

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33245.1.1(B-3705)	1	24

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STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33245.1.1 (B-3705) F.A. PROJ. BRZ-2045(1)
 COUNTY WAKE
 PROJECT DESCRIPTION BRIDGE NO. 125 ON -L- (SR 2045) OVER
SMITHS CREEK

INVENTORY REVISION

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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. THE SUBSURFACE PLANS, FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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 DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, OR THE 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

PROJECT: 33245.1.1 ID: B-3705

PERSONNEL

W.F. GOFORTH

M.D. VALIQUETTE

R. NORWOOD

S&ME PERSONNEL

DRAWN BY **T.T. WALKER**

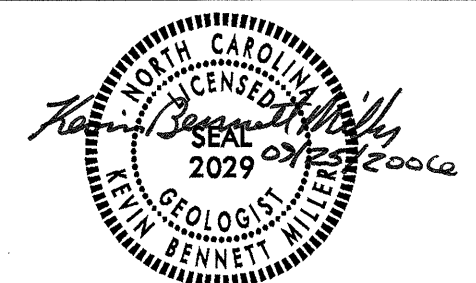
DRAWN BY **K.B. MILLER**

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CHECKED BY **N.T. ROBERSON**

SUBMITTED BY **N.T. ROBERSON**

DATE **AUGUST 2006**



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 33245.LKB-3705	SHEET NO. 2
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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: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A-7-6	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. 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 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 (MOTJ.) - 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 (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 (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATA 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.	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. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	
COMPRESSIONIBILITY	PERCENTAGE OF MATERIAL	GROUND WATER	MISCELLANEOUS SYMBOLS
SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 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
CONSISTENCY OR DENSENESS	TEXTURE OR GRAIN SIZE	ROCK HARDNESS	ABBREVIATIONS
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	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 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.	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 - MICEACEOUS 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
EQUIPMENT USED ON SUBJECT PROJECT	PLASTICITY	FRACTURE SPACING	INDURATION
DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST CME-550X	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	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 0.76 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	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.
COLOR	SOIL MOISTURE - CORRELATION OF TERMS	SOIL MOISTURE SCALE (ATTERBERG LIMITS)	NOTES:
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.	FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION - SATURATED - (SAT.) 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	GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN 12 3	BENCH MARK: BL-3 -L- STA. 25+35.94, 64.78' RT REBAR & CAP ELEVATION: 200.85 FT.



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

August 18, 2006

STATE PROJECT: 33245.1.1 B-3705
FEDERAL PROJECT: BRZ-2045(1)
COUNTY: Wake

DESCRIPTION: Bridge No. 125 on -L- (SR 2045) over Smiths Creek

SUBJECT: Geotechnical Report – Structure Inventory Revision

Site Description

The original proposed structure has been redesigned by the Structure Design Unit. This Structure Inventory report supercedes the report dated August 15, 2005. No additional borings were performed for the completion of this report.

The proposed structure is comprised of three 50.5' wide spans, 2 at 50' and 1 at 70' in length. The project is located in Wake County approximately three miles southwest of the town of Wake Forest. The proposed bridge is on a 115° skew and will replace the existing structure on new location. The existing structure will be used to maintain traffic during construction.

During the month of April 2005, borings were advanced via hollow stem augers using a CME-550X drill machine equipped with an automatic hammer. Three Standard Penetration Tests borings were performed at each bent location. All borings were advanced to either weathered or crystalline rock. Representative soil samples were collected for visual classification in the field and for laboratory analysis. Six borings were cored using a NQ core barrel. Seven rock core samples were submitted for laboratory analysis.

Physiography and Geology

The project is located in rolling terrain within the Piedmont Physiographic Province. The area is highly developed with some commercial property, but mostly single family dwellings in large subdivisions. Geologically the site lies within the Raleigh Belt and is located in an area predominately composed of granitic intrusions associated with the Pennsylvanian to Permian age Rolesville Batholith. The Rolesville Batholith is a north-south trending granite pluton approximately 650 mi² in size.

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LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

Soil Properties

Soils encountered at the project site include roadway embankment materials, alluvial sediments and residual soils.

Roadway Embankment material was encountered at End Bent 1 and 2 along the existing alignment. This material consists of approximately 10 feet of medium stiff to stiff, silty/sandy clay (A-7, A-6) and loose, clayey sand (A-2-6).

Alluvial soils at the site are primarily composed of 10 to 13 feet of very loose to medium dense, sand with some gravel (A-2-4, A-1-b). However, locally 5 to 7 feet of very soft to soft, clayey/sandy silt and sandy clay (A-4, A-6) occur above the alluvial sands.

Residual soils primarily consist of up to 15 feet of medium dense to very dense sand (A-2-4, A-1-b).

Rock Properties

Weathered granite was encountered in all borings at elevations 180.2 to 168.4 feet and ranges in thickness from 6 to 22 feet.

Crystalline rock, granite, is present in all borings except EB1-B and EB2-B. Top of crystalline rock ranges from 165.1 to 157.5 feet with the shallowest occurrence being at B2-A. A potential granite boulder was encountered in B1-A at elevation 173.7 and was approximately 3 feet thick. Core borings were performed at all interior bent locations to evaluate rock type and competency. Core Recovery (REC) ranges from 85% to 100%. Rock Quality Designation (RQD) ranges from 52% to 84%. Laboratory tests of the granite show compressive strengths from 2.17 ksi to 12.47 ksi and a unit weight ranging from 155.1 lb/ft³ to 168.8 lb/ft³. More detailed descriptions may be found in the Core Boring Report.

Groundwater

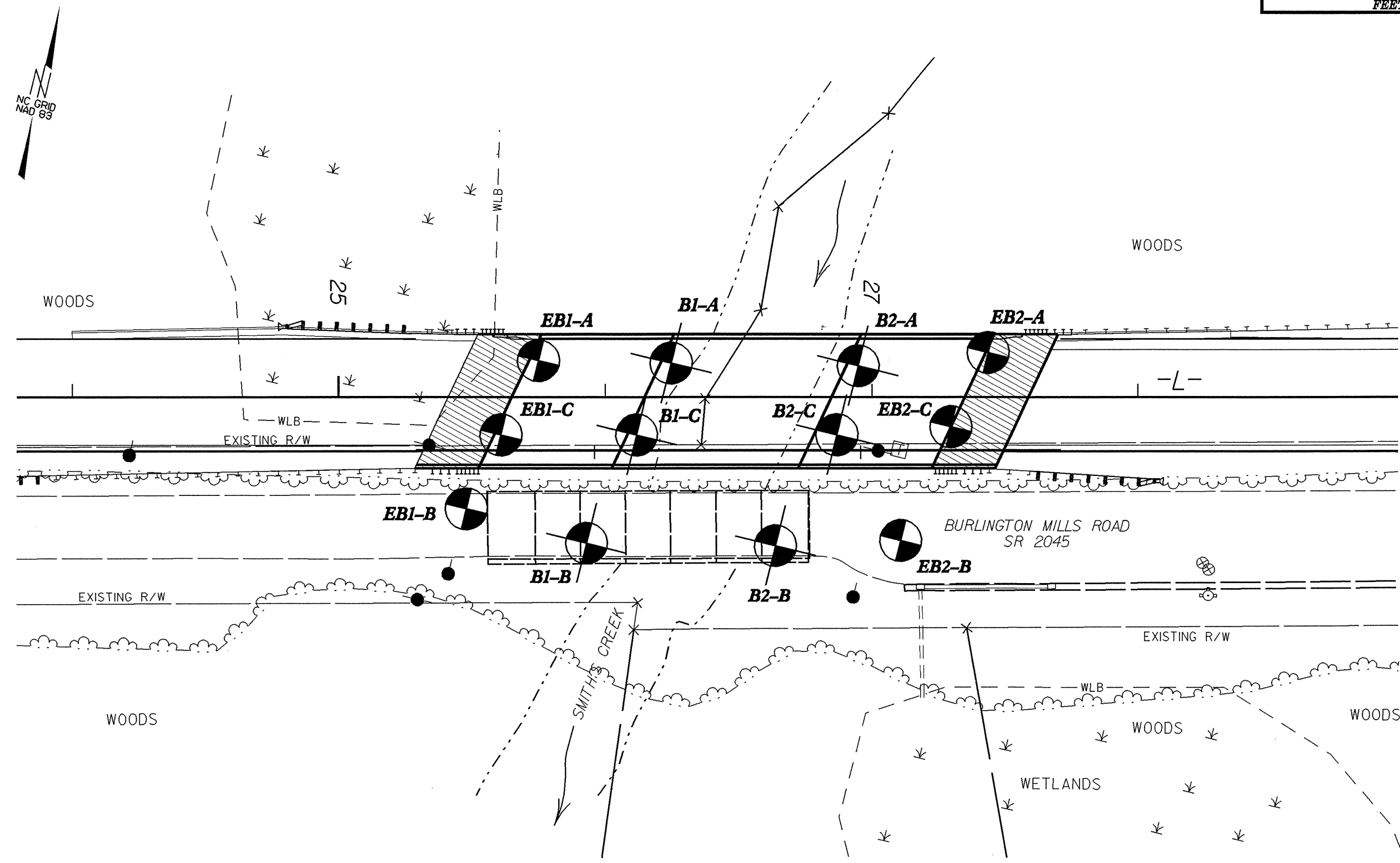
Groundwater at the site was measured at elevations 188.7 to 186.4 feet at the time of the investigation. The surface water of Smiths Creek was noted at elevation 187.1 feet in May 2005.

Notice

This report is based on the bent locations provided in the memo "Request for Foundation Recommendations" and the Preliminary General Drawing dated June 1, 2006 and the Bridge Survey and Hydraulic Design Report dated June 6, 2006. If significant changes are made in the design, or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

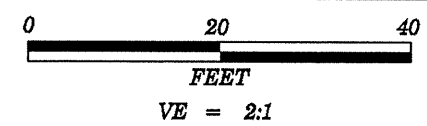
Prepared by:

Kevin B. Miller, LG
Project Geological Engineer

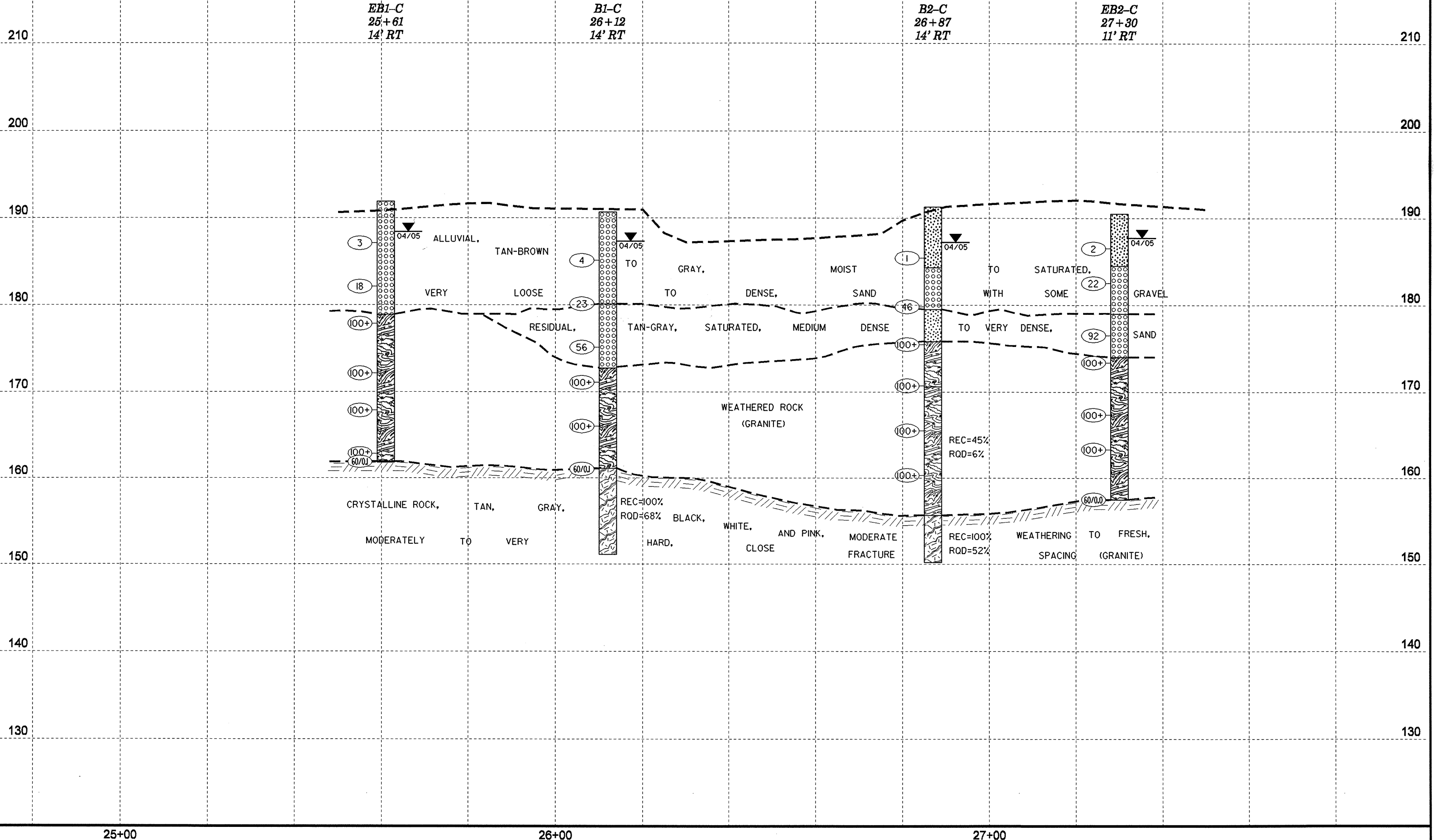


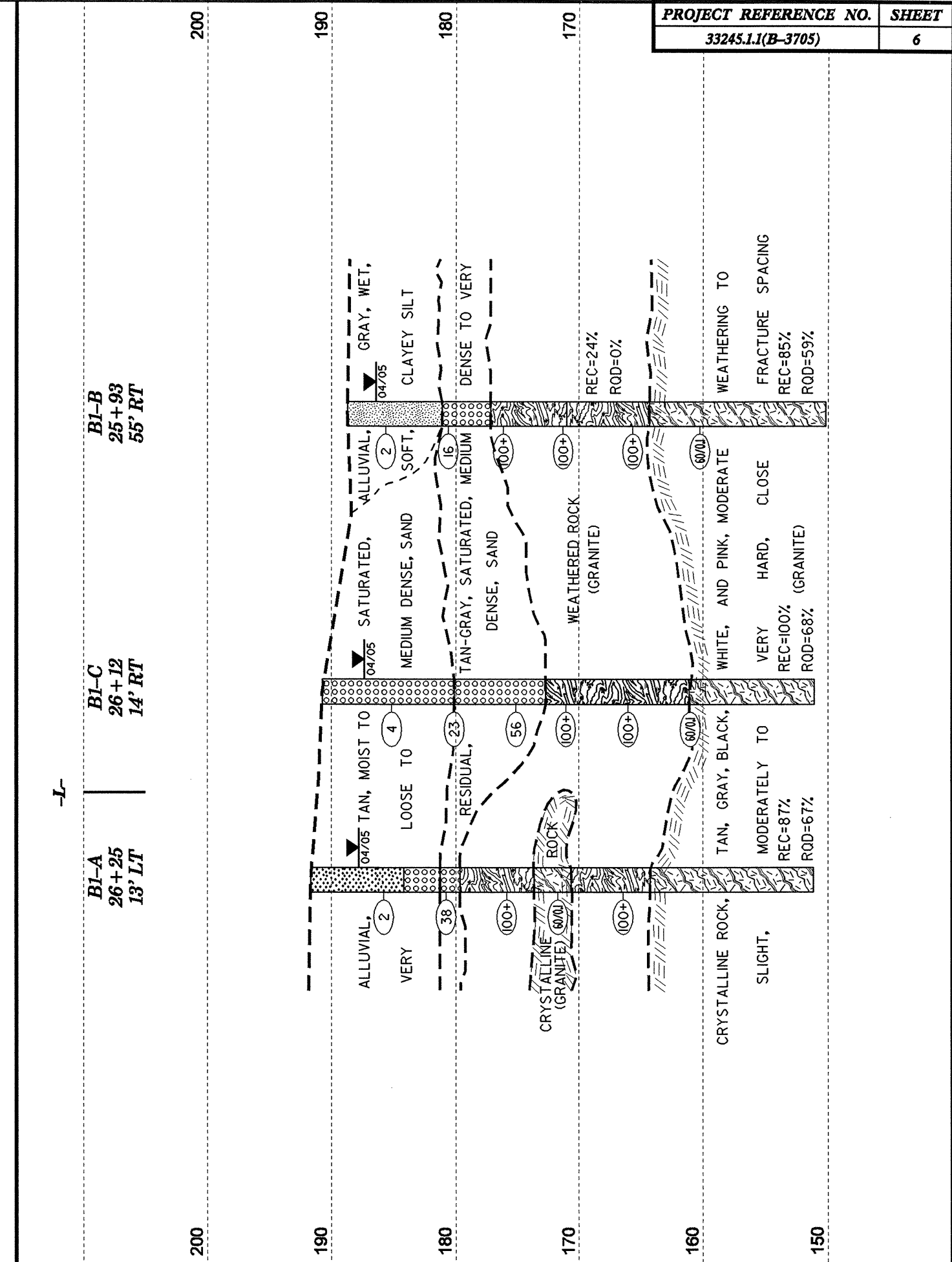
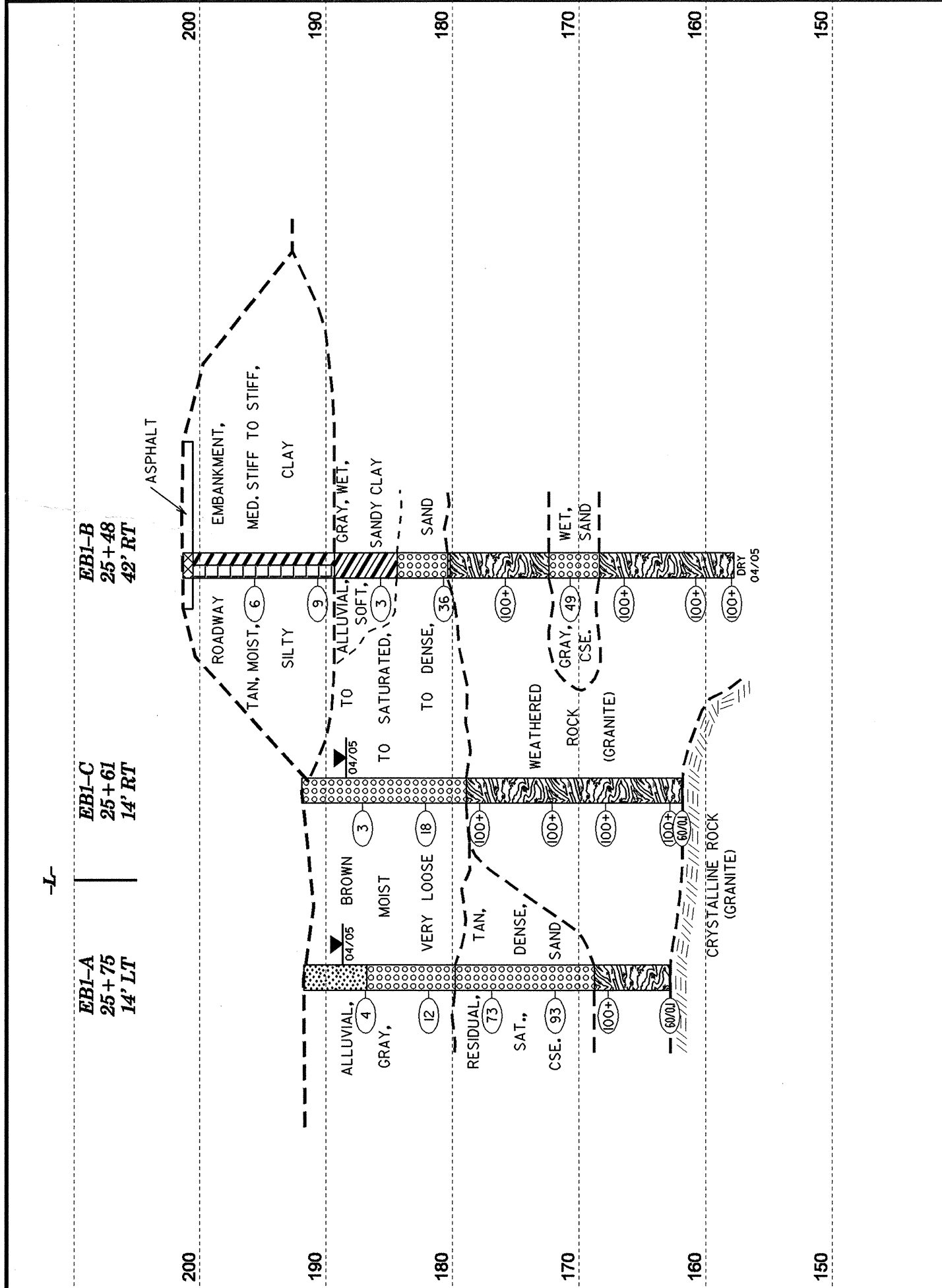
NOTE: EXISTING PRIVATE 2" SAN. SEWER LINE ALONG EDGE OF PAVEMENT TO US #1.

NOTE: TERMINUS OF 2" PVC SEWER PAST BRIDGE IS UNKNOWN.



PROJECT REFERENCE NO.	SHEET
33245.1.1(B-3705)	5
PROFILE 14' FEET RT OF -L-	





HORIZ. SCALE 0 10 20 (FEET)

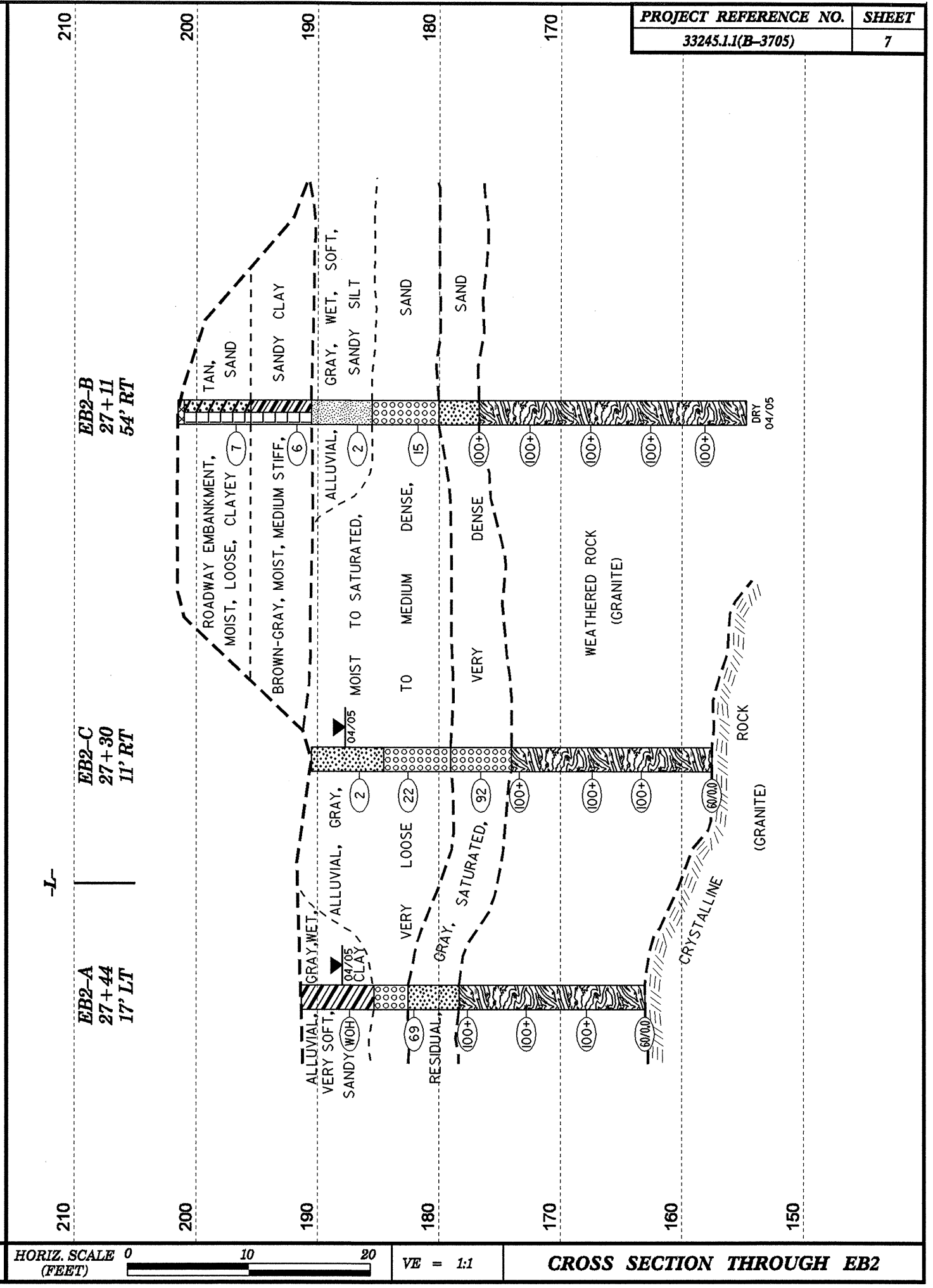
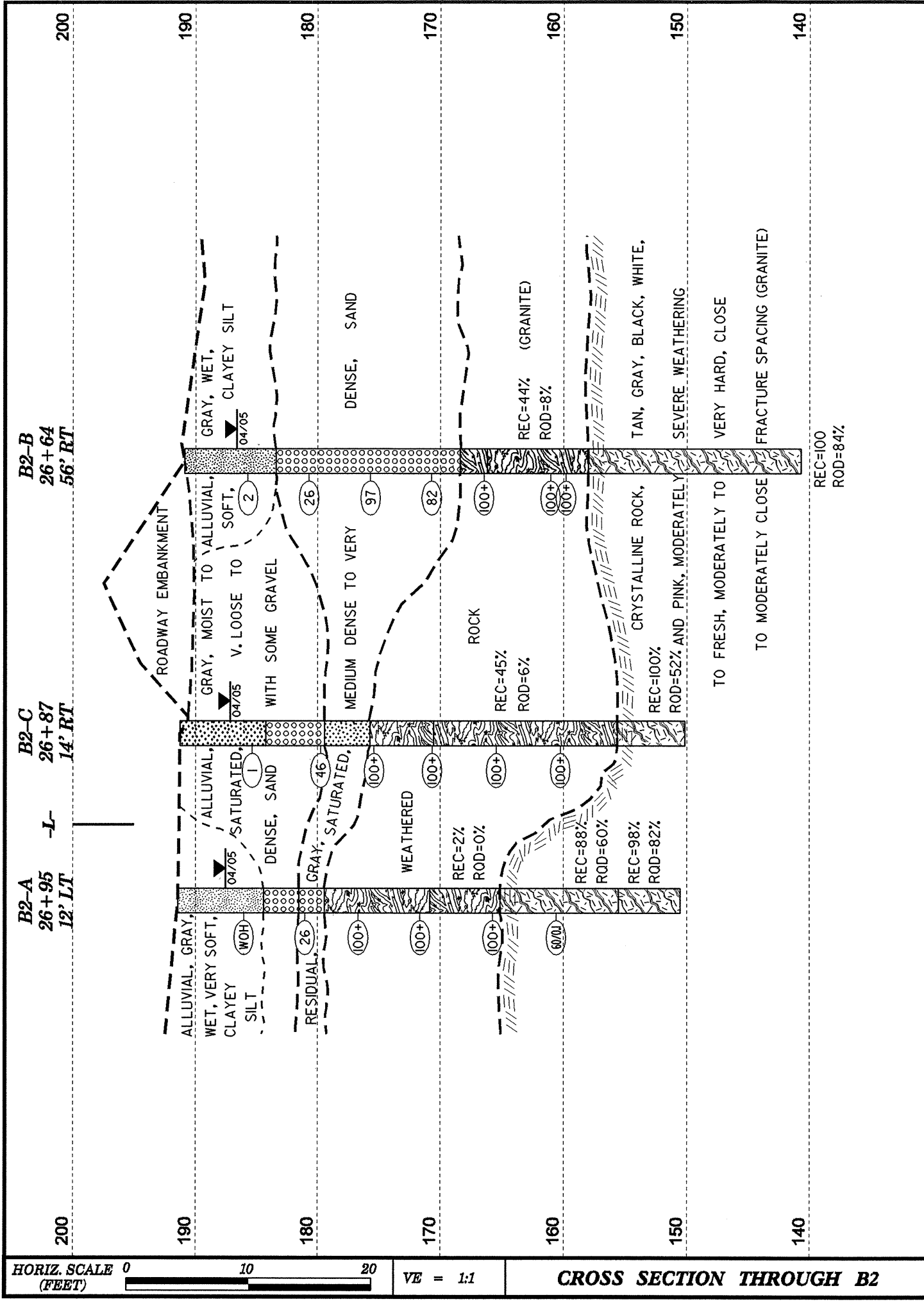
VE = 1:1

CROSS SECTION THROUGH EBI

HORIZ. SCALE 0 10 20 (FEET)

VE = 1:1

CROSS SECTION THROUGH BI



**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG**

SHEET 9

PROJECT NO. 33245.1.1		ID. B-3705		COUNTY WAKE		GEOLOGIST W.F. GOFORTH/M.D. VALIQUETTE								
SITE DESCRIPTION BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK							GROUND WATER							
BORING NO. EBI-B		BORING LOCATION 25+48		OFFSET 42' RT		ALIGNMENT -L-								
COLLAR ELEVATION 201.4'		NORTHING 789517'		EASTING 2137785'		0 HR. 15.0'								
TOTAL DEPTH 43.6'		DRILL MACHINE CME-550X		DRILL METHOD H.S. AUGERS		24 HR. N/A								
START DATE 4/18/05		COMPLETION DATE 4/18/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A								
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'		0	25	50	75					100
201.4														
200.0														ASPHALT
	4.7	2	3	3	1.0									
195.0										SS-6	M			ROADWAY EMBANKMENT, TAN, SILTY CLAY
	9.7	3	4	5	1.0									
190.0										SS-7	M			
	14.7	2	2	1	1.0									ALLUVIAL, GRAY, SANDY CLAY
185.0										SS-8	M			
	19.7	3	13	23	1.0									GRAY, COARSE SAND WITH WOOD FRAGMENTS
180.0										SS-9	W			RESIDUAL, GRAY, SILTY SAND
	24.7	17	55	45	0.7									WEATHERED ROCK (GRANITE)
175.0														
	29.7	31	35	14	1.0									
170.0										SS-10	W			RESIDUAL, GRAY, COARSE SAND
	34.7	88	12		0.5									
165.0														
	39.7	19	55	45	0.8									
160.0														
	43.3	100			0.3									
155.0														
150.0														
145.0														
140.0														
135.0														
130.0														
125.0														

BORING TERMINATED AT
ELEVATION 157.8 FEET IN
WEATHERED ROCK
(GRANITE)

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33245.1.1		ID. B-3705		COUNTY WAKE		GEOLOGIST W.F. GOLFORTH/M.D. VALIQUETTE							
SITE DESCRIPTION BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK							GROUND WATER						
BORING NO. BI-A		BORING LOCATION 26+25		OFFSET 13' LT		ALIGNMENT -L-							
COLLAR ELEVATION 191.7'		NORTHING 789588'		EASTING 2137846'		0 HR. 4.5'							
TOTAL DEPTH 40.5'		DRILL MACHINE CME-550X		DRILL METHOD CORE BORING		HAMMER TYPE AUTOMATIC							
START DATE 4/26/05		COMPLETION DATE 4/26/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 27.4'							
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		0.5'	0.5'	0.5'	0	25	50	75	100				
191.7													
190.0	4.9	WOH	1	1	1.0								ALLUVIAL, TAN-GRAY, SILTY SAND
185.0	9.9	10	19	19	1.0								GRAY, COARSE SAND
180.0	14.9	31	50	50	0.8								RESIDUAL, GRAY, COARSE SAND
175.0	19.9	60			0.1								WEATHERED ROCK (GRANITE)
170.0	25.0	100			0.5								CRYSTALLINE ROCK (GRANITE)
165.0													WEATHERED ROCK (GRANITE)
160.0													CRYSTALLINE ROCK, TAN-GRAY, BLACK AND PINK, MODERATE TO VERY SLIGHT WEATHERING, MODERATE TO VERY HARD, CLOSE FRACTURE SPACING (GRANITE) REC=87% ROD=67%
155.0													
150.0													
145.0													
140.0													
135.0													
130.0													
125.0													
120.0													
115.0													

CORE BORING REPORT							
PROJECT: 33245.1.1		ID: B-3705		COUNTY: WAKE		BORING NO: B1-A	
DESCRIPTION: BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK							
LOCATION OF BORING: -L- 26+25 13' LT				COMPLETION DATE: 4/26/2005			
COLLAR or GROUND ELEVATION: 191.7 ft		CORE SIZE: NQ		GEOLOGIST: W. F. GOFORTH		DRILLER: R. NORWOOD	
CORE EQUIPMENT: CME-550X							
ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
171.7	20.0	0:46					Weathered Rock (Granite)
		0:32					
		0:23	5.0	0.0	0.0		
		0:37		0%	0%		
166.7	25.0	0:23					SPT drive 25.0-25.5 (100/0.5)
166.2	25.5	1:05					27.4'- Crystalline Rock, Tan-gray, black, pink, moderate to very slight weathering, moderately to very hard, close fracture spacing, granite
		0:55					
		2:13	5.0	3.5	3.0		
		1:58		70%	60%		
161.2	30.5	2:17				RS-7	
161.2	30.5	1:40					Crystalline Rock, Tan-gray, black, pink, moderate to very slight weathering, moderately to very hard, close fracture spacing, granite
		1:16					
		1:58	5.0	4.8	2.6		
		2:49		96%	52%		
156.2	35.5	1:57					
156.2	35.5	1:50					
		3:45					
		3:59	5.0	4.7	4.4		
		4:09		94%	88%		
151.2	40.5	5:10					
BOREHOLE TERMINATED AT ELEVATION OF 151.2 FEET, IN ROCK.							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33245.1.1		ID. B-3705		COUNTY WAKE		GEOLOGIST W.F. GOLFORTH/M.D. VALIQUETTE								
SITE DESCRIPTION BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK										GROUND WATER				
BORING NO. BI-C		BORING LOCATION 26+12		OFFSET 14' RT		ALIGNMENT -L-		0 HR. 3.0'		24 HR. 3.4'				
COLLAR ELEVATION 190.7'		NORTHING 789559'		EASTING 2137840'										
TOTAL DEPTH 39.6'		DRILL MACHINE CME-550X		DRILL METHOD CORE BORING		HAMMER TYPE AUTOMATIC								
START DATE 4/25/05		COMPLETION DATE 4/25/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 29.6'								
ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		0.5	1.0	1.5		0	25	50	75	100				
190.7														
185.0	4.6	3	2	2	1.0	X 4							S	ALLUVIAL, TAN, SILTY COARSE SAND
180.0	9.6	5	8	15	1.0			X 23					S	RESIDUAL, GREEN-TAN, COARSE SAND
175.0	14.6	15	25	31	1.0			X 56					S	
170.0	19.6	100			0.5						100+ X		S	WEATHERED ROCK (GRANITE)
165.0	24.6	100			0.2						100+ X		S	
160.0	29.6	60			0.1						60/0.1X		S	CRYSTALLINE ROCK, TAN, GRAY, BLACK, AND PINK, MODERATE TO SLIGHT WEATHERING MEDIUM HARD TO HARD, CLOSE FRACTURE SPACING (GRANITE) REC=100% RQD= 68%
155.0													SS-19	CORING TERMINATED AT ELEVATION 151.1 FEET IN CRYSTALLINE ROCK (GRANITE)
150.0													RS-6	
145.0														
140.0														

CORE BORING REPORT							
PROJECT:	33245.1.1	ID:	B-3705	COUNTY:	WAKE	BORING NO.:	B1-C
DESCRIPTION: BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK							
LOCATION OF BORING: -L- 26+12 14' RT				COMPLETION DATE: 4/25/2005			
COLLAR or GROUND ELEVATION:		190.7 ft		CORE SIZE: NQ		GEOLOGIST: W. F. GOFORTH	
CORE EQUIPMENT: CME-550X				DRILLER: R. NORWOOD			
ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
161.1	29.6	0:23 0:29 0:25 0:37	5.0	5.0 100%	1.8 36%		Crystalline Rock, Tan, gray, black, pink, moderate to slight weathering, medium hard to hard, close fracture spacing, granite
156.1	34.6	0:47					
156.1	34.6	1:03 2:03	5.0	5.0 100%	5.0 100%	RS-6	
151.1	39.6	1:02 1:22					
		1:28					
							BOREHOLE TERMINATED AT ELEVATION OF 151.1 FEET, IN ROCK.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33245.1.1		ID. B-3705		COUNTY WAKE		GEOLOGIST W.F. GOLFORTH/M.D. VALIQUETTE					
SITE DESCRIPTION BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK							GROUND WATER				
BORING NO. BI-B		BORING LOCATION 25+93		OFFSET 55' RT		ALIGNMENT -L-					
COLLAR ELEVATION 188.7'		NORTHING 789515'		EASTING 2137831'		0 HR. 1.4'					
TOTAL DEPTH 38.5'		DRILL MACHINE CME-550X		DRILL METHOD CORE BORING		HAMMER TYPE AUTOMATIC					
START DATE 4/20/05		COMPLETION DATE 4/20/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 24.4'					
ELEV.	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5' 0.5' 0.5'		0	25	50	75	100			
188.7	2.1	WOH 1	1	1.0	X2				SS-13	S	ALLUVIAL, GRAY, CLAYEY SILT
185.0	7.1	7	6	1.0	X16					S	RESIDUAL, GRAY, COARSE SAND
180.0	12.1	100		0.9				100+X			WEATHERED ROCK (GRANITE)
175.0	17.1	100		0.6				100+X			REC=24% ROD=0%
170.0	22.7	100		0.7				100+X			CRYSTALLINE ROCK, GRAY, BLACK, WHITE, AND PINK, MODERATE TO SLIGHT WEATHERING, MODERATELY HARD TO HARD, CLOSE FRACTURE SPACING (GRANITE)
165.0	28.4	60		0.1				60ZOLX	RS-2		REC=85% ROD=59%
CORING TERMINATED AT ELEVATION 150.2 FEET IN CRYSTALLINE ROCK (GRANITE)											

CORE BORING REPORT

PROJECT: 33245.1.1 ID: B-3705 COUNTY: WAKE BORING NO: B1-B
 DESCRIPTION: BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK
 LOCATION OF BORING: -L- 25+93 55' RT COMPLETION DATE: 4/20/2005
 COLLAR or GROUND ELEVATION: 188.7 ft CORE SIZE: NQ GEOLOGIST: W. F. GOFORTH
 CORE EQUIPMENT: CME-550X DRILLER: R. NORWOOD

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (%)	RQD (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
171.0	17.7	0:23					Weathered Rock (Granite)
		0:29					
		0:25	5.0	1.2	0.0		
		0:37		24%	0%		SPT drive 22.7-23.4 (100/0.7)
166.0	22.7	0:47					
165.3	23.4	1:03					
		2:03					
		1:02	5.0	4.0	3.3		24.4'- Crystalline Rock, Gray, black, white, pink, moderate to slight weathering, moderately hard to hard, close fracture spacing, granite
		1:22		80%	66%		
160.3	28.4	1:28					SPT drive 28.4-28.5 (60/0.1)
160.2	28.5	3:48					
		2:18					
		1:47	5.0	4.5	2.7	RS-2	
		1:03		90%	54%		
155.2	33.5	1:11					
155.2	33.5	1:24					
		1:59					
		1:11	5.0	4.2	2.9		
		2:14		84%	58%		
150.2	38.5	2:42					
BOREHOLE TERMINATED AT ELEVATION OF 150.2 FEET, IN ROCK.							

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG**

PROJECT NO. 33245.1.1	ID. B-3705	COUNTY WAKE	GEOLOGIST W.F. GOLFORTH/M.D. VALIQUETTE
SITE DESCRIPTION BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK			GROUND WATER
BORING NO. B2-A	BORING LOCATION 26+95	OFFSET 12' LT	ALIGNMENT -L-
COLLAR ELEVATION 191.4'	NORTHING 789604'	EASTING 2137915'	0 HR. 3.6' 24 HR. 3.9'
TOTAL DEPTH 40.9'	DRILL MACHINE CME-550X	DRILL METHOD CORE BORING	HAMMER TYPE AUTOMATIC
START DATE 4/22/05	COMPLETION DATE 4/22/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 26.3'

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT					SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		0.5'	1.0'	1.5'		0	25	50	75	100				
191.4														
190.0	4.4	WOH	WOH	WOH	1.0								MS-2	ALLUVIAL, GRAY, CLAYEY SILTY
185.0														
180.0	9.4	8	14	12	1.0								SS-17	GRAY, CSE. SAND W/ SOME GRAVEL RESIDUAL, GRAY, COARSE SAND
175.0	14.4	6Ø	4Ø		0.7									WEATHERED ROCK (GRANITE)
170.0	19.4	53	47		0.8									WEATHERED ROCK (GRANITE) REC=2% ROD=0%
165.0	25.6	1ØØ			0.2									WEATHERED ROCK (GRANITE) REC=2% ROD=0%
160.0	30.8	6Ø			0.1								RS-3	CRYSTALLINE ROCK, TAN, GRAY, MODERATELY SEVERE TO SLIGHT WEATHERING, MODERATELY HARD, CLOSE FRACTURE SPACING (GRANITE) REC=88% ROD=60%
155.0														
150.0														CORING TERMINATED AT ELEVATION 150.5 FEET IN CRYSTALLINE ROCK (GRANITE) GRAY, BLACK, WHITE, AND PINK, VERY SLIGHT WEATHERING, MODERATELY HARD TO HARD, CLOSE FRACTURE SPACING (GRANITE) REC=98% ROD=82%
145.0														
140.0														
135.0														
130.0														
125.0														
120.0														
115.0														

CORE BORING REPORT

PROJECT: 33245.1.1 ID: B-3705 COUNTY: WAKE BORING NO: B2-A

DESCRIPTION: BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK

LOCATION OF BORING: -L- 26+95 12' LT COMPLETION DATE: 4/22/2005

COLLAR or GROUND ELEVATION: 191.4 ft CORE SIZE: NQ GEOLOGIST: W. F. GOFORTH

CORE EQUIPMENT: CME-550X DRILLER: R. NORWOOD

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (%)	RQD (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
170.8	20.6	1:44					Weathered Rock (Granite)
		0:49					
		0:21	5.0	0.1	0.0		
		0:23		2%	0%		
165.8	25.6	0:26					SPT drive 25.6-25.8 (100/0.2)
165.6	25.8	0:54					26.3'- Crystalline Rock, Tan, gray, moderately severe weathering, moderately hard, close fracture spacing, granite
		0:52					
		0:51	5.0	4.5	3.0	RS-3	
		0:34		90%	60%		
160.6	30.8	1:32					SPT drive 30.8-30.9 (60/0.1)
160.5	30.9	1:32					Crystalline Rock, gray, black, white, pink, very slight weathering, moderately hard to hard, close fracture spacing, granite
		1:25					
		1:38	5.0	4.3	3.0		
		1:46		86%	60%		
155.5	35.9	0:58					
155.5	35.9	1:13					
		1:58					
		2:12	5.0	4.9	4.1		
		2:28		98%	82%		
150.5	40.9	2:48					
							BOREHOLE TERMINATED AT ELEVATION OF 150.5 FEET, IN ROCK.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33245.1.1	ID. B-3705	COUNTY WAKE	GEOLOGIST W.F. GOLFORTH/M.D. VALIQUETTE
SITE DESCRIPTION BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK			GROUND WATER
BORING NO. B2-C	BORING LOCATION 26+87	OFFSET 14' RT	ALIGNMENT -L-
COLLAR ELEVATION 191.3'	NORTHING 789577'	EASTING 2137913'	0 HR. 3.2'
TOTAL DEPTH 41.1'	DRILL MACHINE CME-550X	DRILL METHOD CORE BORING	HAMMER TYPE AUTOMATIC
START DATE 4/22/05	COMPLETION DATE 4/22/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 35.6'

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT	PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
				0	25	50	75			
191.3										
190.0	4.9	WOH	1	0						ALLUVIAL, GRAY, SILTY SAND
185.0										
180.0	10.5	13	13	33				SS-18	S	GRAY, COARSE SAND WITH SOME GRAVEL
175.0	15.5	52	48						W	RESIDUAL, GREEN-GRAY, SILTY SAND
170.0	20.5	100								WEATHERED ROCK, TAN AND ORANGE, SEVERE WEATHERING, SOFT, VERY CLOSE TO CLOSE FRACTURE SPACING (GRANITE)
165.0	25.7	100						RS-4		REC=45% RQD=6%
160.0	30.9	100								
155.0										
150.0										CRYSTALLINE ROCK, GRAY, BLACK, WHITE AND PINK, MODERATE WEATHERING TO FRESH, MODERATE TO VERY HARD, CLOSE FRACTURE SPACING (GRANITE)
145.0										REC=100% RQD=52%
140.0										
135.0										
130.0										
125.0										
120.0										
115.0										

CORE BORING REPORT

PROJECT: 33245.1.1	ID: B-3705	COUNTY: WAKE	BORING NO: B2-C
DESCRIPTION: BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK			
LOCATION OF BORING: -L- 26+87 14' RT			COMPLETION DATE: 4/22/2005
COLLAR or GROUND ELEVATION: 191.3 ft		CORE SIZE: NQ	GEOLOGIST: W. F. GOFORTH
CORE EQUIPMENT: CME-550X		DRILLER: R. NORWOOD	

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (%)	RQD (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS	
170.6	20.7	0:57					Weathered Rock (Granite)	
		0:24						
		0:24	5.0	1.0	0.0			
		0:27		20%	0%			
165.6	25.7	0:38					SPT drive 25.7-25.9 (100/0.2)	
165.4	25.9	0:37				RS-4		
		0:31						
		0:33	5.0	3.3	0.9			
		0:45		66%	18%			
160.4	30.9	0:55					SPT drive 30.9-31.1 (100/0.2)	
160.2	31.1	0:37					35.6'- Crystalline Rock, Gray, black, white, pink, moderate weathering to fresh, moderately to very hard, close fracture spacing, granite.	
		0:32						
		0:39	5.0	2.7	0.0			
		0:41		54%	0%			
155.2	36.1	0:50				RS-5	Crystalline Rock, Gray, black, white, pink, moderate weathering to fresh, moderately to very hard, close fracture spacing, granite.	
		1:25						
		1:38						
		2:00	5.0	5.0	2.6			
150.2	41.1	1:59		100%	52%			
		2:28						

BOREHOLE TERMINATED AT ELEVATION OF 150.2 FEET, IN ROCK.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33245.1.1	ID. B-3705	COUNTY WAKE	GEOLOGIST W.F. GOLFORTH/M.D. VALIQUETTE
SITE DESCRIPTION BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK			GROUND WATER
BORING NO. B2-B	BORING LOCATION 26+64	OFFSET 56' RT	ALIGNMENT -L-
COLLAR ELEVATION 190.9'			0 HR. 2.8'
NORTHING 789531'			24 HR. 4.3'
EASTING 2137901'			
TOTAL DEPTH 50.2'	DRILL MACHINE CME-550X	DRILL METHOD CORE BORING	HAMMER TYPE AUTOMATIC
START DATE 4/19/05	COMPLETION DATE 4/19/05	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 32.9'

ELEV. (FT.)	DEPTH (FT.)	BLOW COUNT			PEN. (FT.)	BLOWS PER FOOT				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		0.5'	1.0'	1.5'		0	25	50	75			
190.9	0.0										W	ALLUVIAL, GRAY, CLAYEY SILT WITH FINE SAND
185.0	4.2	1	1	1	1.0							
180.0	9.2	9	13	13	1.0						S	RESIDUAL, GRAY-BROWN, COARSE SAND
175.0	14.2	13	43	54	1.0						S	
170.0	19.2	16	43	39	1.0						S	
165.0	24.2	100			0.5							WEATHERED ROCK (GRANITE) REC=44% ROD=8%
160.0	29.7	100			0.3							
155.0	35.0	100			0.2							CRYSTALLINE ROCK, GRAY, BLACK, WHITE, AND PINK, SLIGHT WEATHERING TO FRESH, MODERATE TO VERY HARD, CLOSE TO MODERATELY CLOSE FRACTURE SPACING (GRANITE) REC=100% ROD=84%
CORING TERMINATED AT ELEVATION 140.7 FEET IN CRYSTALLINE ROCK (GRANITE)												
140.0												
135.0												
130.0												
125.0												
120.0												
115.0												

CORE BORING REPORT

PROJECT: 33245.1.1	ID: B-3705	COUNTY: WAKE	BORING NO: B2-B
DESCRIPTION: BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK			
LOCATION OF BORING: -L- 26+64 56' RT		COMPLETION DATE: 4/19/05	
COLLAR or GROUND ELEVATION: 190.9 ft	CORE SIZE: NQ	GEOLOGIST: W. F. GOFORTH	
CORE EQUIPMENT: CME-550X		DRILLER: R. NORWOOD	

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (%)	RQD (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
166.2	24.7	1:40 1:02 0:59 0:43	5.0	1.9 38%	0.0 0%		Weathered Rock (Granite)
161.2	29.7	0:42					SPT drive 29.7-30.0 (100/0.3)
160.9	30.0	0:45 0:45 0:45 0:47	5.0	2.5 50%	0.8 16%		32.9'- Crystalline Rock, Gray, black, white and pink, slight weathering to fresh, moderately to very hard, close to moderately close fracturing, granite. Weathered zones from 34.4-37.5.
155.9	35.0	1:55					SPT drive 35.0-35.2 (100/0.2)
155.7	35.2	1:23 2:01 2:05 2:23	5.0	5.0 100%	3.2 64%	RS-1	
150.7	40.2	2:32					
150.7	40.2	3:24 3:03 2:47 2:50	5.0	5.0 100%	4.9 98%		
145.7	45.2	3:05					
145.7	45.2	3:53 3:14 8:03 4:44	5.0	5.0 100%	4.5 90%		
140.7	50.2	2:56					
BOREHOLE TERMINATED AT ELEVATION OF 140.7 FEET, IN ROCK.							



**FIELD
SCOUR REPORT**

WBS: 33245.1.1 TIP: B-3705 COUNTY: WAKE

DESCRIPTION(1): BRIDGE NO. 125 ON -L- (SR 2045) OVER SMITHS CREEK

EXISTING BRIDGE

Information from: Field Inspection Microfilm _____ (reel _____ pos: _____)
Other (explain) Bridge Survey & Hydraulic Design Report

Bridge No.: 125 Length: 121.3' Total Bents: 8 Bents in Channel: 4 Bents in Floodplain: 4
Foundation Type: Timber Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: End Bent 1 slope has evidence of scour

Interior Bents: Scour holes present at interior bents

Channel Bed: Some scour pockets

Channel Bank: Some tree roots are exposed along the banks indicating erosion

EXISTING SCOUR PROTECTION

Type(3): Rip Rap

Extent(4): Approximately 5-10 feet from outside edge of bridge; End Slopes are unprotected

Effectiveness(5): Effective where used; End Slopes need protection

Obstructions(6): At the time of the investigation trees and other debris were noted just upstream of the bridge

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): Fine to coarse sand

Channel Bank Material(8): (SS-13) Coarse sand

Channel Bank Cover(9): Trees and scrub

Floodplain Width(10): Approximately 500'

Floodplain Cover(11): Wooded

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): Slight tendency to the west towards End Bent 1

Observations and Other Comments: N/A

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

		BENTS											
		Bent 1	Bent 2										
100 yr		180.9	180.2										

Comparison of DSE to Hydraulics Unit theoretical scour:

No scour is anticipated beyond the end bents. The Geotechnical Engineering Unit agrees with the predicted scour in the Bridge Survey and Hydraulic Design Report dated 06/05/2006.

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 18,
"Soil Test Results",
for sample:
SS-13

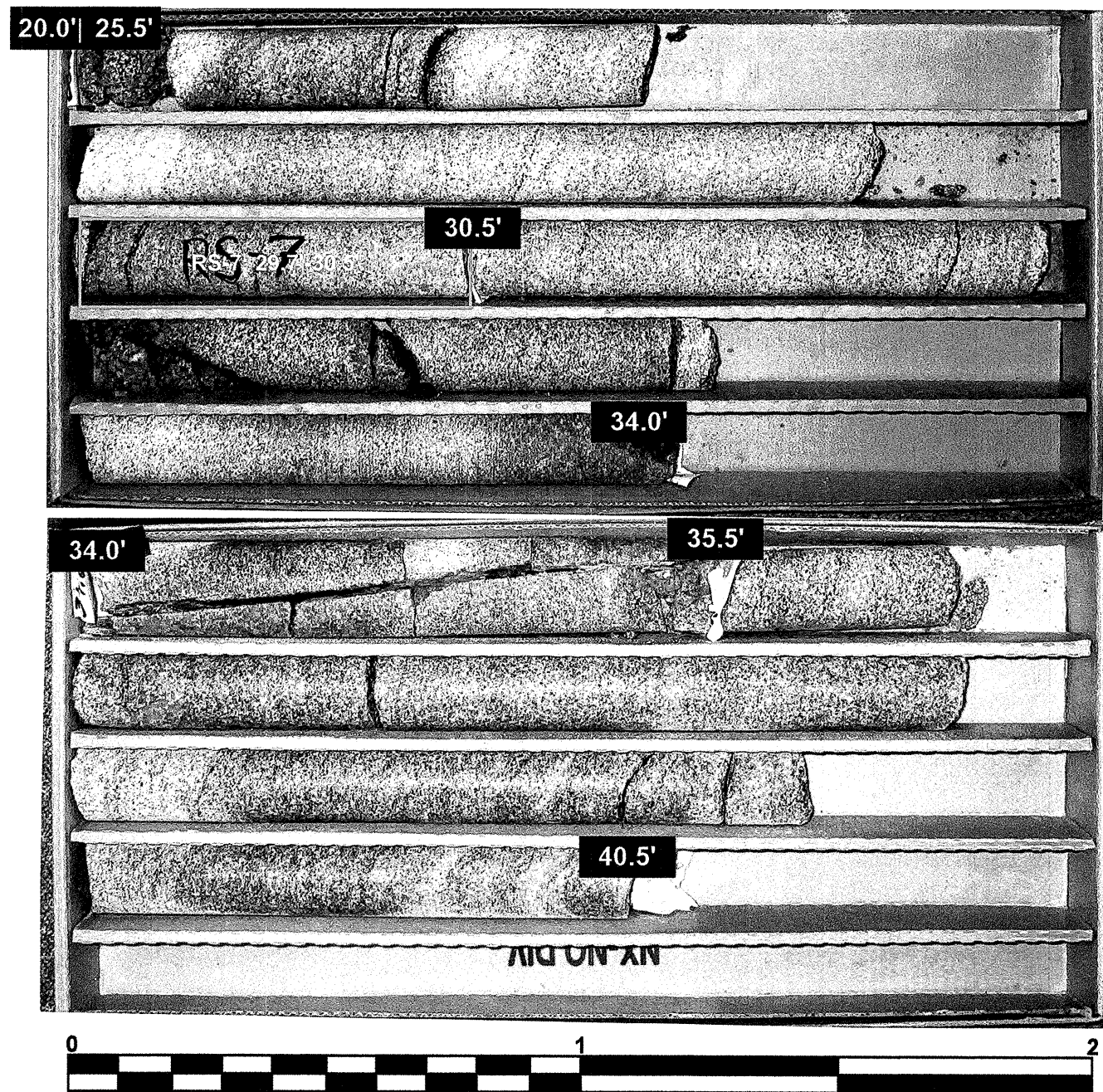
Reported by: 
Kevin B. Miller, LG
Project Geological Engineer

Date: 09/25/2006

CORE PHOTOGRAPHS

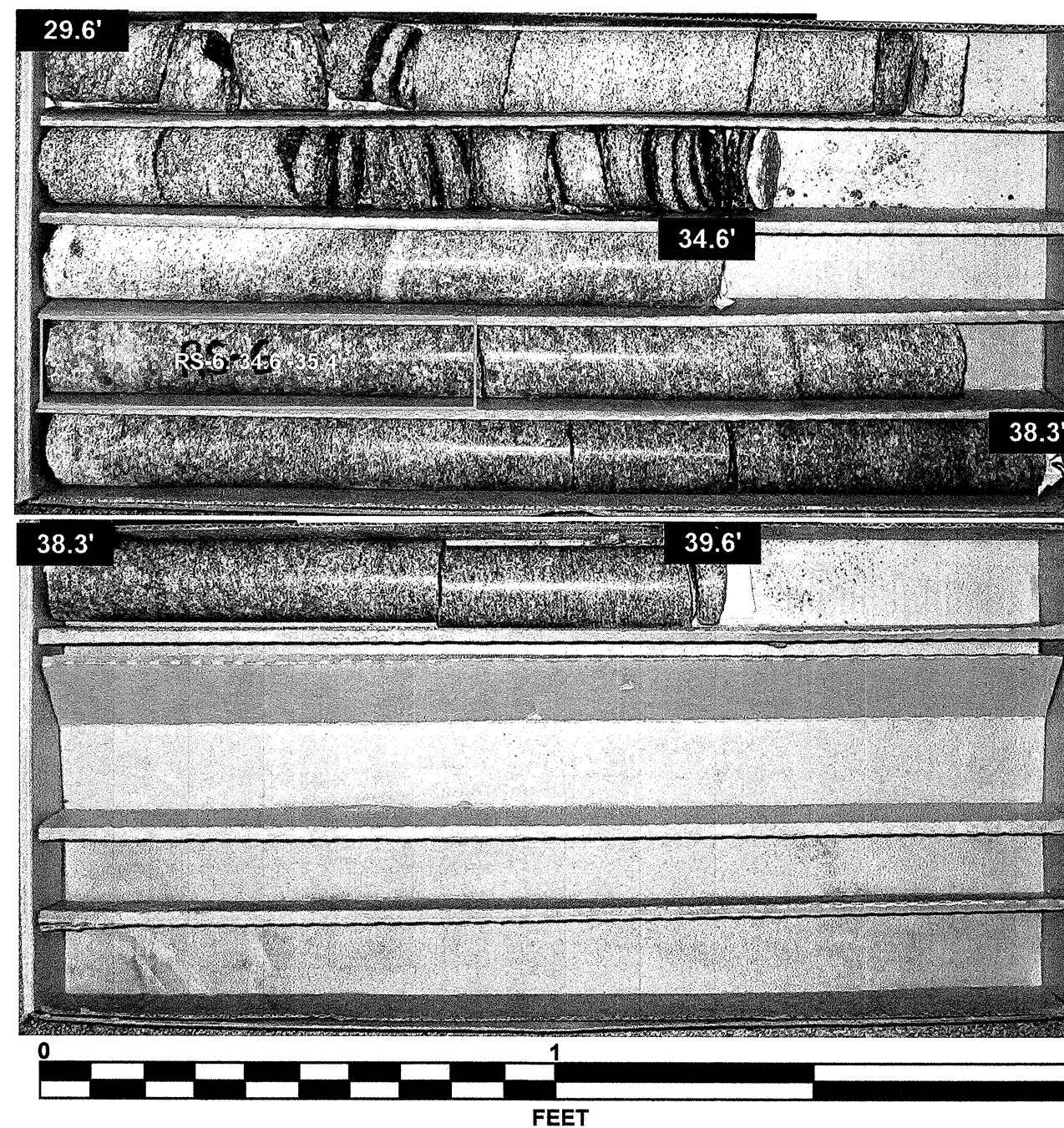
B1-A

BOXES 1 & 2: 20.0 - 40.5 FEET



B1-C

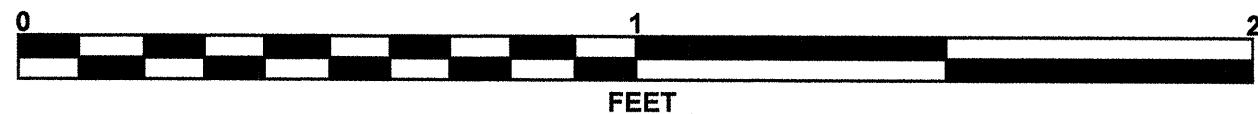
BOXES 1 & 2: 29.6 - 39.6 FEET



CORE PHOTOGRAPHS

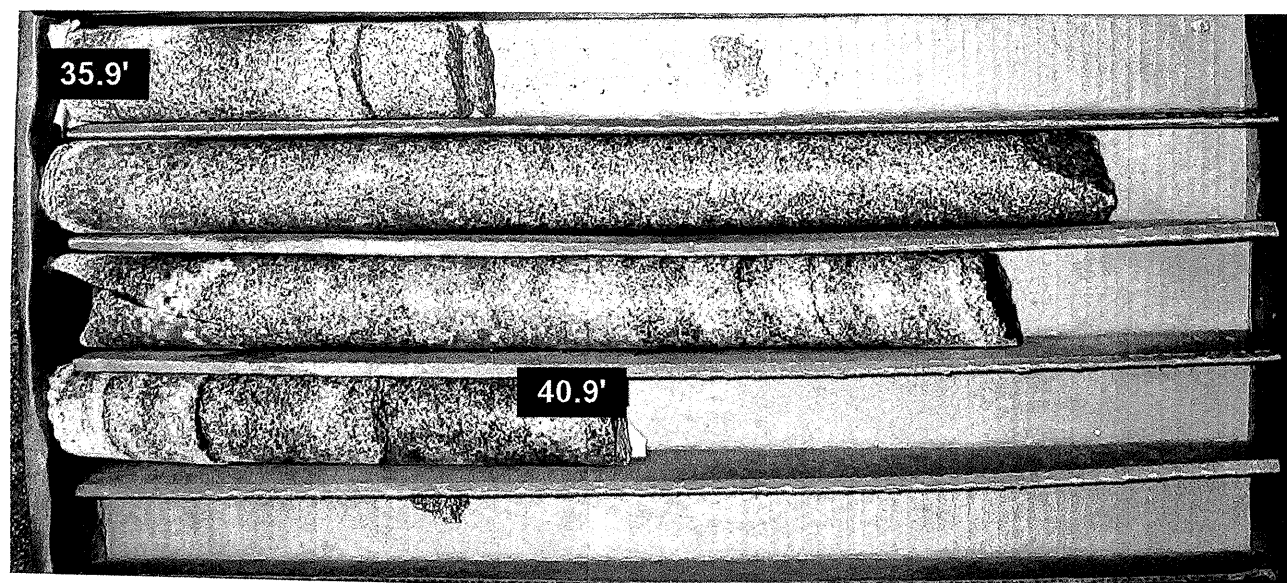
B1-B

BOXES 1 & 2: 17.7 - 38.5 FEET



B2-A

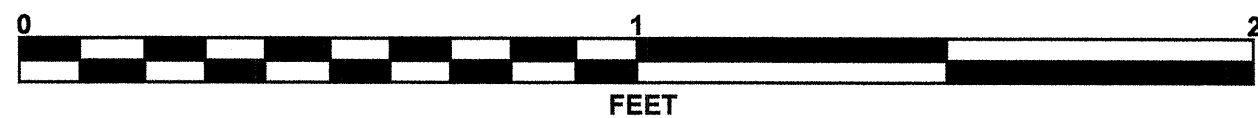
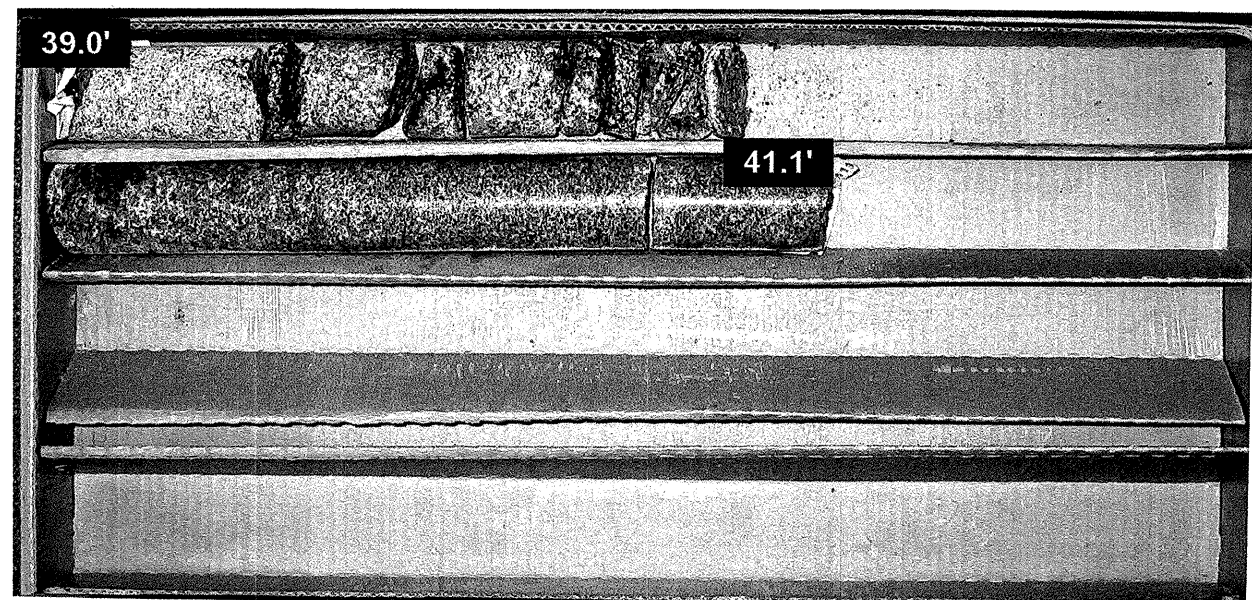
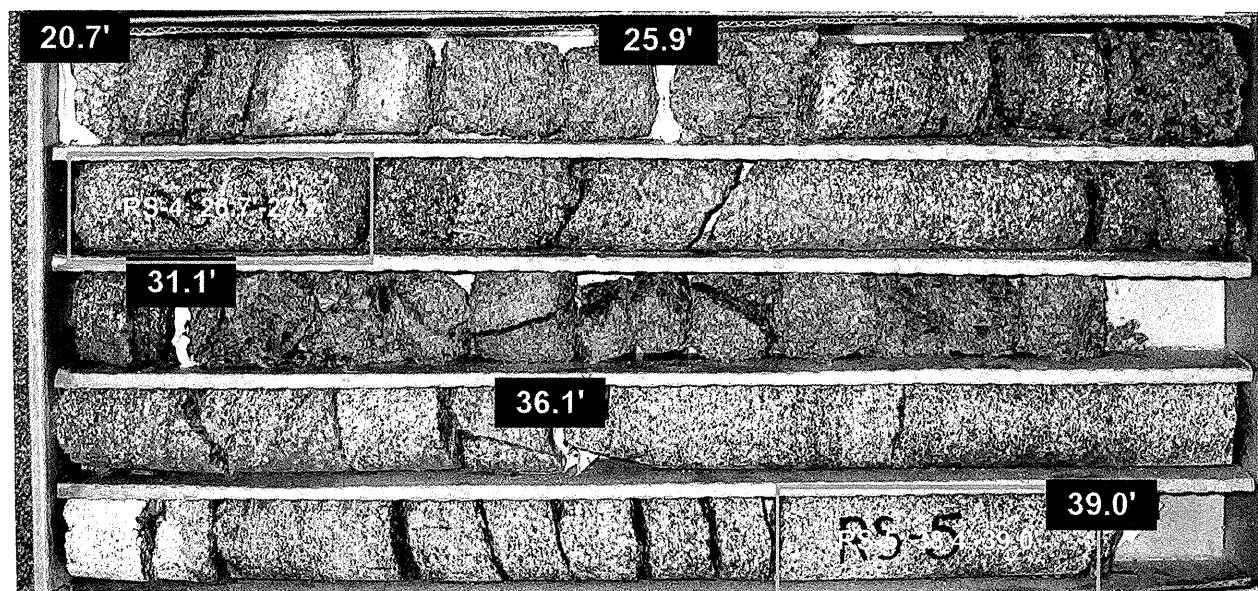
BOXES 1 & 2: 20.6 - 40.9 FEET



CORE PHOTOGRAPHS

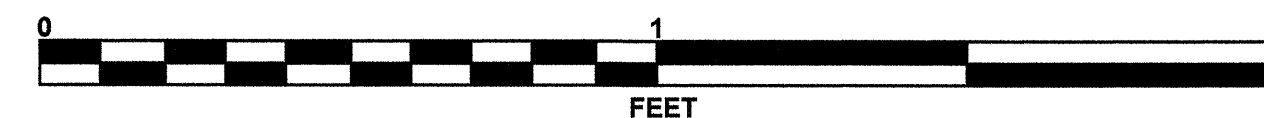
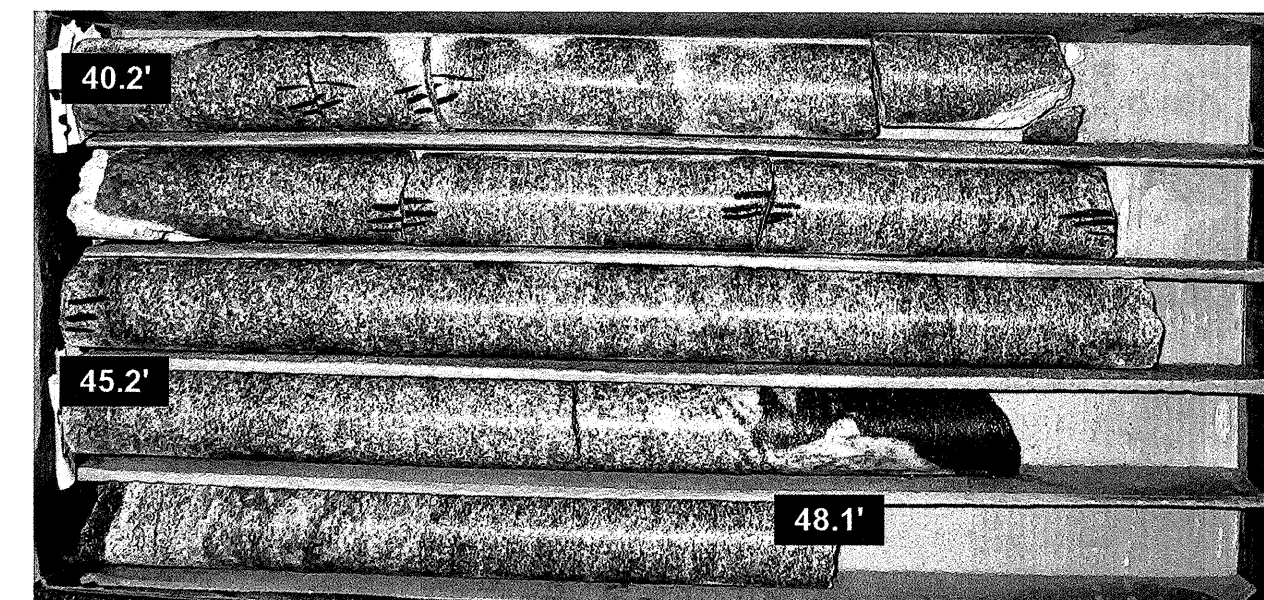
B2-C

BOXES 1 & 2: 20.7 - 41.1 FEET



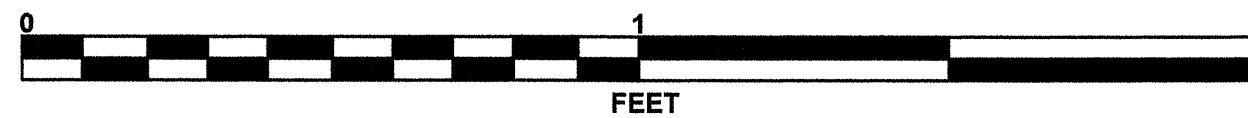
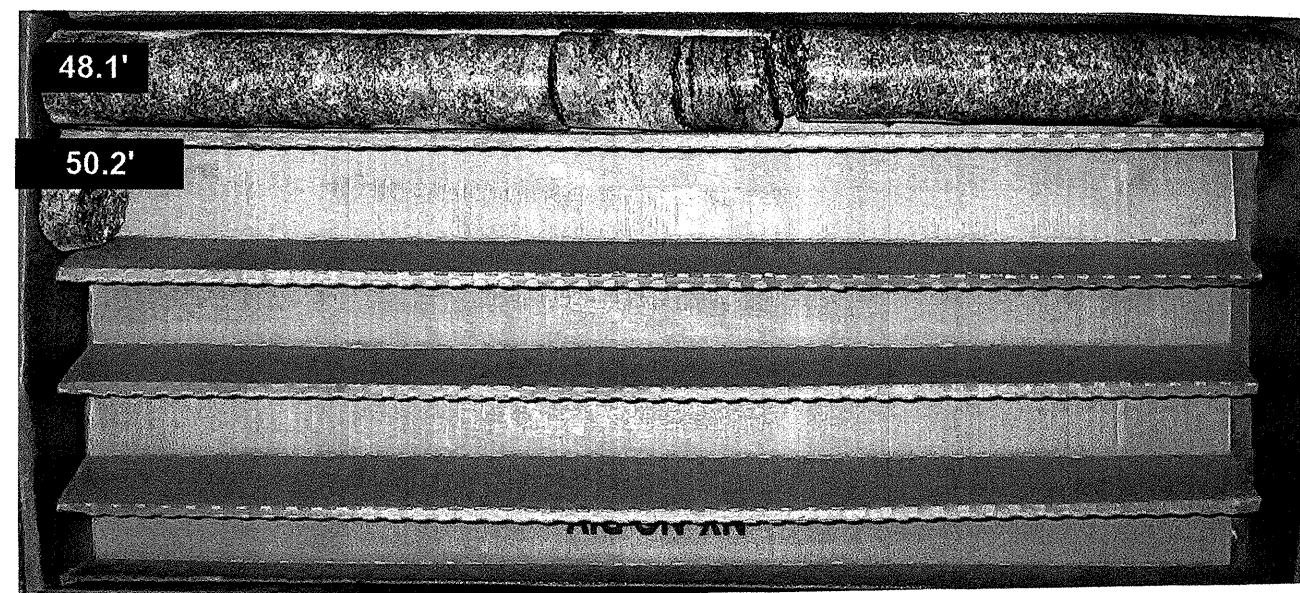
B2-B

BOXES 1 & 2: 24.7 - 48.1 FEET



CORE PHOTOGRAPHS

B2-B
BOX 3: 48.1 - 50.2 FEET



SITE PHOTOGRAPH

Bridge No. 125 on -L- (SR 2045) Over Smiths Creek



Looking North Towards End Bent 2