ID: B-3872

PROJECT: C201363

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3872	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33316.1.1	BRZ-1552(8)	PE
33316.2.2	BRZ-1552(8)	R/W, UTIL
33316.3.1	BRZ-1552(10)	CONST

CONTENTS: 11+50 - 14+50 -L-
11+00 - 15+50 DETOUR

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

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

F.A. PROJECT BRZ-1552(8)

COUNTY MCDOWELL

DESCRIPTION APPROACHES TO BRIDGE NO. 195 ON SR-1552 OVER BEAR CREEK

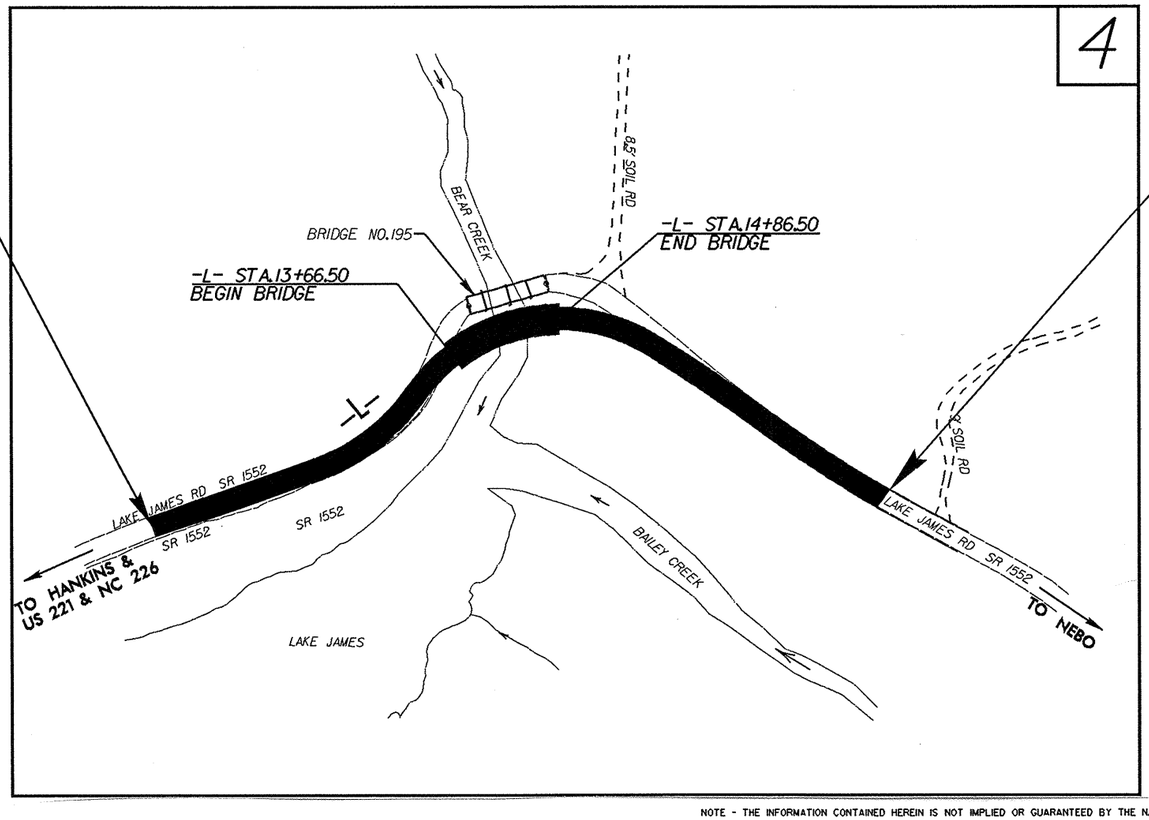
CAUTION NOTICE

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

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

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

NAD 83



INVESTIGATED BY L.L. ACKER PERSONNEL T.B. DANIEL

CHECKED BY W.D. FRYE L.A. LANKFORD

SUBMITTED BY W.D. FRYE J.T. WILLIAMS

DATE AUGUST 04 D.O. CHEEK

C.J. COFFEY

C.K. ROSE

DRAWN BY: J.W. MANN, L.L. ACKER

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

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

NORTH CAROLINA LICENSED SEAL 1007 GEOLOGIST LOUIS L. ACKER

SEAL

SIGNATURE

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3872	33316.1.1	2	27

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTN D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING # 10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT / PLASTIC INDEX	6 MX		N.P.	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.0	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12"	3"				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE
UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.
- STATIC WATER LEVEL AFTER 24 HOURS.
- PW — PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
- SPRING OR SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS
S- BULK SAMPLE
SS- SPLIT SPOON SAMPLE
ST- SHELBY TUBE SAMPLE
RS- ROCK SAMPLE
RT- RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [X] CME-45
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] OTHER _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V. SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:

ELEVATION:

NOTES:

REVISED 09/15/00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

August, 2004

STATE PROJECT: 33316.1.1
TIP NO: B-3872
F. A. PROJECT: BRZ-1552(8)

DESCRIPTION: Bridge No. 195 on SR 1552 over Bear Creek – Approaches

SUBJECT: Geotechnical Report – Inventory

Site Description

This project is located in the foothills of eastern McDowell County, on the north shore of Lake James. The area is sparsely populated and dedicated chiefly to timber plantations and recreation on Lake James. Bridge 195 is a one-lane structure located on a sharp curve at a point about 100 feet upstream of the confluence of Bear Creek and Bailey Creek at the Lake James shore line.

The existing approach back station from the bridge is bounded on the Left Side by a cut about 50 feet high, with hard rock in its lower part. The lakeshore is on the Right Side at the base of an embankment. The approach up station from the bridge is bounded on the Left Side by a low cut in soil and on the Right Side by the floodplain of Bailey Creek.

This project runs on alignment -LREV- from Station 10+00 to Station 18+00. Temporary pavement on a widened approach to the existing bridge will allow traffic to be maintained on the bridge while construction is underway. The widening will involve a Left Side cut about 50 feet high in soil and rock, another Left Side cut about 20 feet high in soil, and fill 12 feet or less in depth.

A retaining wall is planned for the proposed Right Side embankment beside Bear Creek from Station 13+00 to the new bridge abutment at Station 13+59.

This project has undergone several revisions since the initial plan of 2002. The Geotechnical Engineering Unit conducted a subsurface investigation in August and September, 2002, for plans in effect at that time, with borings for alignments -L- and -DET-, including a retaining wall. Those borings are located favorably for investigation

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LOCATION:
CENTURY CENTER COMPLEX
BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

The embankment soils found on this project are of two kinds. Most embankment soil located back from the bridge as well as up station from it is derived from residual soil and rock, and as such it is composed of red-brown to orange-brown, micaceous, sandy silt and silty sand with abundant fresh to weathered rock fragments and boulders (A-1-b, A-2-4, A-4). Some of the embankment soil located up station from the bridge is derived from the alluvial terrace deposits and is composed of red to orange sandy clay and silt with very hard, well rounded cobbles and boulders (A-1-b, A-6, A-4).

The bedrock at this site is for the most part mica gneiss to mica schist with well developed foliation that dips at moderate angles to the southeast. The bedrock from the beginning of the project to approximately Station 11+00 is a fine-grained, highly fractured mylonite gneiss with pods of alaskite.

Geotechnical Descriptive Analysis

<u>Station 10+00 to 12+00</u>

Construction on this segment involves only minimal excavation and grading. Hard rock is exposed in the existing Left Side cut and it will be encountered in ditch line excavations. Most of the roadway is underlain by weathered rock, and the Right Side shoulder is stony embankment material.

<u>Station 12+00 to 14+00</u>

Plans call for widening the existing roadway in this segment to accommodate its use as a detour. The widening will involve additional excavation of the existing Left Side cut, leaving an exposed face about 50 feet high.

The position of the hard rock line can be predicted using information from borings on the slope above the cut, the exposed rock line in the existing cut, and some natural outcrops at the base of the slope on the Right Side. The hard rock line should be about 15 to 20 feet above the ditch line from Station 12+25 to Station 13+25, and 5 to 10 feet above the ditch line beyond there. Material in the cut above hard rock will include about 5 to 15 feet of weathered rock overlain by thick residual soils comprising beds of medium stiff to stiff clay (A-6) and micaceous silt (A-4) and dense to very dense, micaceous silty sand (A-2-4).

A retaining wall is to be constructed on the Right Side from Station 13+00 to the bridge abutment at Station 13+59. Three borings located on the shoulder of the road in the vicinity of the proposed wall found 5 to 11 feet of embankment soil overlying weathered rock. Hard rock was encountered at depths between 9 and 18 feet.

of the current alignment. Additional borings were made in April, 2004 for the retaining wall in the current plan. A total of 15 borings were made using a CME 45 track-mounted power drilling machine and a CME 550 power drilling machine. All borings were made with 8-inch hollow-stem augers. Standard Penetration Tests were made at regular intervals. A total of 20 soil samples were submitted to a DOT laboratory for tests of quality or moisture.

Items of Special Geotechnical Concern

Hard rock in Cut

Hard rock will be encountered in a cut on the Left Side of -LREV- between Stations 12+25 and 13+75.

Soil and Rock Characteristics

There is a considerable diversity of soils on this project. Residual soils underlie the slopes above the road on the Left Side. Those soils grade downward to micaceous weathered rock and hard rock which are exposed in the existing cut back station from the bridge. Natural rock outcrops can be seen also at the base of the slope along the lakeshore and in the creek channels. Soils up station of the bridge include flood plain alluvium of Bailey Creek as well as Pleistocene or older alluvial terrace deposits of the Catawba River. Those terrace soils underlie most of the roadway beyond the bridge, and they overlie saprolite.

The residual soils comprise a clay-silt cap 4 to 5 feet thick at the ground surface and saprolite in the subsurface. The surficial soils are yellow-brown to orange-brown, dry to moist, soft to medium stiff sandy, silty clay (A-6) and sandy, clayey silt (A-4).

Saprolite is composed of brown or red-brown to gray, stiff to hard, micaceous sandy silt (A-4), and brown to gray-brown, medium dense to very dense, micaceous, silty sand (A-2-4). Those soils comprise a bed 16 to 20 feet thick between the surficial, fine soil and the weathered rock line in borings on the slope on the Left Side, back station of the bridge. Saprolite of similar composition is exposed in the Left Side cut up station of the bridge, and it also underlies alluvial flood plain and terrace soils.

Alluvium on the Baily Creek flood plain comprises about 5 to 7 feet of brown, loose, silty sand (A-2-4) and basal gravel (A-1-b).

Alluvial terrace soils are red or orange to yellow brown, soft to medium stiff, moist to wet, sandy clay or silt with suspended pebbles and cobbles (A-6, A-4); and brown, loose to medium dense, silty sand, gravel and boulders (A-1-b). The terrace soils are notable for the abundance of very hard, well-rounded, white to tan, cobbles and boulders of meta-quartzite within the alluvial beds, and concentrated on the ground surface in some places as lag deposits.

Station 15+00 to 17+00

Construction in this segment will involve a cut on the Left Side and fill on the Right Side. The Left Side cut, which is part of the proposed detour widening, will have an exposed cut face about 20 feet high. No borings have been made for this cut; however, inspection of the existing cut face indicates that the excavation will encounter residual soils similar to soils in other borings on the project. The soils consist of red-brown clay and silt grading downward into stiff or medium dense, brown, micaceous sandy silt to silty sand saprolite.
Excavation of a small portion of the cut beyond Station 16+50 will encounter alluvial terrace soil in the upper half of the cut overlying saprolite. The terrace soil consists of red, sandy clay with suspended, well rounded cobbles and small boulders.

The fill on the Right Side is to be about 12 feet high near the bridge abutment, decreasing rapidly to less than 5 feet at Station 16+00. Alluvial terrace soils 3 to 6 feet thick are below and to the Right of the existing embankment slope, where the new fill is to be placed. They are composed of red-brown to yellow-brown, soft to medium stiff sandy clay and silt with hard, rounded cobbles and boulders (A-6, A-1-b). The terrace soils overlie saprolite consisting of stiff to hard sandy silt (A-4) and medium dense to dense silty sand (A-2-4). Groundwater has not been found within 6 feet of the ground surface at any point in this segment.

Station 17+00 to 18+00

This segment involves very minimal construction activity. The existing roadway is underlain by clayey alluvial terrace soils with hard, well-rounded cobbles and boulders (A-6, A-1-b). The existing shallow embankments are derived from those terrace soils.

Respectfully submitted,

Louis L. Acker, LG
Project Geologist

EARTHWORK SUMMARIES

Volumes in Cubic Yards

PROJECT B-3872 COUNTY McDowell COMPUTED BY: AS SHEET 3C OF 27 SHEETS

CHECKED BY: WB

RD10S01C

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. +15%	BORROW	SUITABLE WASTE	ROCK WASTE	TOTAL WASTE
Summary No. 1															
Phase 1 Temporary Pavement Widening															
-L-	11+75.00	13+75.00	4526	1106			3420	3	3		3		3420	1103	4523
-L-	15+40.00	16+35.00	614				614	7		7	8		606		606
Summary No. 1 Total			5140	1106			4034	10	3	7	11		4026	1103	5129
Summary No. 2															
Phase 2 Rt. Side -L-															
-L-	10+00.00	13+66.50	42				42	255		255	293	251			
-L-	14+86.50	18+00.00	4				4	1336		1336	1536	1532			
Summary No. 2 Total			46				46	1591		1591	1829	1783			
Summary No. 3															
Phase 3 Lt. Side -L-															
-L-	10+00.00	13+66.50	75	39			36	144	39	105	160	85			
-L-	14+86.50	18+00.00	16				16	21		21	24	8			
Summary No. 3 Total			91	39			52	165	39	126	184	93			
Summaries Total			5277	1145			4132	1766	42	1724	2024	1876	4026	1103	5129
Deduction for Clearing and Grubbing			-120				-120					120	-120		-120
Rock Waste to be used in lieu of Borrow									1103	-1103		-1103		-1103	-1103
Adjustment for Rock Waste											-276	-276			
Suitable Waste to be used in lieu of Borrow												-617	-617		-617
Project Totals			5157	1145			4012	1766	1145	621	1748	0	3289		3289
Say			5200												
Estimated Undercut		500 CY													
NOTE: Earthwork quantities are calculated by the Roadway Design Unit. These earthwork quantities are based in part on subsurface data provided by the Geotechnical Engineering Unit.															
SHEET TOTALS:															

PROJECT REF. NO.	SHEET NO.	TOTAL SHEETS
B-3872	4	27

PLAN VIEW -LREV-

0 60 120

SCALE IN FEET

NAD 83/95

BEAR CREEK

I5

RESIDUAL

EMBANKMENT

ALLUVIAL FLOODPLAIN

ALLUVIAL TERRACE

STA 13+59.28
END RETAINING WALL

RETAINING WALL

Rock outcrop

STA 13+00.00
BEGIN RETAINING WALL

rock outcrops

POT Sta. 10+00.00

-LREV-

RESIDUAL

EMBANKMENT

SR 1552
LAKE JAMES RD

rock outcrops

LAKE JAMES

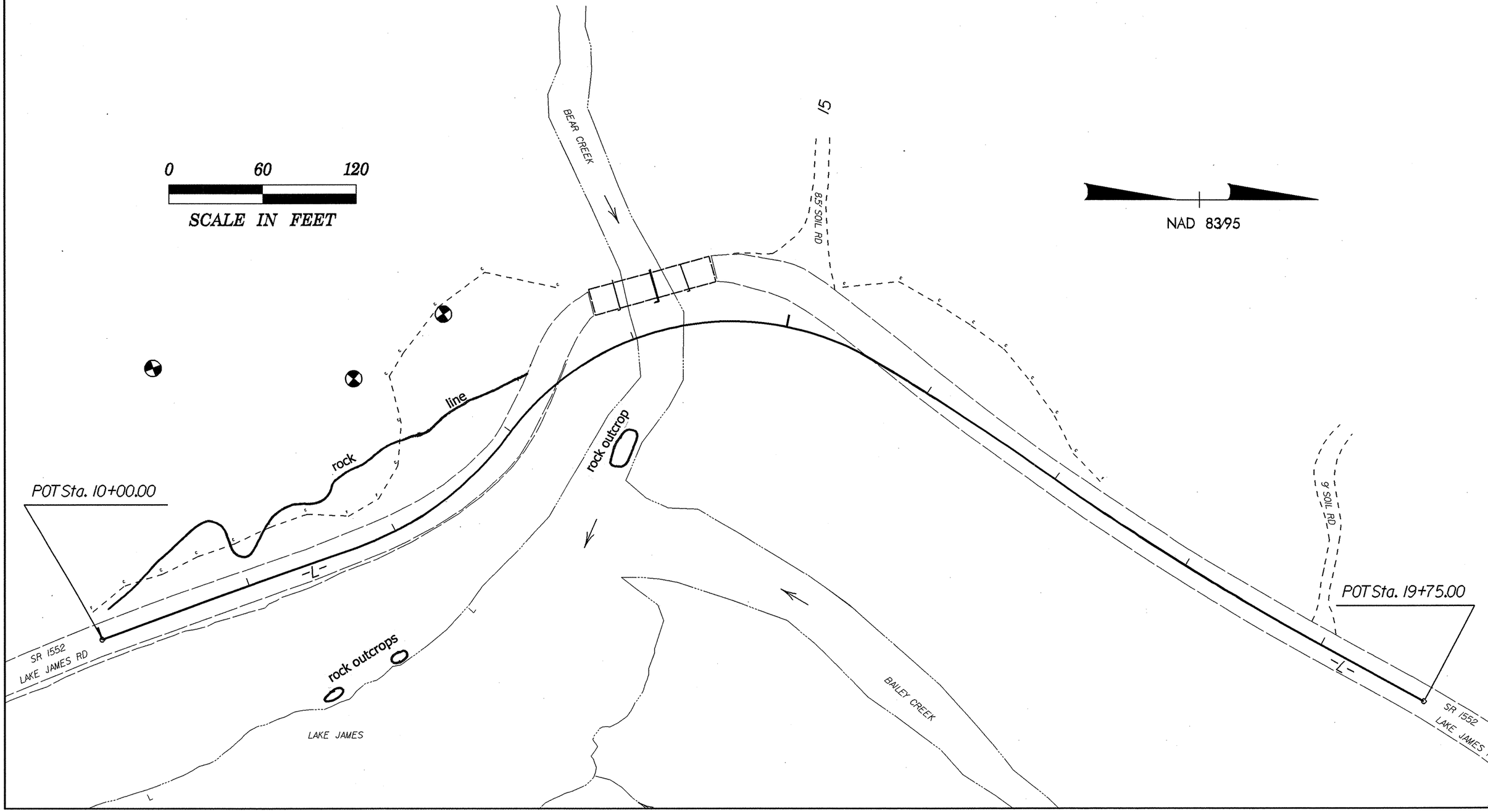
BAILEY CREEK

-LREV-

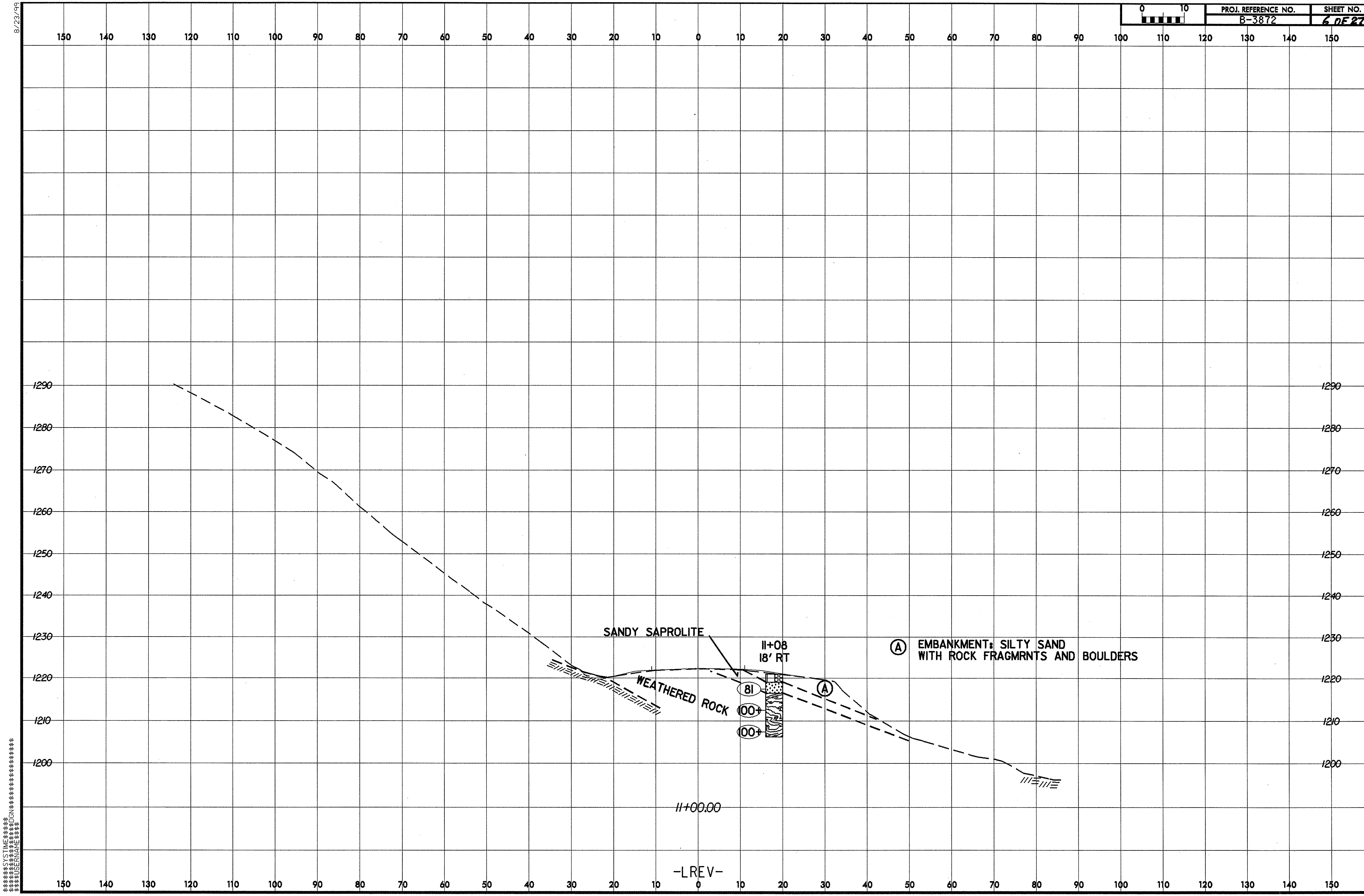
POT Sta. 19+75.00

PROJECT REF. NO.	SHEET NO.	TOTAL SHEETS
B-3872	5	27

TEMPORARY PAVEMENT DETAIL



PROJ. REFERENCE NO.	SHEET NO.
B-3872	6 OF 27



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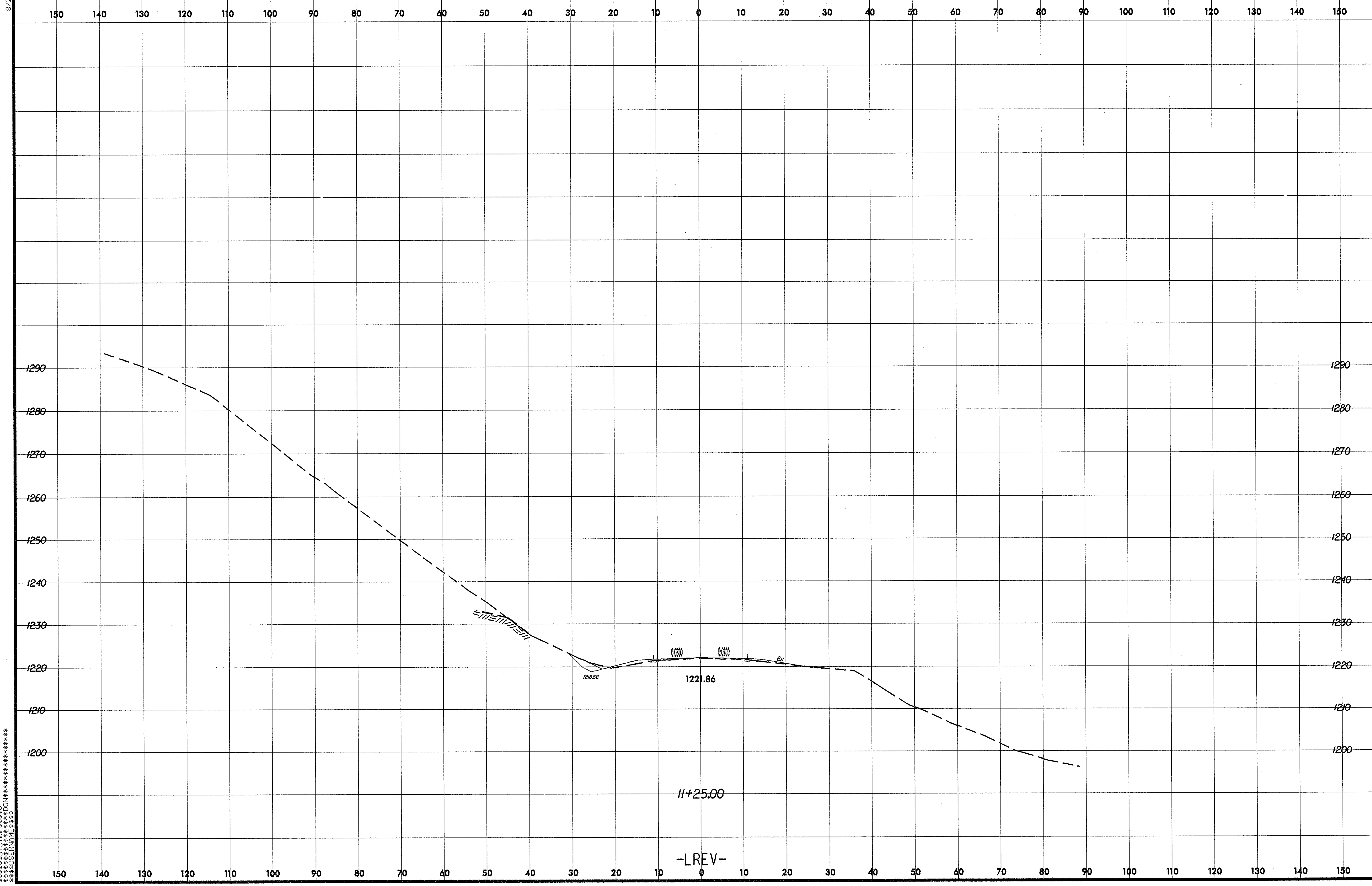
0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3872	7 OF 27



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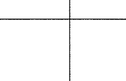
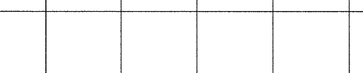
0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3872	8 OF 27

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1290
1280
1270
1260
1250
1240
1230
1220
1210
1200





11+50.00
-LREV-

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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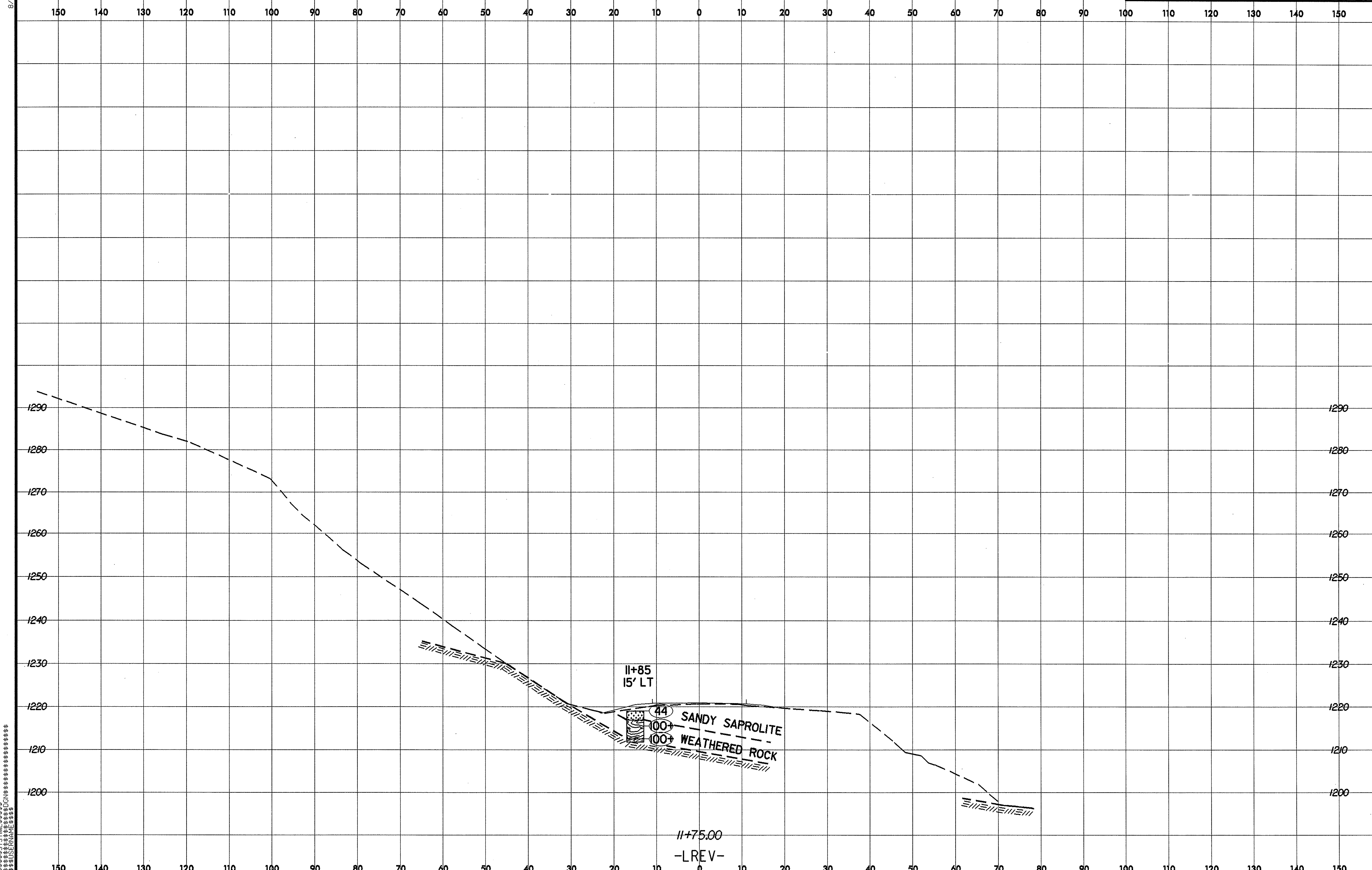

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0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3872	10 OF 27

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1280
1270
1260
1250
1240
1230
1220
1210
1200

0.000 0.000

1217.32

1219.88

12+00.00

-LREV-

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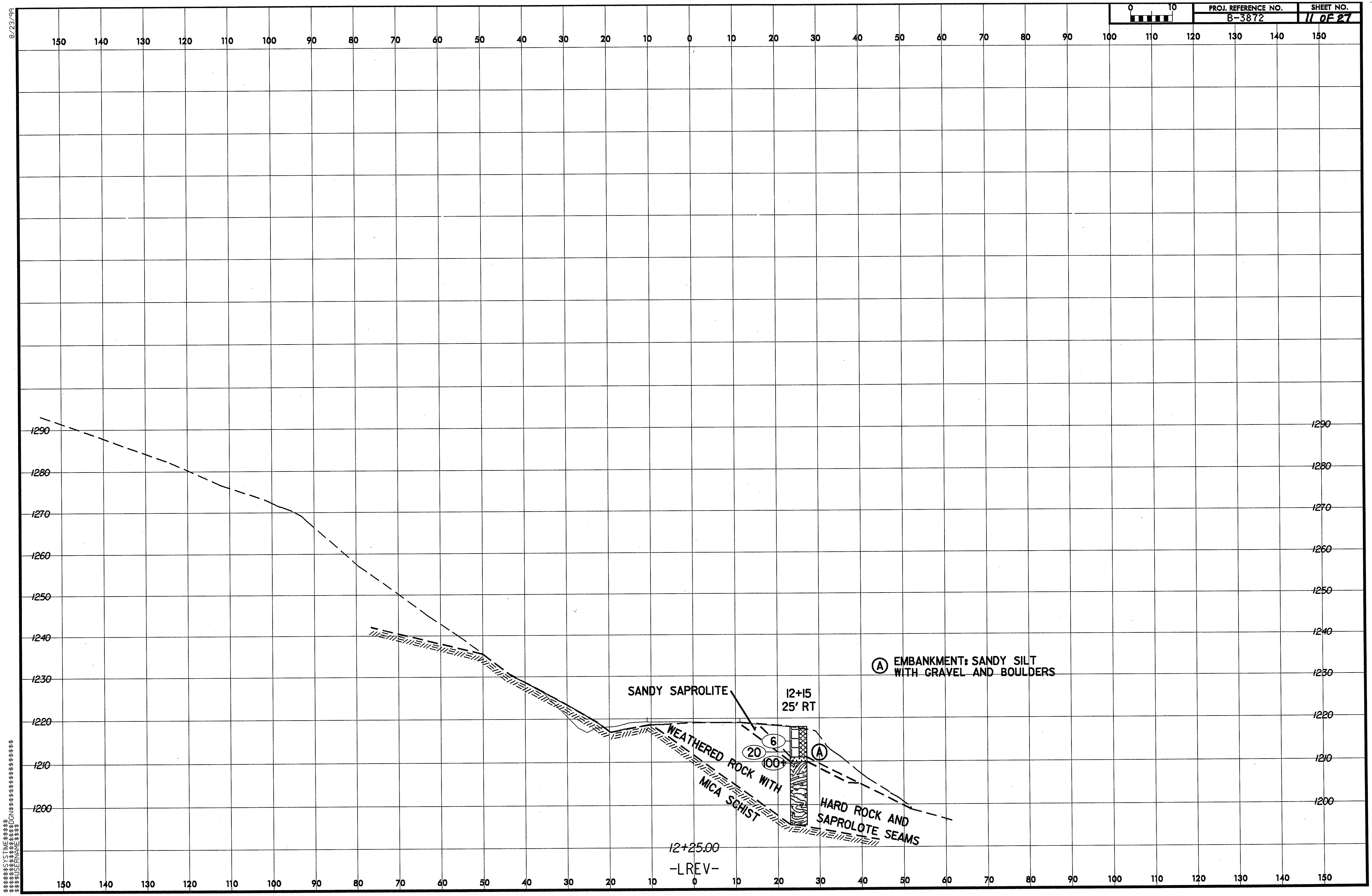
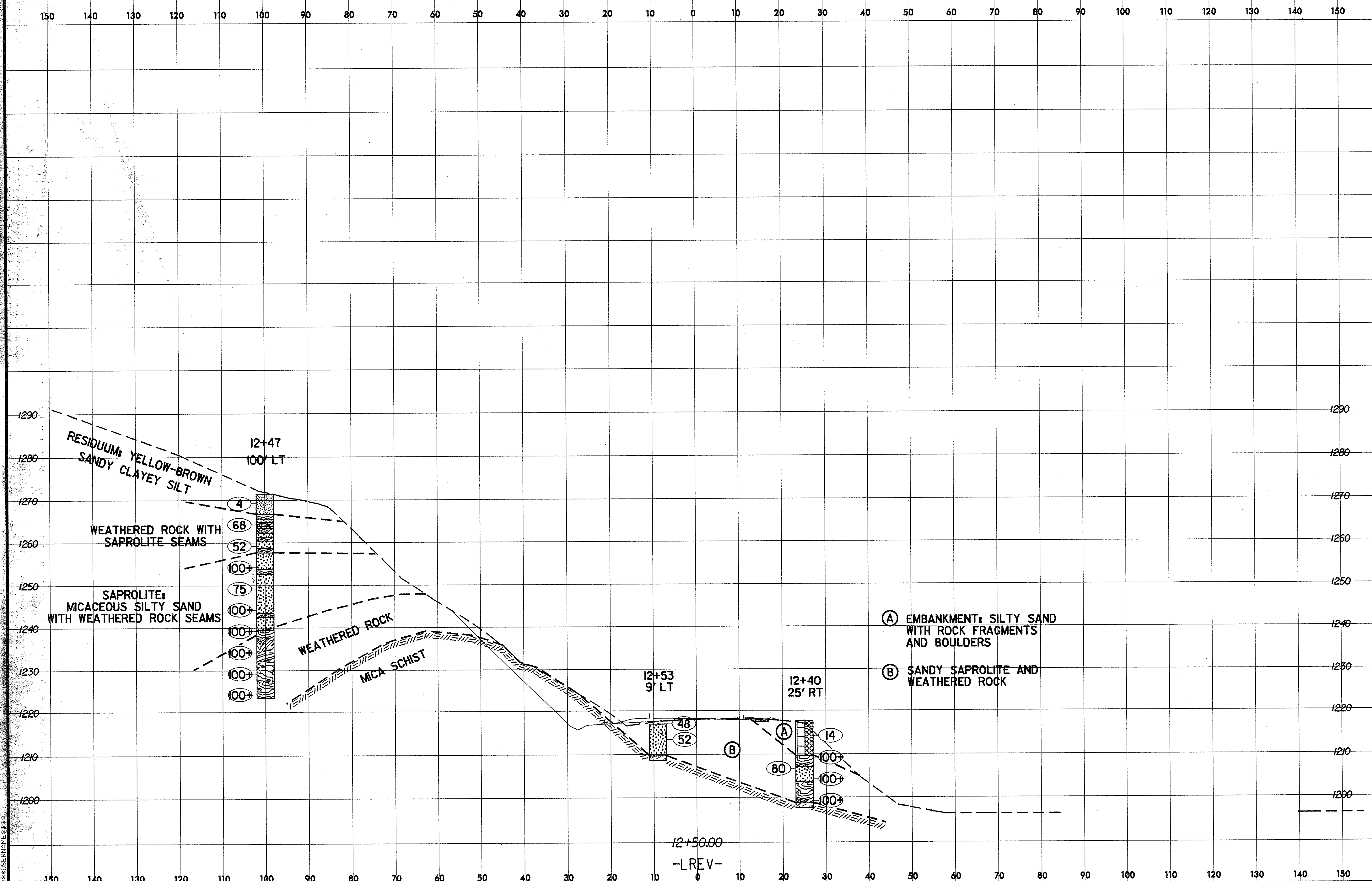
PROJ. REFERENCE NO.	SHEET NO.
B-3872	11 OF 27




0 10
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
12+47
100' LT
RESIDUUM: YELLOW-BROWN SANDY CLAYEY SILT
WEATHERED ROCK WITH SAPROLITE SEAMS
SAPROLITE: MICACEOUS SILTY SAND WITH WEATHERED ROCK SEAMS
4
68
52
100+
75
100+
100+
100+
100+
100+
WEATHERED ROCK
MICA SCHIST
12+53
9' LT
48
52
12+40
25' RT
14
100+
80
100+
100+
A
B
Ⓐ EMBANKMENT: SILTY SAND WITH ROCK FRAGMENTS AND BOULDERS
Ⓑ SANDY SAPROLITE AND WEATHERED ROCK
12+50.00
-LREV-

8/23/99

0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3872	13 OF 27

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1280 1270 1260 1250 1240 1230 1220 1210 1200

121373

1216.58

13+00.00

MICA SCHIST

Ⓐ EMBANKMENT: SANDY, MICACEOUS SILT

12+70
17' RT

3
100+
100+
REF

Ⓐ

WEATHERED ROCK WITH HARD ROCK SEAM

12+75.00

-LREV-

$$$$$$$$SYSTIME$$$$$$
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$$$$$USERNAME$$$$

PROJ. REFERENCE NO. B-3872

SHEET NO. 14 OF 27

0 10

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1260 1250 1240 1230 1220 1210 1200 1290 1280 1270

Ⓐ EMBANKMENT: BROWN, SILTY, MICACEOUS SAND WITH ROCK FRAGMENTS AND BOULDERS

13+67
7' LT

16
2
75
REF
Ⓐ

WEATHERED ROCK

13+50.00

SAPROLITE: TAN, MICACEOUS, SANDY SILT WITH ROCKY SEAMS

13+20
84' LT

43
41
16
100+
100+
REF

SAPROLITE:

BROWN, MICACEOUS, SILTY SAND

WEATHERED ROCK: BROWN MICA SHIST

HARD ROCK: MICA SCHIST

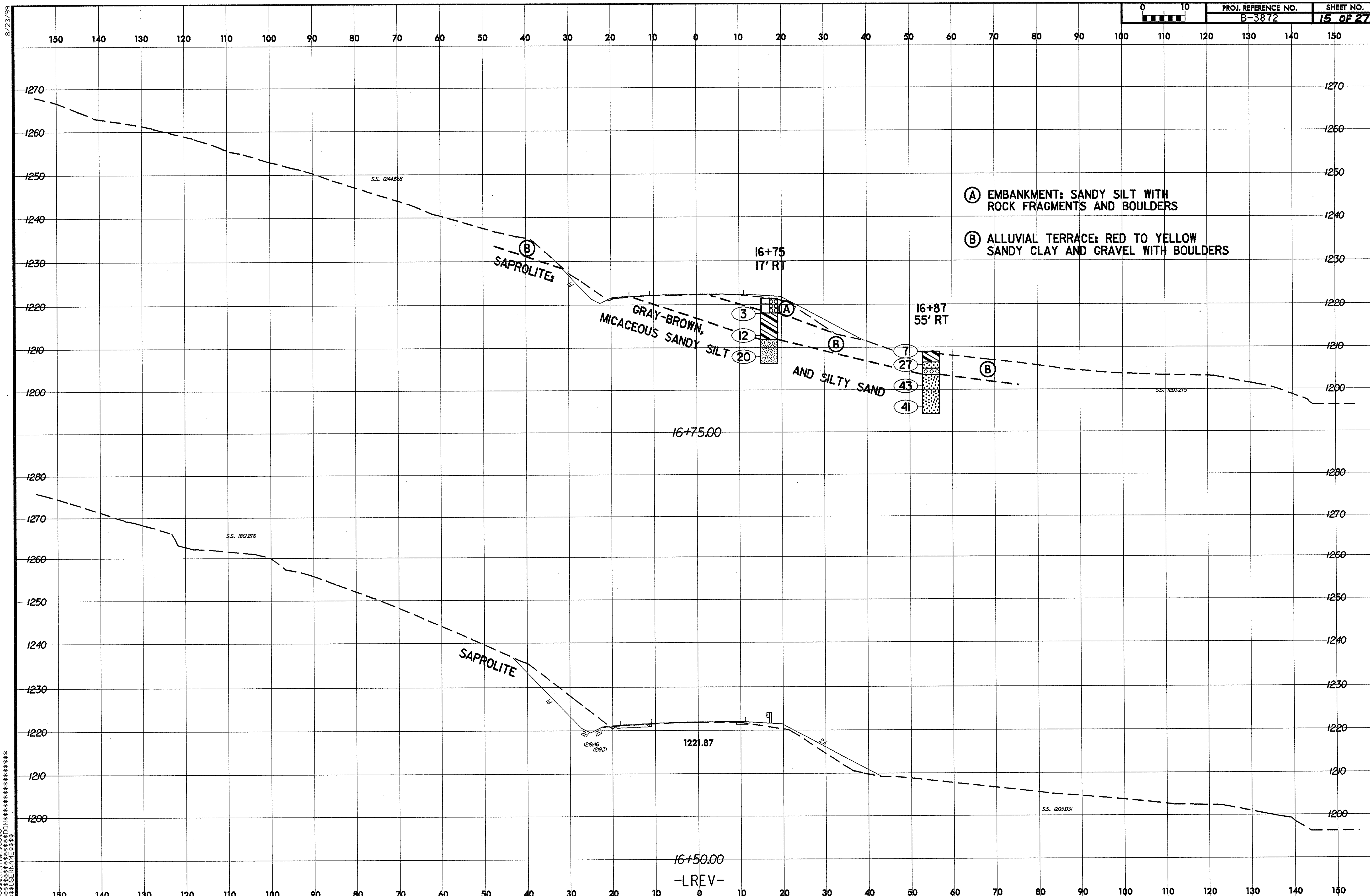
13+22
12' RT

Ⓑ 10
100+
Ⓐ

Ⓐ EMBANKMENT: RED-BROWN, SILTY SAND WITH ROCK FRAGMENTS

Ⓑ WEATHERED ROCK

13+25.00
-LREV-


PROJ. REFERENCE NO.
B-3872
SHEET NO.
15 OF 27
8/23/99
(A) EMBANKMENT: SANDY SILT WITH ROCK FRAGMENTS AND BOULDERS
(B) ALLUVIAL TERRACE: RED TO YELLOW SANDY CLAY AND GRAVEL WITH BOULDERS
16+75
17' RT
16+87
55' RT
SAPROLITE:
GRAY-BROWN, MICACEOUS SANDY SILT AND SILTY SAND
16+75.00
SAPROLITE
1221.87
16+50.00
-LREV-

8/23/99

0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3872	16 OF 27

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1260 1250 1240 1230 1220 1210 1200

17+27
14' RT

(A) EMBANKMENT: RED-BROWN, SANDY SILT WITH A FEW BOULDERS

(B) ALLUVIAL TERRACE: RED TO YELLOW-BROWN, SANDY CLAY WITH COBBLES AND BOULDERS

(B) (B) (A)

18
22
42

SAPROLITE: BROWN, MICACEOUS

SANDY SILT

17+25.00

S.S. 1234.42

4:1

1221.09

1220.44

1222.84

2:1

S.S. 1205.927

17+00.00
-LREV-

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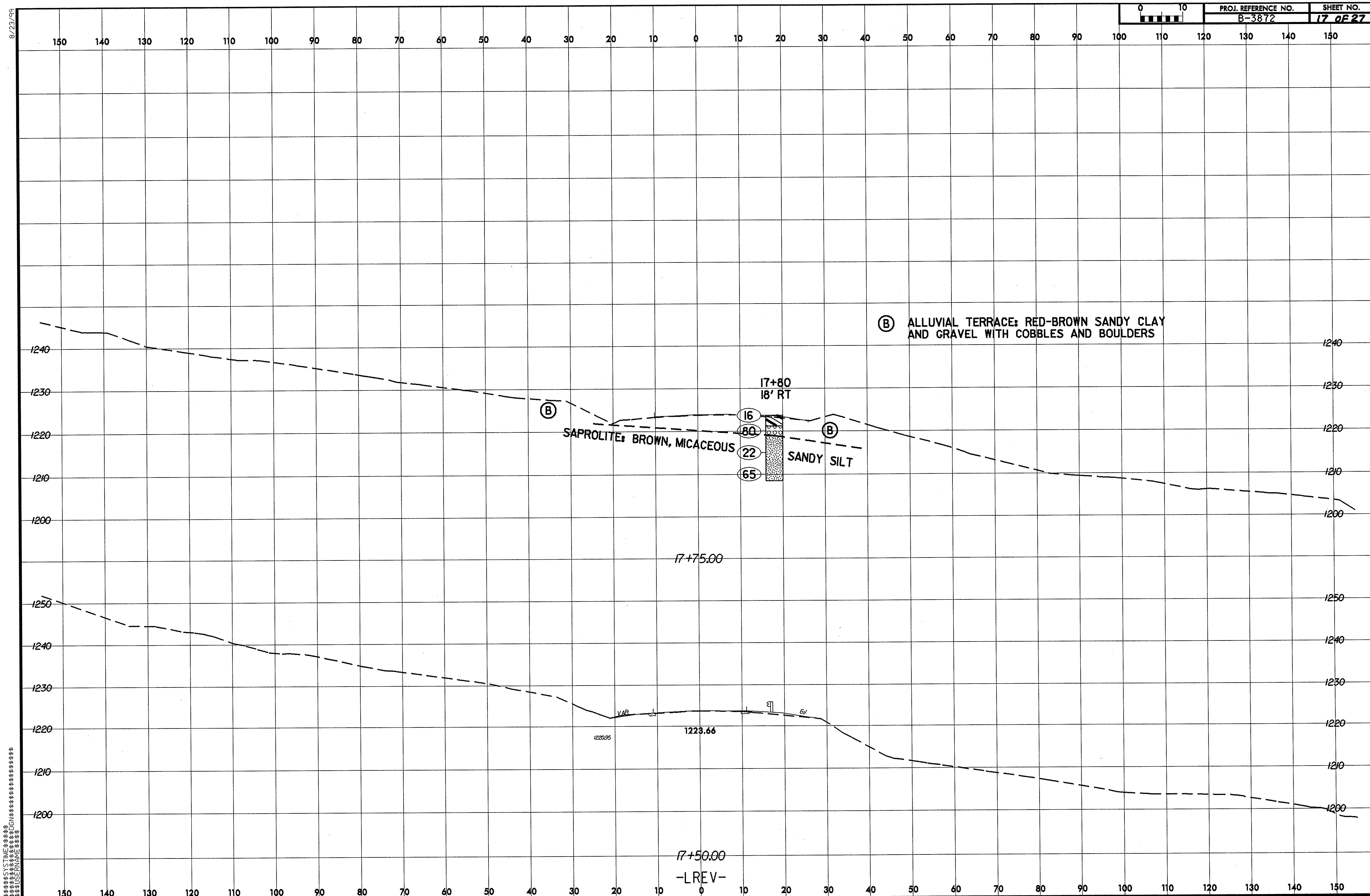
8/23/99
0 10
(B) ALLUVIAL TERRACE: RED-BROWN SANDY CLAY AND GRAVEL WITH COBBLES AND BOULDERS
17+80
18' RT
16
80
22
65
(B)
SAPROLITE: BROWN, MICACEOUS
SANDY SILT
17+75.00
VAR
6:1
1220.95
1223.66
17+50.00
-LREV-
$$$$$SYSTIME$$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 3	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 10+91.000	OFFSET 154.00ft LT	24 HR N/A
COLLAR ELEV 1290.00ft	TOTAL DEPTH 26.10ft	START DATE 9/01/02	COMPLETION DATE 09/03/02
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A		Log BORING 3, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1290.00	0.00	1	1	1	1.0	Ground Surface				
	3.60	4	8	10	1.0	2 18	SS-6	D		RESIDUAL: ORANGE BROWN, SOFT TO MEDIUM STIFF, SANDY, SILTY CLAY
								D		SAPROLITE: RED-BROWN TO GRAY, STIFF, MICACEOUS, SANDY SILT
1280.00	8.60	3	4	6	1.0	10	SS-7 MS-3	M M		
	13.60	3	5	8	1.0	13		M		
	18.60	6	6	9	1.0	15	SS-8 MS-4	M M		
1270.00	23.60	30	70		0.2	100				WEATHERED ROCK: GRAY-BROWN BIOTITE GNEISS
1263.90										HARD ROCK: GRAY-BROWN BIOTITE GNEISS
						TERMINATED BORING IN HARD ROCK AT ELEVATION 1263.9 FEET				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 10	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 11+08.000	OFFSET 18.00ft RT	24 HR N/A
COLLAR ELEV 1221.00ft	TOTAL DEPTH 14.70ft	START DATE 9/06/02	COMPLETION DATE 09/06/02
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH	DEPTH TO ROCK N/A		Log BORING 10, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1221.00						Ground Surface				
	3.60	4	25	56	1.0	81				EMBANKMENT: SILTY SAND WITH ROCK FRAGMENTS AND BOULDERS
	8.60	100			0.1	100				SAPROLITE: BROWN, MICACEOUS, SILTY SAND
1210.00										WEATHERED ROCK WITH HARD ROCK SEAMS
1206.30	13.60	19	45	55	1.0	100				
						TERMINATED BORING IN WEATHERED ROCK AT ELEVATION 1206.3 FEET				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 4	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 11+85.000	OFFSET 15.00ft LT	24 HR N/A
COLLAR ELEV 1219.00ft	TOTAL DEPTH 7.20ft	START DATE 9/04/02	COMPLETION DATE 09/04/02
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH N/A	DEPTH TO ROCK 6.50ft		Log BORING 4, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1219.00	0.00	3	16	28	1.0	Ground Surface; 44		D		SAPROLITE: LIGHT BROWN, MICACEOUS, SILTY SAND
	3.50	100			0.3	100				WEATHERED ROCK: MICA SCHIST
1211.80	6.50	100			0.3	100				HARD ROCK: MICA SCHIST
		TERMINATED BORING IN HARD ROCK AT ELEVATION 1212.5 FEET								

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 12	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 12+15.000	OFFSET 25.00ft RT	24 HR N/A
COLLAR ELEV 1218.00ft	TOTAL DEPTH 22.70ft	START DATE 9/11/02	COMPLETION DATE 09/11/02
DRILL MACHINE CME 55O	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH	DEPTH TO ROCK 22.70ft		Log BORING 12, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1218.00						Ground Surface				
	3.40	3	3	3	1.0	6		D		EMBANKMENT: ORANGE-BROWN, SANDY SILT WITH GRAVEL AND BOULDERS
	5.90	4	8	12	1.0	20		D		
1210.00	8.40	19	40	60	0.8	100		M		SAPROLITE: BROWN-GRAY, MICACEOUS, SILTY SAND
										WEATHERED ROCK: MICA SCHIST WITH SEAMS OF HARD ROCK AND SAPROLITE
1200.00										
1195.30		TERMINATED BORING ON HARD ROCK AT ELEVATION 1195.3 FEET								

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER	
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK				GND WATER
BORING NO BORING 2	NORTHING 0.00	EASTING 0.00		0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 12+47.000	OFFSET 100.00ft LT		24 HR 21.70ft
COLLAR ELEV 1271.50ft	TOTAL DEPTH 48.10ft	START DATE 8/27/02	COMPLETION DATE 08/29/02	
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A		Log BORING 2, Page 1 of 2	

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1271.50						Ground Surface				
1270.00	2.30	2	2	2	1.0	4	SS-1	M		RESIDUUM: YELLOW-BROWN, SANDY, CLAYEY SILT
	7.30	58	43	25	1.0	68		M		WEATHERED ROCK WITH SANDY SAPROLITE SEAMS
1260.00	12.30	76	27	25	1.0	52	SS-2	M		
	17.30	100			0.3	100		M		SAPROLITE: GRAY-BROWN, MICACEOUS, SILTY SAND
										WEATHERED ROCK
1250.00	22.30	23	43	32	1.0	75	SS-3	M/W		SAPROLITE: GRAY-BROWN, MICACEOUS, SILTY SAND WITH WEATHERED ROCK SEAMS AT BASE
	27.30	26	32	68	0.9	100				
1240.00	32.30	11	29	71	0.9	100				WEATHERED ROCK: MICA SCHIST AND FELDSPATHIC GNEISS
	37.30	35	65		0.5	100				
1230.00	42.30	37	63		0.5	100				
	47.30	45	55		0.3	100				
1223.40						Continued on the next page.				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER	
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK				GND WATER
BORING NO BORING 2	NORTHING 0.00	EASTING 0.00		0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 12+47.000	OFFSET 100.00ft LT		24 HR 21.70ft
COLLAR ELEV 1271.50ft	TOTAL DEPTH 48.10ft	START DATE 8/27/02	COMPLETION DATE 08/29/02	
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A		Log BORING 2, Page 2 of 2	

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1223.40						TERMINATED BORING IN WEATHERED ROCK AT ELEVATION 1223.4 FEET				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER	
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK				GND WATER
BORING NO BORING 11	NORTHING 0.00	EASTING 0.00		0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 12+40.000	OFFSET 25.00ft RT		24 HR N/A
COLLAR ELEV 1217.70ft	TOTAL DEPTH 20.10ft	START DATE 9/11/02	COMPLETION DATE 09/11/02	
DRILL MACHINE CME 550	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH	DEPTH TO ROCK 19.00ft		Log BORING 11, Page 1 of 1	

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1217.70						Ground Surface				
	3.50	2	3	11	1.0	14		D		EMBANKMENT: BROWN-ORANGE SILTY SAND, GRAVEL AND BOULDERS
1210.00	8.50	100			0.3	100		D		WEATHERED ROCK
	11.00	11	36	44	1.0	80				
	13.50	11	100		0.3	100		D		SAPROLITE: BROWN, MICACEOUS, SILTY SAND
1200.00	18.50	83	17		0.5	100				WEATHERED ROCK: MICA SCHIST
1197.60						TERMINATED BORING IN HARD ROCK AT ELEVATION 1197.6 FEET				HARD ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 5	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 12+53.000	OFFSET 9.00ft LT	24 HR N/A
COLLAR ELEV 1218.00ft	TOTAL DEPTH 8.30ft	START DATE 9/04/02	COMPLETION DATE 09/04/02
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH N/A	DEPTH TO ROCK 7.30ft		Log BORING 5, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1218.00	0.00	6	20	28	1.0	Ground Surface 48		D		SAPROLITE: LIGHT BROWN, MICACEOUS, SILTY SAND
	3.60	13	23	29	1.0	52		D		
1209.90						TERMINATED BORING IN HARD ROCK AT ELEVATION 1210.7 FEET				HARD ROCK: MICA SCHIST

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER	
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK				GND WATER
BORING NO BORING 13	NORTHING 0.00	EASTING 0.00		0 HR 0.00ft
ALIGNMENT -LREV-	BORING LOCATION 12+70.000	OFFSET 17.00ft RT		24 HR N/A
COLLAR ELEV 1217.10ft	TOTAL DEPTH 17.50ft	START DATE 4/06/04	COMPLETION DATE 04/06/04	
DRILL MACHINE CME 550	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH N/A	DEPTH TO ROCK 17.00ft		Log BORING 13, Page 1 of 1	

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1217.10						Ground Surface				
	2.40	2	2	1	1.0	3				EMBANKMENT: BROWN, SANDY, MICACEOUS SILT
1210.00	7.40	40	60		0.4	100				WEATHERED ROCK
	12.40	100			0.4	100				HARD ROCK WEATHERED ROCK
1199.60	17.40	60			0.1	60				HARD ROCK
						TERMINATED BORING IN HARD ROCK AT ELEVATION 1199.6 FEET.				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER	
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK				GND WATER
BORING NO BORING 1	NORTHING 0.00	EASTING 0.00		0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 13+20.000	OFFSET 84.00ft LT		24 HR N/A
COLLAR ELEV 1264.00ft	TOTAL DEPTH 30.60ft	START DATE 9/03/02	COMPLETION DATE 09/03/02	
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH	DEPTH TO ROCK 28.40ft		Log BORING 1, Page 1 of 1	

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1264.00						Ground Surface				
1260.00	5.30	18	15	28	1.0	43	SS-4 MS-1	D M		SAPROLITE: TAN, MICACEOUS, SANDY SILT WITH ROCKY SEAMS
	10.30	5	16	25	1.0	41		M		
1250.00	15.30	5	8	8	1.0	16	SS-5 MS-2	M		SAPROLITE: BROWN, MICACEOUS, SILTY SAND
	20.30	23	42	58	0.8	100				WEATHERED ROCK: BROWN MICA SCHIST
1240.00	25.30	24	76		0.3	100				
1233.40	30.30	100			0.0	100				HARD ROCK: BROWN MICA SCHIST
						TERMINATED BORING IN HARD ROCK AT ELEVATION 1233.4 FEET				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 14	NORTHING 0.00	EASTING 0.00	0 HR 0.00ft
ALIGNMENT -LREV-	BORING LOCATION 13+22.000	OFFSET 12.00ft RT	24 HR N/A
COLLAR ELEV 1216.10ft	TOTAL DEPTH 9.30ft	START DATE 4/06/04	COMPLETION DATE 04/06/04
DRILL MACHINE CME 550	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH N/A	DEPTH TO ROCK 9.30ft		Log BORING 14, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1216.10						Ground Surface				
	2.60	2	6	4	1.0	10 100				EMBANKMENT: RED-BROWN, SILTY SAND WITH ROCK FRAGMENTS
1210.00										
	7.60	100			0.2					WEATHERED ROCK WITH THIN SOFT SEAMS
1206.80						TERMINATED BORING ON HARD ROCK AT ELEVATION 1206.8 FEET.				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 15	NORTHING 0.00	EASTING 0.00	0 HR 0.00ft
ALIGNMENT -LREV-	BORING LOCATION 13+67.000	OFFSET 7.00ft LT	24 HR N/A
COLLAR ELEV 1213.90ft	TOTAL DEPTH 12.70ft	START DATE 4/06/04	COMPLETION DATE 04/06/04
DRILL MACHINE CME 550	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH N/A	DEPTH TO ROCK 12.30ft		Log BORING 15, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1213.90						Ground Surface				
1210.00	2.70	12	12	4	1.0	16				EMBANKMENT: BROWN, SILTY MICACEOUS SAND WITH ROCK FRAGMENTS AND BOULDERS
	7.70	1	1	1	1.0	2				
	10.20	2	6	69	1.0	75				
1201.20	12.70	60			0.1	60				WEATHERED ROCK
						TERMINATED BORING IN HARD ROCK AT ELEVATION 1201.6 FEET.				HARD ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 7	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 16+75.000	OFFSET 17.00ft RT	24 HR N/A
COLLAR ELEV 1221.50ft	TOTAL DEPTH 15.20ft	START DATE 9/06/02	COMPLETION DATE 09/06/02
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH	DEPTH TO ROCK N/A		Log BORING 7, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1221.50						Ground Surface				
1220.00	3.70	1	1	2	1.0	3	SS-13	M		EMBANKMENT: RED-BROWN, SANDY SILT, GRAVEL AND BOULDERS
	8.70	2	4	8	1.0	12	SS-14	M		ALLUVIUM: RED-BROWN, SANDY, SILTY CLAY WITH A LITTLE GRAVEL
1210.00								D		SAPROLITE: GRAY-BROWN, MICACEOUS, SANDY SILT
1206.30	13.70	5	9	11	1.0	20		M		
						TERMINATED BORING IN SAPROLITE AT ELEVATION 1206.3 FEET				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 6	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 16+87.000	OFFSET 55.00ft RT	24 HR 9.40ft
COLLAR ELEV 1209.00ft	TOTAL DEPTH 14.70ft	START DATE 9/05/02	COMPLETION DATE 09/05/02
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH	DEPTH TO ROCK N/A		Log BORING 6, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1209.00	0.00	2	3	4	1.0	Ground Surface				
	3.20	2	7	20	1.0	7 27	SS-9	M		ALLUVIUM: RED, SANDY CLAY
							SS-10	M		ALLUVIUM: YELLOW-BROWN SILTY SAND
1200.00	8.20	9	18	25	1.0	43				ALLUVIUM: YELLOW-BROWN, SILTY SAND AND GRAVEL TO BOULDERS
	13.20	7	17	24	1.0	41		D		SAPROLITE: GRAY-BROWN, MICACEOUS, SILTY SAND
1194.30						TERMINATED BORING IN SAPROLITE AT ELEVATION 1194.3 FEET				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 8	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 17+27.000	OFFSET 14.00ft RT	24 HR N/A
COLLAR ELEV 1223.00ft	TOTAL DEPTH 15.10ft	START DATE 9/05/02	COMPLETION DATE 09/05/02
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A		Log BORING 8, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1223.00						Ground Surface				
1220.00	3.60	1	9	9	1.0	18	S-11	M		EMBANKMENT: RED-BROWN SANDY SILT WITH A FEW BOULDERS
								M		ALLUVIUM: YELLOW-BROWN, SANDY CLAY
	8.60	2	6	16	1.0	22		M		SAPROLITE: BROWN, MICACEOUS, SANDY SILT
1210.00	13.60	4	20	22	1.0	42	SS-12	M		
1207.90						TERMINATED BORING IN SAPROLITE AT ELEVATION 1207.9 FEET				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33316.1.1	ID B-3872	COUNTY MCDOWELL	GEOLOGIST L.L. ACKER
SITE DESCRIPTION APPROACHES TO BR 195 ON SR-1552 OVER LAKE JAMES CREEK			GND WATER
BORING NO BORING 9	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT -LREV-	BORING LOCATION 17+80.000	OFFSET 18.00ft RT	24 HR N/A
COLLAR ELEV 1223.70ft	TOTAL DEPTH 15.20ft	START DATE 9/05/02	COMPLETION DATE 09/05/02
DRILL MACHINE CME-45	DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC
SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A		Log BORING 9, Page 1 of 1

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1223.70	0.00	8	9	7	1.0	Ground Surface				
1220.00	3.70	80	45	35	1.0	16 80		M		ALLUVIUM: RED-BROWN, SANDY CLAY WITH A LITTLE GRAVEL
										ALLUVIUM: LIGHT BROWN, SAND, GRAVEL AND BOULDERS
	8.70	10	11	11	1.0	22		D		SAPROLITE: BROWN MICACEOUS, SANDY SILT
1210.00	13.70	15	26	39	1.0	65		D		
1208.50						TERMINATED BORING IN SAPROLITE AT ELEVATION 1208.5 FEET				

JJL

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

T.I.P. ID #:	

REPORT ON SAMPLES OF:	Soil for Classification

PROJECT:	8.2872001	COUNTY:	McDowell	Owner:	--
DATE SAMPLED:	8-27-02	DATE RECEIVED:	9-10-02	DATE REPORTED:	10-9-02
SAMPLED FROM:	Rdw – Detour	SAMPLED BY:	L L Acker		
SUBMITTED BY:	W D Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-1	MS-2	SS-2	MS-2	SS-3	MS-3	SS-4	MS-4
Lab Sample No. A-	138998	138999	139000	139001	139002	139003	139004	139005
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	--	--	--	--	--	--	--	--
Passing #10 Sieve %	90		92		95		95	
Passing #40 Sieve %	77		70		73		79	
Passing #200 Sieve %	43		28		30		40	

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	25		39		38		28	
Fine Sand - Ret. #270	37		39		39		36	
Silt 0.05-0.005 mm %	22		18		19		28	
Clay < 0.005 mm %	16		4		4		8	
Passing # 40 Sieve %	--		--		--		--	
Passing # 200 Sieve %	--		--		--		--	

Liquid Limit	33		31		30		35	
Plastic Index	7		NP		NP		NP	
AASHTO Classification	A-4 (1)		A-2-4 (0)		A-2-4 (0)		A-4 (1)	
Quantity								
Texture								
Station	14+00 Lt	15+10 Lt	14+00 Lt	15+1- Lt	14+00 Lt	13+00 Lt	15+10 Lt	13+00 :t
Hole No.								
Depth (ft) From:	1.0	3.8	12.3	13.8	22.3	8.6	3.8	18.6
To:	3.0	5.3	13.8	15.3	23.8	10.1	5.3	20.1
% Moisture		6.2		8.2		16.9		14.5

Remarks:

A-138999 thru A-139017

CC:

W D Frye	
J J Lail	
File	

SOILS ENGINEER:	

JJL

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

T.I.P. ID #:	

REPORT ON SAMPLES OF:	Soil for Classification

PROJECT:	8.2872001	COUNTY:	McDowell	Owner:	--
DATE SAMPLED:	9-3-02	DATE RECEIVED:	9-10-02	DATE REPORTED:	10-9-02
SAMPLED FROM:	Rdw	SAMPLED BY:	L L Acker		
SUBMITTED BY:	W D Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-5	SS-6	SS-7	SS-8	SS-9	SS-10	SS-11	SS-12
Lab Sample No. A-	139006	139007	139008	139009	139010	139011	139012	139013
HiCAMS Sample #	--	--	--	--	--	--	--	--
Retained #4 Sieve %	--	--	--	--	--	--	--	--
Passing #10 Sieve %	95	90	91	87	97	92	89	97
Passing #40 Sieve %	76	78	79	67	94	82	85	87
Passing #200 Sieve %	35	55	45	33	59	33	49	41

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	33	21	26	36	6	21	9	18
Fine Sand - Ret. #270	39	22	30	32	41	52	48	56
Silt 0.05-0.005 mm %	20	22	32	20	14	13	25	24
Clay < 0.005 mm %	8	35	12	12	39	14	18	2
Passing # 40 Sieve %	--	--	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--	--	--

Liquid Limit	31	40	34	40	36	24	25	36
Plastic Index	NP	14	NP	NP	17	NP	4	NP
AASHTO Classification	A-2-4 (0)	A-6 (6)	A-4 (2)	A-2-4 (0)	A-6(8)	A-2-4 (0)	A-4 (3)	A-4 (1)
Quantity								
Texture								
Station	15+10 Lt	13+00 Lt	13+00 Lt	13+00 Lt	16+00 Rt	16+00 Rt	16+50 CL	16+50 CL
Hole No.	Detour	kDetour	Detour	Detour	-L-	-L-	-L-	-L-
Depth (ft) From:	13.8	0.0	8.6	18.6	0.0	3.2	0.0	13.6
To:	15.3	1.5	10.1	20.1	1.5	4.7	3.0	15.1

Remarks:

A-138999 thru A-139017

CC:

W D Frye	
J J Lail	File

SOILS ENGINEER:	

JJL

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

T.I.P. ID #:	

REPORT ON SAMPLES OF:	Soil for Classification

PROJECT:	8.2872001	COUNTY:	McDowell	Owner:	--		
DATE SAMPLED:	0-6-02	DATE RECEIVED:	9-10-02	DATE REPORTED:	10-9-02		
SAMPLED FROM:	Rdw –L-	SAMPLED BY:	L L Acker				
SUBMITTED BY:	W D Frye	2002	STANDARD SPECIFICATION				
LABORATORY:	Asheville						

TEST RESULTS

Project Sample No.	SS-13	SS-14	SS-15	SS-16				
Lab Sample No. A-	139014	139015	139016	139017				
HiCAMS Sample #	--	--	--	--				
Retained #4 Sieve %	--	--	--	--				
Passing #10 Sieve %	91	97	100	64				
Passing #40 Sieve %	86	89	91	44				
Passing #200 Sieve %	55	58	44	24				

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	10	14	20	42				
Fine Sand - Ret. #270	39	36	49	28				
Silt 0.05-0.005 mm %	25	21	27	20				
Clay < 0.005 mm %	26	29	4	10				
Passing # 40 Sieve %	--	--	--	--				
Passing # 200 Sieve %	--	--	--	--				

Liquid Limit	33	37	35	24				
Plastic Index	11	15	NP	NP				
AASHTO Classification	A-6 (5)	A-6 (6)	A-4 (2)	A-1-b (0)				
Quantity								
Texture								
Station	16+00 Lt	16+00 Lt	16+00 Lt	11+10 Rt				
Hole No.								
Depth (ft) From:	3.7	8.7	13.7	4.8				
To:	5.2	9.6	15.2	8.6				

Remarks:

A-138999 thru A-139017

CC:

W D Frye	
J J Lail	File

SOILS ENGINEER:	