

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 33809.1.1 (B-4641) F.A. PROJ. _____
COUNTY SCOTLAND
PROJECT DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL
CREEK ON US 74 BUS.

SITE DESCRIPTION _____

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.

ID: B-4641

PROJECT: 33809.1.1

PERSONNEL

R.W. TODD

M.L. SMITH

A.C. SMITH

C.L. SMITH

C.C. MURRAY

J.E. ESTEP

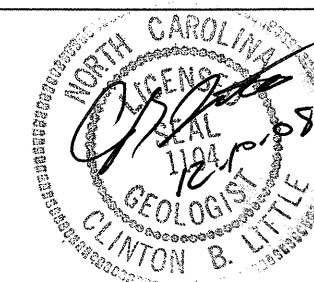
L.N. HARPER

INVESTIGATED BY **J.P. ROGERS**

CHECKED BY **C.B. LITTLE**

SUBMITTED BY **C.B. LITTLE**

DATE **NOVEMBER 2008**



DRAWN BY: **J.K. McClURE**

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

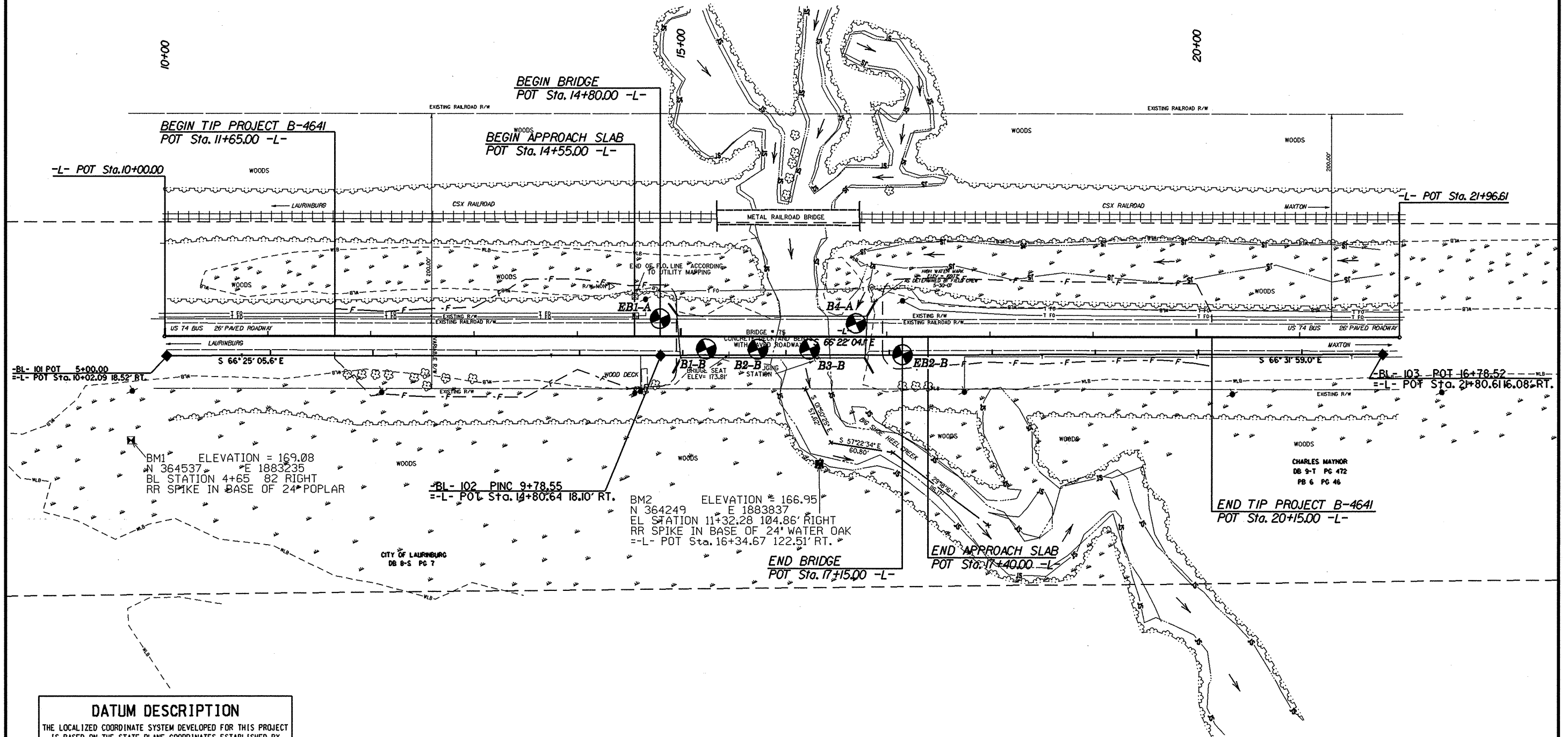
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. 33809.11 (B-4641) SHEET NO. 2

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. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS, IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) 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 SURFACE 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, CRYSTALLINE 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, YIELDS SPT N VALUES > 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 < 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.		COMPRESSIONIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 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 FRESH ROCK FRESH, CRYSTALLINE 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, YIELDS SPT N VALUES > 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 < 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.			
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		GROUP CLASS. A-1, A-2, A-3, A-4, A-5, A-6, A-7		GROUP CLASS. A-1, A-2, A-3, A-4, A-5, A-6, A-7							
SYMBOL		SYMBOL		SYMBOL							
% PASSING #10 #40 #200		SYMBOL		SYMBOL							
LIQUID LIMIT PLASTIC INDEX		SYMBOL		SYMBOL							
GROUP INDEX		SYMBOL		SYMBOL							
USUAL TYPES OF MAJOR MATERIALS		SYMBOL		SYMBOL							
GENERATING AS A SUBGRADE		SYMBOL		SYMBOL							
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		SYMBOL		SYMBOL							
CONSISTENCY OR DENSENESS		GROUND WATER		MISCELLANEOUS SYMBOLS							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		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 TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL					
GENERALY GRANULAR MATERIAL (NON-COHESIVE)											
GENERALY SILT-CLAY MATERIAL (COHESIVE)											
TEXTURE OR GRAIN SIZE		ABBREVIATIONS									
U.S. STD. SIEVE SIZE OPENING (MM)		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		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 γ - UNIT WEIGHT γ _d - DRY UNIT WEIGHT					
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F, SD.) SILT (SL.) CLAY (CL.)		GRAIN SIZE									
GRAIN SIZE											
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING		BEDDING					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST		HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H		TERM SPACING THICKNESS VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET					
LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE STEEL TEETH TRICONE 2 1/16" TUNG-CARB. CORE BIT				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.					
PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH		COLOR									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.											
				BENCH MARK: BL-102 STA. 14+82 -L- 18.00 RT. ELEVATION: 176.46 FT.		NOTES:					



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "BUTLER"

WITH NAD 83 STATE PLANE GRID COORDINATES OF
 NORTHING: 365844.481(ft) EASTING: 1879714.961(ft)
 THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99990718

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "BUTLER" TO -L- STATION IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
 VERTICAL DATUM USED IS NGVD 29

BM1 ELEVATION = 169.08
 N 364537 E 1883235
 BL STATION 4+65 82 RIGHT
 RR SPIKE IN BASE OF 24" POPLAR

BL-102 PINC 9+78.55
 =-L- POT Sta. 14+80.64 18.10' RT.

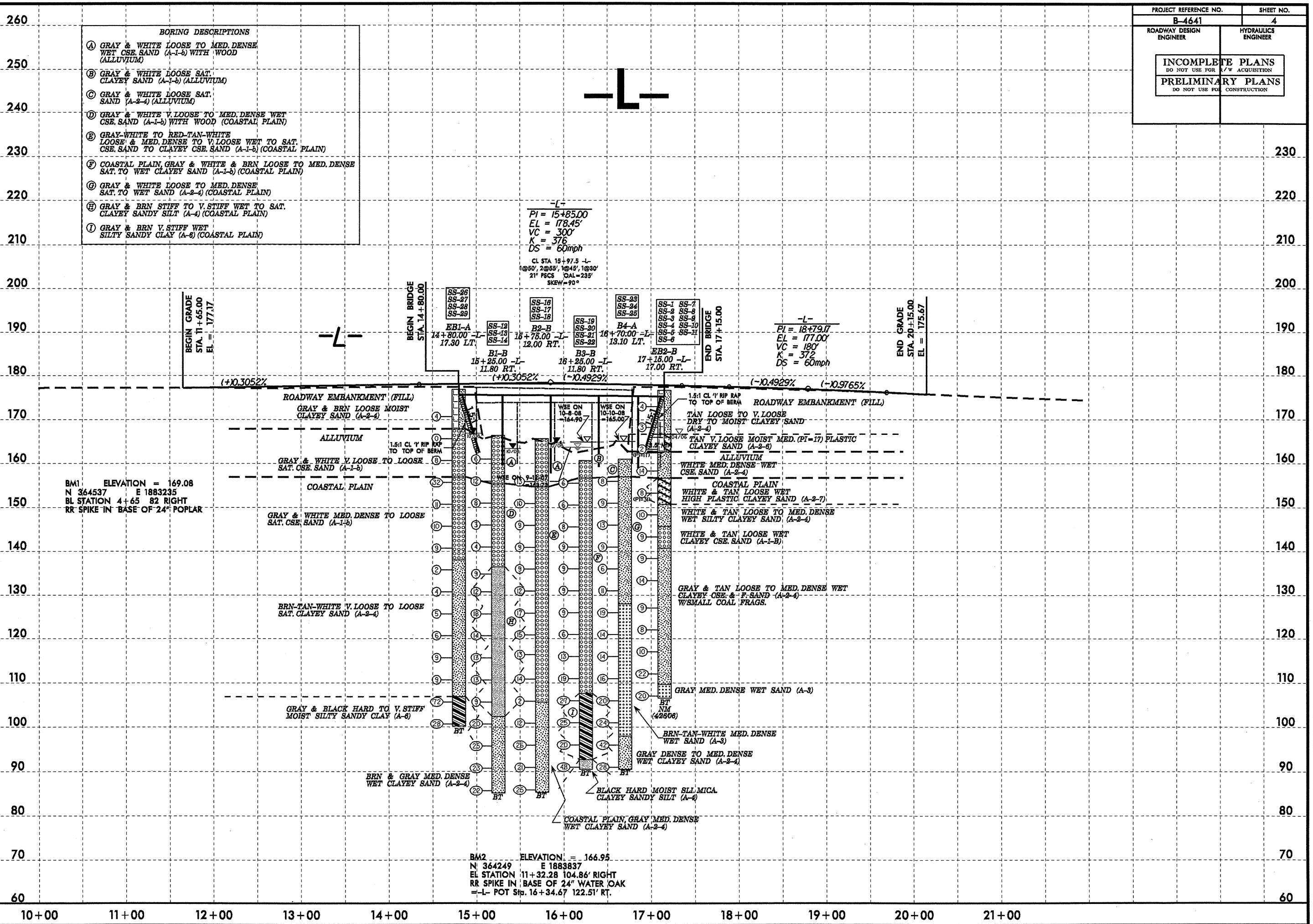
BM2 ELEVATION = 166.95
 N 364249 E 1883837
 EL STATION 11+32.28 104.86' RIGHT
 RR SPIKE IN BASE OF 24" WATER OAK
 =-L- POT Sta. 16+34.67 122.51' RT.

CHARLES MAYNOR
 DB 9-T PG 472
 PB 6 PG 46

END TIP PROJECT B-4641
 POT Sta. 20+15.00 -L-

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 5/14/99

PROJECT REFERENCE NO. B-4641	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



PROJECT NO. 33809.1.1		ID. B-4641		COUNTY SCOTLAND		GEOLOGIST Todd, R. W.										
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 14+80		OFFSET 17ft LT		ALIGNMENT -L-										
COLLAR ELEV. 176.9 ft		TOTAL DEPTH 76.7 ft		NORTHING 364,439		EASTING 1,883,752										
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic											
START DATE 10/13/08		COMP. DATE 10/13/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
180																
															176.9	0.0
175																
	171.7	5.2	2	2	2											
170																
	166.7	10.2	1	0	0											
165																
	161.7	15.2	3	4	4											
160																
	156.7	20.2	4	19	13											
155																
	151.7	25.2	3	5	6											
150																
	146.7	30.2	2	4	6											
145																
	141.7	35.2	3	4	5											
140																
	136.7	40.2	1	1	1											
135																
	131.7	45.2	1	2	2											
130																
	126.7	50.2	3	2	3											
125																
	121.7	55.2	2	3	3											
120																
	116.7	60.2	5	2	7											
115																
	111.7	65.2	3	3	6											
110																
	106.7	70.2	7	20	52											
105																
	101.7	75.2	10	16	12											
100															100.2	76.7

NCDOT BORE SINGLE B4641_GEO_BH_BRDGG0075_SCOTLAND.GPJ NC_DOT.GDT 11/18/08

PROJECT NO. 33809.1.1		ID. B-4641		COUNTY SCOTLAND		GEOLOGIST Todd, R. W.										
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 14+80		OFFSET 17ft LT		ALIGNMENT -L-										
COLLAR ELEV. 176.9 ft		TOTAL DEPTH 76.7 ft		NORTHING 364,439		EASTING 1,883,752										
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic											
START DATE 10/13/08		COMP. DATE 10/13/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
100																
95																
90																
85																
80																
75																
70																
65																
60																
55																
50																
45																
40																
35																
30																
25																
20																

NCDOT BORE SINGLE B4641_GEO_BH_BRDGG0075_SCOTLAND.GPJ NC_DOT.GDT 11/18/08

Match Line

Boring Terminated at Elevation 100.2 ft
GRAY & BLACK HARD MOIST SILTY SANDY CLAY (A-6)

PROJECT NO. 33809.1.1		ID. B-4641		COUNTY SCOTLAND		GEOLOGIST Todd, R. W.									
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.						GROUND WTR (ft)									
BORING NO. B1-B		STATION 15+25		OFFSET 12ft RT		ALIGNMENT -L-									
COLLAR ELEV. 166.4 ft		TOTAL DEPTH 81.2 ft		NORTHING 364,394		EASTING 1,883,781									
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
START DATE 10/06/08		COMP. DATE 10/06/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
170															
165														166.4	0.0
160	162.0	4.4	3	3	3							SS-12	W	ALLUVIAL GRAY & WHITE LOOSE TO MED. DENSE WET CSE. SAND (A-1-b) WITH WOOD	
155	157.0	9.4	2	5	7								W		
150	152.0	14.4	2	4	4								W	COASTAL PLAIN GRAY & WHITE V. LOOSE TO MED. DENSE WET CSE. SAND (A-1-b) WITH WOOD	
145	147.0	19.4	1	2	1								W		
140	142.0	24.4	2	2	2								W		
135	135.8	30.6	3	3	6							SS-13	W	COASTAL PLAIN GRAY & BRN STIFF TO V. STIFF WET TO SAT. CLAYEY SANDY SILT (A-4)	30.0
130	131.7	34.7	5	5	7								W		
125	126.7	39.7	7	7	11								Sat.		
120	121.7	44.7	4	7	7								Sat.		
115	116.7	49.7	3	5	8								Sat.		
110	111.7	54.7	3	5	8								W		
105	106.7	59.7	2	4	5								W		
100	101.7	64.7	8	10	10							SS-14	W	COASTAL PLAIN BRN & GRAY MED. DENSE WET CLAYEY SAND (A-2-4)	64.0
95	96.7	69.7	6	11	14								W		
90	91.7	74.7	7	11	12								W		

NCDOT BORE SINGLE B4641_GEO_BH_BRD0075_SCOTLAND.GPJ_NC_DOT_GDT_11/18/08

PROJECT NO. 33809.1.1		ID. B-4641		COUNTY SCOTLAND		GEOLOGIST Todd, R. W.									
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.						GROUND WTR (ft)									
BORING NO. B1-B		STATION 15+25		OFFSET 12ft RT		ALIGNMENT -L-									
COLLAR ELEV. 166.4 ft		TOTAL DEPTH 81.2 ft		NORTHING 364,394		EASTING 1,883,781									
DRILL MACHINE CME-550X		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
START DATE 10/06/08		COMP. DATE 10/06/08		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
90															
85	86.7	79.7	8	10	12								W	COASTAL PLAIN BRN & GRAY MED. DENSE WET CLAYEY SAND (A-2-4) (continued)	81.2
80														Boring Terminated at Elevation 85.2 ft BRN & GRAY MED. DENSE WET CLAYEY SAND (A-2-4)	
75															
70															
65															
60															
55															
50															
45															
40															
35															
30															
25															
20															
15															
10															

NCDOT BORE SINGLE B4641_GEO_BH_BRD0075_SCOTLAND.GPJ_NC_DOT_GDT_11/18/08

PROJECT NO. 33809.1.1	ID. B-4641	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.			GROUND WTR (ft)
BORING NO. B2-B	STATION 15+75	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 165.7 ft	TOTAL DEPTH 80.3 ft	NORTHING 364,374	EASTING 1,883,827
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 10/07/08	COMP. DATE 10/07/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
170														
165													GROUND SURFACE 0.0	
160													ALLUVIAL GRAY-WHITE MED. DENSE WET CSE. SAND (A-1-b) WITH WOOD	
155	156.9	8.8	4	5	8						SS-16	W		11.0
150	151.9	13.8	3	5	5							W	COASTAL PLAIN GRAY-WHITE TO RED-TAN-WHITE LOOSE & MED. DENSE TO V. LOOSE WET TO SAT. CSE. SAND TO CLAYEY CSE. SAND (A-1-b)	
145	146.9	18.8	2	5	4							W		
140	141.9	23.8	4	4	5							W		
135	136.9	28.8	4	5	4						SS-17	W		
130	131.9	33.8	4	6	6							W		
125	126.9	38.8	5	7	10							W		
120	121.9	43.8	4	5	10							W		
115	117.4	48.3	3	6	7							W		
110	111.9	53.8	2	5	9							W		
105	106.9	58.8	2	1	1						Sat.		COASTAL PLAIN GRAY MED. DENSE WET CLAYEY SAND (A-2-4)	60.0
100	101.9	63.8	3	5	7						SS-18	W		
95	96.9	68.8	3	11	15							W		
90	91.9	73.8	3	9	12							W		

PROJECT NO. 33809.1.1	ID. B-4641	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.			GROUND WTR (ft)
BORING NO. B2-B	STATION 15+75	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 165.7 ft	TOTAL DEPTH 80.3 ft	NORTHING 364,374	EASTING 1,883,827
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 10/07/08	COMP. DATE 10/07/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
90														
85	86.9	78.8	4	11	14								Match Line	
85.4												W	COASTAL PLAIN GRAY MED. DENSE WET CLAYEY SAND (A-2-4) (continued)	80.3
80													Boring Terminated at Elevation 85.4 ft GRAY MED. DENSE WET CLAYEY SAND (A-2-4)	
75														
70														
65														
60														
55														
50														
45														
40														
35														
30														
25														
20														
15														
10														

NCDOT BORE SINGLE B4641_GEO_BH_BRD0075_SCOTLAND.GPJ_NC_DOT.GDT 11/18/08

NCDOT BORE SINGLE B4641_GEO_BH_BRD0075_SCOTLAND.GPJ_NC_DOT.GDT 11/18/08

PROJECT NO. 33809.1.1	ID. B-4641	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.			GROUND WTR (ft)
BORING NO. B3-B	STATION 16+25	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 160.7 ft	TOTAL DEPTH 70.2 ft	NORTHING 364,354	EASTING 1,883,873
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 10/08/08	COMP. DATE 10/08/08	SURFACE WATER DEPTH 4.2ft	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
165															
160														160.7	GROUND SURFACE
155	156.6	4.1	2	3	3							SS-19	Sat.	156.7	ALLUVIAL GRAY & WHITE LOOSE SAT. CLAYEY SAND (A-1-b)
150	151.6	9.1	3	3	3								Sat.		COASTAL PLAIN GRAY & WHITE & BRN LOOSE TO MED. DENSE SAT. TO WET CLAYEY SAND (A-1-b)
145	146.6	14.1	2	4	4								Sat.		
140	142.0	18.7	3	4	5								Sat.		
135	137.0	23.7	2	4	5								Sat.		
130	132.0	28.7	2	4	5								Sat.		
125	127.0	33.7	3	4	5								Sat.		
120	122.0	38.7	3	4	2								Sat.		
115	117.0	43.7	4	5	8							SS-20	W		
110	112.0	48.7	5	8	11								W		
105	107.0	53.7	5	13	14							SS-21	W	107.7	COASTAL PLAIN GRAY & BRN V. STIFF WET SILTY SANDY CLAY (A-6)
100	102.0	58.7	8	11	14								W		
95	97.0	63.7	9	9	11								W		
90	92.0	68.7	19	24	24							SS-22	M	92.7	COASTAL PLAIN BLACK HARD MOIST SLI. MICA. CLAYEY SANDY SILT (A-4)
85														90.5	Boring Terminated at Elevation 90.5 ft BLACK HARD MOIST SLI. MIC. CLAYEY SANDY SILT (A-4)

NCDOT BORE SINGLE B4641_GEO_BH_BRD0075_SCOTLAND.GPJ NC_DOT.GDT 11/18/08

PROJECT NO. 33809.1.1	ID. B-4641	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.			GROUND WTR (ft)
BORING NO. B4-A	STATION 16+70	OFFSET 13ft LT	ALIGNMENT -L-
COLLAR ELEV. 161.0 ft	TOTAL DEPTH 70.5 ft	NORTHING 364,359	EASTING 1,883,924
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 10/10/08	COMP. DATE 10/10/08	SURFACE WATER DEPTH 4.0ft	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
165															
160														161.0	GROUND SURFACE
															ALLUVIAL GRAY & WHITE LOOSE SAT. SAND (A-2-4)
155	157.0	4.0	3	4	4							SS-23	Sat.	157.0	4.0
															COASTAL PLAIN GRAY & WHITE LOOSE TO MED. DENSE SAT. TO WET SAND (A-2-4)
150	152.0	9.0	3	4	5								Sat.		
145	147.0	14.0	3	6	7								Sat.		
140	142.0	19.0	2	4	5								Sat.		
135	137.0	24.0	1	3	3								Sat.		
130	132.0	29.0	2	3	8								W		
125	127.0	34.0	4	9	10							SS-24	W	128.0	33.0
															COASTAL PLAIN BRN-TAN-WHITE MED. DENSE WET SAND (A-3)
120	122.0	39.0	4	5	9								W		
115	117.0	44.0	7	7	7								W		
110	112.0	49.0	6	7	9								W		
105	107.0	54.0	6	9	11								W		
100	102.0	59.0	7	11	13								W		
95	97.0	64.0	13	21	21							SS-25	W	98.0	63.0
															COASTAL PLAIN GRAY DENSE TO MED. DENSE WET CLAYEY SAND (A-2-4)
90	92.0	69.0	7	12	16								W	90.5	70.5
															Boring Terminated at Elevation 90.5 ft GRAY MED. DENSE WET CLAYEY SAND (A-2-4)
85															

NCDOT BORE SINGLE B4641_GEO_BH_BRDGG0075_SCOTLAND.GPJ NC_DOT.GDT 11/18/08



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 33809.1.1	ID. B-4641	COUNTY SCOTLAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE NO. 75 OVER BIG SHOE HEEL CREEK ON US 74 BUS.			GROUND WTR (ft)
BORING NO. EB2-B	STATION 17+15	OFFSET 17ft RT	ALIGNMENT -L-
COLLAR ELEV. 176.7 ft	TOTAL DEPTH 70.1 ft	NORTHING 364,313	EASTING 1,883,953
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 04/19/06	COMP. DATE 04/25/06	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
180																
175	174.0	2.7	2	2	2										176.7	0.0
170	169.3	7.4	2	2	1											
165	164.3	12.4	1	1	1										166.7	10.0
160	159.3	17.4	4	7	7										162.7	14.0
155	154.3	22.4	3	5	3										156.7	20.0
150	149.3	27.4	3	4	6										150.7	26.0
145	144.3	32.4	5	6	3										145.7	31.0
140	139.3	37.4	1	3	6										140.7	36.0
135	134.3	42.4	3	6	8											
130	128.1	48.6	3	4	5											
125	123.1	53.6	3	3	5											
120	118.1	58.6	3	4	6											
115	113.1	63.6	4	10	12											
110	108.1	68.6	3	7	13										109.7	67.0
105															106.6	70.1
100																

NCDOT BORE SINGLE B4641 GEO_BH_BRD0075 SCOTLAND.GPJ NC_DOT.GDT 11/18/08

Boring Terminated at Elevation 106.6 ft
GRAY MED. DENSE WET SAND (A-3)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAY
 MATERIALS & TESTS UNIT
 SOILS LABORATORY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAY
 MATERIALS & TESTS UNIT
 SOILS LABORATORY

T. I. P. No. B4641

T. I. P. No. B4641

REPORT ON SAMPLES OF SOILS FOR QUALITY

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project 3380911 County SCOTLAND Owner _____
 Date: Sampled 4/25/06 Received 5/1/06 Reported 5/3/2006
 Sampled from _____ By C C MURRAY
 Submitted by N WAINAINA 1995 Standard Specifications

Project 3380911 County SCOTLAND Owner _____
 Date: Sampled 4/25/06 Received 5/1/06 Reported 5/3/2006
 Sampled from _____ By C C MURRAY
 Submitted by N WAINAINA 1995 Standard Specifications

729494 TO 729504
 5/8/06

729494 TO 729504
 5/8/06

TEST RESULTS

Proj. Sample No.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Lab. Sample No.	729494	729495	729496	729497	729498	729499
Retained #4 Sieve %	-	-	-	-	-	-
Passing #10 Sieve %	96	95	100	94	97	99
Passing #40 Sieve %	61	44	41	64	38	76
Passing #200 Sieve %	24	17	25	35	13	15

TEST RESULTS

Proj. Sample No.	SS-7	SS-8	SS-9	SS-10	SS-11
Lab. Sample No.	729500	729501	729502	729503	729504
Retained #4 Sieve %	-	-	-	1	-
Passing #10 Sieve %	98	100	98	98	98
Passing #40 Sieve %	84	97	37	72	60
Passing #200 Sieve %	15	34	14	13	10

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60 %	55.8	69.4	71.1	37.3	79.5	63.8
Fine Sand Ret - #270 %	21.8	13.7	4.7	35.1	8.3	22.2
Silt 0.05 - 0.005 mm %	6.3	0.8	3.0	13.5	2.1	1.9
Clay < 0.005 mm %	16.1	16.1	21.2	14.1	10.1	12.1
Passing #40 Sieve %	-	-	-	-	-	-
Passing #200 Sieve %	-	-	-	-	-	-

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%					
Coarse Sand Ret - #60 %	46.2	7.3	79.1	57.0	81.8
Fine Sand Ret - #270 %	40.0	65.1	7.3	29.9	9.0
Silt 0.05 - 0.005 mm %	2.7	9.5	1.5	1.0	0.2
Clay < 0.005 mm %	11.1	18.1	12.1	12.1	9.1
Passing #40 Sieve %	-	-	-	-	-
Passing #200 Sieve %	-	-	-	-	-

L. L.	23	33	47	21	18	20
P. I.	9	17	31	6	2	NP
AASHTO Classification	A-2-4(0)	A-2-6(0)	A-2-7(2)	A-2-4(0)	A-1-b(0)	A-2-4(0)
Station						
Hole No.	<i>EB2-B</i>	<i>EB2-B</i>	<i>EB2-B</i>	<i>EB2-B</i>	<i>EB2-B</i>	<i>EB2-B</i>
Depth (Ft)	2.70	12.40	22.40	27.40	32.40	37.40
to	4.20	13.90	23.90	28.90	33.90	38.90

L. L.	22	21	23	20	19
P. I.	NP	3	7	NP	NP
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-3(0)
Station					
Hole No.	<i>EB2-B</i>	<i>EB2-B</i>	<i>EB2-B</i>	<i>EB2-B</i>	<i>EB2-B</i>
Depth (Ft)	42.40	48.60	53.60	58.60	68.60
to	43.90	50.10	55.10	60.10	70.10

cc: C C MURRAY
 Soils File

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY**

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY**

T. I. P. No. B-4641

T. I. P. No. B-4641

REPORT ON SAMPLES OF SOILS FOR QUALITY

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project 33809.1.1 County SCOTLAND Owner _____
 Date: Sampled 10/8/08 Received 10/20/08 Reported 10/22/08
 Sampled from BRIDGE By J P ROGERS
 Submitted by N WAINAINA 1995 Standard Specifications

Project 33809.1.1 County SCOTLAND Owner _____
 Date: Sampled 10/8/08 Received 10/20/08 Reported 10/22/08
 Sampled from BRIDGE By J P ROGERS
 Submitted by N WAINAINA 1995 Standard Specifications

749830 TO 749846
11/20/08

749830 TO 749846
11/20/08

TEST RESULTS

Proj. Sample No.	SS-12	SS-13	SS-14	SS-16	SS-17	SS-18
Lab. Sample No.	749830	749831	749832	749833	749834	749835
Retained #4 Sieve	%	-	-	1	-	-
Passing #10 Sieve	%	94	99	89	99	100
Passing #40 Sieve	%	35	80	56	39	42
Passing #200 Sieve	%	6	44	17	2	12

TEST RESULTS

Proj. Sample No.	SS-19	SS-20	SS-21	SS-22	SS-23	SS-24
Lab. Sample No.	749836	749837	749838	749839	749840	749841
Retained #4 Sieve	%	-	-	-	-	-
Passing #10 Sieve	%	98	98	99	100	98
Passing #40 Sieve	%	48	39	82	99	74
Passing #200 Sieve	%	12	10	51	68	11

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60	%	79.9	31.4	58.7	88.7	79.6
Fine Sand Ret - #270	%	14.5	29.8	24.0	9.6	9.0
Silt 0.05 - 0.005 mm	%	1.6	20.6	3.2	0.7	0.4
Clay < 0.005 mm	%	4.0	18.1	14.1	1.0	11.1
Passing #40 Sieve	%	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60	%	75.6	80.7	33.2	4.0	49.5
Fine Sand Ret - #270	%	12.9	9.9	17.9	36.1	41.4
Silt 0.05 - 0.005 mm	%	0.4	0.4	10.6	21.7	0.0
Clay < 0.005 mm	%	11.1	9.1	38.3	38.3	9.1
Passing #40 Sieve	%	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-

L. L.	20	25	20	11	19	24
P. I.	NP	8	3	NP	NP	5
AASHTO Classification	A-1-b(0)	A-4(1)	A-2-4(0)	A-1-b(0)	A-1-b(0)	A-2-4(0)
Station						
ALIGNMENT	L	L	L	L	L	L
LOCATION	B1-B	B1-B	B1-B	B2-B	B2-B	B2-B
Depth (Ft)	4.40	30.60	64.70	8.80	28.80	63.80
to	5.90	32.10	66.20	10.30	30.30	65.30

L. L.	20	16	33	39	21	20
P. I.	NP	NP	17	8	NP	NP
AASHTO Classification	A-1-b(0)	A-1-b(0)	A-6(5)	A-4(5)	A-2-4(0)	A-3(0)
Station						
ALIGNMENT	L	L	L	L	L	L
LOCATION	B3-B	B3-B	B3-B	B3-B	B4-B	B4-A
Depth (Ft)	4.10	43.70	53.70	68.70	4.00	34.00
to	5.60	45.20	55.20	70.20	5.50	35.50

cc: J P ROGERS
Soils File

Soils Engineer

Soils Engineer

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY**

T. I. P. No. B-4641

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project 33809.1.1 County SCOTLAND Owner _____
 Date: Sampled 10/8/08 Received 10/20/08 Reported 10/22/08
 Sampled from BRIDGE By J P ROGERS
 Submitted by N WAINAINA 1995 Standard Specifications

749830 TO 749846
11/20/08

TEST RESULTS

Proj. Sample No.	SS-25	SS-26	SS-27	SS-28	SS-29
Lab. Sample No.	749842	749843	749844	749845	749846
Retained #4 Sieve %	-	-	2	-	-
Passing #10 Sieve %	100	97	89	100	100
Passing #40 Sieve %	76	61	40	95	93
Passing #200 Sieve %	13	21	5	23	73

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60 %	60.1	57.0	74.6	21.6	11.1	
Fine Sand Ret - #270 %	27.6	24.3	21.7	56.4	21.1	
Silt 0.05 - 0.005 mm %	1.2	4.6	0.7	3.9	23.5	
Clay < 0.005 mm %	11.1	14.1	3.0	18.1	44.3	
Passing #40 Sieve %	-	-	-	-	-	
Passing #200 Sieve %	-	-	-	-	-	

L. L.	18	19	12	20	37
P. I.	NP	5	NP	NP	17
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-1-b(0)	A-2-4(0)	A-6(11)
Station					
ALIGNMENT	L	L	L	L	L
LOCATION	B4-A	EB1-A	EB1-A	EB1-A	EB1-A
Depth (Ft)	64.00	5.20	15.20	40.20	70.20
to	65.50	6.70	16.70	41.70	71.70

Soils Engineer



**FIELD
 SCOUR REPORT**

WBS: 33809.1.1 TIP: B-4641 COUNTY: SCOTLAND

DESCRIPTION(1): BRIDGE NO. 75 ON US 74 BUS. OVER BIG SHOE HEEL CREEK.

EXISTING BRIDGE

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

Bridge No.: 75 Length: 180' Total Bents: 5 Bents in Channel: 3 Bents in Floodplain: 5
 Foundation Type: REINFORCED CONCRETE PILES

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NO

Interior Bents: NO

Channel Bed: NO

Channel Bank: NO

EXISTING SCOUR PROTECTION

Type(3): NONE

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): NONE

INSTRUCTIONS

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

DESIGN INFORMATION

Channel Bed Material(7): GRAY/WHITE, LOOSE, SAT., CLAYEY SAND (A-1-b) AS SS-19.

Channel Bank Material(8): GRAY/WHITE, MED. DENSE, SAND (A-1-b) AS SS-16.

Channel Bank Cover(9): GRASS & WEEDS

Floodplain Width(10): APPROXIMATELY ONE MILE

Floodplain Cover(11): TREES

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): NO OBSERVABLE TENDENCY.

Observations and Other Comments: ENTIRE BRIDGE, END BENT TO END BENT, WAS FLOODED DURING THIS INVESTIGATION (10/13/08). CREEK BACK IN ITS BANKS (10/14/08)

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

	BENTS											
	B1	B2	B3	B4								
100 YR.	163	163	156	162								

Comparison of DSE to Hydraulics Unit theoretical scour:
 DESIGN SCOUR IS EQUIVALENT TO THE HYDRAULICS THEORETICAL SCOUR.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

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

Reported by: RW TODD Date: 10/18/2008