

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 18509

MSAS NO. 104

OVER THE

MISSISSIPPI RIVER

DISTRICT 3 – CROW WING COUNTY, CITY OF BRAINERD

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 66)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 18509, Piers 1, 2, and 3, were found to be in good and sound condition below water, with no defects of structural significance and no appreciable changes since the last underwater inspection. The channel bottom and footing exposure at Pier 2 was comparable to the last inspection, and the channel bottom at Piers 1 and 3 has changed slightly, but still appeared stable with only minor localized scour.

INSPECTION FINDINGS:

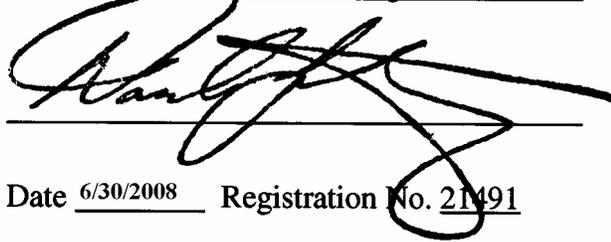
- (A) The top of the footing was exposed with no vertical exposure at the nose of Pier 2. The top of the footing was rough with ¼ inch irregularities.
- (B) Minor scour depressions were observed at the upstream end of Piers 1 and 2 ranging from 2.5 feet deep with a radius of 6 feet at Pier 1 to 2 feet deep with a radius of 6 feet at Pier 2.
- (C) A light accumulation of timber debris and a truck tire were observed along the upstream half of the east face of Pier 3 extending from the channel bottom up 3 feet and up to 6 feet off the pier face.
- (D) The channel bottom material consisted of firm sandy gravel with cobbles and a maximum of 2 inches of probe rod penetration.

RECOMMENDATIONS:

- (A) Monitor the extent of the footing exposure at Pier 2 during future inspections, and if found to be significantly progressing, then countermeasures may be warranted.
  
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

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

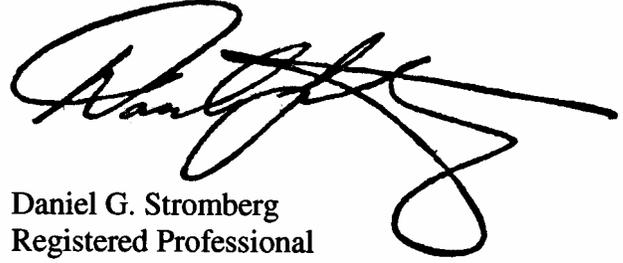


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Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



A large, stylized handwritten signature in black ink, written over two horizontal lines.

Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 418509

Feature Crossed: Mississippi River

Feature Carried: MSAS No. 104 – Laurel Street

Location: District 1 – Crow Wing County, City of Brainerd

Bridge Description: The superstructure consists of four spans of prestressed concrete beams. The superstructure is supported by two reinforced concrete abutments and three reinforced concrete piers. The abutments and piers are founded on steel H-piles. The piers are numbered 1 through 3 starting from the west.

2. INSPECTION DATA

Professional Engineer/Team Leader: Bradley A. Syler, P.E., S.E.

Dive Team: John J. Loftus, Valerie Rouston

Date: August 16, 2007

Weather Conditions: Sunny, 70°F

Underwater Visibility: 4.0 feet

Waterway Velocity: 1.0 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1, 2, and 3

General Shape: The pier each consists of two semi-circular reinforced concrete columns connected with a webwall supported by a rectangular footing founded on steel H-piles.

Maximum Water Depth at Substructure Inspected: Approximately 11.5 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap on the south end of Pier 2.

Water Surface: The waterline was approximately 55.9 feet below reference  
Water Elevation = 1148.4.

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 6

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code I/92

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

       Yes      X   No



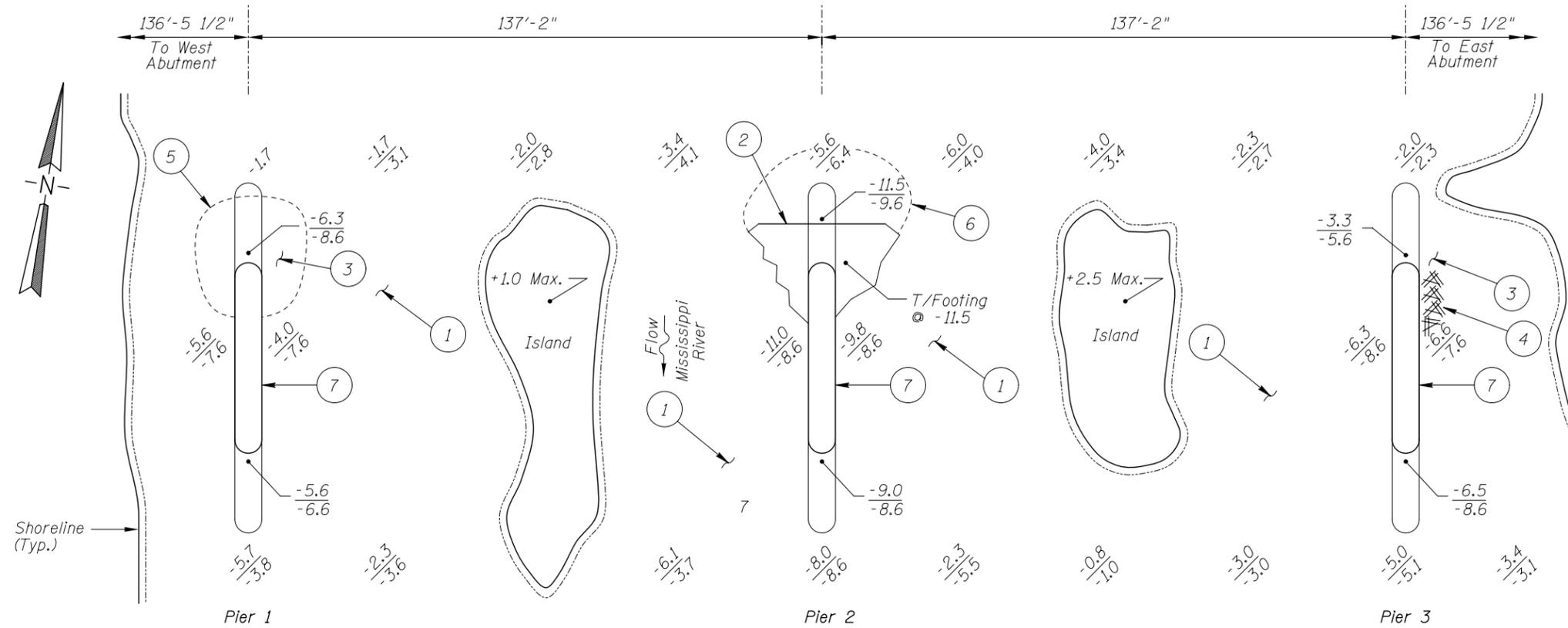
Photograph 1. View of Pier 1, Looking Northwest.



Photograph 2. View of Pier 2, Looking Southeast.



Photograph 3. View of Pier 3, Looking Southeast.



**SOUNDING PLAN**

**INSPECTION NOTES:**

- 1 The channel bottom material consisted of firm sandy gravel with cobbles and a maximum of 2 inches of probe rod penetration.
- 2 Footing exposed with no vertical exposure at the upstream nose of Pier 2. Top of footing was rough with 1/4 inch irregularities.
- 3 Riprap from 1 to 2 feet in diameter was located at the upstream nose of Piers 1 and 3.
- 4 A light accumulation of timber debris and a truck tire was observed along the upstream half of the east face of Pier 3 extending from the channel bottom up 3 feet and up to 6 feet off pier face.
- 5 A minor scour depression was observed at the upstream end of Pier 1 with a radius of 6 feet and a depth up to 2.5 feet.
- 6 A moderate scour depression was observed at the upstream end of Pier 2 with a radius of 6 feet and a depth up to 2 feet.
- 7 Above and below the waterline, the concrete was typically smooth and sound with random areas of delaminating and loss of section of the finishing grout. Heaviest at downstream nose of Pier 2. In addition hairline vertical cracks were observed in the webwall in all piers from top of webwall to channel bottom.

**GENERAL NOTES:**

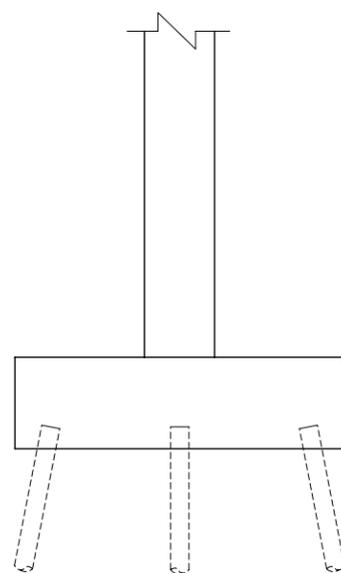
1. Piers 1, 2, and 3 were inspected at this bridge.
2. At the time of inspection on August 14, 2007, the waterline was located approximately 55.9 feet below the top of the cap at the south end of Pier 2. This corresponds to a waterline elevation of 1148.4 based on design drawings.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

**Legend**

- 13.0 Sounding Depth (8/16/07)
- 13.0 Sounding Depth (8/27/97)

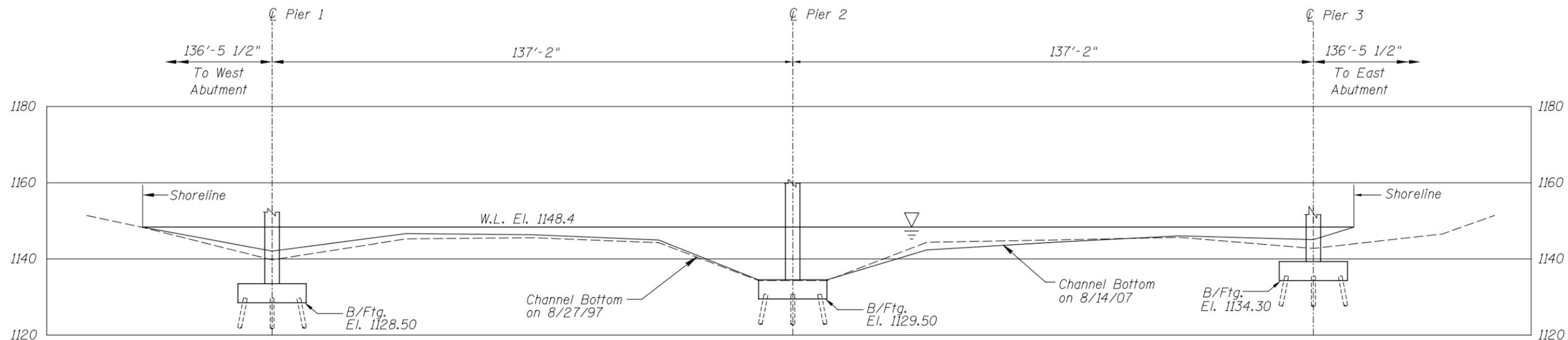
**Note:**

All soundings based on 2007 waterline location.

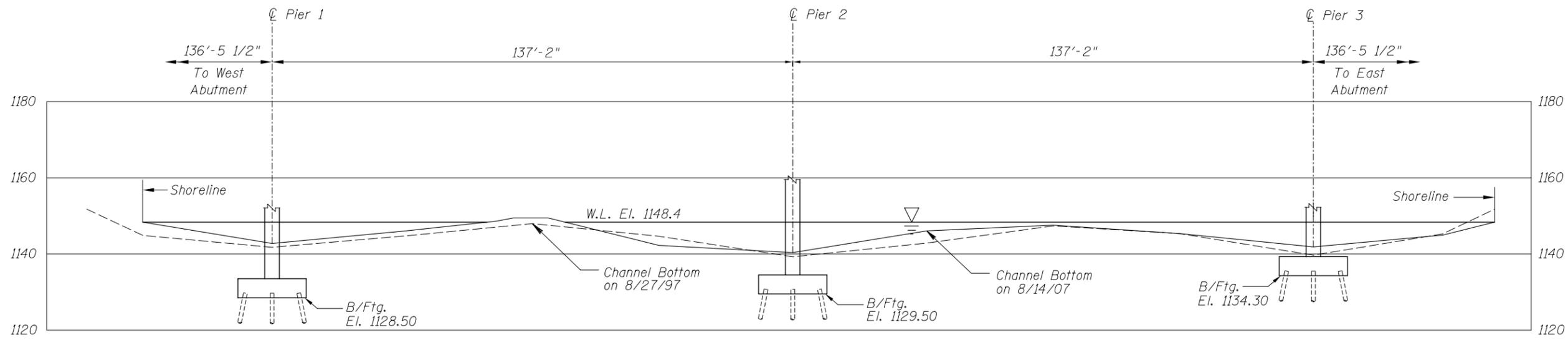


**TYPICAL END VIEW OF PIERS**

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 18509 OVER THE MISSISSIPPI RIVER DISTRICT 3, CROW WING COUNTY, CITY OF BRAINERD		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 200 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST, 2007
Checked By: MDK		Scale: NTS
Code: 522118509		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. 18509 OVER THE MISSISSIPPI RIVER DISTRICT 3, CROW WING COUNTY, CITY OF BRAINERD		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST, 2007
Checked By: MDK		Scale: 1"=30'
Code: 522118509		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: August 16, 2007

ON-SITE TEAM LEADER: Bradley A. Syler, P.E., S.E.

BRIDGE NO: 18509 WEATHER: Sunny, 70°F

WATERWAY CROSSED: Mississippi River

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: John J. Loftus, Valerie Roustan

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

TIME IN WATER: 4:00 P.M.

TIME OUT OF WATER: 4:30 P.M.

WATERWAY DATA: VELOCITY 1.0 f.p.s.

VISIBILITY 4.0 feet

DEPTH 11.5 feet maximum at Pier 2

ELEMENTS INSPECTED: Piers 1, 2, and 3

REMARKS: Above and below the waterline, the concrete was typically smooth and sound with random areas of delamination/loss of section of the finishing grout. Footing exposure with no vertical exposure was observed at the upstream nose of Pier 2. Scour depressions were observed at the upstream end of Piers 1 and 2 with a maximum radius of 6 feet and a maximum depth of 2.5 feet. A light accumulation of timber debris and a truck tire were observed along the upstream half of the east face of Pier 3 extending from the channel bottom up 3 feet and up to 6 feet off the pier face.

FURTHER ACTION NEEDED:  YES  NO

Monitor the extent of footing exposure at Pier 2 during future inspections, and if found to be significantly progressing, then countermeasures may be warranted.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years, and continue to monitor extent of footing exposure at all piers.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 18509  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER. Bradley A. Syler, P.E., S.E.  
 WATERWAY CROSSED Mississippi River

INSPECTION DATE August 16, 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	5.6'	N	7	N	9	N	7	7	8	8	N	7	7	N	N	N	N	N
	Pier 2	11.5'	N	7	7	9	N	7	6	N	N	N	6	7	N	N	N	N	N
	Pier 3	6.6'	N	7	N	9	N	7	7	7	8	7	7	7	N	N	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Above and below the waterline, the concrete was typically smooth and sound with random areas of delamination/loss of section of the finishing grout. Footing exposure with no vertical exposure was observed at the upstream nose of Pier 2. Scour depressions were observed at the upstream end of Piers 1 and 2 with a maximum radius of 6 feet and a maximum depth of 2.5 feet. A light accumulation of timber debris and a truck tire were observed along the upstream half of the east face of Pier 3 extending from the channel bottom up 3 feet and up to 6 feet off the pier face.

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.