

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: June 20, 2002

TO: Mike Perkins
District Soils Engineer
Transportation District 6

FROM: Dennis G. Althaus
Geologist

SUBJECT: Site Investigation Report
Project I.D. 1020-09-04
Structure B-55-202
STH 63 over I-94
Woodville to Hudson
St. Croix County

Attached is the Site Investigation Report for the above project.

DGA:\
Attachments

cc: District 6 (4)
C.O. Files
DTID, BOS, Structures Design
Geotechnical File

SITE INVESTIGATION REPORT

Project I.D. 1020-09-04

Structure B-55-202

STH 63 over I-94

Woodville to Hudson

St. Croix County

1. GENERAL

Three borings and one auger probe were done for a proposed two span structure (about 236 feet long by 98 feet wide) at about station 63+88. The proposed structure will replace the existing four span bridge, which is about 240 feet long by 36 feet wide and appears to be in fair condition. The site is located on STH 63 over I-94, which is about 12 miles west of the east St. Croix County line on I-94 at Baldwin. The 18 to 20 foot high approach fills look to be in good condition. The existing concrete bridge deck is cracked, spalled and faulted at the abutments. Gently rolling hills with woods and farm fields for ground cover make up the surrounding terrain. No marsh, boulders or rock outcrops were observed. The existing I-94 pavement is cracked, spalled and in generally poor condition.

2. SUBSURFACE CONDITION

Three borings conforming to AASHTO Method T-206 Standard Penetration Test were performed 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. There was also one auger probe to rock at the pier location.

Boring 1 was done at station 62+66, 69 feet right of the reference line.

<u>Elevations</u>	<u>Soil Description</u>
1111.4 to 1108.4	dark brown silt
1108.4 to 1107.4	brown silt, some clay
1107.4 to 1092.4	brown / white sand, some silt and a little gravel
1092.4 to 1092.0	very dense limestone

Boring 2 was done at station 65+14, 20 feet left of the reference line.

<u>Elevations</u>	<u>Soil Description</u>
1133.9 to 1133.3	bituminous
1133.3 to 1132.8	base course
1132.8 to 1130.9	brown sandy silt (fill)
1130.9 to 1130.0	white sand (fill)
1130.0 to 1124.5	loose brown silty sand, little gravel (fill)
1124.5 to 1121.0	very stiff brown / gray silt, little sand and clay (fill)
1121.0 to 1110.0	very stiff brown / gray silty clay, little gravel (fill)
1110.0 to 1106.0	stiff brown / gray silt
1106.0 to 1098.5	firm brown sand, little silt and gravel
1098.5 to 1097.4	very dense limestone

Boring 3 was done at station 63+87, 116 feet right of the reference line.

<u>Elevations</u>	<u>Soil Description</u>
1115.7 to 1110.2	brown silt, some sand a little clay and a trace of gravel (fill)
1110.2 to 1108.2	very stiff brown / gray silt, trace of topsoil
1108.2 to 1106.2	brown silty sand, some gravel
1106.2 to 1097.2	firm brown / white sand, little silt and some silt layers
1097.2 to 1091.7	stiff brown / red silt, trace of gravel and clay
1091.7 to 1086.2	gray brown limestone (cored 5', 73% recovery, 34% RQD)

Boring 4 (auger probe) was done at station 63+79, 35 feet left of the reference line.

<u>Elevations</u>	<u>Soil Description</u>
1113.1 to 1105.6	brown / gray sandy silt, little gravel and clay
1105.6 to 1091.1	white sand
1091.1 to 1088.1	gray limestone

The groundwater elevation was about 1110 at the time the borings were done.

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 9000 psi stress in the steel section if driven to rock at about elevation 1092 for the south abutment, about elevation 1091 for the pier and about elevation 1098 for the north abutment.

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 30 to 35 psf, silty sands 45 psf, silts 65 psf, silty clays and clays 85 psf or more.

7. CONSTRUCTION PROBLEMS

No unique or especially difficult construction problems are foreseen at this site.

8. RECOMMENDATIONS

- A) Remove any topsoil encountered before placing any new fill material over an area where topsoil now exists.
- B) The use of a drainage system behind the abutments as well as any other earth retaining structure is suggested to help prevent water caused problems such as material washout from behind these structure units.
- C) 10 inch H-piles driven to 9000 psi stress in the steel section are the recommended foundation type at this location. The piles will tip out on limestone at about elevation 1092 for the south abutment, about elevation 1091 for the pier and about elevation 1098 for the north abutment.

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

Boring No.

Boring No. 3 Structure B-55-002 County ST. CROIX Sheet 1 of 1
Project 1020-09-04 Road ST. 63. OVER EY
Station G3+87 Offset 116' RT. OF R Surface Elevation 1115.72
(Pier)

GROUND WATER OBSERVATIONS

Streambed Elev. _____ Time After Drilling EOB
Water Elev. _____ Depth to Water 4.5
Top of Well Elev. _____

MOISTURE

D = Damp
M = Moist
W = Wet

HS = Hollowstem
WA = Wash Ahead
RB = Rockbit

DRILLING METHOD

ST = Shelby Tube
SS = Splitspoon
DM = Drilling Mud

A = Auger
C = Coring
W = Wash

E = Easy
M = Medium
H = Hard

Start 6/5/03 Unit 3

Finish 6/5/03 Chief Byrne

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Drilling Method	Probe Blows
		0/6	6/12							
						(Fill) <u>SILT</u> Bl. some sand little clay th. of gravel			AE	
					5		5			
1	DP	2	5	19		V-STIFF <u>SILT</u> gray/Bk. th. of exp soil	3.25		SS	
						<u>SAND</u> Bl. silty some gravel			Am	
2	M	7	7	14	10	<u>SAND</u> white/Bk. little silty some silty layer	10		WA RB	
									On	
3	M-W	4	6	18	15	Fim	15			
4	M	2	4	12	20	<u>SILT</u> red/Bk. th. of gravel & clay	1.5			
					25	<u>LIMESTONE</u> gray/Bk. some silty layers	25		Co RB	
						(CORE 24.5' - 29.5' 90% REC)				
					30	EOB # 3	30			
							29.5'			
					35		35			
					40		40			

Checked by

Final

Boring No.

3

