

CONTRACT: C201812 ID: B-4038

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4038	1	9
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33403.1.1	BRSTP-0183(1)	P.E.	
33404.2.1	BRSTP-0183(1)	R/W & UTIL.	
33401.3.1	BRSTP-0183(1)	CONST.	

CONTENTS

LINE	STATION	PLAN	SHEET NUMBERS	
			EARTHWORK	XSECT
-L-	15+79.18 to 28+51.10	3	3A	4 & 5

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. B-4038 F.A. PROJ. BRSTP-0183(1)
 COUNTY BURKE
 PROJECT DESCRIPTION APPROACHES FOR BRIDGE NO. 26 ON
NC-183 OVER LINVILLE RIVER

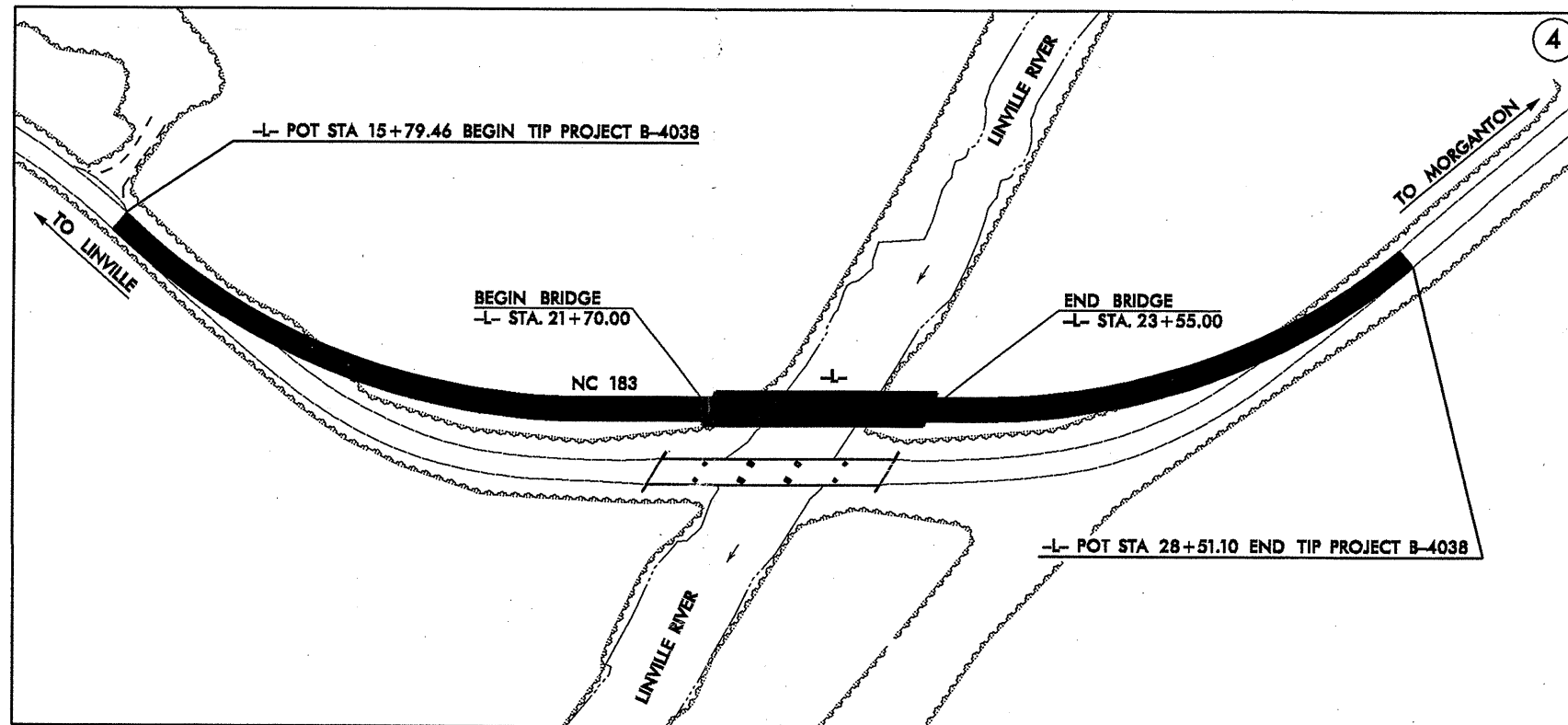
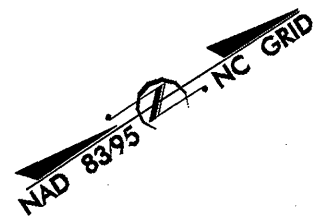
INVENTORY

CAUTION NOTICE

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

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

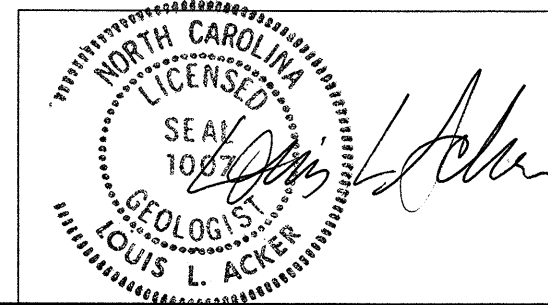
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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



PERSONNEL
C. BALDWIN (F&R)
J. FULLER

INVESTIGATED BY L.L. ACKER
 CHECKED BY W.D. FRYE
 SUBMITTED BY W.D. FRYE
 DATE 1/11/06

** DESIGN EXCEPTION FOR HORIZONTAL ALIGNMENT REQUIRED



DRAWN BY: J.T. WILLIAMS





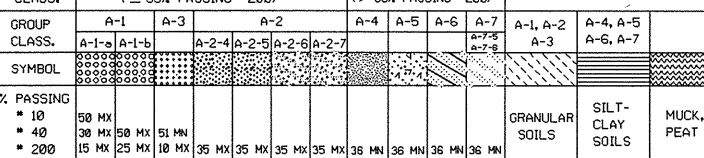





















NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																					
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. EXAMPLES: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>	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 .	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 YIELD 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.	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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - 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 IN 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 (SROD) - 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.																					
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-6, A-7 SYMBOL:  % PASSING: 10, 40, 200 LIQUID LIMIT PLASTIC INDEX: 6, NP, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100 GROUP INDEX: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100 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, POOR, UNSUITABLE PI OF A-7-5 SUBGROUP IS <= LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30	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%, 5-12%, 10-20%, 20-35%, >20% LITTLE ORGANIC MATTER: 3-5%, 5-12%, 10-20%, 20-35%, >20% MODERATELY ORGANIC: 5-10%, 12-20%, 20-35%, >20% HIGHLY ORGANIC: >10%, >20%, 20-35%, 35% AND ABOVE GROUND WATER  WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING  STATIC WATER LEVEL AFTER 24 HOURS  PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA  SPRING OR SEEP	WEATHERING FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.): ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.): ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. 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 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 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 GROUDED 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 GROUDED 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 FINGER NAIL.																					
CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE: GENERALLY GRANULAR MATERIAL (NON-COHESIVE), GENERALLY SILT-CLAY MATERIAL (COHESIVE) COMPACTNESS OR CONSISTENCY: VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE RANGE OF STANDARD PENETRATION RESISTANCE (IN-VALUE): <4, 4 TO 10, 10 TO 30, 30 TO 50, >50 RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²): N/A, <0.25, 0.25 TO 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4	MISCELLANEOUS SYMBOLS  ROADWAY EMBANKMENT WITH SOIL DESCRIPTION  SOIL SYMBOL  ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENT  INFERRED SOIL BOUNDARY  INFERRED ROCK LINE  ALLUVIAL SOIL BOUNDARY  DIP & DIP DIRECTION OF ROCK STRUCTURES  SOUNDING ROD  TEST BORING  AUGER BORING  CORE BORING  MONITORING WELL  PIEZOMETER INSTALLATION  SLOPE INDICATOR INSTALLATION  SPT N-VALUE  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 V - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC - FRACTURED FRAGS - FRAGMENTS HI - HIGHLY MED - MEDIUM MICA - MICACEOUS MOD - MODERATELY NP - NON PLASTIC PMT - PRESSUREMETER TEST SAP - SAPROLITIC SD - SAND, SANDY SL - SILT, SILTY SLL - SLIGHTLY TCR - TRICONE REFUSAL W - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST CL - UNIT WEIGHT γ _s - DRY UNIT WEIGHT	TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM): 4, 10, 40, 60, 200, 270 4.75, 2.00, 0.42, 0.25, 0.075, 0.053 <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F. SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td>GRAIN SIZE MM</td> <td>305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td>GRAIN SIZE IN.</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	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	GRAIN SIZE IN.	12	3				
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																		
GRAIN SIZE IN.	12	3																						
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS): LL, PL, OM, SL FIELD MOISTURE DESCRIPTION: SATURATED (SAT.), WET (W), MOIST (M), DRY (D) GUIDE FOR FIELD MOISTURE DESCRIPTION: USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE; SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE; SOLID; AT OR NEAR OPTIMUM MOISTURE; REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B-51, BK-51, CME-45C, CME-550, PORTABLE HOIST, OTHER, OTHER ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 6" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING, TRICONE * STEEL TEETH, TRICONE * TUNG-CARB., CORE BIT, OTHER HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, N, H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST, OTHER	FRACTURE SPACING TERM: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE SPACING: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET BEDDING TERM: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED THICKNESS: > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, 0.008 - 0.03 FEET, < 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.																					
PLASTICITY NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY PLASTICITY INDEX (PI) vs DRY STRENGTH: VERY LOW, SLIGHT, MEDIUM, 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.	NOTES: BENCH MARK: BM #2 -BL- STA. 16+98.55 51.32' RT ELEVATION: 3199.16 FT.																						



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

January 11, 2006

STATE PROJECT: 33404.1.1 (B-4038)
F. A. PROJECT: BRSTP-0183(1)
COUNTY: Burke

DESCRIPTION: Approaches to Bridge No. 26 on NC-183 over Linville River

SUBJECT: Geotechnical Report – Subsurface Investigation

Site Description

Bridge No. 26 is located in northern Burke County on NC-183 approximately 1.7 miles east of the intersection with US-221 at the village of Linville Falls. The site lies within the Mountain Province at an elevation of about 3200 feet.

The Linville River at this site is on a straight run, with a channel about 100 feet wide and an alluvial floodplain about 300 feet wide, most of which is on the east bank of the river. Heavily forested slopes rise 200 to 400 feet above the river on both sides of the valley. A small tributary stream crosses beneath NC-183 approximately 300 feet west of the existing bridge and enters the river 200 feet downstream of the bridge. The river plunges over Linville Falls at the head of Linville Gorge about 3000 feet downstream of the bridge.

All of the land surrounding this site belongs to the United States Government and is administered by the Department of the Interior as part of the Blue Ridge Parkway. A paved spur road from the parkway to parkway maintenance facilities and the Linville Falls access area lies 150 feet east of NC-183 near the end of this project.

This project consists of approaches to Bridge 26 on alignment -L-, beginning at Station 15+79 and ending at Station 28+51. The plans call for a Left Side cut from Station 19+00 to Station 21+50, and an embankment about 10 feet high over the floodplain from Station 23+50 to Station 25+50. A culvert extension will be required for the tributary stream crossing at Station 18+50.

The Geotechnical Engineering Unit conducted a subsurface investigation in November, 2005. Test borings were performed by Froehling and Robertson, Inc., of Raleigh, NC, under the supervision of the Project Geologist from November 2 to November 4, 2005. Two borings were made in the area of the proposed Left Side cut, and one boring was made on the floodplain near the west abutment site of the proposed bridge. Borings were made using a CME-45 power drilling machine, which was mounted on tracks and equipped with hollow stem augers and NQ diamond bit coring tools. Standard Penetration Tests were made at 5-foot intervals in soil and weathered rock. Samples representing all soil strata were submitted to a DOT laboratory for quality tests.

Areas of Special Geotechnical Interest

Hard Rock in Cut

Hard rock will be encountered in the lower half of the proposed Left Side cut from Station 19+00 to Station 21+00, approximately. The rock is moderately to severely weathered, green, mylonitic mica gneiss with layers a few feet thick of moderately weathered, white alaskite. Rock quality is poor to very poor in both lithologies. The hard rock is overlain by 10 to 15 feet of interlayered weathered rock and dense to very dense, coarse sand saprolite (A-1-b). A few feet of loose sandy colluvium may be found on the lower parts of the natural slope at either end of the cut.

Soil and Rock Materials

Alluvial soil, saprolite, weathered rock and hard rock will be encountered on this project in addition to the existing embankments and small amounts of colluvium. The subsurface investigation has been restricted to the area of the proposed principal excavation – the Left Side cut – and to the narrow strip of floodplain on the west bank. Other parts of the project will involve principally uninvestigated alluvial floodplain soils and embankment soils.

The alluvial soils near the west end bent comprise approximately 6 feet of soft, micaceous sandy silt (A-5) and 2 feet of bouldery gravel.

Saprolite soils are composed of brown, dense to very dense, micaceous, silty coarse sand (A-1-b, A-2-4) and gray to white, dense to very dense, feldspathic coarse sand (A-1-b). Those soils are interlayered with each other and with weathered rock to form an overburden above the hard rock line that is 10 to 15 feet thick. Coarse saprolite and weathered rock are also found as seams and layers below the hard rock line to a depth of at least 40 feet.

The hard rock comprises two lithologies that are interlayered. The most abundant lithology is green to gray mica gneiss with a strong mylonitic (sheared) texture. The other lithology is white to light gray alaskite and alaskite gneiss with a more or less mylonitic texture. It is composed principally of feldspar. The alaskite forms layers a few feet thick within the mica gneiss and roughly parallel with the foliation. Both lithologies are moderately to severely weathered and highly fractured on foliation planes. The foliation dips west at about 20 degrees.

Geotechnical Descriptive Analysis

Station 15+79 to 19+00

The proposed roadway begins in residual soil and rock that underlie the existing roadway. Alignment -L- passes over the narrow floodplain and channel of a small creek from Station 18+00 to approximately Station 19+00. A culvert extension will need to be installed in that interval.

Station 19+00 to 21+50

Plans call for a Left Side cut approximately 50 feet deep at the ditchline. Borings indicate 10 to 15 feet of interlayered saprolite and weathered rock overlying moderately to severely weathered rock. The rock quality is poor to very poor. Numerous seams or layers of weathered rock and saprolite occur below the initial hard rock line. A few feet of loose sandy colluvium lies at ground surface on the lower parts of the natural slope, at either end of the proposed cut, but not in the central part of the cut.

Station 21+50 to 21+77

A narrow strip of alluvial floodplain lies between the end of the proposed cut and the west abutment of the proposed bridge. The alluvial soils comprise about 6 feet of soft sandy silt overlying about 2 feet of gravel, which in turn directly overlies hard rock.

Station 21+77 to 23+47

The proposed new bridge will occupy this interval. Hard rock is visible in abundance most of the way across the river channel.

Station 23+47 to 25+50

The alignment in this interval crosses the Linville River floodplain. Plans call for as much as 12 feet of roadway embankment. No subsurface investigation was done in this interval because of the difficulty of access off and on the existing embankment slope. The alluvial soils are probably similar to soils on the west side of the river in that they comprise a total thickness of about 6 to 10 feet of loose sand, soft silt and basal gravel overlying hard rock.

Station 25+50 to 28+51

No subsurface investigation was done for this interval, in which the alignment is on the existing roadway embankment. The embankment in this area is about 10 feet high overlying the floodplain, and it extends as far as 60 feet Left of -L- and the existing centerline.

Respectfully Submitted,



Louis L. Acker, LG
Project Engineering Geologist

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT: B-4038

COUNTY: BURKE

DATE: 2/6/08

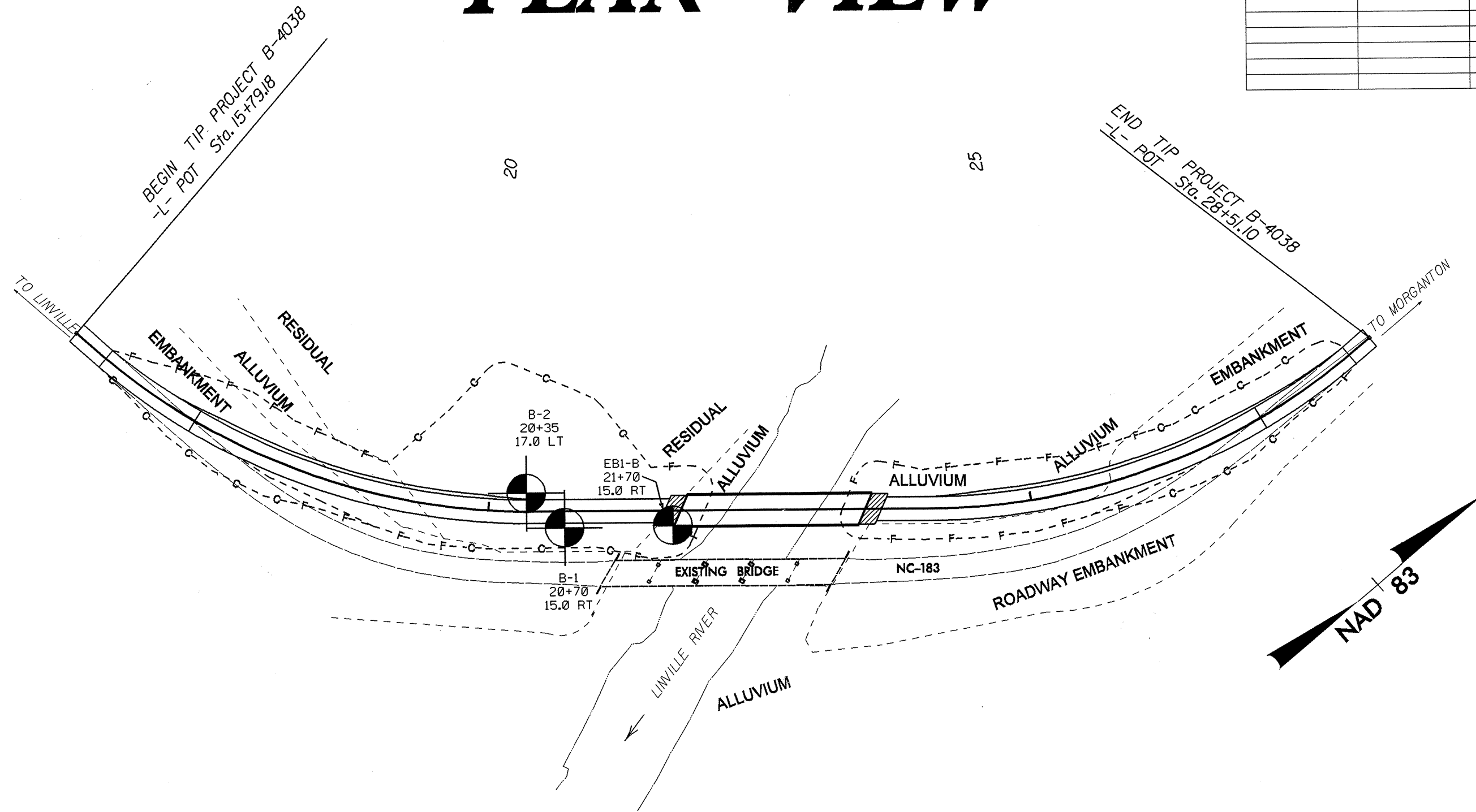
COMPILED BY: DAP

SHEET 1 OF 1

STATION	STATION	EXCAVATION				EMBANKMENT				BORROW	WASTE					
		TOTAL UNCLASS.	ROCK	UNDERCUT UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. (+) 15%		ROCK	SUITABLE	UNSUIT.	TOTAL		
SUMMARY #1																
-L- 15+79.18	-L- 21+70.00 BRIDGE	23,344	12,094		11,250	4,671	4,671		4,671	0	7,423	11,250			18,673	
SUMMARY #2																
-L- 23+55.00	-L- 28+51.10 BRIDGE	69	0		69	3,847	0	3,847	4,424	4,355					0	
SUBTOTALS		23,413	12,094		11,319	8,518	4,671	3,847	9,095	4,355	7,423	11,250			18,673	
ESTIMATED LOSS DUE TO CLEARING & GRUBBING		-1,000			-1,000								-1,000		-1,000	
ROCK WASTE TO REPLACE BORROW							3,787	-3,787		-3,787	-3,787				-3,787	
ADJUST FOR ROCK WASTE									-568	-568						
ADJUST FOR EARTH WASTE							60	-60	-9		-60	69			9	
GRAND	TOTALS	22,413	12,094		10,319	8,518	8,518	0	8,518	0	3,576	10,319			13,895	
SAY		22,420								0					14,000	
ESTIMATED UNDERCUT = 500 CY.																
ESTIMATED FABRIC FOR SOIL STABILIZATION = 1,000 SY.																
ESTIMATED SELECT GRANULAR MATERIAL = 1,000 CY.																
ESTIMATED CLASS IV SUBGRADE STABILIZATION = 1,200 TNS.																
ESTIMATED DRAINAGE DITCH EXCAVATION = 620 CY.																
ESTIMATED INCIDENTAL STONE BASE = 25 TNS.																
						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.										

PLAN VIEW

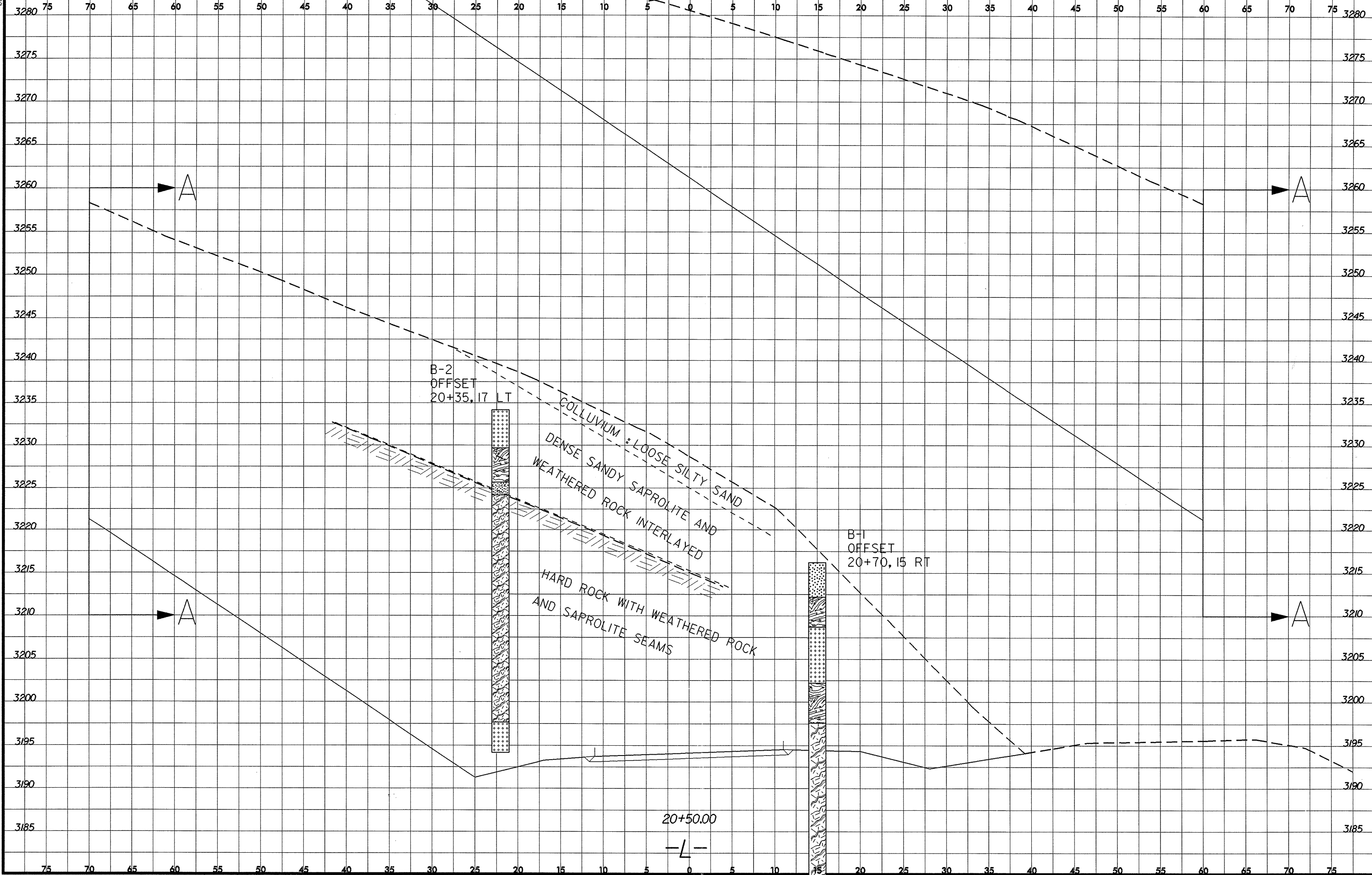
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4038	4	9
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33404.1.1	BRSTP-0183(1)		



02/03/98



PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
B-4038	5	9



B-2
OFFSET
20+35.17 LT

B-1
OFFSET
20+70, 15 RT

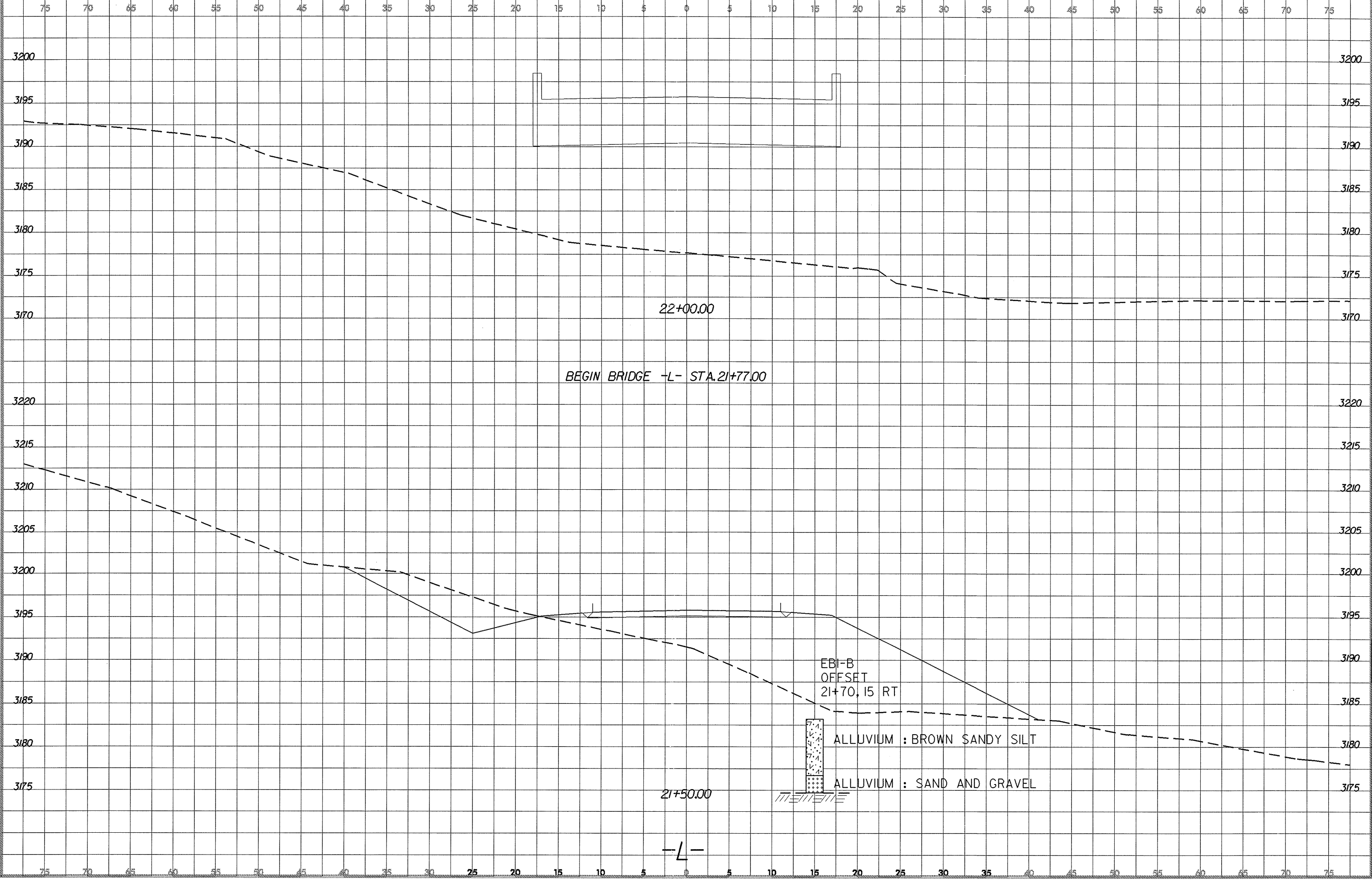
COLLUVIUM: LOOSE SILTY SAND
DENSE SANDY SAPROLITE AND
WEATHERED ROCK INTERLAYED
HARD ROCK WITH WEATHERED ROCK
AND SAPROLITE SEAMS

20+50.00

-L-

238 GEO. ROWY (CAD) (E) | ELCH\ssc\4038-geo\ssi-1_4038.dgn
 AT 08:22:40
 Williams

02.01
\$\$\$\$\$ UNITS: HORIZONTAL \$\$\$



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33404.1.1		ID B-4038		COUNTY BURKE		GEOLOGIST C. BALDWIN (F&R)											
SITE DESCRIPTION BRIDGE NO. 26 OVER LINVILLE RIVER ON NC 183							GND WATER										
BORING NO B-1		NORTHING 0.00		EASTING 0.00		0 HR N/A											
ALIGNMENT -L-		BORING LOCATION 20+70.000		OFFSET 15.00ft RT		24 HR 12.00ft											
COLLAR ELEV 3216.20ft		TOTAL DEPTH 37.60ft		START DATE 11/02/05		COMPLETION DATE 11/02/05											
DRILL MACHINE CME-45			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC											
SURFACE WATER DEPTH			DEPTH TO ROCK 18.60ft			Log B-1, Page 1 of 1											
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION					
		6in	6in	6in		0	25	50	75				100				
3216.20	0.00	2	1	4	1.0												
	3.50	5	28	72	1.0												
3210.00																	
	8.50	6	28	33	1.0												
	13.50	38	50	50	0.9												
3200.00																	
	18.50	100			0.0												
3190.00																	
3180.00																	
3178.60																	
TERMINATED BORING IN HARD ROCK AT ELEVATION 3178.6 FEET.																	

Sheet 7

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33404.1.1		ID B-4038		COUNTY BURKE		GEOLOGIST C. BALDWIN (F&R)											
SITE DESCRIPTION BRIDGE NO. 26 OVER LINVILLE RIVER ON NC 183							GND WATER										
BORING NO B-2		NORTHING 0.00		EASTING 0.00		0 HR N/A											
ALIGNMENT -L-		BORING LOCATION 20+35.000		OFFSET 17.00ft LT		24 HR 17.00ft											
COLLAR ELEV 3234.20ft		TOTAL DEPTH 40.00ft		START DATE 11/04/05		COMPLETION DATE 11/04/05											
DRILL MACHINE CME-45			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC											
SURFACE WATER DEPTH			DEPTH TO ROCK 10.00ft			Log B-2, Page 1 of 1											
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION					
		6in	6in	6in		0	25	50	75				100				
3234.20	0.00	3	4	7	1.0												
	3.50	17	28	72	1.0												
3230.00																	
	8.50	38	40	31	1.0												
3220.00																	
3210.00																	
3200.00																	
3194.20																	
TERMINATED BORING IN HARD ROCK AT ELEVATION 3194.2 FEET.																	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

Sheet 8

M&T 503E

PROJECT NO 33404.1.1		ID B-4038		COUNTY BURKE		GEOLOGIST C. BALDWIN (F&R)							
SITE DESCRIPTION BRIDGE NO. 26 OVER LINVILLE RIVER ON NC 183						GND WATER							
BORING NO EB1-B		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 21+70.000		OFFSET 15.00ft RT		24 HR N/A							
COLLAR ELEV 3183.20ft		TOTAL DEPTH 8.60ft		START DATE 11/03/05		COMPLETION DATE 11/03/05							
DRILL MACHINE CME-45			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK 8.50ft			Log EB1-B, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75	100			
3183.20	0.00	3	2	3	1.0	Ground Surface							
3180.00	3.50	3	3	3	1.0	X-5 X-6					SS-6	M	ALLUVIUM: BROWN SANDY SILT
3174.60	8.50	60			0.1	60							ALLUVIUM: SAND AND GRAVEL
TERMINATED BORING ON HARD ROCK AT ELEVATION 3174.6 FEET.													

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

T.I.P. ID #: B-4038

REPORT ON SAMPLES OF: Soils for Classification

PROJECT:	33404.1.1	COUNTY:	Burke	Owner:	--
DATE SAMPLED:	11.2.05	DATE RECEIVED:	11.8.05	DATE REPORTED:	11.10.05
SAMPLED FROM:	Roadway	SAMPLED BY:	L. L. Acker		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-1	SS-3	SS-6	SS-8	SS-10
Lab Sample No. A	151059	151060	151061	151062	151063
HiCAMS Sample #	--	--	--	--	--
Retained #4 Sieve %	--	--	--	--	--
Passing #10 Sieve %	57	56	100	55	68
Passing #40 Sieve %	50	39	95	42	51
Passing #200 Sieve %	35	20	70	22	29

MINUS #10 FRACTION

Soil Mortar - 100%	SS-1	SS-3	SS-6	SS-8	SS-10
Coarse Sand -Ret. #60	18	41	7	32	33
Fine Sand - Ret. #270	33	33	38	37	35
Silt 0.05-0.005 mm %	39	24	43	25	30
Clay < 0.005 mm %	10	2	12	6	2
Passing # 40 Sieve %	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--

Liquid Limit	39	32	43	30	33
Plastic Index	NP	NP	NP	NP	NP
AASHTO Classification	A-2-4 (0)	A-1-b (0)	A-5 (7)	A-1-b (0)	A-2-4 (0)
Quantity					
Texture					
Station	20+70	20+70	21+70	20+35	20+35
Hole No.					
Depth (ft) From:	0.0	8.5	3.5	0.0	8.5
To:	1.5	10.0	5.0	1.5	10.0

Remarks:

A-151059 - 151063

CC:

L. L. Acker

File

SOILS ENGINEER:

PROJECT NO. 33404.1.1 (B-4038)
BURKE COUNTY

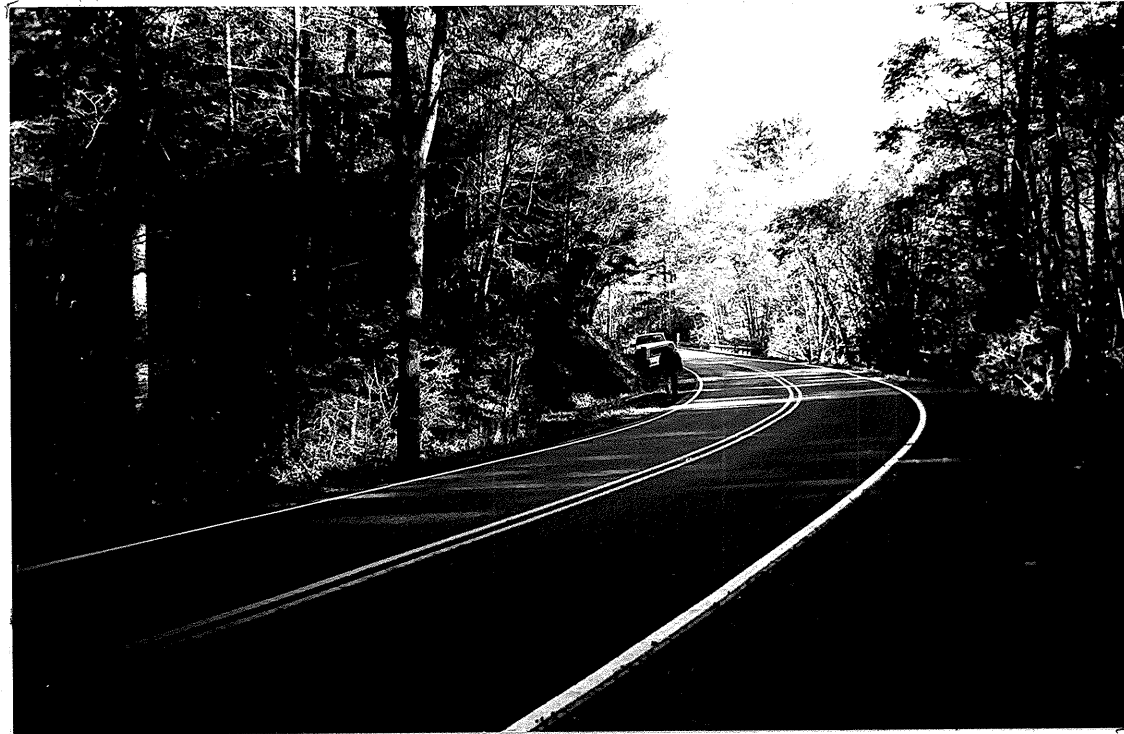


Figure 1. View looking forward from Station 17+50, 50°RT.



Figure 2. View looking back from Station 26+00, 40°RT.

PROJECT NO. 33404.1.1 (B-4038)
BURKE COUNTY

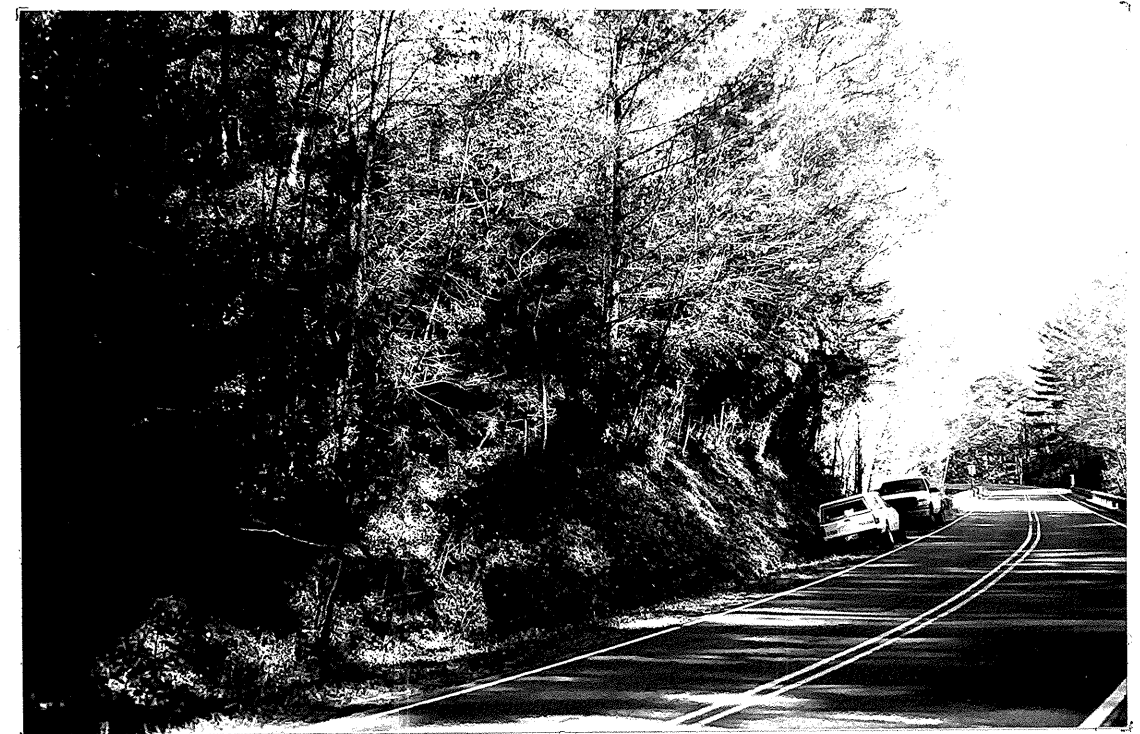


Figure 3. View of cut from Station 19+00, 60°RT.



Figure 4. View looking upstream towards -L- from bridge rail.