

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: May 8, 1995

TO: Richard Pauser
Construction and Materials Supervisor
Transportation District 6

FROM: Dennis G. Althaus
Geologist

SUBJECT: Site Investigation Report
Project I.D. 1720-08-03
Structure B-47-139
STH 65 over Trimbelle River
Ellsworth to River Falls
Pierce County

Attached is the Site Investigation Report for the above project.

DGA:\

Attachments

cc: District 6 (orig. +3)
C.O. Bridge (2)
C.O. Files
C.O. Design
J.E. Haverberg
Geotechnical File

SITE INVESTIGATION REPORT

Project I.D. 1720-08-03

Structure B-47-139

STH 65 over Trimbelle River

Ellsworth to River Falls

Pierce County

1. GENERAL

Three borings were taken for a proposed single span structure to replace the present two span structure at about station 10+000 for STH 65 over the Trimbelle River. The proposed structure will be about the same length but 2 meters wider than the present structure. The site is located about 1.6 miles north of the junction of STH 65 and CTH "J". The 8 foot approach fills look to be in good condition. Riprap was used on the both abutment fills. The river bank shows signs of erosion. The present structure has some rusting on the girders and is in general fair condition. The river channel is a meandering 6 meters wide by 5 to 60 cm deep with a sandy silty cobbled bottom. Rolling hills with woods and farm fields for ground cover make up the surrounding topography. Rock outcrops and boulders were noted in the surrounding area. The surface soil is a silty sand.

2. SUBSURFACE CONDITION

Three borings conforming to AASHTO Method T-206, Standard Penetration Test, to estimate relative density, fix presumptive bearing capacity, investigate soil properties to select suitable pile types with their support values, make a cursory review of alternative foundation possibilities, and recover samples for soil textural identification and classification. Soil textures in the borings logs are field identifications made by the drillers and were later verified in the C.O. Geotechnical Lab.

Boring 1 was taken at station 9+986.1 6.4 meters right of the existing centerline. Boring 1 was logged as the following; elevation 290.136 to 290 brown topsoil, 290 to 287.75 loose brown sand with a little silt and a trace of gravel, 287.75 to 285.65 very loose black topsoil with layers of sand, 285.65 to 284.75 dense brown sand with a little gravel, 284.75 to 282.65 dense to very dense weathered limestone.

Boring 2 was taken at station 10+013 1.9 meters left of the existing centerline. Boring 2 was logged as the following; elevation 290.546 to 290.34 asphalt, 290.34 to 290 gravel base course, 290 to 287.4 firm brown sand with a trace of gravel and silt, 287.4 to 287.25 very loose brown peat with a trace of sand, 287.25 to 285.75 loose black topsoil with layers of gray sand, 285.75 to 285.15 very loose black peat with a trace of wood fibers, 285.15 to 284.4 firm to dense weathered limestone, 284.4 to 282.55 very dense weathered limestone.

Boring 3 was taken at station 9+984 1.5 meters left of the existing centerline. Boring 3 was logged as the following; elevation 290.446 to 290.3 asphalt, 290.3 to 283.25 did not sample, 283.25 to 281.75 limestone (cored 1.5 meters, 80% recovery, RQD 0%). Boring 3 was taken strictly for the limestone core that was to be taken at boring 1, however the drill rig was not stable enough to take the core at the boring 1 location.

The water elevation was at elevation 286.256 at the time the borings were made. The stream bed elevation was 285.756.

Weathered Rock Elevations

<u>Structure unit</u>	<u>Boring No.</u>	<u>Station</u>	<u>Weathered Rock</u>
South Abutment	1	9+986.1	284.75
North Abutment	2	10+013	285.15

3. BEARING CAPACITY

The subsurface soils within a practical footing depth have insufficient bearing capacity to support spread footings for this structure.

4. PILES

A cursory review indicates that the soils above rock/weathered rock would not be adequate to support friction/displacement piles at practical load levels.

H-piles or oil field pipe piles however could be driven to 634kg per square cm load in the steel section if driven into the weathered rock at about elevation 284.

5. ALTERNATIVE FOUNDATION TYPE

Drilled caissons could be used here but the cost would be more. Dynamic and vibratory methods could not be used effectively here.

6. LATERAL EARTH PRESSURE

Grade 1 granular backfill will exert an equivalent fluid pressure of 14.7 to 17.1 g/square cm, silty sands 22 g/square cm, silts 31.8 g/square cm, silty clays and clays 41.6 g/square cm or more.

7. CONSTRUCTION PROBLEMS

The proposed structure is to be 2 meters wider than the existing structure. Since the existing structure approach fill was placed over 2.1 to 2.4 meters of topsoil or topsoil and peat the fill widening will have settlement problems if the topsoil and peat under the newly widened portion of the approach fill is left to settle on its own (as much as 2").

8. RECOMMENDATIONS

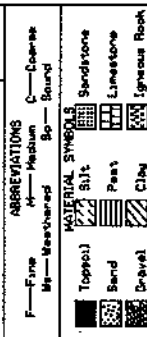
A) Due to where the problem exists under the present fill and the cost of dealing with it in money or time it is recommended that the fill settle on its own and do periodic maintenance on the approach pavements for a couple of years till the settlement subsides.

B) Use H-piles or oil field pipe piles driven into weathered rock at 634kg per square cm load in the steel section. The pile tip elevation should be about 284.

C) Use a grade 1 sand as fill and backfill. If a grade 1 sand is not used a drainage system may be needed behind any earth retaining structure.

D) Due to signs of erosion on the stream bank and the fact that the present structure has riprapped the abutment fills, it is recommended that the new structure also riprap the fills where the river could otherwise cause erosion problems.

If you have any questions, please contact the Geotechnical Unit.



Probe No.	Sta.	Elevation	7 Average Blows Per 30mm	Unconfined Refuse
95/152-95				95/152
152mm Penetration				
Probe taken with #				
15N.Kg Wt.				
Falling 457mm on a				
5mm O.D. Pipe.				

LEGEND OF BORING

Strength Kg/cm²

7.7 *

7.7 *

Blows Per 305mm

Using 838 Kg Wt.

Falling 782mm

Mesh Sample

Elev.

Dorsing No. 810

Sandy Gravel

F

Boulders or

[illegible][illegible][illegible]

FIELD BORE LOG EL3(S) 385 State of Wisconsin/Department of Transportation

State of Wisconsin/Department of Transportation

Boring No. 1 Structure B-41-139 County Pierce Sheet 1 of 1

Project 1720-08-03 Road 5TH 65 over Trimbelle

Station	9+986.1	Offset	6.4 meters, R ± C	Surface Elevation	968.9
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GROUND WATER OBSERVATIONS

While drilling Used Revert Time after drilling 243 - 5.1
29A-121

Before casing removal _____ Depth to water _____ 210.50

After Boring Completed _____ Depth to cave-in _____

Cave In	Water Notes	U	V	W	X	Y
	DRILLING METHOD					

MOISTURE

D = Damp
M = Moist
W = Wet

HS = Hollowstem
WA = Washhead
BB = Rockbit

ST = Shelby tube
SS = Split spoon
DM = Drilling mud

A = Auger
C = Coring
W = Wash

E = Easy
M = Medium
H = Hard

Start 2-7-95 Unit 3

Finish 2-8-25 Chief Morston

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on		Drilling Method
		0/6	6/12					Casing Size	Probe Size	
					BT 70 <u>PS 01</u> loose Br <u>SAND</u> little silt or gravel					HS
1 m		3 4	4 5							
2 m		1 1	1 1		V. loose Br to sandy <u>TAPS 01</u> w/ layers sand					
3 W		7 18	13 19		Br. med-coarse <u>SAND</u> <u>DENSE</u> little gravel to silt					WA RB rev
4 W		17 22	13 75		Dense, weathered <u>LIMESTONE</u>					
		75/8			20/55 refusal E.O.B.					

Checked by

Final

Boring No.

FIELD BORE LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 2 Structure B-47-139 County Pierce Sheet 1 of 1

Project 1720-08-03 Road STH 65 over Trimbelle

Station	10+013	Offset	1.9 meters Lt C	Surface Elevation	225.41
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While drilling Used reverb GROUND WATER OBSERVATIONS
Time after drilling _____ 290.546

Before casing removal _____ Depth to water _____

After Boring Completed _____ Depth to cave-in _____

Cave In Water Notes

MOISTURE

D = Damp
M = Moist

W = Wet



DRILLING METHOD

HS = Hollowstem
MA = Macbride

WA = Washhead
RB = Rockbit

Phone 321-1100

ST = Shelby tube
SS = Split spoon

DM = Drilling mud

.....

A = Auger
C = Coring

W = Wash

1. *Journal of the American Medical Association*, 1997; 277: 1033-1036.

E = Easy
M = Med

$H = H_{arc}$

(continued)

Start 2-9-95 Unit 3

Finish 2-9-95 Chief Huxford

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on			Drilling Method
		0/6	6/12					Casing Size	Probe Size	Size	
					Asphalt Base Course GRAVEL Firm Br. SAND to gravel + silt						HS
1	M	5 6	6 7								
2	M	1 2	2 3		V. loose Br. Silt to fine sand Loose Bl. TOPSOIL w/ thin layers grey sand						WA RB revers
3	W	2 1	1 2		V. loose Bl. PEAT to wood fibers Firm-Dense weathered LIMESTONE						
4	W	22 47	70 85		V. Dense weathered LIMESTONE V. ssrefusal Drilled v. smooth + v. Hard 22.5' to 30'						V.H
5	W	refusal									
					E.O.B						

Checked by _____

Final

Boring No.

2

FIELD BORING LOG
6 Meter Log

Boring No. 3 Structure B-47-139 County PIERCE Sheet 1 of 2
Project 1720-08-03 Road STH "65"
Station 9+984 Offset 1.5 m LEFT of Q Surface Elevation 295.316

GROUND WATER OBSERVATIONS

Streambed Elev. 290.626 Time After Drilling _____
Water Elev. 291.126
Top of Well Elev. _____ Depth to Water _____

290.441

MOISTURE
D = Damp
M = Moist
W = Wet

DRILLING METHOD
A = Auger
C = Coring
CA = Casing Advancer
WA = Wash Ahead
HS = Hollowstem

DM = Drilling Mud
RB = Rockbit
SS = Splitspoon
ST = Shelby Tube
E = Easy

NW = Casing, 76.2mm I.D. (3")
HW = Casing, 101.6mm I.D. (4")
BV = Corebarrel, 36.5mm Core Dia. (1 7/16")
NV = Corebarrel, 47.6mm Core Dia. (1 7/8")
M = Medium
H = Hard

Start 02-19-95 Unit 3
Finish 02-21-95 Chief ANDELS

Sample No.	Moisture	Blows on Sampler	Sample and Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS		Unconfined Strength	Boulders	Drilling Method	Drilling
					ASPHALT				RB	
					30 cm	BRN SAND - LITTLE S< LITTLE GRAVEL			REVERT	
					60 cm					
					90 cm					
					120 cm					
					1.5 m		1.5 m			
					180 cm					
					210 cm	No SAMPLING REQUIRED				
					240 cm					
					270 cm					
					3 m		3 m			
					330 cm					
					360 cm					
					390 cm					
					420 cm					
					4.5 m		4.5 m			
					480 cm					
					510 cm					
					540 cm					
					570 cm					
					6 m		6 m			

Checked by _____

METRIC CONVERSION FACTORS
1 cm = 0.3937 inches
1 m = 3.281 feet
1 inch = 2.54 cm
1 foot = 30.48 cm, 0.3048 m

Boring No. 3

FIELD BORING LOG
6 Meter Log

Boring No. 3 Structure B-47-139 County PIERCE Sheet 2 of 2
Project 1720-08-03 Road SRH "65"
Station 9+984 Offset 1.5 m LEFT of Q Surface Elevation 295.316

GROUND WATER OBSERVATIONS

290.446

Streambed Elev. 290.626 Time After Drilling _____
Water Elev. 291.124
Top of Well Elev. _____ Depth to Water _____

MOISTURE

D = Damp
M = Moist
W = Wet

DRILLING METHOD

A = Auger

C = Coring

CA = Casing Advancer

WA = Wash Ahead

HS = Hollowstem

DM = Drilling Mud

RB = Rockbit

SS = Split spoon

ST = Shelby Tube

B = Easy

NW = Casing, 76.2mm I.D. (3")

HW = Casing, 101.6mm I.D. (4")

BV = Corebarrel, 36.5mm Core Dia. (1 7/16")

NV = Corebarrel, 47.6mm Core Dia. (1 7/8")

M = Medium

H = Hard

Start 02-19-95 Unit 3Finish 02-21-95 Chief ANDERSON

Sample No.	Moisture	Blows on Sampler	Sample and Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Drilling Method	Probe Blows
					WEATHERED LIMESTONE			RB	
					630 cm				
					660 cm				
					690 cm				
					720 cm				
					LIMESTONE ROCK CORE			C	
					7.5 m				
					80% RECOVERY				
					780 cm				
					810 cm				
					840 cm				
					870 cm				
					9 m				
					930 cm				
					960 cm				
					990 cm				
					1020 cm				
					10.5 m				
					1080 cm				
					1110 cm				
					1140 cm				
					1170 cm				
					12 m				

Checked by _____

METRIC CONVERSION FACTORS

1 cm = 0.3937 inches

1 m = 3.281 feet

1 inch = 2.54 cm

1 foot = 30.48 cm, 0.3048 m

Boring No. 3