

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 6646

CSAH NO. 36

OVER THE

RED RIVER OF THE NORTH

DISTRICT 4 - CLAY COUNTY



AUGUST 31, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

AYRES ASSOCIATES & COLLINS ENGINEERS, INC.

JOB NO. 7423

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 heavy 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 had some heavy erosion. The channel bottom consisted of firm material which appeared stable with no evidence of scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS:

- (A) A heavy accumulation of timber debris, consisting of 18 inch diameter and smaller logs and branches, was observed at the upstream nose and along both sides of Pier 1. The debris extended from the channel bottom to the waterline, 6 feet off the nose, and up to 15 feet off the faces.
- (B) The steel icebreaker angle mounted to the upstream nose had 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 2.0 feet above the waterline. The section loss had up to 8 inches of maximum penetration and exposed reinforcing steel with up to 5 percent loss of section due to corrosion.
- (D) At the southeast corner of Pier 1, 3 feet below shaft step, there was a spall 14 inches wide by 6 inches high by 2.5 inches deep without exposed reinforcement present.
- (E) Both embankments had erosion in the vicinity of the structure.

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 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 sixty (60) months.

Respectfully submitted,

Inspection Team Leader

Ayres Associates, Inc.



Brian K. Schroeder
Registered Professional Engineer
State of Minnesota

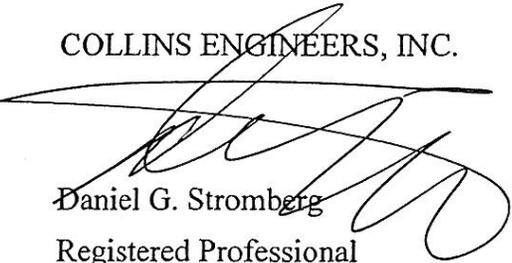
PROFESSIONAL ENGINEER

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 6/30/14 License # 21491

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: Brian K. Schroeder, P.E.

Dive Team: Jason A. Cook, Anthony J. Coffaro

Date: August 31, 2012

Weather Conditions: Sunny, 77°F

Underwater Visibility: Negligible/None

Waterway Velocity: 1.5 ft/sec

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 5.8 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 31.9 feet below reference.

Waterline Elevation = 866.9.

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/08/12

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

6. STRUCTURAL ELEMENT CONDITION RATING

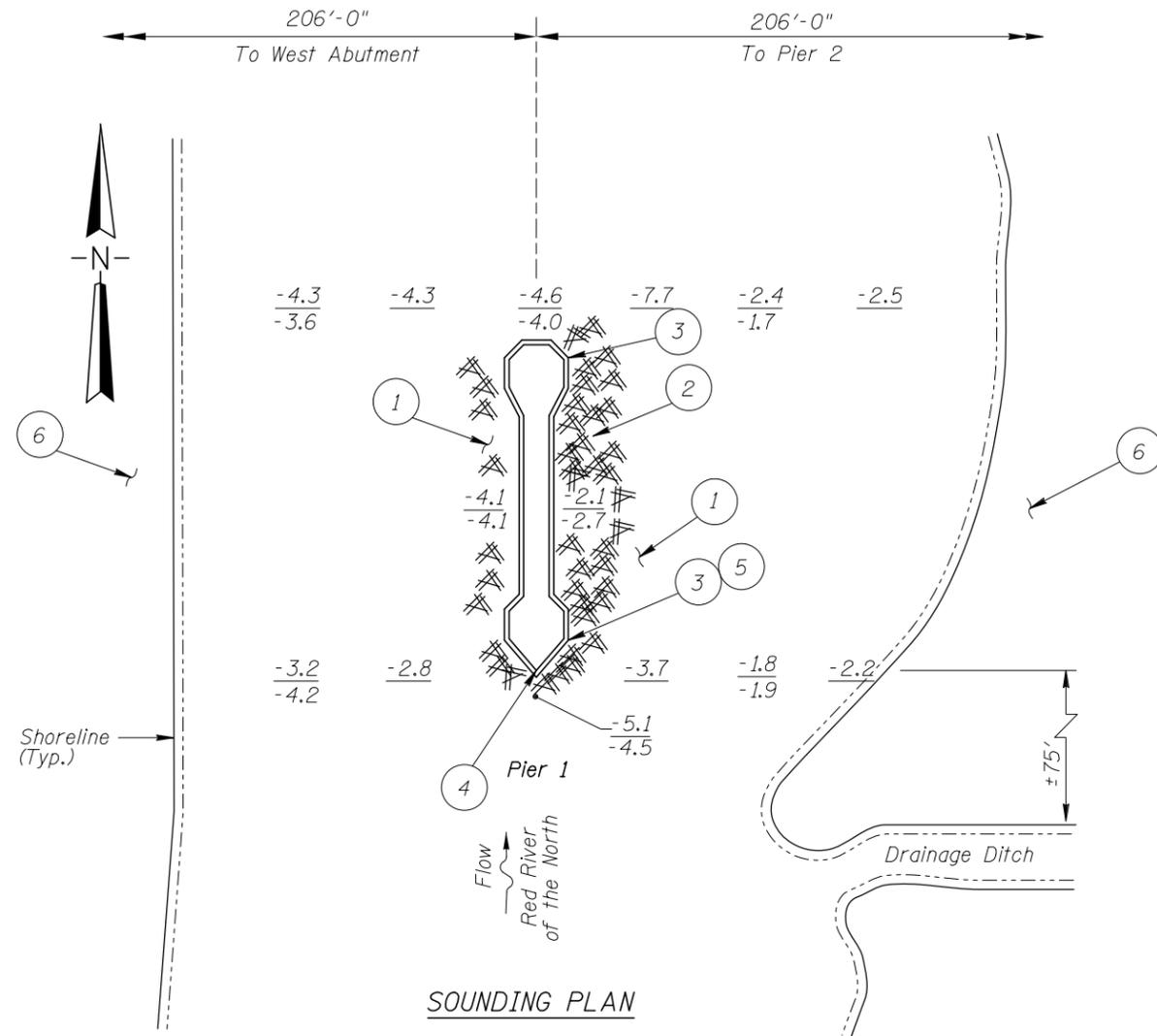
Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
205	Reinforced Concrete Column	2	EA		2			
210	Reinforced Concrete Pier Wall	22	EA		22			
985	Slopes and Slope Protection	1	EA		1			



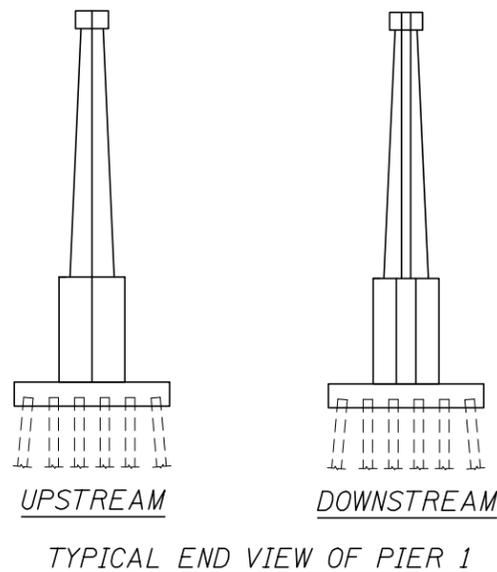
Photograph 1. Overall View of the Structure, Looking North.



Photograph 2. View of Pier 1, Looking West.



SOUNDING PLAN



Legend

- 2.0 Sounding Depth (8/31/12)
- 5.2 Sounding Depth (8/20/07)

Timber Debris

Note:

All soundings based on 2012 waterline location.

GENERAL NOTES:

1. Pier 1 was inspected underwater.
2. At the time of inspection on August 31, 2012, the waterline was located approximately 31.9 feet below the top of the pier cap at the downstream end of Pier 1. This corresponds with a waterline elevation of 866.9.
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 1/8 point intervals (panel points) 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 heavy accumulation of timber debris, consisting of 18 inch diameter and smaller logs and branches, was observed at the upstream nose and along both faces of Pier 1. The debris extended from channel bottom to waterline, 6 feet off the nose and up to 15 feet off the faces.
- 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 2.0 feet above waterline. The section loss had up to 8 inches maximum penetration and exposed reinforcing steel with up to 5% loss of section.
- 4 The steel icebreaker angle had 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 14 inch by 6 inch by 2.5 inches deep spall was observed at the southeast corner of Pier 1, 3 feet below shaft step. No exposed reinforcement.
- 6 Both embankments had erosion in the vicinity of the structure.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 6646
OVER THE RED RIVER OF THE NORTH
DISTRICT 4, CLAY COUNTY

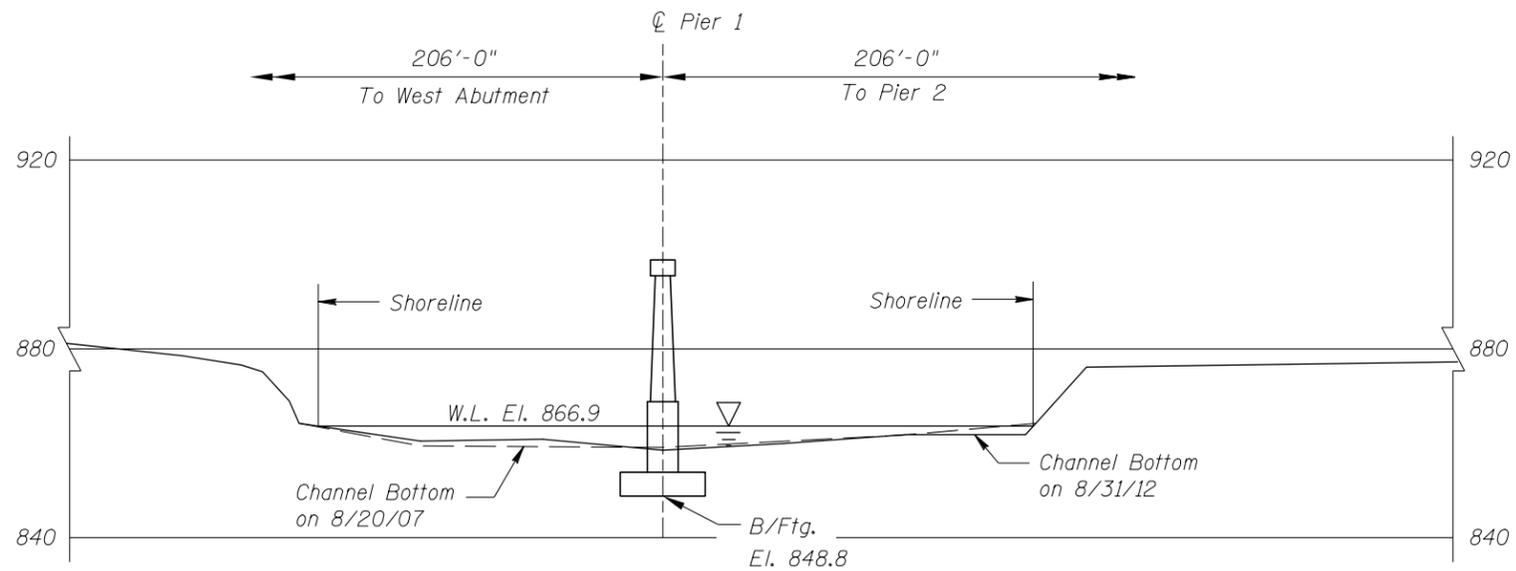
INSPECTION AND SOUNDING PLAN

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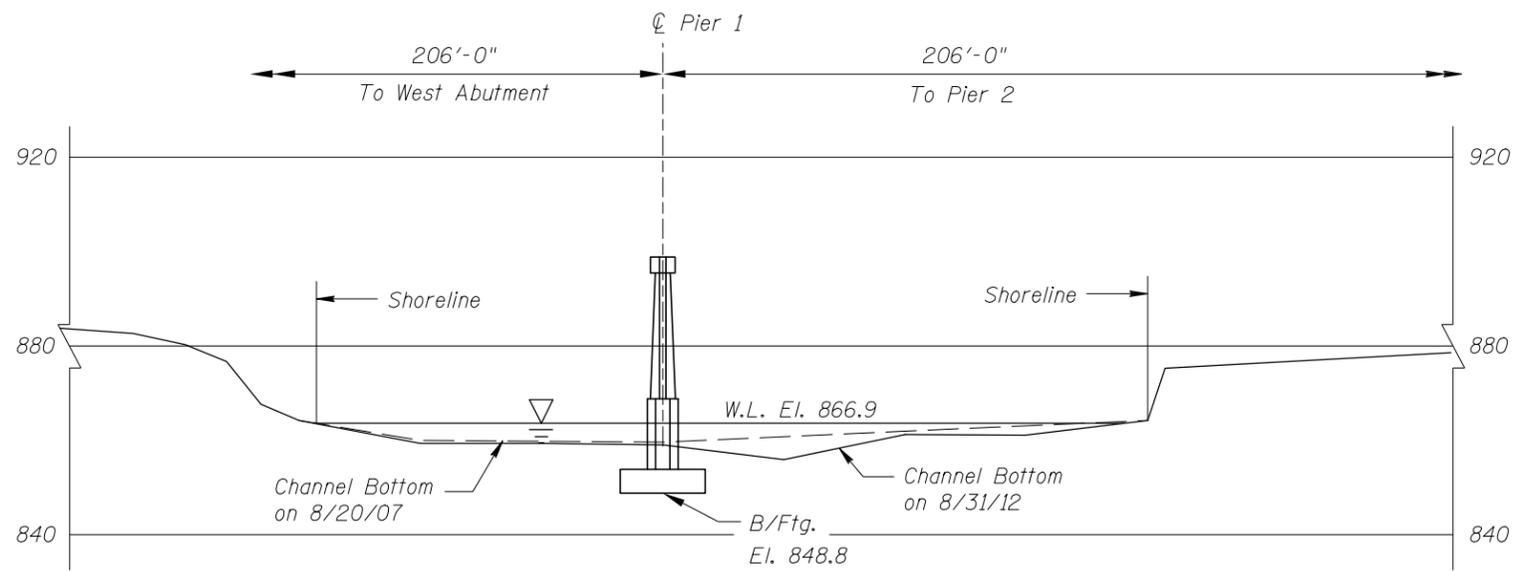
Drawn By: JAC
Checked By: BKS
Code: 52210044

AVRES ASSOCIATES
3433 Oakwood Hills Parkway
Eau Claire, WI 54701
www.AyresAssociates.com

Date: SEPT, 2012
Scale: NTS
Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note: _____

Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 6646 OVER THE RED RIVER OF THE NORTH DISTRICT 4, CLAY COUNTY UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: JAC	AVRES ASSOCIATES <small>3433 Oakwood Hills Parkway Eau Claire, WI 54701 www.AyresAssociates.com</small>	Date: SEPT, 2012
Checked By: BKS		Scale: 1"=40'
Code: 52210044		Figure No.: 2

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

INSPECTORS: Ayres Associates DATE: August 31, 2012

ON-SITE TEAM LEADER: Brian K. Schroeder, P.E.

BRIDGE NO: 6646 WEATHER: Sunny, 77°F

WATERWAY CROSSED: Red River of the North

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Jason A. Cook, Anthony J. Coffaro

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

TIME IN WATER: 11:00 AM

TIME OUT OF WATER: 12:00 PM

WATERWAY DATA: VELOCITY 1.5 ft/sec

VISIBILITY Negligible/None

DEPTH 5.8 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 heavy accumulation of timber debris, consisting of 18 inch diameter and smaller logs and branches, was observed at the upstream nose and both faces 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 1.5 feet above the waterline. There was a spall in the southeast corner of Pier 1, 3 feet below the waterline that was 14 inches wide by 6 inches tall by 2.5 inches deep without exposed reinforcement. The steel icebreaker angle mounted to the upstream nose was moderately corroded and pitted. Both of the upstream and downstream channel embankments were eroded in the vicinity of the structure.

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.

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 sixty (60) months.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 6646
 INSPECTORS Ayres Associates
 ON-SITE TEAM LEADER Brian K. Schroeder, P.E.
 WATERWAY CROSSED Red River of the North

INSPECTION DATE August 31, 2012

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	5.8	N	7	N	9	7	7	7	6	6	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 heavy accumulation of timber debris, consisting of 18 inch diameter and smaller logs and branches, was observed at the upstream nose and both faces 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 1.5 feet above the waterline. There was a spall in the southeast corner of Pier 1, 3 feet below the waterline which measured 14 inches wide by 6 inches tall by 2.5 inches deep without exposed reinforcement. The steel icebreaker angle mounted to the upstream nose was moderately corroded and pitted. Both of the upstream and downstream channel embankments were eroded in the vicinity of the structure.

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.