

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4007B	1	5
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35008.1.1	STPNHF-17(31)	P.E.	
		RW & UTIL.	

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 35008.1.1 (U-4007B) F.A. PROJ. STPNHF-17(31)  
COUNTY ONslow  
PROJECT DESCRIPTION WESTERN PARKWAY FROM APPROXIMATELY 1300'  
SOUTH OF COUNTRY CLUB RD. TO WESTERN BLVD.  
SITE DESCRIPTION RETAINING WALL AT -Y2- STA. 85+50, 60' RT.

**RETAINING WALL INVENTORY**

**CONTENTS:**

SHEET	DESCRIPTION
1	TITLE SHEET
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5	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: 35008.1.1 ID: U4007B**

PERSONNEL

JRS

SCD

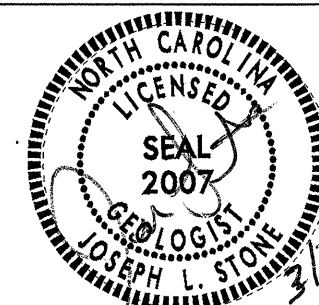
MID-ATLANTIC PERSONNEL

INVESTIGATED BY J.L. STONE

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE MARCH 2009



DRAWN BY: C.R. SUMNER, 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.

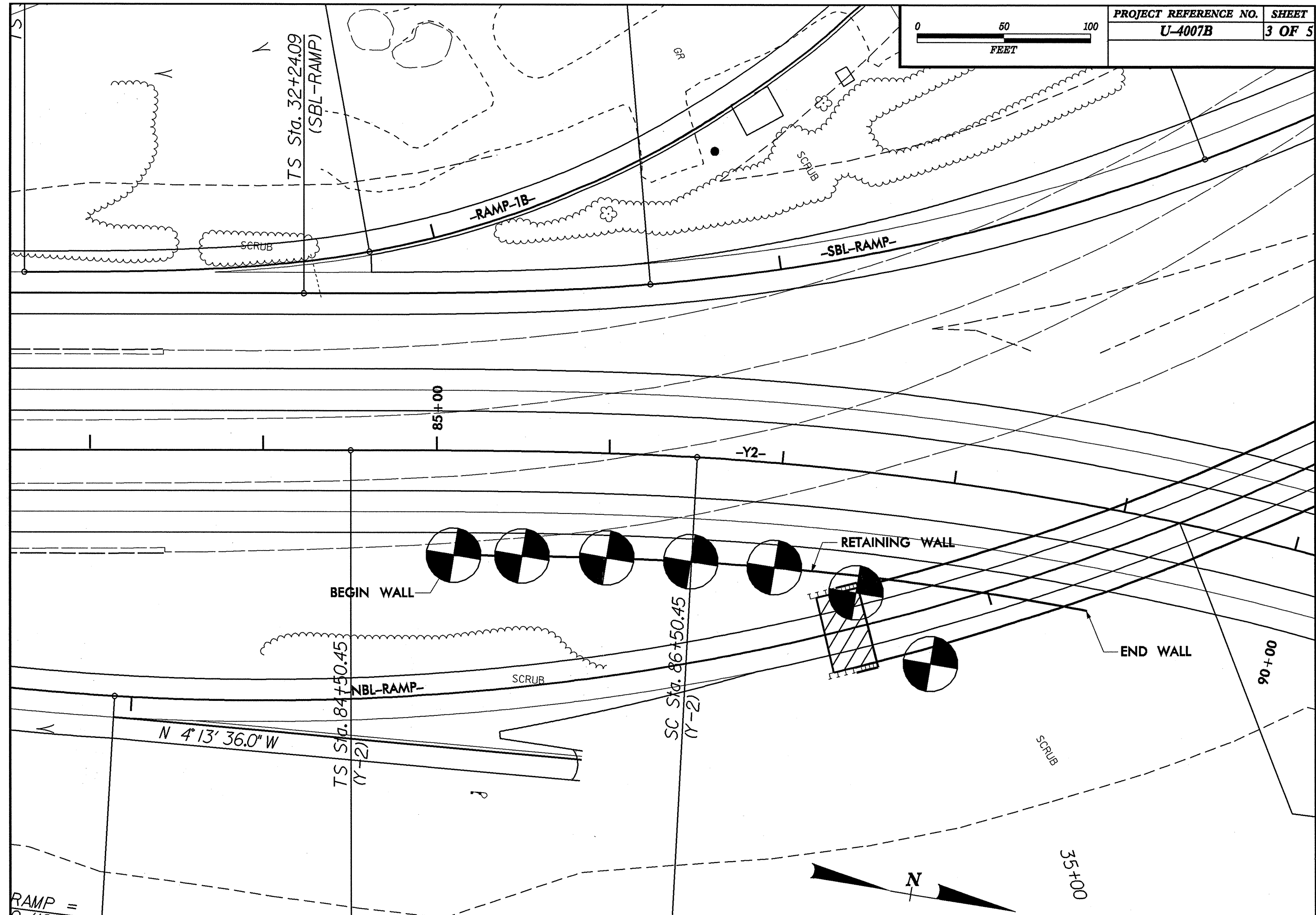
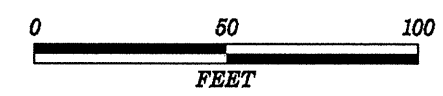
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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

**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

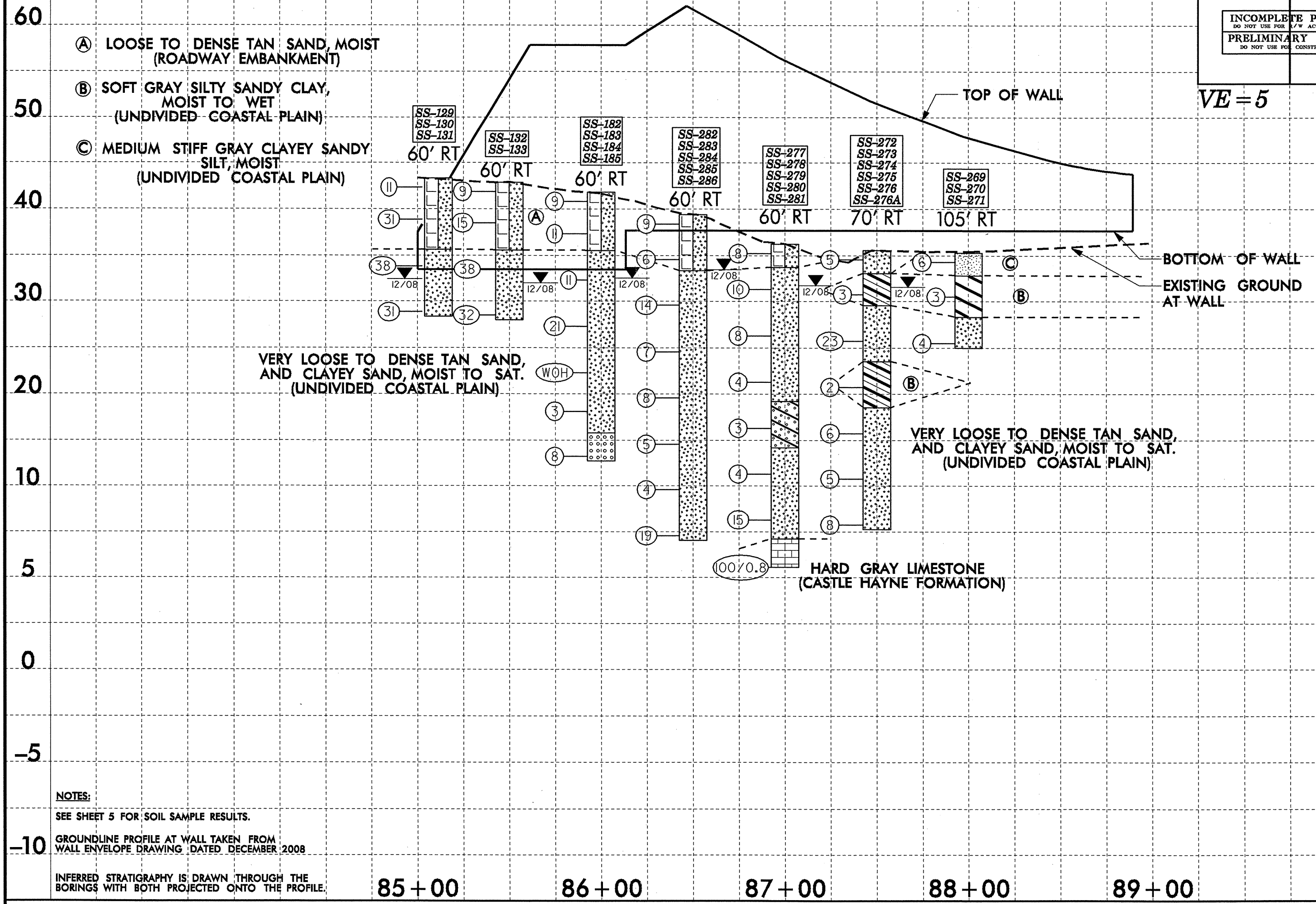
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS					
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) 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. ADUIFIER - 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 SHALE-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 (MTJ) - 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 (ROQ) - 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 (IN 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 (SROQ) - 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							
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.		WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.							
GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7		COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		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. ROCK 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		WEATHERING			
% PASSING # 10, # 40, # 200		GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		FRESH VERY SLIGHT (V SL) SLIGHT (SL) MODERATE (MOD) MODERATELY SEVERE (MOD. SEV) SEVERE (SEV) VERY SEVERE (V SEV) COMPLETE							
LIQUID LIMIT PLASTIC INDEX		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		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 SPT OPT DMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL							
GROUP INDEX		ABBREVIATIONS AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO FOSS - FOSSILIFEROUS FRAC - FRACTURED, FRACTURES FRAGS - FRAGMENTS HI - HIGHLY MED - MEDIUM MICA - MICACEOUS MOD - MODERATELY NP - NON PLASTIC ORG - ORGANIC PMT - PRESSUREMETER TEST SAP - SAPROLITIC SD - SAND, SANDY SL - SILTY, SILTY SLI - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WEA - WEATHERED w - UNIT WEIGHT w - DRY UNIT WEIGHT		ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROUVED 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 GROUVED 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.							
USUAL TYPES OF MAJOR MATERIALS		EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B-51, BK-51, CME-45B, CME-550, 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% STEEL TEETH, TRICONE TUNG-CARB, CORE BIT		HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, N, H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST							
TEXTURE OR GRAIN SIZE		FRACTION SPACING TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED > 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET		INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.							
CONCISENESS		BENCH MARK: ELEVATION: FT.		NOTES:							
PRIMARY SOIL TYPE		PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH VERY LOW, SLIGHT, MEDIUM, HIGH									
COMPACTNESS OR CONSISTENCY		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.									
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)											
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )											
GENERAL GRANULAR MATERIAL (NON-COHESIVE)											
GENERAL SILT-CLAY MATERIAL (COHESIVE)											
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.)											
GRAIN SIZE											
SOIL MOISTURE - CORRELATION OF TERMS											
SOIL MOISTURE SCALE (ATTERBERG LIMITS)											
FIELD MOISTURE DESCRIPTION											
GUIDE FOR FIELD MOISTURE DESCRIPTION											
LIQUID LIMIT (LL)											
WET (W)											
MOIST (M)											
DRY (D)											



# PROFILE ALONG RETAINING WALL AT -Y2- STA. 85+50

PROJECT REFERENCE NO. <b>U-4007B</b>	SHEET NO. <b>4 OF 5</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

VE = 5



**NOTES:**

SEE SHEET 5 FOR SOIL SAMPLE RESULTS.

GROUNDLINE PROFILE AT WALL TAKEN FROM WALL ENVELOPE DRAWING DATED DECEMBER 2008

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

85+00      86+00      87+00      88+00      89+00

U-4007B

35008.1.1

## RETAINING WALL AT -Y2- STA. 85+50, 60' 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- 129	60 RT	85+10	1.0- 1.5	A-2-4(0)	20	NP	54.9	32.6	5.4	7.1	96	71	16	-	-
SS- 130	60 RT	85+10	3.5- 5.0	A-2-4(0)	19	NP	40.4	43.9	6.7	9.1	96	74	21	-	-
SS- 131	60 RT	85+10	13.5- 15.0	A-2-4(0)	18	NP	10.7	80.7	4.5	4.0	100	99	11	-	-
SS- 132	60 RT	85+50	1.0- 1.5	A-2-4(0)	22	NP	35.6	47.0	9.4	8.1	96	86	22	-	-
SS- 133	60 RT	85+50	8.4- 9.9	A-2-4(0)	19	NP	49.7	38.4	4.8	7.1	94	76	13	-	-
SS- 182	60 RT	86+00	1.0- 1.5	A-2-4(0)	22	NP	28.6	50.8	6.5	14.1	94	82	24	-	-
SS- 183	60 RT	86+00	8.5- 10.0	A-2-4(0)	16	NP	48.3	39.3	3.3	9.1	94	77	13	-	-
SS- 184	60 RT	86+00	22.7- 24.2	A-2-4(0)	29	NP	11.9	75.3	5.7	7.1	100	97	17	-	-
SS- 185	60 RT	86+00	27.6- 29.1	A-3(0)	20	NP	25.0	64.4	0.5	10.1	93	83	10	-	-
SS- 282	60 RT	86+50	1.0- 1.5	A-2-4(0)	20	NP	30.8	51.0	6.1	12.0	96	82	22	-	-
SS- 283	60 RT	86+50	8.8- 10.3	A-2-4(0)	20	NP	31.4	56.8	2.7	9.0	99	82	13	-	-
SS- 284	60 RT	86+50	18.8- 20.3	A-2-4(0)	20	NP	20.3	61.5	4.1	14.1	99	91	20	-	-
SS- 285	60 RT	86+50	24.3- 25.3	A-2-4(0)	19	NP	34.2	53.0	0.7	12.0	98	86	14	-	-
SS- 286	60 RT	86+50	28.8- 30.3	A-2-4(0)	16	NP	33.5	47.6	9.8	9.0	100	86	20	-	-
SS- 277	60 RT	87+00	1.0- 1.5	A-2-4(0)	19	NP	35.4	47.4	7.1	10.0	97	83	19	-	-
SS- 278	60 RT	87+00	3.9- 5.4	A-2-4(0)	16	NP	15.0	69.2	4.8	11.0	100	96	18	-	-
SS- 279	60 RT	87+00	13.9- 15.4	A-2-4(0)	19	4	26.3	47.3	9.3	17.1	100	89	32	-	-
SS- 280	60 RT	87+00	18.9- 20.4	A-2-6(0)	30	16	40.0	36.7	2.2	21.1	95	76	23	-	-
SS- 281	60 RT	87+00	23.9- 25.4	A-2-4(0)	17	NP	26.4	48.3	17.3	8.0	100	89	26	-	-
SS- 272	70 RT	87+50	1.0- 1.5	A-2-4(0)	17	NP	12.6	63.6	9.8	14.1	100	96	27	-	-
SS- 273	70 RT	87+50	3.8- 5.3	A-6(1)	26	11	11.6	50.8	11.4	26.1	100	98	41	-	-
SS- 274	70 RT	87+50	8.8- 10.3	A-2-4(0)	15	NP	10.3	80.2	4.4	5.0	100	98	12	-	-
SS- 275	70 RT	87+50	13.8- 15.3	A-6(5)	28	11	3.8	38.0	28.1	30.1	100	98	65	24.6	-
SS- 276	70 RT	87+50	18.8- 20.3	A-2-4(0)	18	NP	22.3	64.8	2.9	10.0	99	89	14	-	-
SS- 276A	70 RT	87+50	28.8- 30.3	A-2-4(0)	15	NP	35.5	49.4	8.0	7.0	100	84	16	-	-
SS- 269	105 RT	88+00	1.0- 1.5	A-4(0)	24	8	8.6	52.6	10.6	28.1	100	98	42	17.6	-
SS- 270	105 RT	88+00	3.8- 5.3	A-7-6(23)	47	30	3.0	24.7	24.1	48.2	100	100	78	26.5	-
SS- 271	105 RT	88+00	8.8- 10.3	A-2-4(0)	17	NP	24.4	65.2	2.4	8.0	100	88	12	-	-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4007B	1	5
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35008.1.1	STPNHF-17(31)	P.E.	
		RW & UTIL.	

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 35008.1.1 (U-4007B) F.A. PROJ. STPNHF-17(31)  
COUNTY ONSLow  
PROJECT DESCRIPTION WESTERN PARKWAY FROM APPROXIMATELY 1300'  
SOUTH OF COUNTRY CLUB RD. TO WESTERN BLVD.  
SITE DESCRIPTION RETAINING WALL AT -NBL-RAMP- STA. 19+00, 94' RT.

**RETAINING WALL INVENTORY**

**CONTENTS:**

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5	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.

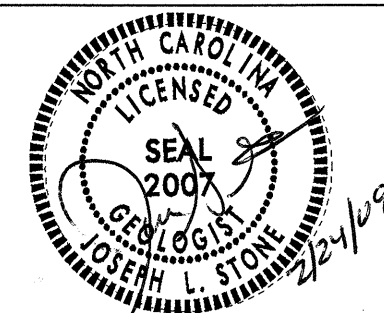
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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: 35008.1.1 ID: U4007B**

PERSONNEL

JRS  
MID-ATLANTIC  
PERSONNEL

INVESTIGATED BY J.L. STONE  
CHECKED BY D.N. ARGENBIRGHT  
SUBMITTED BY D.N. ARGENBRIGHT  
DATE FEBRUARY 2009



DRAWN BY: C.R. SUMNER, 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.

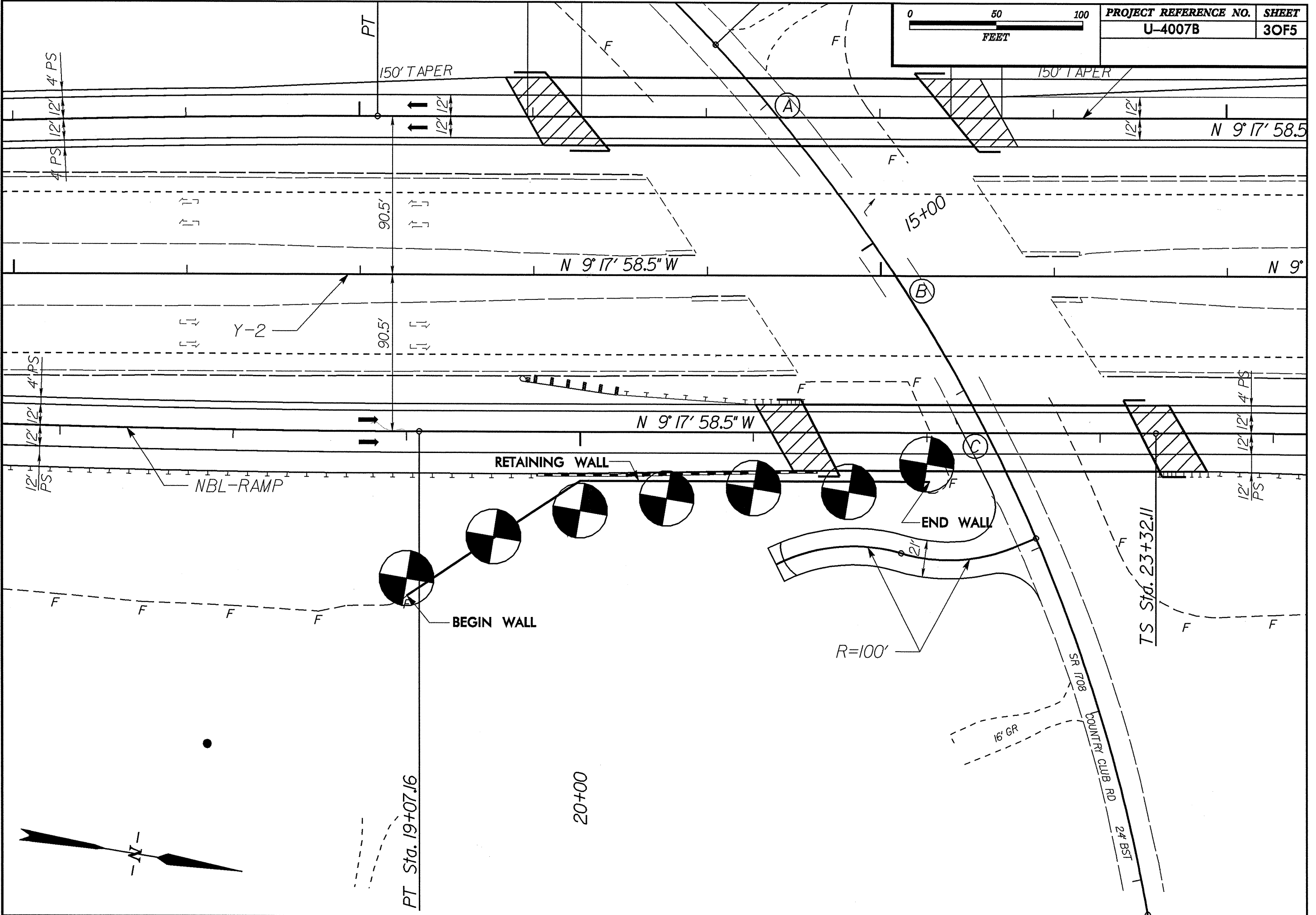
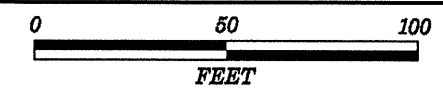
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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

**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																													
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (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:</p> <p style="text-align: center;"><i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>		<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORM</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p><b>POORLY GRADED</b></p> <p><b>DAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;"><b>ANGULARITY OF GRAINS</b></p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <b>ANGULAR</b>, <b>SUBANGULAR</b>, <b>SUBROUNDED</b>, OR <b>ROUNDED</b>.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p><b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA.</p> <p><b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p><b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p><b>ARTESIAN</b> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p><b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p><b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p><b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p><b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p><b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p><b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p><b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p><b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p><b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.</p> <p><b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p><b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p><b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p><b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p><b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p><b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p><b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p><b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p><b>ROCK QUALITY DESIGNATION (ROD)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p><b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p><b>SILL</b> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p><b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p><b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p><b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p><b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p><b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																													
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**U-4007B**  
**35008.1.1**

**RETAINING WALL AT -NBL-RAMP- STA. 19+00, 94' RT**

<b>SOIL TEST RESULTS</b>															
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-360	84 RT	19+00	0.5-1.5	A-2-4(0)	19	NP	8.0	72.4	7.4	12.1	95	94	20	-	-
SS-361	84 RT	19+00	3.0-4.5	A-2-4(0)	21	4	9.2	65.2	3.5	22.1	100	99	27	-	-
SS-362A	84 RT	19+00	8.0-9.0	A-7-6(38)	63	37	1.4	9.7	20.5	68.4	100	100	90	75.0	-
SS-363	84 RT	19+00	13.0-14.5	A-4(0)	17	NP	5.6	60.8	16.5	17.1	100	99	41	-	-
SS-355	60 RT	19+50	0.5-1.5	A-2-4(0)	22	NP	11.2	73.9	7.8	7.0	100	99	16	-	-
SS-356	60 RT	19+50	3.0-4.5	A-2-4(0)	21	5	9.0	65.4	2.5	23.1	98	97	26	-	-
SS-357	60 RT	19+50	8.0-9.5	A-2-4(0)	20	NP	16.5	57.9	13.5	12.1	100	93	34	-	-
SS-358	60 RT	19+50	13.0-14.5	A-2-4(0)	19	NP	40.8	43.4	2.7	13.1	92	73	15	-	-
SS-359	60 RT	19+50	18.0-19.5	A-3(0)	18	NP	11.6	81.3	2.1	5.0	100	97	8	-	-
SS-349	45 RT	20+00	0.5-1.5	A-2-4(0)	21	NP	10.7	73.2	6.0	10.1	100	99	20	-	-
SS-350	45 RT	20+00	3.7-4.7	A-7-6(15)	41	23	2.4	30.4	18.9	48.3	100	100	71	-	-
SS-351	45 RT	20+00	8.2-9.7	A-2-4(0)	18	NP	18.9	57.8	8.1	15.1	100	92	28	-	-
SS-352	45 RT	20+00	13.2-14.7	A-2-4(0)	19	NP	53.9	32.4	1.6	12.1	90	64	13	-	-
SS-353	45 RT	20+00	18.2-19.7	A-3(0)	18	NP	10.0	82.6	1.4	6.0	98	96	9	-	-
SS-354	45 RT	20+00	43.2-44.7	A-3(0)	24	NP	4.8	86.7	2.4	6.0	95	94	9	-	-
SS-344	38 RT	20+50	0.5-1.5	A-2-4(0)	20	NP	9.3	71.4	5.2	14.1	100	99	21	-	-
SS-345	38 RT	20+50	3.6-5.1	A-6(12)	39	23	3.6	35.0	17.1	44.3	100	99	65	-	-
SS-346	38 RT	20+50	8.6-10.1	A-2-4(0)	19	2	16.4	58.0	7.4	18.1	100	93	30	-	-
SS-347	38 RT	20+50	18.6-20.1	A-3(0)	23	NP	8.8	83.3	2.9	5.0	100	98	9	-	-
SS-348	38 RT	20+50	43.6-45.1	A-2-4(0)	15	NP	4.0	82.3	3.6	10.1	100	99	15	-	-
SS-338	32 RT	21+00	0.5-1.5	A-2-4(0)	17	NP	15.3	72.6	4.0	8.0	100	98	14	-	-
SS-339	32 RT	21+00	3.7-5.2	A-6(1)	24	11	7.8	52.1	9.9	30.2	100	99	44	23.0	-
SS-340	32 RT	21+00	8.7-10.2	A-2-4(0)	18	NP	11.5	60.8	15.7	12.1	100	97	34	-	-
SS-341	32 RT	21+00	13.7-15.2	A-3(0)	14	NP	56.8	34.6	2.5	6.0	94	65	10	-	-
SS-342	32 RT	21+00	23.7-25.2	A-2-4(0)	21	NP	47.3	24.1	18.5	10.1	93	65	30	-	-
SS-343	32 RT	21+00	43.7-45.1	A-2-4(0)	17	NP	6.1	83.9	2.9	7.0	98	97	11	-	-
SS-134	34 RT	21+55	1.0-1.5	A-2-4(0)	22	NP	12.8	68.9	8.2	10.0	98	97	20	-	-
SS-135	34 RT	21+55	3.3-4.8	A-2-4(0)	17	NP	7.8	70.3	5.8	16.0	100	100	24	-	-
SS-136	34 RT	21+55	8.3-9.3	A-7-6(19)	44	24	1.4	22.2	18.2	58.1	100	100	80	-	-
SS-138	34 RT	21+55	13.3-14.8	A-2-4(0)	21	NP	10.2	67.9	9.8	12.0	100	97	28	-	-
SS-139	34 RT	21+55	23.3-24.8	A-3(0)	19	NP	25.6	65.0	3.4	6.0	97	89	10	-	-
SS-140	34 RT	21+55	28.3-29.8	A-1-b(0)	21	NP	63.5	19.4	12.0	5.0	77	38	15	-	-
SS-141	34 RT	21+55	43.3-44.8	A-2-4(0)	16	NP	6.5	79.7	5.8	8.0	100	99	15	-	-
SS-142	34 RT	21+55	53.3-54.8	A-2-4(0)	21	NP	0.2	81.5	7.3	11.0	100	100	21	-	-
SS-170	18 RT	22+00	1.0-1.5	A-2-4(0)	25	NP	15.6	66.1	6.2	12.0	90	85	19	-	-
SS-171	18 RT	22+00	3.3-4.8	A-2-4(0)	19	2	7.3	68.8	1.8	22.2	100	99	26	24.0	-
SS-172	18 RT	22+00	8.3-9.8	A-7-6(31)	56	33	2.4	12.1	21.0	64.5	100	99	87	-	-
SS-173	18 RT	22+00	18.3-19.8	A-2-4(0)	19	NP	20.0	65.7	2.2	12.1	99	96	15	-	-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4007B	1	4

**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 PLAN
3	PROFILE
4	SOIL TEST RESULTS

PROJ. REFERENCE NO. 35008.I.1 (U-4007B) F.A. PROJ. STPNHF-17(31)  
COUNTY ONSLow  
PROJECT DESCRIPTION WESTERN PARKWAY FROM APPROXIMATELY  
1300' SOUTH OF COUNTRY CLUB RD. TO WESTERN BLVD.  
SITE DESCRIPTION NOISE WALL AT -L- STA. 42+00, 49' LT

**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: 35008.I.1 ID: U-4007B**

**PERSONNEL**

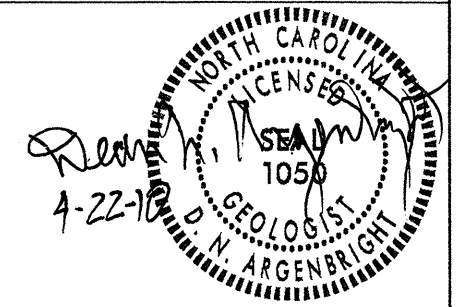
- T.C. BOTTOMS
- J.R. SWARTLEY
- R.E. SMITH
- J.M. EDMONDSON

INVESTIGATED BY T.C. BOTTOMS  
CHECKED BY D.N. ARGENBRIGHT  
SUBMITTED BY D.N. ARGENBRIGHT  
DATE APRIL 2010

DRAWN BY: C.P. TURNER

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**

PROJECT REFERENCE NO. U-4007B  
 SHEET NO. 2 OF 4

**SUBSURFACE INVESTIGATION**

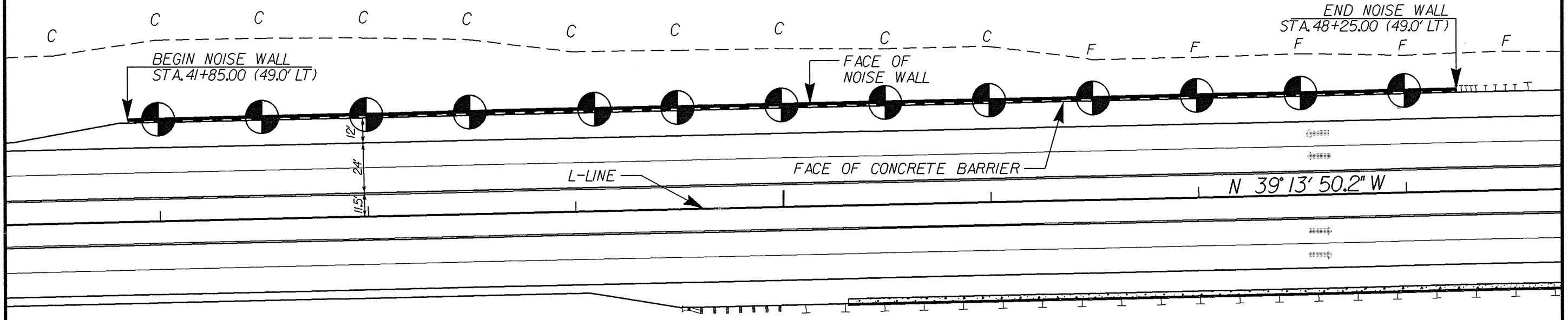
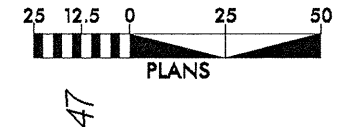
**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.		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 60 BLOWS PER FOOT 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 DISLOADED 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 (MOTL) - 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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. 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 INTRODUCED 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 IN 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 60 BLOWS PER FOOT. 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			
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.		FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.			
COMPRESSIONIBILITY		PERCENTAGE OF MATERIAL		GROUND WATER			
SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE		LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP			
TEXTURE OR GRAIN SIZE		MISCELLANEOUS SYMBOLS		ROCK HARDNESS			
U.S. STD. SIEVE SIZE OPENING (MM): 4, 10, 40, 60, 200, 270; 4.75, 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		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 GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT: CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.			
SOIL MOISTURE - CORRELATION OF TERMS		ABBREVIATIONS		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING	
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION		AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, CSE - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, F - VOID RATIO, 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, W - UNIT WEIGHT, W <sub>u</sub> - DRY UNIT WEIGHT, S - BULK, SS - SPLIT SPOON, ST - SHELBY TUBE, RS - ROCK, RT - RECOMPACTED TRIAXIAL, CBR - CALIFORNIA BEARING RATIO		DRILL UNITS: MOBILE B-51, BK-51, CME-45B, CME-550, 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 5/8" STEEL TEETH, TRICONE TUNG-CARB. CORE BIT, HAMMER TYPE: AUTOMATIC, MANUAL, CORE SIZE: B, N, H, HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST		VERY WIDE: MORE THAN 10 FEET, WIDE: 3 TO 10 FEET, MODERATELY CLOSE: 1 TO 3 FEET, CLOSE: 0.16 TO 1 FEET, VERY CLOSE: LESS THAN 0.16 FEET	
PLASTICITY		INDURATION		BEDDING		BENCH MARK:	
NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY		FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED		TERM: THICKNESS, VERY THICKLY BEDDED (> 4 FEET), THICKLY BEDDED (1.5 - 4 FEET), THINLY BEDDED (0.16 - 1.5 FEET), VERY THINLY BEDDED (0.03 - 0.16 FEET), THICKLY LAMINATED (0.008 - 0.03 FEET), THINLY LAMINATED (< 0.008 FEET)		ELEVATION: FT., NOTES:	
COLOR							
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.							

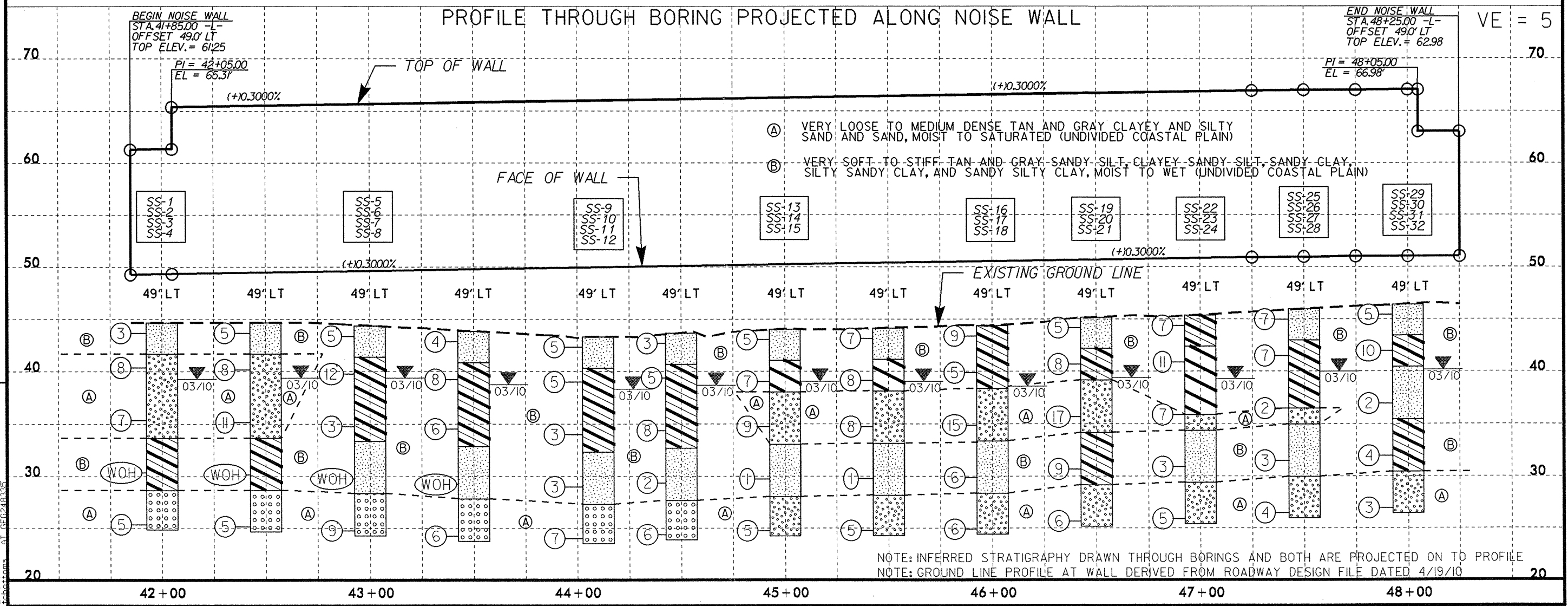
# NOISE WALL SITE PLAN

8/17/09

PROJECT REFERENCE NO. <b>U-4007B</b>	SHEET NO. <b>3 OF 4</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS	
DO NOT USE FOR CONSTRUCTION	



## PROFILE THROUGH BORING PROJECTED ALONG NOISE WALL



NOTE: INFERRED STRATIGRAPHY DRAWN THROUGH BORINGS AND BOTH ARE PROJECTED ON TO PROFILE  
NOTE: GROUND LINE PROFILE AT WALL DERIVED FROM ROADWAY DESIGN FILE DATED 4/19/10

REVISIONS

22-APR-2010 11:41:11 Investigation\TIP-U4007B-GEI-NOISEWALL-NCADD-GEOTECH\Site&Sub-U4007B-Geo\_WALL-NOISEWALL.dgn

35008.1.1

U-4007B

NOISE WALL AT -L- STA. 42+00, 49' LT

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	49 LT	42+00	1.0-1.5	A-4(0)	16	2	2.4	49.5	31.9	16.2	100	99	49	-	-
SS-2	49 LT	42+00	3.3-4.8	A-2-4(0)	14	NP	3.6	65.9	20.3	10.1	100	99	32	-	-
SS-3	49 LT	42+00	13.3-14.8	A-6(4)	28	11	3.6	49.1	18.9	28.3	100	99	62	-	-
SS-4	49 LT	42+00	18.3-19.8	A-3(0)	21	NP	18.5	73.9	1.5	6.1	100	89	8	-	-

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-19	49 LT	46+50	1.0-1.5	A-4(4)	25	10	1.8	35.2	34.7	28.3	100	100	65	-	-
SS-20	49 LT	46+50	3.5-5.0	A-6(14)	38	23	1.4	29.5	30.6	38.4	100	100	71	-	-
SS-21	49 LT	46+50	13.5-15.0	A-6(6)	30	13	1.2	48.9	19.5	30.3	100	100	65	-	-

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-5	49 LT	43+00	1.0-1.5	A-4(0)	18	4	1.8	51.6	26.4	20.2	100	100	48	-	-
SS-6	49 LT	43+00	3.6-5.1	A-6(2)	31	15	1.5	57.7	11.4	29.3	100	100	42	-	-
SS-7	49 LT	43+00	13.6-15.1	A-4(0)	23	7	17.5	50.8	12.5	19.2	100	95	37	-	-
SS-8	49 LT	43+00	18.6-20.1	A-3(0)	20	NP	22.2	69.0	1.7	7.1	100	90	10	-	-

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-22	49 LT	47+00	1.0-1.5	A-6(5)	28	12	1.8	35.6	34.3	28.3	100	100	64	-	-
SS-23	49 LT	47+00	3.5-5.0	A-7-6(21)	51	31	1.4	28.3	29.8	40.4	100	100	72	-	-
SS-24	49 LT	47+00	13.5-15.0	A-4(1)	24	8	11.3	50.8	15.7	22.2	100	96	48	-	-

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-9	49 LT	44+10	1.0-1.5	A-4(2)	27	8	4.7	43.3	27.8	24.3	100	98	54	-	-
SS-10	49 LT	44+10	3.3-4.8	A-6(6)	31	14	1.6	39.8	22.1	36.4	100	100	60	-	-
SS-11	49 LT	44+10	13.3-14.8	A-4(0)	21	5	16.5	53.5	10.8	19.2	100	95	36	-	-
SS-12	49 LT	44+10	18.3-19.8	A-3(0)	19	NP	22.6	70.0	1.3	6.1	100	91	8	-	-

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-25	49 LT	47+50	1.0-1.5	A-4(3)	23	10	2.4	41.5	31.9	24.3	100	100	58	-	-
SS-26	49 LT	47+50	3.5-5.0	A-6(4)	28	13	4.7	47.5	21.5	26.3	100	99	54	-	-
SS-27	49 LT	47+50	9.5-10.0	A-2-4(0)	28	10	7.1	67.4	5.3	20.2	100	99	27	-	-
SS-28	49 LT	47+50	13.5-15.0	A-4(0)	23	7	13.9	51.3	14.7	20.2	100	95	43	-	-

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-13	49 LT	45+00	4.0-5.5	A-7-6(13)	41	24	1.8	34.8	27.0	36.4	100	100	65	-	-
SS-14	49 LT	45+00	8.3-9.8	A-2-4(0)	21	NP	6.0	74.6	3.2	16.2	100	100	20	-	-
SS-15	49 LT	45+00	18.3-19.8	A-2-4(0)	20	NP	19.0	66.7	4.1	10.1	100	93	16	-	-

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-29	49 LT	48+00	1.0-1.5	A-4(0)	19	3	3.2	44.1	38.5	14.2	100	99	54	-	-
SS-30	49 LT	48+00	3.5-5.0	A-6(11)	38	20	2.0	34.2	29.4	34.4	100	100	65	-	-
SS-31	49 LT	48+00	8.5-10.0	A-4(0)	17	NP	9.9	57.6	18.3	14.2	100	98	36	-	-
SS-32	49 LT	48+00	13.5-15.0	A-6(4)	28	11	6.5	48.5	16.7	28.3	100	98	58	-	-

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-16	49 LT	46+00	1.0-1.5	A-6(5)	27	12	2.0	36.0	31.6	30.3	100	100	64	-	-
SS-17	49 LT	46+00	8.5-10.0	A-2-4(0)	20	NP	7.7	80.9	7.4	4.0	100	98	15	-	-
SS-18	49 LT	46+00	13.5-15.0	A-4(2)	26	9	8.7	52.4	16.7	22.2	100	97	54	-	-

CONTRACT: 35008.1.1 ID: U-4007B

**CONTENTS**

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**STATE OF NORTH CAROLINA**

**DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT**

**STRUCTURE  
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 35008.1.1 (U-4007B) F.A. PROJ. STPNHF-14(31)

COUNTY ONSLow

PROJECT DESCRIPTION WESTERN PARKWAY FROM APPROXIMATELY 1300'  
SOUTH OF COUNTRY CLUB RD. TO WESTERN BLVD.

SITE DESCRIPTION BRIDGE NO. 290 ON -SBL RAMP- OVER -Y0- (COUNTRY  
CLUB ROAD) AT -SBL RAMP- STA. 22 + 41

**INVENTORY**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	35008.1.1 (U-4007B)	1	6
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35008.1.1	STPNHF-17(31)	P.E. RW & UTIL.	

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE, THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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.

PERSONNEL

SCD

JRS

MID-ATLANTIC  
PERSONNEL

INVESTIGATED BY J.L. STONE

CHECKED BY D.N. ARGENBRIGHT

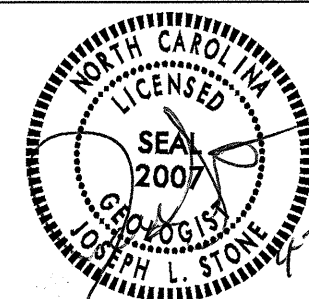
SUBMITTED BY D.N. ARGENBRIGHT

DATE APRIL 2009

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

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

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. U-4007B	SHEET NO. 2 OF 6
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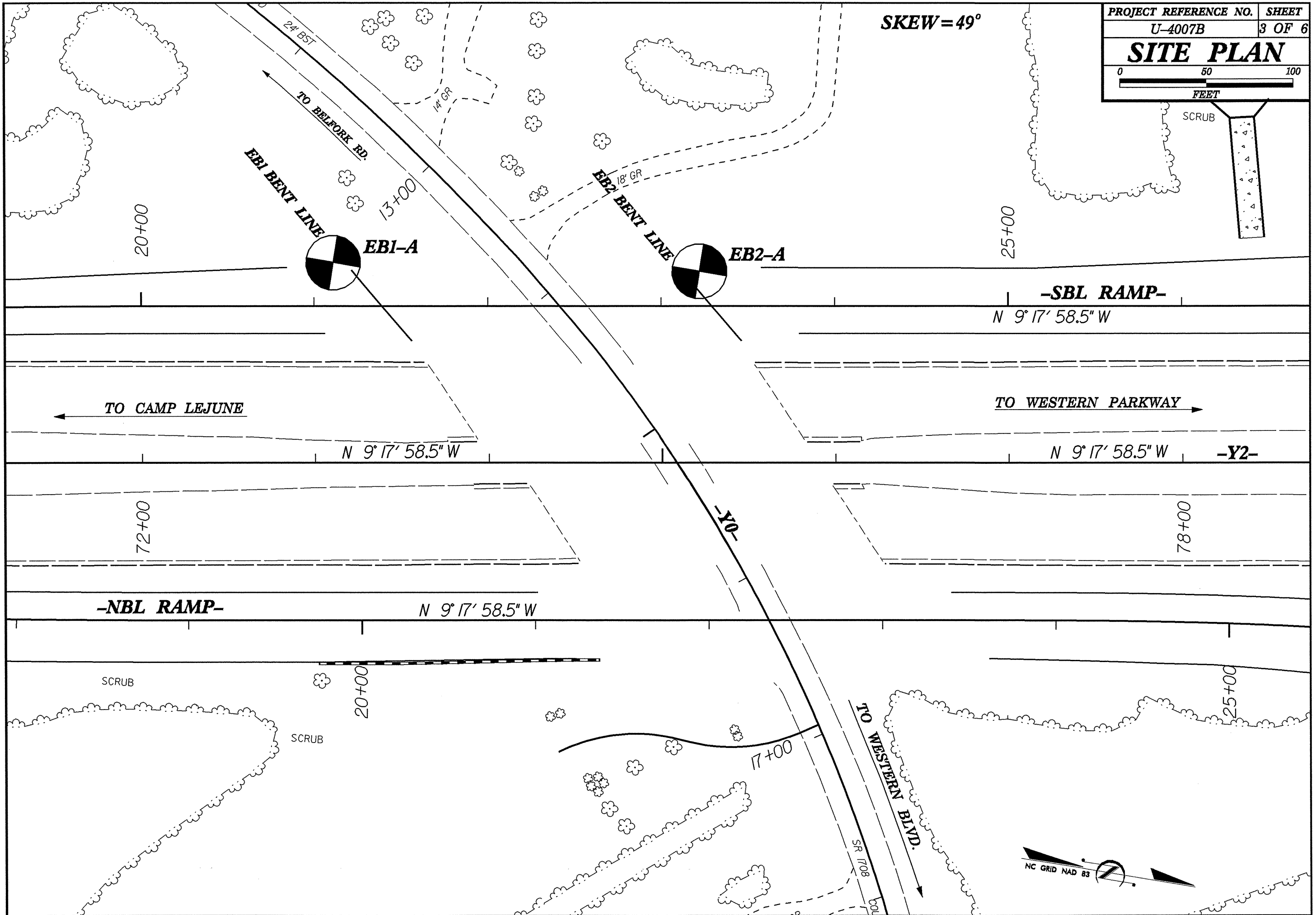
**SUBSURFACE INVESTIGATION**

**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: <i>VERY STIFF, DRN. SCLT CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.	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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. 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.
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>	<b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	
<b>GENERAL CLASS.</b>	<b>COMPRESSIBILITY</b>	<b>WEATHERING</b>	
<b>GROUP CLASS.</b>	<b>PERCENTAGE OF MATERIAL</b>	<b>FRESH</b>	
<b>SYMBOL</b>	<b>GROUND WATER</b>	<b>VERY SLIGHT (V SL.)</b>	
<b>% PASSING</b>	<b>MISCELLANEOUS SYMBOLS</b>	<b>SLIGHT (SL.)</b>	
<b>LIQUID LIMIT</b>	<b>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</b>	<b>MODERATE (MOD.)</b>	
<b>PLASTIC INDEX</b>	<b>SOIL SYMBOL</b>	<b>SEVERE (SEV.)</b>	
<b>GROUP INDEX</b>	<b>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</b>	<b>VERY SEVERE (V SEV.)</b>	
<b>USUAL TYPES OF MAJOR MATERIALS</b>	<b>INFERRED SOIL BOUNDARY</b>	<b>COMPLETE</b>	
<b>GENERATING AS A SUBGRADE</b>	<b>INFERRED ROCK LINE</b>		
<b>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</b>	<b>ALLUVIAL SOIL BOUNDARY</b>		
<b>CONSISTENCY OR DENSENESS</b>	<b>DIP &amp; DIP DIRECTION OF ROCK STRUCTURES</b>		
<b>PRIMARY SOIL TYPE</b>	<b>SOUNDING ROD</b>		
<b>COMPACTNESS OR CONSISTENCY</b>	<b>ABBREVIATIONS</b>		
<b>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</b>	<b>HI. - HIGHLY</b>		
<b>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</b>	<b>MED. - MEDIUM</b>		
<b>TEXTURE OR GRAIN SIZE</b>	<b>MICA - MICAACEOUS</b>		
<b>U.S. STD. SIEVE SIZE OPENING (MM)</b>	<b>MOD. - MODERATELY</b>		
<b>BOULDER (BLDR.)</b>	<b>MP - NON PLASTIC</b>		
<b>COBBLE (COB.)</b>	<b>ORG. - ORGANIC</b>		
<b>GRAVEL (GR.)</b>	<b>PMT - PRESSUREMETER TEST</b>		
<b>COARSE SAND (CSE. SD.)</b>	<b>SAP. - SAPROLITIC</b>		
<b>FINE SAND (F. SD.)</b>	<b>SD. - SAND, SANDY</b>		
<b>SILT (SL.)</b>	<b>SL. - SILT, SILTY</b>		
<b>CLAY (CL.)</b>	<b>SLI. - SLIGHTLY</b>		
	<b>TCR - TRICONE REFUSAL</b>		
	<b>SOIL MOISTURE - CORRELATION OF TERMS</b>		
	<b>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</b>		
	<b>FIELD MOISTURE DESCRIPTION</b>		
	<b>GUIDE FOR FIELD MOISTURE DESCRIPTION</b>		
	<b>PLASTICITY</b>		
	<b>PLASTICITY INDEX (PI)</b>		
	<b>DRY STRENGTH</b>		
	<b>COLOR</b>		
	<b>DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</b>		
	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		
	<b>DRILL UNITS:</b>		
	<b>ADVANCING TOOLS:</b>		
	<b>HAMMER TYPE:</b>		
	<b>CORE SIZE:</b>		
	<b>HAND TOOLS:</b>		
	<b>FRACUTURE SPACING</b>		
	<b>BEDDING</b>		
	<b>INDURATION</b>		



SKEW = 49°

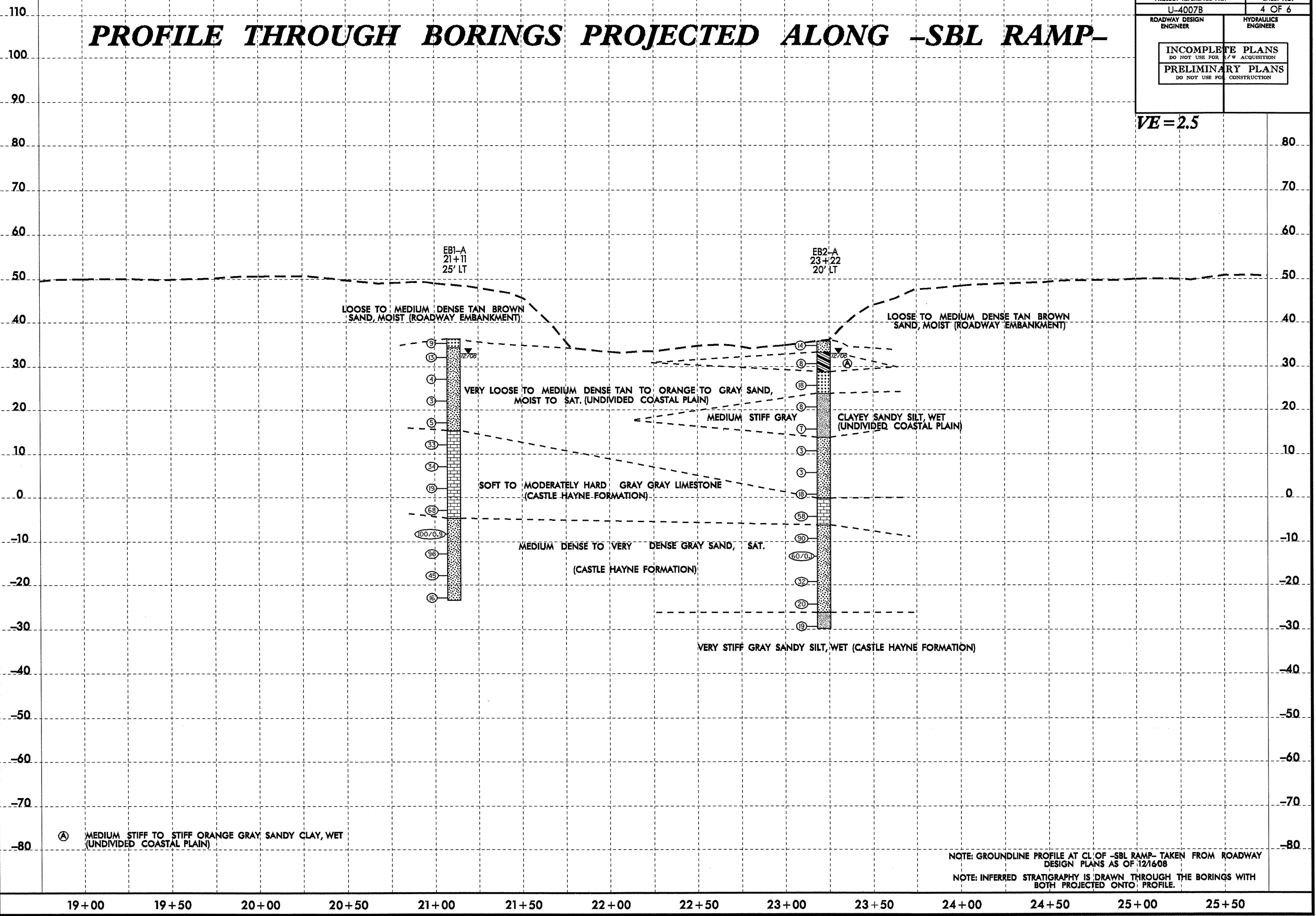


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# PROFILE THROUGH BORINGS PROJECTED ALONG -SBL RAMP-

PROJECT REFERENCE NO. U-4007B	SHEET NO. 4 OF 6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

**VE = 2.5**



NOTE: GROUNDLINE PROFILE AT CL OF -SBL RAMP- TAKEN FROM ROADWAY DESIGN PLANS AS OF 12/16/08  
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

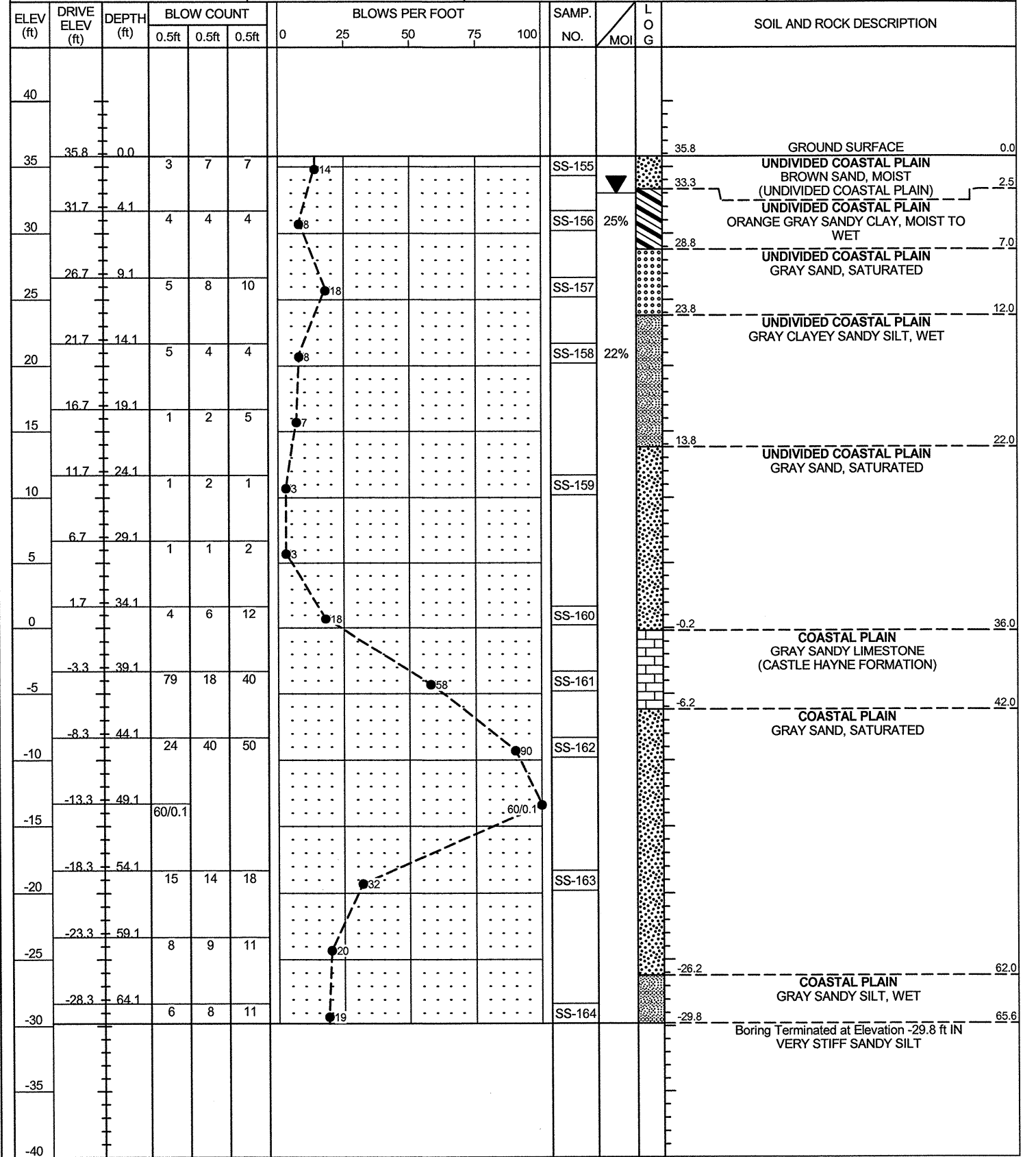
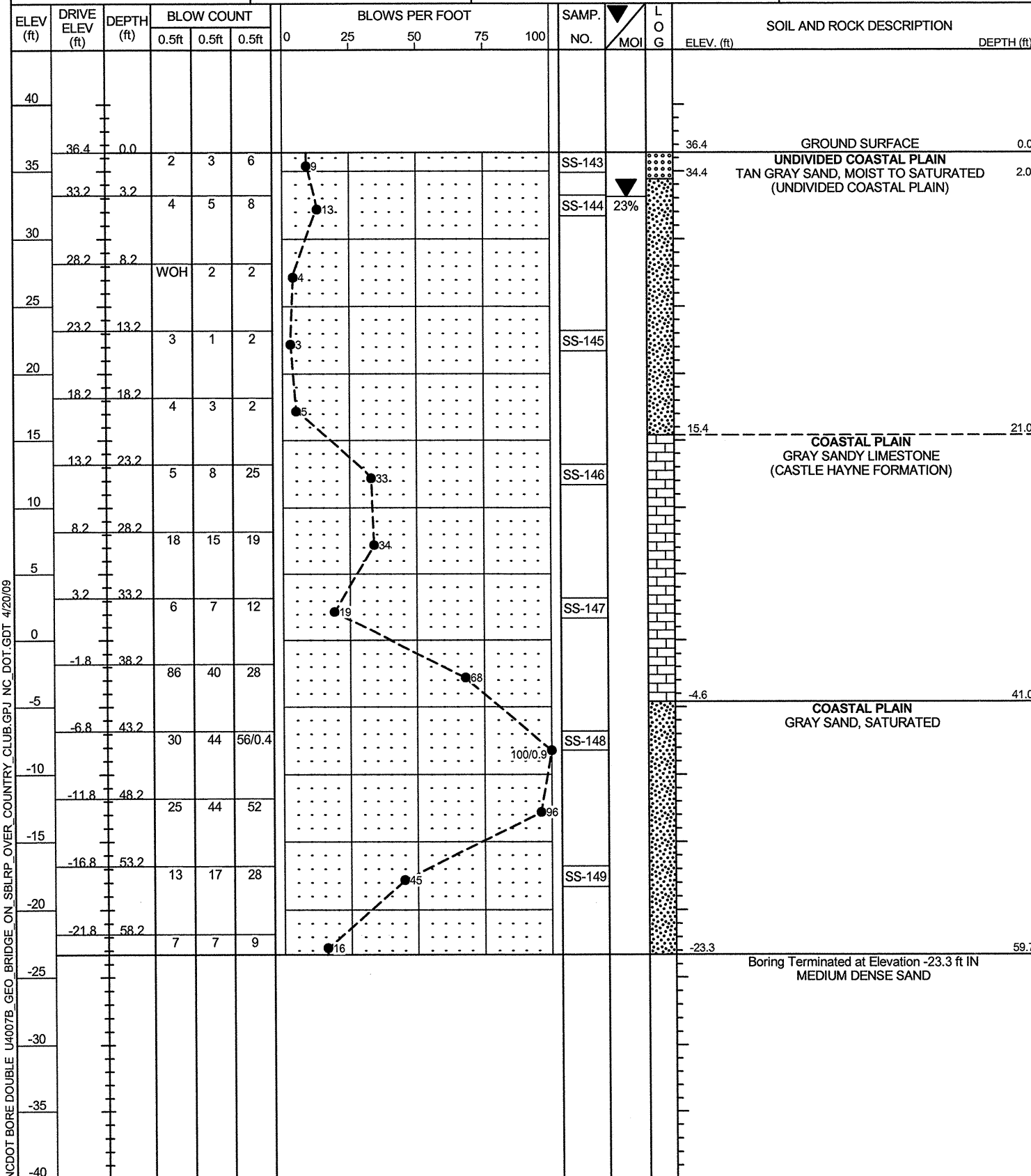


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY ONSLOW	GEOLOGIST Dillard, S. C.
SITE DESCRIPTION BRIDGE NO. 290 ON -SBL RAMP- OVER -Y0- (COUNTRY CLUB RD.)			GROUND WTR (ft)
BORING NO. EB1-A	STATION 21+11	OFFSET 25ft LT	ALIGNMENT -SBL RAMP-
COLLAR ELEV. 36.4 ft	TOTAL DEPTH 59.7 ft	NORTHING 374,354	EASTING 248,153
DRILL MACHINE CME-45 SKID	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 12/03/08	COMP. DATE 12/03/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 21.0 ft

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY ONSLOW	GEOLOGIST Dillard, S. C.
SITE DESCRIPTION BRIDGE NO. 290 ON -SBL RAMP- OVER -Y0- (COUNTRY CLUB RD.)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 23+22	OFFSET 20ft LT	ALIGNMENT -SBL RAMP-
COLLAR ELEV. 35.8 ft	TOTAL DEPTH 65.6 ft	NORTHING 374,563	EASTING 2,481,484
DRILL MACHINE CME-45 SKID	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 12/04/08	COMP. DATE 12/04/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 36.0 ft



NCDOT BORE DOUBLE U4007B GEO BRIDGE ON\_SBLRP\_OVER\_COUNTRY\_CLUB.GPJ NC\_DOT.GDT 4/20/09

U-4007B

35008.1.1

BRIDGE NO. 290 ON -SBL RAMP- OVER -Y0- (COUNTRY CLUB ROAD) AT -SBL RAMP- STA. 22+41

SOIL TEST RESULTS EB1-A															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS- 143	25 LT	21+11	1.0- 1.5	A- 3(0)	23	NP	16.2	76.4	3.4	4.0	100	98	9	-	-
SS- 144	25 LT	21+11	3.2- 4.7	A- 2- 4(0)	20	NP	3.8	75.8	2.4	18.0	100	100	22	23.2	-
SS- 145	25 LT	21+11	13.2- 14.7	A- 2- 4(0)	20	NP	31.1	56.2	1.7	11.0	97	82	13	-	-
SS- 146	25 LT	21+11	23.2- 24.7	A- 1- b(0)	20	NP	56.5	19.8	14.6	9.0	70	39	19	-	-
SS- 147	25 LT	21+11	33.2- 34.7	A- 2- 4(0)	22	NP	47.3	35.4	10.3	7.0	86	61	17	-	-
SS- 148	25 LT	21+11	43.2- 44.6	A- 2- 4(0)	23	NP	4.0	85.9	4.1	6.0	100	99	12	-	-
SS- 149	25 LT	21+11	53.2- 54.7	A- 2- 4(0)	19	NP	0.3	85.9	4.8	9.0	100	100	16	-	-

SOIL TEST RESULTS EB2-A															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS- 155	20 LT	23+22	1.0- 1.5	A- 2- 4(0)	22	NP	16.8	69.7	5.4	8.0	78	73	12	-	-
SS- 156	20 LT	23+22	4.1- 5.6	A- 6(8)	35	18	2.6	42.1	17.2	38.1	100	100	60	24.8	-
SS- 157	20 LT	23+22	9.1- 10.6	A- 3(0)	22	NP	4.5	87.2	2.3	6.0	100	99	9	-	-
SS- 158	20 LT	23+22	14.1- 15.6	A- 4(0)	23	3	8.2	58.9	12.8	20.0	100	97	46	22.4	-
SS- 159	20 LT	23+22	24.1- 25.6	A- 2- 4(0)	19	NP	44.1	39.4	2.5	14.0	93	73	16	-	-
SS- 160	20 LT	23+22	34.1- 35.6	A- 2- 4(0)	17	NP	18.4	50.3	13.2	18.0	98	90	32	-	-
SS- 161	20 LT	23+22	39.1- 40.6	A- 1- b(0)	16	NP	38.3	35.7	10.0	16.0	49	36	14	-	-
SS- 162	20 LT	23+22	44.1- 45.6	A- 2- 4(0)	23	NP	3.8	85.9	3.3	7.0	100	100	12	-	-
SS- 163	20 LT	23+22	54.1- 55.6	A- 2- 4(0)	21	NP	0.4	84.8	2.8	12.0	100	100	17	-	-
SS- 164	20 LT	23+22	64.1- 65.6	A- 4(0)	23	NP	0.4	70.9	11.6	17.0	100	100	36	-	-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	35008.1.1 (U-4007B)	1	6
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35008.1.1	STPNHF-17(31)	P.E. RW & UTIL.	

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE, THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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.

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5	BORELOGS
6	SOIL TEST RESULTS

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

**STRUCTURE  
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 35008.1.1 (U-4007B) F.A. PROJ. STPNHF-17(31)  
COUNTY ONslow  
PROJECT DESCRIPTION WESTERN PARKWAY FROM APPROXIMATELY 1300'  
SOUTH OF COUNTRY CLUB RD. TO WESTERN BLVD.  
SITE DESCRIPTION BRIDGE NO. 291 ON -NBL RAMP- OVER -Y0- (COUNTRY  
CLUB RD.) AT -NBL RAMP- STA. 22+34

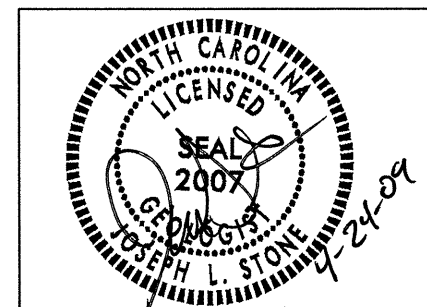
**INVENTORY**

**PROJECT: 35008.1.1 ID: U-4007B**

PERSONNEL

- SCD
- JRS
- MID-ATLANTIC PERSONNEL

INVESTIGATED BY JL. STONE  
CHECKED BY D.N. ARGENBRIGHT  
SUBMITTED BY D.N. ARGENBRIGHT  
DATE APRIL 2009



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

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


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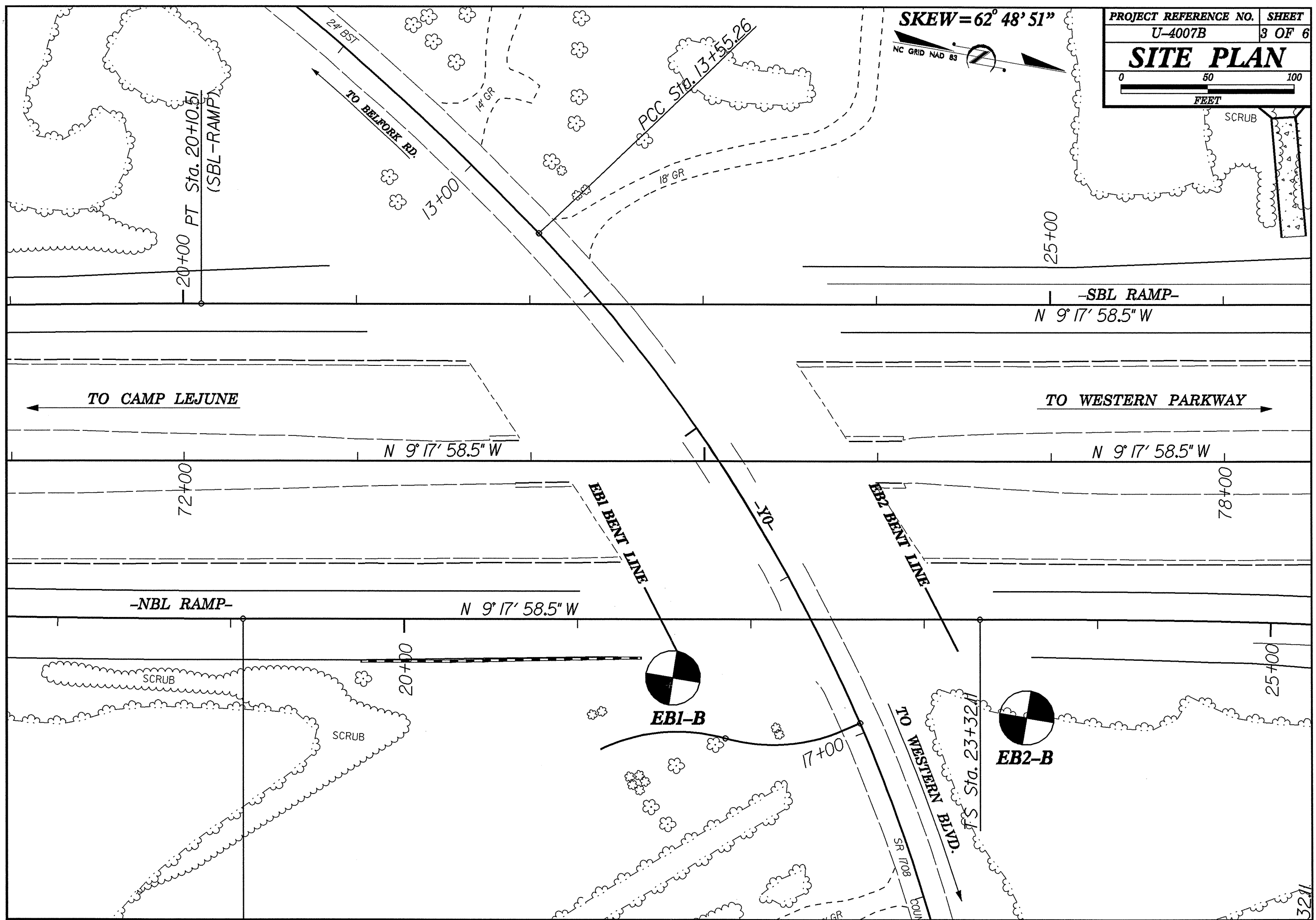
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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.  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)  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTARY ROCK (CP)  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	<b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - A FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SRQD)</b> - 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. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>	<b>MINERALOGICAL COMPOSITION</b>	<b>WEATHERING</b>	
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL. SEVERE (SEV.) ALL 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. ORGANIC MATTER MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	
GROUP CLASS. A-1, A-2, A-3, A-4, A-5, A-6, A-7	<b>COMPRESSIBILITY</b> SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	<b>PERCENTAGE OF MATERIAL</b>	
SYMBOL	<b>ORGANIC MATERIAL</b>	<b>GROUND WATER</b>	
% PASSING #10, #40, #200	TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	
LIQUID LIMIT PLASTIC INDEX	<b>GROUND WATER</b>	<b>MISCELLANEOUS SYMBOLS</b>	
GROUP INDEX	ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL	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	
USUAL TYPES OF MAJOR MATERIALS	PERCENTAGE OF MATERIAL	SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL	
GENERATING AS A SUBGRADE	TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%	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	
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	FAIR TO POOR, POOR, UNSUITABLE	<b>ABBREVIATIONS</b>	
<b>CONSISTENCY OR DENSENESS</b>		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	
PRIMARY SOIL TYPE	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	HI. - 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	
COMPACTNESS OR CONSISTENCY		w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W <sub>d</sub> - DRY UNIT WEIGHT	
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)		<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	
VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input checked="" type="checkbox"/> CME-45B <input type="checkbox"/> CME-750 <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> CME-45-SKID	
VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input checked="" type="checkbox"/> TRICONE 2 1/2" STEEL TEETH <input type="checkbox"/> TRICONE " TUNG-CARB. <input type="checkbox"/> CORE BIT	
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	N/A	HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL  CORE SIZE: <input type="checkbox"/> B <input type="checkbox"/> N <input type="checkbox"/> H  HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4	<b>INDURATION</b>	
TEXTURE OR GRAIN SIZE		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
U.S. STD. SIEVE SIZE OPENING (MM)		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.	
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F, SD.) SILT (SL.) CLAY (CL.)			
GRAIN SIZE MM IN. 305 12 75 3 2.0 0.25 0.075 0.05 0.005			
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			
LL - LIQUID LIMIT PLASTIC RANGE (PI) PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- SATURATED - (SAT.) - WET - (W) - MOIST - (M) - DRY - (D)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE SOLID; AT OR NEAR OPTIMUM MOISTURE REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	
<b>PLASTICITY</b>			
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY	PLASTICITY INDEX (PI) 0-5 6-15 16-25 26 OR MORE		
<b>COLOR</b>	DRY STRENGTH VERY LOW SLIGHT MEDIUM HIGH		
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.			
			<b>BENCH MARK: NCDOT GPS U-4007B</b> <b>-BL- STA. 56+50</b> <b>ELEVATION: 60.3 FT.</b>
			<b>NOTES:</b>

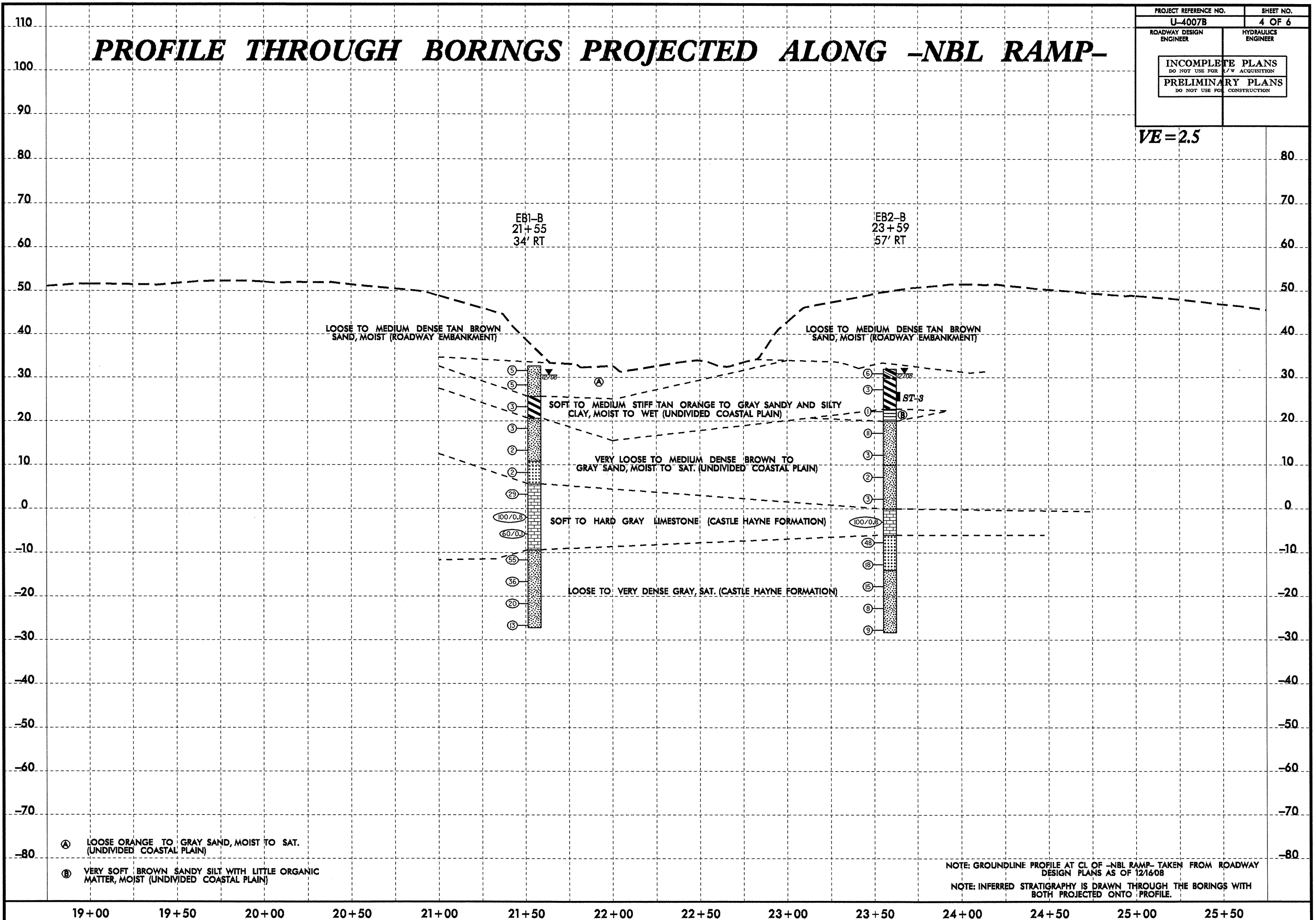
**SKEW = 62° 48' 51"**  
 NC GRID NAD 83



# PROFILE THROUGH BORINGS PROJECTED ALONG -NBL RAMP-

PROJECT REFERENCE NO. <b>U-4007B</b>	SHEET NO. <b>4 OF 6</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> <small>DO NOT USE FOR ACQUISITION</small>	
<b>PRELIMINARY PLANS</b> <small>DO NOT USE FOR CONSTRUCTION</small>	

VE = 2.5



- Ⓐ LOOSE ORANGE TO GRAY SAND, MOIST TO SAT. (UNDIVIDED COASTAL PLAIN)
- Ⓑ VERY SOFT BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, MOIST (UNDIVIDED COASTAL PLAIN)

NOTE: GROUNDLINE PROFILE AT CL OF -NBL RAMP- TAKEN FROM ROADWAY DESIGN PLANS AS OF 12/1608  
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

19+00    19+50    20+00    20+50    21+00    21+50    22+00    22+50    23+00    23+50    24+00    24+50    25+00    25+50



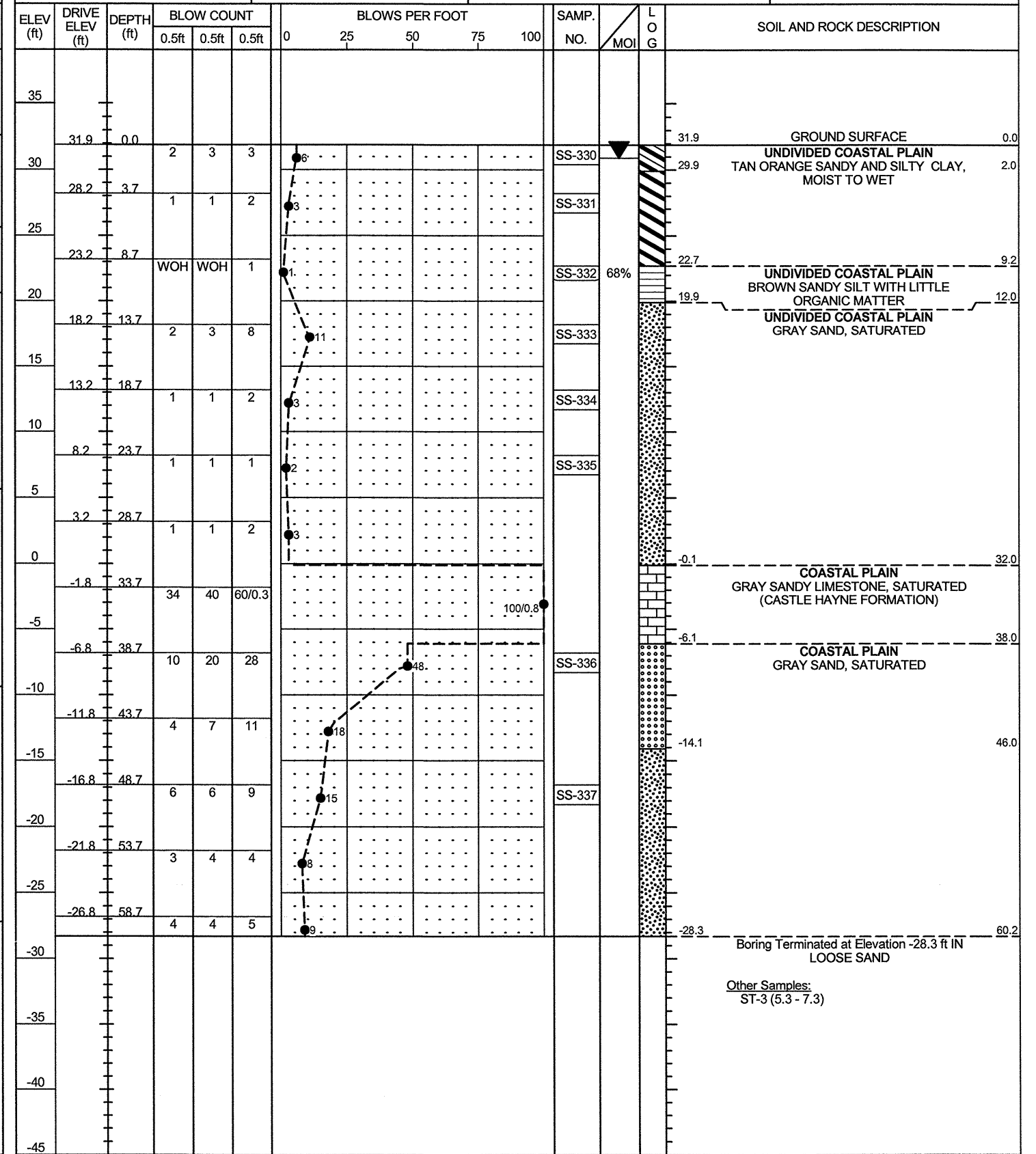
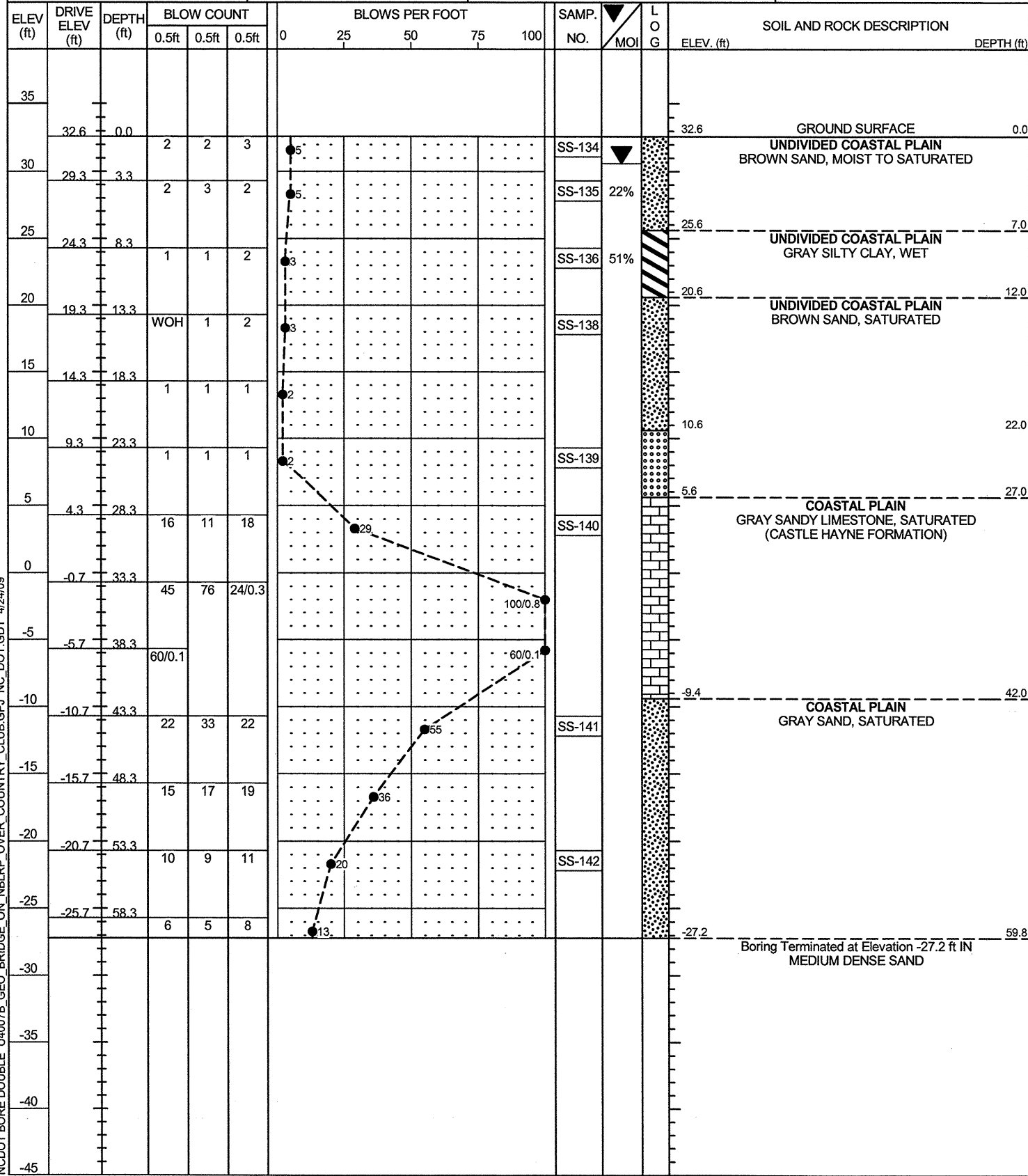


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 35008.1.1	ID. U4007B	COUNTY ONSLOW	GEOLOGIST Dillard, S. C.
SITE DESCRIPTION BRIDGE NO. 291 ON -NBL RAMP- OVER -Y0- (COUNTRY CLUB RD.)			GROUND WTR (ft)
BORING NO. EB1-B	STATION 21+55	OFFSET 34ft RT	ALIGNMENT -NBL RAMP-
COLLAR ELEV. 32.6 ft	TOTAL DEPTH 59.8 ft	NORTHING 374,561	EASTING 2,481,722
DRILL MACHINE CME-45 SKID	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 12/03/08	COMP. DATE 12/03/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 27.0 ft

PROJECT NO. 35008.1.1	ID. U4007B	COUNTY ONSLOW	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 291 -NBL RAMP- OVER -Y0- (COUNTRY CLUB RD.)			GROUND WTR (ft)
BORING NO. EB2-B	STATION 23+59	OFFSET 57ft RT	ALIGNMENT -NBL RAMP-
COLLAR ELEV. 31.9 ft	TOTAL DEPTH 60.2 ft	NORTHING 374,766	EASTING 2,481,712
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/15/08	COMP. DATE 12/15/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 32.0 ft



NCDOT BORE DOUBLE U4007B.GEO.BRIDGE\_ON\_NBLRP\_OVER\_COUNTRY\_CLUB.GPJ\_NC\_DOT.GDT 4/24/09

U-4007B

35008.1.1

BRIDGE NO. 291 ON -NBL RAMP- OVER -Y0- (COUNTRY CLUB ROAD) AT -NBL RAMP- STA. 22+34

SOIL TEST RESULTS EB1-B															
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- 134	34 RT	21+55	1.0- 1.5	A- 2- 4( 0)	22	NP	12.8	68.9	8.2	10.0	98	97	20	-	-
SS- 135	34 RT	21+55	3.3- 4.8	A- 2- 4( 0)	17	NP	7.8	70.3	5.8	16.0	100	100	24	22.1	-
SS- 136	34 RT	21+55	8.3- 9.8	A- 7- 6( 19)	44	24	1.4	22.2	18.2	58.1	100	100	80	51.2	-
SS- 138	34 RT	21+55	13.3- 14.8	A- 2- 4( 0)	21	NP	10.2	67.9	9.8	12.0	100	97	28	-	-
SS- 139	34 RT	21+55	23.3- 24.8	A- 3( 0)	19	NP	25.6	65.0	3.4	6.0	97	89	10	-	-
SS- 140	34 RT	21+55	28.3- 29.8	A- 1- b( 0)	21	NP	63.5	19.4	12.0	5.0	77	38	15	-	-
SS- 141	34 RT	21+55	43.3- 44.8	A- 2- 4( 0)	16	NP	6.5	79.7	5.8	8.0	100	99	15	-	-
SS- 142	34 RT	21+55	53.3- 54.8	A- 2- 4( 0)	21	NP	0.2	81.5	7.3	11.0	100	100	21	-	-

SOIL TEST RESULTS EB2-B															
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- 330	60 RT	23+45	1.0- 1.5	A- 6( 6)	34	19	5.4	44.0	10.4	40.2	100	100	52	-	-
SS- 331	60 RT	23+45	3.7- 5.2	A- 7- 6( 47)	72	44	0.4	4.0	29.3	66.3	95	95	92	-	-
SS- 332	57 RT	23+59	9.2- 10.2	A- 4( 0)	31	NP	8.5	57.3	18.1	16.1	100	97	40	67.7	11.1
SS- 333	57 RT	23+59	13.7- 15.2	A- 2- 4( 0)	17	NP	22.8	64.8	5.3	7.0	90	83	14	-	-
SS- 334	57 RT	23+59	18.7- 20.2	A- 2- 4( 0)	22	NP	37.8	43.6	4.5	14.1	100	81	20	-	-
SS- 335	57 RT	23+59	23.7- 25.2	A- 2- 4( 0)	16	NP	17.9	72.4	1.6	8.0	100	95	11	-	-
SS- 336	57 RT	23+59	38.7- 40.2	A- 3( 0)	17	NP	2.9	88.7	2.3	6.0	100	99	10	-	-
SS- 337	57 RT	23+59	48.7- 50.2	A- 2- 4( 0)	19	NP	0.3	86.7	2.9	10.1	100	100	15	-	-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	35008.1.1 (U-4007B)	1	7
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35008.1.1	STPNHF-17(31)	P.E. RW & UTIL.	

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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.

PERSONNEL

SCD

JRS

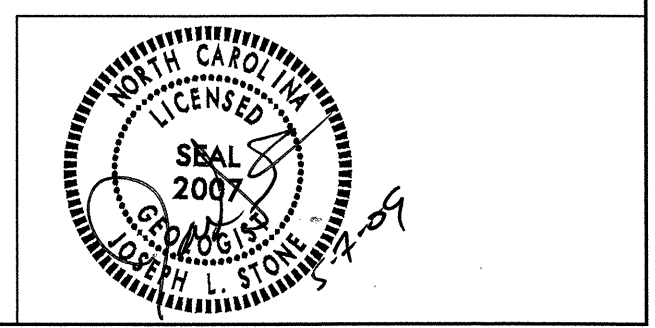
MID-ATLANTIC  
PERSONNEL

INVESTIGATED BY J.L. STONE

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE MAY 2009



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

**STRUCTURE  
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 35008.1.1 (U-4007B) F.A. PROJ. STPNHF-17(31)

COUNTY ONSLow

PROJECT DESCRIPTION WESTERN PARKWAY FROM APPROXIMATELY 1300'  
SOUTH OF COUNTRY CLUB RD. TO WESTERN BLVD.

SITE DESCRIPTION BRIDGE NO. 292 ON -NBL RAMP- (WESTERN PARKWAY)  
OVER -Y2- (US 17) AT -NBL RAMP- STA. 36+17

**INVENTORY**

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	BORELOGS
7	SOIL TEST RESULTS

**PROJECT: 35008.1.1 ID: U-4007B**

DRAWN BY: C.R. SUMNER, 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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

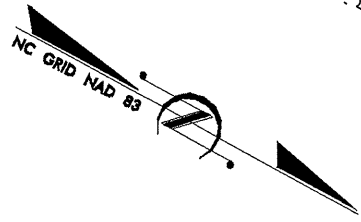
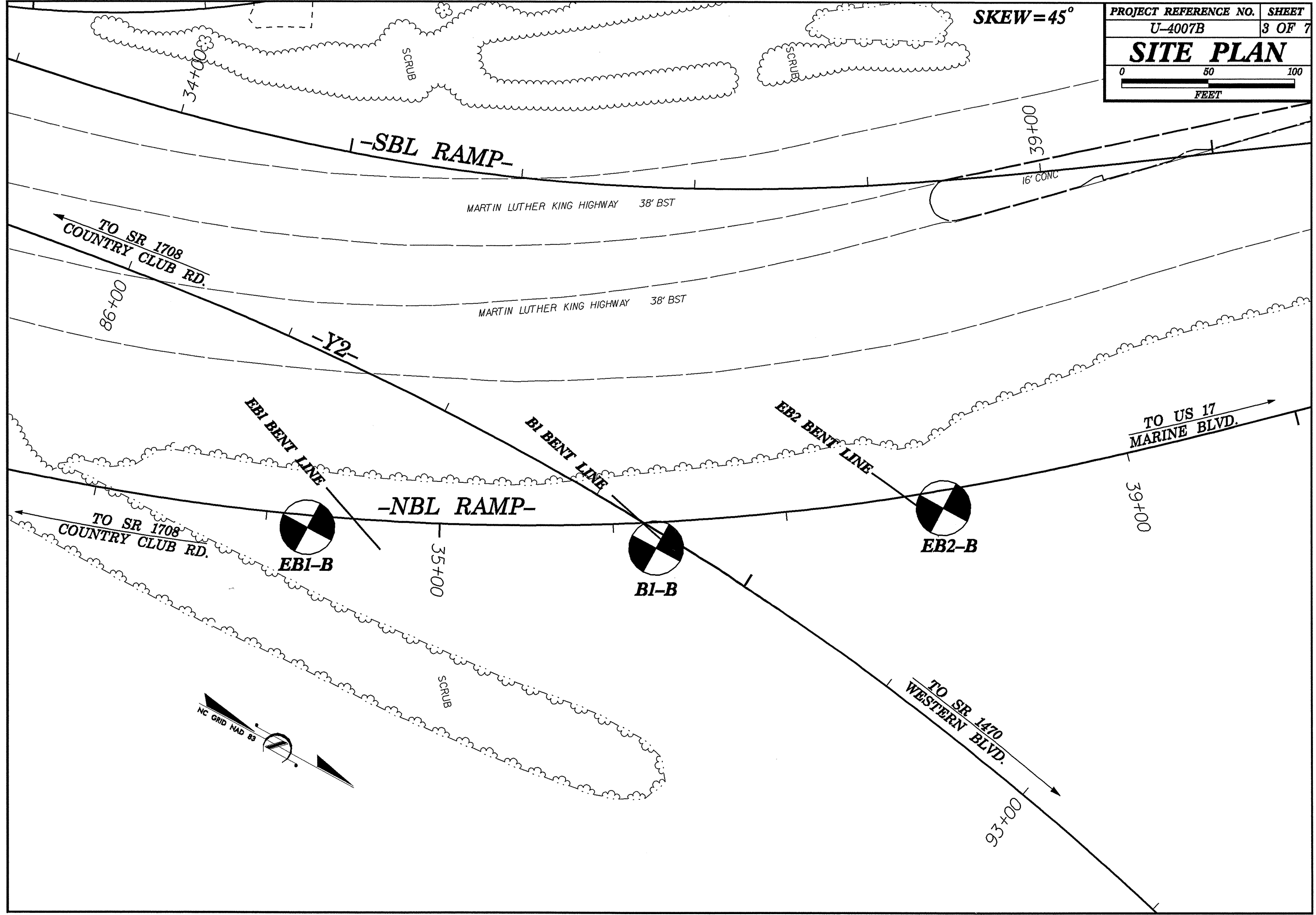
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. U-4007B	SHEET NO. 2 OF 7
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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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.		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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. 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 CONSISTENCY 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.	
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>		<b>ANGULARITY OF GRAINS</b>		<b>WEATHERED ROCK (WR)</b>			
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.			
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		<b>MINERALOGICAL COMPRESSION</b>		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-1-b, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7		<b>COMPRESSION</b>		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 MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE		COASTAL PLAIN SEDIMENTARY ROCK (CP)			
% PASSING # 10 # 40 # 200		LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50					
LIQUID LIMIT PLASTIC INDEX		<b>PERCENTAGE OF MATERIAL</b>		<b>WEATHERING</b>			
GROUP INDEX		ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL		FRESH ROCK FRESH, CRYSTALLINE BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.			
USUAL TYPES OF MAJOR MATERIALS		TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%		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.			
GEN. RATING AS A SUBGRADE		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.			
PI OF A-7-5 SUBGROUP IS <= LL - 30 + PI OF A-7-6 SUBGROUP IS > LL - 30		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		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.			
<b>CONSISTENCY OR DENSENESS</b>		<b>MISCELLANEOUS SYMBOLS</b>		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.			
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )		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		S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE			
GENERALY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE		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. 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.			
GENERALY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD		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		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.			
<b>TEXTURE OR GRAIN SIZE</b>		<b>ABBREVIATIONS</b>		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.			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270		AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST V - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS		ROCK HARDNESS			
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)		HL - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.			
GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005		<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.			
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>		DRILL UNITS: MOBILE B- BK-51 CME-45B CME-750 PORTABLE HOIST D-25		MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HAND BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 1/2" STEEL TEETH TRICONE TUNG-CARB. CORE BIT		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.			
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT		HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST		SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.			
PLASTICITY INDEX (PI) DRY STRENGTH				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.			
NONPLASTIC 0-5 LOW PLASTICITY 6-15 MED. PLASTICITY 16-25 HIGH PLASTICITY 26 OR MORE				FRACURE SPACING			
<b>COLOR</b>				BEDDING			
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.				INDURATION			
				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
				FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			
				MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.			
				INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.			
				EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.			

SKEW = 45°

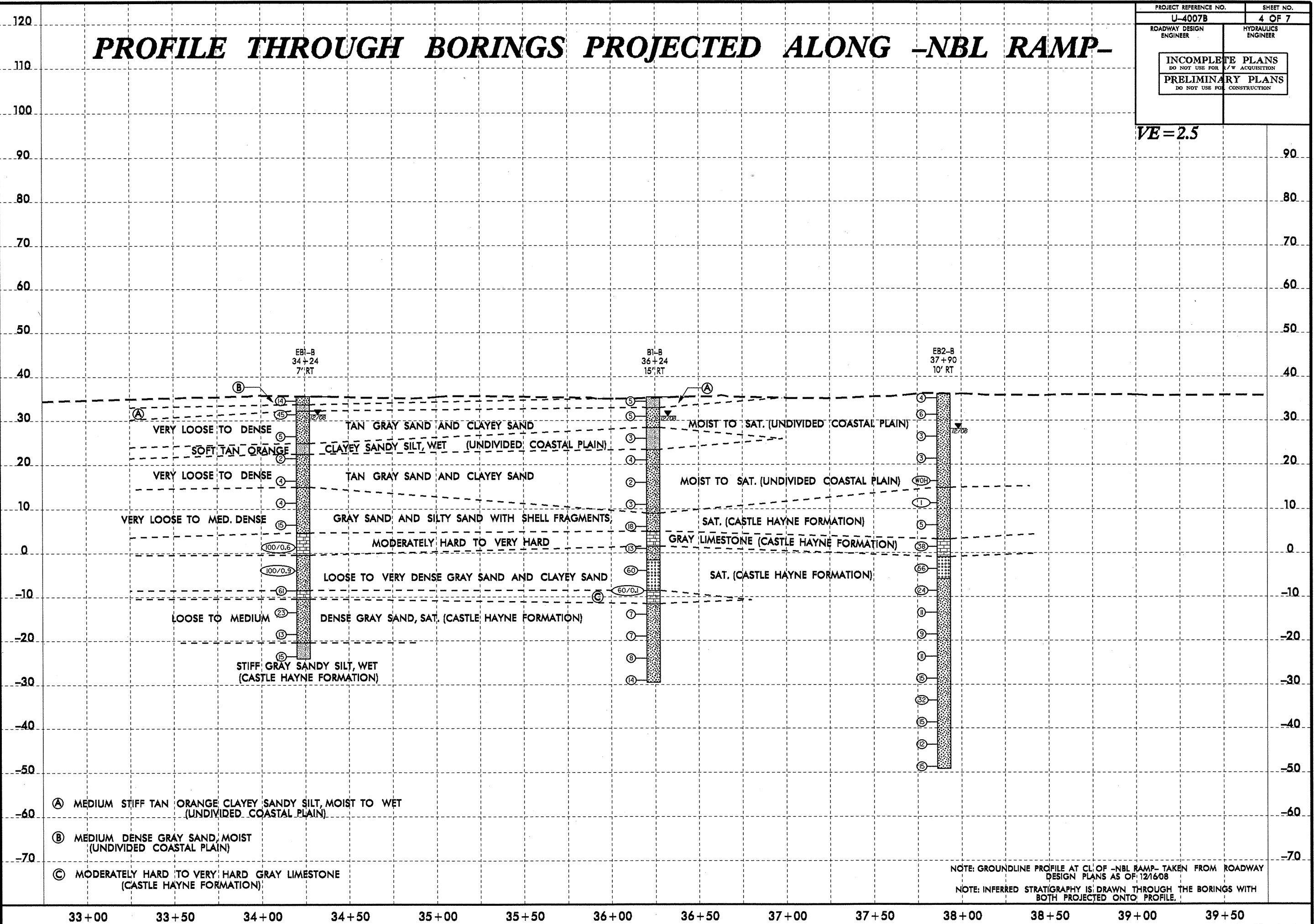
PROJECT REFERENCE NO.	SHEET
U-4007B	3 OF 7
<b>SITE PLAN</b>	
0      50      100 FEET	



# PROFILE THROUGH BORINGS PROJECTED ALONG -NBL RAMP-

PROJECT REFERENCE NO. U-4007B	SHEET NO. 4 OF 7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

VE = 2.5



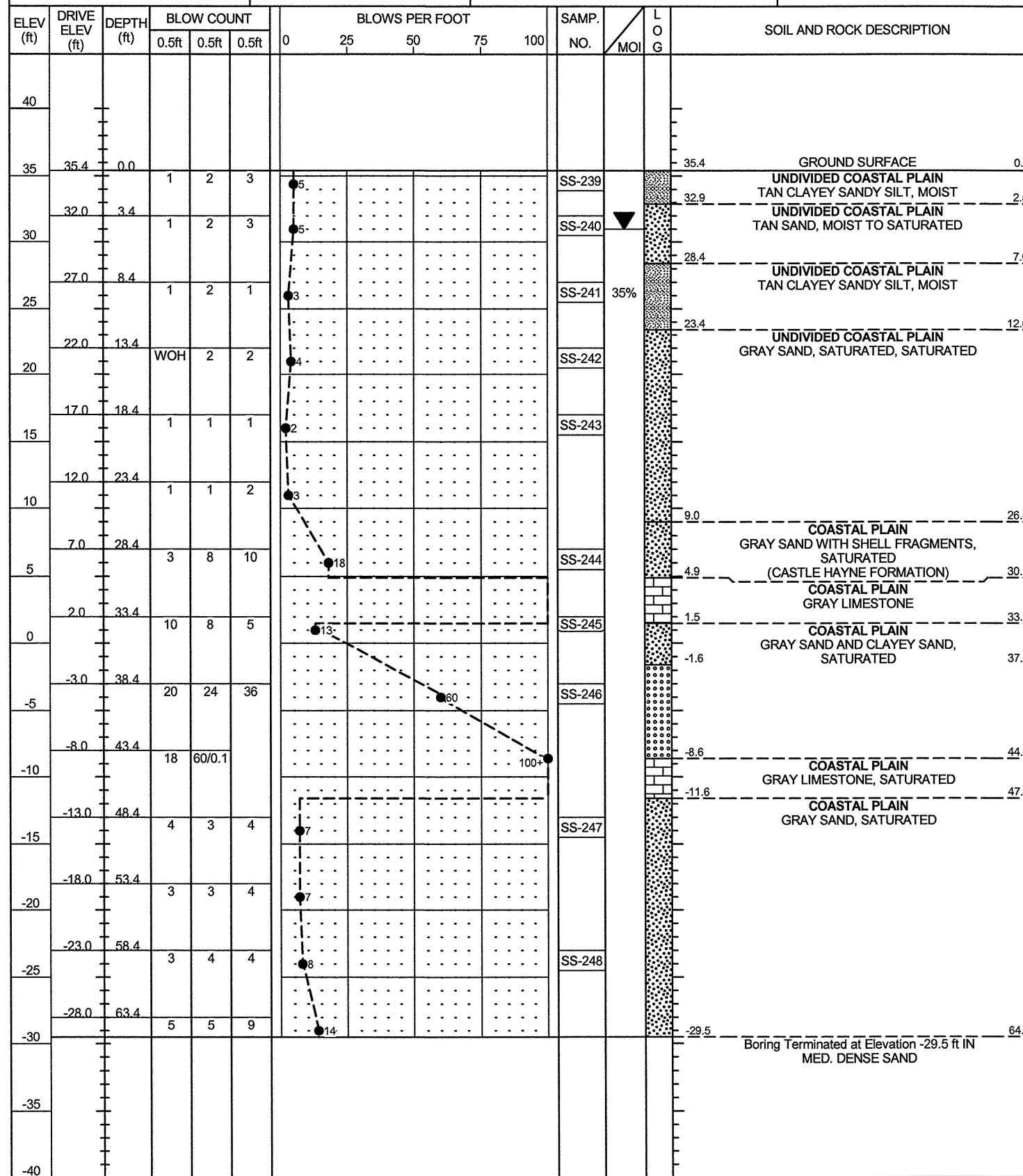
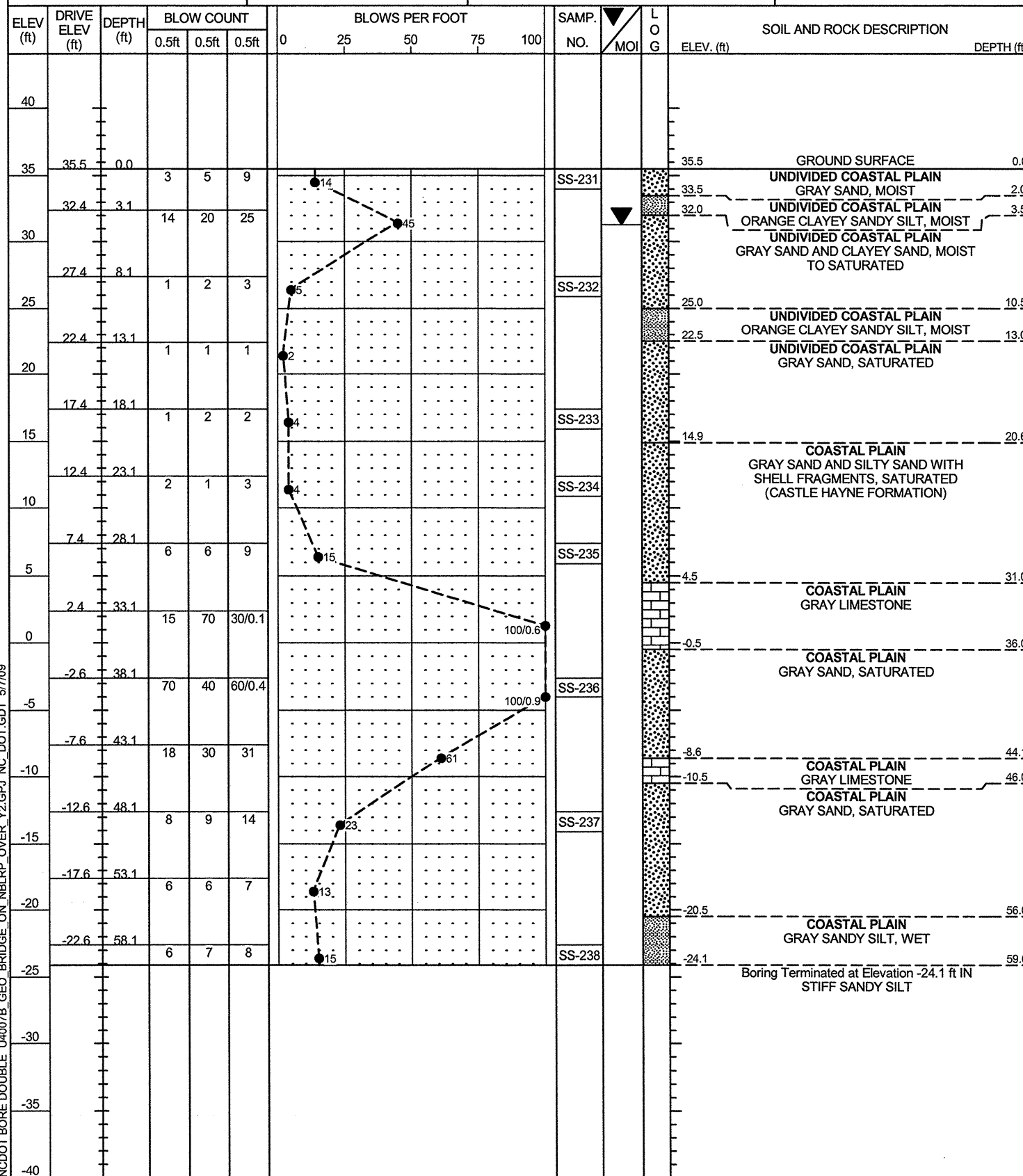
- (A) MEDIUM STIFF TAN ORANGE CLAYEY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)
- (B) MEDIUM DENSE GRAY SAND, MOIST (UNDIVIDED COASTAL PLAIN)
- (C) MODERATELY HARD TO VERY HARD GRAY LIMESTONE (CASTLE HAYNE FORMATION)

NOTE: GROUNDLINE PROFILE AT CL. OF -NBL RAMP- TAKEN FROM ROADWAY DESIGN PLANS AS OF 12/16/08  
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

33+00    33+50    34+00    34+50    35+00    35+50    36+00    36+50    37+00    37+50    38+00    38+50    39+00    39+50

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY ONSLOW	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE ON -NBL RAMP- OVER -Y2-			GROUND WTR (ft)
BORING NO. EB1-B	STATION 34+24	OFFSET 7ft RT	ALIGNMENT -NBL RAMP- 0 HR. N/A
COLLAR ELEV. 35.5 ft	TOTAL DEPTH 59.6 ft	NORTHING 375,806	EASTING 2,481,501 24 HR. 4.2
DRILL MACHINE D-25	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 12/05/08	COMP. DATE 12/05/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 31.0 ft

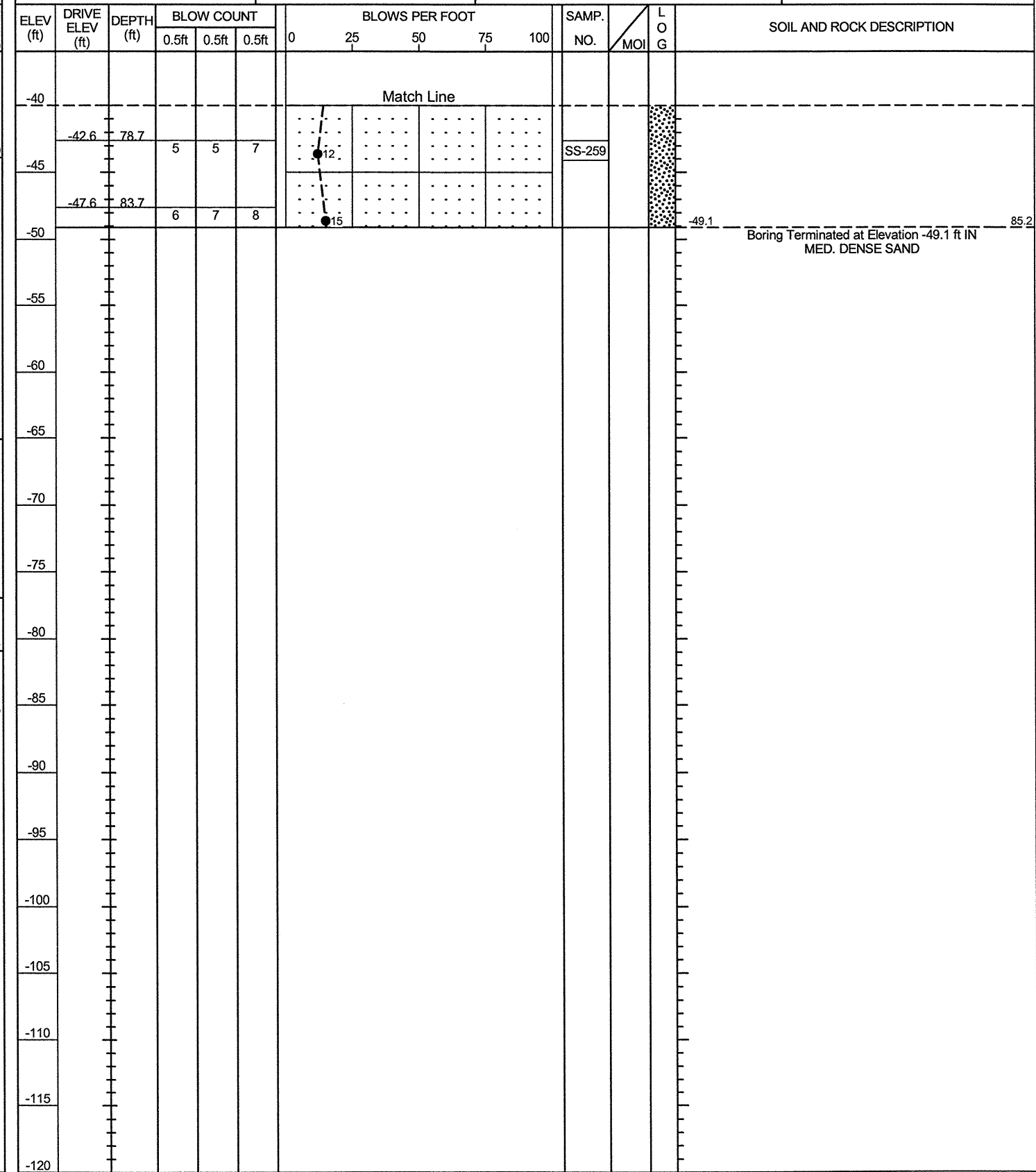
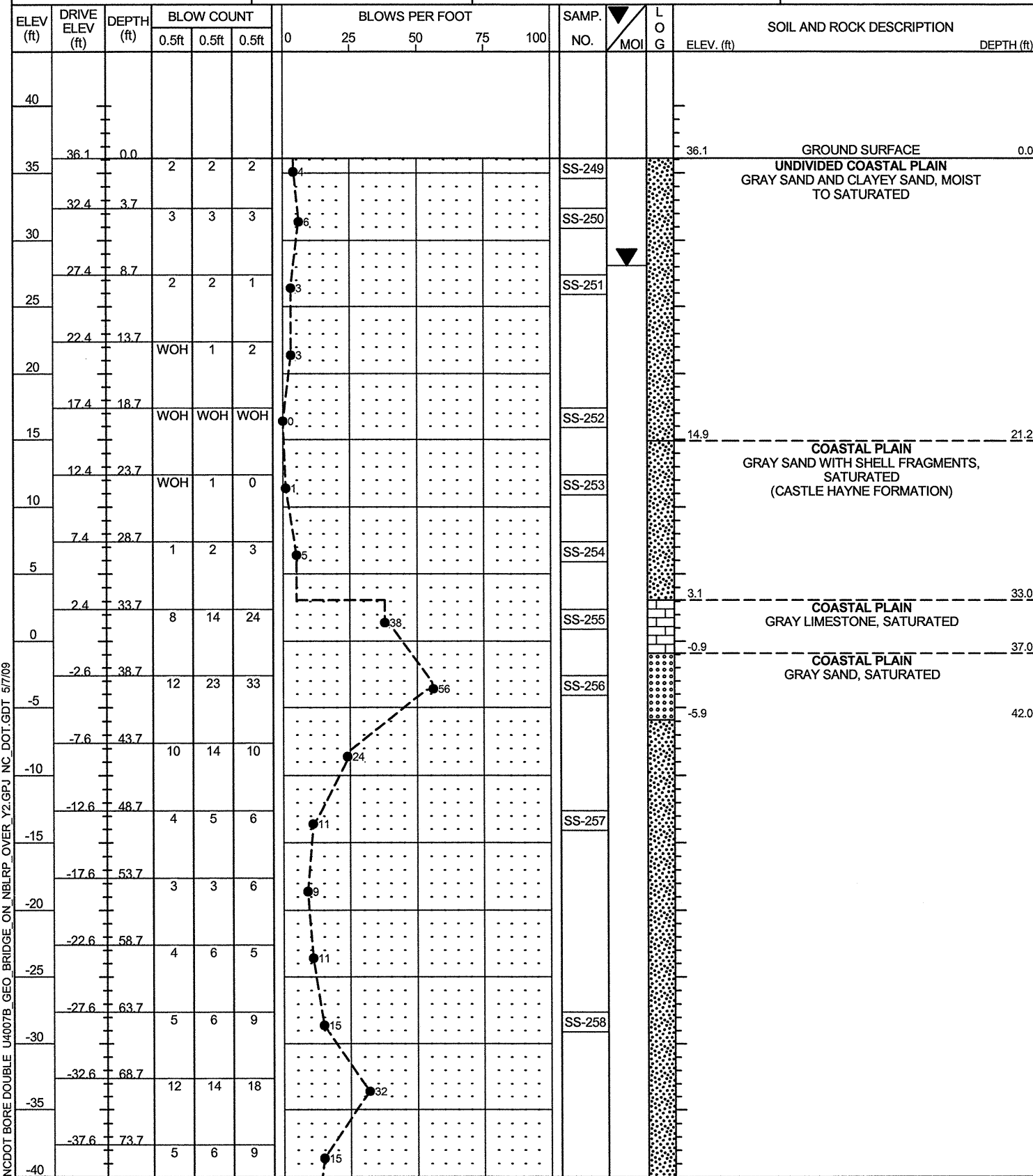
PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY ONSLOW	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE ON -NBL RAMP- OVER -Y2-			GROUND WTR (ft)
BORING NO. BI-B	STATION 36+24	OFFSET 15ft RT	ALIGNMENT -NBL RAMP- 0 HR. N/A
COLLAR ELEV. 35.4 ft	TOTAL DEPTH 64.9 ft	NORTHING 375,989	EASTING 2,481,416 24 HR. 4.4
DRILL MACHINE CME-45	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/08/08	COMP. DATE 12/08/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 30.5 ft



NCDOT BORE DOUBLE U4007B\_GEO\_BRIDGE\_ON\_NBLRP\_OVER\_Y2.GPJ NC\_DOT.GDT 5/7/09

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY ONSLOW	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE ON -NBL RAMP- OVER -Y2-			GROUND WTR (ft)
BORING NO. EB2-B	STATION 37+90	OFFSET 10ft RT	ALIGNMENT -NBL RAMP-
COLLAR ELEV. 36.1 ft	TOTAL DEPTH 85.2 ft	NORTHING 376,124	EASTING 2,481,316
DRILL MACHINE CME-45	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/08/08	COMP. DATE 12/08/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 33.0 ft

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY ONSLOW	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE ON -NBL RAMP- OVER -Y2-			GROUND WTR (ft)
BORING NO. EB2-B	STATION 37+90	OFFSET 10ft RT	ALIGNMENT -NBL RAMP-
COLLAR ELEV. 36.1 ft	TOTAL DEPTH 85.2 ft	NORTHING 376,124	EASTING 2,481,316
DRILL MACHINE CME-45	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/08/08	COMP. DATE 12/08/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 33.0 ft



NCDOT BORE DOUBLE U4007B\_GEO\_BRIDGE\_ON\_NBLRP\_OVER\_Y2.GPJ NC\_DOT\_GDT 5/7/09

Boring Terminated at Elevation -49.1 ft IN MED. DENSE SAND



U-4007B  
35008.1.1

BRIDGE NO. 292 ON WESTERN PARKWAY OVER US 17  
AT -NBL RAMP- STA. 36+17

SOIL TEST RESULTS EB1-B

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-231	7' RT	34+24	1.0- 1.5	A-2-4(0)	19	NP	15.5	62.5	5.8	16.1	100	94	24	-	-
SS-232	7' RT	34+24	8.1- 9.6	A-2-4(0)	23	6	18.1	55.9	5.7	20.2	100	95	29	-	-
SS-233	7' RT	34+24	18.1- 19.6	A-2-4(0)	28	9	41.3	38.3	1.2	19.2	95	76	20	-	-
SS-234	7' RT	34+24	23.1- 24.6	A-2-4(0)	15	NP	28.8	40.7	24.4	6.0	100	89	32	-	-
SS-235	7' RT	34+24	28.1- 29.6	A-2-4(0)	19	NP	43.3	43.8	8.9	4.0	98	73	14	-	-
SS-236	7' RT	34+24	38.1- 39.5	A-2-4(0)	19	NP	10.3	76.4	7.3	6.0	100	97	15	-	-
SS-237	7' RT	34+24	48.1- 49.6	A-2-4(0)	20	NP	0.4	86.3	5.2	8.1	100	100	15	-	-
SS-238	7' RT	34+24	58.1- 59.6	A-4(0)	23	NP	0.4	70.2	15.3	14.1	100	100	38	-	-

SOIL TEST RESULTS B1-B

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-239	15' RT	36+24	1.0- 1.5	A-4(0)	25	7	8.0	53.5	14.3	24.1	100	99	40	-	-
SS-240	15' RT	36+24	3.4- 4.9	A-2-4(0)	18	1	13.7	62.6	5.6	18.1	100	97	25	-	-
SS-241	15' RT	36+24	8.4- 9.9	A-4(3)	27	10	15.5	41.4	14.9	28.2	100	92	56	34.8	-
SS-242	15' RT	36+24	13.4- 14.9	A-2-4(0)	18	NP	39.7	39.4	5.7	15.1	100	81	26	-	-
SS-243	15' RT	36+24	18.4- 19.9	A-2-4(0)	19	NP	38.2	47.7	2.0	12.1	98	81	14	-	-
SS-244	15' RT	36+24	28.4- 29.9	A-2-4(0)	17	NP	48.6	33.8	8.6	9.1	87	60	17	-	-
SS-245	15' RT	36+24	33.9- 34.9	A-2-4(0)	17	1	19.3	48.5	10.1	22.1	88	78	30	-	-
SS-246	15' RT	36+24	38.4- 39.9	A-3(0)	20	NP	4.0	87.8	1.1	7.0	100	100	10	-	-
SS-247	15' RT	36+24	48.4- 49.9	A-2-4(0)	18	NP	0.5	80.3	6.1	13.1	100	100	22	-	-
SS-248	15' RT	36+24	58.4- 59.9	A-2-4(0)	22	NP	0.4	73.2	10.3	16.1	100	100	32	-	-

SOIL TEST RESULTS EB2-B

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-249	10' RT	37+90	1.0- 1.5	A-2-4(0)	19	NP	13.5	65.2	7.2	14.1	100	97	24	-	-
SS-250	10' RT	37+90	3.7- 5.2	A-2-4(0)	19	1	11.4	65.4	4.1	19.1	100	97	25	-	-
SS-251	10' RT	37+90	8.7- 10.2	A-2-4(0)	19	4	49.0	25.5	7.4	18.1	100	81	31	-	-
SS-252	10' RT	37+90	18.7- 20.2	A-2-4(0)	26	8	33.2	42.2	2.5	22.1	93	78	24	-	-
SS-253	10' RT	37+90	23.7- 25.2	A-2-4(0)	15	NP	25.4	63.2	5.4	6.0	100	93	12	-	-
SS-254	10' RT	37+90	28.7- 30.2	A-2-4(0)	16	NP	38.2	44.9	2.8	14.1	100	79	18	-	-
SS-255	10' RT	37+90	33.7- 35.2	A-2-4(0)	15	NP	33.8	46.9	5.2	14.1	72	54	15	-	-
SS-256	10' RT	37+90	38.7- 40.2	A-3(0)	19	NP	4.9	86.7	2.3	6.0	97	96	9	-	-
SS-257	10' RT	37+90	48.7- 50.2	A-2-4(0)	18	NP	0.4	81.0	5.5	13.1	100	100	22	-	-
SS-258	10' RT	37+90	63.7- 65.2	A-2-4(0)	22	NP	0.8	82.1	6.0	11.1	100	100	21	-	-
SS-259	10' RT	37+90	78.7- 80.2	A-2-4(0)	19	NP	0.7	69.6	12.6	17.1	100	100	34	-	-

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 35008.1.1 (U-4007B) F.A. PROJ. N/A  
 COUNTY ONslow  
 PROJECT DESCRIPTION BRIDGES 293 AND 294 ON WESTERN PARKWAY  
OVER MARINE BLVD.

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1	TITLE SHEET
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**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 (ON-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: 35008.1.1 ID: U-4007B**

PERSONNEL

- J. HOWARD
- C. FREDETTE
- T. HAHN
- P. PITTS
- D. WHITE
- D. RHODES

INVESTIGATED BY MACTEC

CHECKED BY B. DEOBALD

SUBMITTED BY S. JOHNSON

DATE 07/01/09

REVISED 07/15/09

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.

**MACTEC**  
 MACTEC ENGINEERING & CONSULTING, INC.  
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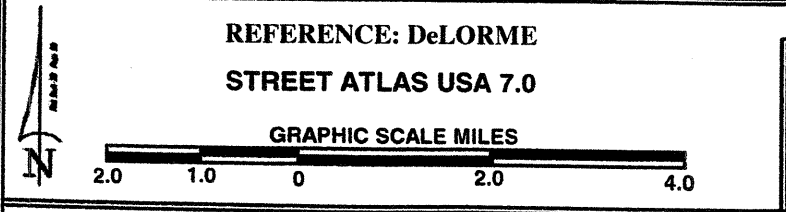
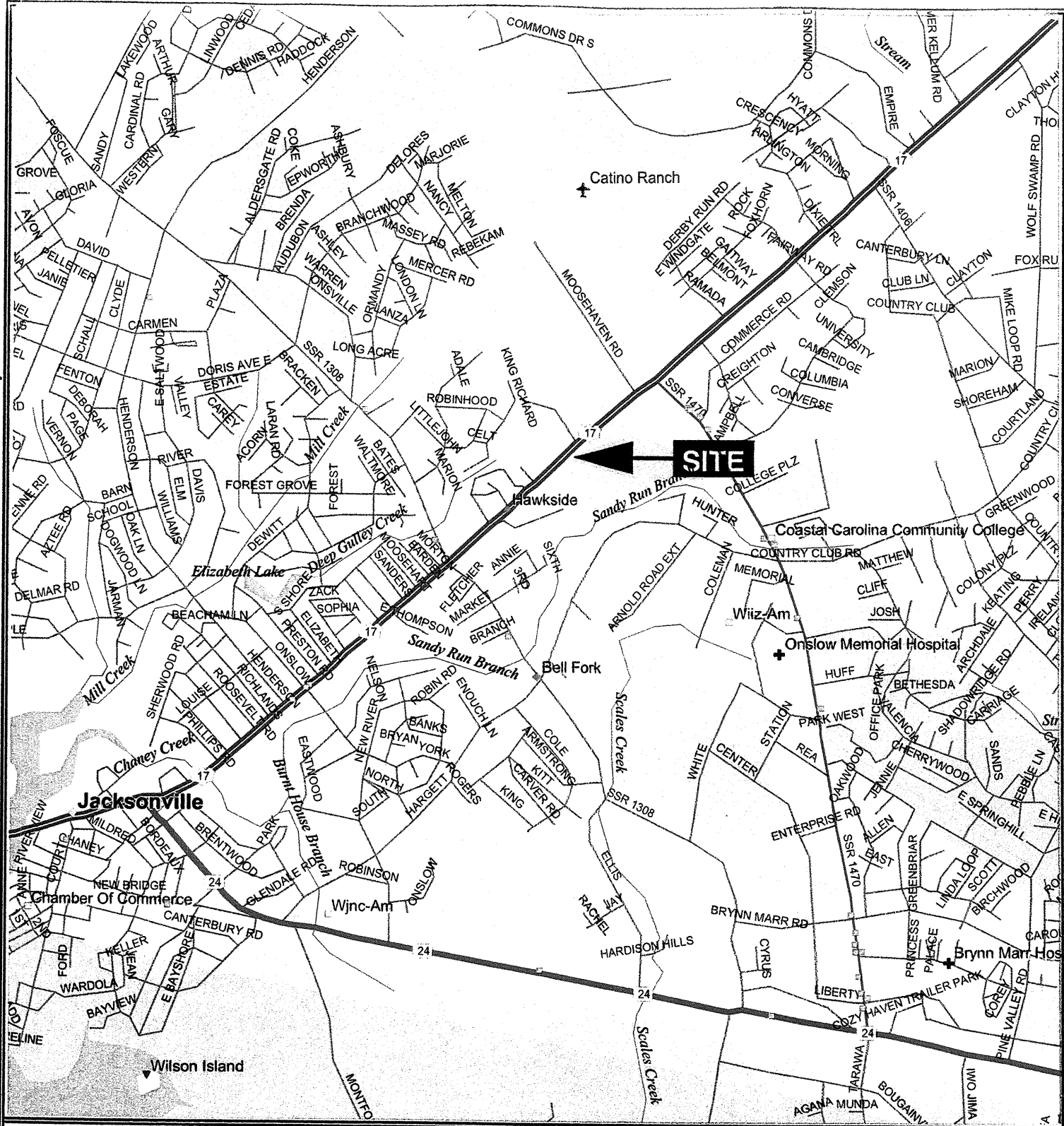
Signature: William Brian Deobald 7-15-09  
 MACTEC NC LICENSE F-0653

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: <i>VERY STIFF, GRM, SILTY CLM, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. 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) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.										ALLUVIUM (ALLUV.) - SOILS 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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. 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										WEATHERING																																							
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V 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 ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE 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. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.										SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50										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 ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE 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. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.																			
PERCENTAGE OF MATERIAL										GROUND WATER										MISCELLANEOUS SYMBOLS																																							
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										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP										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 SPT DPT DMT VST TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL										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																													
CONSISTENCY OR DENSENESS										TEXTURE OR GRAIN SIZE										ROCK HARDNESS																																							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )										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										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.										BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3										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.																			
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										EQUIPMENT USED ON SUBJECT PROJECT										INDURATION																													
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										HI. - HIGHLY MED. - MEDIUM MICA. - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITE SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL W - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT Wd - DRY UNIT WEIGHT										DRILL UNITS: 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" TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST										FRACURE SPACING TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET BEDDING TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET 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										COLOR										BENCH MARK: NCDOT REBAR AND CAP STAMPED BY11-4 LOCATED AT STATION 65+13.53, 6.47 LT ELEVATION: 38.24 FT.										NOTES:																													
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH VERY LOW SLIGHT MEDIUM HIGH										DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																																	

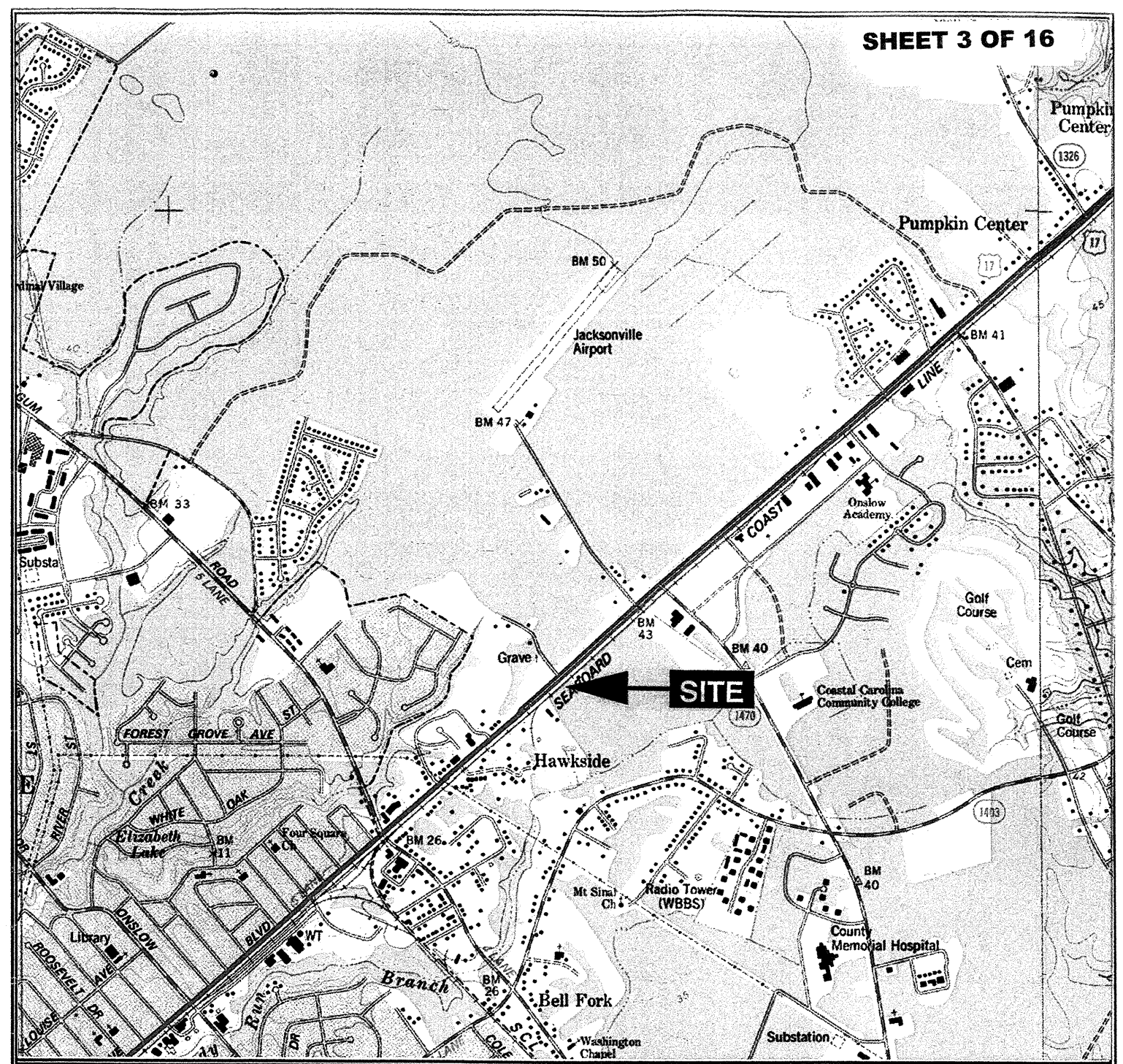


NOTE: SITE LOCATION IS APPROXIMATE

MACTEC ENGINEERING AND CONSULTING, INC.  
RALEIGH, NORTH CAROLINA

**SITE LOCATION MAP**  
**BRIDGES 293 AND 294**  
**NCDOT PROJ. NO. 35008.1.1(U-4007B)**  
**ONSLow COUNTY, NORTH CAROLINA**

DRAWN: JPH	DATE: MAY 2009	DRAWING
APPROVAL:	SCALE: 1" = 2 miles	<b>1</b>
REVISED:	JOB: 6468-09-2407	



JACKSONVILLE NORTH, N.C.  
 JACKSONVILLE NORTH QUARDANGLE  
 N3445-W7722.5/7.5  
 1978  
 AMS 5553 IV SW-SERIES V842  
 CONTOUR INTERVAL 5 FEET  
 NATIONAL GEODETIC VERTICAL DATUM OF 1929

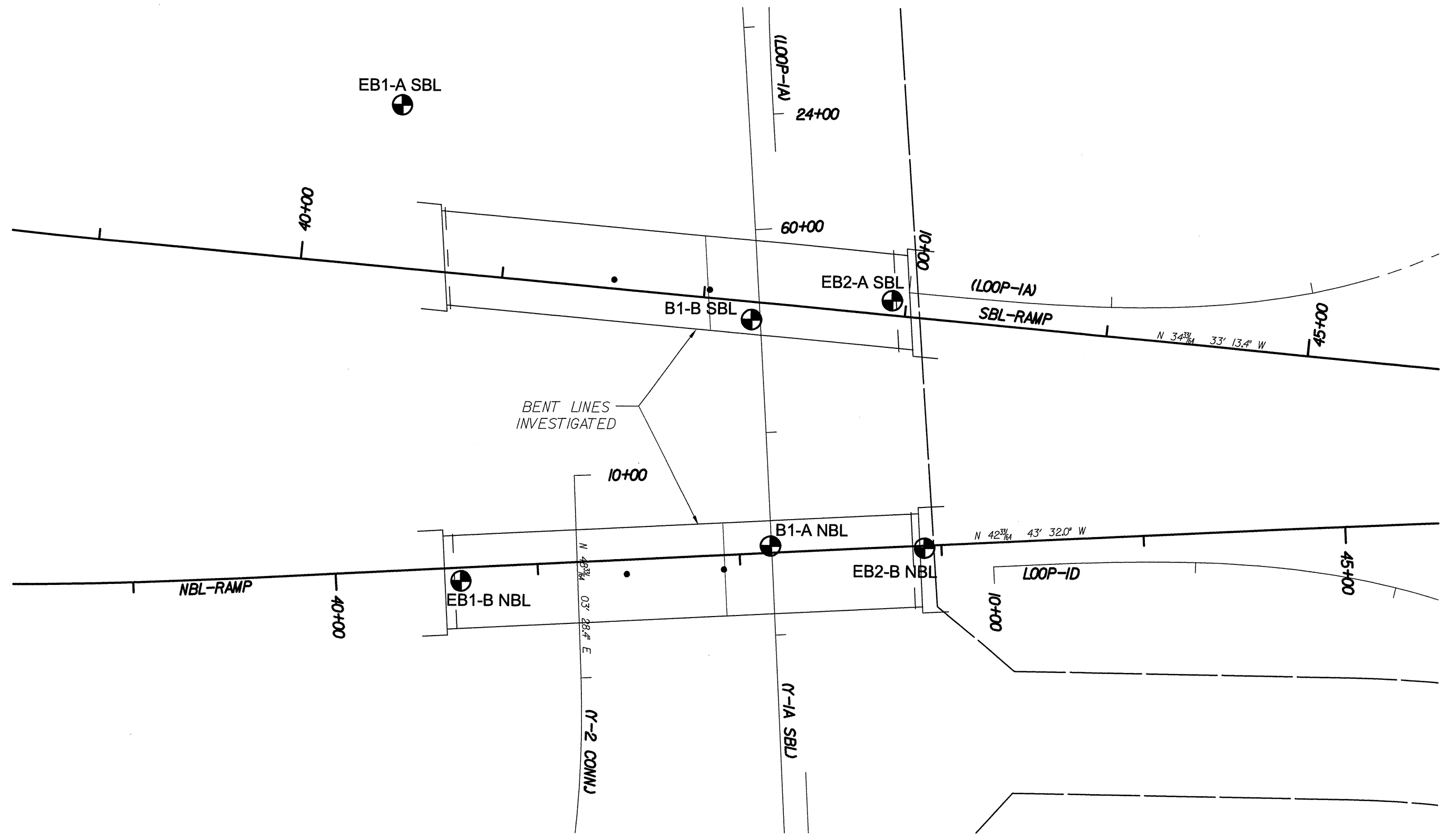
GRAPHIC SCALE FEET

NOTE: SITE LOCATION IS APPROXIMATE

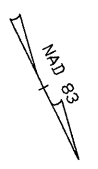
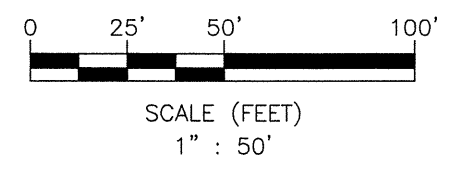
MACTEC ENGINEERING AND CONSULTING, INC.  
RALEIGH, NORTH CAROLINA

**TOPOGRAPHIC SITE MAP**  
**BRIDGES 293 AND 294**  
**NCDOT PROJ. NO. 35008.1.1 (U-4007B)**  
**ONSLow COUNTY, NORTH CAROLINA**

DRAWN: JPH	DATE: MAY 2009	DRAWING
APPROVAL:	SCALE: 1: 24000	<b>2</b>
REVISED:	JOB: 6468-09-2407	



TYPICAL SKEW NBL BENT : 90°.00'.00"  
 TYPICAL SKEW SBL BENT : 81°.32'.00"



**BORING LOCATION PLAN**  
 BRIDGES 293 AND 294 ON WESTERN PARKWAY  
 OVER MARINE BLVD  
 NCDOT PROJECT NO. 35008.1.1 (U-4007B)  
 F.A. No. N/A  
 ONSLOW COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 07/01/09
	DFT CHECK:	J.S.J.	JOB : 6468-09-2407
	ENG CHECK:	J.E.V.	DWG: 3

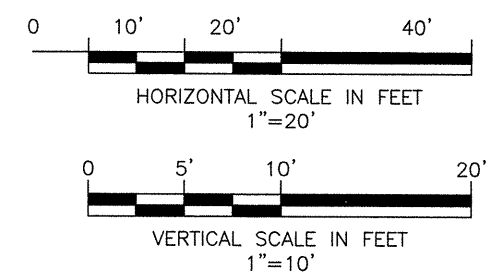
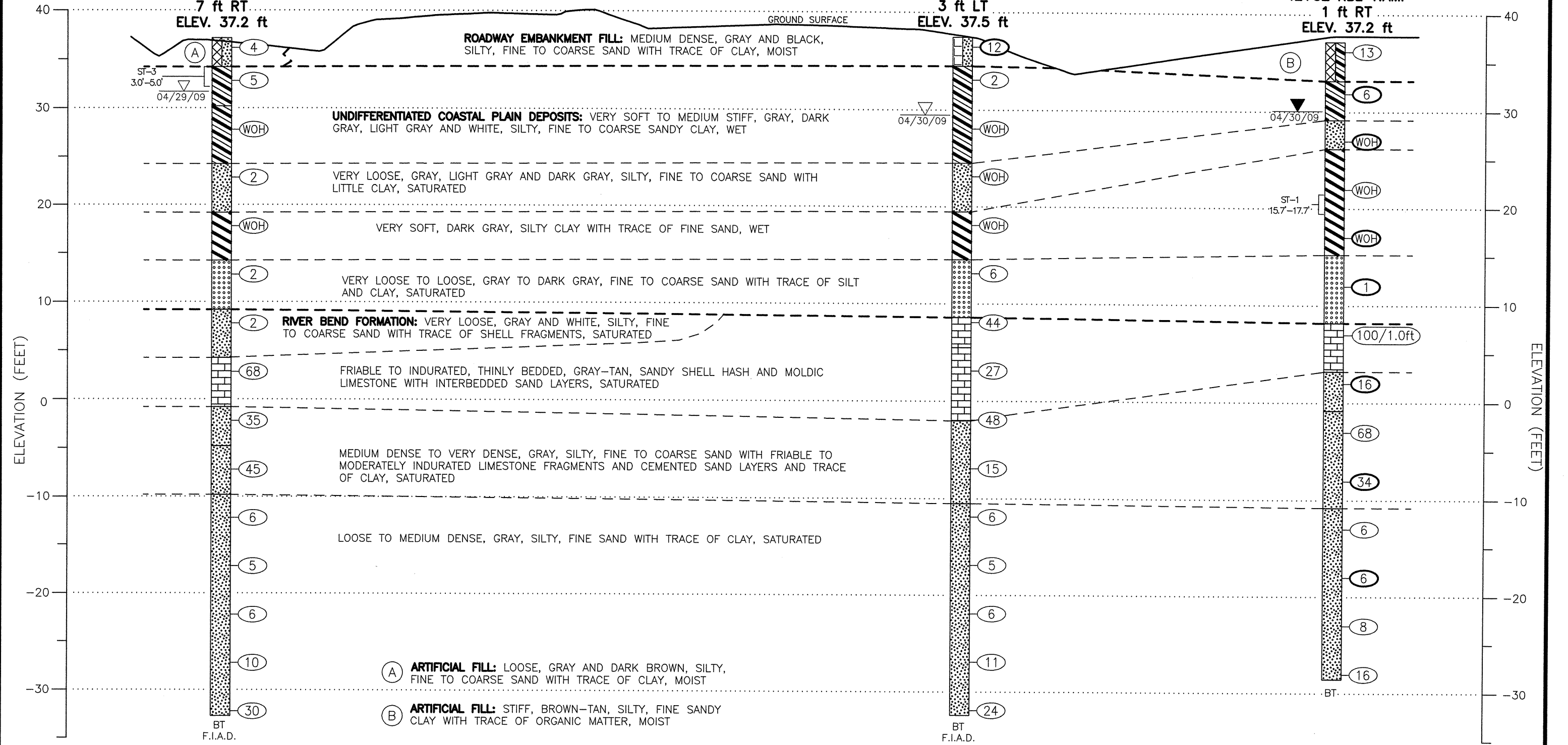
REFERENCE: NCDOT PRELIMINARY GENERAL DRAWINGS DATED 2/5/09.

41+00 42+00 43+00

**EB1-B NBL**  
**40+62 NBL-RAMP**  
**7 ft RT**  
**ELEV. 37.2 ft**

**B1-A NBL**  
**42+15 NBL-RAMP**  
**3 ft LT**  
**ELEV. 37.5 ft**

**EB2-B NBL**  
**42+92 NBL-RAMP**  
**1 ft RT**  
**ELEV. 37.2 ft**



- GROUND LINE PROFILE AT NBL-RAMP TAKEN FROM PRELIMINARY GENERAL DRAWING DATED 2/12/09.

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

PROFILE ALONG NBL-RAMP  
 BRIDGES 293 AND 294 ON WESTERN PARKWAY  
 OVER MARINE BLVD  
 NCDOT PROJECT NO. 35008.1.1 (U-4007B)  
 F.A. No. N/A  
 ONSLOW COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 07/01/09
07/15/09	DFT CHECK:	J.S.J.	JOB: 6468-09-2407
	ENG CHECK:	J.E.V.	DWG: 4











**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: Bridges 293 and 294 on Western Parkway over Marine Blvd. (6468-09-2407)  
 NCDOT PROJ. NO.: 35008.1.1 (U-4007B) COUNTY: Onslow OWNER: N.C.D.O.T.  
 DATE SAMPLED: April 2009 RECEIVED: 5/6/2009 REPORTED BY: MACTEC  
 SAMPLED FROM: EB2-B NBL  
 SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

**1992 STANDARD SPECIFICATIONS**

**TEST RESULTS**

Lab Sample No.	SS-8	SS-9	SS-10	SS-11	SS-12	SS-13
Retained No. 4 Sieve (%)	0.0	0.0	0.0	0.0	0.0	1.7
Passing No. 10 Sieve (%)	100.0	99.9	100.0	100.0	99.9	97.3
Passing No. 40 Sieve (%)	96.7	87.8	99.7	99.0	98.7	89.5
Passing No. 200 Sieve (%)	54.9	32.8	97.0	4.1	12.6	22.4

**MINUS 2.00mm FRACTION**

SOIL MORTAR - 100%							
Coarse Sand (%)	10.5	27.8	0.6	13.5	5.0	12.8	
Fine Sand (%)	44.4	45.0	3.4	82.7	83.2	65.8	
Silt (%)	33.0	14.5	59.6	3.5	7.4	11.4	
Clay (%)	12.1	12.6	36.4	0.3	4.4	10.0	

Moisture Content (%)	26.1	ND	111.9	ND	ND	ND
Liquid Limit, L.L.	27	20	79	NV	NV	NV
Plasticity Index, P.I.	13	5	40	NP	NP	NP
AASHTO Classification	A-6(4)	A-2-4(0)	A-7-5(49)	A-3(0)	A-2-4(0)	A-2-4(0)
Organic Content (%)	ND	ND	ND	ND	ND	ND

Boring No.	EB2-B NBL	EB2-B NBL	EB2-B NBL	EB2-B NBL	EB2-B NBL	EB2-B NBL
Station	42+93	42+93	42+93	42+93	42+93	42+93
Offset	1 RT	1 RT	1 RT	1 RT	1 RT	1 RT
Alignment	-NBL-RAMP-	-NBL-RAMP-	-NBL-RAMP-	-NBL-RAMP-	-NBL-RAMP-	-NBL-RAMP-
Depth (FT) From	4.3	9.2	19.2	24.2	34.2	44.2
to	5.8	10.7	20.7	25.7	35.7	45.7

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: Bridges 293 and 294 on Western Parkway over Marine Blvd. (6468-09-2407)  
 NCDOT PROJ. NO.: 35008.1.1 (U-4007B) COUNTY: Onslow OWNER: N.C.D.O.T.  
 DATE SAMPLED: April 2009 RECEIVED: 5/6/2009 REPORTED BY: MACTEC  
 SAMPLED FROM: EB1-B NBL, B1-A NBL, EB2-B NBL  
 SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

**1992 STANDARD SPECIFICATIONS**

**TEST RESULTS**

Lab Sample No.	SS-14	SS-15	ST-1	ST-3
Retained No. 4 Sieve (%)	0.0	2.3	0.0	0.0
Passing No. 10 Sieve (%)	100.0	95.7	100.0	100.0
Passing No. 40 Sieve (%)	99.9	86.7	99.7	94.7
Passing No. 200 Sieve (%)	27.3	19.4	97.8	65.6

**MINUS 2.00mm FRACTION**

SOIL MORTAR - 100%					
Coarse Sand (%)	0.3	22.0	0.4	12.9	
Fine Sand (%)	78.0	61.3	2.5	25.1	
Silt (%)	13.5	9.5	50.1	27.8	
Clay (%)	8.2	7.1	47.0	34.2	

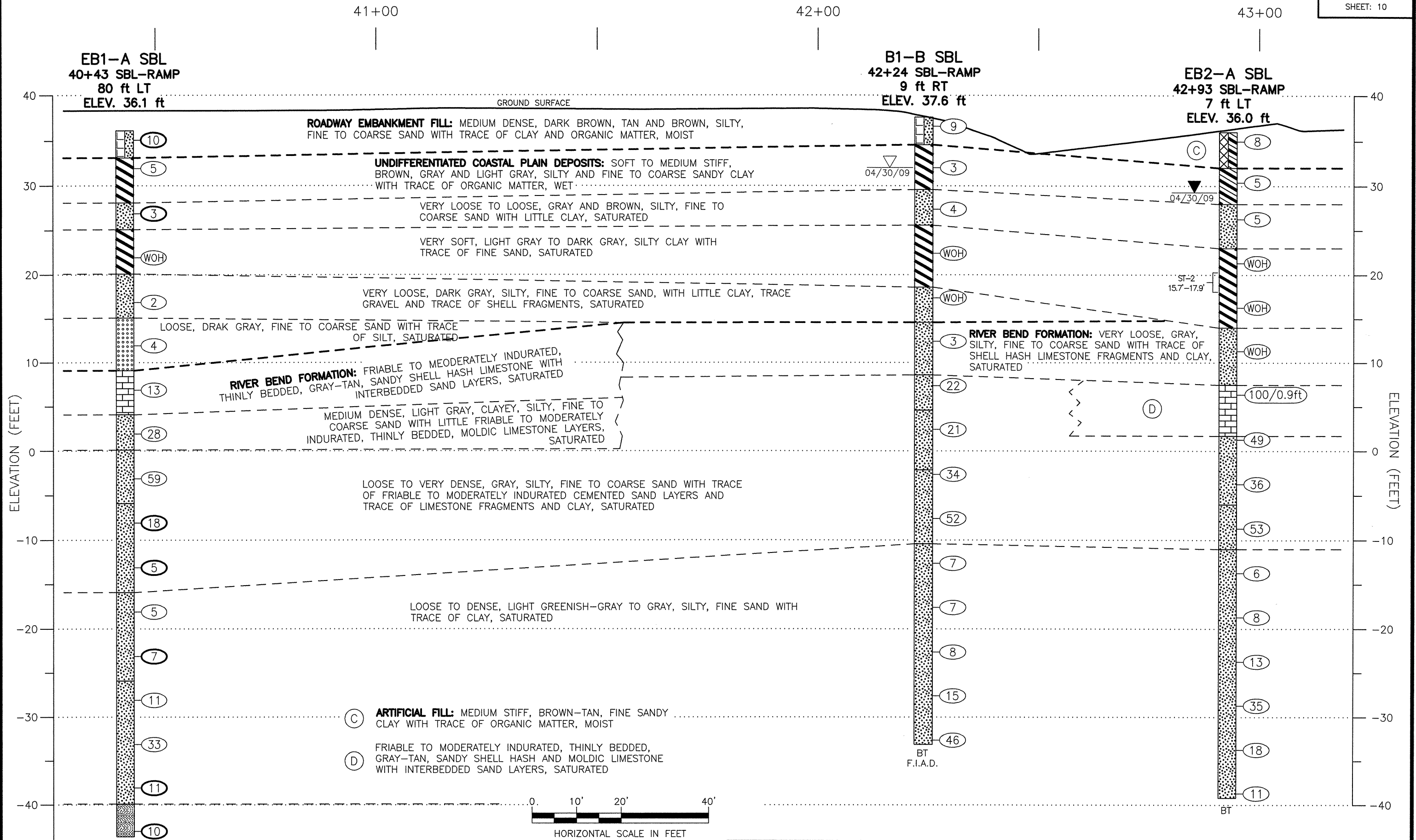
Moisture Content (%)	ND	ND	115.9	26.1
Liquid Limit, L.L.	NV	NV	76	38
Plasticity Index, P.I.	NP	NP	40	23
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-7-5(49)	A-6(13)
Dry Density (pcf)	ND	ND	38.6	67.9
Pc (ksf)	ND	ND	3.23	4.21
Cc	ND	ND	1.57	0.21

Boring No.	EB2-B NBL	B1-A NBL	EB2-B NBL	EB1-B NBL
Station	42+93	42+24	42+93	40+43
Offset	1 RT	3 LT	1 RT	7 RT
Alignment	-NBL-RAMP-	-NBL-RAMP-	-NBL-RAMP-	-NBL-RAMP-
Depth (FT) From	54.2	0.0	15.7	3.0
to	55.7	1.5	17.7	5.0

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

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

*Chana Savanapridi*  
 Signature



- GROUND LINE PROFILE AT NBL-RAMP TAKEN FROM PRELIMINARY GENERAL DRAWING DATED 2/12/09.

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

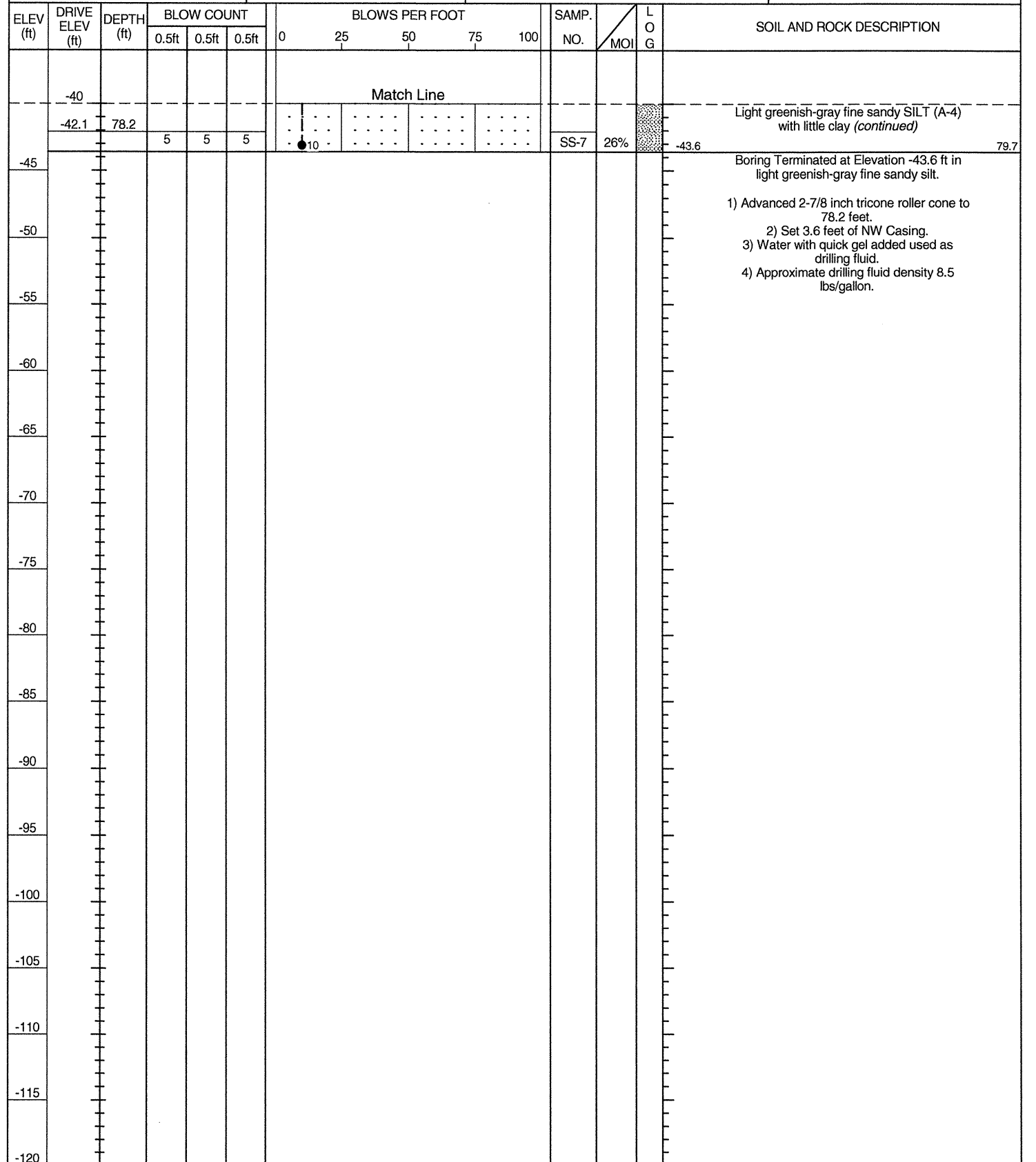
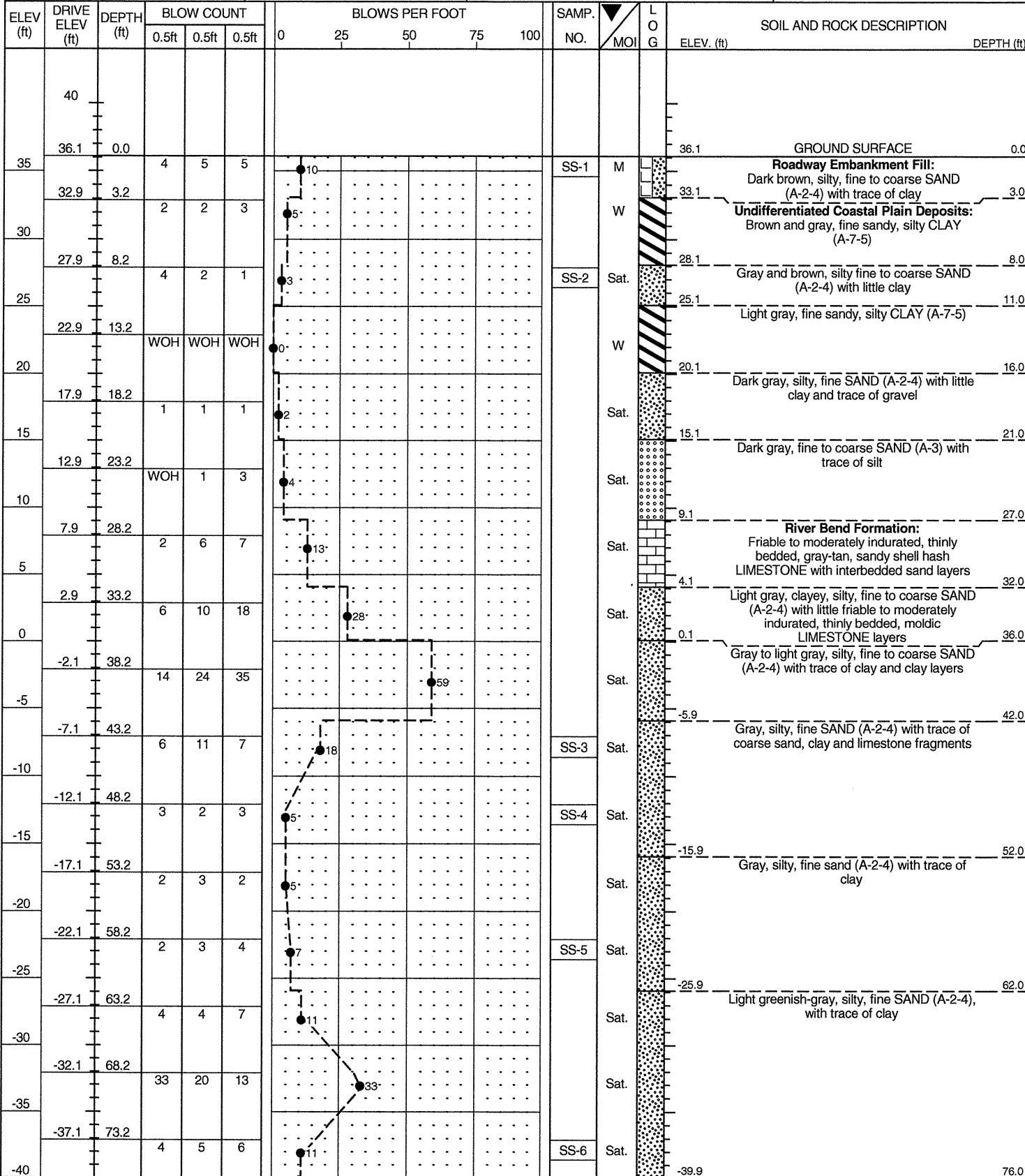
PROFILE ALONG SBL-RAMP  
BRIDGES 293 AND 294 ON WESTERN PARKWAY  
OVER MARINE BLVD  
NCDOT PROJECT NO. 35008.1.1 (U-4007B)  
F.A. No. N/A  
ONSLow COUNTY, NORTH CAROLINA

MACTEC ENGINEERING & CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 07/01/09
07/15/09	DFT CHECK:	J.S.J.	JOB: 6468-09-2407
	ENG CHECK:	J.E.V.	DWG: 5



PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY Onslow	GEOLOGIST Fredette, C.
SITE DESCRIPTION Bridges 293 and 294 on Western Parkway over Marine Blvd. (MACTEC Project No. 6468-09-2407)			GROUND WTR (ft)
BORING NO. EB1-A SBL	STATION 40+43	OFFSET 80ft LT	ALIGNMENT SBL-RAMP
COLLAR ELEV. 36.1 ft	TOTAL DEPTH 79.7 ft	NORTHING 376,153	EASTING 2,480,972
DRILL MACHINE CME-55 Track	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/29/09	COMP. DATE 04/29/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 27.0 ft

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY Onslow	GEOLOGIST Fredette, C.
SITE DESCRIPTION Bridges 293 and 294 on Western Parkway over Marine Blvd. (MACTEC Project No. 6468-09-2407)			GROUND WTR (ft)
BORING NO. EB1-A SBL	STATION 40+43	OFFSET 80ft LT	ALIGNMENT SBL-RAMP
COLLAR ELEV. 36.1 ft	TOTAL DEPTH 79.7 ft	NORTHING 376,153	EASTING 2,480,972
DRILL MACHINE CME-55 Track	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/29/09	COMP. DATE 04/29/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 27.0 ft

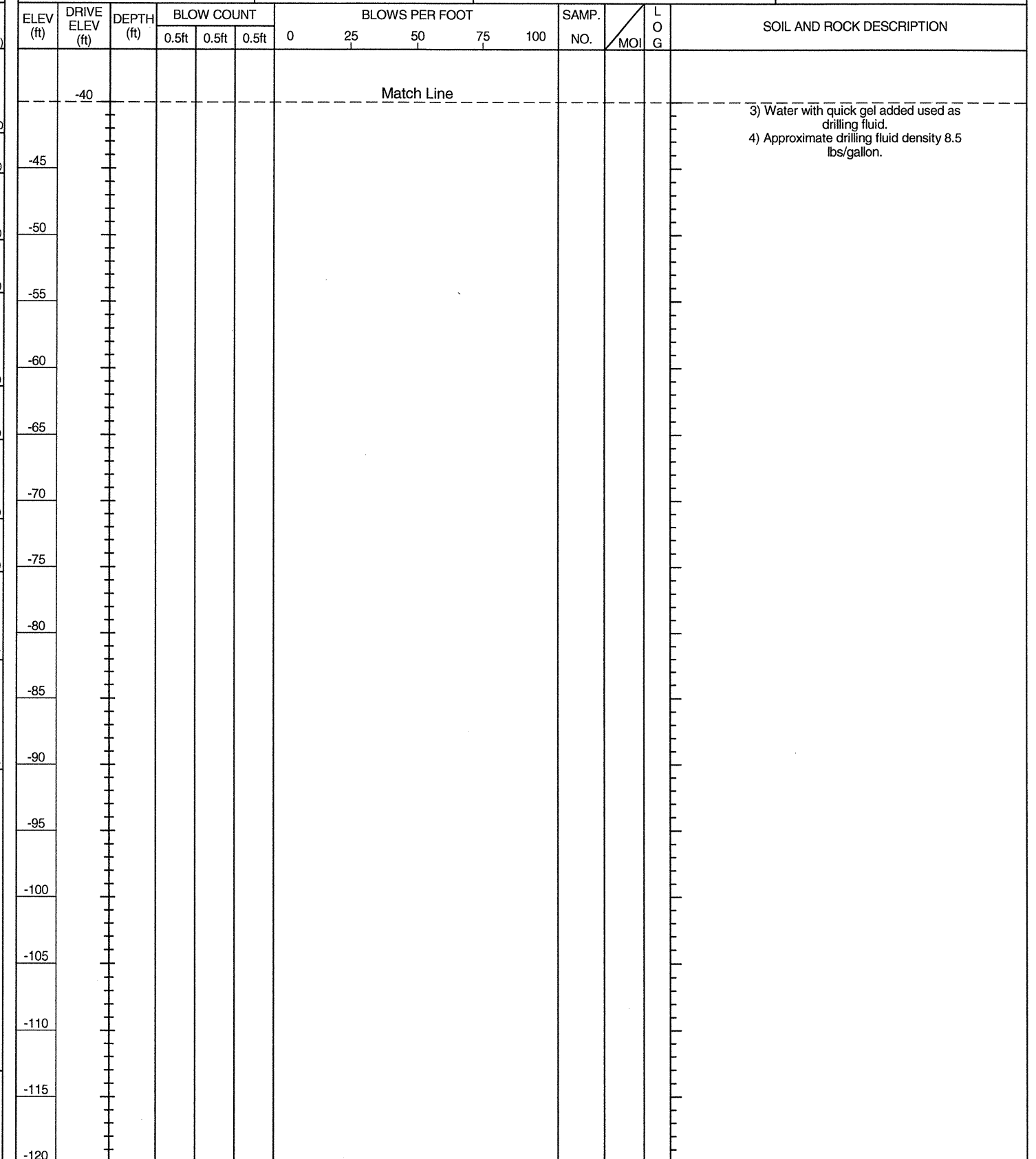
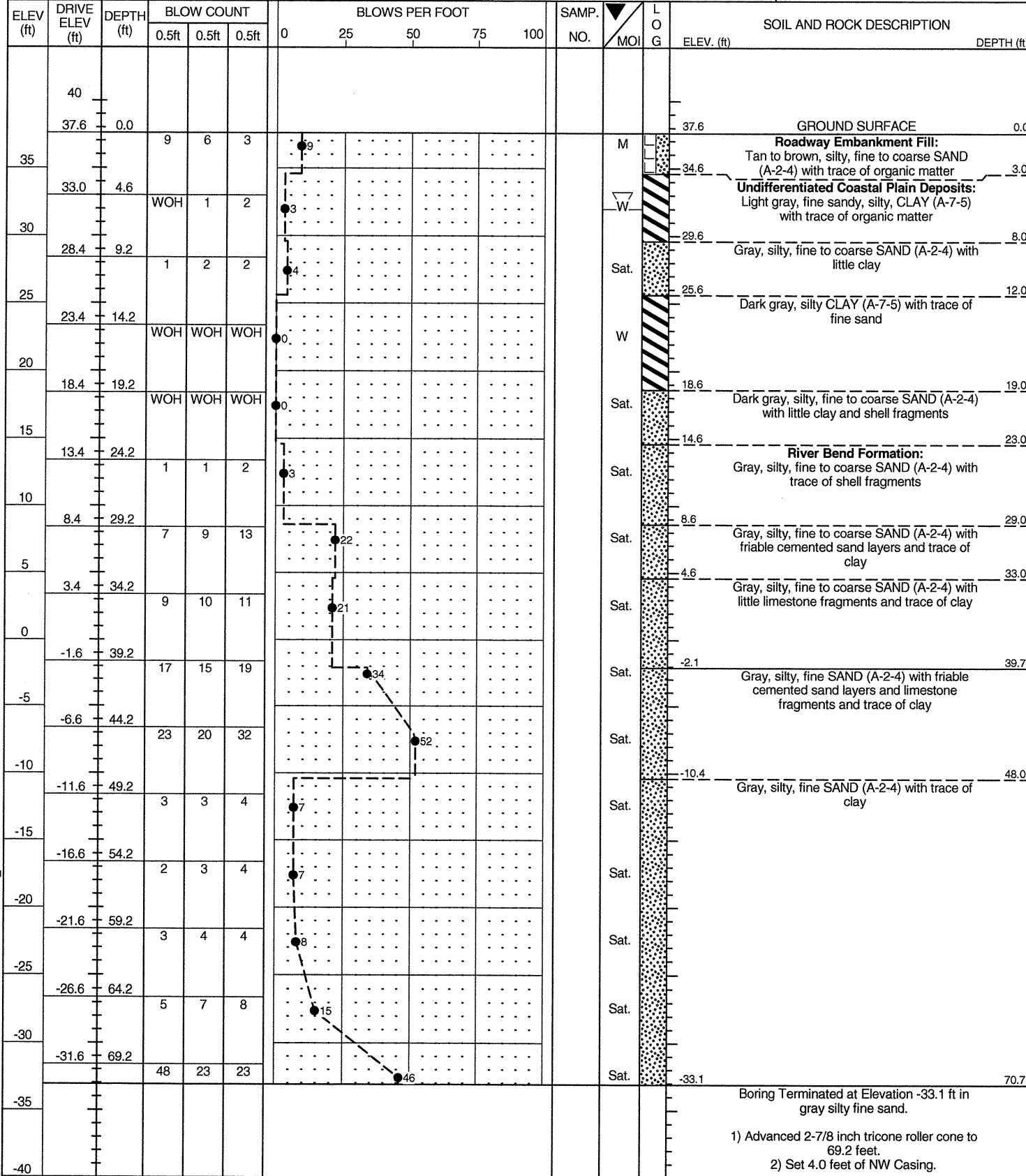


NCDOT BORE DOUBLE BRIDGES 293 AND 294.GPJ NC\_DOT.GDT 7/14/09



PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridges 293 and 294 on Western Parkway over Marine Blvd. (MACTEC Project No. 6468-09-2407)			GROUND WTR (ft)
BORING NO. B1-B SBL	STATION 42+24	OFFSET 9ft RT	ALIGNMENT SBL-RAMP
COLLAR ELEV. 37.6 ft	TOTAL DEPTH 70.7 ft	NORTHING 376,353	EASTING 2,480,942
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/30/09	COMP. DATE 04/30/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridges 293 and 294 on Western Parkway over Marine Blvd. (MACTEC Project No. 6468-09-2407)			GROUND WTR (ft)
BORING NO. B1-B SBL	STATION 42+24	OFFSET 9ft RT	ALIGNMENT SBL-RAMP
COLLAR ELEV. 37.6 ft	TOTAL DEPTH 70.7 ft	NORTHING 376,353	EASTING 2,480,942
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/30/09	COMP. DATE 04/30/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE BRIDGES 293 AND 294.GPJ NC\_DOT.GDT 7/14/09

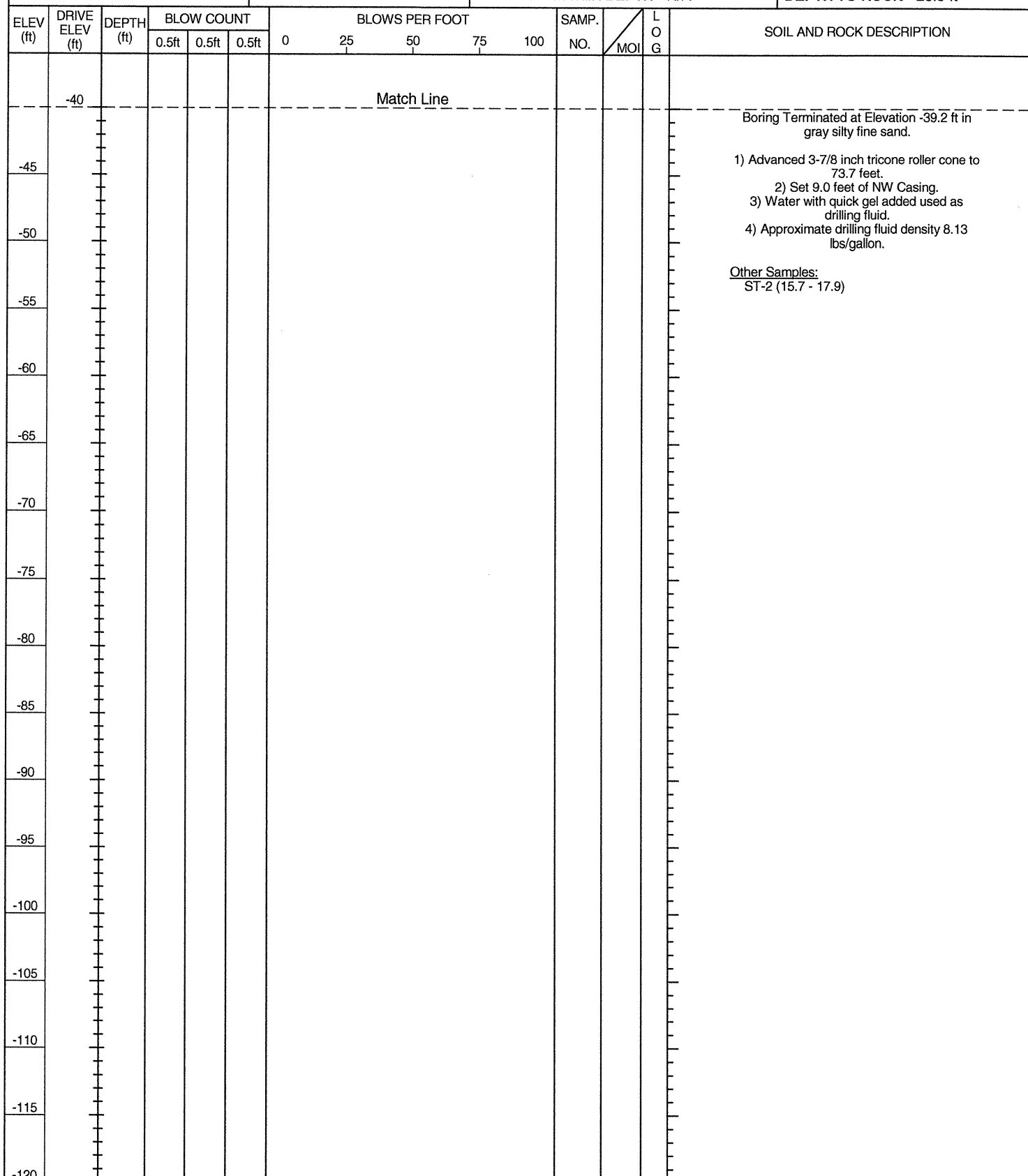
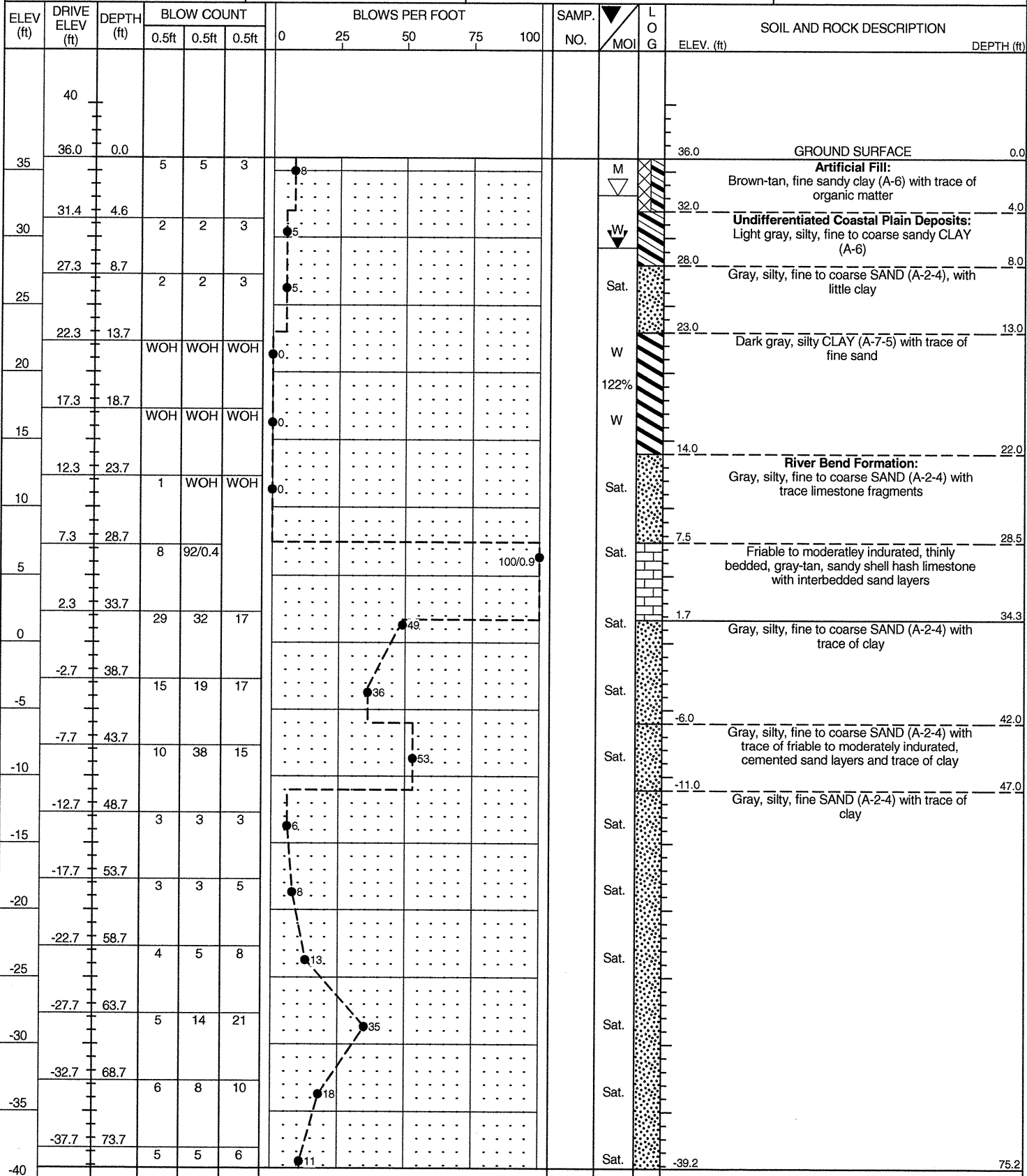


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridges 293 and 294 on Western Parkway over Marine Blvd. (MACTEC Project No. 6468-09-2407)			GROUND WTR (ft)
BORING NO. EB2-A SBL	STATION 42+93	OFFSET 7ft LT	ALIGNMENT SBL-RAMP
COLLAR ELEV. 36.0 ft	TOTAL DEPTH 75.2 ft	NORTHING 376,400	EASTING 2,480,890
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/28/09	COMP. DATE 04/29/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 28.5 ft

PROJECT NO. 35008.1.1	ID. U-4007B	COUNTY Onslow	GEOLOGIST Howard, J.
SITE DESCRIPTION Bridges 293 and 294 on Western Parkway over Marine Blvd. (MACTEC Project No. 6468-09-2407)			GROUND WTR (ft)
BORING NO. EB2-A SBL	STATION 42+93	OFFSET 7ft LT	ALIGNMENT SBL-RAMP
COLLAR ELEV. 36.0 ft	TOTAL DEPTH 75.2 ft	NORTHING 376,400	EASTING 2,480,890
DRILL MACHINE CME-45C	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/28/09	COMP. DATE 04/29/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 28.5 ft



NCDOT BORE DOUBLE BRIDGES 293 AND 294.GPJ NC\_DOT.GDT 7/14/09



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: Bridges 293 & 294 on Western Parkway over Marine Blvd (6468-09-2407)

NCDOT PROJ. NO.: 35008.1.1 (U-4007B)

COUNTY: Onslow

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

DATE SAMPLED: April 2009

RECEIVED: 5/6/2009

REPORTED BY: MACTEC

SAMPLED FROM: EB1-A SBL

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 (%)	2.1	0.0	0.0	0.0	0.0	0.0
Passing No. 10 Sieve (%)	96.4	100.0	99.9	99.5	100.0	100.0
Passing No. 40 Sieve (%)	83.5	93.7	99.0	99.5	99.9	99.9
Passing No. 200 Sieve (%)	17.5	35.2	19.2	17.9	28.7	28.0

**MINUS 2.00mm FRACTION**

SOIL MORTAR - 100%						
Coarse Sand (%)	31.7	14.6	3.5	0.3	0.4	0.5
Fine Sand (%)	49.5	57.7	78.5	84.8	88.0	78.2
Silt (%)	8.2	13.8	11.7	10.6	5.6	15.2
Clay (%)	7.0	13.9	6.3	4.3	6.0	6.1

Moisture Content (%)	ND	ND	ND	ND	ND	ND
Liquid Limit, L.L.	18	19	NV	NV	NV	NV
Plasticity Index, P.I.	1	8	NP	NP	NP	NP
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)
Organic Content (%)	ND	ND	ND	ND	ND	ND

Boring No.	EB1-A SBL	EB1-A SBL	EB1-A SBL	EB1-A SBL	EB1-A SBL	EB1-A SBL	
Station	40+62	40+62	40+62	40+62	40+62	40+62	
Offset	80 LT	80 LT	80 LT	80 LT	80 LT	80 LT	
Alignment	-SBL RAMP-	-SBL RAMP-	-SBL RAMP-	-SBL RAMP-	-SBL RAMP-	-SBL RAMP-	
Depth (FT)	From	0.0	8.2	43.2	48.2	58.2	73.2
	to	1.5	9.7	44.7	49.7	59.7	74.7

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

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

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: Bridges 293 and 294 on Western Parkway over Marine Blvd. (6468-09-2407)

NCDOT PROJ. NO.: 35008.1.1 (U-4007B)

COUNTY: Onslow

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

DATE SAMPLED: April 2009

RECEIVED: 5/6/2009

REPORTED BY: MACTEC

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

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

**TEST RESULTS**

Lab Sample No.	SS-7	ST-2				
Retained No. 4 Sieve (%)	0.0	0.0				
Passing No. 10 Sieve (%)	100.0	100.0				
Passing No. 40 Sieve (%)	100.0	99.7				
Passing No. 200 Sieve (%)	40.5	96.8				

**MINUS 2.00mm FRACTION**

SOIL MORTAR - 100%						
Coarse Sand (%)	0.2	0.6				
Fine Sand (%)	67.0	3.8				
Silt (%)	20.4	53.0				
Clay (%)	12.4	42.6				

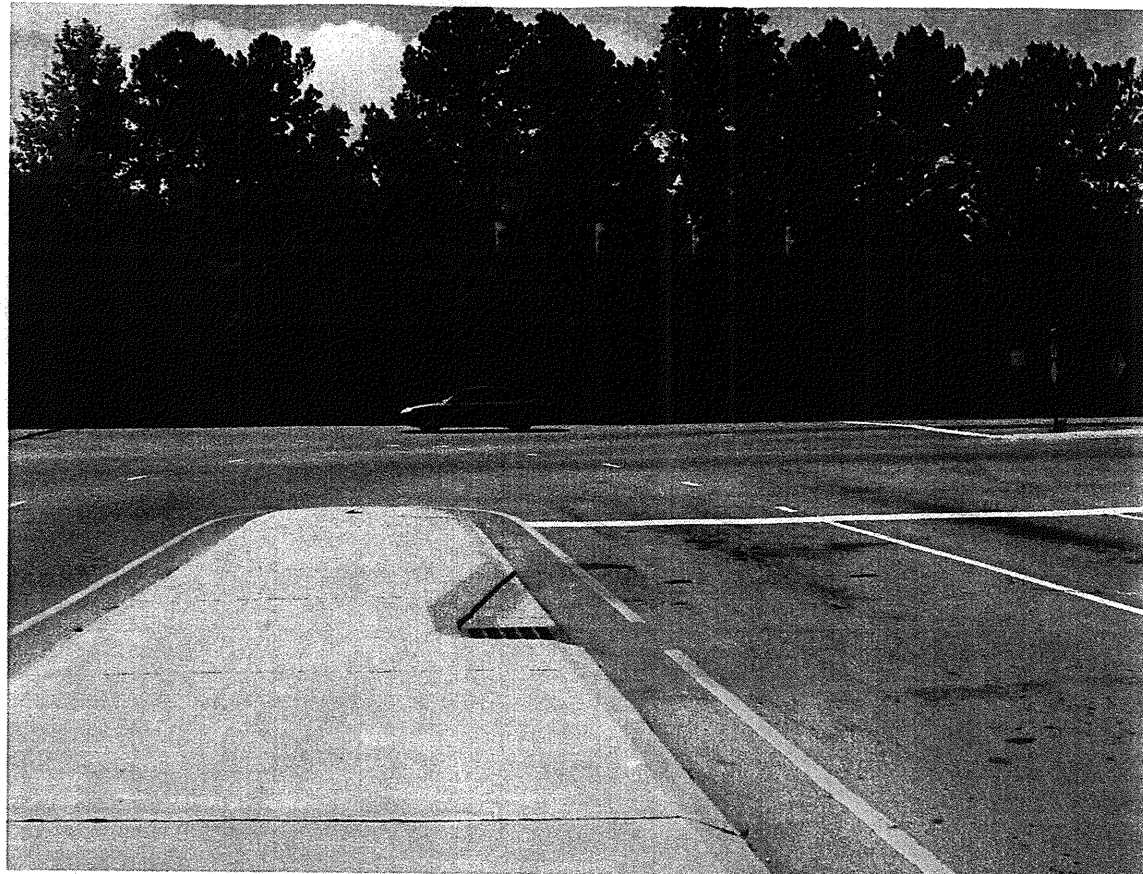
Moisture Content (%)	25.8	122.1				
Liquid Limit, L.L.	19	74				
Plasticity Index, P.I.	1	41				
AASHTO Classification	A-4(0)	A-7-5(48)				
Dry Density (pcf)	ND	37.6				
Pc (ksf)	ND	2.00				
Cc	ND	1.60				

Boring No.	EB1-A SBL	EB2-A SBL				
Station	40+62	42+92				
Offset	80 LT	7 LT				
Alignment	-SBL RAMP-	-SBL RAMP-				
Depth (FT)	From	78.2	15.7			
	to	79.7	17.9			

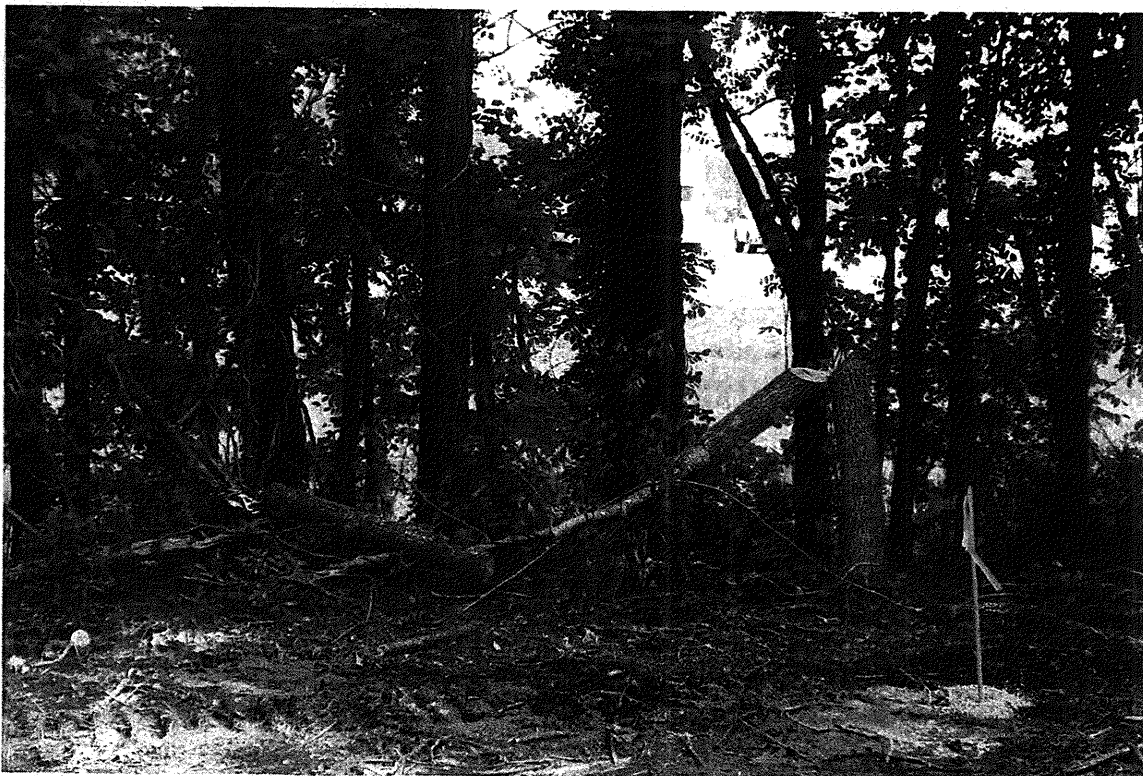
REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

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

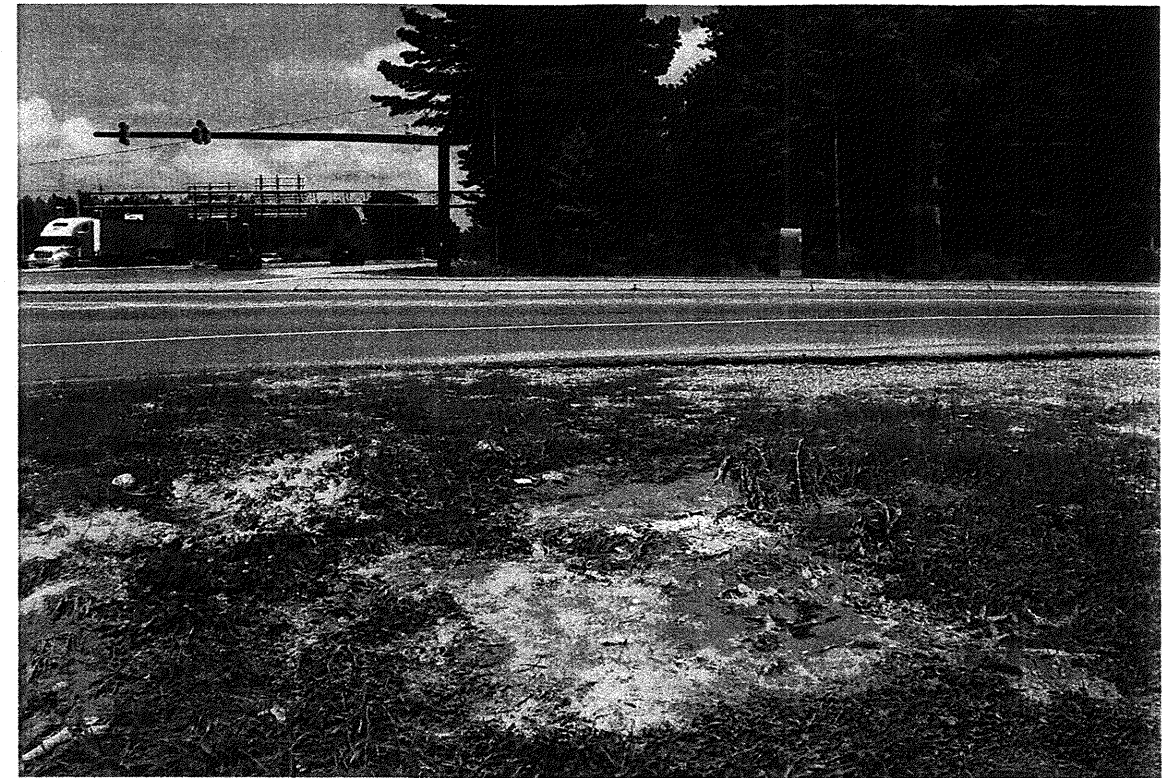
Signature



**View Looking Up Station Along South Bound Lane From End Bent No. 1.**



**View Looking Down Station Along South Bound Lane from End Bent No. 2.**



**View of End Bents No. 1 Looking Left to Right.**



**View of Interior Bents No. 1 Looking Right to Left (Interior Bents No. 1 are Located in Pavement).**





***View of End Bents No. 2 Looking Right to Left.***