

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 2110

CSAH NO. 8

OVER THE

MINNESOTA RIVER

DISTRICT 8 - BROWN COUNTY



OCTOBER 24, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

AYRES ASSOCIATES & COLLINS ENGINEERS, INC.

JOB NO. 7423

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 2110, Bent 3 and Pier 1, were found to be in fair to poor condition. Pier 1 exhibited substantial section loss of the exposed footing and heavy section loss at the nose of the upstream column. All the piles of Bent 3 exhibited scaling with maximum penetration of 1 inch. Several of the bent piles also exhibited spalling with exposed reinforcing steel. Comparison of water depth soundings with the previous underwater inspection revealed an overall degradation of the channel bottom.

INSPECTION FINDINGS:

- (A) All of the piles of Bent 3 exhibited widespread scaling with penetrations of up to 1 inch.
- (B) Pier 1 exhibited heavy scaling on the upstream column with 1 inch maximum penetration, and at the downstream column with penetrations reaching 4 inches of maximum depth.
- (C) The tops of both column footings of Pier 1 were exposed at 8.2 feet below water. Heavy to moderate deterioration was present all around the footings. At the downstream column the horizontal penetrations due to section loss were approximately 12, and at the upstream column, the horizontal penetrations reached up to approximately 2 feet.
- (D) A heavy accumulation of timber debris was observed at the upstream nose of Bent 3 extending from the channel bottom to 3 feet above the waterline.

RECOMMENDATIONS:

- (A) Repair the section loss on the footings of Pier.
- (B) Repair/patch the areas of spalled concrete with exposed reinforcing steel on the piles of Bent 3.
- (C) Consider removal of the timber debris at the upstream end of Bent 3 during routine maintenance.
- (D) Consideration should be given to placement of scour countermeasures along the exposed foundation of Pier 1 or a scour analysis should be performed to determine the ultimate scour depths and stability of the substructure.
- (E) In light of apparent age and extent of deterioration for structure, investigate cost benefit of total bridge replacement.
- (F) Reinspect the submerged substructure at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader

Ayres Associates, Inc.



Brian K. Schroeder
Registered Professional Engineer
State of Minnesota

Respectfully submitted,

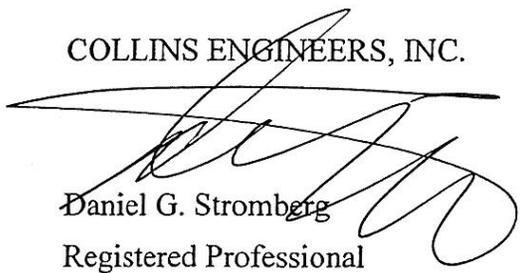
PROFESSIONAL ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

Date 6/30/14 License # 21491

COLLINS ENGINEERS, INC.



Daniel G. Stromberg

Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 2110

Feature Crossed: Minnesota River

Feature Carried: CSAH No. 8

Location: District 8 - Brown County

Bridge Description: Starting at the south end of the bridge, the superstructure consists of a multiple beam approach span, two pony truss spans, and three multiple beam spans. The substructure units are indicated as Bent 1 (South Abutment), Bent 2, Pier 1, Bent 3, Bent 4, Bent 5, and the North Abutment.

2. INSPECTION DATA

Professional Engineer/Team Leader: Brian K. Schroeder, P.E.

Dive Team: Ricardo S. Narvaez, Adam J. Enderby

Date: October 24, 2012

Weather Conditions: Cloudy, 45°F

Underwater Visibility: 1.0 foot

Waterway Velocity: None/Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Bent 3 and Pier 1

General Shape: Bent 3 consists of a “dumbbell” shaped concrete cap supported by three octagonal concrete piles at each end. Pier 1 consists of a diaphragm wall with a square concrete column and footing at each end.

Maximum Water Depth at Substructure Inspected: Approximately 9.1 feet.

4. WATERLINE DATUM

Water Level Reference: The top of Bent 3, Elevation 102.33.

Water Surface: The waterline was approximately 20.2 feet below reference.
Waterline Elevation = 82.1.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 5

Item 61: Channel and Channel Protection: Code 6

Item 92B: Underwater Inspection: Code B/10/12

Item 113: Scour Critical Bridges: Code I/07

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

 Yes X No

6. STRUCTURAL ELEMENT CONDITION RATING

Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
205	Concrete Column	2	EA		1	1		
227	Reinforced Concrete Piling	6	EA		5	1		
220	Concrete Footing	2	EA			2		
361	Scour	1	EA		1			
363	Section Loss Smart Flag	1	EA		1			



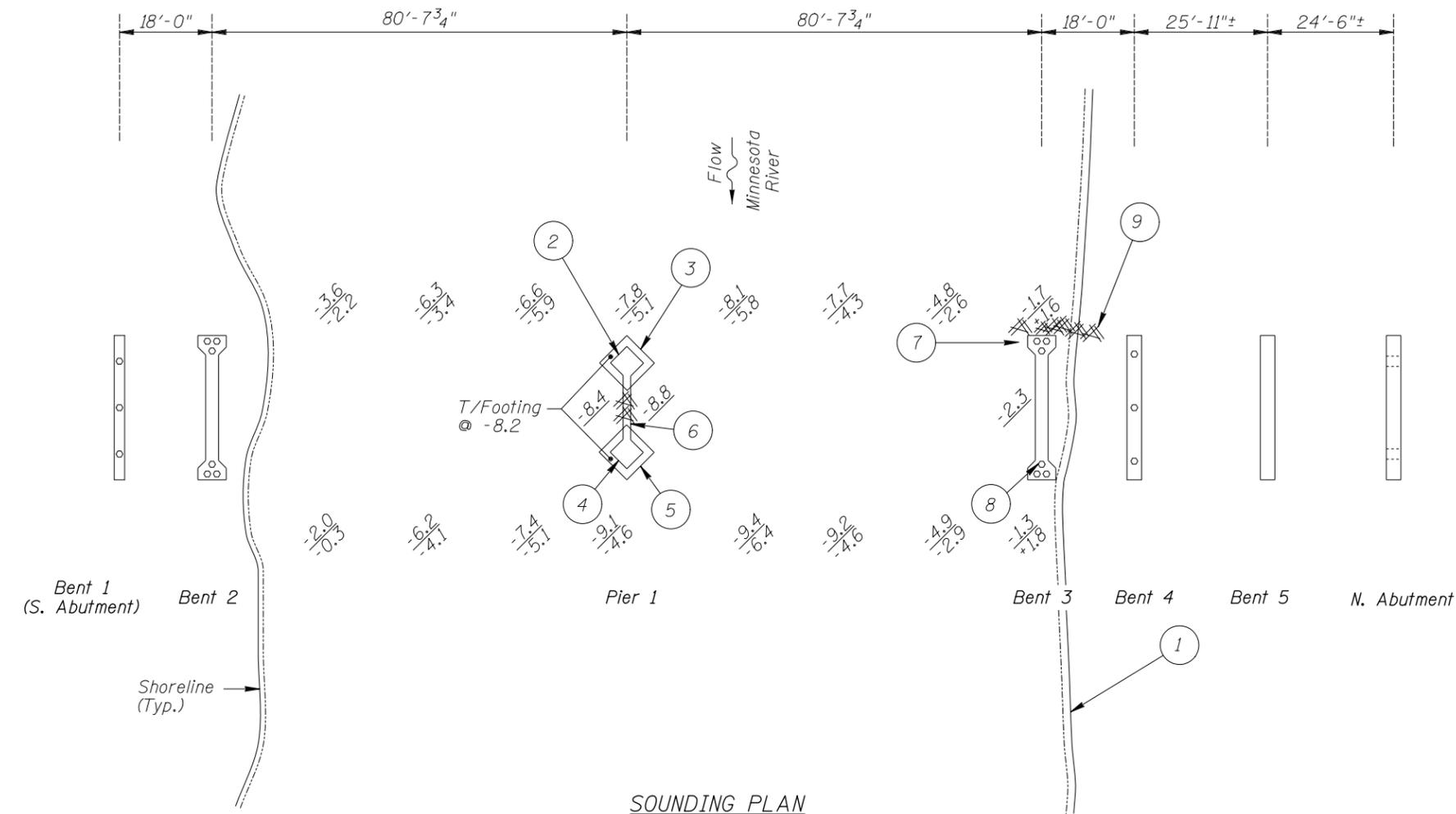
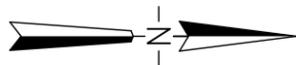
Photograph 1. View of Pier 1, Looking Northwest.



Photograph 2. View of Bents 3 and 4, Looking West.



Photograph 3. View of Pier 1, Looking South.



SOUNDING PLAN

INSPECTION NOTES:

- 1 North shoreline exhibited embankment erosion.
- 2 Heavy scaling/section loss on the upstream column located near the waterline with 1 foot of maximum penetration.
- 3 Heavy deterioration/section loss was present on the upstream footing with up to approximately 2 feet of horizontal penetration.
- 4 Moderate scaling with 3 to 4 inches of maximum penetration was present on all faces of the downstream column concentrated near the waterline.
- 5 Moderate to heavy deterioration was present all the way around the footing with up to 12 inches of horizontal penetration.
- 6 The diaphragm wall exhibited light scaling with 1/8 inch typical penetration. Timber debris, consisting of 6 inch to 8 inch diameter branches, was present between the columns below the wall.
- 7 Scaling was observed on all piles of Bent 3 from 5 to 9 feet above the waterline, with 1 inch of maximum penetration.
- 8 Concrete spall along the pile extended from pile cap down 5 feet, measuring up to 1.5 foot wide with 1.5 inches of maximum penetration and exposed reinforcing steel with moderate corrosion.
- 9 A heavy accumulation of timber debris, consisting of logs and branches up to 2 feet in diameter, was observed at the upstream end of Bent 3 extending from the channel bottom to 1 foot above the waterline.

GENERAL NOTES:

1. Bent 3 and Pier 1 were inspected underwater.
2. At the time of inspection on October 24, 2012, the waterline was located approximately 20.2 feet below top of pile cap at Bent 3. This corresponds with a waterline elevation of 82.1 feet based on design drawings.
3. Soundings indicate the water depth at the time of the inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4-point intervals between the substructure units.

Legend

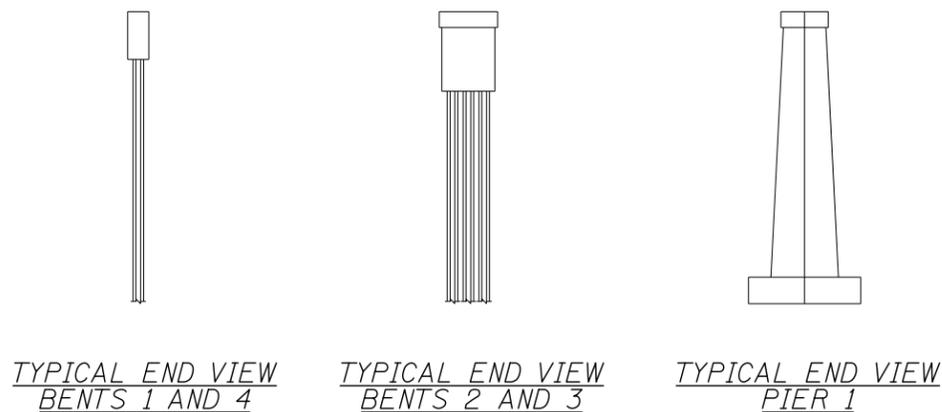
- 0.4 Sounding Depth (10/24/12)
- 0.4 Sounding Depth (10/27/07)

Timber Debris

Octagonal Concrete Pile

Note:

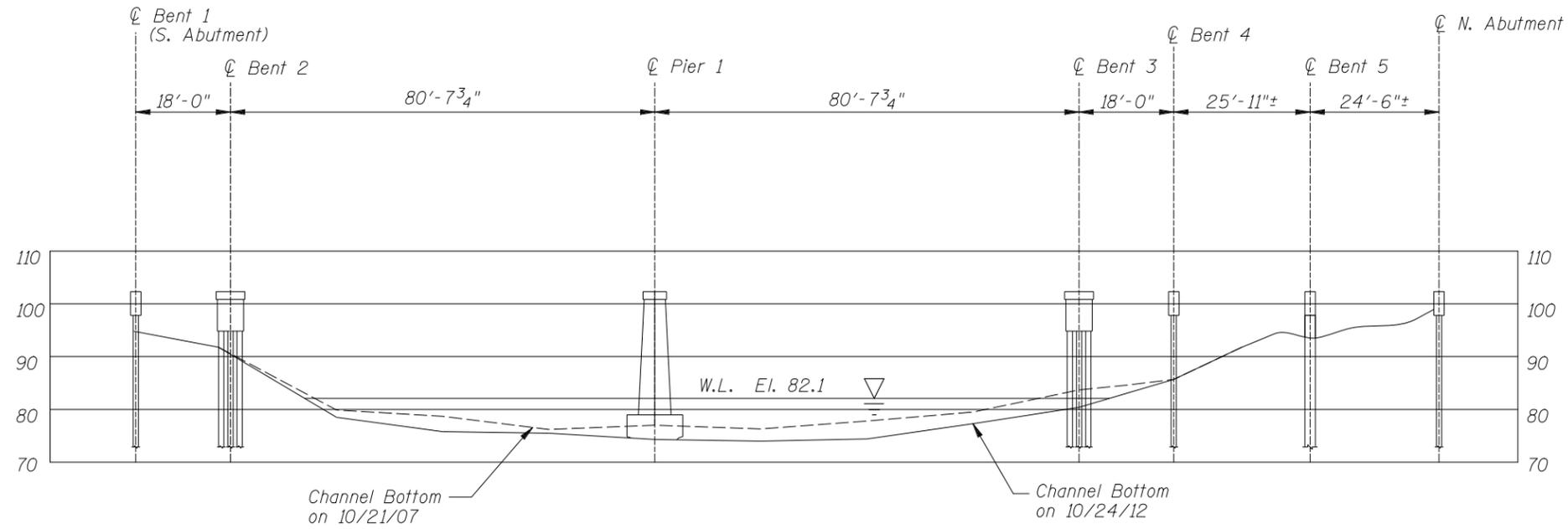
All soundings based on 2012 waterline location.



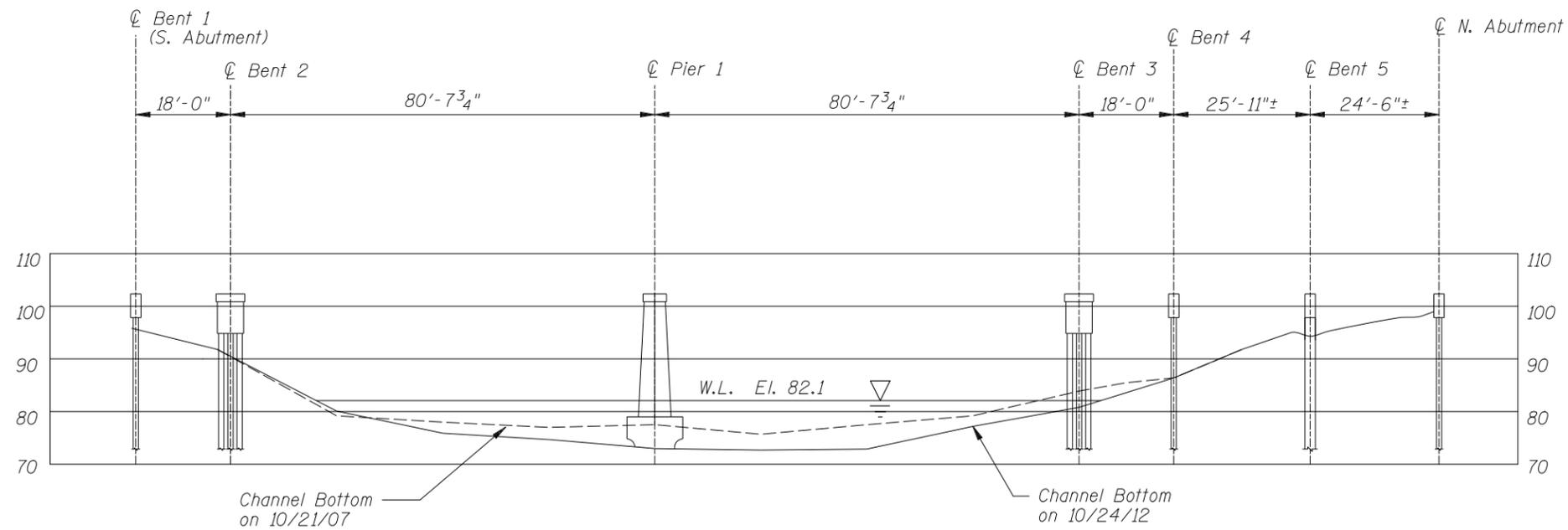
MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION	
STRUCTURE NO. 210 OVER THE MINNESOTA RIVER DISTRICT 8, BROWN COUNTY	
INSPECTION AND SOUNDING PLAN	
Drawn By: JAC	Date: OCT, 2012
Checked By: BKS	Scale: NTS
Code: 74232110	Figure No.: 1

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UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 210 OVER THE MINNESOTA RIVER DISTRICT 8, BROWN COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: JAC	AVRES ASSOCIATES <small>3433 Oakwood Hills Parkway Eau Claire, WI 54701 www.AyresAssociates.com</small>	Date: OCT, 2012
Checked By: BKS		Scale: NTS
Code: 7423210		Figure No.: 2

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MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Ayres Associates DATE: October 24, 2012

ON-SITE TEAM LEADER: Brian K. Schroeder, P.E.

BRIDGE NO: 2110 WEATHER: Cloudy, 45°F

WATERWAY CROSSED: Minnesota River

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Ricardo S. Narvaez, Adam J. Enderby

EQUIPMENT: Commercial Scuba, U/W Light, Hammer, Camera, Sounding Rod

TIME IN WATER: 3:30 p.m.

TIME OUT OF WATER: 4:00 p.m.

WATERWAY DATA: VELOCITY None/Negligible

VISIBILITY 1.0 foot

DEPTH 9.4 feet maximum at Pier 1

ELEMENTS INSPECTED: Bent 3 and Pier 1

REMARKS: Overall, the concrete was in fair to poor condition. All of the piles of Bent 3 exhibited widespread scaling with penetrations of up to 1 inch. Several of the bent piles also exhibited spalling with exposed reinforcing steel. In addition, Pier 1, exhibited heavy scaling on the upstream column with 1 inch maximum penetration, and at the downstream column with penetrations that were 4 inches maximum depth. The tops of both column footings of Pier 1 were exposed at 8.2 feet below water. Heavy to moderate deterioration was present all around the footing with up to 12 inches of horizontal penetration at the downstream column and up to approximately 2 feet of horizontal penetration at the upstream column.

FURTHER ACTION NEEDED: YES NO

Repair the section loss on the footings of Pier.

Repair/patch the areas of spalled concrete with exposed reinforcing steel on the piles of Bent 3.

Consider removal of the timber debris at the upstream end of Bent 3 during routine maintenance.

Consideration should be given to placement of scour countermeasures along the exposed foundation of Pier 1 or a scour analysis should be performed to determine the ultimate scour depths and stability of the substructure.

In light of apparent age and extent of deterioration for structure, investigate cost benefit of total bridge replacement.

Reinspect the submerged substructure at the normal maximum recommended (NBIS) interval of sixty (60) months.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 2110
 INSPECTORS Ayres Associates
 ON-SITE TEAM LEADER. Brian K. Schroeder, P.E.
 WATERWAY CROSSED Minnesota River

INSPECTION DATE October 24, 2012

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	9.4'	N	5	5	7	N	5	6	N	N	7	6	5	N	N	5	N	N
	Bent 3	2.3'	6	5	N	7	N	5	N	N	N	6	6	5	N	N	6	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete was in fair to poor condition. All of the piles of Bent 3 exhibited widespread scaling with penetrations of up to 1 inch. Several of the bent piles also exhibited spalling with exposed reinforcing steel. In addition, Pier 1, exhibited heavy scaling on the upstream column with 1 inch maximum penetration, and at the downstream column with penetrations that were 4 inches maximum depth. The tops of both column footings of Pier 1 were exposed at 8.2 feet below water. Heavy to moderate deterioration was present all around the footing with up to 12 inches of horizontal penetration at the downstream column and up to approximately 2 feet of horizontal penetration at the upstream column.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO. USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.