

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 7149

CSAH NO. 101

OVER THE

MINNESOTA RIVER

DISTRICT 8 - REDWOOD COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 99)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 7149, Piers 1 and 2, were found to be generally in good condition. Random minor areas of poorly consolidated concrete were observed on both piers. The footing was exposed at Pier 1 with up to 7 feet of vertical undermining detected with the steel H-piles exhibiting minor surface corrosion. The footing at Pier 2 was also exposed with up to 3 feet of vertical face exposure, but no undermining was observed. The footing exposures are related to both general and local scour at the bridge site.

INSPECTION FINDINGS:

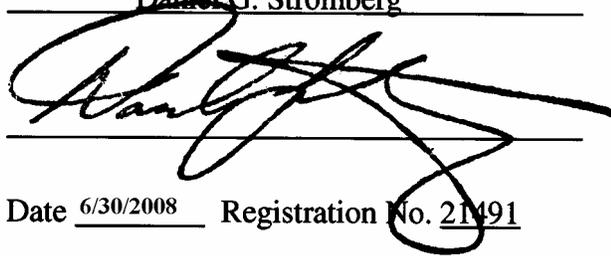
- (A) Random areas of poor consolidation were observed along the pier shaft and footing concrete between the channel bottom and the waterline.
- (B) The footing was exposed at Pier 1 with undermining ranging from 4 feet at the upstream end to 6 feet at the downstream nose and 7 feet at the south face of the pier. The exposed steel H-piles exhibited minor surface corrosion with rust nodules up to 1 inch in diameter over 15 percent of the surface area.
- (C) The footing at Pier 2 was also exposed with up to 3 feet of vertical face exposure, but no undermining was observed.
- (D) A moderate accumulation of timber debris was observed at the upstream nose and along the south face of Pier 1.
- (E) A spall 10 inch in diameter by 2 inch penetration was observed at the upstream corners of the exposed footing of Pier 2.

RECOMMENDATIONS:

- (A) Scour rating indicates that the bridge has the potential to be at greater risk for scour with further scour analysis required. At a minimum, it is recommended that riprap be properly designed and placed around the piers and in the scour/undermining areas to armor against further scour, unless further scour analysis indicates differently.
  
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years. In the interim, and certainly until the scour conditions are further addressed, the footing exposures and undermining should be closely monitored with the taking of water depth soundings, and with the occurrence of a high water event, an underwater inspection should be considered immediately after as soon as conditions will safely permit.

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



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Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 7149

Feature Crossed: Minnesota River

Feature Carried: CSAH No. 101

Location: District 8 - Redwood County

Bridge Description: The superstructure consists of a three span, multiple steel beam bridge. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete piers. The South Abutment and Pier 1 are supported on piles, and the North Abutment and Pier 2 are supported on spread footings keyed into underlying bedrock. The piers are numbered 1 and 2, starting from the north end of the bridge.

2. INSPECTION DATA

Professional Engineer/Team Leader: Daniel G. Stromberg, P.E., S.E.

Dive Team: Clayton G. Brookins, Valerie Roustan

Date: October 21, 2007

Weather Conditions: Cloudy, 55°F

Underwater Visibility: 1.0 foot

Waterway Velocity: 1.0 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2

General Shape: The pier shafts are oblong and rectangular with rounded downstream noses and beveled upstream noses. The piers are supported by rectangular footings. Although the design plans do not indicate piles under either footing, Pier 1 was determined to be founded on steel H-piles (Based on field observation).

Maximum Water Depth at Substructure Inspected: Approximately 13.7 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap on the downstream end of Pier 1.

Water Surface: The waterline was approximately 15.7 feet below reference.  
Waterline Elevation = 78.4.

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

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 3

Item 92B: Underwater Inspection: Code B/10/07

Item 113: Scour Critical Bridges: Code J/91

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

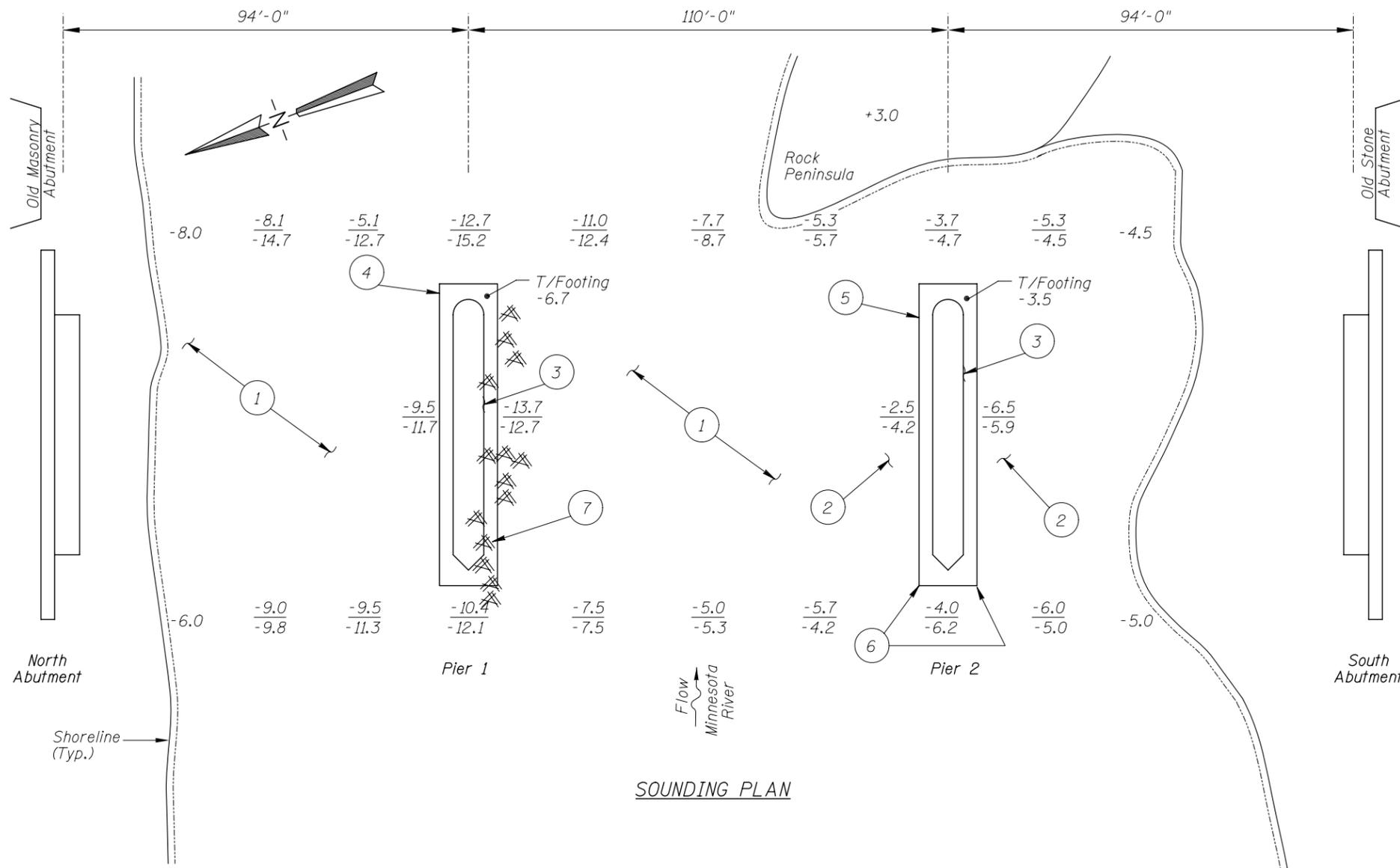
       Yes   X   No



Photograph 1. View of Pier 1, Looking Northwest.



Photograph 2. View of Pier 2, Looking Southwest.



**GENERAL NOTES:**

- Piers 1 and 2 were inspected underwater.
- At the time of inspection on October 21, 2007, the waterline was located approximately 15.7 feet below the top of the pier cap at the downstream end of Pier 1. This corresponds to a waterline elevation of 78.4.
- Soundings indicate the water depth at the time of inspection and are measured in feet.
- Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

**INSPECTION NOTES:**

- The channel bottom consisted of firm silty clay with up to 1 inch of probe rod penetration.
- The channel bottom consisted of 1 to 2 foot diameter riprap.
- Overall concrete was smooth and sound with random minor areas of poor consolidation observed along the pier shaft and footing from the channel bottom to the waterline.
- The footing at Pier 1 was completely exposed with undermining ranging from 4 feet at the upstream end to 6 feet at the downstream nose and 7 feet at south face of Pier 1. The steel piles that were exposed exhibited rust nodules up to 1 inch over 15 percent of the surface area.
- The top of the footing at Pier 2 was completely exposed with up to 3 feet of vertical face exposure at the upstream 1/4 point on the north face and all along the south face. No undermining was detected.
- Spall 10 inches in diameter and 2 inches maximum penetration was observed at the upstream corners of the exposed footing at Pier 2.
- A moderate accumulation of timber debris was observed at the upstream nose of Pier 1 and along the south face consisting of 1.5 feet diameter and smaller logs and branches.

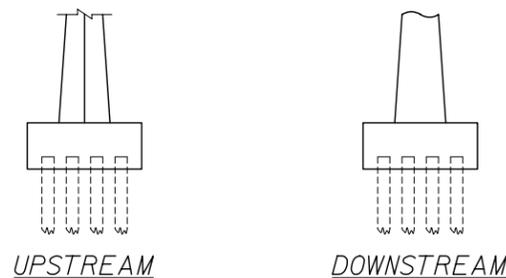
**Legend**

- 2.0 Sounding Depth (10/21/07)
- 5.2 Sounding Depth (11/1/02)

Timber Debris

**Note:**

All soundings based on 2007 waterline location.



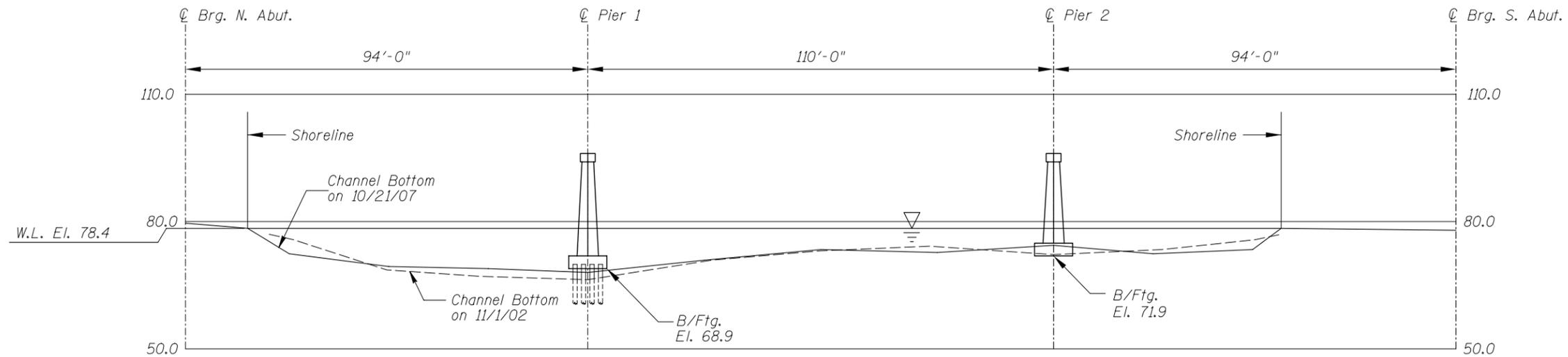
**TYPICAL END VIEW OF PIERS**  
(Piles at Pier 1, observed at time of inspection, are not indicated on design drawings dated 1955.)

**MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION**

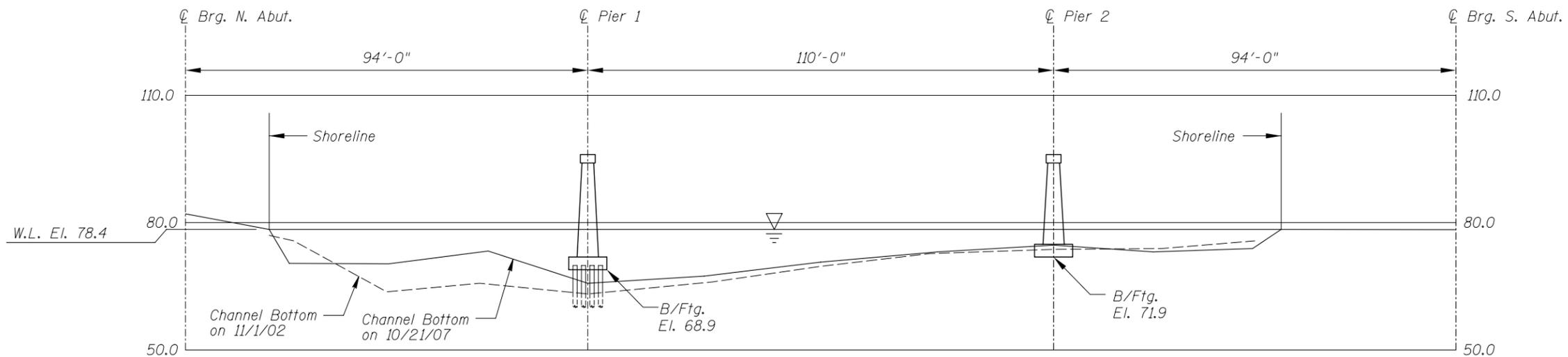
STRUCTURE NO. 7149  
OVER THE MINNESOTA RIVER  
DISTRICT 8, REDWOOD COUNTY

**INSPECTION AND SOUNDING PLAN**

Drawn By: LJ	<b>COLLINS ENGINEERS</b>	123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: OCT. 2007
Checked By: VR			Scale: NTS
Code: 52210099			Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 7149 OVER THE MINNESOTA RIVER DISTRICT 8, REDWOOD COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: LJ	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: OCT. 2007
Checked By: VR		Scale: 1"=30'
Code: 52210099		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: October 21, 2007

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.

BRIDGE NO: 7149 WEATHER: Cloudy, 55°F

WATERWAY CROSSED: Minnesota River

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: Clayton G. Brookins, Valerie Roustan

EQUIPMENT: Scuba, U/W Light, Scraper, Lead Line, Sounding Pole, Probe Rod, Camera

TIME IN WATER: 1:20 p.m.

TIME OUT OF WATER: 1:50 p.m.

WATERWAY DATA: VELOCITY 1.0 f.p.s.

VISIBILITY 1.0 foot

DEPTH 13.7 feet maximum at Pier 1

ELEMENTS INSPECTED: Piers 1 and 2

REMARKS: Overall, the concrete of Piers 1 and 2 was in good condition with only random minor areas of poor consolidation observed on the shafts and footings. The footing was exposed at Pier 1 with up to 7 feet of vertical undermining at the south face of the pier. The exposed steel H-piles exhibited minor surface corrosion with rust nodules up to 1 inch in diameter over 15 percent of the surface area. The footing at Pier 2 was also exposed with up to 3 feet of vertical face exposure, but no undermining was observed. A moderate accumulation of timber debris was observed at the upstream nose and along the south face of Pier 1. A spall 10 inch in diameter by 2 inch penetration was observed at the upstream corners of the exposed footing of Pier 2.

FURTHER ACTION NEEDED:  YES  NO

Scour rating indicates that the bridge has the potential to be at greater risk for scour with further scour analysis required. At a minimum, it is recommended that riprap be properly designed and placed around the piers and in the scour/undermining areas to armor against further scour, unless further scour analysis indicates differently.

## FURTHER ACTION NEEDED (CONTINUED)

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years. In the interim, and certainly until the scour conditions are further addressed, the footing exposures and undermining should be closely monitored with the taking of water depth soundings, and with the occurrence of a high water event, an underwater inspection should be considered immediately after as soon as conditions will safely permit.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 7149  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.  
 WATERWAY CROSSED Minnesota River

INSPECTION DATE October 21, 2007  
 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	13.7'	7	7	7	9	N	7	3	8	8	6	3	7	7	N	N	N	N
	Pier 2	6.5'	N	7	7	9	N	7	5	8	8	N	5	7	N	N	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete of Piers 1 and 2 was in good condition with only random minor areas of poor consolidation observed on the shafts and footings. The footing was exposed at Pier 1 with up to 7 feet of vertical undermining at the south face of the pier. The exposed steel H-piles exhibited minor surface corrosion with rust nodules up to 1 inch in diameter over 15 percent of the surface area. The footing at Pier 2 was also exposed with up to 3 feet of vertical face exposure, but no undermining was observed. A moderate accumulation of timber debris was observed at the upstream nose and along the south face of Pier 1. A spall 10 inch in diameter by 2 inch penetration was observed at the upstream corners of the exposed footing of Pier 2.

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.