

PROJECT: 6.503445 ID: B-3457

# STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

## STRUCTURE SUBSURFACE INVESTIGATION

STATE	STATE PROJECT REFERENCE NO.	POST	ANAL.
N.C.	B-3457	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
6.503445		P.E.	
		CONST.	

### 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 (ON-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.

STATE PROJECT 6.503445 I.D. NO. B-3457

F.A. PROJECT N/A

COUNTY GRAHAM

PROJECT DESCRIPTION \_\_\_\_\_

BRIDGE #68 OVER PANTHER CREEK on

SR 1232

SITE DESCRIPTION \_\_\_\_\_

For Letting

INVESTIGATED BY TITAN ATLANTIC GROUP PERSONNEL L. CLARK

CHECKED BY BARNEY C. HALE B. FLETCHER

SUBMITTED BY BARNEY C. HALE V. GONZALEZ

DATE 4/26/02 B. HALE

M. JORDAN

M. POTRATZ

S. DAVIS

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

DRAWN BY: S.E.D.



SEAL

RC

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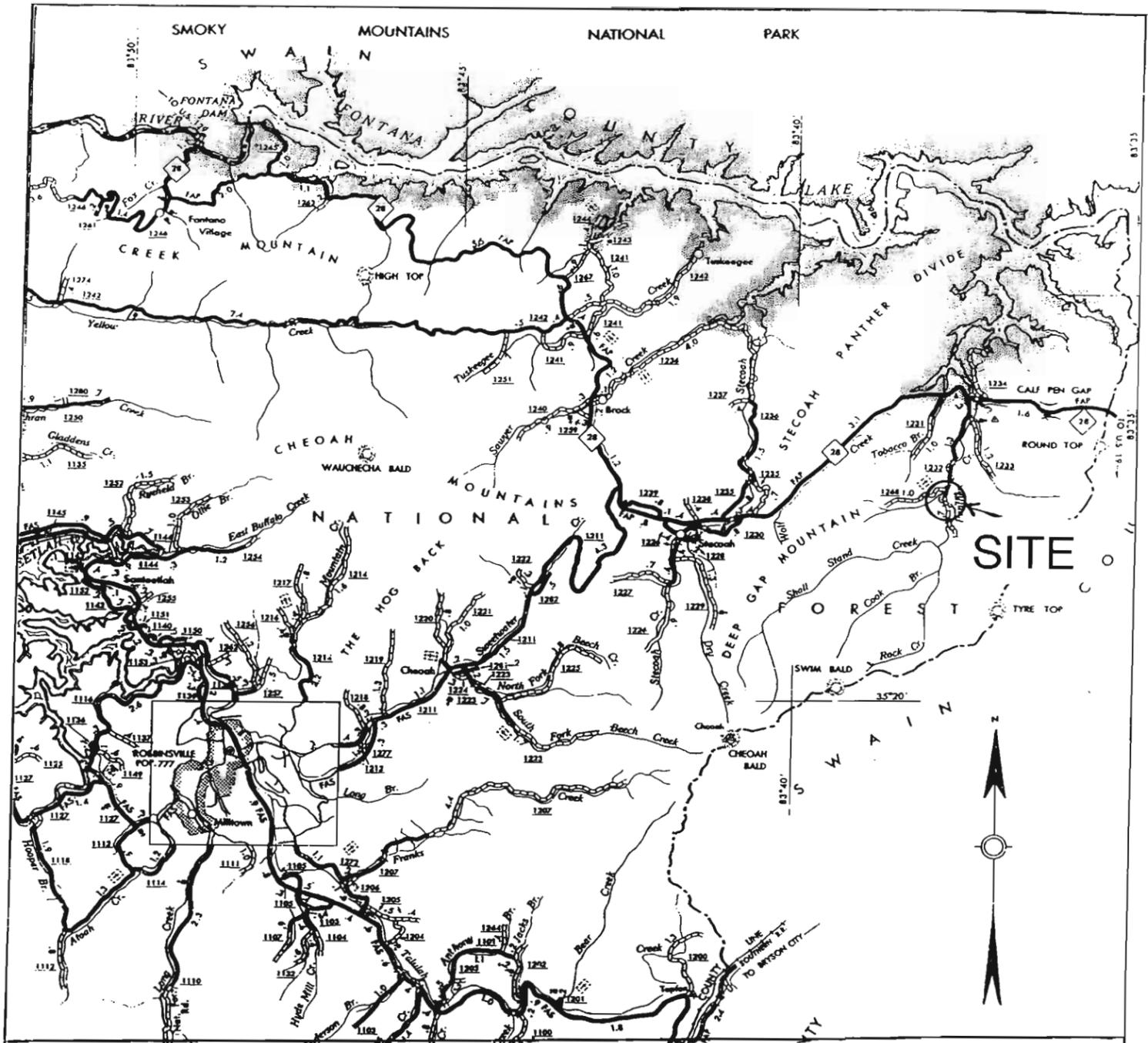
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL UNIT**

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3457	6.503445	2	

## 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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <b>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</b>										<b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE <b>UNIFORM</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.										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 8.1 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:										<b>ALLUVIUM (ALLUV.)</b> - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. <b>CALCAREOUS (CALC.)</b> - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (F.P.)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (R.Q.D.)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS IN OR B.P.F.J. OF A 148 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 8.1 FOOT PENETRATION WITH 60 BLOWS. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.)</b> - 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. <b>TOPSOIL (T.S.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																			
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>										<b>MINERALOGICAL COMPOSITION</b>										<b>WEATHERING</b>										<b>WEATHERING</b>																			
GENERAL CLASS. GRANULAR MATERIALS (<35% PASSING #200) SILT-CLAY MATERIALS (1-85% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.										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.																			
<b>COMPRESSION</b>										<b>PERCENTAGE OF MATERIAL</b>										<b>WEATHERING</b>										<b>WEATHERING</b>																			
SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE										LIQUID LIMIT LESS THAN 30 LIQUID LIMIT 31-50 LIQUID LIMIT GREATER THAN 50										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.																			
<b>GROUND WATER</b>										<b>GROUND WATER</b>										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.																			
WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.										STATIC WATER LEVEL AFTER 24 HOURS.										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. <b>IF TESTED, WOULD YIELD SPT REFUSAL</b>										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. <b>IF TESTED, YIELDS SPT N VALUES &gt; 100 B.P.F.</b>																			
PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA										SPRING OR SEEPAGE										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. <b>IF TESTED, YIELDS SPT N VALUES &lt; 100 B.P.F.</b>										COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DDKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.																			
<b>CONSISTENCY OR DENSENESS</b>										<b>MISCELLANEOUS SYMBOLS</b>										<b>ROCK HARDNESS</b>										<b>ROCK HARDNESS</b>																			
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )										ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS INFERRED SOIL BOUNDARIES INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP/DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD										SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																			
GENERALY GRANULAR MATERIAL (NON-COHESIVE)										GENERALY SILT-CLAY MATERIAL (COHESIVE)										GENERALY GRANULAR MATERIAL (NON-COHESIVE)										GENERALY SILT-CLAY MATERIAL (COHESIVE)																			
TEXTURE OR GRAIN SIZE										TEXTURE OR GRAIN SIZE										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.																			
U.S. STD. SIEVE SIZE OPENING (MM)										U.S. STD. SIEVE SIZE OPENING (MM)										MEDIUM HARD CAN BE GROOVED OR GOUGED 0.125 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.																			
BOULDER (BLDR) COBBLE (COB) GRAVEL (GR) COARSE SAND (CSE. SO.) FINE SAND (F. SO.) SILT (SL) CLAY (CL)										BOULDER (BLDR) COBBLE (COB) GRAVEL (GR) COARSE SAND (CSE. SO.) FINE SAND (F. SO.) SILT (SL) CLAY (CL)										VERY SOFT CAN BE CARRIED 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.										SOFT CAN BE CARRIED 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.																			
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>ABBREVIATIONS</b>										<b>FRACTURE SPACING</b>										<b>BEDDING</b>																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										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 SO - SAND, SANDY SL - SILT, SILTY SLI - SLIGHTLY TCR - TRICONE REFUSAL γ - UNIT WEIGHT γ <sub>d</sub> - DRY UNIT WEIGHT W - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST										TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.15 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET										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									
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										<b>INDURATION</b>										<b>INDURATION</b>																			
PLASTICITY INDEX (PI) DRY STRENGTH										DRILL UNITS: MOBILE B- BK-51 CME-45 CME-550 PORTABLE HOIST OTHER OTHER										ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE STEEL TEETH TRICONE 3 TUNG-CARB. CORE BIT OTHER										HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B-N-D-H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST OTHER										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;									
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										BENCH MARK: TBM - NAIL IN BASE OF 18" MAPLE TREE 37' LT. OF STA 11+40 EL. 100.00 (ASSUMED DATUM) ELEVATION: 100.00 ASSUMED										NOTES:																			



**SITE LOCATION PLAN**

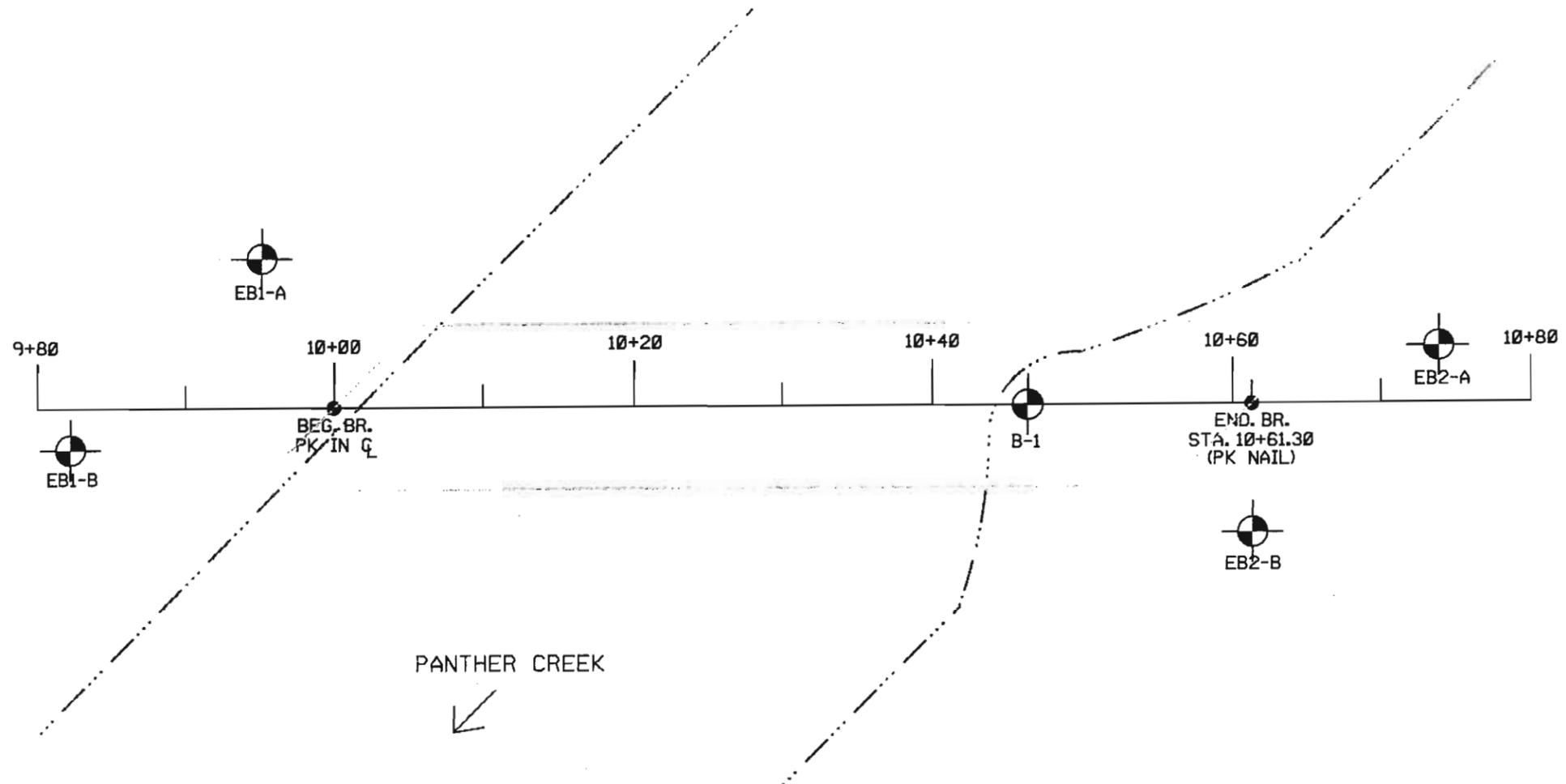
NCDOT Project No. 6.503445 (B-3457)  
 Bridge # 68 over Panther Creek on SR 1232  
 Graham County, NC



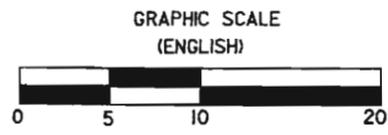
Titan Project No.: 62-20131  
 Date: 04/26/02  
 Drawn By: LMC  
 Scale: AS SHOWN      Drawing No. 1

Reference: NCDOT Municipal, State, Primary, and Interstate Highway Systems Maintenance Maps - 1978

TBM: NAIL IN BASE OF 18' MAPLE  
 TREE 37' LT OF STA. 11+40  
 EL. 100.00 (ASSUMED DATUM)



PANTHER CREEK



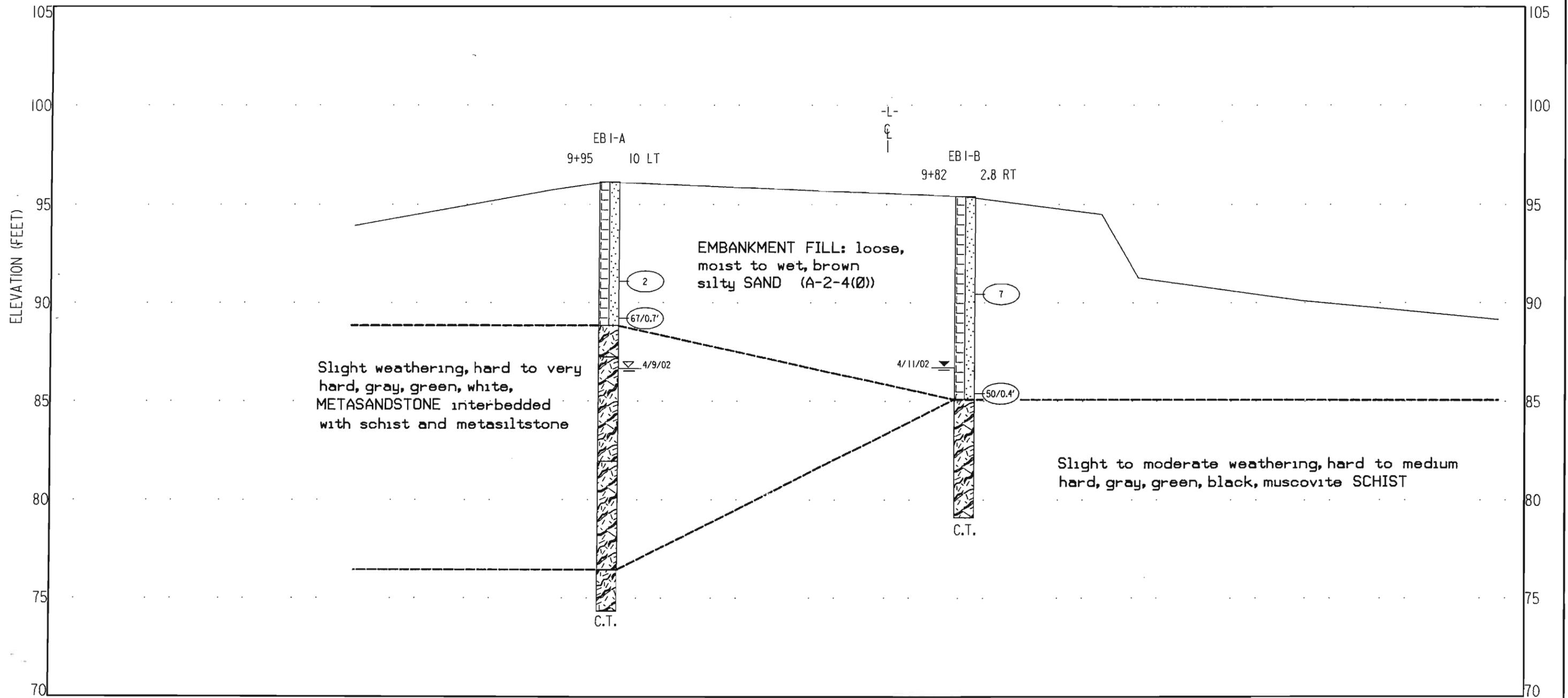
EXISTING BRIDGE  
 CREEK LINE

REFERENCE: HYDRAULIC SURVEY PROVIDED BY  
 NCDOT DATED 12/01

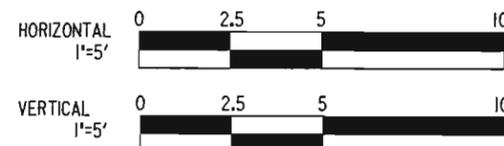
**TITAN** ATLANTIC GROUP  
 ENGINEERING - SURVEYING - PLANNING  
 5240 GREENS DAIRY ROAD, RALEIGH, N.C. 27616 (919) 873-2211

- BORING LOCATION PLAN -  
 BRIDGE # 68 OVER PANTHER CREEK ON SR 1232  
 GRAHAM COUNTY, NORTH CAROLINA  
 PROJ. NO. 6.503445 TIP NO. B-3457

DATE 04-17-02	SCALE 1:10
DRAWN BY S.E.D.	CHECKED BY B.C.H.
REVISIONS	
TITAN PROJ. NO. 62-20131	
SHEET DWG NO 2	



GRAPHIC SCALES  
(ENGLISH)



CROSS SECTION THROUGH END BENT 1  
BRIDGE #68 OVER PANTHER CREEK  
GRAHAM COUNTY, NORTH CAROLINA  
PROJECT NO. 6.503445 TIP NO. B-3457

CHECK: BCH

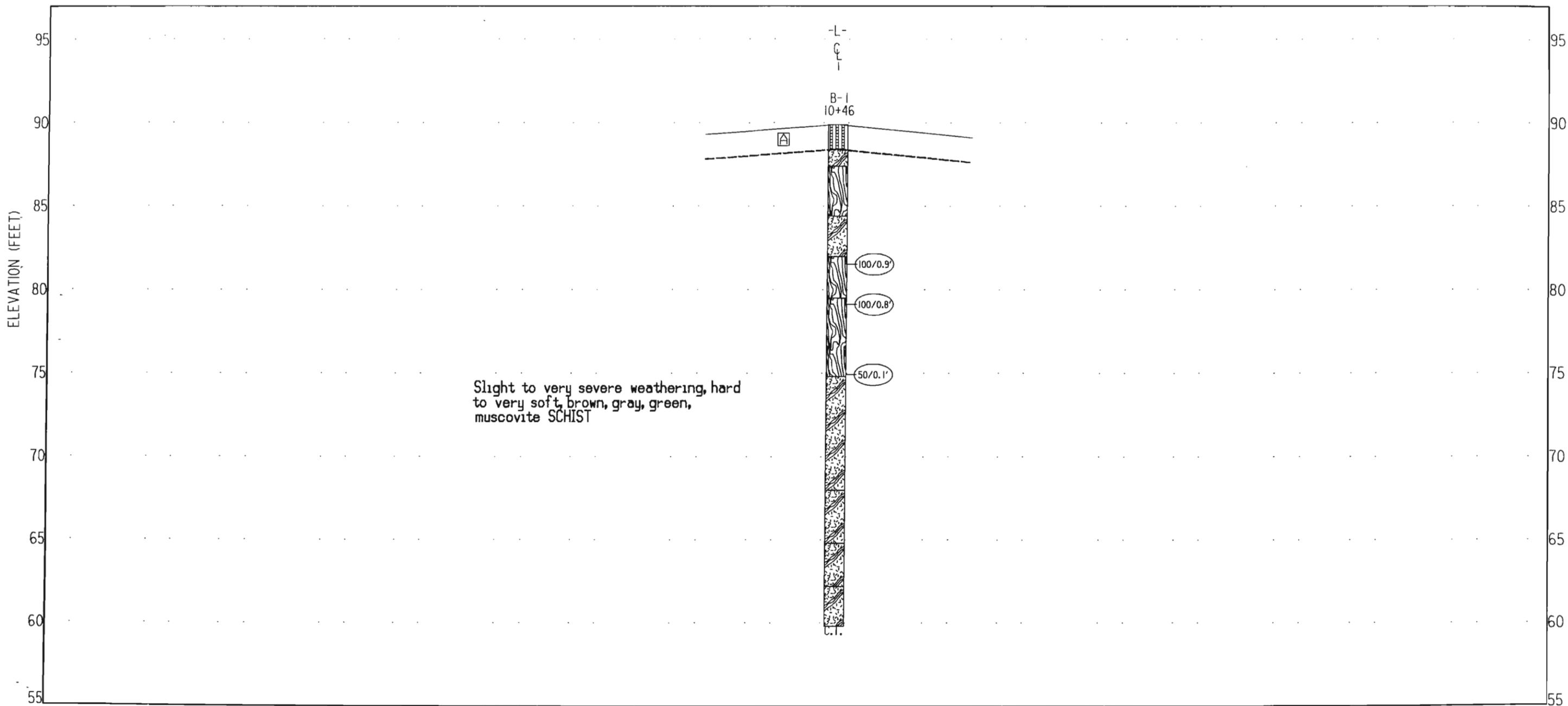
DRAWN BY: MRP

TITAN NO. 62-20131

DATE: 04/24/02

SCALE: AS SHOWN

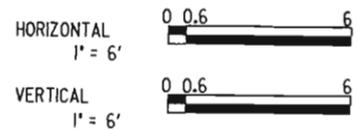
DWG. NO. 3



Slight to very severe weathering, hard to very soft, brown, gray, green, muscovite SCHIST

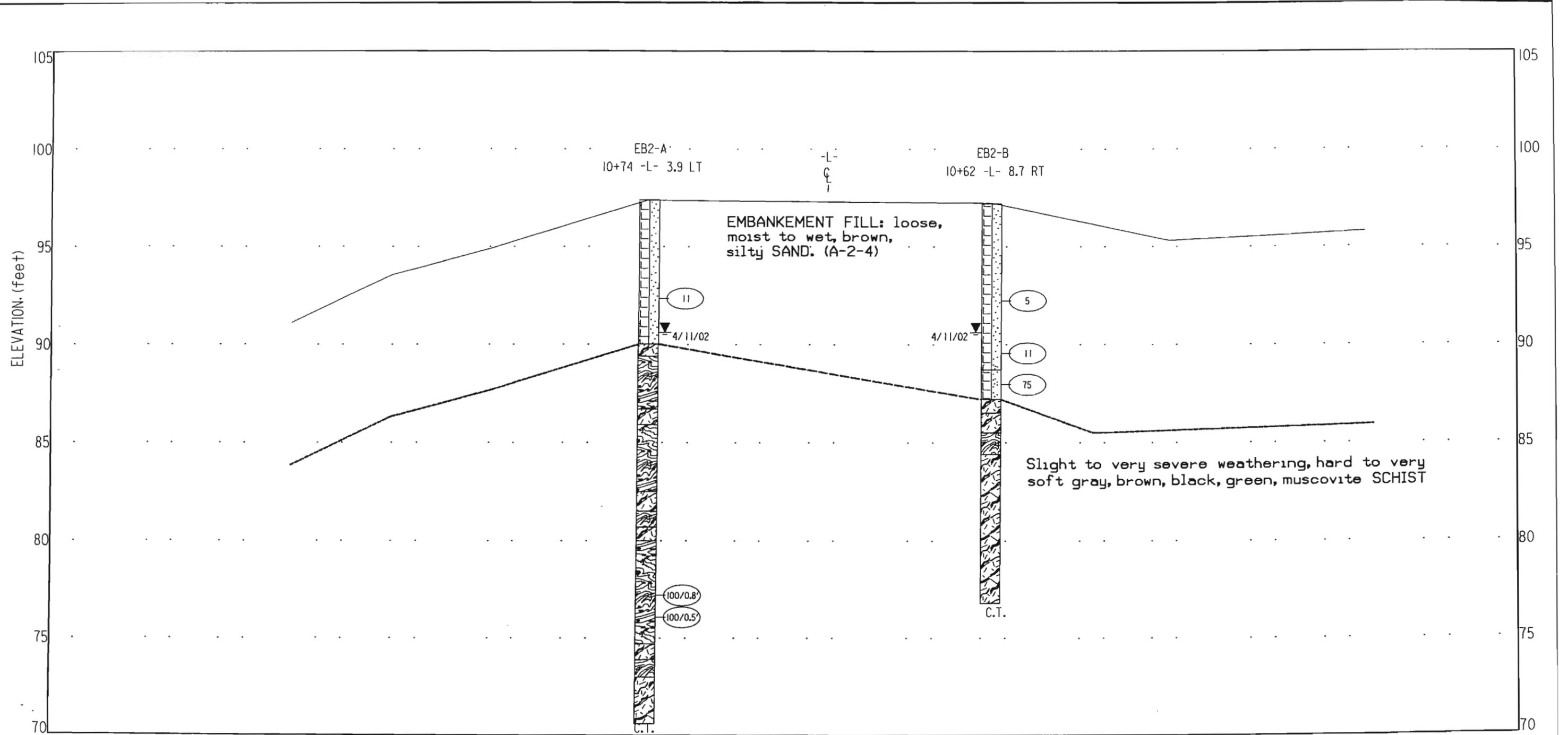
☐ CREEK BED-GRAVEL and SAND (A-1-a) with cobbles and boulders

GRAPHIC SCALES (ENGLISH)

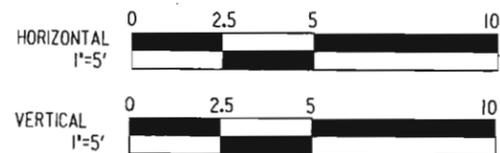


CROSS SECTION THROUGH INTERIOR BENT  
 BRIDGE #64 OVER PANTHER CREEK  
 GRAHAM COUNTY, NORTH CAROLINA  
 PROJECT NO. 6.503445 TIP NO. B-3457

CHECK: BCH	DRAWN BY: MRP	TITAN NO. 62-20131	DATE: 05/08/02	SCALE: AS SHOWN	DWG. NO. 4
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GRAPHIC SCALES  
(ENGLISH)



CROSS SECTION THROUGH END BENT 2  
BRIDGE #68 OVER PANTHER CREEK  
GRAHAM COUNTY, NORTH CAROLINA  
PROJECT NO. 6.503445 TIP NO. B-3457

CHECK: BCH

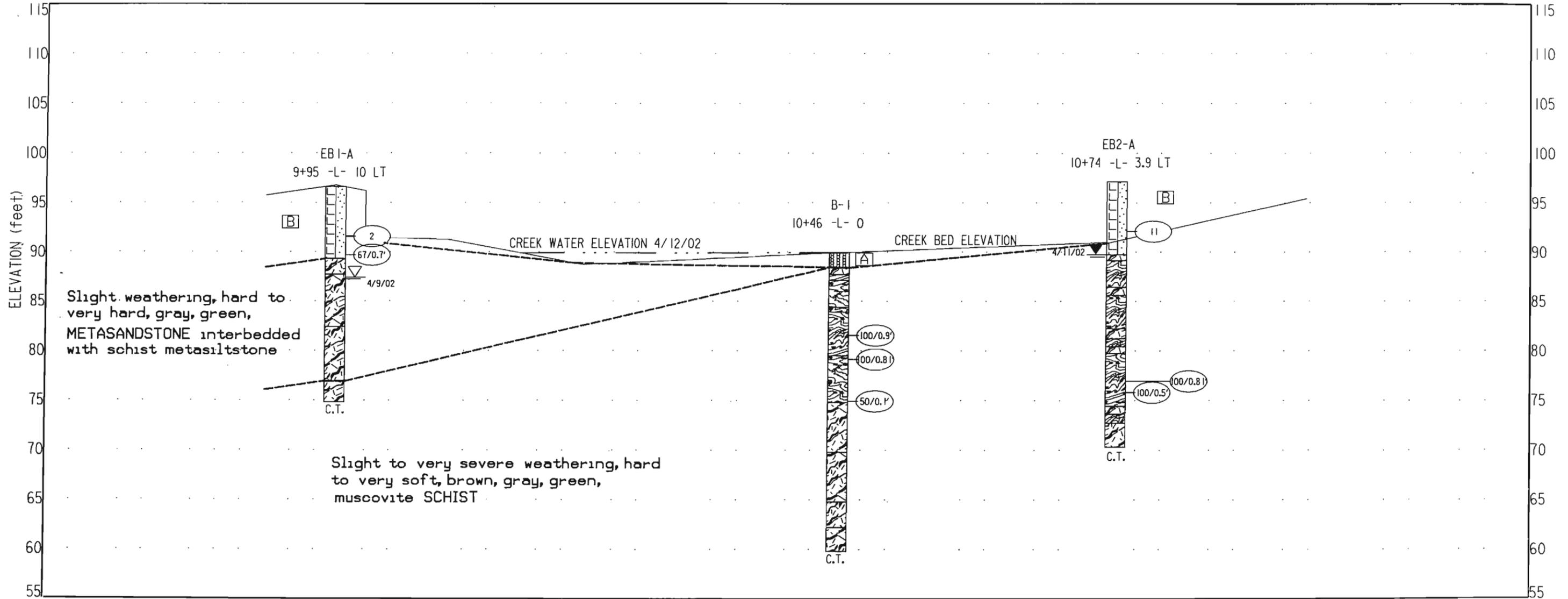
DRAWN BY: MRP

TITAN NO. 62-20131

DATE: 04/24/02

SCALE: AS SHOWN

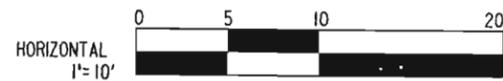
DWG. NO. 5



Ⓐ CREEK BED-GRAVEL and SAND (A-1-a)  
with cobbles and boulders

Ⓑ EMBANKMENT FILL: loose, moist to  
wet, brown silt, SAND (A-2-4(Ø))

GRAPHIC SCALES  
(ENGLISH)



PROFILE 13 FEET LEFT OF CENTERLINE  
BRIDGE #68 OVER PANTHER CREEK  
GRAHAM COUNTY, NORTH CAROLINA  
PROJECT NO. 6.503445 TIP NO. B-3457

CHECK: BCH

DRAWN BY:MRP

TITAN NO. 62-20131

DATE: 04/24/02

SCALE: AS SHOWN

DWG. NO. 6



N.C.D.O.T. GEOTECHNICAL UNIT  
BORING LOG

SHEET 1 OF 1

ECT NO. 6.503445		ID. B-3457		COUNTY Graham		GEOLOGIST M. Potratz							
SITE DESCRIPTION Bridge #68 over Panther Creek on SR 1232						GROUND WATER (ft)							
BORING NO. EB1-A		BORING LOCATION 9+95		OFFSET 10 LT		ALIGNMENT -L-							
COLLAR ELEV. 96.2 ft		NORTHING 0.0		EASTING 0.0		4/9/02 9.5							
TOTAL DEPTH 21.80 ft		DRILL MACHINE CME 550		DRILL METHOD HSA/HQ Core		HAMMER TYPE Manual							
DATE STARTED 04/09/02		COMPLETED 04/09/02		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
96.20													96.20 0.00
													Embankment FILL: brown, moist, loose, silty SAND (A-2-4(0))
	4.30		3	1	1							M	
	6.60		17	50/0.1'								M	87.70
	10.00											RS-1	88.90 7.30
													Slight weathering, hard to very hard, gray, MetaSANDSTONE interbedded with biotite garnet Schist
													87.30 8.90
													Moderate weathering, medium hard, gray, green, orange, Muscovite SCHIST
													82.00 14.20
													Slight weathering, hard, gray, green, white MetaSANDSTONE interbedded with metasiltstone
													76.50 19.70
													Moderate weathering, moderately hard, gray, green, Muscovite SCHIST
													74.40 21.80
													Coring terminated at elevation 74.4 ft. in Muscovite SCHIST
													Casing set at elevation 88.9 ft. (7.3 ft. depth).

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL UNIT CORE BORING REPORT

PROJECT NO.: 6.305445		I.D. NO.: B-3457		BORING NO.: EB1-A			
SITE DESCRIPTION: Bridge # 68 over Panther Creek on SR 1232				CORE SIZE: HQ			
COLLAR ELEVATION: 96.2				EQUIPMENT: CME 550			
DRILLER: Titan Drilling				GEOLOGIST: M. Potratz / M. Jordan			
TOTAL DEPTH: 21.8				PERSONNEL: F. Cox / A. Rodriguez			
				DATE: 04/09/02			
ELEV. (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN # (ft)	REC (%)	RQD (%)	SAMP. NO.	FIELD CLASSIFICATION AND REMARKS
88.9	7.3	4	1	4.3	1.5	RS-1	Slight weathering, hard to very hard, gray, Metasandstone interbedded with biotite garnet SCHIST. 87.3 STRATUM REC = 94%. STRATUM RQD = 63% 8.9
		4					
		4					Moderate weathering, medium hard, gray, green, orange Muscovite SCHIST with close to moderately close fracture spacing and thickly laminated to very thin bedding 8 JT's @ 59-64 deg. STRATUM REC = 94%. STRATUM RQD = 17%
		4					
84.4	11.8	2/0.5	4.5	96.0	33		
84.4	11.8	4	2	3.8	1.2		
		2					
		3					82.0 14.2
		4					Slight weathering, hard, gray, green, white METASANDSTONE interbedded with metasiltstone. with very close fracture spacing and very thin bedding 14 JT's @ 60-65 deg STRATUM REC = 84%. STRATUM RQD = 26%
		4					
79.4	16.8		5.0	76	24		
79.4	16.8	4	3	1.9	0.5		
		4					
		3					
		5					76.5 19.7
		3					Moderate weathering, moderately hard, gray, green, Muscovite SCHIST. with close fracture spacing and thickly laminated bedding 2 JT's @ 60 deg STRATUM REC = 90%. STRATUM RQD = 0%
74.4	21.8		5.0	98.0	10.0		74.4 STRATUM REC = 90%. STRATUM RQD = 0% 21.8
Coring Terminated @ 21.8 feet. Elevation 74.4 feet.							

**CORE PHOTOGRAPHS (EB1-A)**

Bridge # 68 over Panther Creek

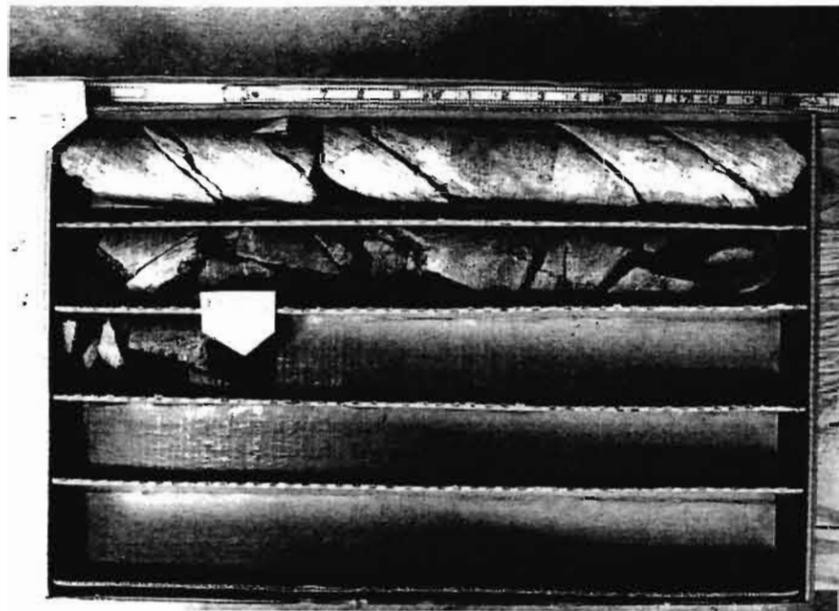
State Project 6.503445 (B-3457)

Scale 1"=0.5'

0 1.0 ft 2.0 ft



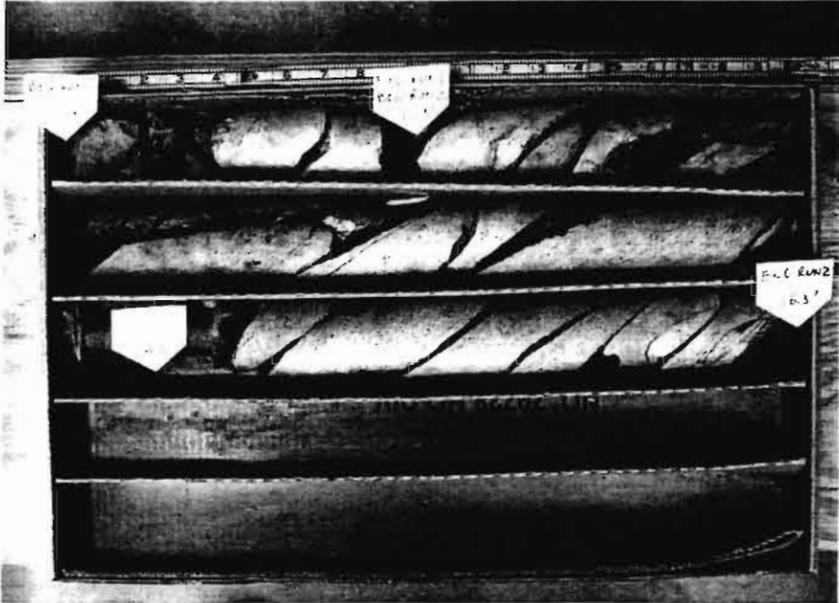
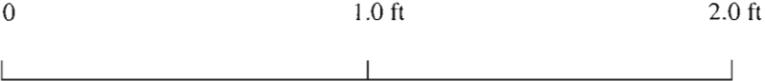
0 1.0 ft 2.0 ft





**CORE PHOTOGRAPHS (EB1-B)**

Bridge # 68 over Panther Creek  
State Project 6.503445 (B-3457)  
Scale 1"=0.5'





N.C.D.O.T. GEOTECHNICAL UNIT  
BORING LOG

SHEET 1 OF 1

PROJECT NO. 6.503445		ID. B-3457		COUNTY Graham		GEOLOGIST M. Potratz							
SITE DESCRIPTION Bridge #68 over Panther Creek on SR 1232							GROUND WATER (ft)						
BORING NO. B-1		BORING LOCATION 10+46		OFFSET 0		ALIGNMENT -L-							
COLLAR ELEV. 89.9 ft		NORTHING 0.0		EASTING 0.0									
TOTAL DEPTH 30.10 ft		DRILL MACHINE CME 550		DRILL METHOD HSA/HQ Core		HAMMER TYPE Manual							
DATE STARTED 04/10/02		COMPLETED 04/10/02		SURFACE WATER DEPTH N/A									
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80				100
89.90													89.90 Creek Bed, tan GRAVEL and SAND (A-1-a) with cobbles and boulders 0.00
													88.40 Slight weathering, hard, gray, Mica SCHIST interbedded with metasandstone 1.50
													87.40 Very severely weathered, very soft, brown, gray, Muscovite SCHIST 2.50
													84.40 Slight weathering, medium hard, gray, brown, Muscovite SCHIST 5.50
													82.00 Very severely weathered, very soft, brown, gray, Muscovite SCHIST 7.90
	7.90	45	55/0.4'									W	79.50 severe to very severe weathering, soft to very soft brown, gray, Muscovite SCHIST 10.40
	10.40	50	50/0.3'									W	74.80 Slight weathering, hard, gray, Muscovite SCHIST 15.10
	14.90	50/0.1'										W	68.00 Slight to moderately weathered, moderately hard, gray, tan, Muscovite SCHIST 21.90
													64.80 Moderate weathering, medium hard, gray, green, Muscovite SCHIST 25.10
													62.20 Slight weathering, hard, gray, Muscovite SCHIST 27.70
	20.10											RS-3	59.80 Casing set at elevation 88.4 ft. (1.5 ft. depth). Boring performed in creek channel, water elevation approximately 89.7 ft.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL UNIT CORE BORING REPORT

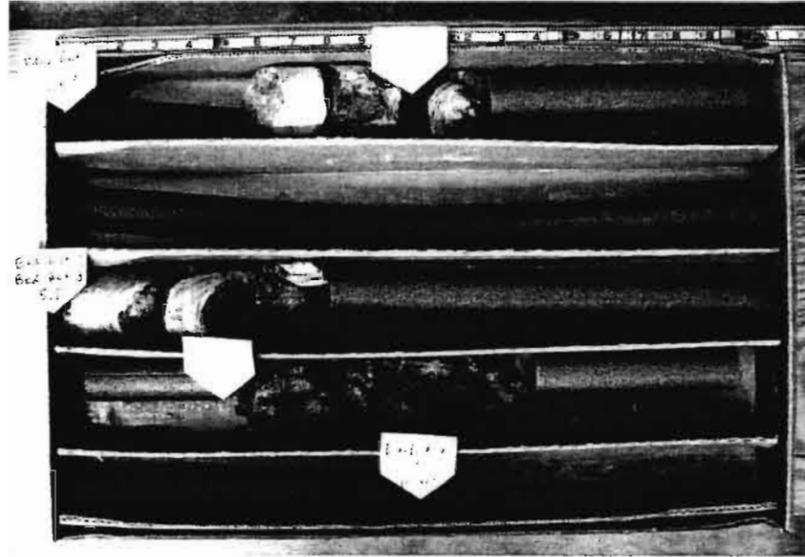
PROJECT NO.: 6.503445		I.D. NO.: B-3457		BORING NO.: B-1			
SITE DESCRIPTION: Bridge # 68 over Panther Creek on SR 1232							
COLLAR ELEVATION: 89.9		CORE SIZE: HQ		EQUIPMENT: CME 550			
DRILLER: Titan Drilling		GEOLOGIST: M. Potratz / M. Jordan		PERSONNEL: F. Cox / A. Rodriguez			
TOTAL DEPTH: 30.1		TOTAL RUN: 28.6		DATE: 4/10/02			
ELEV. (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN # (ft)	REC (%)	RQD (%)	SAMP. NO.	FIELD CLASSIFICATION AND REMARKS
88.4	1.5	5	1	0.6	0		Slight weathering, hard, gray, Mica SCHIST interbedded with metasandstone
87.4	2.5		1	50	0		No JT sets.
87.4	2.5	3	2	0.9	0		87.4 STRATUM REC = 50%. STRATUM RQD = 0% 2.5
		3					Very severely weathered, very soft, muscovite SCHIST. No JT sets.
		3					STRATUM REC = 0%. STRATUM RQD = N/A
84.4	5.5		3	30	0		84.4 5.5
84.4	5.5	7	3	0	0		Slight weathering, medium hard, gray, brown Muscovite SCHIST
		6					No JT sets.
		6					STRATUM REC = 50%. STRATUM RQD = 0%
		5					82.0 7.9
		2.7/0.9					Severe to very severe weathering, very soft, brown Muscovite SCHIST
79.5	10.4		4.9	0%	0		79.5 10.4
79.5	10.4						Switched from coring to tricone drilling. Two SPT samples obtained
							SOFT WEATHERED ROCK - Muscovite SCHIST
74.8	15.1						74.8 15.1
74.8	15.1	5	4	2.6	0		Slight weathering, hard, gray, Muscovite SCHIST
		3.5					with close to moderately close fracture spacing and thickly laminated to very thin bedding.
		3.5					14 JT's @ 61 to 65 deg
							STRATUM REC = 93%. STRATUM RQD = 36%
71.8	18.1		3	87	0		
71.8	18.1	4	5	4.4	2.8		
		4					
		6					
		6					
		6					
		6					
66.8	23.1		5	88	56		66.0 21.9
66.8	23.1	4	6	4.5	0		Slight to moderately weathered, moderately hard, gray, tan, Muscovite SCHIST
		4					with close fracture spacing and thickly laminated to very thin bedding.
		4					6 JT's @ 43 to 46 deg
		4					STRATUM REC = 88%. STRATUM RQD = 31%
		3					
		3					
		4					
61.8	28.1		5	90.0	0.0		64.8 25.1
61.8	28.1	7.5	7	1.9	0.7		Moderate weathering, medium hard, gray, green, Muscovite SCHIST
		7.5					with close fracture spacing and thickly laminated to very thin bedding.
							3 JT's @ 44 to 47 deg; STRATUM REC = 85%. STRATUM RQD = 0%
59.8	30.1		2	95.0	35.0		62.2 27.7
							Slight weathering, hard, gray, Muscovite SCHIST
							with close fracture spacing and thickly laminated to very thin bedding.
							6 JT's @ 44 to 47 deg; STRATUM REC = 88%. STRATUM RQD = 29%
							59.8 30.1
Coring Terminated @ 30.1 feet. Elevation 59.8 feet.							

# CORE PHOTOGRAPHS (B1)

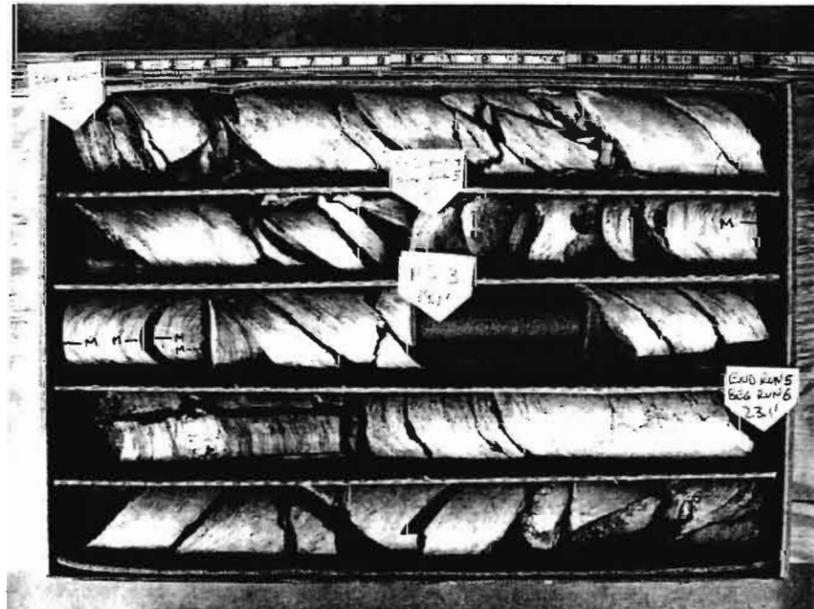
Bridge # 68 over Panther Creek  
State Project 6.503445 (B-3457)

Scale 1"=0.5'

0 1.0 ft 2.0 ft



0 1.0 ft 2.0 ft



0 1.0 ft 2.0 ft





N.C.D.O.T. GEOTECHNICAL UNIT  
BORING LOG

SHEET 1 OF 1

PROJECT NO. 6.503445	ID. B-3457	COUNTY Graham	GEOLOGIST M. Potratz										
SITE DESCRIPTION Bridge #68 over Panther Creek on SR 1232			GROUND WATER (ft)										
BORING NO. EB2-A	BORING LOCATION 10+74	OFFSET 3.9 LT	ALIGNMENT -L-										
COLLAR ELEV. 97.4 ft	NORTHING 0.0	EASTING 0.0	4/11/02 7.3										
TOTAL DEPTH 26.80 ft	DRILL MACHINE CME 550	DRILL METHOD HSA/HQ Core	HAMMER TYPE Manual										
DATE STARTED 04/09/02	COMPLETED 04/09/02	SURFACE WATER DEPTH N/A											
ELEV. (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
		0.5ft	0.5ft	0.5ft	0	20	40	60	80	100			
97.40													Embankment FILL: brown, moist to wet, loose silty SAND (A-2-4(0))
95	4.30	4	5	6									
90													90.00 Slight to very slight weathering, hard, gray, brown, black, Muscovite SCHIST interbedded with metasandstone
													89.40 Very severely weathered, very soft, gray, green, orange, Muscovite SCHIST
													87.70 Moderate weathering, medium hard, gray, orange, Muscovite SCHIST
													86.90 Very severely weathered, very soft, gray, green, orange, Muscovite SCHIST
85													83.50 Moderate weathering, medium hard, gray, orange, Muscovite SCHIST
													82.50 Very severely weathered, very soft, gray, green, orange, Muscovite SCHIST
80													80.70 Moderate weathering, medium hard, gray, orange, Muscovite SCHIST
													80.00 Very severely weathered, very soft, gray, green, orange, Muscovite SCHIST
75	19.80	47	53/0.3'										74.70 Moderate weathering, medium hard, gray, orange, Muscovite SCHIST
	21.10	100/0.5'											73.90 Very severely weathered, very soft, gray, green, orange, Muscovite SCHIST
													73.00 Moderate weathering, medium hard, gray, orange, Muscovite SCHIST
	25.80												70.60 Coring terminated at elevation 70.6 ft. in Muscovite SCHIST
													Casing set at elevation 90.0 ft. (7.4 ft. depth).

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL UNIT CORE BORING REPORT

PROJECT NO.: 6.305445	I.D. NO.: B-3457	BORING NO.: EB2-A					
SITE DESCRIPTION: Bridge # 68 over Panther Creek on SR 1232							
COLLAR ELEVATION: 97.4	CORE SIZE: HQ	EQUIPMENT: CME 550					
DRILLER: Titan Drilling	GEOLOGIST: M. Potratz / M. Jordan	PERSONNEL: F. Cox / A. Rodriguez					
TOTAL DEPTH: 26.8 ft.	TOTAL RUN: 19.4	DATE: 04/09/02					
ELEV. (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN # (ft)	REC (%)	RQD (%)	SAMP. NO.	FIELD CLASSIFICATION AND REMARKS
90.0	7.4	4	1	0.6	0		Slight to very slight weathering, hard, gray, brown, black, Muscovite Biotite SCHIST interbedded with meta-sandstone. No JT sets. STRATUM REC = 67%. STRATUM RQD = 0%
			2				
			2				
86.5	10.9	1/0.5	3.5	17	0		Very severely weathered, very soft, grey, green, orange Muscovite SCHIST. No JT sets. STRATUM REC = 0%. STRATUM RQD = N/A
86.5	10.9	4	2	1.4	0		Moderate weathering, medium hard, grey, orange Muscovite SCHIST. No JT sets. STRATUM REC = 88%. STRATUM RQD = 0%
		4					
		4					
		4					
		4					
		4					
81.5	15.9		5.0	28	0		Moderate weathering, medium hard, grey, green, orange Muscovite SCHIST. No JT sets. STRATUM REC = 90%. STRATUM RQD = 0%
81.5	15.9	4	3	1.7	0		Very severely weathered, very soft, grey, green, orange Muscovite SCHIST. No JT sets. STRATUM REC = 0%. STRATUM RQD = N/A
		3					
		4					
		4					
77.6	19.8	3.6/0.9	3.9	44	0		Very severely weathered, very soft, grey, green, orange Muscovite SCHIST. No JT sets. STRATUM REC = 21%. STRATUM RQD = N/A
77.6	19.8						
76.8	20.6						SPT Sample Taken at 19.8 ft.; N value = 100/0.8'
76.8	20.3		4	0	0		Very severely weathered, very soft, grey, green, orange Muscovite SCHIST. No JT sets
76.3	21.1	3/0.5	0.5	0	0		STRATUM REC = 0%. STRATUM RQD = N/A
76.3	21.1						
75.8	21.6						SPT Sample Taken at 21.1ft.; N value = 100/0.5'
75.8	21.6	5	5	2.5	0.7		Very severely weathered, very soft, grey, green, orange Muscovite SCHIST. No JT sets. STRATUM REC = 21%. STRATUM RQD = N/A
		5					
		5					
		5					
		5					
71.5	25.9	4.3/0.8	4.3	58.0	16.0		Moderate weathering, medium hard, grey, green, orange Muscovite SCHIST with close fracture spacing and very thin bedding.
71.5	25.9	3.6/0.9	6	0.8	0.7	RS-4	2 JT's @ 62-66 deg; STRATUM REC = 92%. STRATUM RQD = 35%
70.6	26.8		0.9	91.0	78.0		Coring Terminated @ 26.8 feet. Elevation 70.6 feet.

JT\_BORE 62.201 NCDOT GDT 5/21/02

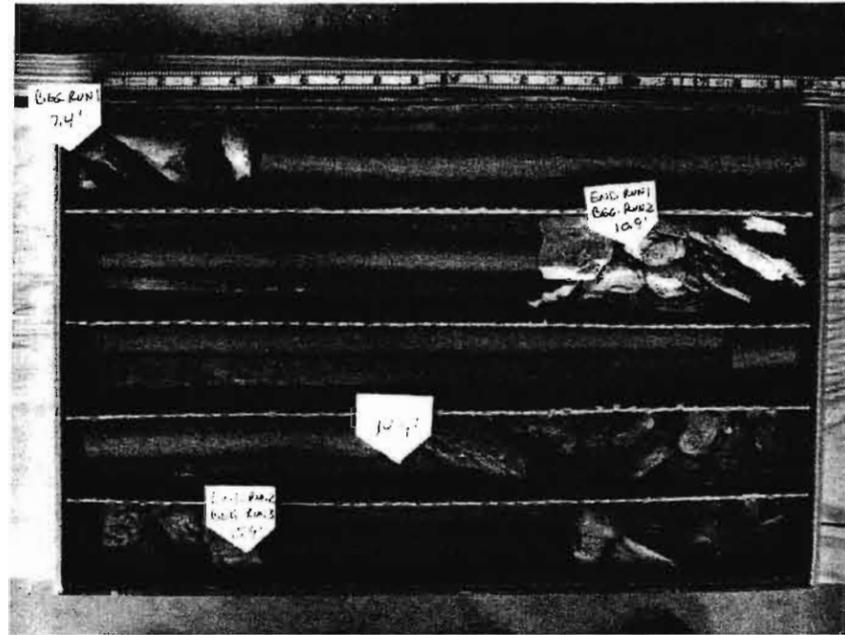
**CORE PHOTOGRAPHS (EB2-A)**

Bridge # 68 over Panther Creek

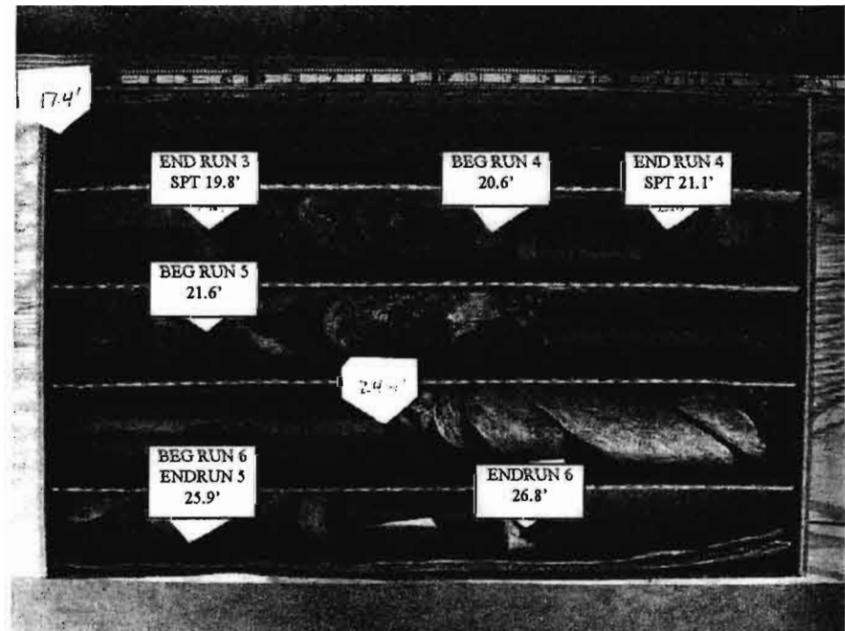
State Project 6.503445 (B-3457)

Scale 1"=0.5'

0 1.0 ft 2.0 ft



0 1.0 ft 2.0 ft





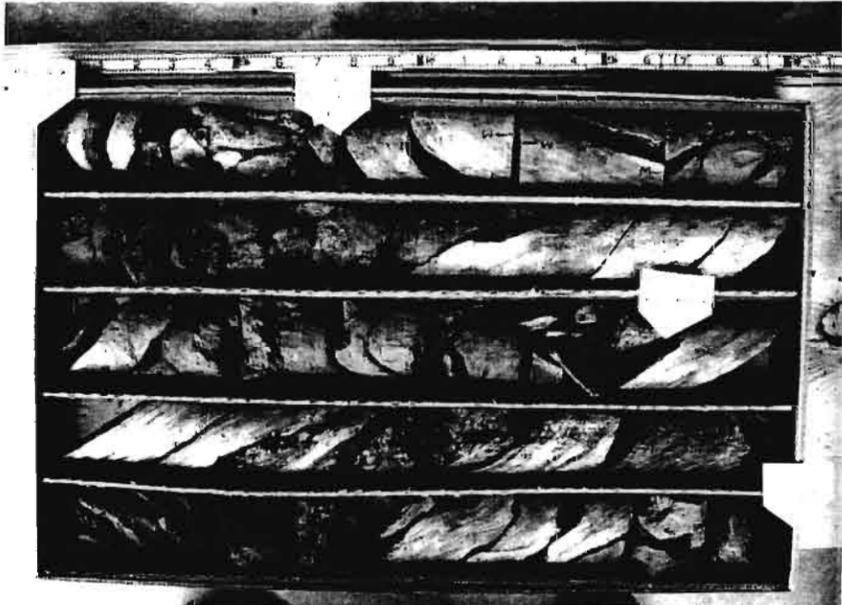
**CORE PHOTOGRAPHS (EB2-B)**

Bridge # 68 over Panther Creek

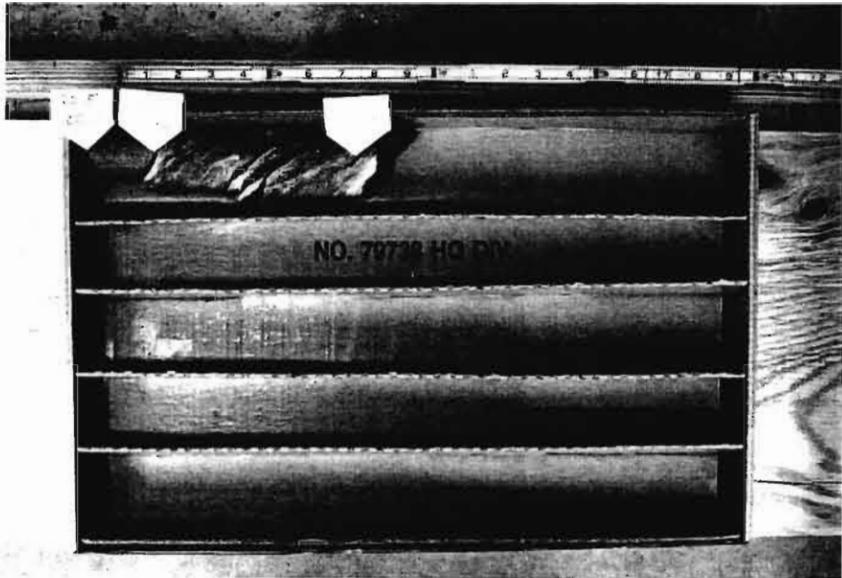
State Project 6.503445 (B-3457)

Scale 1"=0.5'

0 1.0 ft 2.0 ft



0 1.0 ft 2.0 ft



## SUMMARY OF LABORATORY SOIL CLASSIFICATION TEST DATA

BRIDGE # 68 OVER PANTHER CREEK ON SR 1232  
GRAHAM COUNTY, NORTH CAROLINA  
NCDOT NO. 6.503445 (B-3457)

TITAN PROJECT NO. 62-20131

Boring Number	Lab Sample Number*	Sample Depth (ft)	AASHTO Class.	N-Value (bpf)	Natural Moisture Content (%)	Atterberg Limits			Gradation Results						
									Classification Sieves			Minus 2.00 mm Fraction			
						L.L.	P.L.	P.I.	Percent Pass #10	Percent Pass #40	Percent Pass #200	Coarse Sand % (Ret. #60)	Fine Sand % (Ret. #270)	Silt % (0.05-0.005mm)	Clay % (<0.005mm)
EB2-B	SS-1	8.5-10	A-2-4(0)	75	19.4	29	NP	NP	62.5	45.6	31.0	33.9	25.6	36.6	3.9
Creek bed	S-1	---	A-1-a	---	---	---	---	---	19.5	4.9	0.1	98.3	100.0	0.0	0.0

NOTES: \* SS = Split-spoon sample (ASTM D 1586)

Atterberg Limits Test Methods - AASHTO T 88-94 and T 90-94  
Grain Size Test Results Test Method - AASHTO T-88-93 and ASTM D 422



## SUMMARY OF LABORATORY ROCK TEST DATA

BRIDGE # 68 OVER PANTHER CREEK  
Graham County, NC  
NCDOT No. 6.503445 (B-3457)

Titan Project No. 62-20131

Boring #	Sample Depth (ft)	Rock Sample No.	Moisture Content (%)	Specimen Diameter (in)	Specimen Height (in)	Unit Weight (lb/ft <sup>3</sup> )	Loading Rate (lb/sec)	Test Results		
								Maximum Unconfined Compressive Strength (psi)	E <sub>s</sub> - Young's Modulus (psi)	Poisson's Ratio
EB1-A	10.0-10.4	RS-1	N/T	2.41	4.76	158.3	80	2,260	N/T	N/T
EB1-B	14.3-14.5	RS-2	0.9	2.39	2.67	158.9	---	3,522	N/T	N/T
B-1	20.1-20.4	RS-3	N/T	2.40	3.21	167.1	30	1,550	209,320	N/T
EB2-A	26.2-26.5	RS-4	N/T	2.37	4.01	145.4	50	770	N/T	N/T
EB2-B	20.1-20.3	RS-5	N/T	2.40	2.45	141.5	---	894	N/T	N/T

NOTES: N/T = NOT TESTED  
Unconfined Compressive Strength Method - ASTM D 2938-95 for RS-1, RS-3 and RS-4  
Point Load Test Method - ASTM D 5731-95 for RS-2 and RS-5 (Axial Test)  
Elastic Moduli Method - ASTM D 3148-96


**TITAN Atlantic Group**  
 Engineering, Construction and Consulting  
 5240 Green's Dairy Road  
 Raleigh, NC 27616





**TITAN** Atlantic Group  
Engineering, Construction and Consulting

5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211

SIEVE ANALYSIS (WASH 200)

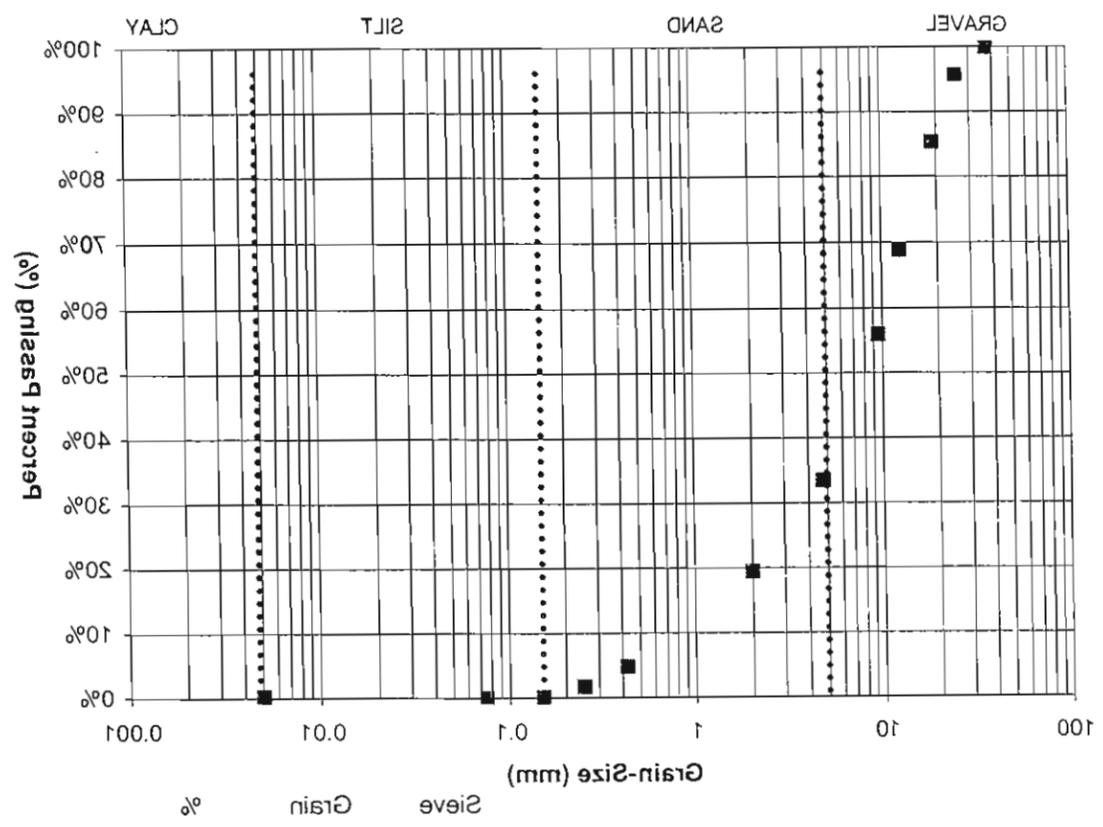
**Particle-Size Analysis Report**  
ASTM D 422 & D 4318

CLIENT: NCDOT TITAN JOB No.: 62-20131

PROJECT: Bridge # 68 over Panther Creek DATE: April 20, 2002

Sample No. Creek Grab Sample

Location: Creek Grab Sample Description: gravel and sand



5240 Green's Dairy Road  
Raleigh, NC 27616  
919-873-2211



**ASTM D 422**  
**SIEVE ANALYSIS (WASH 200)**

CLIENT: NCDOT

PROJECT: Bridge # 68 over Panther Creek

TITAN JOB No.: 62-20131

DATE: 04/25/2002 PERSONNEL: L. Clark

Sample No.: Boring No.: N/A

Depth: N/A Location: Grab Sample from Creek bed

Soil Description: rounded gravel and sand

- (1) Weight of total oven dried sample + Pan 3704.5 g
- (2) Tare weight of Pan 1012.9 g
- (3) Weight of total oven dried sample 2688.6 g
- (4) Weight of fraction retained on No. 270 Sieve (washed and oven-dried) 2688.6 g
- (5) Percentage of sample retained on No. 270 Sieve 99.7%
- (6) Percentage of sample passing No. 270 Sieve 0.3%

Sieve Size	mm	Weight Retained (g)	Weight Passed (g)	Total % Passed
No. 270	0.075	3.2	0.0	0.0%
No. 200	0.150	43.2	3.2	0.1%
No. 60	0.250	84.2	46.7	1.7%
No. 40	0.425	393.9	130.9	4.9%
No. 10	2.000	376.7	524.8	19.2%
No. 4	4.750	602.1	901.2	33.2%
3/8 inch	9.5	346.2	1506.6	56.0%
1/2 inch	19	443.3	1852.8	68.9%
3/4 inch	19	277.8	2298.1	85.4%
1 inch	114.7	114.7	2573.9	95.7%
1 1/2 inch	37.5	0.0	2688.6	100.0%