

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33469.1.1 (B-4114) F.A. PROJ. BRZ-1146(5)
COUNTY FRANKLIN
PROJECT DESCRIPTION BRIDGE NO. 151 ON -L- (SR 1146) OVER
CAMPING CREEK AT STATION 14+89

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PROJECT: 33469.1.1 ID: B-4114

PERSONNEL

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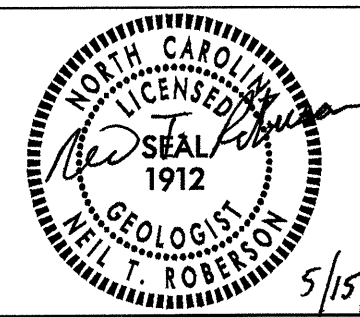
D. W. DIXON

INVESTIGATED BY J. L. PEDRO

CHECKED BY N. T. ROBERSON

SUBMITTED BY N. T. ROBERSON

DATE MAY 2007



DRAWN BY: J. L. PEDRO

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

May 14, 2007

STATE PROJECT: 33469.1.1 (B-4114)
F.A. PROJECT: BRZ-1146(1)
COUNTY: Franklin
DESCRIPTION: Bridge No. 151 on -L- (SR 1146) over Camping Creek at Station 14+89
SUBJECT: Geotechnical Report – Structure Inventory

Project Description

A single-span bridge, 70-feet in length with a 75° skew, is proposed on -L- (SR 1146) over Camping Creek. The project is located in central Franklin County between Louisburg and Youngsville.

The subsurface investigation was conducted during April of 2007 using a CME-550X ATV-mounted drill machine. Standard Penetration Test borings were performed at each of the proposed bent locations. All borings were advanced to crystalline rock using hollow stem augers. 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.

Physiography and Geology

The project is located in the gently rolling terrain of the Piedmont Physiographic province. Geologically, the site is underlain by foliated to massive granitic rock of the Raleigh belt. The area is predominantly rural in nature with a mixture of residential homes, agriculture, and forestry operations.

Soil Properties

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

Roadway embankment soils were encountered at all bent locations. The embankment soils range in thickness from 5.5 to 8.0 feet. These soils consist of brown, very soft to medium stiff, moist, silty clay (A-7-6) and sandy clay (A-6). Alluvial soils underlie roadway embankment soils.

Alluvial soils range from 4.5 to 8.0 feet in thickness. These soils predominantly consist of light and dark gray, very loose to loose, moist to saturated, silty sand (A-2-4) and coarse sand (A-1-b). Other soils present in smaller quantities are gray, very soft to stiff, moist, sandy silt (A-4) and sandy clay (A-6). The alluvial soils were deposited on residual soil and weathered rock.

Residual soils were encountered on the B-side of both bent locations, and are 2.5 to 3.2 feet thick. These soils consist of orange-brown, dense to very dense, moist, saprolitic, coarse sand (A-1-b). The residual soils are underlain by weathered rock.

Rock Properties

Weathered rock was derived from the underlying intrusive granitic rock, and ranges in thickness from 0.4 feet at EB2-A to as much as 11.4 feet at EB1-A. Weathered rock was encountered in all of the borings. The top of weathered rock ranges in elevation from 220.2 feet at EB1-B to 229.4 feet at EB1-A.

Crystalline rock was encountered at both bent locations. Rock present at the site predominantly consists of orange-brown and white, severely weathered to slightly weathered, moderately hard to hard, granite. The top of crystalline rock ranges in elevation from 216.6 feet at EB2-B to 226.4 feet at EB2-A.

Groundwater

Groundwater was encountered at each of the boring locations except for EB2-A. The groundwater elevations range from 229.3 feet at EB1-B to 230.7 feet at EB1-A. The water in Camping Creek was at an elevation of 230.0 feet (1-07).

Temporary Detour Structure

A temporary detour structure will be constructed approximately 45 feet upstream of the existing bridge at -DET- Station 14+23. The structure has a total length of 65 feet, and is on a 60° skew. Borings EB1-B (DET) and EB2-B (DET) were drilled along the -DET- alignment to provide additional information for the detour structure. Geologic conditions along the detour alignment correlate directly to those encountered along the main-line structure.

Notice

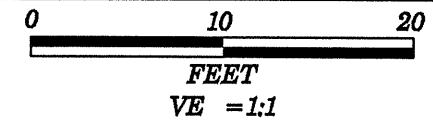
This Geotechnical foundation report is based on the Preliminary General Drawing dated January 2007 and the Hydraulics Bridge Report dated January 10, 2007. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

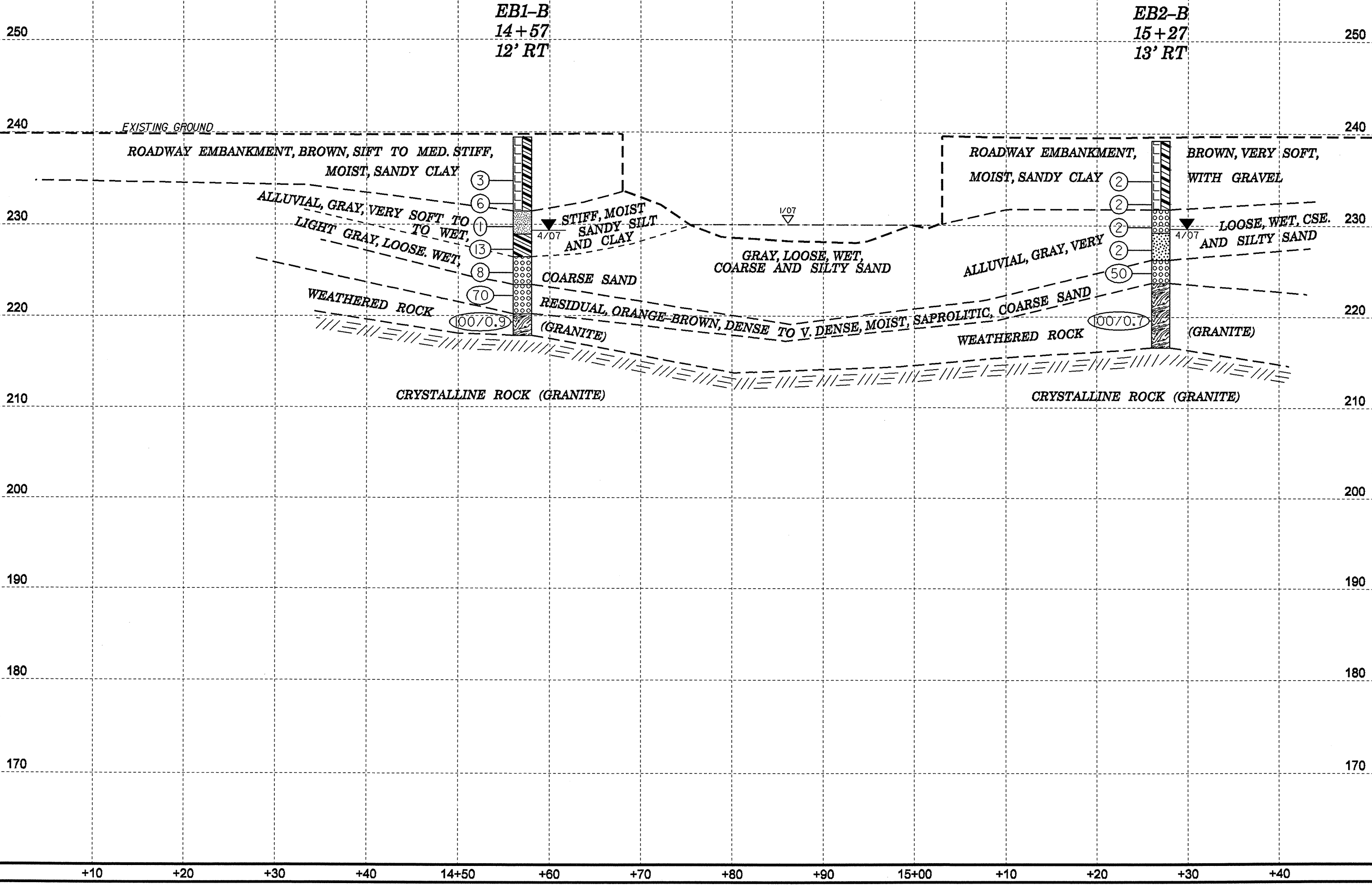
Jaime Love Pedro

Jaime Love Pedro
Engineering Geologist

FENCE DIAGRAM THROUGH BORINGS PROJECTED ALONG -L-



PROJECT REFERENCE NO.	SHEET
33469.1.1 (B-4114)	5





PROJECT NO. 33469.1.1	ID. B-4114	COUNTY Franklin	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 151 on -L- (SR 1146) over Camping Creek			GROUND WTR (ft)
BORING NO. EB1-A	STATION 14+49	OFFSET 12ft LT	ALIGNMENT -L-
COLLAR ELEV. 239.4 ft	TOTAL DEPTH 21.4 ft	NORTHING 838,826	EASTING 2,189,332
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 04/12/07	COMP. DATE 04/12/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 21.4 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
240												ROADWAY EMBANKMENT Brown, SANDY CLAY with gravel (0.0'-1.0')	0.0
236.0	3.4	1	2	4									5.5
233.5	5.9	10	15	12								ALLUVIAL Gray, SANDY SILT with trace wood debris	7.5
231.0	8.4	4	2	1								Light Gray, SILTY SAND	10.0
228.5	10.9	45	55/0.4									WEATHERED ROCK (Granite)	
226.0	13.4	70	30/0.1										
221.0	18.4	100/0.3											

Boring Terminated by Auger Refusal at Elevation 218.0 ft on CRYSTALLINE ROCK (Granite)

PROJECT NO. 33469.1.1	ID. B-4114	COUNTY Franklin	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 151 on -L- (SR 1146) over Camping Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 14+57	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 239.4 ft	TOTAL DEPTH 21.6 ft	NORTHING 838,841	EASTING 2,189,352
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 04/12/07	COMP. DATE 04/12/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 21.6 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
240												ROADWAY EMBANKMENT Brown, SANDY CLAY with gravel (0.0'-1.0')	0.0
235.7	3.7	1	1	2									5.5
233.2	6.2	2	2	4								ALLUVIAL Gray, SANDY SILT with trace organics	8.0
230.7	8.7	1	0	1								Dark gray, SANDY CLAY	10.5
228.2	11.2	3	5	8								Light gray, COARSE SAND	13.0
225.7	13.7	1	4	4									16.0
223.2	16.2	7	27	43								RESIDUAL Orange-brown, saprolitic, COARSE SAND	19.2
220.7	18.7	14	38	62/0.4								WEATHERED ROCK (Granite)	21.6

Boring Terminated by Auger Refusal at Elevation 217.8 ft on CRYSTALLINE ROCK (Granite)

PROJECT NO. 33469.1.1	ID. B-4114	COUNTY Franklin	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 151 on -L- (SR 1146) over Camping Creek			GROUND WTR (ft)
BORING NO. EB2-A	STATION 15+20	OFFSET 13ft LT	ALIGNMENT -L-
COLLAR ELEV. 239.3 ft	TOTAL DEPTH 12.9 ft	NORTHING 838,894	EASTING 2,189,310
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 04/12/07	COMP. DATE 04/12/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 12.9 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
240														0.0
235.8	3.5	1	1	1									ROADWAY EMBANKMENT Brown, SILTY CLAY	5.5
233.3	6.0	1	3	3									ALLUVIAL Gray, SILTY SAND	7.5
230.8	8.5	7	6	4									Light gray, COARSE SAND with trace organics	12.5
228.3	11.0	2	1	2									WEATHERED ROCK (Granite)	12.9
													Boring Terminated by Auger Refusal at Elevation 226.4 ft on CRYSTALLINE ROCK (Granite)	

PROJECT NO. 33469.1.1	ID. B-4114	COUNTY Franklin	GEOLOGIST Pedro, J. L.
SITE DESCRIPTION Bridge No. 151 on -L- (SR 1146) over Camping Creek			GROUND WTR (ft)
BORING NO. EB2-B	STATION 15+27	OFFSET 13ft RT	ALIGNMENT -L-
COLLAR ELEV. 239.2 ft	TOTAL DEPTH 22.6 ft	NORTHING 838,908	EASTING 2,189,333
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 04/13/07	COMP. DATE 04/13/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 22.6 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
240														0.0
235.8	3.4	2	1	1									ROADWAY EMBANKMENT Brown, SANDY CLAY with gravel (0.0'-1.0')	5.5
233.3	5.9	WOH	WOH	2									ALLUVIAL Gray, COARSE SAND	7.5
230.8	8.4	2	1	1									Dark gray, SILTY SAND with little organics	10.0
228.3	10.9	WOH	1	1									RESIDUAL Orange-brown, saprolitic, COARSE SAND	15.5
225.8	13.4	2	18	32									WEATHERED ROCK (Granite)	15.5
		6	50	50/0.2									Boring Terminated by Auger Refusal at Elevation 216.6 ft on CRYSTALLINE ROCK (Granite)	22.6
220.8	18.4													

NCDOT BORE DOUBLE B4114_GEO_BH.GPJ NC_DOT.GDT 05/14/07

PROJECT NO. 33469.1.1		ID. B-4114		COUNTY Franklin		GEOLOGIST Pedro, J. L.										
SITE DESCRIPTION Bridge No. 151 on -L- (SR 1146) over Camping Creek							GROUND WTR (ft)									
BORING NO. EB1-B (DET)		STATION 13+90		OFFSET 9ft RT		ALIGNMENT -DET-										
COLLAR ELEV. 232.2 ft		TOTAL DEPTH 5.5 ft		NORTHING 838,808		EASTING 2,189,313										
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
START DATE 04/13/07		COMP. DATE 04/13/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 5.5 ft										
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100							
235																
230.1	2.1													232.2	0.0	
		100/0.3												230.7	1.5	ALLUVIAL Gray-brown, SANDY SILT
														226.7	5.5	WEATHERED ROCK (Granite)
																Boring Terminated by Auger Refusal at Elevation 226.7 ft on CRYSTALLINE ROCK (Granite)

PROJECT NO. 33469.1.1		ID. B-4114		COUNTY Franklin		GEOLOGIST Pedro, J. L.										
SITE DESCRIPTION Bridge No. 151 on -L- (SR 1146) over Camping Creek							GROUND WTR (ft)									
BORING NO. EB2-B (DET)		STATION 14+61		OFFSET 11ft RT		ALIGNMENT -DET-										
COLLAR ELEV. 233.2 ft		TOTAL DEPTH 13.8 ft		NORTHING 838,877		EASTING 2,189,294										
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
START DATE 04/13/07		COMP. DATE 04/13/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 13.1 ft										
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100							
235																
														233.2	0.0	
														231.7	1.5	ROADWAY EMBANKMENT Brown, SILTY CLAY
230.1	3.1													230.1	1.5	ALLUVIAL Dark gray, SANDY SILT with trace organics
														227.6	5.6	Dark gray, SANDY SILT with trace organics
														226.6	6.6	Light gray, COARSE SAND
														225.1	8.1	Light gray, COARSE SAND
														222.7	10.5	WEATHERED ROCK (Granite)
														220.1	13.1	WEATHERED ROCK (Granite)
														219.4	13.8	CRYSTALLINE ROCK (Granite)
																Boring Terminated by Auger Refusal at Elevation 219.4 ft on CRYSTALLINE ROCK (Granite)

NCDOT BORE DOUBLE B4114_GEO_BH.GPJ NC_DOT.GDT 05/15/07

EB1-A (-L-)

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	10' LT	14+49	8.4-9.9	A-2-4(0)	29	10	40.9	24.9	16.0	18.2	90	62	34	-	-

EB1-B (-L-)

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	12' RT	14+57	3.7-5.2	A-6(1)	34	16	42.7	20.2	12.8	24.3	89	61	36	-	-
SS-2	12' RT	14+57	8.7-10.2	A-4(0)	26	7	45.1	19.4	17.2	18.2	97	67	36	-	-
SS-3	12' RT	14+57	11.2-12.7	A-6(4)	31	15	24.9	27.5	15.2	32.4	99	86	50	-	-
SS-4	12' RT	14+57	13.7-15.2	A-1-b(0)	25	NP	56.1	25.7	12.1	6.1	86	49	18	-	-
SS-5	12' RT	14+57	16.2-17.7	A-1-b(0)	21	NP	67.2	18.4	10.3	4.0	70	32	12	-	-

EB2-A (-L-)

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	13' LT	15+20	3.5-5.0	A-7-6(7)	48	25	35.8	16.6	17.2	30.4	87	63	44	-	-
SS-8	13' LT	15+20	6.0-7.5	A-2-4(0)	16	NP	51.6	23.1	15.2	10.1	94	56	27	-	-

EB2-B (-L-)

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	13' RT	15+27	3.4-4.9	A-6(4)	37	17	38.5	18.4	14.8	28.3	95	68	44	-	-
SS-10	13' RT	15+27	5.9-7.4	A-6(6)	40	21	34.8	17.8	17.0	30.4	95	69	48	18.4	-
SS-11	13' RT	15+27	10.9-12.4	A-2-4(0)	29	NP	50.0	30.4	9.5	10.1	95	69	21	-	3.9

EB2-B (-DET-)

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-12	11' RT	14+61	3.1-4.6	A-4(2)	25	6	6.5	29.8	35.4	28.3	100	99	70	-	-



**FIELD
SCOUR REPORT**

WBS: 33469.1.1 TIP: B-4114 COUNTY: Franklin

DESCRIPTION(1): Bridge No. 151 on -L- (SR 1146) over Camping Creek at Station 14+89

EXISTING BRIDGE

Information from: Field Inspection Microfilm (reel pos:
Other (explain) hydro report

Bridge No.: 151 Length: 36 Total Bents: 5 Bents in Channel: 3 Bents in Floodplain: 2
Foundation Type: Timber piles and steel crutch bents between interior B1 and both End Bents

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Bottom left of abutment wall exposed at End Bent 2

Interior Bents: None visible

Channel Bed: Local scour

Channel Bank: Contraction scour along banks upstream on End Bent 2 side

EXISTING SCOUR PROTECTION

Type(3): Wing walls and concrete boxes have been added around various piles

Extent(4): 30'L x 10'H

Effectiveness(5): Effective

Obstructions(6): Lots of limbs underneath bridge

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 theoretical 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, light gray, loose, coarse sand (SS-4)

Channel Bank Material(8): Alluvial, dark gray, very soft to soft, sandy silt with trace organics (SS-12)

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

Floodplain Width(10): +/- 250'

Floodplain Cover(11): Grass, trees, and brush

Stream is(12): Aggrading Degrading Static

Channel Migration Tend.(13): Northeast towards End Bent 2

Observations and Other Comments: Old crossing has fallen in creek 100' upstream from existing bridge and is obstructing water flow

DESIGN SCOUR ELEVATIONS(14)

Feet X Meters

Comparison of DSE to Hydraulics Unit theoretical scour:

The Geotechnical Engineering Unit agrees with the Hydraulic Unit's theoretical overtopping scour elevation of 222.7 feet.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bed	Bank					
Sample No.	SS-4	SS-12					
Retained #4	3	-					
Passed #10	86	100					
Passed #40	49	99					
Passed #200	18	70					
Coarse Sand	56.1	6.5					
Fine Sand	25.7	29.8					
Silt	12.1	35.4					
Clay	6.1	28.3					
LL	25	25					
PI	NP	6					
AASHTO	A-1-b(0)	A-4(2)					
Station	14+57(L)	14+61 (Det)					
Offset	12' Rt	11' Rt					
Depth	13.7'-15.2'	3.1'-4.6'					

Reported by: Jaime Love Pedro
Jaime Love Pedro

Date: 4/3/2007

SITE PHOTOGRAPH

Bridge No. 151 on -L- (SR 1146) over Camping Creek

