

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4238	1	8

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 33581.1.1 (B-4238) F.A. PROJ. BRSTP-171(14)  
COUNTY PITT  
PROJECT DESCRIPTION BRIDGE 219 ON SR 1726 (PORTERTOWN RD)  
OVER HARDEE CREEK AT -L- STATION 20+80.5

**REVISED INVENTORY**

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	BORE LOG REPORT
7	SOIL TEST RESULTS
8	SCOUR REPORT

**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**

J.R. SWARTELY

R.E. SMITH

J. EDMONDSON

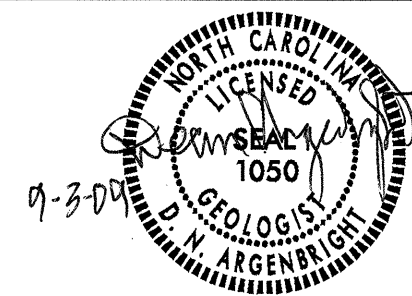
M.M. HAGER

INVESTIGATED BY F.M. WESCOTT III

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE SEPTEMBER 2009



**PROJECT: 33581.1.1 ID: B-4238**

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 IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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

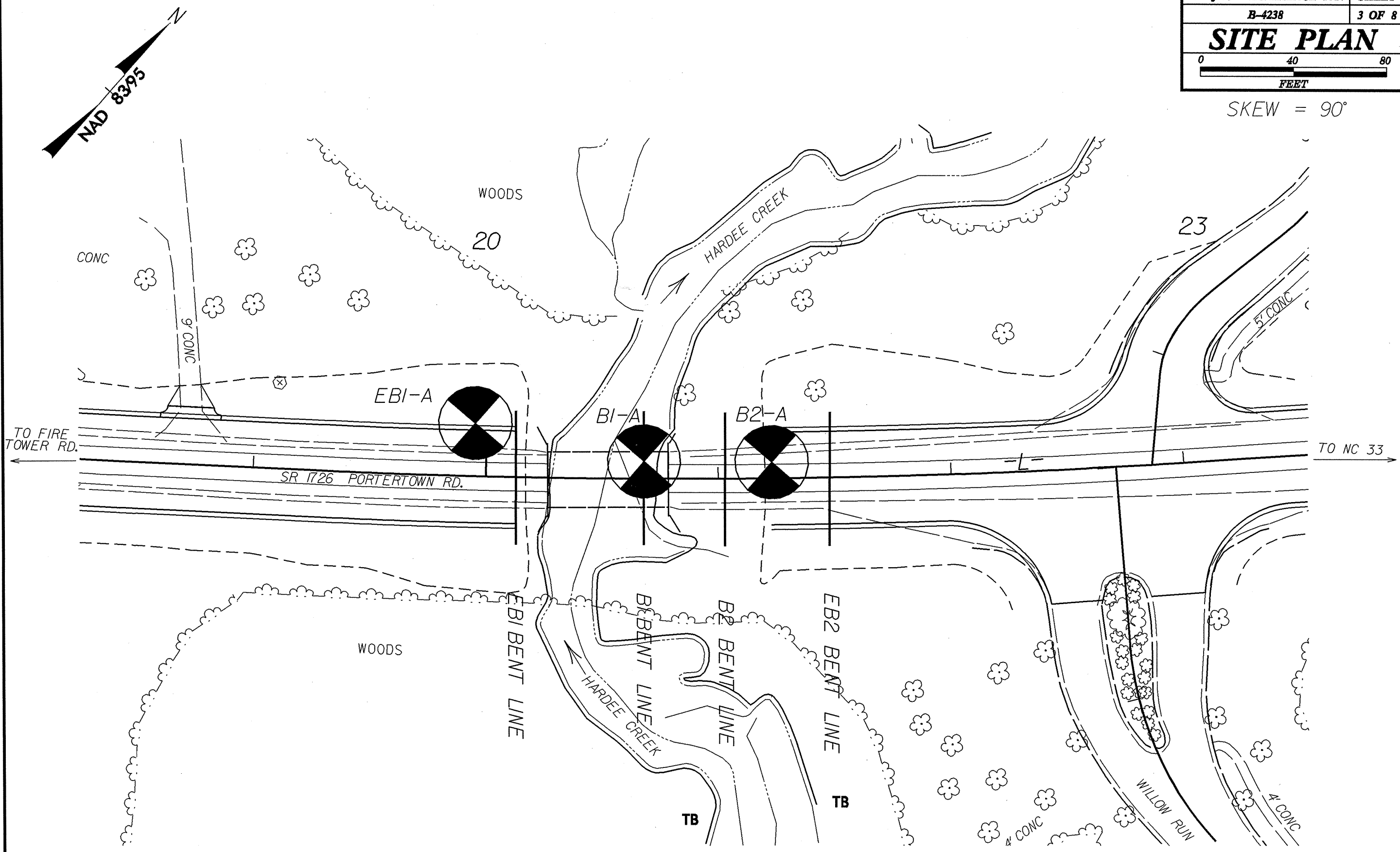
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

<p style="text-align: center;"><b>SOIL DESCRIPTION</b></p> <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 1286, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</p>	<p style="text-align: center;"><b>GRADATION</b></p> <p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE, (ALSO POORLY GRADED) GAP-GRADED - 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: <u>ANGULAR</u>, <u>SUBANGULAR</u>, <u>SUBROUNDED</u>, OR <u>ROUNDED</u>.</p>		<p style="text-align: center;"><b>ROCK DESCRIPTION</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. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> <table border="1" style="width: 100%;"><tr><td style="width: 20%;">WEATHERED ROCK (WR)</td><td style="width: 20%;"></td><td style="width: 60%;">NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</td></tr><tr><td>CRYSTALLINE ROCK (CR)</td><td></td><td>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</td></tr><tr><td>NON-CRYSTALLINE ROCK (NCR)</td><td></td><td>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.</td></tr><tr><td>COASTAL PLAIN SEDIMENTARY ROCK (CP)</td><td></td><td>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</td></tr></table>	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.	<p style="text-align: center;"><b>TERMS AND DEFINITIONS</b></p> <p><b>ALUVIUM (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> - 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 (MOTL)</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 (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. <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 (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. <b>TOPSOIL (TS)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>
WEATHERED ROCK (WR)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.														
CRYSTALLINE ROCK (CR)		FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. 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>SOIL LEGEND AND AASHTO CLASSIFICATION</b>																
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIALS													
GROUP CLASS.	A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-7.5, A-7.6	A-2-1, A-2-2, A-2-3, A-2-4, A-2-5, A-2-6, A-2-7	A-1, A-2, A-3, A-4, A-5, A-6, A-7													
SYMBOL																
% PASSING	50, 30, 20, 15, 10, 5	40, 30, 20, 15, 10, 5	GRANULAR SOILS, SILT-CLAY SOILS, MUCK, PEAT													
LIQUID LIMIT	50, 40, 30, 25	40, 30, 25, 20, 15, 10, 5														
PLASTIC INDEX	6, 4, 3, 2	10, 8, 6, 4, 3, 2	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER, HIGHLY ORGANIC SOILS													
GROUP INDEX	0, 1, 2, 3, 4	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10														
USUAL TYPES	GRAVEL, SAND	CLAYEY SAND, SILTY SAND, SILTY CLAY, CLAYEY SILT, CLAY														
GEN. RATINGS	EXCELLENT TO GOOD	FAIR TO POOR	POOR, UNSUITABLE													
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																
<b>CONSISTENCY OR DENSENESS</b>	PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)													
GENERAL	GENERAL	VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE	< 4, 4 TO 10, 10 TO 30, 30 TO 50, > 50													
SILT-CLAY	GENERAL	VERY SOFT, SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD	< 2, 2 TO 4, 4 TO 8, 8 TO 15, 15 TO 30, > 30													
<b>TEXTURE OR GRAIN SIZE</b>	U.S. STD. SIEVE SIZE	4, 10, 40, 60, 200, 270	OPENING (MM)													
	BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)													
	GRAIN SIZE MM	305, 75	2.0, 0.25, 0.05, 0.005													
	IN.	12, 3														
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>	SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION													
	LL	LIQUID LIMIT	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE													
	W	- SATURATED - (SAT.)														
	P	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE													
	PL	PLASTIC LIMIT														
	DM	OPTIMUM MOISTURE	SOLID; AT OR NEAR OPTIMUM MOISTURE													
	SL	SHRINKAGE LIMIT														
		- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE													
<b>PLASTICITY</b>	PLASTICITY INDEX (PI)	DRY STRENGTH														
	NONPLASTIC	0-5	VERY LOW													
	LOW PLASTICITY	6-15	SLIGHT													
	MED. PLASTICITY	16-25	MEDIUM													
	HIGH PLASTICITY	26 OR MORE	HIGH													
<b>COLOR</b>	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>MINERALOGICAL COMPOSITION</b>	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	<b>COMPRESSIBILITY</b>	SLIGHTLY COMPRESSIBLE, MODERATELY COMPRESSIBLE, HIGHLY COMPRESSIBLE													
<b>PERCENTAGE OF MATERIAL</b>	ORGANIC MATERIAL	SILT - CLAY SOILS	OTHER MATERIAL													
	TRACE OF ORGANIC MATTER	2 - 3%	TRACE 1 - 10%													
	LITTLE ORGANIC MATTER	3 - 5%	LITTLE 10 - 20%													
	MODERATELY ORGANIC	5 - 10%	SOME 20 - 35%													
	HIGHLY ORGANIC	> 10%	HIGHLY 35% AND ABOVE													
<b>GROUND WATER</b>	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	STATIC WATER LEVEL AFTER 24 HOURS	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA													
<b>MISCELLANEOUS SYMBOLS</b>	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT	INFERRED SOIL BOUNDARY													
	INFERRED ROCK LINE	ALLUVIAL SOIL BOUNDARY	DIP & DIP DIRECTION OF ROCK STRUCTURES													
	SOUNDING ROD	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION	TEST BORING													
	SOIL SYMBOL	AUGER BORING	CORE BORING													
	MONITORING WELL	PIEZOMETER INSTALLATION	RECOMPACTED TRIAXIAL SAMPLE													
	SLOPE INDICATOR INSTALLATION	CALIFORNIA BEARING RATIO SAMPLE	SPT N-VALUE													
	SPT REFUSAL	SPT N-VALUE	SPT REFUSAL													
<b>ABBREVIATIONS</b>	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													
	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													
	W - MOISTURE CONTENT	V - VERY	VST - VANE SHEAR TEST													
	WEA. - WEATHERED	WU - UNIT WEIGHT	% - DRY UNIT WEIGHT													
<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:													
	<input type="checkbox"/> MOBILE B-	<input type="checkbox"/> CLAY BITS	<input checked="checked" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL													
	<input type="checkbox"/> BK-51	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:													
	<input type="checkbox"/> CME-45C	<input type="checkbox"/> 6" HOLLOW AUGERS	<input type="checkbox"/> -B-													
	<input type="checkbox"/> CME-550	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -N-													
	<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG.-CARBIDE INSERTS	<input type="checkbox"/> -H-													
	<input checked="checked" type="checkbox"/> CME-45B	<input checked="checked" type="checkbox"/> CASING W/ ADVANCER	HAND TOOLS:													
		<input checked="checked" type="checkbox"/> TRICONE 2 IS/16" STEEL TEETH	<input type="checkbox"/> POST HOLE DIGGER													
		<input type="checkbox"/> TRICONE - TUNG.-CARB.	<input type="checkbox"/> HAND AUGER													
		<input type="checkbox"/> CORE BIT	<input type="checkbox"/> SOUNDING ROD													
			<input type="checkbox"/> VANE SHEAR TEST													
<b>FRACTURE SPACING</b>	TERM	SPACING	BEDDING													
	VERY WIDE	MORE THAN 10 FEET	TERM													
	WIDE	3 TO 10 FEET	THICKNESS													
	MODERATELY CLOSE	1 TO 3 FEET	> 4 FEET													
	CLOSE	0.16 TO 1 FEET	1.5 - 4 FEET													
	VERY CLOSE	LESS THAN 0.16 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													
<b>INDURATION</b>	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.													
<b>BENCH MARK: BL-3</b>	-L- STATION 19+97.54 34' LT	ELEVATION: 23.87 FT.														
<b>NOTES:</b>																

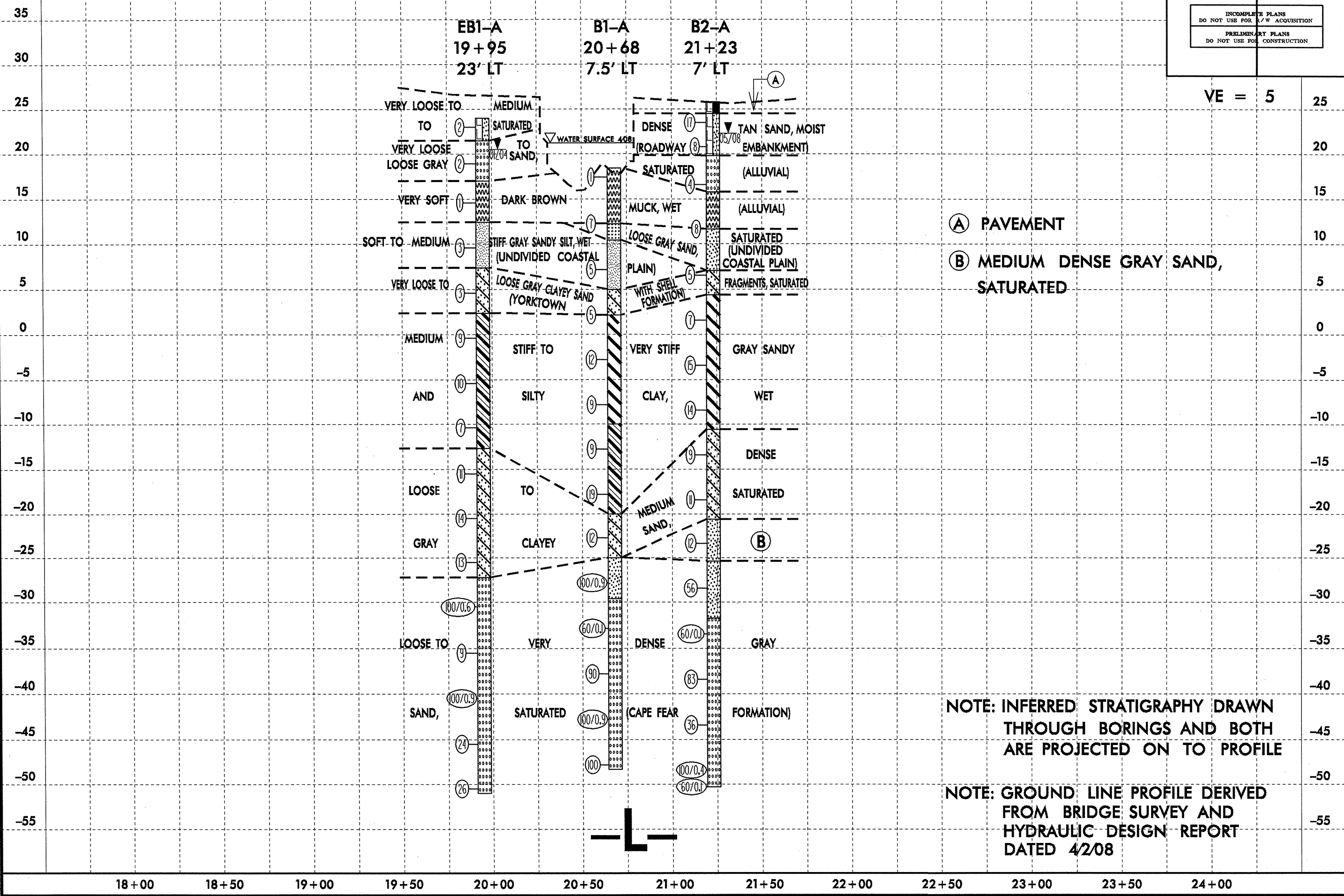
SKEW = 90°



5/14/99  
 03-SEP-2009 08:56  
 I:\proj\green\action\tp\b4238-geo\_brg0219\cadd\geotech\site\sub\B4238\_GEO\_BRDG\_pf1.dgn

# PROFILE THROUGH BORINGS PROJECTED ALONG -L-

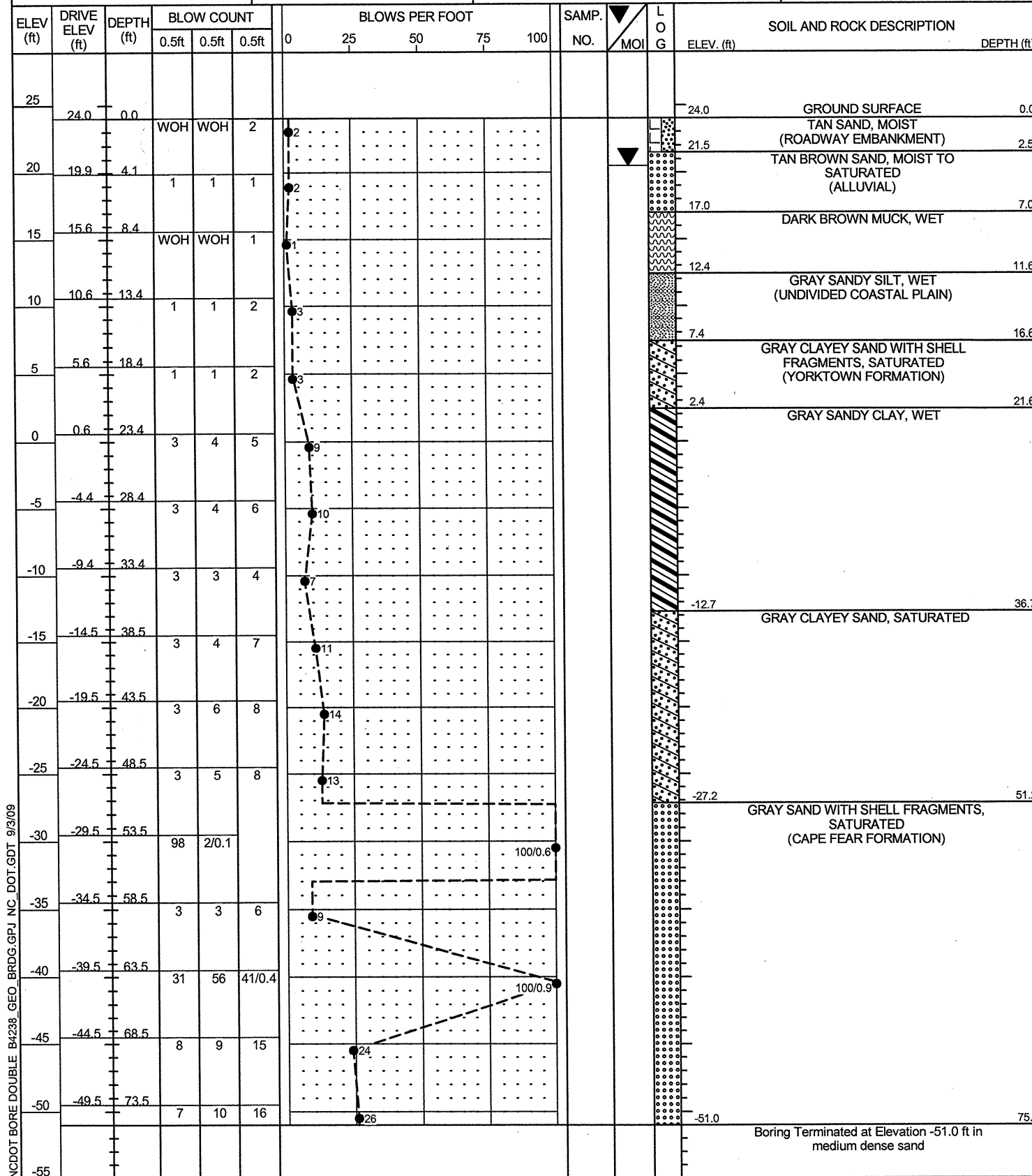
PROJECT REFERENCE NO. B-4238	SHEET NO. 4 OF 8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 80%;">           INCOMPLETE PLANS            DO NOT USE FOR A/W ACQUISITION         </div> <div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 80%;">           PRELIMINARY PLANS            DO NOT USE FOR CONSTRUCTION         </div>	



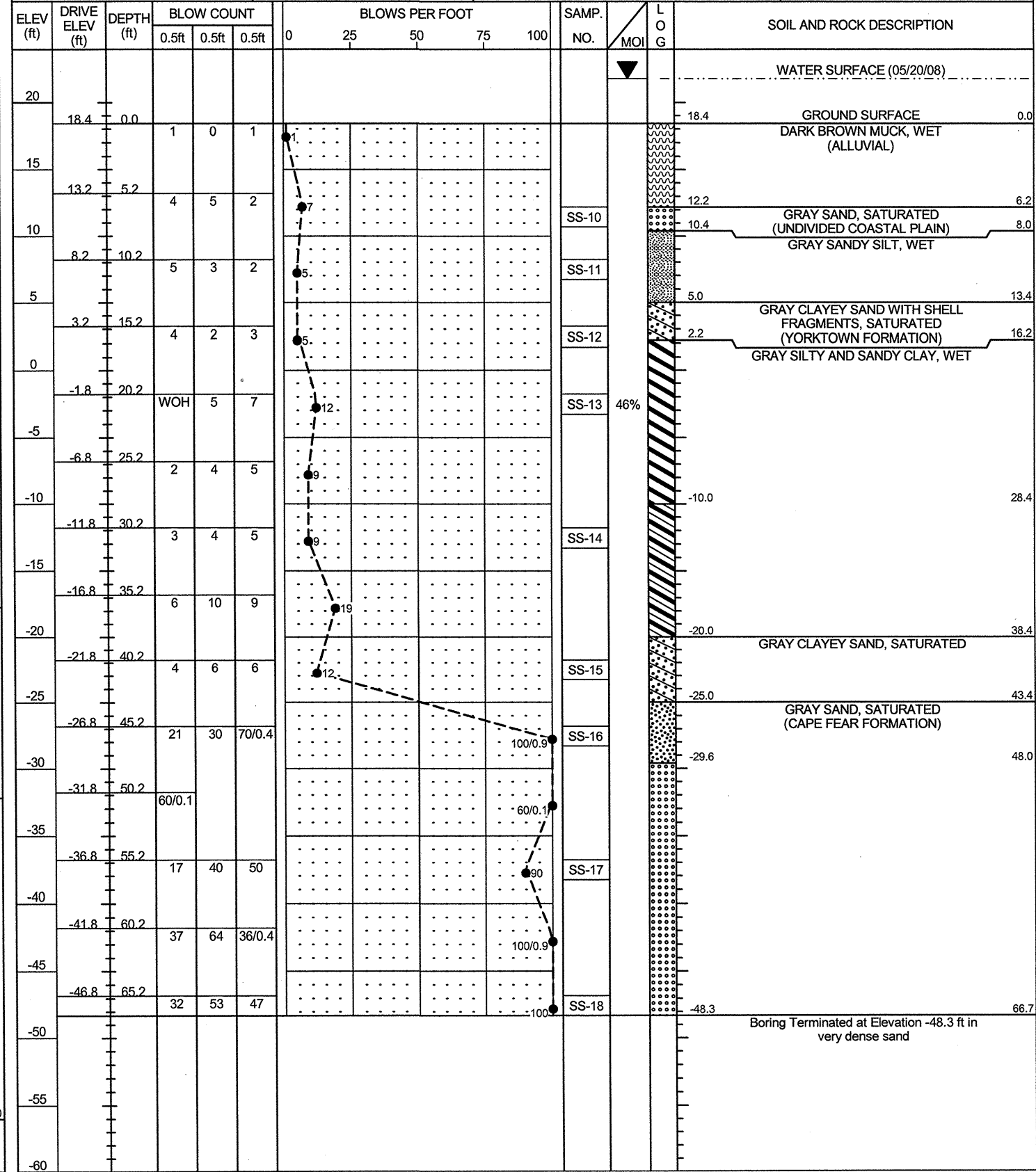
18+00    18+50    19+00    19+50    20+00    20+50    21+00    21+50    22+00    22+50    23+00    23+50    24+00

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 33581.1.1	ID. B-4238	COUNTY PITT	GEOLOGIST Hager, M. M.
SITE DESCRIPTION BRIDGE NO. 219 ON SR 1726 (PORTERTOWN RD.) OVER HARDEE CREEK			GROUND WTR (ft)
BOHRING NO. EB1-A	STATION 19+95	OFFSET 23ft LT	ALIGNMENT -L-
COLLAR ELEV. 24.0 ft	TOTAL DEPTH 75.0 ft	NORTHING 668,905	EASTING 2,498,429
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 01/23/04	COMP. DATE 01/23/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 33581.1.1	ID. B-4238	COUNTY PITT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 219 ON SR 1726 (PORTERTOWN RD.) OVER HARDEE CREEK			GROUND WTR (ft)
BOHRING NO. B1-A	STATION 20+68	OFFSET 8ft LT	ALIGNMENT -L-
COLLAR ELEV. 18.4 ft	TOTAL DEPTH 66.7 ft	NORTHING 668,940	EASTING 2,498,495
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 05/20/08	COMP. DATE 05/20/08	SURFACE WATER DEPTH 3.4ft	DEPTH TO ROCK N/A

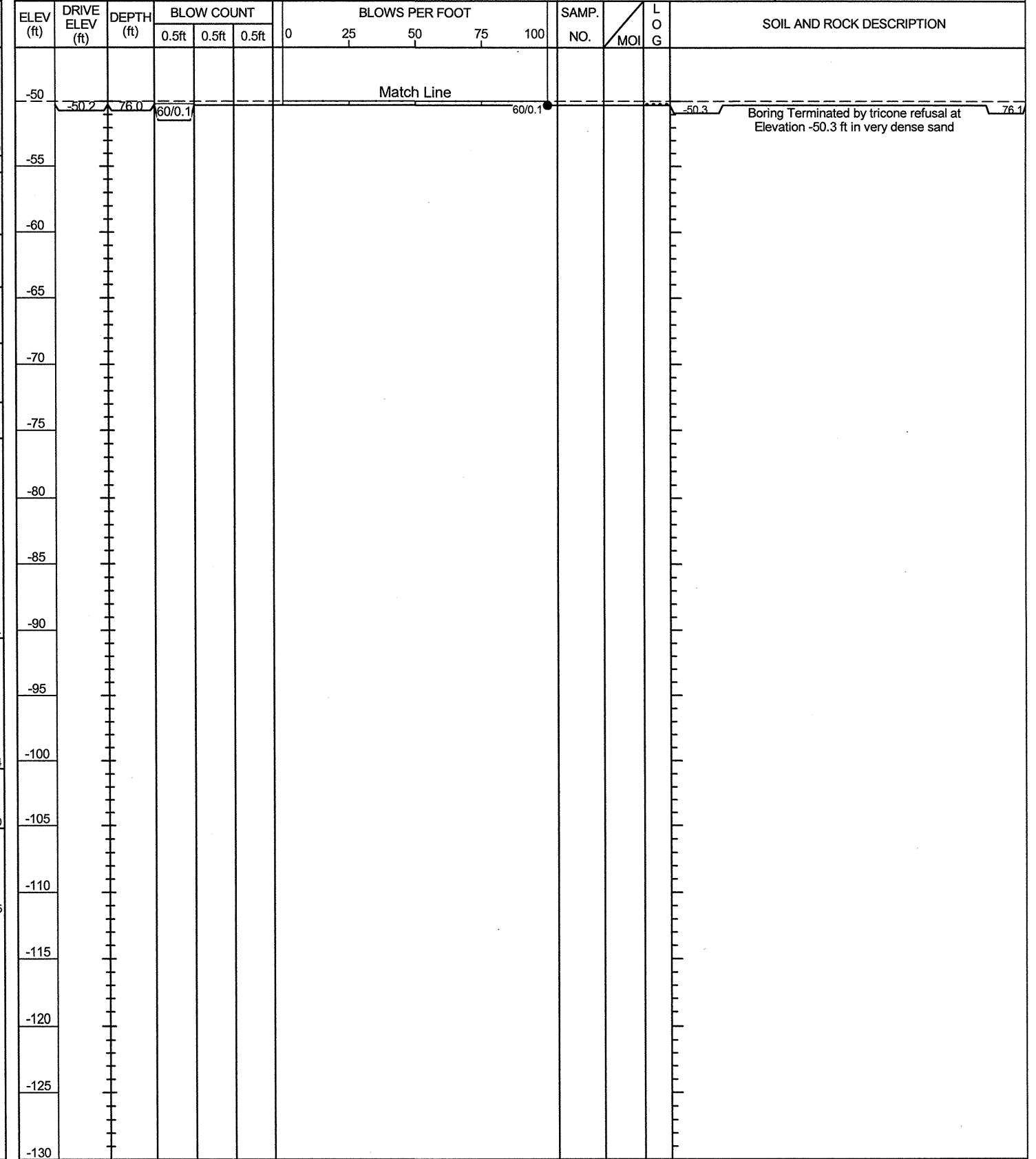
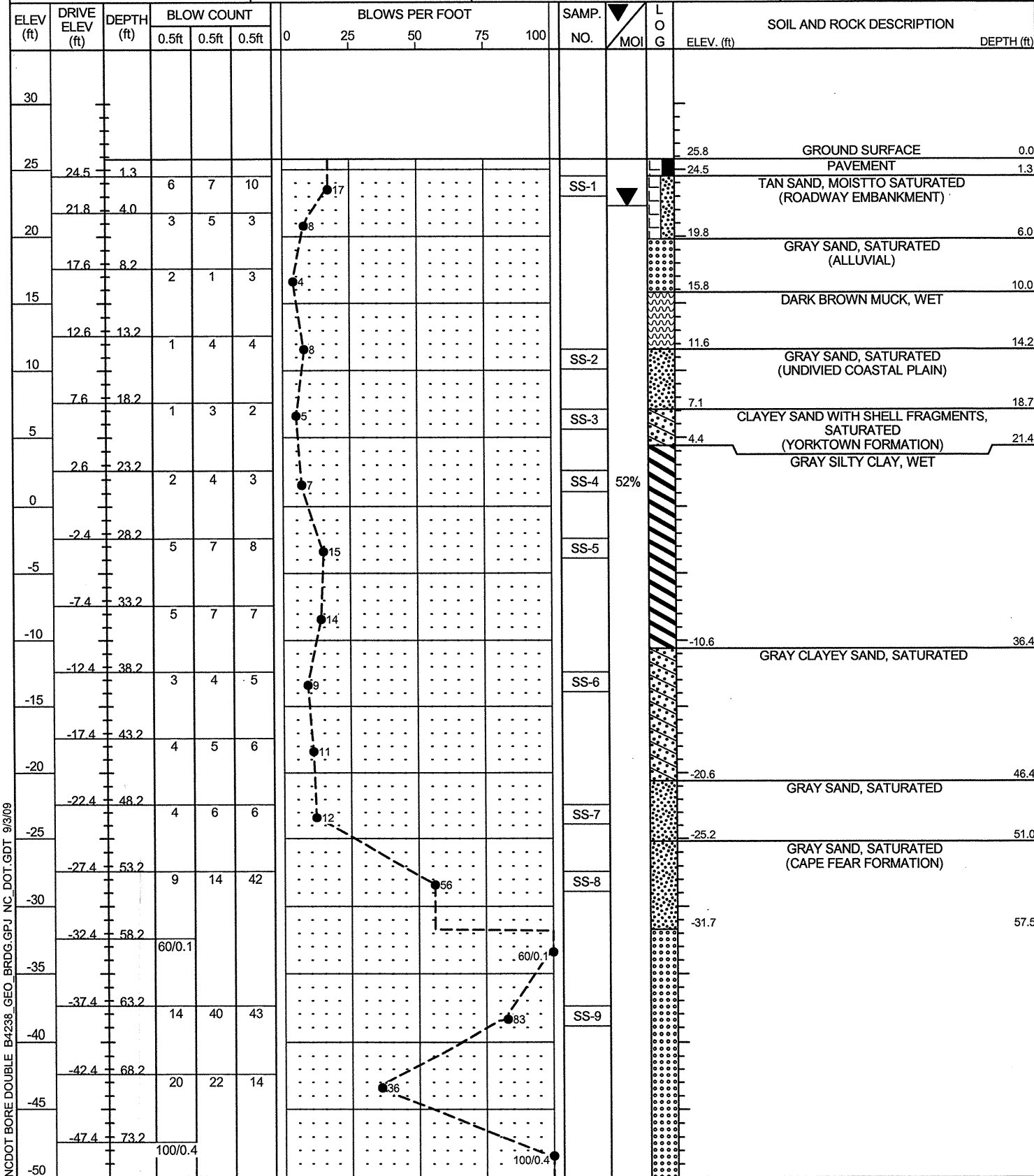


NCDOT BORE DOUBLE B4238\_GEO\_BRDG.GPJ\_NC\_DOT.GDT 9/3/09

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 33581.1.1	ID. B-4238	COUNTY PITT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 219 ON SR 1726 (PORTERTOWN RD.) OVER HARDEE CREEK			GROUND WTR (ft)
BORING NO. B2-A	STATION 21+23	OFFSET 7ft LT	ALIGNMENT -L-
COLLAR ELEV. 25.8 ft	TOTAL DEPTH 76.1 ft	NORTHING 668,976	EASTING 2,498,536
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 05/18/08	COMP. DATE 05/19/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33581.1.1	ID. B-4238	COUNTY PITT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 219 ON SR 1726 (PORTERTOWN RD.) OVER HARDEE CREEK			GROUND WTR (ft)
BORING NO. B2-A	STATION 21+23	OFFSET 7ft LT	ALIGNMENT -L-
COLLAR ELEV. 25.8 ft	TOTAL DEPTH 76.1 ft	NORTHING 668,976	EASTING 2,498,536
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 05/18/08	COMP. DATE 05/19/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B4238\_GEO\_BRDG.GPJ NC\_DOT\_GDT\_9/3/08

**B-4238**  
**Bridge No. 219 on SR 1726 over Hardee Creek**

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
<b>B2-A</b>	SS-1	100	96	18	4.4	80.5	8.1	7.1	18	NP	A-2-4(0)	1.3-2.8		
	SS-2	100	98	5	25.3	70.4	4.3	0.0	23	NP	A-3(0)	14.2-14.7		
	SS-3	89	52	22	66.1	10.2	7.5	16.2	35	14	A-2-6(0)	18.7-19.7		
	SS-4	100	98	93	3.8	5.1	28.3	62.8	88	60	A-7-6(65)	23.2-24.7	52.0	
	SS-5	100	99	57	0.8	51.8	19.0	28.3	43	23	A-7-6(10)	28.2-29.7		
	SS-6	100	98	35	21.1	46.0	10.7	22.3	35	17	A-2-6(1)	38.2-39.7		
	SS-7	100	96	30	17.2	56.3	10.3	16.2	27	5	A-2-4(0)	48.2-49.7		
	SS-8	98	87	22	22.9	57.7	9.3	10.1	23	NP	A-2-4(0)	53.2-54.7		
	SS-9	100	91	9	21.3	70.5	3.1	5.1	19	NP	A-3(0)	63.2-64.7		
<b>B1-A</b>	SS-10	100	84	3	49.0	49.0	2	0.0	23	NP	A-3(0)	6.2-6.7		
	SS-11	98	80	38	33.6	33.4	22.9	10.1	27	9	A-4(0)	10.2-11.7		
	SS-12	79	52	23	57.4	15.0	8.4	19.2	29	14	A-2-6(0)	15.2-16.2		
	SS-13	100	100	63	0.6	47.8	25.3	26.3	48	24	A-7-6(13)	20.2-21.7	46.3	
	SS-14	100	97	37	24.3	41.9	11.5	22.3	37	19	A-6(2)	30.2-31.7		
	SS-15	99	95	34	17.2	52.2	10.3	20.2	29	11	A-2-6(0)	40.2-41.7		
	SS-16	99	84	26	26.7	50.4	10.7	12.1	23	NP	A-2-4(0)	45.2-46.6		
	SS-17	100	92	10	11.3	79.9	4.8	4.0	16	NP	A-3(0)	55.2-56.7		
	SS-18	100	79	9	51.2	41.2	4.6	3.0	16	NP	A-3(0)	65.2-66.7		



# FIELD SCOUR REPORT

WBS: 33581.1.1 TIP: B-4238 COUNTY: Pitt

DESCRIPTION(1): Bridge No. 219 on SR 1726 over Hardee Creek

### EXISTING BRIDGE

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

Bridge No.: 219 Length: 53' Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2  
 Foundation Type: Timber piles

#### EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None noted

Interior Bents: None noted

Channel Bed: None noted

Channel Bank: None noted

#### EXISTING SCOUR PROTECTION

Type(3): Wooden end walls, rip rap at End Bent 1 and End Bent 2

Extent(4): 8-12' outside edge of bridge at End Bent 1 and End Bent 2

Effectiveness(5): Appears satisfactory

Obstructions(6): None noted

#### INSTRUCTIONS

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

### DESIGN INFORMATION

Channel Bed Material(7): Muck

Channel Bank Material(8): Sand and muck

Channel Bank Cover(9): Grasses and shrubs

Floodplain Width(10): 200+/- feet

Floodplain Cover(11): Trees and shrubs

Stream is(12): Aggrading \_\_\_\_\_ Degrading \_\_\_\_\_ Static

Channel Migration Tendency(13): Very low, toward End Bent 1

Observations and Other Comments: No flow at time of investigation

#### DESIGN SCOUR ELEVATIONS(14)

Feet  Meters \_\_\_\_\_

#### BENTS

B1	B2									
7.0	14.5									

Comparison of DSE to Hydraulics Unit theoretical scour:  
 Geotechnical analysis indicates the Design Scour Elevation to be 7.0 feet at Bent 1 and 14.5 feet at Bent 2.  
 The elevation at Bent 1 is 1.2 feet higher than the theoretical scour calculated by the Hydraulics Unit.

#### SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank										
Sample No.										
Retained #4										
Passed #10										
Passed #40										
Passed #200										
Coarse Sand										
Fine Sand										
Silt										
Clay										
LL										
PI										
AASHTO										
Station										
Offset										
Depth										

See Sheet 7,  
 "Soil Test Results",  
 for samples:  
 Channel bed No sample  
 Channel bank No sample

Reported by: Dean N. Argenbright  
 Dean N. Argenbright

Date: 6/19/2008