

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. L4870

TWP NO. 332

OVER THE

ROOT RIVER

FILLMORE COUNTY

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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 L4870, the North and South Abutments, were found to be in satisfactory to fair condition below water. Random areas of section loss were observed along the submerged abutment walls with average penetrations of 6 to 12 inches and, in some instances, with exposed and corroded reinforcing steel. A section of the concrete facing was undermined/undercut along the South Abutment exposing the underlying original masonry wall, which appeared to be in good condition.

INSPECTION FINDINGS:

- (A) The South Abutment footing was undermined between the upstream corner and 12 feet downstream, exposing the underlying masonry wall (original construction) which was found to be in good condition. The undermining cavity was up to 1.5 feet high with approximately 1.5 feet of horizontal penetration.
- (B) An area of poor consolidation was observed on the east corner of the South Abutment from 1.5 feet below to 6 inches above the waterline with 5 inches of maximum penetration. A formed steel angle was exposed due to an area of section loss, up to 1 foot wide and 4 inches deep, on the west corner of the South Abutment that extended from 3 feet above to 2 feet below the waterline.
- (C) Random areas of section loss were observed on the submerged portion of the North Abutment with typical penetrations of 12 inches with no exposed reinforcing steel.

RECOMMENDATIONS:

- (A) Although not structurally detrimental at this time, the areas of concrete section loss on the South Abutment should be repaired using a concrete mix which provides a high durability and low permeability, to prevent further deterioration of the concrete.
- (B) Monitor the height of exposure and condition of the masonry wall exposed below the concrete facing at the South Abutment, and if deterioration continues, further concrete encasement may be required.
- (C) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Respectfully submitted,

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

COLLINS ENGINEERS, INC.

Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: L4870

Feature Crossed: Root River

Feature Carried: TWP No. 332

Location: Fillmore County

Bridge Description: The superstructure consists of a single span, multiple steel stringer structure supporting a timber deck. The superstructure is supported by two masonry stone/concrete faced abutments. No design drawings or plans were available for this bridge; therefore, the type of substructure foundation is not known.

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: Sunny, 45°F

Underwater Visibility: 3 feet

Waterway Velocity: 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: The North and South Abutments.

General Shape: The abutments consist of a masonry breastwall covered by a concrete facing with two adjoining skewed wingwalls.

Maximum Water Depth at Substructure Inspected: Approximately 5.3 feet.

4. WATERLINE DATUM

Water Level Reference: The bottom of the outermost steel stringer on the east side of the North Abutment.

Water Surface: The waterline was approximately 8.4 feet below reference.  
Assumed Waterline Elevation = 91.6.

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

Item 60: Substructure: Code 5

Item 61: Channel and Channel Protection: Code 6

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

Item 113: Scour Critical Bridges: Code R/09

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
205	Reinforced Concrete Abutment	36	LF			36		
220	Reinforced Concrete Footing	2	EA		2			
361	Scour Smart Flag	1	EA		1			
985	Slopes & Slope Protection	1	EA	1				



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



Photograph 2. View of South Abutment, Looking Southwest.



Photograph 3. View of North Abutment, Looking Northeast.



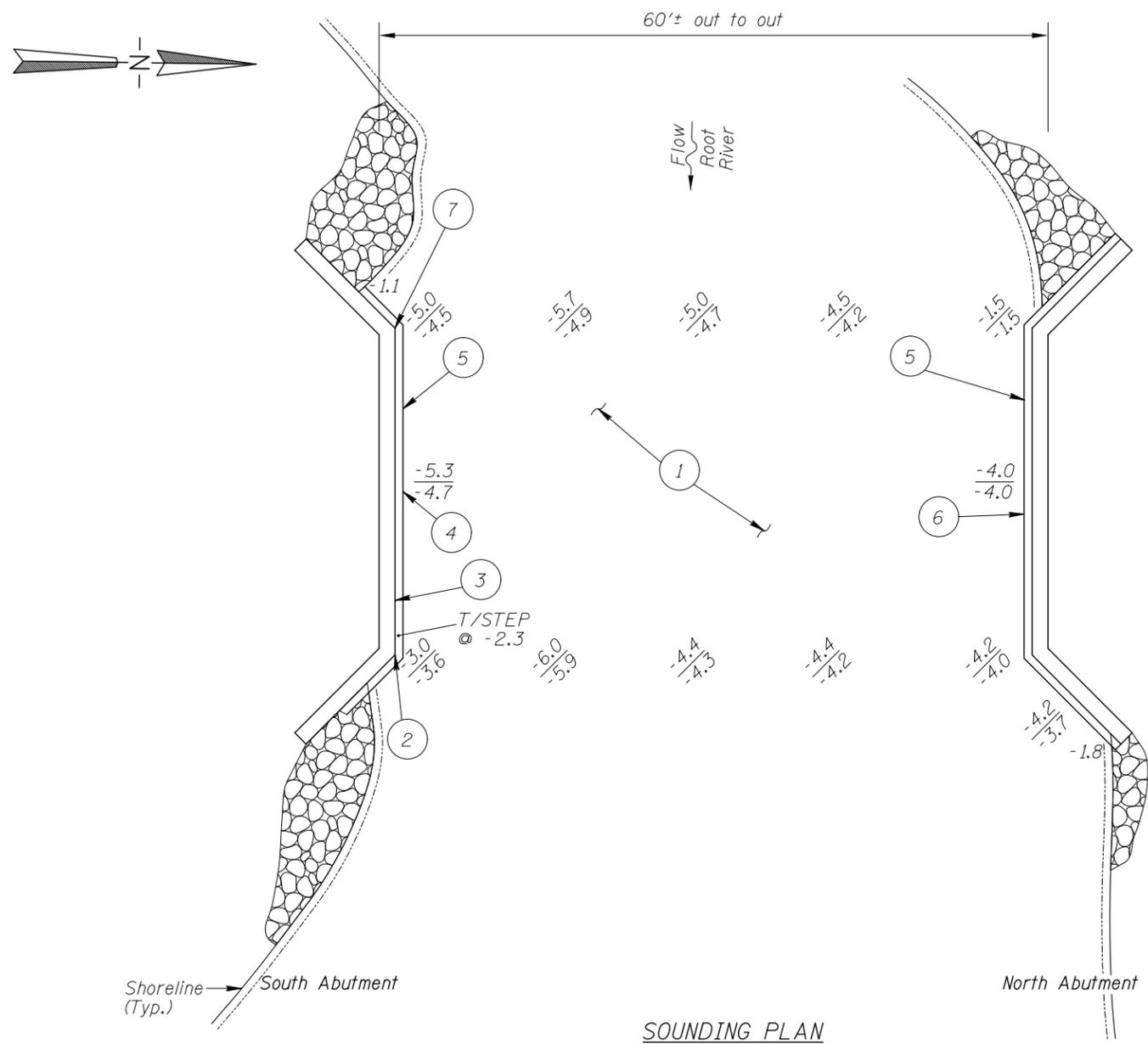
Photograph 4. View of the Exposed Steel Angle and Area of Concrete Section Loss at the South Abutment Upstream Corner, Looking Southeast.



Photograph 5. View of Irregular Concrete Underwater along the North Abutment, Looking North.



Photograph 6. View of Irregular Concrete Underwater along the South Abutment, Looking South.



SOUNDING PLAN

GENERAL NOTES:

1. The North and South Abutments were inspected underwater.
2. At the time of inspection on October 5, 2012, the waterline was located approximately 8.4 feet below the bottom of the outermost steel stringer on the downstream end of the North Abutment. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 91.6.
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 riprap with no probe rod penetration. Along the face of the South Abutment there was up to 6 inches of infill.
- 2 An area of poor consolidation was observed on the east corner of the South Abutment from 1.5 feet below to 6 inches above the waterline with 5 inches of maximum penetration.
- 3 A 6 inch band of poorly consolidated concrete was observed at the waterline extending from the downstream 1/4 point to the east wingwall.
- 4 The upstream half (from 12 feet downstream of the upstream corner to the upstream corner) of the South Abutment concrete wall facing exhibited undermining that was 1.5 feet high with up to 1.5 feet of penetration, which exposed the underlying masonry (original construction). Random areas of section loss were observed on the submerged portion of the South Abutment facing with average penetrations of 6 inches exposing heavily corroded vertical reinforcing steel near the center of the abutment.
- 5 A concrete ledge was located at 2.3 feet below the waterline at the South Abutment and 1.8 feet below the waterline at the North Abutment. The concrete was irregular with up to 6 inch deep irregularities.
- 6 Random areas of section loss were observed on the submerged portion of the North Abutment with average penetrations of 12 inches and no exposed reinforcing steel detected.
- 7 A formed steel angle was exposed due to an area of section loss, up to 1 foot wide and 4 inches deep, on the west corner of the South Abutment which extended from 3 feet above to 2 feet below the waterline.

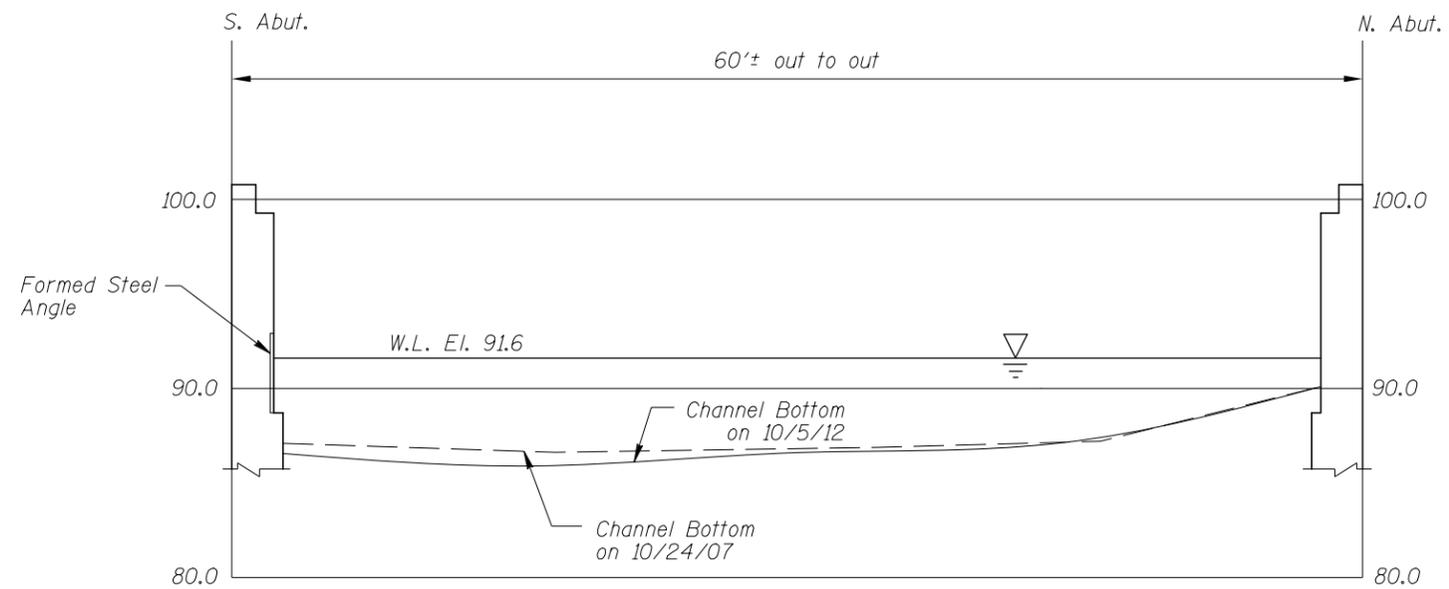
Legend

- 2.8 Sounding Depth (10/5/12)
- 2.9 Sounding Depth (10/24/07)
- Riprap

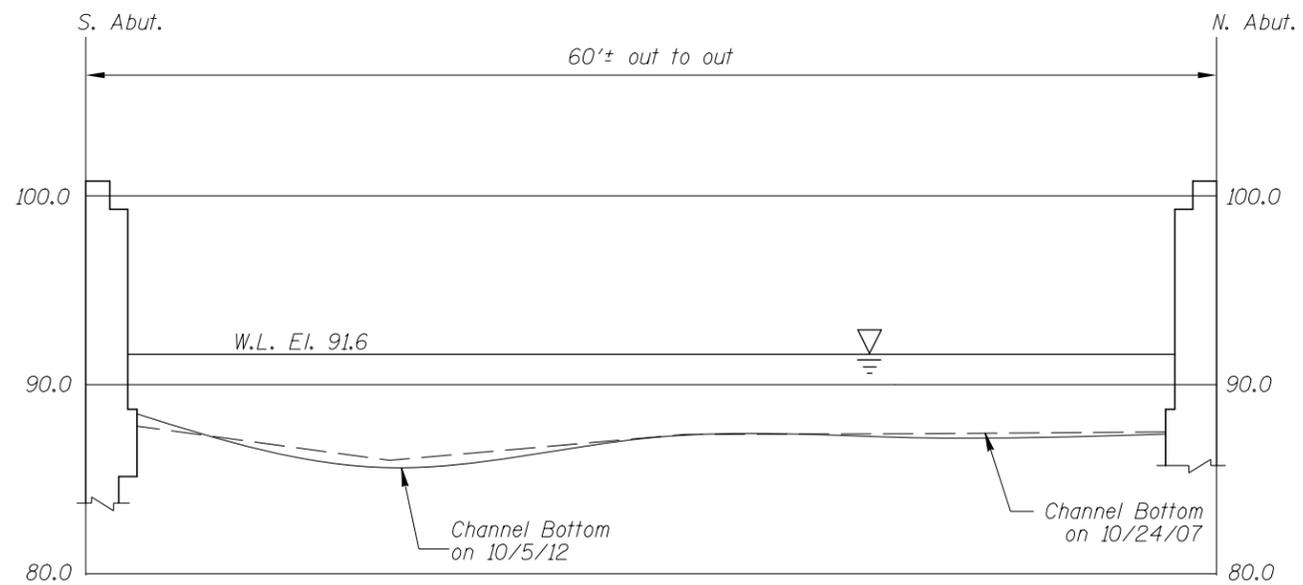
Note:

All soundings based on 2012 waterline location.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. L4870 TWP 332 OVER THE ROOT RIVER FILLMORE COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: BMS	<b>COLLINS ENGINEERS</b>	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: T423L4870		Figure No.: I



**UPSTREAM FASCIA PROFILE**  
Vertical Scale: 1"=10'-0"



**DOWNSTREAM FASCIA PROFILE**  
Vertical Scale: 1"=10'-0"

Note:  
Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. L4870 TWP 332 OVER THE ROOT RIVER FILLMORE COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: BMS	<b>COLLINS ENGINEERS</b> <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 (U.O.N.)
Code: 7423L4870		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: L4870 WEATHER: Sunny, 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, Camera, Probe Rod, Hand Tools

TIME IN WATER: 9:00 A.M.

TIME OUT OF WATER: 9:45 A.M.

WATERWAY DATA: VELOCITY 0.5 ft/sec

VISIBILITY 3.0 feet

DEPTH 5.3 feet maximum at the South Abutment

ELEMENTS INSPECTED: The North and South Abutments

REMARKS: Overall, the North and South Abutments, were found to be in satisfactory to fair condition below water. Random areas of section loss were observed along the submerged abutment walls with average penetrations of 6 to 12 inches and, in some instances, with exposed and corroded steel reinforcing. A section of the concrete facing was undermined along the South Abutment wall exposing the underlying masonry wall, which was in good condition.

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

Although not structurally detrimental at this time, the areas of concrete section loss on the South Abutment should be repaired using a concrete mix which provides a high durability and low permeability, to prevent further deterioration of the concrete.

Monitor the height of exposure and condition of the masonry wall exposed below the concrete facing at the South Abutment, and if deterioration continues, further concrete encasement may be required.

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. L4870  
 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
	North Abutment	4.0'	N	6	5	N	N	6	6	N	N	N	6	6	N	N	6	N	N
	South Abutment	5.3'	N	5	5	N	N	5	6	N	N	N	6	5	N	N	5	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the North and South Abutments, were found to be in satisfactory to fair condition below water. Random areas of section loss were observed along the submerged abutment walls with average penetrations of 6 to 12 inches and, in some instances, with exposed and corroded steel reinforcing. A section of the concrete facing was undermined along the South Abutment exposing the underlying masonry wall, which 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.