

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 92277 H, I, J, and K

26<sup>th</sup> AVE

OVER

MILLER CREEK

CITY OF DULUTH

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JULY 26, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

AND

WSB & ASSOCIATES, INC.

JOB NO. 7423

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The structure inspected at Structure No. 92277 H, I, J and K, a set of continuous concrete culverts, were found to be in satisfactory condition, however a significant extent of undermining was observed along the culver walls.

INSPECTION FINDINGS:

- (A) Overall, concrete surfaces of all culvert sections exhibited minor scaling. Masonry structures exhibited minor scaling and minor grout deterioration..
- (B) Undermining of the culvert walls was observed at multiple locations throughout the structure ranging from 4 to 14 inches vertically and 5 inches to 3 feet deep. At structure 92277 J the entire south wall of the culvert (approximately 80 feet) was undermined.
- (C) Timber and other industrial debris were found hanging on a cross pipe within the inspected structure.

RECOMMENDATIONS:

- (A) Repair the undermining throughout the culvert sections.
- (B) Remove all debris from the interior of the structure.
- (C) Reinspect the culvert at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader:

WSB and Associates



Barritt Lovelace  
Registered Professional Engineer  
Bridge Safety Inspection Team Leader

Respectfully submitted,

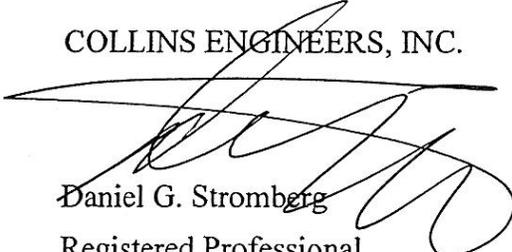
PROFESSIONAL ENGINEER

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 Numbers: 92277 H, I, J, and K

Feature Crossed: Miller Creek

Feature Carried: 26<sup>th</sup> Avenue W

Location: City of Duluth

Bridge Description: The structure consists of a concrete and masonry culvert. The type of construction varies throughout the culvert. The walls and ceiling of the culvert consisted of concrete or masonry with a natural bottom.

2. INSPECTION DATA

Professional Engineer/Team Leader: Barritt Lovelace, P.E (WSB)

Dive Team: Kasey Yoder (WSB), John Loftus (Collins)

Date: July 26, 2012

Weather Conditions: Sunny, 72° F

Underwater Visibility: 3 ft

Waterway Velocity: 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Culvert

General Shape: Three sided cast in place concrete or masonry culvert.

Maximum Water Depth within the Culvert Inspected: Approximately 5.1 feet.

4. WATERLINE DATUM

Water Level Reference: Top of concrete at downstream opening of Culvert K.

Water Surface: The waterline was approximately 8 feet below the reference.  
Assumed Waterline Elevation 92.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 62: Culvert: Code 6

Item 61: Channel and Channel Protection: Code 4

Item 92B: Underwater Inspection: Code B/07/12

Item 113: Scour Critical Bridges: E

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 |
| 241    | Reinforced Conc. Culvert | 732      | LF   |            | 732 |   |   |   |



Photograph 1. View of Downstream End of Culvert, Looking Southwest.



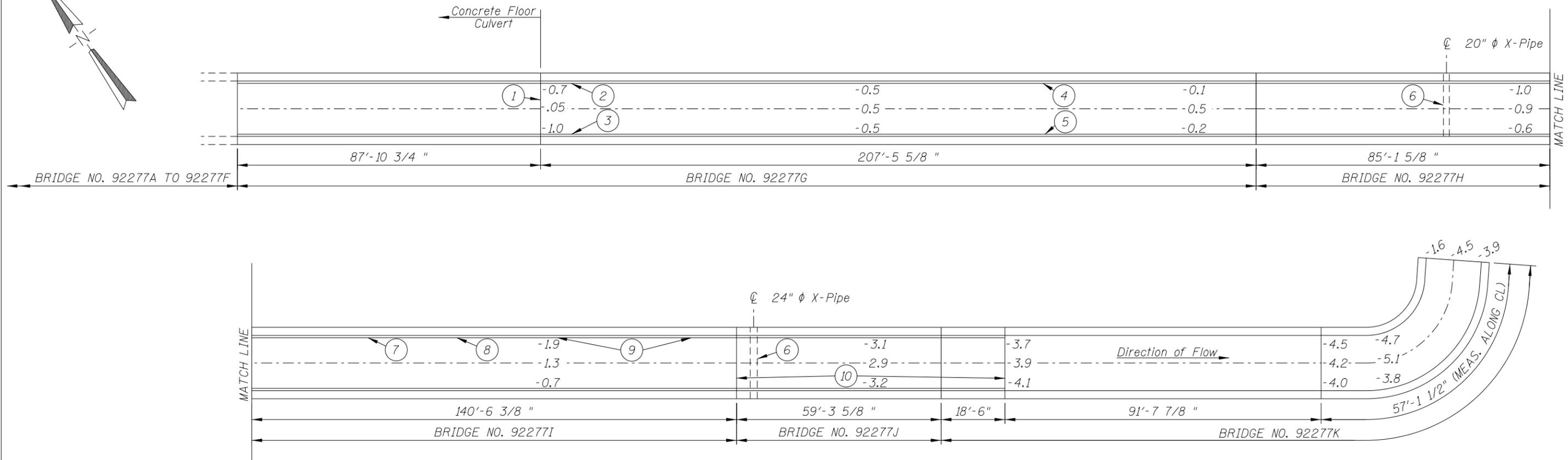
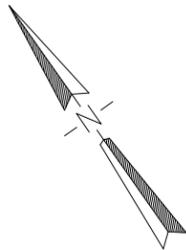
Photograph 2. View of Culvert Interior, Looking West.



Photograph 3. Typical Undermining, Looking North.



Photograph 4. View of Debris near the Cross Pipe within the Culvert, Looking East.



**INSPECTION NOTES:**

- ① The concrete surfaces were smooth and sound with no notable deterioration.
- ② Undermining was observed for a area of 5 feet long, 14 inch vertical and 14 inch of penetration.
- ③ Undermining was observed for a area of 15 feet long, 14 inch vertical and 3 feet of penetration.
- ④ Undermining was observed for a area of 4 feet long, 4 inch vertical and 4 inch of penetration.
- ⑤ Undermining was observed for a area of 10 feet long, 14 inch vertical and 1 feet of penetration.
- ⑥ Light timber debris was hung up on the cross pipe.
- ⑦ Undermining was observed for a area of 3 feet long, 5 inch vertical and 5 inch of penetration.
- ⑧ Undermining was observed for a area of 10 feet long, 4 inch vertical and 6 inch of penetration.
- ⑨ Undermining was observed for a area of 40 feet long, 6 inch vertical and 1 foot of penetration.
- ⑩ The entire south wall of Structure No. 92277J was undermined.

**SOUNDING PLAN**

**GENERAL NOTES:**

- 1. Culvert was inspected underwater.
- 2. At the time of inspection on July 26, 2012, the waterline was located approximately 8.0 feet below the top of the head wall at the downstream opening of culvert. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 92.0.
- 3. Soundings indicate the water depth at the time of inspection and are measured in feet.
- 4. Soundings were taken parallel to the barrel openings at downstream, and center of the culvert box barrels.

**Legend**

-1.2 Sounding Depth from Waterline (7/26/12)

**MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION**

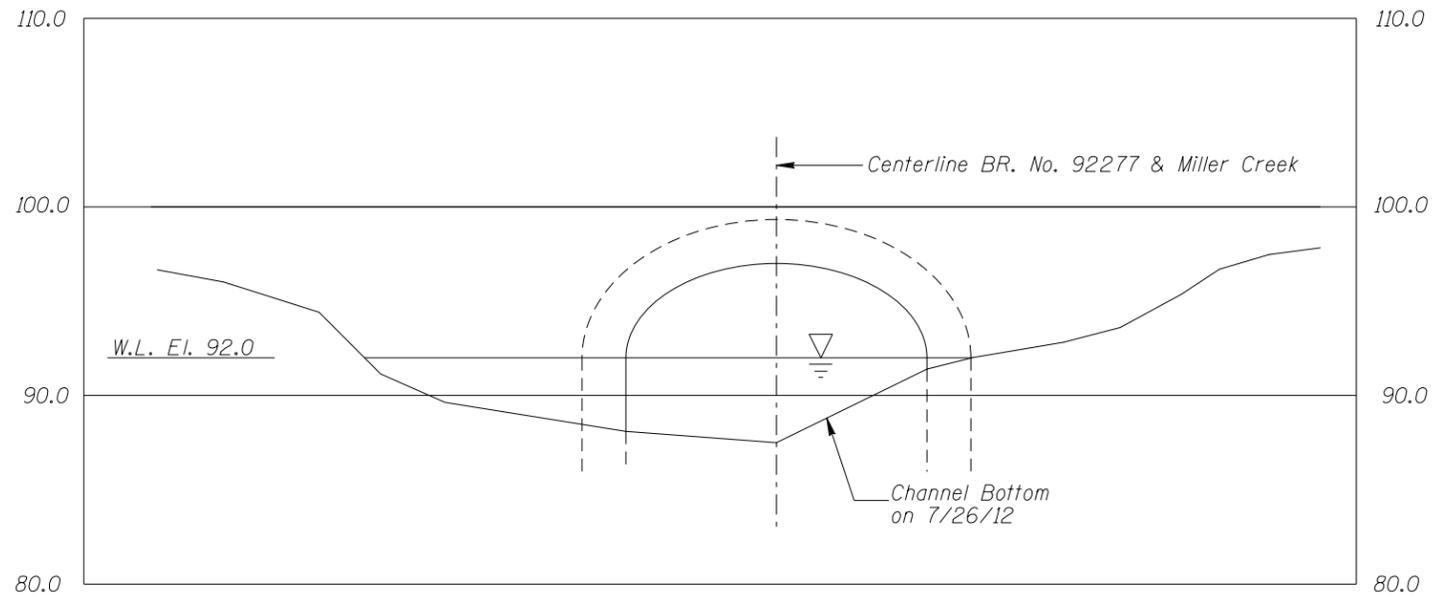
STRUCTURE NO. 92277 H-K  
OVER THE MILLER CREEK  
DISTRICT I, ST. LOUIS COUNTY

**INSPECTION AND SOUNDING PLAN**

|                 |  |                 |
|-----------------|--|-----------------|
| Drawn By: BJR   |  | Date: JULY 2012 |
| Checked By: BRL |  | Scale: NTS      |
| Code: ---       |  | Figure No.: I   |

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123 North Wacker Drive  
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DOWNSTREAM OPENING PROFILE  
(Looking Upstream)

Note:  
Refer to Figure 1 for General Notes.

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|  |   |                 |
|--|---|-----------------|
| <b>MINNESOTA<br/>DEPARTMENT OF TRANSPORTATION<br/>UNDERWATER BRIDGE INSPECTION</b> |   |                 |
| STRUCTURE NO. 92277 H-K<br>OVER THE MILLER CREEK<br>DISTRICT 1, ST. LOUIS COUNTY   |   |                 |
| UPSTREAM AND DOWNSTREAM<br>FASCIA PROFILES   |   |                 |
| Drawn By: BJR  | <b>COLLINS<br/>ENGINEERS</b>  | Date: JULY 2012 |
| Checked By: BRL  |   | Scale: 1"=20'   |
| ---  | 123 North Wacker Drive<br>Suite 300<br>Chicago, IL 60606<br>(312) 704-9300<br>www.collinsengr.com | Figure No.: 2   |

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

INSPECTORS: WSB & Associates and Collins DATE: July 26, 2012

ON-SITE TEAM LEADER: Barritt Lovelace, P.E.

BRIDGE NO: 92277 H, I, J, and K WEATHER: Sunny, 72° F

WATERWAY CROSSED: Miller Creek

DIVING OPERATION: \_\_\_\_\_ SCUBA \_\_\_\_\_ SURFACE SUPPLIED AIR  
 OTHER Wading

PERSONNEL: Kasey Yoder (WSB), John Loftus (Collins)

EQUIPMENT: Wet Suit, U/W Light, Scraper, Lead Line, Probe Rod, Camera

TIME IN WATER: 9:50 a.m.

TIME OUT OF WATER: 11:00 a.m.

WATERWAY DATA: VELOCITY 0.5 ft/sec

VISIBILITY 3 feet

DEPTH 4.7 feet maximum on North wall

ELEMENTS INSPECTED: Culvert

REMARKS: Overall, the concrete surfaces of the culverts exhibited minor scaling. The masonry of the culvert walls and ceilings was found to be in satisfactory condition with joint mortar typically intact. However, a significant extent of undermining was observed throughout the structure ranging from 4 to 14 inches vertically and up to 3 feet of maximum penetration.

FURTHER ACTION NEEDED:  YES \_\_\_\_\_ NO

Remove debris in culvert.

Repair undermining throughout the structure.

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