Subsurface Profile

Site Photographs

Site Vicinity Map Boring Identification Diagram

D. Hordister

DRAWN BY:

Final Boring Logs Laboratory Test Results

Rock Testing Summary

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1 | 19 B-3872

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33316.	1.1 I.D. NO. B-3872
F.A. PROJECTBRZ-155	52(8)
COUNTYMcDOWELL	
PROJECT DESCRIPTION	Retaining Wall at End Bent-1
for Bridge No. 195 over Bea	
SITE DESCRIPTION	

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 VAROUS FELD BORING LOGS, ROCK CORES, MIO SOIL TEST DATA AVAILABLE MAY BE REVEWED OR INSPECTED IN RALEICH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, CEDTECHNICAL UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FELD

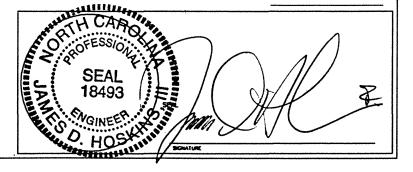
CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A CEDTECHNICAL INTERPRETATION OF ALL AVALABLE SUBSURFACE DATA AND MAY NOT NECESSARLY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BORRHOLE, THE LABORATORY SAMPLE DATA AND THE 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 MOSTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION, THESE WATER LEVELS OR SOIL MOSTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATE CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETALS SHOWN ON THE SUBSURFACE PLANS ARE PRELBINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETALS ARE DIFFERENT, FOR BIDDING AND CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN IMPORTANTON ON THES PROJECT, THE DEPARTMENT DOES NOT WARRANT OR CUMANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPENION 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 HANSELF 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 MAY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE RIGICATED IN THE SUBSURFACE INFORMATION.

- NOTE THE REFORMATION CONTAMED HEREIN IS NOT MIPLED 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 WAVES MY CLAMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS MOICATED HEREN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

For Letting

INVESTIGATED BY D. Hardister PERSONNEL D. Harris CHECKED BY ___ JD Hoskins III R. Burleson R. Kumar SUBMITTED BY __ JD Hoskins III S. Tierney January 26, 2005 R. Benfield



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

	,	SOIL AND RO	CK LEGEND, TERM	s, symbols,	AND ABBREVI	IATIONS		
SOIL DESCR	IPTION	GRADATION				DESCRIPTION		TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-COM WHICH CAN BE PEMETRATED WITH A CONTINUOUS FLIGHT POW 189 BLOWS PER FOOT ACCORDING TO STANDARD PEMETRATION CLASSIFICATION IS BASED ON THE ARSHITO SYSTEM AND BAS CONSISTENCY, COLOR, TEXTURE, MOISTURE, ANSHITO CLASSIFICATION CLASSIFICATION AND ASSIMILATION OF THE MOISTURE, AND ASSIMILATION OF THE MOISTURE, AND ASSIMILATION OF THE MOISTURE ASSIMILATI	er auger, and which yields less than i test gashto 1286, astm d-1586, soil. Its cescriptions generally shall include: Ition, and other pertinent factors such	MELL CRADED - INDICATES A COOD REPRESENTATION OF PARTICLE SIZES F LNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE POORLY GRADED LAP-CRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR M ANGULARITY OF GRAINS	SAME SIZE. IALSO ORE SIZES.	ROCK LINE INDICAT SPT REFUSAL IS PE IN NON-COASTAL PL OF WEATHERED ROC	COASTAL PLAIN MATERIAL THA ES THE LEVEL AT WHICH NON- NETRATION BY A SPLIT SPOON AIN MATERIAL. THE TRANSITI	AT WHEN TESTED, WOULD YIELD SPT REFL CDASTAL PLAIN MATERIAL WOULD YIELD N SAMPLER EDUAL TO OR LESS THAN 0.1 ON BETWEEN SOIL AND ROCK IS OFTEN R	SPT REFUSAL.	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.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLA WERF STAFF, GRAF SULY CLA, MOST WITH INTERREDUED	FINE SIND UNERS, HORST PLUSTIC, AT 6	THE ANGULARITY OR ROLADNESS OF SOIL GRAINS ARE DESIGNATED BY THE SUBANGULAR, SUBROUNDED, OR ROLADED.		WEATHERED ROCK (WR)	NON-COASTAL P	PLAIN MATERIAL THAT YIELDS SPT N VAL	LUES > 100 BLOWS	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
	O CLASSIFICATION -CLAY MATERIALS Z PASSING *2880 ORGANIC MATERIALS	MINERAL DGICAL COMPOSITION MINERAL NAMES SUCH AS DUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		CRYSTALLINE ROCK (CR)	WOULD YIELD SI CHEISS, GASSING		CLUDES GRANITE,	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE CROUND SURFACE. CALCAREOUS ICALCJ - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CROUP A-1 A-3 A-2 A-4 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7	A-5 A-6 A-7 A-1, A-2 A-4, A-5 A-6, A-7		LESS THAN 38	NON-CRYSTALLINE ROCK (NCR)	SEDIMENTARY RO	E GRAIN METAMORPHIC AND NON-COASTAL OCK THAT WOULD YEILD SPT REFUSAL IF LITE, SLATE, SANOSTONE, ETC.	F TESTED, ROCK TYPE	COLLINIUM - ROCK FRACHENTS MIXED WITH SOIL DEPOSITED BY CRAYITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL SOCIODOS STATEMENT OF ST		MODERATELY COMPRESSIBLE LIQUID LIMIT HIGHLY COMPRESSIBLE PERCENTAGE OF MATERIA	GREATER THAN 50	COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SPT REFUSAL, R SHELL BEDS, ETI	SEDIMENTS CEMENTED INTO ROCK, BUT M ROCK TYPE INCLUDES LIMESTONE, SANDSTI C.	MAY NOT YIELD TONE, CEMENTED	CORE RECOVERY GRECO - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUM AND EXPRESSED AS A PERCENTAGE.
* 18 58 HX * 49 38 HX58 HX51 HN	GRANULAR SILT- CLAY PEAT	ORGANIC MATERIAL GRANULAR SILT- CLAY SOILS SOILS	OTHER MATERIAL		WE/	ATHERING		\underline{OIKE} - a tabular 800y of Igneous rock that cuts across the structure of adjacent rocks or cuts massive rock.
* 288 15 MX 25 MX88 MX 35 MX35 MX35 MX35 MX35 MX36 MX 1040 LMT	N36 19/36 19/36 19/	TRACE OF ORGANIC MATTER 2 - 32 3 - 52 TR. LITTLE ORGANIC MATTER 3 - 52 5 - 122 LIT	ACE 1 - 18% TLE 18 - 28%	HAMMER	IF ERYSTALLINE.	JOINTS MAY SHOW SLIGHT STAINING, ROCK		$\underline{\text{OIP}}$ - THE ANCLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS DICLINED FROM THE HORIZONTAL.
LASTIC BIDEX 6 MX N.P. 18 MX 18 MX 11 MN 11 MN 18 MI	OB HICHLY	<u></u>	ME 28 - 352 HLY 352 AND ABOVE	IV. SLIJ CRYSTA		NED, SOME JOINTS MAY SHOW THIN CLAY NEE SHINE BRIGHTLY, ROCK RINGS UNDER	HAMMER BLOWS IF	<u>OIP DIRECTION (DIP AZIMUTH) -</u> THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM MORTH.
USUAL TYPES STORE FRACE. FINE SILTY OR CLAYEY SI	ILTY CLAYEY ORGANIC SOILS	GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER	ORILLING.	ISLIJ I INCH.	OPEN JOINTS MAY CONTAIN CL	NEO AND DISCOLORATION EXTENOS INTO I AY. IN GRANITOID ROCKS SOME OCCASION	NAL FELOSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
MATERIALS SAND GENL PATING	DILS SOILS MATTER	STATIC WATER LEVEL AFTER 24 HOURS.	NIA C70474	MODERATE SIGNIFIE	ANT PORTIONS OF ROCK SHOW). CRYSTALLINE ROCKS RING UNDER HAMM I DISCOLORATION AND WEATHERING EFFEC RE DULL AND DISCOLORED, SOME SHOW CI	CTS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRACHENTS ON SURFACE MEAR THEIR ORIGINAL POSITION AND DISLOGED FROM
AS A EXCELLENT TO GOOD SUBGRADE P.I. OF A-7-5 ≤ L.L 30 ± P.I.	PAIR TO PUCK POOR POUR UNSUITABLE	PERCHED WATER, SATURATED ZONE OR WATER BEAF O'Me SPRING OR SEEPAGE	SIMAIR	DULL SI WITH FE	XUNO UNDER HAMMER BLOWS AN ESH ROCK.	NO SHOWS SIGNIFICANT LOSS OF STRENG	TH AS COMPARED	PARENT MATERIAL. FLOOD PLAIN G-P.) - LAND BORDERING A STREAM, BUILT OF SEDDMENTS DEPOSITED BY THE STREAM.
CONSISTENCY OR		MISCELLANEOUS SYMBOLS		SEVERE AND DIS	COLORED AND A MAJORITY SHO	D OR STAINED. IN GRANITOID ROCKS, ALL OW KAOLINIZATION. ROCK SHOWS SEVERE OGIST'S PICK. ROCK GIVES "CLUNK" SOUND	LOSS OF STRENGTH .	FORMATION OF M.J. A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR PENETRI	ATION RESISTENCE COMPRESSIVE STRENGTH (TONS/FTP)	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION ROADWAY FIRST BORIS	NG SAMPLE DESIGNATIONS	IF TEST	ED. WOULD YIELD SPT REFUSAL			JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
MEDITAL DENCE	4 TO 18	SOIL SYMBOL ALGER BORING	S- BULK SAMPLE	IN STRE	NGTH TO STRONG SOIL. IN GRA SOME FRAGMENTS OF STRONG	ANITOID ROCKS ALL FELDSPARS ARE KAO FROCK USUALLY REMAIN.	OLINIZED TO SOME	LECCE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO TIS LATERAL EXTENT.
PRICKIPAL I	10 TO 30 R/A 38 TO 50 >50	ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS	SS- SPLIT SPOON SAMPLE ST- SHELBY TUBE	VERY SEVERE ALL ROX		INST. BY. DOR STAINED ROCK FABRIC ELEMENTS (TO SOIL STATUS, WITH ONLY FRACMENTS	ARE DISCERNIBLE BUT	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR HORE DIRECTIONS. MOTILED BNDTJ IRRECULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTILING IN SOILS USBALLY INDICATES POOR AGRATION AND LACK OF COOD DRAINAGE.
VERY SOFT GENERALLY SOFT	<2	MONITORING WE	CALIFIC C	REMAINI	G. SAPROLITE IS AN EXAMPLE	E OF ROCK WEATHERED TO A DEGREE SUC IRIC REMAIN. IF TESTED VIELDS SPT N	CH THAT DNLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
	4 TO 8 8.5 TO 1 8 TO 15 1 TO 2 15 TO 39 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY	RT- RECOMPACTED	SCATTER	ED CONCENTRATIONS. QUARTZ I	NOT DISCERNIBLE, OR DISCERNIBLE ONLY MAY BE PRESENT AS DIKES OR STRINGER		RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE MEATHERING OF ROCK, ROCK QUALITY DESIGNATION GLOLDJ - A MEASURE OF ROCK QUALITY DESCRIBED BY, TOTAL LENGTH OF
HARD TEXTURE OR GF	>389 >4	28/828 DIP/DIP DIRECTION OF SLOPE INDICATE ROCK STRUCTURES SLOPE INDICATE INSTALLATION	CBR - CBR SAMPLE	ALSO AA	ROCK	HARDNESS		ROCK SECRENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
U.S. STO. SIEVE SIZE 4 18 46	9 69 200 270	● - SOUNDING ROD ● SPT REFUSAL			BE SCRATCHED BY KNIFE OR L HARD BLOWS OF THE GEOLD	SHARP PICK. BREAKING OF HAND SPECIM DGISTS PICK.		SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
BOULDER COBBLE GRAVEL COA	RSE FINE SUT SLAV	ABBREVIATIONS			SCRATCHED BY KNIFE OR PIC ACH HAND SPECIMEN.	CK DNLY WITH DIFFICULTY. HARD HANNER		SILL - AN INTRUSIVE BODY OF ICAEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH MAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUCED ROCKS
menos moos cos SA	NO SANO SEL CLAT SOJ (F. SOJ (SLJ (CLJ) 8.25 8.85 8.865	AR - AUGER REFUSAL HSA - HOLLOW STEM AUGER BT - BORING TERMINATED MED MEDIUM CL CLAY MIC MICACEOUS	W - MOISTURE CONTENT V VERY VST - VANE SHEAR TEST	HARD EXCAVA		CK. GOUGES OR GROOVES TO 8.825 INCHE DLOGISTS PICK. HAND SPECIMENS CAN BE	ES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FALLT OR SLIP PLANE.
SIZE IN. 12" 3" SOIL MOISTURE - CORRE		CPT - COME PENETRATION TEST NOME - NO GROUNDWATER ENCOUNTER CSE CDARSE CT - CORING TERMINATED PMT - PRESSUREMETER TEST	WOH - WEIGHT OF HAMMER	MEDIUM CAN BE	CROOVED OR COUGED 8.85 IN	ICHES DEEP BY FIRM PRESSURE OF KNIFF TO PEICES I INCH MAXIMUM SIZE BY HA		STANDARD PENETRATION TEST OPENETRATION RESISTANCE (SPT) - NUMBER OF BLOWS IN OR BUFFJOF A 148 LB. HAMMER FALLING 38 INDES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION		OMT - DILATOMETER TEST SU SAND, SANDY OPT - DYNAMIC PENETRATION TEST St SILT, SILTY SILT, SILTY SILT, SILTY		SOFT CAN BE		BY KNIFE OR PICK. CAN BE EXCAVATED	IN FRAGMENTS	A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN BLI FOOT PENETRATION WITH 68 BLOWS. STRATA CORE RECOVERY ISRECJ - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
- Saturated - Caturated -	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	F FINE TCR - TRICONE REFUSAL FOSS FOSSILIFEROUS 7 - UNIT WEIGHT		PIECES	CAN BE BROKEN BY FINCER P	SIZE BY MODERATE BLOWS OF A PICK PI PRESSURE. EXCAVATED READILY WITH POINT OF PIC	CK DIECES I INCH	OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:
LL LIQUID LIMIT	SEMISOLIDI REQUIRES DRYING TO	FRAC FRACTURED 76 - DRY UNIT WEIGHT FRACS FRACMENTS			E IN THICKNESS CAN BE BROK	KEN BY FINGER PRESSURE, CAN BE SCRAT	TOWER DEADS V DV	TOTAL LENGTH OF ROCK SECHENTS WITHIN A STRATUM EQUAL TO DR GREATER THAN 4 DICHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANCE - WET - (W) (PI) PLASTIC LIMIT	ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT F			RE SPACING	BEDDING TERM I	THICKNESS	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
OM _ OPTIMUM MOISTURE - MOIST - OO	SOLID; AT OR NEAR OPTIMUM MOISTURE	ORILL UNITS: ADVANCING TOOLS:	HAMMER TYPE: X AUTOMATIC MANUAL	IERM VERY VIDE VIDE	SPACING MORE THAN 10 FEET 3 TO 18 FEET	VERY THICKLY BEDDED THICKLY BEDDED 1.	> 4 FEET 1.5 - 4 FEET	BENCH MARK: BM*2 = 18+10.12, 40.7'LT -BL-
SL SHRINKAGE LIMIT	REDUIRES ADDITIONAL WATER TO	S'CONTINUOUS FLIGHT AUGER	CORE SIZE:	MODERATELY CLOSE CLOSE	1 TO 3 FEET 8.16 TO 1 FEET	VERY THINLY BEDOED 8.1	.16 - 1.5 FEET .83 - 8.16 FEET 188 - 8.83 FEET	ELEVATION: 1210.53 ft NOTES: [Z]
PLASTIC	ATTAIN OPTIMUM MOISTURE	BK-51 X 6" HOLLOW AUGERS	□-в	VERY CLOSE	LESS THAN B.16 FEET		(8.808 FEET	NOTES: STUBOL FOR ROADHAY EMBANKMENT FILL CONSISTING OF SILTY SAND (A-2-(A-1-A) with BOULDERS & COBBLES
PLASTICITY INDE		CHE-45 HARD FACED FINGER BITS X TUNG,-CARBIDE INSERTS	-NO	FOR SEDIMENTARY ROCI		ING OF THE MATERIAL BY CEMENTING, HE	EAT, PRESSURE, ETC.	<u>ш</u>
NOMPLASTIC 8-5 LOW PLASTICITY 6-15	VERY LOW SLIGHT	X CHE-558 X CASING W/ ADVANCER	X -HQ	FRIABLE		WITH FINGER FREES NUMEROUS GRAINS: BLOW BY HAMMER DISINTEGRATES SAMPL		SYMBOL FOR ALLWIN. SOIL CONSISTING OF SILTY SAND IA-2-WITH BOLLDERS & COBBLES
MED. PLASTICITY 16-25 HIGH PLASTICITY 26 OR MOR		PORTABLE HOIST TRICOME STEEL TEETH TRICOME TUMG-CARB.	POST HOLE DIGGER	MODERATELY		CAN BE SEPARATED FROM SAMPLE WITH SEASILY WHEN HIT WITH HAMMER.	STEEL PROBE	
COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COME		OTHER CHE-55 TM X CORE BIT	SOUNDING ROD	INDURATED		ARE DIFFICULT TO SEPARATE WITH STEE LT TO BREAK WITH HAMPER.	EL PROBE:	STHEOL FOR ROADHAY EMBANKMENT FILL CONSTST ING OF SILTY CLAY (AT 4)
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. AR	RE USED TO DESCRIBE APPEARANCE.	OTHER OTHER	VAME SHEAR TEST OTHER	EXTREMELY		MAMMER BLOWS REQUIRED TO BREAK SAME BREAKS ACROSS GRAINS.	PLEs	with BOULDERS & COBBLES
								00/35/00 03/35/00

STATE PROJECT NO. SHEET NO. TOTAL SHEETS
33316.1.1 2 19

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

State No. 33316.1.1 (B-3872)
Geotechnical Report of Subsurface Exploration

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,

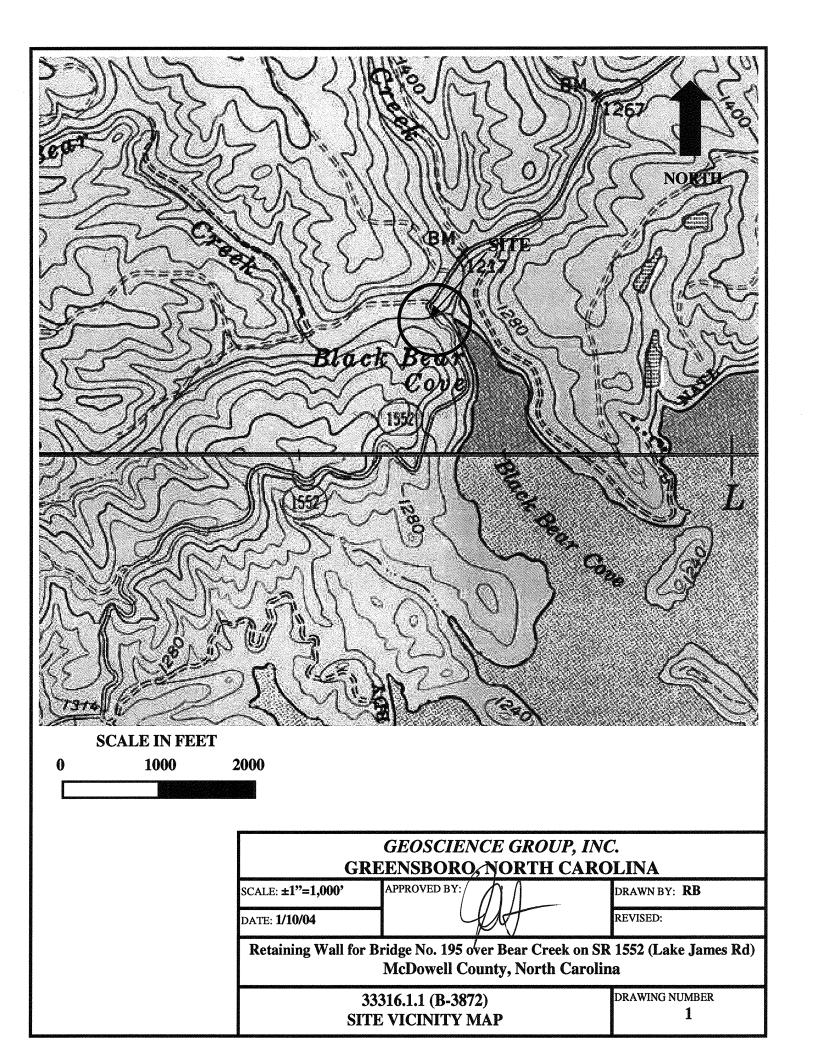
GEOSCIENCE GROUP, INC

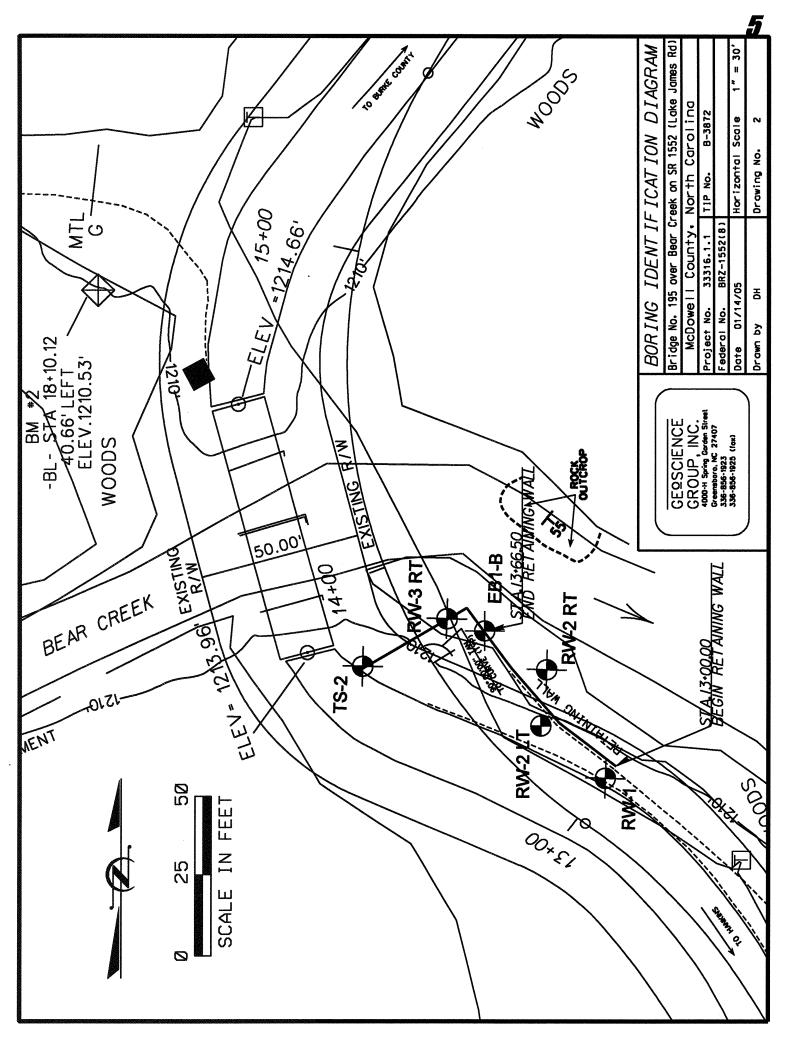
Project Manager

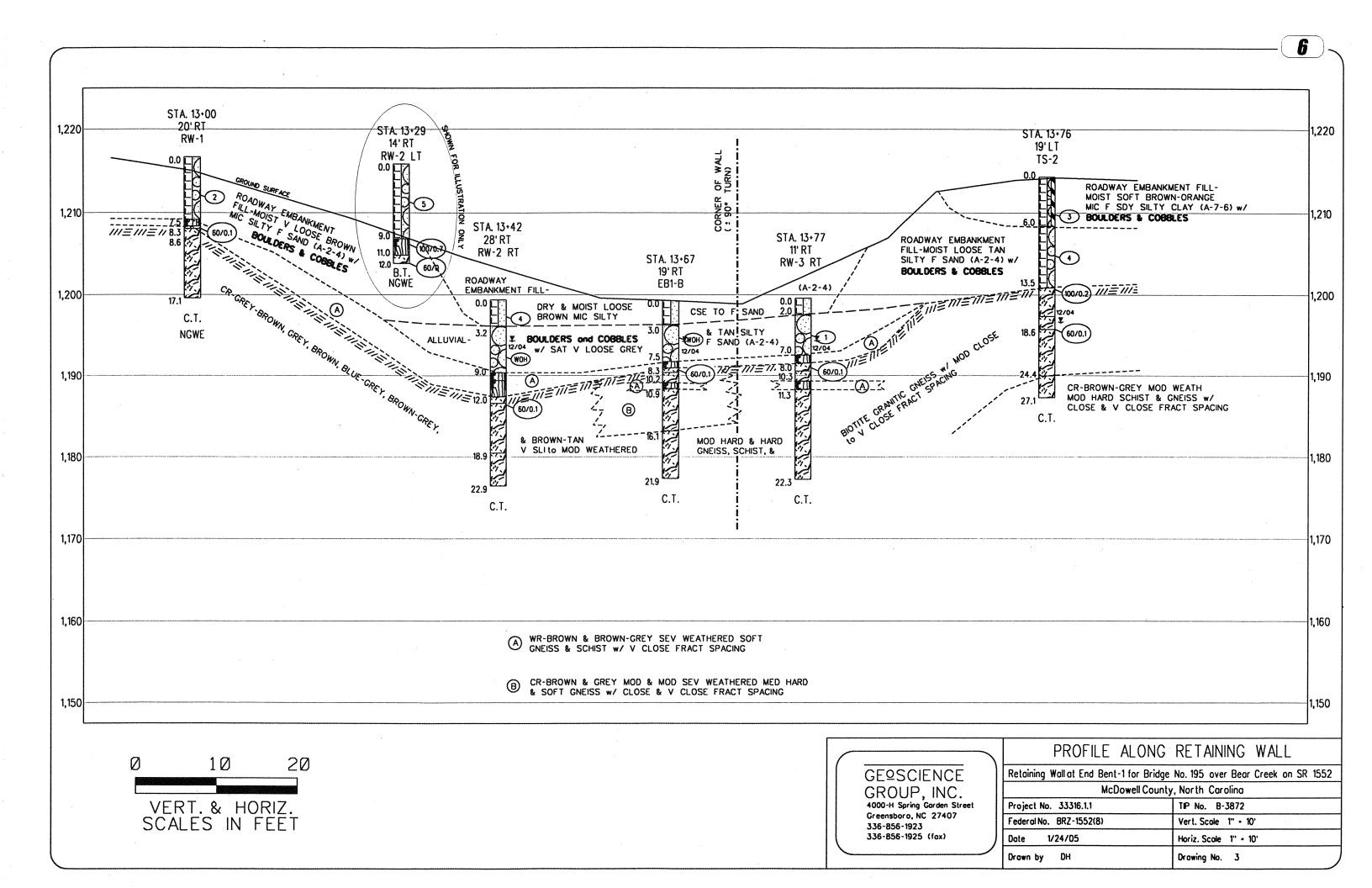
James D. Hoskins III. PE. Registered North Carolina

DH:JDH:dh

Enclosures







GEOSCIENCE GROUP, INC. **BORING LOG**

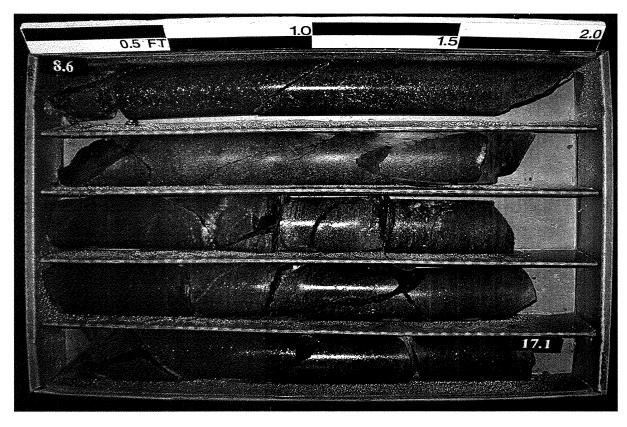
				T.=		T						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			HEET 1 C	******	***************************************
	CT NO				3-3872	·	IO.BRZ-1				CO. N			FIELD SI	JPERV. D.Ha		
			Retair		II at End Be		······································			-		R 15	Y				VATER (f
	G NO.				RING LOC					ET 20'	**********		ALIGNME		0 Н		N/M
	AR ELE			L	L DEPTH			RTHING	742				EASTING				NGWE
	MACHI			ــــــــــــــــــــــــــــــــــــــ	DRILL MET		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						PE Automa		AL CASING D		8.6 ft
	STARTI	T		<u> </u>	PLETED 12				D DE		Cree		ter SURFA	ACE WATE	R DEPTH	N/A	
	DEPTH		DW COL		0 20		PER FOO		400	SAMP.	V /	0		SOIL AND	ROCK DESCRI	PTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 20	40	60	80	100	NO.	MOI	G	****				
216.7	0.00				Grou	nd Surfa	ce Elev.	1216.7 ft					1216.7				
-	-						7		-				Roa	dway Emba	nkment Fill-Very is Silty Fine SAN	Loose ID with	
1215-	_								• •			Fà	BOU	JLDERSand	COBBLES(A-2	-4)	
	_						• • • •		• •			FD		÷			
	3.5	2	1	 					٠.	00 40	.,	可心		•			
.]	L	~	'	'	•2				• •	SS-10	M	HA					
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1210-	Ī				-				· ·			以	1209.2				
1	- 8.5	<u> </u>		<u> </u>					\cdot			M	1208.4		k-Brown Weathe		eiss
1	_	60/0.1						60	/0.1		D		Crvs	stalline Rock	-Grey-Brown Gr -Grey and Grey-	Brown	
1	-									RS-6			Mod	lerately Hard	leratély Weathér I and Hard Gnei	ss with (Close
1	-												and	Very Close	Fracture Spacing	9	
205-	-																
1	-						. .										
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4	-											网					
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200-	-				<u> </u>	······································						1	1199.6				-
-	-											-	Cori Crys	ing Terminat stalline Rock	ed at Elev. 1199 (Gneiss)	.6ft in	
4	-											-					
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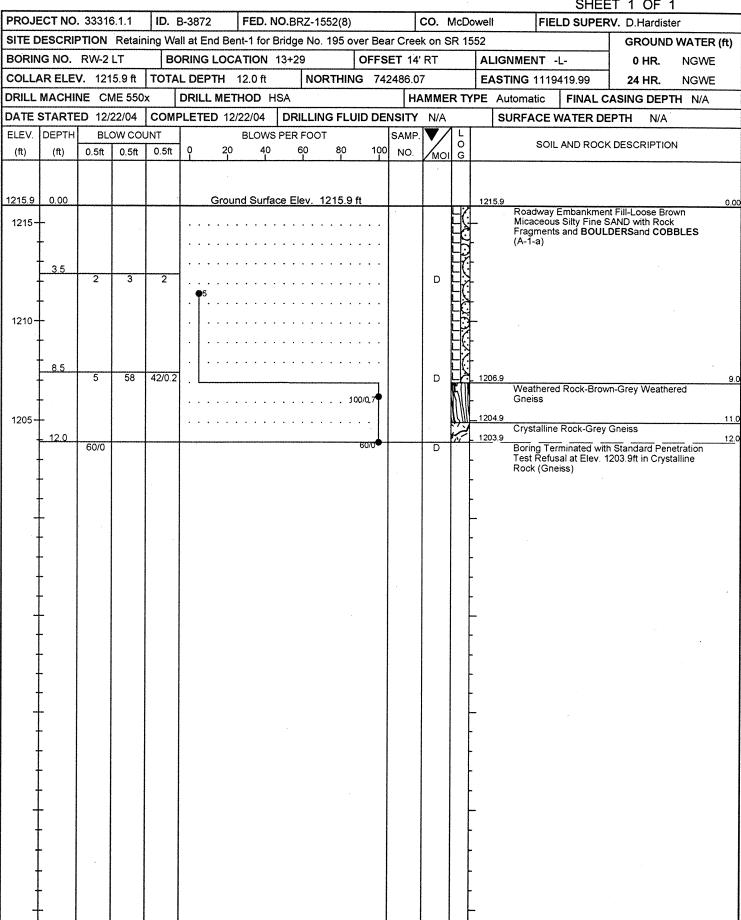
GEOSCIENCE GROUP, INC. CORE BORING REPORT

				***									SHE	ET 1 OF 1	
PROJ	ECT N) . 33	316.1.1	ID.	B-387	72	FED.	NO.BF	RZ-1552(8)		CO. McDov	well	FIELD SUPER	RV. D.Hardister	
SITE	DESCR	IPTIC	N Reta	ining V	Vall at I	End Be	nt-1 for	Bridge	No. 195 o	ver Bear Cre	ek on SR 155	52		GROUND V	VATER (ft)
BORII	VG NO.	RV	V-1	E	BORIN	G LOC	ATION	13+0)	OFFSET 20)' RT	ALIGNMEN	T -L-	0 HR.	N/M
COLL	AR ELI	ΞV.	1216.7 ft	тот	AL DE	PTH	17.1 ft	***********	NORTHIN	G 742469.6	33	EASTING 1	119440.06	24 HR.	NGWE
DRILL	MACH	INE	CME 55	0x	DRIL	L MET	HOD	HSA/H	Q	. Н	AMMER TYP	E Automat	ic FINAL C	ASING DEPTH	8.6 ft
DATE	START	ED	12/22/04	CON	IPLET	ED 12	/22/04	DRI	LLING FLU	JID DENSITY	Creek Wat	er SURFA	CE WATER DE	EPTH N/A	
CORE	SIZE	HQ	***************************************			TOTA	AL RUI	V 8.51	t	DRILLER	D. Harris				
ELEV.	DEPTH	RUN	DRILL RATE		JN	SAMP.	STR	ATA						***************************************	
(ft)	(ft)	(ft)	(Min./ft)	REC. (ft) %	RQD (ft) %	NO.	REC.	RQD %			DESCRI	PTION AND R	EMARKS		
1208.1		energick statem										Coring @ 12			
1208.1	8.6	3.5	5:55	(3.4) 97%	(2.8) 80%	RS-6	8.3 98%	5.8 68%		Close Fra	cture Spacing	and Grey-Bro Hard and Ha J	own Slightly an ard Gneiss with	d Moderately n Close and Ver	у
			3:55						-	8 JTS @ 0 2 JTS @ 3 10 JTS @ 3 JTS @ 5 5 JTS @ 3 1 JT @ 80	0-10° 30-40° 50-60°				
1204.6	42.4		2:41 1:47/0.5							5 JTS @ 5 1 JT @ 80	70-80 9-90			,	
1204.6 1204.6	12.1 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						17.1
									-	Coring Te	rminated at E	lev. 1199.6ft	in Crystalline	Rock (Gneiss)	
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33316.1.1/B-3872 RW-1 Box 1 of 1



GEOSCIENCE GROUP, INC. BORING LOG



GEOSCIENCE GROUP, INC. BORING LOG

PROJ	ECT NO	. 3331	6.1.1	ID.	B-3872	FED. N	NO.BRZ-15	552(8)		CO. N	/lcDo	well	FIEL	D SUPE	RV. D.Hardister	
SITE C	ESCRI	PTION	Retair	ning Wa	all at End B	ent-1 for l	Bridge No.	195 over Be	ar Cree	k on S	R 15	52		***************************************	GROUND W	ATER (ft
BORIN	IG NO.	RW-2	RT	ВС	ORING LO	CATION	13+42	OFF	SET 28	'RT	**********	ALIGN	MENT -	L-	0 HR.	N/M
COLL	AR ELE	V. 119	99.4 ft	ТОТА	L DEPTH	22.9 ft	NO	RTHING 7	42503.5	3	-	EASTIN	IG 1119	421.82	24 HR.	5.0
DRILL	MACHI	NE CI	ME 550	x	DRILL ME	THOD R	Rotary/HQ		H	AMME	R TYI	PE Auto	matic	FINAL	CASING DEPTH	10.0 ft
DATE	STARTI	ED 12/	15/04		PLETED 1			IG FLUID DI						VATER D		
ELEV.	DEPTH	BL	ow col	JNT		BLOWS	PER FOO	T	SAMP	V/	L	Ł	······································	***************************************		
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 20	40	60	80 10	0 NO.	MOI	0		SOIL	AND ROC	K DESCRIPTION	

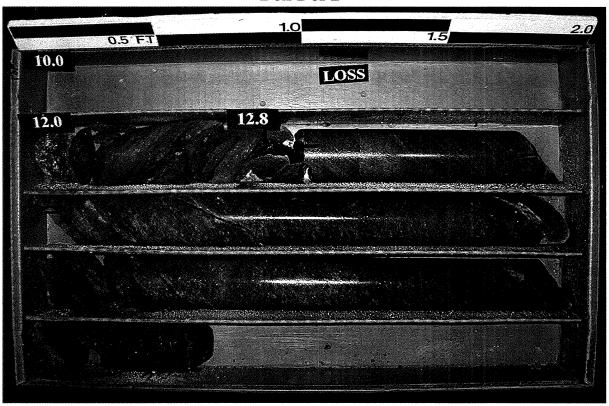
							<u></u> .									
<u>1199.4</u>	_	 	 		Gro	una Surra	ce Elev. 1	1199.4 ft	+	+		1199.4 F	Roadway I	Embankme	ent Fill-Loose Brown	C
	1.0	1	2	2						D	ᄩ	, V	/licaceous	Silty Coar	se to Fine SAND (A	-2-4)
	L				. •4						ᇤ					
					╽┾╁╸						빞	1196.2	U D.C	W DEDC	-4.00001.50	
1195-											(:]				and COBBLESwith / Fine SAND (A-2-4)
1135										V	97	-				
	6.0	1 1	WOH	WOH	∤ 			· · · · · · · ·		SAT	Y					
		'		wo	Н					0/11	X					
											ان)					
•					L							1190.4				
1190-	_											1189.4	eneiss wit	h Crystallir	wn-Grey Weathered te Rock Seams	1
-	-										MIT	V S	Veathered oft Gneis	l Rock-Bro s with Very	wn Severely Weath Close Fracture Spa	ered acing
•	-											1187.4				1
•	12.9										沙	1186.6 V	rystalline Veathered	Rock-Brov Soft and	vn Moderately Seve Medium Hard Gneis	rely s1
•	-	60/0.1						60/0.1		D		[M	ith Very (Close Fract	ture Spacing e-Grey Slightly and V	
1185-	-											. S	lightly We	eathered H	ard Gneiss and Sch rately Close Fractur	ist
	-												pacing	and wode	rately Close Fractur	6
	-										河					4
	-															
	_										河	1180 E				
1180-	_						• • • • • •					1180.5 _ C	rystalline	Rock-Blue	-Grey and Brown-G	rey 1
	_						<i></i>					N	foderately	/ Hard and	ely Weathered Hard Gneiss, Biotite	
											المزي			neiss, and Fracture S	Schist with Close ar Spacing	nd
							<i>.</i>						•			
_		 	 	 			***************************************		╅	 	" /	1176.5 C	oring Ter	minated at	Elev. 1176.5ft in	2
•												Č	rystalline	Rock (Gne	eiss & Schist)	
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GEOSCIENCE GROUP, INC. CORE BORING REPORT

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PRO	JECT N	0. 33	3316.1.1	ID.	B-387	72	FED.	NO.BF	RZ-1552(8)		CO. McDo	well	FIELD SUPER	V. D.Hardister	
SITE	DESCF	RIPTIO	ON Reta	ining V	Vall at	End Be	nt-1 fo	r Bridge	e No. 195 o	ver Bear Cre	ek on SR 15	52		GROUND WA	TER (ft)
BORI	NG NO	. RV	V-2 RT	E	BORIN	G LOC	ATION	13+4	2	OFFSET 2	3' RT	ALIGNMEN	T -L-	0 HR.	N/M
COLL	AR EL	EV.	1199.4 ft	тот	AL DE	PTH	22.9 ft		NORTHIN	I G 742503.	53	EASTING 1	119421.82	24 HR.	5.0
DRILL	_ MACH	IINE	CME 55	0x	DRIL	L MET	THOD	Rotary	/HQ	Н	AMMER TYP	PE Automati	c FINAL C	ASING DEPTH	10.0 ft
DATE	STAR	TED	12/15/04	COI	MPLET	ED 12	2/15/04	DRI	LLING FLU	JID DENSIT	Creek Wa	ter SURFAC	CE WATER DE	PTH N/A	
CORE	E SIZE	HQ				TOT	AL RUI		3 ft	DRILLER	D. Harris				
ELEV.	DEPTH	RUN	I RATE		UN RQD	SAMP		RATA			DESCR	IPTION AND R	FMARKS		
(ft)	(ft)	(ft)	(Min./ft)	REC. (ft) %	(ft) %	NO.	REC.	RQD %			DEGOIN				
1189.4											Begin	Coring @ 11	89.40 ft		
1189.4	10.0	2.9	6:46	(0.9) 31%	N/A	-	0.0	N/A	_	Weathere Close Fra	d Rock-Brow cture Spacing	n Severely W	eathered Soft	Gneiss with Very	
			0.10				0,0			No Discer		•			
			4:27		İ				-						
							0.8	0.0	1187.4	Crystalline	Rock-Brown	Moderately	Severely Weat	hered Soft and	12.0
1186.5	1		3:27/0.9			N=	100%	0% 5.1	1186.6	_		vith Very Clos	se Fracture Spa	acing	12.8
1186.4	13.0	4.9	5:21	(4.9) 100%	(4.4) 90%	60/0.1	98%	84%	-	8 JTS @ 4	+0-50 -70 - Rock -Plus (Gray Clichtle	and Van Sligh	Hy Mastharad Li-	
Yestonia												Close and M	loderately Clos	tly Weathered Ha e Fracture Spacin	g
			4:44						-	2 JTS @ 2 8 JTS @ 4 2 JTS @ 6	20-30°			*	
			4:19						L	ž JTS @	50-70°				
			4.19												
-			4:59						-						
1181.5			5:21/0.9												
1181.5	17.9	5.0	5:28	(4.9) 98%	(3.1) 62%				-						
							4.0	2.4	1180.5	Crystalline	Rock-Blue-C	Grev and Bro	wn-Grev Slight	ly and Moderately	18.9
			3:22				100%	1	_	Weathere	d Moderately	Hard and Ha	ird Gneiss, Biol	y and Moderately lite Granitic Gneis acing	s,
												and vory olds	or radiale ope	ionig	
			3:03						-	2 JTS @ 0 3 JTS @ 2 12 JTS @ 1 JT @ 60	20-30° 40-50°				
			5:52						-	1 JT @ 60)-70°				
1176.5	22.9		3:19						L 1176.5						22.9
1	T				<u> </u>			 	L, <u>v.o</u>	Coring Te	rminated at E	lev 1176 5#	in Crystalline E	 Rock (Gneiss, Biot	
										Granitic G	neiss, & Schi	st)	iii Crystallille r	COCK (Grieiss, Biol	ille.
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33316.1.1/B-3872 RW-2 RT Box 1 of 2



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



GEOSCIENCE GROUP, INC. BORING LOG

SHEET 1 OF 1

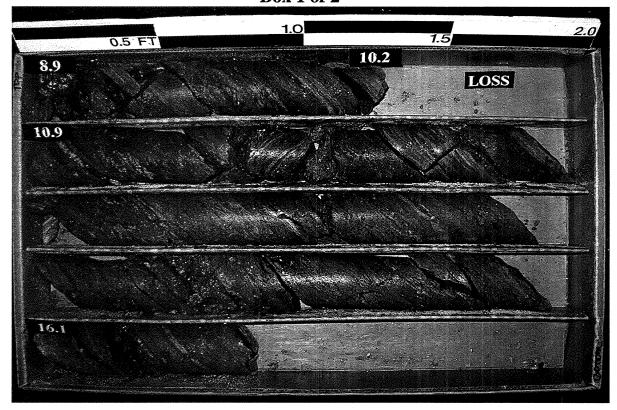
		**********			**********			***************************************		**********			***********		ET 1 OF 1	
	CT NO				3-3872		.BRZ-1552(8)			CO. 1	/IcDo	well	FIE	LD SUPE	RV. D.Hardister	
SITE D	ESCRI	PTION	Bridge	No. 19	5 over Bear	Creek on	SR 1552 (Lake	Jame	s Road)					GROUND W	ATER (ft
BORIN	G NO.	EB1-E	3	ВС	PRING LOC	ATION 13	3+67	OFFS	ET 19'	RT		ALIG	VMENT -	L-	0 HR.	N/M
COLLA	R ELE	V. 119	99.3 ft	TOTA	L DEPTH	21.9 ft	NORTHING	742	2515.66	3		EAST	ING 1119	402.56	24 HR.	5.0
ORILL	MACHI	NE C	ME 550	x	DRILL MET	HOD Rot	ary/HQ		НА	MME	R TY	PE Au	tomatic	FINAL	CASING DEPTH	8.9 ft
DATE	START	ED 12/	15/04	COMP	PLETED 12	/15/04 [ORILLING FLUI	D DEI	VTISV	Cree	k Wa	ter St	JRFACE \	VATER D	EPTH N/A	
ELEV.	DEPTH	BL	ow cou	JNT		BLOWS PI	ER FOOT		SAMP.	$\mathbf{V}/$	L		6011	AND DOC	K DESCRIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 20 1 1	40	60 80	100	NO:	MOI			3011	AND ROC		
							•						•			
4400.3	0.00				Cana	ad Curfaaa	Fig.: 4400.2 #									
1199.3 -	0.00 -	 		 	Grou	no Surrace	Elev. 1199.3 ft				4:	1199.3	Roadway	Embankme	nt Fill-Loose Brown	
-	_										Hil		Micaceous	Silty Coars	se to Fine SAND (A	-2-4)
-	_										ᄖ					
-	- 3.5										糾	1196.3	Alluvial-Re	OULDERS	nd COBBLESw/ V	erv
1195-	-	WOH	WOH	WOH	<u>.</u>				SS-2	SAT		_	Loose Tar	Silty Fine	SAND (A-2-4)	,
1130				wo	н¶					Y	X					
•											M					
											W					
-					 			<u>.</u> 7			ein	1191.8 1191.0		d Rock-Brov	vn-Grey Weathered	<u> </u>
-	- 8.5	60/0.1	 			. <i></i>		v0.1€		м		1190.4	Gneiss Crystalline	Rock-Grey	Gneiss	
1190-	-											- 1189.1	Crystalline	Rock-Brow	on and Grey Modera ely Weathered Med	ately dium 1
-	-							`			KII	1188.4	Hard and	Soft Gneiss cture Spacir	with Close and Ver	ry 1
-													Weathere	d Rock-Brov	vn Severely Weath Close Fracture Spa	ered
-	-												Crystalline	Rock-Brow	n and Grey Modera	ately
-	-					.							Hard and	Soft Gneiss	ely Weathered Med with Close and Ver	ry
1185-	_											-	Close Fra	cture Spacir	ng	
-	-	-									(7)					
_	-										5	1183.2	Crystalline	Rock-Grey	and Brown-Grey ly Weathered	1
-	-					• • • • • •							Moderatel	y Hard to Ha	ard Gneiss and Sch	nist
-	_					· · · · · ·							with Close	Fracture S	pacing	
1180-	_							• •				- .				
-	-							• •								
	_															
-		 								**********	1	1177.4	Coring Te	minated at	Elev. 1177.4ft in	2
-	_							1					Crystalline	Rock (Gne	iss & Schist)	
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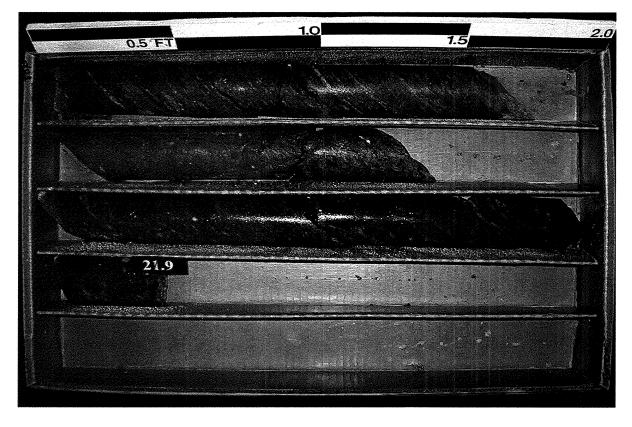
GEOSCIENCE GROUP, INC. CORE BORING REPORT

p													SHE	ET 1 OF 1	
			3316.1.1		B-387		J		RZ-1552(8)		CO. McDov	well	FIELD SUPE	RV. D.Hardister	
										e James Ro	ad)		`	GROUND WAT	ER (ft)
	NG NO						ATION			OFFSET 1		ALIGNMEN	NT -L-	0 HR. N	/M
			1199.3 ft				21.9 ft		L	IG 742515	l		1119402.56	24 HR.	5.0
 			CME 55				HOD			L	IAMMER TYP			CASING DEPTH 8.9	9 ft
			12/15/04	COI	MPLET					T	Y Creek Wat	er SURFA	CE WATER D	EPTH N/A	
 		HQ			UN	,L	AL RUI	N 13.0 RATA	ft	DRILLER	D. Harris				
ELEV.	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	REC. (ft)	RQD (ft)	SAMP.	REC.	RQD			DESCRI	PTION AND F	REMARKS		
		 	<u> </u>	<u>%</u>	%	<u> </u>	<u>%</u>	<u>%</u>							
1190.4 1190.4		3.0	 	(2.3)	(0.6)		1.3	0.3	· · · · · · · · · · · · · · · · · · ·	Crystallin		Coring @ 1 and Grev N		Moderately Severely	,—
			6:05	(2.3) 77%	20%		100%		-	Weathere Fracture	ed Medium Ha Spacing	rd and Soft	Gneiss with Cl	Moderately Severely ose and Very Close	
			5:02				0.0	N/A	1189.1						10.2
			5.02				0%		1188.4	2 JTS @ 2 JTS @ 2 JTS @ 8 JTS @	30-40° 40-50°			,	10.9
1187.4	11.9		6:20				5.1 98%	2.6 50%	-	Weather	ed Rock-Browr acture Spacing	n Severely V I	Veathered Soft	Gneiss with Very	
1187.4		5.0	0.07	(4.9)	(2.7)					No Disce	rnible .lts	and Grov N	Andorataly and	Madasataly Savasaly]
			6:27	98%	54%					Weathere Fracture	ed Medium Ha	rd and Soft	Gneiss with Cl	Moderately Severely ose and Very Close	' l
			3:23						-			•			
										1 JT @ 0 2 JTS @ 7 JTS @ 9 JTS @	20-30° 30-40°				
			3:23						-	9 JTS @ 1 JT @ 6	40-50 0-70				
			4:40						-						
			4.40						1183.2						16.1
1182.4	16.9		3:25				5.8 100%	5.2 90%	-	Crystallin Weathere	e Rock-Grey and Moderately	and Brown-C Hard to Har	Grey Moderatel d Gneiss and S	y and Slightly Schist with Close	
1182.4	16.9	5.0	3:27	(5.0) 100%	(4.8) 96%				-	Fracture	Spacing				
			3.27	100%	90%					3 JTS @ 8 JTS @	20-30 40-50				
			4:26						-						
			3:10						_						
			3:17						_						
1177.4	21.9		6:09						- 1177.4						21.9
							-			Coring Te	rminated at El	 lev 1177 /ff	tin Covetalline	Rock (Gneiss &	21.9
										Schist)	illinated at L	ICV. 1177.41	in Orystanne	Nock (Grieiss &	
									-						1
															
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33316.1.1/B-3872 EB1-B Box 1 of 2



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



GEOSCIENCE GROUP, INC. BORING LOG

SHEET 1 OF 1

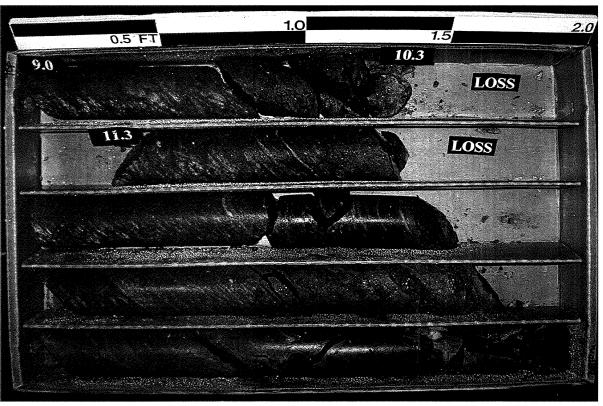
					***************************************	Г	***************************************				-			T 1 OF 1	
	ECT NO				B-3872	<u> </u>	O.BRZ-155			CO. I			LD SUPER	V. D.Hardister	
SITE C	ESCRI	PTION	Retair	ning Wa	all at End Be	nt-1 for E	Bridge No.	195 over Be	ar Cree	k on S	R 15	552		GROUND W	ATER (ft)
BORIN	IG NO.	RW-3	RT	BC	DRING LOC	ATION	13+77	OFF	SET 11	RT		ALIGNMENT	·L-	0 HR.	N/M
COLLA	AR ELE	V. 119	99.6 ft	ТОТА	L DEPTH	22.3 ft	NOR	RTHING 7	12519.5	5		EASTING 1119	390.81	24 HR.	5.2
DRILL	MACHI	NE CI	ME 550	x	DRILL MET	HOD R	otary/HQ		HA	MME	R TY	PE Automatic	FINAL C	ASING DEPTH	9.0 ft
DATE	STARTE	ED 12/	16/04	СОМ	PLETED 12	/16/04	DRILLING	G FLUID DI	ENSITY	Cree	k Wa	ater SURFACE	WATER DE	PTH N/A	
ELEV.	DEPTH	BL	ow col	TNL	·	BLOWS	PER FOOT		SAMP.	V	L	SOII	AND BOCK	DESCRIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 20	40	60	80 10	0 NO.	MOI			AND ROOF		
1199.6	0.00				Groun	nd Surfa	ce Elev. 11	100 6 #				1199.6			0.0
1199.0	- 0.00		 	<u> </u>	Orour	ia Garia	CC LICV. 1	199.0 10	†		L:	Roadway	Embankmer	t Fill-Loose Brown	1
	L												s Slity Coars	e to Fine SAND (A	
					• • • • •	.	• • • • •							nd COBBLESwith	
l .	3.5		14/6/	<u> </u>		.						Very Loos	ie I an Silty F	ine SAND (A-2-4)	
1195-	L	1	WOH	1	● 1					SAT	D.				
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	L											, •			
	Ŀ										m	1192.6 Weathere	d Rock-Brow	n-Grey Weathere	
	8.5			ļ	1 · · · ·			· · · <u>· ·</u> ·]				1191.6 Gneiss Crystalline	Rock-Blue-	Grey Gneiss	. 8
1190-	L	60/0.1				 .		60/0.1		D		1190.6 Crystalline	Rock-Blue-	Grey Slightly	9
1190-	Ī											1189.3 Weathere	d Hard Gneis I Verv Close	ss and Schist with Fracture Spacing	<u>10</u>
	Ī					<i>.</i>					Щ	Weathere	d Rock-Brow	n Severely Weath t with Very Close	ered 11
•	†											Fracture 9	Spacing	Grey and Grey	
•	Ť										1	Moderate	y and Slightl	y Weathered Hard ss with Close Frac	l and
-	†										17.	Spacing	y Haid Giles	ss with Close Mac	luie
1185-	†										约	-			
	t					<i>.</i> .					1	-		•	
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1180-	F					<i>.</i>						_			
-	+											-			
	F											1177.3			22
-	 		†	†					1	1		 Coring Te 	rminated at E	Elev. 1177.3ft in	22
	+										-	- Crystalline	Rock (Gnei	99)	
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GEOSCIENCE GROUP

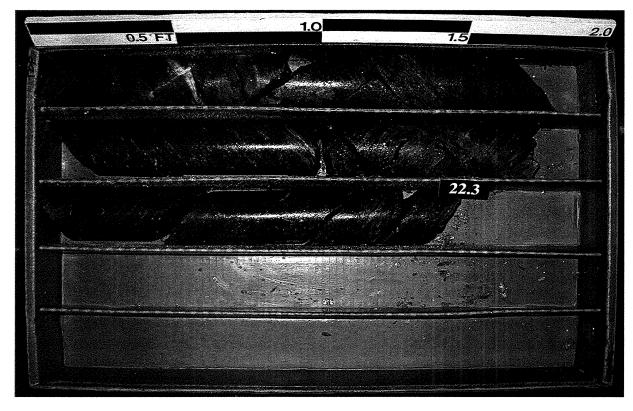
GEOSCIENCE GROUP, INC. CORE BORING REPORT

	*********				*************			***					SHEE	ET 1 OF 1	
PROJ	IECT N	0. 33	316.1.1	ID.	B-38	72	FED.	NO.BF	RZ-1552(8)		CO. McDo	well	FIELD SUPER	RV. D.Hardister	
SITE	DESCR	IPTIC	ON Reta	ining V	Vall at	End Be	nt-1 for	Bridge	No. 195 o	ver Bear Cr	eek on SR 15	52		GROUND WA	TER (ft)
BORI	NG NO	. RV	V-3 RT		BORIN	G LOC	ATION	13+7	7	OFFSET '	11' RT	ALIGNMEN	T -L-	0 HR.	N/M
COLL	AR EL	EV.	1199.6 ft	TOT	TAL DE	PTH	22.3 ft		NORTHIN	IG 742519).55	EASTING 1	119390.81	24 HR.	5.2
DRILL	. MACH	IINE	CME 55	0x	DRIL	L ME1	THOD	Rotary	/HQ		HAMMER TY	PE Automati	c FINAL C	ASING DEPTH	9.0 ft
DATE	STAR	ΓED	12/16/04	CO	MPLET	ED 12	/16/04	DRI	LLING FLU	JID DENSIT	Y Creek Wa	ter SURFAC	CE WATER DE	EPTH N/A	
CORE	SIZE	HQ				TOT	AL RUI	N 13.3	ft	DRILLER	D. Harris				
ELEV.	DEPTH	RUN	DRILL RATE	REC.	UN RQD	SAMP.		RATA I			DESCR	IPTION AND RI	FMARKS		
(ft)	(ft)	(ft)	(Min./ft)	(ft) %	(ft) %	NO.	REC.	RQD			D LOOK	ii HOITAIDI	LIVIANO		
1190.6							,				Begin	Coring @ 11	90.60 ft		
1190.6	9.0	3.3	3:47	(2.3) 70%	(1.7) 52%		1.3 100%	0.7 54%		Crystallin	ne Rock-Blue-G	Grey Slightly	Weathered Ha	ard Gneiss and Scl	nist
			0.17	''	5270		100%	3470	1189.3			- Tuotaio	opaonig		1
			4:09				0.0	N/A	- 1109.5	2 JTS @ 2 JTS @ 2 JTS @ 1 JT @ 6	30-40° 40-50°				10.3
							0%		1188.3	— Weather	ed Rock-Brow	n Severely W	eathered Soft	Gneiss and Schis	11.3
			2:52				10.6	7.5 68%	•	with Very	/ Close Fractu	re Spacing			
1187.3 1187.3		5.0	1:15/0.3	(4.8)						L No Disce Crystallin	rnible Jts ne Rock-Blue-(Grey and Gre	y Moderately a	and Slightly n Close Fracture	_
			5:21	96%	70%					Weather Spacing	ed Hard and M	floderately Ha	ird Gneiss with	n Close Frácture	
			4:12						-	4 JTS @	20-30				
			4.12							4 JTS @ 14 JTS @ 16 JTS @ 5 JTS @	2) 30-40 2) 40-50				
			3:32							2312@	60-70	~			
									_						
			4:44												
			5:23						-						
1182.3 1182.3	17.3 17.3	5.0		(4.8)	(3.0)										l
1102.3	17.3	3.0	3:47	96%	60%				-						
									<u>-</u>						
			3:10												
			3:06						-						
			3:56						-						
									-						
1177.3	22.3		4:07						1177.3						22.3
									-	Coring To	erminated at E	lev. 1177.3ft	in Crystalline I	Rock (Gneiss)	
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33316.1.1/B-3872 RW-3 RT Box 1 of 2



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



GEOSCIENCE GROUP, INC. BORING LOG

SHEET 1 OF 1

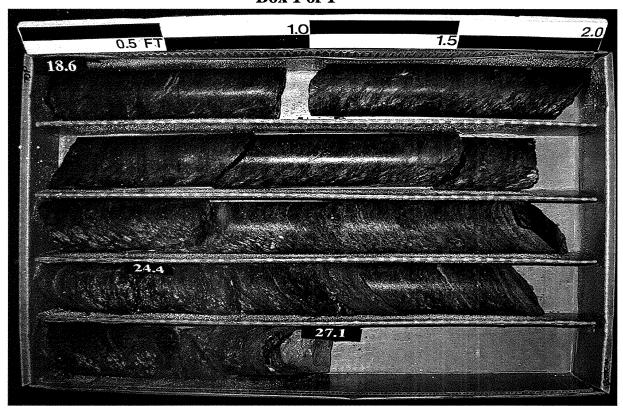
PROJECT NO. 33316.1.1 ID. B-3872 FED. NO.BRZ-1552(8) CO. McDowell FIELD SUPERV. D. Hardister SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road) **GROUND WATER (ft)** BORING NO. TS-2 BORING LOCATION 13+76 OFFSET 19' LT ALIGNMENT -L-0 HR. N/M COLLAR ELEV. 1214.4 ft TOTAL DEPTH 27.1 ft NORTHING 742504.59 EASTING 1119364.71 17.7 24 HR. 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. DEPTH **BLOW COUNT** BLOWS PER FOOT SAMP. SOIL AND ROCK DESCRIPTION 0.5ft 0.5ft 0.5ft 60 80 (ft) NO. 1214.4 0.00 Ground Surface Elev. 1214.4 ft Roadway Embankment Fill-Soft Brown-Orange Micaceous Fine Sandy Silty CLAY and BOULDERSand COBBLES 1210-Roadway Embankment Fill-Loose Tan Micaceous Silty Fine SAND with BOULDERSand COBBLES(A-2-4) 1205-100/0.2 Crystalline Rock-Brown-Tan Gneiss 1200 Crystalline Rock-Grey Schist Crystalline Rock-Grey Slightly Weathered Hard Schist with Close and Moderately Close 1195 RS-5 Fracture Spacing 1190-Crystalline Rock-Brown-Grey Moderately Weathered Moderately Hard Schist and Gneiss with Close and Very Close Fracture Coring Terminated at Elev. 1187.3ft in Crystalline Rock (Schist & Gneiss)

GEOSCIENCE

GEOSCIENCE GROUP, INC. CORE BORING REPORT

		****			-				SHEET 1 OF 1
			316.1.1		B-387				RZ-1552(8) CO. McDowell FIELD SUPERV. D.Hardister
SITE	DESCR	IPTIC	ON Bridg	ge No.	195 ov	er Bear	r Creek	on SR	R 1552 (Lake James Road) GROUND WATER (ft)
BORII	VG NO.	TS	-2	TE	BORING	G LOC	ATION	13+7	6 OFFSET 19' LT ALIGNMENT -L- 0 HR. N/M
COLL	AR ELI	EV.	1214.4 ft	тот	AL DE	PTH	27.1 ft	**********	NORTHING 742504.59 EASTING 1119364.71 24 HR. 17.7
DRILL	MACH	INE	CME 55	0x	DRIL	L MET	HOD	HSA/H	L
			12/21/04			ED 12			ILLING FLUID DENSITY Creek Water SURFACE WATER DEPTH N/A
CORE		HQ					AL RUN		
	DEPTH	-			JN	SAMP.	STR		
(ft)	(ft)	(ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft)	NO.	REC.	RQD	DESCRIPTION AND REMARKS
1.7	\·*/	,	,,	%	<u>%</u>		%	%	
1195.8	ACTION AND DESCRIPTIONS	<u> </u>		75.51	70.0				Begin Coring @ 1195.80 ft
1195.8	18.6	3.5	4:58	(3.3) 94%	(3.3) 94%		5.6 97%	5.3 91%	Crystalline Rock-Grey Slightly Weathered Hard Schist with Close and Moderately Close Fracture Spacing
						RS-5			-
			6:55						2 JTS @ 10-20 2 JTS @ 50-60 1 JT @ 70-80
			4:03						
1192.3	22.1		2:50/0.5						
1192.3	22.1	5.0		(4.9)	(3.4)				
			4:42	98%	68%				
			0.50						 -
			2:52						
			3:43				2.6	1.4	1190.0 24. Crystalline Rock-Brown-Grey Moderately Weathered Moderately Hard
]				96%	52%	Crystalline Rock-Brown-Grey Moderately Weathered Moderately Hard Schist and Gneiss with Close and Very Close Fracture Spacing
			5:16						2 JTS @ 0-10 3 JTS @ 30.40
									- 2 JTS @ 0-10° 3 JTS @ 30-40° 4 JTS @ 40-50° - 1 JT @ 70-80°
11070	ا ، ۔ ، ا		5:32						
1187.3	27.1								<u> 1187.3 </u>
									Coring Terminated at Elev. 1187.3ft in Crystalline Rock (Schist & Gneiss)
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33316.1.1/B-3872 TS-2 Box 1 of 1



SUMMARY OF LABORATORY TEST DATA FOR NCDOT

33316.1.1/B-3872
Retaining Wall at End Bent-1 for Bridge No. 195 over Bear Creek on SR 1552
McDowell, North Carolina

		Clay (%)	12	15										
		Silt (%)	7	15					·			,		
		Fine Sand (Ret. #270) (%)	58	26										
		Coarse Sand (Ret. #60)		4										
	Gradation Results	Pass #270 Sieve	19	27										
		Pass #200 Sieve	28	31										
		Pass #40 Sieve	06	58										
		Pass #10 Sieve	66	68										
nits		٥	ďN	d/N										
Atterberg Limits		نم	άN	d/Ν										
At		j	61	28							,			
	Z	Value	МОН	2										
· Comment	AASHIO	Class	A-2-4(0)	A-2-4(0)										
Natural Moisture	Content	(%)	N/A	N/A										
	Sample	Type	SS-2	SS-10										
Sample	Depth	(£)	3.5-5.0	3.5-5.0										-
	Boring	Š	EB1-B	RW-1										

GREENSBORO, NORTH CAROLINA PROJECT NO: GR04-0424.GE

GEOSCIENCE GROUP, INC. GREENSBORO, NORTH CAROLINA

33316.1.1 (B-3872) Retaining Wall for Bridge No. 195 over Bear Creek on SR 1552 (Lake James) McDowell County, North Carolina

ROCK TESTING SUMMARY

BORING NO.	SAMPLE NO.	DEPTH	UNCONFINED COMP.	YOUNG'S	POISSON'S
			STRENGTH (psi)	MODULUS (psi)	RATIO
TS-2	RS-5	19.7-20.2	540	N/A	N/A
RW-1	RS-6	9.8-10.3	8,640	N/A	N/A
		0.0 .0.0	0,040	IVA	INA

SITE PHOTOGRAPHS



Looking from Beginning of Retaining Wall toward EB1-B



Looking from Corner of Retaining Wall toward TS-2

SITE PHOTOGRAPHS



Looking from Corner of Retaining Wall toward RW-1

CONTENTS:

D. Hardister

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

STATE	STATE PE	ORCT REPRESENCE IN		T	724
N.C.	В	-3872		1	35
STATE !	PROT. 170.	P.A.PROLIFO.	Г	BESCHUT	THON
3331	6.1.1	BRZ-1443(8)		P.E	
			_	CUNC	T

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33316.	1.1 I.D. NO. B-3872
F.A. PROJECTBRZ-155	2(8)
COUNTY McDOWELL	
PROJECT DESCRIPTION_	Bridge No. 195 over Bear
Creek on SR 1552 (Lake Jam	
SITE DESCRIPTION	

CAUTION NOTICE

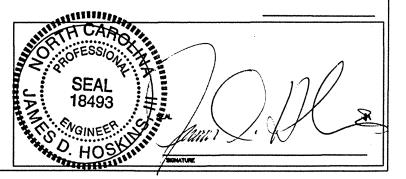
THE SUBSURFACE REFORMATION AND THE SUBSURFACE RIVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORNING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVEWED OR RESPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT @ (078) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORRIOL 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 CECTECHNICAL INTERPRETATION OF ALL AVAILABLE. SUBSURFACE DATA AND MAY NOT RECESSARILY 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 IN-REPENT IN THE STRUMAND THE METHOD. THE OBSERVED WATER LEVELS OR SOIL MOSTURE CONDITIONS DIOCATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION, THESE WATER LEVELS OR SOIL MOSTURE CONDITIONS MAY VARY CONSERVELY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIODER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESION DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESION INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR COMPANIES 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 EXCUMITERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HAMBLE 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 ROLICATED IN THE SUBSURFACE REFORMATION.

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT MAPLED OR QUARANTEED 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 CLAMS FOR INCREASED COMPENSATION OR EXTENSION OF THE BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE. For Letting



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

	SOIL AND ROCK LEG	BEND, TERMS, SYMBOLS, AND AB	BREVIATIONS	
SOIL DESCRIPTION	GRADATION		ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SENI-CONSOLIDATED OR WEATHERED EARTH NATERIALS	WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO CO- UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE, (ALS	LSO ROCK LINE INDICATES THE LEVEL AT	aterial that when tested, would yield spt refusal an inferred which non-coastal plain material would yield spt refusal.	ALLUYIUM (ALLUY.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 1988 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 1286, ASTM D-1586), SOIL	POORLY GRADED GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.	I SPT REFUSAL IS PENEIRATION BY A 3	split spoon sampler equal to or less than 8.1 foot per 68 blows. He transition between soil and rock is often represented by a zone	
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE:	ANGULARITY OF GRAINS	OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVI		PREPAREDOS - PETELED TO NOCKS THAT PAYE BEEN BERTARED FROM SHAD ON THAT CONTINUE SHAD.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS ANGULA	AR.	+-CDASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 188 BLOWS	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.
YEM STIFF, GRAF SICTY CLAY, MOIST WITH MITERBEDDED FINE SAND LAVERS, HIGHLY PLASTIC, A7-6	SUBANGULAR, SUBROUNDED, OR ROUNDED.		R FOOT.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	TOTAL LINE 1 1/1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	E TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT ALD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE,	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS (195% PASSING *280) (195% PASSING *280)	Mineral Names such as Quartz, Feldspar, Mica, Talc, Kaolin, etc. are used in descrip Whenever they are considered of significance.	ROCK (CR) GNE	ISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	NUN-CRYSTALLING con	e to coarse grain metamorphic and non-coastal plain Ilmentary rock that would yelld spt refusal if tested, rock type	COLLUYIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6, A-7	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 38	8 RUCK UNCHU INC.	Ludes Phyllite, Slate, Sandstone, etc. Stal Plain Sediments cemented into Rock, But May Not Yield	of slope.
SYMBOL SHEETH SECRETARY STATES AND ADMINISTRATION OF THE STATES AN	MODERATELY COMPRESSIBLE LIQUID LIMIT 31-58 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN	N 568 SEDIMENTARY ROCK SPT	REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANOSTONE, CEMENTED	CORE RECOVERY RIEC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUM AND EXPRESSED AS A PERCENTAGE.
Z PASSING SILT-	PERCENTAGE OF MATERIAL	(CP) SHE	LL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGHEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
9 19 D9 RQ GRANUAR CLAY PICCE.	ORGANIC MATERIAL GRANULAR SILT- CLAY OTHER MATERIA	IA. DOGU CONCOLUE O	RIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
● 288 15 MX 25 HOUR HX 35 HOUS HOUSE HOUSE HOUSE HAUSE	TRACE OF ORGANIC MATTER 2 - 3X 3 - 5X TRACE 1 - 16	18% HAMMER IF CRYSTALLINE.	AGUITER STATES THE STAR SCIOTE STATEMENTON TANGS CARCEL	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIBRID LIMIT 48 HOLAS HAN 48 HOLAS HAN 48 HOLAS HAN 48 HOLAS HAN SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 18 - 2 NODERATELY ORGANIC 5 - 18% 12 - 28% SOME 29 - 3	VERY SLIGHT HUCK GENERALLY PRESING	JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
PLASTIC BREX 6 MX N.P. 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN LITTLE OR HIGHLY		AND ABOVE (V. SLL) CRYSTALS ON A BROKEN S OF A CRYSTALLINE NATUR		THE LINE OF DIP, MEASURED CLOCKYISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX S 8 S 4 HX 8 HX 12 HX 16 HX No HX MODERATE AMOUNTS OF SOILS	GROUND WATER		JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USINE TYPES STORE PHRISE FINE STETY OR CLAYEY STETY CLAYEY ORGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.		CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SMO SAND UNAVEL HAND SHAND SOILS SUILS	STATIC WATER LEVEL AFTER 24 HOURS.	MODERATE SIGNIFICANT PORTIONS OF	ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGED FROM
GEN. RATING AS A EXCELLENT TO GOOD FAIR TO POOR POOR POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA		eldspars are dull and discolored, some show clay. Rock has er blows and shows significant loss of strength as compared	PARENT MATERIAL.
SUBGRACE	SPRING OR SEEPAGE	WITH FRESH ROCK.	·	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDDMENTS DEPOSITED BY THE STREAM.
P.I. OF A-7-5 ≤ L.L 3Ø : P.I. OF A-7-6 > L.L 3Ø	MISCELLANEOUS SYMBOLS		OISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL IAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
CONSISTENCY OR DENSENESS RANGE OF STANDARD RANGE OF UNCONFINED		CHOOL SEV.) AND CAN BE EXCAVATED W	VITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	THE FIELD.
PRIMARY SOIL TYPE COMPRESSION PENETRATION RESISTENCE COMPRESSIVE STRENGTH		NPLE IF TESTED, WOULD YIELD ! CHATIONS SEVERE ALL BOOKS EXCEPT CHART	<i>spt. Beflisal.</i> Fz discolored or stained, rock fabric Clear and Evident But Reduce	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
ACDA I UUGE	1 1	IN STRENGTH TO STRONG	SOIL. IN GRANITOID ROCKS ALL FELOSPARS ARE KAOLINIZED TO SOME	LEDGE - A SHELF-LINE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SHALL COMPARED TO ITS LATERAL EXTENT.
GRANS AR LOOSE 4 TO 18	-	LK SAMPLE EXTENT. SOME FRAGMENTS	OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL PENSE 18 TO 38		LII SECON	Z DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN
(NON-COHESIVE) VERY DENSE >56	ST- SHEL	ELBY TUBE (Y. SEV.) THE MASS IS EFFECTIVELY	Y REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	SOILS USUALLY INDICATES POOR AFRATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
VERY SOFT	O MONETORING WELL	VECTICES OF THE DOTISTIA	AN EXAMPLE OF ROCK VEATHERED TO A DEGREE SUCH THAT ONLY MONOR IL ROCK FABRIC REMAIN. <i>IF TESTELLYTELDS SPT N. YALUES & 188 BPE</i>	INTERVENING IMPERVIOUS STRATUM
GENERALLY SOFT 2 TO 4 8.25 TO 8.5 SILT-CLAY MEDIUM STIFF 4 TO 8 8.5 TO 1	A PIEZONETER	COMPLETE ROCK REDUCED TO SOIL, R	ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE VEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	TTTTT PLLUVIPL SUIL BOURDANT		NS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (R.Q.Q.) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 38 2 TO 4 HARD >38 >4	Score indication	CBR SAMPLE ALSO AN EXAMPLE.	ROCK HARDNESS	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 DICHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AN EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES — SPT N-VALUE	PARENT OF GODAYOUTD		SAPPOLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 18 48 68 286 279	• - SOUNDING ROD (REF) SPT REFUSAL	VERY HARD CANNOT BE SCRATCHED B SEVERAL HARD BLOWS OF	BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES F THE GEOLOGISTS PICK.	PARENT ROCK.
OPENING 0900 4.76 2.8 8.42 8.25 8.875 9.853	ABBREVIATIONS		ONIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY		MOISTURE CONTENT MODERATELY CAN BE CONTENT BY IN		TO THE BEDOING OR SCHISTOSITY OF THE INTRUDED ROCKS
BLORU (COB.) (GRU (CSE, SOL) (F, SOL) (SLJ (CLJ	BT - BORING TERMINATED MED MEDIUM V VI	VERY HARD EXCAVATED BY HARD BLO	ONITE OR PICK, GOUGES OR GROOVES TO BLAZ5 INCHES DEEP CAN BE DV OF A GEOLOGISTS PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 385 75 2.8 8.25 8.86 8.265	MONE - MO CONTINUATER PROTESTED	- VANE SHEAR TEST BY MODERATE BLOWS.		STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF
SIZE IN. 12' 3'	CSE COARSE PMT - PRESSUREMETER TEST	I MEDIUM CHAIN DE GROUVED ON GOO	JGED BUBS INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. NALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 148 LB HAMMER FALLING 38 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH
SOIL MOISTURE - CORRELATION OF TERMS	CT - CORING TERMINATED SD SAND, SANDY	POINT OF A GEOLOGISTS	PICK.	A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN BLI FOOT PENETRATION WITH 68 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION GATTERBERG LIMITS) DESCRIPTION	DPT - DYNAMIC PENETRATION TEST SLL - SLIGHTLY		GED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN	STRATA CORE RECOVERY ISRECJ - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
- SATURATED - USUALLY LIQUID, VERY WET, USUALLY	F FINE TCR - TRICONE REFUSAL	PIECES CAN BE BROKEN	BY FINGER PRESSURE.	of Stratum and Expressed as a percentage. <u>Strata rock quality designation is.r.q.d.</u> - a measure of rock quality described by
(SAT.) FROM BELOW THE GROUND WATER TABLE	FOSS FOSSILIFEROUS 7 - UNIT WEIGHT FRAC FRACTURED 7 - DRY UNIT WEIGHT	VERY CAN BE CARVED WITH KN SOFT OR MORE IN THICKNESS (IFFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE
PLASTIC LIQUID LINGT	FRACS FRACHENTS	FINGERNAIL.		TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (V) SEPUSULUS REDUINES DATING TO	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING		
PD PLL PLASTIC LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMPER TYPE		1 VEOV TUTCH V DEPOCE 3 A FEFT	BENCH MARK: BM#2 = 18+10.12, 40.7' LT -BL-
OM OPTIMUM MOISTURE - MOIST - 00 SOLIDI AT OR NEAR OPTIMUM MOISTURE	□ X AUTOMA	HATIC MANUAL VERY WIDE MORE THAN 1	THICKLY BEDOED 1.5 - 4 FEET	ELEVATION: 1210.53 ft
SL SHRINKAGE LIMIT		MODERATELY CLOSE 1 TO 3 FEET CLOSE 9.16 TO 1 FE	VERY THINLY BEDDED 8.83 - 8.16 FEET	
- DRY - CD REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6° CONTINUOUS FILIGHT AUGER CORE SIZES	VERY CLOSE LESS THAN I		NOTES: STUBOL FOR ROADIN'S EMBANKMENT FILL
HITHUR UPITHUM HOUSTONE		i i	INDURATION	CONSIST ING OF SILTY SAND CHE-LA-I-A
PLASTICITY	CHE-45 HARD FACED FINGER BITS -NQ	FOR SEDIMENTARY ROCKS, INDURATION IS	THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
PLASTICITY INDEX (PD DRY STRENGTH NONPLASTIC 8-5 VERY LOW	X CHE-556 X TUNG,-CARBIDE INSERTS X -HQ.	FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS	STANDAL FOR ALLWIAL SOIL CONSISTING
LOW PLASTICITY 6-15 SLIGHT	CASING W/ ADVANCER HAND TOOLS	7110-00-0	GENTLE BLOW BY HANNER DISINTEGRATES SAMPLE.	OF SILTY SAID LAR-II WITH BOULDERS & COBBLES
HED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH	PORTABLE HOIST TRUCONE STEEL TEETH POST	T HOLE DEGGER MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WIEN HIT WITH HAMMER.	
COLOR		AUGER	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	FR CHANGE FOR BOLOWAY SUBJURIES STOL
	I IXI CORE EUT	NODING ROO INDURATED	DIFFICULT TO BREAK WITH HAMMER	STIBOL FOR ROADIN' EMBANGMENT FILL COISIST HIM OF SILTY CLN (A7-6)
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.	OTHER OTHER	E SHEAR TEST EXTREMELY DIQURATED	SHARP HANNER BLOWS REQUIRED TO BREAK SAMPLE;	WITH BOULDERS & COBBLES
	OTHER	R annual control of the control of t	SAMPLE BREAKS ACROSS GRAINS.	

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.

<u>Bridge:</u> 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

<u>Temporary Shoring:</u> 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

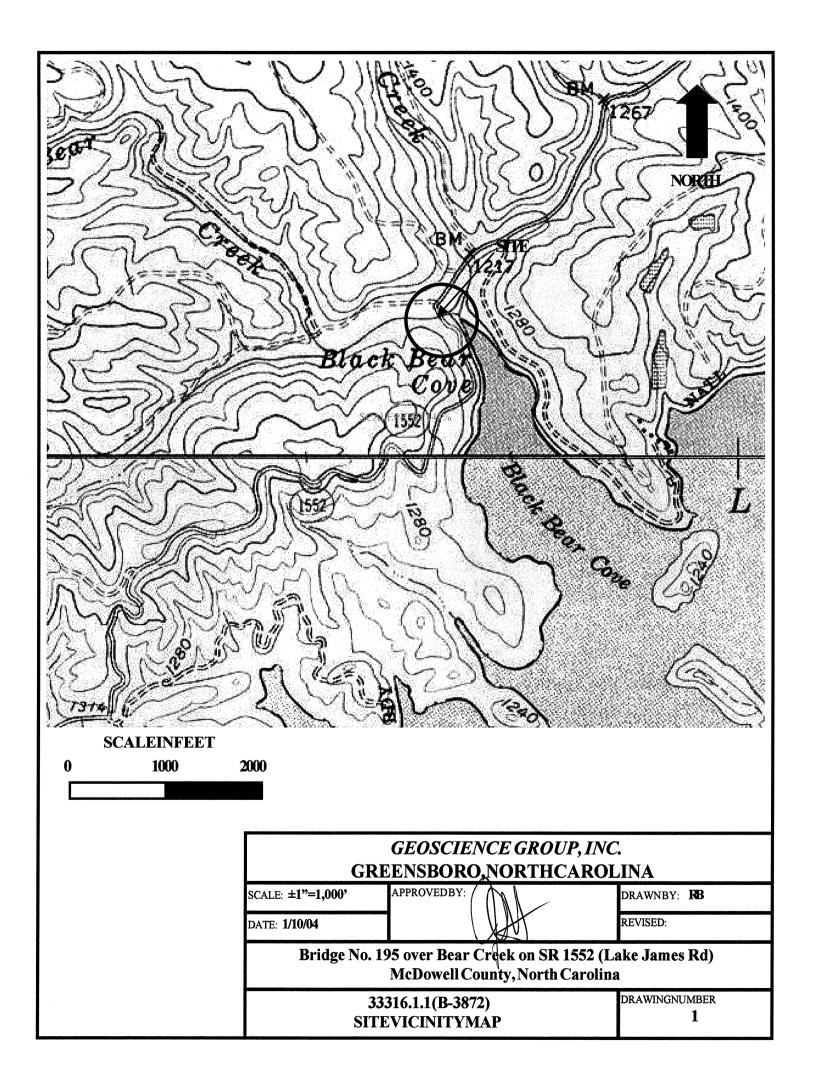
Project Manager

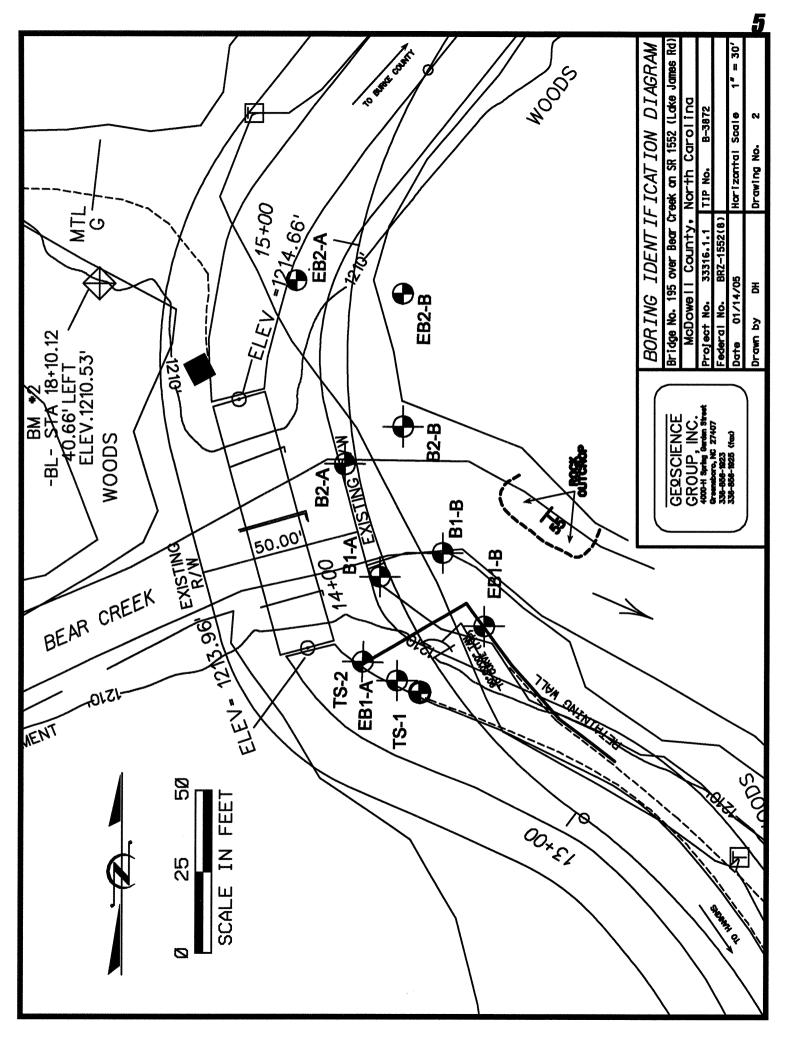
James D. Hoskins, III

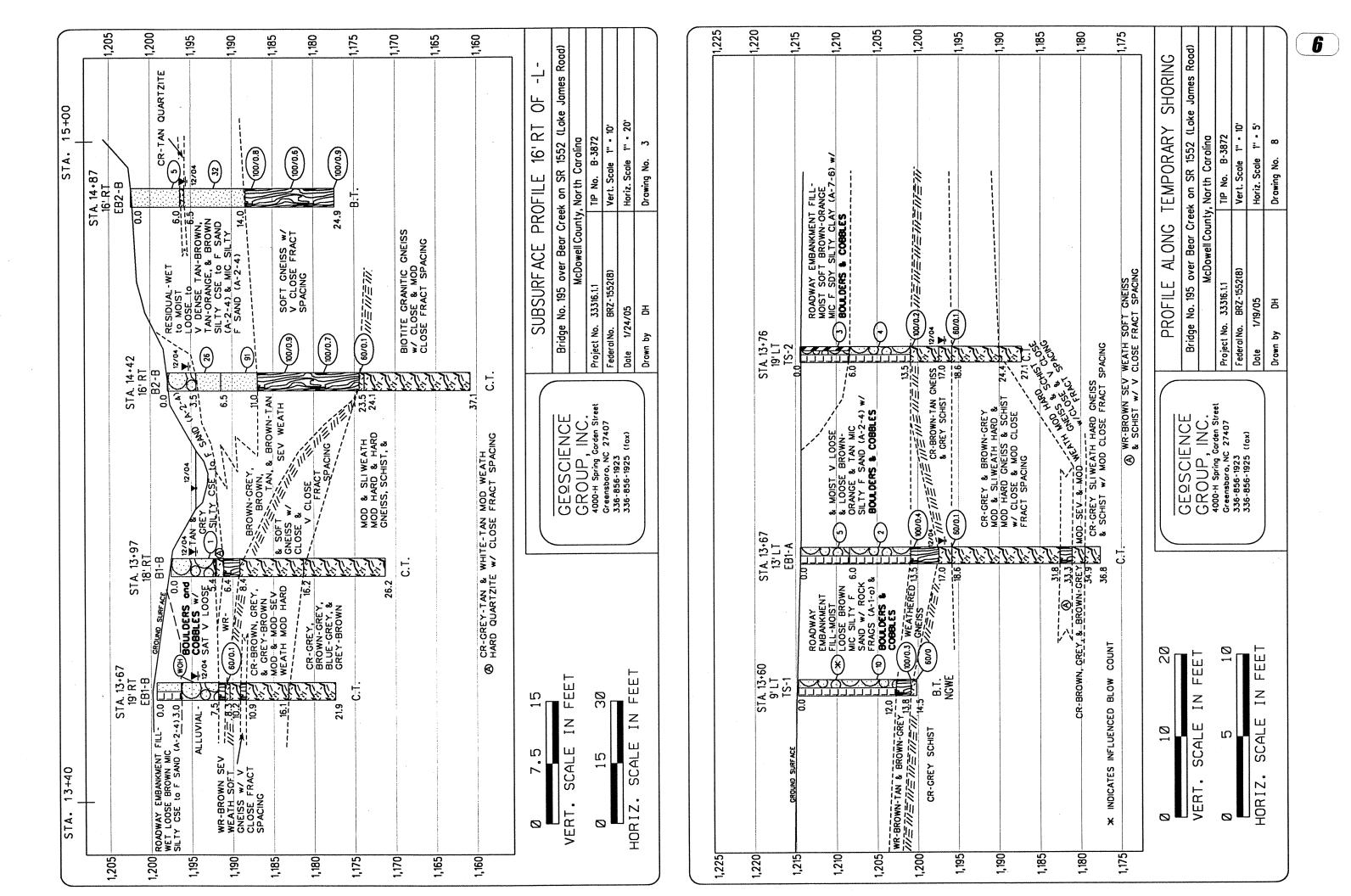
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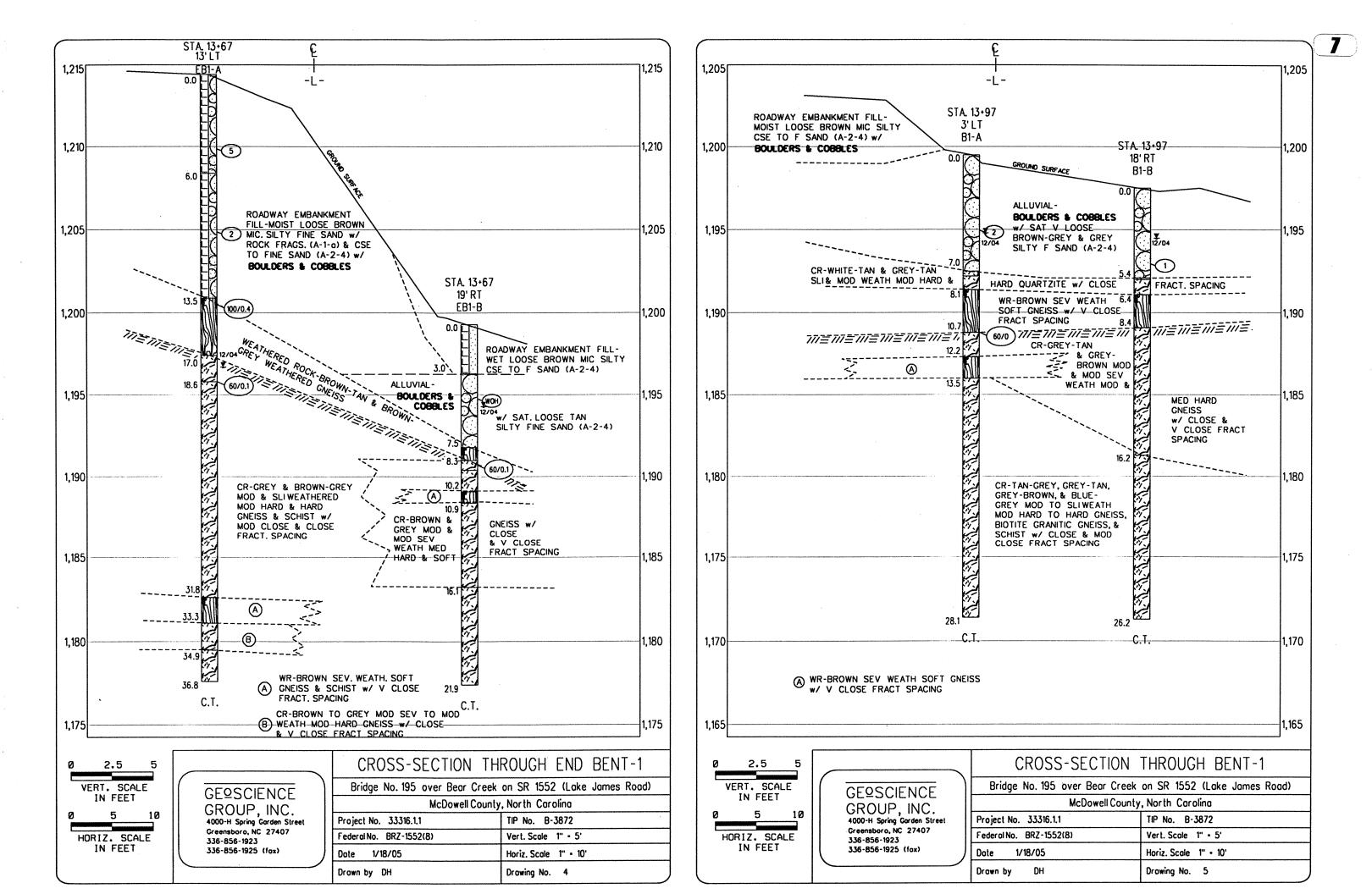
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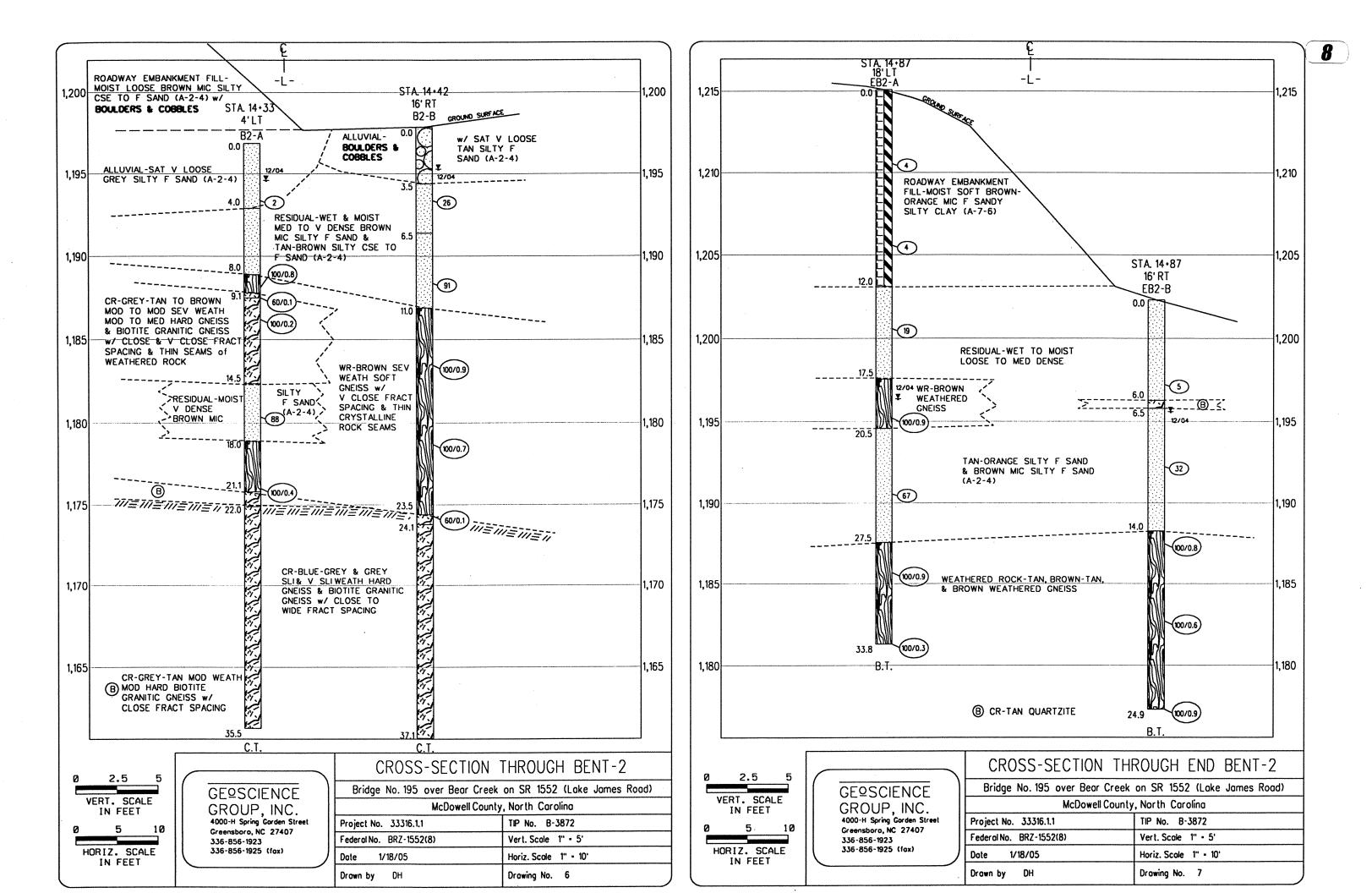
Enclosures











ID. B-3872

PROJECT NO. 33316.1.1

GEOSCIENCE GROUP, INC. BORING LOG

CO. McDowell

SHEET 1 OF 2

FIELD SUPERV. D.Hardister

SITE DE	SCRIPT	ION	Bridge		5 over Re		on SR 15			nes Pa	ad)					Tor Entr.	GROUND \		f+\
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FED. NO. BRZ-1552(8)

GEOSCIENCE GROUP

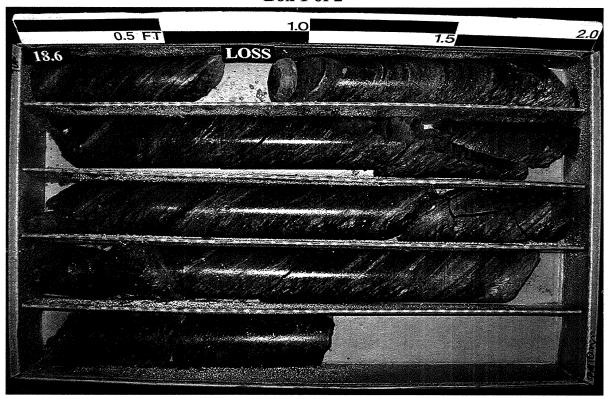
GEOSCIENCE GROUP, INC. BORING LOG

														SHE	ET 2 OF 2	
PROJE	CT NO.	33316	3.1.1	ID.	B-3872	FED.	NO. BRZ	Z-1552(8)			co. N	McDov	well	FIELD SUPERV		
SITE DE	SCRIPT	ION	Bridge					2 (Lake Ja							GROUND W	/ATER (ft)
BORING	NO.	EB1-A			RING LOC	CATION	13+67			ET 13'	LT		ALIGNMENT	-L-	0 HR.	N/M
	R ELEV.		4.4 ft	·	L DEPTH	36.8 ft		NORTHING	74:	2498.69			EASTING 1		24 HR.	17.7
ļ	ACHINE		ЛЕ 550x		DRILL ME		HSA/HQ				MMER				ASING DEPTH	18.6 ft
 	TARTED		21/04	<u></u>	LETED	12/21/04		LING FLUII	DENS		Cree	k Wat	er SURFAC	E WATER DEPT	TH N/A	
ELEV. (ft)	DEPTH (#)	BL 0.5ft	OW COL	0.5ft	ļ		WS PER FO		100	SAMP.	V	0		SOIL AND ROCK	K DESCRIPTION	
(11)	(ft)	0.511	0.5ft	U.JIL	 	Ĭ	<u>. </u>	<u> </u>	<u>`ĭ</u> °	NO.	MOI	G				
	-		<u> </u>			Continued	from Pre	vious Page		 -	ļ	\vdash	Coring	Terminated at El	ev. 1177.6ft in Crys	talline
	-												Rock	(Gneiss & Schist)	,	
	-												-			
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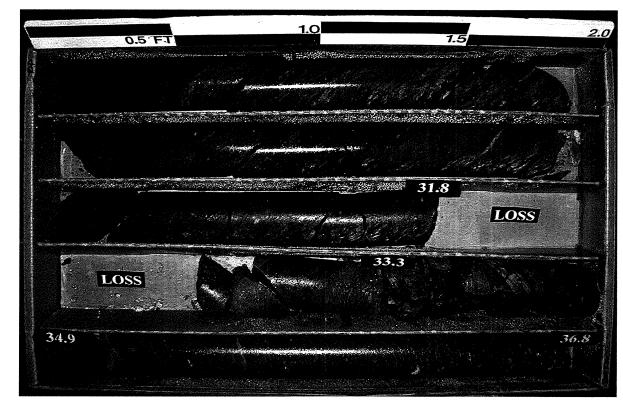
GEOSCIENCE GROUP, INC. CORE BORING REPORT

PROJE	CT NO.	33	316.1.1	ID.	B-387	2	FED. N	VO. BF	RZ-1552(8)		CO. McDov	vell	FIELD SU		D.Hardister	·····
	ESCRIP						1		52 (Lake Jar	mes Road)					GROUND W	ATER (ft)
BORIN		EB			BORING			13+67		OFFSET 1	3' LT	ALIGNMENT	Γ -L-		0 HR.	N/M
COLLA	R ELEV	/.	1214.4 ft	ТОТ	AL DEP	TH	36.8 ft		NORTHING			EASTING		10	24 HR.	17.7
DRILL	MACHIN	IE.	CME 550)x	DRILI	L METH	OD	HSA/H	Q	Тн	AMMER TYPE	Automat	ic FIN	VAL CASING	G DEPTH	18.6 ft
DATES	STARTE	D	12/21/04	COM	IPLETE	D 12	/21/04	DRII	LLING FLUIC	DENSITY	Creek Wat	er SURFAC	CE WATER	R DEPTH	N/A	
CORE	SIZE	HQ	***************************************	t		ТОТА	L RUN	18.2	ft	DRILLER	D. Harris					
ELEV.	DEPTH	RUN	DRILL RATE	REC.	JN RQD	SAMP.	STR	ATA			DESCR	IDTION AND	DEMARKS			***************************************
(ft)	(ft)	(ft)	(Min./ft)	(ft) %	(ft) %	NO.	REC.	RQD %			DESCR	IPTION AND I	KEWAKKS			
1195.8	••••••										Begin	Coring @ 11	95.80 ft		*****************	····
1195.8	18.6	3.2	4:53	(3.0) 94%	(2.7) 84%		13.0	9.7		Crystalline	Rock-Grey ar loderately Ha			tely and Slig	htly Weathe	red
			4.55	3470	0476		98%	73%	-			id Gliciss all	a ocinist w	itii Close i i	acture Spaci	ing
			3:11							4 JTS @ 0 2 JTS @ 1 6 JTS @ 3 9 JTS @ 4 10 JTS @ 3 JTS @ 8	0-20° 0-40°					
										9 JTS @ 4	0-50° 50-60°					
			1:59						-	3 JTS @ 8	0-90°					
1192.6 1192.6	21.8 21.8	5.0	0:23/0.2	(5.0)	(3.1)											
			2:27	100%	62%				<u> </u>							
	٠.		2:47													
														•		
	·		3:09						_							
						RS-1										
			3:12						-							
			3:09													
1187.6	26.8	5.0	0.00	(F.O)	(2.0)											
1187.6	26.8	5.0	1:56	(5.0) 100%	(3.9) 78%				-							
			2:12						-							2
			2:21													
			2.21													
			2:36						L							
1182.6	31.8		2:37						1182.6							31.8
1182.6	31.8	5.0	E.40	(3.5) 70%	(1.9) 38%		0.0	N/A	1102.0	Weathered	Rock-Brown Fracture Spa	Severely Wea	athered Sc	oft Gneiss a	nd Schist wit	
			5:13	10%	30%		0%		<u> </u>	No Discern	•	ung				
			3:42				16	0.0	1181.1		Rock-Brown t	n Grev Modo	rately Sou	erely to Ma	derately.	33.3
							1.6 100%	0.0		Weathered Spacing	Moderately H	lard Gneiss w	ith Close	and Very Cl	ose Fracture	•
			2:50								10°					
			0.50				1.9	1.9	1179.5	8 JTS @ 0 3 JTS @ 4 2 JTS @ 8)-50°)-80°					34.9
			. 2:59				100%	100%	<u> </u>	LOther Jis N	J-90 lot Discernible Rock-Grey Sli		red Hard	Gneiss and	Schiet with	
			3:18				·		_	Moderately	Close Fractu	re Spacing	icu Fidiu (Oliciss aliQ	OCHIST WITH	
1177.6	36.8								1177.6	_No_lts						
									-	Coring Terr	minated at Ele	v. 1177.6ft in	Crystalline	e Rock (Gn	eiss & Schist)
									-							
									-							
													Marie Color Carrier			

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



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



GEOSCIENCE GROUP, INC. BORING LOG

SHEET 1 OF 1

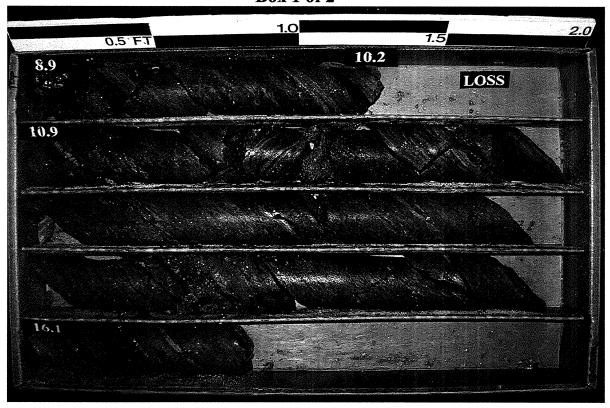
PROJECT NO. 33316.1.1 ID. B-3872 FED. NO.BRZ-1552(8) CO. McDowell FIELD SUPERV. D.Hardister SITE DESCRIPTION Bridge No. 195 over Bear Creek on SR 1552 (Lake James Road) **GROUND WATER (ft) BORING NO. EB1-B** BORING LOCATION 13+67 OFFSET 19' RT ALIGNMENT -L-0 HR. N/M **EASTING** 1119402.56 COLLAR ELEV. 1199.3 ft TOTAL DEPTH 21.9 ft NORTHING 742515.66 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. DEPTH **BLOW COUNT BLOWS PER FOOT** SAMP. SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 60 80 NO. (ft) 1199.3 0.00 Ground Surface Elev. 1199.3 ft Roadway Embankment Fill-Loose Brown Micaceous Silty Coarse to Fine SAND (A-2-4) Alluvial-BOULDERSand COBBLESw/ Very Loose Tan Silty Fine SAND (A-2-4) WOH WOH WOH SAT (Weathered Rock-Brown-Grey Weathered 1191.0 1191.0 Gneiss
1190.4 Crystalline Rock-Grey Gneiss
Crystalline Rock-Brown and Grey Moderately
and Moderately Severely Weathered Medium 60/0. 1190 Hard and Soft Gneiss with Close and Very Close Fracture Spacing
Weathered Rock-Brown Severely Weathered
Soft Gneiss with Very Close Fracture Spacing
Crystalline Rock-Brown and Grey Moderately 1188.4 and Moderately Severely Weathered Medium Hard and Soft Gneiss with Close and Very Close Fracture Spacing 1185-Crystalline Rock-Grey and Brown-Grey Moderately and Slightly Weathered Moderately Hard to Hard Gneiss and Schist with Close Fracture Spacing 1180 Coring Terminated at Elev. 1177.4ft in Crystalline Rock (Gneiss & Schist)

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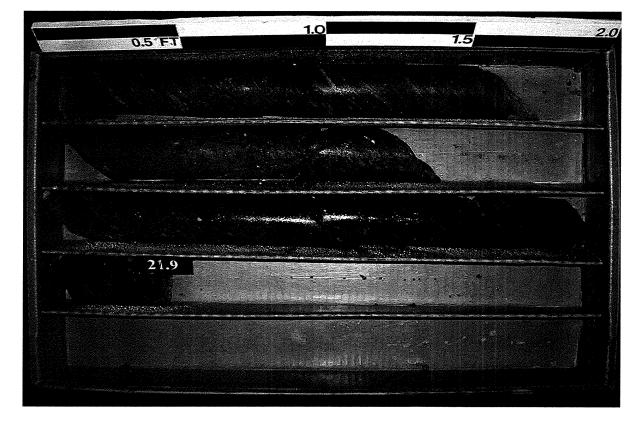
GEOSCIENCE GROUP, INC. CORE BORING REPORT

			***************************************										SHE	ET 1 OF 1	
PROJ	ECT NO) . 33	316.1.1	ID.	B-387	'2	FED.	NO.BF	RZ-1552(8)		CO. McDov	well	FIELD SUPE	RV. D.Hardister	
SITE	DESCR	IPTIC	N Bridg	ge No.	195 ov	er Bea	r Creek	on SR	1552 (Lak	e James Ro	ad)			GROUND W	ATER (ft)
 	NG NO.			E	BORING	3 LOC	ATION	13+6	7	OFFSET 1	19' RT	ALIGNMEN	T -L-	0 HR.	N/M
COLL	AR ELE	EV	1199.3 ft	тот	AL DE	PTH	21.9 ft		NORTHIN	IG 742515	.66	EASTING 1	119402.56	24 HR.	5.0
DRILL	MACH	INE	CME 55	0x	DRIL	L MET	HOD	Rotary	/HQ		HAMMER TYP	PE Automat	ic FINAL	CASING DEPTH	8.9 ft
DATE	START	ED	12/15/04	CO	IPLET	ED 12	/15/04	DRI	LLING FLU	JID DENSIT	Y Creek Wat	ter SURFA	CE WATER D	DEPTH N/A	
CORE	SIZE	HQ		·	nagyynojeksimusuusimus	TOT	AL RUN		ft	DRILLER	D. Harris				
ELEV.	DEPTH	RUN	DRILL RATE	REC.	JN RQD	SAMP.		ATA			DESCR	IPTION AND R	EMARKS		
(ft)	(ft)	(ft)	(Min./ft)	(ft) %	(ft) %	NO.	REC.	RQD %							
1190.4											Begin	Coring @ 11	90.40 ft		
1190.4	8.9	3.0	6:05	(2.3) 77%	(0.6) 20%		1.3 100%	0.3 23%	_	Crystallin	ne Rock-Brown	and Grey M	loderately and	d Moderately Seve lose and Very Clo	rely
			0.00	1170	2070		100%	23%	1189.1	Fracture	Spacing	ii a ana con v	Shoiss with O	lose and very ole.	
			5:02				0.0	N/A	_	7 2 JTS @ 2 JTS @ 2 JTS @	20-30°				10.2
							0% 5.1	2.6	1188.4	T & JTS &	40-50°	n Severely M	leathered Sof	ft Gneiss with Very	10.9
1187.4	11.9		6:20				98%	50%	<u> </u>	Close Fr	acture Spacing)	roamered 501	it Officias with very	
1187.4	11.9	5.0		(4.9) 98%	(2.7)				_	No Disce	rnible Jts	and Grov M	Inderstaly and	1 Moderatoly Sour	rely
			6:27	98%	54%					Weather Fracture	ed Medium Ha	rd and Soft (Gneiss with C	d Moderately Seve lose and Very Clos	se
			3:23						_		-				
										1 JT @ 0 2 JTS @ 7 JTS @ 9 JTS @ 1 JT @ 6	20-30 30-40				
			3:23						_	9 JTS @	40-50 0-70				
			4.40						•	701 @ 0	.0 10			•	
			4:40						1183.2						16.1
			3:25				5.8	5.2	- 1100.2	Crystallin	e Rock-Grey a	and Brown-G	rey Moderate	ely and Slightly Schist with Close	10.1
1182.4 1182.4	16.9 16.9	5.0		(5.0)	(4.8)		100%	90%		Fracture	Spacing	naid to naid	J Gheiss and	Schist with Close	
			3:27	100%	96%				-	3 JTS @ 8 JTS @	20-30°				
	,		4:26						-	0010@	40 00				
			4.20												
			3:10						_						
			3:17												
			6:09						- -						
1177.4	21.9								1177.4				***************************************		21.9
									-	Coring To Schist)	erminated at E	lev. 1177.4ft	in Crystalline	Rock (Gneiss &	
									_	Cornoty					
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33316.1.1/B-3872 EB1-B Box 1 of 2



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



GEOSCIENCE GROUP, INC. BORING LOG

SHEET 1 OF 1

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PROJE	ECT NO	. 33316	3.1.1	ID. I	B-3872	FED. N	IO.BRZ-15	52(8)			CO. N	/lcDo	well F	IELD SUPE	RV. D.Hardister	
SITE D	ESCRI	PTION	Bridge	No. 19	95 over Bear	r Creek o	on SR 1552	(Lake Ja	mes	Road)				GROUND V	VATER (ft
BORIN	IG NO.	B1-A		ВС	ORING LOC	ATION	13+97	OF	FSE	T 3' L	.T		ALIGNMENT	-L-	0 HR.	N/M
COLLA	AR ELE	V. 119	9.5 ft	TOTA	L DEPTH	28.1 ft	NOF	RTHING	7425	31.12	 2		EASTING 11	19370.00	24 HR.	4.7
DRILL	MACHI	VE C	ИЕ 550	×	DRILL MET	HOD R		***				R TY	PE Automatic	FINAL	CASING DEPTH	
	STARTE				PLETED 12		·	G EL UID	DENI				ter SURFAC			7.01
	DEPTH		OW COL				PER FOOT			AMP.	V /	L	iter SORFAC	LVAILNE	LEIN IVA	····
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 20	40	60		- 1	NO.	//	O G	S	OIL AND ROC	K DESCRIPTION	
(1-7)	(1-7								╁		MOI	9				
									l							
1199.5	0.00				Grou	nd Surfa	ce Elev. 1	199.5 ft					1199.5			C
-	 								.			(:]			and COBBLESwith rey Silty Fine SANI	
-	_												(A-2-4)		, ,	
-	-											X				
-	3.5	3	1	1							SAT					
1195-	ļ.		· .	'	•2	· · · · ·			.		Y	(:]	-			
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_									.			;; <u>;</u>	1192.5 1192.2 Crystal	line Rock-Whi	te-Tan Quartzite	
									\cdot				1191.4 Crystal	line Rock-Whi ered Moderate	te-Tan Slightly ly Hard Quartzite w	rith
4400									.			MI	Close F	racture Spaci	ing wn Severely Weath	
1190-	T								.			KIIIT	Soft Gr	eiss with Very	y Close Fracture Sp	acing
-	- 10.7	60/0						60/	•		D		1188.8 Crystal	ine Rock-Gre	y-Tan Moderately	1
									.			***	Weathe	ered Moderate	ely and Medium Har nd Very Close Fract	d ure 1
_	_				 							KIIF	\Spacing	כ	wn Severely Weath	- /
-	-												 Soft Gr	eiss with Clos	se and Very Close	
1185-	_												- Crystal	e Spacing line Rock-Tan	-Grey, Grey-Tan, a y to Slightly Weath	nd .
-	-												Modera	itely Hard to F	lard Gneiss, Biotite	
-	-					.			.						Schist with Close to acture Spacing)
-	-								.					•	. 0	
-	_															
1180-									.				_			
1100													-			
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1175-	-								.				-			
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	-					.						**	4474.4			_
	-								+			-			Elev. 1171.4ft in	2
_	_													ine Rock (Gne & Schist)	eiss, Biotite Granitio	:
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GEOSCIENCE GROUP

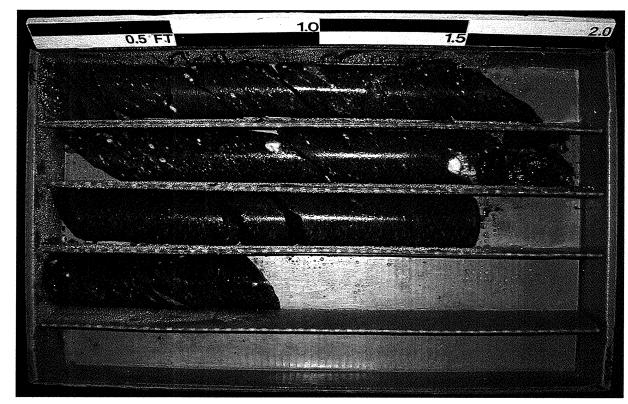
GEOSCIENCE GROUP, INC. CORE BORING REPORT

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			316.1.1		B-387		<u> </u>		RZ-1552(8) CO. McDowell FIELD SUPERV. D.Hardister
			-						R 1552 (Lake James Road) GROUND WATER (f
	NG NO.			┰┷			ATION	13+9	
			1199.5 ft			PTH		D -4	NORTHING 742531.12
			CME 55		J		HOD	-,	
CORE		HQ	12/13/04	CON	APLEI	ED 12/	AL RUN		8 ft DRILLER D. Harris
	DEPTH		DRILL		JN .	SAMP.		ATA	OIL DRILLER D. FIAITIS
(ft)	(ft)	(ft)	RATE (Min./ft)	REC. (ft) %	RQD (ft) %	NO.	REC.	RQD %	DESCRIPTION AND REMARKS
192.2				(0.0)	10.5				Begin Coring @ 1192.20 ft
192.2 191.4	7.3 8.1	8.0	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
191.4	8.1	2.6	12:20	(0.0) 0%	N/A		0.0 0%	N/A	
			12:52						No Discernible Jts
188.8	10.7		13:18/0.6		(6.6)	N=			- 1188.8
188.8	10.7	2.4	6:22	(1.7) 71%	(0.0) 0%	60/0	1.5 100%	0.0 0%	L
			3:43				0.2	N/A	1 JT @ 40-50° 2 JTS @ 50-60° 2 JTS @ 70-80° 2 JTS @ 80-90° Other Jis Not Discernible
186.4	13.1		4:42/0.4				15%		2 JTS @ 80-90° Other Jts Not Discernible
186.4	13.1	5.0	3:20	(3.8) 76%	(2.3) 46%		13.6	10.8	1186.0 Weathered Rock-Brown Severely Weathered Soft Gneiss with Close
			3:36				93%	74%	1 1
									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°
.			4:55						8 JTS @ 50-60 1 JT @ 70-80
181.4	18.1		6:25						
181.4	18.1	5.0	6:29	(4.8) 96%	(3.7) 74%				
			4:47	-					
			4:01						
			3:07						
176.4	22.4		3:00						
176.4 176.4	23.1	5.0	4:04	(5.0) 100%	(4.8) 96%	RS-2			_
			3:06						_
			4:45						-
			4:05						
171.4	28.1		4:23						1171.4
									Coring Terminated at Elev. 1171.4ft in Crystalline Rock (Gneiss, Biotite Granitic Gneiss, & Schist)

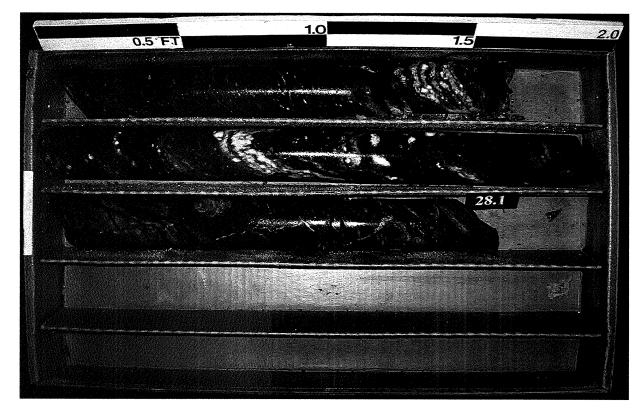
33316.1.1/B-3872 B1-A Box 1 of 3



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



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



GEOSCIENCE GROUP, INC. **BORING LOG**

SHEET 1 OF 1

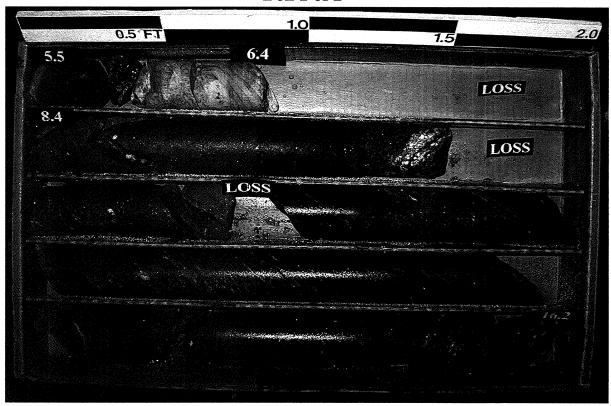
PROJE	CT NO.	33316	.1.1	ID. I	3-3872	FED.	NO. BRZ-15	52(8)			co. N	/IcDov	well		FIEL	SUPERV	. D.Hardiste	er	
SITE DE	SCRIPT	ION	Bridge	No. 19	over Be	ar Creek o	n SR 1552 (L	ake Jar	nes Ro	ad)							GROUND	WATER (ft)	
BORING	S NO.	B1-B		ВС	RING LC	CATION	13+97		OFFSE	ET 18'	RT		ALIGN	MENT	-L	-	0 HR.	N/M	
COLLA	R ELEV.	119	7.5 ft	TOTAL	. DEPTH	26.2 ft	NOI	RTHING	742	2538.63			EAST	ING 1	1193	39.55	24 HR.	3.0	
DRILL N	ACHINE	CN.	1E 550x		DRILL M	ETHOD	Rotary/HQ			НА	MMER	TYPE	E Au	utomatic		FINAL CA	ASING DEPTH	5.5 ft	
DATE S	TARTED	12/	16/04	COMP	LETED	12/16/04	DRILLING	3 FLUID	DENS	ITY	Cree	k Wat	er St	URFACE	. WA	TER DEPT	'H N/A		
ELEV.	DEPTH		OW COL	T	_		WS PER FOOT		400	SAMP.	V /	L			SOIL	AND ROCK	C DESCRIPTION		
(ft)	(ft)	0.5ft	0.5ft	0.5ft	9	20 4	10 60 1 1	80	100	NO.	MOI	G							
							•												
1197.5	0.00					Ground Sur	rface Elev. 1	197.5 ft					1197.5						0.0
												(:					COBBLES with AND (A-2-4)	Very	
-	-											07	•		,				
1195-	-										V	DY.	-						
-	3.5	1	1	WOH			· · · · · ·			003	CAT		•						
	_	1	'	VVOH	 ●1					SS-3	SAT								
_	_										1	Di.	1192.1					·	5
	_					. <i>.</i>							1192.0 1191.1	_ Crystal	line R	ock-Grey-T	an Quartzite an and White-Ta		5 6
4400														Fractur	e Spa	icing	Hard Quartzite wi	- 1	
1190-													1189.1	Weathe	ered F	Rock-Brown	Severely Weath	ered Soft	8.
														Crystal	line R	ock-Grey-B	rown Moderately eathered Moderat	and	
-						. .								Mediun	n Har	d Gneiss wi	th Close and Ver	y Close	
	-													Fractur	e opa	icing			
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1185-	-					<i></i>							-						
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-	-						· · · · · ·						1181.3	Crystal	line R	ock-Grey-B	rown to Blue-Gre	γ	16.
1180-	-												-	Hard to	Hard	Gneiss, Bid	eathered Modera otite Granitic Gne	itely iss, and	
-	-								• • •					Schist v	with C	lose Fractu	re Spacing		
	-																		
	-																		
	_					• • • • • •			• • • •										
1175-							• • • • • • • • • • • • • • • • • • •						_						
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1	-																		
†	-				<u> </u>				<u> </u>				1171.3						26.
1	-											-		Coring Rock (C	Termi	nated at Ele	ev. 1171.3ft in Cr anitic Gneiss, & S	ystalline	
-	-											-	-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	J. 1013	-, Divute Of	arnio Onoiss, & C		
+	-											-							
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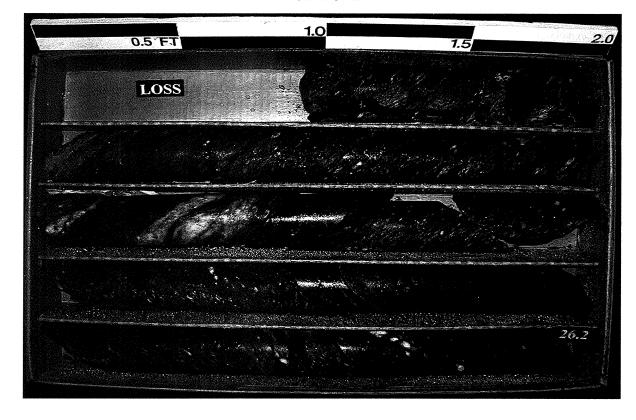
GEOSCIENCE GROUP, INC. CORE BORING REPORT

														SH	HEET	1 OF 1	
PROJI	ECT NO.	33	3316.1.1	ID.	B-387	2	FED. I	NO. BR	Z-1552(8)		CO. McDow	/ell	FIEL	D SUPE		D.Hardister	
SITE	ESCRIF	TION	Bridg	e No. 1	95 over	Bear C	reek or	SR 15	52 (Lake James F	Road)						GROUND V	VATER (ft)
BORIN	IG NO.	B1		E	BORING	LOCAT	ION	13+97	OFF	SET	18' RT	ALIGNMEN	NT -	L-		0 HR.	N/M
	AR ELE		1197.5 ft		AL DEP		26.2 ft			742538		EASTING	11193	389.55		24 HR.	3.0
	MACHIN		CME 550			L METH		Rotary/			HAMMER TYPE	Automa		<u> </u>		NG DEPTH	5.5 ft
 	STARTE		12/16/04	COM	IPLETE	т	16/04		LING FLUID DEN		Creek Wate	er SURFA	ACE W	ATER DI	EPTH	N/A	
CORE ELEV.	1	HQ RUN		RI	UN	SAMP.	L RUN	20.7	π μοκιι	LER	D. Harris						
(ft)	(ft)	(ft)	RATE (Min./ft)	REC. (ft) %	RQD (ft) %	NO.	REC.	RQD %			DESCRI	PTION AND	REMA	RKS			
1192.0												Coring @ 1				•	
1192.0 1191.3	5.5 6.2	0.7	4:27/0.7	(0.4) 57%	(0.0) 0%		0.9 100%	0.0 0%	Qu	ystallin Jartzite	e Rock-Grey-Ta with Close Frac	n and Whit ture Spacin	e-Tan I	Moderat	tely We	athered Hard	
1191.3	6.2	5.0	6:31	(2.8) 56%	(1.0) 20%	-	0.0 0%	N/A	1 1 1 1 1 1	JTS @ JT @ 2 JT @ 4 JT @ 7	0-30° 0-50°						6.4
			5:37				7.0	4.0	1189.1 Fra	acture (ed Rock-Brown S Spacing	Severely W	eathere	ed Soft C	Gneiss	with Very Clo	ose 8.4
			5:18				7.0 90%	4.9 63%	Cn We	ystallin eathere	rnible .lts e Rock-Grey-Bred d Moderately ar acture Spacing	own Moder nd Medium	ately ar Hard G	nd Mode Sneiss w	erately vith Clo	Severely se and Very	
			4:35								0-10° 10-20° 30-40° 40-50° 60-70° 70-80°						
1186.3	11.2		3:14						5 J 9 J	лs @ лs @	30-40° 40-50°						
1186.3	11.2	5.0	4:04	(4.7) 94%	(3.9) 78%				- 2 J 3 J	JTS @ JTS @	60-70° 70-80°						
			4:44														
			3:17			RS-3											
			3:42					,	-								
1181.3	16.2		3:31						- 1181.3								16.2
1181.3	16.2	5.0	5:27	(4.2) 84%	(2.2) 44%		9.0 90%	6.5 65%	_ Cry We	eathere	e Rock-Grey-Bro d Moderately Ha h Close Fracture	ard to Hard	-Grey I Gneiss	Moderat s, Biotite	tely to S Granit	Slightly ic Gneiss, an	
			3:43						7 J 2 J 9 J	ITS @ : ITS @ : ITS @ : ITS @ :	0-10° 30-40° 40-50°						
			4:22						- 8J 3J	ITS @	50-60° 80-90°						
			4:08						-								
1176.3	21.2		6:05						-								
1176.3	21.2	5.0	5:12	(4.8) 96%	(4.3) 86%				-								
			3:40						_								
			3:52														
			4:16						-								
			4:04														
1171.3	26.2								1 <u>171.3</u>	ring Te anitic G	rminated at Elevineiss, & Schist)	. 1171.3ft i	n Cryst	 alline Ro	 ock (Gr	– — – – neiss, Biotite	26.2
																	,

33316.1.1/B-3872 B1-B Box 1 of 2



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



GEOSCIENCE GROUP, INC. BORING LOG

										****					SHEE	T 1 OF 1	
PROJE	CT NO.	33316	5.1.1	ID. I	B-3872	FED. N	NO. BRZ-	1552(8)			co. I	VIcDov	well	FIEL	.D SUPERV.	D.Hardister	
SITE DE	SCRIPT	ION	Bridge	No. 19	5 over Bea	r Creek on	SR 1552	(Lake Ja	mes Ro	ad)						GROUND V	/ATER (ft)
BORING	NO.	B2-A		ВС	RING LOC	ATION	14+33		OFFSE	ET 4'1	_T		ALIGNM	ENT -	L-	0 HR.	N/M
COLLA	R ELEV.	119	6.9 ft	TOTAL	L DEPTH	35.5 ft	N	ORTHING	3 742	2566.22	2		EASTING	G 11190	359.17	24 HR.	2.3
DRILL N	ACHINE	E CN	/E 550x	'	DRILL ME	THOD	Rotary/HC	2		HA	MMER	TYPE	E Auto	matic	FINAL CA	SING DEPTH	18.0 ft
DATE S	TARTED	12/	20/04	COMP	LETED	12/20/04		ING FLUI	D DENS	ITY	Cree	k Wat	er SUR	FACE W	ATER DEPT	H N/A	
ELEV.	DEPTH	BL	ow cou	INT	T	BLOW	/S PER FO	OT .		SAMP.	V /	L				**************************************	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	ļo :	20 40	60	80	100	NO.	MOI	O		SOI	L AND ROCK	DESCRIPTION	
			· ·		 						1						
1196.9	0.00				G	ound Surf	ace Elev.	1196.9 f	<u> </u>		┼		1196.9	Alluvial-Ver	v Loose Grev	Silty Fine SAND	0.0 (A-2-4)
	-														, 20000 0.0,	J., 1 J.	,,
1195-	_ 2.5										V		_				
-	-	WOH	1	1	1					SS-4	SAT		•				
-	-										-	1	1192.9	Pacidual M	ladium Danas	ta Danca Braum	4
-	-														Silty Fine SAI	to Dense Brown ND (A-2-4)	
+	-				.								•				
1190-	- 75				.	· · · · ·					ŀ		-				
-	7.5 -	12	29	71/0.3	1						w		. 1188.9	A C	5		8.
-	9.3								100/0.8				1187.8			Weathered Gneiss	9
	_	60/0.1			1				60/0.1		М	学			Rock-Grey-Ta Rock-Grey-Ta	an Gneiss an to Brown Mode	rately
	10.5	100/0.2			┨				100/0,2		м		to	o Moderate	ely Severely V	Veathered Modera d Biotite Granitic C	tely to
1185-	-											المنزا	W	vith Close		se Fracture Spacin	
	_												•	Tim Ocum	3 01 1100011010	a rook	
					' ' ' '								1182.4	Residual-V	ery Dense Bro	own Micaceous Si	tv Fine
	15.5	28	39	49							м			SAND (A-2			.,
		"	"	13				· · · · ·	●88		"		•				
1180-	-												_ . 1178.9				18.
												KII	٧			Severely Weather	ed Soft
	-											\mathbb{N}			illine Rock Se	racture Spacing a ams	na
	20.5	4657			1		• • • • •		• • •			MI	•				
-	-	100/0.4			• • • •				100/0:4		M	炒	1175.8 C	rystalline	Rock-Grey-Ta	an Moderately We	21. athered
1175-	-					• • • • •						F	<u>_1174.9</u> N	Moderately	Hard Biotite (ture Spacing	Granitic Gneiss wit	h / 22.
	-													rystalline	Rock-Blue-Gr	ey and Grey Sligh Hard Biotite Grani	tly and
-	-					<i></i>						1		eneiss and		Moderately Close	
+	-							.				1/4		nuo i iauli	and opacing		
+	-											1					
1170	-								• • •		1		-				
+	-																
+	-							· ·				**					
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1	_							.									-
		L		L	ļ						 	1		orina Terr	ninated at Ele	v. 1161.4ft in Crys	35. talline
	-															v. 1161.4ft in Crys eiss & Gneiss)	talline

GEOSCIENCE GROUP, INC. CORE BORING REPORT

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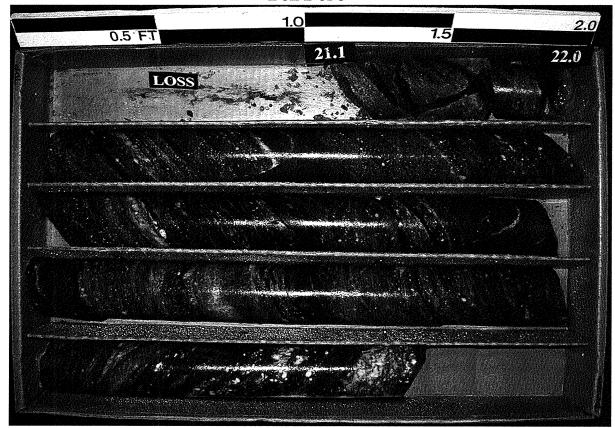
GEOSCIENCE GROUP, INC. CORE BORING REPORT

MODIFIED 100-15 1	GROGI			SHEET 1	OF 2		<i>) </i>	Jui							Q !	HEET 2 OF 2
Mile Mile	PROJECT NO. 33316.1.1	ID. B-3872	FED. NO. BR		······	PROJ	ECT NO.	33316.	1.1	D. B-387	72	FED. N	O. BRZ-1552(8)	CO. McD		······································
MACHINE 1988 10 10 10 10 10 10 10	TE DESCRIPTION Brid	dge No. 195 over Bea	ar Creek on SR 15	552 (Lake James Road) G	ROUND WATER (ft)	SITE	DESCRIF	TION	Bridge No	. 195 ove	r Bear Cr	eek on	SR 1552 (Lake Jar	nes Road)		GROUND WATER (f
MARCHEN PROPRIES MARCHEN PRO	RING NO. B2-A			3 OFFSET 4'LT ALIGNMENT -L-	OHR. N/M	BORI	NG NO.	B2-A		BORING	LOCATI	ON	14+33	OFFSET 4'LT	ALIGNMENT -L-	0 HR. N/M
## STAFFED 100255 COMPATION 120050 COMPATION 12				d	4 HR. 2.3	COLL	AR ELE\			OTAL DEF	PTH 3	5.5 ft	NORTHING	742566.22	EASTING 1119359.17	24 HR. 2.3
No. 100								····								
No. 2011 - 1					N/A				0/04 C	OMPLETE					ater SURFACE WATER D	·····
18		RUN CA	OTDATA	TRILLER D. Harris						RUN	,'		1	DRILLER D. Harris		
Section Continue		REC. RQD (ft) (ft) NO %	O. REC. RQD	DESCRIPTION AND REMARKS		ı		I RA			NO.	REC.	RQD	DESC	RIPTION AND REMARKS	· · · · · · · · · · · · · · · · · · ·
## 25 1.5				Begin Coring @ 1187.50 ft										Conti	nued from previous page	
## 1 ## 1 ## 2 ##	5:41	1 N=1	78% 8%	with Close and Very Close Fracture Spacing and Thin Seams	y Severely ranitic Gneiss of Weathered								-			
11.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0		[(3.1) [(0.0)]	2										The state of the s			
1162 4.270.5 117.5 4.270.5 4.270.5 4.270.5 4.270.5 4.270.5 4.270.5 4.270.5 4.270	9:08			7 JTS @ 40-50° 1 JT @ 70-80°				3:	24							
18.4 15.5 4270.8 NA NA NA NA NA NA NA NA NA NA NA NA NA	9:09			-		1161.4	35.5				1			Coring Terminated at F	Hey 1161 4ft in Crystalline F	Pock (Riotite Granitic
1.2 15 0 4270.8 NA NA NA NA NA NA NA NA NA NA NA NA NA	5:44			11824	14.5									Gneiss & Gneiss)	To the first in Orystalane is	took (Blottle Granitie
1.6 15.5	4:27/0.	8														
1.4 2.5 5.0 3.5	1.4 15.5	N=	88										-			
10				·									-			
18.0 2.5 0.41 24.5 0																
S24 S25 S260 S250 S2				- 1178.9	18.0								<u> </u>			
76.4 20.5 250.9 4.8 350 87% 67% 13.1 12.8 17.7 8 Cristalline Rock-Grey-Tan Moderately Weathered Moderately Hard Biotite Grants with Close Fracture Specing 22.0 3.5 87% 67% 97% 97% 95% 95% 95% 95% 95% 95% 95% 95% 95% 95				Weathered Rock-Brown Severely Weathered Soft Gneiss with Fracture Spacing and Thin Crystalline Rock Seams	n Very Close								-			
76.0 20.9 4.6 3.5 (4.0) (3.1) 0.4 177.8 3.3 (4.0) (3.1) 0.4 177.8 3.3 (4.0) 0.5 (7.0) 0.4 177.9 3.3 (4.0) 0.5 (7.0) 0.4 177.9 3.3 (4.0) 0.5 (7.0)	5:24			3 JTS @ 0-10° Other Jts Not Discernible									_			
75.0 20 9 4.6																
1	20.0	1 0.	4	4475.0									<u> </u>			
3.36 3.36 3.36 3.37 3.	76.0 20.9 4.6 3:53	(4.0) (3.1) 87% 67%	0.9 0.0										. -			
3.59				<u></u> 11/4.9	22.0	.						1				
Fracture Spacing 1 JT @ 0-10° 5 JTS @ 30-40° 2 JTS @ 30-80° 1 Space Space	3:36		97% 95%	3 JTS @ 40-50° 2 LTS @ 60-70°								1	-			
3.24	3:59			Crystalline Rock-Blue-Grey and Grey Slightly and Very Slightl Hard Biotite Granitic Gneiss and Gneiss with Moderately Clos	ly Weathered e and Wide								-			
71.4 25.5 5.0 3.06 (5.0) (4.9) (4.9) 71.4 25.5 5.0 3.06 (5.0) (4.9) (4.	3:24			F									-			
1.14 25.5 5.0 3.06 (5.0) (4.9) 98% 3.19		_		5 JTS @ 30-40° - 2 JTS @ 50-60°												
3.06 100% 98% 3.19 3.53 3.53 3.50 3.50 3.21 3.21 3.21 3.21 3.21 3.21 3.21 3.21	1.4 20.0	(5.0) (4.9)			·	1/25/05						-	ŀ			
3:53 3:50 3:50 3:50 3:50 56.4 30.5		100% 98%				GDT 1							-			
3:50 TYPE TY	3:19			<u> </u>		CDOT2										
3.50 The state of the state o	3:53			-		N LGP.							ľ			
36.4 30.5 3.21 3.21 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5						740424							-			,
56.4 30.5 L	3:50					17 GRC							_			
$\frac{90.4}{66.4} \frac{30.5}{30.5} \frac{5.0}{5.0} \frac{(5.0)}{3.46} \frac{(4.8)}{100\%}$				}		#3-11X1										
		(5.0) (4.8) 100% 96%				CORE							ľ			

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



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



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



GEOSCIENCE GROUP, INC. BORING LOG

SHEET 1 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)** B2-B BORING LOCATION 14+42 OFFSET 16' RT ALIGNMENT -L-BORING NO. 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 ELEV. DEPTH **BLOW COUNT BLOWS PER FOOT** SAMP SOIL AND ROCK DESCRIPTION (ft) (ft) 0.5ft 0.5ft 0.5ft NO. 1197.9 Ground Surface Elev. 1197.9 ft Alluvial-BOULDERS and COBBLES with Very 1.0 Loose Tan Silty Fine SAND (A-2-4) ST-1 1195 3.0 3 23 Residual-Medium Dense Tan-Brown Silty Coarse to Fine SAND (A-2-4) Residual-Very Dense Tan-Brown Silty Coarse to Fine SAND (A-2-4) 1190 43 SS-5 M Weathered Rock-Brown Weathered Gneiss 1185 29 71/0.4 1180 1175 1173.8 Crystalline Rock-Grey-Brown Gneiss 60/0.1 Crystalline Rock-Grey and Blue-Grey Slightly Weathered Hard Gneiss and Biotite Granitic
Gneiss with Close and Moderately Close Fracture 1170 1165-

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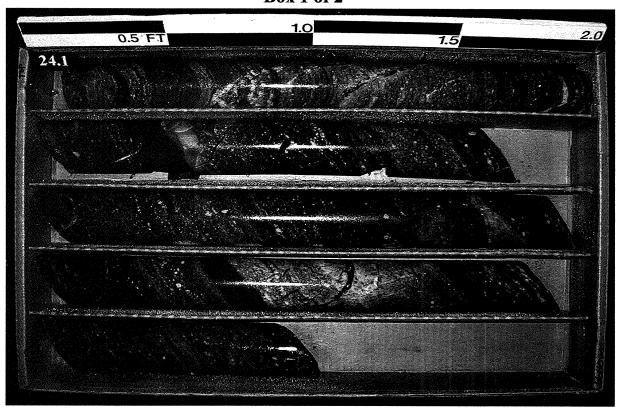
GEOSCIENCE GROUP, INC. **BORING LOG**

																	SHEE	T 2 OF 2	
PROJE	CT NO.	33316	3.1.1	ID.	B-3872	FEC	D. NO. B	RZ-155	2(8)			co. N	/lcDo	well		FIELD S	SUPERV.	D.Hardister	
SITE DE	SCRIPT	ION	Bridge	No. 19	5 over Be	ar Creek	on SR 1	552 (Lal	ke Jam	es Roa	ad)							GROUND V	VATER (ft)
BORING	NO.	B2-B		ВС	ORING LO	CATION	14+4	2		OFFSE	T 16'	RT		ALI	GNMENT	-L-		0 HR.	N/M
COLLA	R ELEV.	119	7.9 ft	ТОТА	L DEPTH	37.1	ft	NORT	THING	742	577.60			EA	STING 1	1119377	.21	24 HR.	2.6
ORILL N	ACHINE	E CN	/IE 550x		DRILL M	ETHOD	Rotary	/HQ			НА	MMER	TYPE	Ξ	Automati	c F	INAL CA	SING DEPTH	24.1 ft
DATE S	TARTED	12/	17/04	СОМР	PLETED	12/20/04	4 DR	ILLING	FLUID I	DENSI	TY	Cree	k Wat	ter	SURFAC	E WATE	R DEPT	H N/A	
ELEV.	DEPTH		OW COL	T			OWS PER				SAMP.	V /	L			SOIL AN	ND ROCK	DESCRIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	10	20 	40	60	80 	100	NO.	MOI	G						
						Continue	ed from P	revious	Page							,			
1160-	_													_	Coring Rock	g Termina (Gneiss 8	ted at Ele Biotite G	v. 1160.8ft in Crystranitic Gneiss)	stalline
	-															•		,	
	_																		
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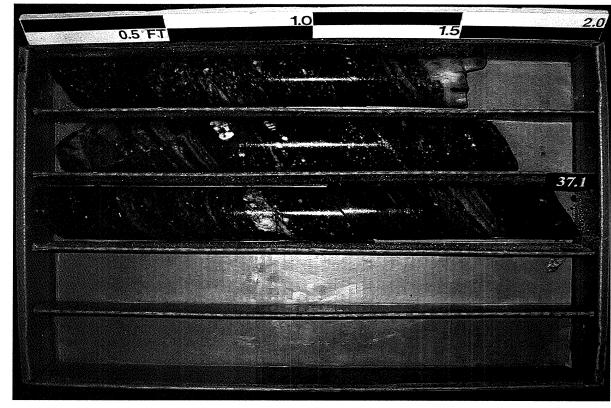
GEOSCIENCE GROUP, INC. CORE BORING REPORT

		-											SH	EET 1 OF 1	
PROJ	ECT NO	. 33	3316.1.1	ID.	B-387	'2	FED.	NO. BF	RZ-1552(8)		CO. McDo	well	FIELD SUPE	RV. D.Hardister	
SITE D	ESCRI	PTION	Brid(ge No. 1	195 ove	r Bear C	Creek or	sR 15	52 (Lake Ja	mes Road)				GROUND W	ATER (ft)
BORIN	IG NO.	B2	-B	E	BORING	LOCA	rion	14+42	2	OFFSET 1	6' RT	ALIGNMENT	-L-	0 HR.	N/M
COLL	AR ELE	٧.	1197.9 ft	тот	AL DEP	тн	37.1 ft		NORTHING	742577.0	30	EASTING	1119377.21	24 HR.	2.6
DRILL	MACHI	NE	CME 55	0x	DRIL	L METH	IOD	Rotary	HQ	1	IAMMER TYPE	E Automat	ic FINAL	CASING DEPTH	24.1 ft
DATE	STARTE	D	12/17/04	CON	/PLETE	D 12	/20/04	DRI	LLING FLUI	DENSITY	Creek Wat	ter SURFAC	E WATER DE	PTH N/A	
CORE		HQ	γ		UN	, 	L RUN	13.0	ft	DRILLER	D. Harris				
1	DEPTH	1	RATE	REC.	RQD	SAMP.	REC.	RATA			DESCR	RIPTION AND I	REMARKS		
(ft)	(ft)	(ft)	(Min./ft)	(ft) %	(ft) %	NO.	%	W							
1173.8				<u> </u>								n Coring @ 11			
1173.8	24.1	3.0	12:08	(3.0) 100%			13.0 100%	13.0 100%		Biotite Gra	Rock-Grey ar Initic Gneiss w	nd Blue-Grey rith Close and	Slightly Weath Moderately C	nered Hard Gneiss a lose Fracture Spaci	and ng
										1 JT @ 10	-20°				
			8:27						Ļ	1 JT @ 10 3 JTS @ 2 5 JTS @ 3 1 JT @ 70	30-40°				
			5:25							131@70	-00				
1170.8 1170.8	27.1 27.1	5.0	ļ	(5.0)	(5.0)	-		l	F						
1175.5	27.1	0.0	6:12	100%	100%				_						
			5:02												
			3.02						-						
			6:19												
				·											
			9:24						-						
			9:43												
1165.8 1165.8	32.1 32.1	5.0	ļ	(5.0)	(5.0)				-						
			5:43	100%	100%	RS-4			_						·
			7:10												
			6:14												
			6:21						_						
			5:40												
1160.8	37.1	 		 					- 11 <u>60</u> .8				-		37 <u>.1</u>
									_	Coring Ter Granitic G	minated at Ele neiss)	ev. 1160.8ft in	Crystalline Ro	ock (Gneiss & Biotite	•
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33316.1.1/B-3872 B2-B Box 1 of 2



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



GEOSCIENCE GROUP, INC. BORING LOG

														SHEE	T 1 OF 1	
PROJE	CT NO.	33316	.1.1	ID. I	3-3872	FED.	NO. BRZ-	1552(8)			co. I	McDo	well F	IELD SUPERV	D.Hardiste	•
SITE DI	ESCRIPT	ION	Bridge	No. 19	over Bear	Creek o	n SR 1552	(Lake Jar	nes Ro	ad)					GROUND	WATER (ft)
BORING	3 NO.	EB2-A		ВО	RING LOCA	TION	14+87		OFFSE	ET 18'	LT		ALIGNMENT	-L-	0 HR.	24.0
COLLA	R ELEV.	1215	5.1 ft	TOTAL	. DEPTH	33.8 ft	N	ORTHING	742	2622.73			EASTING 11	19343.90	24 HR.	18.7
RILL N	MACHINE	CM	IE 550x		DRILL MET	HOD	HSA			НА	MMER	TYPE	E Automatic	FINAL CA	SING DEPTH	N/A
ATE S	TARTED	12/2	21/04	СОМР	LETED 1	2/21/04	DRILL	ING FLUIC	DENS	ITY	N/A		SURFACE	WATER DEPT	H N/A	
ELEV.	DEPTH	BLO	ow cor	INT		BLOV	NS PER FO	ОТ		SAMP.	V/	LO		SOIL AND ROCK	DESCRIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 20	4	0 60 L	80 L	100	NO.	MOI					
1215.1	0.00				Gro	und Sur	face Elev.	1215 1 #					1215.1			
1213.1	0.00				Gio	una oui	iace Liev.	1213.110			t	-N	Roadw	ay Embankment I	Fill-Soft Brown-Or	ange
	 												. Micace	ous Fine Sandy S	Silty CLAY (A-7-6)	1
	-								• • •				•			
	3.5											EN	=			
	- 1	2	2	2						SS-6	26.0	EN	•			
1210-	 -				· 					ļ	-	LN	-			
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	ا ہے ا				.			<i></i>				FN				
_	8.5	2	2	2	.						М		_			
1005					. •4											
1205-	ΓΙ											EN	_			
•	T 1											LN	1203.1			
-													Residu	al-Medium Dense AND (A-2-4)	Brown Micaceou	s Silty
•	13.5	7	9	10					• • •	SS-7	м			110 (7-2-4)		
•	†	,	3	"		<i>.</i> . 19				33-7	"		·			
1200-	-								• • •		1					
•	†												•			
•	-				· · · · <u>ŀ</u>		· · · · ·						1197.6			
	18.5								• •		V	M	. Weathe	ered Rock-Brown	Weathered Gneis	ss ·
-	 	35	53	47/0.4				• • • • •	• •				•			
1195-	-								00/0:9				1194.6			
-	+											[::]	Residu SAND	al-Very Dense Bro (A-2-4)	own Micaceous S	ilty Fine
												::4	•	•		
	23.5											::}	•			
-		19	28	39							 \	:::				
1190-	ļ												_			
-	ļ							.						•		
	Ļ							.					1187.6			
	ا ہے۔ ا]			KIIL		ered Rock-Brown	Weathered Gneis	
_	28.5	23	77/0.4					<i>.</i>			D					
4407								1	00/0.9			MW				
1185-	ΓΙ												-			
-	†					· · · ·						K/(f	•			
-	†											NW	•			
-	33.5	100/0.3		<u></u>		· · · ·						MIL	1181.3			:
-	-	100/0.3						1	00/0.3		7	F	Boring Rock (C	Terminated @ Ele	ev. 1181.3ft in We	athered
-	-												-	J. 10139)		
-	<u> </u>															
	Ll	1		1						1	i	1 1				

GEOSCIENCE GROUP

GEOSCIENCE GROUP, INC. BORING LOG

															SHEE	ET 1 OF 1	
PROJE	CT NO.	33316	3.1.1	ID.	B-3872	FED. N	O. BRZ-15	52(8)			co. I	McDo	owell	FIELD S	SUPERV	. D.Hardiste	٢
SITE DI	ESCRIPT	ION	Bridge	No. 19	5 over Bea	r Creek on	SR 1552 (L	ake Jam	es Ro	ad)						GROUND	WATER (ft)
BORING	G NO.	EB2-B		ВС	RING LOC	ATION	14+87		OFFSE	T 16'	RT		ALIGNMENT	L-		0 HR.	NGWE
COLLA	R ELEV.	120	2.3 ft	TOTAL	L DEPTH	24.9 ft	NO	RTHING	742	2618.49			EASTING 1	1119377	.12	24 HR.	6.7
DRILL N	MACHINE	E CN	∕IE 550x		DRILL ME	THOD H	ISA			HA	MMER	TYP	E Automati	c F	INAL CA	SING DEPTH	N/A
DATE S	TARTEC	12/2	20/04	СОМР	LETED	12/20/04	DRILLING	G FLUID	DENSI	ΙΤΥ	N/A		SURFAC	E WATE	R DEPT	'H N/A	
ELEV.	DEPTH	BL	ow cou	INT			S PER FOOT			SAMP.	V /			SOIL A	ND ROCK	DESCRIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	10 3	20 40	60	80 L	100	NO.	MOI						
1202.3	0.00				G	round Surfa	ce Elev. 1	202.3 ft					1202.3				. · · · · · · · · · · · · · · · · · · ·
-														ual-Loos	e Tan-Ora	inge Silty Fine SA	AND
•	ŀ												(/\-2-4	• •			
1200-	F												_				
	L												-				
	4.0	3	2	3	1						w		_				
	_				. ●5		<i>.</i> .	• • • •					-				
_					. L							-	1196.3 - 1195.8 Crysta	ollina Roc	k-Tan Qu	antzita.	
4405													Resid	ual-Dens	e Brown M	Micaceous Silty F	ine
1195 -													- SANL	(A-2-4)			
-	9.0				1		<i></i>						-				
	ŀ	7	15	17		•32 .				SS-8	М		_				
-	-					52					-		_				
•	<u> </u>												-				
1190-	_												_				
-	14.0							• • • • •	• • •				1188.3				14
-	- 14.0	25	75/0.3		1				\neg		D	KII	- Weath	nered Ro	ck-Tan, Br	rown-Tan, and Br	rown
-	-						• • • • •	· · · ·10	0/0.8	-		11/1/	- vveatr	nered Gn	eiss		
-	-							· · · ·	• •			M	-				
1185-	_					• • • • • •			· •								è
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	19.0	76	24/0.1					· • • • •			Ь		-				
									0/0.6			M	- -				
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1180-											İ	KIII					
1100								.	📗								
	24.0		00/0.4		1							M	.				
		31	69/0.4					100	0/0.9		D					4477 45 - 18/	24
	-													(Gneiss)	itea @ Ele	ev. 1177.4ft in We	eatnered
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GEOSCIENCE GROUP, INC. BORING LOG

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ROJE	CT NO.	33316	5.1.1	ID.	B-3872	FED. NO	. BRZ-15	52(8)			co. I	McDo	well	FIELD SUPER	/. D.Hardiste	r
TE DE	SCRIPT	ION	Bridge	No. 19	5 over Bear (Creek on S	R 1552 (L	ake Jam	es Ro	ad)					GROUND	WATER (f
ORING	3 NO.	TS-1		ВС	RING LOCA	TION 1	3+60		OFFSE	ET 9'L	-T		ALIGNMEN	T -L-	0 HR.	NGWE
OLLAI	R ELEV.	121	4.7 ft	TOTAL	L DEPTH	14.5 ft	NO	RTHING	742	2495.05			EASTING	1119382.50	24 HR.	NGWE
RILL N	ACHINE	E CN	ЛЕ 550x		DRILL METH	IOD HS	SA .		,	НА	MMER	TYPI	E Automa	tic FINAL C	ASING DEPTH	N/A
ATE S	TARTED	12/2	21/04	COMP	LETED 12	/21/04	DRILLING	3 FLUID	DENSI	ITY	N/A		SURFA	CE WATER DEP	TH N/A	
LEV.	DEPTH	BL	ow cor	JNT		BLOWS	PER FOOT	•		SAMP.	V /	L	L			
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 20	40	60	80	100	NO.	MOI	0 G		SOIL AND ROC	K DESCRIPTION	

214.7	0.00	 	ļ	<u> </u>	Grou	ınd Surfac	e Elev. 12	214.7 ft			-		1214.7 Road	dway Embankment	Fill-Loose Brown	
†	-							· • • •				H	Mica	ceous Silty Fine SA ments and BOULD	AND with Rock	: Q
1	-											FH	(A-1-		ENG and GODDEL	.0
†	3.5															
ł	- 3.3	3	16	4	1					SS-9	м	包			•	
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		2	5	5	10				• •		М					
1205	_												-			
t	-											냅				
t	-				L								1202.7		O. W. II.	
+	-								.			M	vvea	thered Rock-Brown	-Grey Weathered	Gneiss
ŧ	13.5	100/0.3			 			100	0/0.3		D	ШŢ	1200.9			<u>-</u>
+	14.5	60/0							60/0		D		1200.2	talline Rock-Grey S		tion Test
1	_												Refu (Sch	sal at Elev. 1200.2f	t in Crystalline Ro	ck
1	-												(001)			
1																
I	-															
Ī	-															
1	-												- NOT	E: * indicates influe	nced blow count	
Ħ	-											 	1101	E. Indicates influe	niced blow could	
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GEOSCIENCE GROUP, INC. BORING LOG

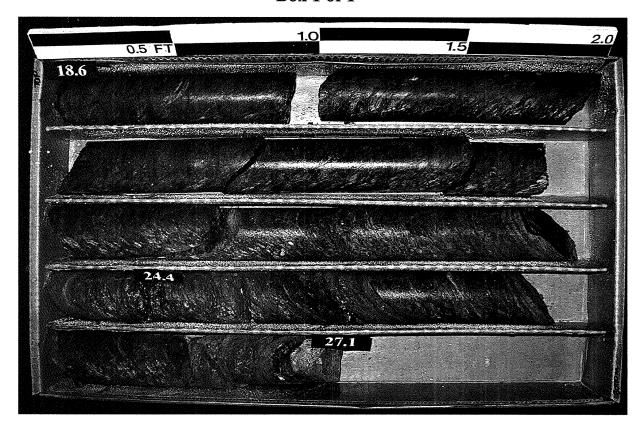
			-												SHE	ET 1 OF 1	
PROJE	ÇT NO.	33316	.1.1	ID.	B-3872	FED. N	O. BRZ-15	52(8)			co. I	VICDov	vell	FI	ELD SUPER	V. D.Hardister	
SITE D	ESCRIPT	ION	Bridge	No. 19	5 over Bear	Creek on	SR 1552 (L	ake Jame	s Roa	ad)						GROUND V	WATER (ft)
BORIN	G NO.	TS-2		ВС	ORING LOCA	TION	13+76	0	FFSE	T 19'	LT		ALIC	SNMENT	-L-	0 HR.	N/M
COLLA	R ELEV.	121	4.4 ft	TOTAL	L DEPTH	27.1 ft	NOF	RTHING	742	504.59			EAS	TING 111	9364.71	24 HR.	17.7
DRILL I	MACHINE	E CN	1E 550x		DRILL METI	HOD I	HSA/HQ			НА	MMER	TYPE	. /	Automatic	FINAL C	ASING DEPTH	18.6 ft
DATE S	TARTED	12/2	21/04	СОМР	LETED 12	2/21/04	DRILLING	FLUID D	ENSI	TY	Cree	k Wat	er s	SURFACE	WATER DEP	TH N/A	
ELEV.	DEPTH	BL	ow cou	JNT		BLOWS	S PER FOOT			SAMP.	V/	L			O!! AND DOG	U DECODIDEION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 20	40	60	80	100	NO.	MOI	O G		٥ 	OIL AND ROC	K DESCRIPTION	
							•										
					0												
1214.4	0.00			-	Gro	una Surra	ice Elev. 12	/14.4 π			 		1214.4	Roadway	y Embankmen	t Fill-Soft Brown-Or	0. ange
	Ļ							· · · ·	٠.					Micaceo: BOULDE	us Fine Sandy RS and COBE	Silty CLAY and BLES (A-7-6)	
	L																
	3.5										ŀ	EAL					
1210-		1	2	1]			<i>.</i>			М		_				
1210									٠.				-				
•	T				.		. .					H	1208.4		/ Emhantman	t Fill-Loose Tan	
•	Ī											国		Micaceo		AND with BOULDE	RS
•	8.5				. . <i>.</i>							FH		and COE	DLES (A-2-4)		
•	- 0.5	4	3	1	╡.						М	时					
1205-	†				. 4							包	-				
•	† •				.							口					
•	†				1.1		. .										
•	t				1.1												
•	13.5	100/0.2		 	1 ' [100/	0.2		D	1	1200.9		ne Rock-Brown	n-Tan Gneiss	1
1200-	-				' ' ' ' '							心	-	01,010			
	+											1					
	-											1	1197.4	4			1
	+				' ' ' ' '						Y				e Rock-Grey	Schist	
,	18.5	60/0.1			1			60/			D		1195.8				18
1195-	-	00/0.1						••	٠, ١.				-	Schist wi		Slightly Weathered Moderately Close Fr	
	-									RS-5				Spacing			
									٠.			1					
	_											须					
	L											阿					
1190-	L											1	1190.0				24
1130	L						<i></i>					NA TO		Crystallir Weather	ne Rock-Brown ed Moderately	n-Grey Moderately Hard Schist and Gr	neiss
•	L											WY.		with Clos	se and Very Cl	ose Fracture Spacir	ng
•	<u> </u>				<u></u>		<u> </u>	<u> </u>					1187.3	3			27
•	Ī													Coring To Rock (So	erminated at E :hist & Gneiss)	lev. 1187.3ft in Cry	stalline
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GEOSCIENCE GROUP

GEOSCIENCE GROUP, INC. CORE BORING REPORT

PROJE	ECT NO.	33	3316.1.1	ID.	B-387	2	FED. I	NO. BF	Z-1552(8)	CO. McDov	well	FIELD SUPERV	. D.Hardister	
SITE D	ESCRIF	TION	Bridg	e No. 1	95 ove	r Bear C	creek or	SR 15	52 (Lake James Road				GROUND WA	TER (ft)
BORIN	IG NO.	TS	-2	В	BORING	LOCAT	rion -	13+76	OFFSET	19' LT	ALIC	GNMENT -L-	0 HR.	N/M
COLLA	AR ELEV	<i>1</i> .	1214.4 ft	тот	AL DEP	тн	27.1 ft		NORTHING 74250)4.59	EAS	TING 1119364.71	24 HR.	17.7
DRILL	MACHIN	JE	CME 550)x	DRIL	L METH	IOD	HSA/H	Q	HAMMER TYPE	. /	Automatic FINAL CA	SING DEPTH	18.6 ft
DATE S	STARTE	D	12/21/04	СОМ	PLETE	D 12	/21/04	DRII	LING FLUID DENSITY	Creek Wate	er	SURFACE WATER DEPT	H N/A	***************************************
ORE	SIZE	HQ				TOTA	L RUN	8.5 f	DRILLER	D. Harris			***************************************	
ELEV.	DEPTH	RUN	DRILL	REC.	JN RQD	SAMP.	STF	RATA	*	55000				
(ft)	(ft)	(ft)	RATE (Min./ft)	(ft) %	(ft) %	NO.	REC.	RQD %		DESCR	IPHO	N AND REMARKS		•
105.0				70	70		70	70		Dagin	Cari	na @ 1105 90 #		
195.8 195.8	18.6	3.5		(3.3)	(3.3)	ļ	5.6	5.3	Crystal	ine Rock-Grey Sli	ightly	ng @ 1195.80 ft Weathered Hard Schist	with Close and	
			4:58	94%	94%		97%	91%	Modera	tely Close Fractu	re Sp	eacing		
			6:55			RS-5			2 JTS (2 JTS (D 10-20° D 50-60° 70-80°				
			6.55						1 JT @	70-80°				
			4:03											
			2:50/0.5						-					
192.3 192.3	22.1 22.1	5.0	2.30/0.3	(4.9)	(3.4)				_					
			4:42	98%	68%									
			2:52						-					
			2.52						4400.0					
			3:43				2.6	1.4	1190.0 Crystal	ine Rock-Brown-0	Grey	Moderately Weathered M	loderately Hard	24
							96%	52%	Schist a	ind Gneiss with C	lose	and Very Ćlose Fracture	Spacing '	
			5:16						2 JTS (3 JTS (D 0-10° D 30-40°				
									4 JTS () - 1 JT (0)	9 30-40° 9 40-50° 70-80°				
187.3	27.1		5:32						1187.3					27
										Terminated at Fle	 v 11.	87.3ft in Crystalline Rock	(Schiet & Gneise)	
									Comig	reminated at Lie	. I I	or.on in orystamine reck	(Ochist & Oheiss)	
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33316.1.1/B-3872 TS-2 Box 1 of 1



SUMMARY OF LABORATORY TEST DATA FOR NCDOT

Boring	Sample Depth	Sample	Natural Moisture Content	AASHTO	Z	Atte	Atterberg Limits	its				Gradatio	Gradation Results			
Š.	(j.	Type	(%)	Class	Value	.	ŝ	Š	Pass #10	Pass #40	Pass #200	Pass #270	Coarse Sand (Ret. #60)	Fine Sand (Ret. #270)	Silt	Clay
EB1-A	3.5-5.0	SS-1	N/A	A-1-a(0)	5	V,A N/A	N/A	Z. V.	Sieve 48	30 30	Sieve 14	Sieve 11	48	28	17	7
EB1-B	3.5-5.0	SS-2	N/A	A-2-4(0)	МОН	61	å	dN	66	06	28	19	23	28	7	12
В1-В	3.5-5.0	SS-3	N/A	A-2-4(0)	-	27	ŝ	ã	92	89	29	24	38	36	=	15
B2-A	2.5-4.0	SS-4	N/A	A-2-4(0)	2	15	ŝ	ďŽ	76	08	14	∞	35	57	5	3
B2-B	8.5-10.0	SS-5	N/A	A-2-4(0)	16	30	Š	ã	35	65	31	23 .	32	42	61	7
EB2-A	3.5-5.0	9-SS	26	A-7-6(6)	4	41	29	12	76	06	09	50	12	36	61	33
EB2-A	13.5-15.0	L-SS	N/A	A-2-4(0)	61	28	ŝ	ŝ	66	91	35	31	61	09	15	9
EB2-B	9.0-10.5	8-SS	N/A	A-2-4(0)	32	¥.	ŝ	ď	66	83	27	17	28	55	12	5
1.8-1	3.5-5.0	6-SS	N/A	A-1-a(0)	20	N/A	V/N	V/N	46	29	13	10	48	30	15	7
GER	0.0-0.5	S-1	N/A	A-1-b(0)	N/A	24	ď	dN	63	23	2		83	16	0	-
BANK	0.5-1.0	S-2	N/A	A-2-4(0)	N/A	22	ďN	dN	100	06	20	11	17	72	7	4
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GEOSCIENCE GROUP, INC. GREENSBORO, NORTH CAROLINA

GEOSCIENCE GROUP, INC. GREENSBORO, NORTH CAROLINA

33316.1.1 (B-3872) Bridge No. 195 over Bear Creek on SR 1552 (Lake James) McDowell County, North Carolina

ROCK TESTING SUMMARY BORING NO. SAMPLE NO. DEPTH UNCONFINED COMP. YOUNG'S POISSON'S STRENGTH (psi) MODULUS (psi) **RATIO** EB1-A RS-1 25.1-25.6 1,480 N/A N/A 23.5-24.0 B1-A RS-2 4,490 N/A N/A RS-3 930 B1-B 13.5-14.0 N/A N/A B2-B RS-4 32.7-33.2 7,560 N/A N/A TS-2 RS-5 19.7-20.2 540 N/A N/A

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: <u>33316.1.1</u>	ID: <u>B-3872</u>	COUNTY: _	McDowell
DESCRIPTION(1):	Bridge No. 195 over Bear (Creek on SR 1552	2 (Lake James Rd)
INFORMATION ON E	XISTING BRIDGES Infor	mation obtained	d 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 Fo	otings	
EVIDENCE OF SCO	OUR(2):		
ABUTMENTS OR END	BENT SLOPES: <u>N</u>	one	
INTERIOR BENTS:	None		
	·		
CHANNEL BED:	None		
CHANNEL BANKS:	Some Sloughing Observed		
EXISTING SCOUR	PROTECTION:		
TYPE(3):Timber Win	gwalls at End Bents; Boulde	rs, Concrete, Asp	halt at End Bent One
EXTENT(4): Just on Side	e Slopes		
	AMS,DEBRIS,ETC.):L		
DESIGN INFORMAT	ΓΙΟΝ		
CHANNEL BED MATER	IAL(7) (SAMPLE RESULTS	ATTACHED): _	Boulders, Cobbles, and Gravel with Silty
Coarse to Fine SAND (A	A-1-b); Residual Silty Coarse	to Fine SAND (A	2-4), WR, CR
CHANNEL BANK MATE	RIAL(8) (SAMPLE RESULT	S ATTACHED):	Alluvial Silty Fine and Coarse to
Fine SAND (A-2-4)			
CHANNEL BANK COVE	R(9): Underbrush, Trees		
FLOOD PLAIN WIDTH(1	10): 150'		
FLOOD PLAIN COVER(-		

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DESIGN INFOR	RMATION CONT.			PAGE 2				
STREAM IS	DEGRADING	X AGGRADING (12)						
		, ,						
OTHER OBSER	RVATIONS AND COM	MENTS: Aggrading north side of ex	isting Bent 2					
CHANNEL MIG	RATION TENDENCY	(1,3): Northeast						
REPORTE	D BY:	GEOSCIENCE GROUP, INC.	DATE:	1/26/05				
GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (14):								
В	oring	GASE						
######################################	B1-A	1191.8						
	31-B	1190.1						
	32-A	1190.4		· · · · · · · · · · · · · · · · · · ·				
	32-B	1191.7						
REPORTE		NCDOT GEOTECHNICAL UNIT	DATE:	3-29-05				
(4) ONE THE DE		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 TH	HE EXTENT OF ANY EXISTIN	IG SCOUR PROTECTION.						
(5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.								

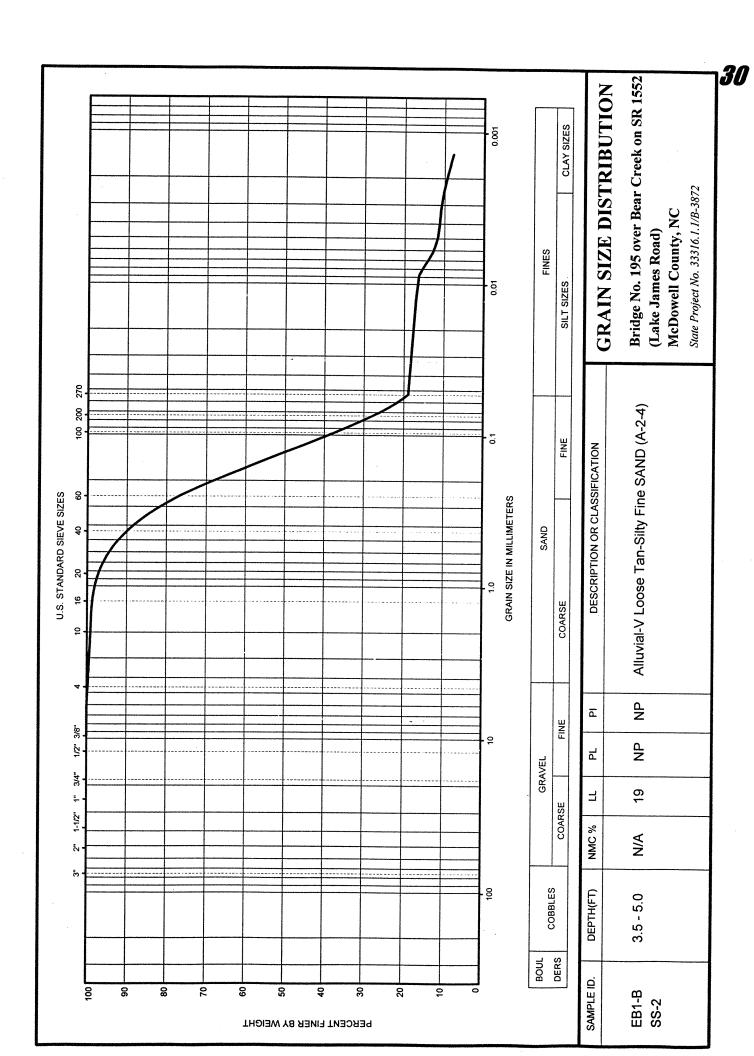
- NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- (9) DESCRIBE THE BANK COVERING (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 ELEVEVATION 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.

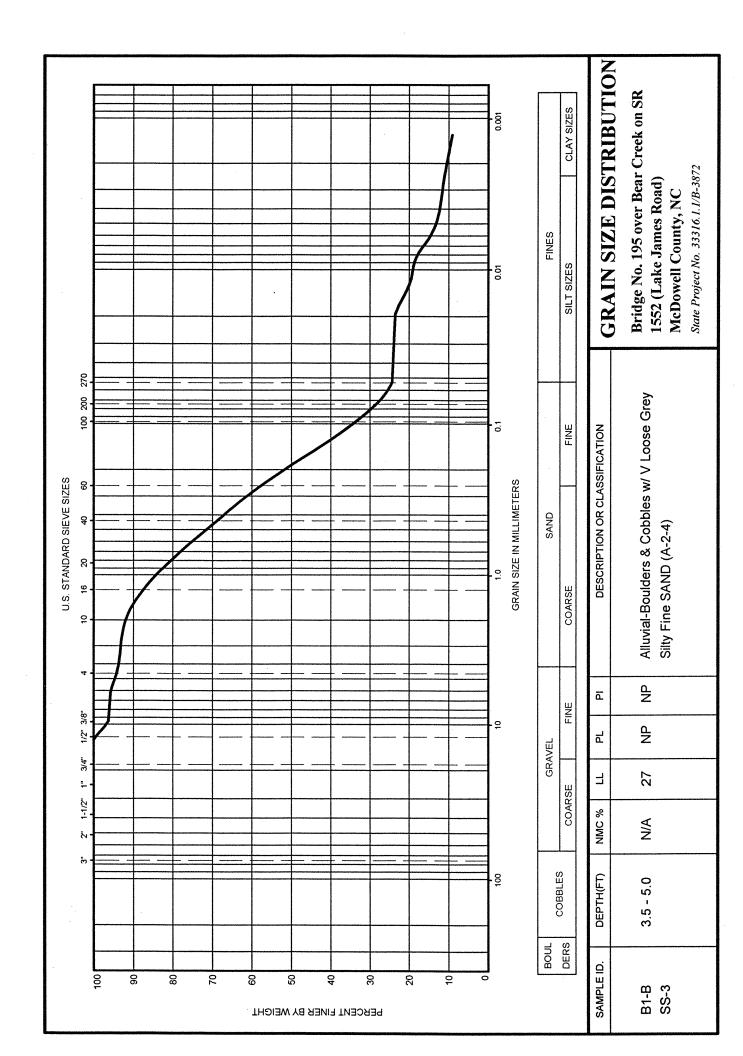
PROJECT #: 33316.1.1 (B-3872)

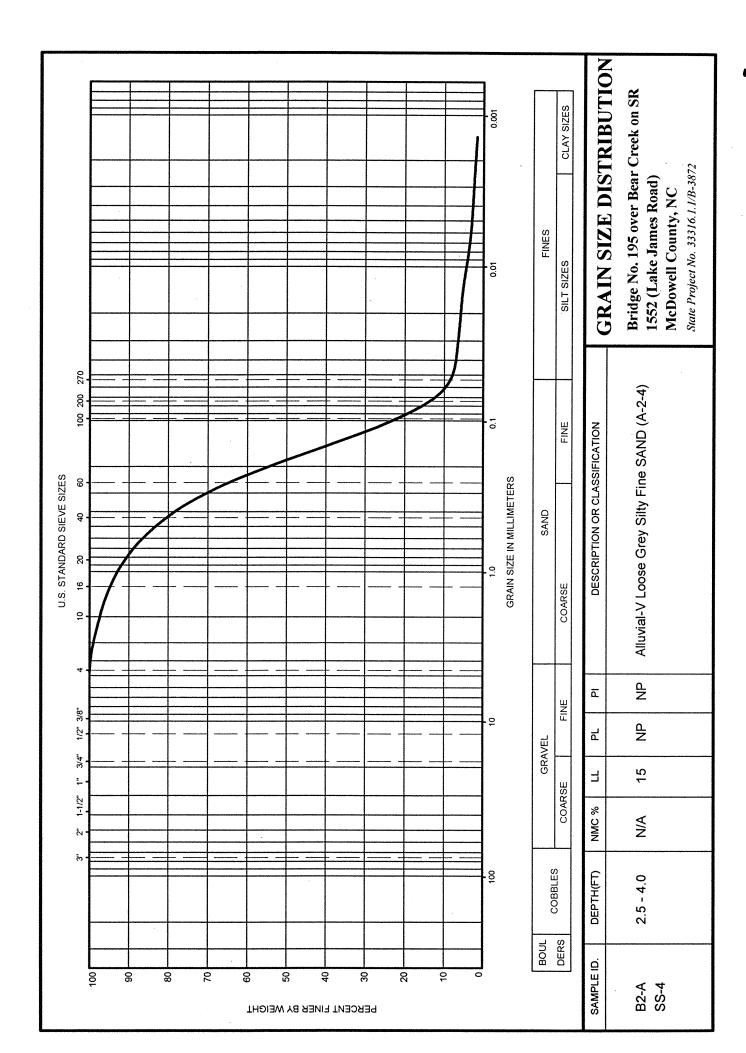
COUNTY: McDowell

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

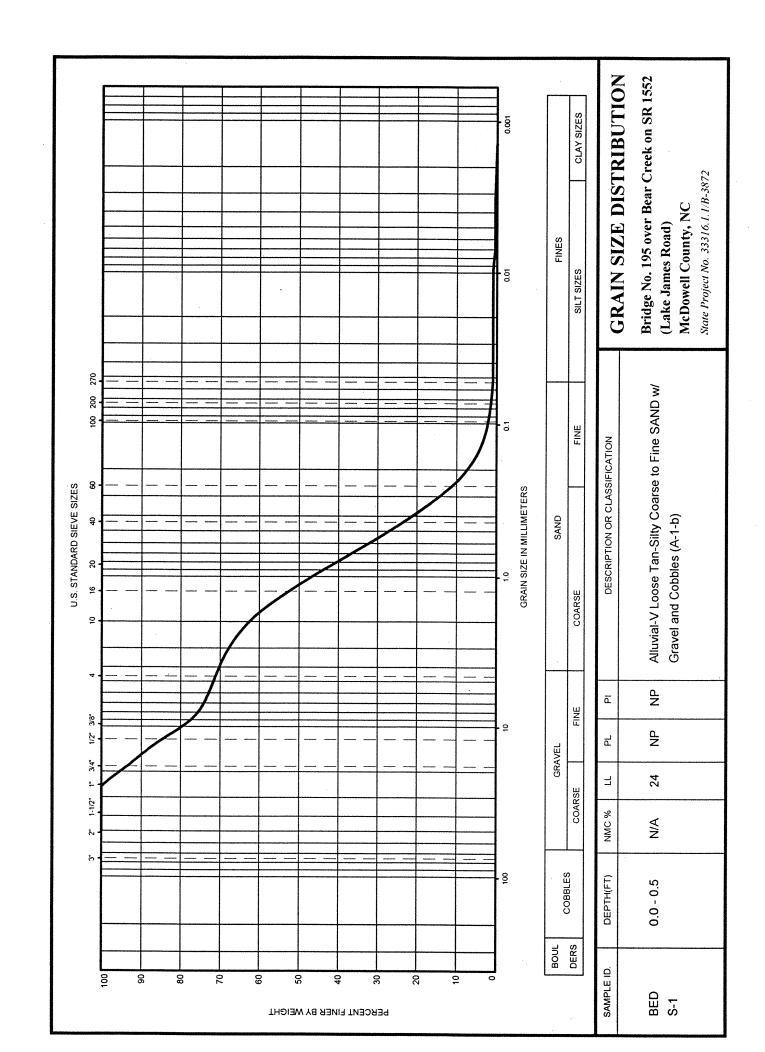
								
	l CH	IANNEL B	ED	CHANNEL BANK MATERIAL				
	MATERIAL							
SAMPLE #	BED	417 (17 12.1 (17 (1	T	SS-2	SS-3	SS-4	BANK	
RETAINED #4	29			0	6	0	0	
PASSING #10	63			99	92	97	100	
PASSING #40	23			90	68	80	90	
PASSING #200	2			28	29	14	20	
	,							
COARSE SAND	83.0			23.0	38.0	35.0	17.0	
FINE SAND	16.0		-	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	

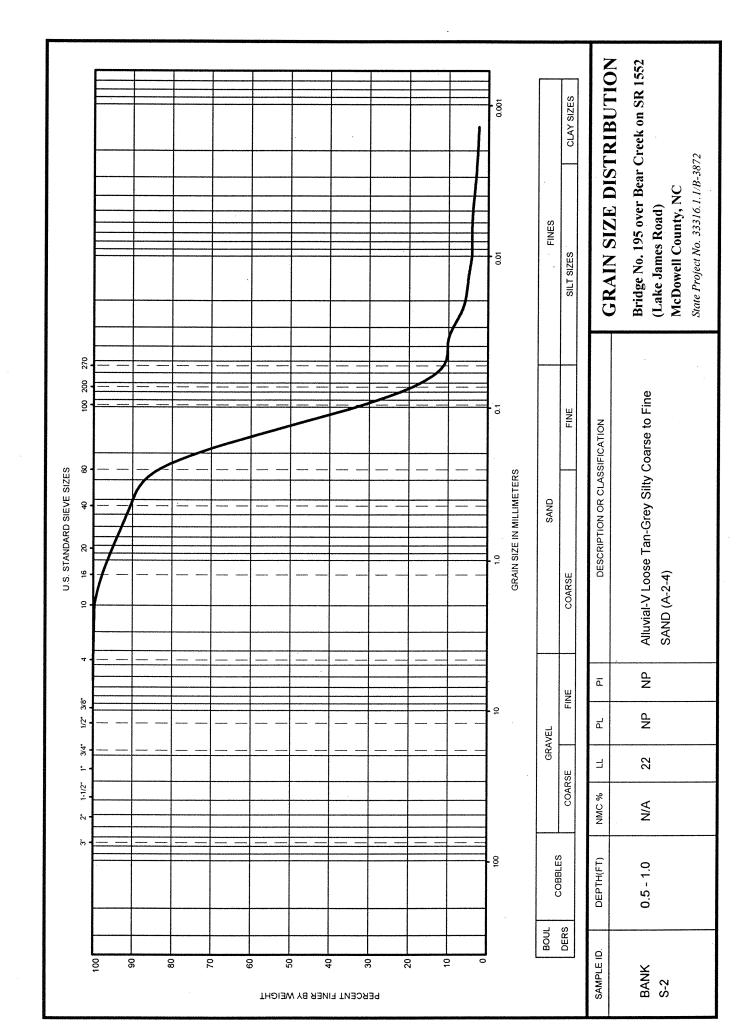












SITE PHOTOGRAPHS



Looking Right to Left along End Bent-1



Looking Right to Left along Bent-1

SITE PHOTOGRAPHS



Looking Right to Left along Bent-2



Looking Right to Left along End Bent-2

SITE PHOTOGRAPHS



Looking Increasing Station along -L-



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

SITE PHOTOGRAPHS



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



Looking along Temporary Shoring Alignment

SITE PHOTOGRAPHS



Looking Upstream



Looking Downstream

SITE PHOTOGRAPHS



Looking North along Lake James Road (SR 1552)