UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 89188

7th STREET

OVER THE

ZUMBRO RIVER

CITY OF ROCHESTER

OCTOBER 2, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 7423
REPORT SUMMARY:

The substructure units inspected below water at Bridge No. 89188, the West Abutment and Piers 1, 2, and 3, were found to be in good to satisfactory condition. Several hairline to 1/4-inch-wide cracks were noted along the pier shafts and the abutment wall, with a very slight, 1/8-inch differential noted along the northern quarter point of Pier 1. The channel bottom appeared to be stable, and the scour protection system in-place around the substructure units was in good condition.

INSPECTION FINDINGS:

(A) The concrete piers were typically in smooth and sound condition.

(B) Two vertical 1/8-inch-wide cracks were observed at the upstream and downstream 1/4 points along the pier shaft of Piers 2 and 3 and extended from the top of the pier to the top of the concrete scour protection. Both cracks extended through the full depth of the pier shaft.

(C) The channel bottom consisted of silty sand with 3 inches of probe rod penetration outside of the concrete scour protection around all substructure units.

(D) Four vertical hairline to 1/4-inch-wide cracks were observed along the Pier 1 shaft and extended from the top of the pier to top of the concrete scour protection. All cracks extended through the full depth of the pier shaft.

(E) A 1/8-inch differential (east / west) was observed at the top of the Pier 1 shaft at the upper 1/4 point along the northernmost 1/4-inch wide crack.

(F) A vertical 1/8-inch-wide crack was observed at the upstream 1/4 point along the West Abutment and extended from the top of the abutment to the concrete scour protection.
(G) A 4-inch-diameter spall was observed near the outfall at the upstream 1/4 point along the West Abutment with up to 2 inches of penetration and an associated hairline crack that extended to the wingwall.

(H) A 1/16-inch wide vertical crack was observed at the middle joint of the West Abutment.

(I) A hairline crack was observed at the downstream 1/4 point of the West Abutment and extended from the top of abutment to top of concrete scour protection.
RECOMMENDATIONS:

(A) Monitor the cracking along the pier shafts at Piers 1, 2 and 3 and the West Abutment, with special attention to the minor 1/8-inch-wide differential along the northern end of Pier 1 for any further progression and/or movement.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader

Roy A. Forsyth, PE
Date 6/30/2014 License# 49270

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 10/20/14 License #21481

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional Engineer, State of Minnesota
1. **BRIDGE DATA**

   Bridge Number: 89188

   Feature Crossed: Zumbro River

   Feature Carried: 7th Street

   Location: City of Rochester

   Bridge Description: The superstructure consists of four spans of multiple reinforced concrete beams supporting a reinforced concrete deck. The bridge is supported by two reinforced concrete abutments and three reinforced concrete piers, which are founded on timber piles. The piers are numbered 1 through 3 from the west to east.

2. **INSPECTION DATA**

   Professional Engineer Diver: Roy A. Forsyth, P.E.

   Dive Team: Charles R. Euwema, Jordan T. Furlan, P.E.

   Date: October 2, 2012

   Weather Conditions: Sunny, 65° F

   Underwater Visibility: 1.0 foot

   Waterway Velocity: Negligible
3. **SUBSTRUCTURE INSPECTION DATA**

Substructure Inspected: West Abutment and Piers 1, 2, and 3.

General Shape: Oblong rectangular shafts with pointed upstream and downstream ends supported by rectangular footings that are founded on timber piles. A sloped concrete scour-protection apron surrounds each of the piers and also extends along the West Abutment.

Maximum Water Depth at Substructure Inspected: Approximately 6.7 feet.

4. **WATERLINE DATUM**

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

Water Surface: The waterline was approximately 9.0 feet below reference. Waterline Elevation = 974.2.

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/10/12

Item 113: Scour Critical Bridges: Code P

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

<table>
<thead>
<tr>
<th>Item #</th>
<th>Element Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>215</td>
<td>Concrete Abutment</td>
<td>65</td>
<td>LF</td>
<td>35 30</td>
</tr>
<tr>
<td>210</td>
<td>Concrete Pier Wall</td>
<td>150</td>
<td>LF</td>
<td>75 75</td>
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</table>
Photograph 1. Overall View of the Structure, Looking Northwest.

Photograph 2. View of Pier 1, Looking Northeast.

The concrete piers were typically in smooth and sound condition.

Two vertical 1/8-inch-wide cracks were observed at the upstream and downstream 1/4 points along the pier shaft and extended from the top of the pier to the top of the concrete scour protection. Both cracks extended through the full depth of the pier shaft.

The channel bottom consisted of silty sand with 3 inches of penetration outside of the concrete scour protection around the substructure units.

Four vertical hairline to 1/4-inch-wide cracks were observed along the Pier 1 shaft and extended from the top of the pier to the top of the concrete scour protection. All cracks extended through the full depth of the pier shaft.

A 1/8-inch differential (east / west) was observed at the top of the Pier 1 shaft along the northwestern 1/4-inch wide crack.

A vertical 1/8-inch wide crack was observed at the upstream 1/4 point along West Abutment and extended from the top of the abutment to the concrete scour protection.

A 1/4-inch diameter spall was observed near the outlet at the upstream 1/4 point along the West Abutment with up to 2 inches of penetration and an associated hairline crack that extended to the wingwall.

A 1/16-inch wide vertical crack was observed at the middle joint of the West Abutment.

A hairline crack was observed at the downstream 1/4 point of the West Abutment and extended from the top of abutment to top of concrete scour protection.

1. Piers 1 through 3 and the West Abutment were inspected underwater.
2. At the time of inspection, on October 2, 2012, the waterline was located approximately 9.0 feet below the top of Pier 1 on the north end. This corresponds to a waterline elevation of 974.8.
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 as well as around the pier structures.
Notes:
Refer to Figure 1 for General Notes.
INSPECTORS: Collins Engineers, Inc.          DATE: October 2, 2012
ON-SITE TEAM LEADER: Roy A. Forsyth, P.E.
BRIDGE NO: 89188                   WEATHER: Sunny, 65° F
WATERWAY CROSSED: Zumbro River
DIVING OPERATION: X SCUBA         SURFACE SUPPLIED AIR
OTHER
PERSONNEL: Charles R. Euwema, Jordan T. Furlan, P.E.
EQUIPMENT: U/W Light, Scraper, Lead Line, Sounding Pole, Probe Rod, Camera
TIME IN WATER: 10:00 A.M.
TIME OUT OF WATER: 10:30 A.M.
WATERWAY DATA: VELOCITY Negotiable
               VISIBILITY 1.0 foot
               DEPTH 6.7 feet maximum at Pier 3.
ELEMENTS INSPECTED: West Abutment and Piers 1, 2, and 3
REMARKS: Overall, the West Abutment and Piers 1, 2, and 3, were found to be in good
to satisfactory condition. Several hairline to 1/4-inch-wide cracks were noted along the
pier shafts and the abutment wall, with a very slight, 1/8-inch differential noted along the
northern quarter point of Pier 1. The channel bottom appeared to be stable, and the scour
protection system in-place around the substructure units was in good condition.

FURTHER ACTION NEEDED: _______ YES ____ X ____ NO

Monitor the cracking along the pier shafts at Piers 1, 2 and 3 and the West Abutment,
with special attention to the minor 1/8-inch-wide differential along the northern end of
Pier 1 for any further progression and/or movement.

Reinspect the submerged substructure units at the normal maximum recommended
(NBIS) interval of sixty (60) months.
## Condition Rating

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<th>UNIT REFERENCE NO.</th>
<th>MAXIMUM DEPTH OF WATER</th>
<th>PILING</th>
<th>COLUMNS, SHAFTS, OR FACES*</th>
<th>FOOTINGS</th>
<th>DISPLACEMENT</th>
<th>OTHER</th>
<th>OVERALL SUBSTRUCTURE CONDITION CODE</th>
<th>SCOUR</th>
<th>EMBANKMENT EROSION</th>
<th>EMBANKMENT PROTECTION</th>
<th>OTHER (DRIFT/DEBRIS)</th>
<th>OVERALL CHANNEL &amp; PROTECTION CONDITION</th>
<th>CONCRETE</th>
<th>STEEL</th>
<th>TIMBER</th>
<th>LOSS OF SECTION</th>
<th>PREVIOUS REPAIR OR MAINTENANCE</th>
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*UNDERWATER PORTION ONLY

### Remarks

Overall, the West Abutment and Piers 1, 2, and 3, were found to be in good to satisfactory condition. Several hairline to 1/4-inch-wide cracks were noted along the pier shafts and the abutment wall, with a very slight, 1/8-inch differential noted along the northern quarter point of Pier 1. The channel bottom appeared to be stable, and the scour protection system in-place around the substructure units was in good condition.

### 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.