

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 92698

CR 769

OVER THE

WILLOW RIVER

ST. LOUIS COUNTY

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SEPTEMBER 17, 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 No. 92769, the North and South Abutments, were found to be in fair condition, with only minor defects of structural significance. The timber piles were typically sound with random splits or checks up to 3/8 inch wide and 2 inches deep. The timber backwall and wingwalls were sound and tight with no observed loss of backfill. The bottom two backwall boards above the waterline were displaced away from the channel a maximum of 2 inches resulting in a gap between the backwall and the wingwall boards. The channel bottom appeared to be stable with no evidence of significant scour.

INSPECTION FINDINGS:

- (A) The channel bottom material typically consisted of sand, gravel, and cobbles with up to 6 inches of probe rod penetration.
- (B) The timber piles were typically sound with random splitting or checking up to 3/8 inches wide and 2 inches deep.
- (C) The timber backwall at the North Abutment was typically sound. The first two backwall boards above the waterline were displaced 2 inches away from the channel. As a result of that displacement, both wingwalls had a gap, up to 2 inches wide, at the backwall.
- (D) The timber backwall at the South Abutment was typically sound. The first two backwall boards above the waterline were displaced 1 inch away from the channel. As a result of that displacement, both wingwalls had a gap, up to 1 inch wide, at the backwall.
- (E) The metal straps holding the tin flashing in place on top of the piles have come loose. The flashing, however, is still all in place and still effectively protecting the tops of the piles.

RECOMMENDATIONS:

- (A) Monitor the timber pile splitting and/or checking and the gaps between the backwall and wingwall boards during future inspections, and if found to be increasing, consideration should be given to repairing these conditions.
- (B) Reinspect the submerged substructure at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader:

*Nicholas R. Triandafilou*

Nicholas R. Triandafilou, 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*  
Daniel G. Stromberg

Registered Professional

Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 92698

Feature Crossed: Willow River

Feature Carried: CR 769

Location: St. Louis County

Bridge Description: The superstructure consists of a timber deck supported by steel I-Beams. The superstructure is supported by two abutments consisting of five 12 inch diameter timber piles, 12 inch by 12 inch timber pile cap, and a timber back wall.

2. INSPECTION DATA

Professional Engineer Diver: Nicholas R. Triandafilou, P.E.

Dive Team: Marc B. Parker, Clay G. Brookins

Date: September 17, 2012

Weather Conditions: Cloudy, 50° F

Underwater Visibility: 2 feet

Waterway Velocity: None / Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: The North and South Abutments

General Shape: The North and South Abutments each consist of five timber 12 inch diameter piles with a 12 inch by 12 inch timber pile cap. The backwall and wingwalls were comprised of 3 inch by 12 inch timber boards.

Maximum Water Depth at Substructure Inspected: Approximately 3.0 feet.

4. WATERLINE DATUM

Water Level Reference: Top of the pile cap at the upstream end of the South Abutment

Water Surface: The waterline was approximately 2.0 feet below the reference.  
Waterline Elevation 98.0.

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: Code K/12

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
228	Timber Piling	18	EA	0	18	0	0	n/a
216	Timber Abutment	43	LF	0	43	0	0	n/a
386	Timber Wingwalls	4	EA	0	4	0	0	n/a
360	Settlement	1	EA	1	0	0	n/a	n/a
361	Scour	1	EA	1	0	0	n/a	n/a
985	Slopes and Slope Protection	1	EA	1	0	0	n/a	n/a



Photograph 1. Overall View of Structure, Looking West



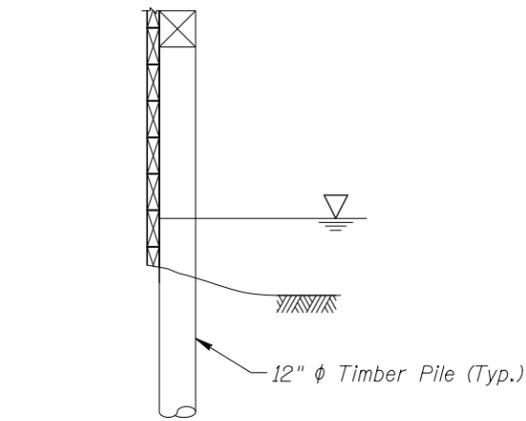
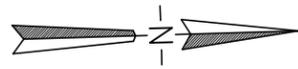
Photograph 2. View of the North Abutment, Looking North.



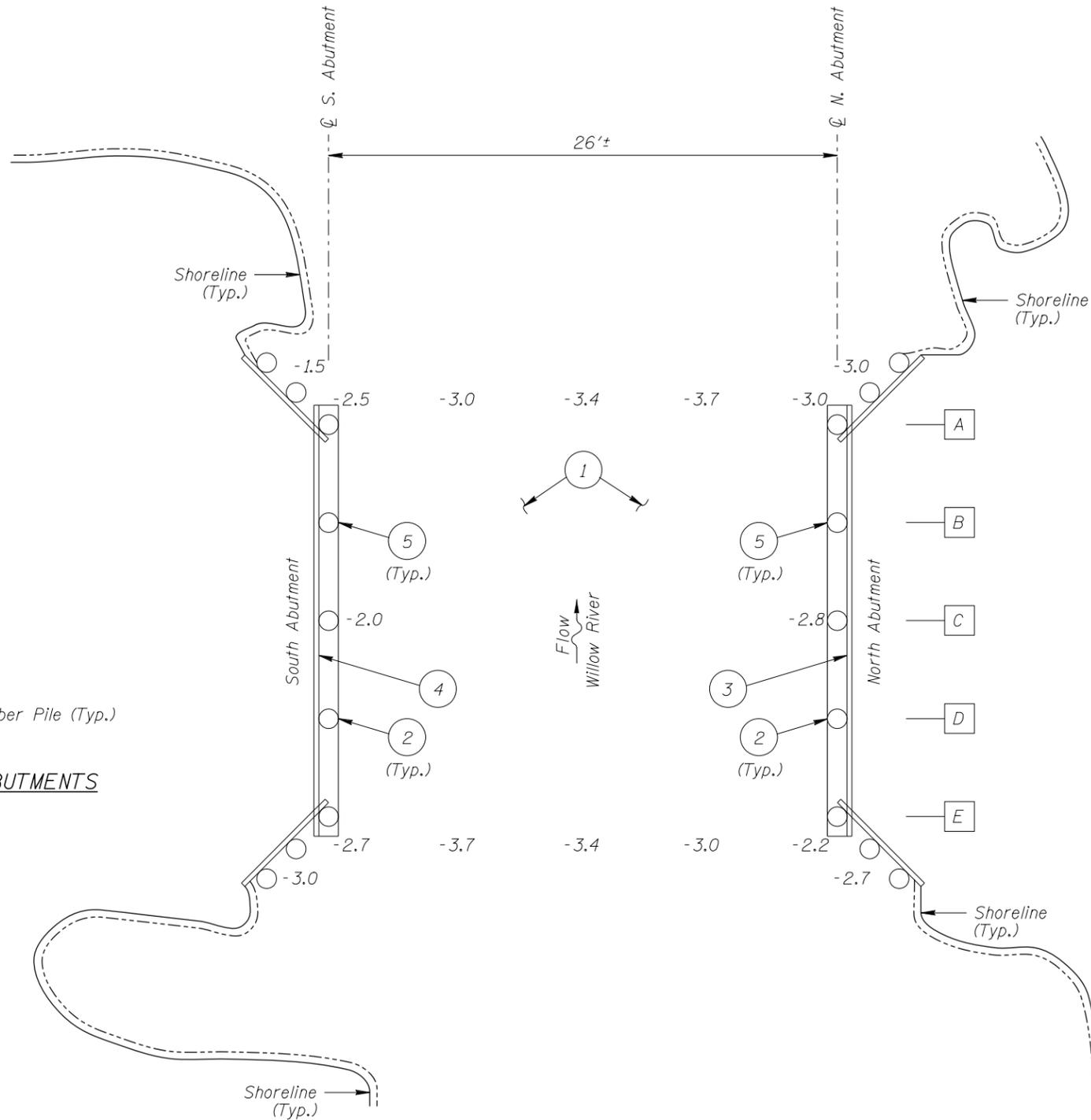
Photograph 3. View of the South Abutment, Looking Southwest.



Photograph 4. View of the Typical Timber Condition at the Waterline and Loose Tin Cap Strap, Looking South.



TYPICAL END VIEW OF ABUTMENTS



SOUNDING PLAN

Legend

- 1.0 Sounding Depth from Waterline (9/17/2012)
- A Pile Identification Designation
- 12 inch Diameter Timber Pile
- ① Inspection Note Number

INSPECTION NOTES:

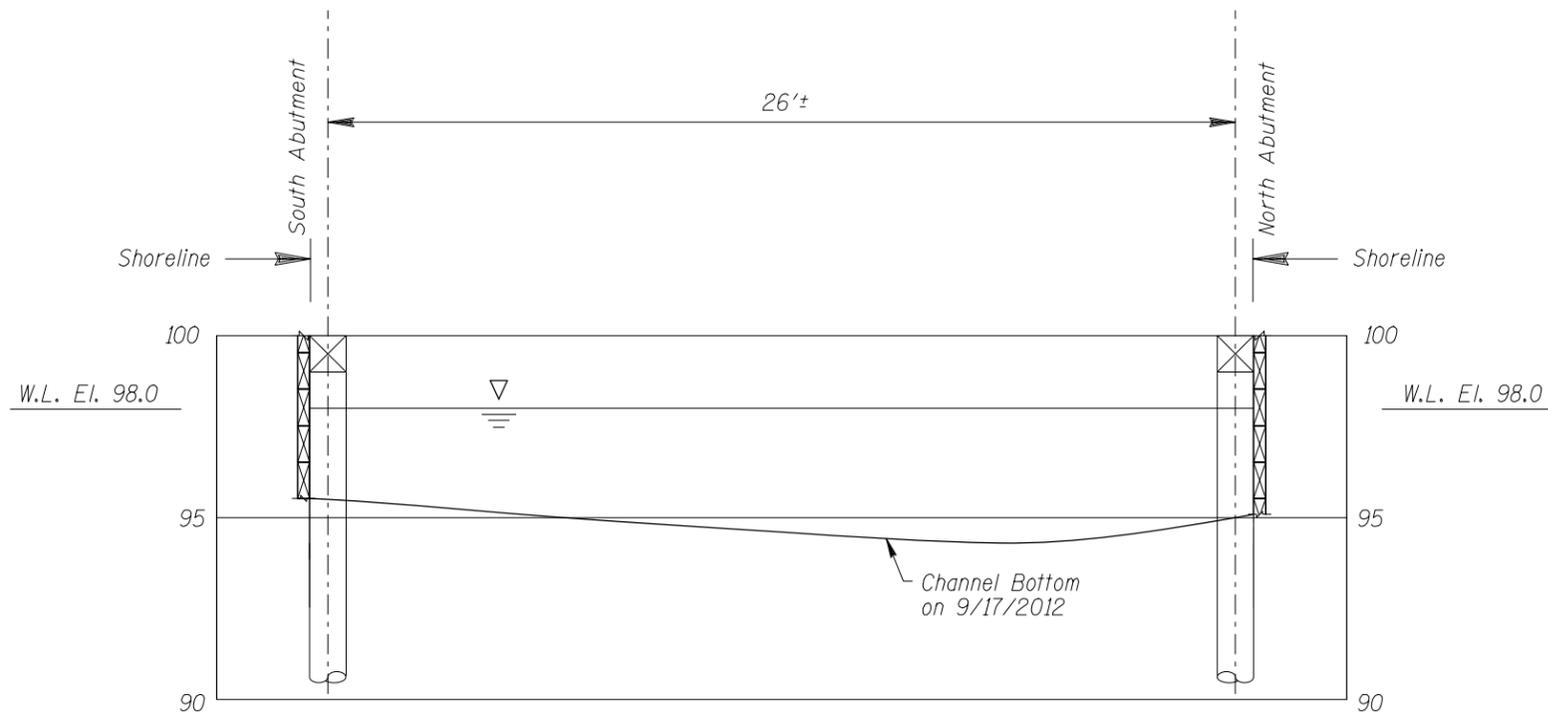
- ① The channel bottom material typically consisted of sand, gravel, and cobbles with up to 6 inches of probe rod penetration.
- ② The timber piles were typically sound with random splitting or checking up to  $\frac{3}{8}$  inches wide and 2 inches deep.
- ③ The timber backwall at the North Abutment was typically sound. The first two backwall boards above the waterline were displaced 2 inches away from the channel. As a result of that displacement both wingwalls had a gap, up to 2 inches wide, at the backwall.
- ④ The timber backwall at the South Abutment was typically sound. The first two backwall boards above the waterline were displaced 1 inch away from the channel. As a result of that displacement, both wingwalls had a gap, up to 1 inch wide, at the backwall.
- ⑤ The metal straps holding the tin flashing in place on top of the piles have come loose. The flashing, however, is still all in place and still effectively protecting the tops of the piles.

GENERAL NOTES:

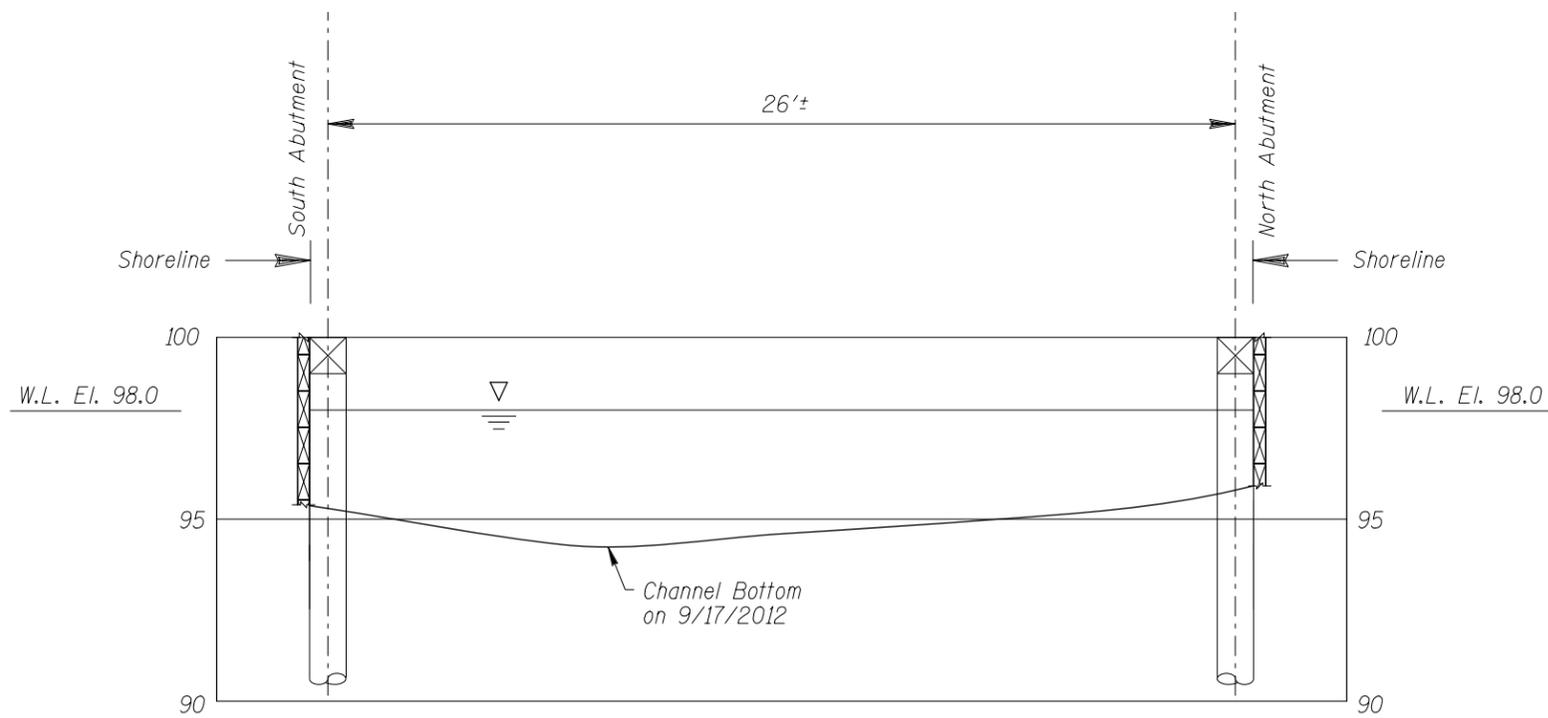
1. The North and South Abutments were inspected during the underwater inspection.
2. At the time of inspection on September 17, 2012, the waterline was located approximately 2.0 feet below the top of the pile cap at the upstream end of the South Abutment. Since elevation information was not available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 98.0.
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.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 92698 CR 769 OVER THE WILLOW RIVER ST. LOUIS COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: MBP	<b>COLLINS ENGINEERS</b>	Date: OCTOBER, 2012
Checked By: LJ		Scale: NTS
Code: 742392698		Figure No.: 1

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DOWNSTREAM FASCIA PROFILE



UPSTREAM FASCIA PROFILE

*Note:* \_\_\_\_\_  
 Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 92698 CR 769 OVER THE WILLOW RIVER ST. LOUIS COUNTY		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: MBP	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: OCTOBER, 2012
Checked By: LJ		Scale: 1"=5'
Code: 742392698		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: September 17, 2012

ON-SITE TEAM LEADER: Nicholas R. Triandafilou, P.E.

BRIDGE NO: 92698 WEATHER: Cloudy, 50° F

WATERWAY CROSSED: Willow River

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: Marc B. Parker, Clayton G. Brookins

EQUIPMENT: Commercial Scuba, Probe Rod, Camera, Hand Tools

TIME IN WATER: 12:20 A.M.

TIME OUT OF WATER: 12:40 P.M.

WATERWAY DATA: VELOCITY None / Negligible

VISIBILITY 2 feet

DEPTH 3.0 feet maximum at the North Abutment

ELEMENTS INSPECTED: The North and South Abutments

REMARKS: Overall, the North and South Abutments, were found to be in fair condition, with only minor defects of structural significance. The timber piles were typically sound with random splits or checks up to 3/8 inch wide and 2 inches deep. The timber backwall and wingwalls were sound and tight with no observed loss of backfill. The bottom two backwall boards above the waterline were displaced away from the channel a maximum of 2 inches resulting in a gap between the backwall and the wingwall boards. The channel bottom appeared to be stable with no evidence of significant scour.

FURTHER ACTION NEEDED:  YES  NO

Monitor the timber pile splitting and/or checking and the gaps between the backwall and wingwall boards during future inspections, and if found to be increasing, consideration should be given to repairing these conditions.

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. 92698  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Nicholas R. Triandafilou, P.E.  
 WATERWAY CROSSED Willow River

INSPECTION DATE September 17, 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						
			TIMBER PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (BACKWALL)	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	3.0'	6	N	N	5	5	5	N	7	N	N	7	N	N	6	N	N	N
	South Abutment	2.7'	6	N	N	5	5	5	N	7	N	N	7	N	N	6	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the North and South Abutments, were found to be in fair condition, with only minor defects of structural significance. The timber piles were typically sound with random splits or checks up to 3/8 inch wide and 2 inches deep. The timber backwall and wingwalls were sound and tight with no observed loss of backfill. The bottom two backwall boards above the waterline were displaced away from the channel a maximum of 2 inches resulting in a gap between the backwall and the wingwall boards. The channel bottom appeared to be stable with no evidence of significant scour.

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.