

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 7054

CSAH 22

OVER

STURGEON RIVER

DISTRICT 1 - ST. LOUIS COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY  
COLLINS ENGINEERS, INC.

JOB NO. 3512 (CEI 10)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure unit inspected at Bridge No. 7054, Pier 2, was found to be in good to satisfactory condition. The concrete of the pier exhibited light to moderate scaling and several areas of section loss; however, there were no structurally significant defects observed. The channel bottom appeared stable with no evidence of significant scour. A light accumulation of timber debris was observed around both columns of Pier 2.

INSPECTION FINDINGS:

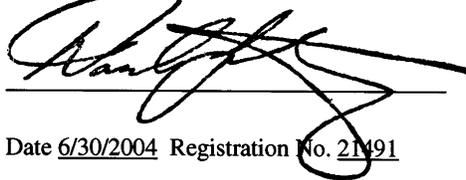
- (A) Light to moderate scaling with penetrations ranging from 1/8 inch to 1/4 inch, with a maximum penetration of 1/2 inch, was observed from 4 feet above the waterline to the mudline on both columns of Pier 2.
- (B) An area of section loss along the beveled sides of the upstream column, extending from 1.5 feet below the waterline to 1.5 feet above the waterline with a maximum penetration of 3 inches, was observed on the upstream side of the upstream column of Pier 2.
- (C) A void measuring from 1 foot above the waterline to the top of the horizontal strut between columns with a maximum penetration of 6 inches was observed on the upstream face of the downstream column of Pier 2.
- (D) The top portion of the horizontal strut connecting the columns of Pier 2 was exposed from the upstream column to 4 feet downstream and from the downstream column to 4 feet upstream, and was covered by the channel bottom material across the center portion of the pier.

RECOMMENDATIONS:

- (A) 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



Date 6/30/2004 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: 7054

Feature Crossed: Sturgeon River

Feature Carried: CSAH 22

Location: District 1 - St. Louis County

Bridge Description: The superstructure consists of a three span, multiple steel stringer bridge supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete piers. The piers are numbered 1 and 2, starting from the west end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg  
State of Minnesota, P.E., No. 21491

Dive Team: Michelle D. Koerbel, Matthew J. Lengyel

Date: August 28, 2002

Weather Conditions: Cloudy,  $\pm 70^{\circ}$  F

Underwater Visibility:  $\pm 1.0$  Feet

Waterway Velocity:  $\pm 1.0$  fps

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Pier 2.

General Shape: The pier consists of two elongated hexagonal shafts supporting a rectangular hammerhead pier cap. The pier shafts are supported on a rectangular footing and are connected by a horizontal concrete diaphragm/strut located above the footing.

Maximum Water Depth at Substructure Inspected: Approximately 5.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the bridge seat at the downstream end of Pier 2.

Water Surface: The waterline was approximately 14.9 feet below reference.  
Assumed Water Elevation = 85.1.

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

Item 60: Substructure: Code 6

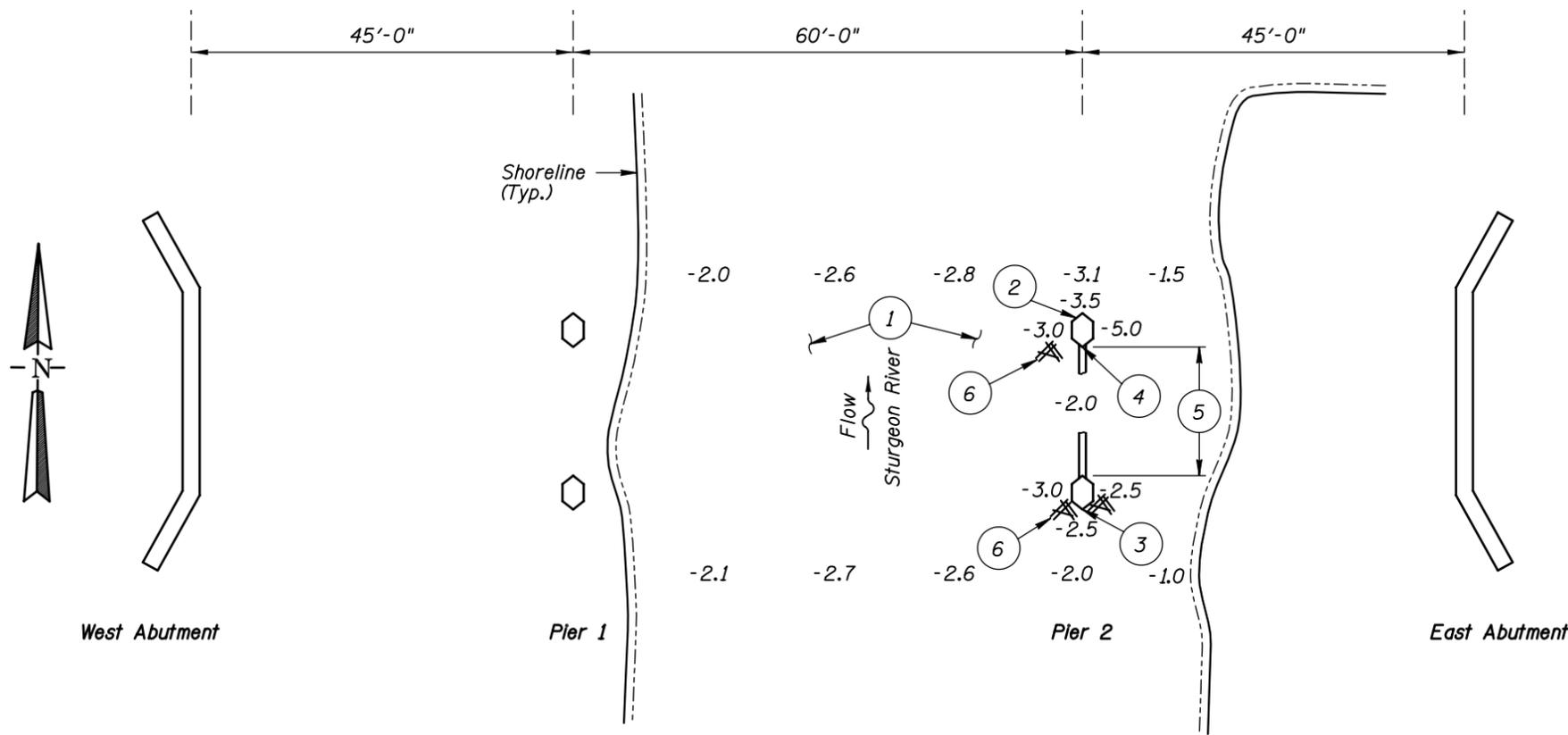
Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/8/02

Item 113: Scour Critical Bridges: Code I/02

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

Yes  No



**SOUNDING PLAN**

**GENERAL NOTES:**

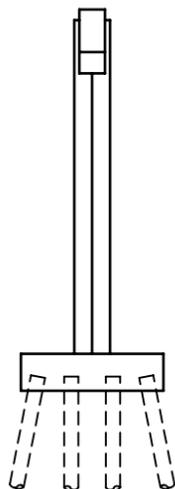
1. Pier 2 was inspected underwater.
2. At the time of inspection on August 28, 2002, the waterline was located 14.9 feet below the top of cap at the downstream end of Pier 2. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 85.1.
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.

**INSPECTION NOTES:**

- ① The channel bottom consisted of silty sand with 0.5 to 1 foot of probe rod penetration.
- ② Light to moderate scaling with penetrations ranging from 1/8 inch to 1/4 inch, with a maximum penetration of 1/2 inch, was observed from 4 feet above the waterline to the mudline on both columns of Pier 2.
- ③ An area of section loss along the upstream column bevels was observed from 1.5 feet below the waterline to 1.5 feet above the waterline with a maximum penetration of 3 inches.
- ④ A 1-foot-wide void was observed on the upstream face of the downstream column from 1 foot above the waterline to the top of the strut with a maximum penetration of 6 inches.
- ⑤ The top portion of the horizontal strut was exposed from the upstream column to 4 feet downstream and from the downstream column to 4 feet upstream, and was covered by the channel bottom material along the center of the strut.
- ⑥ A light accumulation of 3-inch-diameter and smaller timber debris was observed at the upstream column and a 6-inch-diameter log was observed at the downstream column.

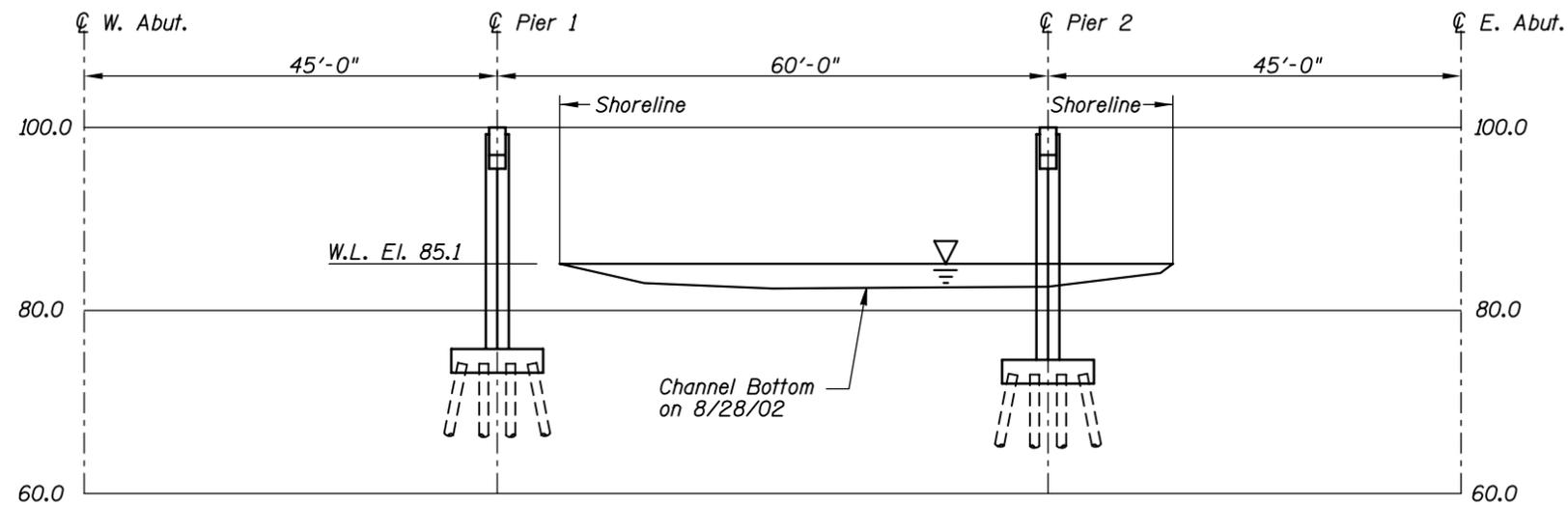
**Legend**

- 2.0 Sounding Depth from Waterline (8/28/02)
- Timber Debris

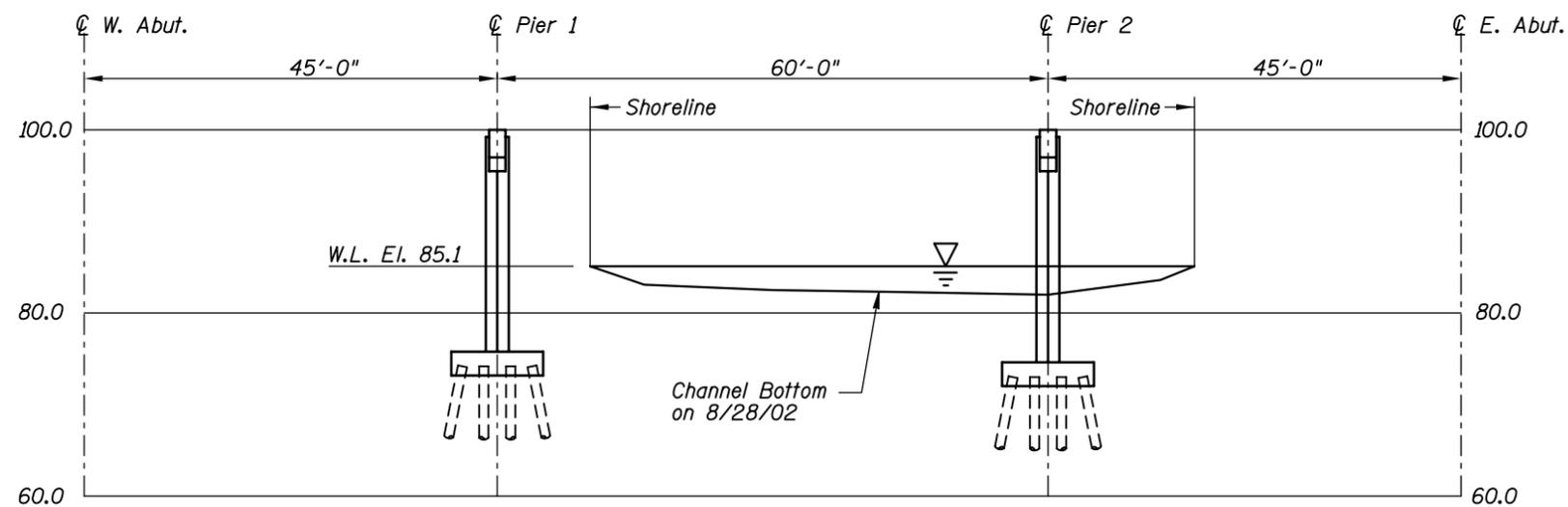


**TYPICAL END VIEW OF PIERS**

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 7054 OVER THE STURGEON RIVER DISTRICT I, ST. LOUIS COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS, INC.</b>	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35I20010		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. 7054 OVER THE STURGEON RIVER DISTRICT I, ST. LOUIS COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: PRH	 <b>COLLINS ENGINEERS, INC.</b> 300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Date: AUG. 2002
Checked By: MDK		Scale: 1"=20'
Code: 35I20010		Figure No.: 2



Photograph 1. Overall View of the Structure, Looking Northeast.



Photograph 2. View of Pier 1, looking East.



Photograph 3. View of Pier 2, Looking Southeast.



MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 7054  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E. 21491  
WATERWAY CROSSED Sturgeon River

INSPECTION DATE August 28, 2002  
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 (BRACING)	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 2	5.0'	N	6	N	9	N	6	7	N	8	7	7	6	N	N	7	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete was in good to satisfactory condition with some light to moderate scaling. The upstream column exhibited section loss from 1.5 feet below the waterline to 1.5 feet above the water line, with a maximum penetration of 3 inches along the beveled sides of the upstream nose. At the upstream nose of the downstream column, there was a void with a maximum penetration of 6 inches extending from 1 foot above the water level to the submerged strut between columns. The concrete strut connecting the two columns was exposed along the length of the pier, with the exception of a 4 foot section along the middle of the pier. There was light timber drift on the channel bottom around both columns.

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.