STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33787.1.1 (B-4587)	1	15

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *33787.1.1 (B-4587)* F.A. PROJ. *BRZ-1316 (4)*

COUNTY *FRANKLIN / NASH*

PROJECT DESCRIPTION *BRIDGE NO. 82 ON -L- (SR 1316) OVER CYPRESS CREEK*

CONTENTS

CAUTION NOTICE

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

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INVENTORY

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SUBMITTED BY *N.T. ROBERSON*

DATE *AUGUST 2008*

NORTH CAROLINA LICENSED SEAL 1912 GEOLOGIST NEIL T. ROBERSON

8/7/08

ID: B-4587

PROJECT: 33787.1.1

DRAWN BY: *J.R. MATULA*

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.

PROJECT REFERENCE NO.	SHEET NO.
33787.1.1 (B-4587)	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	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N NWXL
- [ ] -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-102 AT STA. 17+93.53

ELEVATION: 164.97 FT.

NOTES:

REVISED 02/23/06

0	30	60
FEET		

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SITE PLAN

N

FRANKLIN COUNTY

WOODS

WOODS

JS

16+00

17+00

18+00

19+00

GRAU 350

GRAU 350

GRAU 350

EBI-A

BI-A

B2-A

EB2-A

BRIDGE # 8

EBI-B

BI-B

B2-B

EB2-B

—L—

—L—

AT-1

SOIL & GRAVEL DRIVE

SOIL & GRAVEL

NASH COUNTY

CYPRESS CREEK

WOODS

0	10	20
FEET		

VE = 1:1

PROJECT REFERENCE NO.	SHEET
33787.1.1(B-4587)	4

PROFILE VIEW

EB1-B
16+79
15' RT

B1-B
17+26
8' RT

B2-B
17+65
24' RT

EB2-B
18+04
15' RT

180
170
160
150
140
130
120
110
100

ROADWAY EMBANKMENT, STIFF TO STIFF, AND MEDIUM DENSE.

16 BROWN, MOIST, MED. SANDY SILT

8 SILTY SAND

10

06/08

8

ALLUVIAL, TAN-BROWN, MOIST TO WET, LOOSE TO MEDIUM DENSE, SILTY AND COARSE SAND

WATER SURFACE 06/08

WATER SURFACE 06/08

24

100/0.1

60/0.1

3

6

06/08

100

ROADWAY EMBANKMENT, MOIST, SOFT TO MEDIUM STIFF, AND SANDY CLAY

8 TAN-BROWN, SANDY SILT

5

4 SANDY SILT

9

06/08

ALLUVIAL, GRAY-GREEN, MOIST, SOFT,

RESIDUAL, GRAY-TAN, MOIST, MEDIUM STIFF TO STIFF, SANDY SILT

WEATHERED ROCK, METAVOLCANIC

100/0.7

A

100/0.2

WEATHERED ROCK, METAVOLCANIC

60/0.0

CRYSTALLINE ROCK, GRAY, MODERATELY HARD TO HARD, MODERATELY WEATHERED TO FRESH, CLOSELY TO VERY CLOSELY FRACTURED, METAVOLCANIC

REC=99%

RQD=89%

(A) RESIDUAL, DARK BROWN AND GRAY, MOIST, VERY STIFF, SANDY SILT

-L-

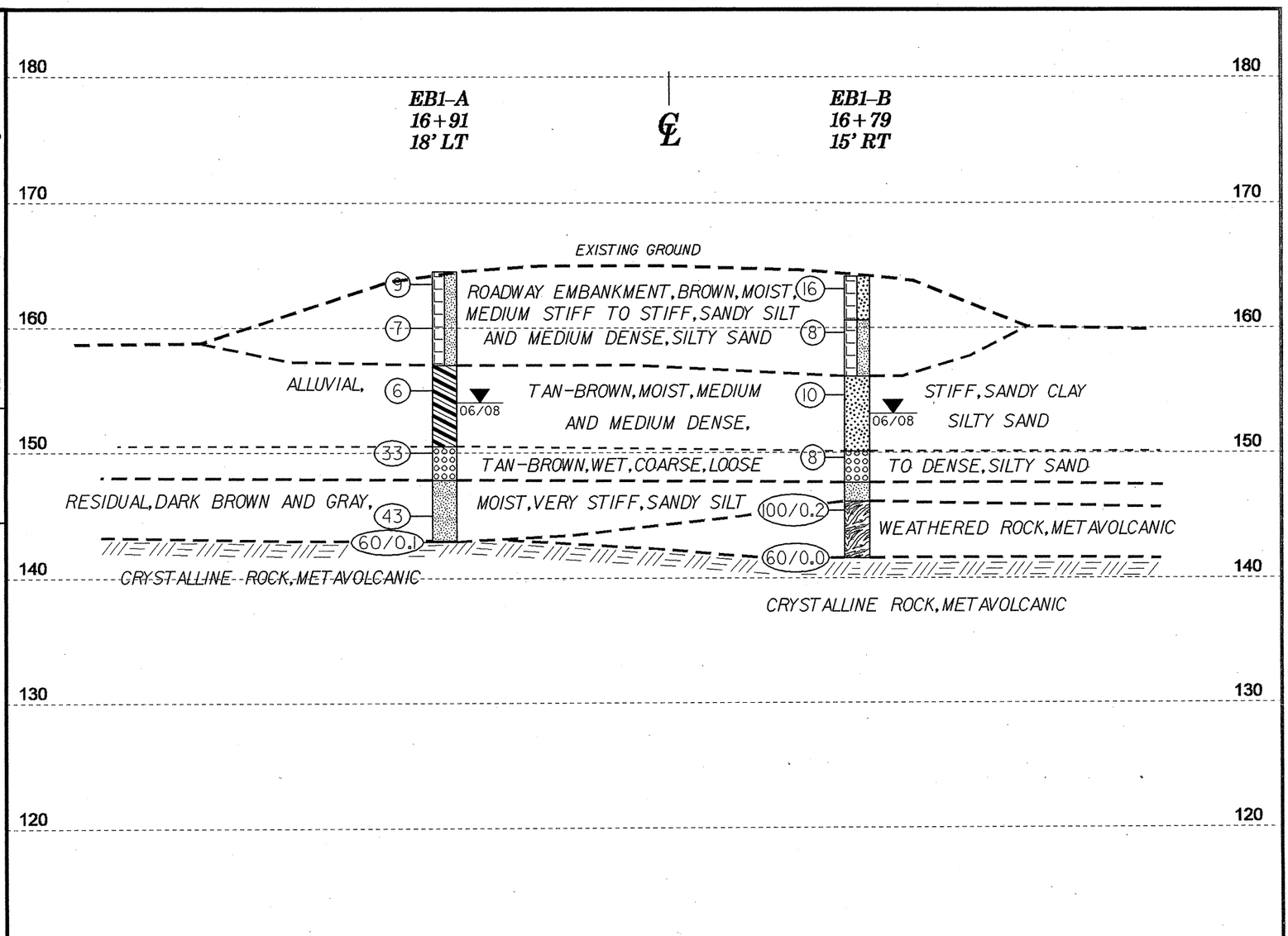
NOTE: GROUNDLINE PROFILE TAKEN FROM HYDRAULICS REPORT DATED 7-5-07

17+00 +50 18+00

HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

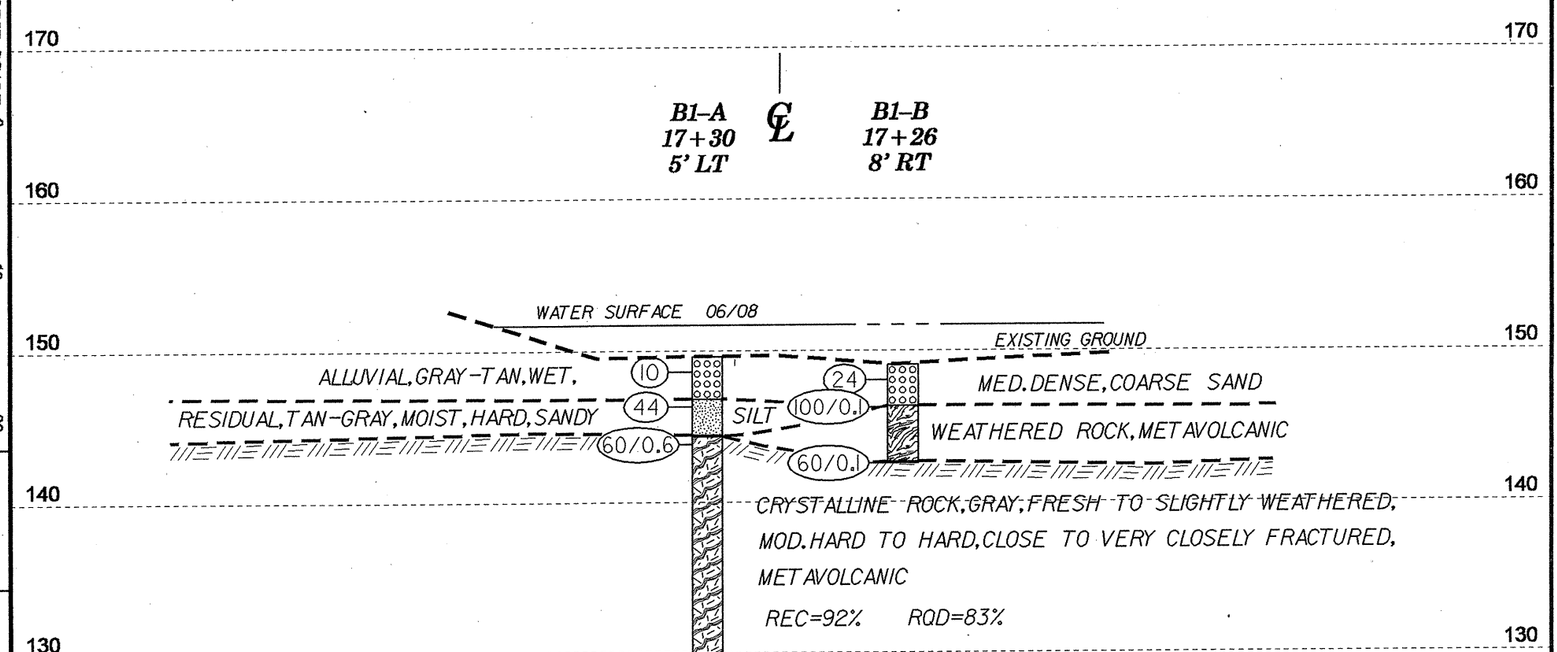
CROSS SECTION THROUGH END BENT 1



HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION THROUGH BENT 1

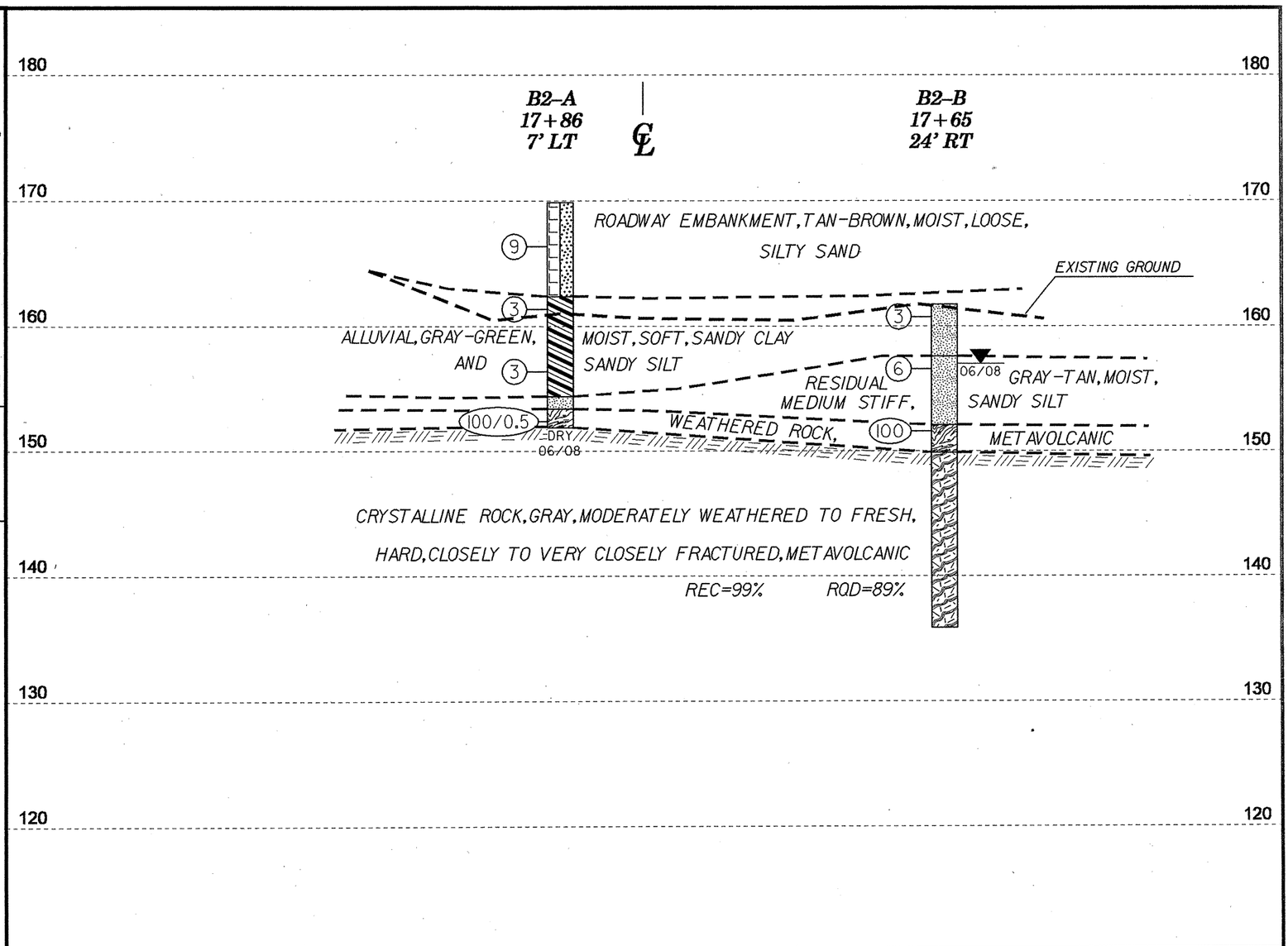


PROJECT REFERENCE NO.	SHEET
33787.1.1(B-4587)	5

HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

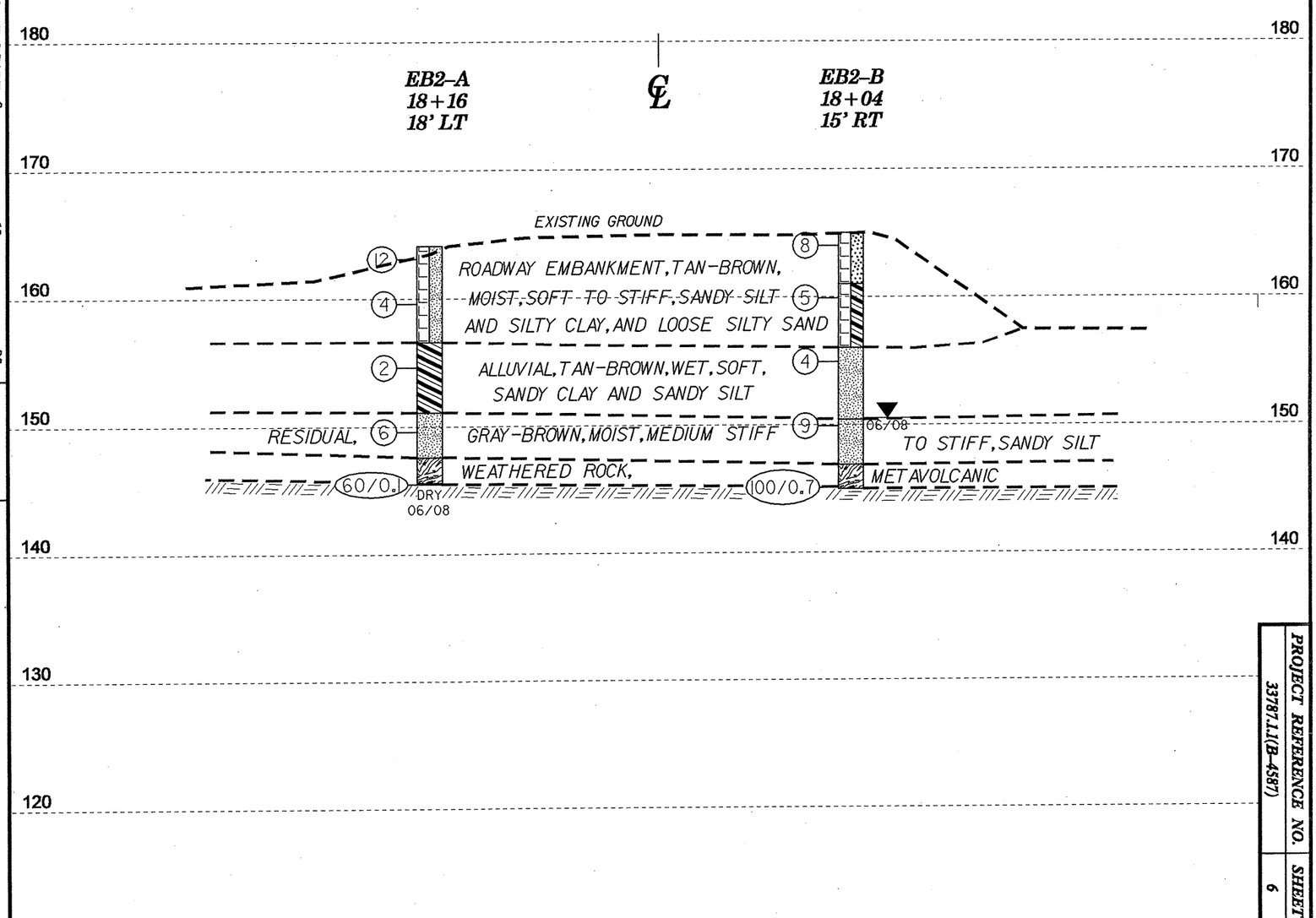
CROSS SECTION THROUGH BENT 2



HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION THROUGH END BENT 2



PROJECT REFERENCE NO.	SHEET
33787.1.1 (B-4587)	6

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 16+91	**OFFSET** 18ft LT	**ALIGNMENT** -L-	**0 HR.** 10.5
COLLAR ELEV. 164.5 ft	**TOTAL DEPTH** 21.6 ft	**NORTHING** 797,649	**EASTING** 2,242,017	**24 HR.** 10.5
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 06/17/08	**COMP. DATE** 06/17/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 21.5 ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
165	164.5	0.0	2	5	4	9	SS-1	M		164.5 GROUND SURFACE	0.0
	161.0	3.5								**ROADWAY EMBANKMENT** BROWN, SANDY SILT	
160			6	4	3	7		M			
	156.0	8.5								157.0 **ALLUVIAL**	7.5
155			3	3	3	6	SS-2	M		TAN-BROWN, SANDY CLAY	
	151.0	13.5								150.5	14.0
150			5	11	22	33	SS-3	W		TAN-BROWN, COARSE SAND	
	146.0	18.5								147.8 **RESIDUAL**	16.7
145			22	28	15	43	SS-4	M		DARK-BROWN, TO GRAY, SANDY SILT	
	143.0	21.5	60/0.1			60/0.1				143.0	21.5
140										142.9 **CRYSTALLINE ROCK** (METAVOLCANIC)	21.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 142.9 ft in Crystalline Rock	
135											
130											
125											
120											
115											
110											
105											
100											
95											
90											
85											

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 16+79	**OFFSET** 15ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 164.1 ft	**TOTAL DEPTH** 22.5 ft	**NORTHING** 797,655	**EASTING** 2,242,007	**24 HR.** 11.0
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 06/17/08	**COMP. DATE** 06/17/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 22.5 ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
165	164.1	0.0	3	10	6	16	SS-5	M		164.1 GROUND SURFACE 0.0
	160.6	3.5								**ROADWAY EMBANKMENT** TAN-BROWN, SILTY SAND 160.6 3.5
160			4	4	4	8		M		BROWN, SANDY SILT
	155.6	8.5								156.1 8.0
155			2	3	7	10	SS-6	M		**ALLUVIAL** TAN-BROWN, SILTY SAND
	150.6	13.5								150.1 14.0
150			1	4	4	8		W		TAN-BROWN, COARSE SAND
	145.6	18.5	100/0.2			100/0.2				147.6 16.5
145										146.1 **RESIDUAL** DARK-BROWN TO GRAY, SANDY SILT 18.0
	141.6	22.5	60/0.0			60/0.0				**WEATHERED ROCK** (METAVOLCANIC)
140										141.6 22.5
										Boring Terminated with Standard Penetration Test Refusal at Elevation 141.6 ft in Crystalline Rock
135										
130										
125										
120										
115										
110										
105										
100										
95										
90										
85										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+30	**OFFSET** 5ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 149.6 ft	**TOTAL DEPTH** 19.8 ft	**NORTHING** 797,633	**EASTING** 2,242,054	**24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 06/19/08	**COMP. DATE** 06/19/08	**SURFACE WATER DEPTH** 2.1ft	**DEPTH TO ROCK** 5.2 ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										WATER SURFACE (06/19/08)		
150												
	149.6	0.0	WOH	2	8	10	SS-11	W		GROUND SURFACE	149.6	0.0
	147.3	2.3								**ALLUVIAL** GRAY-TAN, COARSE SAND		
			13	14	30	44	SS-12	M			146.8	2.8
145										**RESIDUAL** TAN-GRAY, SANDY SILT		
	144.4	5.2									144.4	5.2
			60/0.1			60/0.1				**CRYSTALLINE ROCK** GRAY, FRESH TO SLIGHTLY WEATHERING, MODERATELY HARD TO HARD, CLOSE TO VERY CLOSELY FRACTURED, METAVOLCANIC REC = 92% RQD = 83%		
140												
135												
130							RS-1				129.8	19.8
										Boring Terminated at Elevation 129.8 ft in Crystalline Rock		
125												
120												
115												
110												
105												
100												
95												
90												
85												
80												
75												
70												

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+30	**OFFSET** 5ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 149.6 ft	**TOTAL DEPTH** 19.8 ft	**NORTHING** 797,633	**EASTING** 2,242,054	**24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 06/19/08	**COMP. DATE** 06/19/08	**SURFACE WATER DEPTH** 2.1ft	**DEPTH TO ROCK** 5.3 ft	
CORE SIZE NW-XL	**TOTAL RUN** 14.5 ft	**DRILLER** Conley, H. R.		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS	ELEV. (ft)	DEPTH (ft)
144.3											Begin Coring @ 5.3 ft		
	144.3	5.3	4.5	0:48/1.0 0:47/1.0 0:36/1.0 0:36/1.0	(3.7) 82%	(2.5) 56%		(13.3) 92%	(12.0) 83%		**CRYSTALLINE ROCK** GRAY, FRESH TO SLIGHTLY WEATHERING, MODERATELY HARD TO HARD, CLOSE TO VERY CLOSELY FRACTURED, METAVOLCANIC		
140	139.8	9.8	5.0	0:18/0.5 0:54/1.0 0:49/1.0 1:01/1.0 1:01/1.0	(4.6) 92%	(4.5) 90%							
135	134.8	14.8	5.0	1:00/1.0 1:10/1.0 1:12/1.0 1:15/1.0 1:14/1.0	(5.0) 100%	(5.0) 100%							
130	129.8	19.8					RS-1					129.8	19.8
											Boring Terminated at Elevation 129.8 ft in Crystalline Rock		
125													
120													
115													
110													
105													
100													
95													
90													
85													
80													
75													
70													
65													

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 17+26	**OFFSET** 8ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 149.0 ft	**TOTAL DEPTH** 6.5 ft	**NORTHING** 797,624	**EASTING** 2,242,043	**24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 06/23/08	**COMP. DATE** 06/23/08	**SURFACE WATER DEPTH** 2.7ft	**DEPTH TO ROCK** 6.4 ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										WATER SURFACE (06/23/08)
	149.0	0.0								149.0 GROUND SURFACE 0.0
			WOH	2	22	24 100/0.1		W		**ALLUVIAL** GRAY-TAN, COARSE SAND
	146.3	2.7	100/0.1							146.3 2.7
										WEATHERED ROCK (METAVOLCANIC)
	142.6	6.4	60/0.1			60/0.1				142.6 6.4
										142.5 6.5 **CRYSTALLINE ROCK** (METAVOLCANIC)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 142.5 ft in Crystalline Rock

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Oti, O. B.	
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 17+86	**OFFSET** 7ft LT	**ALIGNMENT** -L-	**0 HR.** 15.0
COLLAR ELEV. 164.9 ft	**TOTAL DEPTH** 18.0 ft	**NORTHING** 797,606	**EASTING** 2,242,102	**24 HR.** FIAD
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 04/27/08	**COMP. DATE** 04/27/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 18.0 ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
	164.9	0.0								164.9 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT TAN-BROWN, SILTY SAND
	162.4	2.5	4	3	6	9		M		
	157.4	7.5	1	1	2	3		M		157.4 7.5
										ALLUVIAL GRAY-GREEN, SANDY CLAY
	152.4	12.5	1	1	2	3		M		
								M		149.4 15.5
	147.4	17.5	8	92/0.0		100/0.5				148.4 16.5 **RESIDUAL** GRAY-TAN, SANDY SILT
										146.9 18.0 **WEATHERED ROCK** (METAVOLCANIC)
										Boring Terminated by Auger Refusal at Elevation 146.9 ft in Crystalline Rock

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 17+65	**OFFSET** 24ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 156.8 ft	**TOTAL DEPTH** 25.9 ft	**NORTHING** 797,590	**EASTING** 2,242,069 — **24 HR.** 4.8
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 06/20/08	**COMP. DATE** 06/20/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 11.9 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
160											
	156.8	0.0	1	1	2	3		M		156.8 GROUND SURFACE	0.0
155										ALLUVIAL GRAY-TAN, SANDY SILT	
	152.6	4.2	2	3	3	6	SS-13	M		152.6 RESIDUAL GRAY-TAN, SANDY SILT	4.2
150											
	147.6	9.2	9	29	71	100/1.0				147.1 WEATHERED ROCK (METAVOLCANIC)	9.7
145										144.9 CRYSTALLINE ROCK GRAY, MODERATE TO FRESH WEATHERING, HARD, CLOSE TO VERY CLOSELY FRACTURED, METAVOLCANIC REC = 99% RQD = 89%	11.9
140											
135											
							RS-2			130.9 Boring Terminated at Elevation 130.9 ft in Crystalline Rock	25.9
130											
125											
120											
115											
110											
105											
100											
95											
90											
85											
80											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 17+65	**OFFSET** 24ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 156.8 ft	**TOTAL DEPTH** 25.9 ft	**NORTHING** 797,590	**EASTING** 2,242,069 — **24 HR.** 4.8
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 06/20/08	**COMP. DATE** 06/20/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 11.9 ft
CORE SIZE NW-XL	**TOTAL RUN** 14.0 ft		**DRILLER** Conley, H. R.

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
144.9											Begin Coring @ 11.9 ft	
	144.9	11.9	4.0	1:00/1.0 0:57/1.0 1:00/1.0 0:58/1.0	(4.0) 100%	(3.5) 88%		(13.8) 99%	(12.5) 89%		144.9 CRYSTALLINE ROCK GRAY, MODERATE TO FRESH WEATHERING, HARD, CLOSE TO VERY CLOSELY FRACTURED, METAVOLCANIC	11.9
140	140.9	15.9	5.0	0:50/1.0 0:31/1.0 0:53/1.0 1:00/1.0 1:02/1.0	(4.8) 96%	(4.0) 80%						
135	135.9	20.9	5.0	0:55/1.0 0:56/1.0 1:06/1.0 1:20/1.0 1:19/1.0	(5.0) 100%	(5.0) 100%						
130	130.9	25.9					RS-2				130.9 Boring Terminated at Elevation 130.9 ft in Crystalline Rock	25.9
125												
120												
115												
110												
105												
100												
95												
90												
85												
80												
75												
70												
65												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 18+16	**OFFSET** 18ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 164.1 ft	**TOTAL DEPTH** 18.6 ft	**NORTHING** 797,585	**EASTING** 2,242,124	**24 HR.** 12.5
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 06/18/08	**COMP. DATE** 06/18/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 18.5 ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
165											
	164.1	0.0	3	6	6	12		M		164.1 GROUND SURFACE	0.0
160	160.6	3.5	3	2	2	4		M		**ROADWAY EMBANKMENT** TAN-BROWN, SANDY SILT	
	155.6	8.5	2	1	1	2	SS-7	W		156.6 ALLUVIAL TAN-BROWN, SANDY CLAY	7.5
155										151.1	13.0
150	150.6	13.5	2	3	3	6	SS-8	M		**RESIDUAL** GRAY-BROWN, SANDY SILT	
	145.6	18.5	60/0.1			60/0.1				147.6	16.5
145										145.6 **WEATHERED ROCK** (METAVOLCANIC)	18.5
140										145.5 **CRYSTALLINE ROCK** (METAVOLCANIC)	18.6
135										Boring Terminated with Standard Penetration Test Refusal at Elevation 145.5 ft in Crystalline Rock	
130											
125											
120											
115											
110											
105											
100											
95											
90											
85											

PROJECT NO. 33787.1.1	**ID.** B-4587	**COUNTY** Franklin/Nash	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 82 on -L- (SR 1316) over Cypress Creek				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 18+04	**OFFSET** 15ft RT	**ALIGNMENT** -L-	**0 HR.** 14.5
COLLAR ELEV. 165.0 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 797,591	**EASTING** 2,242,114	**24 HR.** 14.5
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 06/18/08	**COMP. DATE** 06/18/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 20.1 ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
165											
	165.0	0.0	8	5	3	8		M		165.0 GROUND SURFACE	0.0
160	160.9	4.1	2	3	2	5	SS-9	M		**ROADWAY EMBANKMENT** TAN-BROWN, SILTY SAND	
	155.9	9.1	3	2	2	4	SS-10	W		161.0 TAN-GRAY, SANDY CLAY	4.0
155										156.0 ALLUVIAL GRAY, SANDY SILT	9.0
150	150.9	14.1	WOH	3	6	9		M		150.4 **RESIDUAL** GRAY-BROWN, SANDY SILT	14.6
	145.9	19.1	14	86/0.3		100/0.7				146.9	18.1
145										145.0 **WEATHERED ROCK** (METAVOLCANIC)	20.0
140										Boring Terminated by Auger Refusal at Elevation 144.9 ft in Crystalline Rock	
135											
130											
125											
120											
115											
110											
105											
100											
95											
90											
85											

PROJECT ID: 33787.1.1
TIP : B-4587
NASH/ FRANKLIN COUNTY

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-1	18' LT	16+91	0.0-1.5	A-4(0)	25	7	31.1	25.3	21.4	22.2	84	69	42	-	-
SS-2	18' LT	16+91	8.5-10.0	A-6(9)	39	14	4.0	37.0	26.7	32.3	100	99	71	-	-
SS-3	18' LT	16+91	14.0-15.0	A-1-b(0)	22	NP	60.6	13.5	19.8	6.1	76	37	22	-	-
SS-4	18' LT	16+91	18.5-20.0	A-4(2)	29	3	3.0	12.1	78.8	6.1	90	88	83	-	-

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-5	15' RT	16+79	0.0-1.5	A-2-4(0)	18	NP	49.9	30.3	11.7	8.1	92	63	23	-	-
SS-6	15' RT	16+79	8.5-10.0	A-2-4(0)	33	10	51.7	18.2	14.0	16.1	90	51	32	-	-

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-11	4.8' LT	17+30	0.0-1.5	A-1-a(0)	22	NP	64.4	17.4	16.2	2.0	41	19	9	-	-
SS-12	4.8' LT	17+30	2.3-3.8	A-4(0)	31	NP	9.7	28.5	55.8	6.1	91	85	67	-	-

B2-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	24' RT	17+65	4.2-5.7	A-4(0)	20	2	1.4	40.8	41.6	16.2	100	100	77	-	-

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-7	18' LT	18+16	8.5-10.0	A-6(7)	35	17	20.8	26.5	24.4	28.3	99	87	58	-	-
SS-8	18' LT	18+16	13.5-15.0	A-4(0)	22	2	2.2	56.6	29.1	12.1	100	100	62	-	-

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-9	15' RT	18+04	4.1-5.6	A-6(8)	36	14	15.6	15.8	34.3	34.3	95	84	69	-	-
SS-10	15' RT	18+04	9.1-10.6	A-4(0)	17	3	20.6	23.2	40.0	16.2	99	86	62	-	-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33787.1.1 TIP: B-4587 COUNTY: Franklin/Nash

DESCRIPTION(1): Bridge No. 82 on -L- (SR 1316) over Cypress Creek

EXISTING BRIDGE

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

Bridge No.: 82 Length: 120 Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
Foundation Type: Timber piles with concrete deck

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Small amount of local scour at end bents, some timber piles are encased concrete.

Interior Bents: Crutch piles supporting interior bent in the channel, evidence of local scour around the original timber piles, scour pockets less than 4 feet deep.

Channel Bed: Evidence of contraction scour at opening of bridge (widening of creek) and exposed banks.

Channel Bank: Scour pockets were observed along the banks on the downstream side south of the bridge.

EXISTING SCOUR PROTECTION

Type(3): N/A

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): Large logs around Bent 2 and fallen trees 25 to 75 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 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): Alluvial, medium dense to dense, coarse sand (A-1-a, A-1-b) - SS-3 and SS-11, and medium dense, silty sand (A-2-4) - SS-6

Channel Bank Material(8): Alluvial, soft to medium stiff, sandy silt (A-4) - SS10, and soft to medium dense, sandy clay (A-6) - SS-2 and SS-7

Channel Bank Cover(9): Grass, brush with small and large trees

Floodplain Width(10): 200 +/- feet

Floodplain Cover(11): Grass, brush with small and large trees

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

Channel Migration Tendency(13): Tendency for migration to the south toward End Bent 2

Observations and Other Comments: ____

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS EB1	B1	B2	EB2							
N/A	144.4	146.5	N/A							

Comparison of DSE to Hydraulics Unit theoretical scour:
The geotechnically adjusted scour elevation is 13.4' higher on B1 and 13.5' higher on B2 than the theoretical elevations shown on the Bridge Survey and Hydraulic Design Report.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

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

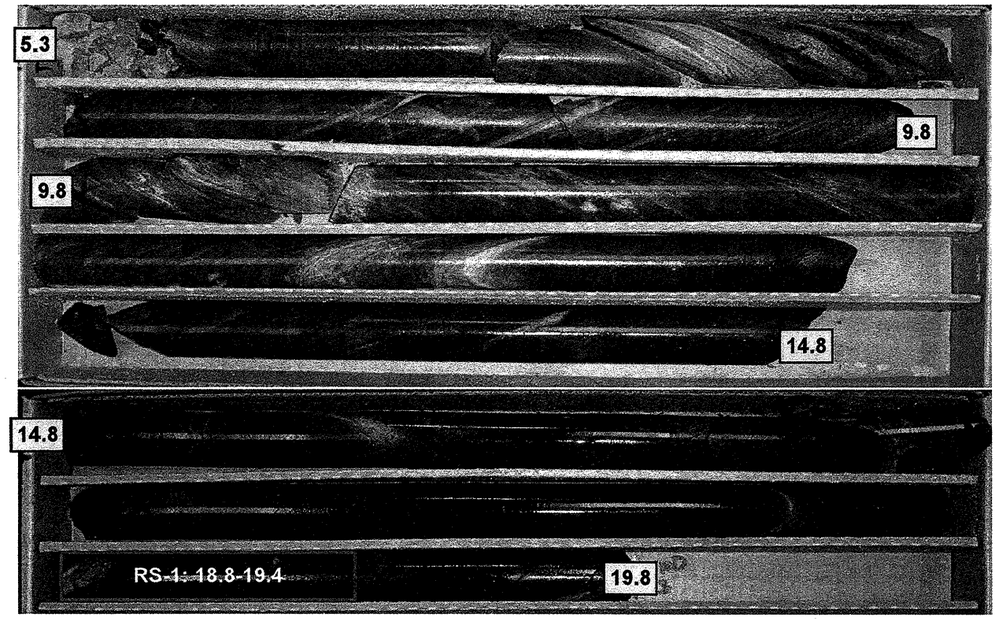
See Sheet 13, "Soil Test Results", for samples:
SS-2
SS-3
SS-6
SS-7
SS-10
SS-11

Reported by: for: Joseph I. Milkovits, Jr. Date: 6/19/2008

CORE PHOTOGRAPHS

B1-A

BOXES 1 & 2: 5.3 - 19.8 FEET

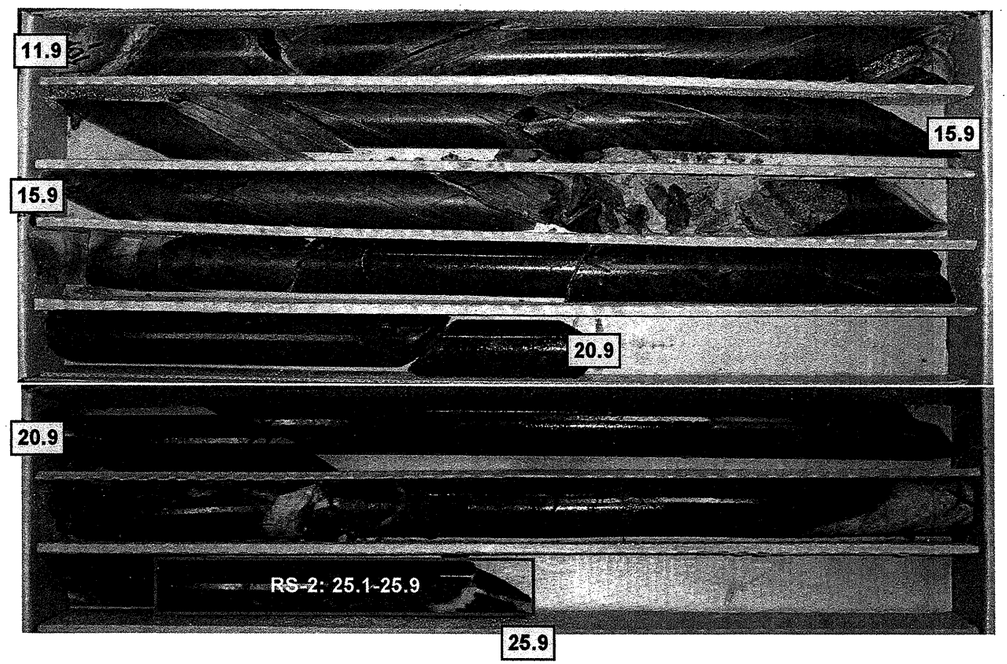


0 1 2

FEET

B2-B

BOXES 1 & 2: 11.9 - 25.9 FEET



0 1 2

FEET

SITE PHOTO

BRIDGE NO. 82 ON -L- (SR 1316) OVER CYPRESS CREEK

LOOKING NORTHEAST TOWARD BENT 1