

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 23501

CSAH NO. 5

OVER THE

ROOT RIVER

FILLMORE COUNTY



OCTOBER 5, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 7423

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 23501, Piers 1 and 2, were found to be in good to satisfactory condition. The concrete surfaces of the piers exhibited light scaling observed near the waterline and some minor vertical cracks on the pier shafts. A heavy accumulation of 2 foot diameter and smaller timber debris was observed extending from the channel bottom to 8 feet above the waterline at the upstream end and along both faces of Pier 1. A tree trunk, 1.5 feet in diameter (forked around pier), was observed extending from the channel bottom to 4 feet above the waterline at the upstream end of Pier 2. The footing at Pier 2 was exposed along the east half of the pier with undermining and steel H-pile exposure across most of the east face, and for a short distance at the upstream southeast corner, with a maximum height of approximately 1.5 feet and up to an estimated 5 feet of horizontal penetration. Since the last inspection in 2007, the overall extent of undermining has progressed somewhat. The exposed piles were in good condition with minimal deterioration.

INSPECTION FINDINGS:

- (A) A heavy accumulation of 2 foot diameter and smaller timber debris was observed extending from the channel bottom to 8 feet above the waterline at the upstream end and along both faces of Pier 1.
- (B) A tree trunk, 1.5 feet in diameter (forked around pier) was observed extending from the channel bottom to 4 feet above the waterline at the upstream end of Pier 2.
- (C) The footing at Pier 2 was exposed along the east half of the pier with undermining and steel H-pile exposure across most of the east face and for a short distance at the upstream southeast corner. The undermining cavity had a maximum height of approximately 1.5 feet and up to an estimated 5 feet of horizontal penetration. The exposed piles were in good condition with minimal deterioration.

- (D) Two vertical hairline cracks were observed at the midpoint of Pier 2 that extended from the top of the pier cap to 2 feet below the waterline on the east face and to the channel bottom on the west face.

RECOMMENDATIONS:

- (A) Remove the heavy accumulations of timber debris around Piers 1 and 2 to alleviate any adverse effects for the channel bottom and the piers.
- (B) Giving the undermining, consideration may need to be given for riprap to be properly designed and placed around the piers (especially Pier 2) and in the scour/undermining areas to armor against further channel bottom degradation, unless further scour analysis indicates differently.
- (C) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader:
Daniel G. Stromberg, P.E.

Respectfully submitted,

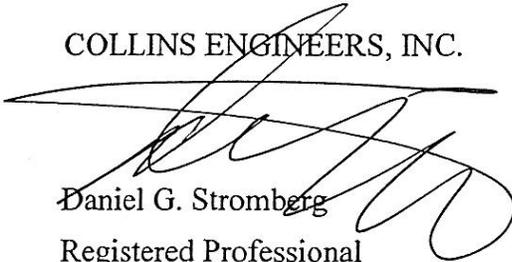
PROFESSIONAL ENGINEER

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: 23501

Feature Crossed: Root River

Feature Carried: CSAH No. 5

Location: Fillmore County

Bridge Description: The superstructure consists of three spans of continuous multiple steel stringers supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete piers. Both the abutments and piers are supported by steel H-piles. The piers are numbered 1 and 2 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer/Team Leader: Daniel G. Stromberg, P.E.

Dive Team: Marc B. Parker, Breanne M. Stromberg

Date: October 5, 2012

Weather Conditions: Windy, 45°F

Underwater Visibility: 3.0 feet

Waterway Velocity: Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2.

General Shape: The piers consist of a rectangular concrete shaft with rounded ends that supports a hammerhead pier cap and bears on a rectangular concrete footing founded on steel H-piles.

Maximum Water Depth at Substructure Inspected: Approximately 7.7 feet.

4. WATERLINE DATUM

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

Water Surface: The waterline was approximately 11.5 feet below reference.
Waterline Elevation = 991.4.

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/10/12

Item 113: Scour Critical Bridges: Code N

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 |
| 210 | Reinforced Concrete Pier Wall | 52 | LF | 52 | | | | |
| 220 | Reinforced Concrete Footing | 1 | EA | 1 | | | | |
| 361 | Scour Smart Flag | 1 | EA | | | 1 | | |
| 985 | Slopes & Slope Protection | 1 | EA | 1 | | | | |



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



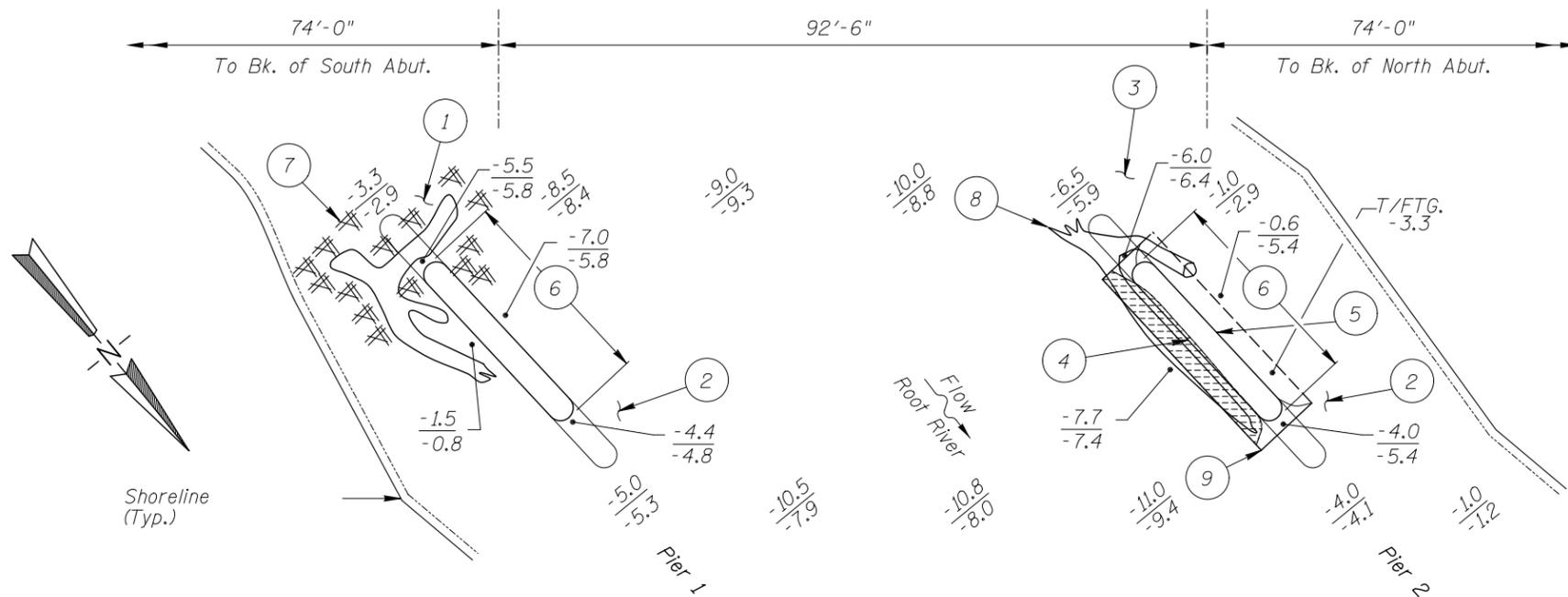
Photograph 2. View of Pier 1, Looking Northwest.



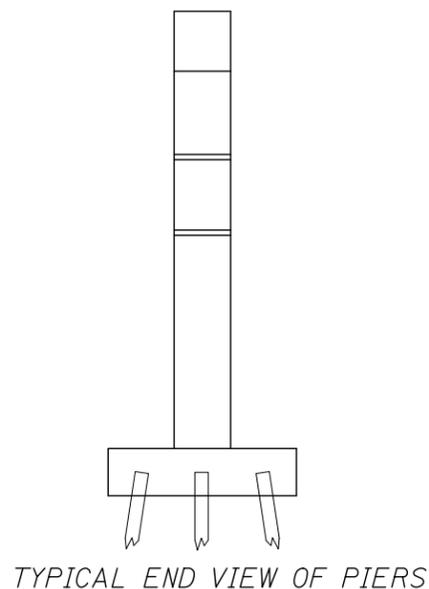
Photograph 3. View of Pier 2, Looking West.



Photograph 4. View of Undermining Cavity Under the Pier 2 Footing at the Upstream End, Looking Down.



SOUNDING PLAN



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on October 5, 2012, the waterline was located approximately 11.5 feet below the top of the pier cap at the west face of Pier 2. This corresponds to a waterline elevation of 991.4.
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 gravel and silt allowing up to 2 inches of probe rod penetration.
2. The channel bottom consisted of silty sand allowing up to 1 foot of probe rod penetration.
3. The channel bottom consisted of soft silt allowing up to 1.5 feet of probe rod penetration.
4. A vertical hairline crack was observed at the midpoint of Pier 2 that extended from the top of the pier cap to 2 feet below the waterline.
5. A vertical hairline crack was observed at the midpoint of Pier 2 that extended from the top of the pier cap to the top of the footing.
6. Light scaling was observed along all pier faces from 1 foot above to 1 foot below the waterline with a maximum penetration of 1/16 inch.
7. A heavy accumulation of 2-foot-diameter-and-smaller timber debris was observed extending from the channel bottom to 8 feet above the waterline at the upstream end and along both faces of Pier 1.
8. A 1.5-foot-diameter tree trunk (forked around the pier nose) was observed extending from the channel bottom to 4 feet above the waterline at the upstream end of Pier 2.
9. The footing was exposed along the east face of Pier 2 with undermining and steel H-piles observed from the midpoint along the downstream nose, around the upstream southeast corner, and extending to the upstream southwest corner, with a maximum height of approximately 1.5 feet along most of the undermined area on the east side of the pier, and 4 to 5 feet of maximum horizontal penetration. The exposed steel H-piles (4) were sound without any notable deterioration (just spotty surface corrosion).

Legend

- 2.0 Sounding Depth (10/5/12)
- 5.2 Sounding Depth (10/25/07)

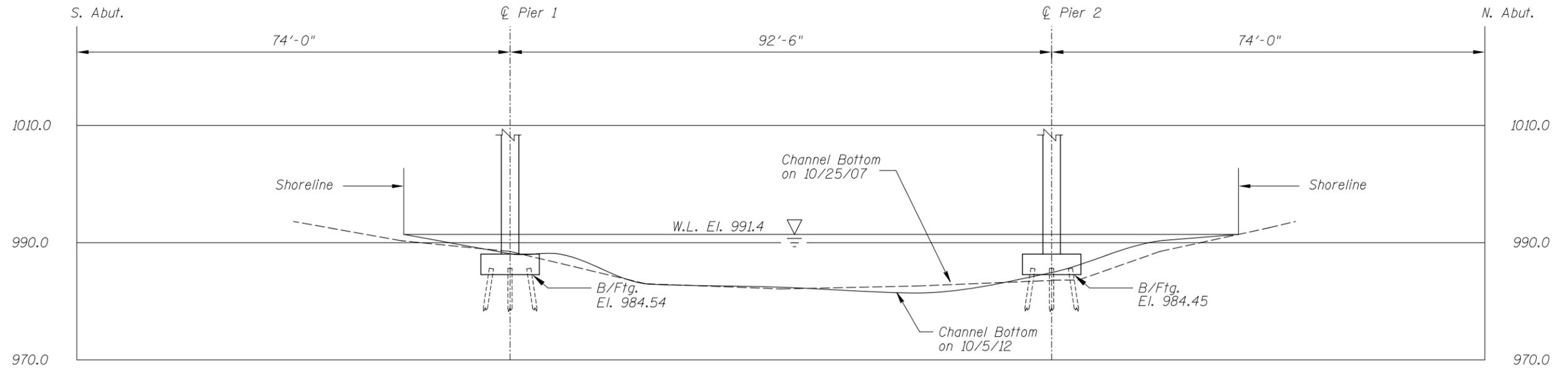
Timber Debris

Undermined Footing

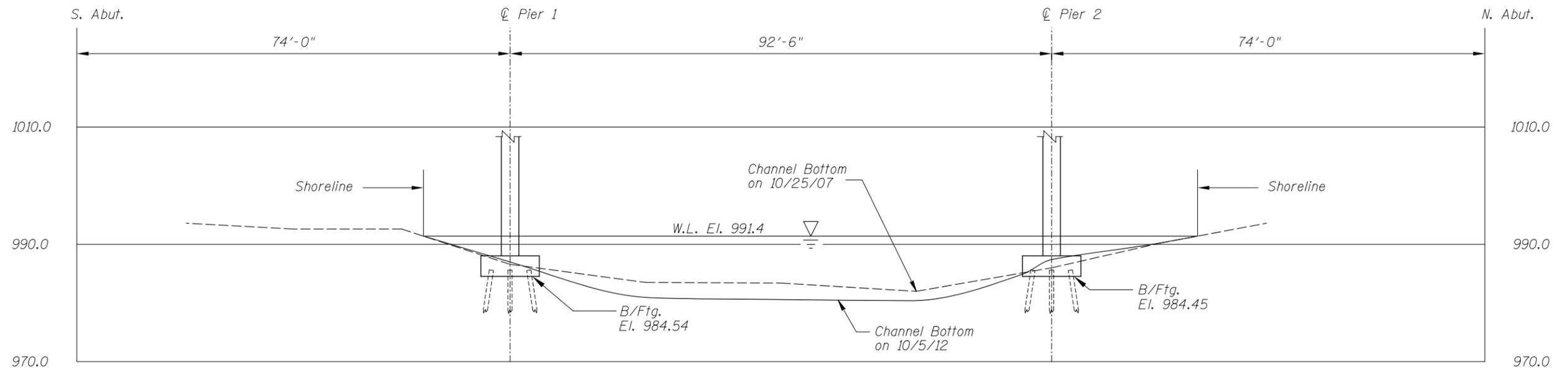
Note:

All soundings based on 2012 waterline location.

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| MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION | | |
| STRUCTURE NO. 23501 CSAH 05 OVER THE ROOT RIVER FILLMORE COUNTY | | |
| INSPECTION AND SOUNDING PLAN | | |
| Drawn By: MBP | COLLINS ENGINEERS <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small> | Date: JAN., 2013 |
| Checked By: LJ | | Scale: NTS |
| Code: 742323501 | | Figure No.: I |



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

| | | |
|--|--|------------------|
| MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION | | |
| STRUCTURE NO. 23501 CSAH 05 OVER THE ROOT RIVER FILLMORE COUNTY | | |
| UPSTREAM AND DOWNSTREAM FASCIA PROFILES | | |
| Drawn By: MBP | COLLINS ENGINEERS <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small> | Date: JAN., 2013 |
| Checked By: LJ | | Scale: 1"=20' |
| Code: 742323501 | | Figure No.: 2 |

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

INSPECTORS: Collins Engineers, Inc. DATE: October 5, 2012

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.

BRIDGE NO: 23501 WEATHER: Windy, 45°F

WATERWAY CROSSED: Root River

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Marc B. Parker, Breanne M. Stromberg

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

TIME IN WATER: 11:00 A.M.

TIME OUT OF WATER: 11:50 A.M.

WATERWAY DATA: VELOCITY Negligible/None

VISIBILITY 3.0 feet

DEPTH 7.7 feet maximum at Pier 2.

ELEMENTS INSPECTED: Piers 1 and 2

REMARKS: The concrete surfaces of the piers exhibited light scaling observed near the waterline and some minor vertical cracks on the pier shafts. A heavy accumulation of 2 feet diameter and smaller timber debris was observed extending from the channel bottom to 8 feet above the waterline at the upstream end and along both faces of Pier 1. A tree trunk, 1.5 feet in diameter (forked around pier), was observed extending from the channel bottom to 4 feet above the waterline at the upstream end of Pier 2. The footing at Pier 2 was exposed along the east half of the pier with undermining and steel H-pile exposure across most of the east face, and for a short distance at the upstream southeast corner with a maximum height of approximately 1.5 feet and up to an estimated 5 feet of horizontal penetration. Since the last inspection in 2007, the overall extent of undermining has progressed somewhat. The exposed piles were in good condition with minimal deterioration.

FURTHER ACTION NEEDED: X YES NO

Remove the heavy accumulations of timber debris around Piers 1 and 2 to alleviate any adverse effects for the channel bottom and the piers.

Giving the undermining, consideration may need to be given for riprap to be properly designed and placed around the piers (especially Pier 2) and in the scour/undermining areas to armor against further channel bottom degradation, unless further scour analysis indicates differently.

Reinspect the submerged substructure units 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. 23501
 INSPECTORS Collins Engineers, Inc.
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.
 WATERWAY CROSSED Root River

INSPECTION DATE October 5, 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 | 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 | 7.0' | N | 7 | N | 8 | N | 7 | N | 7 | 8 | 5 | 5 | 7 | N | N | N | N | N |
| | Pier 2 | 7.7' | 7 | 7 | 7 | 8 | N | 7 | 4 | 7 | 8 | 6 | 4 | 7 | 7 | N | N | N | N |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

*UNDERWATER PORTION ONLY

REMARKS: The concrete surfaces of the piers were in good condition with light scaling observed near the waterline and some minor vertical cracks on the pier shafts. A heavy accumulation of 2 feet diameter and smaller timber debris was observed extending from the channel bottom to 8 feet above the waterline at the upstream end and along both faces of Pier 1. A tree trunk, 1.5 feet in diameter (forked around pier), was observed extending from the channel bottom to 4 feet above the waterline at the upstream end of Pier 2. The footing at Pier 2 was exposed along the east half of the pier with undermining and steel H-pile exposure across most of the east face, and for a short distance at the upstream southeast corner with a maximum height of approximately 1.5 feet and up to an estimated 5 feet of horizontal penetration. Since the last inspection in 2007, the overall extent of undermining has progressed somewhat. The exposed piles were in good condition with minimal deterioration.

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.