

CORRESPONDENCE/MEMORANDUM_____ **State of Wisconsin**

DATE: October 13, 2004

TO: Mike Perkins
District Soils Engineer
Transportation District 6

FROM: Dennis G. Althaus
Geologist

SUBJECT: Site Investigation Report
Project I.D. 8110-05-04
Structure B-17-191
STH 64 over the South Fork of Hay Creek
Connersville to the West County Line
Dunn County

Attached is the Site Investigation Report for the above project.

DGA:\
Attachments

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

SITE INVESTIGATION REPORT
Project I.D. 8110-05-04
Structure B-17-191
STH 64 over the South Fork of Hay Creek
Connersville to the West County Line
Dunn County

1. GENERAL

Three borings were done for a proposed four span structure to carry STH 64 over the south fork of Hay Creek at about station 168+27. The proposed structure will be about 194 feet long. The existing 3 span bridge is 178 feet long by 32 feet wide and appears to be in fair condition. The site is located about 0.2 miles west of STH 79 and CTH "K". Gently rolling hills with farm fields and woods for ground cover make up the surrounding terrain. The south fork of Hay Creek is about 40 feet wide by 1 foot deep, flows south and has a sandy bottom.

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.

Boring 1 was done at station 169+24, 19 feet left of the centerline.

<u>Elevations</u>	<u>Soil Description</u>
985.6 to 984.6	topsoil, some gravel
984.6 to 975.6	loose brown sand, little silt
975.6 to 972.1	very loose gray silt, some organics
972.1 to 969.1	sand and gravel
969.1 to 964.6	very loose (no recovery)
964.1 to 942.6	firm sand and gravel to some gravel
942.6 to 929.1	very dense weathered sandstone (cored 5', 0% recovery, 0% RQD)

Boring 2 was done at station 167+30, 19 feet left of the centerline.

<u>Elevations</u>	<u>Soil Description</u>
976.4 to 974.4	topsoil
974.4 to 971.4	silty sand, some gravel and boulders
971.4 to 941.4	loose to firm sand, some gravel
941.4 to 935.4	very dense yellow fine sand
935.4 to 930.2	very dense weathered sandstone

Boring 3 was done at station 168+27, 19 feet right of the centerline.

<u>Elevations</u>	<u>Soil Description</u>
977.5 to 976.0	topsoil
976.0 to 973.5	silty sand
973.5 to 942.5	loose to firm brown sand, some gravel
942.5 to 936.5	dense white fine sand
936.5 to 926.4	very dense yellow weathered sandstone

The water elevation was 973.6 at the time the borings were done. The streambed elevation is about 971.

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 weathered rock (weathered sandstone) at about elevation 938 for the west abutment to about 936 for the middle pier to about 940 for the east 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

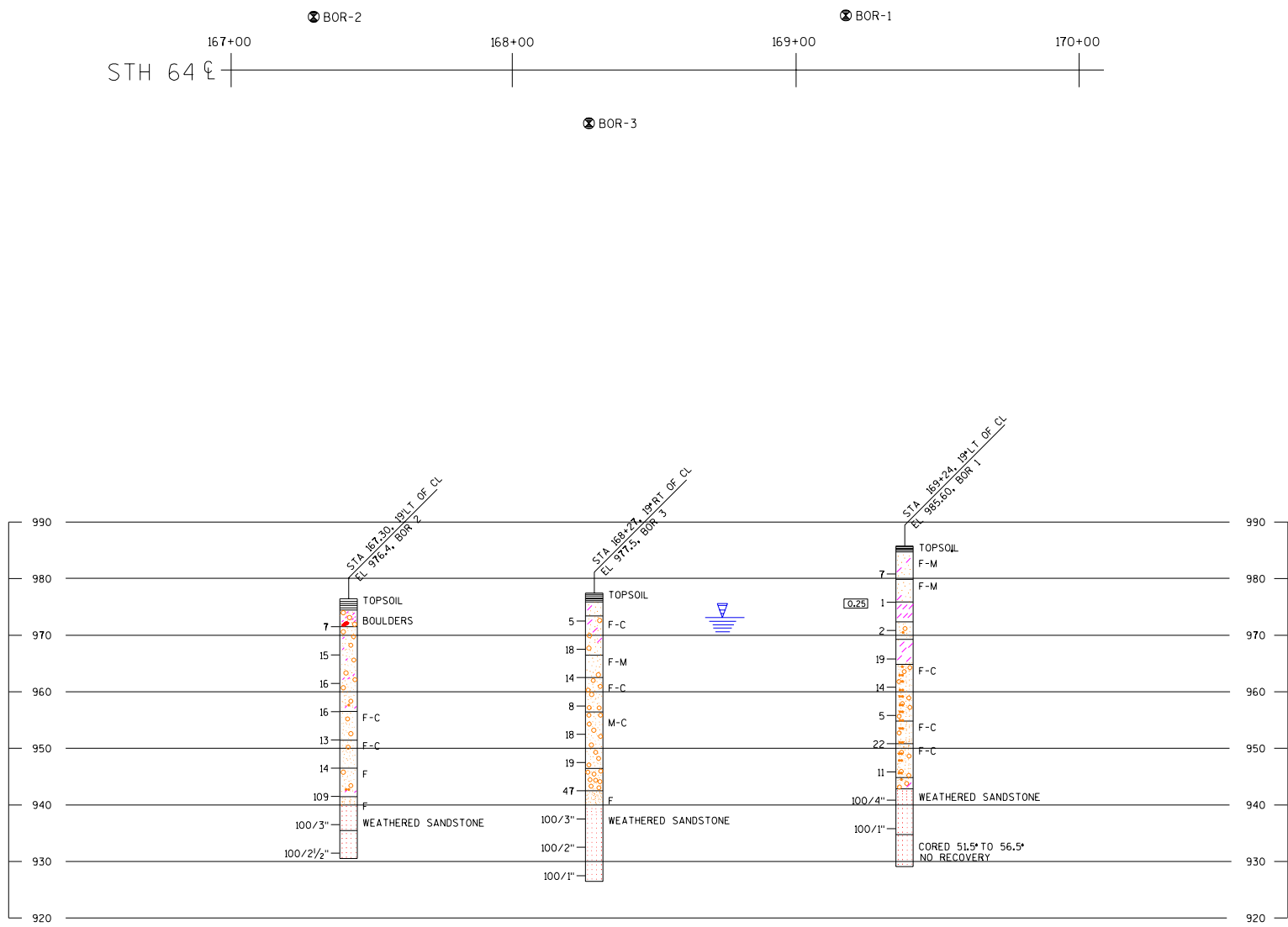
There is buried topsoil at about elevation 976 beneath the existing roadbed. **Boulders were encountered at about streambed depth at the proposed west abutment.**

8. RECOMMENDATIONS

- A) Remove the 1 to 2 feet of 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) The use of H-piles with pile tips driven to 9000-psi stress in the steel section, which should be achieved when the weathered sandstone is encountered. Weathered rock (weathered sandstone) is at about elevation 938 for the west abutment to about 936 for the middle pier to about 940 for the east abutment. The pile tips are recommended due to the boulders encountered at the proposed site of the west abutment. The pile tips are to help protect the piles during pile driving operation.

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

STA 64 OVER SOUTH FORK HAY CREEK
CONNORSVILLE - WEST CO LINE, DUNN COUNTY



STATE PROJECT NUMBER

ABBREVIATIONS

F — FINE M — MEDIUM C — COARSE
WS — WEATHERED SO — SOUND

MATERIAL SYMBOLS

TOPSOIL

SAND

GRAVEL

SILT

PEAT

CLAY

SANDSTONE

LIMESTONE

IGNEOUS ROCK

LEGEND OF PROBING

PROBING NO.
STA.
ELEVATION
7 AVERAGE BLOWS PER FOOT
REFUSAL 95/6

95/6=95 BLOWS FOR 6"
PENETRATION
PROBING TAKEN WITH
A 350# WT.
FALLING 18" ON A 2"
O.D. POINT.

LEGEND OF BORING

ELEV. BORING NO.
STA.

UNCONFINED STRENGTH → 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
SO
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 WISCONSIN DEPARTMENT OF TRANSPORTATION 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 STRUCTURES DESIGN SECTION			
STRUCTURE 8-17-191.....			
CONST. SPEC.	1996	DRAWN BY BE	PLANS CRO.
SUBSURFACE EXPLORATION			SHEET Q1

FIELD BORING LOG

N Side Wisconsin Department of Transportation

Boring No. 1

Structure B-17-191

County Dunn

Sheet 1 of 2

Project 8110-05-04

Road 5th 64

South Fork Hay Creek

Station 169+24

Offset 19' LT

Surface Elevation

985.6

GROUND WATER OBSERVATIONS

Streambed Elev. 971.7

Time After Drilling

Water Elev. 973.8

Top of Well Elev.

Depth to Water

MOISTURE

D = Damp
M = Moist
W = WetHS = Hollowstem
WA = Wash Ahead
RB = Rockbit

DRILLING METHOD

ST = Shelby Tube
SS = Splitspoon
DM = Drilling MudA = Auger
C = Coring
W = WashE = Easy
M = Medium
H = Hard

Start 10-5 Unit 3

Finish

Chief

10-5-4

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							
	D					Top Soil Some Gravel			A	3' 1/2"
						Sand Br F - m some silt				
①		3	4		7	5 Loose Sand Br F - m Tr silt	5		SS	
		3								
②	W	0	0		1	10 Very loose Silt Gravel some Organics	10		SS	
		1								
						15 ? Sand + Gravel (loose, gravel)	15			
		2	1			No Recovery ? Silt			SS	
		1								
③		10	9		19	20 Got hard End of Drill String Firm Sand + Gravel F - C	20		SS	
		10								
④		8	7		14	25 Firm	25		SS	
		7								
⑤		6	3		5	30 loose Sand F - C some Gravel	30		SS	
		2								
⑥		6	9		22	35 Firm Sand + Gravel F - C	35		SS	
		13								
⑦		4	3		11	40 Sand some Gravel Tr silt	40		SS	
		8								

Checked by

Final

Boring No. 1

Wisconsin Department of Transportation

Sheet 2 of 2

Surface Elevation 985.6

Depth to Water

Start 105 Unit 3

Finish Chief

Boring No.

Boring No. 3

Structure B-17-19

Center Per
Pier 2

County Dunn

Sheet 1 of 2

Project B110-05-04

Road 5th St. 64 So Fork May Creek

Station 168+27

Offset 19' RT

Surface
Elevation 977.5

Streambed Elev. 971.7

GROUND WATER OBSERVATIONS

Water Elev. 973.8

Time After Drilling

Top of Well Elev.

Depth to Water

MOISTURE

D = Damp
M = Moist
W = WetHS = Hollowstem
WA = Wash Ahead
RB = Rockbit

DRILLING METHOD

ST = Shelby Tube
SS = Splitspoon
DM = Drilling MudA = Auger
C = Coring
W = WashE = Easy
M = Medium
H = Hard

Start 10-6 Unit 3

Finish 10-6-4 Chief M

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							
	M					Top soil			A	3' 10"
						Sand silty				
①	W	1 4	1	5	5	Sand F-C Br little silty loose Some Gravel			SS	
					10					
②		5 12	6	18	18	Firm Sand F-M Tr Gravel			SS	
					15					
③		7 6	8	14	14	Firm Sand F-C + Gravel Br			SS	
					20					
④		2 4	4	8	8	Loose Sand + Gravel M-C Br			SS	
					25					
⑤		10 8	10	18	18	Firm			SS	
					30					
⑥		10 11	8	18	19	Firm Gravel some sand			SS	
					35					
⑦		15 26	21	36	37	Dense Sand F white			SS	
					40					
⑧		10 100/3				Very Dens			SS	

Checked by

Final

51'

Boring No. 3

Boring No. 3 Structure B-17-19 Rd² County Dunn Sheet 2 of 2
Project 8110-05-04 Road St 64 So Fork Hay Creek
Station 68+27 Offset 19' RT Surface Elevation 977.5

GROUND WATER OBSERVATIONS

Streambed Elev. 971.7 Time After Drilling _____
Water Elev. 973.8 _____
Top of Well Elev. _____ Depth to Water _____

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 10-6 Unit 3Finish 10-6-4 Chief TM

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							
	✓					Sand F white			WA	
9		100 1/2		100 1/2	✓ Dense	5 45 Sand F yellow	5		SS	
10		100 1/2		100 1/2	50 ✓ Dense	10	10			
						51' EOB #3				
						15	15			
						20	20			
						25	25			
						30	30			
						35	35			
						40	40			

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Final

Boring No. 3

Wisconsin Department of Transportation

GROUND WATER OBSERVATIONS

Streambed Elev. 971.7 Time After Drilling _____
 Water Elev. 973.8 _____
 Top of Well Elev. _____ Depth to Water _____

Start 105 Unit 3

Finish Chief
10-6-4 *[Signature]*

Checked by	Final	Boring No.
	46	2

FIELD BORING LOG

Boring No. 2 Structure B-17-191W Abut County Dunn Sheet 2 of 2
Project Q110-05-04 Road St. Hwy 64 So Fork Hay Creek
Station 167+30 Offset 19' LT Surface Elevation 976.4

GROUND WATER OBSERVATIONS

Streambed Elev. 971.7 Time After Drilling _____
Water Elev. 973.8 _____
Top of Well Elev. _____ Depth to Water _____

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 10.5 Unit 3Finish 106.4 Chief M

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							
	W								WA	
						<u>sand</u>				
						<u>5 45</u>	<u>5</u>			
<u>⑧</u>		<u>100 2 1/2</u>			<u>100 2 1/2</u>	<u>46' EOB # 2</u>			<u>SS</u>	
						<u>10 50</u>	<u>10</u>			
						<u>15 55</u>	<u>15</u>			
						<u>20 60</u>	<u>20</u>			
						<u>25 65</u>	<u>25</u>			
						<u>30 70</u>	<u>30</u>			
						<u>35 75</u>	<u>35</u>			
						<u>40 80</u>	<u>40</u>			

Checked by _____

Final 46'Boring No. 2