

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: April 7, 1995

TO: Richard Pauser
Construction and Materials Supervisor
Transportation District 6

FROM: Dennis G. Althaus
Geologist

SUBJECT: Site Investigation Report
Project I.D. 1531-07-03
Structure B-47-105
USH 10 over Oak Grove Creek
Prescott to Ellsworth
Pierce County

Attached is the Site Investigation Report for the above project.

DGA:\

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. 1531-07-03

Structure B-47-105

USH 10 over Oak Grove Creek

Prescott to Ellsworth

Pierce County

1. GENERAL

Two borings were made for a proposed two span structure to replace the existing single span structure that carries USH 10 over Oak Grove Creek at about station 4+500. The existing structure has cracking at both abutments and is in generally poor condition. The 5 foot approach fills look to be in good condition. There is some cracking and faulting at the abutments but the concrete roadway looks to be in generally good condition. Rolling hills with woods and farm fields for cover make up the surrounding terrain. The structure is in the bottom of a valley. The creek was dry when the field reconnaissance was done. Rock boulders and outcrops were visible in and on the surrounding hills. Oak Grove Creek has a meandering 20 foot wide channel where USH 10 crosses it. Sand makes up the surface soil.

2. SUBSURFACE CONDITION

Two borings 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 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.

Boring 1 was taken at station 4+508 8.3 meters left of the existing centerline. Boring 1 was logged as the following; elevation 250.848 to 250.25 black topsoil, 250.25 to 246.35 very loose to firm brown fine sand with a little silt and a trace of gravel, 246.35 to 241.85 firm brown sand with a trace of gravel, 241.85 to 238.25 very dense fine brown sand (weathered limestone), 238.25 to 236.75 limestone (cored 1.5 meters, 65% recovery, 15% RQD).

Boring 2 was taken at station 4+492 8.3 meters right of the existing centerline. Boring 2 was logged as the following; elevation 250.448 to 250.20 black topsoil, 250.20 to 242.95 very loose to firm brown sand with a little silt and a trace of gravel, 242.95 to 239.95 dense to very dense brown sand and weathered limestone, 239.95 to 238.15 very dense weathered limestone and limestone.

The creek was dry at the time the borings were taken. The stream bed elevation was 249.728.

Weathered Rock Elevations

<u>Structure Unit</u>	<u>Station</u>	<u>Rock</u>
West Abutment Boring 2	4+492 8.3m right	239.95
East Abutment Boring 1	4+508 8.3m left	240.05

Pier (no borings were taken for the pier, due to the location of rock at the abutments)

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 634 kg/square cm load in the steel section if driven to weathered rock at about elevation 240.00.

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 14.7 to 17.1 g/square cm, silty sands 22 g/square cm, silts 31.8 g/square cm, silty clays and clays 41.6 g/square cm or more.

7. CONSTRUCTION PROBLEMS

No unique, unusual or especially difficult construction problems are foreseen if the approach fills are not significantly heightened, widened or lengthened.

8. RECOMMENDATIONS

A) Use a grade 1 sand as fill and backfill or put in a drainage system behind any earth retaining structure.

B) Steel H-piles or oil field pipe piles driven into weathered rock at 634kg/square cm load the steel section at about elevation 240.00.

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

FIELD BORING LOG
6 Meter Log

Boring No. 1 Structure B-47-105 County PIERCE Sheet 1 of 3
Project 1531-07-03 Road USH "10"
Station 210500 202+750 4+508 Offset 8.30 m LT of 2 Surface Elevation 250.848

GROUND WATER OBSERVATIONS

Streambed Elev. 249.728 Time After Drilling _____
Water Elev. _____
Top of Well Elev. _____ Depth to Water _____

MOISTURE D = Damp M = Moist W = Wet	DRILLING METHOD				Start <u>03-23-85</u> Unit <u>1</u> Finish <u>03-28-85</u> Chief <u>KOWALD</u>
	A = Auger	DM = Drilling Mud	NW = Casing, 76.2mm I.D. (3")		
	C = Coring	RB = Rockbit	HW = Casing, 101.6mm I.D. (4")		
	CA = Casing Advancer	SS = Splitspoon	BV = Corebarrel, 36.5mm Core Dia. (1 7/16")		
	WA = Wash Ahead	ST = Shelby Tube	NV = Corebarrel, 47.6mm Core Dia. (1 7/8")		
	HS = Hollowstem	E = Easy	M = Medium	H = Hard	

Sample No.	Moisture	Blows on Sampler	Sample and Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Drilling Method	Probe Blows 3"
					30 cm BLACK TOP SOIL			A	
					60 cm				
					90 cm BRN FINE SAND LITTLE SILT TR. GRAVEL				
					120 cm				
					150 cm				
1	D	2 1			180 cm V. LOOSE			RB SS	
		1 5			210 cm				
					240 cm				
					270 cm				
					3 m				
2	D	3 9			330 cm FIRM				
		7 6			360 cm				
					390 cm				
					420 cm				
					4.5 m				
3	W	8 8			480 cm FIRM DROVE ROCK -				
		8			510 cm				
					540 cm				
					570 cm				
4	D	7 8			6 m FIRM FINE BRN SAND TR. GRAVEL				
		8 7							

Checked by _____	METRIC CONVERSION FACTORS		Boring No. <u>1</u>
	1 cm = 0.3937 inches	1 inch = 2.54 cm	
	1 m = 3.281 feet	1 foot = 30.48 cm, 0.3048 m	

FIELD BORING LOG
6 Meter Log

Boring No. 1 Structure B-47-105 County PIERCE Sheet 2 of 3
Project 1531-07-03 Road USH "10"
Station 2087750 4+508 Offset 8.30 cm LT of 9 Surface Elevation 250.848

GROUND WATER OBSERVATIONS

Streambed Elev. 249.728 Time After Drilling _____
Water Elev. _____
Top of Well Elev. _____ Depth to Water _____

MOISTURE

D = Damp
M = Moist
W = Wet

DRILLING METHOD

A = Auger DM = Drilling Mud NW = Casing, 76.2mm I.D. (3")
C = Coring RB = Rockbit HW = Casing, 101.6mm I.D. (4")
CA = Casing Advancer SS = Splitspoon BV = Corebarrel, 36.5mm Core Dia. (1 7/16")
WA = Wash Ahead ST = Shelby Tube NV = Corebarrel, 47.6mm Core Dia. (1 7/8")
HS = Hollowstem E = Easy M = Medium H = Hard

Start 03:23 Unit 1Finish 03:28 Chief KOWALD

Sample No.	Moisture	Blows on Sampler	Sample and Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Drilling Method	Blows 3" Blows 6" Blows 12"
4	D	7 8			630 cm FIRM - FINE BRN SAND TR GRAVEL			RB WA SS	
		8 7			660 cm				
					690 cm				
					720 cm				
					7.5 m	1.5 m			
5	M	4 6			780 cm FIRM				
		7 8			810 cm				
					840 cm				
					870 cm				
					9 m	3 m			
6	M	29 39			930 cm VERY DENSE - FINE BRN SAND				
		25 27			960 cm LAYERED WEATHERED LIMESTONE				
					990 cm				
					1020 cm				
					10.5 m	4.5 m			
7	W	26 60			1080 cm VERY DENSE - WEATHERED LIMESTONE SOME SAND				
					1110 cm				
					1140 cm				
					1170 cm				
					12 m	6 m			
		100/6 cm			V. - DENSE - SS REFUSAL				

Checked by _____

METRIC CONVERSION FACTORS

1 cm = 0.3937 inches 1 inch = 2.54 cm
1 m = 3.281 feet 1 foot = 30.48 cm, 0.3048 m

Boring No. 1

FIELD BORING LOG
6 Meter Log

Boring No. 1 Structure B-47-105 County Pierce Sheet 3 of 3
Project 1531-07-03 Road USH "10"
Station 4+508 Offset 8.30 CH LT of C Surface Elevation 250.848

GROUND WATER OBSERVATIONS

Streambed Elev. 249.728 Time After Drilling _____
Water Elev. _____
Top of Well Elev. _____ Depth to Water _____

MOISTURE

D = Damp
M = Moist
W = Wet

A = Auger
C = Coring
CA = Casing Advancer
WA = Wash Ahead
HS = Hollowstem

DRILLING METHOD

DM = Drilling Mud NW = Casing, 76.2mm I.D. (3")
RB = Rockbit HW = Casing, 101.6mm I.D. (4")
SS = Splitspoon BV = Corebarrel, 36.5mm Core Dia. (1 7/16")
ST = Shelby Tube NV = Corebarrel, 47.6mm Core Dia. (1 7/8")
E = Easy M = Medium H = Hard

Start 03-23-88 Unit 1Finish 03-28-88 Chief Kowal

Sample No.	Moisture	Blows on Sampler	Sample and Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Drilling Method	Probe Blows
		100/6cm			12.30 cm V. DENSE - SS REFUSAL			RB	
					60 cm				
					90 cm CORE TAKEN				
					1320 120 cm 75% - 80% RECOVERY				
					1350 1.5 m				
					1380 180 cm				
					1410 210 cm				
					1440 240 cm E.O.B.				
					1470 270 cm				
					15 M 3 m				
					1530 330 cm				
					1560 360 cm				
					1590 390 cm				
					1620 420 cm				
					1650 4.5 m				
					1680 480 cm				
					1710 510 cm				
					1740 540 cm				
					1770 570 cm				
					18 M 6 m				

Checked by _____

METRIC CONVERSION FACTORS

1 cm = 0.3937 inches
1 m = 3.281 feet
1 inch = 2.54 cm
1 foot = 30.48 cm, 0.3048 m

Boring No. _____

FIELD BORING LOG
6 Meter Log

Boring No. B Structure B-47-105 County PIERCE Sheet 1 of 2
Project 1531-07-03 Road USM 10"
Station A+492 Offset 8.30 M RT of C Surface Elevation 249.448

GROUND WATER OBSERVATIONS

Streambed Elev. 249.728 Time After Drilling _____
Water Elev. _____
Top of Well Elev. _____ Depth to Water _____

MOISTURE

D = Damp
M = Moist
W = Wet

A = Auger
C = Coring
CA = Casing Advancer
WA = Wash Ahead
HS = Hollowstem

DRILLING METHOD

DM = Drilling Mud NW = Casing, 76.2mm I.D. (3")
RB = Rockbit HW = Casing, 101.6mm I.D. (4")
SS = Splitspoon BV = Corebarrel, 36.5mm Core Dia. (1 7/16")
ST = Shelby Tube NV = Corebarrel, 47.6mm Core Dia. (1 7/8")
E = Easy M = Medium H = Hard

Start 03:28 PM Unit 1

Finish 03:29 PM Chief KAWAD

Sample No.	Moisture	Blows on Sampler	Sample and Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Drilling Method	Depth Blows 3"
					BLK Top Soil			A	
					30 cm BLK/BRN SAND SOME SILT LITTLE GRAVEL				
					60 cm				
					90 cm				
					120 cm				
					1.5 m				
1	W	2 2			180 cm V. LOOSE BRN SAND LITTLE SILT TRACE GRAVEL				
		2 3			210 cm				
					240 cm				
					270 cm				
					3 m				
2	W	1 2			330 cm			RB WA	
		2 7			360 cm				
					390 cm				
					420 cm				
					4.5 m				
		5 6			480 cm FIRM - DROVE ROCK NO RECOVERY				
		6 7			510 cm				
					540 cm				
					570 cm				
3	W	6 7			6 m FIRM - BRN MED-FINE SAND LITTLE WEATHERED LIMESTONE				
		9 14							

Checked by _____

METRIC CONVERSION FACTORS

1 cm = 0.3937 inches 1 inch = 2.54 cm
1 m = 3.281 feet 1 foot = 30.48 cm, 0.3048 m

Boring No.

2

FIELD BORING LOG
6 Meter Log

Boring No. 2 Structure B-47-105 County Pierce Sheet 2 of 2
Project 1531-07-03 Road USH 10"
Station 4+492 Offset 0.30 m Rt E Surface Elevation 249.448
250.448

GROUND WATER OBSERVATIONS

Streambed Elev. 249.728 Time After Drilling _____
Water Elev. _____
Top of Well Elev. _____ Depth to Water _____

MOISTURE

D = Damp
M = Moist
W = Wet

DRILLING METHOD

A = Auger

C = Coring

CA = Casing Advancer

WA = Wash Ahead

HS = Hollowstem

DM = Drilling Mud

RB = Rockbit

SS = Splitspoon

ST = Shelby Tube

E = Easy

NW = Casing, 76.2mm I.D. (3")

HW = Casing, 101.6mm I.D. (4")

BV = Corebarrel, 36.5mm Core Dia. (1 7/16")

NV = Corebarrel, 47.6mm Core Dia. (1 7/8")

M = Medium

H = Hard

Start 0328-8 Unit 1Finish 0328-95 Chief KOWALD

Sample No.	Moisture	Blows on Sampler	Sample and Recovery	Total Blows	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Drilling Method	Probe Blows
3	W	6 7			630 cm FIRM - BAN MED-FINE SAND			RB	
		9 14			660 cm LITTLE WEATHERED LIMESTONE - TR. SILT			WA	
					690 cm				
					720 cm				
					75 m				
4	M	23 24			780 cm V. DENSE - LAYERS OF SAND				
		33 33			810 cm & WEATHERED LIMESTONE				
					840 cm LITTLE GRAVEL - LITTLE SILT				
					870 cm				
					9 m DENSE - BAN - FINE-MED SAND				
5	M	9 16			930 cm LITTLE GRAVEL - TR. SILT				
		16 24			960 cm				
					990 cm				
					1020 cm DRILLED HARD				
					105 m				
		100/110 cm			1080 cm V. DENSE - SS REFUSAL				
					1110 cm NO RECOVERY (LIMESTONE)				
					1140 cm DRILLED HARD				
					1170 cm				
					12 m				
		100/100 cm			SS REFUSAL			V	

Checked by

METRIC CONVERSION FACTORS

1 cm = 0.3937 inches

1 m = 3.281 feet

1 inch = 2.54 cm

1 foot = 30.48 cm, 0.3048 m

Boring No.

2