

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: January 5, 1996

TO: Richard Pauser
Construction and Materials Supervisor
Transportation District 6

FROM: Dennis G. Althaus
Geologist

SUBJECT: Site Investigation Report
Project I.D. 1022-02-01
Structure B-55-147/148
I-94 over STH 35
St. Croix County

Attached is the Site Investigation Report for the above project.

DGA:\

Attachments

cc: District 6 (4)
C.O. Bridge
C.O. Files
C.O. Design
J.E. Haverberg
Geotechnical File

SITE INVESTIGATION REPORT

Project I.D. 11022-02-01

Structure B-55-147/148

I-94 over STH 35

St. Croix County

1. GENERAL

Five borings were made for the proposed twin two span 170 foot long by 59 foot wide structures. The new structures will be offset 1000 feet west of the existing STH 35 and I-94 interchange. The proposed structures are part of the STH 35 relocation and is located about at station 145+46. Rolling hills with farm fields and woods for ground cover make up the surrounding terrain. No rock outcrops or boulders were noted. The surface soils are mostly sand.

2. SUBSURFACE CONDITION

Five 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 146+32 50 feet right of the proposed I-94 EB reference line.

<u>Elevations</u>	<u>Soil Description</u>
888.0 to 887.6	black topsoil
887.6 to 853.0	loose to brown sand with a trace of silt and gravel
853.0 to 806.0	firm brown sand with a trace of silt and gravel
806.0 to 798.0	limestone (cored 5' 100% recovery)

Boring 2 was taken at station 144+50 100 feet left of the proposed I-94 EB reference line.

<u>Elevations</u>	<u>Soil Description</u>
886.0 to 885.5	black topsoil
885.5 to 855.0	loose brown sand with a trace of silt and gravel
855.0 to 834.0	loose to firm brown sand with a trace of silt and gravel and clay layers
834.0 to 820.5	very dense limestone

Boring 3 was taken at station 146+13 100 feet left of the proposed I-94 EB reference line.

<u>Elevations</u>	<u>Soil Description</u>
882.3 to 881.8	black topsoil
881.8 to 847.0	loose brown sand with a trace of silt and gravel
847.0 to 807.0	firm brown sand with a trace silt and gravel
807.0 to 801.0	very dense limestone

Boring 4 was taken at station 145+43 26 feet left of the proposed I-94 EB reference line.

<u>Elevations</u>	<u>Soil Description</u>
887.7 to 887.2	black topsoil
887.2 to 865.0	loose brown sand with a trace of gravel and silt
865.0 to 827.0	firm brown sand with a trace of silt and gravel
827.0 to 817.0	very dense limestone

Boring 5 was taken at station 144+71 40 feet right of the proposed I-94 EB reference line.

<u>Elevations</u>	<u>Soil Description</u>
890.0 to 889.6	Bituminous concrete
889.6 to 822.0	firm brown sand with a trace of silt and gravel
822.0 to 810.0	very dense limestone

Ground water was at about elevation 874 at the highest point, however there was no ground water observed in the surrounding area. This means that the existing ground water should be able to be drained off for the STH 35 cut. The topsoil is about 1/2 foot thick.

Rock Elevations

<u>Structure Unit</u>	<u>Station</u>	<u>Offset</u>	<u>Rock Elevation</u>
East Abutments			
Boring 2 WB Lanes	144+50	100' left	834.0
Boring 5 EB Lanes	144+71	40' right	822.0
Pier 1			
Boring 4 All Lanes	145+43	26' left	827.0
West Abutments			
Boring 3 WB Lanes	146+13	100' left	807.0
Boring 1 EB Lanes	146+32	50' right	806.0

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 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. The rock elevations are as follows:

<u>Structure unit</u>	<u>Rock Elevation</u>
B-55-147 EB I-94	
West Abutment	822.0
pier	827.0
East Abutment	806.0
B-55-148 WB I-94	
West abutment	834.0
pier	827.0
East Abutment	807.0

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

The drainage of localized ground water for the STH 35 cut.

8. RECOMMENDATIONS

- A) Remove the 1/2 foot of topsoil before placing the approach fills.
- B) Use a grade 1 or 2 granular material as fill material for the proposed approaches.
- C) Use a grade 1 granular material as backfill material behind the abutments as well as any other earth retaining structure.
- D) Be prepared to drain off any localized ground water.
- E) Use steel H-piles or oil field pipe piles driven to 9000 psi load in the steel section. The estimated pile tip elevations are as follows:

<u>Structure and structure Unit</u>	<u>Estimated pile tip elevation to rock</u>
B-55-147 EB I-94	
West Abutment	822.0
pier	827.0
East Abutment	806.0
 B-55-148 WB I-94	
West Abutment	834.0
Pier	827.0
East Abutment	807.0

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



STATE PROJECT NUMBER _____ SHEET NO. _____

FIELD BORING LOG

Boring No. 1 Structure B-55-147 EL3(S) 385 County St Croix Sheet 1 of 3
 Project 1022-02-01 Road I-94 over STH 35
 Station 146+32.670 Offset 50.000 rt Surface Elevation 880.0
 While drilling 46' GROUND WATER OBSERVATIONS
 Before casing removal Time after drilling
 After Boring Completed Depth to water
 Cave In Depth to cave-in
 Water Notes

MOISTURE D = Damp M = Moist W = Wet
 HS = Hollowstem WA = Washahead RB = Rockbit
 DRILLING METHOD ST = Shelby tube SS = Split spoon DM = Drilling mud A = Auger C = Coring W = Wash E = Easy M = Medium H = Hard
 Start 8-29-95 Unit 3
 Finish Chief Horszma

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on			Drilling Method
		0/6	6/12					Casing Size	Probe Size	Size	
					<u>BI TAIL</u>						
					<u>Loose Br. med-coarse SAND</u>						<u>HS</u>
					<u>±r fine gravel + silt</u>						
1	M	3	3								
		3									
2	M	2	1		<u>Loose</u>						
		2									
3	M	3	2		<u>Loose</u>						
		3									
4	M	2	3		<u>Loose Br. med SAND</u>						
		3			<u>±r silt</u>						
5	M	4	4								
		6									
6	M	3	3		<u>Loose Br. med-coarse SAND</u>						
		4			<u>±r fine gravel + silt</u>						
7	M	4	8		<u>Firm Br. med-coarse SAND</u>						
		10			<u>±r silt</u>						
8	M	5	8								
		12									

Checked by _____ Final _____ Boring No. 1

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 1 Structure B-55-147 County St Croix Sheet 2 of 3

Project 1022-02-01 Road I-94 over STH 35

Station 146+32.670 Offset 50.000 R8 Surface Elevation 880.0

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

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 8-29-95 Unit 3
 Finish _____ Chief Harstman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on			Drilling Method
		0/6	6/12					Casing Size	Probe Size		
8	MA	5	8		40 Firm Br, med-coarse SAND to silt	40					HS
		12									
9	M	6	6		45	45					
	W	7									
10	W	5	6		50 50	50 10					
		6									
11	W	7	8		55 55	55 25					WA RB revert
		9									
12	W	8	11		60 60	60 20					
		13									
13	W	9	10		65 65 Firm Br med SAND to silt	65 25					
		9									
14	W	10	11		70 70	70 30					
		12									
15	W	8	12		75 75 Dense	75 35					
		22									
16	W	14	11		80 80 Firm Br. SAND + limestone GRAVEL	80 40					
		12									

Checked by _____

Final _____

Boring No. 1

FIELD BORING LOG

Boring No. 1 Structure B-55-147 EL3(S) 385 County St Croix Sheet 3 of 3 State of Wisconsin/Department of Transportation

Project 1022-02-01 Road I-94 over STH 35
Station 146+32.270 Offset 50.000 Rt Surface Elevation 880.0

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
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 8-29-95 Unit 3
Finish _____ Chief Horstman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on			Drilling Method
		0/6	6/12					Casing Size	Probe Size	Size	
16	W	14	11	80	Firm Br. SAND + limestone GRAVEL						WA
		12			lt Br. LIMESTONE						RB
				85							rand
					Cored 85'-90' 100% recovery						H
				90							C
					E.O.B.						
				15							
				20							
				25							
				30							
				35							
				40							

Checked by _____ Final _____ Boring No. 1

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 2 Structure B-55-148 County St Croix Sheet 1 of 2

Project 1022-02-01 Road I-94 over STH 35

Station 144+50.765 Offset 100.000 Lt Surface Elevation 886.0

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

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 8-30-95 Unit 4
Finish Chief Horstman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on		Drilling Method
		0/6	6/12					Casing 3"	Probe	
					CL TO 15016					
					Loose Br. med SAND tr gravel & silt					
1	M	2	3					12		
		3						15		
								19		
								20		
								21		
	M	1	3		No recovery					with RB reverse
2	W	4	4		Loose Br. med-coarse SAND tr fine gravel & silt					
3	W	12	11		Firm					
		6								
4	M	3	6		Loose Br. med-coarse SAND w/ thin layers silt tr gravel					
		4								
5	M	14	7		Firm Br. med-coarse SAND tr gravel & silt					
		13								
6	M	9	9							
		12								
7	W	2	4		Layer gray silt & clay					
		2								

FIELD BORING LOG

Boring No. 2 Structure B-55-148 EL3(S) 385 State of Wisconsin/Department of Transportation County St Croix Sheet 2 of 2

Project 1022-02-01 Road I-94 over JTH 35
Station 144 + 50.765 Offset 100.000 Lt Surface Elevation 886.0

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

HS = Hollowstem
WA = Washhead
RB = Rockbit

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

A = Auger
C = Coring
W = Wash

E = Easy
M = Medium
H = Hard

Start B-30-85 Unit 34
Finish _____ Chief Horstman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on			Drilling Method
		0/6	6/12					Casing Size	Probe Size	Size	
7	W	2	2	40	Loose Br med-coarse SAND Layer grey silt & clay to gravel & silt	40					WA RB revert
8	W	12	18	45	Firm	5					
9	M	10	10	50	Firm Br. SILT to sand & gravel	10					
					DRILLED VERY HARD - (Lost DRILLING fluid) (ROCK) (LIMESTONE)	15					
		1"/100			SS REFUSAL - V. DENSE - No Recovery VERY HARD DRILLING (LIMESTONE)	20					
		1"/100			SS REFUSAL - V. DENSE - No Recovery VERY HARD DRILLING (LIMESTONE)	25					
		1"/100			SS REFUSAL E.O. B	30					
				30 70		35					
				25 75		40					
				25 80							

Checked by _____ Final _____ Boring No. 2

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 3 Structure B-55-148 County St Croix Sheet Lot 2

Project 1022-02-01 Road I-94 over STH 35

Station 1464 13.265 Offset 100 + 000 LT 100.000 LT Surface Elevation 882.3

While drilling Used DM GROUND WATER OBSERVATIONS

Before casing removal _____ Time after drilling _____

After Boring Completed _____ Depth to water _____

Cave In _____ Depth to cave-in _____

Water Notes _____

MOISTURE D = Damp M = Moist W = Wet

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 9-5-95 Unit 3

Finish _____ Chief HOTZ

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on		Drilling Method
		0/6	6/12					Casing Size	Probe Size	
					<u>B / TOP SOIL</u>					
					<u>Loose Br. med SAND to silt</u>					
1	W	3	5					17		
		5						22		
								25		
								28		
								30		
2	W	2	3		<u>Loose Br. med-coarse SAND</u>					
					<u>to fine gravel & silt</u>					
3	W	4	4							
4	W	7	7		<u>Thin layer sand</u>					
5	W	4	5							
6	W	5	5							
7	W	9	12		<u>Firm</u>					
8	W	7	7		<u>Firm</u>					

Checked by _____ Final _____ Boring No. 3

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 3 Structure B-55-148 County St. Croix Sheet 2 of 2

Project 1022-02-01 Road I-94 over STH 35

Station 146+13.265 Offset 100.000 L2 Surface Elevation 882.3

GROUND WATER OBSERVATIONS

While drilling Used DM 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

HS = Hollowstem
WA = Washhead
RB = Rockbit

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

A = Auger
C = Coring
W = Wash

E = Easy
M = Medium
H = Hard

DRILLING METHOD

Start 9-5-95 Unit 3
 Finish _____ Chief Horszeman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on			Drilling Method
		0/6	6/12					Casing Size	Probe Size	Size	
					40						
8	W	7	7		Firm Br. med-coarse SAND tr fine gravel + s.s. 18						WA RB DM
9	W	7	8		45						
10	W	8	12		50 Firm Br. med SAND tr s.s. 18						
11	W	7	8		55						
12	W	9	10		60 Firm Br. med-coarse SAND tr fine gravel + s.s. 18						
13	W	6	8		65						
14	W	10	10		70 Thin layers of s.s.						
		100%			75 SS refusal No recovery						H
					6 Br. LIMESTONE						
		100%			80 SS refusal no recovery						
					E.O.B.						

Checked by _____ Final _____ Boring No. 3

FIELD BORING LOG

Boring No. 4 Structure B-55-147/148 County St Croix Sheet of 2
 Project 1022-02-01 Road I-94 over STH 35
 Station 145 + 43 Offset 26' at Surface Elevation 887.7

While drilling used DM GROUND WATER OBSERVATIONS
 Before casing removal Time after drilling _____
 After Boring Completed Depth to water _____
 Cave In Depth to cave-in _____
 Water Notes _____

MOISTURE D = Damp M = Moist W = Wet
 DRILLING METHOD HS = Hollowstem ST = Shelby tube A = Auger E = Easy
 WA = Washhead SS = Split spoon C = Coring M = Medium
 RB = Rockbit DM = Drilling mud W = Wash H = Hard
 Start 9-6-95 Unit 4
 Finish 9-7-95 Chief Horszmar

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on		Drilling Method
		0/6	6/12					Casing Size	Probe Size	
					<u>B1 Topsoil</u>					<u>A</u>
					<u>Loose Br. med SAND to gravel to silt</u>					
<u>1</u>	<u>M</u>	<u>2</u>	<u>2</u>	<u>5</u>				<u>Push</u>		
		<u>3</u>						<u>Down</u>		
<u>2</u>	<u>M</u>	<u>4</u>	<u>5</u>	<u>10</u>	<u>Loose Br. med-coarse SAND to fine gravel + silt</u>					<u>WA</u>
		<u>5</u>								<u>RB</u>
<u>3</u>	<u>M</u>	<u>4</u>	<u>4</u>	<u>15</u>						<u>DM</u>
			<u>3</u>							
<u>4</u>	<u>M</u>	<u>4</u>	<u>5</u>	<u>20</u>						
			<u>5</u>							
<u>5</u>	<u>W</u>	<u>6</u>	<u>6</u>	<u>25</u>	<u>Firm</u>					
			<u>4</u>							
<u>6</u>	<u>W</u>	<u>6</u>	<u>8</u>	<u>30</u>	<u>Firm</u>					
			<u>5</u>							
<u>7</u>	<u>W</u>	<u>6</u>	<u>8</u>	<u>35</u>	<u>Firm</u>					
			<u>7</u>							
<u>8</u>	<u>W</u>	<u>10</u>	<u>11</u>	<u>40</u>	<u>Firm</u>					
			<u>7</u>							

Checked by _____ Final _____ Boring No. 4

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 4 Structure B-55-147/148 County St Croix Sheet 2 of 2

Project 1022-02-01 Road I-94 over STH 35

Station 145+43 Offset 26' L8 Surface Elevation 887.7

GROUND WATER OBSERVATIONS

While drilling Used DM 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 = Washhead
 RB = Rockbit
 ST = Shelby tube
 SS = Split spoon
 DM = Drilling mud
 A = Auger
 C = Coring
 W = Wash
 E = Easy
 M = Medium
 H = Hard

Start 9-6-95 Unit 4
 Finish 9-7-95 Chief Horstman

Sample No.	Moisture	Blows on Sampler		sample and recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on			Drilling Method
		0/6	6/72					Casing Size	Probe Size	Size	
8	W	10	11	40	Firm Br. med-coarse SAND to fine gravel + silt	40					WA RB DM
9	W	8	9	845		436					
10	W	6	8	1030		5020					
11	M	9	11	1055	Firm Br. SILT to sand + gravel (2:11)	5515					
12	W	100/40	35	2060	SS refused v. Dense lt Br. LIMESTONE	6020					H
				2355	Drilled v. Hard to 70'	6525					
				2070	E.O.B	70-30					
				3575		75-35					
				40		40					

Checked by _____ Final _____ Boring No. 4

FIELD BORING LOG

Boring No. 5 Structure B-55-147 EL3(S) 385 County St Croix Sheet 1 of 2
Project 1022-02-01 Road I-94 over STH 35
Station 144+71 Offset 40' 12" Surface Elevation 890.0

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
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 10-2-95 Unit 3
Finish _____ Chief Horsdeman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on		Drilling Method
		0/6	6/12					Casing Size	Probe Size	
					<u>5" B.T. Conc.</u>					<u>A</u>
					<u>Firm Br. med-coarse SAND</u>					
					<u>or fine gravel + s, it</u>					
1	D	7	8							
		8	9							
2	D	6	5							
		7	8							
3	M	5	5							
		5	5							
4	M	4	6							
		6	5							
5	M	6	6							
		7	6							
6	M	5	5							
		6	6							
7	M	4	4							
		5	6							
8	M	5	6							
		5	6							

Checked by _____ Final _____ Boring No. 5

FIELD BORING LOG

Boring No. 5 Structure B-55-147 EL3(S) 385 State of Wisconsin/Department of Transportation
 County 32 Croix Sheet 2 of 2
 Project 1022-02-01 Road I-94 over 5TH 35
 Station 144+21 Offset 40' R Surface Elevation 890.0

While drilling Used reverse 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
 HS = Hollowstem WA = Washhead RB = Rockbit
 DRILLING METHOD ST = Shelby tube A = Auger E = Easy M = Medium H = Hard
 SS = Split spoon C = Coring
 DM = Drilling mud W = Wash
 Start 10-2-95 Unit 3
 Finish _____ Chief Hartman

Sample No.	Moisture	Blows on Sampler		Sample and Recovery	VISUAL FIELD CLASSIFICATION AND REMARKS	Unconfined Strength	Boulders	Blows on		Drilling Method
		0/6	6/12					Casing Size	Probe Size	
8	M	5	6	40	Firm Br, med-coarse SAND to gravel & silt	40				WA RB reverse
9	M	7	9	54.5		45				
		11	12							
10	M	4	11	50.5		50				
		11	14							
11	W	7	8	55.5		55				
		8	8							
12	W	6	7	60.0		60				
		9	9							
13	W	7	7	65.5	Firm Lt Br-weathered LIMESTONE	65				
		10	11		V. Dense Lt Br. LIMESTONE					VA
		100"		70.0	SS as fuse)	70				
					Drilled V. Hard to 80'					
		100"		75.0	SS. refusal	75				
		100"		80.0	SS. refusal	80				
					Gr. O.B.					

Checked by _____ Final _____ Boring No. 5

FIELD BORING LOG

EL3(S) 385

State of Wisconsin/Department of Transportation

Boring No. 1-17 Structure Water County St Croix Sheet 1 of 1

Project _____ Road I-94 + STH 35

Station	Offset	Surface Elevation
146 + 13	97.800 Lt	

GROUND WATER OBSERVATIONS

While drilling dry Time after drilling _____

Before casing removal _____ Depth to water _____

After Boring Completed _____ Depth to cave-in _____

Cave In	Water Notes
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MOISTURE

D = Damp
M = Moist
W = Wet

HS = Hollowstem
WA = Washhead
RB = Rockbit

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

A = Auger
C = Coring
W = Wash

E = Easy
M = Medium
H = Hard

Start 11-28-95 Unit 5

Finish Chief *Horn*

[illegible][illegible]

100

<p> $\frac{1}{2}$ </p>	<p> $\frac{1}{2}$ </p>
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No. 1-44

DT1434 96, (Replaces EL3A(S)) FIELD BORING LOG Wisconsin Department of Transportation
Boring No. 1 well Structure Motion Well County St Croix Sheet 1 of 2
Project 1022-02-01 Road Inter 94 & 35
Station 146+13± Offset 100' Lt Surface Elevation

GROUND WATER OBSERVATIONS

Streambed Elev. _____ Time After Drilling _____
Water Elev. _____
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 = Split spoon
DM = Drilling Mud

A = Auger
C = Coring
W = Wash

E = Easy
M = Medium
H = Hard

Start 9-15-98 Unit 1
Finish 1 Chief Staver

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							
	Dry					10' Screens 40 straight pipe Top Soil BR Fine to Med SAND			A	
					5					
					10					
					15					
					20					
					25					
					30					
					35					
	DM					40 BR Fine to Med SAND				

Checked by _____ Final _____ Boring No. _____

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

DRILLING METHOD

E = Easy
M = Medium
H = Hard

Finish Chief *Staff*

Checked by	Final	Boring No. <i>well</i>
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