

CORRESPONDENCE/MEMORANDUM STATE OF WISCONSIN

DATE: April 11, 1994

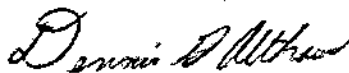
TO: Richard J. Pauser
Construction and Materials Supervisor
Transportation District 6

FROM: Bruce J. Pfister, P.E.
Chief Geotechnical Engineer

SUBJECT: Site Investigation Report
Project I.D. 8940-04-02
USH 12 over Wilson Creek
Baldwin to East County Line
Structure B-55-124
St. Croix County

We are attaching copies of a Site Investigation Report for the project noted above.

by:



Dennis G. Althaus

BJP:DGA:m00147
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. 8940-04-02
USH 12 OVER WILSON CREEK
BALDWIN TO EAST COUNTY LINE
STRUCTURE B-55-124
ST. CROIX COUNTY**

1. GENERAL

Two borings were made for a proposed single span structure to replace the present single span concrete girder bridge. The proposed structure will carry USH 12 over Wilson Creek at station 610+97±. The new structure will be 10 feet longer and 10 feet wider than the existing bridge. The structure is located 2.4 miles east of the junction STH 128 and USH 12 near the ST. Croix County/Dunn County line. There is some cracking on the existing structure abutment walls but overall the structure is in fair to good condition. No seepage, erosion or sloughing was noted on the 10 foot fills and fill slopes. The fills appear to be in good condition. The cracked and patched bituminous pavement is in poor condition. Rolling hills covered with trees and brush make up the topography and ground cover. Rock outcrops and boulders were observed. NO riprap was used on the abutment slopes, stream banks, or fill slopes. Wilson Creek is 10 feet wide and 1 to 12 inches deep with a stony rocky bottom.

2. SUBSURFACE CONDITION

Three borings were made 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 and their support values, make a cursory review of alternate foundation possibilities, and recover samples for soil textural identification and classification. Soil textures noted on the drilling logs are drillers field identification with a later check at the Central Geotechnical Section Office.

Boring 1 was taken at station 611+31 6 feet left of the existing centerline. Boring 1 was logged as the following, elevation 1021.8 to 1008 firm to dense brown sand, 1008 to 985.5 very dense brown sand (weathered sandstone to sandstone).

Boring 2 was taken at station 610+64 10 feet right of the existing centerline. Boring 2 was logged as the following, elevation 1020 to 1011.5 brown sandy silt, 1011.5 to 1008 brown silty sand, 1008 to 1004 brown sand with a layer of gravel, 1004 to 994 very dense white sand (sandstone).

The creek elevation at the time the borings were taken was 1008.7. The creek bottom was 1007.7.

<u>Structure Unit</u>	<u>Station</u>	<u>Weathered Rock/Rock</u>
Boring 1 East Abutment	611+31	1008±
Boring 2 West Abutment	610+64	1004±

3. BEARING CAPACITY

A cursory review indicates that the soils above bedrock are inadequate for bridge support on footings. However, rock (sandstone) is located $6 \pm$ feet below the existing fills. Spread footings at 5 to 6 tons per square foot could be placed on the rock at elevation $1004 \pm$ for the west abutment and $1008 \pm$ for the east abutment.

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 9000 psi load in the steel section if driven to rock at elevation $1003 \pm$ or below for the west abutment or $1007 \pm$ or below for the east abutment. Since the bridge is to be widened by $10 \pm$ feet and the original ground is $1009 \pm$ the piles would be augered into elevation $998 \pm$ then driven to bearing.

5. ALTERNATE FOUNDATION TYPE

Drilled caissons could be used here but the cost would be more. Dynamic and vibratory methods could not be used effectively here. If drilled caisson are used they should go 7.5 feet into the sandstone. The bearing capacity is 23 tons per square foot. The shaft would be total end bearing shafts.

6. LATERAL EARTH PRESSURE

The active lateral earth pressure can be held to a minimum of 30 to 35 psf if the fill material behind the abutment or other earth retaining structures is a good sand material and adequate compaction and thorough drainage is maintained. If a silty sand material is used increase the pressures to 45 psf or more.

7. CONSTRUCTION PROBLEMS

- A. Predrilling for piles in the sandstone would not be extremely difficult for an auger down to elevation $998 \pm$. But, predrilling would boost the cost.
- B. Spread footings would mean removing existing fill and overburden down to elevation $1003 \pm$ for the west abutment and $1007 \pm$ for the east abutment. This would mean removing $15 \pm$ feet of fill and overburden for the east abutment and $17 \pm$ feet for the west abutment.

- C. The step up cost for drilled caissons would be quite high for such a small structure.

8. RECOMMENDATIONS

- A. Build the fill widening with a good sand material. Use the same good sand material as backfill also.
- B. Since the present fill has been in place for 70+ years it is recommended that the existing fills be treated as in place soils. This fact would make it possible to drive H-piles or oil field pipe piles to rock without having to prebore into the sandstone.

The pile tip elevation would be $1003 \pm$ for the west abutment and $1007 \pm$ for the east abutment at 9000 psi load in the steel section.

If you do not wish to treat the 70+ year old fills as in place soils, the tip elevation would be $998 \pm$ for both abutments. Preboring down to elevation $998 \pm$ and hammering to set at 9000 psi load in the steel section will be necessary. The pile type should be heavy walled oil field pipe piles the same size as the augered hole for lateral stability purposes.

- C. Build the fill widenings before building the structure.

FIELD BORING LOG

Boring No. 2

Structure B55.124

County ST GROSV

Sheet 1 of 1

Project 8949 04 02

Road U.S.H. 12 WILSON CREEK

Station 610 + 64

Offset 10' RT of C.

Surface Elevation 1020.05

GROUND WATER OBSERVATIONS

While drilling

Before casing removal

After Boring Completed

Cave In

Time after drilling

Depth to water 6.6

Depth to cave-in 23.0

Water Notes

MOISTURE

D = Damp

M = Moist

W = Wet

REG = Hollowstem

WA = Washhead

RE = Rockbit

ST = Shelby tube

SS = Split spoon

DM = Drilling mud

A = Auger

C = Coring

W = Wash

E = Easy

M = Medium

H = Hard

Start 3-30-94

Unit CLARK

Finish 11

Chief CLARK

SW CORNER

VISUAL FIELD CLASSIFICATION AND REMARKS

Sample No.

Moisture

Blows on Sampler

Sample and Recovery

Unconfined Strength

Boards

Blows on

Drilling Method

0/6

6/12

4"

A

1 M

10 15

12

BR SANDY SILT

2 M

9 37

17

BR SILTY SAND

Dense

WA

RE

SS

DM

M

3 M

14 7

15 31

BR SAND

With LAYER OF GRAVEL

Dense

WHITE SAND STONE

4 M

200

20

Dense

5 M

200 3

25

Dense

EOB #2

25'

CREEK W.C. Elev.

1008.71

CREEK BOTTOM

1007.67

Checked by

Final

Boring No. 2

Checked by _____

Floor

Shipping No.