CORRESPONDENCE/MEMORANDUM **STATE OF WISCONSIN**

DATE: April 14, 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. 8651-00-00
STH 128 Over South Branch of Tiffany Creek
Spring Valley to Glenwood City
Structure B-55-158
St. Croix County

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

by:

Dennis G. Althaus

JBP:DGA:m00174
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. 8651-00-00
STH 128 OVER SOUTH BRANCH OF TIFFANY CREEK
SPRING VALLEY TO GLENWOOD CITY
STRUCTURE B-55-128
ST. CROIX COUNTY

1. GENERAL

Two borings were made for a proposed single span structure to replace the present single steel girder structure. The proposed structure will carry STH 128 over the south branch of Tiffany Creek at station 349+89±. The proposed structure is offset 10 feet to the south of the present structure. The structure is located 1.1 miles north of the STH 128 and CTH "DD" intersection. There is some cracking at the abutment walls but overall the existing structure is in good condition. The bituminous pavement shows some cracking but is in generally good condition. The 5 foot approach fills look to be in good condition. There is some erosion on the creek banks. Rolling hills have farm fields and woods for ground cover. Tiffany Creek is 4 to 10 feet wide and 4 feet deep at the structure. No rock outcrops, boulders or marsh areas were noted. The surface soil is a sandy loam.

2. SUBSURFACE CONDITION

Two 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 with 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 350+08 26 feet left of the existing centerline. Boring 2 was logged as the following; elevation 1014.3 to 974 firm gray/brown sand with a trace of gravel and silt, 974 to 965 dense to very dense brown sand with some gravel and a trace of silt, 965 to 954 very dense greenish shale (rock).

The water elevation at the time the borings were made was 1006.2.

Rock elevation was 964± for boring No. 2.

3. BEARING CAPACITY

A cursory review indicates that the soils down to a practical footing depth are inadequate for bridge support on footings.

4. PILES

The following chart can be used to set pile lengths.

Structure Unit Boring No. Elevation	Skin Friction (psf) (SF=2)	End Bearing psf (SF=2) (Displ.)	 (H-Piles)
South Abutment Boring 2			
1014 to 1006	50	--	--
1006 to 974	300	--	--
974 to 965	600	79,000	47,000
965 to 954	Rock	Refusal	
North Abutment Boring 1			
1006 to 994	50	--	--
994 to 972	300	44,000	26,000
972 to 960	950	240,000	147,000

H-piles or oil field pipe piles however could be driven to 9000 psi load in the steel section if driven to rock/weathered rock. The estimated pile tip elevations would be 965± for both abutments.

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.

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

No unusual, unique or especially difficult construction problems are foreseen.

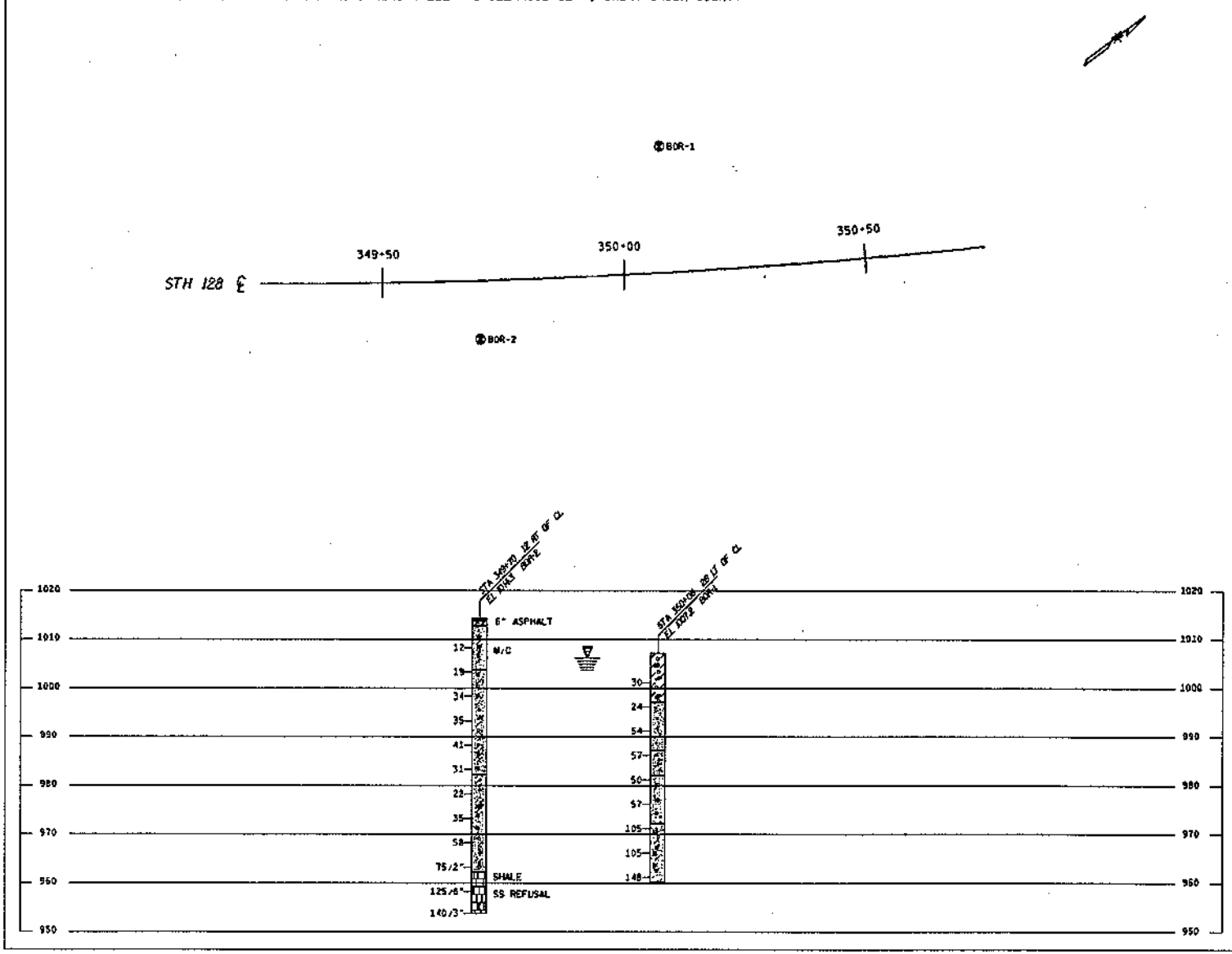
8. RECOMMENDATIONS

A. Use H-piles or oil field pipe piles driven to rock/weathered rock at 9000 psi load in the steel section. The pile tip elevation should be 965±.

B. Use a good sand material for fill and back fill.

m00174

STH 128 OVER SOUTH BRANCH OF TIFFANY CREEK, SPRING VALLEY TO GLENWOOD CITY, SAINT CROIX COUNTY



STATE PROJECT NUMBER | SHEET NO.

ABBREVIATIONS

F—Fine M—Medium C—Coarse
Wa—Weathered Sa—Sound

MATERIAL SYMBOLS

Topsoil, Silt, Sandstone, Sand, Peat, Limestone, Gravel, Clay, Igneous Rock

LEGEND OF PROBING

Probing No.
Sta.
Elevation
95/6=95 Blows for 6" Penetration
Probing taken with a 350# Wt. Falling 18" on a 2" O.D. Point.
7 Average Blows Per Foot
Refusal 95/6

LEGEND OF BORING

Boring No.
Elev.
Sta.
Unconfined Strength
7.7
7
Blows Per Ft. Using 140# Wt. Falling 30"
Wash Sample
Shelby Tube—S.T.
Ground Water Elevation
No Ground Water Observed Above This Elevation
Sandy Gravel
F
Boulders or Cobbles
Sand
Silty Clay
Sp
Limestone

Unless otherwise specified, the blows per foot at the locations indicated are based on driving a 2" O.D. x 1.4" I.D. split spoon sampler with a 140# hammer having a free fall of 30". The blow count is taken in undisturbed soil immediately below a cased or open hole eliminating side friction on the drive pipe.

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

To obtain relative data concerning the character of material in and upon which the foundation might be built, borings and/or soundings were made at points approximately as indicated on this drawing. The data presented herein represents the findings of the subsurface explorations made. However, because the depths investigated are limited and the area of the borings and/or soundings is very small in relation to the entire area, the Division of Highways does not warrant conditions below the depths investigated or that the classification of material encountered in these investigations is necessarily typical of the entire site.

NO.	DATE	REVISION	BY

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

STRUCTURE B-55-158

CONST. SPEC.	1986	DRAWN BY	D.J.F.	PLANS BOOK

SUBSURFACE EXPLORATION

SHEET 1 OF 1

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/usr/projects/mt_gtdraw/b550158.dg Apr. 13, 1994 09:27:20

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 1 Structure B-55-158 County St Croix Sheet 1 of 2

Project 8651-00-00 Road STH 128 Spring Valley – Glenwood City

Station 350+08 Offset 26' Lt Existing ℄ Surface Elevation 1007

GROUND WATER OBSERVATIONS

While drilling 1.2' 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

DRILLING METHOD: HS = Hollowstem, WA = Washahead, RB = Rockbit, ST = Shelby tube, SS = Split spoon, DM = Drilling mud, A = Auger, C = Coring, W = Wash, E = Easy, M = Medium, H = Hard

Start 3-31-94 Unit 7

Finish 4-5-94 Chief Horstman

Water Elev. 1006.2

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample and Recovery	Depth	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing 4" Size	Blows on Probe Size	Drilling Method
						Loose grey sandy SILT tr gravel tr cobbles					A
1	W	10 16	14 20		5	Drove rock					
2	W	7 14	10 12		10	Firm Br. SAND little gravel					
3	W	12 28	26 30		15	V. Dense					
4	W	22 24	33 18		20	V. DENSE BR SAND SOME GRAVEL					
5	W	22 25	25 21		25	V. DENSE BR SAND TR GRAVEL					
6	W	23 31	26 30		30						
7	W	36 60	45 39		35	V. DENSE BR SAND SOME GRAVEL TR SILT					
8	W	90 45	60 51		40						

Checked by

Final

Boring No. 1

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 1 Structure B-55-~~00-00~~ 158 County ST. CROIX Sheet 2 of 2

Project 8651-00-00 Road STH "128" SPRING VALLEY-GLENWOOD CITY

Station 350+08 Offset 26' LT EXISTING ℄ Surface Elevation 1007.2

GROUND WATER OBSERVATIONS

While drilling 1.2' 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

DRILLING METHOD: HS = Hollowstem, WA = Washahead, RB = Rockbit, ST = Shelby tube, SS = Split spoon, DM = Drilling mud, A = Auger, C = Coring, W = Wash, E = Easy, M = Medium, H = Hard

Start 4-5-94 Unit 7

Finish 4-5-94 Chief Anderson

Water Elev. 1006.2

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample and Recovery	Depth	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
8	W	90	60		40	VERY DENSE BR SAND SOME GRAVEL TR SILT.					WK
		45	51								RG
											rev. 8
9	W	91	75		45						
		73	60								
						E.O.B. 47'					
					50						
					55						
					60						
					65						
					70						
					75						
					80						

Checked by Final Boring No. 1

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 2 Structure B-55-158 County St Croix Sheet 1 of 2

Project 8651-00-00 Road STH 128 Spring Valley-Glenwood City

Station 349+70 Offset 12' Rt Existing ℄ Surface Elevation 1014.3

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

DRILLING METHOD: HS = Hollowstem, WA = Washahead, RB = Rockbit, ST = Shelby tube, SS = Split spoon, DM = Drilling mud, A = Auger, C = Coring, W = Wash, E = Easy, M = Medium, H = Hard

Start 4-6-94 Unit 4

Finish _____ Chief Horstman

Water Elev. 1006.2

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Casing Size	Blows on Casing 3"	Probe Size	Drilling Method
					Asphalt						A
					Br. SAND some gravel tr silt						
					Firm Br. med-coarse SAND little gravel tr silt						
									7		
1	M	5 6	6 7						10		
									12		
									18		
									22		
									24		
			9						14/8		WA
2	W	8	11		Firm grey SAND ~~little~~ some gravel tr silt				12		RB reverb
		16							15		
									17		
									21		
			19						17/		
3	W	19	15								
		12									
			13								
4	W	17	18								
		20									
			15								
5	W	19	22								
		23									
			14								
6	W	15	16								
		17			Firm Br. SAND tr gravel + silt						
			7								
7	W	9	13								
		14									
			13								
8		13	22								

Checked by 24 Final Boring No. 2

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

Boring No. 2 Structure B-55-158 County St Croix Sheet 2 of 2

Project 8651-00-00 Road STH 128 Spring Valley - Glenwood City

Station 349+70 Offset 12' Rt Existing ℄ Surface Elevation 1014.3

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

DRILLING METHOD: HS = Hollowstem, WA = Washahead, RB = Rockbit, ST = Shelby tube, SS = Split spoon, DM = Drilling mud, A = Auger, C = Coring, W = Wash, E = Easy, M = Medium, H = Hard

Start 4-6-94 Unit 4

Finish ____ Chief Horitman

Sample No.	Moisture	Blows on Sampler 0/6	Blows on Sampler 6/12	Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on Casing Size	Blows on Probe Size	Drilling Method
			13		40 V. Dense Br. SAND some gravel tr silt					WA RB recovery
8	W	13	22							
		24								
					45					
			20							
9	W	32	26							
		26								
			75/2"		50 S.S. refusal No recovery					
					V. Dense greenish SHALE					
					55					
10	W		125		2 SS refusal					
11	W		140/3"		60					
					E.O.B.					
					65					
					70					
					75					
					80					

Checked by ____ Final ____ Boring No. 2