

PROJECT: 34445.1.1 ID: R-2518A BRDG. ON -Y2-

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34445.1.1	1	13

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STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34445.1.1 F.A. PROJ. _____
 COUNTY MADISON
 PROJECT DESCRIPTION US 19 FROM I-26 TO 0.8 km EAST OF
THE YANCEY CO. LINE

 SITE DESCRIPTION NEW BRIDGE ON SR 1524 (-Y2-)
OVER MIDDLE FORK CREEK

CAUTION NOTICE

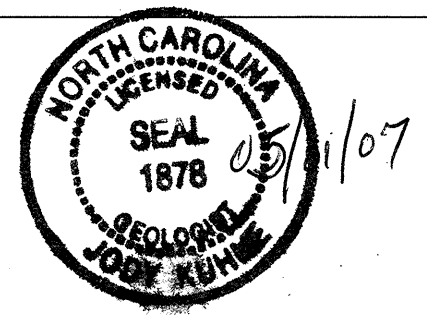
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 250-4086. 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. HAGER
D. O. CHEEK
G. K. ROSE

INVESTIGATED BY J. C. KUHNE
 CHECKED BY W. D. FRYE
 SUBMITTED BY W. D. FRYE
 DATE _____



DRAWN BY: J C KUHNE

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION



SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS			
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER 30 CM ACCORDING TO STANDARD PENETRATION TEST (ASHTO T208, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE ASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, ASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY/SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>				WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.				HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 3 CM PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:				ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AOUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 10 CM 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) OF A 63.5 KG HAMMER FALLING 0.76 M REQUIRED TO PRODUCE A PENETRATION OF 30 CM INTO SOIL WITH A 5 CM OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 3 CM 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 10 CM 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				GROUND WATER			
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.				FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (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 BLOWS PER 30 CM. 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 BLOWS PER 30 CM. 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.				WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP			
LIQUID LIMIT PLASTIC INDEX GROUP INDEX				PERCENTAGE OF MATERIAL ORGANIC MATERIAL SILT - CLAY SOILS OTHER MATERIAL				TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE				WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP			
USUAL TYPES OF MAJOR MATERIALS GEN. RATING AS A SUBGRADE				MISCELLANEOUS SYMBOLS				S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE				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 DENSITY				TEXTURE OR GRAIN SIZE				ABBREVIATIONS				EQUIPMENT USED ON SUBJECT PROJECT			
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (KN/M ²)				U.S. STD. SIEVE SIZE OPENING (MM) BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)				AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS				DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST			
GENERALLY GRANULAR MATERIAL (NON-COHESIVE) GENERALLY SILT-CLAY MATERIAL (COHESIVE)				U.S. STD. SIEVE SIZE OPENING (MM) BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)				HI. - HIGHLY MED. - MEDIUM MIC. - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL				ADVANCING TOOLS: CLAY BITS 152mm CONTINUOUS FLIGHT AUGER 203mm HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS TRICONE mm STEEL TEETH TRICONE mm TUNG-CARB. CORE BIT			
SOIL MOISTURE - CORRELATION OF TERMS				MOISTURE CONTENT VERY MOIST WEATHERED UNIT WEIGHT DRY UNIT WEIGHT FIAD - FILLED IN AFTER DRILLING				HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N XWL H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST				FRACURE SPACING TERM SPACING VERY WIDE MORE THAN 3 M WIDE 3 TO 10 M MODERATELY CLOSE 30 TO 100 CM CLOSE 5 TO 30 CM VERY CLOSE LESS THAN 5 CM			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION				PLASTICITY 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				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.				BEDDING TERM THICKNESS VERY THICKLY BEDDED > 1 M THICKLY BEDDED 0.5 - 1 M THINLY BEDDED 0.05 - 0.5 M VERY THINLY BEDDED 10 - 50 MM THICKLY LAMINATED 2.5 - 10 MM THINLY LAMINATED < 2.5 MM			
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH				FRACURE SPACING TERM SPACING VERY WIDE MORE THAN 3 M WIDE 3 TO 10 M MODERATELY CLOSE 30 TO 100 CM CLOSE 5 TO 30 CM VERY CLOSE LESS THAN 5 CM				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.				BENCH MARK: BM #3 CHISELED SQUARE ON TOP OF WEST SIDE PARAPET N. END OF SAM COX BRIDGE BEHIND P&E GROCERY ELEVATION: 658.44 M			
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.				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.				NOTES:							



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Michael F. Easley
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

Lyndo Tippett
SECRETARY

1 May, 2007

STATE PROJECT: R-2518A, 34445.1.1, New Bridge on -Y2-
COUNTY: Madison
DESCRIPTION: New Bridge on SR 1524 over Middle Fork Creek
SUBJECT: Geotechnical Report - Foundation Investigation

Introduction

This is a 90.5 meter long single span replacement of an existing structure that was ceded to the private property owner many years ago. The site is being reclaimed for Line -Y2- of the subject roadway Project, R-2518A. According to the Hydraulics Report the skew is 60°. The investigation borings were advanced using a CME 550 ATV rig using NW casing and advancer. Standard Penetration Tests (SPT) were performed at intervals of 5.0 feet using an automatic drop hammer. Scour is not predicted at the end bents and stream flow is controlled by a three barreled culvert located 25 meters upstream.

The bridge is located to one side of a 20 meter wide floodplain with alluvial deposits over shallow saprolite or immediately grading into weathered rock and rock.

Foundation Materials

End Bent One

EB-1 will be constructed through fill in the existing roadway. Alluvium and roadway fill (very similar material in this case) are 4 meters deep in boring EB1-A. They rest directly on crystalline biotite/amphibolite gneiss which showed core recoveries averaging nearly 80% and RQD's averaging a dismal 35% to a total depth of 13.29 m. The alluvium and roadway fill is loose to med. dense micaceous silt with layers of sandy silt, sand and gravel. EB1-A terminated in rock at elevation 643.33 m. EB1-B was advanced primarily to determine depth to rock. Loose alluvium and fill exist to 2.4 m with 0.3 m of weathered rock overlying crystalline biotite/amphibolite gneiss. EB1-B was terminated on rock at elevation 652.31.

End Bent Two

EB-2 will be constructed on existing embankment overlying alluvium. Boring EB2-A was advanced to the top of rock and consists of loose alluvium to a depth of 2.28 m, 0.45 m. of micaceous silty saprolite and approximately 0.4 m of weathered rock overlying crystalline feldspathic/biotite gneiss. The boring was terminated at elevation 651.7 m. in rock. EB2-B was advanced through 2.4 m. of sandy silt embankment and 2.0 m of sandy silt alluvium. This abruptly rests on 2.6 m. of weathered felsic/biotite gneiss. Rock coring began at 7.04 m. with recovery average of nearly 80% and RQD average of a dismal 26.5% consistently over 6.25 m. The boring was terminated at elevation 642.71 in crystalline felsic/biotite gneiss.

Groundwater

Water level was noted in EB1-A only at a depth of 2.74 m. This is generally the base flow elevation of Middle Fork Creek and matches the Hydraulic Report stream elevation of 653.5. The water elevation is expected to be consistent at this elevation in the alluvial strata across both end bents.

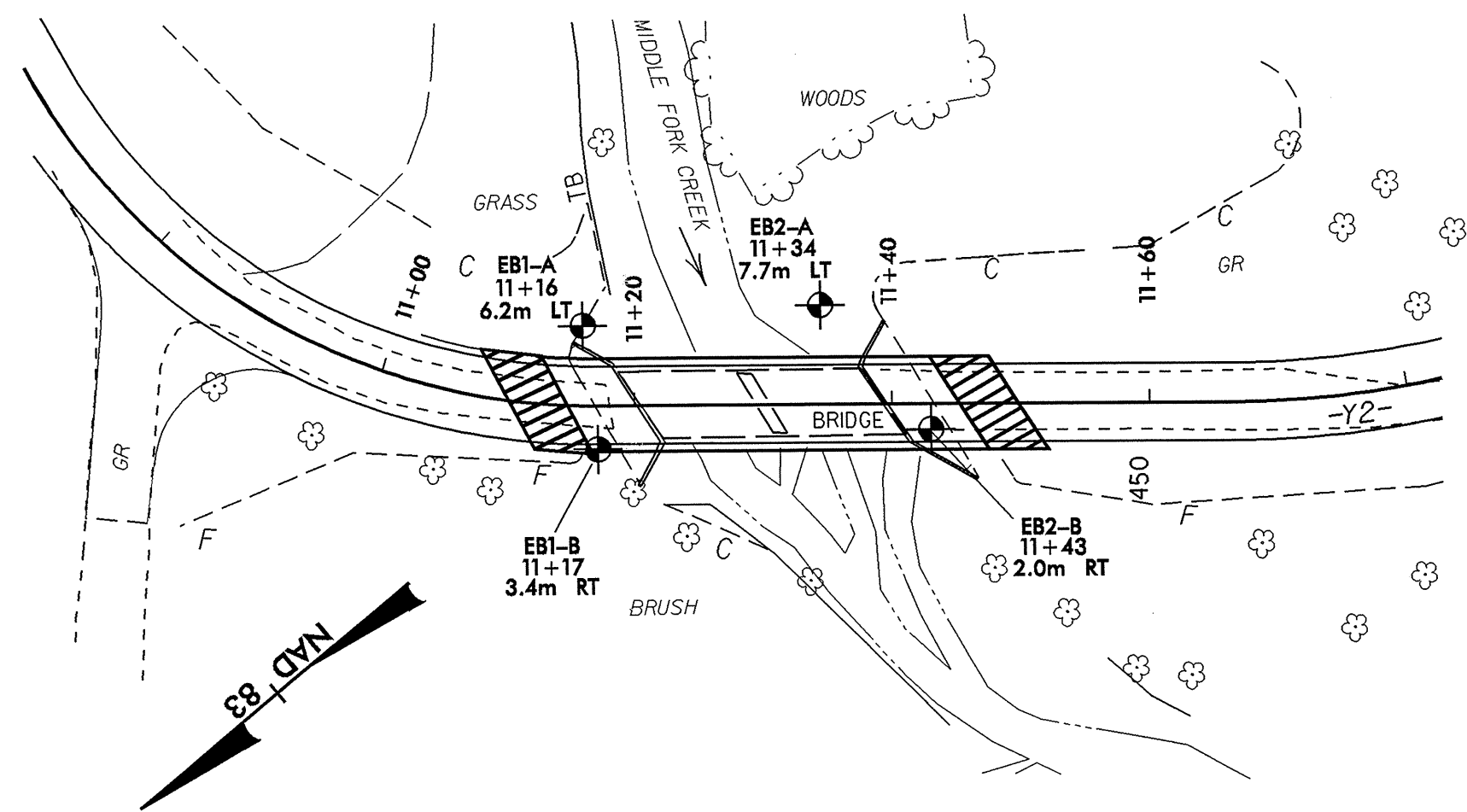
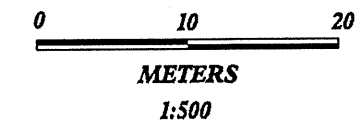
Respectfully submitted,

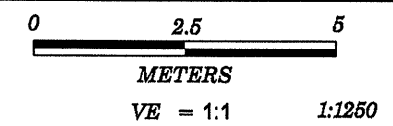
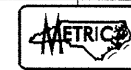
Jody C. Kuhne



SITE PLAN

SKEW = 60°

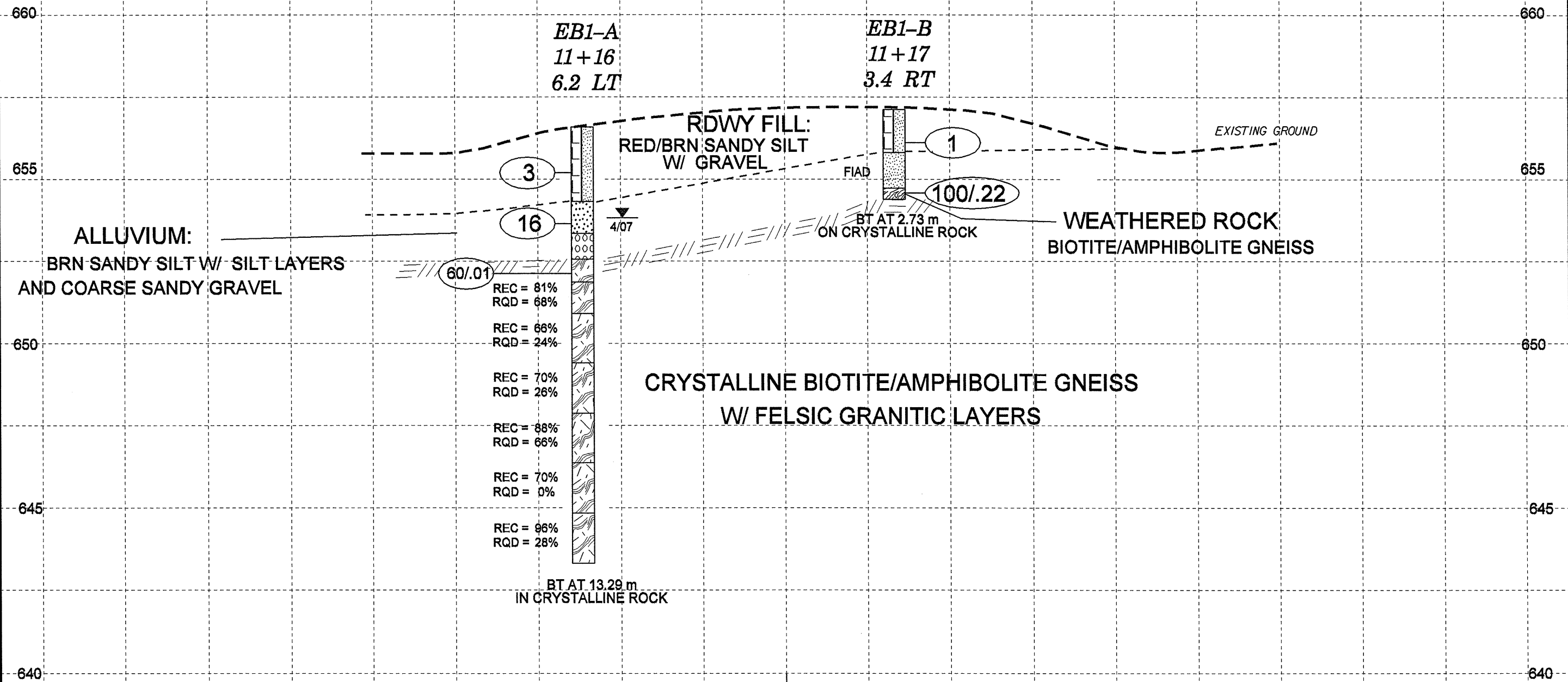




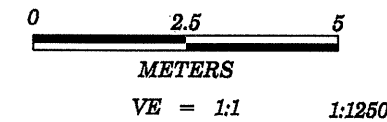
PROJECT REFERENCE NO.	SHEET
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NEW BRIDGE ON -Y2-	

R-2518A, NEW BRIDGE ON -Y2- SECTION THROUGH EB-1

SKEW = 60°



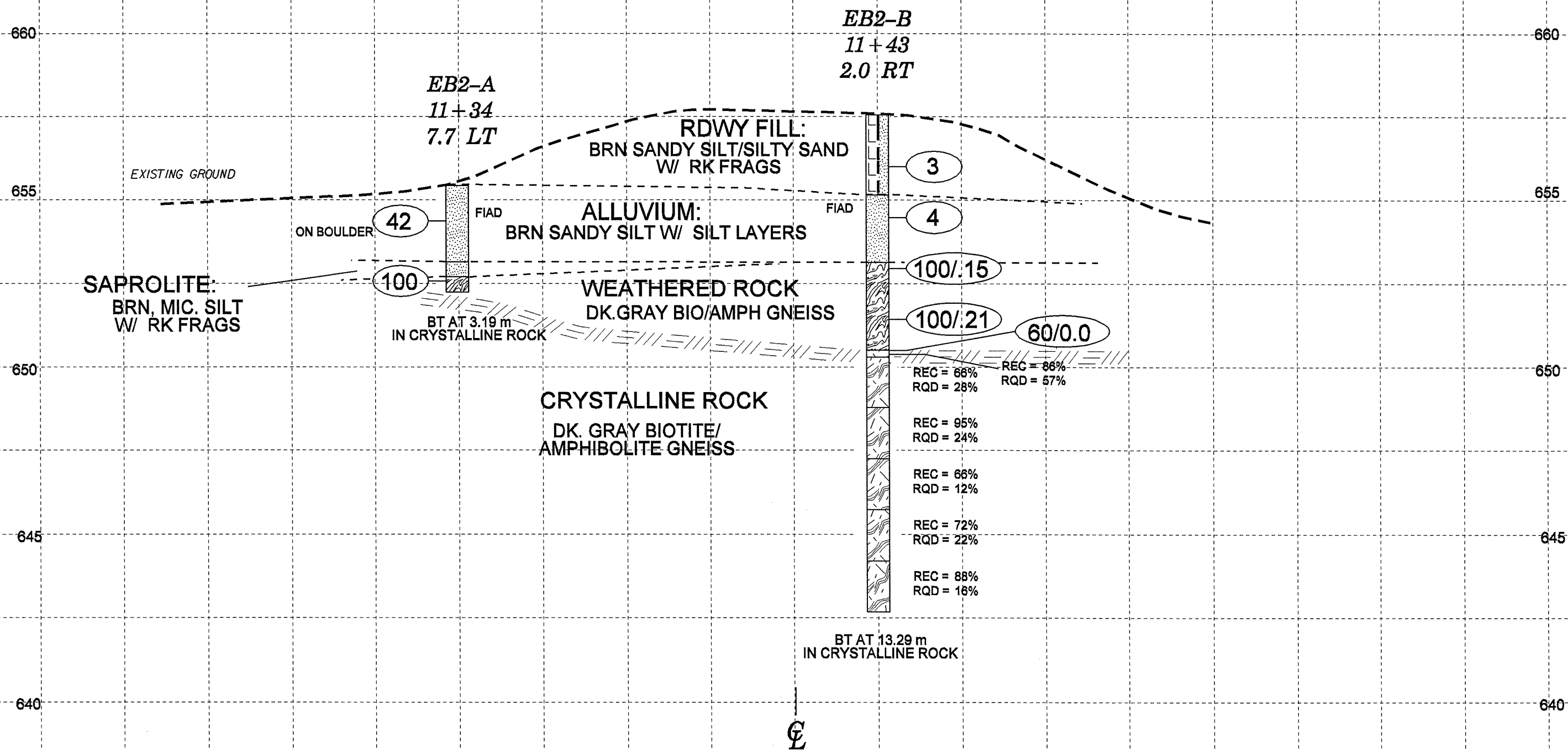
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PROJECT REFERENCE NO.	SHEET
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NEW BRIDGE ON -Y2-	

R-2518A, NEW BRIDGE ON -Y2- SECTION THROUGH EB-2

SKEW = 60°



PROJECT NO. 34445.1.1 ID. R-2518A Y2 BRIDGE COUNTY MADISON GEOLOGIST Hager, M. M.

SITE DESCRIPTION N/A				GROUND WTR (m)
BORING NO. EB1-A	STATION 11+16.0	OFFSET 6.2m LT	ALIGNMENT -Y2-	0 HR. N/A
COLLAR ELEV. 656.62 m	TOTAL DEPTH 13.29 m	NORTHING 236,828.4	EASTING 292,478.2	24 HR. 2.74
DRILL MACHINE CME-550	DRILL METHOD NW Casing w/ SPT Core		HAMMER TYPE Automatic	
START DATE 04/02/07	COMP. DATE 04/03/07	SURFACE WATER DEPTH N/A		DEPTH TO ROCK 4.0 m

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518A -Y2- BORING NO: EB1-A GEOLOGIST: MM HAGER

DESCRIPTION: NEW BRIDGE ON -Y2- (SR 1524) OVER MIDDLE FORK CREEK

COUNTY: MADISON COLLAR ELEVATION: 656.62 m TOTAL DEPTH: 13.29 m

ELEV. (m)	DEPTH (m)	DRILL RATE (m)	RUN (m)	REC. METERS		SAMP. #	FIELD CLASSIFICATION AND REMARKS
				MIN./3 m	%		
651.90	4.72	0:00	0.95	0.76	0.64		WHITE/LT. GRAY FELSIC GNEISS LAYERED W/ DK GRAY BIOTITE/AMPHIBOLITE GNEISS
650.95	5.67			80	67		
650.95	5.67		1.52	1.01	0.37		SAME AS ABOVE
649.43	7.19			66	24		
649.43	7.19		1.53	1.07	0.40		SAME AS ABOVE
647.90	8.72			70	26		
647.90	8.72		1.52	1.34	1.01		SAME AS ABOVE
646.38	10.24			88	66		
646.38	10.24		1.53	1.07	0.00		SAME AS ABOVE
644.85	11.77			70	0		
644.85	11.77		1.52	1.46	0.43		SAME AS ABOVE
643.33	13.29			96	28		

CORING TERMINATED AT ELEVATION 643.33 m

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-451 CME-550

ELEV (m)	DEPTH (m)	BLOW COUNT			BLOWS PER 30 CM					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (m)	DEPTH (m)
		15cm	15cm	15cm	0	25	50	75	100					
657													656.62	0.00
655.22	1.40	1	2	1									654.36	2.26
653.69	2.93	1	1	15									653.39	3.23
652.17	4.45												652.60	4.02
													651.90	4.72
													643.33	13.29

Boring Terminated at Elevation 643.33 m
CRYSTALLINE ROCK (GNEISS)

PROJECT NO. 34445.1.1		ID. R-2518A Y2 BRIDGE		COUNTY MADISON		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION N/A						GROUND WTR (m)									
BORING NO. EB1-B		STATION 11+17.0		OFFSET 3.4m RT		ALIGNMENT -Y2-									
COLLAR ELEV. 655.04 m		TOTAL DEPTH 2.73 m		NORTHING 236,821.9		EASTING 292,471.1									
DRILL MACHINE CME-45C		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 03/15/05		COMP. DATE 03/15/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV (m)	DEPTH (m)	BLOW COUNT			BLOWS PER 30 CM					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (m)	DEPTH (m)
		15cm	15cm	15cm	0	25	50	75	100						
656														655.04	0.00
654.02	1.02	1	0	1											
652.50	2.54	18		82/07										652.65	2.39
														652.31	2.73

NCDOT BORE SINGLE R2518A_Y2_BRIDGE.GPJ NC_DOT.GDT 04/16/07

PROJECT NO. 34445.1.1		ID. R-2518A Y2 BRIDGE		COUNTY MADISON		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION N/A						GROUND WTR (m)									
BORING NO. EB2-A		STATION 11+34.0		OFFSET 7.7m LT		ALIGNMENT -Y2-									
COLLAR ELEV. 654.89 m		TOTAL DEPTH 3.19 m		NORTHING 236,814.3		EASTING 292,490.2									
DRILL MACHINE CME-45C		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 03/15/05		COMP. DATE 03/15/05		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 3.0 m									
ELEV (m)	DEPTH (m)	BLOW COUNT			BLOWS PER 30 CM					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (m)	DEPTH (m)
		15cm	15cm	15cm	0	25	50	75	100						
655														654.89	0.00
653.83	1.06														
652.31	2.58	1	2	40										652.61	2.28
														652.16	2.73
														651.88	3.01
														651.70	3.19

NCDOT BORE SINGLE R2518A_Y2_BRIDGE.GPJ NC_DOT.GDT 05/02/07



PROJECT NO. 34445.1.1	ID. R-2518A Y2 BRIDGE	COUNTY MADISON	GEOLOGIST Hager, M. M.
SITE DESCRIPTION N/A			GROUND WTR (m)
BORING NO. EB2-B	STATION 11+43.0	OFFSET 2.0m RT	ALIGNMENT -Y2-
COLLAR ELEV. 657.58 m	TOTAL DEPTH 14.87 m	NORTHING 236,801.7	EASTING 292,487.4
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT Core	
START DATE 04/03/07		COMP. DATE 04/04/07	HAMMER TYPE Automatic
		SURFACE WATER DEPTH N/A	DEPTH TO ROCK 7.0 m

SHEET 9 OF 13

DATE 4/3/2007

CORE BORING REPORT

PROJECT: 34445.1.1 I. D. NO: R-2518A -Y2- BORING NO: EB2-B GEOLOGIST: MM HAGER
 DESCRIPTION: NEW BRIDGE ON -Y2- (SR 1524) OVER MIDDLE FORK CREEK
 COUNTY: MADISON COLLAR ELEVATION: 657.58 m TOTAL DEPTH: 14.87 m

ELEV (m)	DEPTH (m)	BLOW COUNT			BLOWS PER 30 CM					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (m)
		15cm	15cm	15cm	0	25	50	75	100				
658												657.58	GROUND SURFACE 0.00
656.06	1.52	3	2	1								655.18	ROADWAY EMBANKMENT ORANGE/BRN SLI. CLAYEY SILT W/ LAYERS OF FINE SAND AND GRAVEL 2.40
654.53	3.05	1	2	2								653.16	ALLUVIAL BRN SANDY SILT W/ SILT LAYERS 4.42
653.01	4.57	89	11/0.0									650.54	WEATHERED ROCK DK. GRAY TO BLACK AMPHIBOLITE GNEISS 7.04
651.48	6.10	27	43	57/0.6									
650.54	7.04	60/0.0											CRYSTALLINE ROCK DK. GRAY MOD. FOLIATED BIOTITE/AMPHIBOLITE GNEISS 14.87
													Boring Terminated at Elevation 642.71 m CRYSTALLINE ROCK (AMPH. GNEISS)

NCDOT BORE SINGLE R2518A_Y2_BRIDGE.GPJ NC DOT.GDT 05/01/07

ELEV. (m)	DEPTH (m)	DRILL RATE MIN./3 m	RUN (m)	REC. METERS %	RQD. METERS %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
650.54	7.04	0:00	0.21	0.18 86	0.12 57		DK. GRAY, MODERATELY FOLIATED BIOTITE/AMPHIBOLITE GNEISS
650.33	7.25		1.53	1.01 66	0.43 28		SAME AS ABOVE
648.80	8.78		1.52	1.37 90	0.37 24		SAME AS ABOVE
647.28	10.30		1.52	1.01 66	0.18 12		SAME AS ABOVE
645.76	11.82		1.53	1.10 72	0.34 22		SAME AS ABOVE
644.23	13.35		1.52	1.34 88	0.24 16		SAME AS ABOVE
642.71	14.87						

CORING TERMINATED AT
ELEVATION 642.71 m

DRILLER: DO CHEEK CORE SIZE: NXWL EQUIPMENT: CME-45i CME-550



**FIELD
 SCOUR REPORT**

WBS: 33830.1.1 TIP: B-4675 COUNTY: WILKES

DESCRIPTION(1):

EXISTING BRIDGE

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

Bridge No.: NEW Length: 30.5m Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
 Foundation Type: TIMBER COLUMNS ON CONC. SPREAD FOOTINGS

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE NOTED

Interior Bents: NA

Channel Bed: NONE NOTED

Channel Bank: NONE NOTED

EXISTING SCOUR PROTECTION

Type(3): CONCRETE WING WALLS

Extent(4): 10' EACH DIRECTION FROM END BENTS

Effectiveness(5): ADEQUATE

Obstructions(6): DEBRIS ON EXIST. INT. 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): FINE TO COARSE SAND W/ COBBLES AND BOULDERS

Channel Bank Material(8): SANDY SILT/SILTY SAND W/ ALLUVIAL COBBLES AND BOULDERS

Channel Bank Cover(9): WOODED W/ BRUSH

Floodplain Width(10): 18.5 m

Floodplain Cover(11): GRASS AND PAVED/GRAVEL COMMERCIAL PROPERTY

Stream is(12): Aggrading Degrading Static

Channel Migration Tendency(13): CULVERT 20m UPSTREAM PREVENTS CHANNEL MIGRATION

Observations and Other Comments:

DESIGN SCOUR ELEVATIONS(14)

Feet Meters

BENTS

EB1 EB2

NA	NA									

Comparison of DSE to Hydraulics Unit theoretical scour:
 SCOUR ENVELOPE DOES NOT REACH PROPOSED BENTS

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							

Template Revised 02/07/06

Reported by:

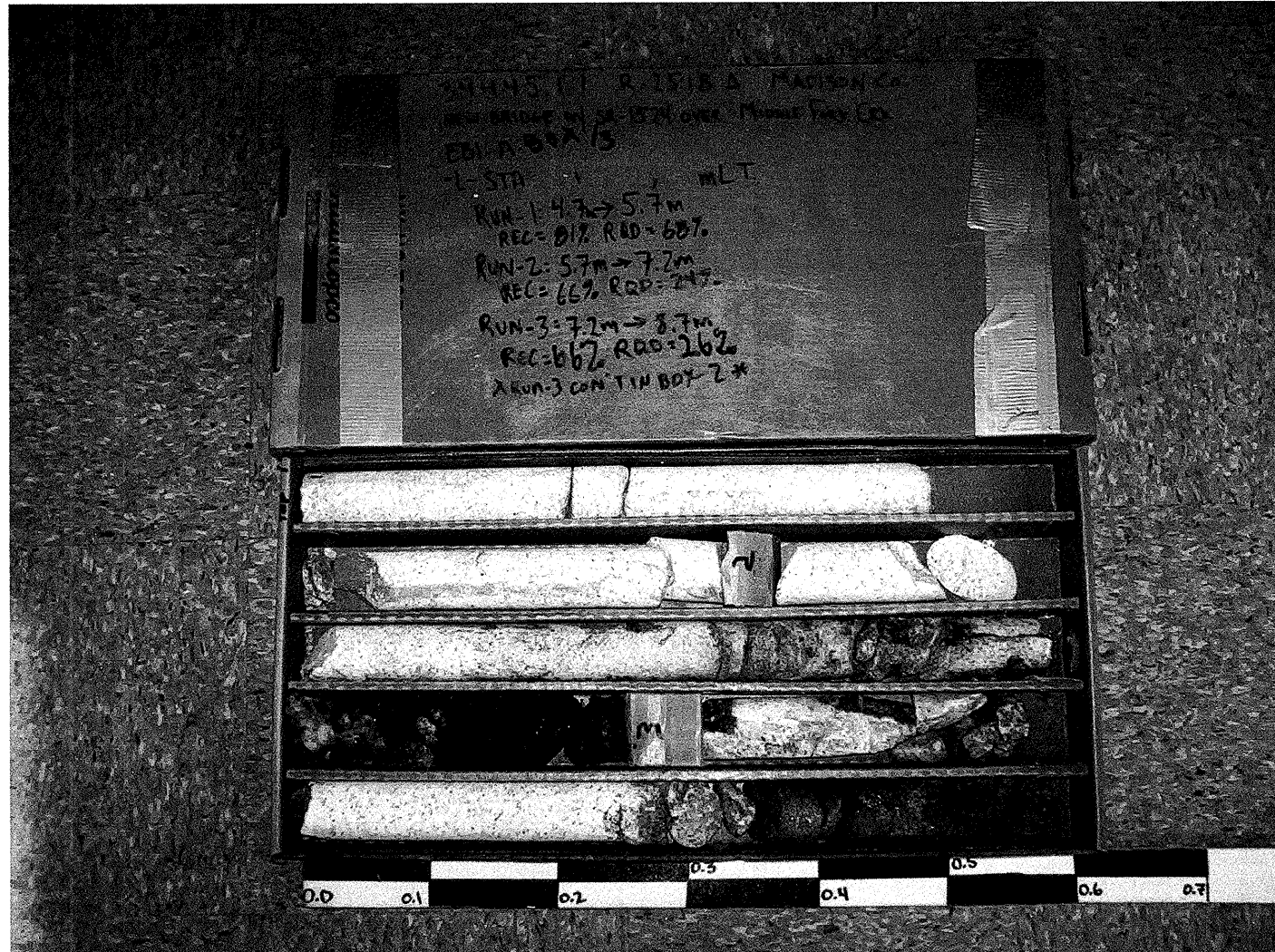
Jody C. Hill

Date:

5/1/07

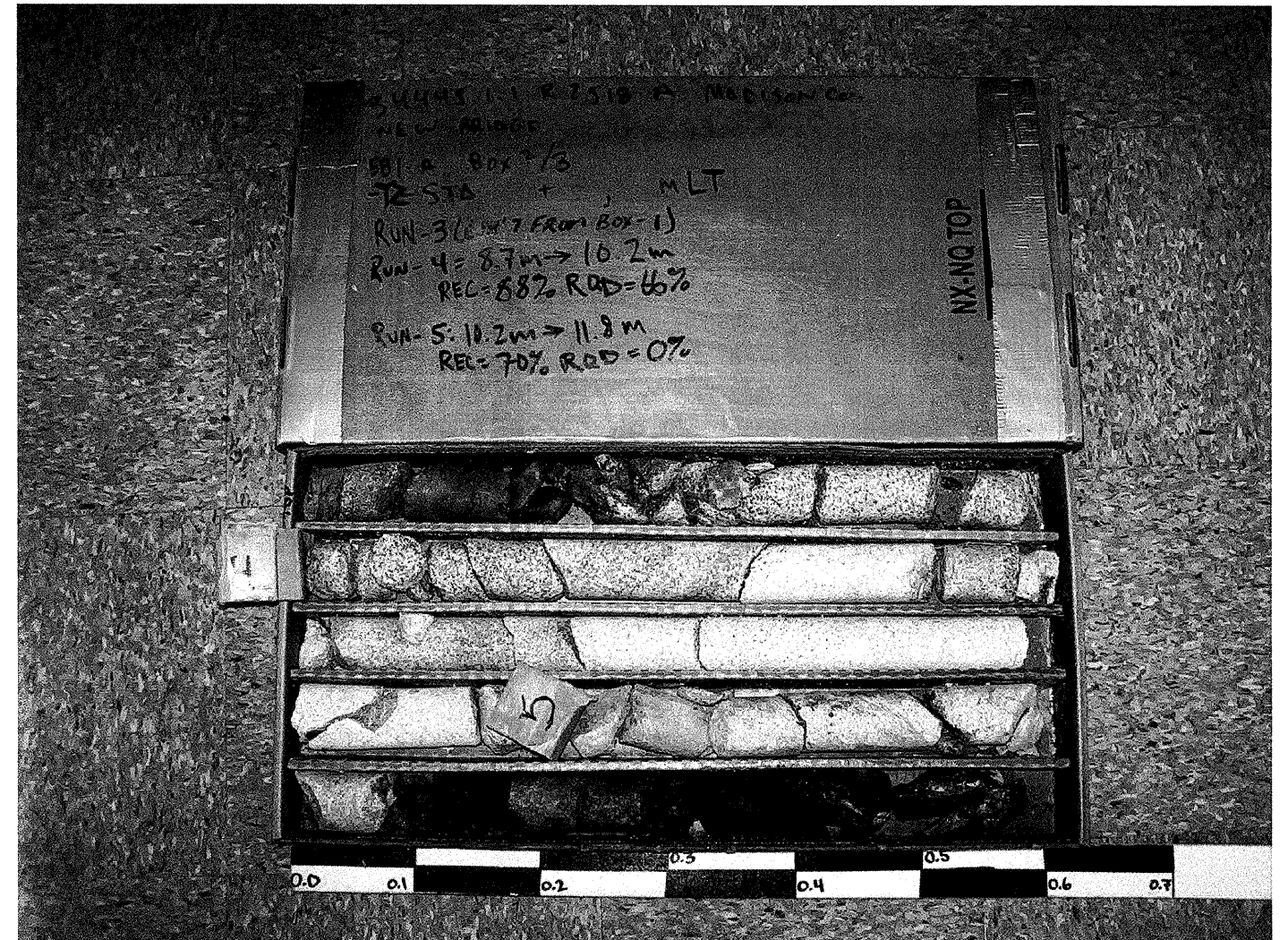
R-2518A, 34445.1.1
NEW BRIDGE ON -Y2-, SR 1524 OVER MIDDLE FORK CREEK
BORING EB1-A

DEPTH: 4.7m - 8.7m



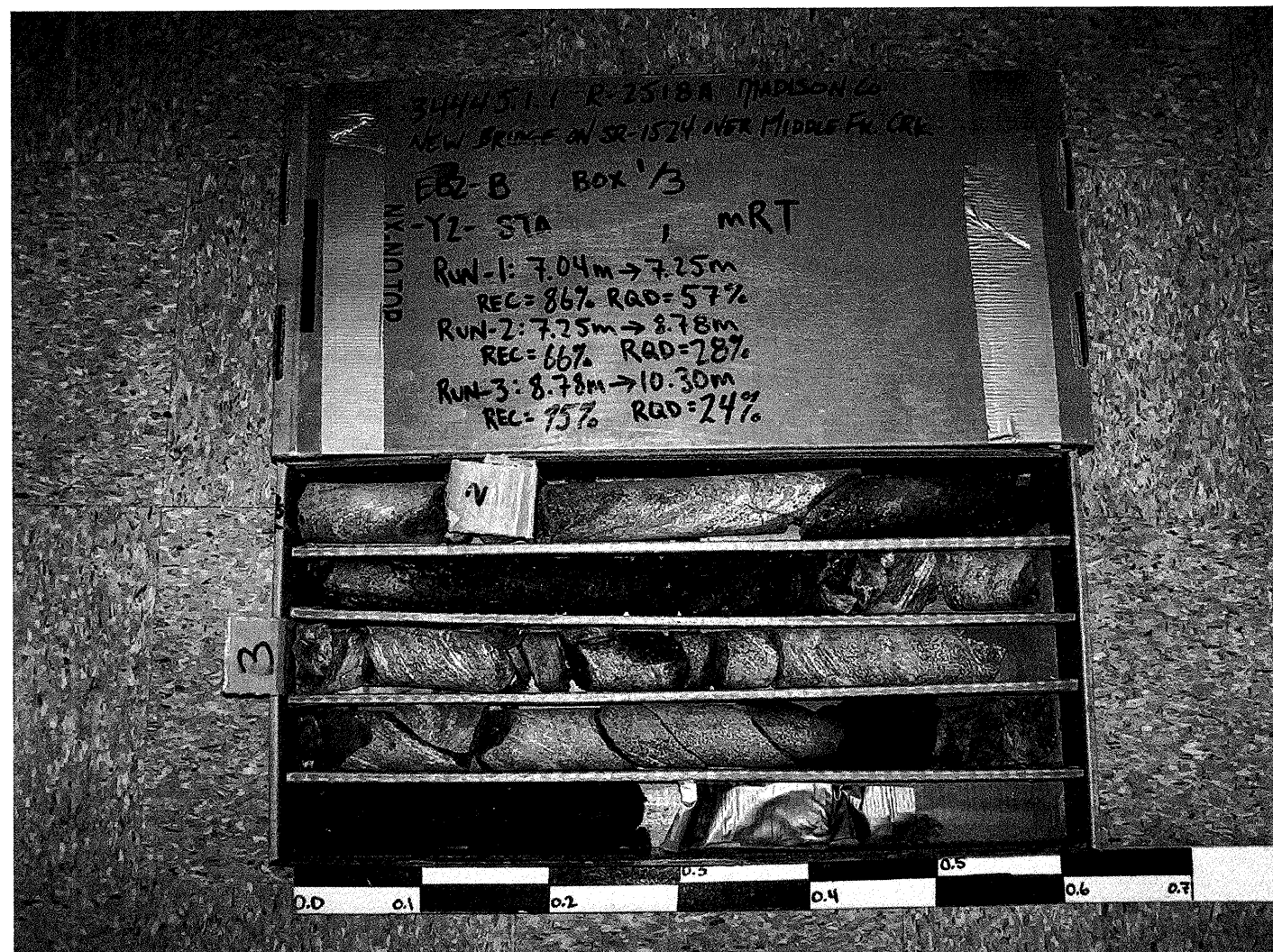
R-2518A, 34445.1.1
NEW BRIDGE ON -Y2-, SR 1524 OVER MIDDLE FORK CREEK
BORING EB1-A

DEPTH: 8.7m - 11.8m



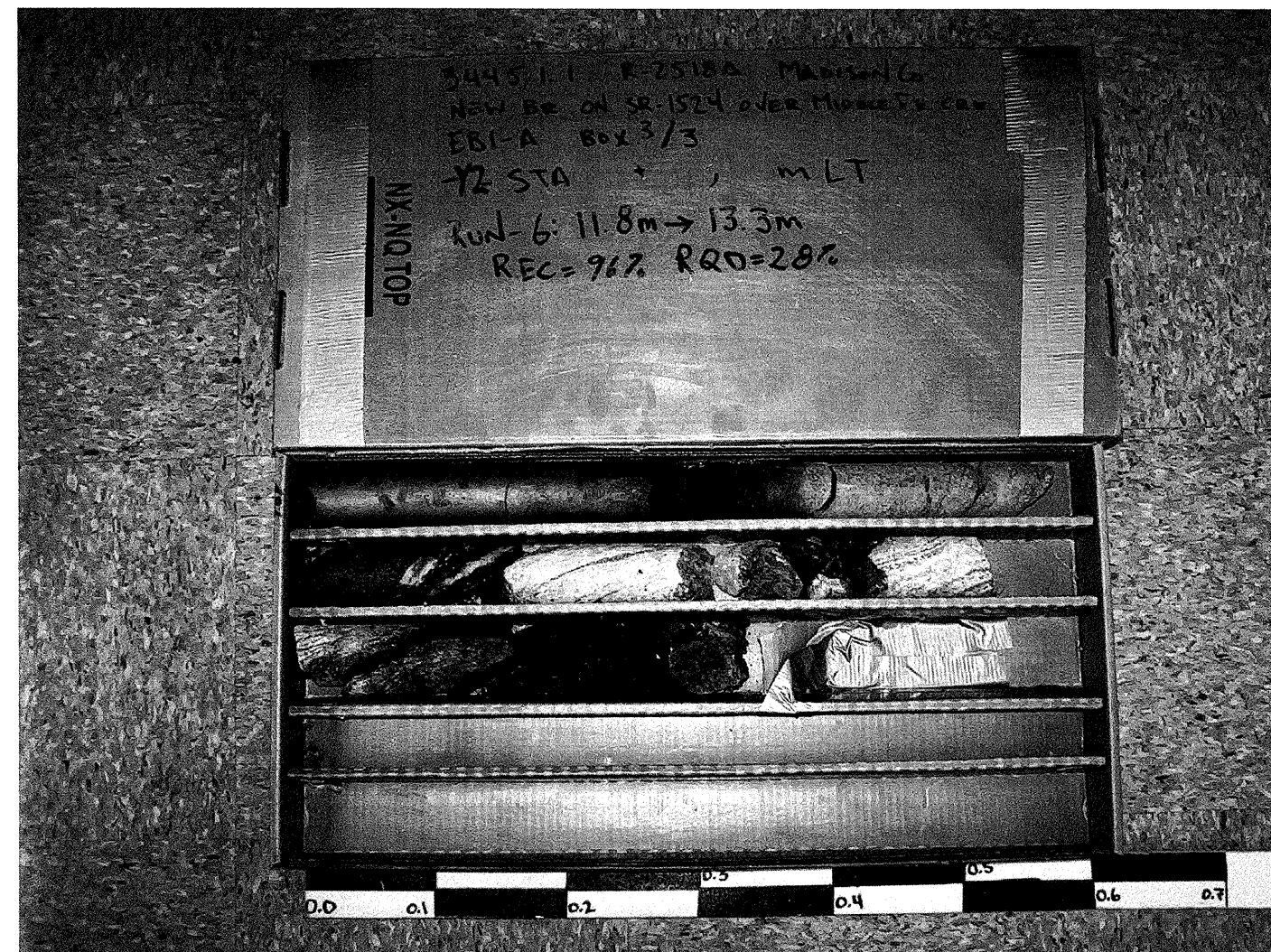
R-2518A, 34445.1.1
NEW BRIDGE ON -Y2-, SR 1524 OVER MIDDLE FORK CREEK
BORING EB2-B

DEPTH: 7.04m - 10.30m



R-2518A, 34445.1.1
NEW BRIDGE ON -Y2-, SR 1524 OVER MIDDLE FORK CREEK
BORING EB1-A

DEPTH: 11.8m - 13.3m



R-2518A, 34445.1.1
NEW BRIDGE ON -Y2-, SR 1524 OVER MIDDLE FORK CREEK
BORING EB2-B

DEPTH: 10.3m - 14.47m



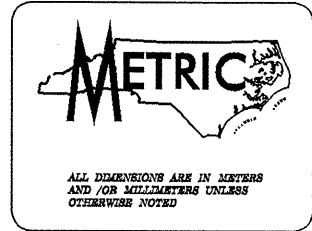
R-2518A, 34445.1.1
NEW BRIDGE ON -Y2-, SR 1524 OVER MIDDLE FORK CREEK
BORING EB2-B

DEPTH: 14.47m - 14.87m



PROJECT: 6.869005T ID. R-2518A

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



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.		1	4
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		CONST.	

CONTENTS:

INVESTIGATION OF RET. WALL
 ALONG -L-

STRUCTURE
SUBSURFACE INVESTIGATION

STATE PROJECT 6.869005T I.D. NO. R-2518A
 F.A. PROJECT _____
 COUNTY MADISON
 PROJECT DESCRIPTION US 19 FROM 1-26
TO 0.8 KM EAST OF THE YANCEY CO. LINE

 SITE DESCRIPTION RETAINING WALL
STATIONS 112+30 - 112+70 17 M LT

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

INVESTIGATED BY JC KUHNE PERSONNEL _____

CHECKED BY WD FRYE M. JOHNSON, J CARVER

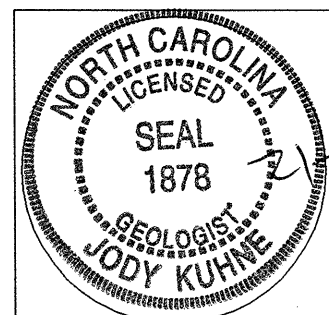
SUBMITTED BY JC KUHNE F&H ENGINEERING

DATE _____

DRAWN BY: JC KUHNE

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

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



SEAL 2/27/04
 SIGNATURE Jody Kuhne



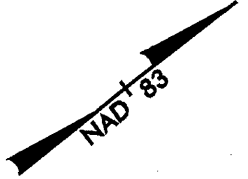
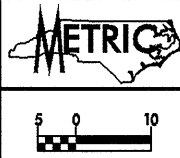
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

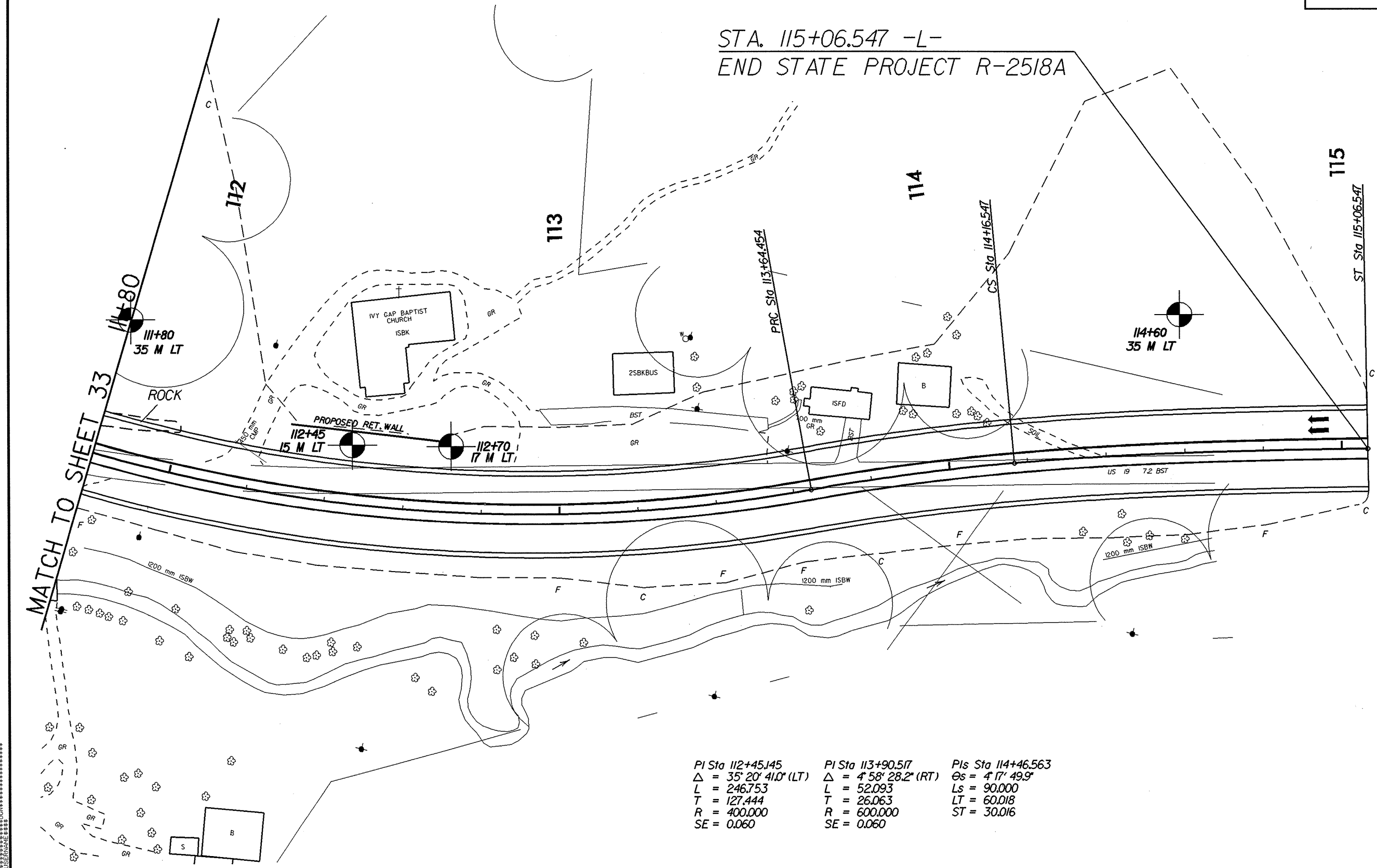
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION					GRADATION		ROCK DESCRIPTION				TERMS AND DEFINITIONS																																																																																													
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER 30 cm ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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, HIGHLY 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.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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 2.5 cm PER 50 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)				ALLUVIUM (ALLUV.) - SOILS WHICH 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 IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - 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, MOTTLED 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH 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, WHICH 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) OF A 63.5 kg HAMMER FALLING 0.76 METERS REQUIRED TO PRODUCE A PENETRATION OF 30 cm INTO SOIL WITH A 5 cm OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 2.5 cm PENETRATION WITH 50 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 (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																													
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COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL.-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.					NOTES: ELEVATION: _____																																																																																																			

PROJECT REFERENCE NO. R-2518A		SHEET NO. 3 OF 4
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		
CONST. REV.		
R/W REV.		



STA. 115+06.547 -L-
END STATE PROJECT R-2518A



MATCH TO SHEET 33

PI Sta 112+45.145 $\Delta = 35^{\circ} 20' 41.0" (LT)$ L = 246.753 T = 127.444 R = 400.000 SE = 0.060	PI Sta 113+90.517 $\Delta = 4^{\circ} 58' 28.2" (RT)$ L = 52.093 T = 26.063 R = 600.000 SE = 0.060	PIs Sta 114+46.563 $\Theta_s = 4^{\circ} 17' 49.9"$ Ls = 90.000 LT = 60.018 ST = 30.016
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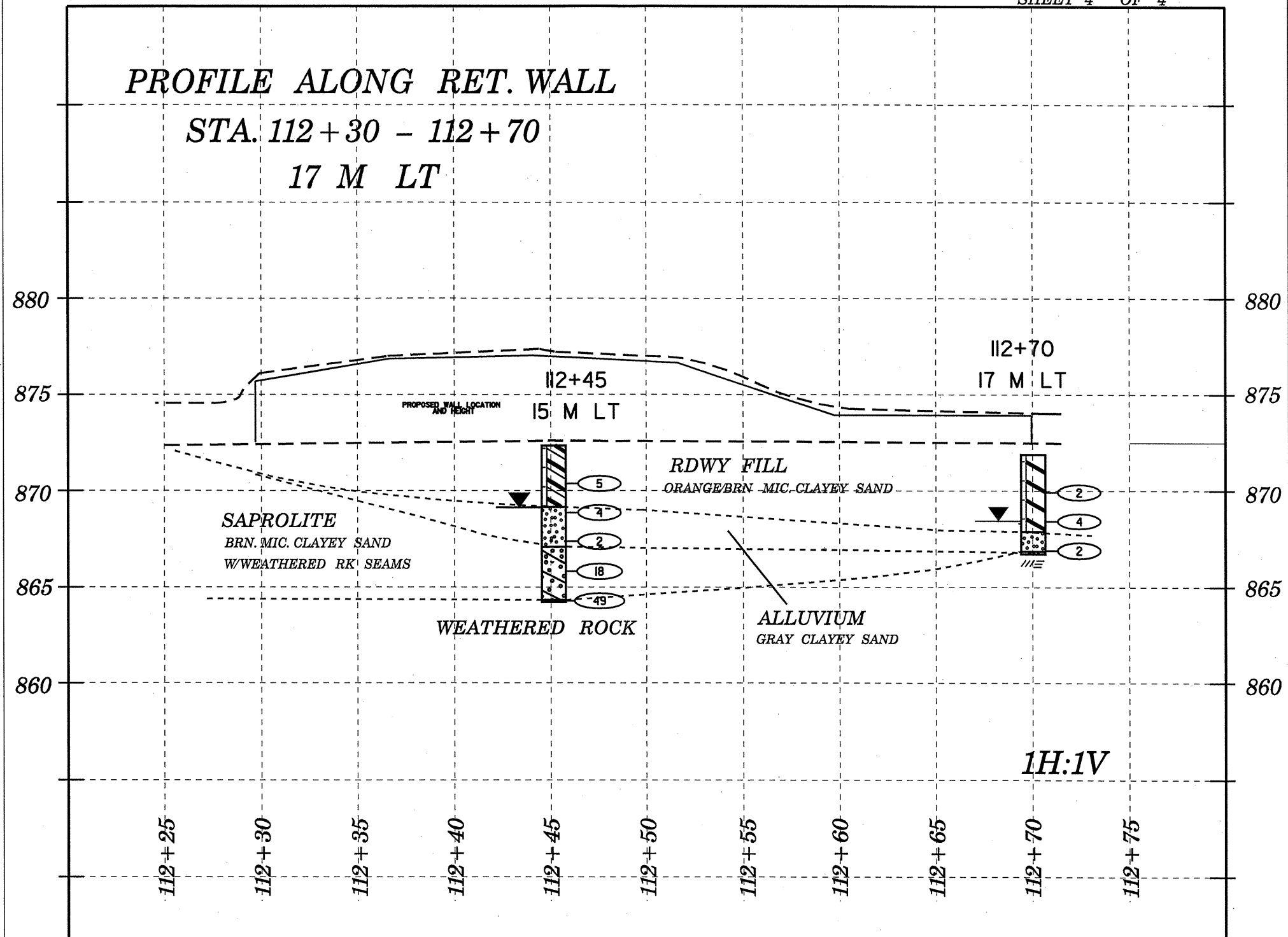
*****CYCLING*****
*****BERNARD*****

(SCALE IN METERS)

PROFILE ALONG RET. WALL

STA. 112+30 - 112+70

17 M LT



PROJECT: 6.869005T ID. R-2518A

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
 GEOTECHNICAL UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

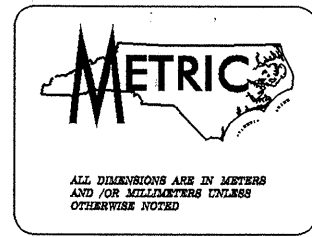
STATE PROJECT 6.869005T I.D. NO. R-2518A
 F.A. PROJECT _____
 COUNTY MADISON
 PROJECT DESCRIPTION US 19 FROM I-26
TO 0.8 KM EAST OF THE YANCEY CO. LINE

 SITE DESCRIPTION _____
RETAINING WALL
 STATIONS 102+00 - 103+60 38 M LT

CONTENTS:

INVESTIGATION OF RET. WALL
 ALONG -L-

DRAWN BY: JC KUHNE



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2518A	1	4
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
6.869005T		P.E. CONST.	

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

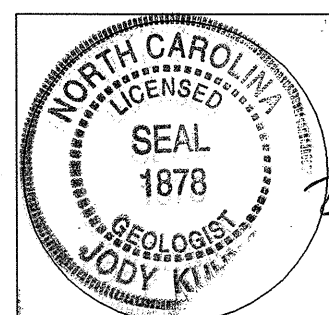
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND 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.

INVESTIGATED BY JC KUHNE PERSONNEL _____
 CHECKED BY WD FRYE M. JOHNSON, J CARVER
 SUBMITTED BY JC KUHNE F&H ENGINEERING
 DATE _____

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

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



2/27/04
 SEAL
 Jody C. Kuhne
 SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Table with 4 columns: ID (R-2518A), STATE PROJECT NO. (6.869005T), SHEET NO. (2), TOTAL SHEETS (4)



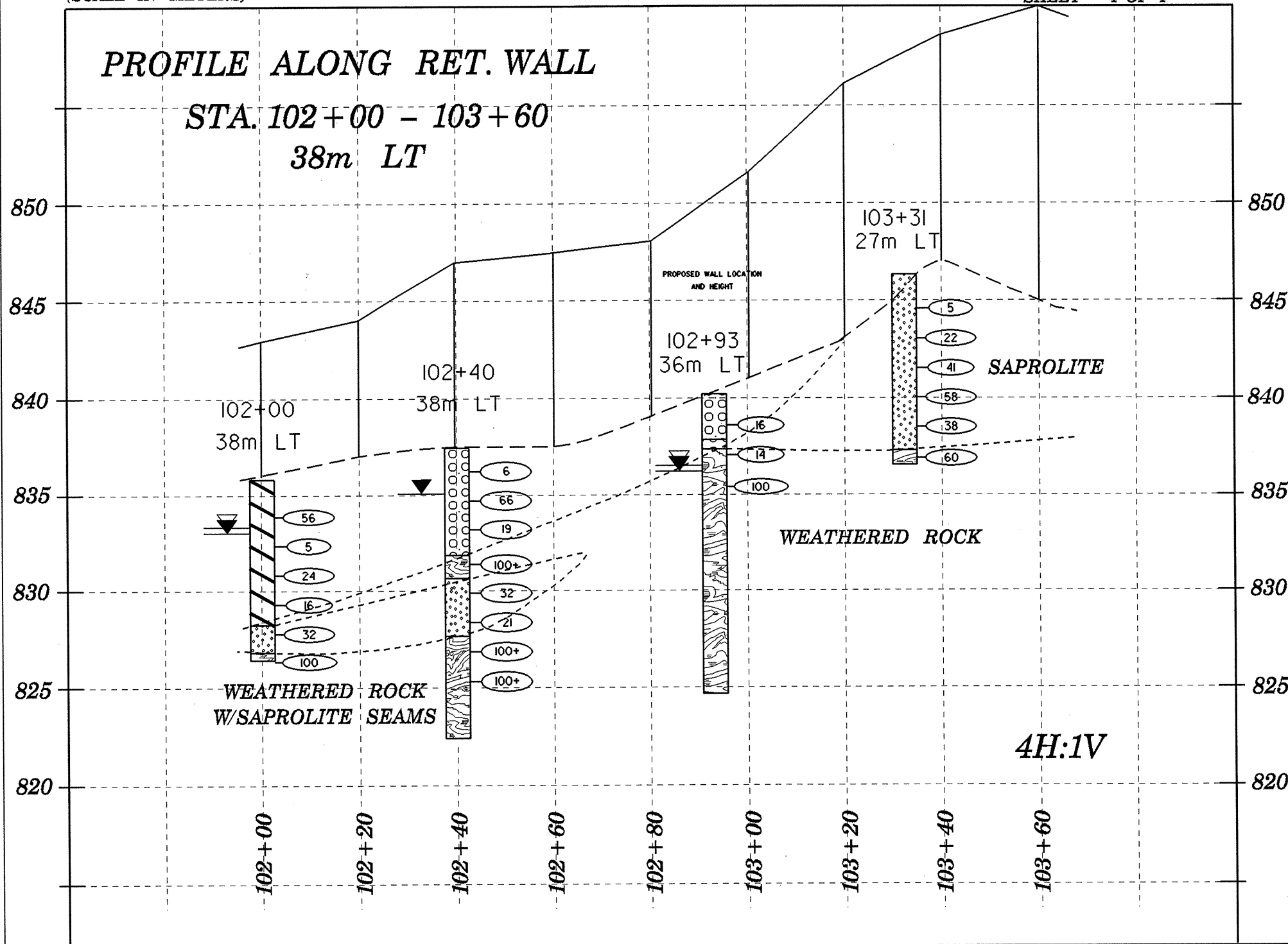
Main content area containing: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSION, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION, PLASTICITY, and COLOR.

(SCALE IN METERS)

PROFILE ALONG RET. WALL

STA. 102+00 - 103+60

38m LT



PROPOSED WALL LOCATION AND HEIGHT

102+93
36m LT

103+31
27m LT

SAPROLITE

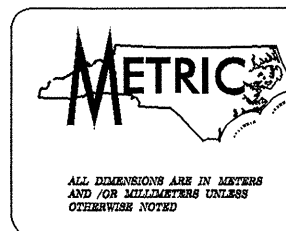
WEATHERED ROCK

4H:1V

WEATHERED ROCK
W/SAPROLITE SEAMS

PROJECT: 6.869005T ID. R-2518A

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



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2518A	1	5
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		CONST.	

CONTENTS:

INVESTIGATION OF RET. WALL
ALONG -L-

**STRUCTURE
SUBSURFACE INVESTIGATION**

STATE PROJECT 6.869005T I.D. NO. R-2518A

F.A. PROJECT _____

COUNTY MADISON

PROJECT DESCRIPTION US 19 FROM I-26
TO 0.8 KM EAST OF THE YANCEY CO. LINE

SITE DESCRIPTION RETAINING WALL
STATIONS 100+70 - 101+20 48 M LT

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INVESTIGATED BY JC KUHNE PERSONNEL _____

CHECKED BY WD FRYE M. JOHNSON, J CARVER

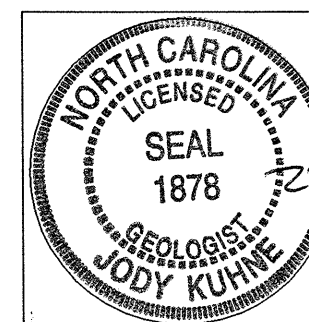
SUBMITTED BY JC KUHNE F&H ENGINEERING

DATE _____

DRAWN BY: JC KUHNE

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2/27/04
SEAL
Jody Kuhne
SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

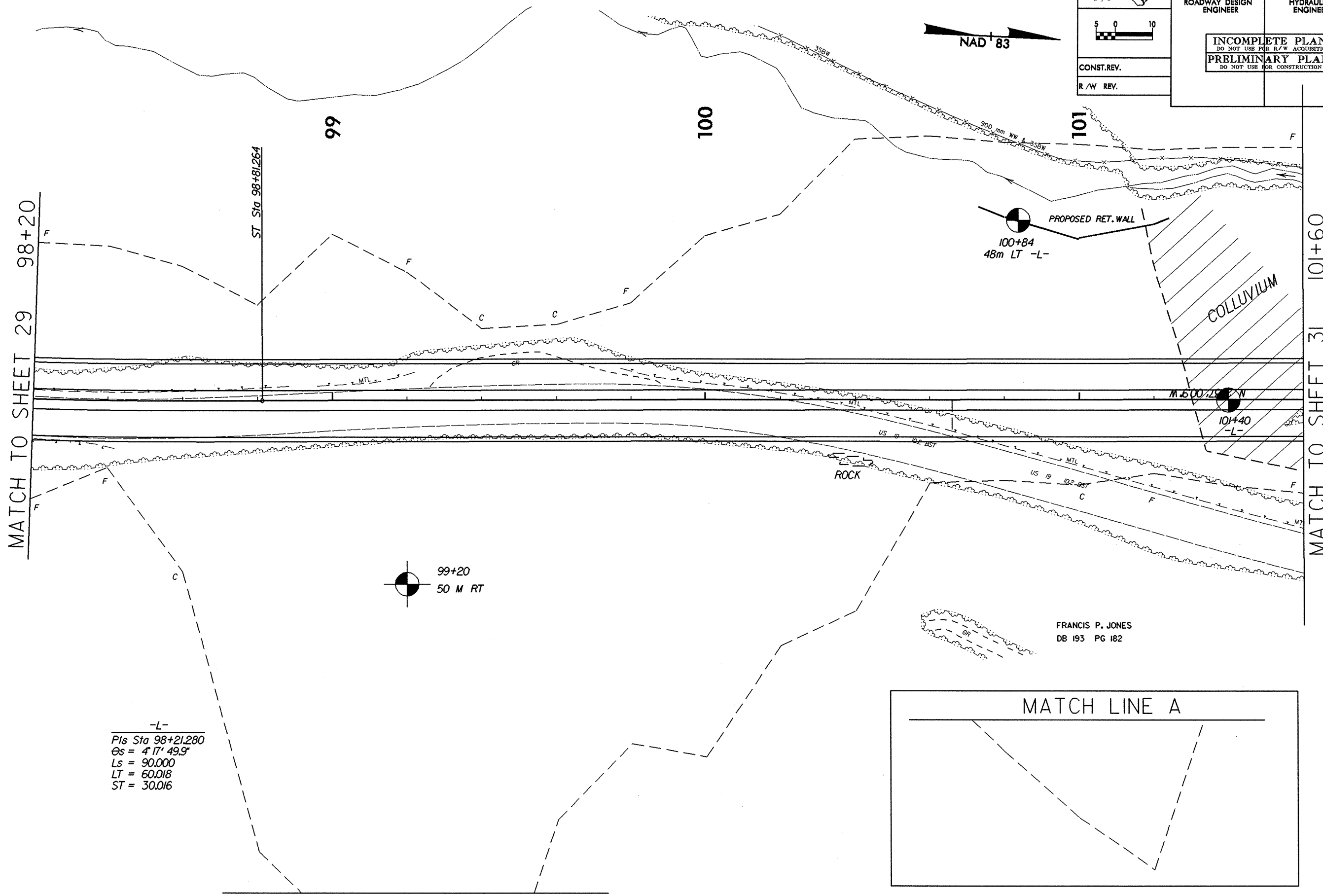
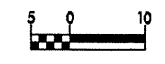
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS



Table with 4 main columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, and TERMS AND DEFINITIONS. Includes sub-sections like SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, and MISCELLANEOUS SYMBOLS. Also includes various diagrams and symbols for soil types, gradation, and rock descriptions.



PROJECT REFERENCE NO. R-2518A	SHEET NO.
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
CONST. REV.	
R/W REV.	



MATCH TO SHEET 29 98+20

MATCH TO SHEET 31 101+60

ST Sta 98+81.264

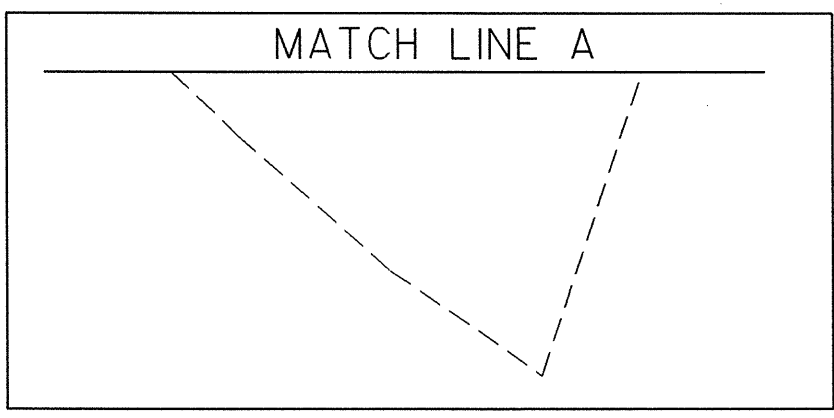
PROPOSED RET. WALL
100+84
48m LT -L-

M.500/25 W
101+40
-L-

99+20
50 M RT

FRANCIS P. JONES
DB 193 PG 182

-L-
Pls Sta 98+21.280
 $\theta_s = 4' 17' 49.9''$
Ls = 90.000
LT = 60.018
ST = 30.016



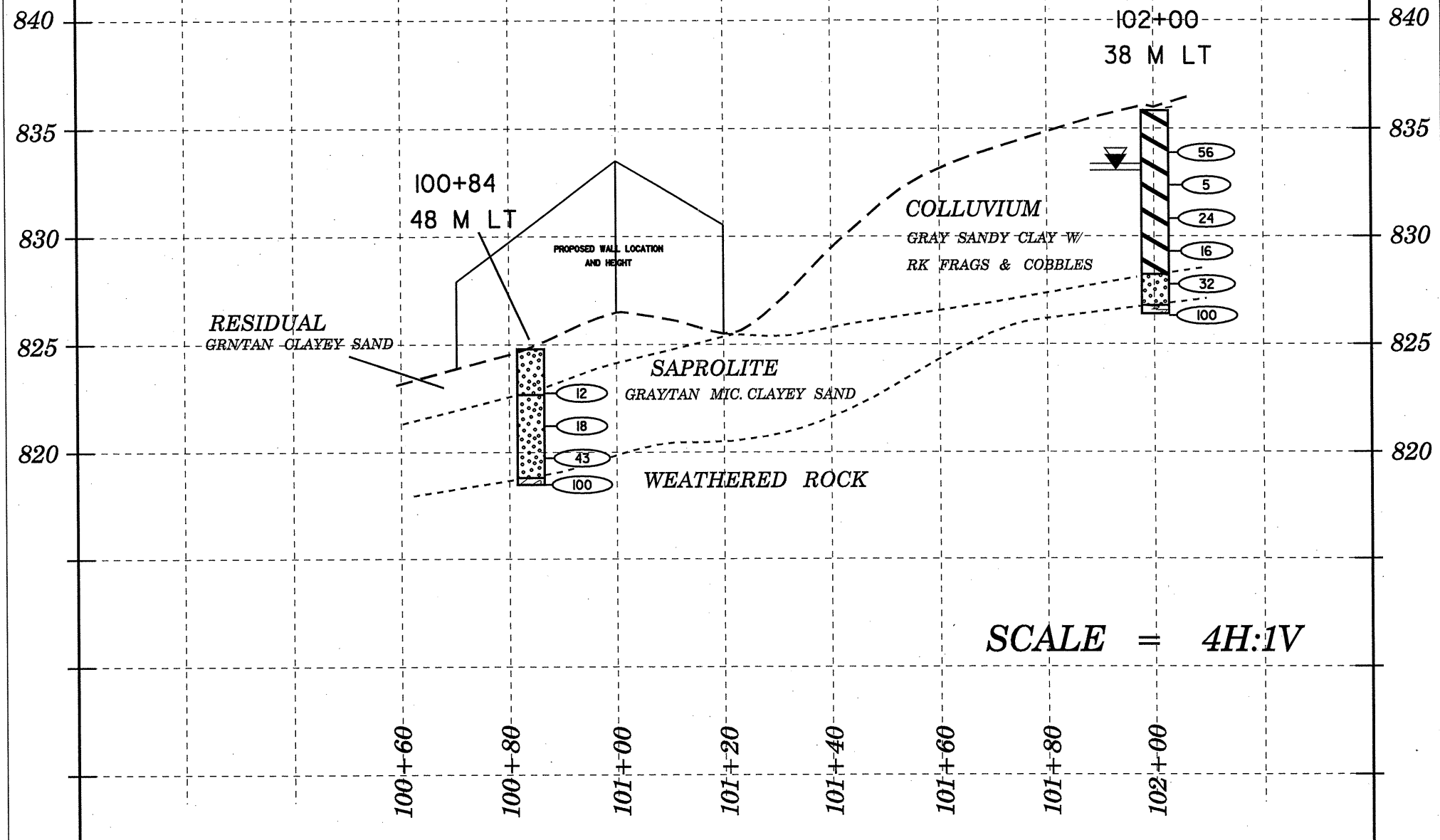
MATCH LINE A

8/17/08
*****SYTIME*****
*****USURNAME*****

(SCALE IN METERS)

PROFILE ALONG RET. WALL: STA. 100+70 - 101+20

48 - 46m LEFT



PROJECT: 34445.1.1 ID. R-2518A

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

STATE PROJECT 34445.1.1 I.D. NO. R-2518A

F.A. PROJECT _____

COUNTY MADISON

PROJECT DESCRIPTION US 19 FROM 1-26
TO 0.8 KM EAST OF THE YANCEY CO. LINE

SITE DESCRIPTION _____
RETAINING WALL

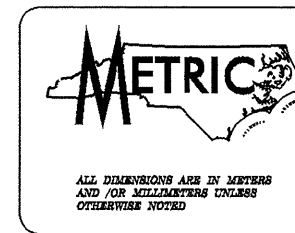
STATIONS 38+45 - 38+75 16 M RT

CONTENTS:

INVESTIGATION OF RET. WALL

ALONG -L-

DRAWN BY: JC KUHNE



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2518A	1	4
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34445.1.1		P.E. CONST.	

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INVESTIGATED BY JC KUHNE PERSONNEL DO CHEEK

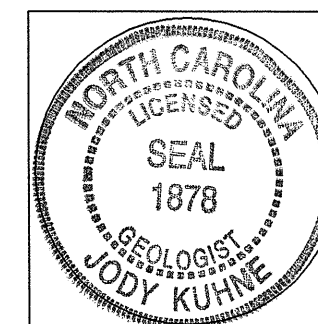
CHECKED BY WD FRYE GK ROSE

SUBMITTED BY JC KUHNE

DATE 3/6/04

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SEAL
Jody C Kuhne
SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
R-2518A	34445.1.1	2	4

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

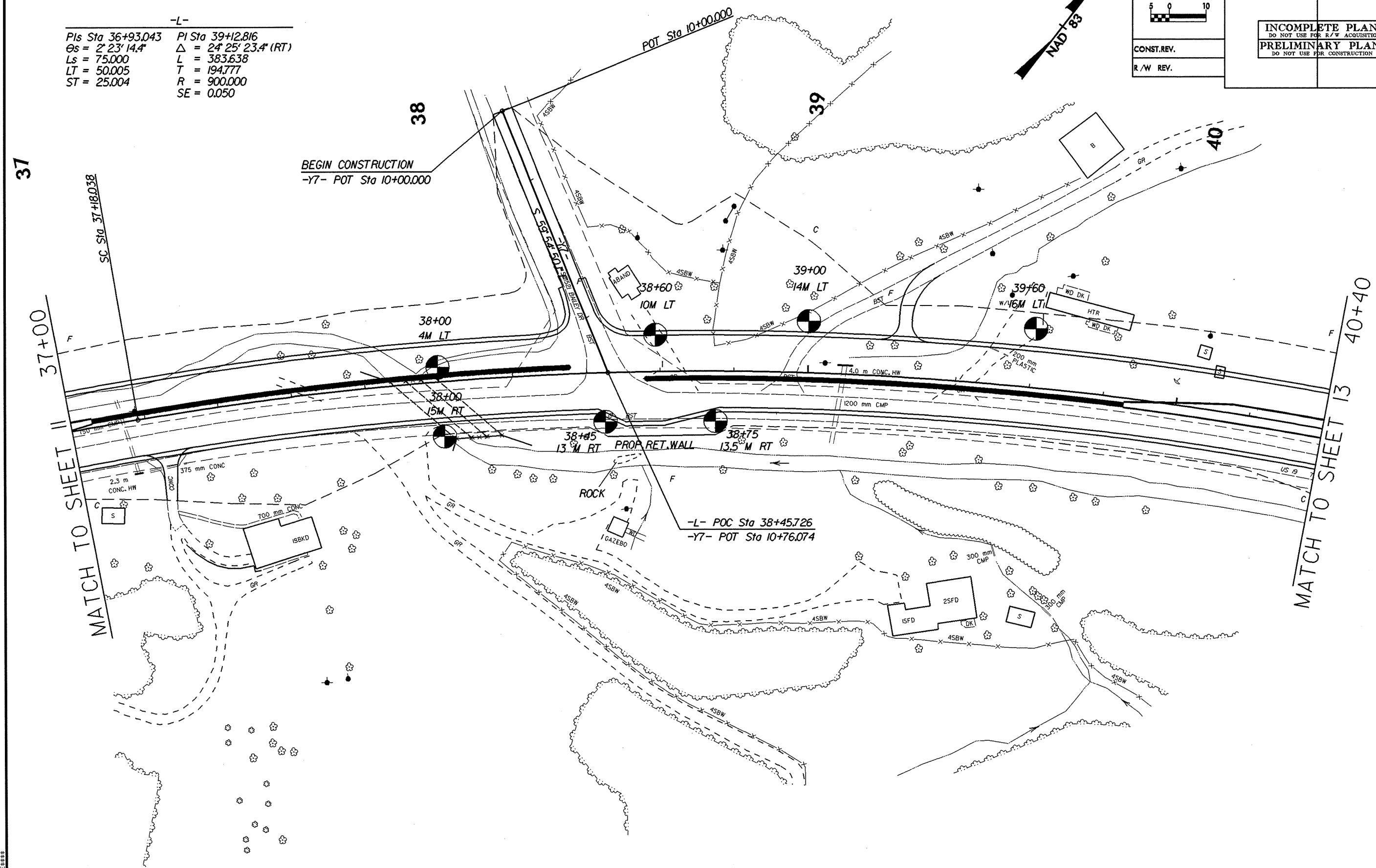
SOIL DESCRIPTION				GRADATION				TERMS AND DEFINITIONS				ABBREVIATIONS											
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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, HIGHLY 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.				ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. APPARENT DIP - THE DIP OF ROCK STRATA NOT PERPENDICULAR TO STRIKE. AQUIFER - A WATER BEARING FORMATION OR STRATA. AUGER REFUSAL (A.R.) - POINT AT WHICH POWER AUGERS WILL NOT PENETRATE. BEDDED - SOIL OR ROCK LYING IN A POSITION ESSENTIALLY PARALLEL. BEDROCK - ROCK OF RELATIVELY GREAT THICKNESS AND EXTENT IN ITS ORIGINAL LOCATION. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COHESIVE SOIL - A SOIL THAT WHEN UNCONFINED HAS CONSIDERABLE DRY STRENGTH AND SIGNIFICANT COHESION WHEN SUBMERGED. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (% REC.) - TOTAL LENGTH OF ALL ROCK DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. COQUINA - A ROCK TYPE COMPOSED ESSENTIALLY OF MARINE SHELLS CEMENTED BY CALCIUM CARBONATE. DIKE - IGNEOUS ROCK INTRUSION WHICH IS NARROW COMPARED WITH ITS OTHER DIMENSIONS. DIP - THE ANGLE BETWEEN A BEDDING PLANE, JOINT PLANE OR FAULT PLANE AND THE HORIZONTAL, MEASURED PERPENDICULAR TO THE STRIKE. DUMPS - UNCOVERED DEPOSITS OF WASTE MATERIAL SUCH AS WOOD, MASONRY DEBRIS OR GARBAGE. FAULT - A BREAK IN THE CONTINUITY OF A BODY OF ROCK, ATTENDED BY A MOVEMENT ON EITHER OR BOTH SIDES OF THE BREAK. FINES - PORTIONS OF A SOIL FINER THAN NO. 200 U.S. STANDARD SIEVE. FISSILITY OR FISSILE - A PROPERTY OF SPLITTING EASILY ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOODPLAIN - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION - A MAPPABLE UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. FRACTURE - A CRACK LARGE ENOUGH TO BE VISIBLE TO THE UNAIDED EYE. FRIABLE - EASY TO BREAK OR CRUMBLE. GRANULAR MATERIAL - SOIL THAT WHEN UNCONFINED HAS LITTLE OR NO DRY STRENGTH AND HAS LITTLE OR NO COHESION WHEN SUBMERGED. GROUNDWATER (G.W.) - WATER THAT IS FREE TO MOVE THROUGH SOIL MASS UNDER THE INFLUENCE OF GRAVITY. GROUNDWATER LEVEL - LEVEL OF WATER WITH RESPECT TO EXISTING GROUND SURFACE. HARDPAN - A GENERAL TERM USED TO DESCRIBE A HARD CEMENTED SOIL LAYER WHICH DOES NOT SOFTEN WHEN WET. INDURATED - EARTH MATERIAL HARDENED BY HEAT, PRESSURE OR CEMENTATION. INTERBEDDED - ALTERNATING LENSES OR LAYERS OF SOIL AND/OR ROCK MATERIALS. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LAMINATED - VERY THIN ALTERNATING LAYERS LESS THAN 1cm. LAYER - SUBJECT MATERIAL GREATER THAN 1cm IN THICKNESS. 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. MARL - A NON-INDURATED, CALCAREOUS DEPOSIT OF CLAYS, SILTS AND SANDS, OFTEN CONTAINING SHELLS. MICACEOUS SOIL (MIC.) - A SOIL OR ROCK TYPE CONTAINING AN APPRECIABLE AMOUNT OF MICA. MUCK (MK.) - A HIGHLY ORGANIC SOIL OF VERY SOFT CONSISTENCY, GENERALLY FOUND ON TIDAL FLATS, LAKE OR STREAM FLOODPLAINS. PEAT (PT) - A FIBROUS MASS OF ORGANIC MATTER IN VARIOUS STAGES OF DECOMPOSITION. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK - SEE LEGEND. ROCK QUALITY DESIGNATION (R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 0.1 METER DIVIDED BY THE TOTAL LENGTH OF CORE RUN EXPRESSED AS A PERCENTAGE. SANITARY LANDFILLS - COMPACTED AND/OR COVERED LAYERS OF SOIL AND WASTE PRODUCTS. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLAIN. SILL - AN IGNEOUS SHEET OF INTRUSIVE ROCK WHOSE THICKNESS IS SLIGHT COMPARED TO ITS LATERAL EXTENT. SOME - PRESENCE OF 5% TO 30% OF SUBJECT MATERIAL. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N) OF A 63.5 kg HAMMER FALLING 0.76 METERS REQUIRED TO PRODUCE A PENETRATION OF 30 cm INTO SOIL WITH A 5 cm OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION RESISTANCE OF LESS THAN 2.5 cm WITH 50 BLOWS. STRIKE - THE DIRECTION OR BEARING OF A HORIZONTAL LINE IN THE PLANE OF AN INCLINED STRATUM, JOINT, FAULT OR OTHER STRUCTURAL PLANE. SUBGRADE - THE SOIL PREPARED TO SUPPORT A STRUCTURE OR A PAVEMENT SYSTEM. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. TRACE - PRESENCE OF LESS THAN 5% OF SUBJECT MATERIAL.				THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.				BLDR. - BOULDER CL. - CLAY COB. - COBBLE CSE. - COARSE EST. - ESTIMATED F. - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED GR. - GRAVEL LL - LIQUID LIMIT MED. - MEDIUM MOT. - MOTTLED OM - OPTIMUM MOISTURE ORG. - ORGANIC PL - PLASTIC LIMIT PI - PLASTICITY INDEX n - POROSITY SD. - SAND SAT. - SATURATED SL. - SILT, SILTY SLI. - SLIGHTLY G _s - SPECIFIC GRAVITY qu - UNCONFINED COMPRESSIVE STRENGTH γ - UNIT WEIGHT (WET UNIT WEIGHT) γ _d - DRY UNIT WEIGHT γ _{SAT} - SATURATED UNIT WEIGHT e - VOID RATIO V. - VERY			
SOIL LEGEND AND AASHTO CLASSIFICATION				COMPRESSION				ROCK DESCRIPTION				CAUTION NOTICE :											
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS				SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50				IN THE BROADEST MEANING, HARD ROCK IS CONSIDERED THAT MATERIAL WHICH CANNOT BE SAMPLED BY CONVENTIONAL SOIL SAMPLING TOOLS OR TECHNIQUES. THE BOUNDARY BETWEEN SOIL AND ROCK IS ARBITRARY. TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF "WEATHERED ROCK". FOR THE PURPOSE OF THIS INVESTIGATION, THESE MATERIALS ARE DIVIDED AS FOLLOWS:				THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. SOME DATA OBTAINED MAY BE OMITTED FROM THIS RELEASE. ADDITIONAL INFORMATION MAY BE AVAILABLE, INCLUDING, BUT NOT LIMITED TO THE FOLLOWING: FIELD BORING LOGS ROCK CORES SOIL & ROCK TEST DATA SUBSURFACE REPORT THIS INFORMATION MAY BE VIEWED BY APPOINTMENT BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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 OPINIONS 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. 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.											
GROUP CLASS. A-1 A-1-B A-2 A-2-5 A-2-6 A-2-7 A-3 A-3 A-4 A-5 A-6 A-7 A-7-5 A-7-6 A-7-8 A-7-9 A-7-10 A-7-11 A-7-12 A-7-13 A-7-14 A-7-15 A-7-16 A-7-17 A-7-18 A-7-19 A-7-20 A-7-21 A-7-22 A-7-23 A-7-24 A-7-25 A-7-26 A-7-27 A-7-28 A-7-29 A-7-30 A-7-31 A-7-32 A-7-33 A-7-34 A-7-35 A-7-36 A-7-37 A-7-38 A-7-39 A-7-40 A-7-41 A-7-42 A-7-43 A-7-44 A-7-45 A-7-46 A-7-47 A-7-48 A-7-49 A-7-50 A-7-51 A-7-52 A-7-53 A-7-54 A-7-55 A-7-56 A-7-57 A-7-58 A-7-59 A-7-60 A-7-61 A-7-62 A-7-63 A-7-64 A-7-65 A-7-66 A-7-67 A-7-68 A-7-69 A-7-70 A-7-71 A-7-72 A-7-73 A-7-74 A-7-75 A-7-76 A-7-77 A-7-78 A-7-79 A-7-80 A-7-81 A-7-82 A-7-83 A-7-84 A-7-85 A-7-86 A-7-87 A-7-88 A-7-89 A-7-90 A-7-91 A-7-92 A-7-93 A-7-94 A-7-95 A-7-96 A-7-97 A-7-98 A-7-99 A-7-100				WEATHERED ROCK (SWR) HARD WEATHERED ROCK HARD CORED ROCK INFERRED ROCK LINE				* SPT REFUSAL ≤ 2.5cm OF PENETRATION PER 50 BLOWS. ** AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH AUGERS COULD NO LONGER PENETRATE. THE HARD ROCK SYMBOL IS SHOWN WHEN ROCK IS CORED AND ONLY TO THAT DEPTH CORED. A DESCRIPTION OF ROCK IS GIVEN INCLUDING: CORE RECOVERY (REC.) - TOTAL LENGTH OF ROCK RECOVERED IN THE CORE BARREL DIVIDED BY THE TOTAL LENGTH OF THE CORE RUN TIMES 100%. ROCK QUALITY DESIGNATION (ROD) - TOTAL LENGTH OF SOUND ROCK SEGMENTS RECOVERED THAT ARE LONGER THAN OR EQUAL TO 0.1m DIVIDED BY THE TOTAL LENGTH OF THE CORE RUN TIMES 100%.				WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. STATIC WATER LEVEL AFTER _____ HOURS. PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA SPRING OR SEEPAGE											
% PASSING • 10 • 40 • 200				GRANULAR SOILS SILT-CLAY SOILS MUCK, PEAT				SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER HIGHLY ORGANIC SOILS				SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION 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											
LIQUID LIMIT PLASTIC INDEX GROUP INDEX USUAL TYPES OF MAJOR MATERIALS GEN. RATING AS A SUBGRADE				P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30				TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 0.425 0.85 2.0 0.25 0.075 0.053															
CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (BLOWS) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (KN/M ²)				MISCELLANEOUS SYMBOLS AND ABBREVIATIONS ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS INFERRED SOIL BOUNDARIES ALLUVIAL/RESIDUAL BOUNDARIES 25° DIP DIRECTION AND DIP OF STRUCTURES APPARENT DIP (NORMAL TO)				EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B BK-51 CME-45 CME-550 PORTABLE HOIST OTHER OTHER AUGER TOOLS: 6" (152mm) CONTINUOUS FLIGHT 8" (203mm) HOLLOW AUGERS HARD FACED FINDER BITS TUNG. - CARBIDE INSERTS CLAY BITS OTHER HAMMER TYPE: AUTOMATIC MANUAL CORE BORING TOOLS: AX BX NX HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST															
PLASTICITY PLASTICITY INDEX 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, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, MOTTLED, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.				NOTES:															

METRIC

CONST. REV.
R/W REV.

PROJECT REFERENCE NO. R-2518A	SHEET NO. 3 OF 4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-L-
 PIs Sta 36+93.043 PI Sta 39+12.816
 $\theta_s = 2^\circ 23' 14.4"$ $\Delta = 24^\circ 25' 23.4"$ (RT)
 Ls = 75.000 L = 383.638
 LT = 50.005 T = 194.777
 ST = 25.004 R = 900.000
 SE = 0.050



37

38

39

40

37+00

40+40

MATCH TO SHEET

MATCH TO SHEET 13

*****SYTIME*****
 *****SYTIME*****
 *****SYTIME*****
 *****SYTIME*****
 *****SYTIME*****

(SCALE IN METERS)

PROJECT 34445.1.1
COUNTY MADISON
SHEET 4 OF 4

PROFILE ALONG RET. WALL

STA. 38+45 - 38+75

16m RT

