

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 23503

CSAH NO. 25

OVER THE

ROOT RIVER

FILLMORE COUNTY



OCTOBER 4, 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 unit inspected at Bridge No. 23503, Pier 2, was found to be in satisfactory condition, but with significant extent of foundation exposure/undermining. A scour depression approximately 3 feet deep was detected at the upstream nose of Pier 2. The pier footing was exposed around the entire perimeter with some undermining detected. The channel bottom appeared stable with no appreciable changes since the previous inspection. The extent of foundation exposure was also comparable to the findings of 2007 inspection.

INSPECTION FINDINGS:

- (A) The submerged concrete of Pier 2 was in good and sound condition with only random light scaling observed from the top of the footing to 4 feet above the waterline.
- (B) Two impact related voids were also observed on the upstream nose of Pier 2 above the waterline, 2 feet long by 1 foot wide by ½ inch maximum penetration.
- (C) The footing of Pier 2 was exposed along the entire perimeter with a maximum vertical exposure of 4 feet at the upstream end with a 3 foot long section undermined. The undermining cavity was 4 inches high with 6 inches of penetration.
- (D) A light accumulation of timber debris was observed at the waterline at the upstream nose of Pier 2. Also, a moderate accumulation of debris was observed within the scour depression at Pier 2 from the channel bottom up 3 feet.
- (D) A scour depression was observed at the upstream end of Pier 2 with a radius of 5 feet and a maximum depth of 3 feet.

RECOMMENDATIONS:

- (A) Monitor the scour depression and footing exposure at Pier 2 during future inspections. If these conditions progress, scour countermeasures may be considered.
- (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,

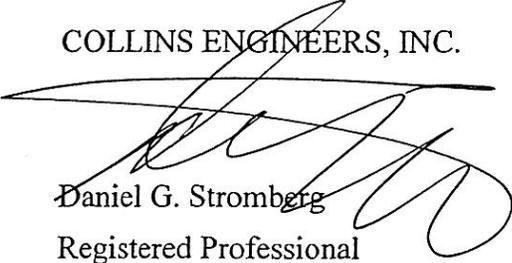
PROFESSIONAL ENGINEER

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

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: 23503

Feature Crossed: Root River

Feature Carried: CSAH No. 25

Location: Fillmore County

Bridge Description: The bridge superstructure is a four span, multiple steel girder bridge. The superstructure is supported by two reinforced concrete abutments and three reinforced concrete piers. The piers and abutment footings are supported by timber piles. The piers are numbered 1 through 3 starting at the west 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 4, 2012

Weather Conditions: Sunny, 55°F

Underwater Visibility: 5.0 feet

Waterway Velocity: 1.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Pier 2

General Shape: The pier consists of a rectangular concrete shaft with rounded ends supporting a hammerhead pier cap and founded on a rectangular pile supported footing.

Maximum Water Depth at Substructure Inspected: Approximately 4.5 feet.

4. WATERLINE DATUM

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

Water Surface: The waterline was approximately 21.1 feet below reference.
Waterline Elevation = 731.2.

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 6

Item 92B: Underwater Inspection: Code B/10/12

Item 113: Scour Critical Bridges: Code O/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

| Item # | Element Description | Quantity | Unit | Conditions | | | | |
|--------|-------------------------------|----------|------|------------|----|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 |
| 210 | Reinforced Concrete Pier Wall | 30 | LF | | 30 | | | |
| 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 Northeast.



Photograph 2. View of Pier 2, Looking Northwest.



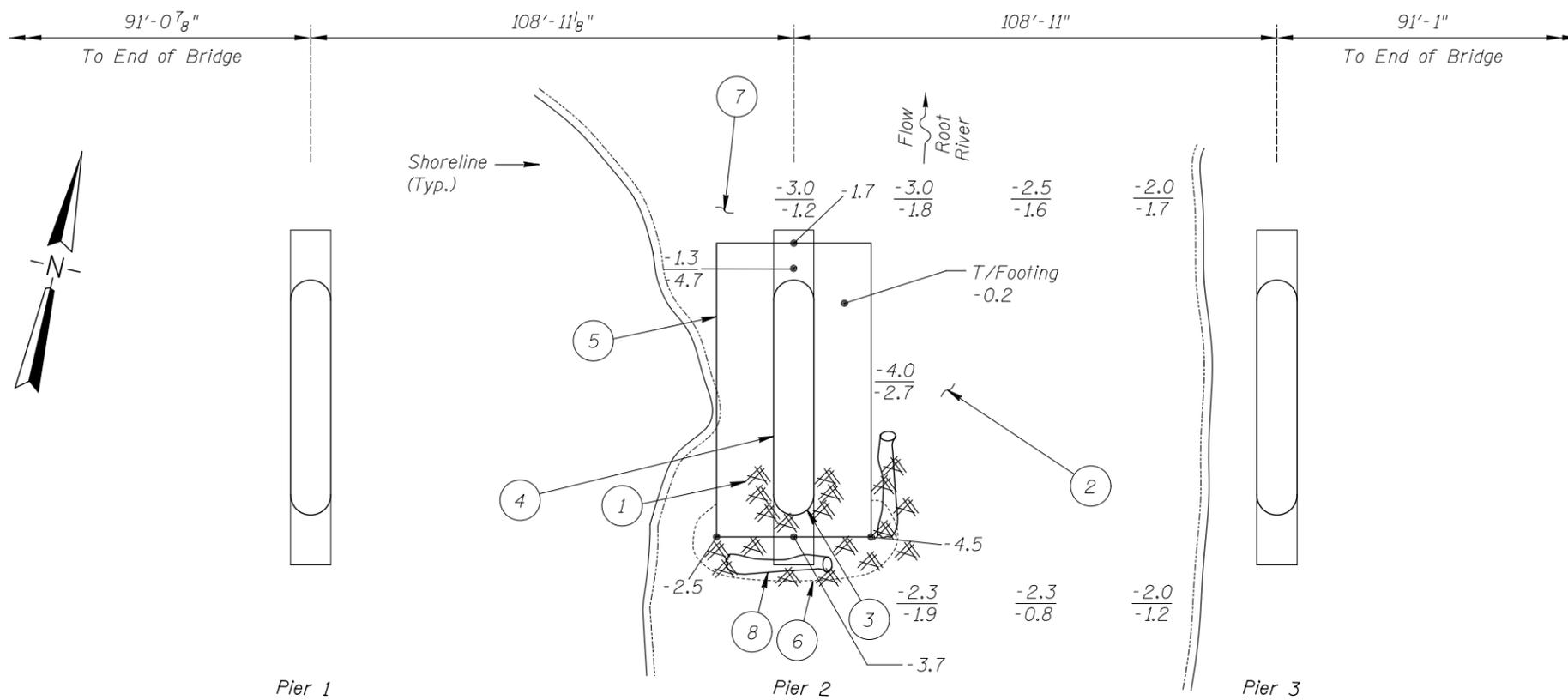
Photograph 3. View of Pier 3, Looking East.



Photograph 4. View of the Exposed Footing at the Upstream Nose of Pier 2, Looking East.



Photograph 5. View of the Undermining Cavity at the Upstream Nose of Pier 2, Looking Down.



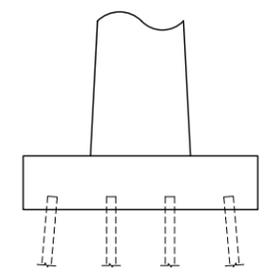
SOUNDING PLAN

GENERAL NOTES:

1. Pier 2 was inspected underwater.
2. At the time of inspection on October 4, 2012, the waterline was located approximately 21.1 feet below the top of the pier cap at the upstream end of Pier 2. This corresponds with a waterline elevation of 731.2.
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 A light accumulation of timber debris consisting of 2 inch diameter and smaller branches was observed at the upstream nose of Pier 2 at waterline.
- ② The channel bottom material consisted of fine sandy gravel allowing 2 inches of maximum probe rod penetration.
- ③ Two horizontal impact related voids were observed on the upstream nose of Pier 2 above the waterline, measuring 2-foot-long by 1-inch-wide with 1/2 inch of penetration and exposed aggregate.
- ④ Light scaling of concrete was observed from the top of the footing to 4 feet above the waterline, with 1/4 inch maximum penetration.
- ⑤ The footing was exposed along the entire perimeter of Pier 2 with a maximum vertical exposure of 4 feet at the southeast corner with a 3 feet long section of undermining measuring 4 inches high and 6 inches maximum penetration. Vertical exposure at the southwest corner was 2.5 feet, along the east face was 3 feet, and at the downstream end was 6 inches.
- ⑥ A 5-foot-radius, 3-foot-deep scour depression was observed at the southeast corner of Pier 2.
- ⑦ The channel bottom at the downstream end of Pier 2 consisted of sandy infilling with 3 inch probe rod penetration.
- ⑧ A moderate accumulation of timber debris, up to 1.5 feet diameter, was observed within the scour depression at the upstream end and along the east face of the pier, extending from the channel bottom up 3 feet.



TYPICAL END VIEW OF PIERS

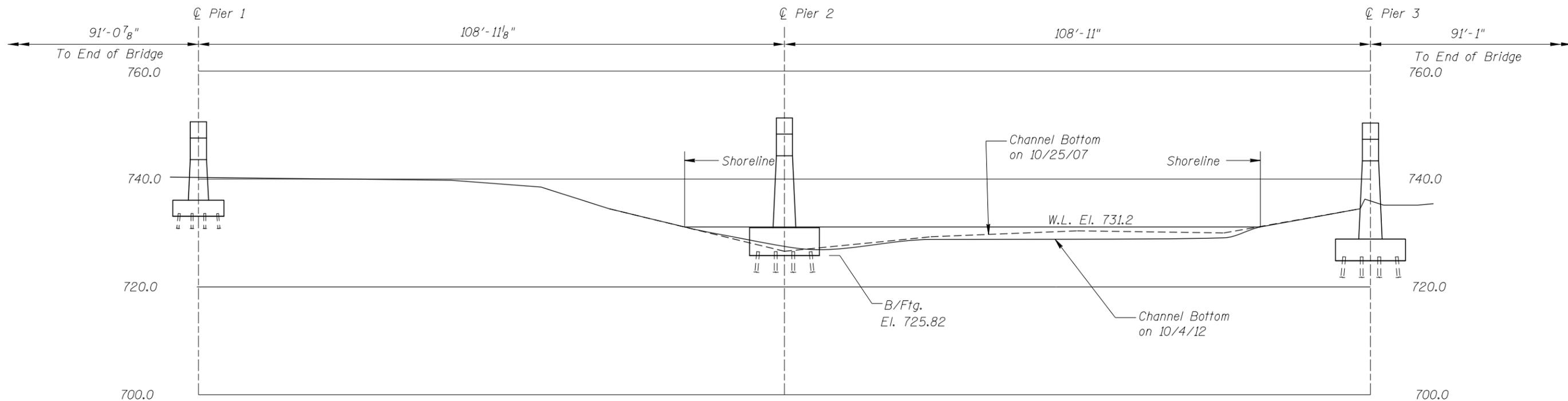
Legend

- 4.0 Sounding Depth (10/4/12)
- 4.1 Sounding Depth (10/25/07)
- Timber Debris

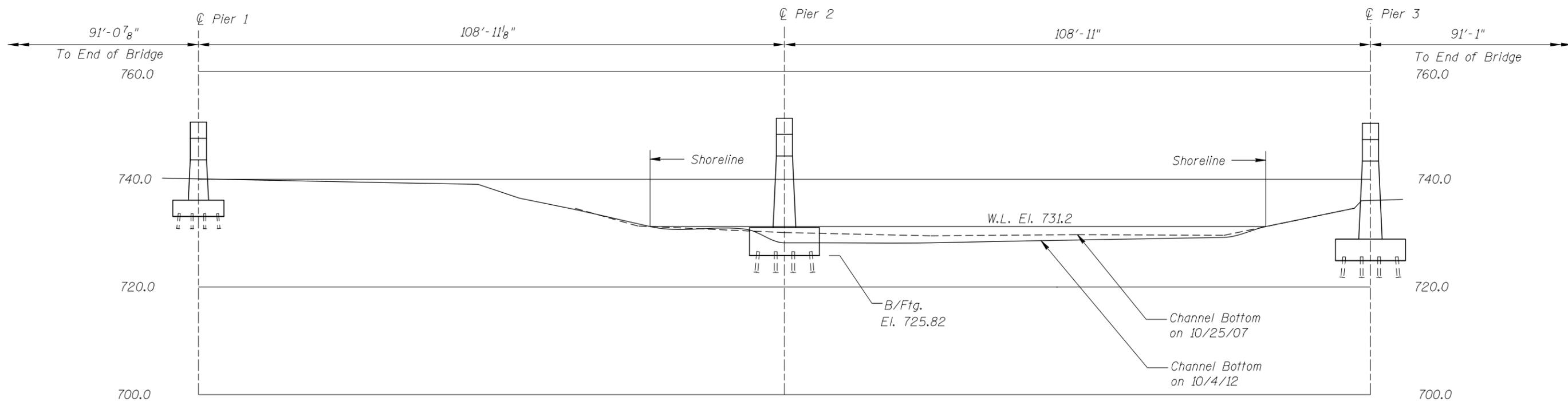
Note:

All soundings based on 2012 waterline location.

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| MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION | | |
| STRUCTURE NO. 23503 CSAH 25 OVER THE ROOT RIVER FILLMORE COUNTY | | |
| INSPECTION AND SOUNDING PLAN | | |
| Drawn By: BMS | COLLINS ENGINEERS | Date: JAN., 2013 |
| Checked By: LJ | <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small> | Scale: NTS |
| Code: 742323503 | | 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. 23503 CSAH 25 OVER THE ROOT RIVER FILLMORE COUNTY | | |
| UPSTREAM AND DOWNSTREAM FASCIA PROFILES | | |
| Drawn By: BMS | COLLINS ENGINEERS | Date: JAN., 2013 |
| Checked By: LJ | | Scale: 1"=20' |
| Code: 742323503 | | Figure No.: 2 |

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

INSPECTORS: Collins Engineers, Inc. DATE: October 4, 2012

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

BRIDGE NO: 23503 WEATHER: Sunny, 55° 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, Camera, Hand Tools

TIME IN WATER: 11:45 A.M.

TIME OUT OF WATER: 12:15 P.M.

WATERWAY DATA: VELOCITY 1.5 ft/sec

VISIBILITY 5.0 feet

DEPTH 4.5 feet maximum at Pier 2

ELEMENTS INSPECTED: Pier 2

REMARKS: Overall, Pier 2, was found to be in satisfactory condition with minor defects of structural significance observed. A scour depression approximately 3 feet deep was detected at the upstream nose of Pier 2. The pier footing was exposed around the entire perimeter with some undermining detected. The channel bottom appeared stable with no appreciable changes since the previous inspection.

FURTHER ACTION NEEDED: YES NO

Monitor the scour depression and footing exposure at Pier 2 during future inspections. If these conditions progress, scour countermeasures may be considered.

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. 23503
 INSPECTORS Collins Engineers, Inc.
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.
 WATERWAY CROSSED Root River

INSPECTION DATE October 4, 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 2 | 4.3' | N | 7 | 6 | 8 | N | 6 | 5 | N | N | 6 | 6 | 7 | N | N | N | N | N |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

*UNDERWATER PORTION ONLY

REMARKS: Overall, Pier 2, was found to be in satisfactory condition with minor defects of structural significance observed. A scour depression approximately 3 feet deep was detected at the upstream nose of Pier 2. The pier footing was exposed around the entire perimeter with some undermining detected. The channel bottom appeared stable with no appreciable changes since the previous inspection.

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.