STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33483.1.1 (B-4130)	1	17

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33483.1.1 (B-4130) F.A. PROJ. BRZ-3045(2)

COUNTY GUILFORD

PROJECT DESCRIPTION BRIDGE NO. 228 ON -L- (SR 3045, MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK AT -L- STATION 21+95

INVENTORY

ID: B-4130

PROJECT: 33483.1.1

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CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE AUGUST 2006

NORTH CAROLINA LICENSED SEAL 1301 GEOLOGIST THOMAS P. MOOREFIELD 8-24-06

DRAWN BY: T.T. WALKER

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PROJECT REFERENCE NO.	SHEET NO.
33483.1.1 (B-4130)	2

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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		
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — 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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [■] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -NXWL_____
- [ ] -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 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 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: BL-6, -L- 20+76 61' LT

ELEVATION: 576.28 FT.

NOTES:

REVISED 02/23/06

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

August 24, 2006

STATE PROJECT: 33483.1.1 (B-4130)
FEDERAL PROJECT: BRZ-3045 (2)
COUNTY: Guilford

DESCRIPTION: Bridge No. 228 on –L– (SR 3045, Mount Hope Church Rd.) over Big Alamance Creek at -L- Sta. 21+95

SUBJECT: Geotechnical Report – Structure Inventory

Site Description

A two-span bridge with proposed deck of 6600 square feet, 100-foot long spans with a skew angle of 90°, is proposed on -L- over Big Alamance creek. This project is located in rural southeastern Guilford County on SR 3045, Mount Hope Church Rd. The new bridge will replace the existing bridge at a new location, approximately 50 feet downstream. Traffic will be maintained on the existing bridge during construction.

The subsurface investigation was conducted in July of 2006 using a CME-45 drill machine equipped with an automatic hammer. Six borings were advanced to crystalline rock using hollow stem augers and solid augers. A single boring (B1-B) was cored with N-casing and an NXWL core barrel. Representative soil samples were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit. Six rock core samples from boring B1-B were submitted to the Materials and Tests Unit for analysis.

Physiography and Geology

The structure is located in rolling terrain within the Piedmont Physiographic Province. The area is a developing rural community with a mixture of farms and housing developments. The site is within the Carolina Slate Belt and is underlain by meta-volcanic units and metamorphosed diorite intrusives. The rock units range in age from Late Proterozoic to Late Cambrian.

MAILING ADDRESS:
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LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

Soil Properties

Soils encountered at the project site include roadway embankment soils, alluvial sediments, and residual soils.

Roadway embankment soil of the existing bridge approach was encountered in boring EB1-A. The soil consisted of three feet of medium stiff, sandy silt (AASHTO classification of A-4).

Alluvial soil is present in the stream channel and the adjacent floodplain north of the stream (borings B1-A, B1-B, EB1-A, EB2-B, and EB2-C). The alluvial soils in the floodplain are 12 to 15 feet thick and consist of soft to medium stiff, sandy silt (A-4) and stiff, sandy silty clay (A-6). Three feet of loose alluvial sand (A-2-4) was encountered at the base of the alluvial soil at boring B1-B. Alluvial coarse sand (A-1-b) with cobble-size rocks occurs within the stream channel.

Residual soils are present at End Bent One, consisting of 6 to 10 feet of medium stiff to stiff, silty sandy clay (A-6), dense, silty sand (A-2-4), and hard, sandy silt (A-4).

Rock Properties

Weathered rock was encountered in borings EB1-B, B1-A, and EB2-A and is one to three feet in thickness. The weathered rock is derived from the underlying metadiorite bedrock.

Crystalline rock was encountered in all borings. The top of crystalline rock ranges in elevation from 555 feet at boring B1-A to 565 feet at boring EB1-A. Rock core was recovered from boring B1-B to evaluate rock type and competency. Core Recovery (REC) for the entire core boring ranged from 52% to 100% with an average of 76%, and Rock Quality Designation (RQD) ranged from 0% to 80% with an average of 40%. Six rock samples were submitted for testing to the Materials and Tests unit for compressive strength tests. More detailed descriptions of the rock core may be found in the Core Boring Report. Results of the rock strength tests are included on page 13 of this report.

Groundwater

Groundwater elevations measured in the Interior Bent borings and the End Bent Two borings ranged from approximately 564 feet to 568 feet at the time of the investigation. The surface water elevation of Big Alamance Creek was noted at elevation 561.7 feet in the Bridge Survey and Hydraulic Design Report. Groundwater was not encountered in the End Bent One borings.

Notice

This report is based on the bent locations provided in the memo "Verification of Bent Locations and Request for Foundation Recommendations" and the Preliminary General Drawing dated April 26, 2006 and the Bridge Survey and Hydraulic Design Report dated February 2, 2006. If significant changes are made in the design, or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

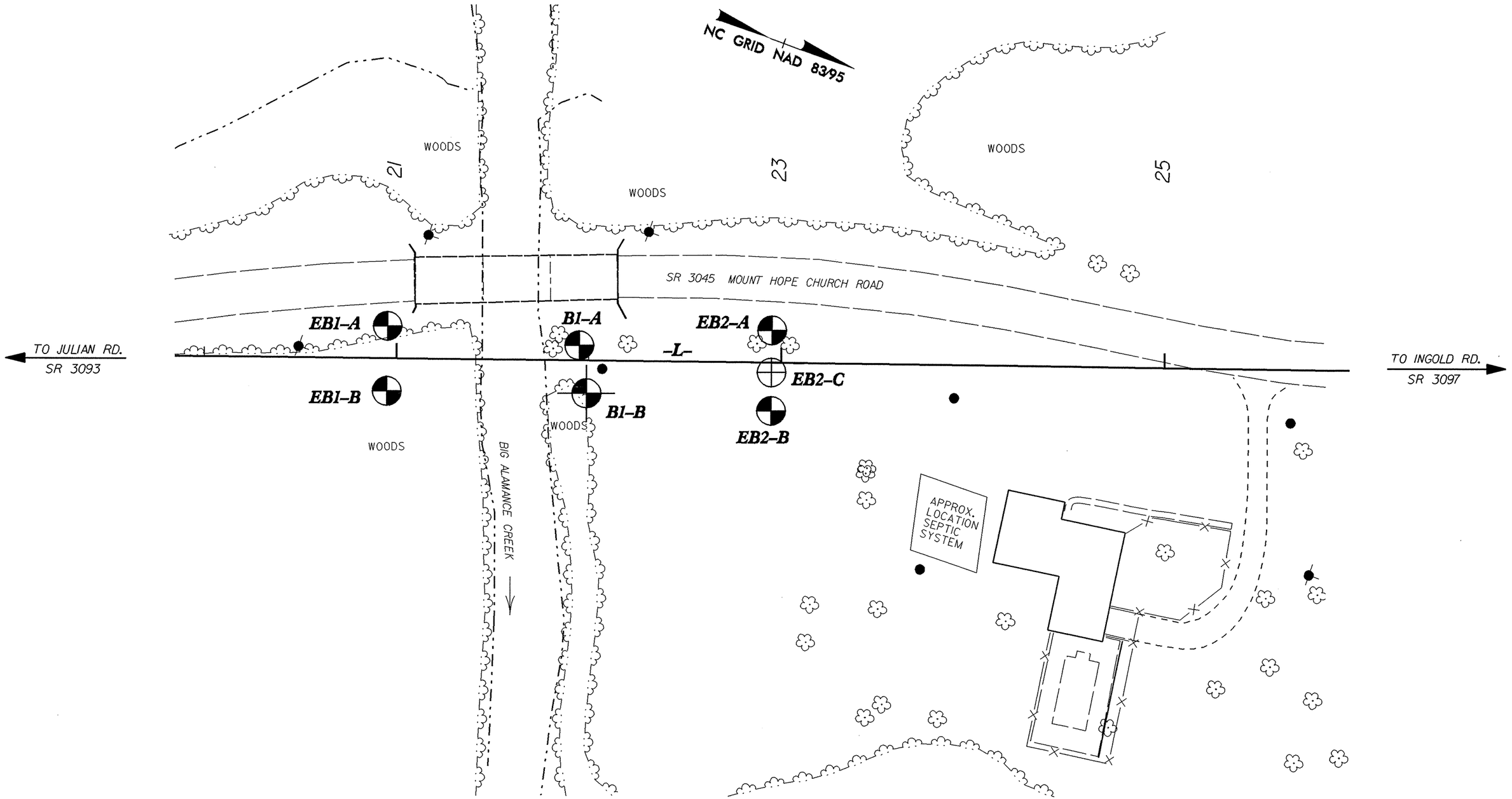
Thomas P. Moorefield, L.G.
Project Geological Engineer

PROJECT REFERENCE NO.	SHEET
33483.1.1(B-4130)	4

SITE PLAN

0 50 100

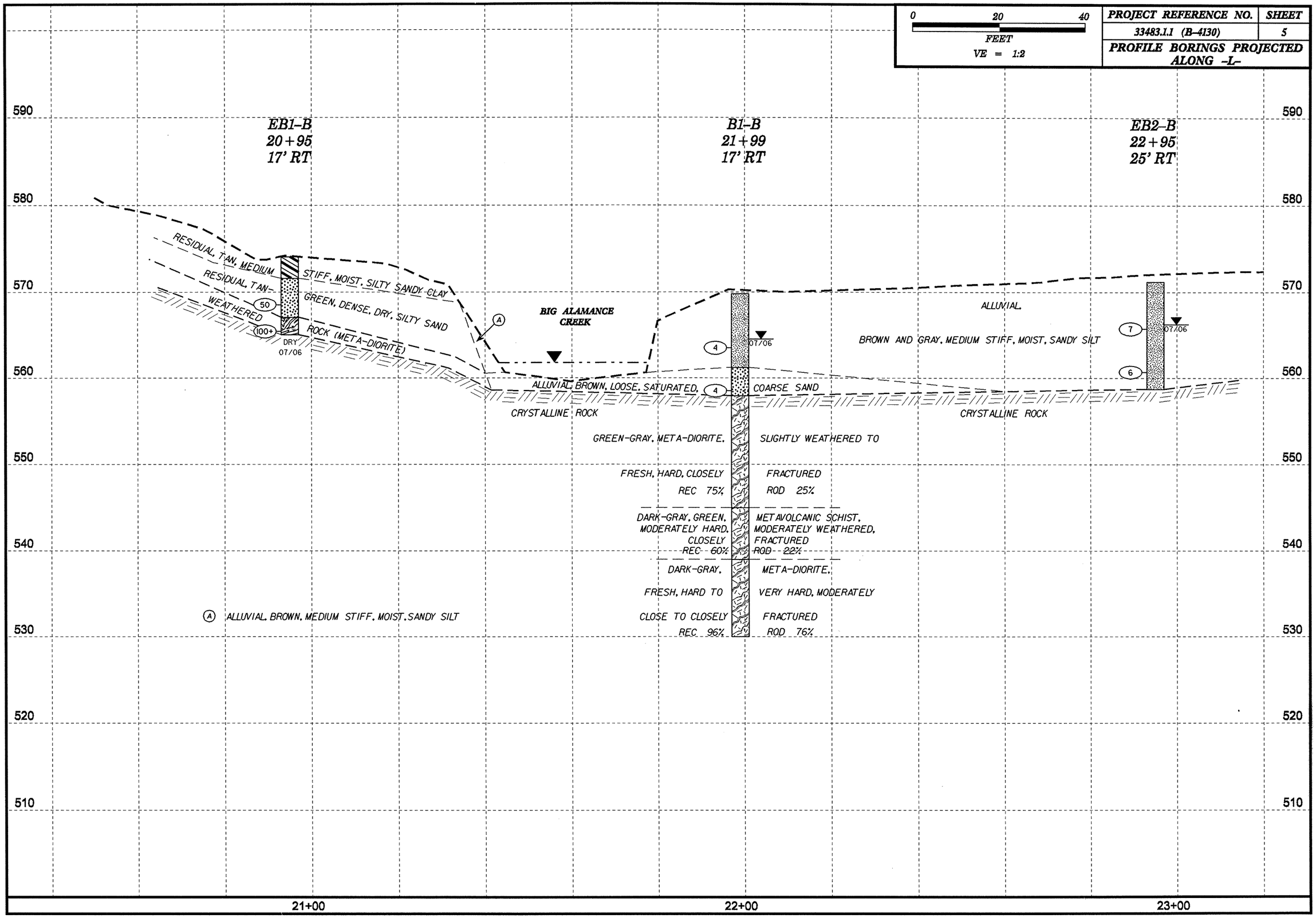
FEET



SKEW = 90°

0	20	40
FEET		
VE = 1:2		

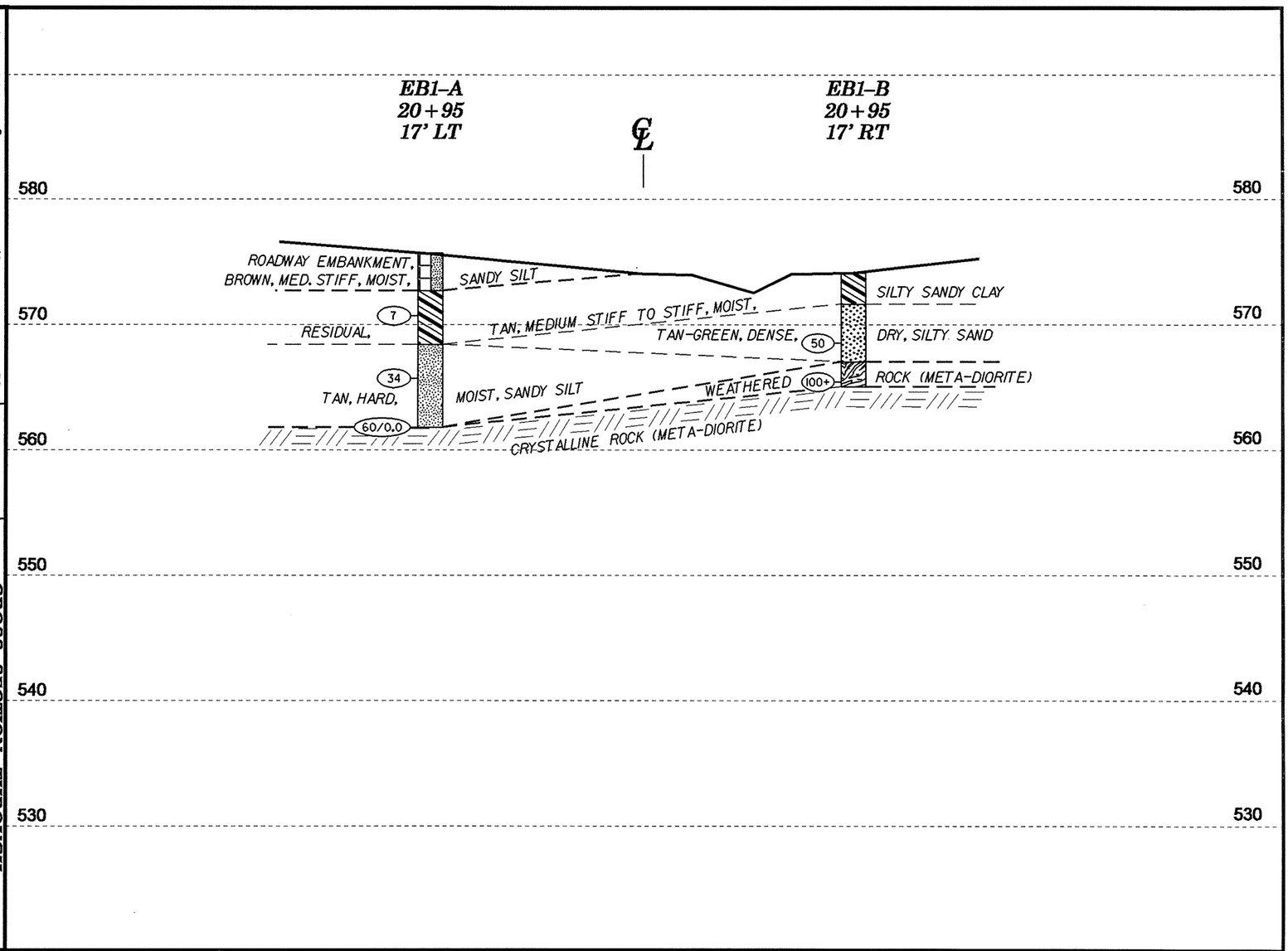
PROJECT REFERENCE NO.	SHEET
33483.1.1 (B-4130)	5
PROFILE BORINGS PROJECTED ALONG -L-	



HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

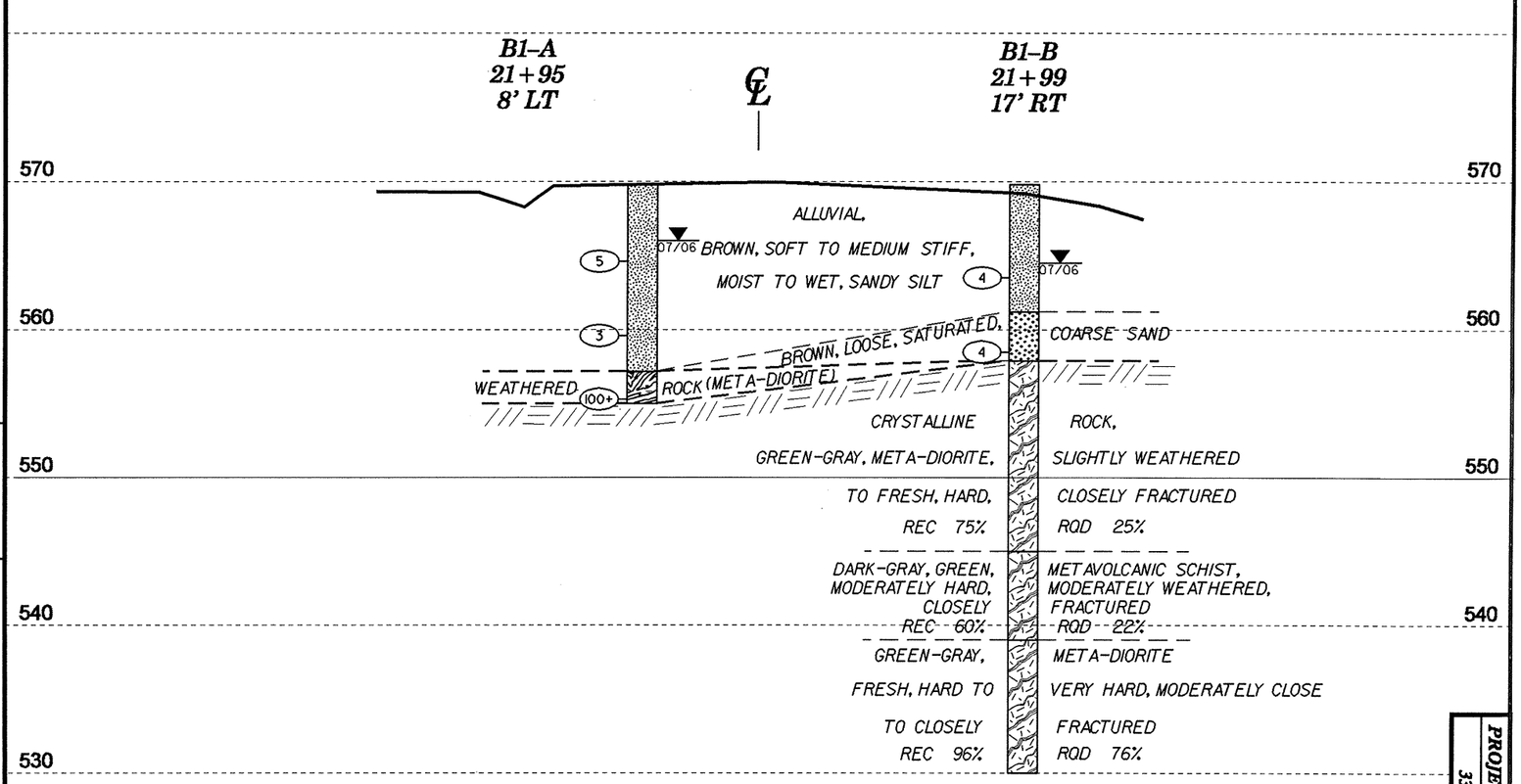
CROSS SECTION THROUGH END BENT 1



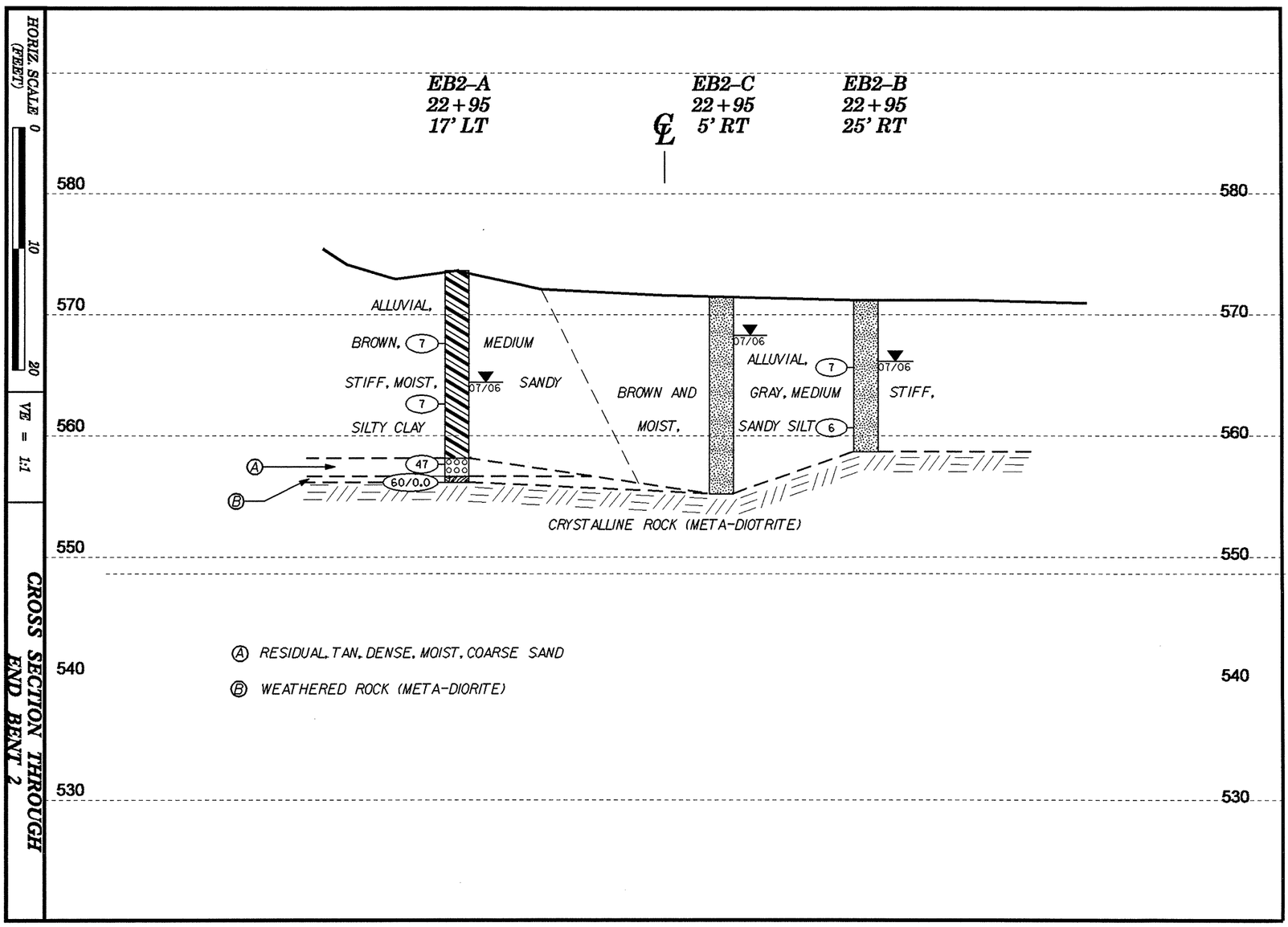
HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION THROUGH BENT 1



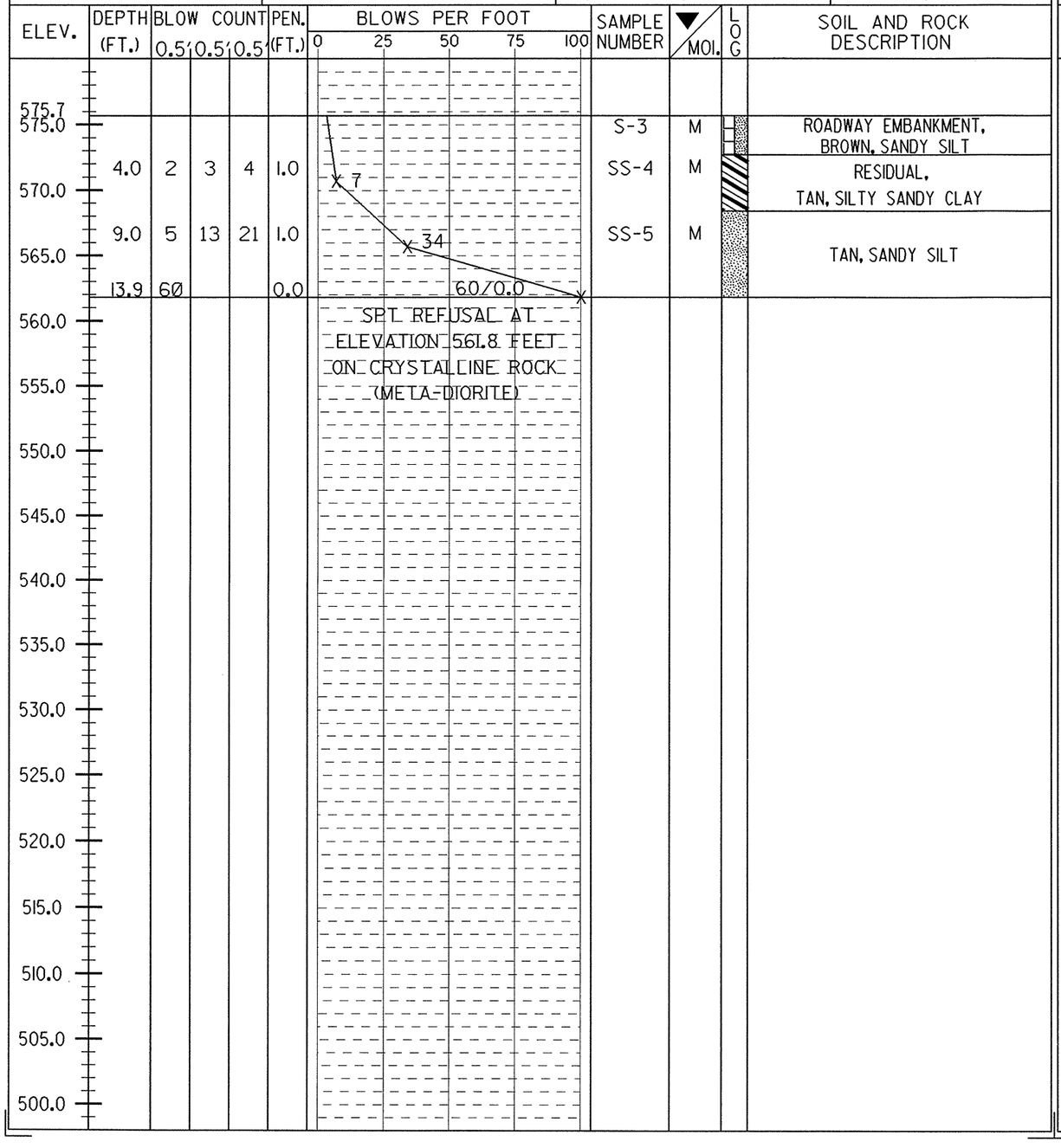
PROJECT REFERENCE NO.	SHEET
33483.1.1 (B-4130)	6



PROJECT REFERENCE NO.	SHEET
33483.1.1 (B-4130)	7

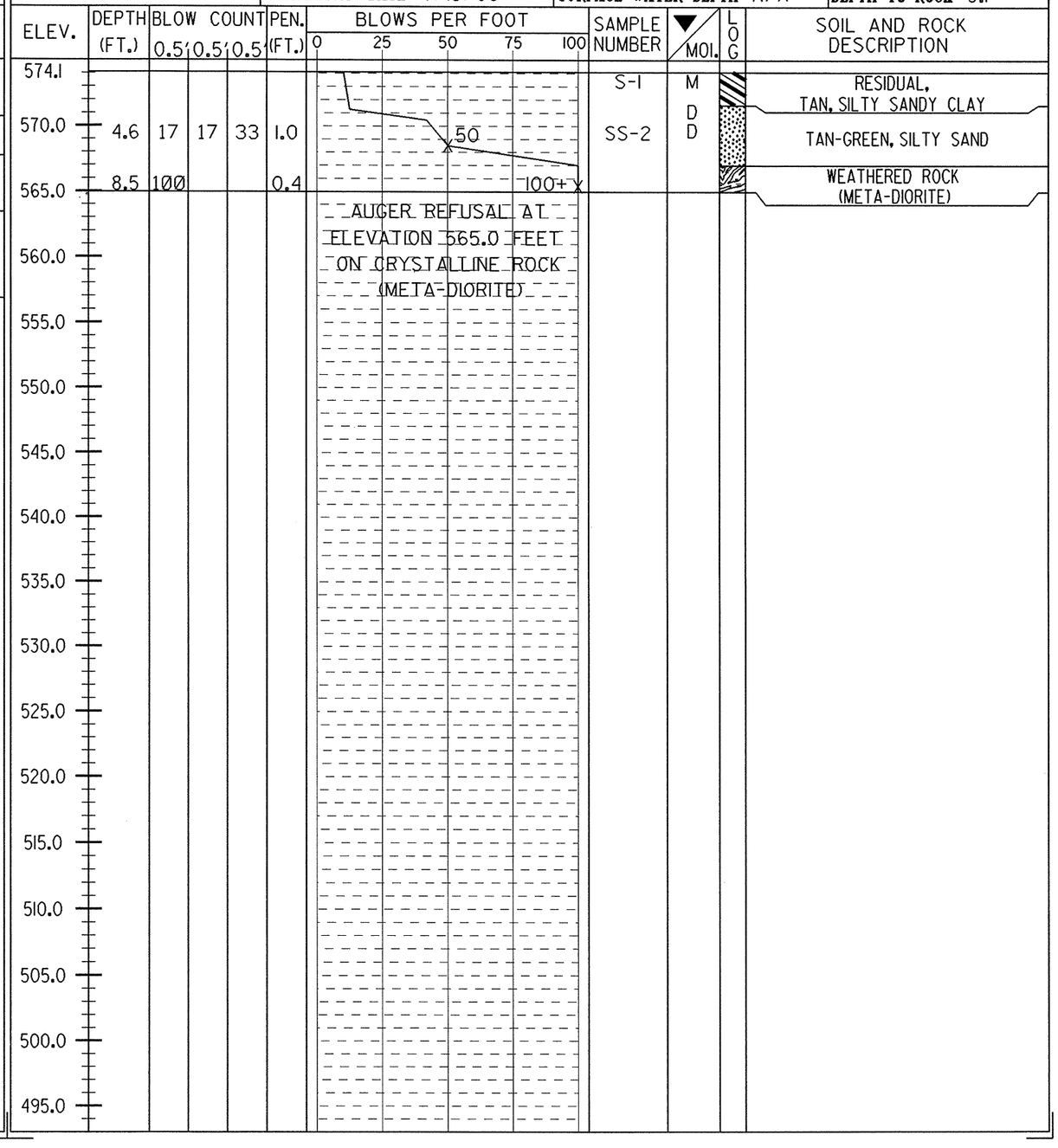
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33483.1.1	**ID.** B-4130	**COUNTY** GUILFORD	**GEOLOGIST** T.P. MOOREFIELD
SITE DESCRIPTION BRIDGE NO. 228 ON -L- (SR 3045 MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK			**GROUND WATER**
BORING NO. EBI-A	**BORING LOCATION** 20+95	**OFFSET** 17' LT	**ALIGNMENT** -L-
COLLAR ELEVATION 575.7'	**NORTHING** 824940'	**EASTING** 1815156'	**24 HR.** DRY
TOTAL DEPTH 13.9'	**DRILL MACHINE** CME-45	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC
START DATE 7/14/06	**COMPLETION DATE** 7/14/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 13.9'



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33483.1.1	**ID.** B-4130	**COUNTY** GUILFORD	**GEOLOGIST** T.P. MOOREFIELD
SITE DESCRIPTION BRIDGE NO. 228 ON -L- (SR 3045, MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK			**GROUND WATER**
BORING NO. EBI-B	**BORING LOCATION** 20+95	**OFFSET** 17' RT	**ALIGNMENT** -L-
COLLAR ELEVATION 574.1'	**NORTHING** 824951'	**EASTING** 1815189'	**24 HR.** DRY
TOTAL DEPTH 9.1'	**DRILL MACHINE** CME-45	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC
START DATE 7/13/06	**COMPLETION DATE** 7/13/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 9.1'



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33483.1.1	**ID.** B-4130	**COUNTY** GUILFORD	**GEOLOGIST** T.P. MOOREFIELD
SITE DESCRIPTION BRIDGE NO. 228 ON -L- (SR 3045, MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK			**GROUND WATER**
BORING NO. BI-A	**BORING LOCATION** 21+95	**OFFSET** 8' LT	**ALIGNMENT** -L-	**0 HR.** 10.0'
COLLAR ELEVATION 569.8'	**NORTHING** 825038'	**EASTING** 1815133'		**24 HR.** 3.8'
TOTAL DEPTH 14.8'	**DRILL MACHINE** CME-45	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC	
START DATE 7/21/06	**COMPLETION DATE** 7/21/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 14.8'	

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	▼ MOI.	LOG	SOIL AND ROCK DESCRIPTION
569.8										
565.0	4.2	3	2	3	1.0	X 5		▼		ALLUVIAL, BROWN, SANDY SILT
560.0	9.2	2	1	2	1.0	X 3	SS-15	W		
555.0	14.2	67	33		0.6	100+ X				WEATHERED ROCK (GREEN-GRAY, META-VOLCANIC)
550.0						AUGER REFUSAL AT ELEVATION 555.0 FEET ON CRYSTALLINE ROCK (META-DIORITE)				
545.0										
540.0										
535.0										
530.0										
525.0										
520.0										
515.0										
510.0										
505.0										
500.0										
495.0										
490.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33483.1.1	**ID.** B-4130	**COUNTY** GUILFORD	**GEOLOGIST** T.P. MOOREFIELD
SITE DESCRIPTION BRIDGE NO. 228 ON -L- (SR 3045, MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK			**GROUND WATER**
BORING NO. BI-B	**BORING LOCATION** 21+99	**OFFSET** 17' RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEVATION 569.8'	**NORTHING** 825049'	**EASTING** 1815155'		**24 HR.** 5.3'
TOTAL DEPTH 39.8'	**DRILL MACHINE** CME-45	**DRILL METHOD** H.S. AUGERS/CORE	**HAMMER TYPE** AUTOMATIC
START DATE 7/19/06	**COMPLETION DATE** 7/19/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 11.9'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
569.8								M		ALLUVIAL,
565.0	5.3	1	2	2	1.0	X 4	SS-13	M		BROWN, SANDY SILT
560.0	10.3	1	1	3	1.0	X 4	SS-14	S		BROWN, COARSE SAND
555.0							RS-1			CRYSTALLINE ROCK GREEN-GRAY, META-DIORITE, SLIGHTLY WEATHERED TO FRESH, HARD, CLOSELY FRACTURED REC 75% RQD 25%
550.0							RS-2			
545.0							RS-3			DARK-GRAY, GREEN, METAVOLCANIC SCHIST, MODERATELY HARD, MODERATELY WEATHERED, CLOSELY FRACTURED REC 60% RQD 22%
540.0							RS-4			
535.0							RS-5			GRAY-GREEN, META-DIORITE, FRESH, HARD TO VERY HARD, MODERATELY CLOSE TO CLOSELY FRACTURED REC 96% RQD 76%
530.0							RS-6			
525.0						CORING TERMINATED AT ELEVATION 530.0 FEET IN CRYSTALLINE ROCK (META-DIORITE)				NOTE: CASING SET AT DEPTH OF 13.0', 1.1' BELOW THE TOP OF CRYSTALLINE ROCK
520.0										
515.0										
510.0										
505.0										
500.0										
495.0										
490.0										

CORE BORING REPORT

PROJECT: 33483.1.1 ID: B-4130 COUNTY: Guilford BORING NO: B1-B

DESCRIPTION: Bridge No. 228 on -L- (SR 3045, Mount Hope Church Rd.) over Big Alamance Ck.

LOCATION OF BORING: -L- Sta. 21+99, 17' RT COMPLETION DATE: 7/20/06

COLLAR or GROUND ELEVATION: 569.8 ft CORE SIZE: NXWL GEOLOGIST: T. P. Moorefield

CORE EQUIPMENT: CME-45, Casing with advancer DRILLER: D. W. Dixon

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
556.8	13.0	1:30					Crystalline rock, green-gray, slightly weathered, hard, closely fractured. Metadiorite.
		1:00/0.8		1.3	0.0		Joint surfaces iron-stained.
			1.8				3 joints@ 30 to 40 degrees.
				(72%)	(0%)		2 joints@ 60 degrees.
555.0	14.8						
555.0	14.8	2:30				RS-1	Crystalline rock, green-gray, fresh, hard, closely fractured. Metadiorite.
		3:00		4.6	2.1	15.9-16.5'	Slight manganese staining on joint surfaces.
		3:00	5.0				2 joints@ 60 degrees.
		3:30		(92%)	(42%)		1 joint @ 30 degrees.
550.0	19.8	4:48					5 joints @ 0 to 5 degrees.
550.0	19.8	2:00				RS-2	Crystalline rock, green-gray, fresh, hard, closely fractured. Metadiorite.
		2:12		2.9	0.9	21.0-21.5'	Joint surfaces sli.weathered. Soil seam 23.8 to 24.3'.
		2:06	5.0				3 joints@ 30 degrees.
		2:00		(58%)	(18%)		2 quartz-filled joints @ 60 degrees.
545.0	24.8	1:48					
545.0	24.8	1:30				RS-3	Crystalline rock, dark gray-green, moderately weathered, moderately hard, closely fractured.
		1:42		2.6	0.9	24.8-25.3'	Metavolcanic schist. Vuggy. Soapstone-like texture.
		1:48	5.0				2 joints@ 30 degrees.
		2:00		(52%)	(18%)		
540.0	29.8	2:06					
540.0	29.8	2:06				RS-4	29.8 to 30.8' Crystalline rock, dark green-gray,moderately weathered, moderately hard, closely fractured.
		2:00		5.0	4.0	29.8-30.2'	Metavolcanic schist. Soapstone-like texture.
		2:30	5.0				30.8 to 34.8' Crystalline rock, gray, fresh, very hard. Moderately close fracture spacing. Metadiorite.
		2:24		(100%)	(80%)	RS-5	2 joints@ 60 degrees.
535.0	34.8	2:00				33.5-34.0'	
535.0	34.8	2:18				RS-6	Crystalline rock, green-gray, fresh, hard, close fracture spacing. Metadiorite.
		2:24		4.6	3.2	37.5-38.1'	Quartz vein, 35.0 to 35.2'
		2:00	5.0				2 joints@ 60 degrees.
		2:36		(92%)	(64%)		
530.0	39.8	2:42					
							BOREHOLE TERMINATED AT ELEVATION OF 530.0 FEET, IN CRYSTALLINE ROCK.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33483.1.1	**ID.** B-4130	**COUNTY** GUILFORD	**GEOLOGIST** T.P. MOOREFIELD
SITE DESCRIPTION BRIDGE NO. 228 ON -L- (SR 3045, MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK			**GROUND WATER**
BORING NO. EB2-A	**BORING LOCATION** 22+95	**OFFSET** 17' LT	**ALIGNMENT** -L-	**0 HR.** DRY
COLLAR ELEVATION 573.6'	**NORTHING** 825129'	**EASTING** 1815092'		**24 HR.** 9.2'
TOTAL DEPTH 17.5'	**DRILL MACHINE** CME-45	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC	
START DATE 7/17/06	**COMPLETION DATE** 7/17/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 17.5'	

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
573.6							S-6	M		
570.0	5.0	2	3	4	1.0		SS-7	M		ALLUVIAL, BROWN, SANDY SILTY CLAY
565.0	10.0	3	3	4	1.0		SS-8	M		
560.0	15.0	10	29	18	1.0	60/0.0	SS-9	M		
	17.5	60			0.0					RESIDUAL, TAN, COARSE SAND WEATHERED ROCK
555.0						SPT REFUSAL AT ELEVATION 556.1 FEET ON CRYSTALLINE ROCK (META-DIORITE)				
550.0										
545.0										
540.0										
535.0										
530.0										
525.0										
520.0										
515.0										
510.0										
505.0										
500.0										
495.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33483.1.1	**ID.** B-4130	**COUNTY** GUILFORD	**GEOLOGIST** T.P. MOOREFIELD
SITE DESCRIPTION BRIDGE NO. 228 ON -L- (SR 3045, MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK			**GROUND WATER**
BORING NO. EB2-C	**BORING LOCATION** 22+95	**OFFSET** 5' RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEVATION 571.5'	**NORTHING** 825137'	**EASTING** 1815113'		**24 HR.** 3.2'
TOTAL DEPTH 16.3'	**DRILL MACHINE** CME-45	**DRILL METHOD** SOLID AUGERS	**HAMMER TYPE** AUTOMATIC	
START DATE 7/21/06	**COMPLETION DATE** 7/21/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 16.3'	

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
571.5										
570.0										ALLUVIAL, BROWN, SANDY SILT
565.0										
560.0										
555.0						AUGER REFUSAL AT ELEVATION 555.2 FEET ON CRYSTALLINE ROCK (META-DIORITE)				
550.0										
545.0										
540.0										
535.0										
530.0										
525.0										
520.0										
515.0										
510.0										
505.0										
500.0										
495.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33483.1.1	**ID.** B-4130	**COUNTY** GUILFORD	**GEOLOGIST** T.P. MOOREFIELD
SITE DESCRIPTION BRIDGE NO. 228 ON -L- (SR 3045, MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK			**GROUND WATER**
BORING NO. EB2-B	**BORING LOCATION** 22+95	**OFFSET** 25' RT	**ALIGNMENT** -L- — **0 HR.** 5.3'
COLLAR ELEVATION 571.2'	**NORTHING** 825143'	**EASTING** 1815132'	**24 HR.** 5.0'
TOTAL DEPTH 12.5'	**DRILL MACHINE** CME-45	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC
START DATE 7/17/06	**COMPLETION DATE** 7/17/06	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 12.5'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	▼/MOI.	LOG	SOIL AND ROCK DESCRIPTION
571.2										
570.0							S-10	M		ALLUVIAL, BROWN AND GRAY, SANDY SILT
	4.5	2	3	4	1.0	7	SS-11	▼		
565.0										
	9.5	3	3	3	1.0	6	SS-12	M		
560.0										
						AUGER REFUSAL AT ELEVATION 558.7 FEET ON CRYSTALLINE ROCK (META-DIORITE)				
555.0										
550.0										
545.0										
540.0										
535.0										
530.0										
525.0										
520.0										
515.0										
510.0										
505.0										
500.0										
495.0										

PROJ. # -33481.1.1
ID NO. -B-4130
COUNTY - GUILFORD

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-3	17' RT	20+95	0.0-3.0	A-4(1)	26	7	21.3	26.6	29.7	22.3	92	78	54	-	-
SS-4	17' LT	20+95	4.0-5.5	A-6(4)	30	11	19.5	29.8	28.3	22.3	96	85	56	-	-
SS-5	17' LT	20+95	9.0-10.5	A-4(1)	32	4	19.9	33.7	36.2	10.2	94	83	53	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-1	17' RT	20+95	0.0-2.5	A-6(5)	33	12	14.8	26.2	30.6	28.4	91	82	62	-	-
SS-2	17' RT	20+95	4.6-6.1	A-2-4(0)	24	NP	29.6	35.3	23.9	11.2	75	60	33	-	-

B1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-15	8' LT	21+95	9.2-10.7	A-4(1)	24	6	7.3	41.8	26.5	24.4	100	99	59	-	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-13	17' RT	21+99	5.3-6.8	A-4(0)	20	NP	10.4	57.9	19.6	12.2	100	99	41	-	-
SS-14	17' RT	21+99	10.3-11.8	A-2-4(0)	28	NP	52.2	33.7	9.0	5.1	98	68	17	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-6	17' LT	22+95	0.0-3.0	A-6(7)	31	13	8.1	28.6	30.8	32.5	96	92	68	-	-
SS-7	17' LT	22+95	5.0-6.5	A-6(8)	34	15	8.3	32.3	28.9	30.5	97	93	67	-	-
SS-8	17' LT	22+95	10.0-11.5	A-6(6)	32	12	5.3	38.4	27.9	28.4	100	98	67	-	-
SS-9	17' LT	22+95	15.5-16.5	A-1-b(0)	26	2	52.8	24.0	17.2	6.1	62	36	17	-	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-10	25' RT	22+95	0.0-4.5	A-4(1)	22	4	7.5	31.1	37.1	24.4	98	94	69	-	-
SS-11	25' RT	22+95	4.5-6.0	A-4(6)	28	10	3.9	25.4	40.3	30.5	98	96	77	-	-
SS-12	25' RT	22+95	9.5-11.0	A-4(2)	24	8	9.3	45.3	21.0	24.4	100	98	55	-	-

B1-B

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	BORING NO.	DEPTH INTERVAL	UNIT WT. LB/FT3	UNCONFINED COMPRESSIVE STRENGTH KSI	SEC MOD @ 40% MPSI
RS-1	17' RT	21+99	B1-B	15.9-16.5	190.6	8.93	8.65
RS-2	17' RT	21+99	B1-B	21.0-21.5	188.7	7.74	7.08
RS-3	17' RT	21+99	B1-B	24.8-25.3	154.0	1.31	0.30
RS-4	17' RT	21+99	B1-B	29.8-30.2	N/A	N/A	N/A
RS-5	17' RT	21+99	B1-B	33.5-34.0	187.3	6.02	13.03
RS-6	17' RT	21+99	B1-B	37.5-38.1	192.7	8.81	12.41

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33483.1.1 TIP: B-4130 COUNTY: Guilford

DESCRIPTION(1): Bridge No. 228 On -L- (SR 3045, Mt. Hope Church Rd.) over Big Alamance Creek

EXISTING BRIDGE

Information from: Field Inspection X Microfilm ____ (reel ____ pos: ____)
Other (explain) Bridge Survey & Hydaulic Design Report

Bridge No.: 228 Length: 105' Total Bents: 4 Bents in Channel: 1 Bents in Floodplain: 1
Foundation Type: Timber Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: 0.5' of scour around bent one piles.

Channel Bed: None

Channel Bank: None

EXISTING SCOUR PROTECTION

Type(3): Concrete reinforcement poured around upstream and downstream piles of interior bent one

Extent(4): 2' X 2' approximately

Effectiveness(5): Effective

Obstructions(6): None

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 (A-2-4), gravel, and cobble-sized rocks.
Sample S-16

Channel Bank Material(8): Sand

Channel Bank Cover(9): Grass and weeds at proposed bridge, trees upstream and downstream.

Floodplain Width(10): ____

Floodplain Cover(11): Grass and weeds at proposed bridge, trees upstream and downstream.

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

Channel Migration Tendency(13): None

Observations and Other Comments: ____

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS 1
565.6

Comparison of DSE to Hydraulics Unit theoretical scour:
The DSE agrees with the Hydraulic Unit's theoretical scour elevation of 565.6 feet.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

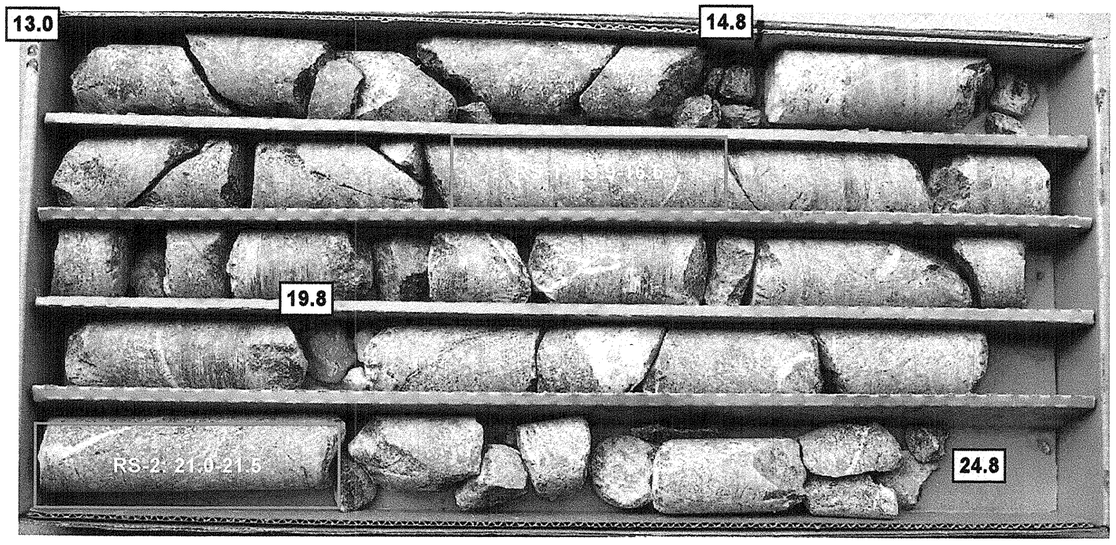
Bed or Bank	Bed
Sample No.	S-16
Retained #4	4
Passed #10	73
Passed #40	20
Passed #200	4
Coarse Sand	86.6
Fine Sand	8.9
Silt	1.4
Clay	3
LL	30
PI	NP
AASHTO	A-1-b(0)
Station	Stream
Offset	Channel
Depth	0.0-1.0

Template Revised 02/07/06

Reported by: T. P. Moorefield **Date:** 7/13/2006
T. P. Moorefield

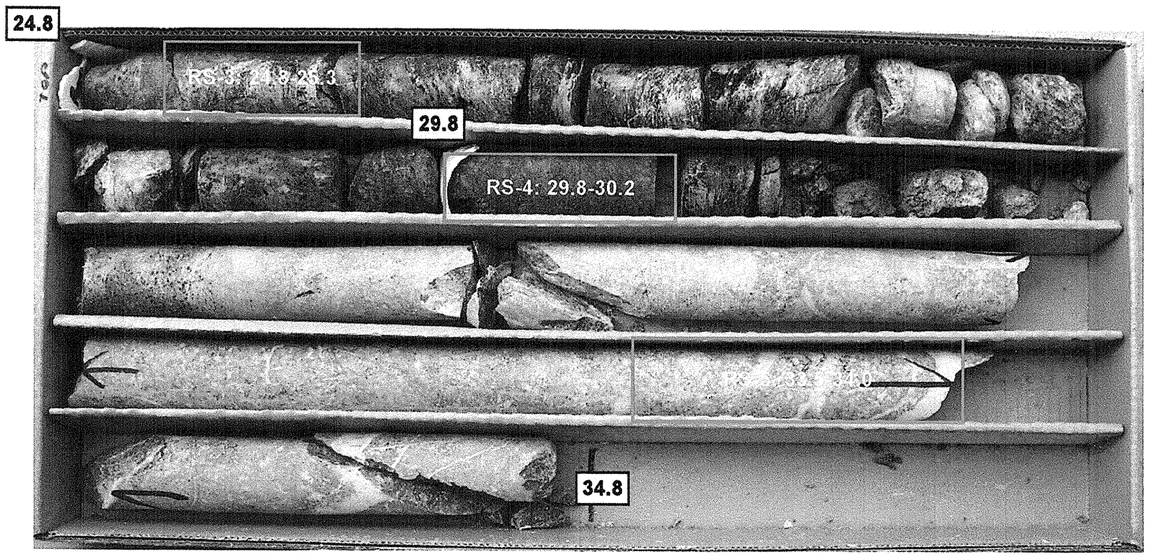
CORE PHOTOGRAPHS

B1-B
BOX 1: 13.0 - 24.8 FEET



0 1 2
FEET

B1-B
BOX 2: 24.8 - 34.8 FEET

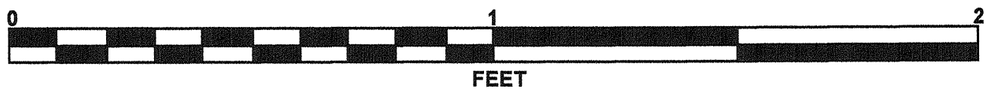


0 1 2
FEET

CORE PHOTOGRAPHS

B1-B

BOX 3: 34.8 - 39.8 FEET



SITE PHOTOGRAPH

BRIDGE NO. 228 ON -L- (SR 3045, MT. HOPE CHURCH RD.) OVER BIG ALAMANCE CREEK

LOOKING WEST