

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	38461.1.1 B-4668	1	20

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. B-4668 F.A. PROJ. BRNHS-321(13)
COUNTY WATAUGA
PROJECT DESCRIPTION BRIDGE NO. 29 ON U.S. 321 OVER COVE
CREEK

SITE DESCRIPTION _____

CONTENTS

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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1909 ZSO-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

M. M. HAGAR

R. D. CHILDERS

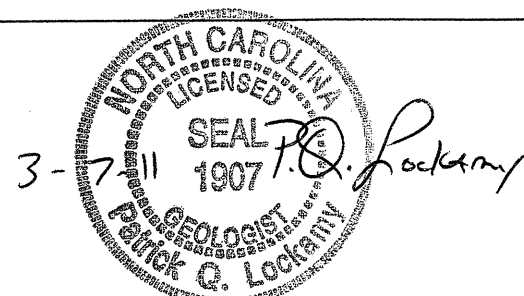
G. K. ROSE

INVESTIGATED BY P. Q. LOCKAMY

CHECKED BY W. D. FRYE

SUBMITTED BY W. D. FRYE

DATE 03.07.11



PROJECT: 38461.1.1 ID: B-4668

DRAWN BY: J. T. WILLIAMS

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

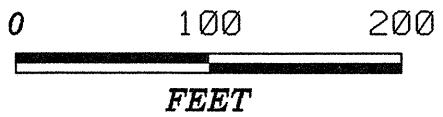
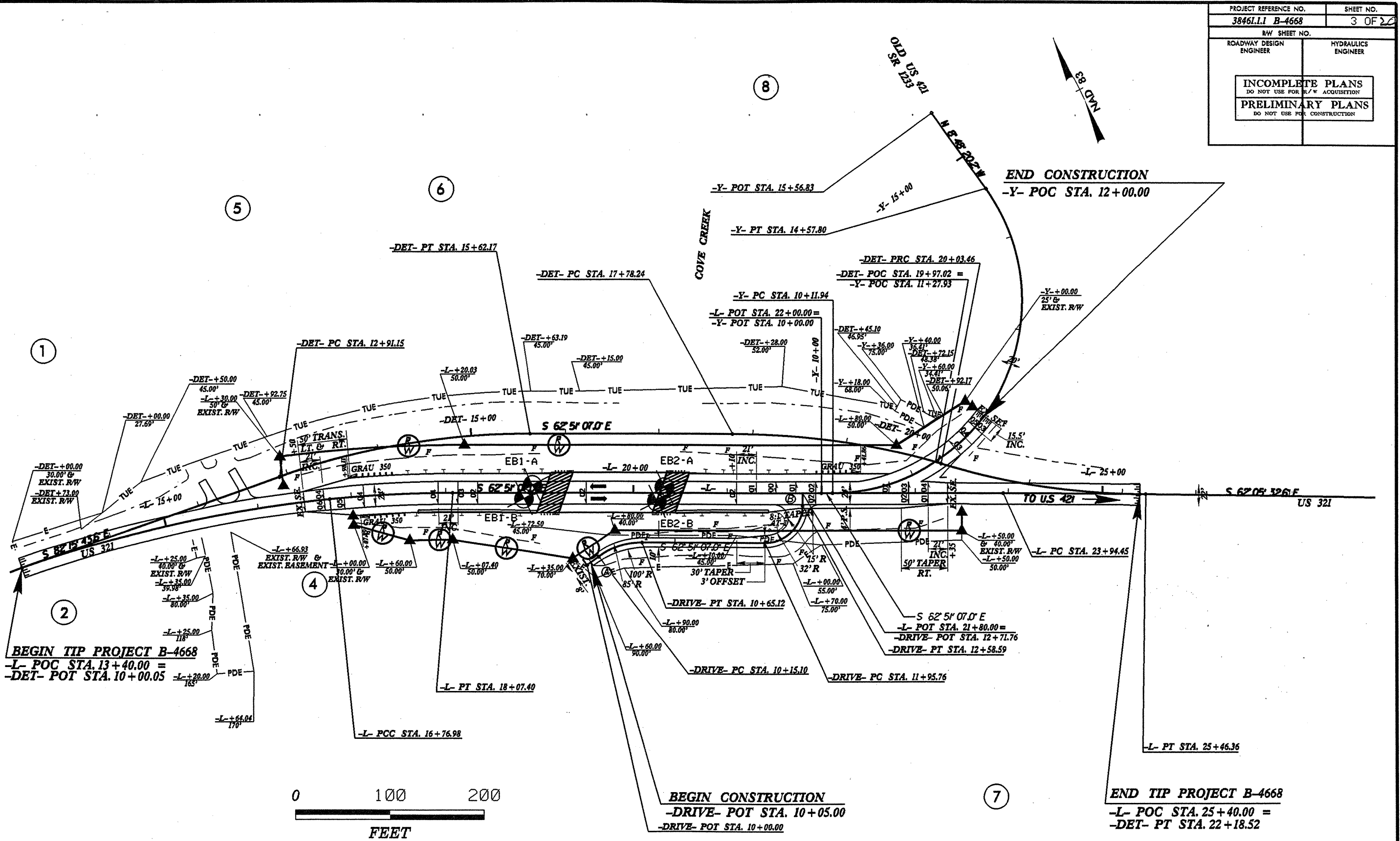
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, HEAVY 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 6.0 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: NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN 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 DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (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 6.0 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCREC) - 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.			SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50			FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.		
COMPRESSIBILITY			PERCENTAGE OF MATERIAL			GROUND WATER			MISCELLANEOUS SYMBOLS		
GROUP CLASS. A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 A-6, A-7			ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL			WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING			ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		
SYMBOL			TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%			STATIC WATER LEVEL AFTER 24 HOURS			SOIL SYMBOL		
% PASSING			SILT-CLAY SOILS GRANULAR SOILS MUCK, PEAT			PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA			ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		
LIQUID LIMIT PLASTIC INDEX			SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER			SPRING OR SEEP			INFERRED SOIL BOUNDARY		
GROUP INDEX			HIGHLY ORGANIC SOILS						INFERRED ROCK LINE		
USUAL TYPES OF MAJOR MATERIALS			FAIR TO POOR POOR UNSUITABLE						ALLUVIAL SOIL BOUNDARY		
GENERAL RATING AS A SUBGRADE									DIP & DIP DIRECTION OF ROCK STRUCTURES		
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30									SOUNDING ROD		
CONSISTENCY OR DENSENESS			ABBREVIATIONS			FRACTURE SPACING			BEDDING		
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)			HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS 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			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			VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET		
GENERAL GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE			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			HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B-N XWL H			FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.		
GENERAL SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD			HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS 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			HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST			MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.		
TEXTURE OR GRAIN SIZE			EQUIPMENT USED ON SUBJECT PROJECT			INDURATION					
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			DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST			FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.					
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)			ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE 2 15/16" STEEL TEETH TRICONE * TUNG-CARB. CORE BIT			FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.					
GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005			PORTABLE HOIST			MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.					
SOIL MOISTURE - CORRELATION OF TERMS			PORTABLE HOIST			INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			PORTABLE HOIST			EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					
LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE			PORTABLE HOIST								
PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE			PORTABLE HOIST								
OPTIMUM MOISTURE SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE			PORTABLE HOIST								
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE			PORTABLE HOIST								
PLASTICITY			PORTABLE HOIST								
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY			PORTABLE HOIST								
PLASTICITY INDEX (PI) DRY STRENGTH			PORTABLE HOIST								
DRY STRENGTH VERY LOW SLIGHT MEDIUM HIGH			PORTABLE HOIST								
COLOR			PORTABLE HOIST								
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.			PORTABLE HOIST								

5/14/95
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PROJECT REFERENCE NO. 38461.1.1 B-4668	SHEET NO. 3 OF 20
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



BEGIN TIP PROJECT B-4668
 -L- POC STA. 13+40.00 =
 -DET- POT STA. 10+00.05

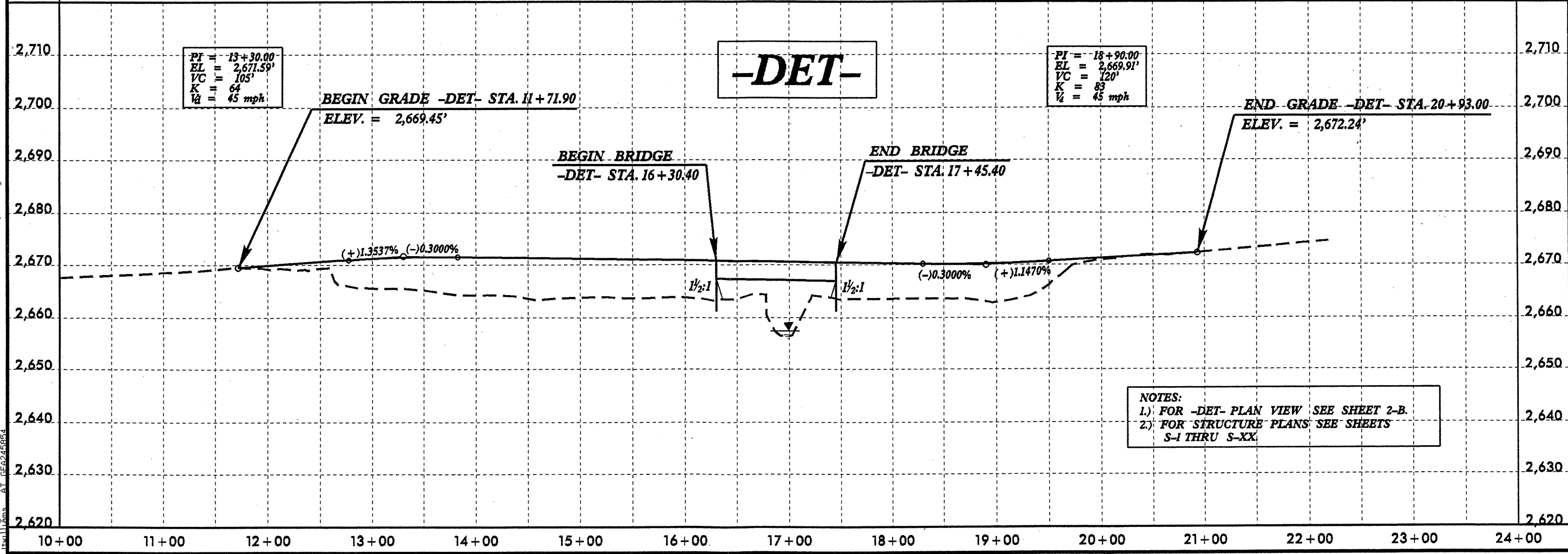
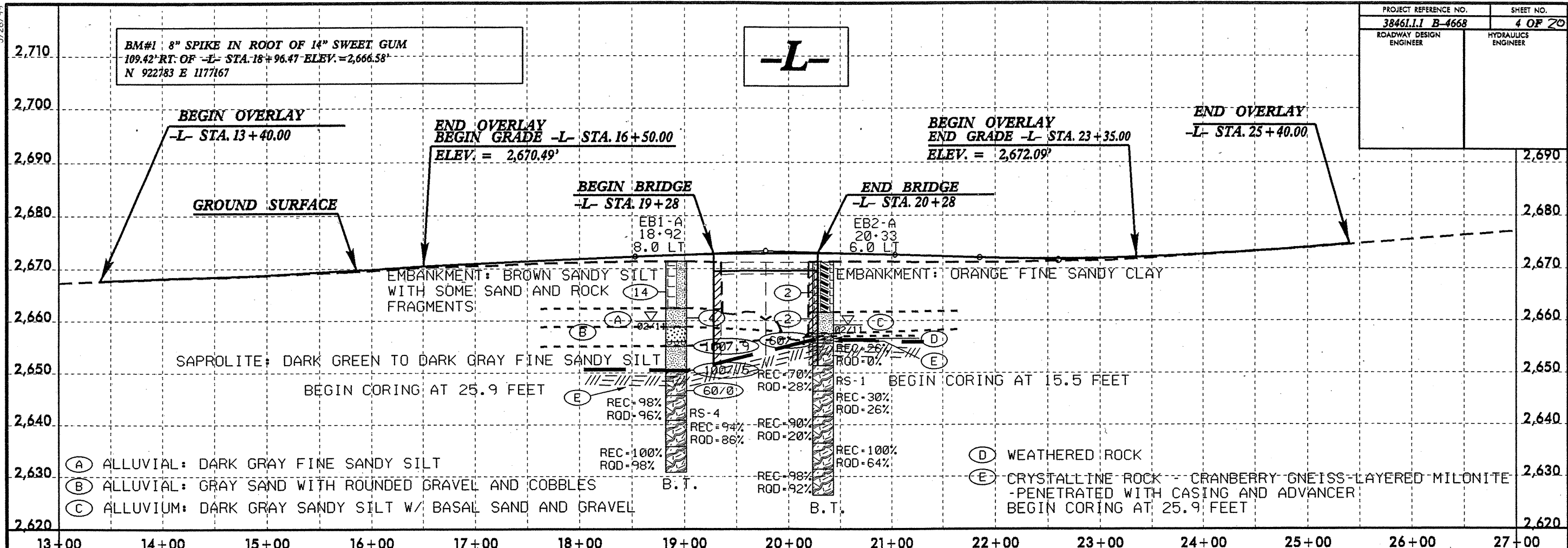
BEGIN CONSTRUCTION
 -DRIVE- POT STA. 10+05.00
 -DRIVE- POT STA. 10+00.00

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 -L- POC STA. 25+40.00 =
 -DET- PT STA. 22+18.52

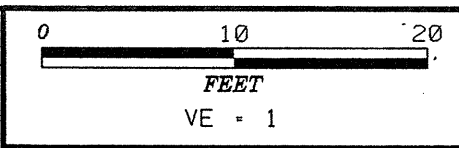
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5/28/99

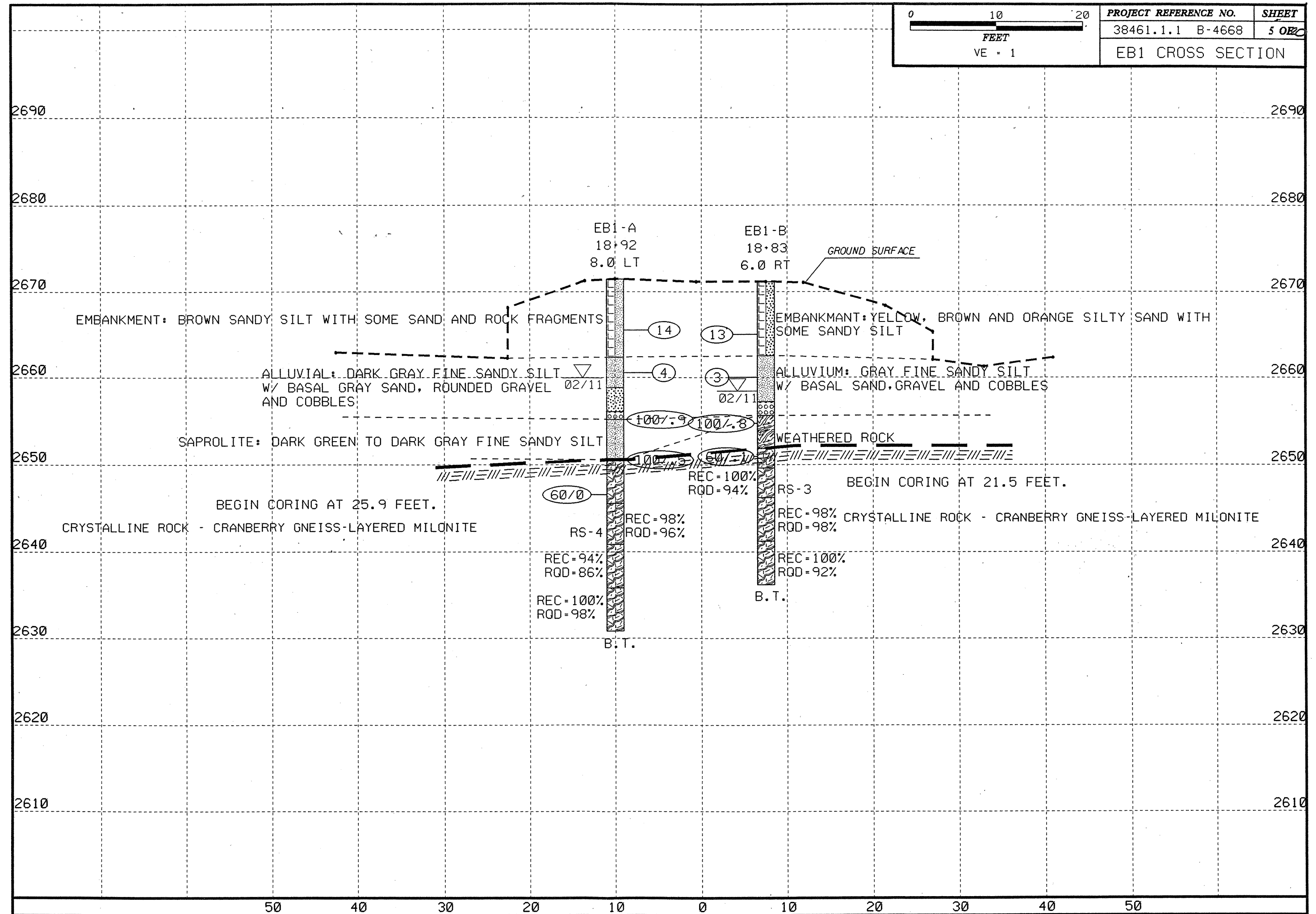
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

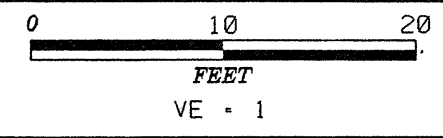


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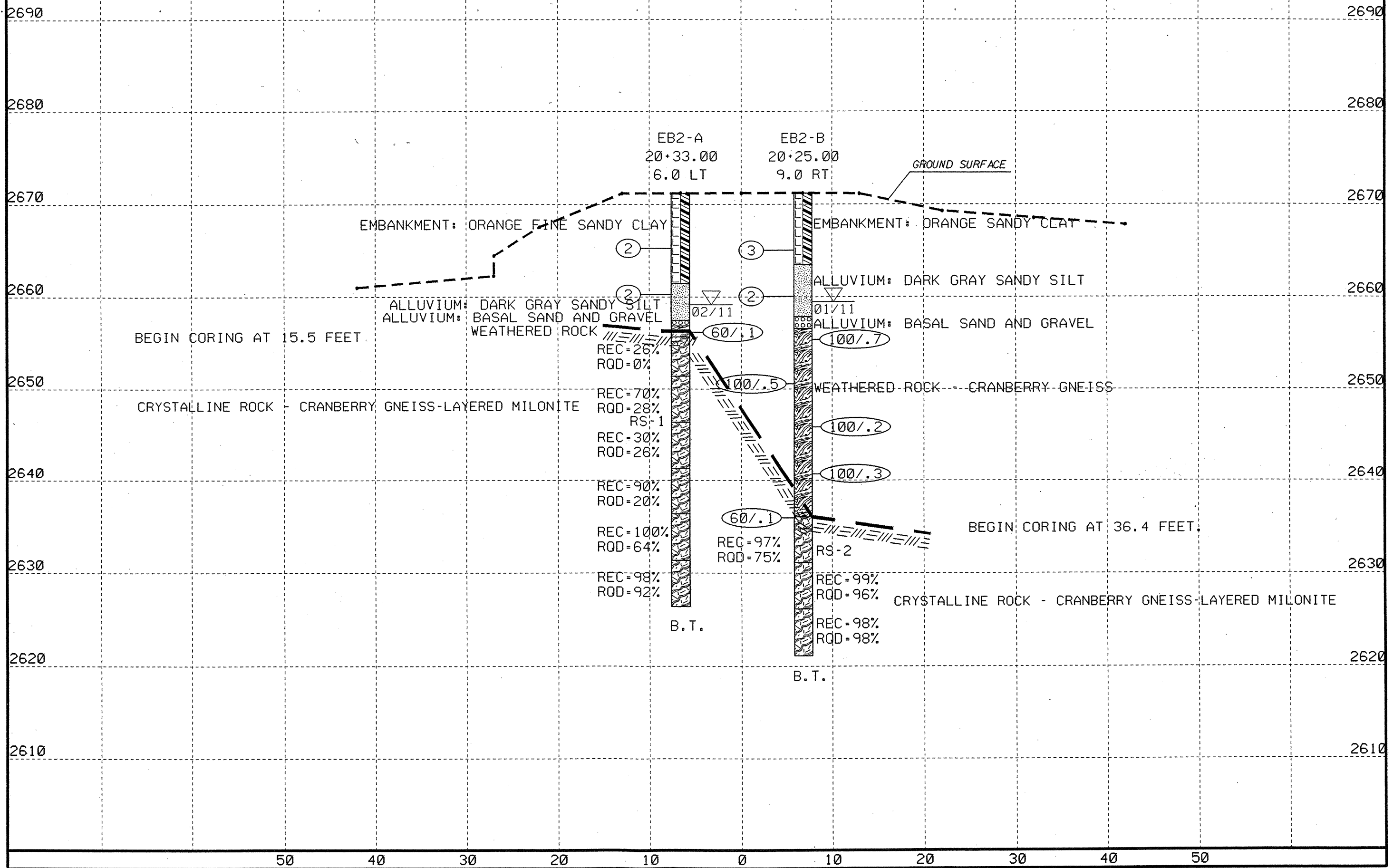


PROJECT REFERENCE NO.	SHEET
38461.1.1 B-4668	5 OF 10
EB1 CROSS SECTION	





PROJECT REFERENCE NO.	SHEET
38461.1.1 B-4668	6 OF 22
EB2 CROSS SECTION	



WBS 38461.1.1		TIP B-4668		COUNTY WATAUGA		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION Watauga Co. Bridge 29 on US-321 over Cove Creek							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 18+92		OFFSET 8 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 2,671.4 ft		TOTAL DEPTH 40.6 ft		NORTHING 922,889		EASTING 1,177,217										
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic												
DRILLER Rose, G. K.		START DATE 02/03/11		COMP. DATE 02/03/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2675														2,671.4	0.0	GROUND SURFACE
2670														2,671.4		Embankment: Brown sandy silt with some sand and rock fragments
2665	2,666.5	4.9	4	5	9									2,666.5		
2660	2,661.5	9.9	4	1	3									2,662.3	9.1	Alluvial: Dark gray fine sandy silt
2655	2,656.5	14.9	10	32	68/0.4									2,658.8	12.6	Alluvial: Gray sand with rounded gravel
2650	2,651.5	19.9	16	32	67/0.0									2,656.0	15.4	Alluvial: Cobbles
2645	2,646.5	24.9	60/0											2,655.1	16.3	Saprolite: Dark green to Dark gray fine sandy silt
2640														2,650.5	20.9	Crystalline Rock - Cranberry Gneiss-penetrated with casing and advancer
2635														2,645.5	25.9	Begin Coring at 25.9 feet.
														2,640.8	30.6	Crystalline Rock - Cranberry Gneiss mylonite
														2,635.8	35.6	Crystalline Rock - Cranberry Gneiss mylonite
														2,630.8	40.6	Boring Terminated at Elevation 2,630.8 ft in crystalline rock

NCDOT BORE SINGLE B4668 GEO.GPJ NC_DOT.GDT 3/1/11

WBS 38461.1.1		TIP B-4668		COUNTY WATAUGA		GEOLOGIST Hager, M. M.						
SITE DESCRIPTION Watauga Co. Bridge 29 on US-321 over Cove Creek							GROUND WTR (ft)					
BORING NO. EB1-A		STATION 18+92		OFFSET 8 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 2,671.4 ft		TOTAL DEPTH 40.6 ft		NORTHING 922,889		EASTING 1,177,217						
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Rose, G. K.		START DATE 02/03/11		COMP. DATE 02/03/11		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
2645.5	2,645.5	25.9	4.7	1:44/1.0 1:33/1.0 1:32/1.0 1:57/1.0 1:18/0.7	(4.6) 98%	(4.5) 96%					2,645.5	25.9
2640	2,640.8	30.6	5.0	1:42/1.0 1:51/1.0 1:44/1.0 1:58/1.0 1:55/1.0	(4.7) 94%	(4.3) 86%	RS-4				2,640.8	30.6
2635	2,635.8	35.6	5.0	2:19/1.0 1:56/1.0 3:07/1.0 2:34/1.0 2:40/1.0	(5.0) 100%	(4.9) 98%					2,635.8	35.6
	2,630.8	40.6									2,630.8	40.6

NCDOT CORE SINGLE B4668 GEO.GPJ NC_DOT.GDT 3/1/11

WBS 38461.1.1	TIP B-4668	COUNTY WATAUGA	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Watauga Co. Bridge 29 on US-321 over Cove Creek			GROUND WTR (ft)
BORING NO. EB2-A	STATION 20+33	OFFSET 6 ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,671.2 ft	TOTAL DEPTH 44.8 ft	NORTHING 922,823	EASTING 1,177,341
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Rose, G. K.	START DATE 02/02/11	COMP. DATE 02/02/11	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
2675														
2670													2,671.2 GROUND SURFACE 0.0	
2665	2,666.3	4.9	1	1	1								Embankment: Orange fine sandy clay	
2660	2,661.3	9.9	1	1	1								Alluvium: Dark gray sandy silt	9.7
2655	2,656.3	14.9	60/1										Alluvium: Basal sand and gravel	13.7
													Weathered Rock	14.9
													Crystalline Rock - Cranberry Gneiss - penetrated by casing and advancer	15.5
2650													Begin Coring at 15.5 feet	19.8
													Crystalline Rock - Cranberry Gneiss - mylonite	19.8
2645													Crystalline Rock - Cranberry Gneiss - mylonite	24.8
													Crystalline Rock - Cranberry Gneiss - mylonite	24.8
2640													Crystalline Rock - Cranberry Gneiss - mylonite	29.8
													Crystalline Rock - Cranberry Gneiss - mylonite	29.8
2635													Crystalline Rock - Cranberry Gneiss - mylonite	34.8
													Crystalline Rock - Cranberry Gneiss - mylonite	34.8
2630													Crystalline Rock - Cranberry Gneiss - mylonite	39.8
													Crystalline Rock - Cranberry Gneiss - mylonite	39.8
													Boring Terminated at Elevation 2,626.4 ft in crystalline rock	44.8

WBS 38461.1.1	TIP B-4668	COUNTY WATAUGA	GEOLOGIST Hager, M. M.
SITE DESCRIPTION Watauga Co. Bridge 29 on US-321 over Cove Creek			GROUND WTR (ft)
BORING NO. EB2-A	STATION 20+33	OFFSET 6 ft LT	ALIGNMENT -L-
COLLAR ELEV. 2,671.2 ft	TOTAL DEPTH 44.8 ft	NORTHING 922,823	EASTING 1,177,341
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Rose, G. K.	START DATE 02/02/11	COMP. DATE 02/02/11	SURFACE WATER DEPTH N/A

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
2655.67											Begin Coring @ 15.5 ft	
2655	2,655.7	15.5	4.3	2:55/1.0	(1.1)	(0.0)					Layered mylonite gneiss of the Cranberry Gneiss Formation. Variably weathered. 15.5-16.16.4 V. SLI. and hard. 16.4-19.8 has very severe weathering (saprolitic). Many stained breaks on layering at 10 degrees.	15.5
	2,651.4	19.8		1:32/1.0	26%	0%						19.8
2650			5.0	1:31/1.0			RS-5				Layered mylonite gneiss. Variably weathered. 19.8-21.3 V. SEV. weathered. 21.3-24.8 predominantly V. SLI. and hard w/ layers of SEV. weathering (weathered rock). Numerous breaks on layering at 10-30 degrees.	24.8
	2,646.4	24.8		1:34/1.0	(3.5)	(1.4)						24.8
2645			5.0	0:35/0.3	70%	28%	RS-1				Layered mylonite gneiss. V. SLI. to MOD. V. hard to MED. hard. Numerous breaks on layering at 10 to 30 degrees. One inch layers of weathered rock at 27.0 and 27.8 feet. Breaks at 60 and 80 degrees have soil stains.	29.8
	2,641.4	29.8		1:46/1.0	(1.5)	(1.3)						29.8
2640			5.0	1:27/1.0	(4.5)	(1.0)					Layered mylonite gneiss. Fresh to MOD. SEV. and V. hard to MED. hard. Laterals at 10 to 30 degrees. Numerous breaks on layering. Numerous near vertical fractures at 31.5 to 34.2 feet.	34.8
	2,636.4	34.8		1:15/1.0	30%	26%						34.8
2635			5.0	1:56/1.0	(5.0)	(3.2)					Fresh and hard to MOD. hard layered mylonite gneiss with layers of weathered rock at 37.3 to 37.8 feet and 38.5 feet.	39.8
	2,631.4	39.8		1:32/1.0	100%	64%						39.8
2630			5.0	2:01/1.0	(4.9)	(4.6)					Layered mylonite gneiss. Few breaks on layering at 10 to 30 degrees. One rough break at 75 degree. V. hard and fresh.	44.8
	2,626.4	44.8		1:30/1.0	98%	92%						44.8
				1:53/1.0							Boring Terminated at Elevation 2,626.4 ft in crystalline rock	
				1:15/1.0								
				1:15/1.0								
				1:19/1.0								
				1:21/1.0								

WBS 38461.1.1		TIP B-4668		COUNTY WATAUGA		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION Watauga Co. Bridge 29 on US-321 over Cove Creek						GROUND WTR (ft)									
BORING NO. EB2-B		STATION 20+25		OFFSET 9 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 2,671.2 ft		TOTAL DEPTH 50.0 ft		NORTHING 922,813		EASTING 1,177,328									
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic		0 HR. 11.7									
DRILLER Rose, G. K.		START DATE 01/31/11		COMP. DATE 01/31/11		24 HR. N/A									
DRILLER		START DATE		COMP. DATE		SURFACE WATER DEPTH 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					
2675														2,671.2	0.0
2670														Embarkment: Orange sandy clay	
2665	2,666.1	5.1	2	1	2										
2660	2,661.1	10.1	1	1	1									Alluvium: Dark gray sandy silt	7.7
2655	2,656.1	15.1	48	52/2										Alluvium: Basal sand and gravel	14.6
2650	2,651.1	20.1	100/5											Weathered Rock - Cranberry Gneiss	100/7
2645	2,646.1	25.1	100/2												100/5
2640	2,641.1	30.1	100/3												100/2
2635	2,636.1	35.1	60/1											Crystalline Rock - Cranberry Gneiss - penetrated with casing and advancer	35.1
2630														Begin coring at 36.4 feet.	36.4
2625														Crystalline Rock - Cranberry Gneiss	40.0
														Crystalline Rock - Cranberry Gneiss	45.0
														Crystalline Rock - Cranberry Gneiss	50.0
														Boring Terminated at Elevation 2,621.2 ft in crystalline rock	

NCDOT BORE SINGLE_B4668_GEO.GPJ_NC_DOT.GDT 3/1/11

WBS 38461.1.1		TIP B-4668		COUNTY WATAUGA		GEOLOGIST Hager, M. M.						
SITE DESCRIPTION Watauga Co. Bridge 29 on US-321 over Cove Creek						GROUND WTR (ft)						
BORING NO. EB2-B		STATION 20+25		OFFSET 9 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 2,671.2 ft		TOTAL DEPTH 50.0 ft		NORTHING 922,813		EASTING 1,177,328						
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic		0 HR. 11.7						
DRILLER Rose, G. K.		START DATE 01/31/11		COMP. DATE 01/31/11		24 HR. N/A						
DRILLER		START DATE		COMP. DATE		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
2634.75											Begin Coring @ 36.4 ft	
2634.8	2,634.8	36.4	3.6	2:40/1.0	(3.5)	(2.7)					Layered mylonite gneiss of the Cranberry Gneiss Formation. Hard and fresh, otherwise 1 inch soil layer at 37.8 feet. 2 stained breaks at 45 degrees. 4 breaks on layering at 5-10 degrees.	36.4
2630	2,631.2	40.0	5.0	2:48/1.0	97%	75%						40.0
				2:49/1.0								
				1:39/0.6								
				2:17/1.0	(4.9)	(4.8)					Layered mylonite gneiss. V. hard and fresh. One break on foliation at 5 degrees at 41.6 feet.	
				2:16/1.0	98%	96%						
				2:12/1.0								
				2:33/1.0								
				3:31/1.0								
2625	2,626.2	45.0	5.0	3:03/1.0	(4.9)	(4.9)					Very hard and fresh mylonite gneiss. Layering 5 to 10 degrees. 1 stained break on layering at 5 degrees otherwise all breaks are machine made. Healed fracture at 80 degrees.	45.0
				3:49/1.0	98%	98%						
				4:01/1.0								
				3:26/1.0								
				2:21/1.0								
											Boring Terminated at Elevation 2,621.2 ft in crystalline rock	50.0

NCDOT CORE SINGLE_B4668_GEO.GPJ_NC_DOT.GDT 3/1/11



**FIELD
 SCOUR REPORT**

WBS: 38461.1.1 TIP: B-4668 COUNTY: Watauga

DESCRIPTION(1): Watauga County Bridge 29 on US-321 over Cove Creek

EXISTING BRIDGE

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

Bridge No.: 29 Length: 82 Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 3
 Foundation Type:

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: East end bent has rip-rap up and down stream.

Interior Bents: scour hole on downstream end of interior bent

Channel Bed: scour hole on downstream end of interior bent

Channel Bank: Rip-rap at toe of driveway fill downstream of east endbent and rip-ap upstream of east end bent

EXISTING SCOUR PROTECTION

Type(3): Tapered concrete wing walls

Extent(4): Creek bed to roadway and tapered down and out from bridge

Effectiveness(5): very good

Obstructions(6): Floodplain filled on the NW side of bridge forcing creek to east end bent.

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): sand gravel cobbles and (excavated boulders downstream)

Channel Bank Material(8): sandy silt

Channel Bank Cover(9): weeds

Floodplain Width(10): 400 - 600

Floodplain Cover(11): hay fields

Stream is(12): Aggrading Degrading XX Static

Channel Migration Tendency(13): to the east

Observations and Other Comments: creek bed under western span is filled in with sand bars as current is deflected east by filling of floodplain (hayfield) on NW corner of bridge

Reported by: *P.Q. Lockamy* Date: 3/7/2011
 PQ Lockamy

DESIGN SCOUR ELEVATIONS(14)

Feet XXX Meters

EB1	N/A														
EB2	2661														

Comparison of DSE to Hydraulics Unit theoretical scour:

End bent 1 not impacted
 End bent 2 DSE 2661.0

DSE determined by: *WD Frye* Date: 3/7/2011

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															

POINT LOAD TEST WORKSHEET

TIP: B-4668
 County: Watauga

Notes:

*Type:
 d=diametral
 a=axial
 b=block
 i=irregular lump test

*Load to Plane of weakness:
 ⊥ = Perpendicular to plane of weakness
 // = Parallel to plane of weakness
 N/A if no apparent plane of weakness

diametral requirements: Length/Diameter >1
 Axial requirements: Width(core dia) = 1/3 D to 1 D(platen distance)

De = D for diametral tests
 De = 4A/π for axial, block & lump test
 A=WD

Need min. of 10 samples per strata, delete strongest 2 and weakest 2 samples before averaging I_{s(50)}.
 (If less samples tested, delete only strongest & weakest 1 sample)
 Enter data in fields with blue text. Form is for PIL-7 dimentions.

Boring / Strata	Sample Number	Depth	Type*	Load to Plane of Weakness*	D (Core Dia or distance between platen) (mm)	W (Width) (mm)	PSI (at Failure)	De (Equiv. Core Dia)(in)	P (=PSI*1.47 in ²) (Pounds)	De ² (=De ² for diametral or =4WD/π for axial) (In ²)	I _s (I _s =P/De ²) (KSF)	F (F=(D _c /50) ^{0.45})	I _{s(50)} (I _{s(50)} =F*I _s) (KSF)	Average I _{s(50)} (KSF)	R1 (RMR First Category Rating)
EB1-A	1	30.6	d	//	44		1280	1.7	1881.6	3.0	90.3	0.94	85.2		
EB1-A	2	31.6	d	//	44		1475	1.7	2168.3	3.0	104.0	0.94	98.2	84.3	
EB1-A	3	32.7	d	//	44		1243	1.7	1827.2	3.0	87.7	0.94	82.8		
EB1-A	4	30.0	d	//	44		1263	1.7	1856.6	3.0	89.1	0.94	84.1		
EB1-A	5	26.8	d	//	44		2296	1.7	3375.1	3.0	162.0	0.94	152.9		
EB2-A	6	25.0	d	//	44		2210	1.7	3248.7	3.0	155.9	0.94	147.2		
EB2-A	7	22.3	d	//	44		934	1.7	1373.0	3.0	65.9	0.94	62.2		
EB2-A	8	27.7	d	//	44		835	1.7	1227.5	3.0	58.9	0.94	55.6		
EB2-A	9	37.8	d	//	44		1397	1.7	2053.6	3.0	98.5	0.94	93.0		
EB2-A	10	37.7	d	//	44		598	1.7	879.1	3.0	42.2	0.94	39.8		
EB1-A	11	29.6	a	⊥	44	44	3601		5293.5	3.8	199.5	0.94	188.4		
EB1-A	12	30.6	a	⊥	62	44	1771		2603.4	5.4	69.6	1.10	76.7	125.2	
EB1-A	13	31.6	a	⊥	66	44	2260		3322.2	5.7	83.5	1.13	94.6		
EB1-A	14	27.7	a	⊥	60	44	4056		5962.3	5.2	164.8	1.09	178.9		
EB1-A	15	32.7	a	⊥	56	44	2447		3597.1	4.9	106.5	1.05	112.1		
EB2-A	11	24.8	a	⊥	58	44	2569		3776.4	5.0	108.0	1.07	115.4		
EB2-A	12	22.3	a	⊥	57	44	2635		3873.5	4.9	112.7	1.06	119.5		
EB2-A	13	29.4	a	⊥	60	44	3506		5153.8	5.2	142.4	1.09	154.6		
EB2-A	14	39.6	a	⊥	57	44	1820		2675.4	4.9	77.8	1.06	82.6		
EB2-A	15	39.0	a	⊥	61	44	3542		5206.7	5.3	141.5	1.09	154.8		

**North Carolina Dept. of Transportation
Division of Highways
Materials and Tests
Physical Testing Laboratory**

Rock Compression

Lab Number:
Project #:
County:
Tip ID:

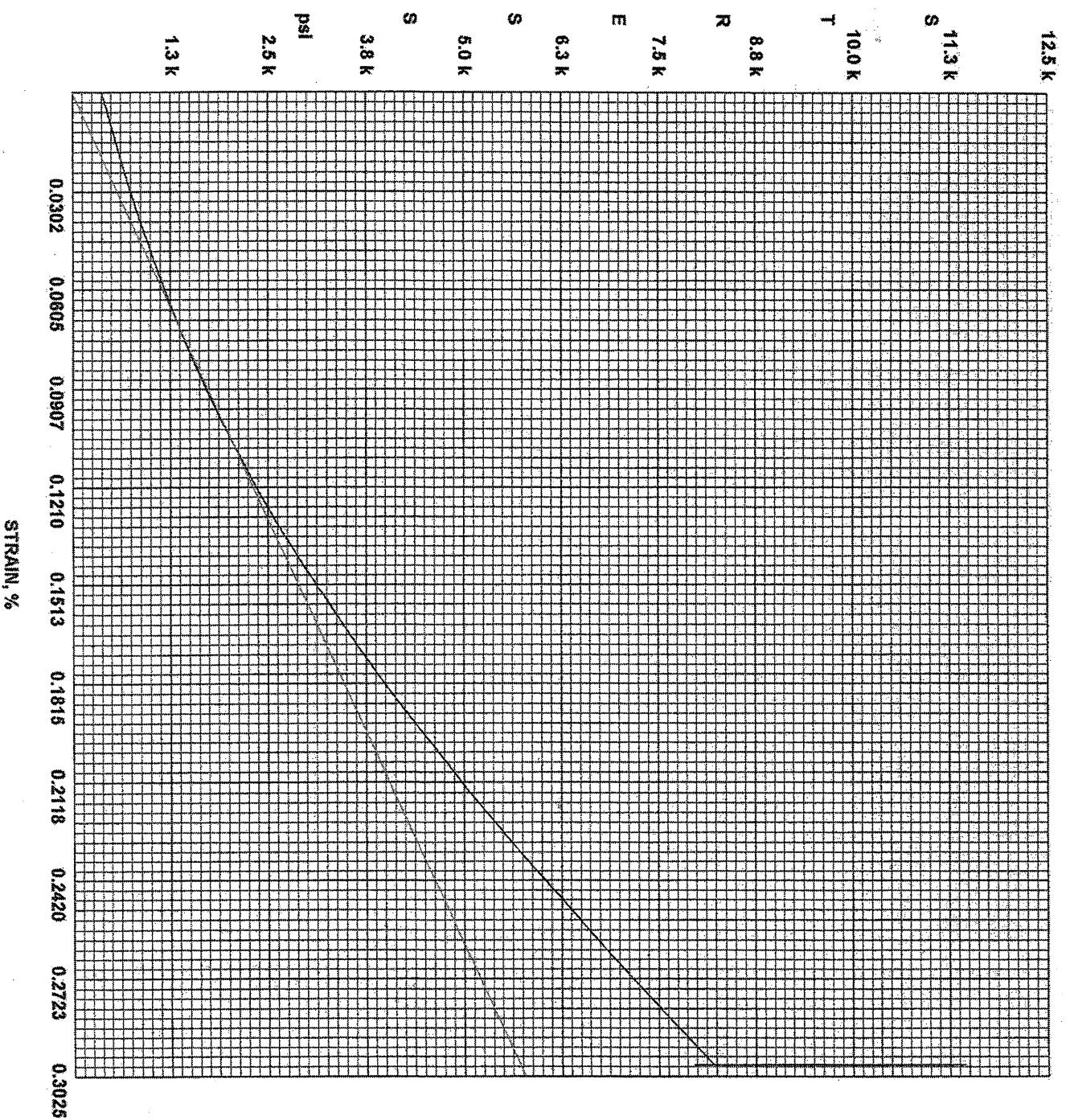
364102
38461.1.1
B-4668

Structure Description:
Test Date:

Watauga Co Br 29 on US
02/28/2011

Sample No.	Diameter in	Area in ²	Specimen Height in	H/D Ratio	Weight lbf	Unit Weight lb/ft ³	Ultimate lbf	Ultimate ksi	Ultimate (corrected) ksi	40% Ult. Load lbf	Sec Mod 40% Mpsi
RS-1	1.8680	2.7406	3.96	2.12	1.0800	171.8	31400	11.45	11.53	12560	1.562
RS-2	1.8660	2.7347	3.65	1.957	1.0900	188.6	32100	11.74	11.71	12840	1.923
RS-3	1.8630	2.7259	3.9	2.09	1.1200	182.1	37700	13.83	13.91	15080	2.15
RS-4	1.8680	2.7406	3.95	2.12	1.0700	170.6	56400	20.6	20.7	22600	2.85

14/20



North Carolina Dept. of Transportatic
 Division of Highways
 Materials and Tests
 Physical Testing Laboratory

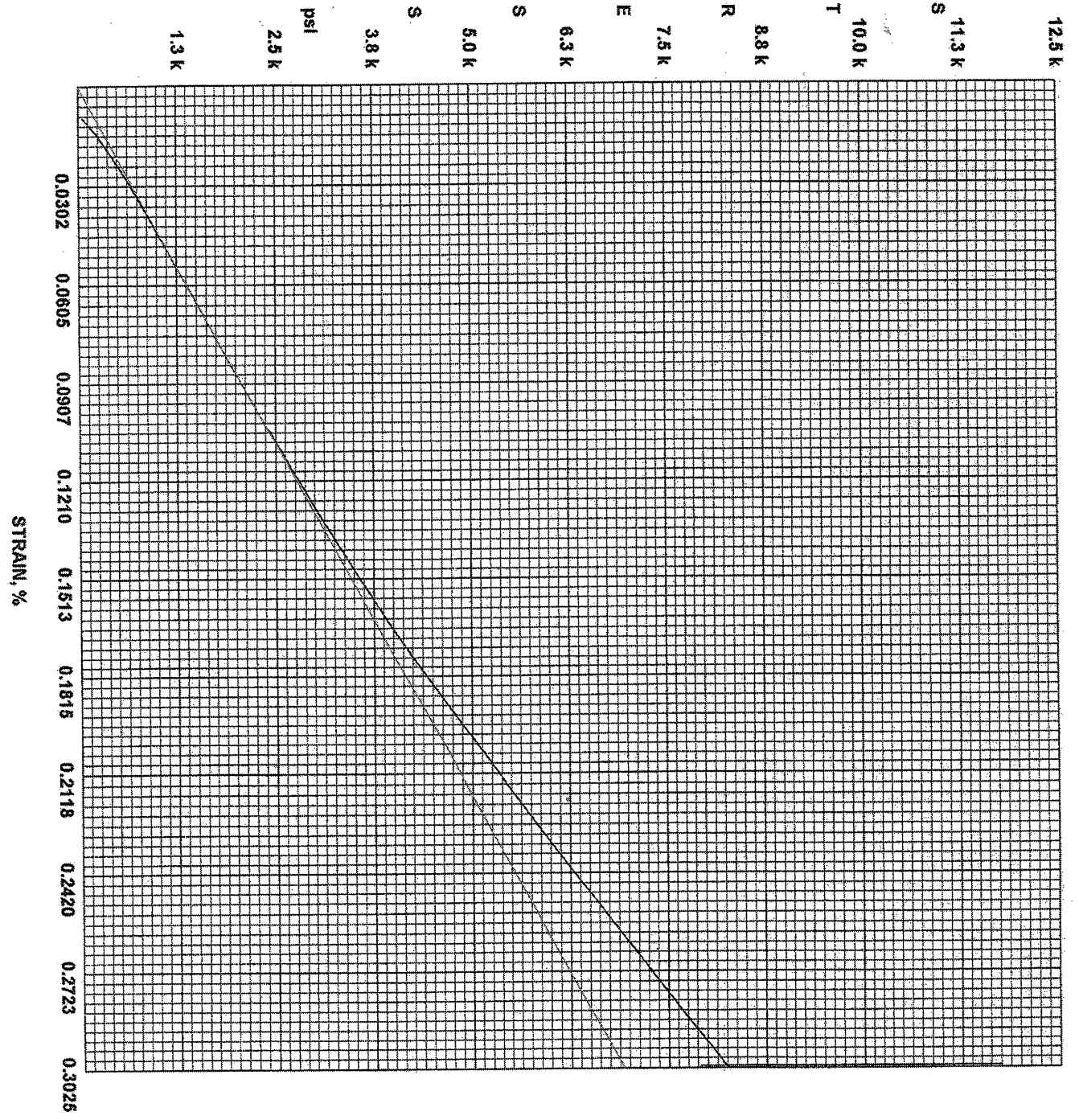
Rock Compression

Lab Number 364102
 Project # 38461.1.1
 County
 Tip ID B-4668

Structure Description Watagua Co Br 29 o
 US 321 over Cove
 Creek
 Test Date 02/28/2011

Sample No.: RS-1
 Diameter, in: 1.8680
 Area, in²: 2.7406
 Specimen, in: 3.96
 H/D Ratio: 2.12
 Weight, lbf: 1.0800
 Unit Weight, lbf/ft³: 171.8
 Ultimate, lbf: 31400
 Ultimate, ksi: 11.45
 Ultimate, ksi: 11.53
 40% Ult. Load, lbf: 12550
 Sec Mod @ 40%, Mpsi: 1.552

Feb 28, 2011 2:12:52 PM
 SN: 205692-R3 V7.02.05



North Carolina Dept. of Transportatic
 Division of Highways
 Materials and Tests
 Physical Testing Laboratory

Rock Compression

Lab Number 364102
 Project # 38461.1.1
 County
 Tip ID B-4668

Structure Description Watagua Co Br 29 o
 US 321 over Cove
 Creek
 Test Date 02/28/2011

Sample No.: RS-2
 Diameter, in: 1.8660
 Area, in²: 2.7347
 Specimen, in: 3.65
 H/D Ratio: 1.957
 Weight, lbf: 1.0900
 Unit Weight, lbf/ft³: 188.6
 Ultimate, lbf: 32100
 Ultimate, ksi: 11.74
 Ultimate, ksi: 11.71
 40% Ult. Load, lbf: 12840
 Sec Mod @ 40%, Mpsi: 1.923

Feb 28, 2011 2:09:41 PM
 SN: 205692-R3 V7.02.05

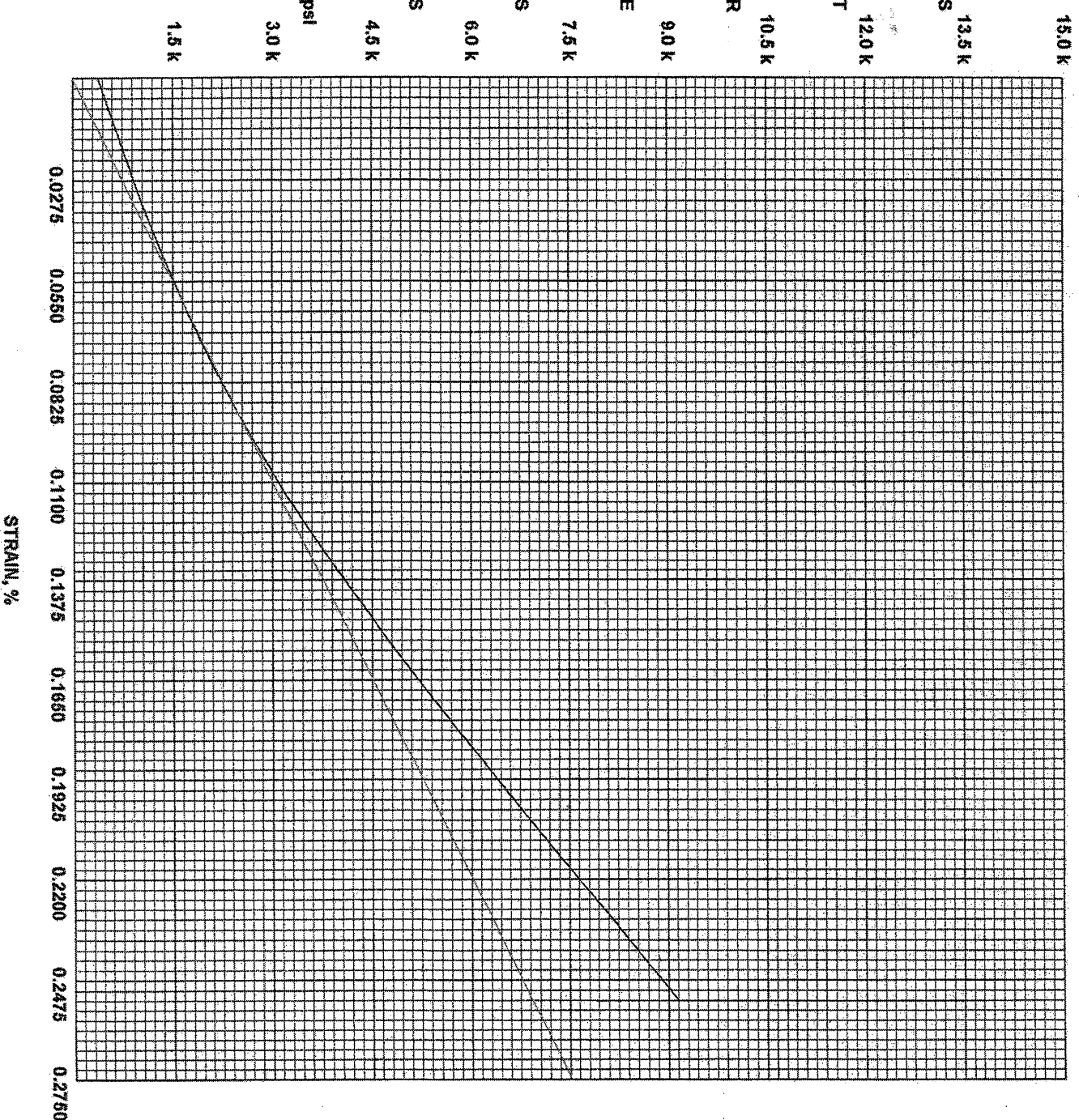
North Carolina Dept. of Transportatic
 Division of Highways
 Materials and Tests
 Physical Testing Laboratory

Rock Compression

Lab Number 364102
 Project # 38461.1.1
 County
 Tip ID B-4668

Structure Description Watagua Co Br 29 o
 US 321 over Cove
 Creek
 Test Date 02/28/2011

Sample No.: RS-3
 Diameter, in: 1.8630
 Area, in²: 2.7259
 Specimen, in: 3.9
 H/D Ratio: 2.09
 Weight, lbf: 1.1200
 Unit Weight, lb/ft³: 182.1
 Ultimate, lbf: 37700
 Ultimate, ksi: 13.83
 Ultimate, ksi: 13.91
 40% Ult. Load, lbf: 15080
 Sec Mod @ 40%, Mpsi: 2.15



Feb 28, 2011 2:21:38 PM
 SN: 205692-R3 V7.02.05

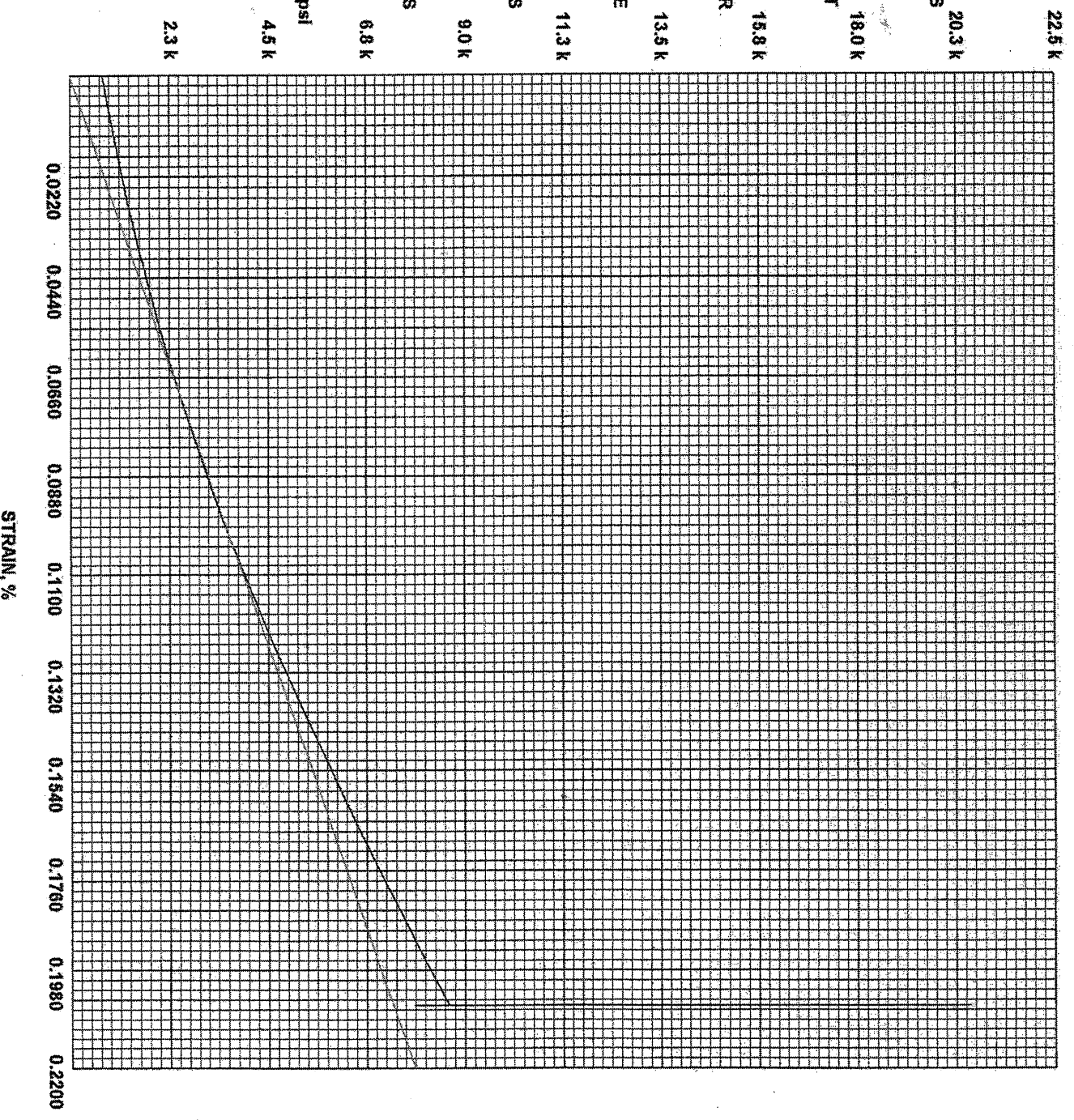
North Carolina Dept. of Transportatic
 Division of Highways
 Materials and Tests
 Physical Testing Laboratory

Rock Compression

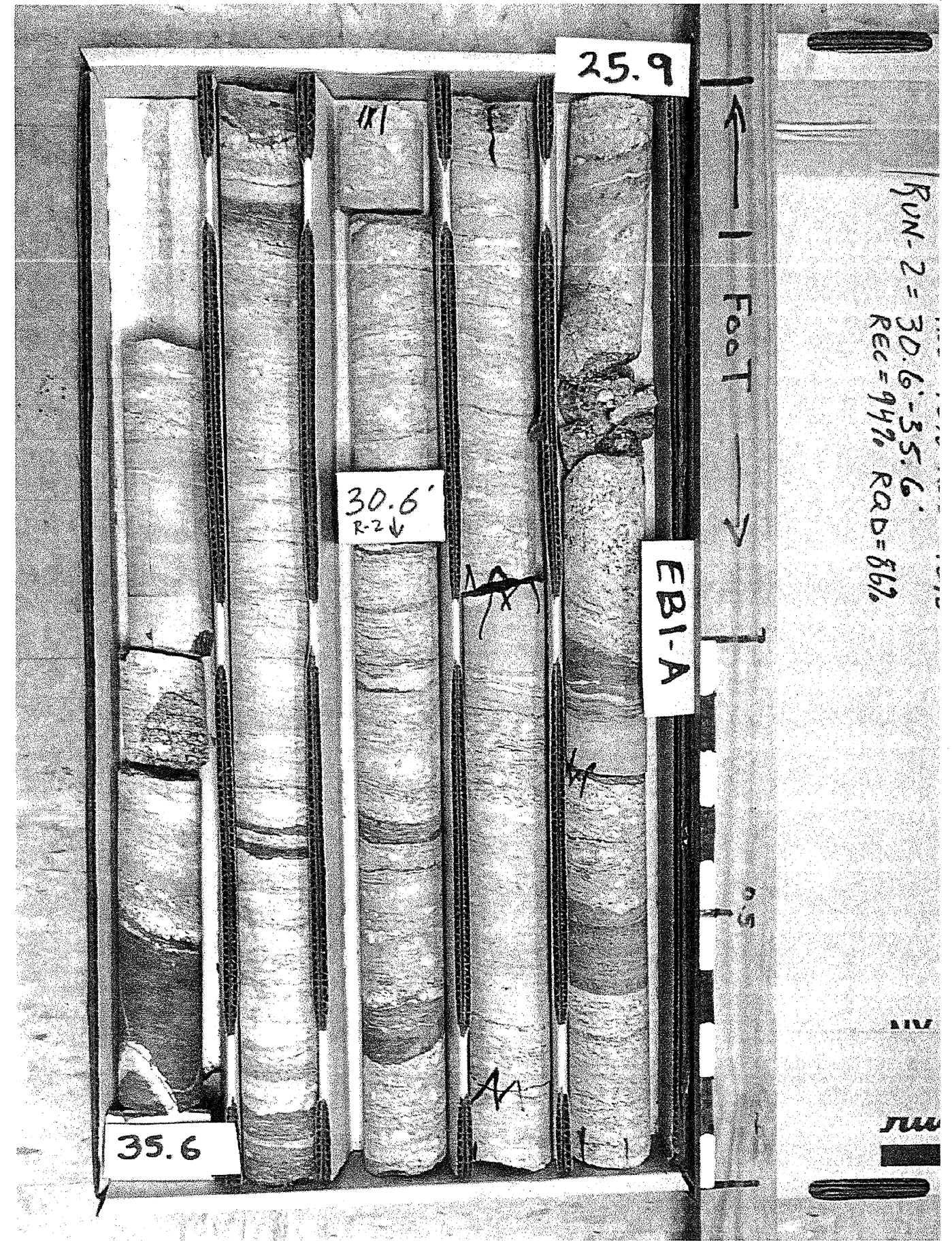
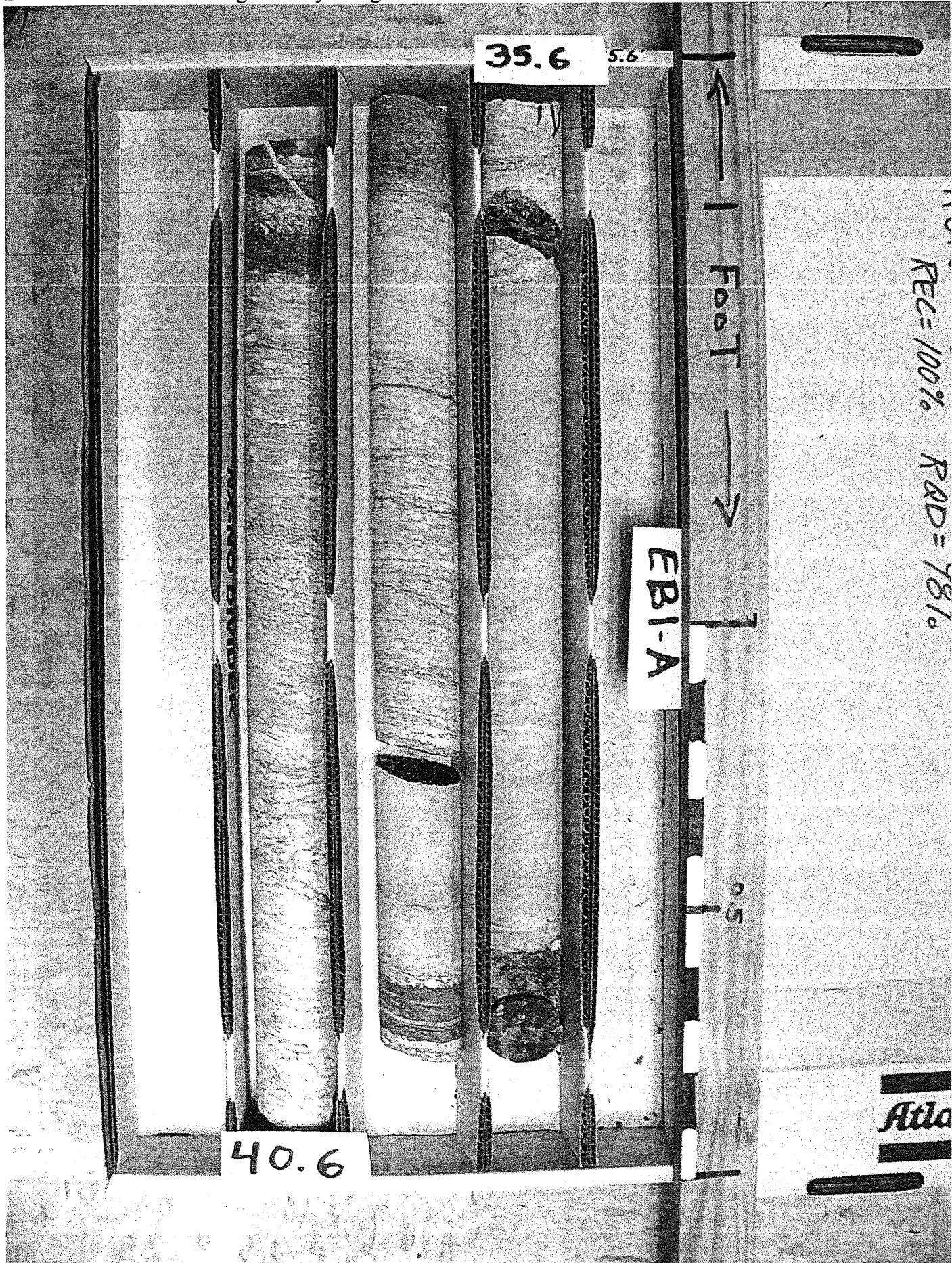
Lab Number 364102
 Project # 38461.1.1
 County
 Tip ID B-4668

Structure Description Watagua Co Br 29 o
 US 321 over Cove
 Creek
 Test Date 02/28/2011

Sample No.: RS-4
 Diameter, in: 1.8680
 Area, in²: 2.7406
 Specimen, in: 3.95
 H/D Ratio: 2.12
 Weight, lbf: 1.0700
 Unit Weight, lb/ft³: 170.6
 Ultimate, lbf: 56400
 Ultimate, ksi: 20.6
 Ultimate, ksi: 20.7
 40% Ult. Load, lbf: 22600
 Sec Mod @ 40%, Mpsi: 2.85



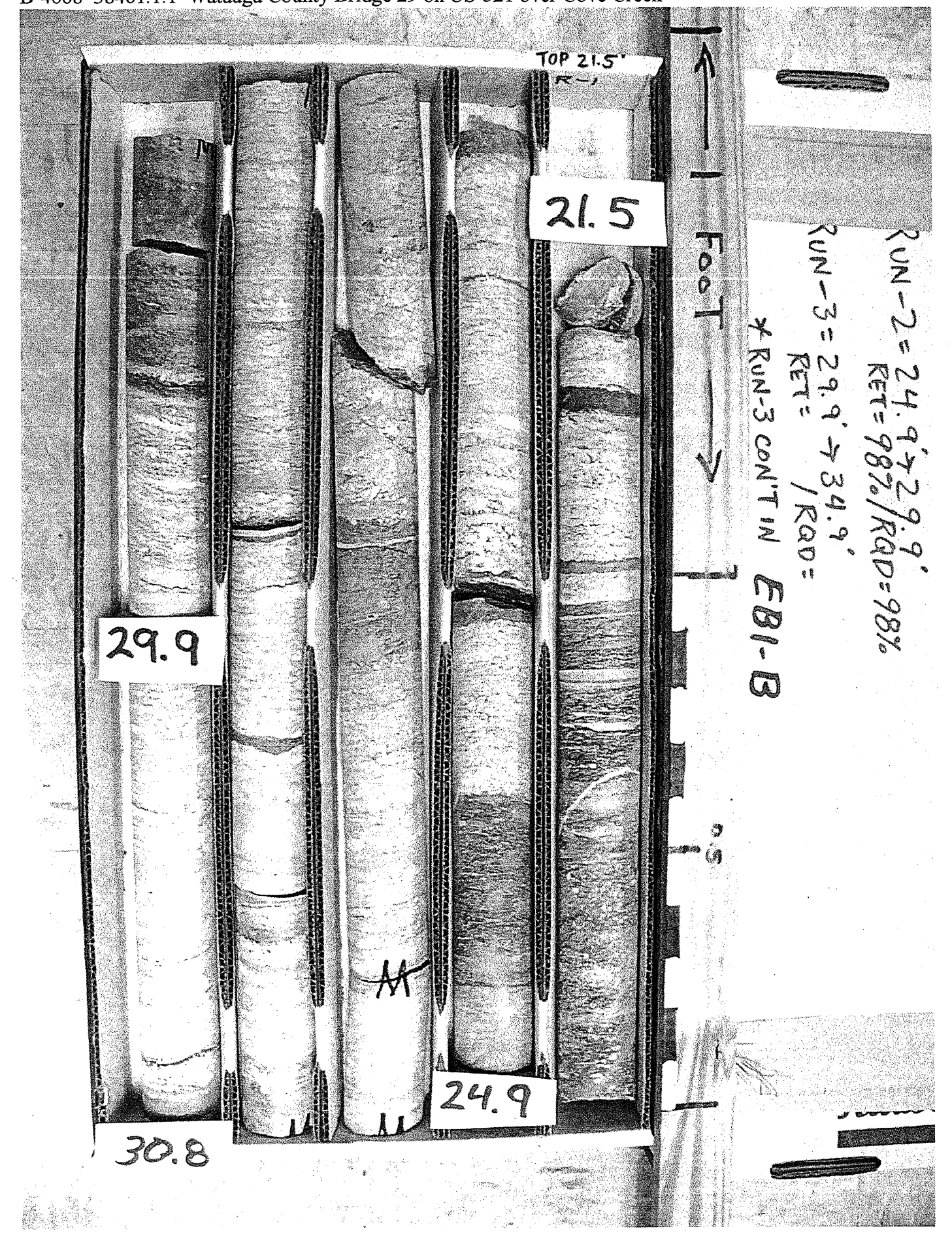
Feb 28, 2011 2:36:36 PM
 SN: 205692-R3 V7.02.05

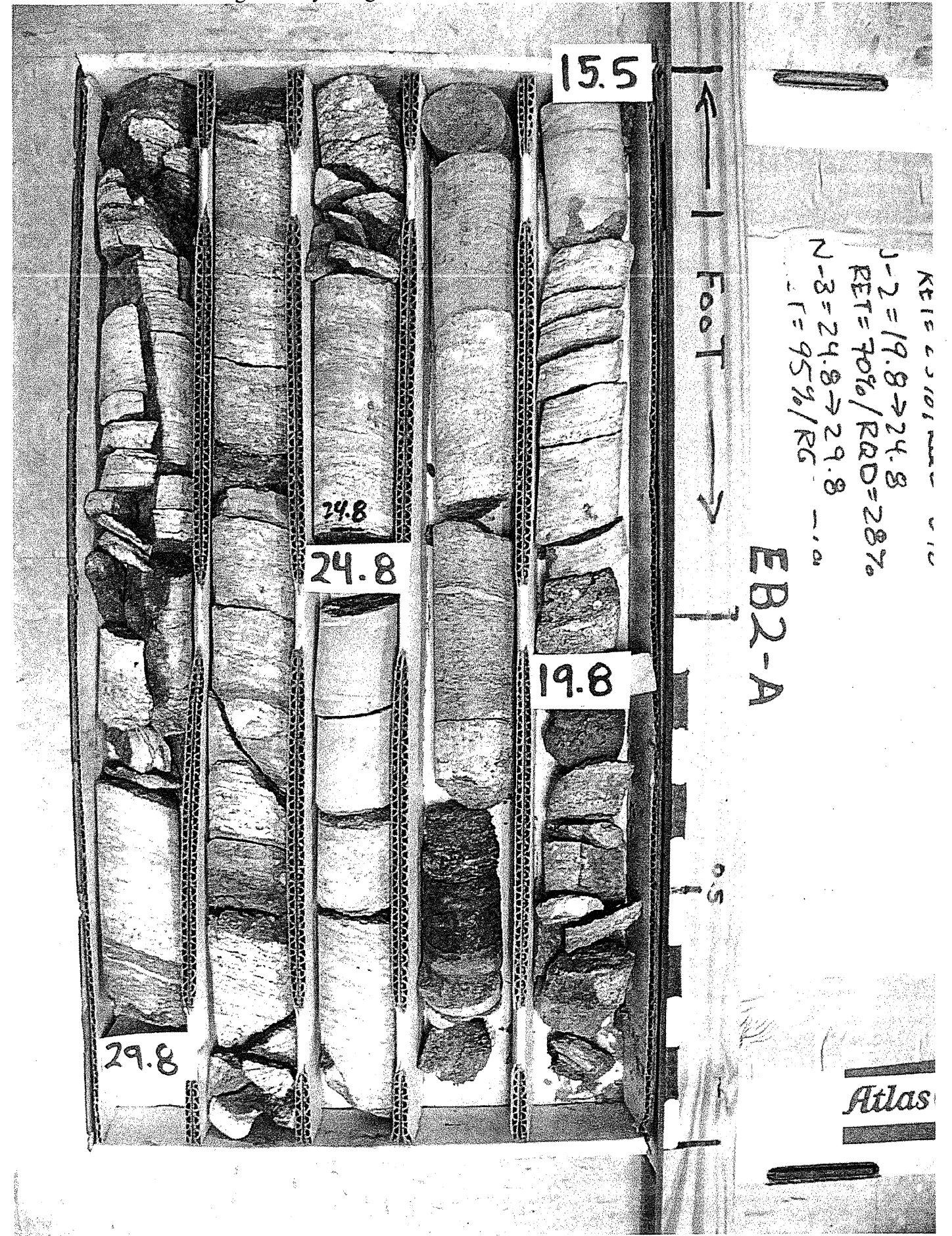
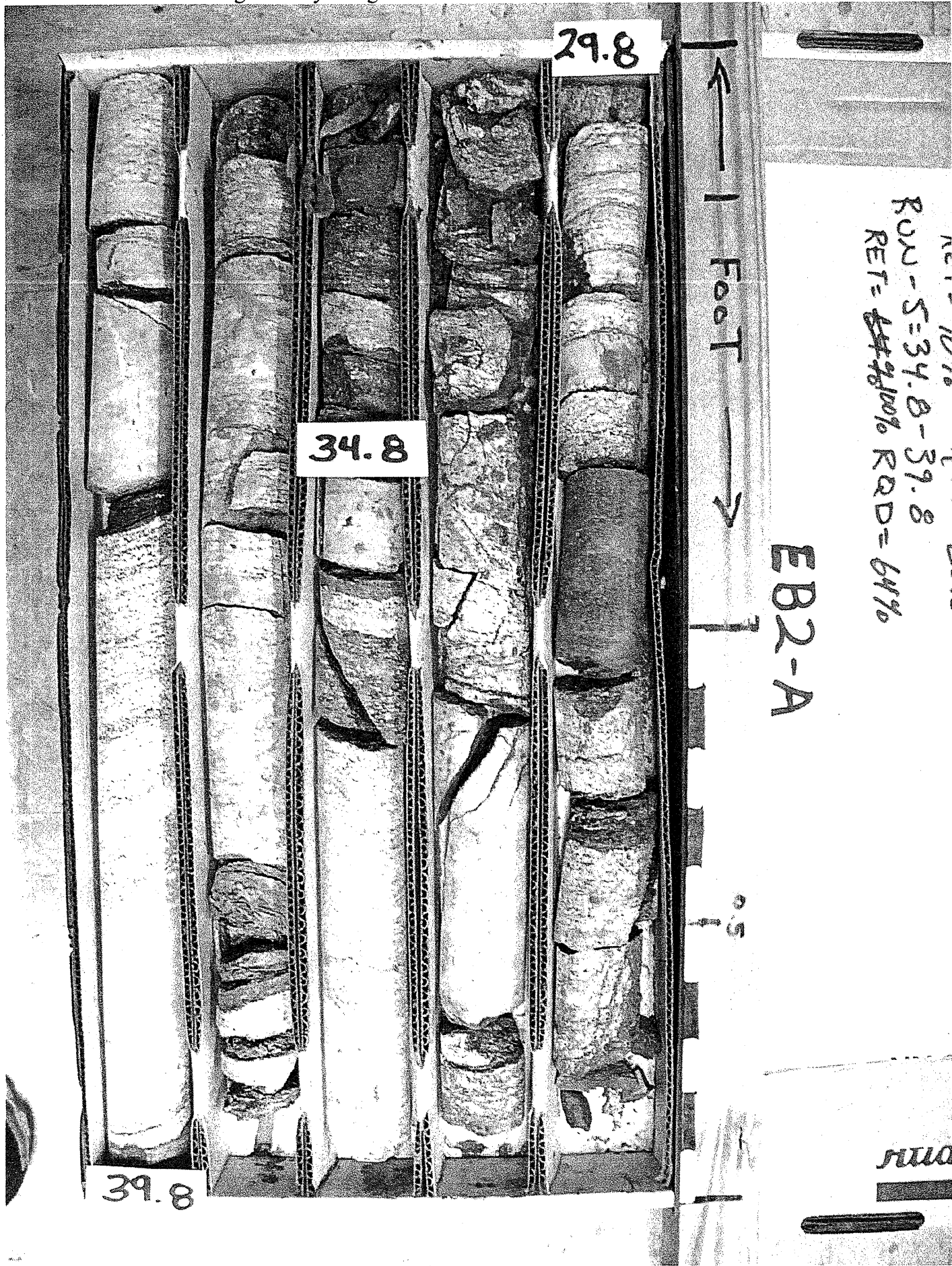


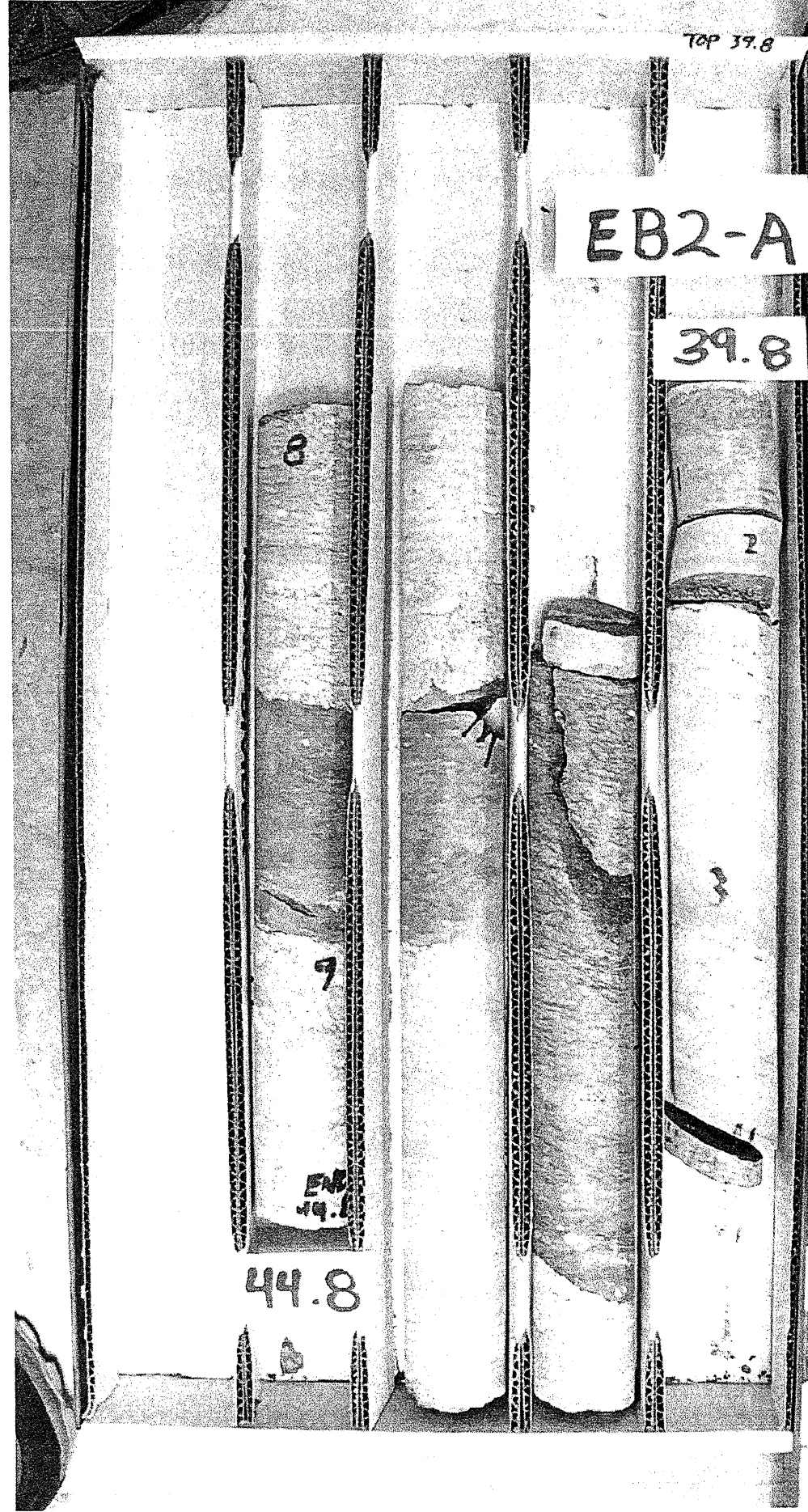
B-4668 38461.1.1 Watauga County Bridge 29 on US-321 over Cove Creek



B-4668 38461.1.1 Watauga County Bridge 29 on US-321 over Cove Creek



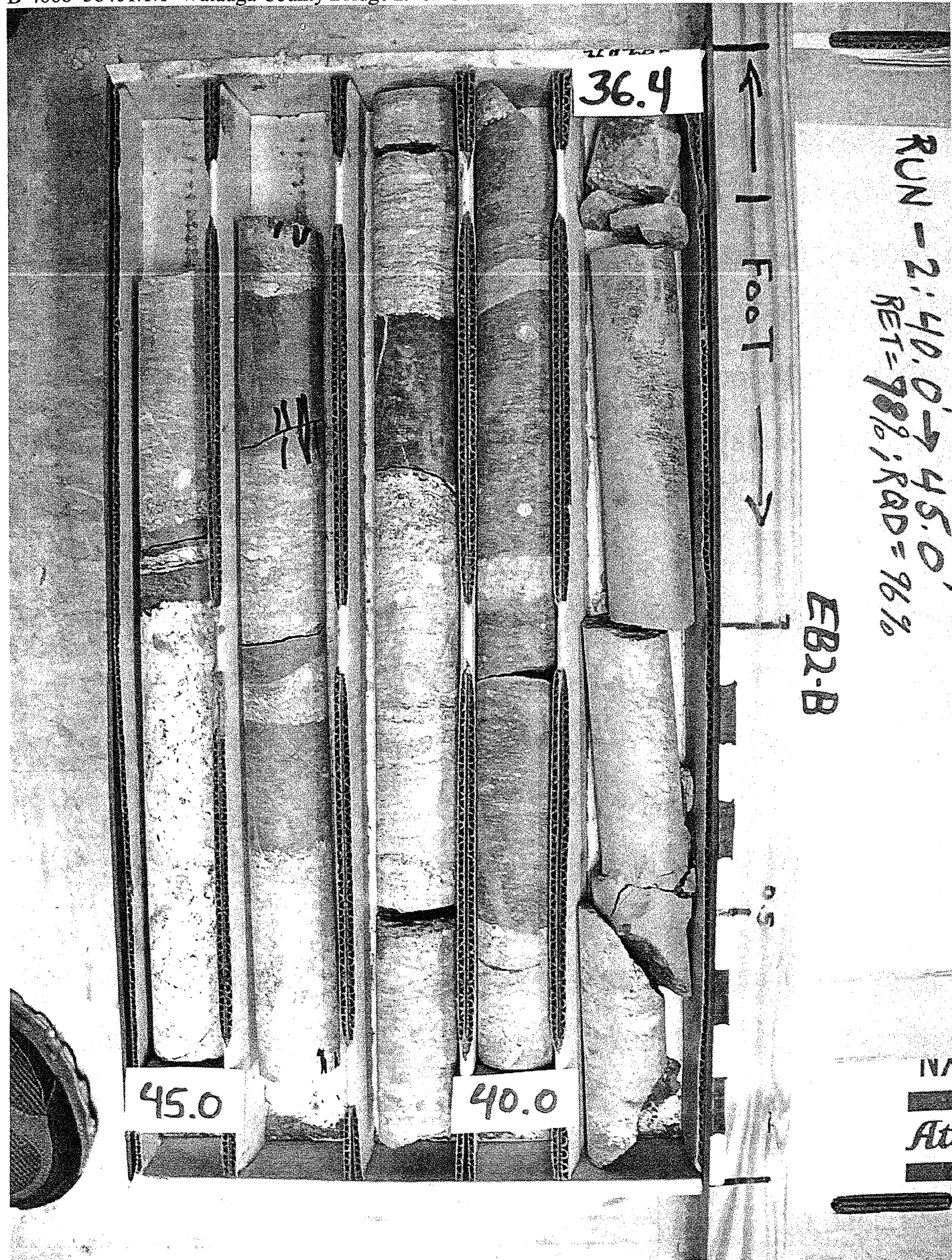




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B-4668 38461.1.1 Watauga County Bridge 29 on US-321 over Cove Creek



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