

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 6646  
CSAH NO. 36  
OVER THE  
RED RIVER OF THE NORTH  
DISTRICT 4 - CLAY COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION  
BY  
COLLINS ENGINEERS, INC.  
JOB NO. 5221 (CEI 44)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure unit inspected at Bridge No. 6646, Pier 1, was in good to satisfactory condition. A moderate accumulation of timber debris, consisting of logs and branches up to 18 inches in diameter, was encountered at the upstream end and along both sides of the pier. The embankments on both sides of the channel exhibited heavy erosion, resulting in steeply cut banks up to 20 feet high. The channel bottom consisted of firm material which appeared stable with no evidence of significant scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS:

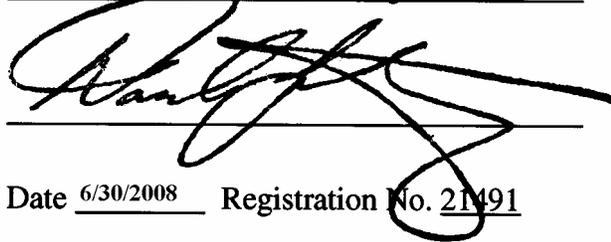
- (A) A moderate accumulation of timber debris, consisting of 18 inch diameter and smaller logs and branches, was observed at the upstream nose and along the entire east face of Pier 1. The debris extended from the channel bottom to the waterline, 6 feet off the nose, and 15 feet off the face.
- (B) The steel icebreaker angle mounted to the upstream nose exhibited moderate corrosion, 1/2 inch diameter rust nodules, and pitting with a maximum penetration of 1/4 inch from 1 foot below the waterline to 1.5 feet above the waterline.
- (C) 4 feet long by 2 feet high areas of section loss and impending section loss were observed at the northeast and southeast corners of Pier 1 centered on the shaft step located at 1.5 feet above the waterline. The section loss exhibited up to 8 inches of maximum penetration and exposed reinforcing steel with up to 5 percent loss of section due to corrosion.
- (D) Both embankments exhibited heavy erosion in the vicinity of the structure with steeply cut banks up to 20 feet high.

RECOMMENDATIONS:

- (A) Monitor river embankment erosion during future biennial inspections. Investigate flow and erosion conditions around the bridge and through the upstream ditch and address the erosion protection needs for site specific conditions.
- (B) Monitor the moderate accumulation of timber debris at the upstream end and along the sides of Pier 1, and if found to be progressing, removal operations may be warranted to alleviate further accumulations and scour problems.
- (C) Reinspect the submerged substructure unit 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.

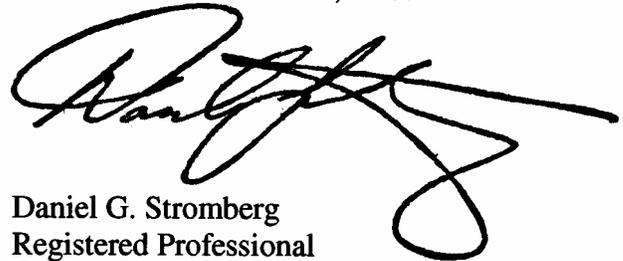
Daniel G. Stromberg



Date 6/30/2008 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: 6646

Feature Crossed: Red River of the North

Feature Carried: CSAH No. 36

Location: District 4 - Clay County

Bridge Description: The Bridge is a multiple span structure consisting of two modified curved-chord Pratt truss main spans with a steel grid deck, and three steel girder approach spans with a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and four reinforced concrete piers. Pier 1, located within the waterway, is founded on untreated timber piles.

2. INSPECTION DATA

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

Dive Team: John J. Loftus, Valerie Roustan

Date: August 20, 2007

Weather Conditions: Cloudy, 60°F

Underwater Visibility: Negligible/None

Waterway Velocity: 2.5 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Pier 1

General Shape: The pier consists of two octagonal-shaped reinforced concrete columns connected continuously with a concrete web wall that rest on a rectangular concrete footing which is founded on untreated timber piles. The upstream column has a pointed end with an integral steel icebreaker.

Maximum Water Depth at Substructure Inspected: Approximately 5.1 feet.

4. WATERLINE DATUM

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

Water Surface: The waterline was approximately 31.3 feet below reference.

Waterline Elevation = 867.5.

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 5

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

Item 113: Scour Critical Bridges: Code I/91

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

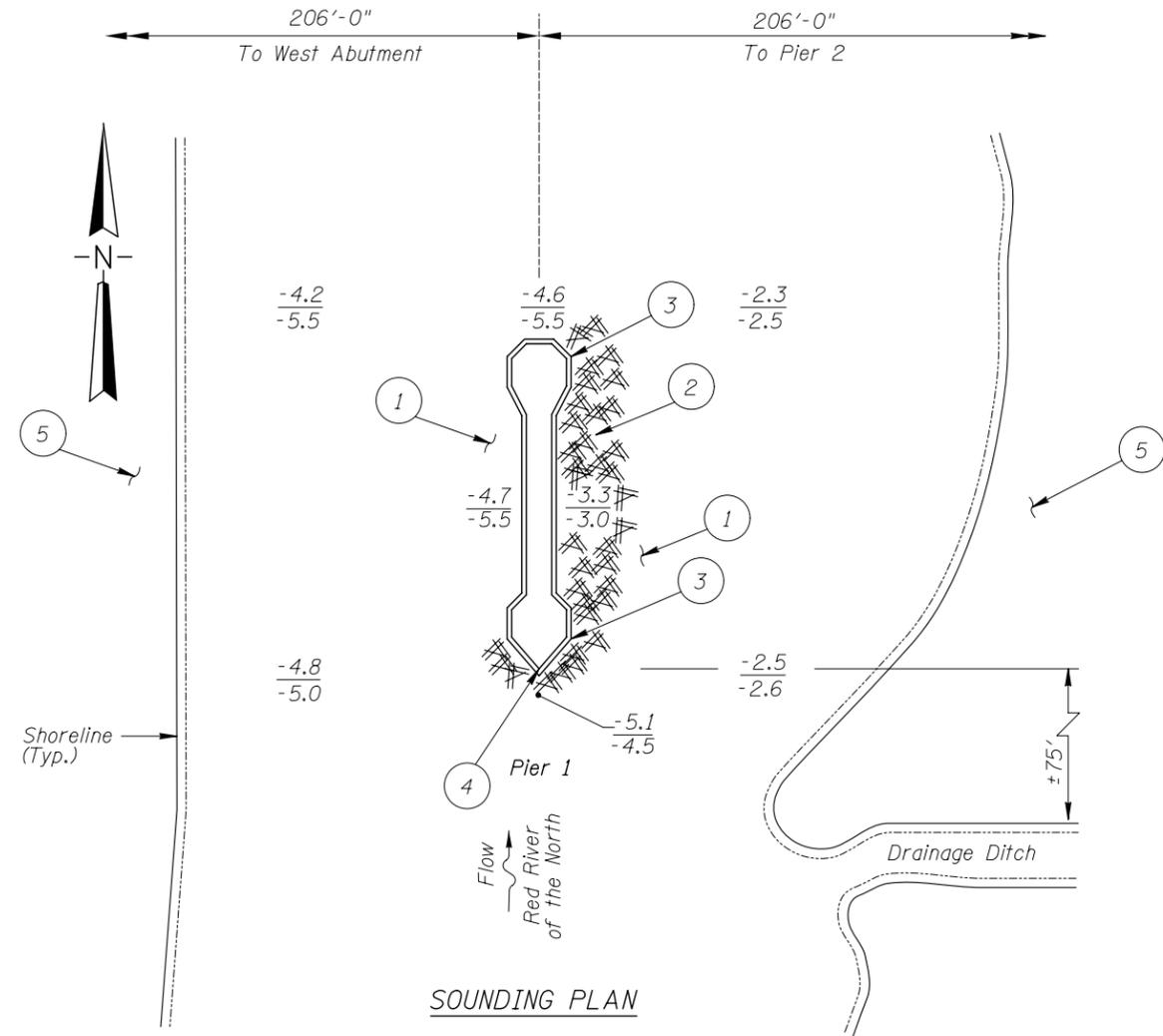
       Yes   X   No



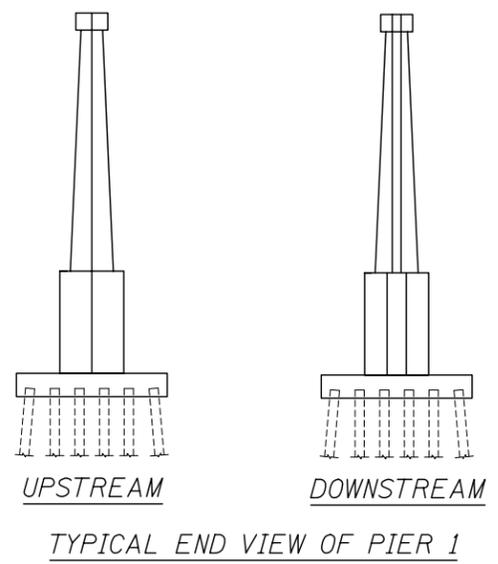
Photograph 1. View of Pier 1, Looking South.



Photograph 2. View of Pier 1, Looking West.



**SOUNDING PLAN**



**GENERAL NOTES:**

1. Pier 1 was inspected underwater.
2. At the time of inspection on August 20, 2007, the waterline was located approximately 31.3 feet below the top of the pier cap at the downstream end of Pier 1. This corresponds with a waterline elevation of 867.5.
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 around the entire perimeter of Pier 1 consisted of gravel with 2 inch diameter cobbles allowing up to 3 inches of probe rod penetration. In addition, an 18 inch thick layer of soft silty clay was observed on top of the channel bottom along the entire east face.
- 2 A moderate accumulation of timber debris, consisting of 18 inch diameter and smaller logs and branches, was observed at the upstream nose and along the entire east face of Pier 1. The debris extended from channel bottom to waterline, 6 feet off nose and 15 feet off face.
- 3 4 feet long by 2 feet high areas of section loss and impending section loss were observed at the northeast and southeast corners of Pier 1 centered on the shaft step located at 1.5 feet above waterline. The section loss exhibited up to 8 inches maximum penetration and exposed rebar with up to 5% loss of section.
- 4 The steel icebreaker angle exhibited 1/2-inch-diameter rust nodules with moderate pitting up to 1/4 inch deep from 1 foot below waterline to 1.5 foot above waterline.
- 5 Both embankments exhibited heavy erosion in the vicinity of the structure with steeply cut banks up to 20 feet high.

**Legend**

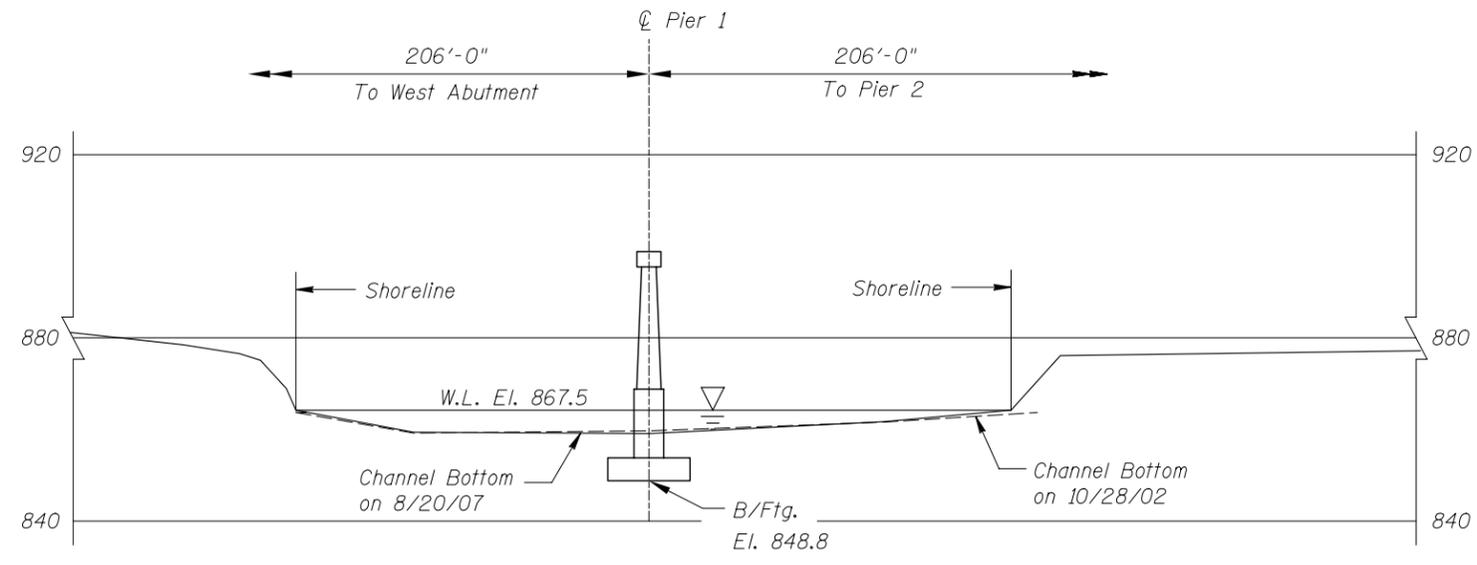
- 2.0 Sounding Depth (8/20/07)
- 5.2 Sounding Depth (10/28/02)

Timber Debris

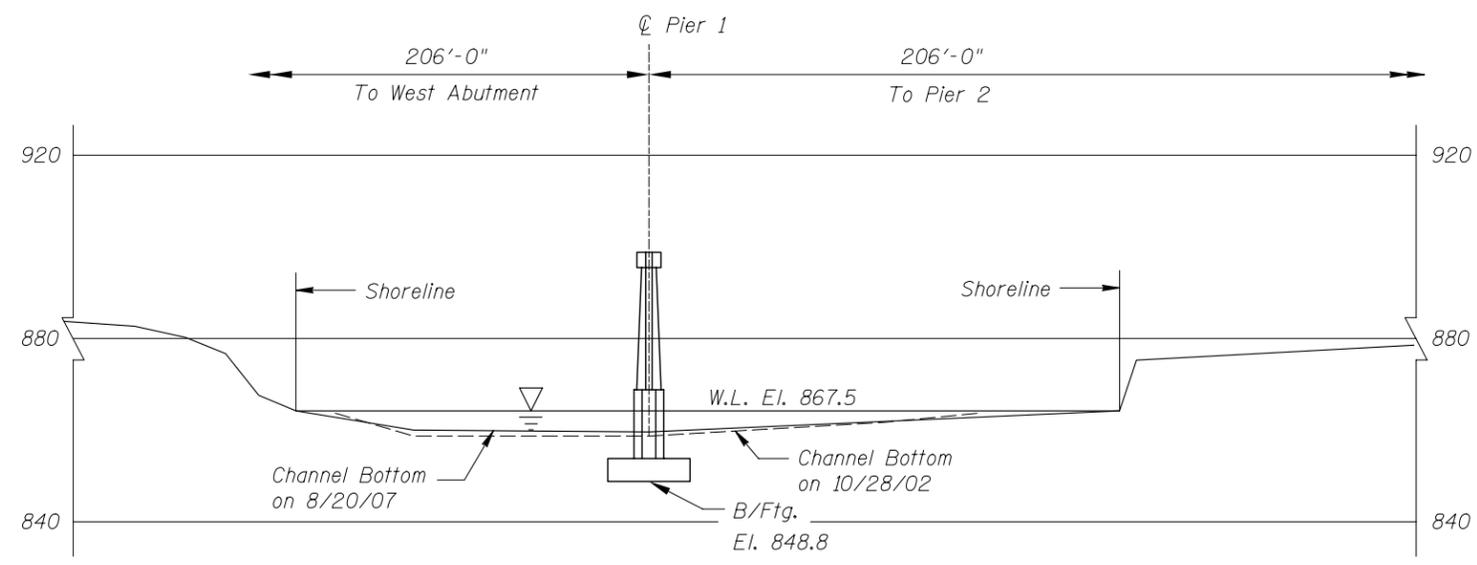
**Note:**

All soundings based on 2007 waterline location.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 6646 OVER THE RED RIVER OF THE NORTH DISTRICT 4, CLAY COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: PRH	<b>COLLINS ENGINEERS</b>	Date: AUGUST, 2007
Checked By: MDK	<small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Scale: NTS
Code: 52210044		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. 6646 OVER THE RED RIVER OF THE NORTH DISTRICT 4, CLAY COUNTY UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
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"=40'
Code: 52210044		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: August 20, 2007

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

BRIDGE NO: 6646 WEATHER: Cloudy, 60°F

WATERWAY CROSSED: Red River of the North

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: John J. Loftus, Valerie Roustan

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

TIME IN WATER: 11:00 a.m.

TIME OUT OF WATER: 12:00 p.m.

WATERWAY DATA: VELOCITY 2.5 f.p.s.

VISIBILITY Negligible/None

DEPTH 5.1 feet maximum at Pier 1

ELEMENTS INSPECTED: Pier 1

REMARKS: Overall, the concrete of the pier was smooth and sound with no structurally significant deterioration observed. A moderate accumulation of timber debris, consisting of 18 inch diameter and smaller logs and branches, was observed at the upstream nose and along the entire east face of Pier 1. Two areas of section loss were observed at the northeast and southeast corners of Pier 1 centered on the shaft step located at 1.5 feet above the waterline. The steel icebreaker angle mounted to the upstream nose was moderately corroded and pitted. Both of the upstream and downstream channel embankments were heavily eroded in the vicinity of the structure with steeply cut banks up to 20 feet high.

FURTHER ACTION NEEDED:  YES  NO

Monitor river embankment erosion during future biennial inspections. Investigate flow and erosion conditions around the bridge and through the upstream ditch and address the erosion protection needs for site specific conditions.

## FURTHER ACTION NEEDED (CONTINUED)

Monitor the moderate accumulation of timber debris at the upstream end and along the sides of Pier 1, and if found to be progressing, removal operations may be warranted to alleviate further accumulations and scour problems.

Reinspect the submerged substructure unit 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. 6646  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Bradley A. Syler, P.E., S.E.  
 WATERWAY CROSSED Red River of the North

INSPECTION DATE August 20, 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 (ICEBREAKERS)	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	5.0	N	7	N	9	7	7	7	5	5	5	5	7	7	N	7	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete of the pier was smooth and sound with no structurally significant deterioration observed. A moderate accumulation of timber debris, consisting of 18 inch diameter and smaller logs and branches, was observed at the upstream nose and along the entire east face of Pier 1. Two areas of section loss were observed at the northeast and southeast corners of Pier 1 centered on the shaft step located at 1.5 feet above the waterline. The steel icebreaker angle mounted to the upstream nose was moderately corroded and pitted. Both of the upstream and downstream channel embankments were heavily eroded in the vicinity of the structure with steeply cut banks up to 20 feet high.

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.