

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 5816
CSAH NO. 3
OVER THE
RED RIVER OF THE NORTH
DISTRICT 2 - NORMAN COUNTY



PREPARED FOR THE
MINNESOTA DEPARTMENT OF TRANSPORTATION
BY
COLLINS ENGINEERS, INC.
JOB NO. 5221 (CEI 41)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure unit inspected at Bridge No. 5816, Pier 2, was in good to satisfactory condition with no defects of structural significance observed. Minor scaling on both noses and a hairline crack at the midpoint on both faces of the pier was observed above and below the waterline. A moderate accumulation of timber debris was also present around the upstream nose of Pier 2. The east bank was observed to be heavily eroded with undermining and exposed piling at the East Abutment. The channel bottom appeared to be in stable condition with some minor degradation since the previous inspection.

INSPECTION FINDINGS:

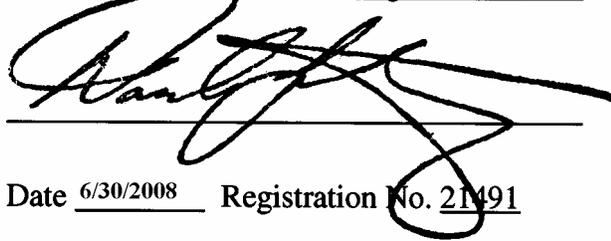
- (A) A moderate accumulation of timber debris consisting of logs and branches up to 18 inches in diameter was observed from the channel bottom to the waterline at the upstream nose and along both faces of Pier 2. The debris extended up to 8 feet off the faces and noses.
- (B) A vertical hairline to 1/16 inch wide crack was observed at the midpoint of Pier 2 on both sides, extending from the top of the cap to the channel bottom.
- (C) Light scaling was observed at both noses of Pier 2 extending from 2 feet above the waterline to 0.5 feet below the waterline with a maximum penetration of 1/8 inch.
- (D) The east bank exhibited heavy erosion to include the East Abutment with undermining up to 8 feet high and exposed piling. One of the five exposed piles that support the abutment was broken (see photo).

RECOMMENDATIONS:

- (A) Replace or structurally jacket broken East Abutment pile and repair erosion with properly sized/placed riprap bank protection.
- (B) Monitor the timber debris at Pier 2, and if found to be increasing in the future, removal operations may become warranted.
- (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



A large, stylized handwritten signature in black ink, appearing to read 'Dan G. Stromberg', is written over two horizontal lines.

Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



A large, stylized handwritten signature in black ink, appearing to read 'Dan G. Stromberg', is 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: 5816

Feature Crossed: Red River of the North

Feature Carried: CSAH No. 3

Location: District 2 - Norman County

Bridge Description: The superstructure consists of two steel through truss spans and one steel beam approach span. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete piers. The abutments are supported by treated timber piles. The piers are supported by untreated timber piles. The substructure units are designated West Abutment, Piers 1 and 2, and East Abutment from west to east.

2. INSPECTION DATA

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

Dive Team: John J. Loftus, Valerie Rouston

Date: August 20, 2007

Weather Conditions: Cloudy, 60° F

Underwater Visibility: Negligible/None

Waterway Velocity: 1.0 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Pier 2

General Shape: The pier consists of a reinforced concrete cap supported by two multi-sided columns connected by a slender diaphragm wall braced with an integral horizontal strut. The pier is founded on a rectangular footing supported by timber piles.

Maximum Water Depth at Substructure Inspected: Approximately 10.1 Feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the downstream end of Pier 2.

Water Surface: The waterline was approximately 31.4 feet below reference.
Waterline Elevation = 821.1.

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 4

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 the Structure, Looking Southwest.



Photograph 2. View of Pier 1, Looking West.



Photograph 3. View of Pier 2, Looking Northwest.



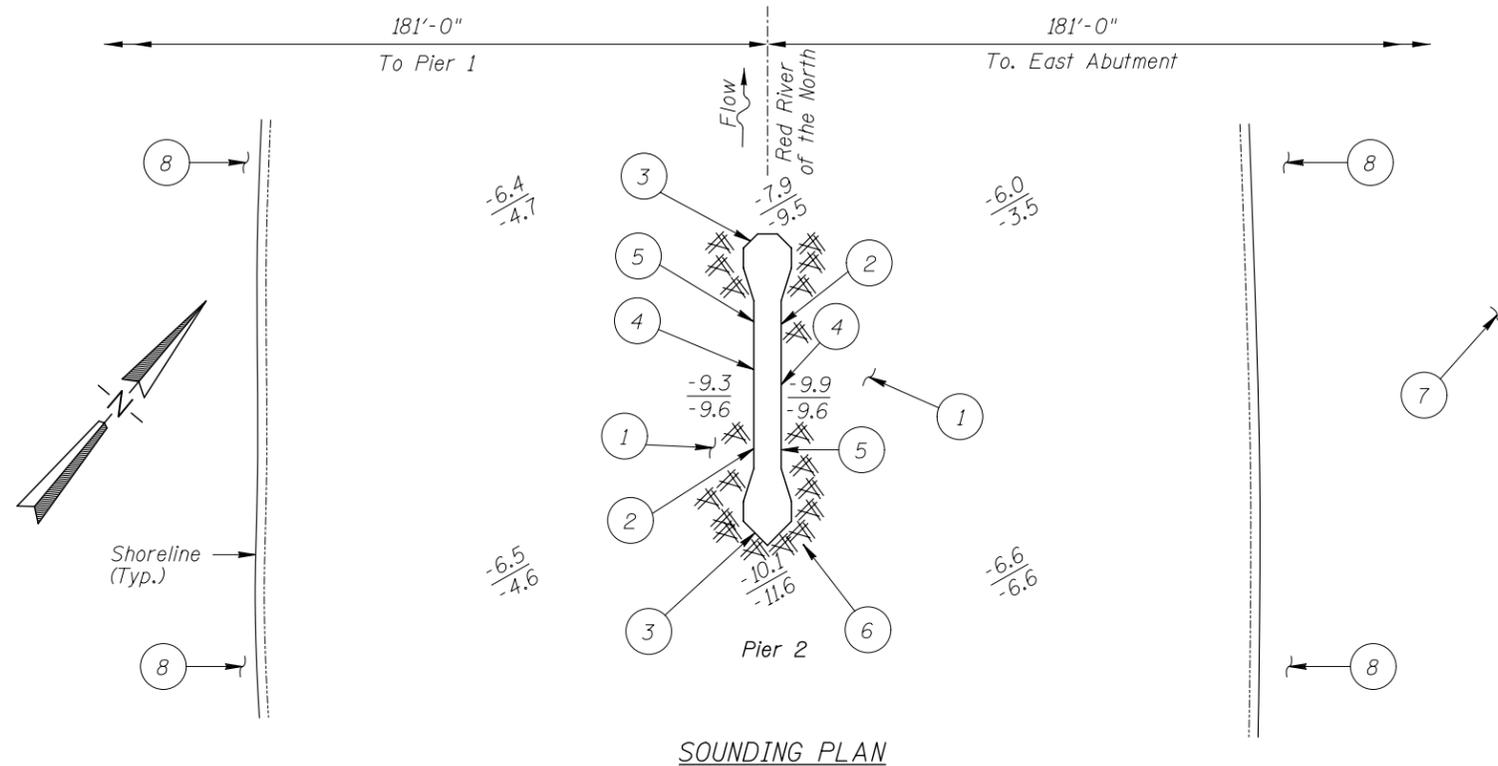
Photograph 4. View of the Bank Erosion and Undermining at the East Abutment, Looking East.



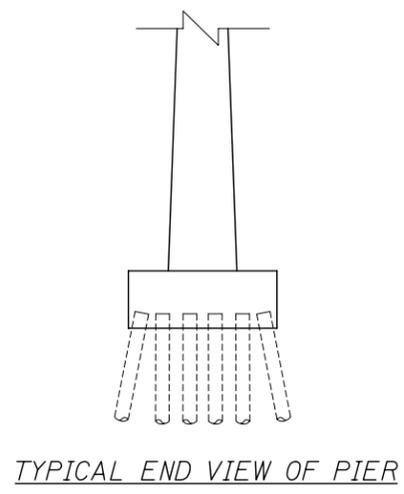
Photograph 5. View of the Undermining at the East Abutment, Looking Southeast. (Piles at upstream end)



Photograph 6. View of the Undermining at the East Abutment, Looking South. (Broken pile at upstream end)



SOUNDING PLAN



TYPICAL END VIEW OF PIER

GENERAL NOTES:

1. Pier 2 was inspected underwater.
2. At the time of inspection on August 20, 2007, the waterline was located approximately 31.4 feet below the top of the pier cap at the downstream end of Pier 2. This corresponds with a waterline elevation of 821.1 feet.
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 material around Pier 2 consisted of gravel with up to 2 inches of probe rod penetration.
- 2 In general, the concrete surfaces of Pier 2 above and below the water line were smooth and sound with random minor areas of poor consolidation with up to 1/4 inch penetration.
- 3 Light scaling was observed at both noses of Pier 2 from 2 feet above the waterline to 0.5 feet below the waterline with a maximum penetration of 1/8 inch.
- 4 A crack up to 1/16 inch wide was observed at the midpoint of Pier 2 on both sides, extending from the top of the cap to the channel bottom.
- 5 Formed openings, measuring 8 inches wide by 8 inches high, were observed along both faces of Pier 2 at 6 feet below the waterline at 1/4 point intervals along the shaft.
- 6 A moderate accumulation of timber debris, consisting of logs and branches up to 18 inches in diameter, was observed from channel bottom to the waterline at the upstream nose and out from both pier faces. The debris extended up to 8 feet off the faces and nose.
- 7 The east bank exhibited heavy erosion at the East Abutment with undermining up to 8 feet high and exposed piling. One of the five exposed piles that support the abutment was broken (see Photo in report text).
- 8 Heavy bank erosion was observed along the banks of the channel upstream and downstream of the bridge with steeply cut banks up to 20 feet high.

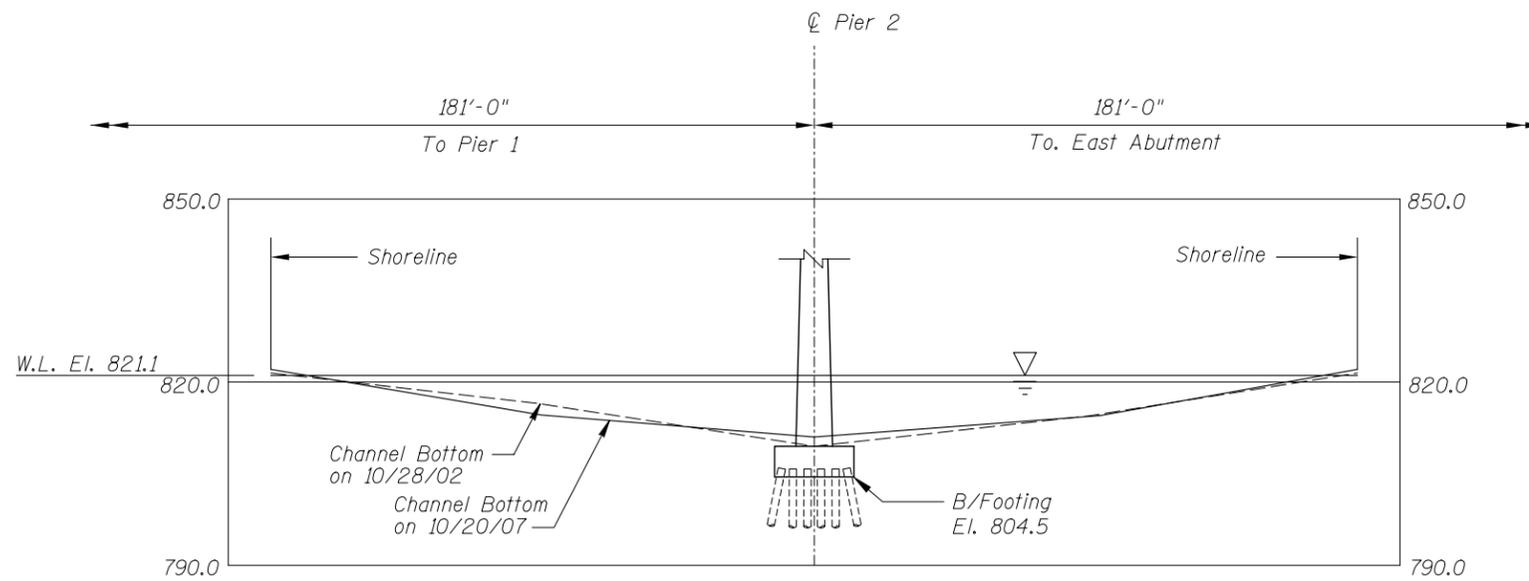
Legend

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

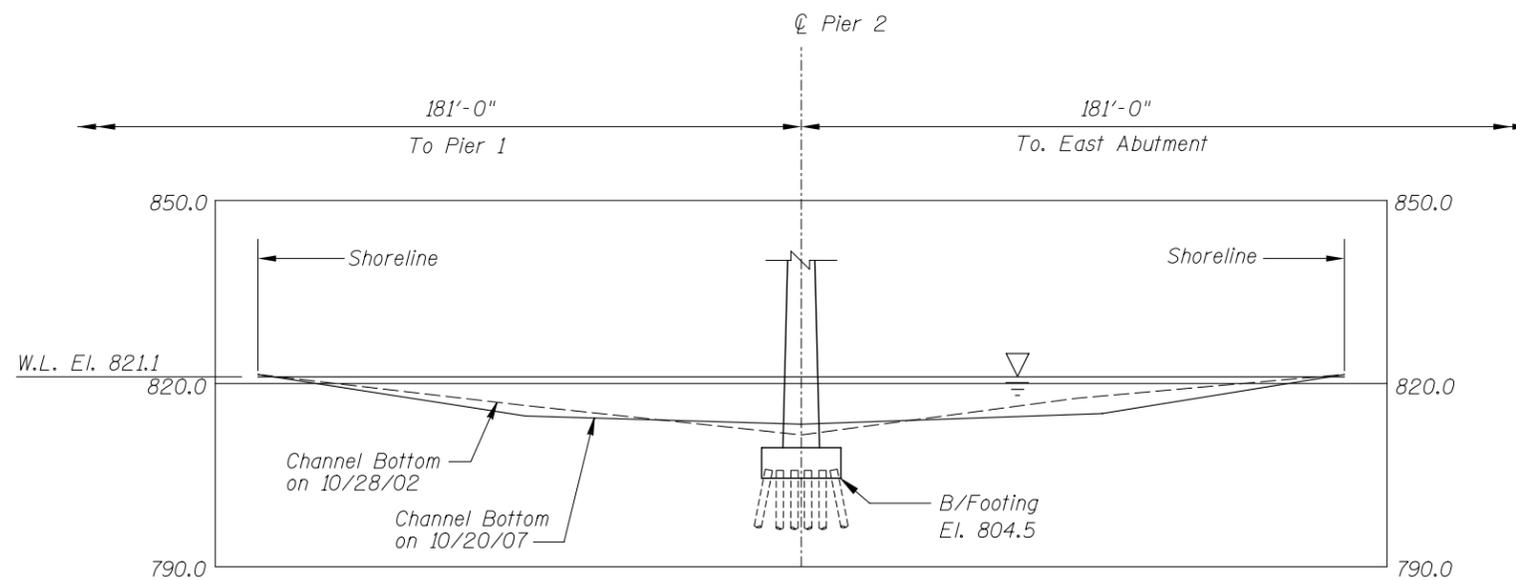
Note:

All soundings based on 2007 waterline location.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 5816 OVER THE RED RIVER OF THE NORTH DISTRICT 2, NORMAN COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: RR	COLLINS ENGINEERS	Date: AUG.2007
Checked By: MDK	123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Scale: NTS
Code: 52210041		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. 5816
OVER THE RED RIVER OF THE NORTH
DISTRICT 2, NORMAN COUNTY
**UPSTREAM AND DOWNSTREAM
FASCIA PROFILES**

Drawn By: RR	COLLINS ENGINEERS	Date: AUG.2007
Checked By: MDK		Scale: 1"=30'
Code: 52210041		Figure No.: 2

133 North Wacker Drive
Suite 300
Chicago, IL 60606
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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: 5816 WEATHER: Cloudy, 60° F

WATERWAY CROSSED: Red River of the North

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: John J. Loftus, Valerie Rouston

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

TIME IN WATER: 8:45 a.m.

TIME OUT OF WATER: 9:30 a.m.

WATERWAY DATA: VELOCITY 1.0 f.p.s.

VISIBILITY Negligible/None

DEPTH 10.1 feet maximum at Pier 2

ELEMENTS INSPECTED: Pier 2

REMARKS: In general, the concrete surfaces of Pier 2 above and below the waterline were smooth and sound with random minor areas of poor consolidation. Light scaling was observed at both noses from 2 feet above the waterline to 0.5 feet below the waterline. A moderate accumulation of timber debris consisting of logs and branches up to 18 inches in diameter was observed from the channel bottom to the waterline at the upstream nose and along both faces. The east bank exhibited heavy erosion with undermining of the East Abutment up to 8 feet high and exposed piling. One of the exposed piles was broken.

FURTHER ACTION NEEDED: YES NO

Replace or structurally jacket broken East Abutment pile and repair erosion with properly sized/placed riprap bank protection.

Monitor the timber debris, and if found to be increasing in the future, removal operations may become warranted.

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. 5816
 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 (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	10.1'	N	7	N	9	N	7	6	4	N	6	4	7	N	N	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: In general, the concrete surfaces of Pier 2 above and below the waterline were smooth and sound with random minor areas of poor consolidation. Light scaling was observed at both noses from 2 feet above the waterline to 0.5 feet below the waterline. A moderate accumulation of timber debris consisting of logs and branches up to 18 inches in diameter was observed from the channel bottom to the waterline at the upstream nose and along both faces. The east bank exhibited heavy erosion with undermining of the East Abutment up to 8 feet high and exposed piling. One of the exposed piles was broken.

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.