STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33308.1.1 (B-3861)	1	27

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33308.1.1 (B-3861) F.A. PROJ. BRZ-1731(6)

COUNTY JACKSON

PROJECT DESCRIPTION BRIDGE NO. 107 ON SR-1731 OVER TUCKASEGEE RIVER

SITE DESCRIPTION

ID: B-3861

PROJECT: 33308.1.1

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CAUTION NOTICE

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

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PERSONNEL

M M HAGER

D O CHEEK

R D CHILDERS

INVESTIGATED BY C A DUNNAGAN

CHECKED BY W D FRYE, Jr

SUBMITTED BY W D FRYE, Jr

DATE MAY 2011

NORTH CAROLINA LICENSED SEAL 10004 GEOLOGIST CHARLES ANDREWS DUNNAGAN

C A Dunnagan

DRAWN BY: C A DUNNAGAN

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PROJECT REFERENCE NO.	SHEET NO.
33308.1.1 (B-3861)	2/27

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING 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 THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, BROWN, 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-4, A-5	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6	A-3	A-6, A-7	
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	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
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 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	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	2.00	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, YELLOW-BROWN, 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 IS 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 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

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 SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- 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 - CALIFORNIA BEARING RATIO 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, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
FIAD-FILLED IMEDIATELLY AFTER DRILLING
WOH-WEIGHT OF HAMMER

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N XWL
- [ ] -H_____

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

ROCK DESCRIPTION

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

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
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 ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
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 VESTIDES 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 GEOLOGIST'S 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 GEOLOGIST'S 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 GEOLOGIST'S 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 THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: #2- CHISELED "X" ON HEADWALL OF CULVERT NO. 119
24.17' LT OF -BL- STA 9+92.42
ELEVATION: 2072.06 FT.

NOTES:

REVISED 02/23/06

3/27

BRIDGE NO. 107 ON SR-1797 OVER TUCKASEGEE RIVER

PROJECT REFERENCE NO.	SHEET
33308.1.1 (B-3861)	
PLAN VIEW	

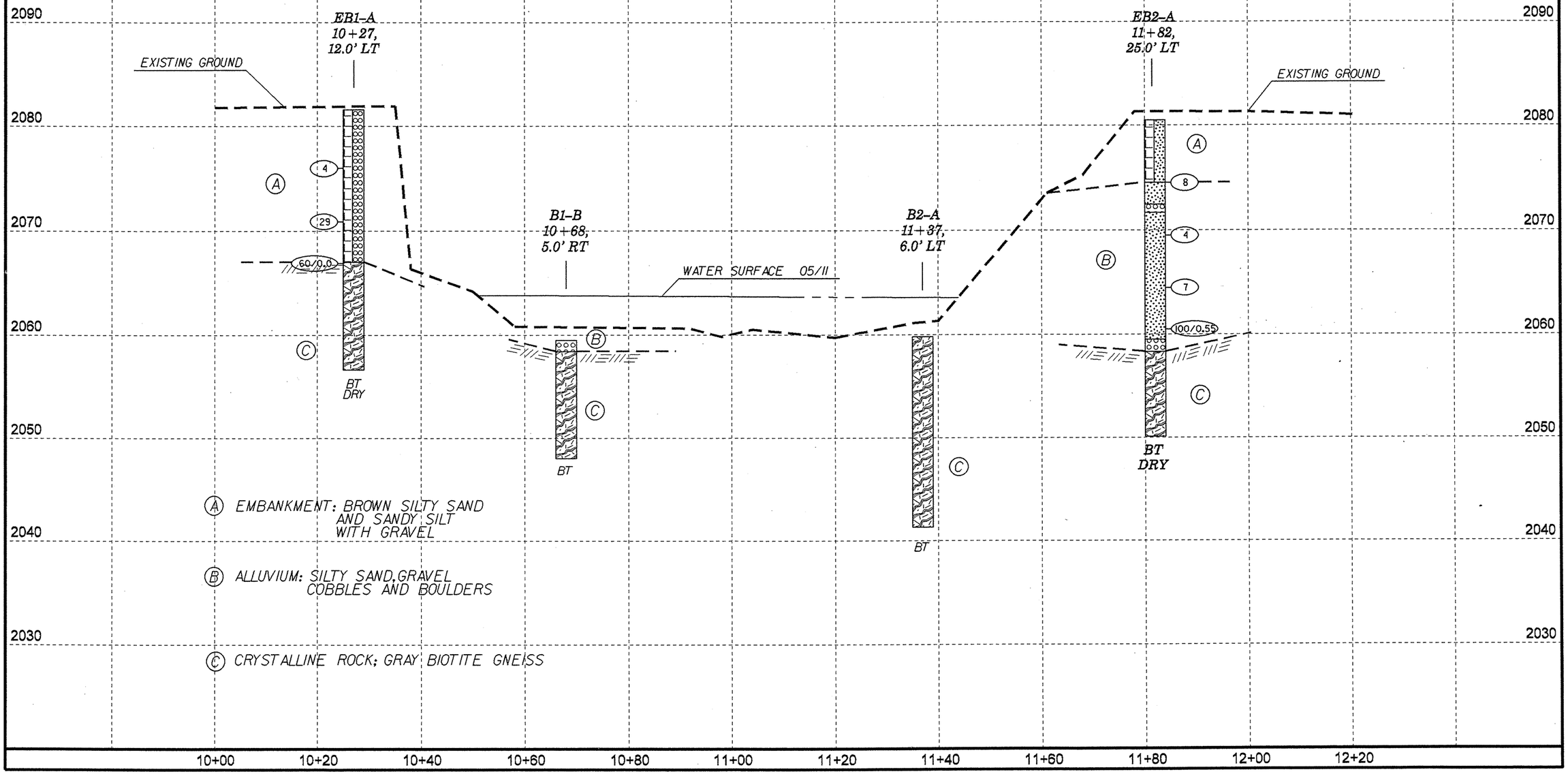
0 25 50
FEET
SKEW = 90°

ROCK OUTCROP
10' GR
15" CMP
12+00
-Y-
11+00
10+00
EB1-A
10+27,
12.0' LT
EB1-B
10+58.6,
12.0' RT
-DET-
EB1-B
10+49,
20.5' LT
B1-B
10+68,
5.9' RT
-L-
-N-
TUCKASEGEE RIVER
MTL
BM#2
MTL
STEEL TRUSS BRIDGE
ROCK OUTCROP
11+00
ROCK OUTCROP
B2-A
11+97,
5.5' LT
-DET-
EB2-A
11+82,
25.0' LT
T
EB2-A
11+94,
2.0' LT
-DET-
EB2-B
11+85,
15.0' RT
48"BLK WALL
GR
DRAIN FIELD
12+00
TUCKASEGEE RIVER

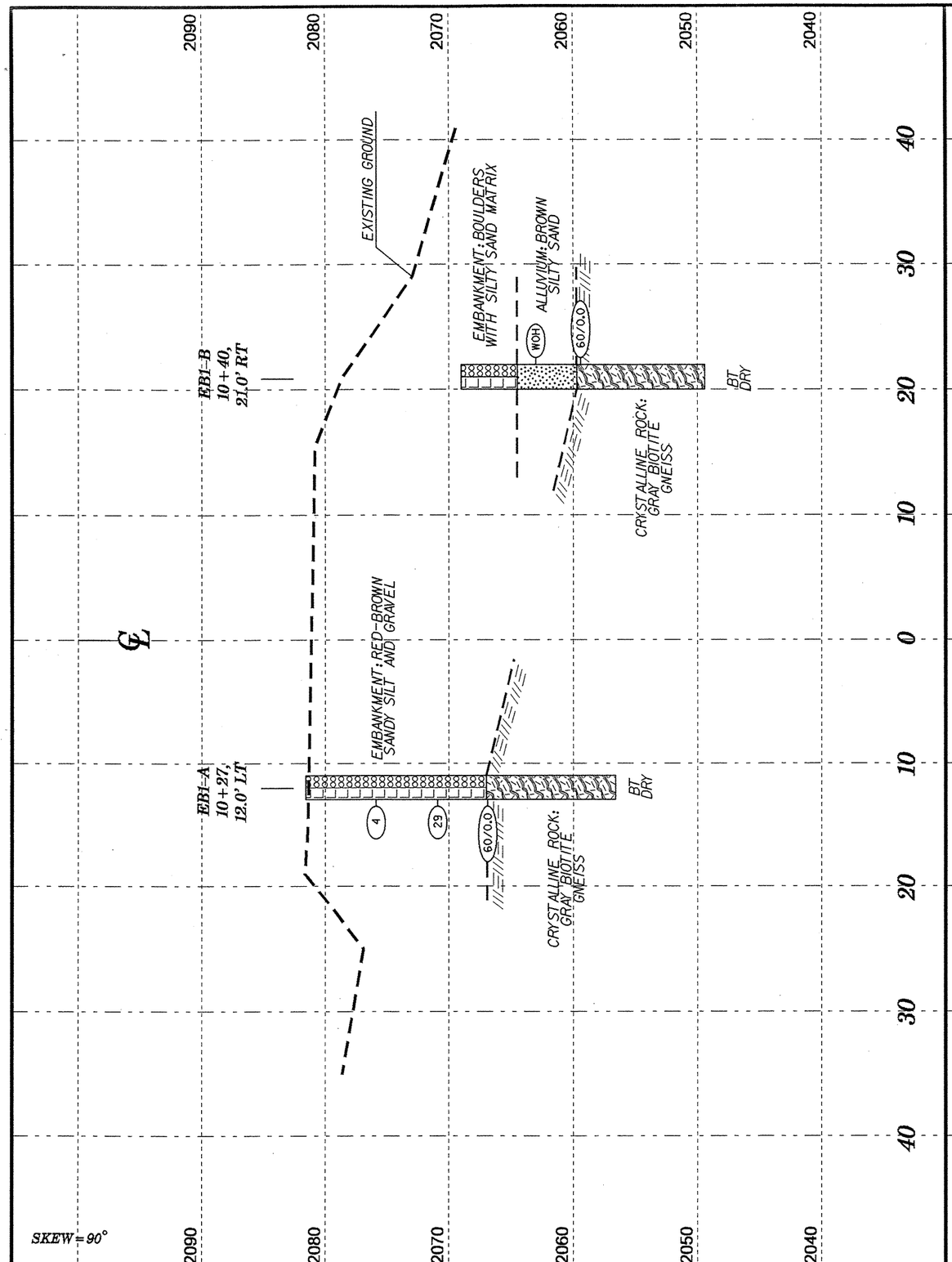
BRIDGE No. 107 ON SR-1797 OVER THE TUCKASEGEE RIVER

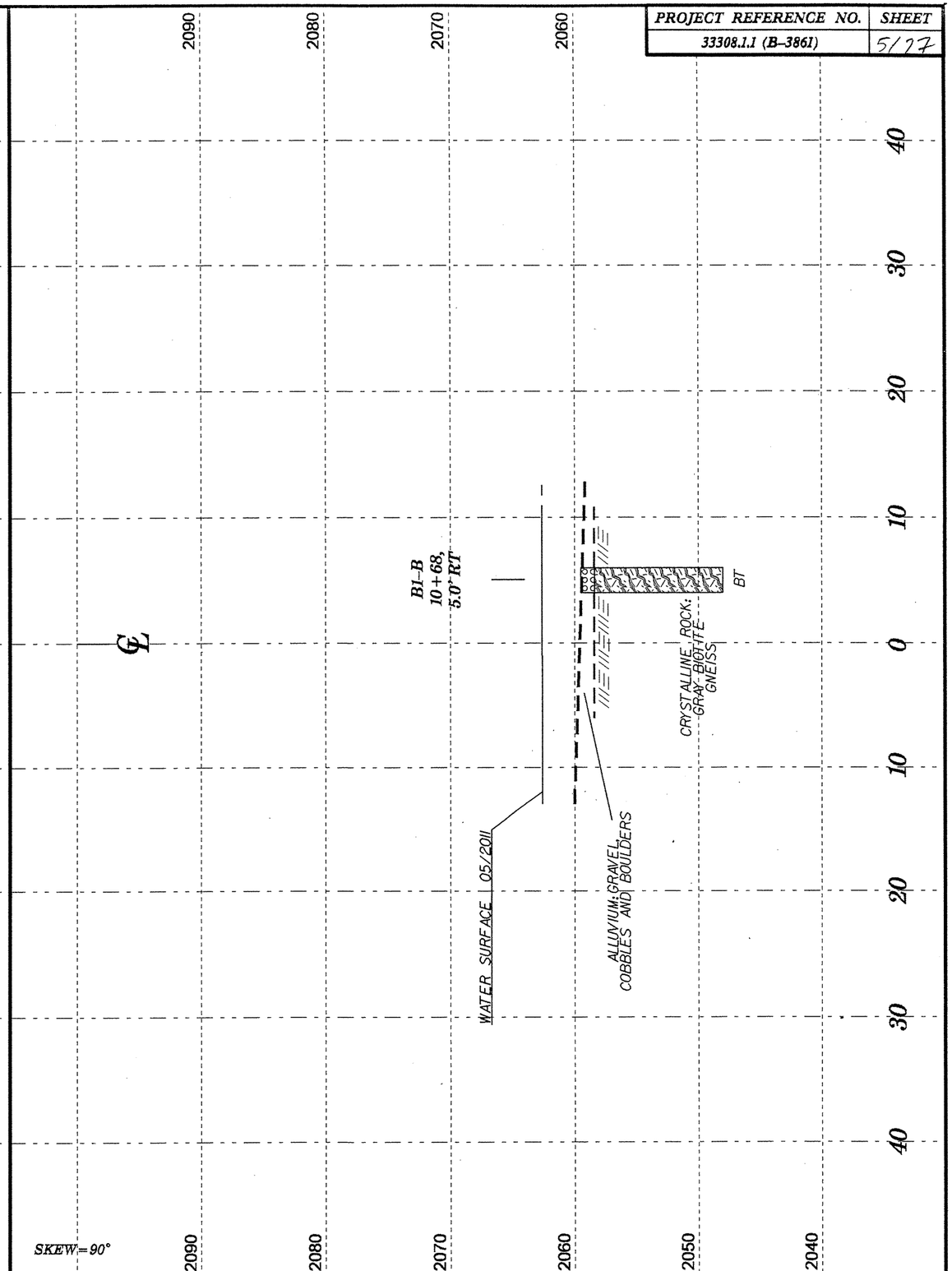
0 20 40
FEET
VE = 2

PROJECT REFERENCE NO.	SHEET
33308.1.1 (B-3861)	4/27
Centerline Profile	



PROJECT REFERENCE NO.	SHEET
33308.1.1 (B-3861)	5/27





PROJECT REFERENCE NO.	SHEET
33308.1.1 (B-3861)	61 27

HORIZ. SCALE (FEET) 0 10 20 | VE = 1 | **INTERIOR BENT TWO**

HORIZ. SCALE (FEET) 0 10 20 | VE = 1 | **END BENT TWO**

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 10+27	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,081.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Cheek, D. O.	**START DATE** 05/09/11	**COMP. DATE** 05/09/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2085										
										2,081.6 GROUND SURFACE 0.0
2080										**ROADWAY EMBANKMENT** Red-brown sandy silt and gravel.
	2,076.9	4.7	3	2	2	4 29		W		
2075										
	2,071.9	9.7	3	19	10					
2070										
	2,066.9	14.7	60/0.0			60/0.0				2,067.0 14.6
2065										**CRYSTALLINE ROCK** Gray biotite gneiss.
2060										2,056.6 25.0
										Boring Terminated at Elevation 2,056.6 ft in biotite gneiss.

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 10+27	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,081.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/09/11	**COMP. DATE** 05/09/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NXWL	**TOTAL RUN** 10.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2066.58											ELEV. (ft) DEPTH (ft)
											Begin Coring @ 15.0 ft
2065	2,066.6	15.0	5.0	2.2/0.0 2.3/0.0 2.4/0.0 2.5/0.0 2.6/0.0	(5.0) 100%	(5.0) 100%					**CRYSTALLINE ROCK** Gray biotite gneiss with a trace of garnets. Very hard; fresh. *(continued)*
	2,061.6	20.0	5.0	2.5/0.0 2.8/0.0 2.9/0.0	(5.0) 100%	(5.0) 100%					
2060											
	2,056.6	25.0		3.0/0.0							2,056.6 25.0
											Boring Terminated at Elevation 2,056.6 ft in biotite gneiss.

NCDOT CORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 10+40	**OFFSET** 21 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,069.0 ft	**TOTAL DEPTH** 19.6 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/09/11	**COMP. DATE** 05/09/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2070										2,069.0 GROUND SURFACE	0.0
2065										**ROADWAY EMBANKMENT** Boulders with silty sand matrix. 2,064.5	4.5
	2,064.0	5.0	WOH	WOH	WOH	0		Sat.		**ALLUVIAL** Brown silty sand. 2,059.7	9.3
2060	2,059.4	9.6	60/0.0			60/0.0				**CRYSTALLINE ROCK** Light gray biotite gneiss. 2,054.7	14.3
2055										**CRYSTALLINE ROCK** Tan and light gray brecciated biotite gniess. 2,049.4	19.6
2050										Boring Terminated at Elevation 2,049.4 ft in biotite gneiss.	

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 10+40	**OFFSET** 21 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,069.0 ft	**TOTAL DEPTH** 19.6 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/09/11	**COMP. DATE** 05/09/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NXWL	**TOTAL RUN** 10.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2059.39											Begin Coring @ 9.6 ft	
	2,059.4	9.6	5.0	*N=60/0.0* 3.9/0.0 3.3/0.0 2.5/0.0 3.1/0.0 2.2/0.0	(5.0) 100%	(5.0) 100%					**CRYSTALLINE ROCK** Light gray biotite gneiss. Fresh; very hard. Contact with brecciated zone begins at 14.3 ft at high angle. *(continued)* 2,054.7	14.3
2055	2,054.4	14.6	5.0	2.0/0.0 2.0/0.0 1.9/0.0 1.9/0.0 1.9/0.0 2.1/0.0	(4.4) 88%	(4.3) 86%					**CRYSTALLINE ROCK** Tan and light gray biotite gniess. Highly brecciated. Hard; moderately to slightly weathered. Trace of pyrite and garnets. a) Joints @ 30°. 2,049.4	19.6
2050	2,049.4	19.6									Boring Terminated at Elevation 2,049.4 ft in biotite gneiss.	

NCDOT CORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

SHEET

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 10+68	**OFFSET** 5 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,059.5 ft	**TOTAL DEPTH** 11.5 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** Core Boring	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/04/11	**COMP. DATE** 05/04/11	**SURFACE WATER DEPTH** 3.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) WATER SURFACE (05/04/11) DEPTH (ft)
2060										2,059.5 GROUND SURFACE 0.0
										2,058.4 ALLUVIAL 1.1
										Gravel, cobbles and boulders.
2055										CRYSTALLINE ROCK
										Gray biotite gneiss.
										2,054.6 4.9
							RS-4			CRYSTALLINE ROCK
										White quartz.
2050							RS-5			
										2,048.0 11.5
										Boring Terminated at Elevation 2,048.0 ft in biotite gneiss.

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

SHEET

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NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 10+68	**OFFSET** 5 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,059.5 ft	**TOTAL DEPTH** 11.5 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** Core Boring	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/04/11	**COMP. DATE** 05/04/11	**SURFACE WATER DEPTH** 3.6ft	
CORE SIZE NXWL	**TOTAL RUN** 10.4 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2058.36											Begin Coring @ 1.1 ft
	2,058.4	1.1	1.8		(1.8) 100%	(1.8) 100%					2,058.4 CRYSTALLINE ROCK 1.1
	2,056.6	2.9									Gray biotite gneiss with a trace of garnets and pyrite. Fresh; very hard.
2055			5.0	1.7/0.0	(5.0) 100%	(5.0) 100%					2,054.6 4.9
				1.9/0.0							CRYSTALLINE ROCK
				4.3/0.0			RS-4				Predominatlely white quartz with trace amounts of biotite and garnets. Very
				5.7/0.0							hard; slightly weathered to fresh; massive to very weakly foliated.
	2,051.6	7.9		6.2/0.0							a) Joints @ 20°.
2050			3.6	6.5/0.0	(3.6) 100%	(3.5) 97%	RS-5				
				7.6/0.0							
				8.8/0.0							
	2,048.0	11.5		7.7/0.6							2,048.0 11.5
											Boring Terminated at Elevation 2,048.0 ft in biotite gneiss.

NCDOT CORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 11+37	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,059.8 ft	**TOTAL DEPTH** 18.5 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** Core Boring		**HAMMER TYPE** Automatic
DRILLER Cheek, D. O.	**START DATE** 05/04/11	**COMP. DATE** 05/04/11	**SURFACE WATER DEPTH** 2.1ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
										WATER SURFACE (05/04/11)
2060										2,059.8 GROUND SURFACE 0.0
							RS-1			**CRYSTALLINE ROCK** Gray biotite gneiss.
2055							RS-2			
2050							RS-3			
2045										2,041.3 18.5
										Boring Terminated at Elevation 2,041.3 ft in biotite gneiss.

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

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NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 11+37	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,059.8 ft	**TOTAL DEPTH** 18.5 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** Core Boring		**HAMMER TYPE** Automatic
DRILLER Cheek, D. O.	**START DATE** 05/04/11	**COMP. DATE** 05/04/11	**SURFACE WATER DEPTH** 2.1ft	
CORE SIZE MXWL	**TOTAL RUN** 18.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
2059.78											Ground Surface
	2,059.8	0.0	3.5		(3.0) 86%	(3.0) 86%	RS-1				**CRYSTALLINE ROCK** Gray biotite gneiss with a trace of pyrite, garnets and graphite. Very hard; slightly weathered to fresh. a) Joints @ 10°.
	2,056.3	3.5									
2055			5.0	2.1/0.0 2.1/0.0 1.8/0.0 1.8/0.0 1.5/0.0	(4.9) 98%	(4.9) 98%	RS-2				
	2,051.3	8.5									
2050			5.0	2.1/0.0 2.4/0.0 2.5/0.0 2.9/0.0 2.3/0.0	(5.0) 100%	(5.0) 100%	RS-3				
	2,046.3	13.5									
2045			5.0	1.8/0.0 1.7/0.0 2.0/0.0 2.0/0.0 2.2/0.0	(5.0) 100%	(5.0) 100%					
	2,041.3	18.5									2,041.3 18.5
											Boring Terminated at Elevation 2,041.3 ft in biotite gneiss.

NCDOT CORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 11+82	**OFFSET** 25 ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 2,080.5 ft	**TOTAL DEPTH** 30.4 ft	**NORTHING** N/A	**EASTING** N/A — **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Cheek, D. O.	**START DATE** 04/29/11	**COMP. DATE** 04/29/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
2085											
2080										2,080.5 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Brown silty sand with gravel.	
2075	2,075.5	5.0	1	2	6	8		W		2,074.5	6.0
										ALLUVIAL Tan silty sand.	
										2,072.5	8.0
2070	2,070.5	10.0	1	2	2	4		M		2,071.7 **ALLUVIAL** Boulder.	8.8
										ALLUVIAL Tan silty sand.	
2065	2,065.5	15.0	2	3	4	7					
2060	2,060.5	20.0	16	33	67/0.05	100/0.55				2,059.5	21.0
										2,058.3 **ALLUVIAL** Silty sand with gravel and boulders.	22.2
2055										**CRYSTALLINE ROCK** Light gray biotite gneiss.	
										2,050.1	30.4
										Boring Terminated at Elevation 2,050.1 ft in biotite gneiss.	

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 11+82	**OFFSET** 25 ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 2,080.5 ft	**TOTAL DEPTH** 30.4 ft	**NORTHING** N/A	**EASTING** N/A — **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Cheek, D. O.	**START DATE** 04/29/11	**COMP. DATE** 04/29/11	**SURFACE WATER DEPTH** N/A
CORE SIZE NXWL	**TOTAL RUN** 8.2 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS — ELEV. (ft)	DEPTH (ft)
2058.33											Begin Coring @ 22.2 ft	
	2,058.3	22.2	3.2	4.9/0.0 4.2/0.0 3.2/1.2	(2.9) 91%	(1.5) 47%					2,058.3 **CRYSTALLINE ROCK** Light gray biotite gneiss with a trace of pyrite and garneits. Very hard; fresh with interlayers of slightly weahtered zones. a) Joints @ 15°. b) Parts along foliation @ 75°.	22.2
2055	2,055.1	25.4	5.0	3.8/0.0 4.8/0.0 3.6/0.0 1.7/0.0	(5.0) 100%	(4.9) 98%						
	2,050.1	30.4		1.7/0.0							2,050.1 Boring Terminated at Elevation 2,050.1 ft in biotite gneiss.	30.4

NCDOT CORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

SHEET

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 11+85	**OFFSET** 15 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,081.6 ft	**TOTAL DEPTH** 34.1 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** 18.5
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/05/11	**COMP. DATE** 05/05/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2085										
										2,081.6 GROUND SURFACE 0.0
2080										**ROADWAY EMBANKMENT** Red-brown sandy silt with clay and gravel.
	2,077.9	3.7	3	2	1	3		M		
2075										2,075.4 6.2
	2,072.9	8.7	1	1	2	3		W		**ALLUVIAL** Tan silty sand with gravel.
2070										
	2,067.9	13.7	2	3	4	7				
2065										
	2,062.9	18.7	2	2	7	9				2,061.2 20.4
2060										**CRYSTALLINE ROCK** Gray biotite gneiss.
2055										
2050										2,047.5 34.1
										Boring Terminated at Elevation 2,047.5 ft in biotite gneiss.

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

SHEET

12/27

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 11+85	**OFFSET** 15 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 2,081.6 ft	**TOTAL DEPTH** 34.1 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** 18.5
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/05/11	**COMP. DATE** 05/05/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NXWL	**TOTAL RUN** 11.9 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
2059.4											Begin Coring @ 22.2 ft
	2,059.4	22.2	1.9	2.5/0.0 2.3/0.9	(1.3) 68%	(0.8) 42%					**CRYSTALLINE ROCK** Gray biotite gneiss with a trace of pyrite and garnets. Very hard; fresh with very slightly weathered zones from 22.2' to 23.2'. a) Joints @ 45°. *(continued)*
	2,057.5	24.1	5.0	2.1/0.0 2.0/0.0 1.6/0.0 2.1/0.0 1.4/0.0	(5.0) 100%	(5.0) 100%					
2055											
	2,052.5	29.1	5.0	1.5/0.0 1.4/0.0 1.4/0.0 1.5/0.0 1.9/0.0	(4.6) 92%	(4.6) 92%					
2050											
	2,047.5	34.1									2,047.5 34.1
											Boring Terminated at Elevation 2,047.5 ft in biotite gneiss.

NCDOT CORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.			**GROUND WTR (ft)**
BORING NO. EB1-B(Det)	**STATION** 10+59	**OFFSET** 12 ft RT	**ALIGNMENT** -DET-	**0 HR.** Dry
COLLAR ELEV. 2,068.6 ft	**TOTAL DEPTH** 15.6 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Cheek, D. O.	**START DATE** 05/10/11	**COMP. DATE** 05/10/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2070										2,068.6 GROUND SURFACE 0.0
										ALLUVIAL Brown silty sand with boulders and trace of organic material.
2065										
	2,063.4	5.2	1	woh	woh	0		Sat.		
2060										2,060.5 8.1
										CRYSTALLINE ROCK Gray biotite gneiss.
2055										2,053.0 15.6
										Boring Terminated at Elevation 2,053.0 ft in biotite gneiss.

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

SHEET 13/27

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON		**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. EB1-B(Det)	**STATION** 10+59	**OFFSET** 12 ft RT	**ALIGNMENT** -DET-	**0 HR.** Dry
COLLAR ELEV. 2,068.6 ft	**TOTAL DEPTH** 15.6 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
DRILLER Cheek, D. O.	**START DATE** 05/10/11	**COMP. DATE** 05/10/11		**SURFACE WATER DEPTH** N/A
CORE SIZE NXWL	**TOTAL RUN** 7.3 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
2060.34											Begin Coring @ 8.3 ft
	2,060.3	8.3	2.3	3.4/0.0	(2.2)	(2.2)					**CRYSTALLINE ROCK**
	2,058.0	10.6		3.6/0.0	96%	96%					Gray biotite gneiss with a trace of garnets interlayered with white quartz-rich zones. Fresh; very hared.
				1.1/0.3							a) Joint @ 60°. *(continued)*
2055			5.0	3.6/0.0	(5.0)	(5.0)					
				3.3/0.0	100%	100%					
				3.7/0.0							
				3.8/0.0							
	2,053.0	15.6		4.6/0.0							2,053.0 15.6
											Boring Terminated at Elevation 2,053.0 ft in biotite gneiss.

NCDOT CORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. EB2-A(Det)	**STATION** 11+94	**OFFSET** 2 ft LT	**ALIGNMENT** -DET-	**0 HR.** N/A
COLLAR ELEV. 2,076.7 ft	**TOTAL DEPTH** 25.2 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** 13.6
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/05/11	**COMP. DATE** 05/05/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2080											
										2,076.7 GROUND SURFACE	0.0
2075										ROADWAY EMBANKMENT Boulders with silty sand matrix.	
										2,073.2	3.5
	2,071.7	5.0								ALLUVIAL Tan silty sand.	
2070			1	1	1	2					
	2,066.7	10.0									
2065			WOH	1	2	3					
	2,061.7	15.0								2,062.0	14.7
			5	6	17	23				ALLUVIAL Gravel with gray silty sand matrix.	
2060										2,059.6	17.1
										CRYSTALLINE ROCK Brown-gray biotite gneiss.	
										2,056.2	20.5
2055										CRYSTALLINE ROCK Gray biotite gneiss.	
										2,051.5	25.2
										Boring Terminated at Elevation 2,051.5 ft in biotite gneiss.	

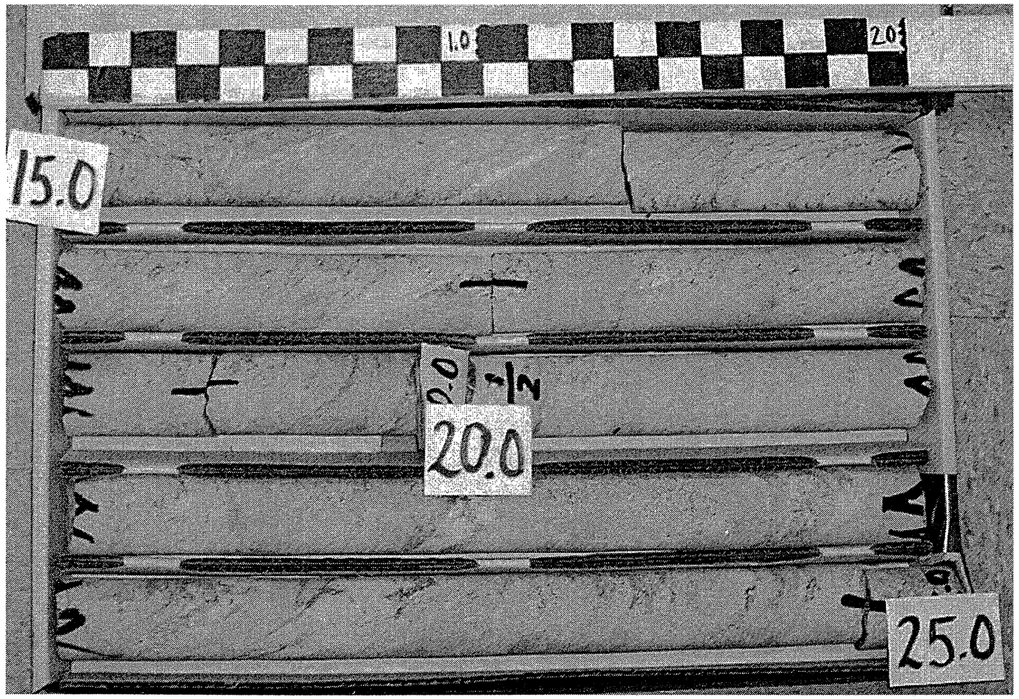
NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 33308.1.1	**TIP** B3861	**COUNTY** JACKSON	**GEOLOGIST** Hager, M. M.	
SITE DESCRIPTION Bridge No. 107 on SR-1797 over Tuckasegee River.				**GROUND WTR (ft)**
BORING NO. EB2-A(Det)	**STATION** 11+94	**OFFSET** 2 ft LT	**ALIGNMENT** -DET-	**0 HR.** N/A
COLLAR ELEV. 2,076.7 ft	**TOTAL DEPTH** 25.2 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** 13.6
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Cheek, D. O.	**START DATE** 05/05/11	**COMP. DATE** 05/05/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NXWL	**TOTAL RUN** 7.0 ft			

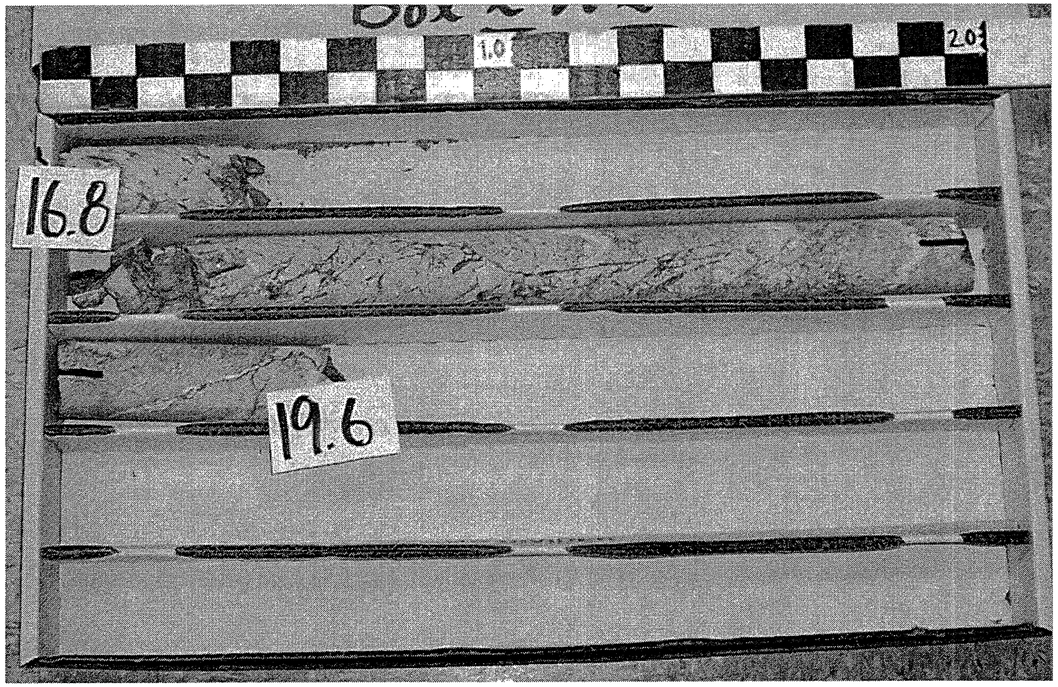
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
2058.49											Begin Coring @ 18.2 ft	
	2,058.5	18.2	2.0	2.5/0.0	(1.7)	(0.4)					CRYSTALLINE ROCK Brown-gray biotite gneiss with garnet-rich layers. Moderately to slightly weathered; hard. a) Parts along foliation @ 85°. b) Joints @ 20°. *(continued)*	
	2,056.5	20.2		0.9/0.0	85%	20%					2,056.2	20.5
2055			5.0	1.5/0.0	(4.7)	(3.8)					CRYSTALLINE ROCK Gray biotite gneiss with garnet-rich layers and a trace of soapstone and pyrite. Fresh with interlayers of slightly weathered zones; very hard. a) Parts along foliation @ 60°. b) Joints @ 20°. c) Joint @ 50°.	
				1.5/0.0							2,051.5	25.2
				1.3/0.0							Boring Terminated at Elevation 2,051.5 ft in biotite gneiss.	
	2,051.5	25.2		1.1/0.0	94%	76%						
				1.6/0.0								

NCDOT CORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 05/13/11

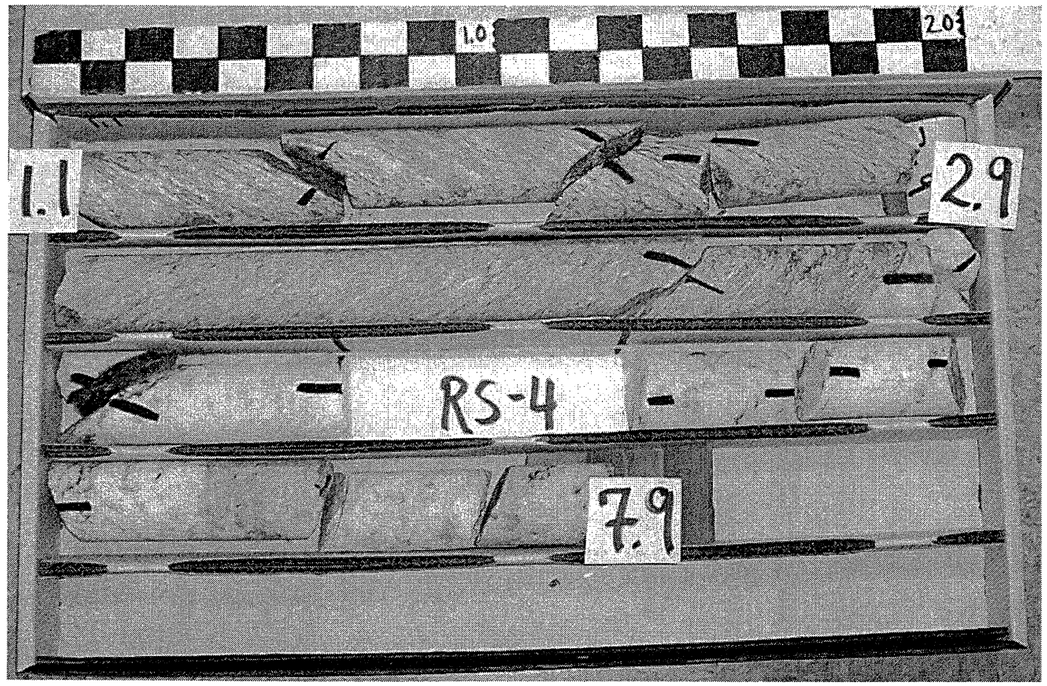


33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
EB1-A
Box 1 of 1

33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
EB1-B
Box 1 of 2

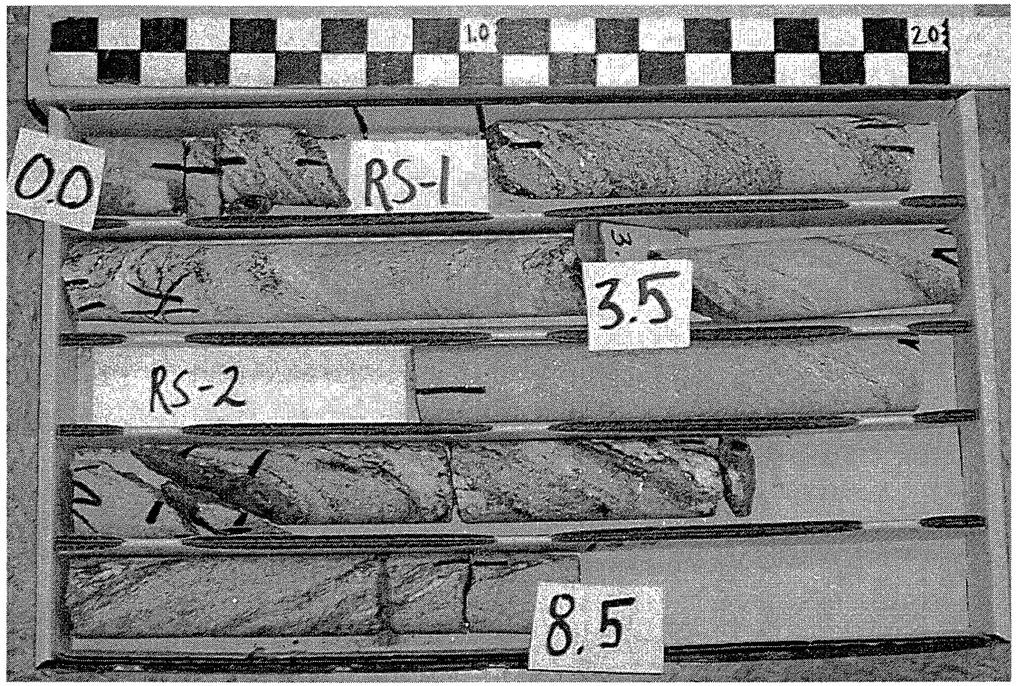


33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
EB1-B
Box 2 of 2

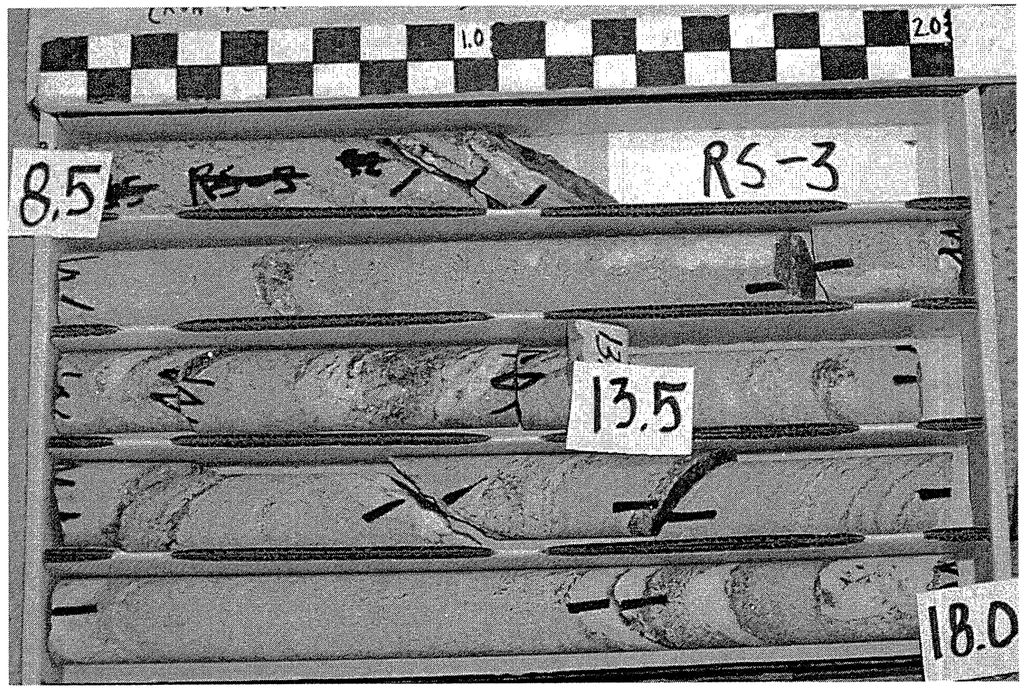


33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
B1-B
Box 1 of 2

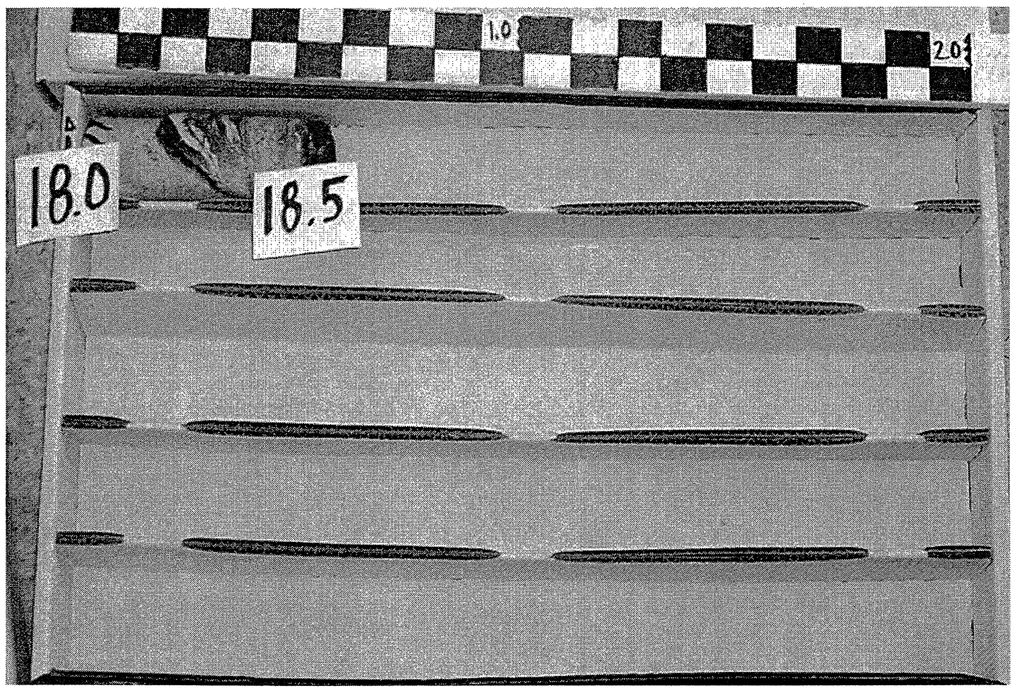
33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
B1-B
Box 2 of 2



33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
B2-A
Box 1 of 3



33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
B2-A
Box 2 of 3

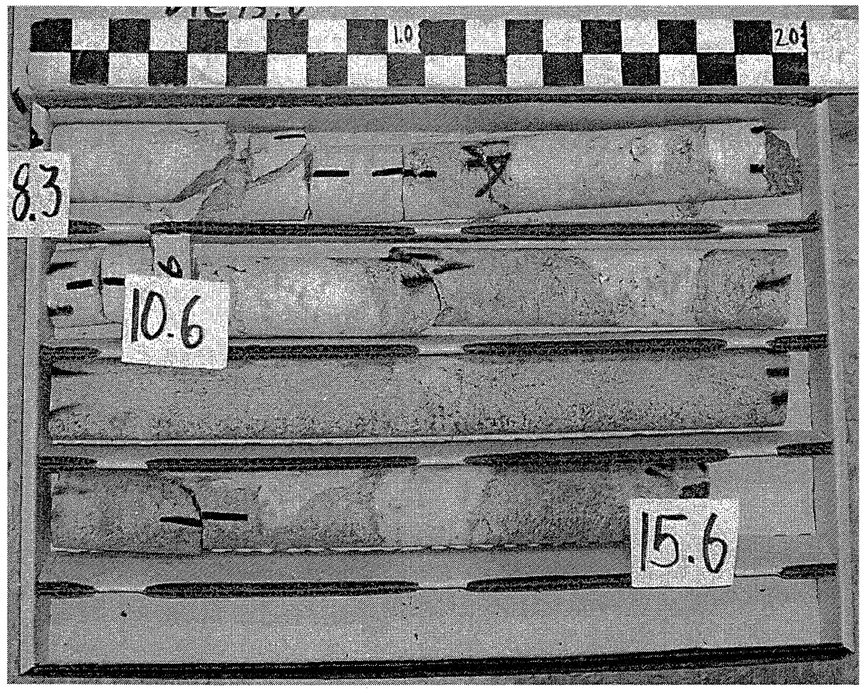


33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
B2-A
Box 3 of 3

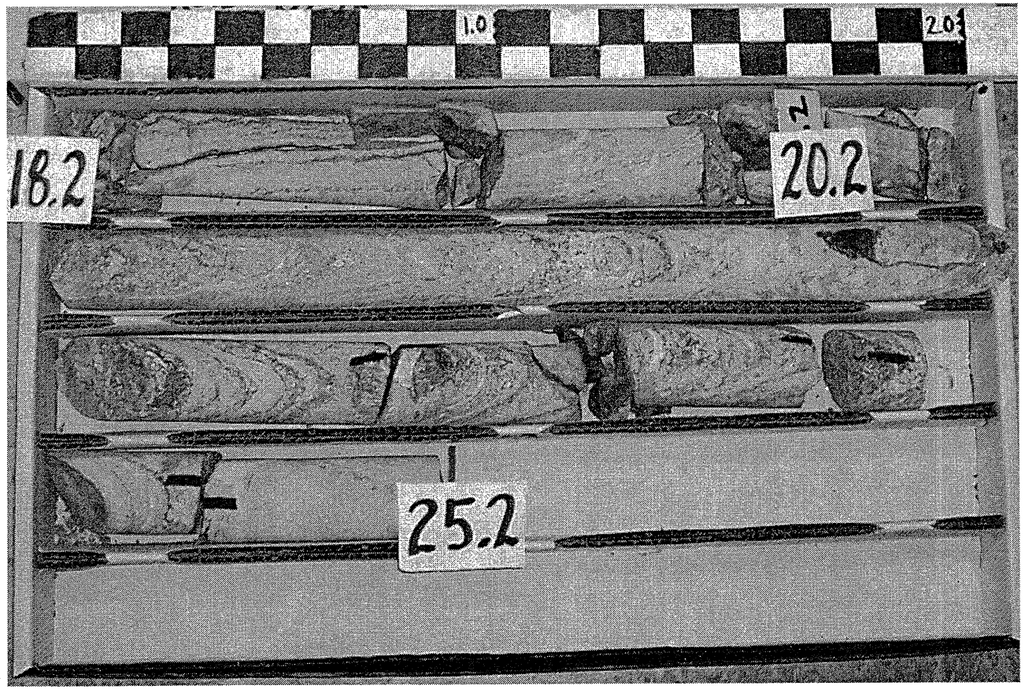
33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
EB2-A
Box 1 of 1

33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
EB2-B
Box 1 of 2

33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
EB2-B
Box 2 of 2



33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
EB1-B
-DET-
Box 1 of 1



33308.1.1 (B-3861)
Jackson Co.
Bridge No. 107 on SR-1797
Over Tuckasegee River
EB2-A
-DET-
Box 1 of 1

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33308.1.1 TIP: B-3861 COUNTY: Jackson

DESCRIPTION(1): Bridge No. 107 on SR-1797 over the Tuckasegee River

EXISTING BRIDGE

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

Bridge No.: 107 Length: 142 ft Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
Foundation Type: Prob. Footings on rock.

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None noted.

Interior Bents: N/A

Channel Bed: None noted.

Channel Bank: Minor undercutting immediately upstream of EB2-A.

EXISTING SCOUR PROTECTION

Type(3): Concrete endbent walls and wingwalls.

Extent(4): Wingwalls extend 12 ft beyond endbent walls.

Effectiveness(5): Good.

Obstructions(6): Relict wooden footing in river, approx. 30 ft downstream.

INSTRUCTIONS

1 Describe the specific site's location, including route number and body of water crossed.
2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
3 Note existing scour protection (e.g. rip rap).
4 Describe extent of existing scour protection.
5 Describe whether or not the scour protection appears to be working.
6 Note obstructions such as dams, fallen trees, debris at bents, etc.
7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
10 Determine the approximate floodplain width from field observation or a topographic map.
11 Describe the material covering the floodplain (e.g. grass, trees, crops).
12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Sand, gravel, cobbles and boulders with occasional outcrops of crystalline rock.

Channel Bank Material(8): Silty sand with gravel, cobbles and boulders.

Channel Bank Cover(9): Shrubs and trees.

Floodplain Width(10): EB1=25 ft. EB2>100 ft.

Floodplain Cover(11): EB1: trees. EB2: predominately grass.

Stream is(12): Aggrading ____ Degrading ____ Static X

Channel Migration Tendency(13): South.

Observations and Other Comments: Abandoned mine shaft approximately 100ft northeast of EB1-A.

Reported by: C A Dunnagan **Date:** 5/18/2011

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS	
B1	B2
2058.4	2059.8

Comparison of DSE to Hydraulics Unit theoretical scour:
Our DSE's are approximately five feet above those supplied in the Hydraulics Unit's report dated January 2011.
The endbents will not be affected.

DSE determined by: C A Dunnagan **Date:** 5/19/2011

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank							
Sample No.							
Retained #4							
Passed #10							
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

24/27

Division of Highways
Materials and Tests
Physical Testing Laboratory

SPLIT TENSILE STRENGTH

Test Setting: Split Tensile Concrete... Test Date: 05/26/2011
Project #:

Lab Number	Sample No.	Thickness in	Width in	Area in²	Ultimate lbf	PSI
366502	2	1.8620	3.9320	7.3214	20900	1820
366502	3	1.8600	3.9260	7.3024	16110	1420
366502	4	1.8570	3.3700	6.2581	29500	3000
366502	5	1.8600	3.4370	6.3928	20400	2030
Average					21700	
SD					5610	

North Carolina Dept. of Transportation
Division of Highways
Materials and Tests
Physical Testing Laboratory

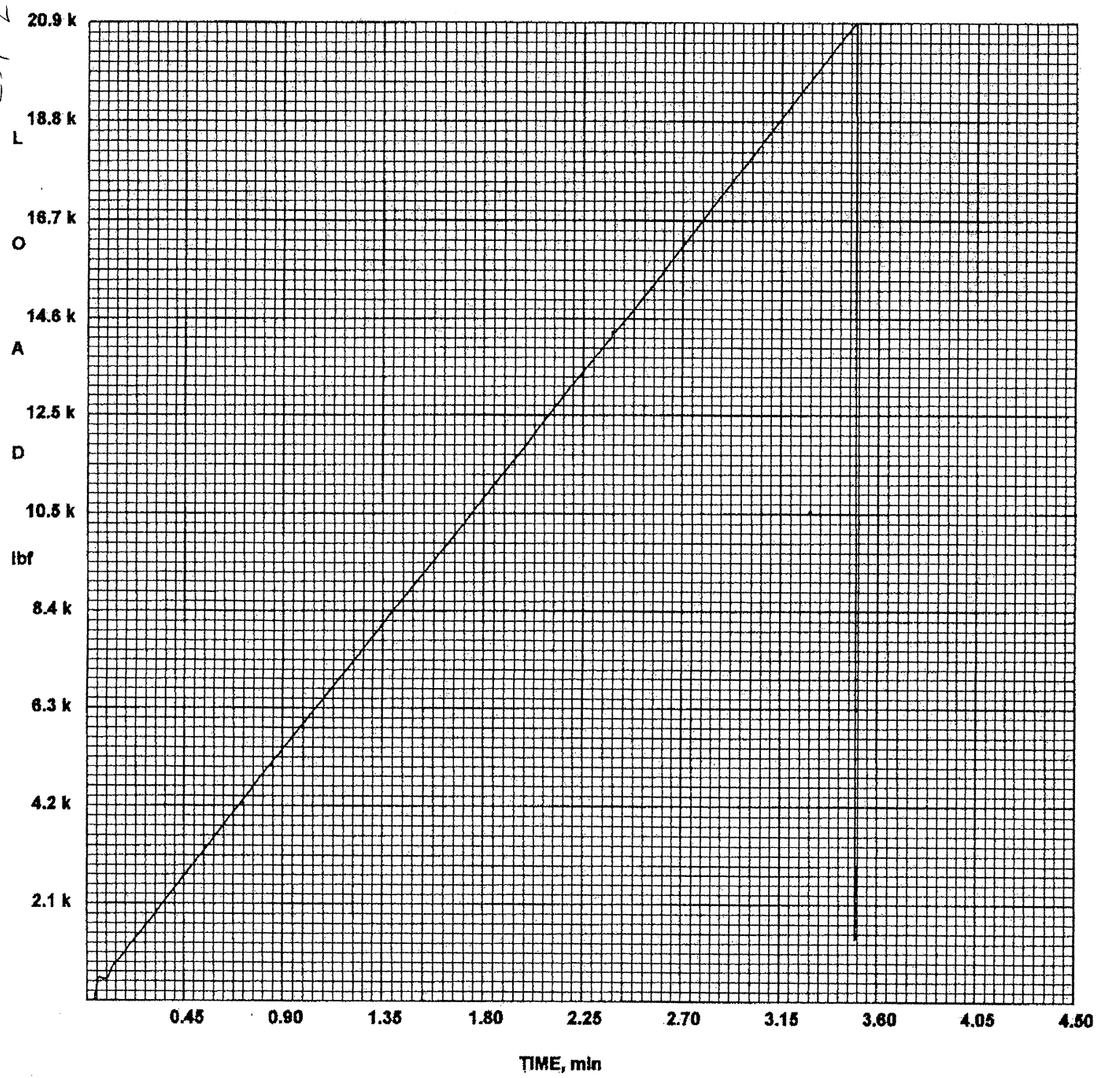
Rock Compression

Lab Number: 366502
Project #: 33308.1.1
County: Jackson
Tip ID: B-3861

Structure Description: Gneiss
Test Date: 05/24/2011

Sample No.	Diameter in	Area in²	Specimen Height in	H/D Ratio	Weight lbf	Unit Weight lbf/ft3	Ultimate lbf	Ultimate ksi	Ultimate (corrected) ksi	40% Ult. Load lbf	Sec Mod @ 40% Mpsi
1	1.8380	2.6533	2.74	1.49	0.8000	190.2	12280	4.63	4.45	4910	-0.021

251 27



North Carolina Dept. of Transportatic
Division of Highways
Materials and Tests
Physical Testing Laboratory

SPLIT TENSILE STRENGTH

Test Setting	Split Tensile Concre cores
Project #	
Test Date	05/26/2011
Lab Number:	366502
Sample No.:	2
Thickness, in:	1.8620
Width, in:	3.9320
Area, in²:	7.3214
Ultimate, lbf:	20900

May 26, 2011 8:40:22 AM
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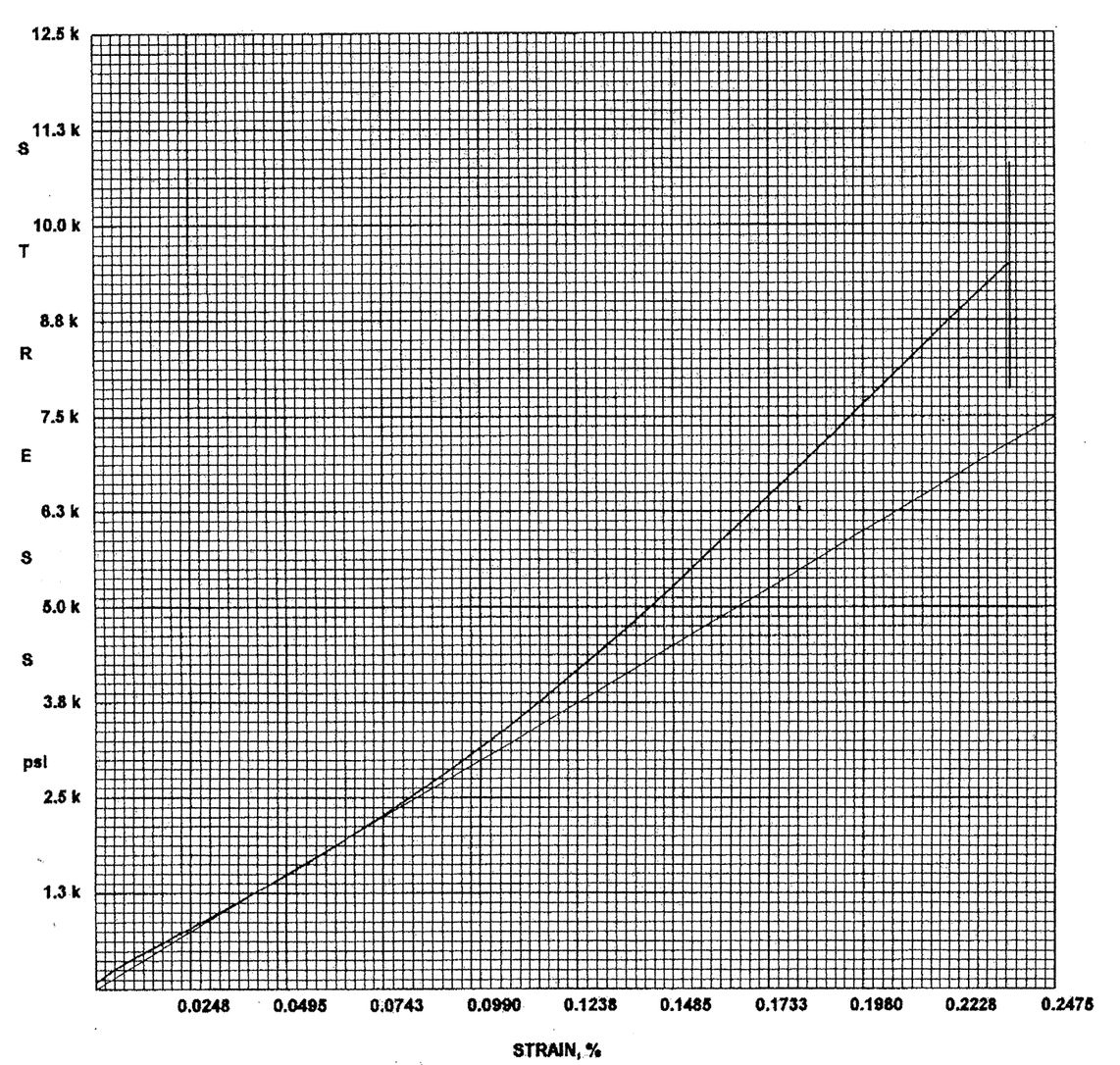

North Carolina Dept. of Transportatic
Division of Highways
Materials and Tests
Physical Testing Laboratory

Rock Compression

Lab Number	366502
Project #	33308.1.1
County	Jackson
Tip ID	B-3861
Structure Description	Gneiss
Test Date	05/24/2011
Sample No.:	2
Diameter, in:	1.8620
Area, in²:	2.7230
Specimen, in:	3.81
H/D Ratio:	2.05
Weight, lbf:	1.0200
Unit Weight, lbf/ft3:	169.9
Ultimate, lbf:	29400
Ultimate, ksi:	10.8
Ultimate, ksi:	10.83
40% Ult. Load, lbf:	11760
Sec Mod @ 40%, Mpsi:	3.29

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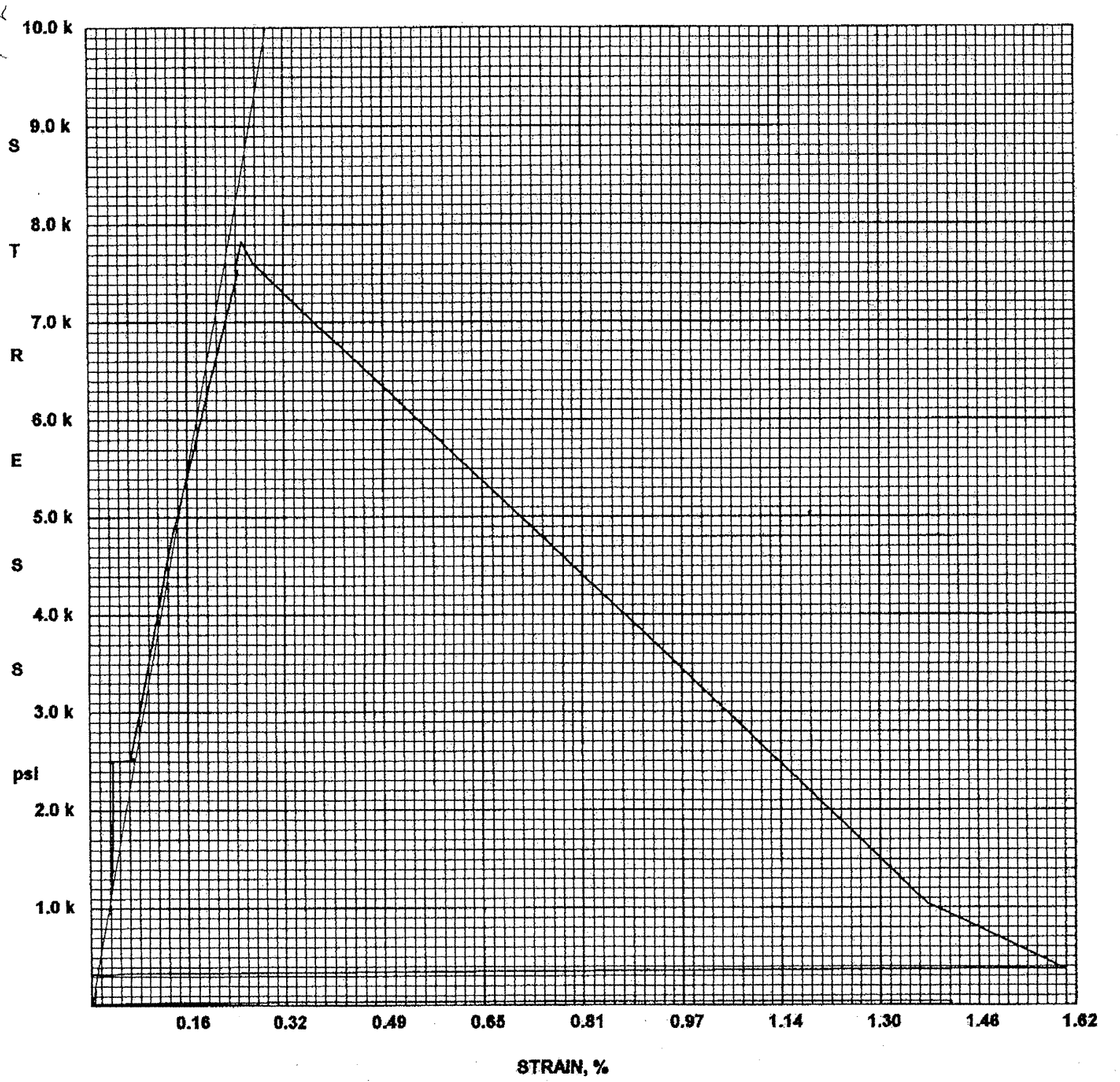

North Carolina Dept. of Transportatic
Division of Highways
Materials and Tests
Physical Testing Laboratory

Rock Compression

Lab Number	366502
Project #	33308.1.1
County	Jackson
Tip ID	B-3861
Structure Description	Gneiss
Test Date	05/24/2011
Sample No.:	3
Diameter, in:	1.8600
Area, in²:	2.7172
Specimen, in:	3.83
H/D Ratio:	2.06
Weight, lbf:	1.0200
Unit Weight, lbf/ft3:	169.5
Ultimate, lbf:	21300
Ultimate, ksi:	7.83
Ultimate, ksi:	7.86
40% Ult. Load, lbf:	8510
Sec Mod @ 40%, Mpsi:	3.8

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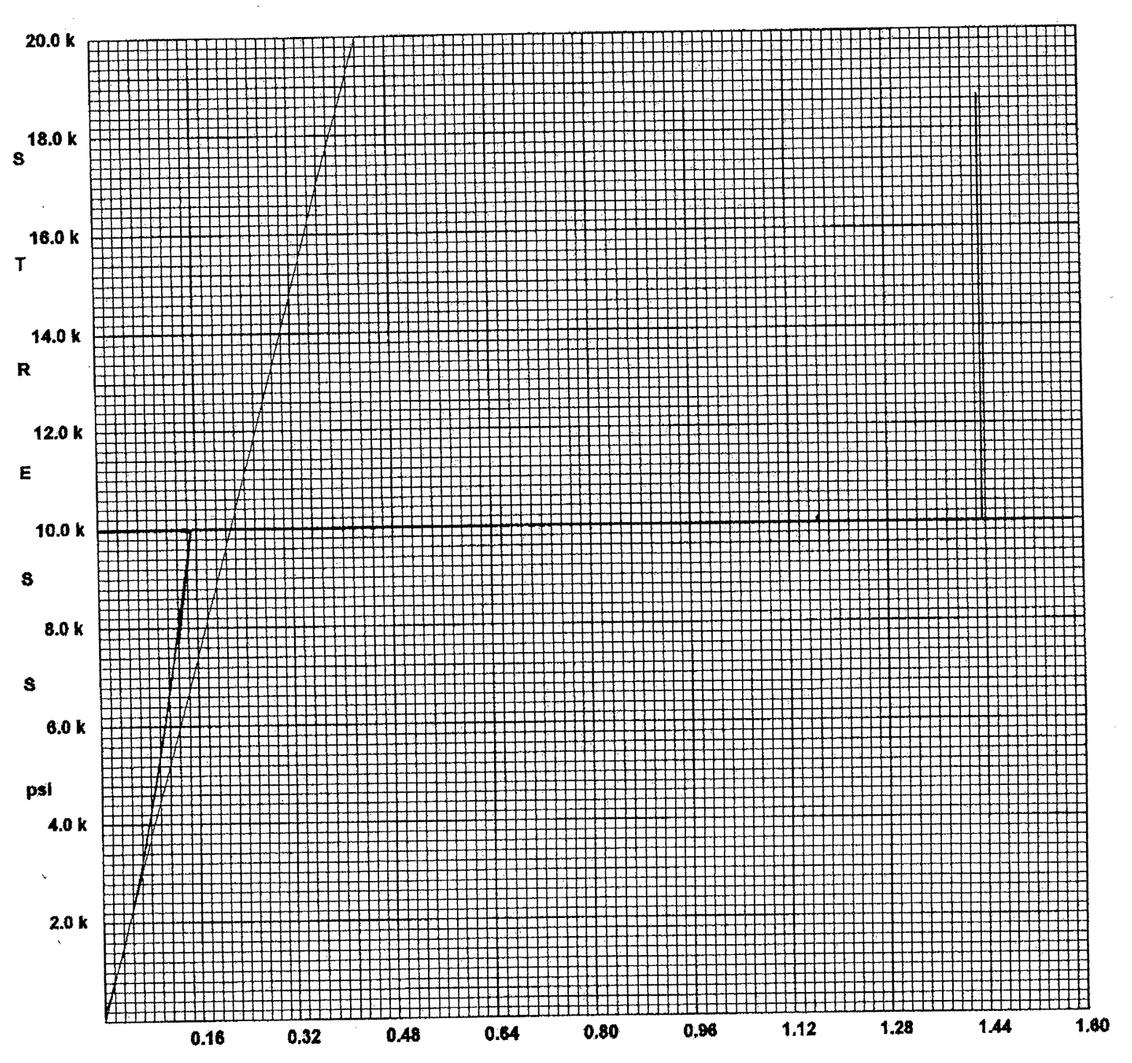
SN: 205692-R3 V7.02.05



North Carolina Dept. of Transportatic
Division of Highways
Materials and Tests
Physical Testing Laboratory

Rock Compression

Lab Number	366502
Project #	33308.1.1
County	Jackson
Tip ID	B-3861
Structure Description	Gneiss
Test Date	05/24/2011
Sample No.:	4
Diameter, in:	1.8570
Area, in²:	2.7084
Specimen, in:	3.38
H/D Ratio:	1.82
Weight, lbf:	0.8700
Unit Weight, lbf/ft3:	164.3
Ultimate, lbf:	50600
Ultimate, ksi:	18.68
Ultimate, ksi:	18.46
40% Ult. Load, lbf:	20200
Sec Mod @ 40%, Mpsi:	4.32

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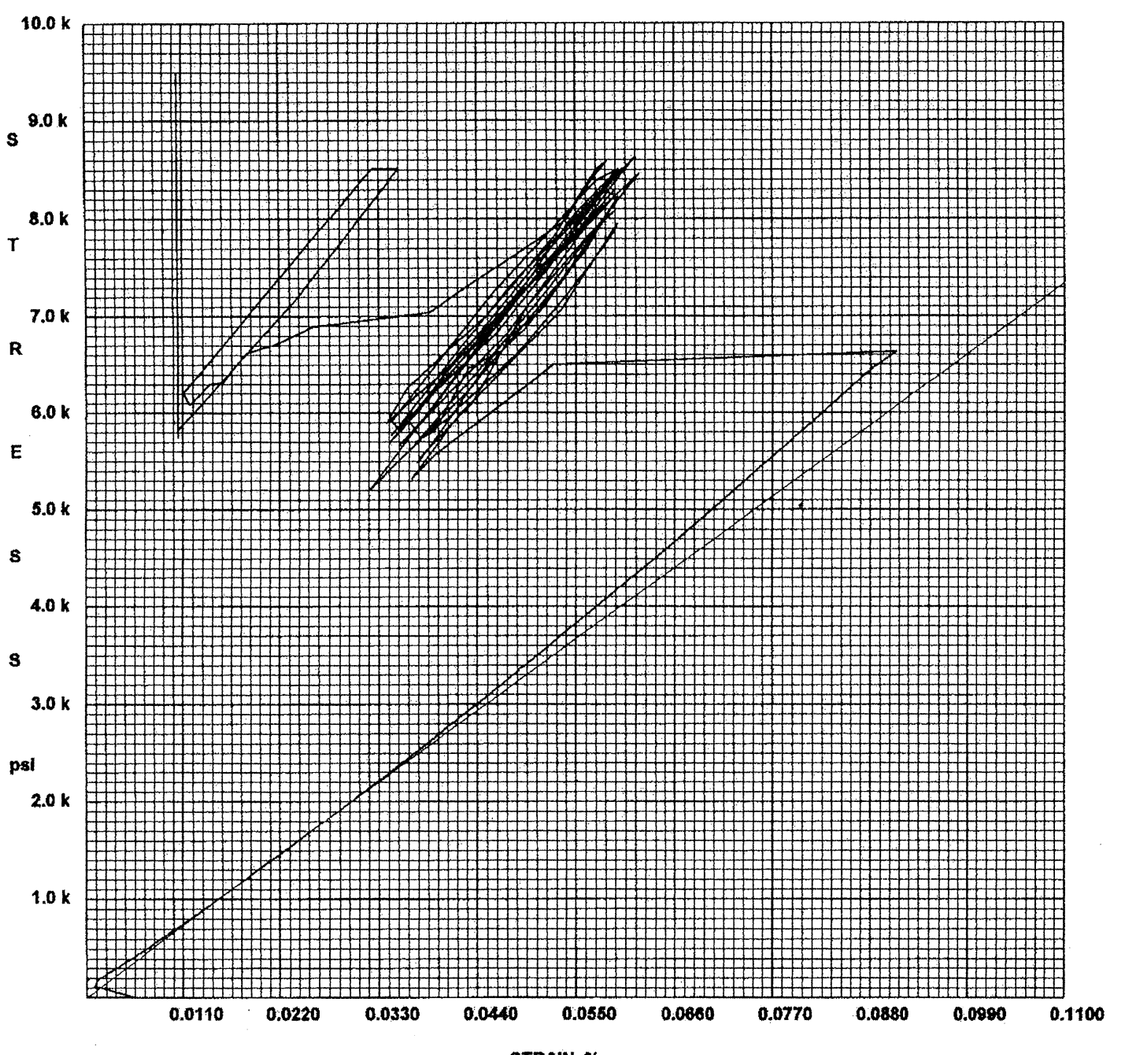

North Carolina Dept. of Transportatic
Division of Highways
Materials and Tests
Physical Testing Laboratory

Rock Compression

Lab Number	366502
Project #	33308.1.1
County	Jackson
Tip ID	B-3861
Structure Description	Gneiss
Test Date	05/24/2011
Sample No.:	5
Diameter, in:	1.8600
Area, in²:	2.7172
Specimen, in:	3.36
H/D Ratio:	1.808
Weight, lbf:	0.8700
Unit Weight, lbf/ft3:	164.6
Ultimate, lbf:	25800
Ultimate, ksi:	9.51
Ultimate, ksi:	9.39
40% Ult. Load, lbf:	10330
Sec Mod @ 40%, Mpsi:	6.69

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