEC

SAMPLED FROM: EB2-B, B1-B, B4-C

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		SS-7	SS-8	SS-9	SS-10	SS-11	SS-12
Retained No. 4 Sieve	(%)	0.0	0.0	0.0	0.6	0.0	0.0
Passing No. 10 Sieve	(%)	100.0	100.0	100.0	98.5	100.0	100.0
Passing No. 40 Sieve	(%)	98.2	68.8	97.6	92.0	99.8	99.8
Passing No. 200 Sieve	(%)	66.3	38.2	7.7	25.0	12.2	41.2

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand	(%)	4.6	39.1	18.2	11.0	0.7	4.6
Fine Sand	(%)	37.3	30.1	74.8	67.4	88.4	64.0
Silt	(%)	24.0	20.8	4.7	13.2	8.3	19.1
Clay	(%)	34.1	10.0	2.3	8.4	2.6	12.3

Moisture Content	(%)	6.6	49.7	ND	ND	ND	12.5
Liquid Limit, L.L.		41	53	NV	NV	NV	19
Plasticity Index, P.I.		22	2	NP	NP	NP	3
AASHTO Classification		A-7-6(12)	A-5(0)	A-3(0)	A-2-4(0)	A-2-4(0)	A-4(0)
Organic Content	(%)	7.8	19.9	ND	ND	ND	ND

Boring No.		EB2-A EBL	EB2-A EBL	EB2-A EBL	EB2-A EBL	B1-B EBL	B4-A EBL
Station		86+31	86+31	86+31	86+31	83+65	85+17
Offset		1 RT	1 RT	1 RT	1 RT	57 RT	0
Alignment		-L-	-L-	-L-	-L-	-L-	-L-
Depth (FT)	From	14.1	19.1	24.1	29.1	58.5	83.8
	to	15.6	20.6	25.6	30.6	60.0	85.3

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504

Chana Savanapridi
 Signature



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

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

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: Bridge over Northeast Creek on SR 1406 located at Station 84+77

MACTEC Job No.: 6468-09-2400

NCDOT PROJ. NO.: 35801.1.1 (U-3810)

COUNTY: Onslow

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

DATE SAMPLED: April 2009

RECEIVED: 5/7/2009

REPORTED BY: MACTEC

SAMPLED FROM: Channel Bed, EB2-B

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		S-1	ST-1			
Retained No 4 Sieve	(%)	0.4	0.0			
Passing No. 10 Sieve	(%)	99.2	100.0			
Passing No. 40 Sieve	(%)	95.7	64.5			
Passing No. 200 Sieve	(%)	32.3	5.2			

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%						
Coarse Sand	(%)	11.2	5.2			
Fine Sand	(%)	61.2	38.0			
Silt	(%)	17.9	21.8			
Clay	(%)	9.7	35.0			

Moisture Content	(%)	ND	37.9			
Liquid Limit, L.L.		31	43			
Plasticity Index, P.I.		8	23			
AASHTO Classification		A-2-4(0)	A-7-6(13)			
Dry Density	pcf	ND	62.1			
P _c	ksf	ND	5.70			
C _c		ND	0.48			

Boring No.		Channel	EB2-A EBL			
Station		85+75	86+31			
Offset		9 RT	1 RT			
Alignment		-L-	-L-			
Depth (FT)	From	0.0	15.3			
	to	1.0	17.3			

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504

Signature



**FIELD
 SCOUR REPORT**

WBS: 35801.1.1 TIP: U-3810 COUNTY: Onslow

DESCRIPTION(1): Bridge on SR 1406 over Northeast Creek (near Station 84+77)

EXISTING BRIDGE

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

Bridge No.: 118 Length: Apx 75' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
 Foundation Type: Cored slab supported on concrete cap piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Not apparent

Interior Bents: Not apparent. Bed not visible through the water.

Channel Bed: Not apparent. Bed not visible through the water.

Channel Bank: Some cutting of banks under bridge. Banks mostly vegetated up and down stream and are apparently stable.

EXISTING SCOUR PROTECTION

Type(3): Rip rap

Extent(4): Across entire width of embankment at both end bents.

Effectiveness(5): Mostly effective.

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): Silty, fine to coarse sand

Channel Bank Material(8): Silty, fine to coarse sand

Channel Bank Cover(9): Grasses and bushes

Floodplain Width(10): 500 feet

Floodplain Cover(11): Grasses, bushes, small to large trees

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): Not apparent. Minor deposition of sediment in bed at location of proposed bridge

Observations and Other Comments: Low flow environment at time of investigation, proposed bridge is located in grass-covered utility easement

Reported by: James Howard Date: 4/27/2009

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

BENTS

B1	B2	B3	B4	B5						
-7.9	-8.8	-8.1	-8.5	-11.3						

Comparison of DSE to Hydraulics Unit theoretical scour:

The Geotechnical Engineering Unit agrees with the theoretical scour elevations for Bents 3 and 4 as reported in the Bridge Survey and Hydraulic Design Report dated 2/28/09. The GEU has determined that the scour elevations for Bents 1, 2, and 5 should be adjusted to the elevations as noted in the above table.

DSE determined by: Chad M. Whyte Date: 7/15/2009

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank	Bank	Bank	Bank	Bank
Sample No.	S-1	SS-1	SS-2	SS-3	SS-7	SS-8
Retained #4	0.4	0	1.6	1.2	0	0
Passed #10	99.2	99.9	97.6	96.7	100	100
Passed #40	95.7	97.7	96.2	84.4	98.2	68.8
Passed #200	32.3	31.4	4.8	3.9	66.3	38.2
Coarse Sand	11.2	5.3	13.2	37.4	4.6	39.1
Fine Sand	61.2	70.4	83	59.3	37.3	30.1
Silt	17.9	20.1	3.8	3.3	24	20.8
Clay	9.7	4.1	0	0	34.1	10
LL	31	26	No Value	No Value	41	53
PI	8	2	Non Plastic	Non Plastic	22	2
AASHTO	A-2-4(0)	A-2-4(0)	A-3(0)	A-3(0)	A-7-6(12)	A-5(0)
Station	85+75	83+19	83+19	83+19	86+31	86+31
Offset	9 RT	6 RT	6 RT	6 RT	1 RT	1 RT
Depth	0.0-1.0	7.6-9.1	12.6-14.1	17.6-19.1	14.1-15.6	19.1-20.6



FIELD
 SCOUR REPORT

WBS: 35801.1.1 TIP: U-3810 COUNTY: Onslow

DESCRIPTION(1): Bridge on SR 1406 over Northeast Creek (near Station 84+77)

EXISTING BRIDGE

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

Bridge No.: 119 Length: Apx 90' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
 Foundation Type: Cored slab supported on concrete cap and piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Not apparent.

Interior Bents: Not apparent. Bed not visible through water.

Channel Bed: Not apparent. Bed not visible through water.

Channel Bank: Some cutting of banks under bridge. Banks mostly vegetated up and down stream and are apparently stable.

EXISTING SCOUR PROTECTION

Type(3): Rip rap

Extent(4): Across entire width of embankment at both end bents.

Effectiveness(5): Mostly effective.

Obstructions(6): Minor debris at up stream-side.

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): Silty, fine to coarse sand

Channel Bank Material(8): Silty, fine to coarse sand, and silty clay, sandy silt with little to some organics

Channel Bank Cover(9): Grasses and bushes

Floodplain Width(10): 500 feet

Floodplain Cover(11): Grasses, bushes, small to large trees

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): Eastward toward end bent 2.

Observations and Other Comments: Low flow environment at time of investigation, proposed bridge is located in grass-covered utility easement, minor deposition of sediment near proposed bent 5

Reported by: James Howard Date: 4/27/2009

DESIGN SCOUR ELEVATIONS(14) Feet Meters _____

BENTS

	B1	B2	B3	B4	B5						
	-7.9	-8.8	-8.1	-8.5	-11.3						

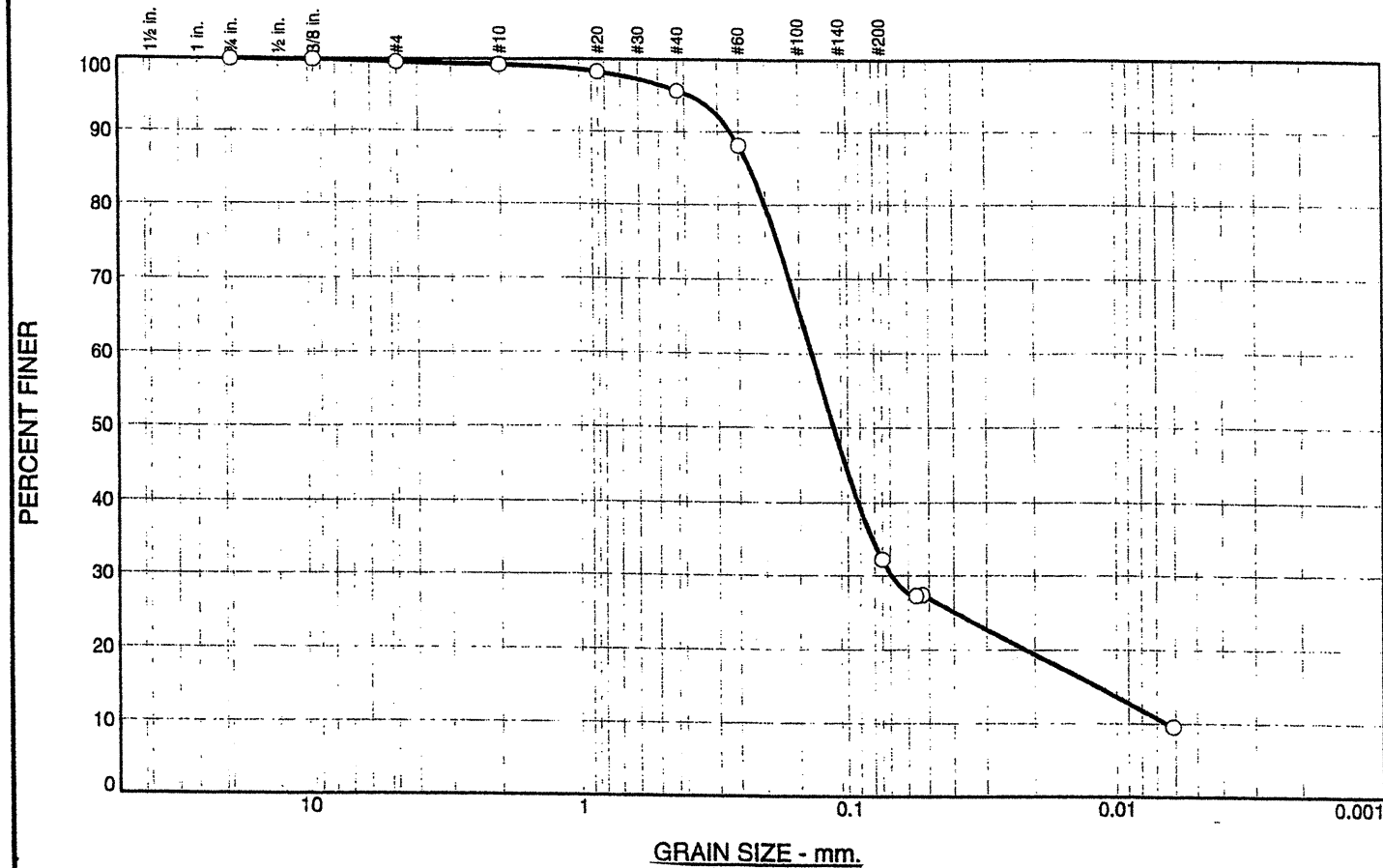
Comparison of DSE to Hydraulics Unit theoretical scour:
 The Geotechnical Engineering Unit agrees with the theoretical scour elevations for Bents 3 and 4 as reported in the Bridge Survey and Hydraulic Design Report dated 2/28/09. The GEU has determined that the scour elevations for Bents 1, 2, and 5 should be adjusted to the elevations as noted in the above table.

DSE determined by: *Chad M. Wilby* Date: 7/15/2009

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank	Bank	Bank	Bank	Bank
Sample No.	S-1	SS-1	SS-2	SS-3	SS-7	SS-8
Retained #4	0.4	0	1.6	1.2	0	0
Passed #10	99.2	99.9	97.6	96.7	100	100
Passed #40	95.7	97.7	96.2	84.4	98.2	68.8
Passed #200	32.3	31.4	4.8	3.9	66.3	38.2
Coarse Sand	11.2	5.3	13.2	37.4	4.6	39.1
Fine Sand	61.2	70.4	83	59.3	37.3	30.1
Silt	17.9	20.1	3.8	3.3	24	20.8
Clay	9.7	4.1	0	0	34.1	10
LL	31	26	No Value	No Value	41	53
PI	8	2	Non Plastic	Non Plastic	22	2
AASHTO	A-2-4(0)	A-2-4(0)	A-3(0)	A-3(0)	A-7-6(12)	A-5(0)
Station	85+75	83+19	83+19	83+19	86+31	86+31
Offset	9 RT	6 RT	6 RT	6 RT	1 RT	1 RT
Depth	0.0-1.0	7.6-9.1	12.6-14.1	17.6-19.1	14.1-15.6	19.1-20.6

Particle Size Distribution Report



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
3/8	100.0		
#4	99.6		
#10	99.2		
#20	98.3		
#40	95.7		
#60	88.1		
#200	32.3		
#270	27.4		

Material Description		
Dark Brown, Silty, Fine to Coarse SAND		
<p>Atterberg Limits PL= 23 LL= 31 PI= 8</p>		
<p>Coefficients D₉₀= 0.2685 D₈₅= 0.2275 D₆₀= 0.1355 D₅₀= 0.1125 D₃₀= 0.0693 D₁₅= 0.0118 D₁₀= 0.0064 C_u= 21.06 C_c= 5.51</p>		
<p>Classification USCS= SC AASHTO= A-2-4(0)</p>		
<p>Remarks ND = Not Determined Specific Gravity is assumed.</p>		

* (no specification provided)

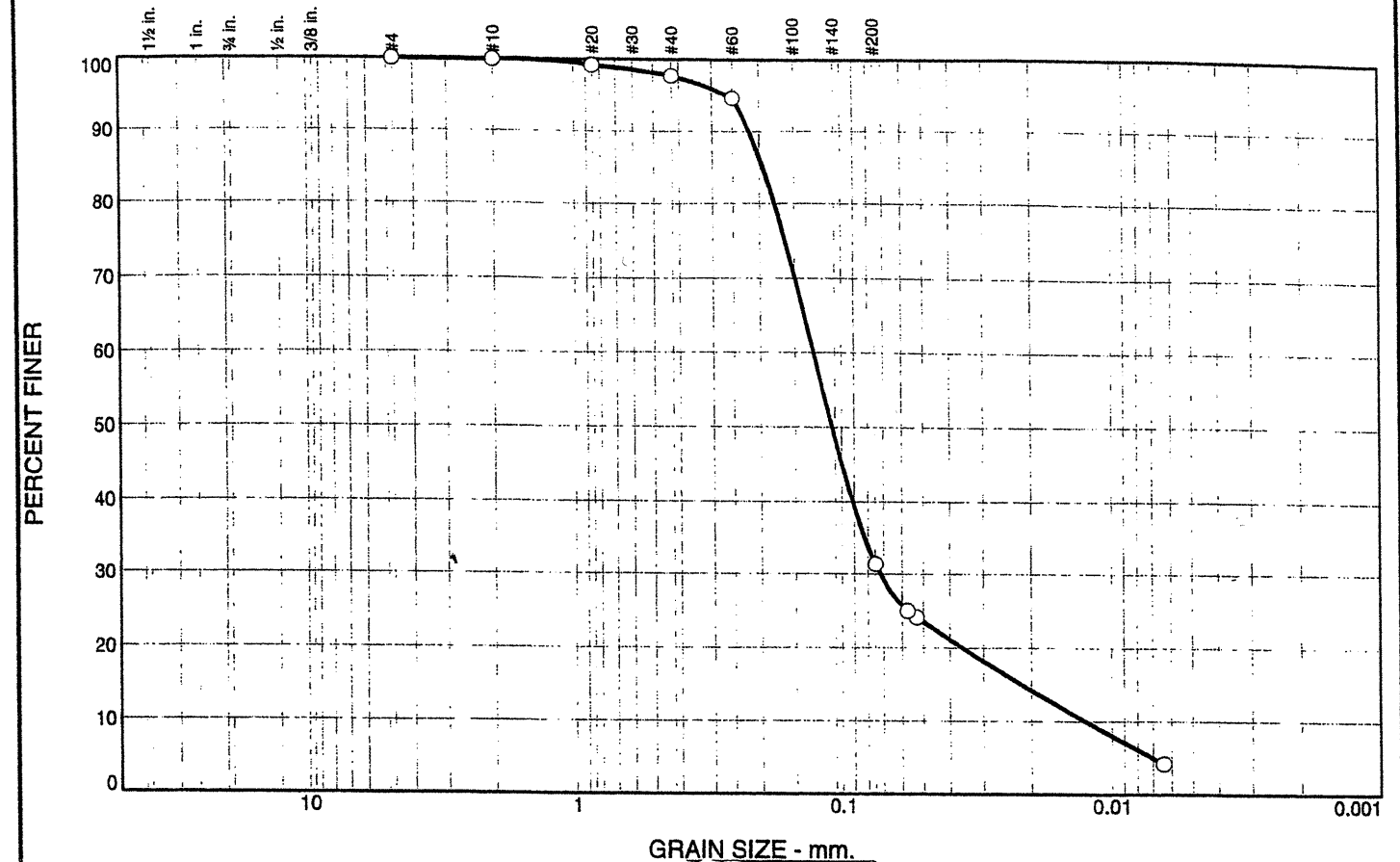
Source of Sample: Channel Bed Depth: 0.0-1.0'
 Sample Number: S-1

Date: 5/7/09

MACTEC Engineering and Consulting, Inc. Raleigh, North Carolina	Client: NC DEPARTMENT OF TRANSPORTATION Project: Bridge on SR 1406 @ Station 84+77 Project No: 6468092400	Figure <i>NA</i>
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Tested By: CS (Cert# 104-04-0504) Checked By: MDC (Lab Manager)

Particle Size Distribution Report



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.2		
#40	97.7		
#60	94.6		
#200	31.4		
#270	24.2		

Material Description		
Brown, Moderately Organic, Silty Fine to Coarse SAND with Trace of Clay		
<p>Atterberg Limits PL= 24 LL= 26 PI= 2</p>		
<p>Coefficients D₉₀= 0.2174 D₈₅= 0.1944 D₆₀= 0.1275 D₅₀= 0.1086 D₃₀= 0.0718 D₁₅= 0.0216 D₁₀= 0.0125 C_u= 10.17 C_c= 3.23</p>		
<p>Classification USCS= SM AASHTO= A-2-4(0)</p>		
<p>Remarks Organic Content = 5.5% as Per AASHTO T 267-86 Specific Gravity is assumed</p>		

* (no specification provided)

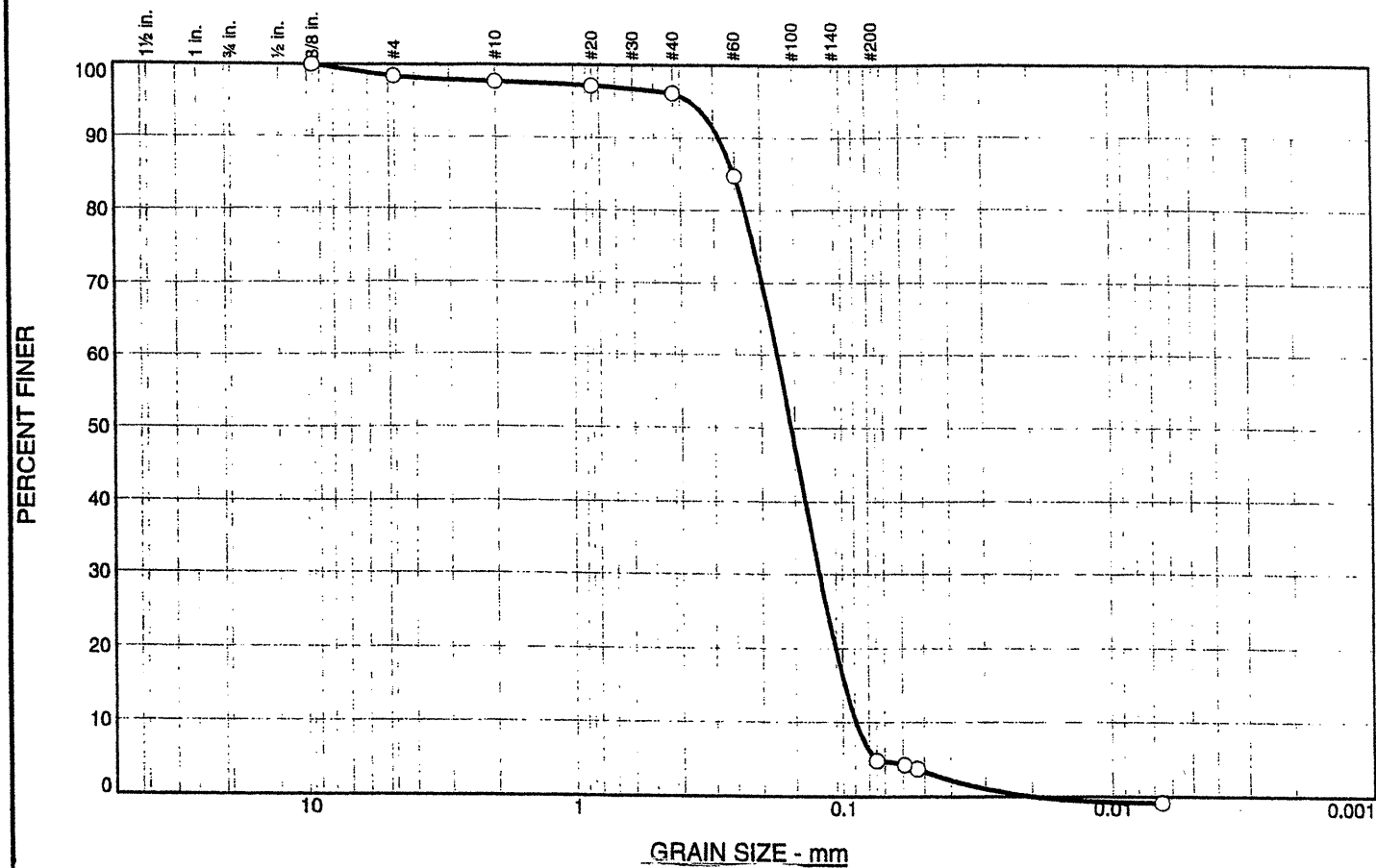
Source of Sample: Boring EB1-A EBL Depth: 7.6-9.1'
 Sample Number: SS-1

Date: 5/7/09

MACTEC Engineering and Consulting, Inc. Raleigh, North Carolina	Client: NC DEPARTMENT OF TRANSPORTATION Project: Bridge on SR 1406 @ Station 84+77 Project No: 6468092400	Figure <i>NA</i>
--	---	------------------

Tested By: CS (Cert# 104-04-0504) Checked By: MDC (Lab Manager)

Particle Size Distribution Report



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	98.4		
#10	97.6		
#20	97.1		
#40	96.2		
#60	84.7		
#200	4.8		
#270	3.7		

Material Description
Tan-Gray, Fine to Coarse SAND with Trace of Organic Matter & Silt

PL= NP **Atterberg Limits** LL= NV PI= NP

Coefficients
D₉₀= 0.2856 D₈₅= 0.2516 D₆₀= 0.1744
D₅₀= 0.1548 D₃₀= 0.1217 D₁₅= 0.0980
D₁₀= 0.0890 C_u= 1.96 C_c= 0.95

Classification
USCS= SP AASHTO= A-3

Remarks
ND = Not Determined Spatular Method
Specific Gravity is assumed
Organic Content = 1.4% as Per AASHTO T 267-86

* (no specification provided)

Source of Sample: Boring EB1-A EBL Depth: 12.6-14.1'
Sample Number: SS-2

Date: 5/7/09

MACTEC Engineering and Consulting, Inc.

Client: NC DEPARTMENT OF TRANSPORTATION
Project: Bridge on SR 1406 @ Station 84+77

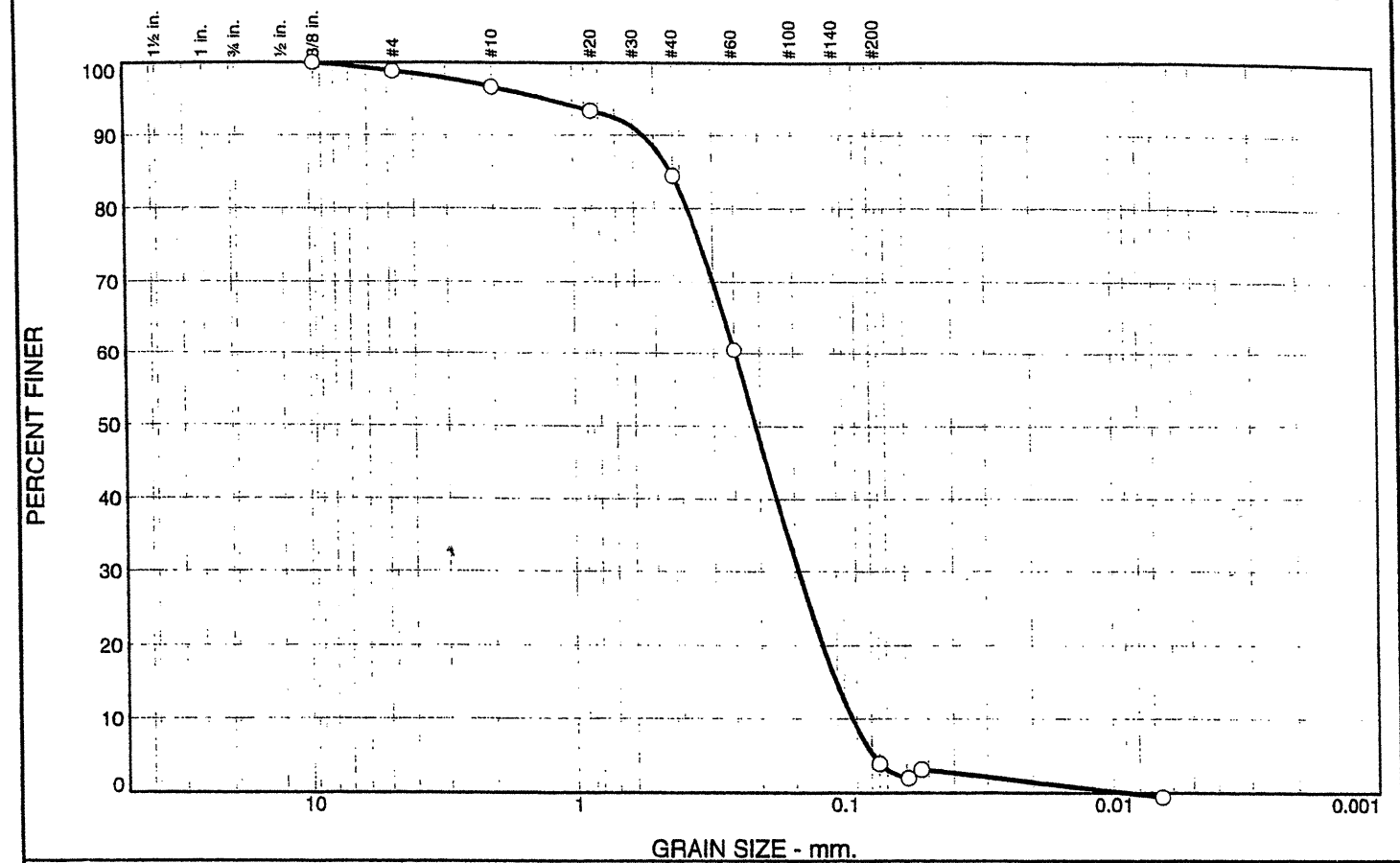
Raleigh, North Carolina

Project No: 6468092400

Figure NA

Tested By: CS (Cert# 104-04-0504) *CS* Checked By: MDC (Lab Manager)

Particle Size Distribution Report



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	98.8		
#10	96.7		
#20	93.4		
#40	84.4		
#60	60.5		
#200	3.9		
#270	3.2		

Material Description
Tan-Gray, Fine to Coarse SAND with Trace of Silt

PL= NP **Atterberg Limits** LL= NV PI= NP

Coefficients
D₉₀= 0.5497 D₈₅= 0.4339 D₆₀= 0.2478
D₅₀= 0.2075 D₃₀= 0.1453 D₁₅= 0.1065
D₁₀= 0.0935 C_u= 2.65 C_c= 0.91

Classification
USCS= SP AASHTO= A-3

Remarks
ND = Not Determined Spatula Method
Specific Gravity is assumed

* (no specification provided)

Source of Sample: Boring EB1-A EBL Depth: 17.6-19.1'
Sample Number: SS-3

Date: 5/7/09

MACTEC Engineering and Consulting, Inc.

Client: NC DEPARTMENT OF TRANSPORTATION
Project: Bridge on SR 1406 @ Station 84+77

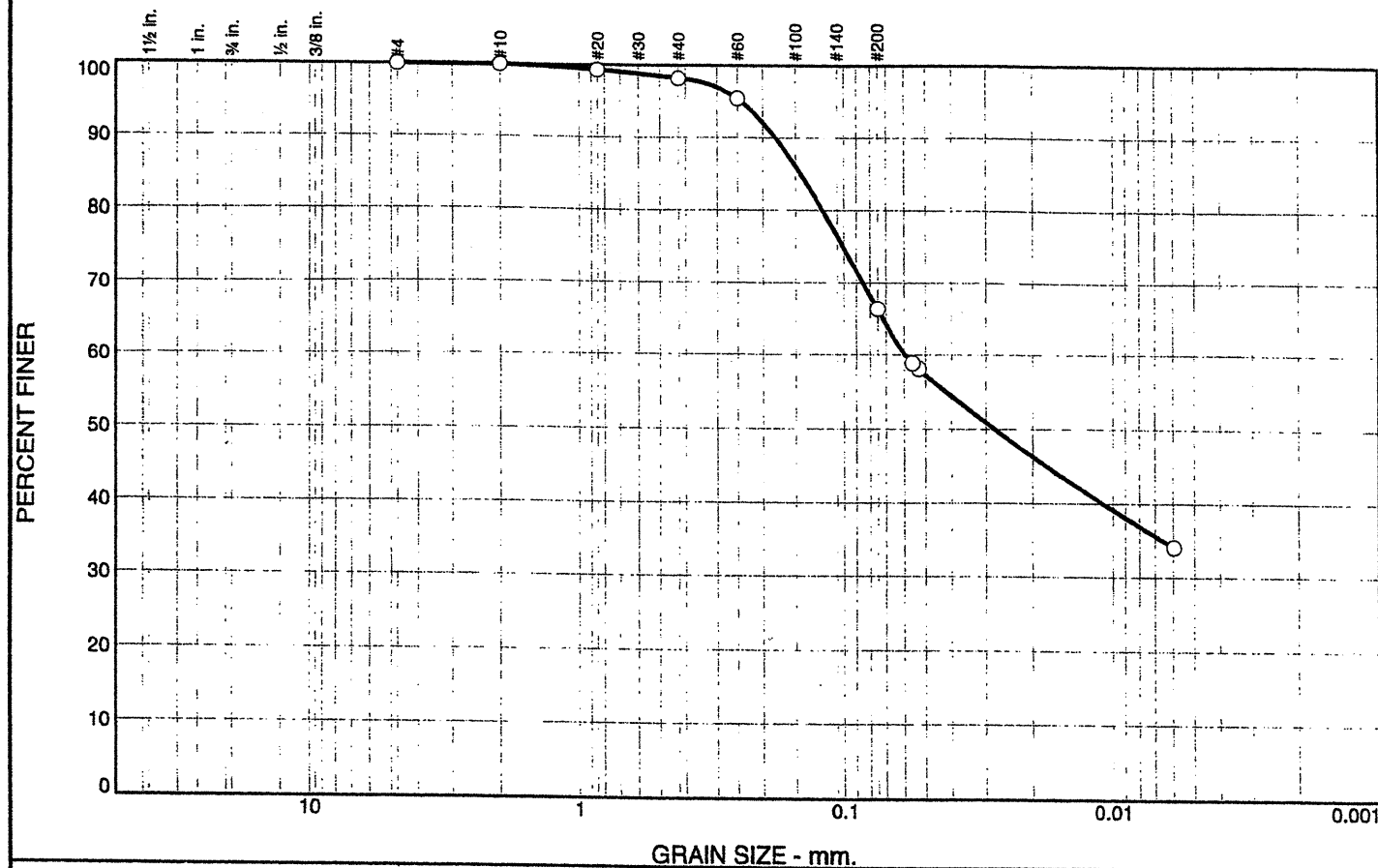
Raleigh, North Carolina

Project No: 6468092400

Figure NA

Tested By: CS (Cert# 104-04-0504) *CS* Checked By: MDC (Lab Manager)

Particle Size Distribution Report



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.3		
#40	98.2		
#60	95.4		
#200	66.3		
#270	58.1		

* (no specification provided)

Material Description
Brown, Silty, Fine Sandy CLAY with Little Organic Matter

PL= 19 **Atterberg Limits** PI= 22
LL= 41

Coefficients
D₉₀= 0.1792 D₈₅= 0.1442 D₆₀= 0.0594
D₅₀= 0.0277 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Classification
USCS= CL AASHTO= A-7-6(12)

Remarks
Specific Gravity is assumed
Organic Content = 7.8% as Per AASHTO T267-86

Source of Sample: Boring EB2-A EBL Depth: 14.1-15.6'
Sample Number: SS-7

Date: 5/7/09

MACTEC Engineering and Consulting, Inc.

Client: NC DEPARTMENT OF TRANSPORTATION
Project: Bridge on SR 1406 @ Station 84+77

Raleigh, North Carolina

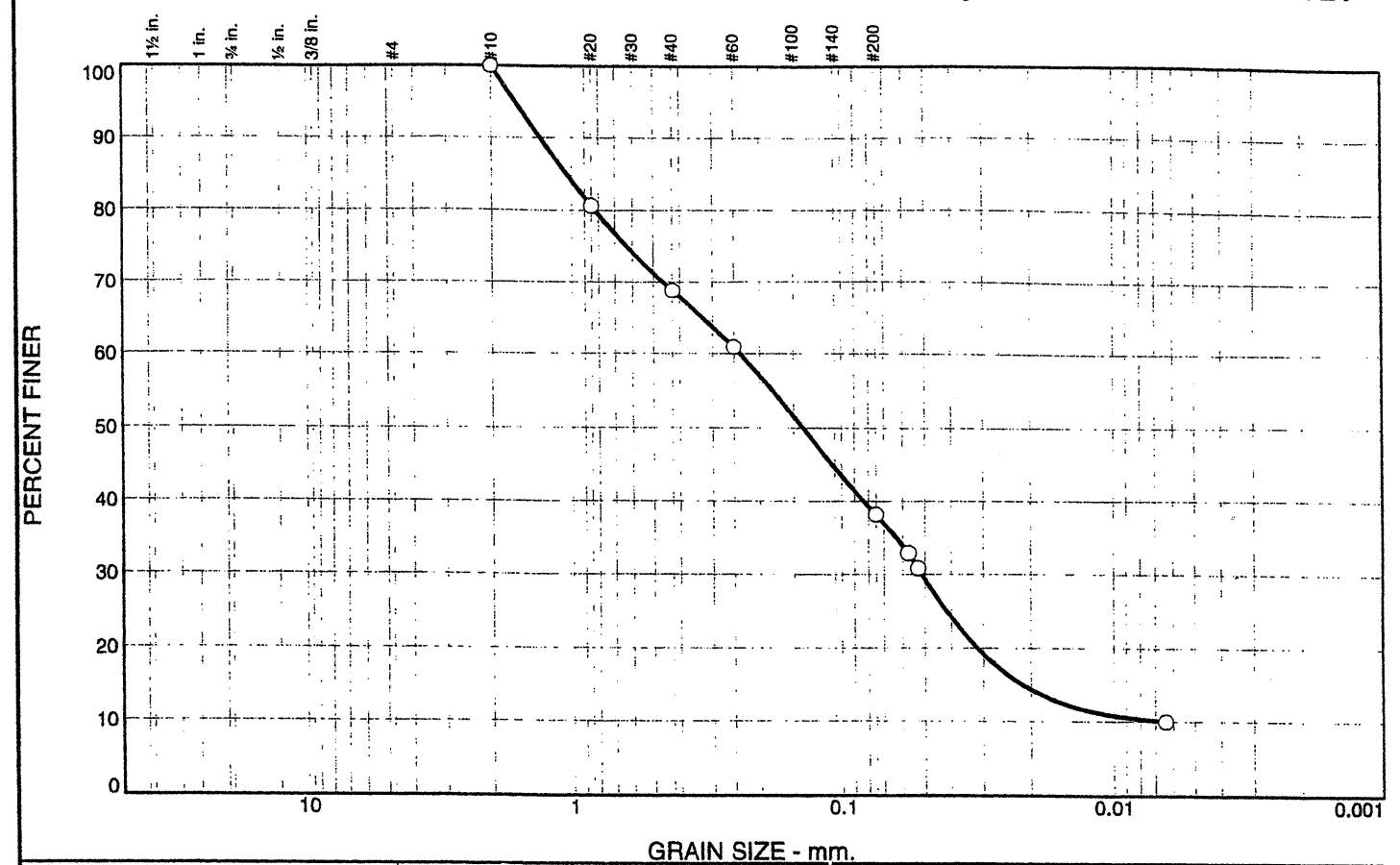
Project No: 6468092400

Figure NA

Tested By: CS (Cert# 104-04-0504) *CS* Checked By: MDC (Lab Manager)

Particle Size Distribution Report

Sheet 21



SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	80.7		
#40	68.8		
#60	60.9		
#200	38.2		
#270	30.8		

* (no specification provided)

Material Description
Brown, Moderately Organic, Fine to Coarse Sandy SILT with Trace of Clay

PL= 51 **Atterberg Limits** PI= 2
LL= 53

Coefficients
D₉₀= 1.3091 D₈₅= 1.0464 D₆₀= 0.2362
D₅₀= 0.1387 D₃₀= 0.0514 D₁₅= 0.0213
D₁₀= 0.0064 C_u= 36.85 C_c= 1.74

Classification
USCS= SM AASHTO= A-5(0)

Remarks
Organic Content = 19.9% as Per AASHTO T267-86
Specific Gravity is assumed

Source of Sample: Boring EB2-A EBL Depth: 19.1-20.6'
Sample Number: SS-8

Date: 5/7/09

MACTEC Engineering and Consulting, Inc.

Client: NC DEPARTMENT OF TRANSPORTATION
Project: Bridge on SR 1406 @ Station 84+77

Raleigh, North Carolina

Project No: 6468092400

Figure NA

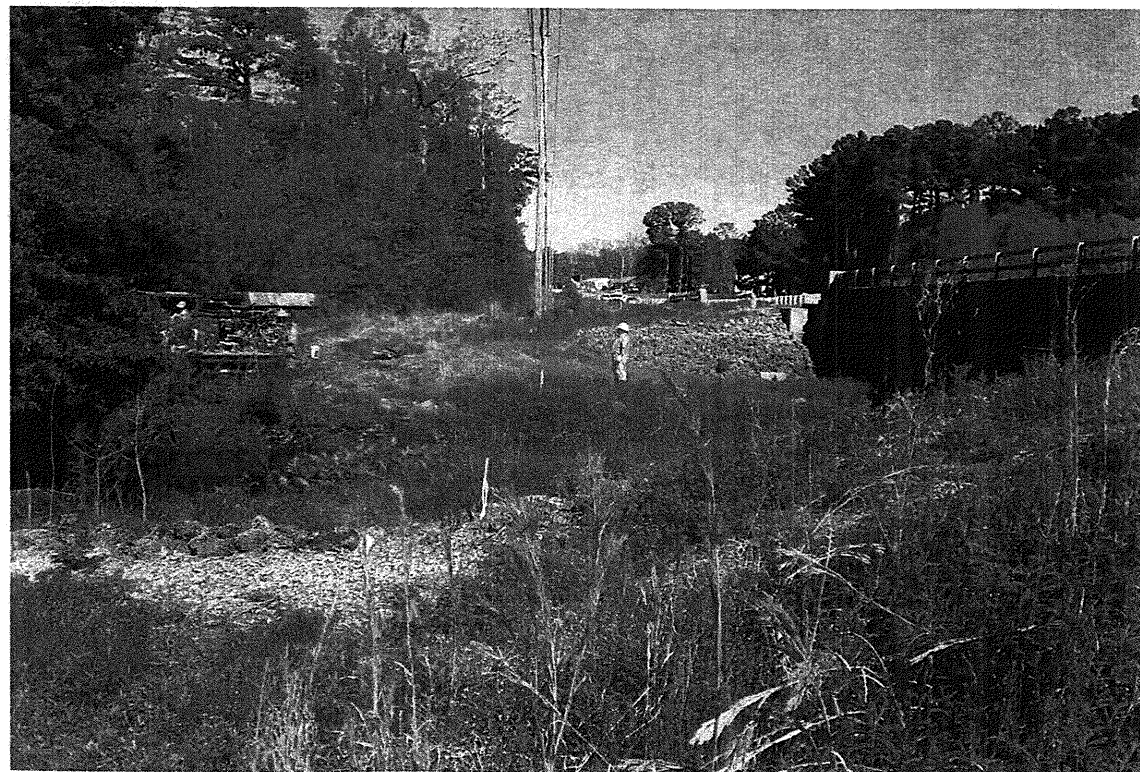
Tested By: CS (Cert# 104-04-0504) *CS* Checked By: MDC (Lab Manager)



View looking Up Station from End Bent No. 1



View looking left to right of End Bent No. 1



View looking Down Station from End Bent No. 2



View looking left to right of Interior Bent No. 1



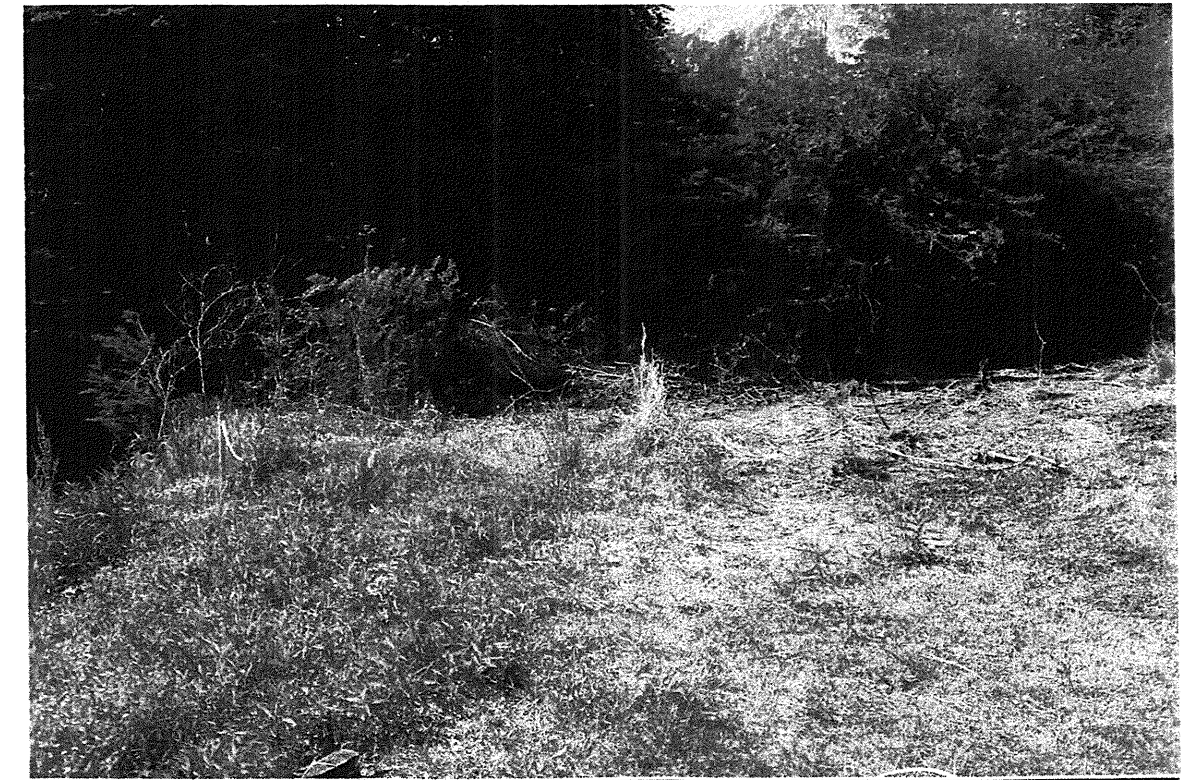
View looking left to right of Interior Bent No. 2



View looking left to right of Interior Bent No. 4



View looking left to right of Interior Bent No. 3



View looking left to right of Interior Bent No. 5



View looking left to right of End Bent No. 2

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3810	1	4
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35801.1.1	STP-1406(4)	P.E.	
		RW & UTIL.	

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 35801.1.1 (U-3810) F.A. PROJ. STP-1406(4)
COUNTY ONSLAW
PROJECT DESCRIPTION SR 1406 (PINEY GREEN ROAD) FROM US 17
(MARINE BOULEVARD) TO NC 24 (FREEDOM WAY)
SITE DESCRIPTION RETAINING WALL AT -L- STA. 201+50, 50' RT.

RETAINING WALL INVENTORY

CONTENTS:

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
3	PROFILE
4	SAMPLE RESULTS

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.

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.

PROJECT: 35801.1.1 ID: U-3810

PERSONNEL

CMW

RES

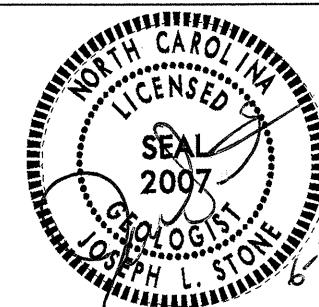
JME

INVESTIGATED BY J.L. STONE

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE JUNE, 2009



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

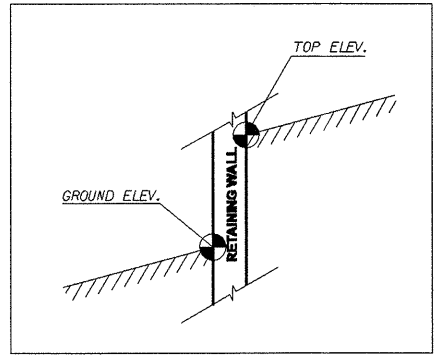
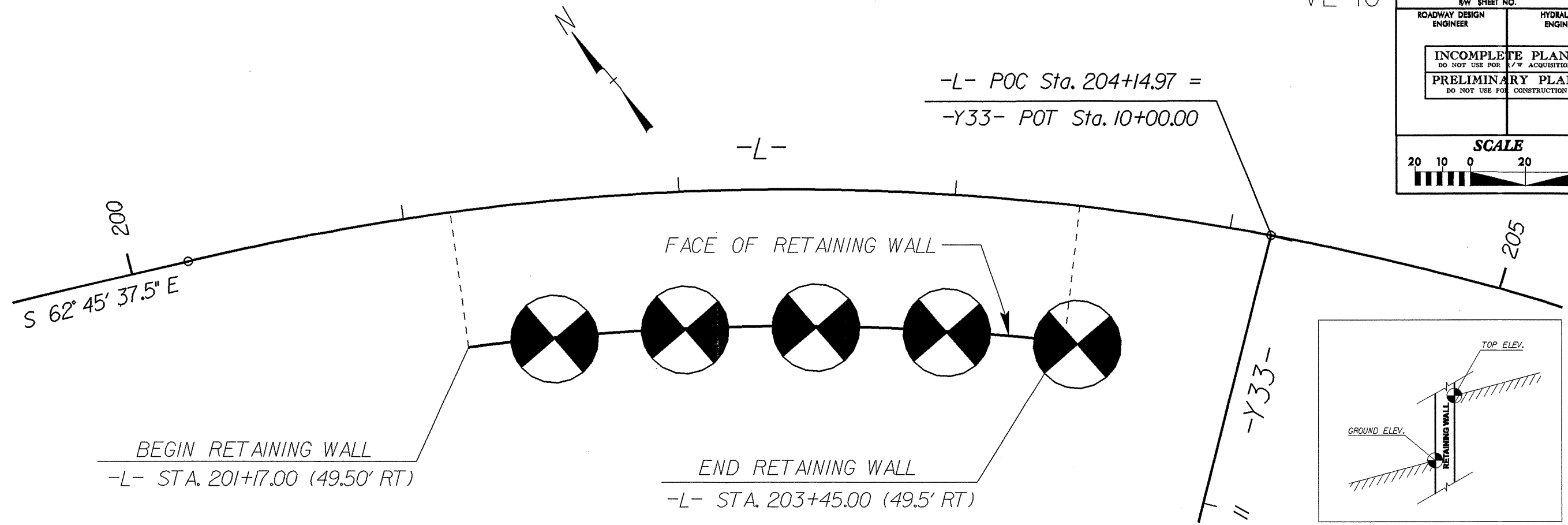
NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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.

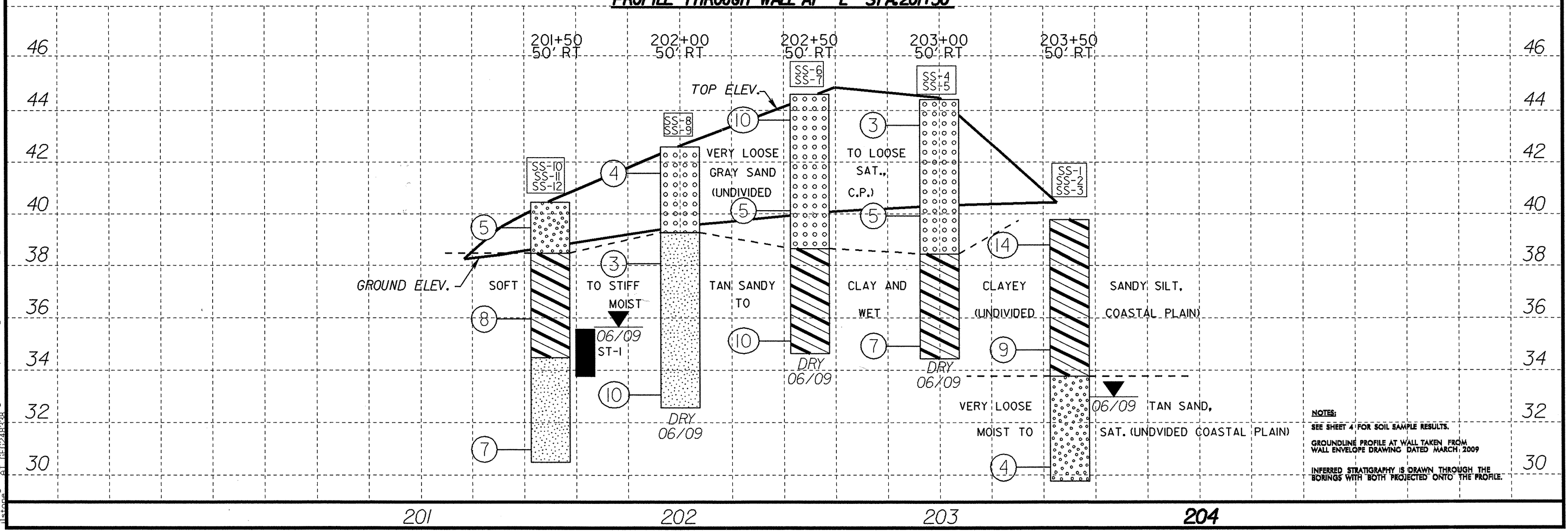
8/17/99

VE=10

PROJECT REFERENCE NO. U-3810	SHEET NO. 3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
SCALE 	



PROFILE THROUGH WALL AT -L- STA. 201+50



NOTES:
 SEE SHEET 4 FOR SOIL SAMPLE RESULTS.
 GROUNDLINE PROFILE AT WALL TAKEN FROM WALL ENVELOPE DRAWING DATED MARCH, 2009
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

29-JUN-2009 09:40 investigation\tp\3810-geo-wall\cadd\geotech\site\sub\3810-geo-wall.dgn

U-3810

35801.1.1

RETAINING WALL AT -L- STA. 201+50, 50' RT

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- 1	50 RT	203+50	1.0- 1.5	A- 6(3)	28	12	4.4	53.6	17.7	24.3	100	99	51	-	-
SS- 2	50 RT	203+50	4.0- 5.5	A- 6(6)	34	17	4.2	51.2	16.3	28.3	100	99	53	19.9	-
SS- 3	50 RT	203+50	8.5- 10.0	A- 2- 4(0)	21	NP	3.2	75.4	13.2	8.1	100	99	29	-	-
SS- 4	50 RT	203+00	1.0- 1.5	A- 3(0)	23	NP	25.7	72.6	1.7	0.0	100	96	3	-	-
SS- 5	50 RT	203+00	8.5- 10.0	A- 6(6)	35	18	3.6	51.6	18.5	26.3	100	99	54	-	-
SS- 6	50 RT	202+50	1.0- 1.5	A- 3(0)	24	NP	20.2	78.4	1.4	0.0	100	97	3	-	-
SS- 7	50 RT	202+50	8.5- 10.0	A- 6(5)	32	15	4.1	52.7	17.9	25.3	100	99	53	-	-
SS- 8	50 RT	202+00	1.0- 1.5	A- 3(0)	23	NP	16.1	80.0	3.9	0.0	100	97	7	-	-
SS- 9	50 RT	202+00	3.5- 5.0	A- 4(0)	22	6	4.7	56.6	18.5	20.2	100	99	48	17.0	-
SS- 10	50 RT	201+50	1.0- 1.5	A- 2- 4(0)	23	NP	10.2	80.0	6.8	3.0	100	98	15	-	-
SS- 11	50 RT	201+50	3.5- 5.0	A- 6(6)	38	18	4.0	51.2	16.5	28.3	100	100	53	-	-
SS- 12	50 RT	201+50	8.5- 10.0	A- 4(0)	22	2	8.7	57.0	18.1	16.2	100	98	50	-	-