

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. R-4748 F.A. PROJ. NA
COUNTY MACON
PROJECT DESCRIPTION NEW ROUTE FROM SR 1660 (SILER ROAD)
TO SR 1662 (WILEY BROWN ROAD) SOUTH OF US 441
SITE DESCRIPTION BR. No. 368 OVER LITTLE TENNESSEE RIVER
RIVER

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

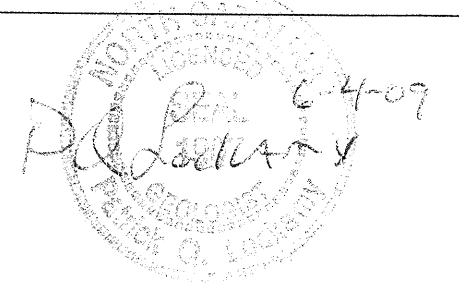
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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.

PROJECT: 40118.1.1 **ID: R-4748**

PERSONNEL

- M. M. HAGAR
- D. O. CHEEK
- G. K. ROSE
- L. E. RIDDLE
- R. D. CHILDERS
- C. J. COFFEY

INVESTIGATED BY P. Q. LOCKAMY
CHECKED BY W. D. FRYE
SUBMITTED BY W. D. FRYE
DATE 06.04.09



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

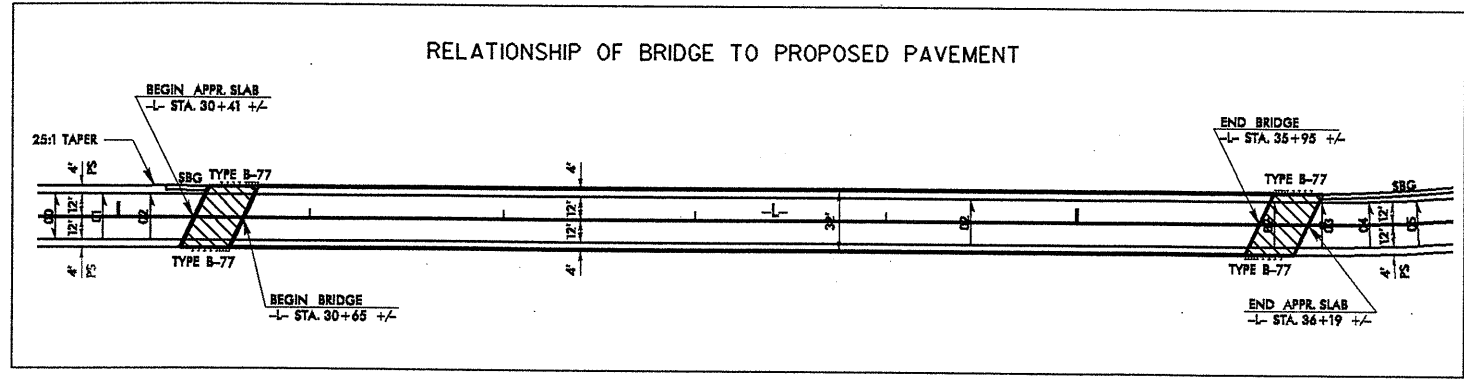
PROJECT REFERENCE NO.	SHEET NO.
R-4748	2/22

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																			
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (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:</p> <p>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</p>		<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>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.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>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.</p> <p>SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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 INTRODUCED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>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.</p> <p>TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																			
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th>GRANULAR MATERIALS (≤ 30% PASSING #200)</th> <th>SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th>ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1, A-1-b, A-3</td> <td>A-2, A-2-4, A-2-5, A-2-6, A-2-7</td> <td>A-4, A-5, A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td>[Diagrams]</td> <td>[Diagrams]</td> <td>[Diagrams]</td> </tr> <tr> <td>% PASSING</td> <td>50, 30, 15, 10, 5, 2.5, 1.25, 0.6, 0.3, 0.15, 0.075, 0.03, 0.015, 0.0075</td> <td>40, 30, 20, 15, 10, 5, 2.5, 1.25, 0.6, 0.3, 0.15, 0.075, 0.03, 0.015, 0.0075</td> <td>GRANULAR SOILS, SILT-CLAY SOILS, MUCK, PEAT</td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td>6, 4, 3, 2, 1, 0</td> <td>10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100</td> <td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER, HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>GROUP INDEX</td> <td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30</td> <td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30</td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS, GRAVEL, SAND</td> <td>FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS, CLAYEY SOILS</td> </tr> <tr> <td>GEN. 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RATING AS A SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR, POOR, UNSUITABLE	<p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31</p> <p>MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50</p> <p>HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p>PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT-CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>		ORGANIC MATERIAL	GRANULAR SOILS	SILT-CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	>10%	>20%	HIGHLY 35% AND ABOVE	<p>WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT 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.</p> <p>SLIGHT 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.</p> <p>MODERATE 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.</p> <p>MODERATELY SEVERE 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.</p> <p>SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF.</p> <p>VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF.</p> <p>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.</p>	
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<p>GROUND WATER</p> <p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>STATIC WATER LEVEL AFTER 24 HOURS</p> <p>PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>SPRING OR SEEP</p>		<p>MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SOUNDING ROD</p> <p>SPT DPT VST CPT DMT PHT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>SPT N-VALUE</p> <p>SPT REFUSAL</p> <p>S - BULK SAMPLE</p> <p>SS - SPLIT SPOON SAMPLE</p> <p>ST - SHELBY TUBE SAMPLE</p> <p>RS - ROCK SAMPLE</p> <p>RT - RECOMPACTED TRIAXIAL SAMPLE</p> <p>CBR - CALIFORNIA BEARING RATIO SAMPLE</p>																																																							
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<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRAGILE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>		<p>NOTES:</p> <p>BL-10 28+59.75 -BL- 2065.74'</p> <p>BL-11 31+07.42 -BL- 2013.54'</p> <p>BL-12 34+27.01 -BL- 2017.39'</p>																																																							

8/17/99

REVISIONS

02-JUN-2005 13:30
d:\p\projects\1748_GEO_BROG.XXX\CADD\GEO\TECH\Plan\Plan\1748_GEO.dwg
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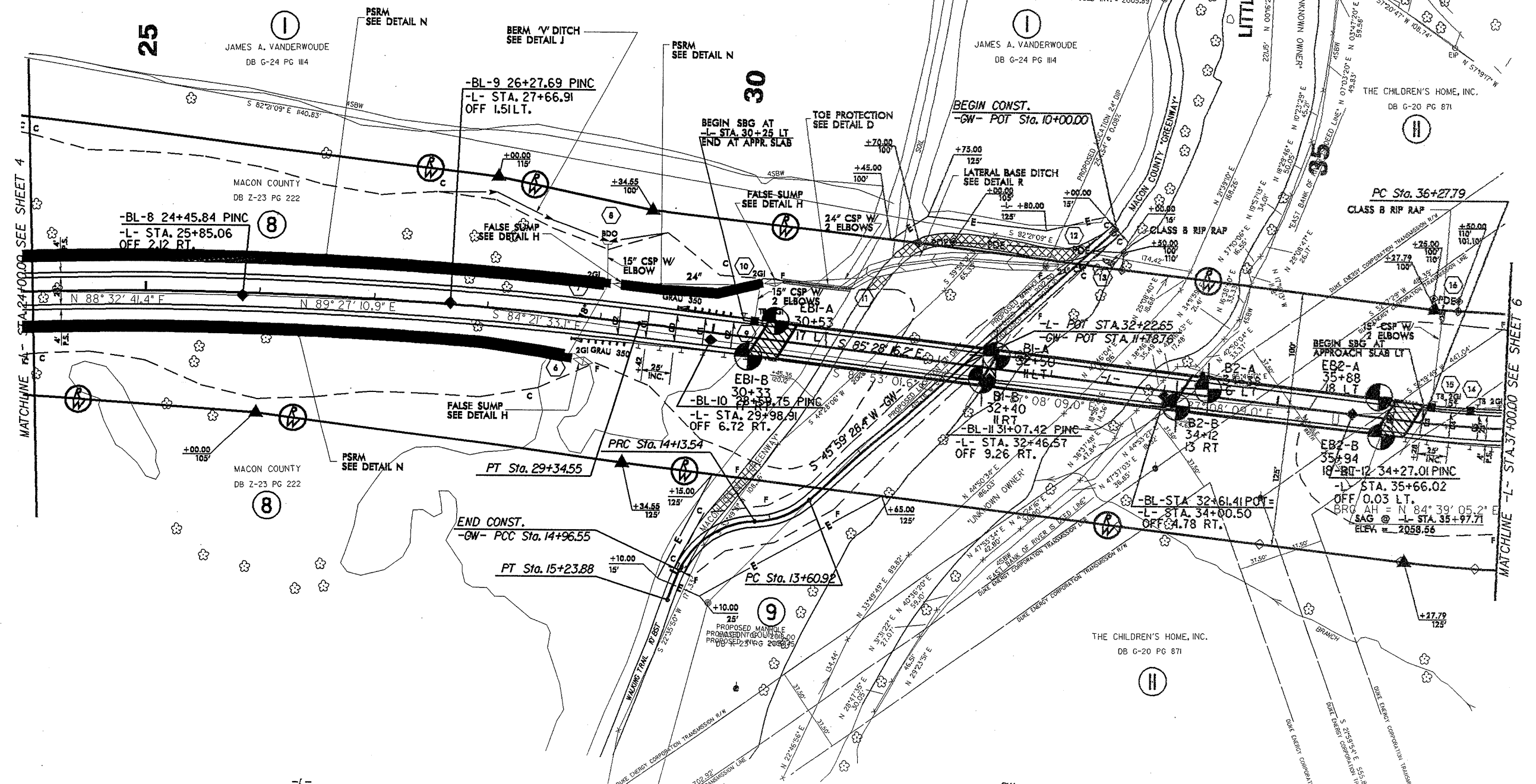
THE PROPOSED LOCATION OF A
MACON COUNTY SANITARY SEWER LINE
AS DESIGNED BY
MCGILL ASSOCIATES, PA
P.O. BOX 2259
ASHEVILLE, N.C. 28802

Contact Information
Contact Person: Mr. Vann Waters, P.L.S.
Phone: (828) 252-0575
e-mail: vann@mcpengineers.com

PROJECT REFERENCE NO. R-4748	SHEET NO. 3/22
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

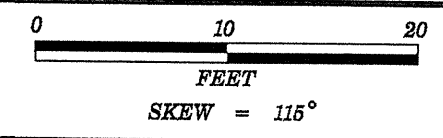
0 60 100
SCALE IN FEET

BRIDGE APP. SLAB



-L-	-L-
PI Sta 26+18.40	PI Sta 42+70.90
Δ = 9° 37' 56.4" (RT)	Δ = 68° 11' 35.0" (LT)
D = 1' 31" 11.2"	D = 6' 0" 52.1"
L = 633.80'	L = 1130.68'
T = 317.65'	T = 643.11'
R = 3770.00'	R = 950.00'
SE = (SEE PLANS)	SE = (SEE PLANS)

-GW-	-GW-	-GW-
PI Sta 13+88.36	PI Sta 14+59.87	PI Sta 15+10.23
Δ = 40° 11' 53.4" (RT)	Δ = 63° 24' 53.8" (LT)	Δ = 5° 27' 12.4" (LT)
D = 76' 23" 39.7"	D = 76' 23" 39.7"	D = 19' 57" 08.4"
L = 52.62'	L = 83.01'	L = 27.33'
T = 27.44'	T = 46.33'	T = 13.68'
R = 75.00'	R = 75.00'	R = 287.16'



PROJECT REFERENCE NO.	SHEET
R-4748	5/22
CROSS SECTION THRU EBI	

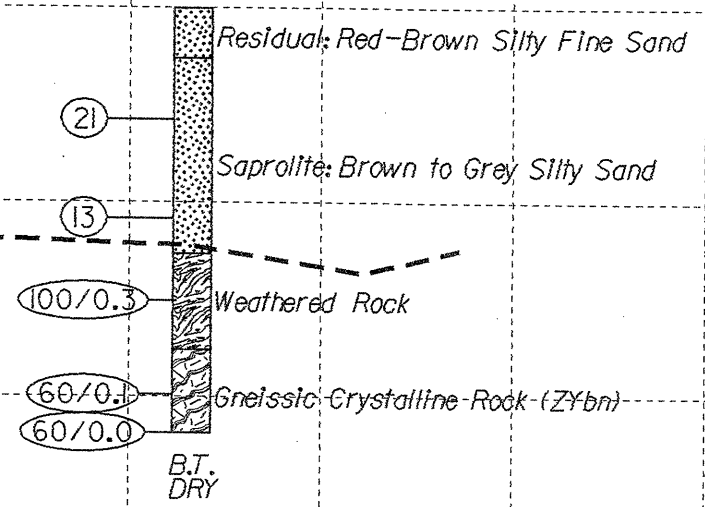
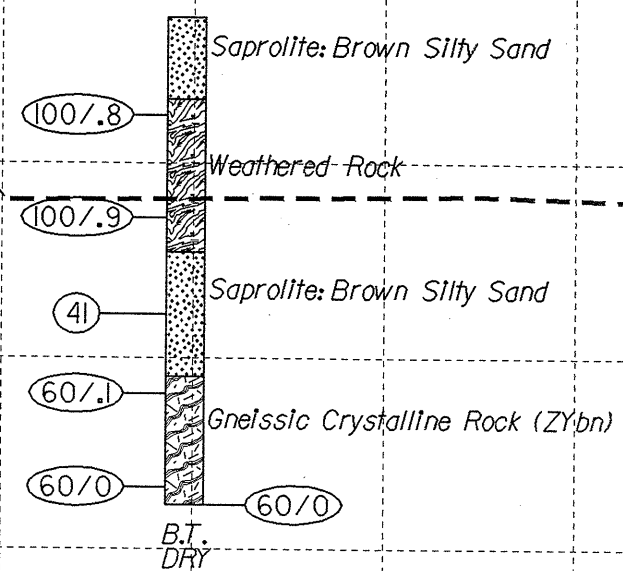
2070
2060
2050
2040
2030
2020
2010

2070
2060
2050
2040
2030
2020
2010

EXISTING GROUND

EBI-A
30+53
17 LT

EBI-B
30+33
17 RT



45 35 25 15 5 30+65 5 15 25 35 45

2050

2040

2030

2020

2010

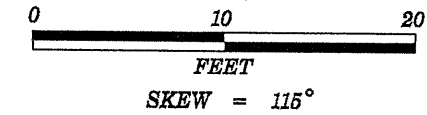
2000

1990

1980

1970

1960



PROJECT REFERENCE NO. SHEET

R-4748 6/22

CROSS SECTION THRU BI

2040

2030

2020

2010

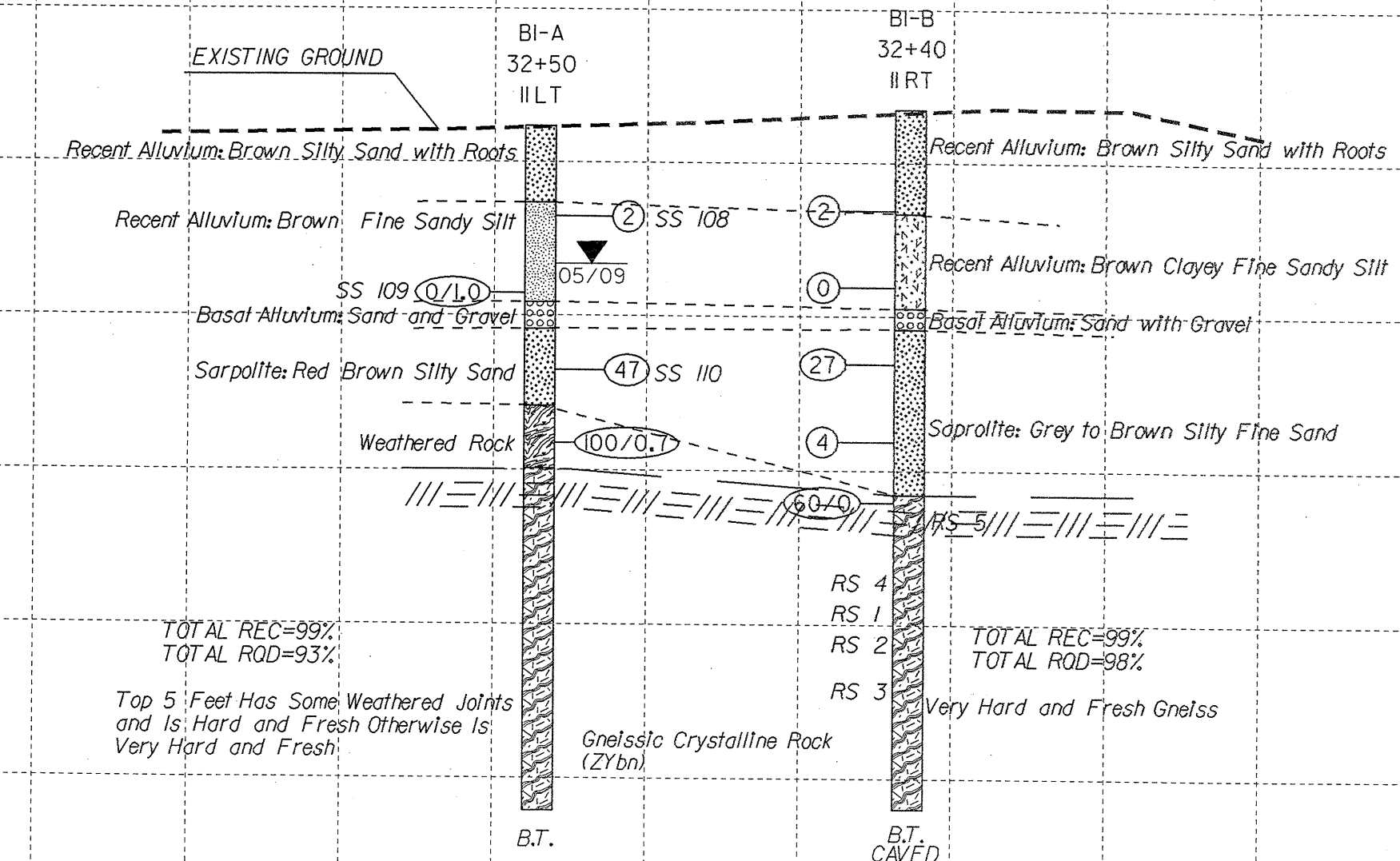
2000

1990

1980

1970

1960



TOTAL REC=99%
TOTAL ROD=93%

TOTAL REC=99%
TOTAL ROD=98%

Top 5 Feet Has Some Weathered Joints
and Is Hard and Fresh Otherwise Is
Very Hard and Fresh

45 35 25 15 5 32+45 5 15 25 35 45

2030

2020

2010

2000

1990

1980

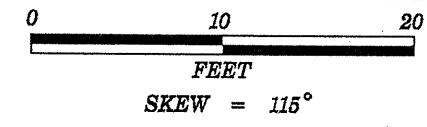
1970

1960

1950

1940

1930



PROJECT REFERENCE NO.	SHEET
R-4748	8/22
CROSS SECTION THRU EB2	

EXISTING GROUND

EB2-A
35+88
18 LT

EB2-B
35+94
18 RT

Terrace Alluvium: Red Fine Sandy Silty Clay

Terrace Alluvium: Red-Brown Clay

Terrace Alluvium: Red Clayey Fine Sandy Silt

Silty Sand with Gravel

04/09

Saprolite: Grey to Brown Sandy Silt

SS 103

Saprolite: Grey to Brown Silty Sand

Saprolite: Brown Sand and silty sand

SS 105

Weathered Rock with Silty Sand

Weathered Rock

Crystalline Rock (ZYbn)

B.T.

B.T.

45 35 25 15 5 35+95 5 15 25 35 45

PROJECT NO. 40118.1.1		ID. R-4748		COUNTY Macon		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 30+53		OFFSET 17ft LT		ALIGNMENT L										
COLLAR ELEV. 2,047.5 ft		TOTAL DEPTH 25.2 ft		NORTHING 542,564		EASTING 692,387										
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic											
START DATE 12/05/39		COMP. DATE 12/05/39		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 18.5 ft										
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						
2050														2,047.5	0.0	GROUND SURFACE
2045	2,043.2	4.3												2,043.2	4.3	Saprolite: Brown Silty Sand
2040	2,038.2	9.3	50	50/3										2,043.2	4.3	Weathered Rock
2035	2,033.2	14.3	17	23	74/4									2,035.4	12.1	Saprolite: Brown Silty Sand
2030	2,028.2	19.3	27	21	20									2,029.0	18.5	Gneissic Crystalline Rock (ZYbn)
2025	2,023.2	24.3	60/1											2,022.3	25.2	Boring Terminated at Elevation 2,022.3 ft in crystalline rock
2020	2,022.3	25.2	60/0													

NCDOT BORE SINGLE R-4748_GEO_BH_BRDGG.PJ_NC_DOT.GDT 6/4/09

PROJECT NO. 40118.1.1		ID. R-4748		COUNTY Macon		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 30+33		OFFSET 17ft RT		ALIGNMENT L										
COLLAR ELEV. 2,050.0 ft		TOTAL DEPTH 21.9 ft		NORTHING 543,531		EASTING 692,365										
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic											
START DATE 05/11/09		COMP. DATE 05/11/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 17.6 ft										
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						
2050														2,050.0	0.0	GROUND SURFACE
2045	2,045.2	4.8												2,047.4	2.6	Residual: Red-brown Silty Fine Sand
2040	2,040.2	9.8	5	10	11									2,043.2	4.3	Saprolite: Brown to Grey Silty Sand
2035	2,035.2	14.8	3	6	7									2,037.4	12.6	Weathered Rock
2030	2,030.2	19.8												2,032.4	17.6	Gneissic Crystalline Rock (ZYbn)
2025	2,028.1	21.9	60/0.1											2,028.1	21.9	Boring Terminated at Elevation 2,028.1 ft in crystalline rock
2020			60/0.0													

NCDOT BORE SINGLE R-4748_GEO_BH_BRDGG.PJ_NC_DOT.GDT 6/4/09

PROJECT NO. 40118.1.1		ID. R-4748		COUNTY Macon		GEOLOGIST Hager, M. M.								
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662							GROUND WTR (ft)							
BORING NO. B1-A		STATION 32+50		OFFSET 11ft LT		ALIGNMENT L								
COLLAR ELEV. 2,012.4 ft		TOTAL DEPTH 44.5 ft		NORTHING 542,542		EASTING 692,583								
DRILL MACHINE CME-550		DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic									
START DATE 05/04/09		COMP. DATE 05/04/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 22.3 ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75					100
2015												2,012.4	GROUND SURFACE	0.0
2010												2,007.4	Recent Alluvium: Brown Silty Sand with roots	5.0
2005	2,007.5	4.9		1	1	1						2,000.9	Recent Alluvium: Brown Fine Sandy Silt	11.5
2000	2,002.5	9.9		0	0	0						1,999.1	Basal Alluvium: Sand and Gravel	13.3
1995	1,997.5	14.9		16	12	35						1,994.2	Sarpolite: Red Brown Silty Sand	18.2
1990	1,992.5	19.9		14	54	46/0.2						1,987.2	Weathered Rock	22.3
1985												1,981.8	Gneissic Crystalline Rock (ZYbn) NOT CORED	25.2
1980												1,981.8	Gneissic Crystalline Rock (ZYbn) cored	30.6
1975														
1970														
1965												1,967.9	Boring Terminated at Elevation 1,967.9 ft in crystalline rock	44.5

NCDOT BORE SINGLE R-4748_GEO_BH_BRDG.GPJ NC_DOT_GDT 6/4/09

PROJECT NO. 40118.1.1		ID. R-4748		COUNTY Macon		GEOLOGIST Hager, M. M.								
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662							GROUND WTR (ft)							
BORING NO. B1-A		STATION 32+50		OFFSET 11ft LT		ALIGNMENT L								
COLLAR ELEV. 2,012.4 ft		TOTAL DEPTH 44.5 ft		NORTHING N/A		EASTING N/A								
DRILL MACHINE CME-550		DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic									
START DATE 05/04/09		COMP. DATE 05/04/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 22.3 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG MOI G	DESCRIPTION AND REMARKS	DEPTH (ft)		
					REC. (%)	RQD (%)		REC. (%)	RQD (%)					
1987.19											Begin Coring @ 25.2 ft			
1985	1,987.2	25.2	5.4		(5.2)	(4.0)					1,987.2	weathered zone 27.7 - 28.5, weathered joints, otherwise hard and fresh. healed fractures common. PYRITE FLOWERS and black oxides in healed fractures and along some micaceous foliations. foliation 5 to 10 degrees.	25.2	
1980	1,981.8	30.6	13.9		(13.9)	(13.9)					1,981.8	R1=7 R2=13 R3=10 R4=0 R5=4 Rock Type = E RMR=34	30.6	
1975														
1970														
1965														
1960														
1955														
1950														
1945														
1940														
1935														

NCDOT CORE SINGLE R-4748_GEO_BH_BRDG.GPJ NC_DOT_GDT 6/4/09

PROJECT NO. 40118.1.1	ID. R-4748	COUNTY Macon	GEOLOGIST Hager, M. M.
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662			GROUND WTR (ft)
BORING NO. B1-B	STATION 32+40	OFFSET 11ft RT	ALIGNMENT L
COLLAR ELEV. 2,013.5 ft	TOTAL DEPTH 45.5 ft	NORTHING 542,521	EASTING 692,571
DRILL MACHINE CME-550		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
START DATE 05/05/09	COMP. DATE 05/05/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 25.1 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
2015												2.013.5 GROUND SURFACE	0.0
2010	2,007.9	5.6										Recent Alluvium: Brown Silty Sand with Roots	
2005	2,002.9	10.6	2	1	1							Recent Alluvium: Brown Clayey Fine sandy Silt	6.8
2000			0	0	0							Basal Alluvium: Sand with Gravel	13.0
1995	1,997.9	15.6	20	15	12							Saprolite: Grey to Brown Silty Fine Sand	14.4
1990	1,992.9	20.6	5	0	4								
1985	1,987.9	25.6	60/0									Gneissic Crystalline Rock (ZYbn)	25.1
1980													
1975													
1970													
1965													
1960													
1955													
1950													
1945													
1940													
1935													

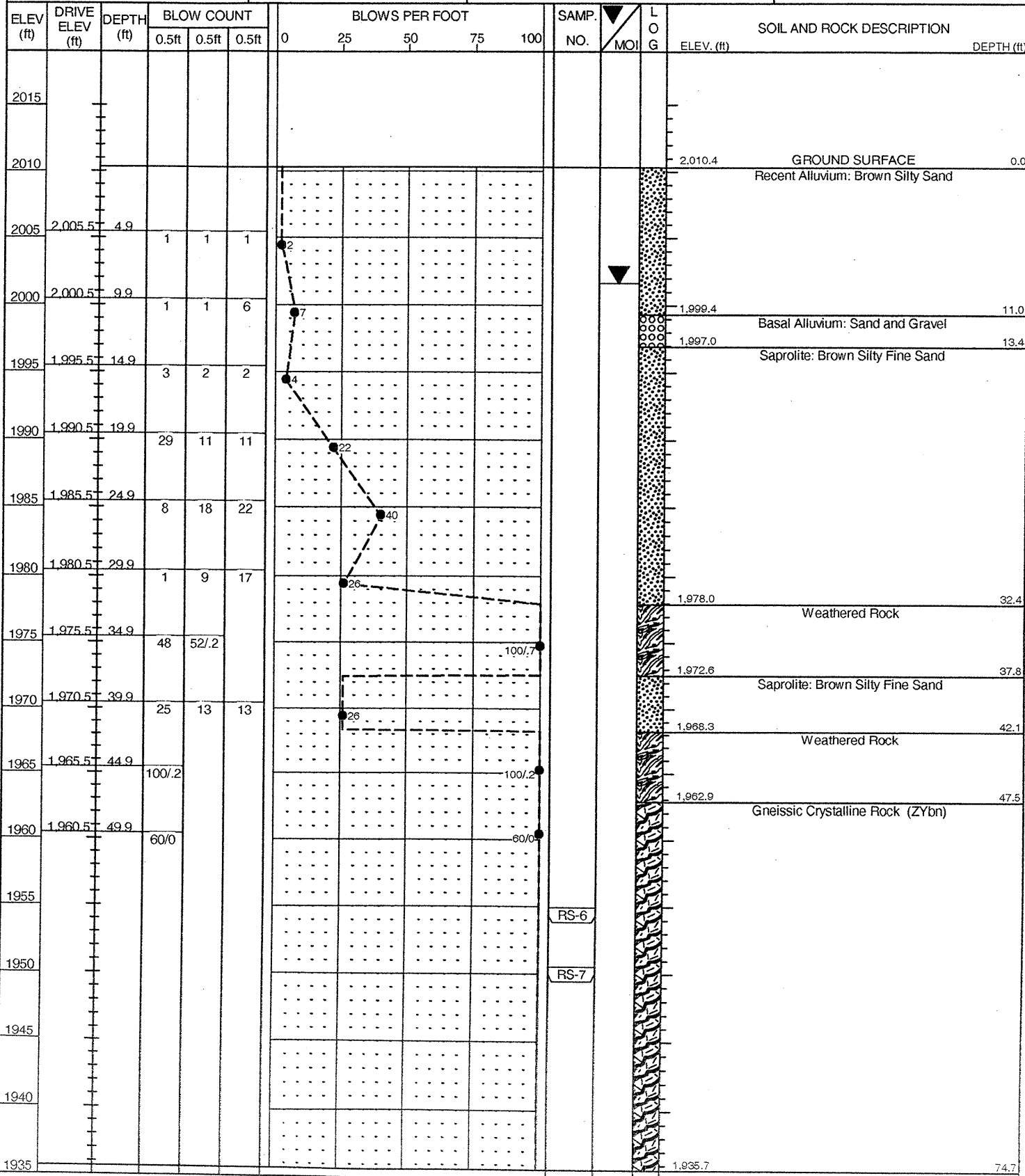
NCDOT BORE SINGLE R-4748_GEO_BH_BRDG.GPJ NC_DOT.GDT 6/4/09

PROJECT NO. 40118.1.1	ID. R-4748	COUNTY Macon	GEOLOGIST Hager, M. M.
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662			GROUND WTR (ft)
BORING NO. B1-B	STATION 32+40	OFFSET 11ft RT	ALIGNMENT L
COLLAR ELEV. 2,013.5 ft	TOTAL DEPTH 45.5 ft	NORTHING N/A	EASTING N/A
DRILL MACHINE CME-550		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
START DATE 05/05/09	COMP. DATE 05/05/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 25.1 ft

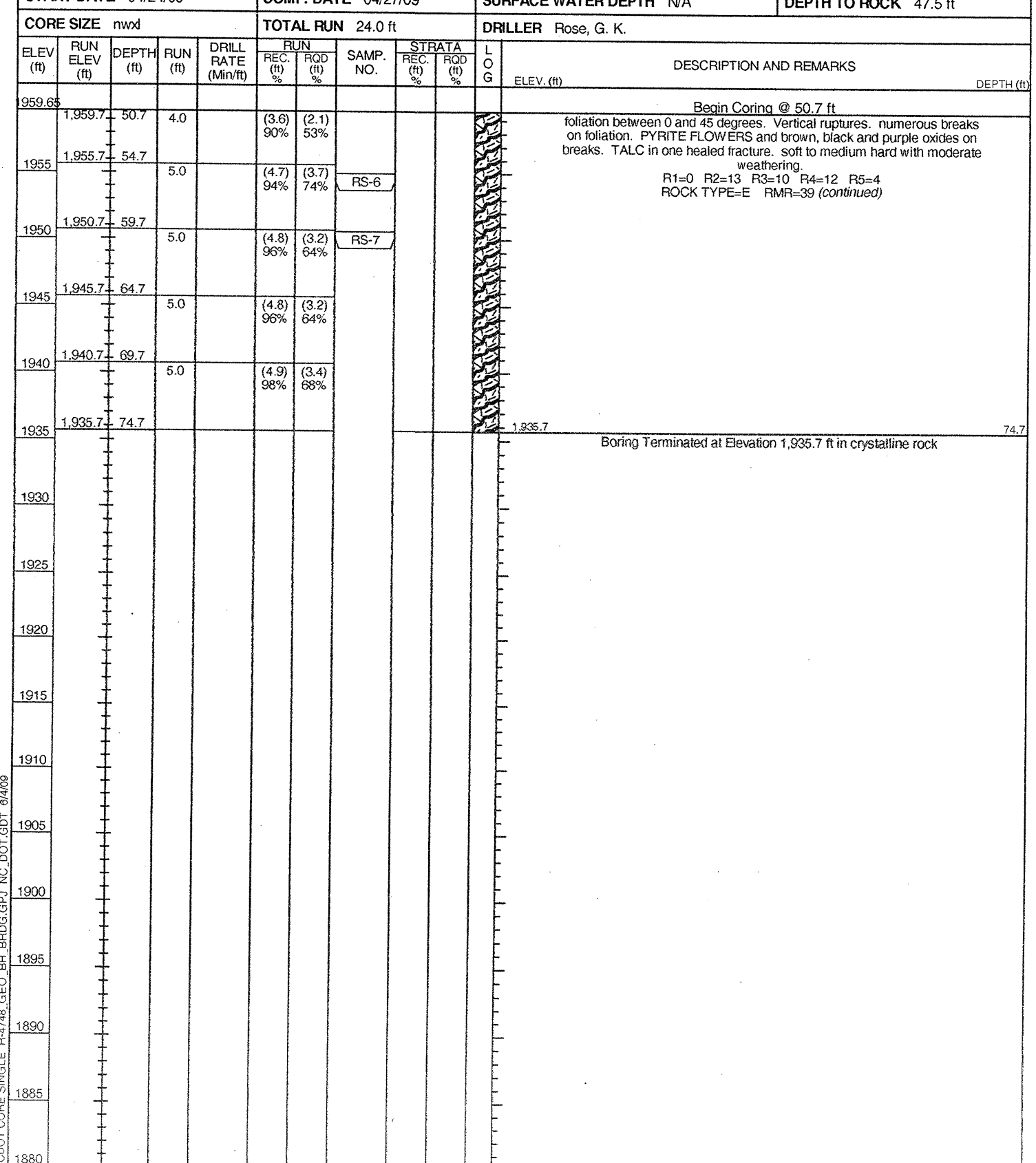
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	ROD (ft)		REC. (%)	ROD (%)			
1987.22											Begin Coring @ 26.3 ft	
1985	1,987.2	26.3	4.2		(4.1)	(4.1)	RS-5				very hard and fresh. foliation at 5 to 15 degrees. 2 breaks on foliation, one slightly weathered with soil stain at 31.7 feet. 3 breaks on healed fractures with PYRITE FLOWERS and black oxides in fractures. R1=12 R2=20 R3=25 R4=20 R5=4 ROCK TYPE = E RMR=85 (continued)	
1980	1,983.0	30.5	5.0		(5.0)	(4.8)	RS-4					
					100%	96%	RS-1					
1975	1,978.0	35.5	5.0		(5.0)	(5.0)	RS-2					
					100%	100%	RS-3					
1970	1,973.0	40.5	5.0		(4.9)	(4.9)						
					98%	98%						
1965	1,968.0	45.5									Boring Terminated at Elevation 1,968.0 ft in crystalline rock	45.5
1960												
1955												
1950												
1945												
1940												
1935												
1930												
1925												
1920												
1915												
1910												

NCDOT CORE SINGLE R-4748_GEO_BH_BRDG.GPJ NC_DOT.GDT 6/4/09

PROJECT NO. 40118.1.1	ID. R-4748	COUNTY Macon	GEOLOGIST Hager, M. M.
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662			GROUND WTR (ft)
BORING NO. B2-B	STATION 34+12	OFFSET 13ft RT	ALIGNMENT L
COLLAR ELEV. 2,010.4 ft	TOTAL DEPTH 74.7 ft	NORTHING 542,505	EASTING 692,743
DRILL MACHINE CME-550	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 04/24/09	COMP. DATE 04/27/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 47.5 ft



PROJECT NO. 40118.1.1	ID. R-4748	COUNTY Macon	GEOLOGIST Hager, M. M.
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662			GROUND WTR (ft)
BORING NO. B2-B	STATION 34+12	OFFSET 13ft RT	ALIGNMENT L
COLLAR ELEV. 2,010.4 ft	TOTAL DEPTH 74.7 ft	NORTHING N/A	EASTING N/A
DRILL MACHINE CME-550	DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic	
START DATE 04/24/09	COMP. DATE 04/27/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 47.5 ft



NCDOT BORE SINGLE R-4748_GEO_BH_BRDGG.PPJ_NC_DOT.GDT 6/4/09

NCDOT CORE SINGLE R-4748_GEO_BH_BRDGG.PPJ_NC_DOT.GDT 6/4/09

PROJECT NO. 40118.1.1		ID. R-4748		COUNTY Macon		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 35+88		OFFSET 18ft LT		ALIGNMENT L										
COLLAR ELEV. 2,019.9 ft		TOTAL DEPTH 70.4 ft		NORTHING 542,522		EASTING 692,921										
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
START DATE 04/28/09		COMP. DATE 04/29/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2020														2,019.9	GROUND SURFACE	0.0
															Terrace Alluvium: Red Fine Sandy Clay	
2015	2,014.9	5.0	3	3	4											
2010	2,009.9	10.0	2	2	2									2,010.1	Terrace Alluvium: Red Clayey Fine Sandy Silt	9.8
														2,007.4	Saprolite: Grey to Brown Sandy Silt	12.5
2005	2,004.9	15.0	1	1	2											
2000	1,999.9	20.0	1	2	3											
1995	1,994.9	25.0	2	5	5											
1990	1,989.9	30.0	11	10	13									1,989.9	Saprolite: Grey to Brown Silty Sand	30.0
1985	1,984.9	35.0	15	9	6											
1980	1,979.9	40.0	2	4	5											
1975	1,974.9	45.0	7	8	8											
1970	1,969.9	50.0	11	15	19											
1965	1,964.9	55.0	14	14	14											
1960	1,959.9	60.0	60/1													
1955	1,954.9	65.0	100/3													
1950	1,949.9	70.0	100/4													
1945																
1940																

NCDOT BORE SINGLE R-4748_GEO_BH_BRDG.GPJ NC_DOT_GDT_6/4/09

PROJECT NO. 40118.1.1		ID. R-4748		COUNTY Macon		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION New Bridge over Little Tennessee River on New Route between SR-1660 and SR-1662							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 35+94		OFFSET 18ft RT		ALIGNMENT L										
COLLAR ELEV. 2,019.7 ft		TOTAL DEPTH 70.2 ft		NORTHING 542,486		EASTING 692,924										
DRILL MACHINE CME-550		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
START DATE 04/27/09		COMP. DATE 04/28/09		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 60.7 ft										
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						
2020														2,019.7	GROUND SURFACE	0.0
															Terrace Alluvium: Red-Brown Clay	
2015	2,014.5	5.2	4	3	4											
2010	2,009.5	10.2	14	20	7									2,011.5	Terrace Alluvium: Red-Brown and Grey Silty Sand with Gravel	8.2
2005	2,004.5	15.2	0	0	0									2,006.0	Saprolite: Red-Brown Fine Sandy Silt	13.7
2000	1,999.5	20.2	1	0	1											
1995	1,994.5	25.2	1	2	3											
1990	1,989.5	30.2	1	2	4											
1985	1,984.5	35.2	1	1	1									1,986.7	Saprolite: Brown Sand and silty sand	33.0
1980	1,979.5	40.2	1	3	5											
1975	1,974.5	45.2	4	4	6											
1970	1,969.5	50.2	1	4	12											
1965	1,964.5	55.2	3	5	10											
1960	1,959.5	60.2	77	23/0												
1955	1,954.5	65.2	60/0													
1950	1,949.5	70.2	60/0													
1945																
1940																

NCDOT BORE SINGLE R-4748_GEO_BH_BRDG.GPJ NC_DOT_GDT_6/4/09

JCS
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
 SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #: --

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	R-4748	COUNTY:	n/a	Owner:	NCDOT
DATE SAMPLED:	4.09	DATE RECEIVED:	4.30.09	DATE REPORTED:	5.6.09
SAMPLED FROM:	B2-A / EB2-A	SAMPLED BY:	P. Q. Lockamy		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-100	SS-101	SS-102	SS-103	SS-104	SS-105	SS-106
Lab Sample No. A	160493	160494	160495	160496	160497	160498	160499
HiCAMS Sample #	--	--	--	--	--	--	--
Retained #4 Sieve %	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Passing #10 Sieve %	100	97	100	100	100	100	97
Passing #40 Sieve %	99	78	95	96	78	86	88
Passing #200 Sieve %	38	37	73	51	34	23	43

MINUS #10 FRACTION

Soil Mortar - 100%							
Coarse Sand -Ret. #60	7	35	13	14	31	37	20
Fine Sand - Ret. #270	63	41	16	39	41	47	42
Silt 0.05-0.005 mm %	22	18	18	31	22	12	32
Clay < 0.005 mm %	8	6	53	16	6	4	6
Passing # 40 Sieve %	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--

Liquid Limit	33	32	47	42	37	36	32
Plastic Index	NP	NP	21	NP	NP	NP	NP
AASHTO Classification	A-4 (1)	A-4 (1)	A-7-6 (13)	A-5 (3)	A-2-4 (0)	A-2-4 (0)	A-4 (1)
Quantity							
Texture							
Station	34+38	34+38	35+94	35+94	35+94	35+94	35+88
Hole No.							
Depth (ft) From:	5.1	20.1	5.7	15.7	35.7	50.7	15.5
To:	6.1	21.1	6.7	16.7	36.7	51.7	16.5
	OK	OK	OK	OK	OK	OK	OK

Remarks:

A-160493 - 160499

CC:

P. Q. Lockamy	
File	

SOILS ENGINEER:

15/22

JCS
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT
 SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #: R-4748

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	40118.1.1	COUNTY:	n/a	Owner:	NCDOT
DATE SAMPLED:	5.09	DATE RECEIVED:	5.5.09	DATE REPORTED:	5.12.09
SAMPLED FROM:	EB2-A / BI-A	SAMPLED BY:	P. Q. Lockamy		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-107	SS-108	SS-109	SS-110
Lab Sample No. A	160524	160525	160526	160527
HiCAMS Sample #	--	--	--	--
Retained #4 Sieve %	0.0	0.0	0.0	0.0
Passing #10 Sieve %	95	100	100	71
Passing #40 Sieve %	81	99	100	59
Passing #200 Sieve %	31	40	56	22

MINUS #10 FRACTION

Soil Mortar - 100%				
Coarse Sand -Ret. #60	29	13	6	31
Fine Sand - Ret. #270	44	51	53	46
Silt 0.05-0.005 mm %	25	30	31	21
Clay < 0.005 mm %	2	6	10	2
Passing # 40 Sieve %	--	--	--	--
Passing # 200 Sieve %	--	--	--	--

Liquid Limit	37	34	40	26
Plastic Index	NP	NP	NP	NP
AASHTO Classification	A-2-4 (0)	A-4 (1)	A-4 (4)	A-2-4 (0)
Quantity				
Texture				
Station	35+88	32+50	32+50	32+50
Hole No.				
Depth (ft) From:	40.5	5.4	10.4	15.4
To:	41.5	6.4	11.4	16.4
	OK	OK	OK	OK

Remarks:

A-160524 - 160527

CC:

P. Q. Lockamy	
File	

SOILS ENGINEER:

**FIELD
SCOUR REPORT**

WBS: 40118.1.1 TIP: R-4748 COUNTY: Macon

DESCRIPTION(1): New bridge over Little Tennessee River on new road between SR 1660 and SR 1662

EXISTING BRIDGE

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

Bridge No.: Length: Total Bents: Bents in Channel: Bents in Floodplain:
 Foundation Type:

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes:

Interior Bents:

Channel Bed: armored with gravel cobbles and small boulders

Channel Bank: vertical banks on both sides of river

EXISTING SCOUR PROTECTION

Type(3):

Extent(4):

Effectiveness(5):

Obstructions(6):

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 and gravel with cobbles

Channel Bank Material(8): silty sand and clayey fine sandy silt

Channel Bank Cover(9): bare soil

Floodplain Width(10): approx. 500 feet

Floodplain Cover(11): grass

Stream is(12): Aggrading XX Degrading Static

Channel Migration Tendency(13): long term lateral migration to west indicated by bedrock weathering

Observations and Other Comments: terrace clays & deep rock on east side, bluff w/ shallow rock on west side

DESIGN SCOUR ELEVATIONS(14)

Feet X Meters

BENTS

B1		B2									
1995	1993										

Comparison of DSE to Hydraulics Unit theoretical scour:

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bank	Bank	Bed				
Sample No.	SS-23	SS-24	SS-25				
Retained #4	0	0	30.7				
Passed #10	100	100	46				
Passed #40	99	99	31				
Passed #200	22	61	7				
Coarse Sand	22	8	52				
Fine Sand	59	39	36				
Silt	11	33	12				
Clay	8	20	0				
LL	29	45	21				
PI	NP	NP	NP				
AASHTO	A-2-4(0)	A-5(6)	A-1-b				
Station	32+50	32+50	32+50				
Offset	0	0	0				
Depth	4.7-5.7	9.7-10.7	14.7-15.7				

Reported by: *pj Lockamy*
 pj lockamy

Date: 6/4/2009



R-4748 40118.1.1 Macon Co., New Bridge over Little Tennessee River
On new Route Between SR-1660 and SR-1662

Core has already been broken on Point Load Tester



R-4748 40118.1.1 Macon Co, New Bridge over Little Tennessee River on New Route
Between SR-1660 and SR-1662



R-4748 40118.1.1 Macon Co, New Bridge over Little Tennessee River on New Route Between SR-1660 and SR-1662

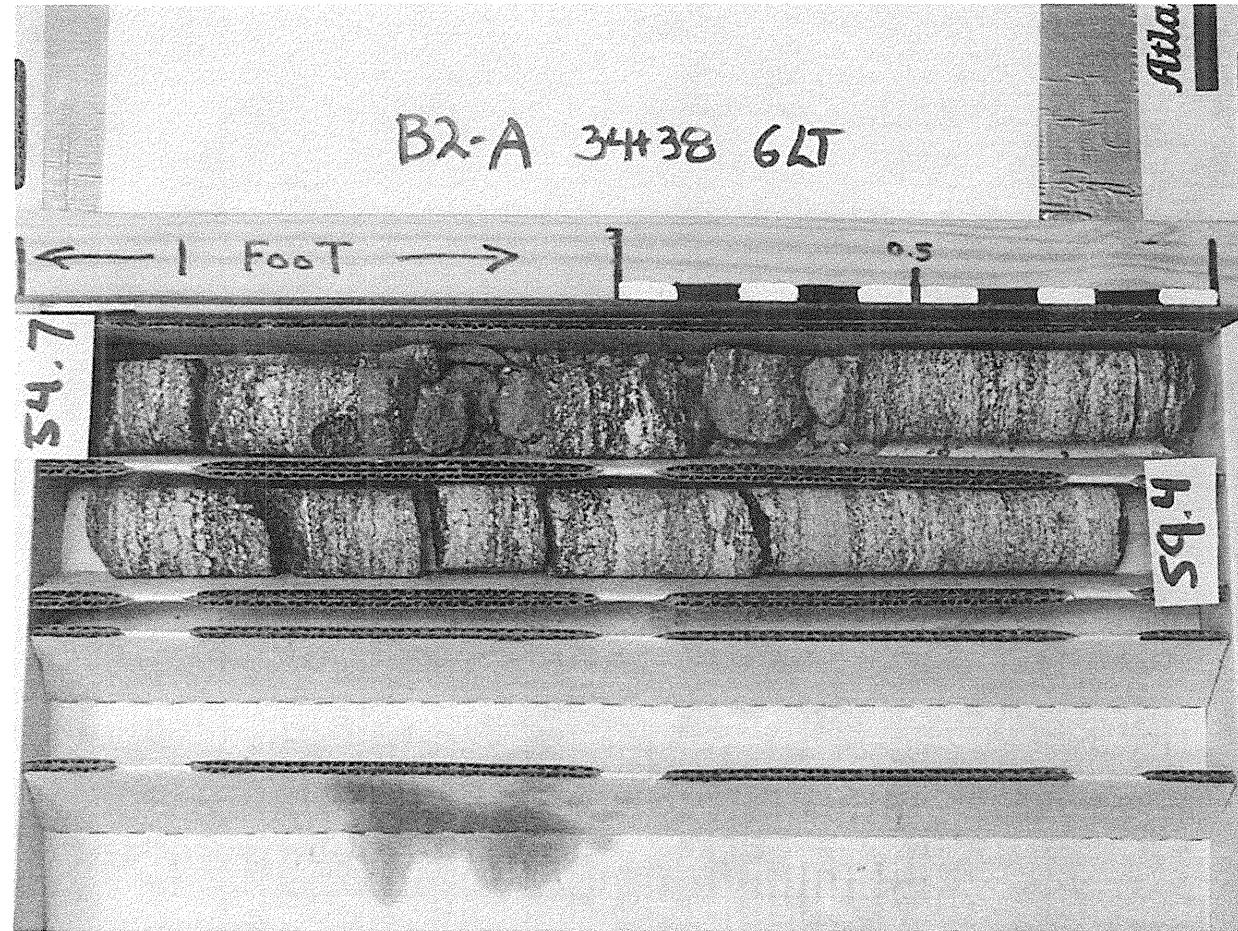
R-4748 40118.1.1 Macon Co, New Bridge over Little Tennessee River on New Route Between SR-1660 and SR-1662



R-4748 40118.1.1 Macon Co, New Bridge over Little Tennessee River on New Route
Between SR-1660 and SR-1662



R-4748 40118.1.1 Macon Co, New Bridge over Little Tennessee River on New Route
Between SR-1660 and SR-1662



R-4748 40118.1.1 Macon Co, New Bridge over Little Tennessee River on New Route
Between SR-1660 and SR-1662



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