

PROJECT: 33316.1.1 ID: B-3872

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE	STATE PROJECT REFERENCE NO.	DATE	SCALE
N.C.	B-3872	1	19
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33316.1.1	BRZ-1552(8)	P.E. CONST.	

STATE PROJECT 33316.1.1 I.D. NO. B-3872

F.A. PROJECT BRZ-1552(8)

COUNTY McDOWELL

PROJECT DESCRIPTION Retaining Wall at End Bent-1
for Bridge No. 195 over Bear Creek on SR 1552

SITE DESCRIPTION _____

For Letting

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.

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 WAVES 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.

INVESTIGATED BY D. Hardister PERSONNEL D. Horris

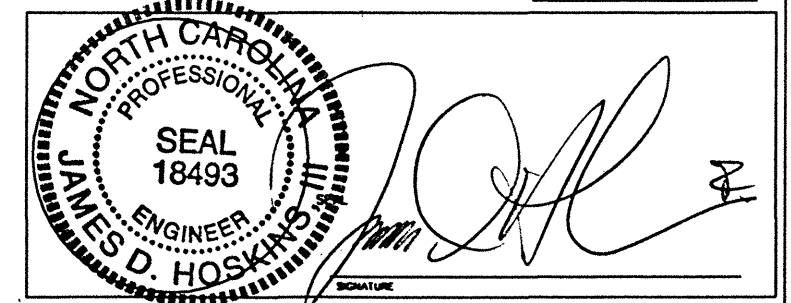
CHECKED BY JD Hoskins III R. Burleson

SUBMITTED BY JD Hoskins III R. Kumar

DATE January 26, 2005 S. Tierney

R. Benfield

DRAWN BY: D. Hardister



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3872	33316.1.1	2	19

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																										
<p>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 FOOT ACCORDING TO THE 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:</p> <p style="text-align: center;"><i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HARD PLASTIC, A-7-6</i></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) GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>	<p>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 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>	<p>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 IT 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 DISLOGGED 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. 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 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 4 INCHES 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 INTRODUCED 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 IN OR B.P.F.F. 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 LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SCREC.)- TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.)- A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.)- SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																										
<p style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="2">GRANULAR MATERIALS (75% PASSING #200)</th> <th colspan="2">SILT-CLAY MATERIALS (75% PASSING #200)</th> <th>ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1</td> <td>A-3</td> <td>A-2</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-4, A-5</td> <td>A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> <td>100</td> </tr> <tr> <td>LIQUID LIMIT</td> <td>≤ 5</td> <td>≤ 10</td> <td>≤ 15</td> <td>≤ 25</td> <td>≤ 35</td> <td>≤ 40</td> <td>≤ 50</td> <td>≤ 50</td> <td>≤ 50</td> <td>≤ 50</td> </tr> <tr> <td>PLASTIC INDEX</td> <td>≤ 4</td> <td>≤ 7</td> <td>≤ 10</td> <td>≤ 15</td> <td>≤ 20</td> <td>≤ 25</td> <td>≤ 30</td> <td>≤ 30</td> <td>≤ 30</td> <td>≤ 30</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS, GRAVEL AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> <td></td> <td></td> </tr> <tr> <td>GENERAL RATING AS A SUBGRADE</td> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>POOR</td> <td>UNSATISFACTORY</td> <td></td> <td></td> </tr> </table> <p style="text-align: center;">P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30</p>	GENERAL CLASS.	GRANULAR MATERIALS (75% PASSING #200)		SILT-CLAY MATERIALS (75% PASSING #200)		ORGANIC MATERIALS	GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	SYMBOL											% PASSING	100	100	100	100	100	100	100	100	100	100	LIQUID LIMIT	≤ 5	≤ 10	≤ 15	≤ 25	≤ 35	≤ 40	≤ 50	≤ 50	≤ 50	≤ 50	PLASTIC INDEX	≤ 4	≤ 7	≤ 10	≤ 15	≤ 20	≤ 25	≤ 30	≤ 30	≤ 30	≤ 30	GROUP INDEX	0	0	0	0	0	0	0	0	0	0	USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT			GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR			POOR	UNSATISFACTORY			<p style="text-align: center;">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 style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </table> <p style="text-align: center;">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. STATIC WATER LEVEL AFTER 24 HOURS. PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA SPRING OR SEEPAGE</p>	ORGANIC MATERIAL	GRANULAR SOILS	SILT-CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p style="text-align: center;">WEATHERING</p> <p>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. <i>IF TESTED, WOULD YIELD SPT REFUSAL.</i> SEVERE (SEV.) ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF.</i> VERY SEVERE (V. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF.</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>	<p style="text-align: center;">MISCELLANEOUS SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>																								
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<p style="text-align: center;">COLOR</p> <p>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.</p>	<p style="text-align: center;">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>FRIABLE</th> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <th>MODERATELY INDURATED</th> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <th>INDURATED</th> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <th>EXTREMELY INDURATED</th> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </table>	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.																																																																																																																																				
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<p style="text-align: center;">NOTES:</p> <p></p> <p></p> <p></p>	<p style="text-align: center;">BENCH MARK: BM#2 = 18+10.12, 48.7' LT -BL-</p> <p style="text-align: right;">ELEVATION: 1210.53 Ft</p>																																																																																																																																												

WBS ELEMENT (TIP): 33316.1.1 (B-3872)

FEDERAL PROJECT: BRZ-1552(8)

COUNTY: McDowell

DESCRIPTION: Retaining Wall for Bridge No. 195 over Bear Creek on SR 1552
(Lake James Road)

SUBJECT: Geotechnical Report of Subsurface Exploration

Project Description:

Geoscience Group, Inc. (Geoscience) has completed the authorized geotechnical investigation for the above referenced project in McDowell County, North Carolina. The bridge will be located in northeastern McDowell County, near Marion. More precisely, the bridge will be located on SR 1552 (Lake James Road) at its crossing of Bear Creek. The retaining wall is proposed along the right side of the project and parallel to end bent-1 of the proposed bridge. A Site Vicinity Map is included in the following pages.

The purpose of this exploration was to investigate the subsurface conditions along the proposed retaining wall. The subsurface exploration was conducted between December 15 and 22, 2004. This exploration consisted of the execution of six (6) soil test borings. Using the baseline points provided by NCDOT, the actual boring locations were surveyed for location and elevation by Geoscience personnel. Drilled boring locations are shown on the Boring Identification Diagram included in the following pages.

The soil test borings were advanced using a CME-550x drilling machine utilizing hollow-stem auger and rotary drilling techniques. In each boring, Standard Penetration tests were performed in general accordance with NCDOT guidelines. In conjunction with this testing, split-barrel soil samples were recovered for visual classification in the field. The split-barrel soil samples were returned to our laboratory for testing. Water for drilling purposes was obtained from Bear Creek. Drilling mud slurry was not utilized during the investigation. Core samples of the underlying weathered rock and bedrock were obtained from five (5) of the borings. The core samples were obtained using an HQ wireline barrel. The core samples were returned to our laboratory for review and classification as well as laboratory testing.

Laboratory testing was performed on representative split-barrel samples to aid in the assessment of AASHTO soil classification and to refine data for evaluation of engineering properties. The laboratory testing consisted of natural moisture content determinations, Atterberg Limits tests, and grain size analyses with hydrometer. The soil laboratory tests performed were in general accordance with AASHTO and NCDOT specifications. Rock core specimens were selected for laboratory testing of unconfined compressive strength. These tests were performed in general accordance with ASTM Method D 2938. The

results of the soil laboratory tests and a rock core test summary are included in the following pages. Complete rock core testing results are provided in Appendix C under separate cover.

Physiography and Geology:

The project site is located in the Blue Ridge Belt of the Blue Ridge Physiographic Province of North Carolina. The site is situated between the Grandfather Mountain Window and the Chauga Belt. According to the 1985 Geologic Map of North Carolina, the site is located in an area consisting of thinly laminated to massive gneiss of the Late Proterozoic Era. Schist is common in this area also. Biotite gneiss and biotite granitic gneiss are common in the Chauga Belt and Grandfather Mountain Window, respectively, in the areas near the site. The core samples obtained on-site consist of gneiss, schist, and biotite granitic gneiss. Thin seams of quartzite were encountered as well. The overlying soils are the residual product of the physical and chemical weathering of the underlying bedrock. Two mountains are present west of the site, with Bear Creek flowing west to east into Lake James between them.

Foundation Materials:

The foundation materials encountered along the wall consist of roadway embankment fill, alluvial soil, residual soil, weathered rock, and crystalline rock.

Borings RW-1, RW-2 LT, RW-2 RT, EB1-B, RW-3 RT, and TS-2 were performed along or near the alignment of the proposed retaining wall. Roadway embankment fill is present in each boring from the surface and extends to elevations ranging between 1209 and 1196 feet. With the exception of EB1-B, the fill consists of dry to moist very loose and loose silty sand (A-2-4) with boulders and cobbles and moist soft silty clay (A-7-6) with boulders and cobbles. In EB1-B, the fill consists of loose silty sand (A-2-4). Blow counts in the fill range between 2 and 5 bpf.

Alluvial soil is present below the fill in EB1-B and RW-3 RT. The alluvial soil consists of boulders and cobbles with saturated loose silty sand (A-2-4). Blow counts in the alluvium range between weight-of-hammer (WOH) and 1 bpf.

Weathered rock is present below the fill in RW-1 and RW-2 LT and is present below the alluvium in EB1-B and RW-3 RT. The weathered rock extends to the top of crystalline rock. Zones of weathered rock are present below the crystalline rock line in EB1-B and RW-3 RT. The weathered rock consists of severely weathered soft gneiss and schist with very close fracture spacing. No recovery of the weathered rock was achieved.

Crystalline rock is present in each boring beginning at elevations ranging between 1208 and 1191 feet. In general, the crystalline rock consists of moderately severely to slightly weathered, soft to hard gneiss and schist with close and very close fracture spacing. Recovery values between 96 and 100 percent were measured. The RQD of the crystalline rock ranges between 23 and 91 percent and was variable with depth.

Groundwater:

After completion of each boring, temporary piezometers (slotted PVC pipe) were installed in the boreholes. Piezometers were used to measure stabilized groundwater levels at least 24 hours after the completion of

drilling. Groundwater elevations range between 1197 and 1194 feet. Due to the creek and Lake James, we anticipate groundwater to fluctuate with the water levels there.

Notes to the Designer:

Boulders and cobbles are present throughout most of the embankment fill and the alluvium. Additionally, concrete slabs and large pieces of asphaltic concrete are visible on the ground near the existing bridge.

Closure:

The geotechnical foundation investigation is based on the Preliminary General Drawing dated November 5, 2004. If any significant changes are made in the design or location of the proposed structure, the subsurface information will have to be reviewed and modified as necessary. For soil descriptions and general stratification at a particular boring location, the respective Boring Log should be reviewed. Cross-sections and profiles are a generalized interpretation of soil conditions between borings and should not be considered accurate other than at the boring locations. Subsurface conditions between boring locations or elsewhere on the site may vary, and subsurface anomalies may exist which were not detected.

Geoscience Group, Inc. appreciates the opportunity to be of service to the NCDOT on this project. Should you have any questions concerning this report, please feel free to contact the undersigned.

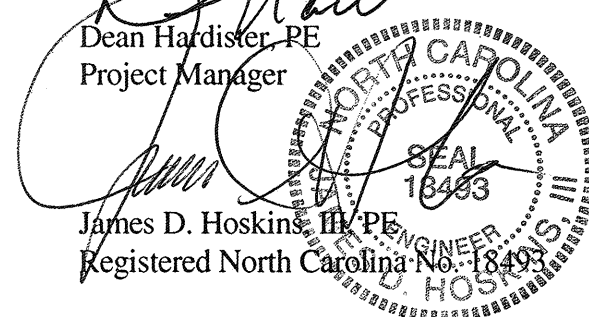
Respectfully,
GEOSCIENCE GROUP, INC

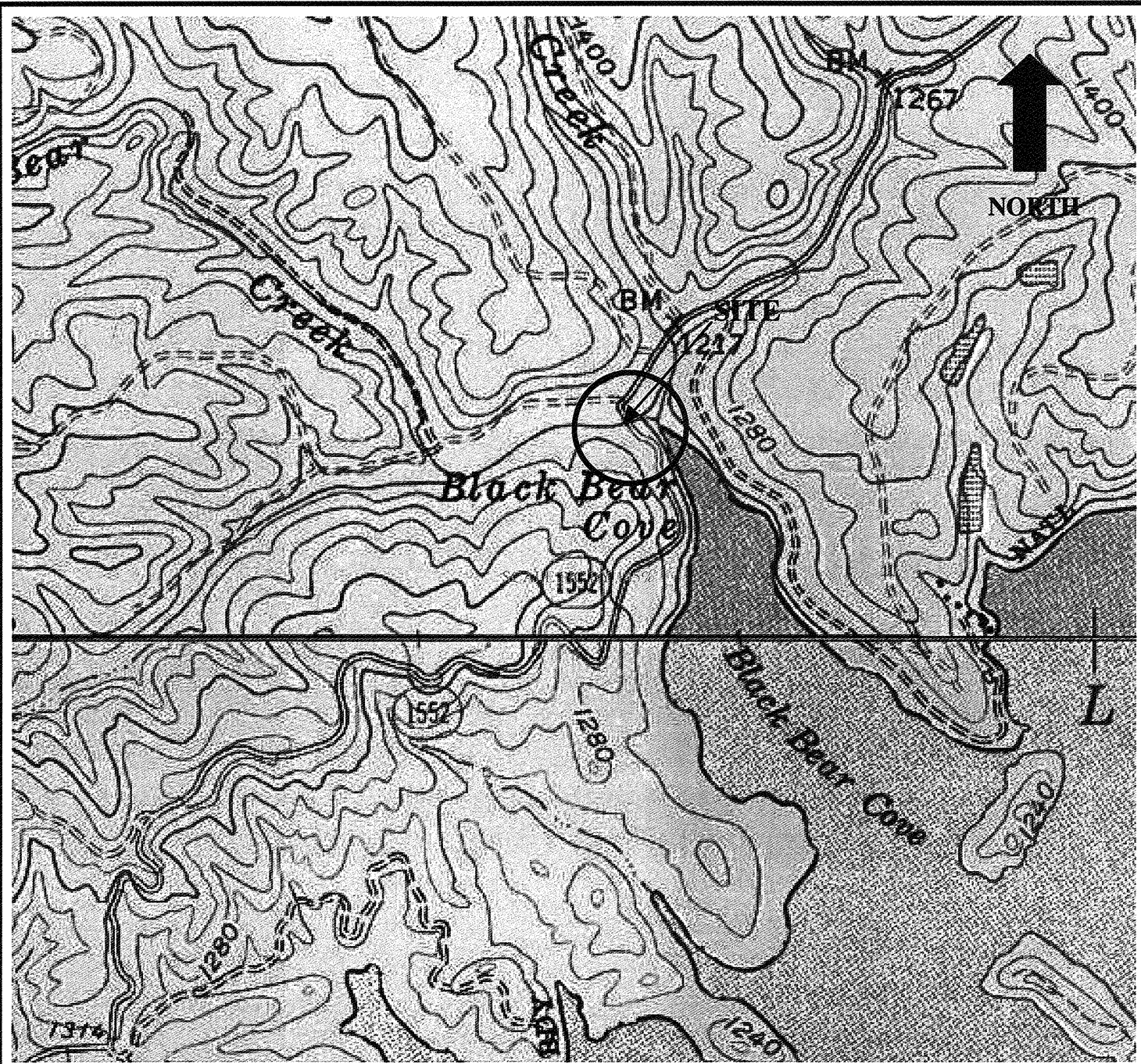

Dean Hardister, PE
Project Manager


James D. Hoskins, III, PE
Registered North Carolina No. 18493

DH:JDH:dh

Enclosures





SCALE IN FEET



GEOSCIENCE GROUP, INC.
GREENSBORO, NORTH CAROLINA

SCALE: ±1"=1,000'

APPROVED BY:

DRAWN BY: RB

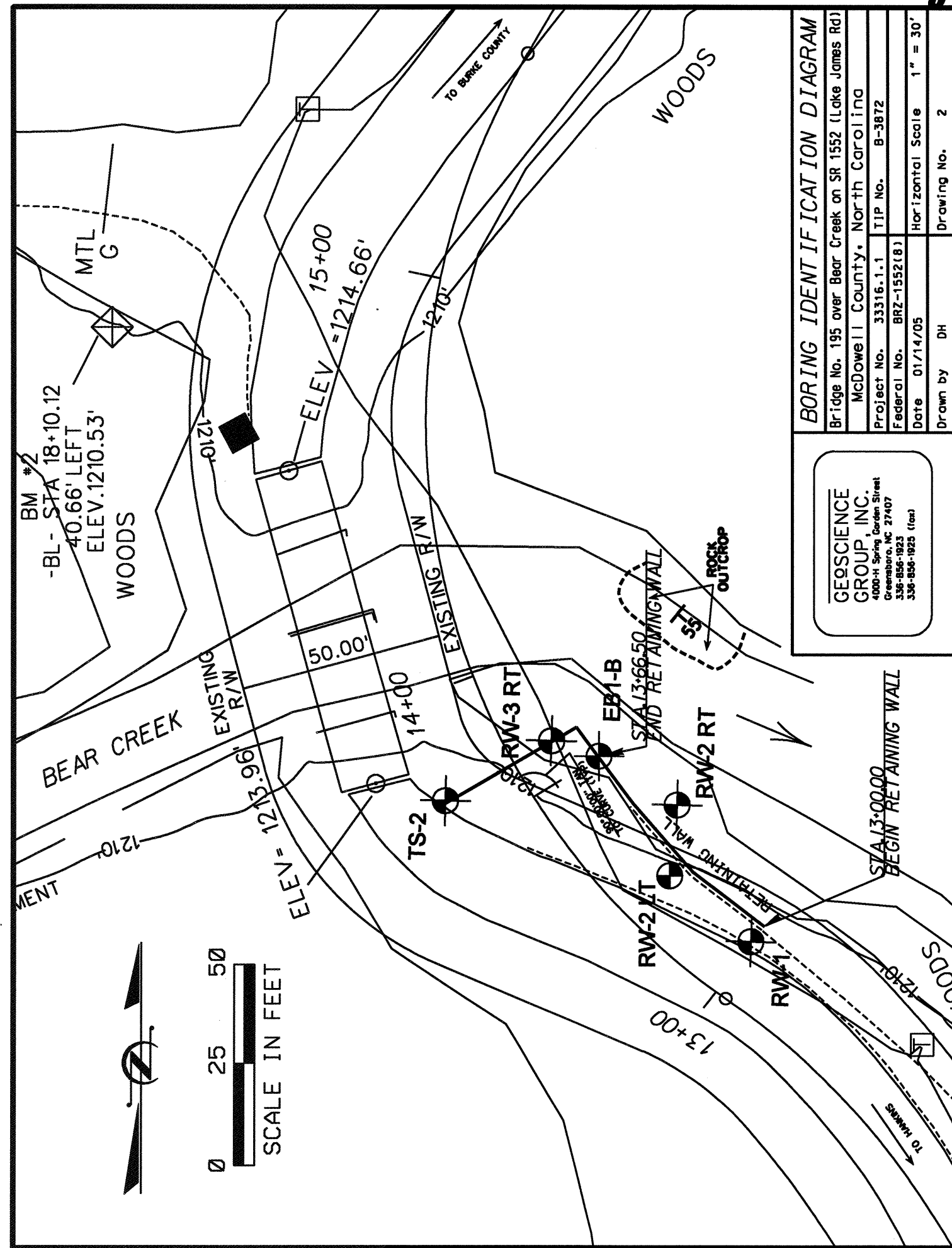
DATE: 1/10/04

REVISED:

Retaining Wall for Bridge No. 195 over Bear Creek on SR 1552 (Lake James Rd)
McDowell County, North Carolina

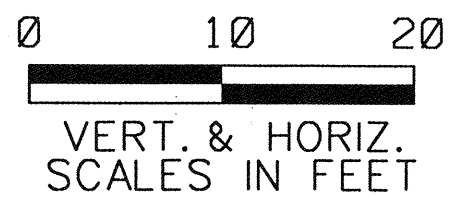
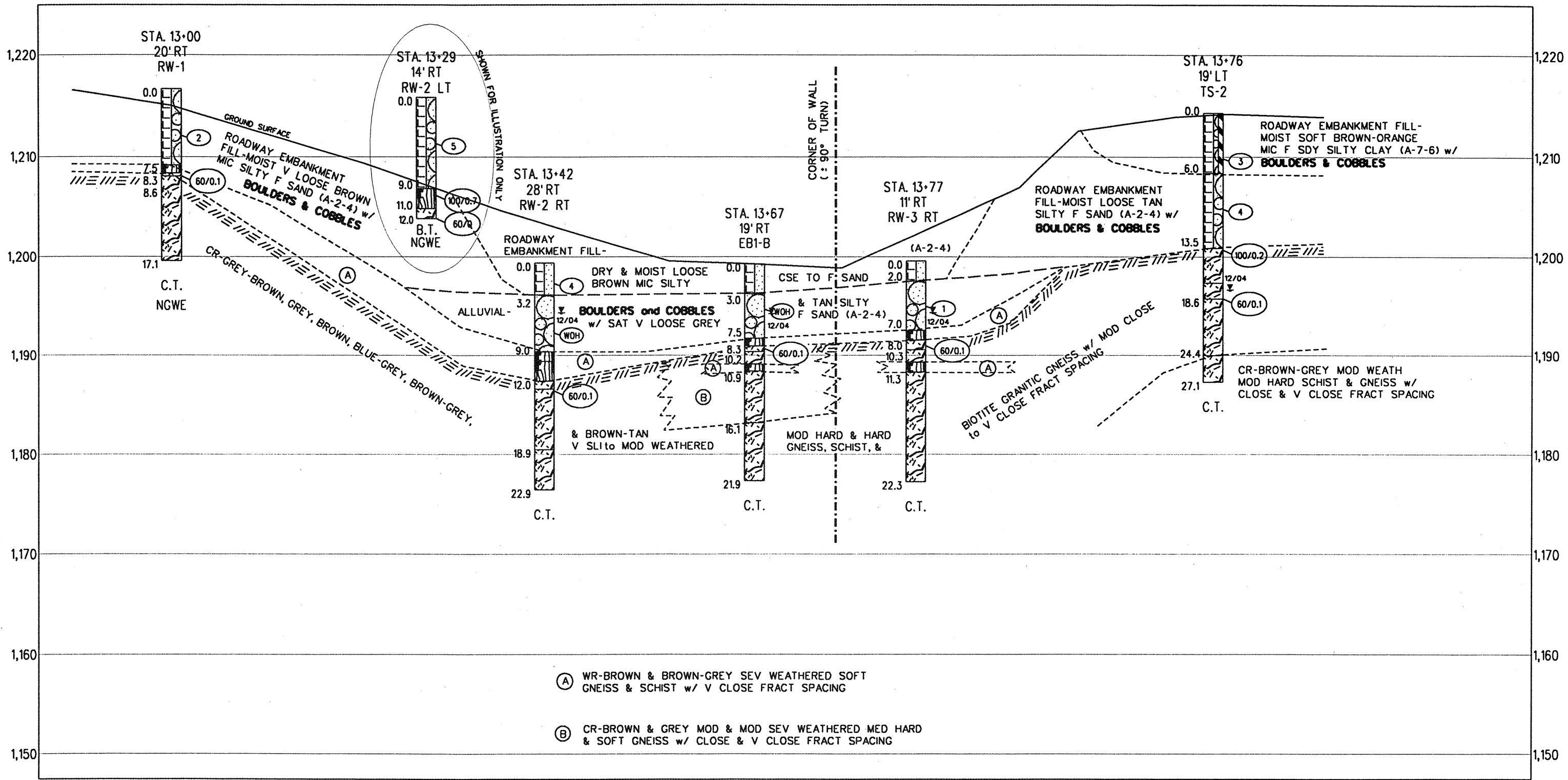
33316.1.1 (B-3872)
SITE VICINITY MAP

DRAWING NUMBER
1



BORING IDENTIFICATION DIAGRAM	
Bridge No. 195 over Bear Creek on SR 1552 (Lake James Rd)	
McDowell County, North Carolina	
Project No. 33316.1.1	TIP No. B-3872
Federal No. BRZ-1552(B)	
Date 01/14/05	Horizontal Scale 1" = 30'
Drawn by DH	Drawing No. 2

GEOSCIENCE GROUP, INC.
 4000-H Spring Garden Street
 Greensboro, NC 27407
 336-856-1925
 336-856-1925 (fax)



GEOSCIENCE GROUP, INC.
 4000-H Spring Garden Street
 Greensboro, NC 27407
 336-856-1923
 336-856-1925 (fax)

PROFILE ALONG RETAINING WALL	
Retaining Wall at End Bent-1 for Bridge No. 195 over Bear Creek on SR 1552	
McDowell County, North Carolina	
Project No. 33316.1.1	TP No. B-3872
Federal No. BRZ-1552(8)	Vert. Scale 1" = 10'
Date 1/24/05	Horiz. Scale 1" = 10'
Drawn by DH	Drawing No. 3

PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister						
SITE DESCRIPTION Retaining Wall at End Bent-1 for Bridge No. 195 over Bear Creek on SR 1552								GROUND WATER (ft)						
BORING NO. RW-1		BORING LOCATION 13+00		OFFSET 20' RT		ALIGNMENT -L-		0 HR. N/M						
COLLAR ELEV. 1216.7 ft		TOTAL DEPTH 17.1 ft		NORTHING 742469.63		EASTING 1119440.06		24 HR. NGWE						
DRILL MACHINE CME 550x		DRILL METHOD HSA/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 8.6 ft								
DATE STARTED 12/22/04		COMPLETED 12/22/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
1216.7	0.00				Ground Surface Elev. 1216.7 ft							1216.7	0.00	
1215	3.5	2	1	1							SS-10	M	Roadway Embankment Fill-Very Loose Brown Micaceous Silty Fine SAND with BOULDERS and COBBLES(A-2-4)	
1210	8.5	60/0.1										D	1209.2 Weathered Rock-Brown Weathered Gneiss 7.5 1208.4 8.3 1208.1 Crystalline Rock-Grey-Brown Gneiss 8.8 Crystalline Rock-Grey and Grey-Brown Slightly and Moderately Weathered Moderately Hard and Hard Gneiss with Close and Very Close Fracture Spacing	
1205											RS-6			
1200													1199.6	17.1
													Coring Terminated at Elev. 1199.6ft in Crystalline Rock (Gneiss)	

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister	
SITE DESCRIPTION Retaining Wall at End Bent-1 for Bridge No. 195 over Bear Creek on SR 1552								GROUND WATER (ft)	
BORING NO. RW-1		BORING LOCATION 13+00		OFFSET 20' RT		ALIGNMENT -L-		0 HR. N/M	
COLLAR ELEV. 1216.7 ft		TOTAL DEPTH 17.1 ft		NORTHING 742469.63		EASTING 1119440.06		24 HR. NGWE	
DRILL MACHINE CME 550x		DRILL METHOD HSA/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 8.6 ft			
DATE STARTED 12/22/04		COMPLETED 12/22/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
CORE SIZE HQ			TOTAL RUN 8.5 ft			DRILLER D. Harris			
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS
				REC. (%)	RQD (%)		REC. (%)	RQD (%)	
1208.1									Begin Coring @ 1208.10 ft
1208.1	8.6	3.5	5:55	(3.4) 97%	(2.8) 80%		8.3 98%	5.8 68%	Crystalline Rock-Grey and Grey-Brown Slightly and Moderately Weathered Moderately Hard and Hard Gneiss with Close and Very Close Fracture Spacing 8 JTS @ 0-10' 2 JTS @ 30-40' 10 JTS @ 50-60' 3 JTS @ 60-70' 5 JTS @ 70-80' 1 JT @ 80-90'
			3:55			RS-6			
			2:41						
1204.6	12.1	5.0	1:47/0.5						
1204.6	12.1	5.0	2:23	(4.9) 98%	(3.0) 60%				
			2:36						
			2:20						
			3:20						
			2:50						
1199.6	17.1								1199.6
Coring Terminated at Elev. 1199.6ft in Crystalline Rock (Gneiss)									

NCDOT_BORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872
RW-1
Box 1 of 1



PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister					
SITE DESCRIPTION Retaining Wall at End Bent-1 for Bridge No. 195 over Bear Creek on SR 1552								GROUND WATER (ft)					
BORING NO. RW-2 RT		BORING LOCATION 13+42		OFFSET 28' RT		ALIGNMENT -L-		0 HR. N/M					
COLLAR ELEV. 1199.4 ft		TOTAL DEPTH 22.9 ft		NORTHING 742503.53		EASTING 1119421.82		24 HR. 5.0					
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 10.0 ft							
DATE STARTED 12/15/04		COMPLETED 12/15/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
1199.4	0.00												Ground Surface Elev. 1199.4 ft
	1.0	1	2	2								D	Roadway Embankment Fill-Loose Brown Micaceous Silty Coarse to Fine SAND (A-2-4)
													1196.2 Alluvial-BOULDERS and COBBLES with Very Loose Grey Silty Fine SAND (A-2-4)
1195	6.0	1	WOH	WOH								SAT	1187.4 Crystalline Rock-Brown Moderately Severely Weathered Soft and Medium Hard Gneiss with Very Close Fracture Spacing
													1186.6 Crystalline Rock-Brown Moderately Severely Weathered Soft and Medium Hard Gneiss with Very Close Fracture Spacing
1190													1189.4 Weathered Rock-Brown-Grey Weathered Gneiss with Crystalline Rock Seams
													1189.4 Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing
													1187.4 Crystalline Rock-Brown Moderately Severely Weathered Soft and Medium Hard Gneiss with Very Close Fracture Spacing
1185	12.9											D	1186.6 Crystalline Rock-Brown Moderately Severely Weathered Soft and Medium Hard Gneiss with Very Close Fracture Spacing
													1180.5 Crystalline Rock-Blue-Grey and Brown-Grey Slightly and Moderately Weathered Moderately Hard and Hard Gneiss, Biotite Granitic Gneiss, and Schist with Close and Very Close Fracture Spacing
1180													1180.5 Crystalline Rock-Blue-Grey and Brown-Grey Slightly and Moderately Weathered Moderately Hard and Hard Gneiss, Biotite Granitic Gneiss, and Schist with Close and Very Close Fracture Spacing
													1176.5 Croring Terminated at Elev. 1176.5ft in Crystalline Rock (Gneiss & Schist)

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister	
SITE DESCRIPTION Retaining Wall at End Bent-1 for Bridge No. 195 over Bear Creek on SR 1552								GROUND WATER (ft)	
BORING NO. RW-2 RT		BORING LOCATION 13+42		OFFSET 28' RT		ALIGNMENT -L-		0 HR. N/M	
COLLAR ELEV. 1199.4 ft		TOTAL DEPTH 22.9 ft		NORTHING 742503.53		EASTING 1119421.82		24 HR. 5.0	
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 10.0 ft			
DATE STARTED 12/15/04		COMPLETED 12/15/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS
				REC. (%)	RQD (%)		REC. (%)	RQD (%)	
1189.4									Begin Coring @ 1189.40 ft
1189.4	10.0	2.9	6.46	(0.9) 31%	N/A		0.0 0%	N/A	Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing No Discernible Jts
			4.27						
			3:27/0.9				0.8 100%	0.0 0%	1187.4 Crystalline Rock-Brown Moderately Severely Weathered Soft and Medium Hard Gneiss with Very Close Fracture Spacing
1186.5	12.9					N=60/0.1	6.0 98%	5.1 84%	1186.6 Crystalline Rock-Brown Moderately Severely Weathered Soft and Medium Hard Gneiss with Very Close Fracture Spacing
1186.4	13.0	4.9	5:21	(4.9) 100%	(4.4) 90%				8 JTS @ 40-50' 1 JT @ 60-70' Crystalline Rock-Blue-Grey Slightly and Very Slightly Weathered Hard Gneiss and Schist with Close and Moderately Close Fracture Spacing
			4:44						2 JTS @ 20-30' 8 JTS @ 40-50' 2 JTS @ 60-70'
			4:19						
			4:59						
			5:21/0.9						
1181.5	17.9						4.0 100%	2.4 60%	1180.5 Crystalline Rock-Blue-Grey and Brown-Grey Slightly and Moderately Weathered Moderately Hard and Hard Gneiss, Biotite Granitic Gneiss, and Schist with Close and Very Close Fracture Spacing
1181.5	17.9	5.0	5:28	(4.9) 98%	(3.1) 62%				2 JTS @ 0-10' 3 JTS @ 20-30' 12 JTS @ 40-50' 1 JT @ 60-70'
			3:22						
			3:03						
			5:52						
1176.5	22.9		3:19						1176.5 Croring Terminated at Elev. 1176.5ft in Crystalline Rock (Gneiss, Biotite Granitic Gneiss, & Schist)

NCDOT_CORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872
RW-2 RT
Box 1 of 2



33316.1.1/B-3872
RW-2 RT
Box 2 of 2



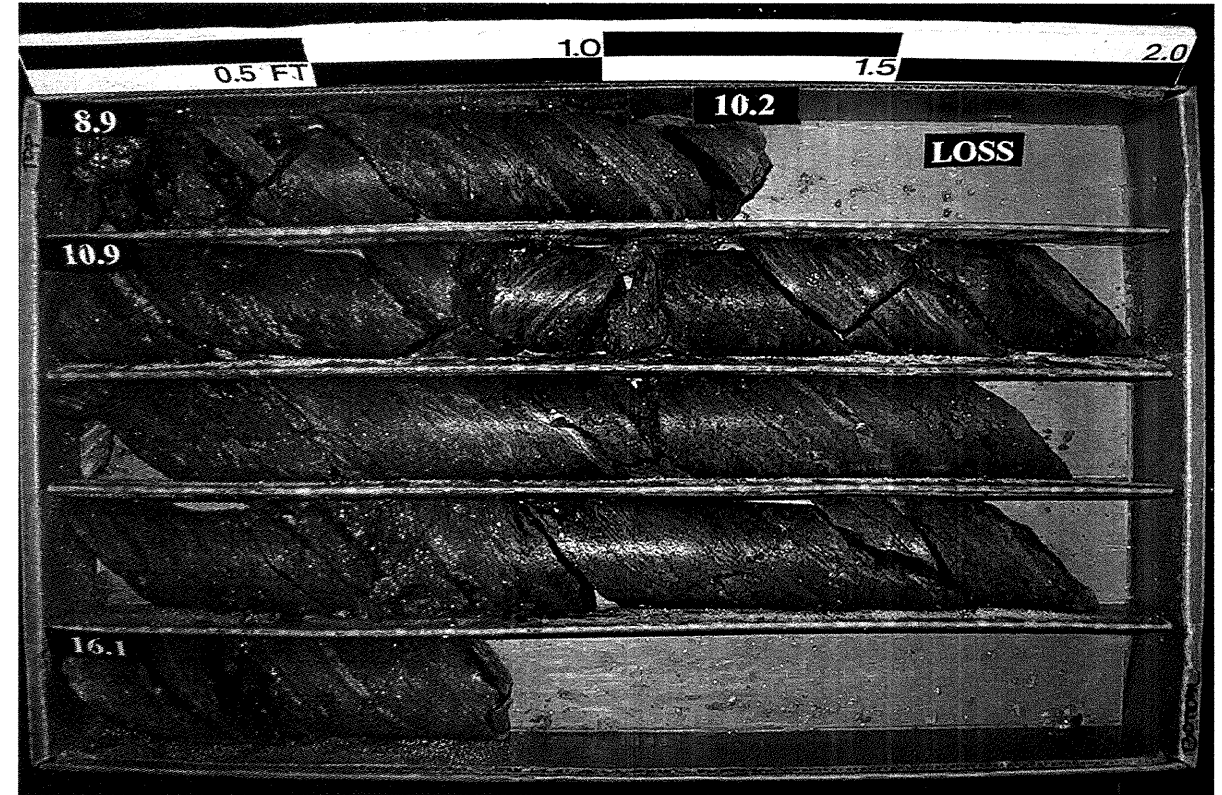
PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister					
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)					
BORING NO. EB1-B		BORING LOCATION 13+67		OFFSET 19' RT		ALIGNMENT -L-		0 HR. N/M					
COLLAR ELEV. 1199.3 ft		TOTAL DEPTH 21.9 ft		NORTHING 742515.66		EASTING 1119402.56		24 HR. 5.0					
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 8.9 ft							
DATE STARTED 12/15/04		COMPLETED 12/15/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
1199.3	0.00												Ground Surface Elev. 1199.3 ft
													1199.3 Roadway Embankment Fill-Loose Brown Micaceous Silty Coarse to Fine SAND (A-2-4)
	3.5	WOH	WOH	WOH									1196.3 Alluvial-BOULDERSand COBBLESw/ Very Loose Tan Silty Fine SAND (A-2-4)
1195													1191.8 Weathered Rock-Brown-Grey Weathered Gneiss
	8.5												1190.4 Crystalline Rock-Grey Gneiss
1190													1189.1 Crystalline Rock-Brown and Grey Moderately and Moderately Severely Weathered Medium Hard and Soft Gneiss with Close and Very Close Fracture Spacing
													1188.4 Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing
													1183.2 Crystalline Rock-Grey and Brown-Grey Moderately and Slightly Weathered Moderately Hard to Hard Gneiss and Schist with Close Fracture Spacing
1180													1177.4 Crystalline Rock-Grey and Brown-Grey Moderately and Slightly Weathered Moderately Hard to Hard Gneiss and Schist with Close Fracture Spacing
													Coring Terminated at Elev. 1177.4ft in Crystalline Rock (Gneiss & Schist)

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister	
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)	
BORING NO. EB1-B		BORING LOCATION 13+67		OFFSET 19' RT		ALIGNMENT -L-		0 HR. N/M	
COLLAR ELEV. 1199.3 ft		TOTAL DEPTH 21.9 ft		NORTHING 742515.66		EASTING 1119402.56		24 HR. 5.0	
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 8.9 ft			
DATE STARTED 12/15/04		COMPLETED 12/15/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS
				REC. (%)	RQD (%)		REC. (%)	RQD (%)	
1190.4	8.9	3.0	6:05	(2.3) 77%	(0.6) 20%		1.3 100%	0.3 23%	Begin Coring @ 1190.40 ft
			5:02				0.0 0%	N/A	2 JTS @ 20-30° 2 JTS @ 30-40° 8 JTS @ 40-50°
			6:20				5.1 98%	2.6 50%	10.2 10.9 Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing
1187.4	11.9	5.0	6:27	(4.9) 98%	(2.7) 54%				No Discernible Jts
			3:23						Crystalline Rock-Brown and Grey Moderately and Moderately Severely Weathered Medium Hard and Soft Gneiss with Close and Very Close Fracture Spacing
			3:23						1 JT @ 0-10° 2 JTS @ 20-30° 7 JTS @ 30-40° 9 JTS @ 40-50° 1 JT @ 60-70°
			4:40						
			3:25				5.8 100%	5.2 90%	16.1 Crystalline Rock-Grey and Brown-Grey Moderately and Slightly Weathered Moderately Hard to Hard Gneiss and Schist with Close Fracture Spacing
1182.4	16.9	5.0	3:27	(5.0) 100%	(4.8) 96%				3 JTS @ 20-30° 8 JTS @ 40-50°
			4:26						
			3:10						
			3:17						
			6:09						
1177.4	21.9								1177.4 Coring Terminated at Elev. 1177.4ft in Crystalline Rock (Gneiss & Schist)

NCDOT_BORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872
EB1-B
Box 1 of 2



33316.1.1/B-3872
EB1-B
Box 2 of 2



PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister					
SITE DESCRIPTION Retaining Wall at End Bent-1 for Bridge No. 195 over Bear Creek on SR 1552								GROUND WATER (ft)					
BORING NO. RW-3 RT		BORING LOCATION 13+77		OFFSET 11' RT		ALIGNMENT -L-		0 HR. N/M					
COLLAR ELEV. 1199.6 ft		TOTAL DEPTH 22.3 ft		NORTHING 742519.55		EASTING 1119390.81		24 HR. 5.2					
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 9.0 ft							
DATE STARTED 12/16/04		COMPLETED 12/16/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
1199.6	0.00												Ground Surface Elev. 1199.6 ft
													Roadway Embankment Fill-Loose Brown Micaceous Silty Coarse to Fine SAND (A-2-4)
	3.5	1	WOH	1									Alluvial-BOULDERSand COBBLESwith Very Loose Tan Silty Fine SAND (A-2-4)
1195													Weathered Rock-Brown-Grey Weathered Gneiss
	8.5												Crystalline Rock-Blue-Grey Gneiss
1190													Crystalline Rock-Blue-Grey Slightly Weathered Hard Gneiss and Schist with Close and Very Close Fracture Spacing
													Weathered Rock-Brown Severely Weathered Soft Gneiss and Schist with Very Close Fracture Spacing
													Crystalline Rock-Blue-Grey and Grey Moderately and Slightly Weathered Hard and Moderately Hard Gneiss with Close Fracture Spacing
1185													
1180													
													Coring Terminated at Elev. 1177.3ft in Crystalline Rock (Gneiss)

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister	
SITE DESCRIPTION Retaining Wall at End Bent-1 for Bridge No. 195 over Bear Creek on SR 1552								GROUND WATER (ft)	
BORING NO. RW-3 RT		BORING LOCATION 13+77		OFFSET 11' RT		ALIGNMENT -L-		0 HR. N/M	
COLLAR ELEV. 1199.6 ft		TOTAL DEPTH 22.3 ft		NORTHING 742519.55		EASTING 1119390.81		24 HR. 5.2	
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 9.0 ft			
DATE STARTED 12/16/04		COMPLETED 12/16/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
CORE SIZE HQ		TOTAL RUN 13.3 ft		DRILLER D. Harris					
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS
				REC. (%)	RQD (%)		REC. (%)	RQD (%)	
1190.6									Begin Coring @ 1190.60 ft
1190.6	9.0	3.3	3:47	(2.3) 70%	(1.7) 52%		1.3 100%	0.7 54%	Crystalline Rock-Blue-Grey Slightly Weathered Hard Gneiss and Schist with Close and Very Close Fracture Spacing
			4:09				0.0 0%	N/A	2 JTS @ 0-10' 2 JTS @ 30-40' 2 JTS @ 40-50' 1 JT @ 60-70'
			2:52				10.6 96%	7.5 68%	Weathered Rock-Brown Severely Weathered Soft Gneiss and Schist with Very Close Fracture Spacing
1187.3	12.3		1:15/0.3						No Discernible Jts
1187.3	12.3	5.0	5:21	(4.8) 96%	(3.5) 70%				Crystalline Rock-Blue-Grey and Grey Moderately and Slightly Weathered Hard and Moderately Hard Gneiss with Close Fracture Spacing
			4:12						4 JTS @ 20-30' 14 JTS @ 30-40' 16 JTS @ 40-50' 5 JTS @ 60-70'
			3:32						
			4:44						
			5:23						
1182.3	17.3		3:47	(4.8) 96%	(3.0) 60%				
1182.3	17.3	5.0	3:10						
			3:06						
			3:56						
			4:07						
1177.3	22.3								Coring Terminated at Elev. 1177.3ft in Crystalline Rock (Gneiss)

NCDOT_BORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872
RW-3 RT
Box 1 of 2



33316.1.1/B-3872
RW-3 RT
Box 2 of 2



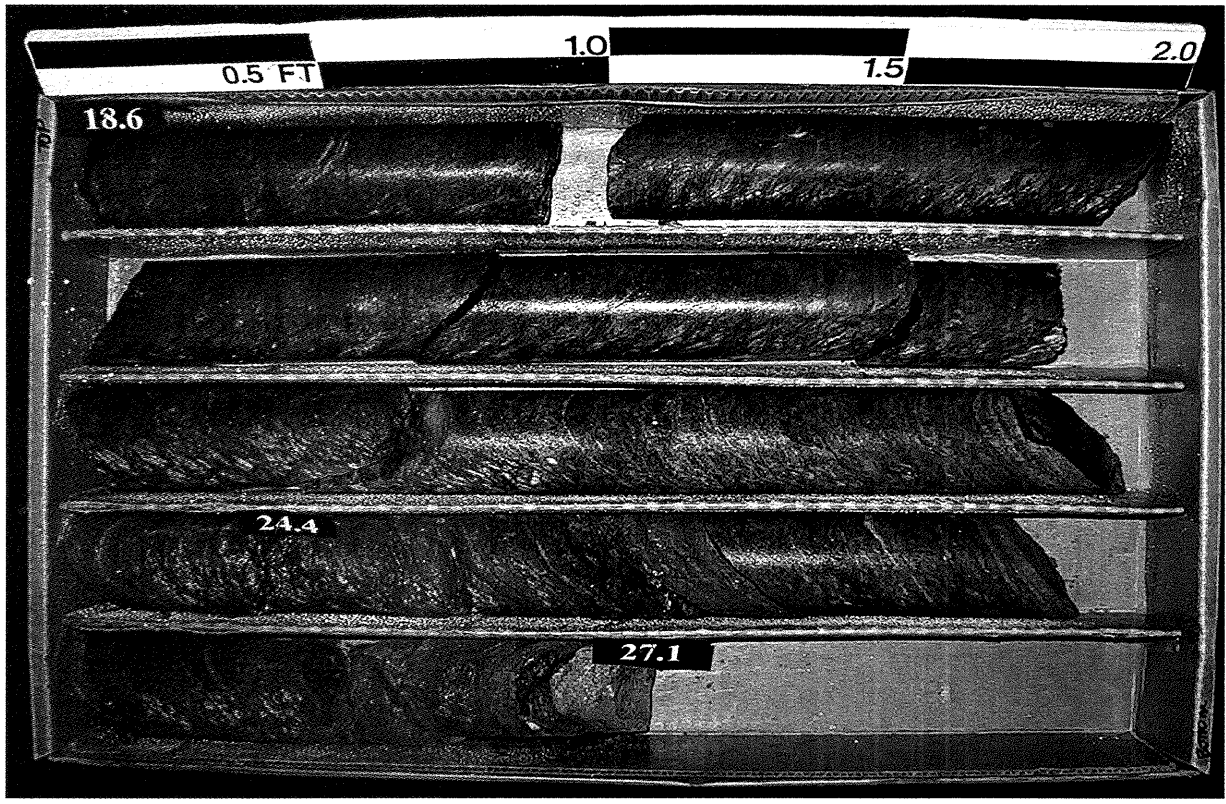
PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister					
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)							GROUND WATER (ft)						
BORING NO. TS-2		BORING LOCATION 13+76		OFFSET 19' LT		ALIGNMENT -L-		0 HR. N/M					
COLLAR ELEV. 1214.4 ft		TOTAL DEPTH 27.1 ft		NORTHING 742504.59		EASTING 1119364.71		24 HR. 17.7					
DRILL MACHINE CME 550x		DRILL METHOD HSA/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 18.6 ft							
DATE STARTED 12/21/04		COMPLETED 12/21/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
1214.4	0.00												Ground Surface Elev. 1214.4 ft
1210	3.5	1	2	1							M		Roadway Embankment Fill-Soft Brown-Orange Micaceous Fine Sandy Silty CLAY and BOULDERSand COBBLES (A-7-6)
1205	8.5	4	3	1							M		Roadway Embankment Fill-Loose Tan Micaceous Silty Fine SAND with BOULDERSand COBBLES(A-2-4)
1200	13.5	100/0.2									D		Crystalline Rock-Brown-Tan Gneiss
1195	18.5	60/0.1									D		Crystalline Rock-Grey Schist
											RS-5		Crystalline Rock-Grey Slightly Weathered Hard Schist with Close and Moderately Close Fracture Spacing
													Crystalline Rock-Brown-Grey Moderately Weathered Moderately Hard Schist and Gneiss with Close and Very Close Fracture Spacing
													Coring Terminated at Elev. 1187.3ft in Crystalline Rock (Schist & Gneiss)

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister	
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)							GROUND WATER (ft)		
BORING NO. TS-2		BORING LOCATION 13+76		OFFSET 19' LT		ALIGNMENT -L-		0 HR. N/M	
COLLAR ELEV. 1214.4 ft		TOTAL DEPTH 27.1 ft		NORTHING 742504.59		EASTING 1119364.71		24 HR. 17.7	
DRILL MACHINE CME 550x		DRILL METHOD HSA/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 18.6 ft			
DATE STARTED 12/21/04		COMPLETED 12/21/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
CORE SIZE HQ			TOTAL RUN 8.5 ft		DRILLER D. Harris				
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS
				REC. (%)	RQD (%)		REC. (%)	RQD (%)	
1195.8									Begin Coring @ 1195.80 ft
1195.8	18.6	3.5	4:58	(3.3) 94%	(3.3) 94%	RS-5	5.6 97%	5.3 91%	Crystalline Rock-Grey Slightly Weathered Hard Schist with Close and Moderately Close Fracture Spacing 2 JTS @ 10-20' 2 JTS @ 50-60' 1 JT @ 70-80'
1192.3	22.1	5.0	2:50/0.5						
1192.3	22.1	5.0	4:42	(4.9) 98%	(3.4) 68%				
			2:52						
			3:43				2.6 96%	1.4 52%	1190.0 24.4 Crystalline Rock-Brown-Grey Moderately Weathered Moderately Hard Schist and Gneiss with Close and Very Close Fracture Spacing 2 JTS @ 0-10' 3 JTS @ 30-40' 4 JTS @ 40-50' 1 JT @ 70-80'
1187.3	27.1		5:32						1187.3 27.1 Coring Terminated at Elev. 1187.3ft in Crystalline Rock (Schist & Gneiss)

NCDOT_CORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872
TS-2
Box 1 of 1



SITE PHOTOGRAPHS



Looking from Beginning of Retaining Wall toward EB1-B

SITE PHOTOGRAPHS



Looking from Corner of Retaining Wall toward RW-1



Looking from Corner of Retaining Wall toward TS-2

PROJECT: 33316.1.1 ID: B-3872

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE	STATE PROJECT REFERENCE NO.	SHEET	TOTAL
N.C.	B-3872	1	35
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33316.1.1	BRZ-1552(8)	P.E. CONST.	

STATE PROJECT 33316.1.1 I.D. NO. B-3872

F.A. PROJECT BRZ-1552(8)

COUNTY McDOWELL

PROJECT DESCRIPTION Bridge No. 195 over Bear
Creek on SR 1552 (Lake James Rd)

SITE DESCRIPTION _____

For Letting

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.

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.

INVESTIGATED BY D. Hardister PERSONNEL D. Harris

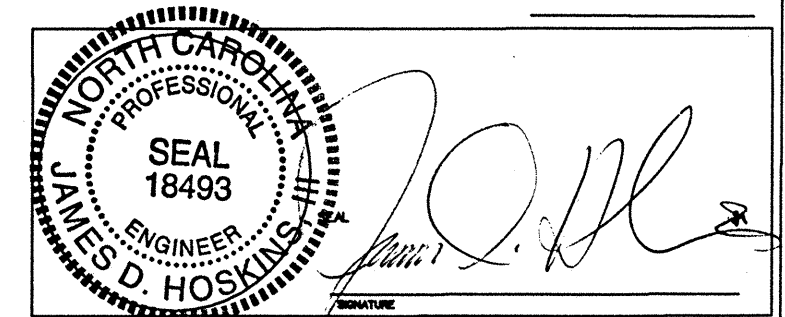
CHECKED BY JD Hoskins III R. Burleson

SUBMITTED BY JD Hoskins III R. Kumar

DATE January 26, 2005 S. Tierney

R. Benfield

DRAWN BY: D. Hardister



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3872	33316.1.1	2	35

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS																																																																																																																																																																																																																												
<p>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 FOOT 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. EXAMPLES: VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HARD PLASTIC, AFS</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) DAP- GRADED: INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>				<p>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 84.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>				<p>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 IT 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. FISSELE - 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 (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 (MOTT.) - 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 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 4 INCHES 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 IN OR B.P.F.J 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 LESS THAN 84.1 FOOT PENETRATION WITH 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 (SR.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																																												
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"><tr><th rowspan="2">GENERAL CLASS.</th><th colspan="7">GRANULAR MATERIALS (>35% PASSING #200)</th><th colspan="7">SILT-CLAY MATERIALS (>35% PASSING #200)</th><th colspan="7">ORGANIC MATERIALS</th></tr><tr><th colspan="2">A-1</th><th colspan="2">A-2</th><th colspan="3">A-3</th><th colspan="2">A-4</th><th colspan="3">A-5</th><th colspan="2">A-6</th><th colspan="2">A-7</th><th colspan="2">A-1, A-2</th><th colspan="2">A-3</th><th colspan="3">A-4, A-5</th><th colspan="2">A-6, A-7</th></tr><tr><th>GROUP CLASS.</th><th colspan="2">A-1-a</th><th colspan="2">A-1-b</th><th colspan="3">A-2-1</th><th colspan="2">A-2-2</th><th colspan="3">A-2-3</th><th colspan="2">A-2-4</th><th colspan="2">A-2-5</th><th colspan="2">A-2-6</th><th colspan="2">A-2-7</th><th colspan="2">A-3-1</th><th colspan="2">A-3-2</th><th colspan="3">A-4, A-5</th><th colspan="2">A-6, A-7</th></tr><tr><th>SYMBOL</th><td colspan="2">[Pattern]</td><td colspan="2">[Pattern]</td><td colspan="3">[Pattern]</td><td colspan="2">[Pattern]</td><td colspan="3">[Pattern]</td><td colspan="2">[Pattern]</td><td colspan="2">[Pattern]</td><td colspan="2">[Pattern]</td><td colspan="2">[Pattern]</td><td colspan="2">[Pattern]</td><td colspan="3">[Pattern]</td><td colspan="2">[Pattern]</td></tr></table>				GENERAL CLASS.	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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>				<p>SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE</p>				<p>LIQUID LIMIT LESS THAN 30 LIQUID LIMIT 31-60 LIQUID LIMIT GREATER THAN 60</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>GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. ▽ STATIC WATER LEVEL AFTER 24 HOURS. ▽PW PERCHED WATER SATURATED ZONE OR WATER BEARING STRATA O SPRING OR SEEPAGE</p>				<p>MISCELLANEOUS SYMBOLS</p> <table border="1"><tr><th>SYMBOL</th><th>DESCRIPTION</th><th>SYMBOL</th><th>DESCRIPTION</th></tr><tr><td>[Symbol]</td><td>ROADWAY EMBANKMENT WITH SOIL DESCRIPTION</td><td>[Symbol]</td><td>SPT TEST BORING</td></tr><tr><td>[Symbol]</td><td>SOIL SYMBOL</td><td>[Symbol]</td><td>AUGER BORING</td></tr><tr><td>[Symbol]</td><td>ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS</td><td>[Symbol]</td><td>CORE BORING</td></tr><tr><td>[Symbol]</td><td>INFERRED SOIL BOUNDARIES</td><td>[Symbol]</td><td>MONITORING WELL</td></tr><tr><td>[Symbol]</td><td>INFERRED ROCK LINE</td><td>[Symbol]</td><td>PIEZOMETER INSTALLATION</td></tr><tr><td>[Symbol]</td><td>ALLUVIAL SOIL BOUNDARY</td><td>[Symbol]</td><td>SLOPE INDICATOR INSTALLATION</td></tr><tr><td>[Symbol]</td><td>DIP/DIP DIRECTION OF ROCK STRUCTURES</td><td>[Symbol]</td><td>SPT N-VALUE</td></tr><tr><td>[Symbol]</td><td></td><td>[Symbol]</td><td>SPT REFUSAL</td></tr></table>				SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	[Symbol]	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION	[Symbol]	SPT TEST BORING	[Symbol]	SOIL SYMBOL	[Symbol]	AUGER BORING	[Symbol]	ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS	[Symbol]	CORE BORING	[Symbol]	INFERRED SOIL BOUNDARIES	[Symbol]	MONITORING WELL	[Symbol]	INFERRED ROCK LINE	[Symbol]	PIEZOMETER INSTALLATION	[Symbol]	ALLUVIAL SOIL BOUNDARY	[Symbol]	SLOPE INDICATOR INSTALLATION	[Symbol]	DIP/DIP DIRECTION OF ROCK STRUCTURES	[Symbol]	SPT N-VALUE	[Symbol]		[Symbol]	SPT REFUSAL	<p>ROCK HARDNESS</p> <table border="1"><tr><th>ROCK HARDNESS</th><th>DESCRIPTION</th></tr><tr><td>VERY HARD</td><td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. 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WBS ELEMENT (TIP): 33316.1.1 (B-3872)

FEDERAL PROJECT: BRZ-1552(8)

COUNTY: McDowell

DESCRIPTION: Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)

SUBJECT: Geotechnical Report of Subsurface Exploration

Project Description:

Geoscience Group, Inc. (Geoscience) has completed the authorized geotechnical investigation for the above referenced project in McDowell County, North Carolina. The bridge will be located in northeastern McDowell County, near Marion. More precisely, the bridge will be located on SR 1552 (Lake James Road) at its crossing of Bear Creek. A Site Vicinity Map is included in the following pages. The project will consist of the construction of a three-span, concrete girder bridge with an overall length of 120 feet, a width of 33.25 feet (out-to-out), and a skew angle of 90°. Fill depths of 4.5 to 2 feet are proposed at end bent-1 and end bent-2, respectively. Excavation of the existing fill embankment is proposed at the interior bents. A retaining wall is proposed along the right side of the project and parallel to end bent-1. The 1.5H:1V end bent-2 slope is to be protected with rip rap.

The purpose of this exploration was to investigate the subsurface conditions at the proposed bridge bent locations and along the anticipated temporary shoring location. The subsurface exploration was conducted between December 13 and 21, 2004. This exploration consisted of the execution of ten (10) soil test borings. Using the baseline points provided by NCDOT, the actual boring locations were surveyed for location and elevation by Geoscience personnel. Drilled boring locations are shown on the Boring Identification Diagram included in the following pages.

The soil test borings were advanced using a CME-550x drilling machine utilizing hollow-stem auger and rotary drilling techniques. In each boring, Standard Penetration tests were performed in general accordance with NCDOT guidelines. In conjunction with this testing, split-barrel soil samples were recovered for visual classification in the field. The split-barrel soil samples were returned to our laboratory for testing. Water for drilling purposes was obtained from Bear Creek. Drilling mud slurry was not utilized during the investigation. Core samples of the underlying weathered rock and bedrock were obtained from seven (7) of the borings. The core samples were obtained using an HQ wireline barrel. The core samples were returned to our laboratory for review and classification as well as laboratory testing.

Laboratory testing was performed on representative split-barrel samples to aid in the assessment of AASHTO soil classification and to refine data for evaluation of engineering properties. The laboratory testing consisted of natural moisture content determinations, Atterberg Limits tests, and grain size analyses

with hydrometer. The soil laboratory tests performed were in general accordance with AASHTO and NCDOT specifications. Rock core specimens were selected for laboratory testing of unconfined compressive strength. These tests were performed in general accordance with ASTM Method D 2938. The results of the soil laboratory tests and a rock core test summary are included in the following pages. Complete rock core testing results are provided in Appendix C under separate cover.

Physiography and Geology:

The project site is located in the Blue Ridge Belt of the Blue Ridge Physiographic Province of North Carolina. The site is situated between the Grandfather Mountain Window and the Chauga Belt. According to the 1985 Geologic Map of North Carolina, the site is located in an area consisting of thinly laminated to massive gneiss of the Late Proterozoic Era. Schist is common in this area also. Biotite gneiss and biotite granitic gneiss are common in the Chauga Belt and Grandfather Mountain Window, respectively, in the areas near the site. The core samples obtained on-site consist of gneiss, schist, and biotite granitic gneiss. Thin seams of quartzite were encountered as well. The overlying soils are the residual product of the physical and chemical weathering of the underlying bedrock. Two mountains are present west of the bridge site, with Bear Creek flowing west to east into Lake James between them.

Foundation Materials:

The foundation materials encountered at the site consist of roadway embankment fill, alluvial soil, residual soil, weathered rock, and crystalline rock. Subsurface conditions will be described for the bridge and temporary shoring independently.

Bridge: Roadway embankment fill is present in borings EB1-A, EB1-B, and EB2-A and extends to elevations ranging between 1203 and 1196 feet. Roadway embankment fill is present along the left side of bent-1 and bent-2, but was not investigated. The fill consists of moist very loose and loose silty sand (A-1-a, A-2-4) along end bent-1, with boulders and cobbles at EB1-A, and moist soft silty clay (A-7-6) at EB2-A. Blow counts range between 2 and 5 blows per foot (bpf).

Alluvial soil is present in boring EB1-B, along bent-1, and along bent-2. The alluvial soil extends to elevations ranging between 1194 and 1192 feet. With the exception of B2-A, the alluvial soils consist of boulders and cobbles with saturated loose silty sand (A-2-4). In B2-A, the alluvial soil consists of loose silty sand (A-2-4). Blow counts range between 1 and 2 bpf.

Residual soil is present along bent-2 and end bent-2. The residual soil begins at elevations ranging between 1203 and 1193 feet and extends to elevations ranging between 1189 and 1187 feet. A zone of residual soil is present below the crystalline rock line in B2-A between 1182 and 1179 feet. The residual soils consist of moist and wet loose to very dense silty sand (a-2-4) with blow counts ranging between 5 and 88 bpf.

Weathered rock is present in each boring beginning at elevations ranging between 1201 and 1187 feet. The weathered rock generally consists of severely weathered, soft gneiss and schist with very close fracture spacing. Recovery of cored weathered rock ranged between 0 and 27 percent. The end bent-2 borings were terminated in weathered rock.

Crystalline rock is present in each bridge boring, with the exception of EB2-A, beginning at elevations

ranging between 1197 and 1174 feet. The crystalline rock generally consists of slightly to moderately weathered hard gneiss, biotite granitic gneiss, and schist with close fracture spacing. In EB2-B, the crystalline rock is a thin seam of quartzite. The recovery of the crystalline rock ranges between 78 and 100 percent; generally increasing with depth. RQD values for the crystalline rock ranges between 0 and 100 percent and was generally variable with depth. With the exception of the end bent-2 borings, each of the bridge borings was terminated in crystalline rock

Temporary Shoring: Borings TS-1, TS-2, and EB1-A were performed along the east side of Lake James Road where temporary shoring may be installed for construction. Roadway embankment fill is present from the surface in each boring and extends to elevations ranging between 1203 and 1201 feet. The fill consists of moist very loose and loose silty sand (A-2-4) and moist silty clay (A-7-6) mixed with boulders and cobbles. Blow counts range between 2 and 10 bpf, with an influenced blow count of 20 in TS-1.

Weathered rock consisting of weathered gneiss is present in TS-1 and EB1-A below the fill. The weathered rock extends to the top of crystalline rock. A zone of severely weathered, soft gneiss and schist with very close fracture spacing is present below the crystalline rock line in EB1-A also. The cored weathered rock was not recovered.

Crystalline rock is present in each boring beginning at elevations ranging between 1201 and 1198 feet. The crystalline rock consists of moderately severely to slightly weathered, moderately hard and hard gneiss and schist with moderately to very close fracture spacing. Recovery values range between 96 and 100 percent. RQD values range between 0 and 100 percent and were variable with depth. Each shoring boring was terminated in crystalline rock.

Groundwater:

After completion of each boring, temporary piezometers (slotted PVC pipe) were installed in the boreholes. Piezometers were used to measure stabilized groundwater levels at least 24 hours after the completion of drilling. Groundwater elevations range between 1197 and 1194 feet. Due to the creek and Lake James, we anticipate groundwater to fluctuate with the water levels there.

Notes to the Designer:


Boulders and cobbles are present throughout most of the embankment fill and the alluvium. Additionally, concrete slabs and large pieces of asphaltic concrete are visible on the ground near the existing bridge.

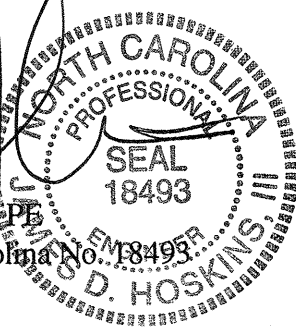
Closure:

The geotechnical foundation investigation is based on the Preliminary General Drawing dated November 5, 2004. If any significant changes are made in the design or location of the proposed structure, the subsurface information will have to be reviewed and modified as necessary. For soil descriptions and general stratification at a particular boring location, the respective Boring Log should be reviewed. Cross-sections and profiles are a generalized interpretation of soil conditions between borings and should not be considered accurate other than at the boring locations. Subsurface conditions between boring locations or elsewhere on the site may vary, and subsurface anomalies may exist which were not detected.

Geoscience Group, Inc. appreciates the opportunity to be of service to the NCDOT on this project. Should you have any questions concerning this report, please feel free to contact the undersigned.

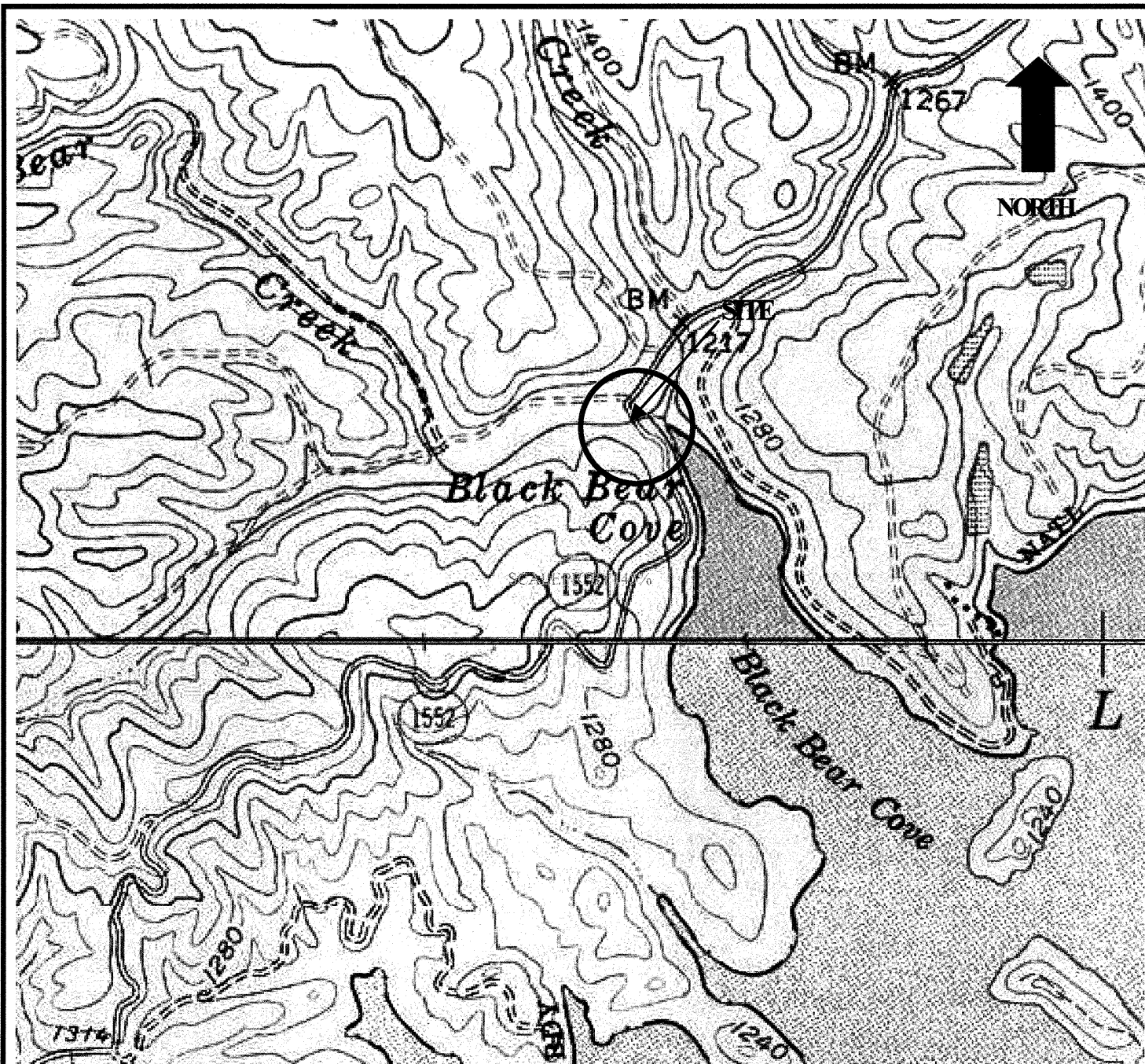
Respectfully,
GEOSCIENCE GROUP, INC.


Dean Hardister, PE
Project Manager

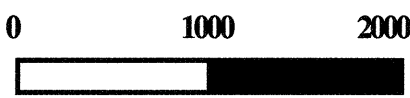

James D. Hoskins, III, PE
Registered North Carolina Professional Engineer No. 18493

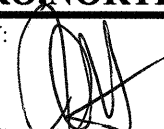
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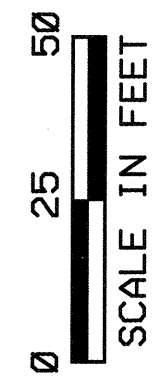
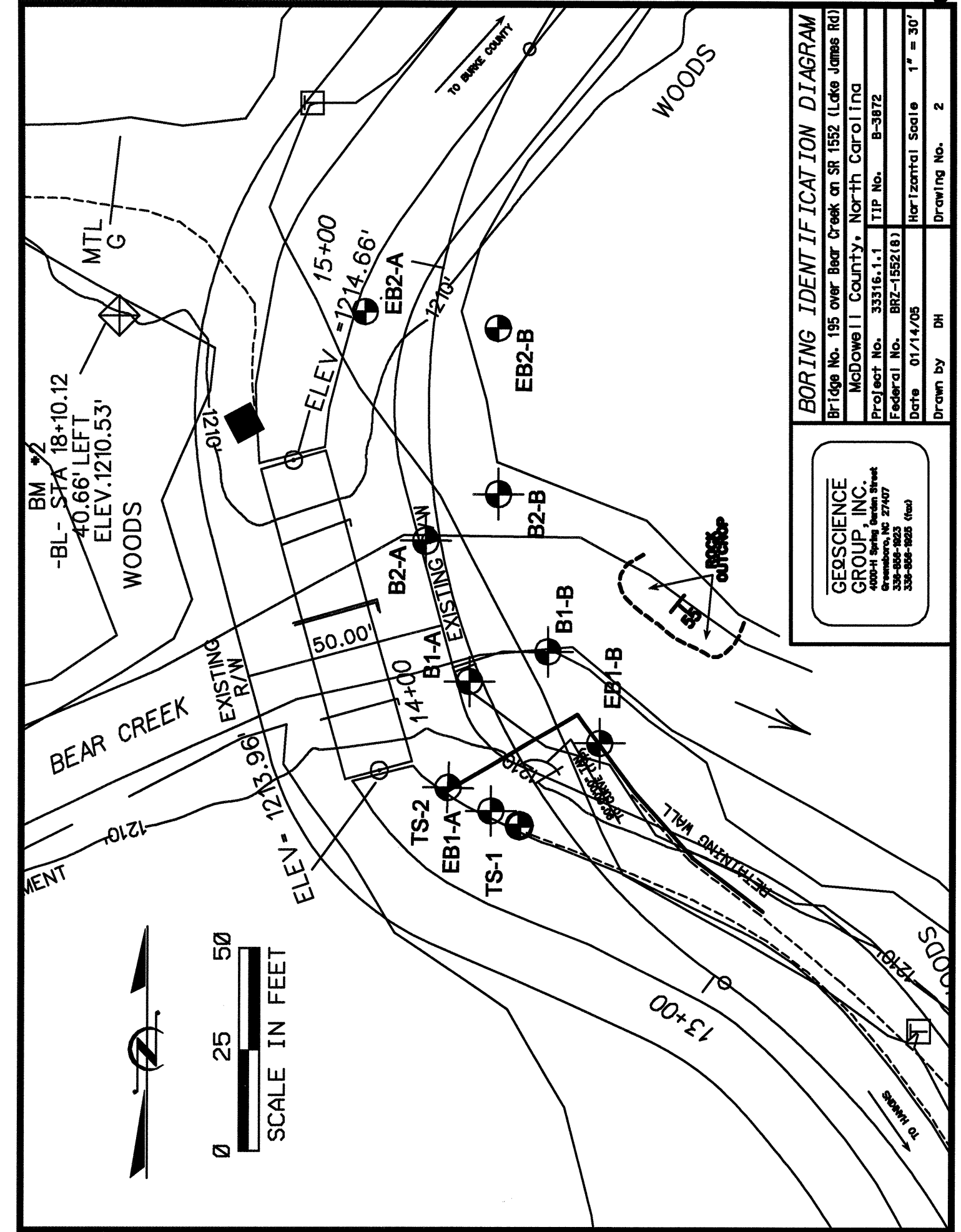
Enclosures



SCALE IN FEET

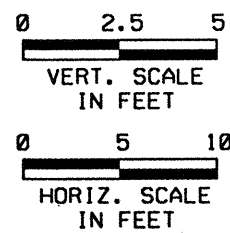
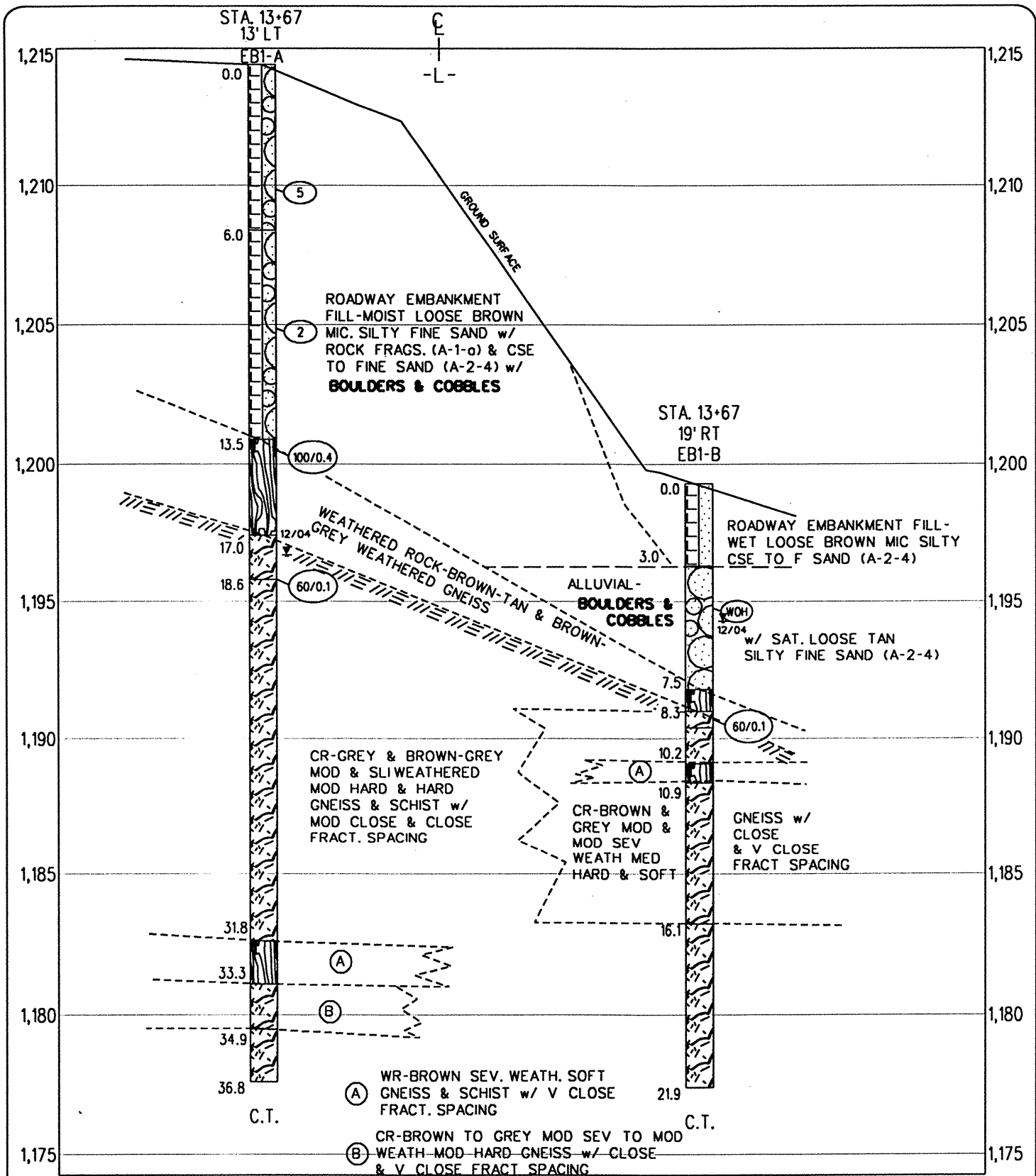


GEOSCIENCE GROUP, INC. GREENSBORO, NORTH CAROLINA		
SCALE: ±1"=1,000'	APPROVED BY: 	DRAWN BY: RB
DATE: 1/10/04		REVISED:
Bridge No. 195 over Bear Creek on SR 1552 (Lake James Rd) McDowell County, North Carolina		
33316.1.1(B-3872) SITE VICINITY MAP		DRAWING NUMBER 1



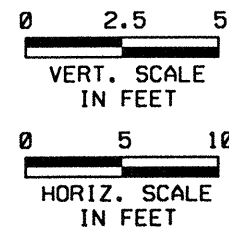
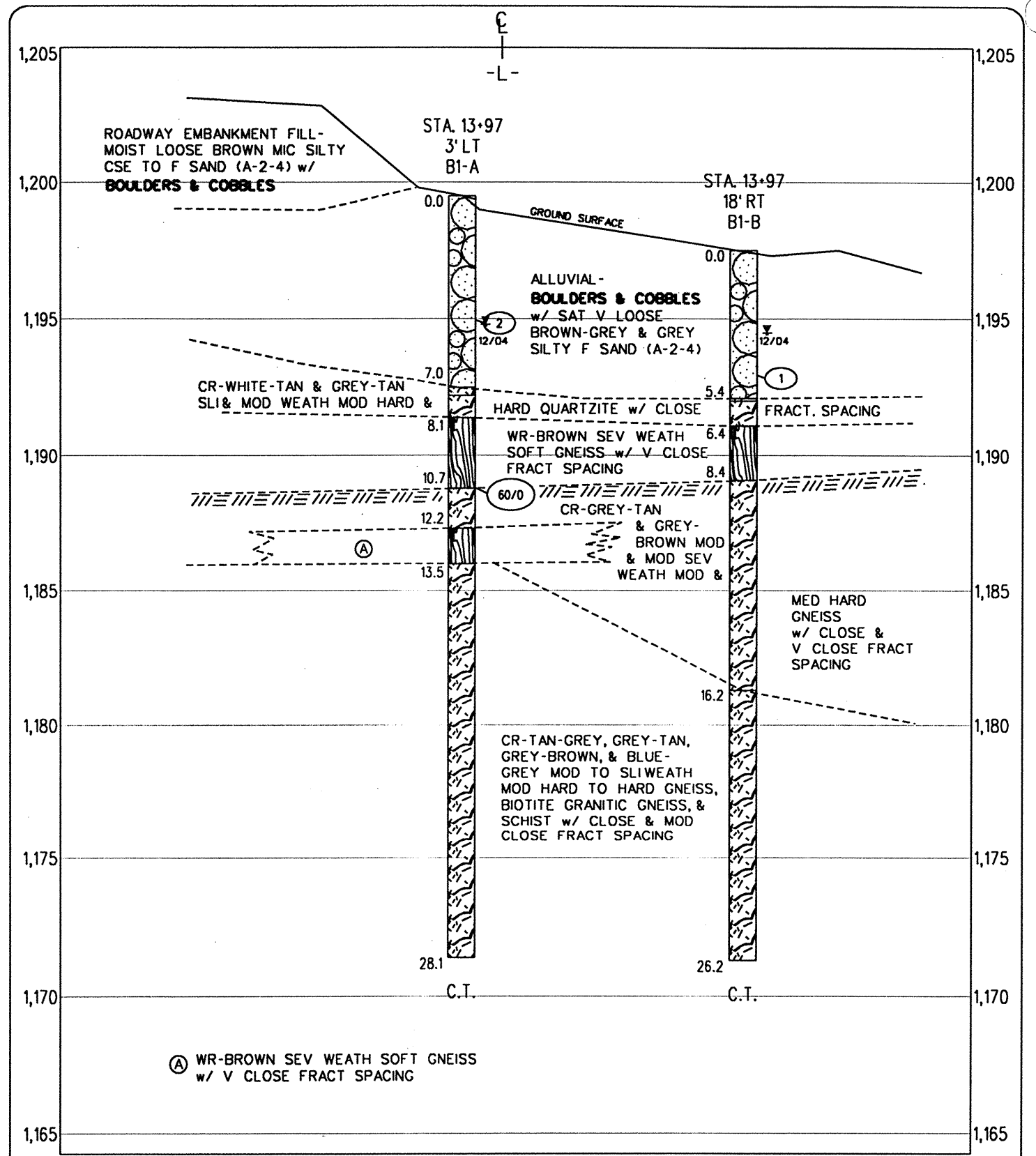
GEOSCIENCE GROUP, INC.
4000-H Spring Garden Street
Greensboro, NC 27407
336-866-8223
336-866-8225 (fax)

BORING IDENTIFICATION DIAGRAM
 Bridge No. 195 over Bear Creek on SR 1552 (Lake James Rd)
 McDowell County, North Carolina
 Project No. 33316.1.1 TIP No. B-3872
 Federal No. BRZ-1552(B)
 Date 01/14/05
 Drawn by DH
 Drawing No. 2



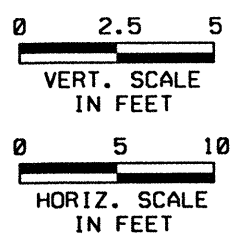
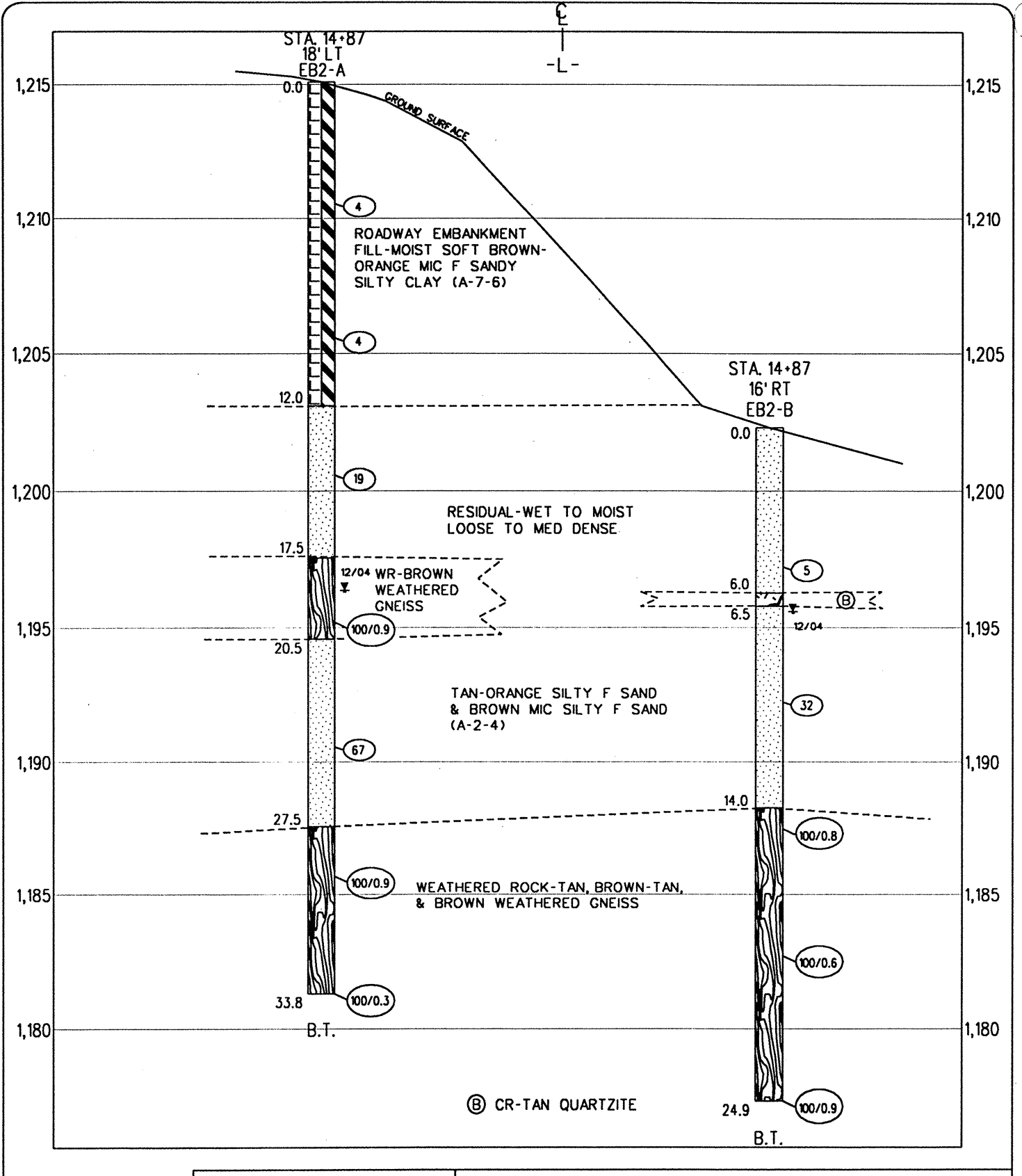
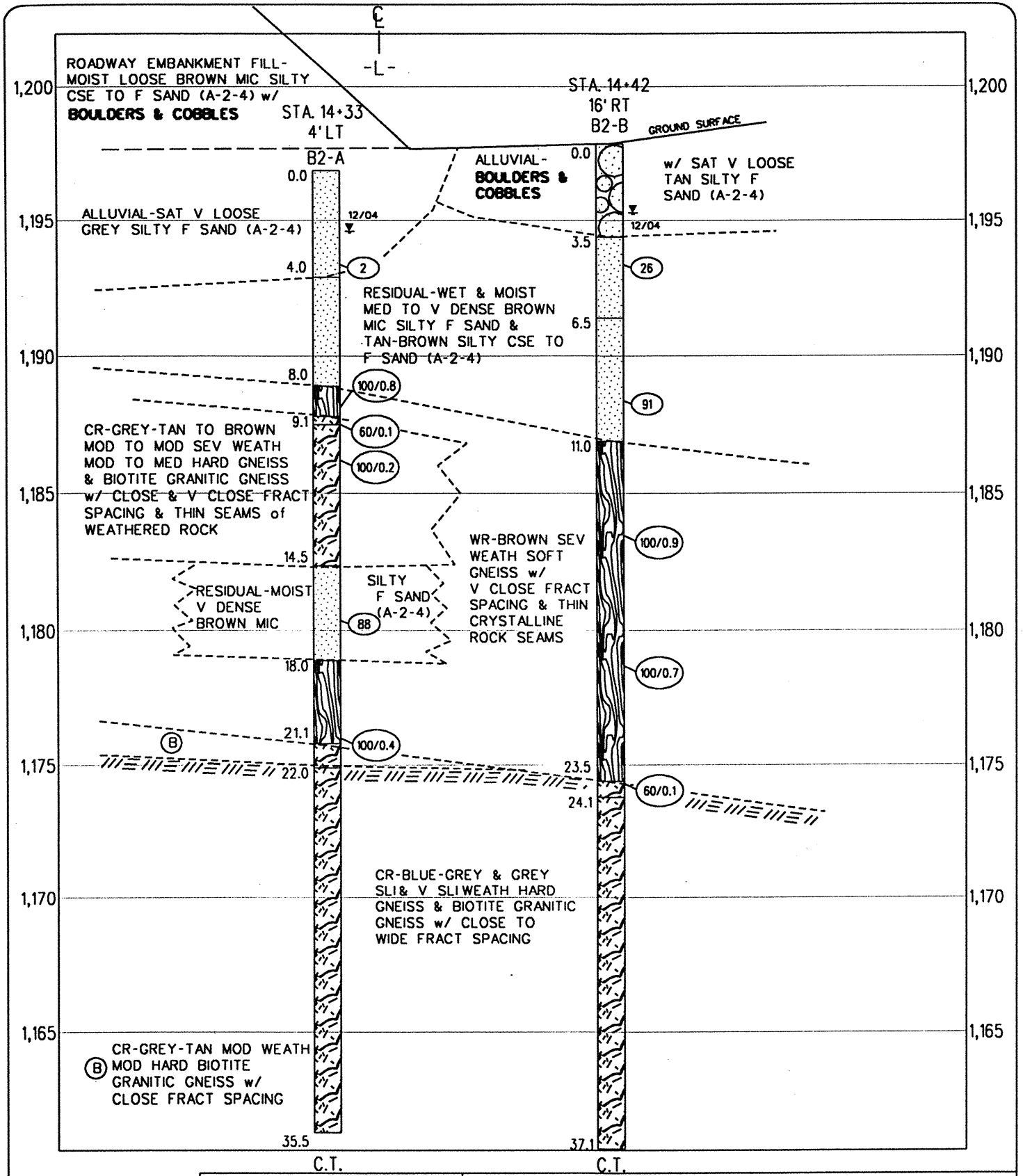
GEOSCIENCE GROUP, INC.
 4000-H Spring Garden Street
 Greensboro, NC 27407
 336-856-1923
 336-856-1925 (fax)

CROSS-SECTION THROUGH END BENT-1	
Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)	
McDowell County, North Carolina	
Project No. 33316.1.1	TIP No. B-3872
Federal No. BRZ-1552(8)	Vert. Scale 1" = 5'
Date 1/18/05	Horiz. Scale 1" = 10'
Drawn by DH	Drawing No. 4

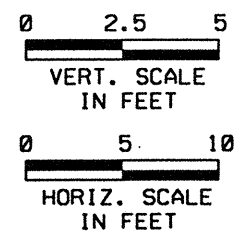


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 336-856-1925 (fax)

CROSS-SECTION THROUGH BENT-1	
Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)	
McDowell County, North Carolina	
Project No. 33316.1.1	TIP No. B-3872
Federal No. BRZ-1552(8)	Vert. Scale 1" = 5'
Date 1/18/05	Horiz. Scale 1" = 10'
Drawn by DH	Drawing No. 5



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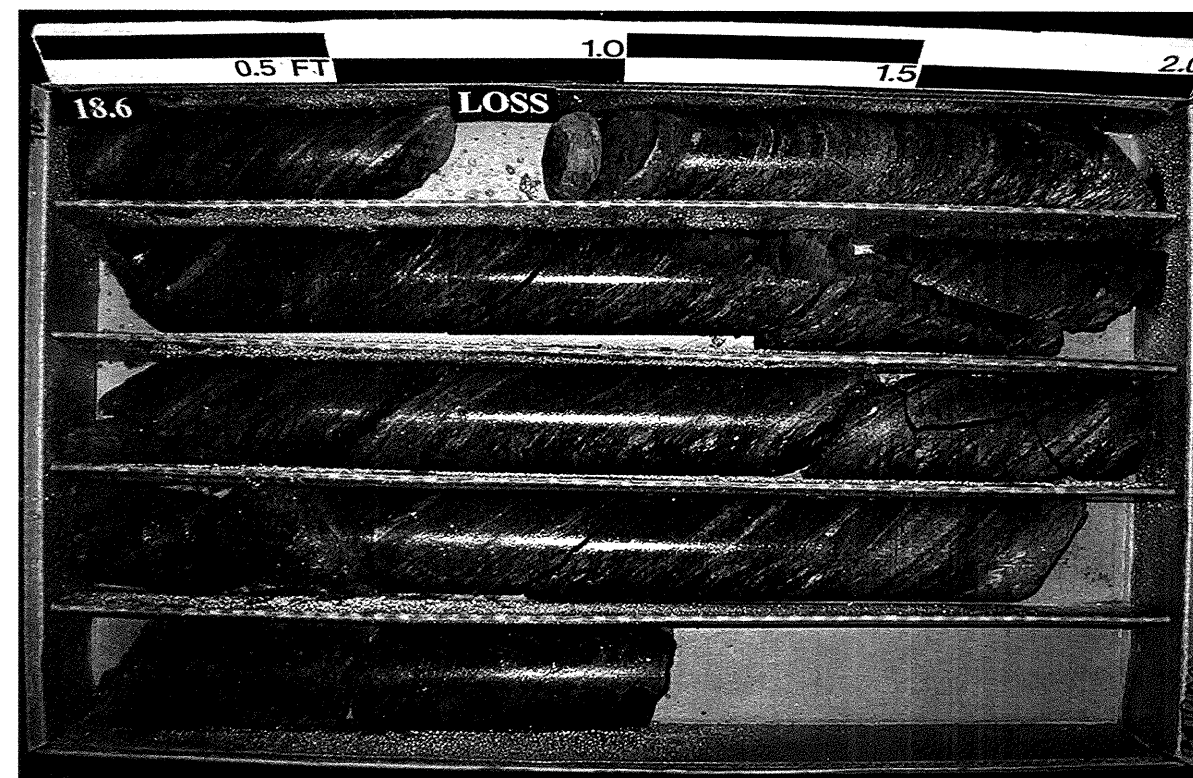


GEOSCIENCE GROUP, INC.
4000-H Spring Garden Street
Greensboro, NC 27407
336-856-1923
336-856-1925 (fax)

PROJECT NO.	33316.1.1	ID.	B-3872	FED. NO.	BRZ-1552(8)	CO.	McDowell	FIELD SUPERV.	D.Hardister			
SITE DESCRIPTION								Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)		GROUND WATER (ft)		
BORING NO.	EB1-A	BORING LOCATION			13+67	OFFSET	13' LT	ALIGNMENT	-L-	0 HR.	N/M	
COLLAR ELEV.	1214.4 ft	TOTAL DEPTH		36.8 ft	NORTHING	742498.69	EASTING		1119375.40	24 HR.	17.7	
DRILL MACHINE	CME 550x	DRILL METHOD			HSA/HQ	HAMMER TYPE		Automatic	FINAL CASING DEPTH		18.6 ft	
DATE STARTED	12/21/04	COMPLETED		12/21/04	DRILLING FLUID DENSITY		Creek Water	SURFACE WATER DEPTH			N/A	
CORE SIZE			HQ	TOTAL RUN		18.2 ft	DRILLER					D. Harris
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS			
				REC. (ft) %	RQD (ft) %		REC. %	RQD %				
1195.8									Begin Coring @ 1195.80 ft			
1195.8	18.6	3.2	4:53	(3.0) 94%	(2.7) 84%	RS-1	13.0 98%	9.7 73%	Crystalline Rock-Grey and Brown-Grey Moderately and Slightly Weathered Hard and Moderately Hard Gneiss and Schist with Close Fracture Spacing			
			3:11							4 JTS @ 0-10° 2 JTS @ 10-20° 6 JTS @ 30-40° 9 JTS @ 40-50° 10 JTS @ 50-60° 3 JTS @ 80-90°		
			1:59									
1192.6	21.8	0.23/0.2										
1192.6	21.8	5.0	2:27	(5.0) 100%	(3.1) 62%							
			2:47									
			3:09									
			3:12									
			3:09									
1187.6	26.8											
1187.6	26.8	5.0	1:56	(5.0) 100%	(3.9) 78%							
			2:12									
			2:21									
			2:36									
			2:37									
1182.6	31.8								1182.6 31.8			
1182.6	31.8	5.0	5:13	(3.5) 70%	(1.9) 38%		0.0 0%	N/A	Weathered Rock-Brown Severely Weathered Soft Gneiss and Schist with Very Close Fracture Spacing			
			3:42						1181.1 No Discernible Jts 33.3			
			2:50				1.6 100%	0.0 0%	Crystalline Rock-Brown to Grey Moderately Severely to Moderately Weathered Moderately Hard Gneiss with Close and Very Close Fracture Spacing			
			2:59				1.9 100%	1.9 100%	1179.5 8 JTS @ 0-10° 3 JTS @ 40-50° 2 JTS @ 80-90° Other Jts Not Discernible 34.9			
			3:18						Crystalline Rock-Grey Slightly Weathered Hard Gneiss and Schist with Moderately Close Fracture Spacing			
1177.6	36.8								1177.6 No Jts 36.8			
Coring Terminated at Elev. 1177.6ft in Crystalline Rock (Gneiss & Schist)												

NCDOT_CORE#3-11X17 GR04024.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872
EB1-A
Box 1 of 2



33316.1.1/B-3872
EB1-A
Box 2 of 2



PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister					
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)					
BORING NO. EB1-B		BORING LOCATION 13+67		OFFSET 19' RT		ALIGNMENT -L-		0 HR. N/M					
COLLAR ELEV. 1199.3 ft		TOTAL DEPTH 21.9 ft		NORTHING 742515.66		EASTING 1119402.56		24 HR. 5.0					
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 8.9 ft							
DATE STARTED 12/15/04		COMPLETED 12/15/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
1199.3	0.00												Ground Surface Elev. 1199.3 ft
	3.5	WOH	WOH	WOH							SS-2 SAT		Roadway Embankment Fill-Loose Brown Micaceous Silty Coarse to Fine SAND (A-2-4)
1195													Alluvial-BOULDERSand COBBLESw/ Very Loose Tan Silty Fine SAND (A-2-4)
	8.5										M		1191.8 Weathered Rock-Brown-Grey Weathered Gneiss 7.5 1191.0 8.3 1190.4 Crystalline Rock-Grey Gneiss 8.9 1189.1 Crystalline Rock-Brown and Grey Moderately and Moderately Severely Weathered Medium Hard and Soft Gneiss with Close and Very Close Fracture Spacing 10.2 1188.4 10.9 Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing Crystalline Rock-Brown and Grey Moderately and Moderately Severely Weathered Medium Hard and Soft Gneiss with Close and Very Close Fracture Spacing
1190													1183.2 Crystalline Rock-Grey and Brown-Grey Moderately and Slightly Weathered Moderately Hard to Hard Gneiss and Schist with Close Fracture Spacing 16.1
1185													
1180													
													1177.4 Coring Terminated at Elev. 1177.4ft in Crystalline Rock (Gneiss & Schist) 21.9

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

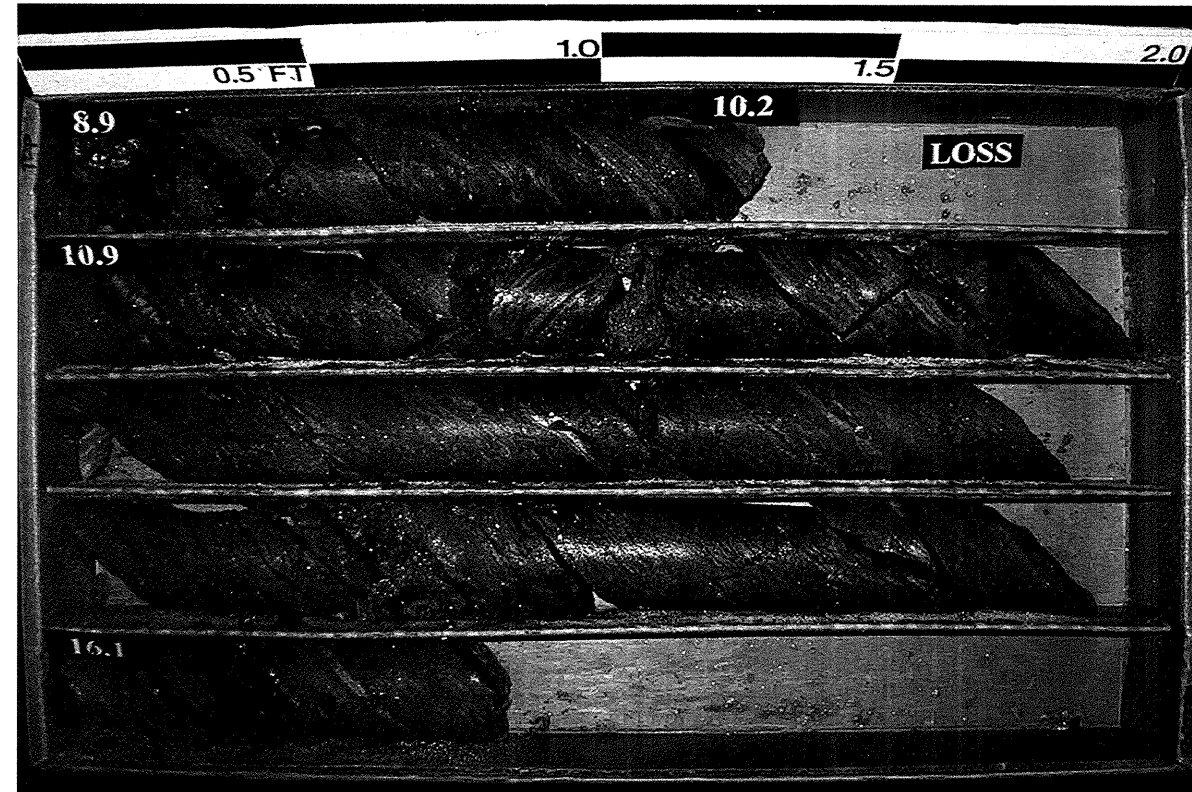
PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister	
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)	
BORING NO. EB1-B		BORING LOCATION 13+67		OFFSET 19' RT		ALIGNMENT -L-		0 HR. N/M	
COLLAR ELEV. 1199.3 ft		TOTAL DEPTH 21.9 ft		NORTHING 742515.66		EASTING 1119402.56		24 HR. 5.0	
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 8.9 ft			
DATE STARTED 12/15/04		COMPLETED 12/15/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
CORE SIZE HQ		TOTAL RUN 13.0 ft		DRILLER D. Harris					
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS
				REC. (%)	RQD (%)		REC. (%)	RQD (%)	
1190.4									Begin Coring @ 1190.40 ft
1190.4	8.9	3.0	6.05	(2.3) 77%	(0.6) 20%		1.3 100%	0.3 23%	Crystalline Rock-Brown and Grey Moderately and Moderately Severely Weathered Medium Hard and Soft Gneiss with Close and Very Close Fracture Spacing
			5.02				0.0 0%	N/A	2 JTS @ 20-30° 2 JTS @ 30-40° 8 JTS @ 40-50°
			6.20				5.1 98%	2.6 50%	1189.1 10.2 1188.4 10.9 Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing
1187.4	11.9	5.0	6.27	(4.9) 98%	(2.7) 54%				No Discernible Jts Crystalline Rock-Brown and Grey Moderately and Moderately Severely Weathered Medium Hard and Soft Gneiss with Close and Very Close Fracture Spacing
			3.23						1 JT @ 0-10° 2 JTS @ 20-30° 7 JTS @ 30-40° 9 JTS @ 40-50° 1 JT @ 60-70°
			3.23						
			4.40						
			3.25				5.8 100%	5.2 90%	1183.2 16.1 Crystalline Rock-Grey and Brown-Grey Moderately and Slightly Weathered Moderately Hard to Hard Gneiss and Schist with Close Fracture Spacing
1182.4	16.9	5.0	3.27	(5.0) 100%	(4.8) 96%				3 JTS @ 20-30° 8 JTS @ 40-50°
			4.26						
			3.10						
			3.17						
			6.09						
1177.4	21.9								1177.4 21.9 Coring Terminated at Elev. 1177.4ft in Crystalline Rock (Gneiss & Schist)

NCDOT_BORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872

EB1-B

Box 1 of 2



33316.1.1/B-3872

EB1-B

Box 2 of 2



PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D. Hardister					
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)					
BORING NO. B1-A				BORING LOCATION 13+97		OFFSET 3' LT		ALIGNMENT -L-					
COLLAR ELEV. 1199.5 ft		TOTAL DEPTH 28.1 ft		NORTHING 742531.12		EASTING 1119370.00		0 HR. N/M 24 HR. 4.7					
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 7.3 ft							
DATE STARTED 12/13/04		COMPLETED 12/14/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
1199.5	0.00												Ground Surface Elev. 1199.5 ft
1195	3.5	3	1	1								SAT	Alluvial-BOULDERSand COBBLESwith Very Loose Brown-Grey Silty Fine SAND (A-2-4)
1190	10.7											D	Crystalline Rock-White-Tan Quartzite
1185													Crystalline Rock-White-Tan Slightly Weathered Moderately Hard Quartzite with Close Fracture Spacing
1180													Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing
1175												RS-2	Crystalline Rock-Grey-Tan Moderately Weathered Moderately and Medium Hard Gneiss with Close and Very Close Fracture Spacing
													Weathered Rock-Brown Severely Weathered Soft Gneiss with Close and Very Close Fracture Spacing
													Crystalline Rock-Tan-Grey, Grey-Tan, and Blue-Grey Moderately to Slightly Weathered Moderately Hard to Hard Gneiss, Biotite Granitic Gneiss, and Schist with Close to Moderately Close Fracture Spacing
													Coring Terminated at Elev. 1171.4ft in Crystalline Rock (Gneiss, Biotite Granitic Gneiss, & Schist)

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

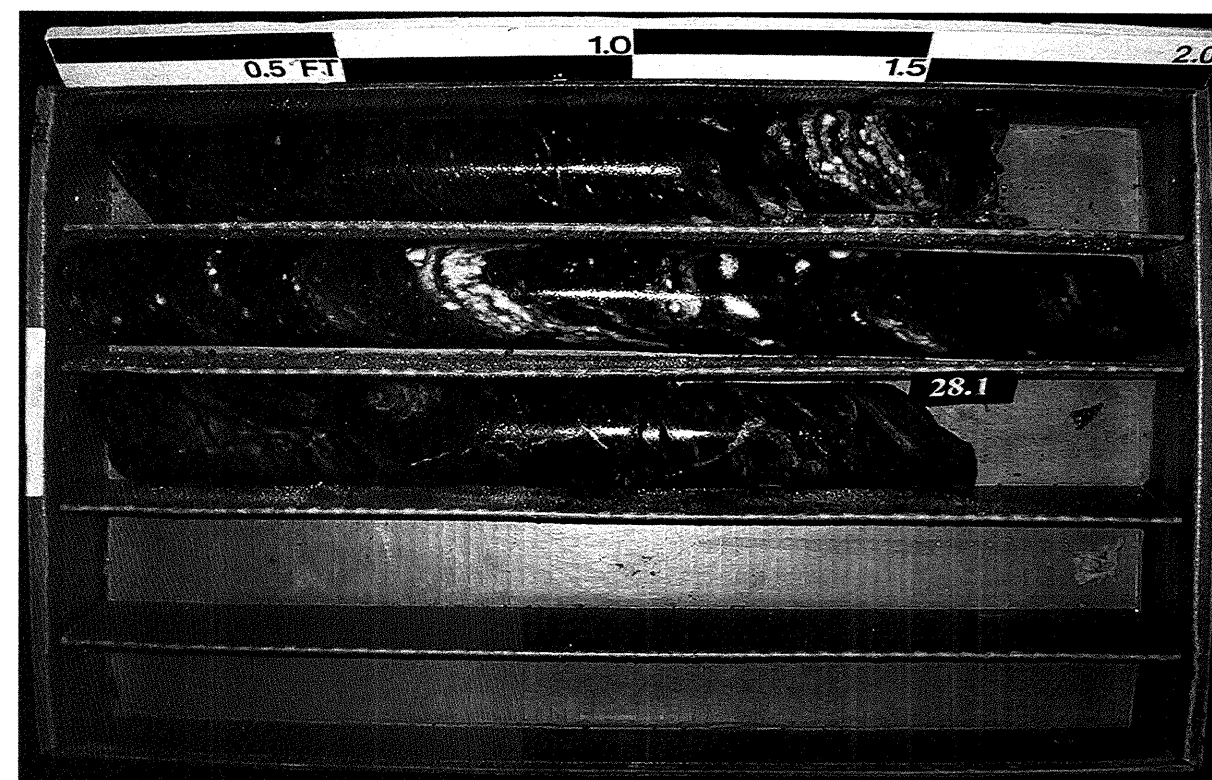
PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D. Hardister	
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)	
BORING NO. B1-A				BORING LOCATION 13+97		OFFSET 3' LT		ALIGNMENT -L-	
COLLAR ELEV. 1199.5 ft		TOTAL DEPTH 28.1 ft		NORTHING 742531.12		EASTING 1119370.00		0 HR. N/M 24 HR. 4.7	
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 7.3 ft			
DATE STARTED 12/13/04		COMPLETED 12/14/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
CORE SIZE HQ			TOTAL RUN 20.8 ft		DRILLER D. Harris				
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	REC. (%)	RQD (%)	SAMP. NO.	STRATA REC. (%)	RQD (%)	DESCRIPTION AND REMARKS
1192.2									Begin Coring @ 1192.20 ft
1192.2	7.3	0.8	5:18/0.8	(0.8) 100%	(0.5) 63%		0.8 100%	0.5 63%	Crystalline Rock-White-Tan Slightly Weathered Moderately Hard Quartzite with Close Fracture Spacing
1191.4	8.1	2.6	12:20	(0.0) 0%	N/A		0.0 0%	N/A	2 JTS @ 0-10° Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing No Discernible Jts
1188.8	10.7		13:18/0.6			N=60/0			
1188.8	10.7	2.4	6:22	(1.7) 71%	(0.0) 0%		1.5 100%	0.0 0%	Crystalline Rock-Grey-Tan Moderately Weathered Moderately and Medium Hard Gneiss with Close and Very Close Fracture Spacing
1186.4	13.1		3:43				0.2 15%	N/A	1 JT @ 40-50° 2 JTS @ 50-60° 2 JTS @ 70-80° 2 JTS @ 80-90° Other Jts Not Discernible
1186.4	13.1	5.0	4:42/0.4	(3.8) 76%	(2.3) 46%		13.6 93%	10.8 74%	Weathered Rock-Brown Severely Weathered Soft Gneiss with Close and Very Close Fracture Spacing
			3:20						1 JT @ 40-50° Other Jts Not Discernible
			3:36						Crystalline Rock-Tan-Grey, Grey-Tan, and Blue-Grey Moderately to Slightly Weathered Moderately Hard to Hard Gneiss, Biotite Granitic Gneiss, and Schist with Close to Moderately Close Fracture Spacing
			9:20						3 JTS @ 0-10° 5 JTS @ 20-30° 14 JTS @ 40-50° 8 JTS @ 50-60° 1 JT @ 70-80°
			4:55						
			6:25						
1181.4	18.1								
1181.4	18.1	5.0	6:29	(4.8) 96%	(3.7) 74%				
			4:47						
			4:01						
			3:07						
			3:00						
1176.4	23.1								
1176.4	23.1	5.0	4:04	(5.0) 100%	(4.8) 96%	RS-2			
			3:06						
			4:45						
			4:05						
			4:23						
1171.4	28.1								Coring Terminated at Elev. 1171.4ft in Crystalline Rock (Gneiss, Biotite Granitic Gneiss, & Schist)

NCDOT_BORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

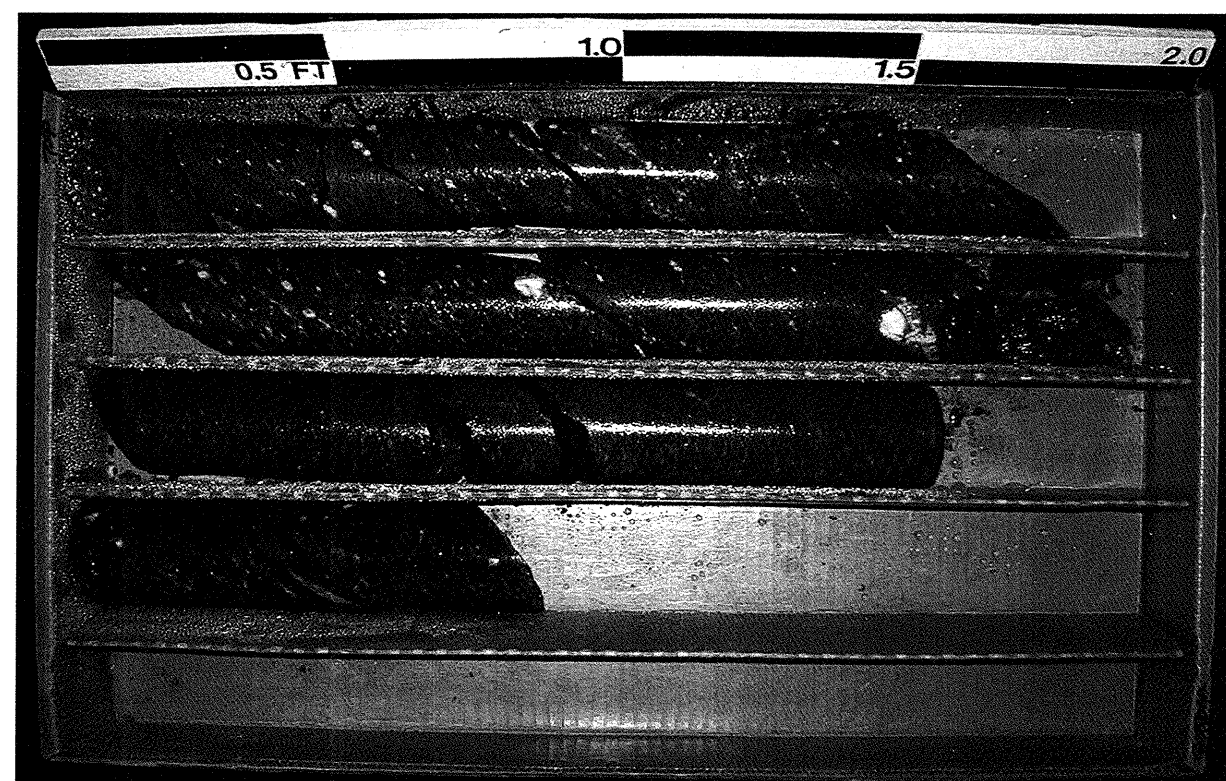
33316.1.1/B-3872
B1-A
Box 1 of 3



33316.1.1/B-3872
B1-A
Box 3 of 3



33316.1.1/B-3872
B1-A
Box 2 of 3



PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister					
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)					
BORING NO. B1-B		BORING LOCATION 13+97		OFFSET 18' RT		ALIGNMENT -L-		0 HR. N/M					
COLLAR ELEV. 1197.5 ft		TOTAL DEPTH 26.2 ft		NORTHING 742538.63		EASTING 1119389.55		24 HR. 3.0					
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 5.5 ft							
DATE STARTED 12/16/04		COMPLETED 12/16/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A							
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
1197.5	0.00												Ground Surface Elev. 1197.5 ft
1195	3.5	1	1	WOH							SS-3	SAT	Alluvial-BOULDERS and COBBLES with Very Loose Grey Silty Fine SAND (A-2-4)
1192.1	5.4												Crystalline Rock-Grey-Tan Quartzite
1191.1	6.4												Crystalline Rock-Grey-Tan and White-Tan Moderately Weathered Hard Quartzite with Close Fracture Spacing
1189.1	8.4												Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing
1186.3	11.2												Crystalline Rock-Grey-Brown Moderately and Moderately Severely Weathered Moderately and Medium Hard Gneiss with Close and Very Close Fracture Spacing
1181.3	16.2										RS-3		Crystalline Rock-Grey-Brown to Blue-Grey Moderately to Slightly Weathered Moderately Hard to Hard Gneiss, Biotite Granitic Gneiss, and Schist with Close Fracture Spacing
1171.3	26.2												Coring Terminated at Elev. 1171.3ft in Crystalline Rock (Gneiss, Biotite Granitic Gneiss, & Schist)

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister	
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)	
BORING NO. B1-B		BORING LOCATION 13+97		OFFSET 18' RT		ALIGNMENT -L-		0 HR. N/M	
COLLAR ELEV. 1197.5 ft		TOTAL DEPTH 26.2 ft		NORTHING 742538.63		EASTING 1119389.55		24 HR. 3.0	
DRILL MACHINE CME 550x		DRILL METHOD Rotary/HQ		HAMMER TYPE Automatic		FINAL CASING DEPTH 5.5 ft			
DATE STARTED 12/16/04		COMPLETED 12/16/04		DRILLING FLUID DENSITY Creek Water		SURFACE WATER DEPTH N/A			
CORE SIZE HQ		TOTAL RUN 20.7 ft		DRILLER D. Harris					
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS
				REC. (%)	RQD (%)		REC. (%)	RQD (%)	
1192.0									Begin Coring @ 1192.00 ft
1192.0	5.5	0.7	4:27/0.7	(0.4)	(0.0)		0.9	0.0	Crystalline Rock-Grey-Tan and White-Tan Moderately Weathered Hard Quartzite with Close Fracture Spacing
1191.3	6.2	5.0	6:31	(2.8)	(1.0)		0.0	0%	
			5:37						2 JTS @ 0-10° 1 JT @ 20-30° 1 JT @ 40-50° 1 JT @ 70-80°
			5:18				7.0	4.9	Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing
			4:35				90%	63%	No Discernible JTS Crystalline Rock-Grey-Brown Moderately and Moderately Severely Weathered Moderately and Medium Hard Gneiss with Close and Very Close Fracture Spacing
			3:14						3 JTS @ 0-10° 2 JTS @ 10-20° 5 JTS @ 30-40° 9 JTS @ 40-50° 2 JTS @ 60-70° 3 JTS @ 70-80°
1186.3	11.2								Crystalline Rock-Grey-Brown to Blue-Grey Moderately to Slightly Weathered Moderately Hard to Hard Gneiss, Biotite Granitic Gneiss, and Schist with Close Fracture Spacing
1186.3	11.2	5.0	4:04	(4.7)	(3.9)				
			4:44						
			3:17						
			3:42						
			3:31						
1181.3	16.2						9.0	6.5	Crystalline Rock-Grey-Brown to Blue-Grey Moderately to Slightly Weathered Moderately Hard to Hard Gneiss, Biotite Granitic Gneiss, and Schist with Close Fracture Spacing
1181.3	16.2	5.0	5:27	(4.2)	(2.2)		90%	65%	
			3:43						7 JTS @ 0-10° 2 JTS @ 30-40° 9 JTS @ 40-50° 8 JTS @ 50-60° 3 JTS @ 80-90°
			4:22						
			4:08						
			6:05						
1176.3	21.2								Crystalline Rock (Gneiss, Biotite Granitic Gneiss, & Schist)
1176.3	21.2	5.0	5:12	(4.8)	(4.3)				
			3:40						
			3:52						
			4:16						
			4:04						
1171.3	26.2								Coring Terminated at Elev. 1171.3ft in Crystalline Rock (Gneiss, Biotite Granitic Gneiss, & Schist)

NCDOT_CORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872

B1-B

Box 1 of 2



33316.1.1/B-3872

B1-B

Box 2 of 2



PROJECT NO.		ID.		FED. NO.		CO.		FIELD SUPERV.	
SITE DESCRIPTION									
BORING NO.		BORING LOCATION		OFFSET		ALIGNMENT		GROUND WATER (ft)	
COLLAR ELEV.		TOTAL DEPTH		NORTHING		EASTING		24 HR.	
DRILL MACHINE		DRILL METHOD		HAMMER TYPE		FINAL CASING DEPTH			
DATE STARTED		COMPLETED		DRILLING FLUID DENSITY		SURFACE WATER DEPTH			
CORE SIZE		HQ		TOTAL RUN		DRILLER			
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. %	RQD %	DESCRIPTION AND REMARKS
1187.5									Begin Coring @ 1187.50 ft
1187.5	9.4	1.1	5.41	(0.9) 82%	(0.4) 36%		4.0 78%	0.4 8%	Crystalline Rock-Grey-Tan to Brown Moderately to Moderately Severely Weathered Moderately to Medium Hard Gneiss and Biotite Granitic Gneiss with Close and Very Close Fracture Spacing and Thin Seams of Weathered Rock 11 JTS @ 0-10° 4 JTS @ 10-20° 3 JTS @ 30-40° 7 JTS @ 40-50° 1 JT @ 70-80°
1186.4	10.5		0.43/0.1			N=100/0.2			
1186.2	10.7	4.8	6.31	(3.1) 65%	(0.0) 0%				
			9.08						
			9.09						
			5.44						1182.4
1181.4	15.5		4.27/0.8			N=88	N/A	N/A	Residual-Very Dense Brown Micaceous Silty Fine SAND (A-2-4)
									1178.9
1178.9	18.0	2.5	6.41	(0.6) 24%	N/A		0.6 19%	N/A	Weathered Rock-Brown Severely Weathered Soft Gneiss with Very Close Fracture Spacing and Thin Crystalline Rock Seams 3 JTS @ 0-10° Other Jts Not Discernible
			5.24						
1176.4	20.5		2.55/0.5			N=100/0.4			1175.8
1176.0	20.9	4.6	3.53	(4.0) 87%	(3.1) 67%		0.9 100%	0.0 0%	Crystalline Rock-Grey-Tan Moderately Weathered Moderately Hard Biotite Granitic Gneiss with Close Fracture Spacing
			3.36				13.1 97%	12.8 95%	3 JTS @ 0-10° 3 JTS @ 40-50° 2 JTS @ 60-70°
			3.59						Crystalline Rock-Blue-Grey and Grey Slightly and Very Slightly Weathered Hard Biotite Granitic Gneiss and Gneiss with Moderately Close and Wide Fracture Spacing
			3.24						1 JT @ 0-10° 5 JTS @ 30-40° 2 JTS @ 50-60°
1171.4	25.5		2.00/0.6						
1171.4	25.5	5.0	3.06	(5.0) 100%	(4.9) 98%				
			3.19						
			3.53						
			3.50						
			3.21						
1166.4	30.5								
1166.4	30.5	5.0	3.46	(5.0) 100%	(4.8) 96%				

NCDOT_CORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

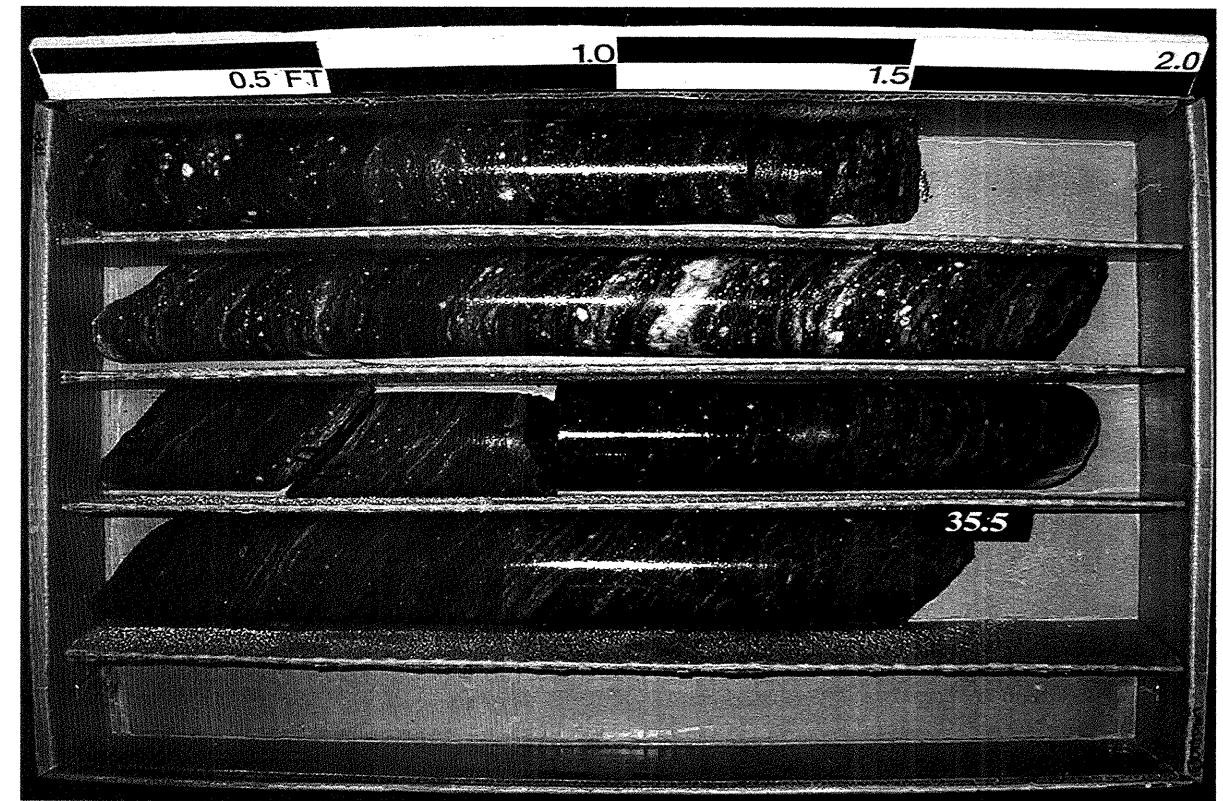
PROJECT NO.		ID.		FED. NO.		CO.		FIELD SUPERV.	
SITE DESCRIPTION									
BORING NO.		BORING LOCATION		OFFSET		ALIGNMENT		GROUND WATER (ft)	
COLLAR ELEV.		TOTAL DEPTH		NORTHING		EASTING		24 HR.	
DRILL MACHINE		DRILL METHOD		HAMMER TYPE		FINAL CASING DEPTH			
DATE STARTED		COMPLETED		DRILLING FLUID DENSITY		SURFACE WATER DEPTH			
CORE SIZE		HQ		TOTAL RUN		DRILLER			
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. %	RQD %	DESCRIPTION AND REMARKS
									Continued from previous page
									4:03
									3:53
									2:49
									3:24
1161.4	35.5								1161.4
									35.5
									Coring Terminated at Elev. 1161.4ft in Crystalline Rock (Biotite Granitic Gneiss & Gneiss)

NCDOT_CORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872
B2-A
Box 1 of 3



33316.1.1/B-3872
B2-A
Box 3 of 3



33316.1.1/B-3872
B2-A
Box 2 of 3



PROJECT NO.	33316.1.1	ID.	B-3872	FED. NO.	BRZ-1552(8)	CO.	McDowell	FIELD SUPERV.	D.Hardister						
SITE DESCRIPTION								GROUND WATER (ft)							
Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								0 HR.	N/M						
BORING NO.	B2-B	BORING LOCATION	14+42	OFFSET	16' RT	ALIGNMENT	-L-								
COLLAR ELEV.	1197.9 ft	TOTAL DEPTH	37.1 ft	NORTHING	742577.60	EASTING	1119377.21	24 HR.	2.6						
DRILL MACHINE	CME 550x	DRILL METHOD	Rotary/HQ	HAMMER TYPE	Automatic	FINAL CASING DEPTH	24.1 ft								
DATE STARTED	12/17/04	COMPLETED	12/20/04	DRILLING FLUID DENSITY	Creek Water	SURFACE WATER DEPTH	N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100		
1197.9	0.00				Ground Surface Elev. 1197.9 ft								1197.9	0.00	
											1.0	ST-1	Alluvial-BOULDERS and COBBLES with Very Loose Tan Silty Fine SAND (A-2-4)		
1195	3.5	2	3	23							3.0	W	Residual-Medium Dense Tan-Brown Silty Coarse to Fine SAND (A-2-4)	1194.4	3.5
													Residual-Very Dense Tan-Brown Silty Coarse to Fine SAND (A-2-4)	1191.4	6.5
1190	8.5	16	43	48								SS-5	Weathered Rock-Brown Weathered Gneiss	1186.9	11.0
												M			
1185	13.5	29	71/0.4									M			
												M			
1180	18.5	61	39/0.2									M			
												M			
1175	23.5	60/0.1										M	Crystalline Rock-Grey-Brown Gneiss	1174.4	23.5
												M	Crystalline Rock-Grey and Blue-Grey Slightly Weathered Hard Gneiss and Biotite Granitic Gneiss with Close and Moderately Close Fracture Spacing	1173.8	24.1
1170															
1165												RS-4			

NCDOT_BORE#3 GR040424.GPJ NCDOT12.GDT 1/25/05

PROJECT NO.	33316.1.1	ID.	B-3872	FED. NO.	BRZ-1552(8)	CO.	McDowell	FIELD SUPERV.	D.Hardister				
SITE DESCRIPTION								GROUND WATER (ft)					
Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								0 HR.	N/M				
BORING NO.	B2-B	BORING LOCATION	14+42	OFFSET	16' RT	ALIGNMENT	-L-						
COLLAR ELEV.	1197.9 ft	TOTAL DEPTH	37.1 ft	NORTHING	742577.60	EASTING	1119377.21	24 HR.	2.6				
DRILL MACHINE	CME 550x	DRILL METHOD	Rotary/HQ	HAMMER TYPE	Automatic	FINAL CASING DEPTH	24.1 ft						
DATE STARTED	12/17/04	COMPLETED	12/20/04	DRILLING FLUID DENSITY	Creek Water	SURFACE WATER DEPTH	N/A						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
					Continued from Previous Page								
1160					Coring Terminated at Elev. 1160.8ft in Crystalline Rock (Gneiss & Biotite Granitic Gneiss)								

NCDOT_BORE#3 GR040424.GPJ NCDOT12.GDT 1/25/05

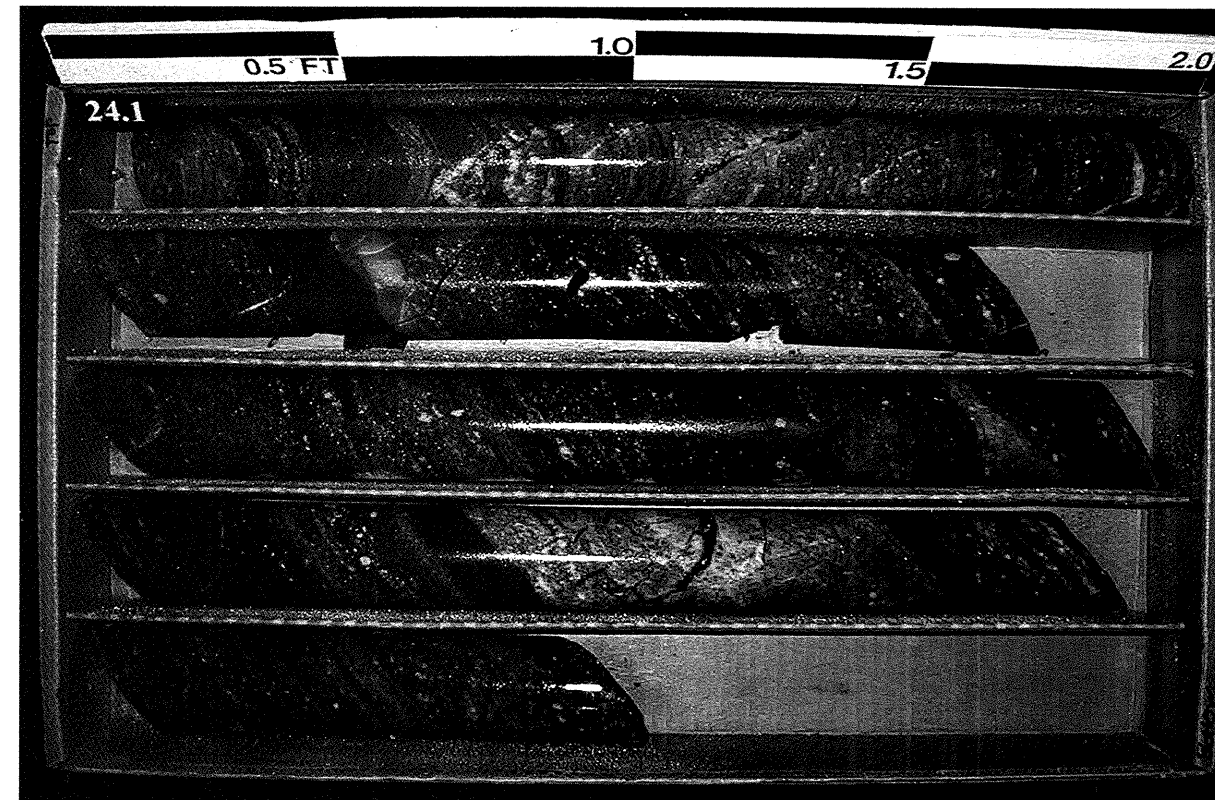
PROJECT NO.	33316.1.1	ID.	B-3872	FED. NO.	BRZ-1552(8)	CO.	McDowell	FIELD SUPERV.	D.Hardister			
SITE DESCRIPTION								Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)		GROUND WATER (ft)		
BORING NO.	B2-B	BORING LOCATION			14+42	OFFSET	16' RT	ALIGNMENT	-L-	0 HR.	N/M	
COLLAR ELEV.	1197.9 ft	TOTAL DEPTH		37.1 ft	NORTHING	742577.60	EASTING	1119377.21	24 HR.	2.6		
DRILL MACHINE	CME 550x	DRILL METHOD			Rotary/HQ	HAMMER TYPE	Automatic	FINAL CASING DEPTH	24.1 ft			
DATE STARTED	12/17/04	COMPLETED	12/20/04	DRILLING FLUID DENSITY			Creek Water	SURFACE WATER DEPTH			N/A	
CORE SIZE		HQ		TOTAL RUN		13.0 ft		DRILLER				D. Harris
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	RUN		SAMP. NO.	STRATA		DESCRIPTION AND REMARKS			
				REC. (ft) %	RQD (ft) %		REC. %	RQD %				
1173.8									Begin Coring @ 1173.80 ft			
1173.8	24.1	3.0	12.08	(3.0) 100%	(3.0) 100%		13.0 100%	13.0 100%	Crystalline Rock-Grey and Blue-Grey Slightly Weathered Hard Gneiss and Biotite Granitic Gneiss with Close and Moderately Close Fracture Spacing			
			8:27						1 JT @ 10-20° 3 JTS @ 20-30° 5 JTS @ 30-40° 1 JT @ 70-80°			
			5:25									
1170.8	27.1	5.0	6:12	(5.0) 100%	(5.0) 100%							
1170.8	27.1	5.0	5:02									
			6:19									
			9:24									
			9:43									
1165.8	32.1	5.0	5:43	(5.0) 100%	(5.0) 100%	RS-4						
1165.8	32.1	5.0	7:10									
			6:14									
			6:21									
			5:40									
1160.8	37.1								Coring Terminated at Elev. 1160.8ft in Crystalline Rock (Gneiss & Biotite Granitic Gneiss)			

NCDOT_CORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872

B2-B

Box 1 of 2

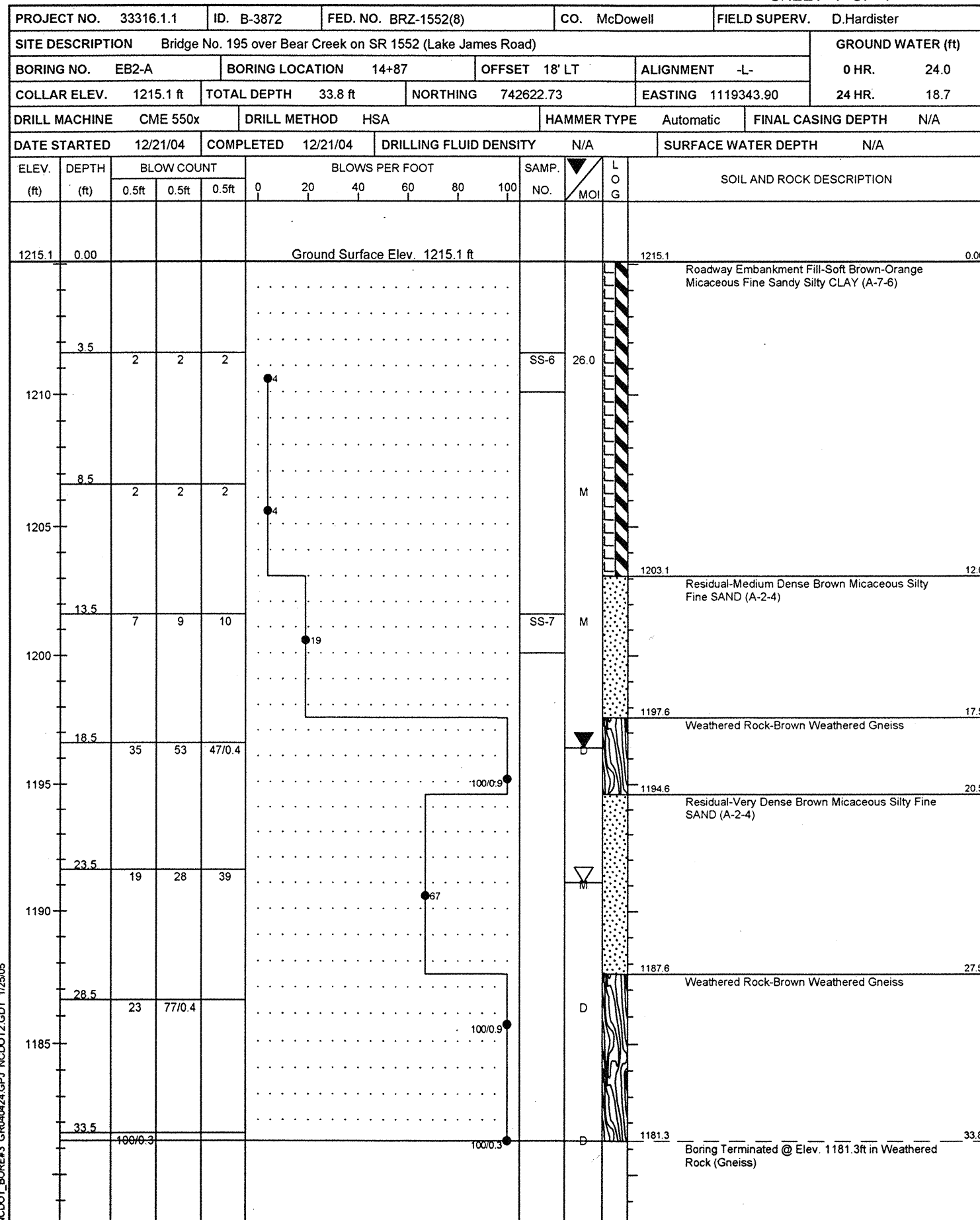


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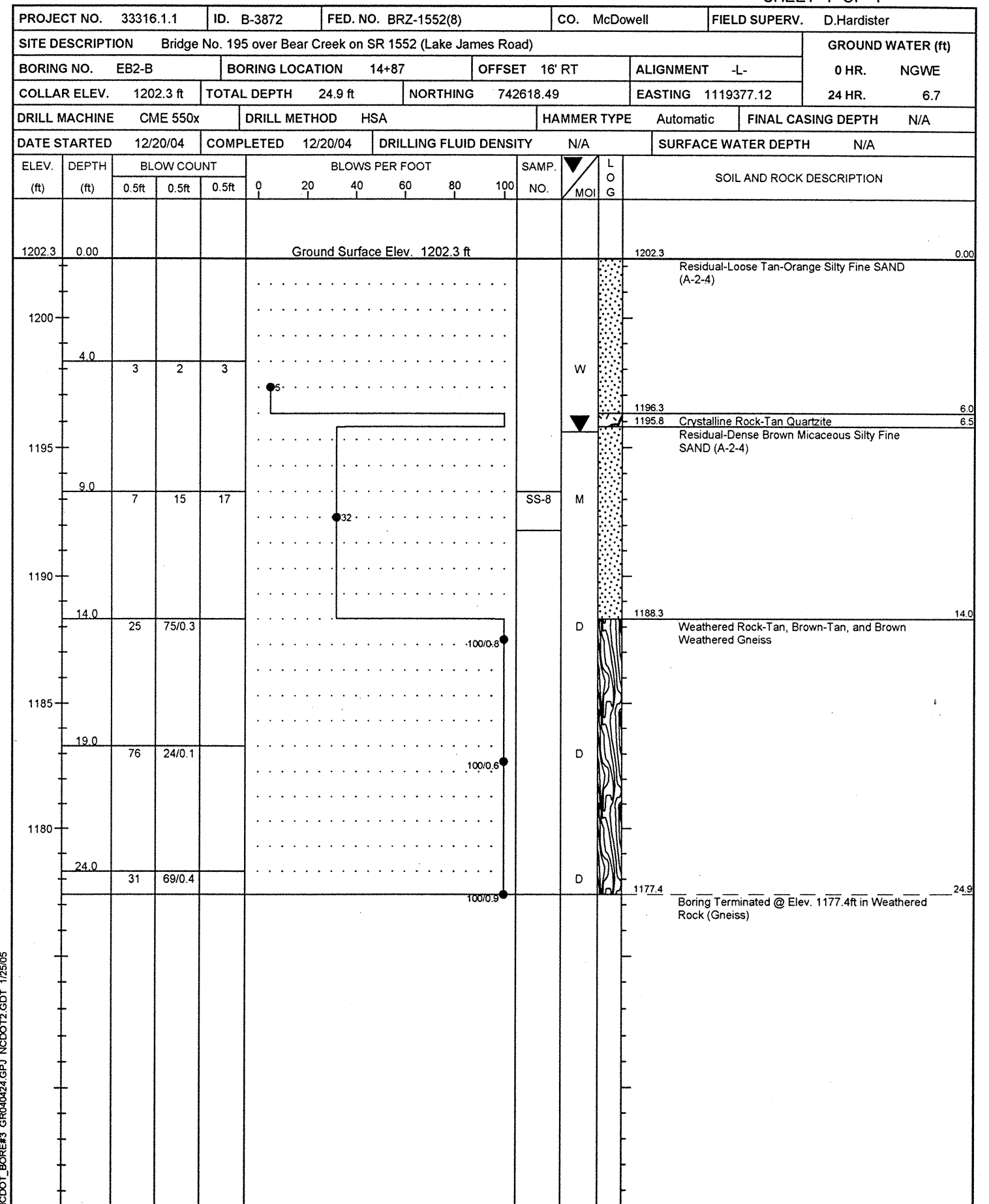
B2-B

Box 2 of 2





NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05



NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

PROJECT NO. 33316.1.1		ID. B-3872		FED. NO. BRZ-1552(8)		CO. McDowell		FIELD SUPERV. D.Hardister						
SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road)								GROUND WATER (ft)						
BORING NO. TS-1		BORING LOCATION 13+60		OFFSET 9' LT		ALIGNMENT -L-		0 HR. NGWE						
COLLAR ELEV. 1214.7 ft		TOTAL DEPTH 14.5 ft		NORTHING 742495.05		EASTING 1119382.50		24 HR. NGWE						
DRILL MACHINE CME 550x		DRILL METHOD HSA		HAMMER TYPE Automatic		FINAL CASING DEPTH N/A								
DATE STARTED 12/21/04		COMPLETED 12/21/04		DRILLING FLUID DENSITY N/A		SURFACE WATER DEPTH N/A								
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION		
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100	
1214.7	0.00				Ground Surface Elev. 1214.7 ft							1214.7	0.00	
	3.5													
1210		3	16	4						SS-9	M	Roadway Embankment Fill-Loose Brown Micaceous Silty Fine SAND with Rock Fragments and BOULDERS and COBBLES (A-1-a)		
	8.5										M			
1205		2	5	5										
	13.5											1202.7	12.0	Weathered Rock-Brown-Grey Weathered Gneiss
	14.5	100/0.3									D	1200.9	13.8	Crystalline Rock-Grey Schist
		60/0									D	1200.2	14.5	Boring Terminated with Standard Penetration Test Refusal at Elev. 1200.2ft in Crystalline Rock (Schist)

NOTE: * indicates influenced blow count

PROJECT NO.	33316.1.1	ID.	B-3872	FED. NO.	BRZ-1552(8)	CO.	McDowell	FIELD SUPERV.	D.Hardister				
SITE DESCRIPTION								BRIDGE No. 195 over Bear Creek on SR 1552 (Lake James Road)					
BORING NO.	TS-2	BORING LOCATION		13+76	OFFSET	19' LT	ALIGNMENT	-L-	GROUND WATER (ft)				
COLLAR ELEV.		TOTAL DEPTH		NORTHING		EASTING		0 HR. N/M					
1214.4 ft		27.1 ft		742504.59		1119364.71		24 HR. 17.7					
DRILL MACHINE	CME 550x	DRILL METHOD	HSA/HQ	HAMMER TYPE	Automatic	FINAL CASING DEPTH	18.6 ft						
DATE STARTED	12/21/04	COMPLETED	12/21/04	DRILLING FLUID DENSITY	Creek Water	SURFACE WATER DEPTH	N/A						
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100	MOI		LOG
1214.4	0.00	Ground Surface Elev. 1214.4 ft										1214.4	0.00
	3.5	1	2	1	Roadway Embankment Fill-Soft Brown-Orange Micaceous Fine Sandy Silty CLAY and BOULDERS and COBBLES (A-7-6)							M	
1210												1208.4	6.0
	8.5	4	3	1	Roadway Embankment Fill-Loose Tan Micaceous Silty Fine SAND with BOULDERS and COBBLES (A-2-4)							M	
1205												1200.9	13.5
	13.5	100/0.2			Crystalline Rock-Brown-Tan Gneiss							D	
1200												1197.4	17.0
	18.5	60/0.1			Crystalline Rock-Grey Schist							D	
1195												1195.8	18.6
												1190.0	24.4
1190												1187.3	27.1
												Coring Terminated at Elev. 1187.3ft in Crystalline Rock (Schist & Gneiss)	

NCDOT_BORE#3 GR040424.GPJ NCDOT2.GDT 1/25/05

PROJECT NO.	33316.1.1	ID.	B-3872	FED. NO.	BRZ-1552(8)	CO.	McDowell	FIELD SUPERV.	D.Hardister	
SITE DESCRIPTION								BRIDGE No. 195 over Bear Creek on SR 1552 (Lake James Road)		
BORING NO.	TS-2	BORING LOCATION		13+76	OFFSET	19' LT	ALIGNMENT	-L-	GROUND WATER (ft)	
COLLAR ELEV.		TOTAL DEPTH		NORTHING		EASTING		0 HR. N/M		
1214.4 ft		27.1 ft		742504.59		1119364.71		24 HR. 17.7		
DRILL MACHINE	CME 550x	DRILL METHOD	HSA/HQ	HAMMER TYPE	Automatic	FINAL CASING DEPTH	18.6 ft			
DATE STARTED	12/21/04	COMPLETED	12/21/04	DRILLING FLUID DENSITY	Creek Water	SURFACE WATER DEPTH	N/A			
CORE SIZE		HQ		TOTAL RUN		8.5 ft		DRILLER		D. Harris
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA	DESCRIPTION AND REMARKS		
							REC. %	RQD %		
1195.8									Begin Coring @ 1195.80 ft	
1195.8	18.6	3.5	4:58	(3.3) 94%	(3.3) 94%	RS-5	5.6 97%	5.3 91%	Crystalline Rock-Grey Slightly Weathered Hard Schist with Close and Moderately Close Fracture Spacing	
			6:55						2 JTS @ 10-20° 2 JTS @ 50-60° 1 JT @ 70-80°	
			4:03							
1192.3	22.1	5.0	2:50/0.5	(4.9) 98%	(3.4) 68%					
1192.3	22.1	5.0	4:42							
			2:52							
			3:43				2.6 96%	1.4 52%	1190.0 24.4	
			5:16						Crystalline Rock-Brown-Grey Moderately Weathered Moderately Hard Schist and Gneiss with Close and Very Close Fracture Spacing	
			5:32						2 JTS @ 0-10° 3 JTS @ 30-40° 4 JTS @ 40-50° 1 JT @ 70-80°	
1187.3	27.1								1187.3 27.1	
									Coring Terminated at Elev. 1187.3ft in Crystalline Rock (Schist & Gneiss)	

NCDOT_BORE#3-11X17 GR040424.GPJ NCDOT2.GDT 1/25/05

33316.1.1/B-3872

TS-2

Box 1 of 1



GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 33316.1.1 ID: B-3872 COUNTY: McDowell

DESCRIPTION(1): Bridge No. 195 over Bear Creek on SR 1552 (Lake James Rd)

INFORMATION ON EXISTING BRIDGES Information obtained from: X field inspection, microfilm(Reel: Pos:), other

COUNTY BRIDGE NO. 195 BRIDGE LENGTH 80' NO. BENTS IN: CHANNEL 1 FLOOD PLAIN 3

FOUNDATION TYPE: Timber Piles / Concrete Footings

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: None

INTERIOR BENTS: None

CHANNEL BED: None

CHANNEL BANKS: Some Sloughing Observed

EXISTING SCOUR PROTECTION:

TYPE(3): Timber Wingwalls at End Bents; Boulders, Concrete, Asphalt at End Bent One

EXTENT(4): Just on Side Slopes

EFFECTIVENESS(5): OK

OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): Lake James immediately down stream

DESIGN INFORMATION

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Boulders, Cobbles, and Gravel with Silty

Coarse to Fine SAND (A-1-b); Residual Silty Coarse to Fine SAND (A-2-4), WR, CR

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Alluvial Silty Fine and Coarse to

Fine SAND (A-2-4)

CHANNEL BANK COVER(9): Underbrush, Trees

FLOOD PLAIN WIDTH(10): 150'

FLOOD PLAIN COVER(11): 150'

DESIGN INFORMATION CONT.

STREAM IS DEGRADING X AGGRADING (12)

OTHER OBSERVATIONS AND COMMENTS: Aggrading north side of existing Bent 2

CHANNEL MIGRATION TENDENCY (13): Northeast

REPORTED BY: [Signature] DATE: 1/26/05 GEOSCIENCE GROUP, INC.

GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (14):

Table with 2 columns: Boring, GASE. Rows: B1-A (1191.8), B1-B (1190.1), B2-A (1190.4), B2-B (1191.7)

REPORTED BY: [Signature] DATE: 3-29-05 NCDOT GEOTECHNICAL UNIT INSTRUCTIONS

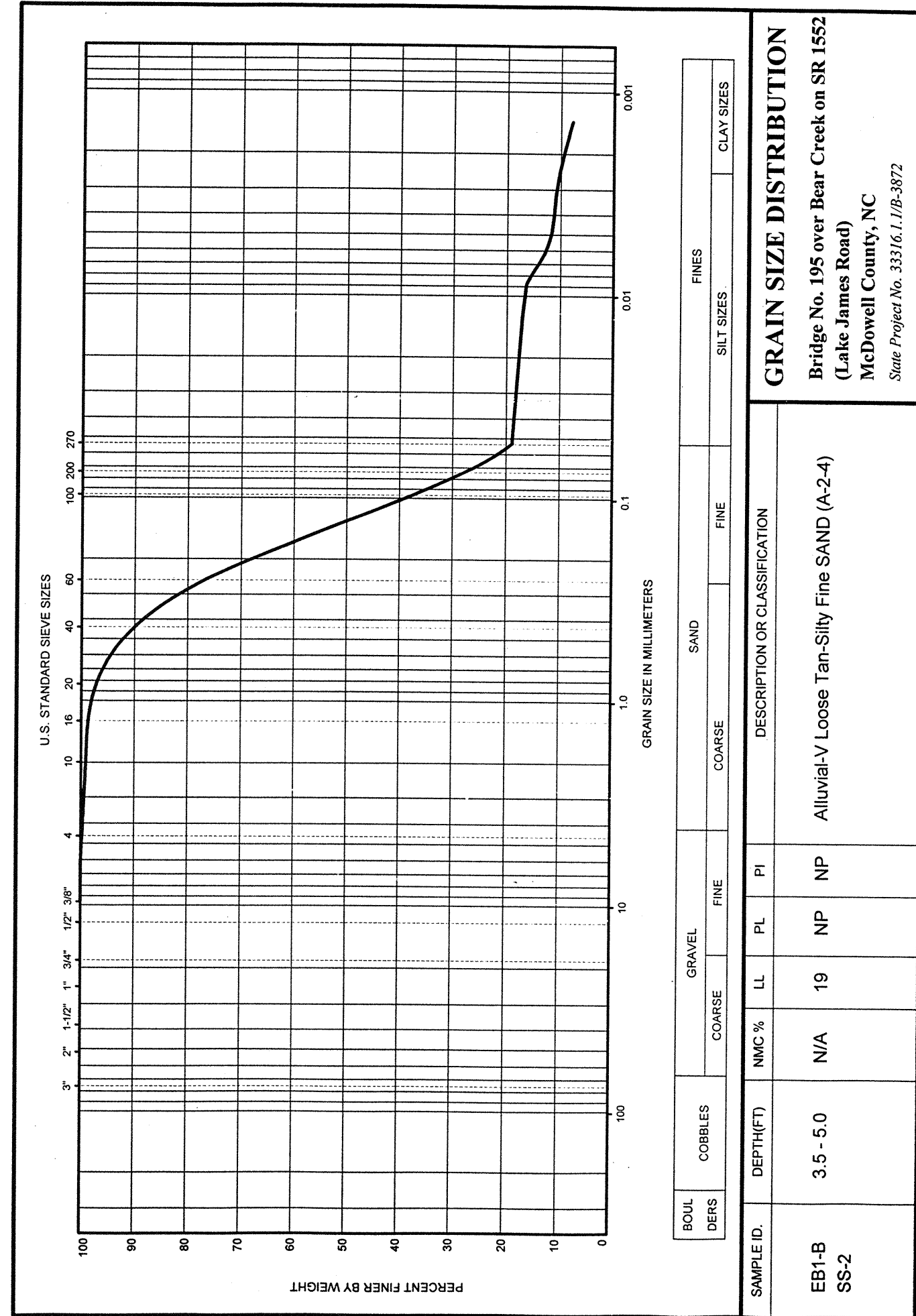
- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED. (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.) (3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.) (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION. (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING. (6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC. (7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS. (8) DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS. (9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.) (10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE). (11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.) (12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING (13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE Laterally DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). (14) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING, SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

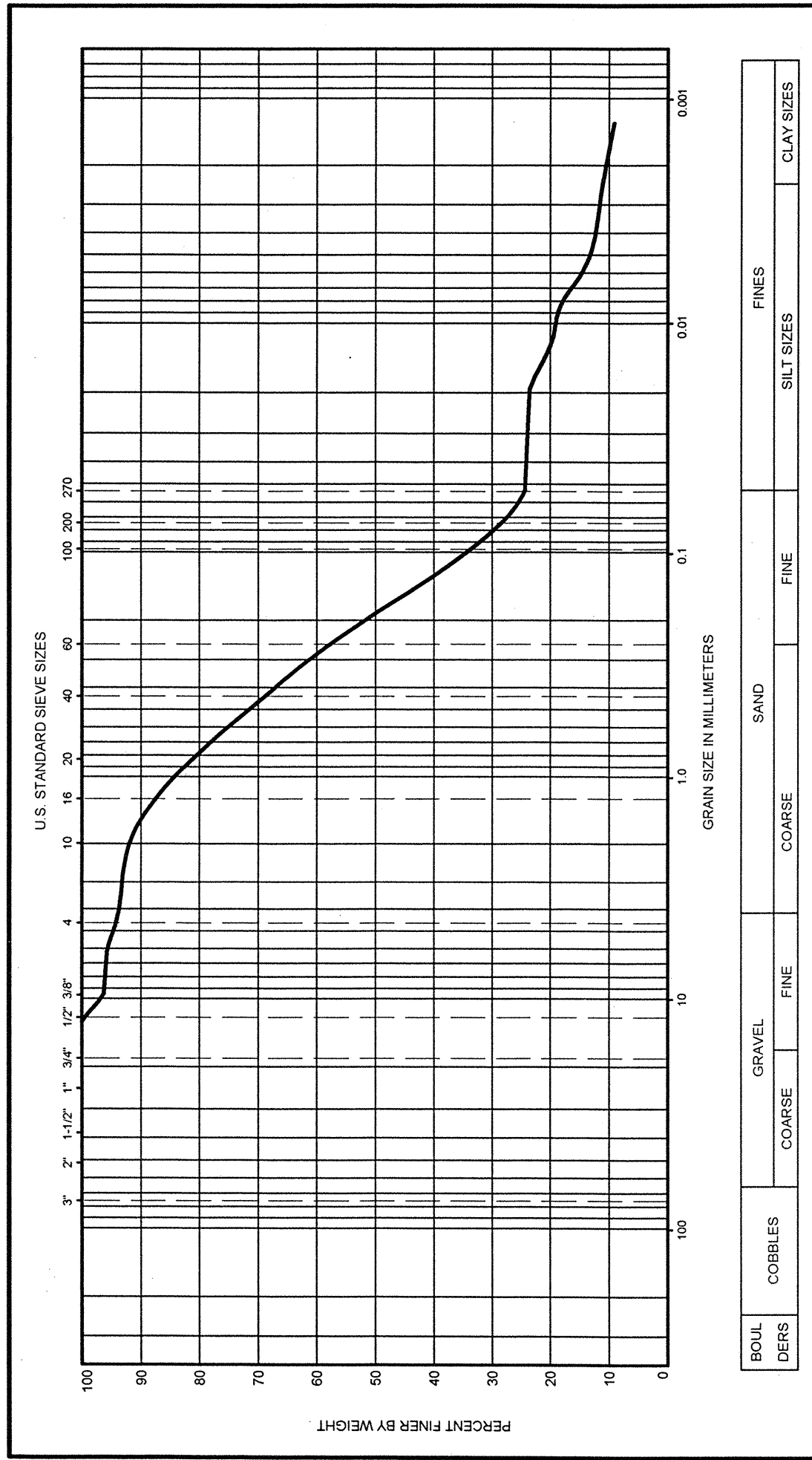
PROJECT #: 33316.1.1 (B-3872)

COUNTY: McDowell

DESCRIPTION: Bridge No. 195 over Bear Creek SR 1552 (Lake James Rd)

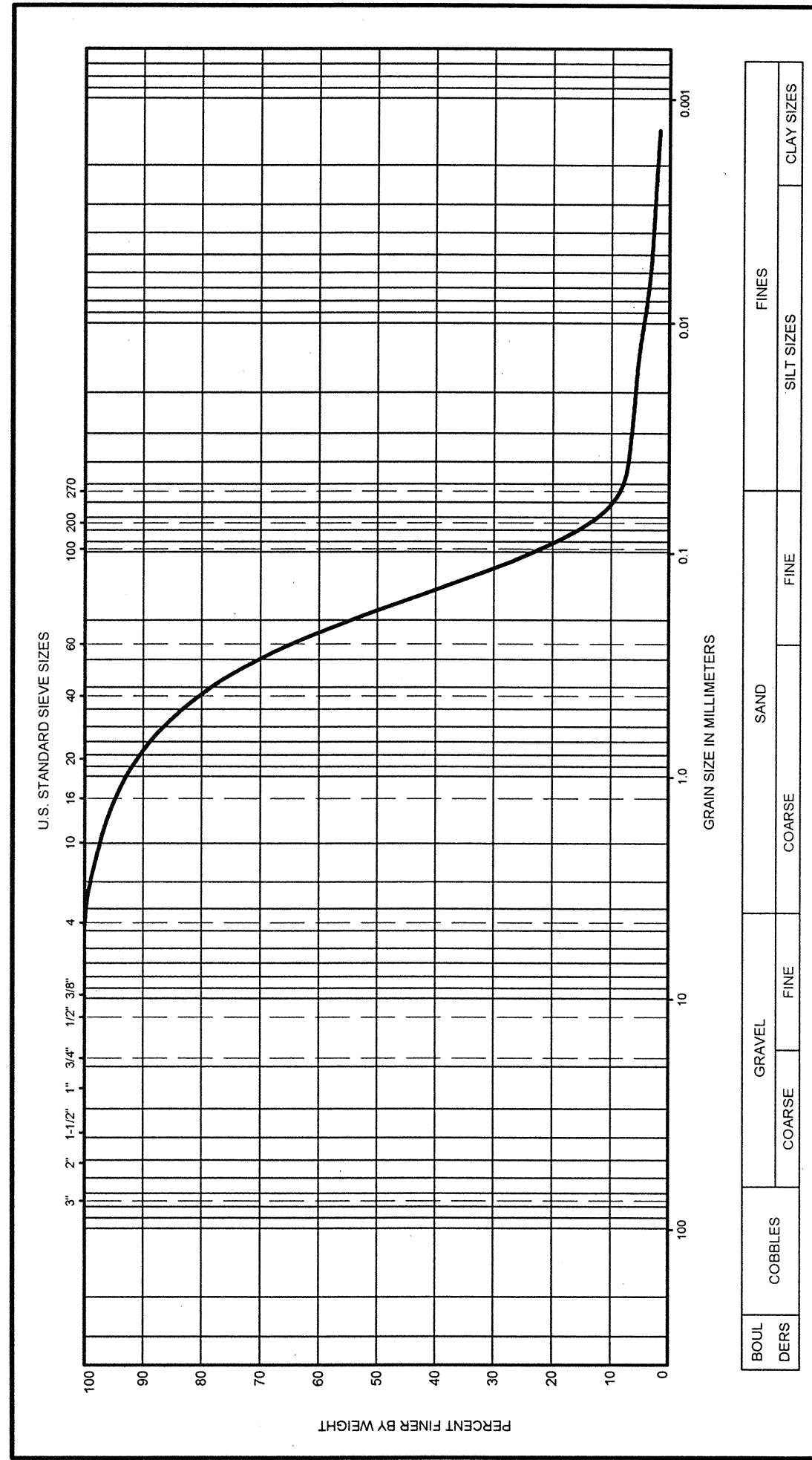
SAMPLE #	CHANNEL BED MATERIAL		CHANNEL BANK MATERIAL			
	BED		SS-2	SS-3	SS-4	BANK
RETAINED #4	29		0	6	0	0
PASSING #10	63		99	92	97	100
PASSING #40	23		90	68	80	90
PASSING #200	2		28	29	14	20
COARSE SAND	83.0		23.0	38.0	35.0	17.0
FINE SAND	16.0		58.0	36.0	57.0	72.0
SILT	0.0		7.0	11.0	5.0	7.0
CLAY	1.0		12.0	15.0	3.0	4.0
LL	24		19	27	15	22
PL	0		0	0	0	0
AASHTO CLASSIFICATION	A-1-b(0)		A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)
STATION	14+10		13+67	13+97	14+33	14+40
OFFSET	15' LT		19' RT	18' RT	4' LT	25' RT
DEPTH	0.0-0.5		3.5-5.0	3.5-5.0	3.5-5.0	0.5-1.0





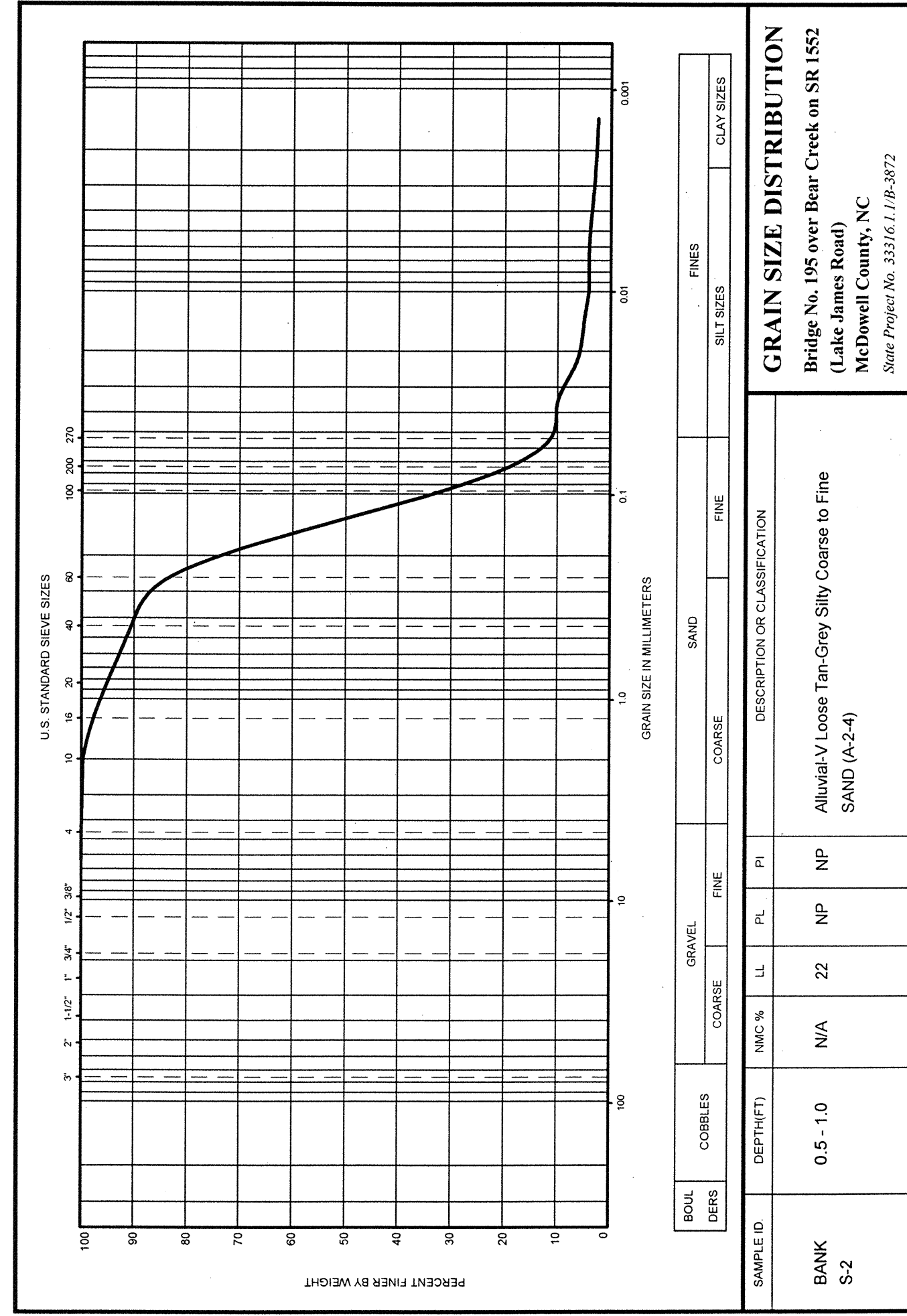
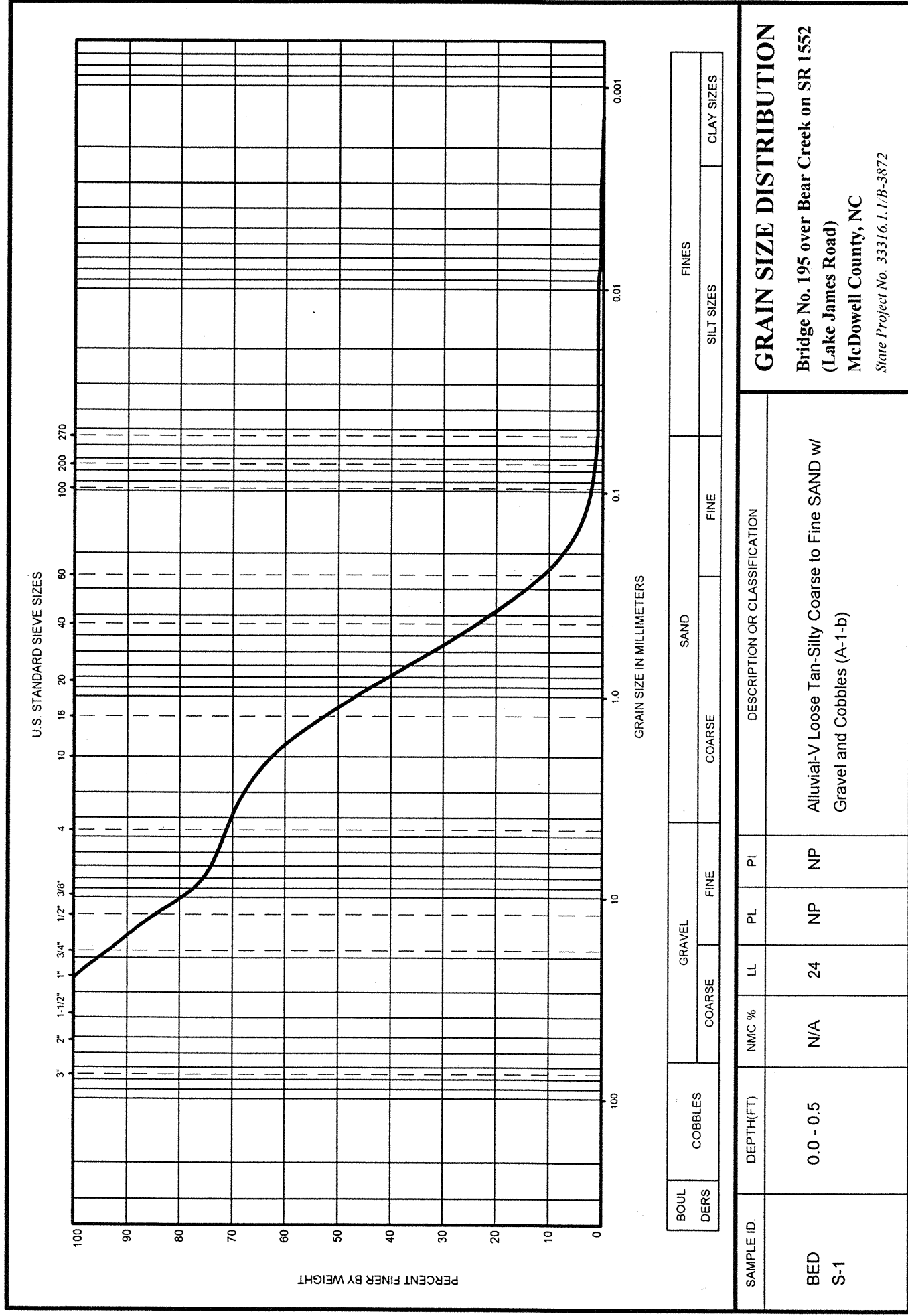
SAMPLE ID.	DEPTH(FT)	NMC %	GRAVEL			SAND		FINES	DESCRIPTION OR CLASSIFICATION
			COARSE	FINE	PI	COARSE	FINE		
B1-B SS-3	3.5 - 5.0	N/A	27	NP	NP			Alluvial-Boulders & Cobbles w/ V Loose Grey Silty Fine SAND (A-2-4)	

GRAIN SIZE DISTRIBUTION
 Bridge No. 195 over Bear Creek on SR
 1552 (Lake James Road)
 McDowell County, NC
 State Project No. 33316.1.1/B-3872



SAMPLE ID.	DEPTH(FT)	NMC %	GRAVEL			SAND		FINES	DESCRIPTION OR CLASSIFICATION
			COARSE	FINE	PI	COARSE	FINE		
B2-A SS-4	2.5 - 4.0	N/A	15	NP	NP			Alluvial-V Loose Grey Silty Fine SAND (A-2-4)	

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SITE PHOTOGRAPHS



Looking Right to Left along End Bent-1

SITE PHOTOGRAPHS



Looking Right to Left along Bent-2



Looking Right to Left along Bent-1



Looking Right to Left along End Bent-2

SITE PHOTOGRAPHS



Looking Increasing Station along -L-

SITE PHOTOGRAPHS



Looking from EB-1 Increasing Station along Profile - 16' RT of -L-



Looking from EB-2 Decreasing Station along Profile - 16' RT of -L-



Looking along Temporary Shoring Alignment

SITE PHOTOGRAPHS



Looking Upstream

SITE PHOTOGRAPHS



Looking North along Lake James Road (SR 1552)



Looking Downstream