

DATE: March 10, 1994

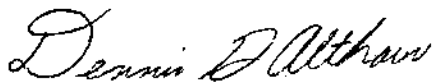
TO: Richard J. Pauser
Construction and Materials Supervisor
Transportation District 6

FROM: Bruce J. Pfister, P.E.
Chief Geotechnical Engineer

SUBJECT: Site Investigation Report
Project I.D. 8949-04-01
USH 12 Over Carr Creek
Baldwin to East County Line
Structure B-55-123
St. Croix County

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

by:



Dennis G. Althaus

DGA:m00033
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. 8949-04-01
USH 12 OVER CARR CREEK
BALDWIN TO EAST COUNTY LINE
STRUCTURE B-55-123
ST. CROIX COUNTY**

1. GENERAL

Two borings were made for a proposed single span structure, that will be 10 feet wider and 10 feet longer, than the present single span concrete deck and girder bridge. The new structure will carry USH 12 over Carr Creek at station 232+34±. The structure is located 1 tenth of a mile east of the USH 12 and CTH "B" junction. The present structure looks to be in poor condition with cracking on the abutment walls and the northeast wingwall has separated from the abutment. The 8 foot approach fills look to be in good condition. There is no erosion, sloughing or seepage noted. There is also no rock riprap used. The topography is hilly to rolling farm fields. The meandering Carr Creek channel is 35 feet wide by 4 to 5 feet deep and flows south. No rock outcrops or boulders were noted. The surface soil is a silty 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 and 1A taken at station 232+63 18.5 feet left of the existing centerline. Boring 1 and 1A was logged as the following; elevation 1147.9 to 1147.5 asphalt, 1147.5 to 1146.5 concrete, 1146.5 to 1140 gray silt with a trace of sand and gravel, 1140 to 1100 firm to dense brown/white sand with a trace of gravel (cobbles in last 5 feet), 1100 to 1095 loose sand and silt, 1095 to 1087 limestone (5 feet cored, 60% recovery). There is as much as 4 feet of very soft weathered limestone between sand and limestone layers.

Boring 2 was taken at station 232+07 33 feet right of the existing centerline. Boring 2 was logged as the following; elevation 1142.3 to 1139 topsoil, 1139 to 1134 loose gray silt with some sand and a little gravel, 1134 to 1104 very dense to dense brown sand with thin layers of shale, 1104 to 1098.5 dense brown silt, 1098.5 to 1193 weathered limestone with limestone cobbles and boulders, 1193 to 1191.5 sound limestone. There is a very porous layer between the dense silt and weathered limestone.

Weathered Rock Elevations

<u>Structure Unit</u>	<u>Station</u>	<u>Rock/Weathered Rock</u>
West Abutment Boring 2	232+07	1095 ±
East Abutment Boring 1 and 1A	232+65 ±	1094 ±

The water elevation was 1139.5 at the time the borings were made.

Topsoil thickness was 3 feet ±.

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

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 load in the steel section if driven to rock at elevation 1194 ±.

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 depending on the silt content.

7. CONSTRUCTION PROBLEMS

The bridge widening and fill widening should not cause any special problems since the widening should only affect the shoulders.

8. RECOMMENDATIONS

- A. Use steel H-piles or oil field pipe piles driven to 9000 psi load in the steel section. The pile tip elevation should be $1194 \pm$. There may be occasional hard driving due to shale layers, limestone cobbles and/or boulders. There are also very soft weathered zones between the limestone and the sands that vary from 1 to several feet in thickness. Due to these factors the accrual tip elevations will vary.
- B. Use a good sand material as fill and backfill. This will eliminate long term settlement problems as well as water caused problems in the fills and behind the earth retaining structures.
- C. Remove all topsoil before placing fills and backfills.
- D. Build the fills before driving piles for the structure.

DGA:m00033

USH 12 OVER CARR CREEK, BALDWIN TO EAST COUNTY LINE, ST. CROIX COUNTY

STATE PROJECT NUMBER SHEET NO.

ABBREVIATIONS
F—Fine M—Medium C—Coarse
M—Marl S—Sand

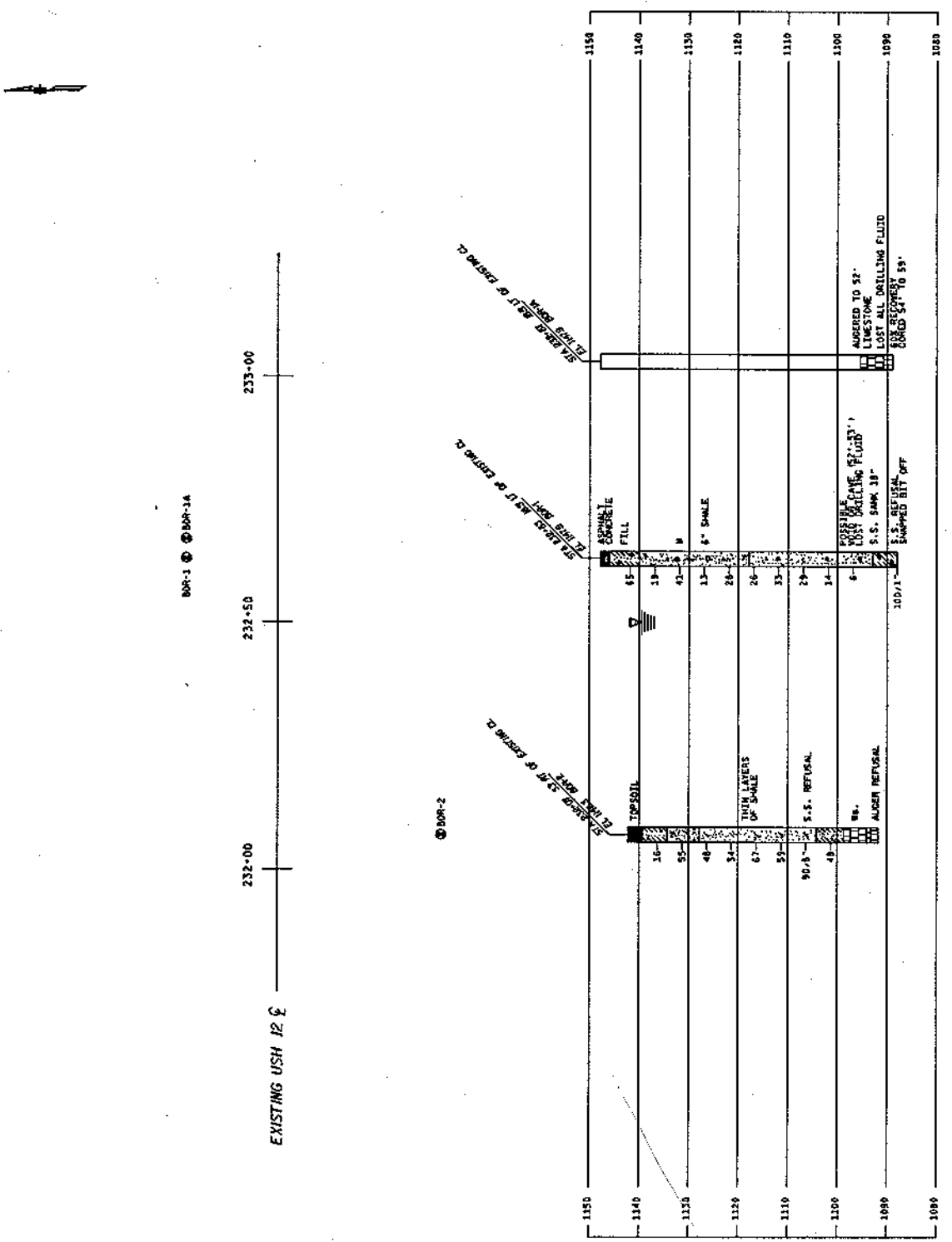
MATERIAL SYMBOLS
Topsoil Silt Sandstone
Sand Peat Limestone
Gravel Clay Igneous Rock

LEGEND OF PROBING
95/100 Blows per 6"
Penetration
7 Average Blow Per Foot
358' wt.
Falling 15' on a 2"
D.S. Point.

LEGEND OF BORING
Elev.
Boring No.
Sta.
Unconfined
Strength
Blows Per Ft.
Using 140 lb. wt.
Falling 30"
Wash Sample
Shelby Tube—S.T.
Ground Water
Elevation
No Ground Water
Observed Above
This Elevation
Limestone
Dolite otherwise specified
Blows per foot at the
location indicated are based on driving a 120 lb. wt.
solid spoon sampler with a 140 lb. hammer having a
free fall of 30". The blow count is taken in undisturbed soil
immediately below a steel or open hole clearing and
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 exploration 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 bridge location of Highway does not
warrant assurance that the depths investigated in this
classification of material presented in these investigations
is necessarily typical of the entire area.

NO. DATE REVISION BY
STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STRUCTURE B-55-123
SHEET 1 OF 1
SUBSURFACE
EXPLORATION



FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 1 Structure B-55-123 County St Croix Sheet of 2Project 8949-04-01 Road USH 12 over Carr CreekStation 232+63 Offset 18.5' Lt Existing E Surface Elevation 1147.9While drilling 8.5' Time after drilling water elev. 1139.5Before casing removal 2.4 Depth to waterAfter Boring Completed 0.4 Depth to cave-inCave in 57 Water NotesMOISTURE
D = Damp
M = Moist
W = WetHS = Hollowstem
WA = Washhead
RB = RockbitST = Shelby tube
SS = Split spoon
DM = Drilling mudA = Auger
C = Coring
W = WashE = Easy
M = Medium
H = HardStart 2-18-84 Unit 4Finish 2-24-84 Chief Hord & new

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on		Drilling Method
		D/G	6/12					Casing 3"	Probe	
					Asphalt					
					Concrete					A
					Loose grey SILT & sand & gravel					
					Firm					
1	M	22	33					35		
		32	33					27		
								18		
								22		
					Firm Br. med SAND & gravel			24		
								15		
2	W	9	10					16		RO
		12						19		WR
								22		revert
								22		
3	W	20	21					24		
		26						25		
								18		
								19		
								18		
4	W	6	7		6" Layer white shale			20		
		9						22		
								26		
								25		
								26		
5	W	12	14					28		
		16						25		
								24		
								31		
								40		
6	W	9	17		Dense Br. white SAND, & gravel			56		
		28						60		
					w/ thin layers shale			65		
								68		
								71		
7	W	16	17					75		
		18						79		
								85		
								105		
								120		
8	W	16	13					140		
		13						180		

Checked by _____ Final _____ Boring No. 1

FIELD BORING LOG

BL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 2 Structure B-55-123 County St. Croix Sheet 1 of 2Project 8949-04-01 Road USH 12Station 232 + 07 Offset 33 Rt Existing Surface Elevation 1142.3

GROUND WATER OBSERVATIONS

While drilling _____ Time after drilling _____

Before casing removal Dry Depth to water _____After Boring Completed Dry Depth to cave-in _____Cave In 45' Water Notes _____

MOISTURE

D = Damp
M = Moist
W = WetHS = Hollowstem
WA = Washhead
RB = RockbitST = Shelby tube
SS = Split spoon
DM = Drilling mudA = Auger
C = Coring
W = WashE = Easy
M = Medium
H = Hard

DRILLING METHOD

Start 2-28-94 Unit 7Finish 3-1-94 Chief Hartman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unclassified Strength	Boulders	Blows on			Coring Method
		0/5	6/12					Casing	Probe	Blow	
					<u>TOP SOIL</u>						
1	W	6	8		Loose DK grey silty SAND little gravel			30			
		8	7		SILT <u>medium</u> little sand			32			
								56			
								95			
								110			
			14		<u>V. Dense Br SAND</u>						WA
2	W	26	29		<u>2" silty</u>						RB
		25			<u>2 thin layers w. shale</u>						count
			7								
3	W	14	34		<u>Dense Br. SAND</u> <u>thin</u>						
		35			<u>2" silty</u>						
			14								
4	W	17	17								
		18									
			17								
5	W	28	39		<u>V. Dense</u>						
			19								
6	W	29	30		<u>V. Dense</u>						
			36		<u>V. Dense</u>						
7	W	90			<u>2 ss. refusal</u>						
			23		<u>Dense br. SILT</u> <u>2" sand</u> <u>w/ v. thin layers sand</u>						
8		24	24		<u>thin layer gravel</u>						

Checked by _____ Date _____ Boring No. 2

FIELD BORING LOG

EL3(S) 385

State of Wisconsin Department of Transportation

Boring No. 2 Structure B-55-123 County St Croix Sheet 2 of 2

Project 8949-04-01 Road USH 12

Station 232+07 Offset 33' Rt Existing 4 Surface Elevation 1142.3

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

O = Damp
M = Moist
W = Wet

HS = Hollowstem
WA = Washhead
RB = Rockbit

ST = Shelby tube
SS = Split spoon
DM = Drilling mud

DRILLING METHOD

A = Auger
C = Coring
W = Wash

E = Easy
M = Medium
H = Hard

Start 2-20-94 Unit 7

Finish 3-1-94 Chief Hovstman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unclassified Strength	Boulders	Blows on		Drilling Method
		O/S	6/12					Casing Size	Probe Size	
8	M	24	24	40	Dense Br. Silt or sand w/ thin layers sand					WA
					lost all drilling fluid down hole					RB
					45' weathered LIMESTONE					A
										H
					1050' Limestone					VH
					Auger retrieval					
					E.O. B 50.5'					
					55					
					60					
					65					
					70					
					75					
					80					

Checked by _____ Final _____ Boring No. 2