UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 7771
CSAH NO. 110
OVER THE
CHANNEL AT WHITEWATER AND COLBY LAKES
ST. LOUIS COUNTY

JUNE 20, 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. 7771, the East and West Abutments, were found to be generally in good condition with no structurally significant defects. A few additional minor cracks and areas of section loss have developed since the previous underwater inspection in 2007, but the progress of those defects is essentially minor in extent. The channel bottom consisted of a formed concrete slab with no appreciable defects.

INSPECTION FINDINGS:

(A) The concrete on all faces was generally smooth and sound with random small pockets of poorly consolidated concrete. On the walls there was up to 1/2 inch of section loss along various horizontal cold construction joints just below the waterline.

(B) There was a vertical crack at the south end of the West Abutment, extending from under the fascia beam to 10 foot below the waterline with a maximum width of 1/8 inch. Associated areas of minor section loss, up to 1 inch wide, were observed at various locations along the crack. At the bottom of the crack, a larger area of section loss with up to 1.5 inches of penetration was present.

(C) Random small areas of poorly consolidated concrete were observed on both abutments. There were also random, less frequent small areas of minor section loss.

(D) Random hairline map cracking with light efflorescence was observed from the waterline to 3 feet above the waterline.

(E) Hairline to 1/16 inch wide vertical cracks with light efflorescence were observed on both abutment walls beginning at the bottom of the bridge deck and extending below water up to 5 feet below the waterline.
Light concrete scaling with 1/8 inch to 1/4 inch penetration was observed from 1 foot above the waterline to 10 feet below the waterline on both abutment walls.

The channel bottom consisted of a formed concrete slab with a light layer of silt. Scattered riprap was observed along the south fascia of the structure.

RECOMMENDATIONS:

(A) Monitor the cracks in both abutment walls for any progression during future underwater inspections, which could result due to freeze and thaw action, and if found to be substantially progressing, repairs may become warranted at a later date.

(B) 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
6/30/14 License # 21491

COLLINS ENGINEERS, INC.

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

Bridge Number: 7771

Feature Crossed: Channel at Whitewater and Colby Lakes

Feature Carried: CSAH No. 110

Location: St. Louis County

Bridge Description: The bridge superstructure consists of a single span of multiple concrete beams. The superstructure is supported by two vertical wall abutments designated as the East and West Abutments. The channel bottom between the abutments consists of a sloped concrete floor. The bridge is located adjacent to a gate control house and pumping station. No original design plans were available.

2. **INSPECTION DATA**

Professional Engineer Diver: Daniel G. Stromberg, P.E.

Dive Team: Clayton Brookins, Breanne Stromberg

Date: June 20, 2012

Weather Conditions: Cloudy, 75° F

Underwater Visibility: 10.0 feet

Waterway Velocity: Negligible/None
3. **SUBSTRUCTURE INSPECTION DATA**

Substructure Inspected: East and West Abutments.

General Shape: Vertical concrete walls (abutments) with a monolithic sloped concrete floor extending between them.

Maximum Water Depth at Substructure Inspected: Approximately 39.5 Feet.

4. **WATERLINE DATUM**

Water Level Reference: The top of the wall with a railing at the south side of the East Abutment.

Water Surface: The waterline was approximately 9.0 feet below reference.

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 N/A(Concrete Floor)

Item 92B: Underwater Inspection: Code B/06/12

Item 113: Scour Critical Bridges: Code I/95

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>
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<tbody>
<tr>
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<td>Reinforced Concrete Abutment</td>
<td>72</td>
<td>LF</td>
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</tbody>
</table>
Photograph 1. Overall View of the South Fascia, Looking Northwest.

Photograph 2. Overall View of the North Fascia/Gate House, Looking West.

Photograph 4. View of Typical Map Cracking Above the Waterline at the East Abutment, Looking Northeast.
Photograph 5. View of Typical Section Loss Underwater at the West Abutment, Looking West.
**INSPECTION NOTES:**

1. The channel bottom consisted of a formed concrete slab with a light layer of silty silt.
2. At 17.5 feet below the water surface (at floor), the edge of the abutment wall along the vertical joint exhibited a 6-inch-high by 3-inch-wide area of section loss with a penetration of 2 inches.
3. Vertical crack, extending from the abutment beam to 30 feet below the waterline with a maximum width of 1/8 inch and minor loss of section with surface openings of up to 1 inch wide along crack.
4. Area of horizontal section loss of 5 feet below the waterline, measuring 2.5 feet long by 1/2 inches high with a maximum penetration of 2 inches.
5. Section loss on corner at waterline to 2 feet below waterline, measuring 9 inches wide by 2 feet high with 2 inches of penetration.
6. The concrete on all faces generally smooth and sound with random small patches of poorly consolidated concrete. On walls, up to 1/4 inch section loss along various horizontal construction joints below waterline.
7. An area of horizontal section loss, 3 feet long by 1/2 inches high, with 3 inches of penetration, was observed on the pump station wall at 2 feet below the waterline.
8. Random hairline crack with light efflorescence was observed from around the waterline to 3 feet above the waterline.
9. Hairline to 1/8 inch wide vertical cracks with light efflorescence were observed on both abutment walls typically beginning at the bottom of the bridge deck and extending below water up to 5 feet below the waterline. Crack locations where all followed as follows: the west abutment, north and south of 3rd beam from the south, or the east abutment, between 3rd and 4th beams from the north and the east abutment, north and south of the 5th beam from north.
10. Scattered riprap was observed along the south fascia.
11. Light scaling of concrete surfaces with 1/8 inch to 1/4 inch penetration was observed from 1 foot above the waterline to approximately 3 feet below the waterline on both abutment walls.

**GENERAL NOTES:**

1. The east and west abutments were inspected underwater.
2. At the time of inspection on June 20, 2022, the waterline was located approximately 3.0 feet below the top of wall with rolling at south edge of East Abutment.
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 each corner of the abutments and at midspan.

**Legend:**
- $-35.0$ Soundings Depth (6/20/22)

**MINNESOTA DEPARTMENT OF TRANSPORTATION**
**UNDERWATER BRIDGE INSPECTION**
**OVER THE CHANNEL AT WHITESTONE AND COOLY LAKES**
**DISTRICT 1 ST. LOUIS COUNTY**

**INSPECTION AND SOUNDING PLAN**

*Diagram details and measurements are provided.*
MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: June 20, 2012

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

BRIDGE NO: 7771 WEATHER: Cloud, 75° F

WATERWAY CROSSED: Channel Between Whitewater and Colby Lakes

DIVING OPERATION: X SCUBA _______ SURFACE SUPPLIED AIR

OTHER

PERSONNEL: Clayton Brookins, Breanne Stromberg

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

TIME IN WATER: 1:45 P.M.

TIME OUT OF WATER: 2:45 A.M.

WATERWAY DATA: VELOCITY Negligible/None

VISIBILITY 10.0 feet

DEPTH 39.5 feet maximum at the West Abutment

ELEMENTS INSPECTED: East and West Abutments

REMARKS: Overall, the East and West Abutments, were found to be generally in good condition with no structurally significant defects. A few additional minor cracks and areas of section loss have developed since the previous underwater inspection in 2007. The channel bottom consisted of a formed concrete slab with no appreciable deficiencies.

FURTHER ACTION NEEDED: _______ YES X _______ NO

Monitor the cracks in both abutment walls for any progression, which could result due to freeze/thaw action, and if found to be substantially progressing, repairs may become warranted at a later date.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.
## UNDERWATER INSPECTION CONDITION RATING FORM

**BRIDGE NO.** 7771  
**INSPECTION DATE** June 20, 2012  
**ON-SITE TEAM LEADER** Daniel G. Stromberg, P.E.

**WATERWAY CROSSED** Channel between Whitewater and Colby Lakes

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### CONDITIONS RATING

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<th>UNIT DESCRIPTION</th>
<th>MAXIMUM DEPTH OF WATER</th>
<th>PILING</th>
<th>COLUMNS, SHAFTS, OR FACES*</th>
<th>FOOTINGS</th>
<th>DISPLACEMENT</th>
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<th>EMBANKMENT EROSION</th>
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<th>TIMBER</th>
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<th>PREVIOUS REPAIR OR MAINTENANCE</th>
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**REMARKS:** Overall, the East and West Abutments, were found to be generally in good condition with no structurally significant defects. A few additional minor cracks and areas of section loss have developed since the previous underwater inspection in 2007. The channel bottom consisted of a formed concrete slab with no appreciable deficiencies.

**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.