ID: B-3337

CONTRACT:

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33000.1.1 (B-3337)	1	15
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
	BRSTP-1001(18)	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33000.1.1 I.D. NO. B-3337

F.A. PROJECT BRSTP-1001(18)

COUNTY GUILFORD

PROJECT DESCRIPTION BRIDGE NO. 527 ON -L- (SR 1001) OVER NORTH BUFFALO CREEK AT STATION 21+01.5

INVENTORY

CONTENTS:

CAUTION NOTICE

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

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

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

INVESTIGATED BY T.P. MOOREFIELD PERSONNEL N.D. MOHS

CHECKED BY N.T. ROBERSON H.R. CONLEY

SUBMITTED BY N.T. ROBERSON W.N. CHERRY

DATE DECEMBER 2005 M.L. REEDER

DRAWN BY: T.T. WALKER & N.D. MOHS

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

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

NORTH CAROLINA LICENSED SEAL 1301 GEOLOGIST THOMAS P. MOOREFIELD 12-9-05

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3337	33000.1.1	2	15

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, 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:

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT (PLASTIC RANGE (PI))		
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
	- 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, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

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

ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -NXWL___
- [ ] -H_____

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: BM #2 AT -BL- STA. 16+89, 60' LT

ELEVATION: 738.5'

NOTES:

REVISED 09/15/00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

December 14, 2005

STATE PROJECT: 33000.1.1 (B-3337)
F.A. PROJECT: BRSTP-1001(18)
COUNTY: Guilford
DESCRIPTION: Bridge No. 527 on -L- (SR 1001) over North Buffalo Creek at Station 21+01.5

SUBJECT: Geotechnical Report – Structure Inventory

Project Description

A three-span bridge, 127-feet in length with a 70° skew, is proposed at the same location on -L- (SR 1001) over North Buffalo Creek to replace the existing structure. The new bridge is 78 feet and will be 14 feet longer than the existing structure. The project is located in Guilford County within the city limits of Greensboro. A USGS Stream Gauging Station is located on North Buffalo Creek near End Bent One. A bridge for the Norfolk-Southern Railroad is located approximately 1000 feet downstream.

The subsurface investigation was conducted during October of 2005 using an ATV-mounted CME-550 drill machine. Two Standard Penetration Test borings were performed at each of the three bent locations. Borings B1-A and B1-B were cored using NXWL core equipment. All borings were advanced until crystalline rock was encountered. Representative soil samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis. Six rock core samples were submitted to the Materials and Tests Unit to determine Unit Weight and Compressive Strength.

Physiography and Geology

The project is located in rolling hill terrain of the Piedmont Physiographic province. The project area is urban, with businesses and a fire station nearby. The area along North Buffalo Creek is grassy. Geologically, the project is located within the Carolina Slate Belt, and is underlain by metamorphosed gabbro and diorite.

Soil Properties

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

Roadway embankment was encountered at both end bent locations. Embankment soils are from 7.0 to 9.7 feet thick, and are composed of orange to red-brown, medium stiff, moist, sandy, silty clay (A-7-6).

Alluvial soils were encountered at all boring locations. The alluvial soils range from 4.1 to 17.2 feet in thickness. These soils predominantly consist of gray, soft to medium stiff, moist to saturated, sandy silt (A-4) and orange to brown-gray, very loose to loose, dry to saturated, silty sand (A-2-4). Other alluvial soils present are gray-brown, soft, moist to wet, silty, sandy clay (A-6). The alluvial soils were deposited on residual soil and weathered rock.

Residual soils were encountered at all boring locations except for EB1-A and range from 1.2 to 8.5 feet in thickness. The residual soils consist of gray to black, dense to very dense, moist to wet, silty sand (A-2-4), and orange-brown, very stiff, silty, sandy clay (A-7-6). The residual soils are underlain by weathered and/or crystalline rock.

Rock Properties

Weathered rock was derived from the underlying bedrock (metadiorite), and ranges in thickness from 0.4 to 2.7 feet. Weathered rock was encountered in borings EB1-A and EB2-A. The top of weathered rock ranges in elevation from 710.4 feet at EB1-A to 713.6 feet at EB2-B.

Crystalline rock was encountered at each boring location. The most abundant rock type is metadiorite, with 4.1 feet of metagabbro being recovered in boring B1-A. The top of crystalline rock ranges in elevation from 708.2 feet at EB1-B to 712.6 feet at EB2-A. Core recovery ranged from 56% to 100%, with an average of 95%. Rock Quality Designation (RQD) ranges from 56% to 98%, with an average of 80%. Ultimate compressive strength of the metadiorite ranged from 11.3 to 34.5 ksi. RS-4 did not break, and was retested to 20.9 ksi. More detailed rock descriptions can be found in the Core Boring Reports.

Groundwater

Groundwater was present in all of the borings. The groundwater elevations ranged from 718.7 feet at EB1-A to 723.4 feet at EB2-B. Surface water in North Buffalo Creek was measured at elevation 720.2 feet in August, 2004.

Notice

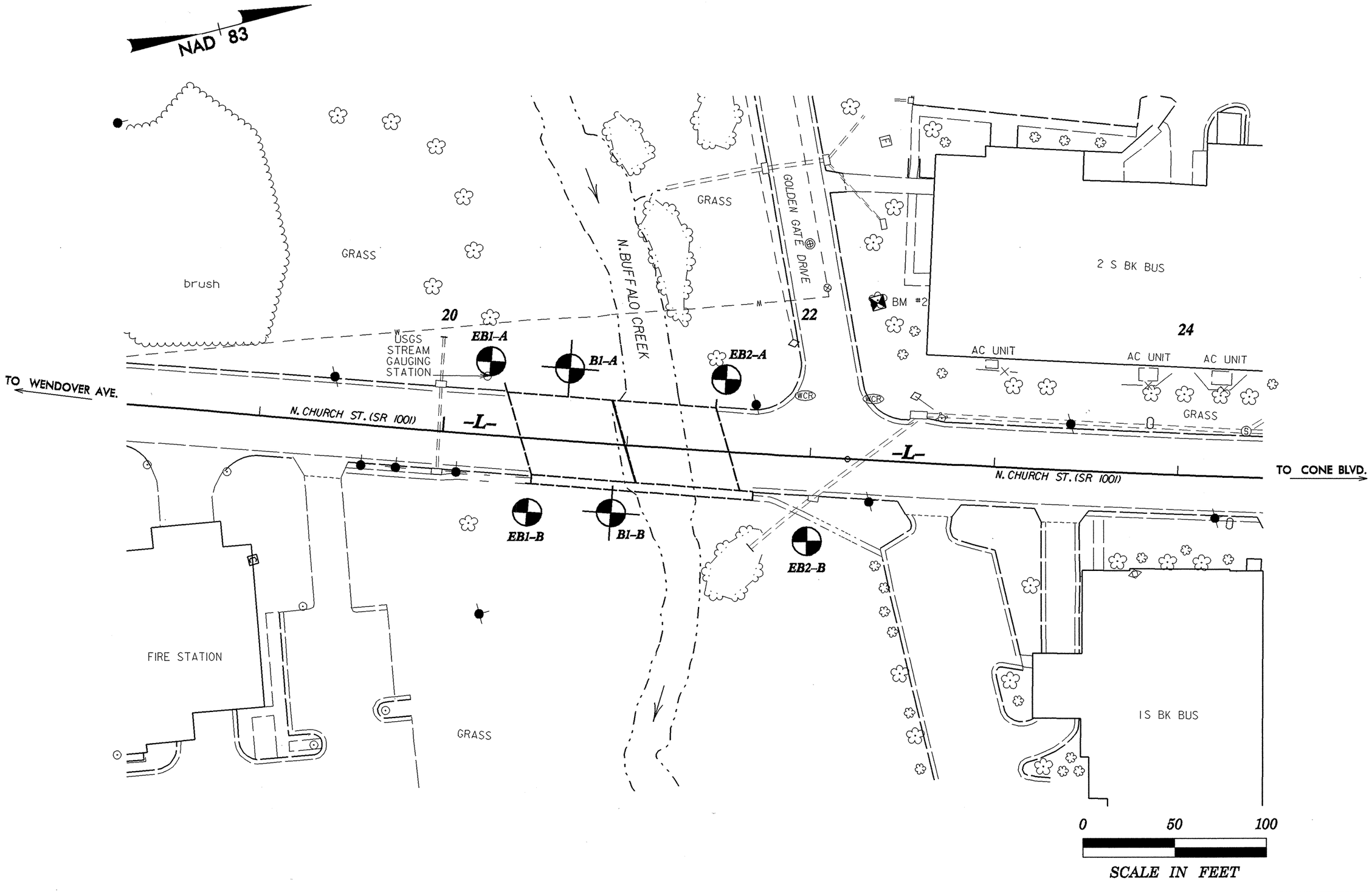
This Geotechnical foundation report is based on the Bridge Survey and Hydraulic Report for North Buffalo Creek dated March 30, 2005 and the Preliminary General Drawing dated August 2005. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

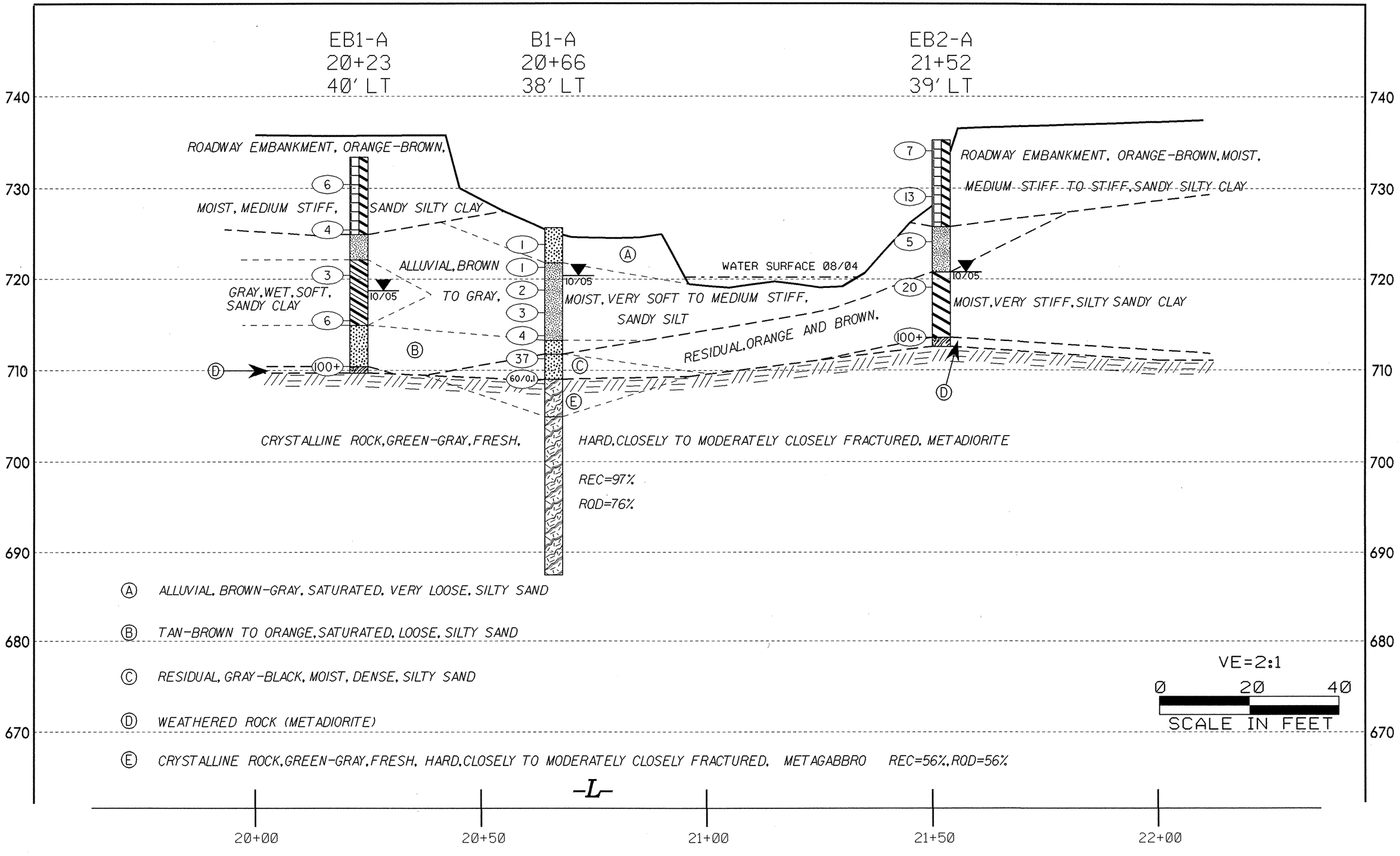
Nathan Mohs
Transportation Engineering Geologist

PROJECT REF. NO.	SHEET NO.	TOTAL SHEETS
33000.1.1	4	15

TEST SITE PLAN

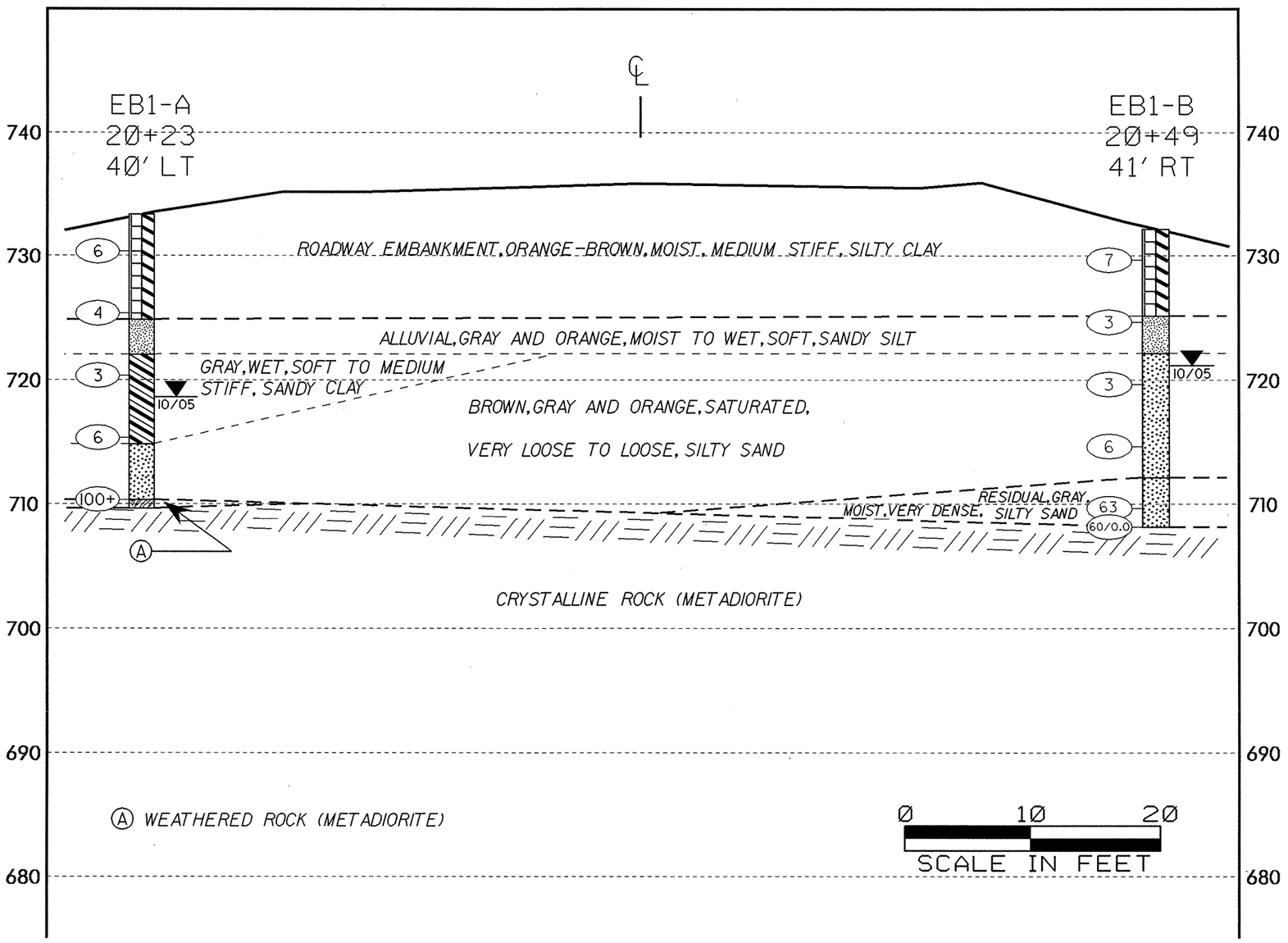


PROFILE THROUGH BORINGS PROJECTED ALONG -L-



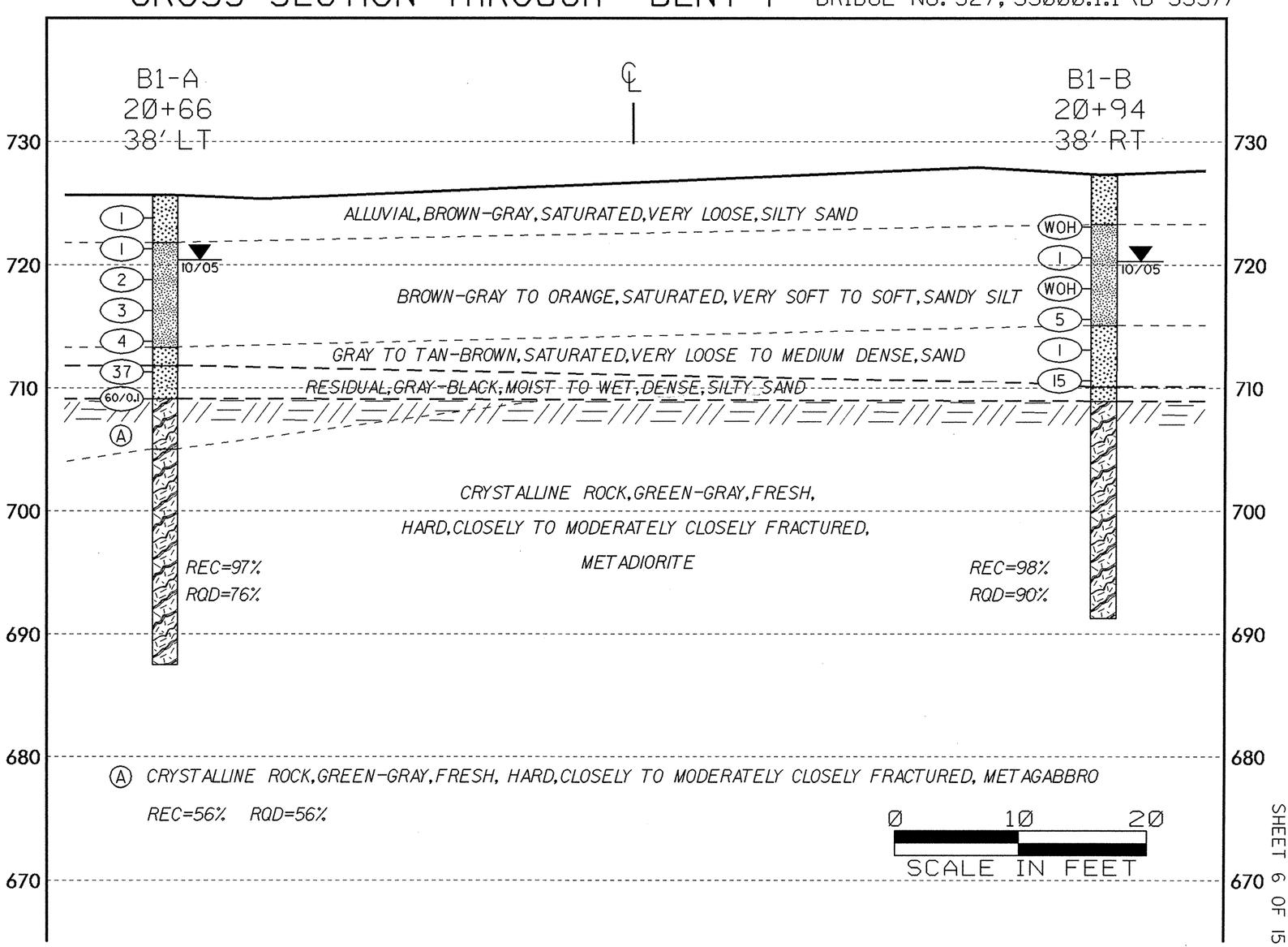
CROSS SECTION THROUGH END BENT 1

BRIDGE NO. 527, 33000.1.1 (B-3337)



CROSS SECTION THROUGH BENT 1

BRIDGE NO. 527, 33000.1.1 (B-3337)



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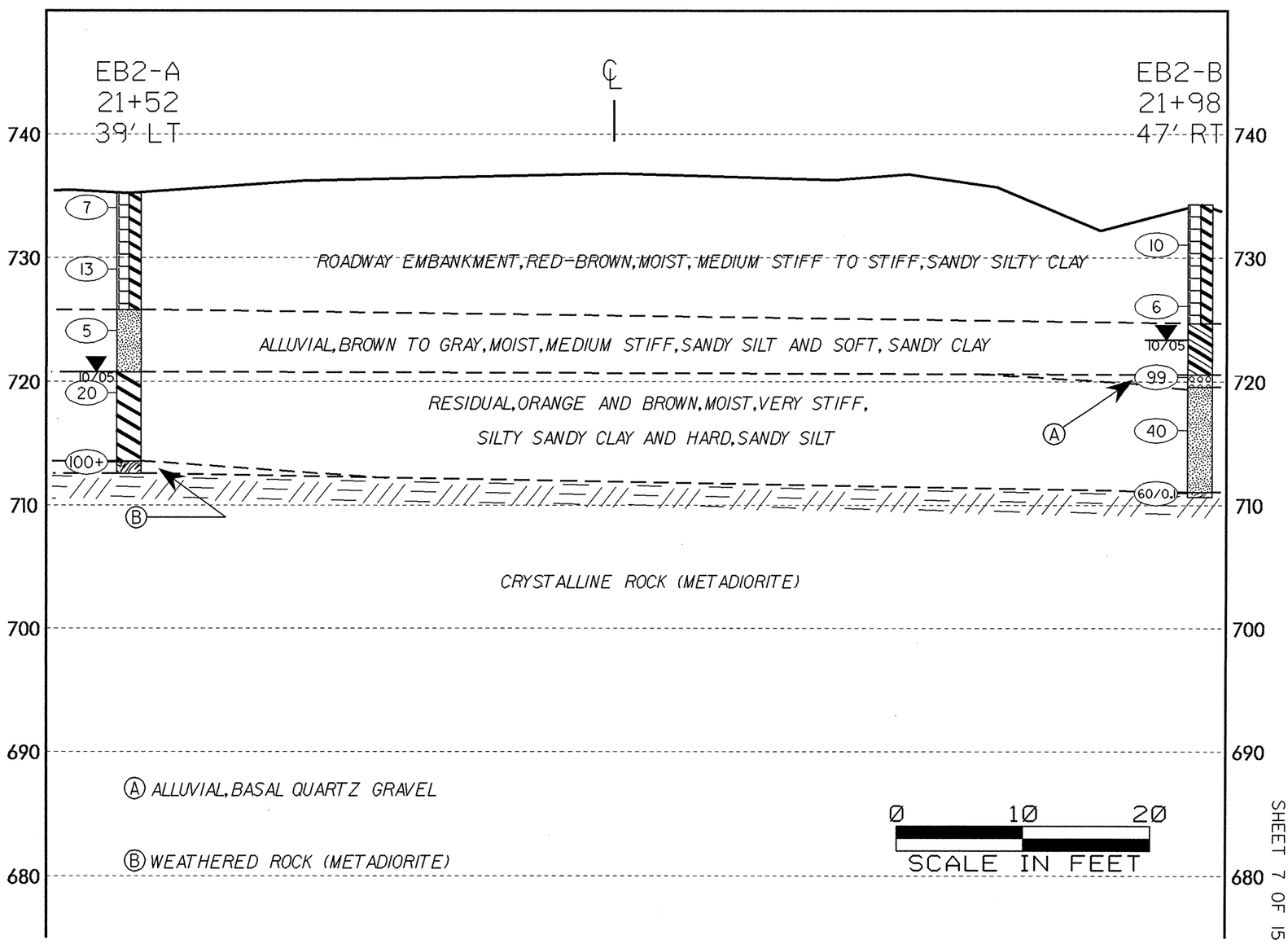


NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33000.1.1	**ID.** B-3337	**COUNTY** GUILFORD	**GEOLOGIST** N. D. MOHS
SITE DESCRIPTION BRIDGE NO. 527 ON SR 1001 OVER NORTH BUFFALO CREEK			**GROUND WATER**
BORING NO. EBI-A	**BORING LOCATION** 20+23	**OFFSET** 40' LT	**ALIGNMENT** -L-
COLLAR ELEVATION 733.4'	**NORTHING** 855369	**EASTING** 1768815	**24 HR.** 14.7'
TOTAL DEPTH 23.7'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC
START DATE 10/25/05	**COMPLETION DATE** 10/25/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 23.7'

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
733.4										
730.0	3.0	3	3	3	1.0	X 6		M		ROADWAY EMBANKMENT, RED-BROWN, SANDY SILTY CLAY
725.0	8.0	2	2	2	1.0	X 4		W		ALLUVIAL, GRAY AND ORANGE, SANDY SILT
720.0	13.0	WOH	2	1	1.0	X 3	SS-5	W ▼		GRAY, SILTY SANDY CLAY
715.0	18.0	4	3	3	1.0	X 6		S		ORANGE, SILTY SAND
710.0	23.0	100			0.2	100+X				WEATHERED ROCK (METADIORITE)
705.0						AUGER REFUSAL AT ELEVATION 709.7 FEET ON CRYSTALLINE ROCK (METADIORITE)				
700.0										
695.0										
690.0										
685.0										
680.0										
675.0										
670.0										
665.0										
660.0										
655.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33000.1.1	**ID.** B-3337	**COUNTY** GUILFORD	**GEOLOGIST** N. D. MOHS
SITE DESCRIPTION BRIDGE NO. 527 ON SR 1001 OVER NORTH BUFFALO CREEK			**GROUND WATER**
BORING NO. EBI-B	**BORING LOCATION** 20+49	**OFFSET** 41' RT	**ALIGNMENT** -L-
COLLAR ELEVATION 732.2'	**NORTHING** 855367	**EASTING** 1768900	**24 HR.** 11.0'
TOTAL DEPTH 24.0'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC
START DATE 10/24/05	**COMPLETION DATE** 10/24/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 24.0'

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
732.2										
730.0	2.5	2	3	4	1.0	X 7	SS-1	M		ROADWAY EMBANKMENT, ORANGE-BROWN, SANDY SILTY CLAY
725.0	7.5	2	1	2	1.0	X 3	SS-2	M		ALLUVIAL, GRAY, SANDY SILT
720.0	12.5	1	1	2	1.0	X 3	SS-3	S ▼		BROWN TO GRAY, SILTY SAND
715.0	17.5	2	3	3	1.0	X 6		S		
710.0	22.5 / 24.0	10 / 60	8	55	1.0 / 0.0	X 63 / 60/0.0	SS-4	M		RESIDUAL, GRAY, SILTY SAND
705.0						AUGER REFUSAL AT ELEVATION 708.2 FEET ON CRYSTALLINE ROCK (METADIORITE)				
700.0										
695.0										
690.0										
685.0										
680.0										
675.0										
670.0										
665.0										
660.0										
655.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33000.1.1	**ID.** B-3337	**COUNTY** GUILFORD	**GEOLOGIST** N. D. MOHS
SITE DESCRIPTION BRIDGE NO. 527 ON SR 1001 OVER NORTH BUFFALO CREEK			**GROUND WATER**
BORING NO. B1-A	**BORING LOCATION** 20+66	**OFFSET** 38' LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEVATION 725.7'	**NORTHING** 855409	**EASTING** 1768831	**24 HR.** 5.3'
TOTAL DEPTH 38.2'	**DRILL MACHINE** CME-550	**DRILL METHOD** N-CASING	**HAMMER TYPE** AUTOMATIC
START DATE 10/26/05	**COMPLETION DATE** 10/27/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 16.9'

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
725.7										
725.0	1.9	WOH	WOH	1	1.0	1	SS-10	S		ALLUVIAL, BROWN-GRAY, SILTY SAND
	4.4	WOH	WOH	1	1.0	1	SS-11	S		
720.0	6.9	WOH	WOH	2	1.0	2	SS-12	S		BROWN-GRAY TO ORANGE, SANDY SILT
	9.4	1	1	2	1.0	3		S		
715.0	11.9	1	2	2	1.0	4	SS-13	S		TAN-BROWN, SAND
	14.4	12	16	21	1.0	37	SS-14	S		RESIDUAL, GRAY-BLACK, SILTY SAND
710.0	16.9	60			0.1	60/0.1				CRYSTALLINE ROCK, GREEN-GRAY, FRESH, HARD, CLOSELY FRACTURED, METAGABBRO REC=56% RQD=56%
705.0										
700.0										CRYSTALLINE ROCK, GREEN-GRAY, FRESH, HARD, CLOSELY TO MODERATELY CLOSELY FRACTURED, METADIORITE REC=97% RQD=76%
695.0										
690.0										
685.0						CORING TERMINATED AT ELEVATION 687.5 FEET IN CRYSTALLINE ROCK (METADIORITE)				
680.0										
675.0										
670.0										
665.0										
660.0										
655.0										
650.0										

CORE BORING REPORT

PROJECT: **33000.1.1** ID: **B-3337** COUNTY: **Guilford** BORING NO: **B1-A**

DESCRIPTION: Bridge No. 527 on -L- (SR 1001) over North Buffalo Creek at Station 21+01.5

LOCATION OF BORING: -L- Sta. 20+66, 38' LT COMPLETION DATE: 10/27/05

COLLAR or GROUND ELEVATION: 725.7 ft CORE SIZE: NXWL GEOLOGIST: N. D. Mohs

CORE EQUIPMENT: CME-550 DRILLER: H. R. Conley

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
708.8	16.9	0:49	1.8	1.0 (56%)	1.0 (56%)	RS-1 17.1'-17.7'	Green-gray, metagabbro, fresh with slight weathering on joint surfaces, hard, closely fractured. 1 joint @ 50 degrees, 1 joint @ 80 degrees.
		0:47/0.8					
707.0	18.7						
707.0	18.7	1:13	5.0	4.5 (90%)	3.1 (62%)		18.7'-21.0': Green-gray metagabbro, fresh, hard, closely fractured. 21.0'+: Green-gray metadiortie, fresh with slight weathering on joint surfaces, hard, closely to moderately closely fractured. 1 cleavage plane @ 45-50 degrees.
		1:02					
		1:03					
		0:58					
702.0	23.7	1:00					
702.0	23.7	1:23	5.0	5.0 (100%)	4.9 (98%)		Green-gray, metadiorite, fresh with slight weathering on joint surfaces, hard, closely to moderately closely fractured. 2 joints @ 45-50 degrees.
		1:14					
		1:20					
		1:22					
697.0	28.7	1:25					
697.0	28.7	1:16	4.5	4.5 (100%)	2.5 (56%)	RS-2 30.7'-31.3'	Green-gray, metadiorite, fresh with slight weathering on joint surfaces, hard, closely fractured. 3 joints @ 40-50 degrees. 2 cleavage planes @ 80 degrees.
		1:30					
		1:16					
		1:27					
692.5	33.2	1:19/0.5					
692.5	33.2	0:57	5.0	4.8 (96%)	4.3 (86%)	RS-3 35.0'-35.5'	Green-gray, metadiorite, fresh with slight weathering on joint surfaces, hard, closely to moderately closely fractured. 1 joint @ 40 degrees. 1 joint @ 60 degrees.
		1:26					
		1:28					
		1:37					
687.5	38.2	1:32					
							BOREHOLE TERMINATED AT ELEVATION OF 687.5 FEET, IN METADIORITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33000.1.1	**ID.** B-3337	**COUNTY** GUILFORD	**GEOLOGIST** N. D. MOHS
SITE DESCRIPTION BRIDGE NO. 527 ON SR 1001 OVER NORTH BUFFALO CREEK			**GROUND WATER**
BORING NO. B1-B	**BORING LOCATION** 20+94	**OFFSET** 38' RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEVATION 727.7'	**NORTHING** 855411	**EASTING** 1768912	**24 HR.** 7.0'
TOTAL DEPTH 36.0'	**DRILL MACHINE** CME-550	**DRILL METHOD** N-CASING	**HAMMER TYPE** AUTOMATIC
START DATE 10/27/05	**COMPLETION DATE** 10/31/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 18.4'

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
727.7										
725.0	4.2	WOH	WOH	WOH	1.0	X 0		S		ALLUVIAL, BROWN, SILTY SAND
	6.7	1	Ø	1	1.0	X 1		S		
720.0	9.2	WOH	WOH	WOH	1.0	X 0	SS-15	S		BROWN TO GRAY, SANDY SILT
	11.7	WOH	2	3	1.0	X 5		S		
715.0	14.2	1	1	Ø	1.0	X 1	SS-16	S		GRAY, SAND
	16.7	3	3	12	1.0	X 15		W		RESIDUAL, GRAY-BLACK, SILTY SAND
710.0										
705.0										CRYSTALLINE ROCK, GREEN-GRAY, FRESH, HARD, CLOSELY TO MODERATELY CLOSELY FRACTURED, METADIORITE REC=98% RQD=90%
700.0										
695.0										
690.0						CORING TERMINATED AT ELEVATION 691.7 FEET IN CRYSTALLINE ROCK (METADIORITE)				
685.0										
680.0										
675.0										
670.0										
665.0										
660.0										
655.0										
650.0										

CORE BORING REPORT

PROJECT: **33000.1.1** ID: **B-3337** COUNTY: **Guilford** BORING NO: **B1-B**

DESCRIPTION: Bridge No. 527 on -L- (SR 1001) over North Buffalo Creek at Station 21+01.5

LOCATION OF BORING: -L- Sta. 20+94, 38' RT COMPLETION DATE: 10/31/05

COLLAR or GROUND ELEVATION: 727.7 ft CORE SIZE: NXWL GEOLOGIST: N. D. Mohs

CORE EQUIPMENT: CME-550 DRILLER: H. R. Conley

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
709.0	18.7	1:26				RS-4	Green-gray metadiortie, fresh, hard, closely fractured.
		1:30		2.3	2.0	20.0'-20.6'	
		0:33/0.3	2.3				
				(100%)	(87%)		
706.7	21.0						
706.7	21.0	1:01				RS-5	Green-gray metadiorite, fresh with slight weathering on joint surfaces, hard, closely fractured.
		1:17		5.0	4.8	24.1'-24.6'	1 joint @ 10 degrees.
		1:43	5.0				1 joint @ 20 degrees.
		1:31		(100%)	(96%)		1 joint @ 50 degrees.
701.7	26.0	1:21					
701.7	26.0	1:31					Green-gray metadiorite, fresh with slight weathering on joint surfaces, hard, closely to moderately
		1:15		4.6	4.2		closely fractured.
		1:10	5.0				2 joints @ 35 degrees.
		1:30		(92%)	(84%)		3 joints @ 45-50 degrees.
696.7	31.0	1:34					
696.7	31.0	1:53				RS-6	Green-gray metadiorite, fresh with slight weathering on joint surfaces, hard, closely to moderately
		1:29		5.0	4.7	34.0'-34.5'	closely fractured.
		1:30	5.0				1 joint @ 10, 1 joint @ 20, and 1 joint @ 30 degrees.
		1:44		(100%)	(94%)		2 joints @ 50 degrees.
691.7	36.0	1:41					
							BOREHOLE TERMINATED AT ELEVATION OF 691.7 FEET, IN METADIORITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33000.1.1	**ID.** B-3337	**COUNTY** GUILFORD	**GEOLOGIST** N. D. MOHS
SITE DESCRIPTION BRIDGE NO. 527 ON SR 1001 OVER NORTH BUFFALO CREEK			**GROUND WATER**
BORING NO. EB2-A	**BORING LOCATION** 21+52	**OFFSET** 39' LT	**ALIGNMENT** -L-	**0 HR.** 22.6'
COLLAR ELEVATION 735.3'	**NORTHING** 855489	**EASTING** 1768856		**24 HR.** 14.5'
TOTAL DEPTH 22.7'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC	
START DATE 10/26/05	**COMPLETION DATE** 10/26/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 22.7'	

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
735.3	1.2	4	3	4	1.0	7		M		ROADWAY EMBANKMENT, RED-BROWN, SANDY SILTY CLAY
730.0	6.2	5	5	8	1.0	13		M		
725.0	11.2	2	3	2	1.0	5	SS-6	M		ALLUVIAL, GRAY, SANDY SILT
720.0	16.2	6	8	12	1.0	20	SS-7	M		RESIDUAL, ORANGE-BROWN, SILTY SANDY CLAY
715.0	21.2	7	21	79	0.9	100+				WEATHERED ROCK (METADIORITE)
710.0						AUGER REFUSAL AT ELEVATION 712.6 FEET ON CRYSTALLINE ROCK (METADIORITE)				
705.0										
700.0										
695.0										
690.0										
685.0										
680.0										
675.0										
670.0										
665.0										
660.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 33000.1.1	**ID.** B-3337	**COUNTY** GUILFORD	**GEOLOGIST** N. D. MOHS
SITE DESCRIPTION BRIDGE NO. 527 ON SR 1001 OVER NORTH BUFFALO CREEK			**GROUND WATER**
BORING NO. EB2-B	**BORING LOCATION** 21+98	**OFFSET** 47' RT	**ALIGNMENT** -L-	**0 HR.** 22.3'
COLLAR ELEVATION 734.4'	**NORTHING** 855508	**EASTING** 1768952		**24 HR.** 11.0'
TOTAL DEPTH 23.7'	**DRILL MACHINE** CME-550	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** AUTOMATIC	
START DATE 10/26/05	**COMPLETION DATE** 10/26/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 23.3'	

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
734.4										
730.0	3.3	2	4	6	1.0	10		M		ROADWAY EMBANKMENT, RED-BROWN, SANDY SILTY CLAY
725.0	8.3	2	4	2	1.0	6		M		ALLUVIAL, BROWN-GRAY, SILTY SANDY CLAY
720.0	13.3	31	54	45	1.0	99	SS-8	M		BASAL QUARTZ GRAVEL
715.0	18.3	10	21	19	1.0	40	SS-9	M		RESIDUAL, BROWN AND ORANGE, SANDY SILT
710.0	23.3	60			0.1	60/0.1				CRYSTALLINE ROCK (METADIORITE)
705.0						AUGER REFUSAL AT ELEVATION 710.7 FEET ON CRYSTALLINE ROCK (METADIORITE)				
700.0										
695.0										
690.0										
685.0										
680.0										
675.0										
670.0										
665.0										
660.0										
655.0										

PROJ. NO. - 33000.1.1
ID NO. - B-3337
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		
SS-5	40 LT	20+23	13.0-14.5	A-6(7)	35	15	18.7	23.3	29.6	28.4	100	89	63	-	-

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		
SS-1	41 RT	20+49	2.5-4.0	A-7-6(17)	47	25	11.2	23.1	27.2	38.5	100	95	72	-	-
SS-2	41 RT	20+49	7.5-9.0	A-4(0)	28	7	33.2	29.3	21.3	16.2	100	86	42	-	-
SS-3	41 RT	20+49	12.5-14.0	A-2-4(0)	24	NP	10.8	70.7	14.5	4.1	100	99	27	-	-
SS-4	41 RT	20+49	22.5-24.0	A-2-4(0)	28	NP	30.8	45.5	19.6	4.1	96	80	31	-	-

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-10	38 LT	20+66	1.9-3.4	A-2-4(0)	29	NP	20.1	58.8	17.0	4.1	100	95	27	-	-
SS-11	38 LT	20+66	4.4-5.9	A-4(0)	36	NP	22.5	39.4	30.0	8.1	99	91	43	-	-
SS-12	38 LT	20+66	6.9-8.4	A-4(3)	29	8	3.4	49.9	28.4	18.3	100	100	59	-	-
SS-13	38 LT	20+66	11.9-13.4	A-2-4(0)	23	NP	54.4	30.2	11.4	4.1	92	69	17	-	-
SS-14	38 LT	20+66	14.4-15.9	A-2-4(0)	23	NP	28.6	44.6	22.7	4.1	91	78	33	-	-

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-15	38 RT	20+94	9.2-10.7	A-4(1)	25	8	15.4	42.0	22.3	20.3	100	97	48	-	-
SS-16	38 RT	20+94	11.7-13.2	A-2-4(0)	21	NP	26.1	55.1	10.8	8.1	100	96	24	-	-

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		
SS-6	39 LT	21+52	11.2-12.7	A-4(2)	26	8	11.8	37.7	28.2	22.3	100	96	58	-	-
SS-7	39 LT	21+52	16.2-17.7	A-7-6(13)	43	20	10.3	25.8	23.3	40.6	99	94	69	-	-

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		
SS-8	47 RT	21+98	13.3-13.8	A-6(8)	36	15	12.8	30.0	28.8	28.4	100	94	64	-	-
SS-9	47 RT	21+98	18.3-19.8	A-4(0)	29	3	29.3	38.2	29.4	3.0	96	77	43	-	-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33000.1.1 TIP: B-3337 COUNTY: Guilford

DESCRIPTION(1): Bridge No. 527 on -L- (SR 1001) over North Buffalo Creek at Station 21+01.5

EXISTING BRIDGE

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

Bridge No.: 527 Length: 113' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
Foundation Type: Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Minor pitting at base of EB2.

Interior Bents: Some scour pitting at base of piers, approximately 1.5' surrounding the piers and 0.5' deep.

Channel Bed: None.

Channel Bank: Some pitting as noted above at EB2.

EXISTING SCOUR PROTECTION

Type(3): Riprap

Extent(4): Upper portion on EB2 slope.

Effectiveness(5): Effective.

Obstructions(6): Exposed water-main approximately 50 feet upstream.

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 geotechnically adjusted scour elevation (GASE) 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 GASE. If the GASE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The GASE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Sand, gravel and mud.

Channel Bank Material(8): Silty sand (A-2-4)

Channel Bank Cover(9): Vegetation (kudzu).

Floodplain Width(10): Approximately 200 feet.

Floodplain Cover(11): Kudzu and grass.

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

Channel Migration Tendency(13): North toward EB2.

Observations and Other Comments: USGS Stream Gauging Station located at stie at EB1-A.

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS B1
719.1

Comparison of GASE to Hydraulics Unit theoretical scour:
The Geotechnically adjusted scour elevation is unchanged from the Hydraulic Units Theoretical Scour.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

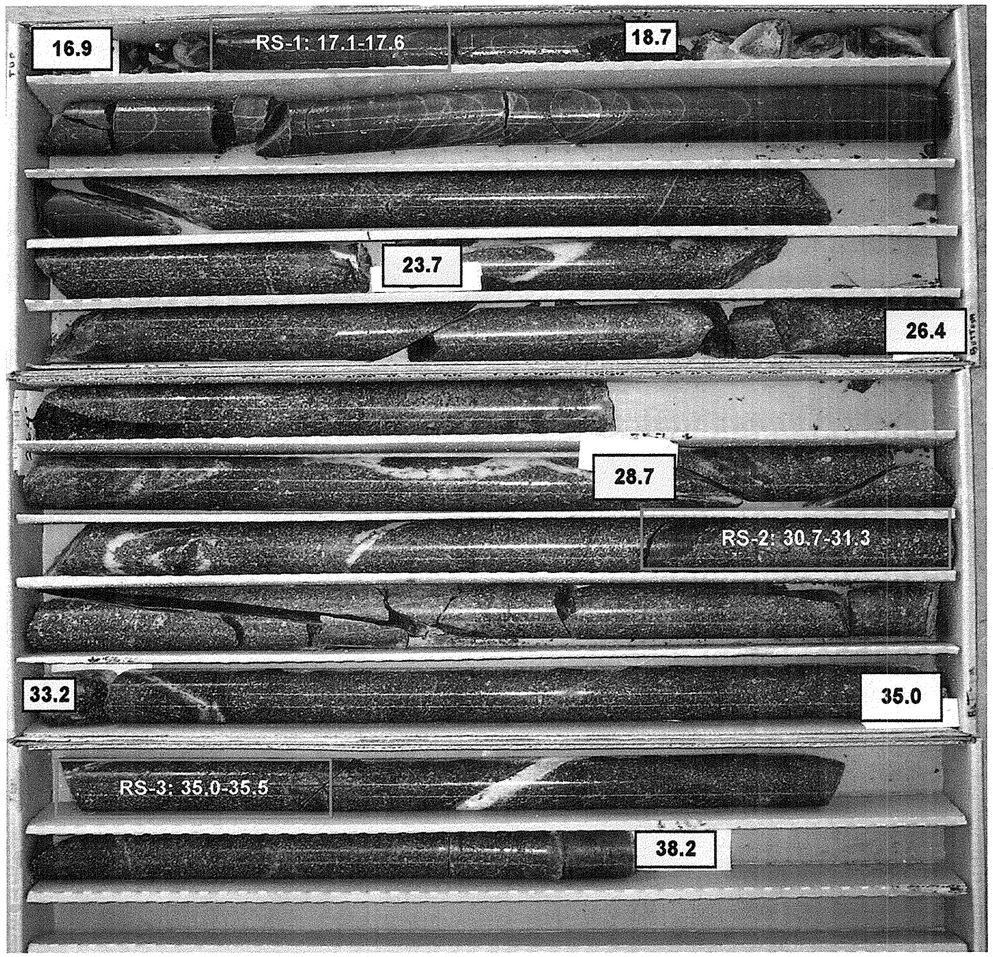
Bed or Bank	Bank
Sample No.	SS-10
Retained #4	
Passed #10	100
Passed #40	95
Passed #200	27
Coarse Sand	20.1
Fine Sand	58.8
Silt	17
Clay	4.1
LL	29
PI	NP
AASHTO	A-2-4(0)
Station	20+66
Offset	38' LT
Depth	1.9'-3.4'

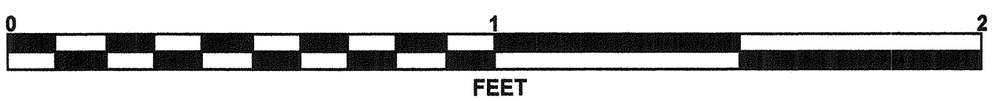
Reported by: Nathan Mohs **Date:** 10/24/2005

CORE PHOTOGRAPHS

B1-A

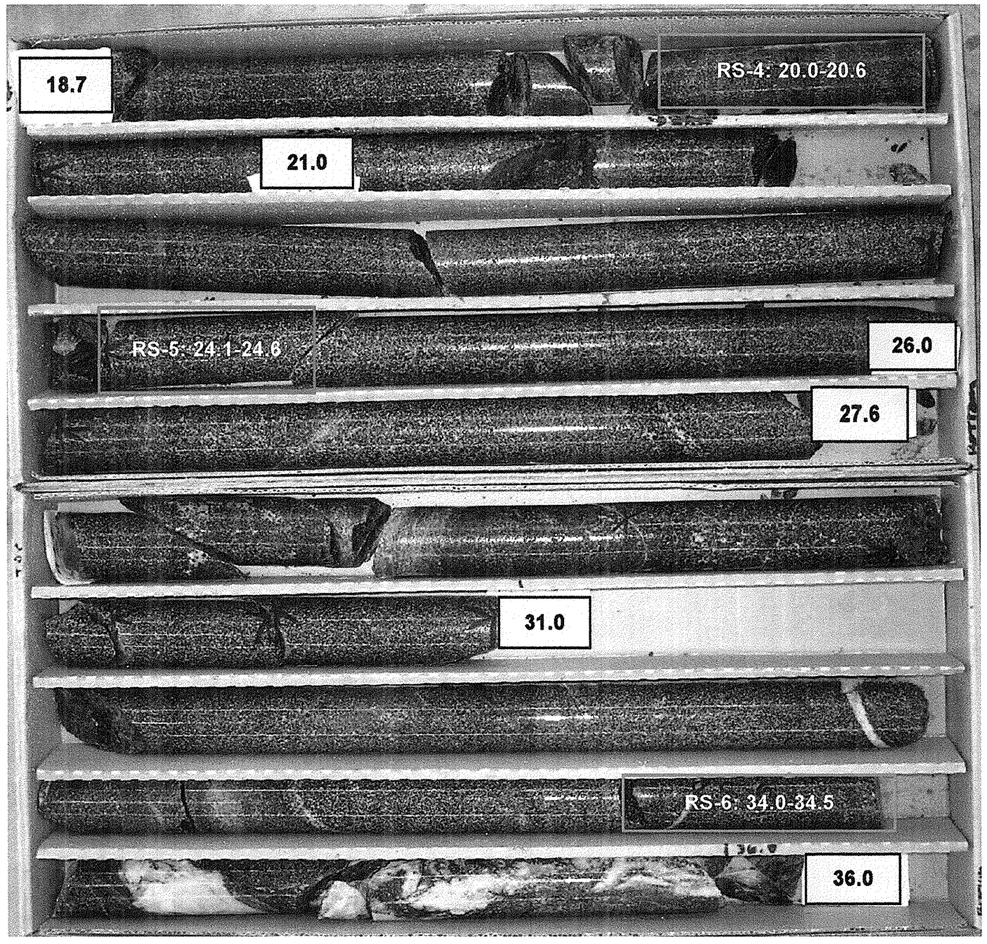
BOXES 1 - 3: 16.9 - 38.2 FEET

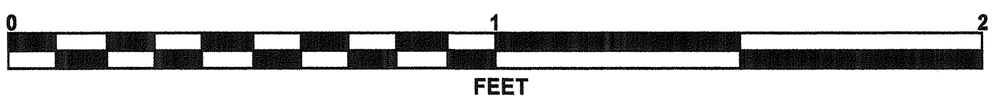




B1-B

BOXES 1 & 2: 18.7 - 36.0 FEET





SITE PHOTO

BRIDGE NO. 527 OVER NORTH BUFFALO CREEK ON SR 1001

LOOKING SOUTHWEST TOWARD END BENT 1