

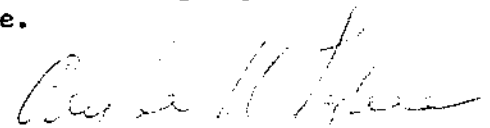
DATE: March 7, 1988

TO: Fred Ross, District Transportation Director
Attn: Bruce Eastenson, District Chief Materials Engineer

FROM: Gary C. Whited, P.E.
State Materials Engineer for Hwys.

SUBJECT: MATERIALS
SOILS
SITE INVESTIGATION REPORT
Project I.D. 1540-06-01
STH 65 over C & NW R.R. - Village of Roberts
Structure B-65-116
St. Croix County

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


by Clyde N. Laughter, P.E.
Chief Soils Engineer

GCW/CNL/clh/c082

cc: District 6 (Orig. + 3)
Bridge (2)
CO Files
GCW
MOF
Soils ✓

SITE INVESTIGATION REPORT
Project I.D. 1540-06-01
STH 65 over C & NW R.R. - Village of Roberts
Structure B-65-116
St. Croix County

1. General

Borings have been made, the results analyzed and recommendations formed for the proposed replacement bridge carrying STH 65, station 23+68, over the C&NW RR in the Village of Roberts. The new 3 span structure will replace a longer 7 span bridge that is narrow and in poor condition. The approach fills are about 25 feet high at the south abutment and 12± feet high at the north. No rock outcrops or marsh vegetation was noted. The general topography is level to gently rolling with the immediate area developed as residential for commercial occupancy.

2. Subsurface Conditions

Seven borings in accordance with AASHTO T-206, Standard Penetration Test, were made to estimate relative soil density, fix presumptive bearing capacity, gain factors for pile type selection and their support values, and recover samples for soil and rock classification and identification. Soil or rock descriptions in the drill logs are driller's field identification with a later check in the Central Soils Office.

The soils are predominantly sands over sandstone bedrock with densities ranging from loose to very dense. There is no discernible stratification by density. The sandstone slopes down from north to south on a 13±% grade but abrupt local changes can be anticipated rather than a smooth slope. The sandstone was not competent for coring with NQ double tube equipment. No groundwater was observed in these borings.

3. Bearing Capacity

Since the intermediate piers cannot use piled foundations unless preboring in rock is done, these units will be discussed individually.

For the south intermediate pier, station 23+46, there is some 12 to 14 feet of loose to firm sands to sand and gravel above bedrock. 5 feet of embedment will support 4,000 psf. The sandstone bedrock can be designed to 12,000 psf.

For the north intermediate pier, station 23+92, the soil above bedrock would be limited to 3,000 psf with the sandstone competent for 12,000 psf.

At the south abutment, piles will drive to bedrock and achieve adequate penetration (10 feet) in the loose to firm soils above rock, elevation 1011±.

At the north abutment, piles will not achieve 10 feet penetration into natural ground without preboring into the sandstone or by hard driving of H-piles with pile points. Even if penetration is marginal on the required 10 feet, the points tend to lock in place the pile point and a good pile exists.

4. Piles

Piles, as stated above, will drive to bedrock, elevation 1011±, at the south abutment. Steel H-piles driven to 9,000 psi stress in steel are the most suited for this unit.

At intermediate piers, required penetration will be impossible unless preboring is used. Steel sections at 9,000 psi in the steel section would be adequate if the preboring is utilized.

At the north abutment, the most straightforward approach is driving H-sections equipped with pile points of the chilled steel hard bite type.

5. Alternate Foundation Types

Either dynamic methods such as ground pounding, etc. or vibratory approaches as Vibroflotation, Terra Probe, etc. would produce densities to afford 2 1/2 tsf.

Drilled caissons or shafts socketed 4 feet into sound sandstone can be designed to 40 tsf on the shaft base.

Any of these methods carry a move-in of \$2-5,000 which makes any cost effectiveness marginal or non-existent.

6. Construction Problems

No unusual, unique or especially difficult foundation problems are foreseen. The usual railroad, urban and utility conditions will of course be encountered.

7. Recommendations

The abutments should be piled. The conditions strongly suggest H-piles as there will be a marginal penetration problem at the north abutment, even with points.

The north pier can be lowered to sandstone and be designed at 6 tsf.

The south intermediate pier is more complex. Designing to 6 tsf on sandstone requires 12 to 14 foot depths of excavation. The soil above is limited to 2 tsf which requires a large footing with the alternate being preboring into sandstone to develop mandatory pile penetration.

If local drilled shaft contractors were available, drilled-in caissons socketed into the rock would provide an adequate foundation. This is somewhat a chicken or egg problem - no local vendors until work is available, and no work unless vendors are nearby.

With pile stresses at 9,000 psi levels and sandstone capacity at 6 tsf, the differential settlement should be negligible and can be ignored.

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 1 Structure C { NW Overhead County St. Croix Sheet Lot 1

Project 1540-06-01 Road STH. "65"

Station 23 + 49 (Sta. "65" Sta.) Offset 17' 4" E of Sta. "65" Surface Elevation 1024.9

GROUND WATER OBSERVATIONS

While drilling 1500 ft. Revent. Time after drilling

Before casing removal 6.25 ft Depth to water _____

After Boring Completed 100 ft Depth to cave-in 100 ft

Cave ID	Water Notes
MOORE-001	DRAINING METHOD

Drilling Method
by type A = Air

INSTITUTE
P. K. RAJAP

M = Moist
W = Wind

姓名	性别	年龄	职业	住址	电话	备注
张德胜	男	45	教师	XX路XX号	12345678	
李小红	女	32	医生	XX街XX号	87654321	
王小明	男	28	工程师	XX巷XX号	98765432	
赵大刚	男	50	农民	XX村XX组	11223344	
孙小丽	女	25	学生	XX中学	55667788	
周国强	男	38	公务员	XX局XX科	44556677	
吴小芳	女	22	护士	XX医院	33445566	
郑大伟	男	42	商人	XX公司	22334455	
陈小红	女	35	记者	XX报社	11223344	
周小明	男	30	程序员	XX公司	99887766	
吴大刚	男	48	工人	XX厂	88776655	
孙小丽	女	27	教师	XX学校	77665544	
周国强	男	33	医生	XX医院	66554433	
吴小芳	女	24	学生	XX大学	55443322	
郑大伟	男	40	公务员	XX局	44332211	
陈小红	女	36	商人	XX公司	33221100	
周小明	男	31	程序员	XX公司	22110099	
吴大刚	男	49	工人	XX厂	11009988	
孙小丽	女	26	教师	XX学校	00998877	
周国强	男	34	医生	XX医院	99887766	
吴小芳	女	23	学生	XX大学	88776655	
郑大伟	男	41	公务员	XX局	77665544	
陈小红	女	37	商人	XX公司	66554433	
周小明	男	32	程序员	XX公司	55443322	
吴大刚	男	50	工人	XX厂	44332211	
孙小丽	女	28	教师	XX学校	33221100	
周国强	男	35	医生	XX医院	22110099	
吴小芳	女	25	学生	XX大学	11009988	
郑大伟	男	43	公务员	XX局	00998877	
陈小红	女	38	商人	XX公司	99887766	
周小明	男	33	程序员	XX公司	88776655	
吴大刚	男	51	工人	XX厂	77665544	
孙小丽	女	29	教师	XX学校	66554433	
周国强	男	36	医生	XX医院	55443322	
吴小芳	女	26	学生	XX大学	44332211	
郑大伟	男	44	公务员	XX局	33221100	
陈小红	女	39	商人	XX公司	22110099	
周小明	男	34	程序员	XX公司	11009988	
吴大刚	男	52	工人	XX厂	00998877	
孙小丽	女	30	教师	XX学校	99887766	
周国强	男	37	医生	XX医院	88776655	
吴小芳	女	27	学生	XX大学	77665544	
郑大伟	男	45	公务员	XX局	66554433	
陈小红	女	40	商人	XX公司	55443322	
周小明	男	35	程序员	XX公司	44332211	
吴大刚	男	53	工人	XX厂	33221100	
孙小丽	女	31	教师	XX学校	22110099	
周国强	男	38	医生	XX医院	11009988	
吴小芳	女	28	学生	XX大学	00998877	
郑大伟	男	46	公务员	XX局	99887766	
陈小红	女	41	商人	XX公司	88776655	
周小明	男	36	程序员	XX公司	77665544	
吴大刚	男	54	工人	XX厂	66554433	
孙小丽	女	32	教师	XX学校	55443322	
周国强	男	39	医生	XX医院	44332211	
吴小芳	女	29	学生	XX大学	33221100	
郑大伟	男	47	公务员	XX局	22110099	
陈小红	女	42	商人	XX公司	11009988	
周小明	男	37	程序员	XX公司	00998877	
吴大刚	男	55	工人	XX厂	99887766	
孙小丽	女	33	教师	XX学校	88776655	
周国强	男	40	医生	XX医院	77665544	
吴小芳	女					

H5 = Hollowstem

W.A. = Washington
R.B. = Rockville

RB - RAYFON	
	P

ST = Shelby tube

১১ = ১৫)। স্বাধীন
১২ = ১৫)। স্বাধীন

CPI = Consumer Price

A = Answer

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McGraw-Hill

HP 44401

E = Easy

$\partial \bar{u} = \partial u$
 $\bar{u} = u$

PLATE 1

Start 3/22/88

Unit II

Finish 8/22/88

Chief Clerk - 55

Sample No.	Molau	Blows on Sampler		Visual Field Classification and Remarks	Unclassified Strata	Boulders	Blows on		Drilling Method
		0/6	6/12				Casing Size	Probe Size	
				SAND and GRAVEL Br. SILT					A
1	M	5	5	Louse Br Med. to Coarse SAND - Little S.H. - Fr. Gravel.			1 4 6 11 12 14		W
2	M	5	5	Louse Br. Alternating Layers of SILT - Little Sand - Fr. Gravel and Med. to coarse SAND - Little S.H. - Fr. Gravel.					R.R. Abroad Revert.
3	M	21	27	V. Dense weathered SANDSTONE - shale					
4	M	105		V. Dense white SANDSTONE					
5	M	100							
6	M	100							

Checked by _____ Final _____ Starting Date _____

FAW

॥ अथानुष्ठुपः ॥

FIELD BORING LOG

 Boring No. 6 Structure C & NW RR. Overhead - City of Roberts State of Wisconsin/Department of Transportation
 Project 1540-06-01 Road STH. 165 County ST. Croix Sheet Lot 1

 Station 24+07- Offset 25' 4" E Surface Elevation 1033.1

GROUND WATER OBSERVATIONS

 While drilling None Time after drilling _____
 Before casing removal _____ Depth to water _____
 After Boring Completed _____ Depth to cave-in _____
 Cave in _____ Water Notes _____

DRILLING METHOD

 MOISTURE
 D = Damp
 M = Moist
 W = Wet
 HS = Hollowstem
 WA = Washhead
 RB = Rockbit
 ST = Shelby tube
 SS = Self feeding
 DM = Drilling mud
 A = Auger
 C = Coring
 W = Wash
 E = Easy
 M = Medium
 H = Hard
 Start 2/25/98 Unit UT
 Finish " " Chief Moyers

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on			Drilling Method
		0/5	6/12					Casing Size	Probe Size	Size	
1	M	6	4	0/12	Firm br. SAND - Little Silt. Fr. Gravel						A
					br. SILET - Little Sand.						
					br. Fine SAND						
2	D	100/4			U. Dense White weathered SANDSTONE						
					Augers to 15' - Augered U. Hard						
					LE						

Checked by

Firm

Boring No.

RFR

6

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 7 Structure C. & N.W. RR. Overhead - City of Rabon County St. Croix Sheet 1 of 1

Project LS40-06-01 Road S.7th "65"

Station	23+37	Offset	26' R+P	Surface Elevation	1032.4
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GROUND WATER OBSERVATIONS

While drilling 12.4 Time after drilling _____

Before casing removal _____ Depth to water _____

After Boring Completed _____ Depth to cave-in _____

Cave In _____ Water Notes _____

MOISTURE

$\mathbb{D} = \mathbb{D}_{\text{jump}}$

$$W = W_{int}$$

HS = Holsteiner

WA = Washington
DE = Delaware

REP - REPUBLIC	11
	11

ST = Shell type number

—33—33/11 00-0000

..CWA - DRAFTING AND

METHOD

Q. A. Adu
C. C. C.

W. J. W.

It's Easy

Id. = Invalid
 h.h. = Invalid

H = H₀

Start 2/25/88 Unit III

Finish # 1 # Chief Meyers

Chris Meyers

Sample No.	Moisture	Blows on Sampler		Visual Field Classification and Remarks	Unconfined Strength	Boulders	Blows on		Drilling Method
		O/G	S/12				Casing Size	Probe Size	
1	14	7	9	Firm Br. Med. to Coarse SAND - Little Silt - Tr. Gravel					A
2	14	7	8	Tn. of Silt Layers.					
3	14	68	85 1/2	V. Dense Chalk White SAND STONEL					
				Auger to 20' (Augered V. Hard)					
				ER					

Checked by

Boring News

1