

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 2501

CSAH NO. 24

OVER THE

RUM RIVER

DISTRICT 5 - ANOKA COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 103)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 2501, Piers 1 and 2, were found to be in satisfactory condition with no defects of structural significance observed. At Pier 1, there was up to 1.5 feet of vertical footing exposure, with numerous cracks and voids observed on top of the downstream portion of the exposed footing. Moderate (Pier 2) to heavy (Pier 1) scaling was observed near the waterline at both piers. The channel bottom appeared to be stable with no evidence of significant scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS:

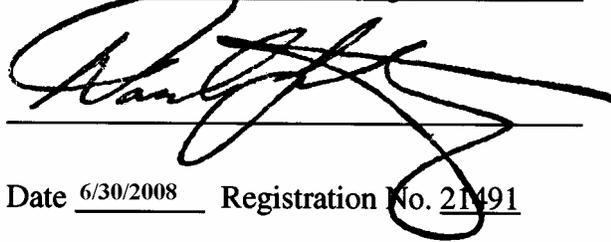
- (A) The top of footing and up to 1.5 feet of vertical face was exposed along the east side of Pier 1.
- (B) Moderate scaling was observed around the entire perimeter of the downstream shaft of Pier 2 from the channel bottom to 2 feet above the waterline with a maximum penetration of 2 inches. The heaviest scaling was along the west face and the upstream nose.
- (C) Heavy scaling, section loss and cracking was observed on the top of the downstream portion of the exposed footing of Pier 1 with penetrations of up to 5 inches. Numerous 1/16 inch to 1/2 inch wide cracks and areas of section loss were observed on the top of the footing between the pier shaft and the edge of the footing.
- (D) The grouted riprap was deteriorated/missing from the west side of the upstream Pier 1 shaft to the slope protection mat for the western embankment.

RECOMMENDATIONS:

- (A) Monitor the concrete deterioration of the footing at Pier 1. If found to be progressing in the future, consideration could be given to repair by removing the unsound concrete and reforming with a concrete mix designed to promote high durability and low permeability.
  
- (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



A large, stylized handwritten signature in black ink, appearing to read 'Daniel G. Stromberg', is written over a horizontal line. Below this line is another horizontal line.

Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



A large, stylized handwritten signature in black ink, appearing to read 'Daniel G. Stromberg', is written over a horizontal line. Below this line is another horizontal line.

Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 2501

Feature Crossed: Rum River

Feature Carried: CSAH No. 24

Location: District 5 - Anoka County

Bridge Description: The superstructure consists of four spans of multiple steel beams supporting a reinforced concrete deck. The superstructure is supported by two concrete abutments and three concrete piers founded on piles. The piers are numbered 1 through 3 starting from the west end of the bridge.

2. INSPECTION DATA

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

Dive Team: Clayton G. Brookins, Valerie Roustan

Date: October 16, 2007

Weather Conditions: Rain, 50°F

Underwater Visibility: 3.0 feet

Waterway Velocity: 4.0 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2.

General Shape: The piers each consist of two oblong rectangular shafts of hammerhead design with rounded noses supported by a rectangular footing founded on piles under each shaft.

Maximum Water Depth at Substructure Inspected: Approximately 2.2 feet.

4. WATERLINE DATUM

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

Water Surface: The waterline was approximately 24.8 feet below reference.

Waterline Elevation = 883.9.

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

Item 60: Substructure: Code 6

Item 61: Channel and Channel Protection: Code 6

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

Item 113: Scour Critical Bridges: Code N/96

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 West.



Photograph 2. View of the Pier 2, Looking Northwest.



Photograph 3. Scaling at Pier 2 at the Upstream Nose of the Downstream Shaft, Looking Southeast.



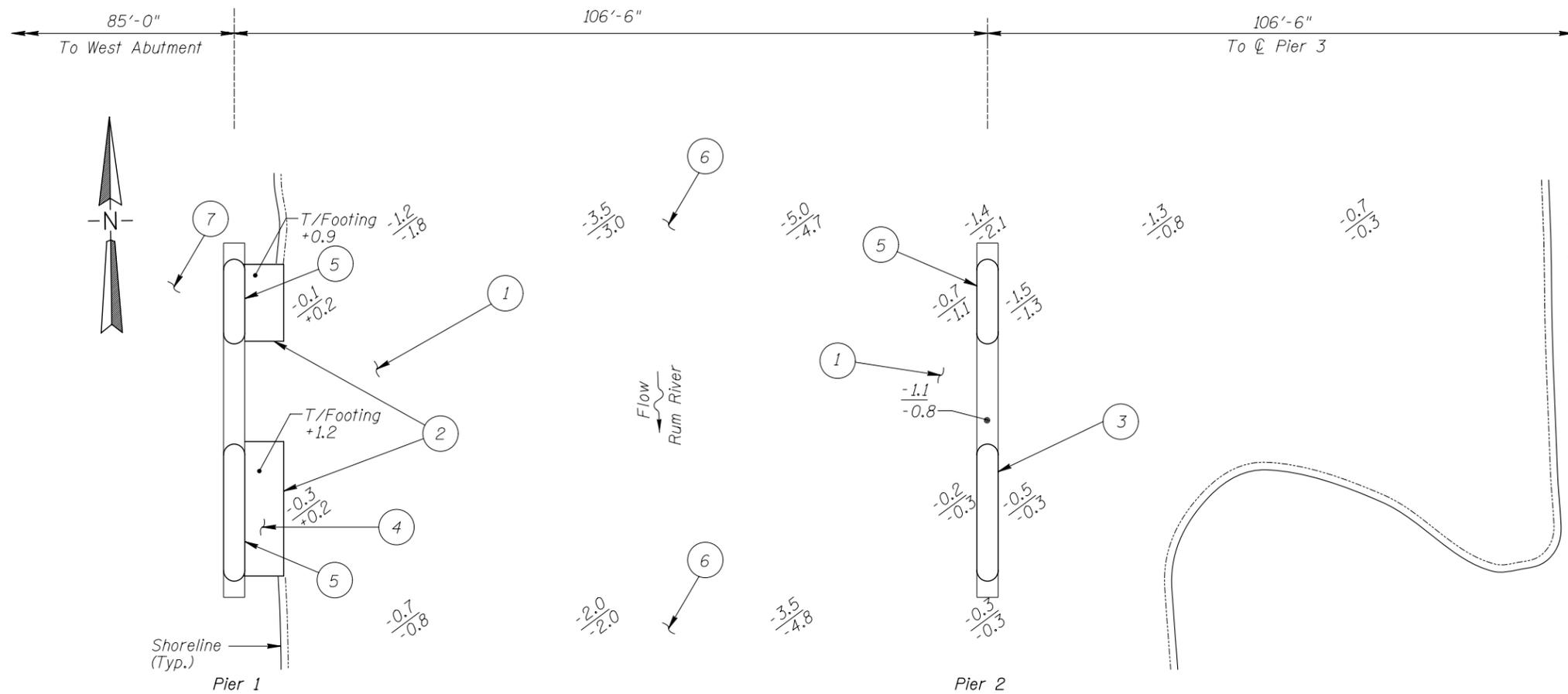
Photograph 4. Scaling on the West Face on the Downstream Shaft of Pier 2, Looking Southeast.



Photograph 5. Washed out area (West Face of Pier 1), Looking Northeast.



Photograph 6. View of top of the footing at the Downstream Pier Shaft of Pier 1, Looking South.



**GENERAL NOTES:**

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on October 16, 2007, the waterline was located approximately 24.8 feet below the top of the pier cap at the upstream end of Pier 2. This corresponds to a waterline elevation of 883.9 based on the previous report dated September 24, 2002.
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.

**SOUNDING PLAN**

**INSPECTION NOTES:**

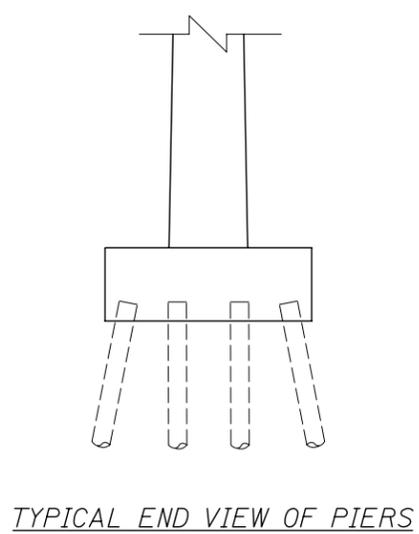
- 1 The channel bottom material consisted of 2-foot-diameter and smaller riprap.
- 2 The footing was exposed along the east side of Pier 1 with up to 1.5 feet of the vertical face exposed.
- 3 Moderate scaling was observed around the entire perimeter of the downstream shaft of Pier 2 from the channel bottom to 2 feet above the waterline with a maximum penetration of 2 inches. The heaviest scaling was along the west face and the upstream nose.
- 4 Heavy scaling and cracking was observed on the top of the footing from the shaft to the footing edge with a maximum penetration of 5 inches. Numerous 1/16-inch- to 1/2-inch-wide cracks and areas of section loss were also observed on the top of footing from the pier shaft to the edge of the footing with the cracks extending into the channel bottom along the vertical face of the footing.
- 5 The concrete shaft was in smooth and sound condition with no noted deficiencies.
- 6 The waterline elevation was approximately 6 inches lower along the downstream fascia compared to the upstream fascia.
- 7 The grouted riprap was deteriorated with missing riprap extending from the west side of the upstream shaft of Pier 1 to the slope protection mat along the western embankment.

**Legend**

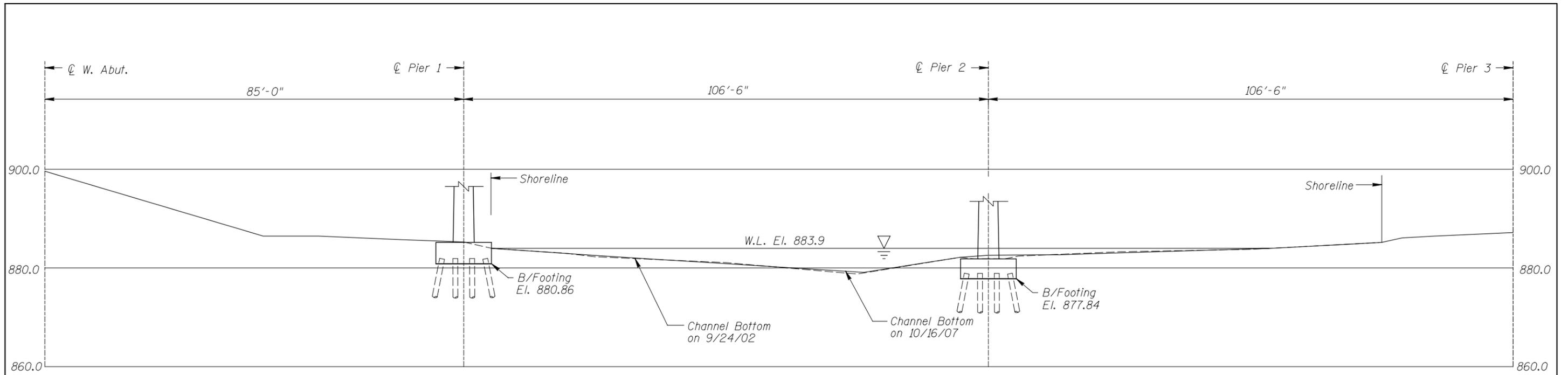
- 2.0 Sounding Depth (10/16/07)
- 0.5 Sounding Depth (9/24/02)

**Note:**

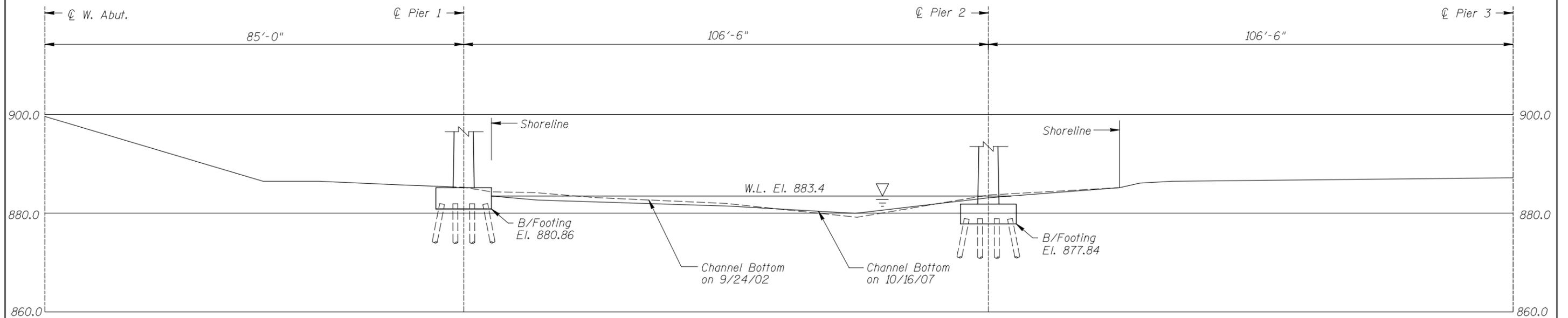
All soundings based on 2007 waterline location.



<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. Q2501 OVER THE RUM RIVER DISTRICT 5, ANOKA COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: MDK	<b>COLLINS ENGINEERS</b>	Date: OCT. 2007
Checked By: DGS	<small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Scale: NTS
Code: 52210103		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. 02501 OVER THE RUM RIVER DISTRICT 5, ANOKA COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: MDK	<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: DGS		Scale: 1"=20'
Code: 52210103		Figure No.: 2

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

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

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

BRIDGE NO: 2501 WEATHER: Rain, 50°F

WATERWAY CROSSED: Rum River

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER Wading at lesser water depths

PERSONNEL: Clayton G. Brookins, Valerie Roustan

EQUIPMENT: Scuba, Scraper, Sounding Pole, Lead Line, Probe Rod, Camera

TIME IN WATER: 6:20 p.m.

TIME OUT OF WATER: 6:50 p.m.

WATERWAY DATA: VELOCITY 4.0 f.p.s.

VISIBILITY 3.0 feet

DEPTH 2.2 feet maximum at Pier 2.

ELEMENTS INSPECTED: Piers 1 and 2.

REMARKS: Overall, the concrete was in satisfactory condition. The top of both column footings was exposed along the east side of Pier 1 with up to 1.5 feet of vertical exposure. Moderate scaling was observed around the entire perimeter of the downstream shaft of Pier 2 from the channel bottom to 2 feet above the waterline with a maximum penetration of 2 inches. Heavy scaling, section loss and cracking was observed on the top of the downstream portion of the exposed footing of Pier 1 with penetrations of up to 5 inches. The upstream shaft of Pier 2 was smooth and sound with no deficiencies. The grouted riprap was deteriorated/missing from the east side of the upstream pier shaft to the slope protection mat for the east embankment.

FURTHER ACTION NEEDED:  YES  NO

Monitor the concrete deterioration of the footing on Pier 1, and if found to be worsening in the future, consideration could be given to repair by removing the unsound concrete and reforming with a concrete mix designed to promote high durability and low permeability.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 02501  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Bradley A. Syler, P.E., S.E.  
 WATERWAY CROSSED Rum River

INSPECTION DATE October 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	0.3'	N	7	6	9	N	6	6	6	6	N	6	7	N	N	N	N	N
	Pier 2	2.2'	N	6	N	9	N	6	7	6	6	N	6	7	N	N	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete was in satisfactory condition. The top of both column footings was exposed along the east side of Pier 1 with up to 1.5 feet of vertical exposure. Moderate scaling was observed around the entire perimeter of the downstream shaft of Pier 2 from the channel bottom to 2 feet above the waterline with a maximum penetration of 2 inches. Heavy scaling, section loss and cracking was observed on the top of the downstream portion of the exposed footing of Pier 1 with penetrations of up to 5 inches. The upstream shaft of Pier 2 was smooth and sound with no deficiencies. The grouted riprap was deteriorated / missing from the east side of the upstream pier shaft to the slope protection mat for the east embankment.

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.