

# CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN

Date: June 19, 1985

File Ref:

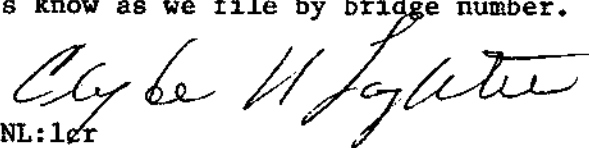
To: Mr. Thomas R. Clark, District Director

Attention: Mr. Louie Schmidt, District Chief Construction & Materials Engineer

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

Subject: MATERIALS  
SOILS  
SITE INVESTIGATION REPORT  
Project ID 8070-07-00  
USH 63 over South Fork, Willow River  
Structure B-55-  
St. Croix County

We are attaching copies of a Site Investigation Report for the project noted above. When a structure number has been assigned to this bridge, please let us know as we file by bridge number.

  
CNL:ler

cc: District 6 (Original + 3)  
Bridge  
GHZ  
DLS  
MOF  
Soils File

SITE INVESTIGATION REPORT  
Project ID 8070-07-00  
USH 63 over South Fork, Willow River  
Structure B-55-  
St. Croix County

1. General

This is a report on subsurface conditions with accompanying foundation studies for the proposed structure carrying USH 63, Station 792 + 50±, over the South Fork of the Willow River. The site is immediately south of the USH 63, STH 64, and STH 46 junction some 12 miles north of Baldwin. The proposed single-span bridge will replace an existing longer two-span concrete structure. The general topography is rolling, largely in farmland. The stream is about 20 feet wide, up to 2 feet deep, meanders gently through this reach and shows cobbles in the river bed. The adjacent area is in woods and pasture with surface soils of sand and gravel till. The existing fill is about 15 feet high and no measurable grade change is anticipated.

2. Subsurface Conditions

Two borings were made on the site with Standard Penetration Tests, AASHTO T-206, to determine relative soil density, set allowable bearing capacity, fix parameters for pile type selection and their support values, and recover samples for textural identification and classification. Two additional auger borings were made to delineate bedrock and buried concrete. NQ cores were cut to check concrete and rock. Soil textures noted on drilling logs were driller's field identification.

All borings were made through the existing bridge deck. The ground surface below the deck was near elevation 1024. From this surface down to elevation 1017±, the soils were predominantly very loose to loose silts. Below this, loose to firm silty sands were logged to elevation 997 at the north bridge end and to 990± at the south end. At the north end, Borings 1 and 3 bottomed on limestone while Borings 2 and 4 at the proposed south abutment location bottomed in dense sand, gravel, and cobbles.

Boulders were noted at the surface. At the south abutment station a block of concrete was logged at elevation 1007±. In Boring 4, by shifting the boring 1 foot south, the augers could then penetrate deeper to elevation 983±.

At the time of drilling, April 1985, the ground water level was elevation 1014. This was essentially stream level.

3. Bearing Capacity

Within workable footing depths, the soil density is obviously insufficient to support bridge loads. No analyses have been made.

#### 4. Piles

At the north abutment, all types of piles would drive to bedrock. The south end is very complex because of the buried concrete near elevation 1007±. In retrospect, the area should have had a pattern of borings to delineate the concrete debris, possibly a relic from an earlier bridge. Steel H-piles would be the only option here, and there is a need to better delineate the concrete even with the steel H-section.

#### 5. Alternate Foundation Types

No engineering or economic advantage can be foreseen for vibratory methods, dynamic consolidation, or drilled-in shafts.

#### 6. Lateral Earth Pressures

The active lateral earth pressure (equivalent fluid) on walls or other earth retaining structures would be 30-55 psf for the silts logged near the surface. For the sandy soils, the pressure would be 33± psf. Both of these assume a placement of adequate density, say 90-95% AASHTO T-99 maximum density, and thorough drainage.

#### 7. Construction Problems

Both the shallow boulders and the buried concrete may create pile driving problems.

#### 8. Recommendations

Piles are the preferred foundation units for this structure. With boulders and other driving obstacles, steel H-piles appear to be the most suitable type. These would drive to limestone bedrock at the north abutment and to either the concrete obstructions or to elevation 970± at the south end.

One thing can be considered to better determine a final decision on the south end, and that would be to auger as needed to determine location and extent of the concrete at the south end.

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Station	792+19	Offset	9' LT E	Surface Elevation	1032.8
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Cave In	Water Notes
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MOISTURE		DRILLING METHOD			Start <u>4/17/85</u>	Unit <u>II</u>
D = Damp	WA = Washahead	ST = Shelby tube	A = Auger	E = Easy		
M = Moist	FT = Fish tail	SS = Split spoon	C = Coring	M = Medium		
W = Wet	RB = Rock bit	DM = Drilling mud	W = Wash	H = Hard	Finish <u>4/18/85</u>	Chief <u>Moyle</u>

[illegible]

**Checked by**

**Final**

Boring No.



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