

CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN

Date: March 9, 1981

File Ref:

To: Mr. Thomas Clark, District Director
ATTN: Mr. Louis Schmidt, District Chief Materials
and Construction Engineer

From: Mr. G. H. Zuehlke, Chief Materials Engineer

Subject: MATERIALS

SOILS

Site Investigation Report

Project I.D. 1559-02-00

STH-64 over the Willow River

Structure B-55-85

St. Croix County

Attached is the Site Investigation Report for the structure that will carry STH-64 over the Willow River at station 295 + 81.

By

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Soils✓

Site Investigation Report
Project I.D. 1559-02-00
STH-64 over Willow River
Structure B-55-85
St. Croix County

1. General

The proposed structure will replace the present structure that carries STH-64 over the Willow River at station 295 + 81. The alignment and grade will not change. The proposed structure will be a three span bridge and be 118 feet long. The present approach fills are approximately 12 feet high. Topsoil has been entrapped under the present fills.

The general geology of the area is moraine.

2. Subsurface Conditions

Three borings were made at the proposed structure site. Standard Penetration Tests (AASHTO T-206) were made to obtain soil samples for testing and classification, to estimate relative soil density, to evaluate bearing capacities and to fix pile soil support values. Rock cores were made in Borings 1 and 3, with 98 and 88% recovery with RQD's of 16 and 20 respectively. The soils were sampled, tested and given classifications in the field by the Drill Crew Chief with subsequent checks made in the Central Soils Office.

The approach fills were constructed with silty sand and gravel. Topsoil was entrapped under the east approach fill. The soils below the fills were sand and gravel. The surface of the limestone bedrock was at elevation 922⁺ at the east abutment, elevation 923⁻ at pier #1 and elevation 920⁻ at the west abutment. The upper 3 feet of the limestone is weathered. Elevation 920⁻ and 922⁻ is the transition from sandstone bedrock to limestone bedrock. There was limestone float above white sandstone at the west abutment. The limestone float is highly weathered and was easily penetrated by the split spoon.

The stream elevation was 944⁺ at the time of drilling. This would reflect the ground water table.

3. Bearing Capacity

No bearing capacity can be assigned to the soils above elevation 944⁺. There may be more topsoil entrapped under the fill than indicated by Boring #1.

The maximum presumptive bearing capacity of the soils from elevation 944⁺ to the surface of the weathered limestone is 4,000 PSF. The bearing capacity of the upper 3 feet of the weathered limestone is 6,000 PSF. Below the weathered zone it is 10 TSF.

4. Piles

All pile types would penetrate to the limestone bedrock. H-piles would penetrate 3 to 4 feet into the weathered limestone.

Driven pile lengths may be erratic due to the uneven weathering of the bedrock and the undulating surface of the bedrock.

5. Construction Problems

The present pavement shows signs of settling. This is probably due to the entrapped topsoil. This topsoil should be removed at the abutments.

Erratic pile lengths may occur due to the uneven weathering of the bedrock and the undulating surface of the bedrock.

6. Recommendations

Piles would be the most suitable foundation for the proposed structure. H-piles would be the most suitable type. Points would be desirable to help penetrate the float and to reduce the possibility of damaging piles in the weathered bedrock. H-piles can be driven to 9,000 PSI in the steel section.

Vibroflotation and drilled caissons would not be economical due to silty soils and the high ground water table.

Equivalent fluid pressures of 33 PCF can be used to proportion structure units.

Cross drains at the abutments would be desirable.

State of Wisconsin/Department of Transportation

Checked By	Final	End of Bor. 42'	Boring No.
		RFR	1

State of Wisconsin/Department of Transportation

Checked by	Final	Boring No.
	RFR	2

FIELD BORING LOG

E-L-3(S)-8-76

State of Wisconsin/Department of Transportation

Boring No. 3 Structure Willow River Crossing B-55-85 County St. Croix Sheet 2 of 2

Project 1559-02-00 Road STH "64"

Station 295+58 Offset 8' RT 2 Surface Elevation 957.8

GROUND WATER OBSERVATIONS

While drilling _____ Time after drilling _____
Before casing removal _____ Depth to water _____
After Boring Completed _____ Depth to cave-in _____
Cave In _____ Water Notes _____

MOISTURE
D = Damp
M = Moist
W = Wet
WA = Washahead
FT = Fish tail
RB = Rock bit
DRILLING METHOD
ST = Shelby tube
SS = Split spoon
DM = Drilling mud
A = Auger
C = Coring
W = Wash
E = Easy
M = Medium
H = Hard
Start 2/20/81 Unit I
Finish 2/24/81 Chief Meyers

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	
5		12	55	40'	SS Refusal. Dense white weathered Sandy Limestone Cored 4.5' Recovery 88% RQD 20			130		
				45'	End of Bor.					
				50'						
				55'						
				60'						
				65'						
				70'						
				75'						
				80'						

Checked by _____ Final RFR Boring No. 3