

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. L0775

TWP NO. 386 (147<sup>th</sup> AVE)

OVER THE

NORTH BRANCH MIDDLE FORK OF THE ZUMBRO RIVER

GOODHUE COUNTY

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SEPTEMBER 12, 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 L0775, the North and South Abutments, were found to be in fair condition. The timber piles were generally found to be unsound with soft outer shells and hollow soundings. Two of the piles have failed completely. The channel bottom and embankments appeared to be in stable condition with no erosion observed.

INSPECTION FINDINGS:

- (A) Pile 1 at the North Abutment and Pile 1 at the South Abutment have failed (severed).
- (B) All piles exhibited a soft outer shell with 3 inches of awl penetration and sounded hollow from the waterline up 2 feet.
- (C) Pile 6 at the South Abutment exhibited a soft outer shell with 3 inches of awl penetration and sounded hollow from the waterline up 4 feet.
- (D) The channel bottom material consisted of 1 foot diameter and smaller stone with 2 inches of silty infill.
- (E) The northeast wingwall had a 4 inch wide gap in the backwall planking located 6 inches above the waterline with loss of fill material occurring.

RECOMMENDATIONS:

- (A) Replace failed timber piles to restore the design bearing capacity of the substructure.
- (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,

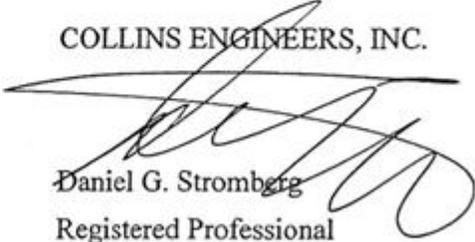
**PROFESSIONAL ENGINEER**

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 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: L0775

Feature Crossed: North branch middle fork of the Zumbro River

Feature Carried: TWP No. 386

Location: Goodhue County

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

2. INSPECTION DATA

Professional Engineer/Team Leader: Roy A. Forsyth, P.E.

Dive Team: Brandon Corr, Charles Euwema

Date: September 12, 2012

Weather Conditions: Cloudy, 65°F

Underwater Visibility: 2 feet

Waterway Velocity: Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: The North and South Abutments.

General Shape: The abutments consist of a timber planking breastwall supported by seven timber piles adjoining skewed wingwalls.

Maximum Water Depth at Substructure Inspected: Approximately 3.8 feet.

4. WATERLINE DATUM

Water Level Reference: The top of cap at the west end of the South Abutment.

Water Surface: The waterline was approximately 6.9 feet below reference.  
Assumed Waterline Elevation = 93.1

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 7

Item 92B: Underwater Inspection: Code B/09/12

Item 113: Scour Critical Bridges: R

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

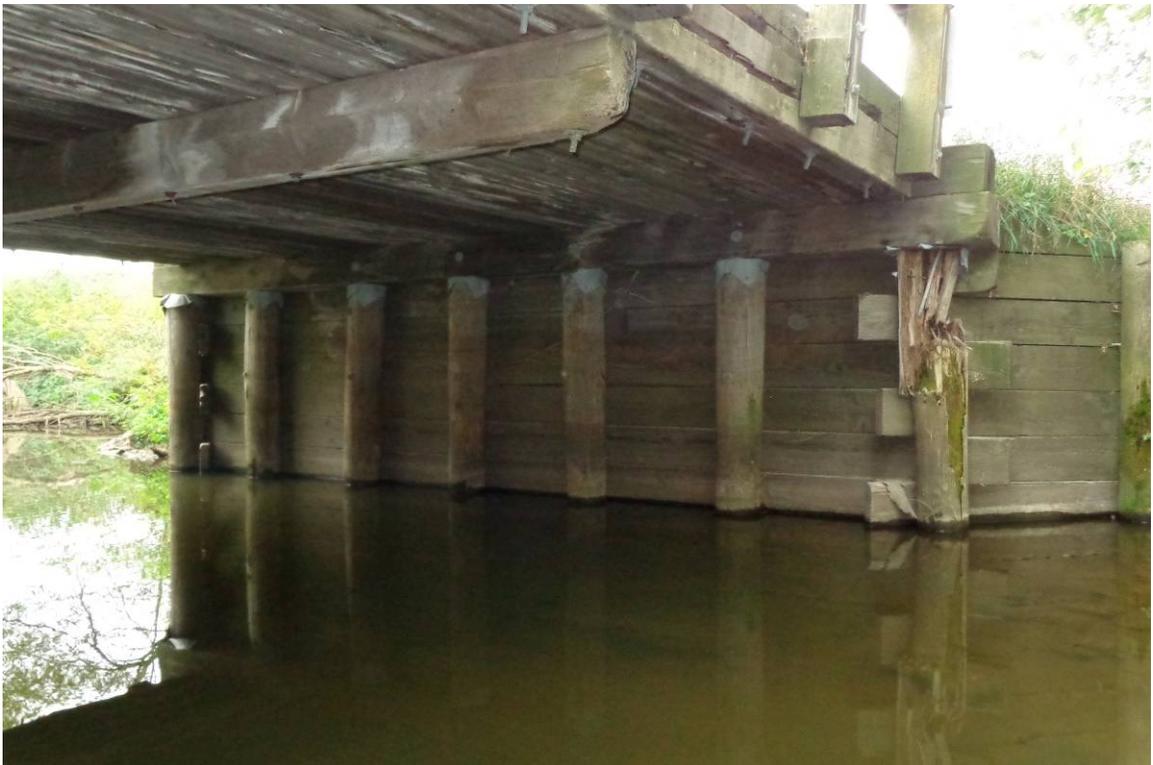
Yes  No

6. STRUCTURAL ELEMENT CONDITION RATING

Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
228	Timber Piles	22	EA			12	2	
216	Timber Abutment	40	LF		40			
386	Timber Wingwall	4	EA	2		2		



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



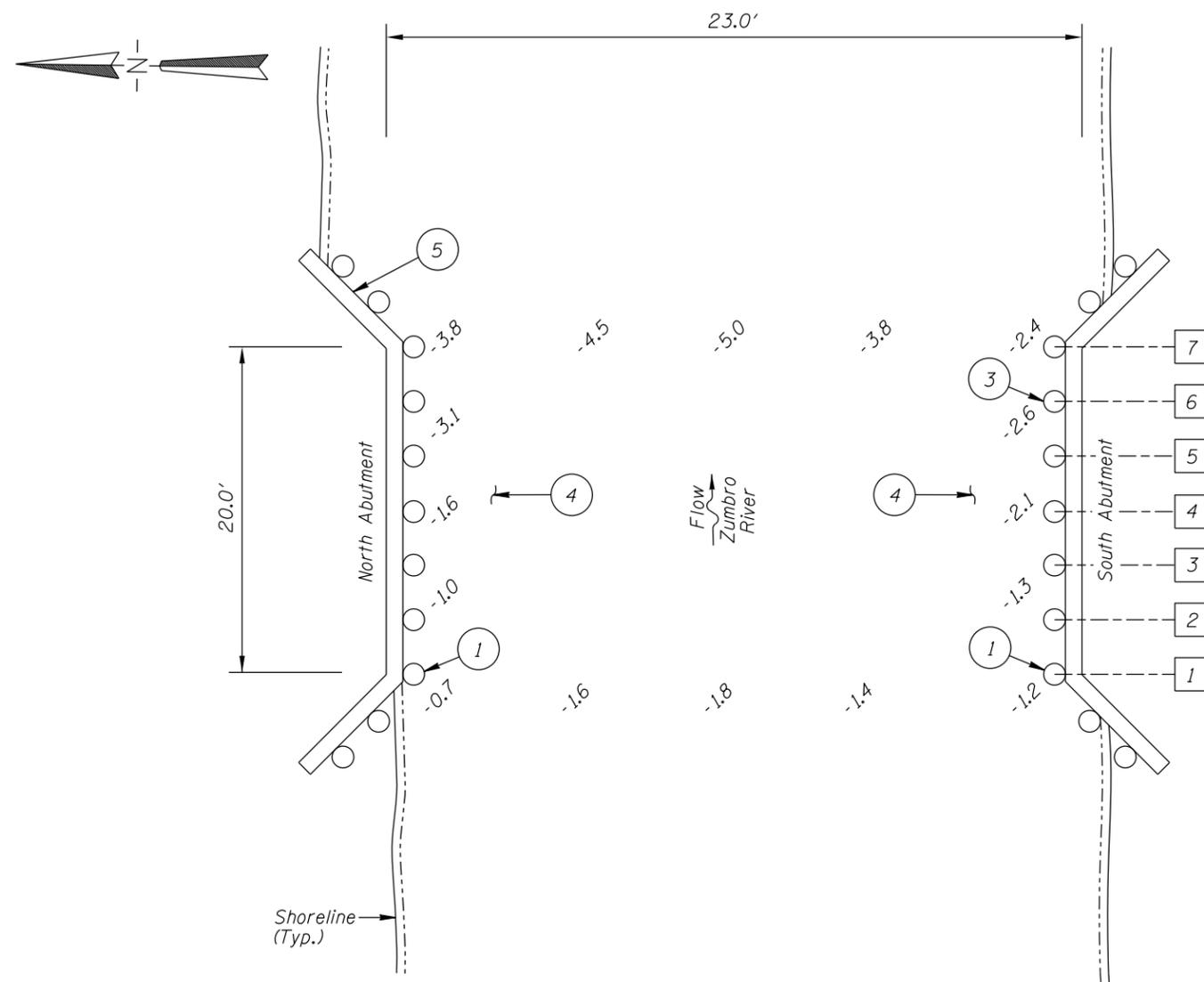
Photograph 2. View of South Abutment, Looking Southeast. Note the Failed Timber Pile.



Photograph 3. View of North Abutment, Looking Northeast.



Photograph 4. View of gap in Northeast Wingwall, Looking Northwest.



SOUNDING PLAN

GENERAL NOTES:

1. The North and South Abutments were inspected underwater.
2. At the time of inspection on September 12, 2012, the waterline was located approximately 6.9 feet below the top of cap at the upstream side of the South 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 93.1.
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 Pile 1 at the North Abutment and Pile 1 at the South Abutment have failed.
- ② All piles exhibited a soft outer shell with 3 inches of awl penetration and sounded hollow from the waterline up 2 feet.
- ③ Pile 6 at the South Abutment exhibited a soft outer shell with 3 inches of awl penetration and sounded hollow from the waterline up 4 feet.
- ④ The channel bottom material consisted of 1 foot diameter and smaller stone with 2 inches of silt infilling.
- ⑤ The northeast wingwall had a 4 inch wide gap along the backwall planking located 6 inches above the waterline with loss of fill material evident.

Legend

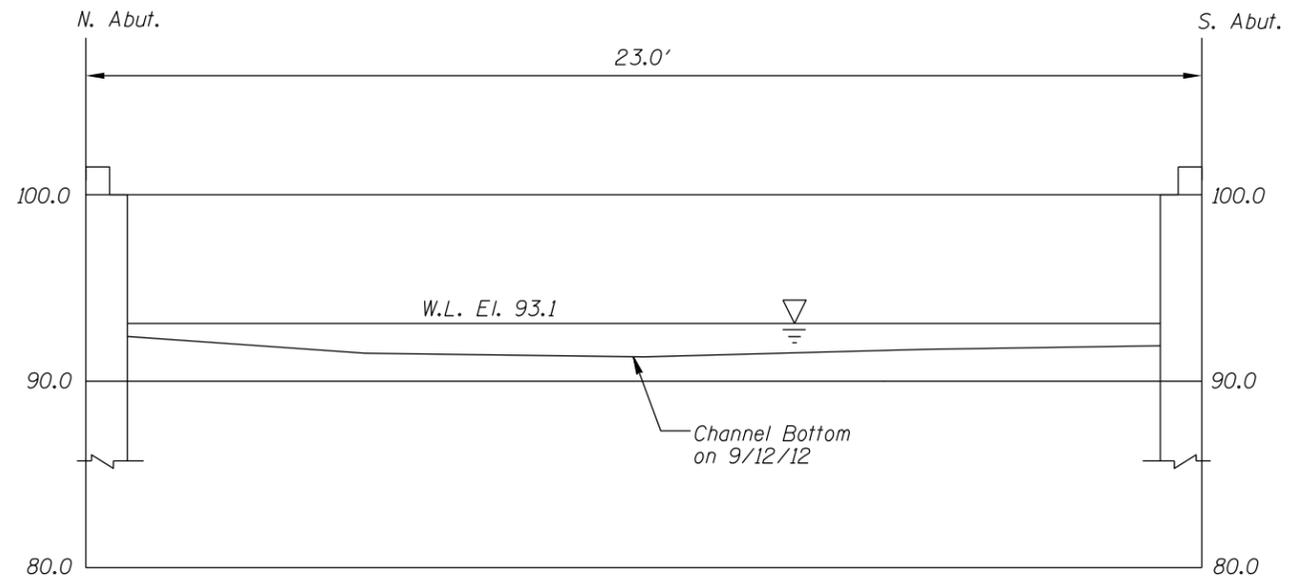
○ Sounding Depth (9/12/12)

**MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION**

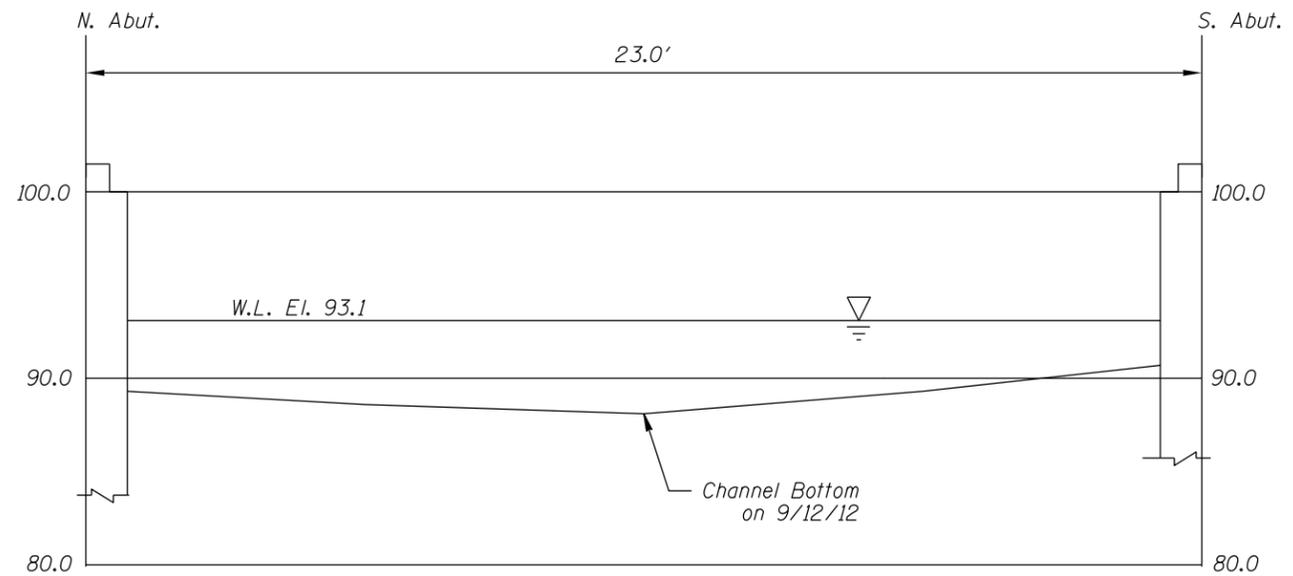
STRUCTURE NO. L0775  
OVER THE ZUMBRO RIVER  
GOODHUE COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: JTF	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: Sept. 2012
Checked By: DGS		Scale: NTS
Code: 52210144		Figure No.: 1



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. L0775 OVER THE ZUMBRO RIVER GOODHUE COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: JTF	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: Sept. 2012
Checked By: DGS		Scale: NTS (U.O.N.)
Code: 35120144		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. L0775  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Roy A. Forsyth, P.E.  
WATERWAY CROSSED North Branch Middle Fork of the Zumbro River

INSPECTION DATE September 12, 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 (WINGWALLS)	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	3.8'	5	N	N	7	6	5	N	7	7	N	7	N	N	5	N	N	N
	South Abutment	2.6'	5	N	N	7	7	5	N	7	7	N	7	N	N	5	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Pile 1 at the North Abutment and Pile 1 at the South Abutment have failed. All piles exhibited a soft outer shell with 3 inches of awl penetration and sounded hollow from the waterline up 2 feet. Pile 6 at the South Abutment exhibited a soft outer shell with 3 inches of awl penetration and sounded hollow from the waterline up 4 feet. The channel bottom material consisted of 1 foot diameter and smaller stone with 2 inches of silt on top. The northeast wingwall had a 4 inch wide gap in the backwall located 6 inches above the waterline with loss of fill material occurring.

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.

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

INSPECTORS: Collins Engineers, Inc. DATE: September 12, 2012

ON-SITE TEAM LEADER: Roy A. Forsyth, P.E.

BRIDGE NO: L0775 WEATHER: Cloudy, 65°F

WATERWAY CROSSED: North Branch Middle Fork of the Zumbro River

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

PERSONNEL: Brandon Corr, Charles Euwema

EQUIPMENT: Waders, Scraper, Sounding Pole, Camera, Probe Rod

TIME IN WATER: 3:45 p.m.

TIME OUT OF WATER: 4:00 p.m.

WATERWAY DATA: VELOCITY Negligible

VISIBILITY 2.0 feet

DEPTH 3.8 feet maximum at the North Abutment

ELEMENTS INSPECTED: The North and South Abutments

REMARKS: Pile 1 at the North Abutment and Pile 1 at the South Abutment have failed. All piles exhibited a soft outer shell with 3 inches of awl penetration and sounded hollow from the waterline up 2 feet. Pile 6 at the South Abutment exhibited a soft outer shell with 3 inches of awl penetration and sounded hollow from the waterline up 4 feet. The channel bottom material consisted of 1 foot diameter and smaller stone with 2 inches of silt on top. The northeast wingwall had a 4 inch wide gap in the backwall located 6 inches above the waterline with loss of fill material occurring.

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

Replace failed timber piles to restore the design bearing capacity of the substructure.

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