

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. R0278

OVER

STREAM

DISTRICT 1 - KOOCHICHING COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY  
COLLINS ENGINEERS, INC.

JOB NO. 5221

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. R0278, North and South Abutments, were found to generally be satisfactory condition with no structurally significant defects at this time. The channel bottom around the substructure units appeared stable with no evidence of significant scour.

INSPECTION FINDINGS:

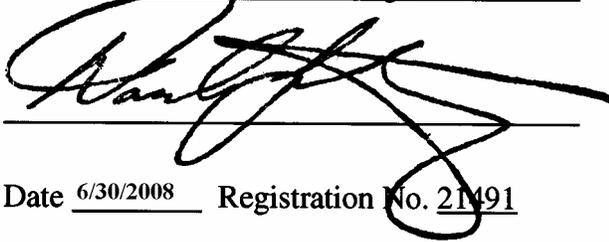
- (A) The wingwalls of both abutments were displaced (entire wall and individual planks), with evidence of fill material spilling out.
- (B) The planks on the west wingwall of the North Abutment and both wingwalls of South Abutment have failed on the joint to backwall area exposing some backfill.
- (C) One of the backwall planks at the downstream end of the North Abutment was heavily deteriorated.
- (D) All of the piles at the South Abutment were split and delaminated, as was also the downstream pile at the North Abutment, with penetrations into piles of up to 2 inches.
- (E) There was a 3 inch wide gap with up to 6 inches of penetration (area of lack of bearing between pile top and cap) between the pile cap and all piles at the South Abutment.

RECOMMENDATIONS:

- (A) Monitor gaps and loss of backfill at all wingwalls, and if found to be affecting the roadway embankment, repair may be necessary.
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

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.

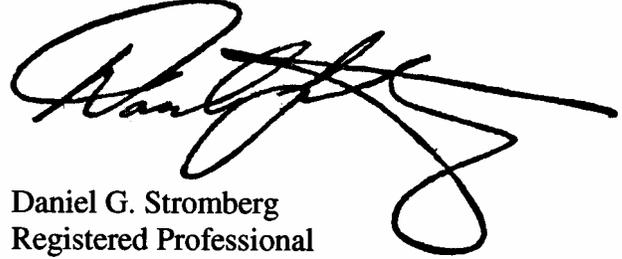
Daniel G. Stromberg



Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

## UNDERWATER BRIDGE INSPECTION

### 1. BRIDGE DATA

Bridge Number: R0278

Feature Crossed: Stream

Feature Carried: CO Forestry Road

Location: District 1 - Koochiching County

Bridge Description: The bridge superstructure consists of a single span timber deck stringer structure supported by two timber pile abutments.

### 2. INSPECTION DATA

Professional Engineer/Team Leader: Daniel G. Stromberg, P.E., S.E.

Dive Team: John J. Loftus, Valerie Roustan

Date: August 26, 2007

Weather Conditions: Sunny, 50°F

Underwater Visibility: None / Negligible

Waterway Velocity: 0.5 f.p.s

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: North and South Abutments.

General Shape: Abutments consist of timber caps and backwall planking supported by timber piles. Skewed wingwalls at each end of each abutment are similarly constructed.

Maximum Water Depth at Substructure Inspected: Approximately 5.8 feet.

4. WATERLINE DATUM

Water Level Reference: The bottom of the seat at the upstream corner of North Abutment.

Water Surface: The waterline was approximately 1.7 feet below reference.

Waterline Elevation = 98.3.

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 8

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code G/07

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

       Yes   X   No



Photograph 1. View of North Abutment, Looking Northeast.



Photograph 2. View of South Abutment, Looking Southeast.



Photograph 3. View of Northeast Wingwall, Looking Northwest.



Photograph 4. View of Northwest Wingwall, Looking Northeast.



Photograph 5. View of Southeast Wingwall, Looking Southwest.



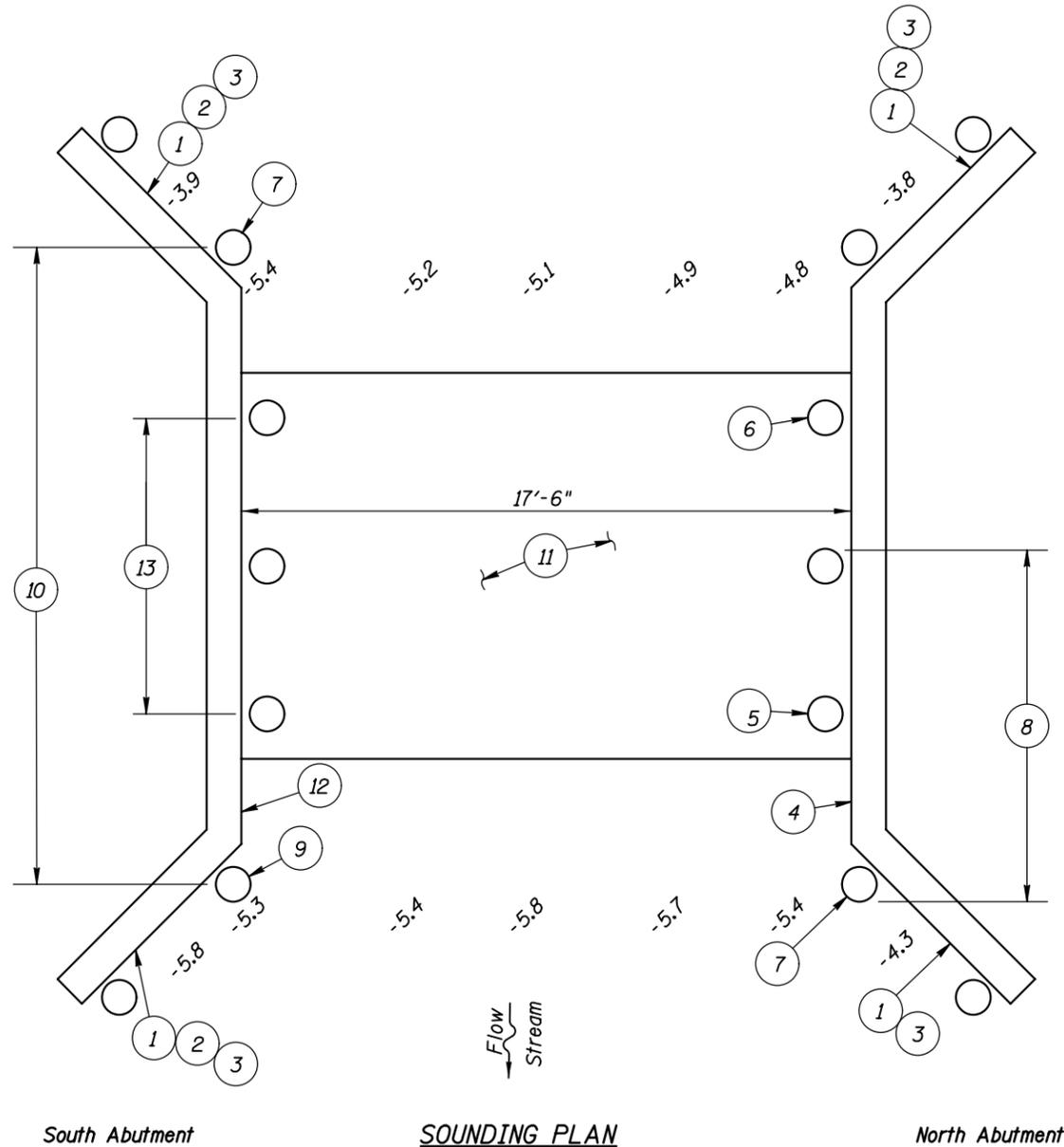
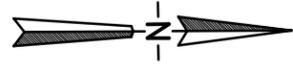
Photograph 6. View of Southwest Wingwall, Looking Southeast.



Photograph 7. View of the First Downstream Pile of the South Abutment, Looking Southwest. Note gap between top of pile and pile cap.



Photograph 8. View of the First Downstream Pile of the South Abutment, Looking Northwest. Note gap between top of pile and pile cap.



INSPECTION NOTES:

- ① Wingwalls and planking were displaced with evidence of fill material spilling out.
- ② The plank on the west wingwall of the north abutment as well as both wingwalls on South Abutment (first two from the top) have failed at the joint backwall area, exposing some backfill.
- ③ Vegetation has grown at the joints between wingwalls and abutment faces.
- ④ Backwall plank at the downstream end of the north abutment is heavily deteriorated.
- ⑤ There is a 6 inch wide by 3 feet long by 6 inches deep gap along the backwall by the second pile from the downstream end of the north abutment.
- ⑥ There is a 3 inch wide by 3 feet long by 6 inches deep gap along the backwall by the fourth pile from the downstream end of the north abutment.
- ⑦ The outer shell of the downstream pile of the North Abutment and upstream pile of the South Abutment was split and delaminated all around the circumference with a 2 inch depth. This condition extends from the top of the pile to 1 foot below the waterline.
- ⑧ The three piles on the downstream end of the North Abutment exhibited surface cracking and delamination on portions of the perimeter with 0.5 to 1 inch of maximum penetration in outer shell from the top of pile to 1 foot below the waterline.
- ⑨ The first pile on the downstream end of the South Abutment was split and delaminated with a 2 inch penetration. This condition extends from the top of pile to the waterline.
- ⑩ There was a 3 inch wide by 6 inch penetration gap (reduced bearing area) between pile caps and all piles on South Abutment.
- ⑪ The channel bottom consisted of soft silt with a maximum probe rod penetration of 1 foot.
- ⑫ Between first and second pile from downstream end of South Abutment exhibited a gap 5 feet long by 6 inches wide by 6 inches deep between pile cap and backwall.
- ⑬ Middle piles on South Abutment exhibited a 1/2 inch wide split.

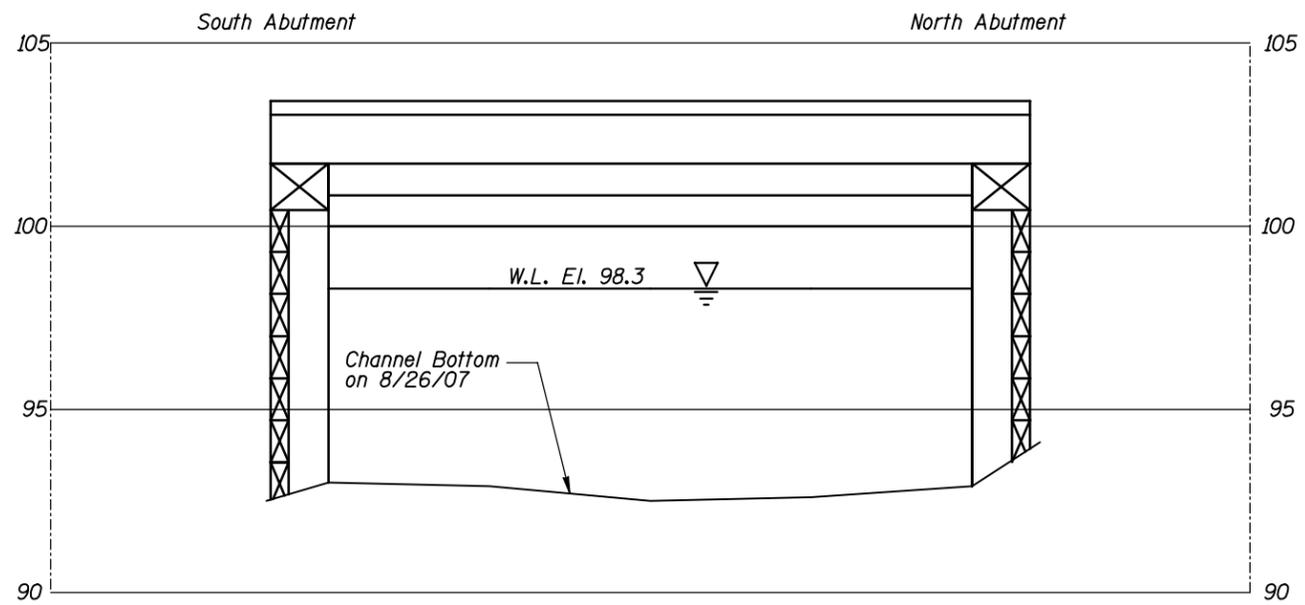
GENERAL NOTES:

1. The North and South Abutments were inspected underwater.
2. At the time of inspection, on August 26, 2007, the waterline was located approximately 1.7 feet below the bottom of the seat at the upstream corner of North Abutment. Due to lack of design plan information the reference elevation was assumed to be 100.0 feet. This corresponds to waterline elevation of 98.3 feet.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to north and south fascias at 1/4 point intervals.

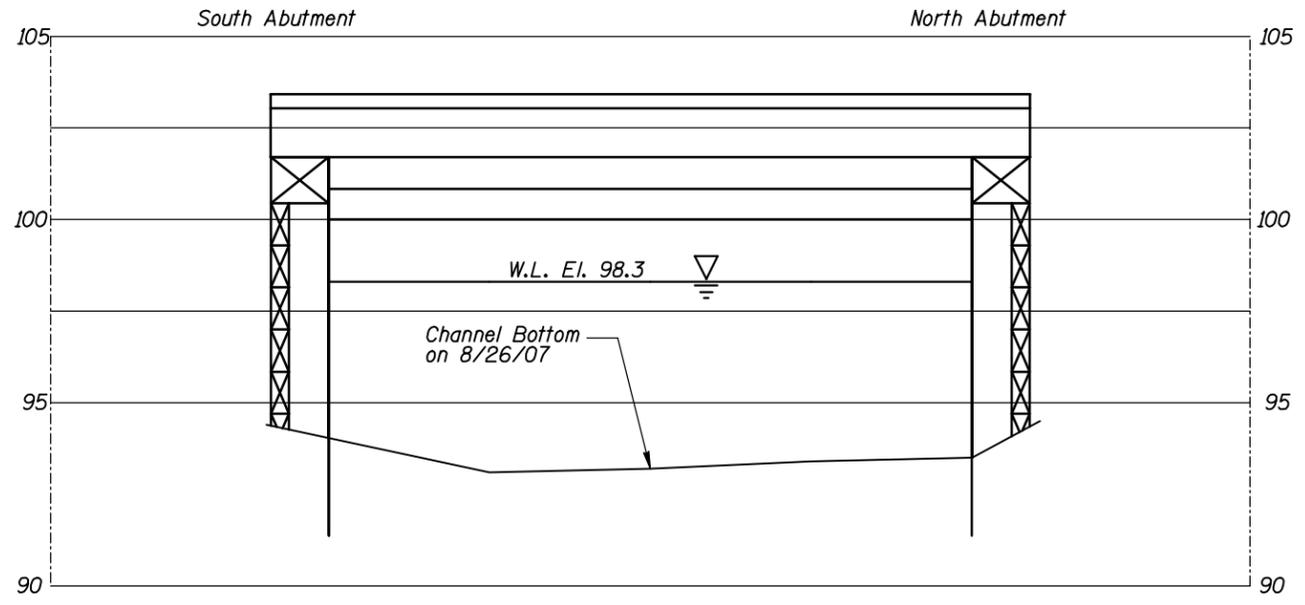
Legend

- 0.4 Sounding Depth (8/26/07)
- Timber Pile

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. R0278 OVER A STREAM DISTRICT 1, KOOCHICHING COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: CAI	<b>COLLINS ENGINEERS</b> <small>133 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST, 2007
Checked By: MDK		Scale: NTS
Code: 5221R0278		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. R0278 OVER A STREAM DISTRICT 1, KOOCHICING COUNTY <b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: CAI Checked By: MDK Code: 5221R0278	<b>COLLINS ENGINEERS</b>	133 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com
		Date: AUGUST, 2007 Scale: N.T.S. Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: August 26, 2007

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

BRIDGE NO: R0278 WEATHER: Sunny, 50°F

WATERWAY CROSSED: Stream

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: John J. Loftus, Valerie Roustan

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

TIME IN WATER: 12:30 p.m.

TIME OUT OF WATER: 1:00 p.m.

WATERWAY DATA: VELOCITY 0.5 f.p.s

VISIBILITY None/Negligible

DEPTH 5.8 feet maximum at South Abutment

ELEMENTS INSPECTED: North and South Abutments

REMARKS: Overall, the structure was in satisfactory condition with no structurally significant defects at this time. The wingwalls and/or their planking of both abutments were displaced with evidence of fill material spilling out. The planks on the west wingwall of the North Abutment and both wingwalls of South Abutment have failed at the joint with the backwall area exposing some backfill. A backwall plank at the downstream end of the North Abutment was heavily deteriorated. All the piles at the South Abutment were split and delaminated as was the downstream pile at the North Abutment with penetrations of up to 2 inches. There was up to 3 inch gap with up to 6 inches of penetration (reduced bearing area) between the pile cap and all piles at the South Abutment.

FURTHER ACTION NEEDED:  YES  NO

Monitor gaps and loss of backfill at all wingwalls, and if found to be affecting the roadway embankment, repair may be necessary.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. R0278  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.  
 WATERWAY CROSSED Stream

INSPECTION DATE August 26, 2007  
 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 (WINGWALL)	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	5.4'	6	7	N	9	6	6	8	8	N	N	8	N	N	6	N	N	N
	South Abutment	5.8'	6	7	N	8	6	6	8	8	N	N	8	N	N	6	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the structure was in satisfactory condition with no structurally significant defects at this time. The wingwalls and/or their planking of both abutments were displaced with evidence of fill material spilling out. The planks on the west wingwall of the North Abutment and both wingwalls of South Abutment have failed at the joint with the backwall area exposing some backfill. A backwall plank at the downstream end of the North Abutment was heavily deteriorated. All the piles at the South Abutment were split and delaminated as was the downstream pile at the North Abutment with penetrations of up to 2 inches. There was up to 3 inch gap with up to 6 inches of penetration (reduced bearing area) between the pile cap and all piles at the South Abutment.

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.