

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 7883

CRANE LAKE ROAD

OVER

HAWKINSON CREEK

ST. LOUIS COUNTY



JUNE 21, 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 7883, the East and West Abutments and Bents 1 through 3, were generally in good to satisfactory condition with no significant deterioration or any other deficiencies of immediate concern. Both abutments were often missing lower timber lagging members between the piles with evidence of backfill escaping, but with no adverse effects to the roadway behind the abutments. The timber piles, caps, and lagging were all in good and sound condition with no notable deterioration or indications of decay.

INSPECTION FINDINGS:

- (A) Horizontal timber lagging members at the East Abutment were often missing from approximately 2 inches above the waterline to the channel bottom. Escaping gravel and 3 inch diameter and smaller stone was spilling out. The loss of backfill has resulted in a 45 degree slope towards Bent 1.
- (B) A light accumulation of timber debris, typically small diameter branches, was observed on the channel bottom between Piles B and E along the west face of Bent 1.
- (C) A light accumulation of timber debris, typically small diameter branches, was observed within the channel between Bents 2 and 3 and between Bents 3 and the West Abutment. The debris is causing some soft and silty infill to accumulate in the vicinity. In these areas the channel was shallower and allowed up to 1 foot of probe rod penetration.
- (D) Horizontal lagging members at the West Abutment were often missing. The lack of members was causing loss of abutment backfill material, particularly between Piles A and B and between Piles E and G.

- (E) Timber piles and caps were generally observed to be sound and in good condition. The timber was firm and typically allowed an awl penetration of 1/8 inch. No indication of decay was observed and piles were well protected with tin caps.
- (F) Except where otherwise noted, the channel bottom material consisted of fairly firm sandy gravel with approximately 2 inches of probe rod penetration.

RECOMMENDATIONS:

- (A) Monitor the roadway behind the East and West Abutments for any settlement related to the lack of timber lagging and backfill material loss. If notable settlement occurs, countermeasures may be warranted to arrest further backfill from escaping.
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader:
Daniel G. Stromberg, 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

Registered Professional

Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 7883

Feature Crossed: Hawkinson Creek

Feature Carried: Crane Lake Road

Location: St. Louis County

Bridge Description: The superstructure consists of a timber deck on multiple steel girders supported by three timber piers and two timber abutments with 12 by 12 inch timber caps. Bent 1 consists of seven 12 inch diameter timber piles. Bent 2 consists of six 12 inch diameter timber piles. Bent 3 consists of eight 12 inch diameter timber piles. The abutments consist of seven 12 inch diameter timber piles. The substructure units are designated as the East Abutment, Bents 1 through 3, and the West Abutment. Piles are designated A through H from south to north.

2. INSPECTION DATA

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

Dive Team: Clayton Brookins, Breanne Stromberg

Date: June 21, 2012

Weather Conditions: Sunny, 75 °F

Underwater Visibility: 2 feet.

Waterway Velocity: 1.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: The East and West Abutments and Bents 1 through 3.

General Shape: Bent 1 consists of seven 12 inch diameter timber piles. Bent 2 consists of six 12 inch diameter timber piles. Bent 3 consists of eight 12 inch diameter timber piles. The East and West Abutments consist of seven 12 inch diameter timber piles with timber lagging. The piles of each abutment and pier support a 12 inch by 12 inch timber cap.

Maximum Water Depth at Substructure Inspected: Approximately 4.2 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the upstream end of Bent 1.

Water Surface: The waterline was approximately 1.8 feet below reference.

Assumed waterline elevation: 98.2 feet

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 6

Item 92B: Underwater Inspection: Code B/06/12

Item 113: Scour Critical Bridges: Code F/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 MEMBER CONDITION RATING

Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
228	Timber Piling	35	EA	35				
216	Timber Abutment	60	LF		32	28		



Photograph 1. Overall View of Downstream Fascia, Looking Southwest.



Photograph 2. Overall View of Upstream Fascia, Looking Northeast.



Photograph 3. View of the East Abutment, Looking Southeast.



Photograph 4. View of Bent 1, Looking Northeast.



Photograph 5. View of Bent 2, Looking Southeast.



Photograph 6. View of Bent 3, Looking Southwest.



Photograph 7. View of the West Abutment, Looking Northwest.



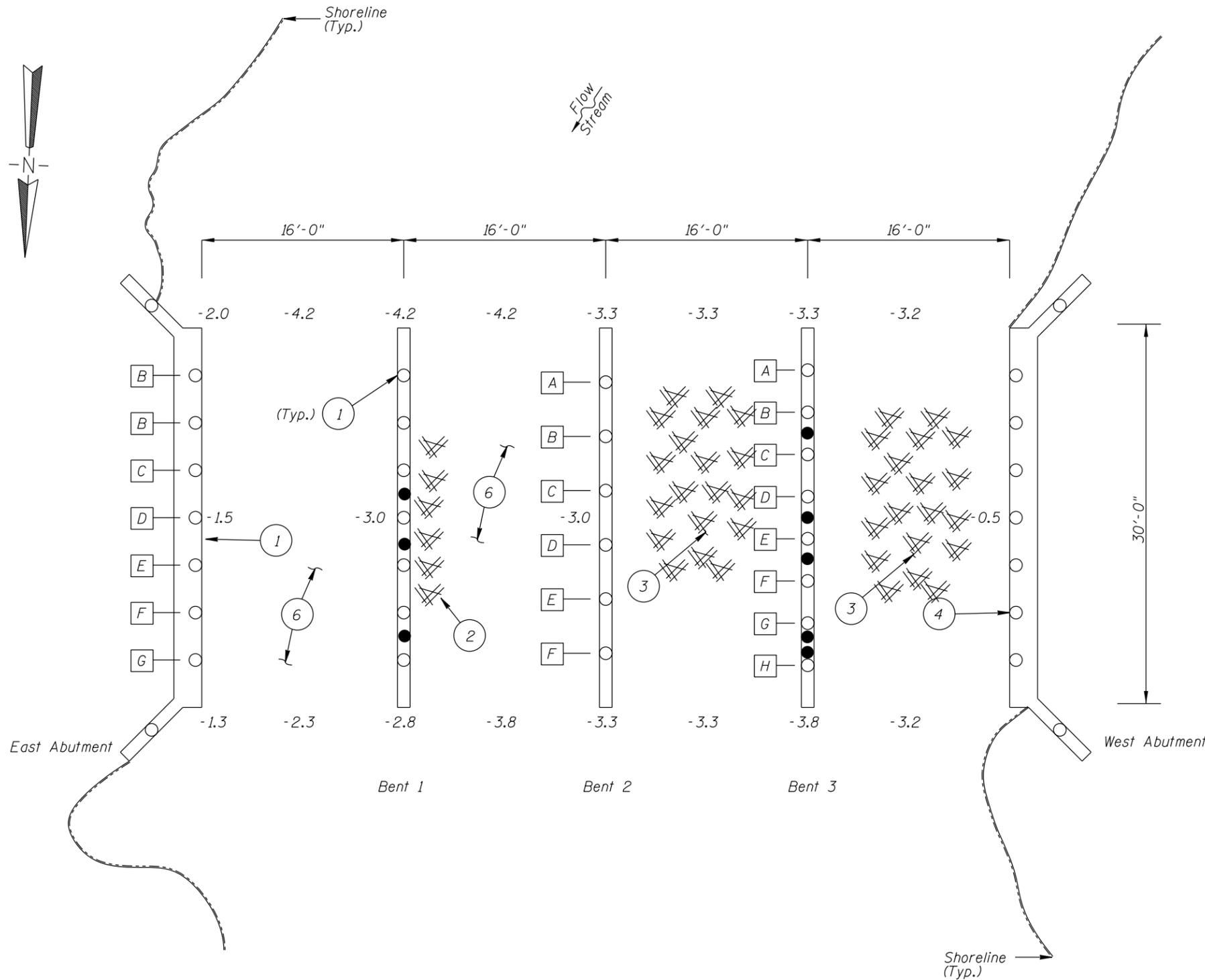
Photograph 8. View of Missing Timber Lagging and Backfill Erosion at the East Abutment, Looking East.



Photograph 9. View of Missing Member Lagging and Backfill Erosion at the West Abutment, Looking West.



Photograph 9. View of Crane Lake Road Over Hawkinson Creek, Looking West.



INSPECTION NOTES:

- 1 Horizontal timber lagging members at the East Abutment were often missing from approximately 2 inches above the waterline to the channel bottom. Escaping gravel and 3 inch diameter and smaller stone was spilling out. The loss of backfill has resulted in a 45 degree slope towards Bent 1.
- 2 A light accumulation of timber debris, typically small diameter branches, was observed on the channel bottom between Piles B and E along the west face of Bent 1.
- 3 A light accumulation of timber debris, typically small diameter branches, was observed within the channel between Bents 2 and 3 and between Bents 3 and the West Abutment. The debris is causing some soft and silty infill to accumulate in the vicinity. In these areas the channel was shallower and allowed up to 1 foot of probe rod penetration.
- 4 Horizontal lagging members at the West Abutment were often missing. The lack of members was causing loss of abutment backfill material, particularly between Piles A and B and between Piles E and G.
- 5 Timber piles and caps were generally observed to be sound and in good condition. The timber was firm and typically allowed an awl penetration of 1/8 inch. No indication of decay was observed and piles were well protected with tin caps.
- 6 Except where otherwise noted, the channel bottom material consisted of fairly firm sandy gravel with approximately 2 inches of probe rod penetration.

GENERAL NOTES:

1. The Bents 1, 2 and 3 and East and West Abutments were inspected underwater.
2. At the time of inspection, on June 21, 2012, the waterline was located approximately 1.8 foot below the top of the cap at the upstream end of Bent 1. Due to lack of design plan information, the reference elevation was assumed to be 100.0 feet. This corresponds to waterline elevation of 98.2 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 1/2 point intervals.

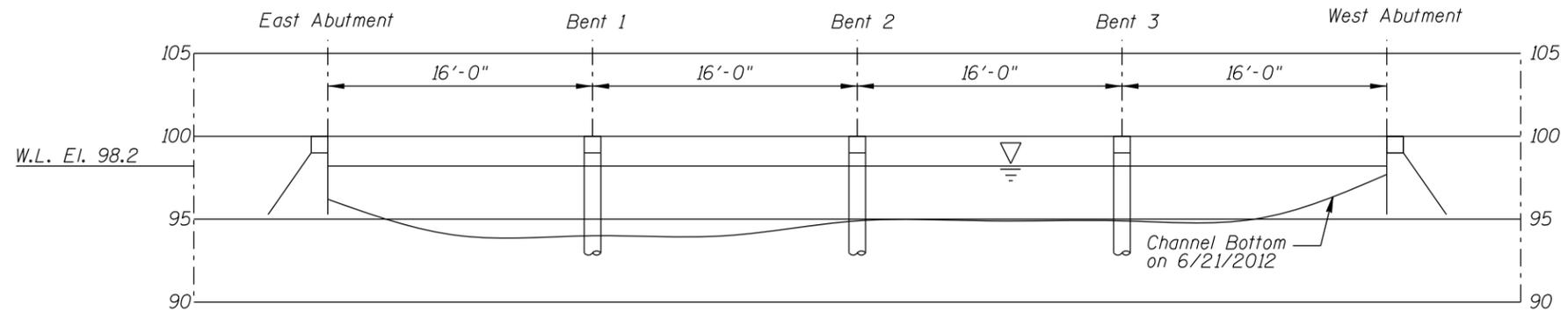


Legend

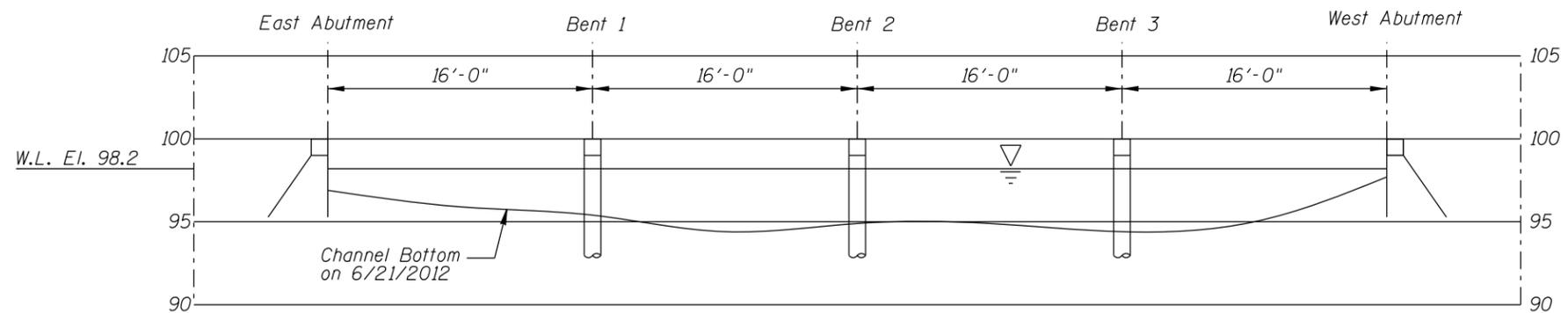
- 0.4 Sounding Depth (6/21/12)
- Timber Debris
- Abandoned Pile (Older Pile)
- Pile Designation

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 7883 CRANE LAKE ROAD OVER HAWKINSON CREEK ST LOUIS COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: BMS	COLLINS ENGINEERS	Date: JULY 2012
Checked By: LJ	<small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Scale: NTS
Code: 74237883		Figure No.: 1

TYPICAL END VIEW OF BENTS



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 7883 CRANE LAKE ROAD OVER HAWKINSON CREEK ST. LOUIS COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: BMS	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: JULY 2012
Checked By: LJ		Scale: NTS
Code: 74237883		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: June 21, 2012

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

BRIDGE NO: 7883 WEATHER: Sunny, 75°F

WATERWAY CROSSED: Sunrise River

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Clayton Brookins, Breanne Stromberg

EQUIPMENT: Commercial Scuba, U/W Light, Sounding Pole, Lead Line, Hand Tools
Camera

TIME IN WATER: 4:00 P.M.

TIME OUT OF WATER: 5:00 P.M.

WATERWAY DATA: VELOCITY 1.5 ft/sec

VISIBILITY 2 ft

DEPTH 4.2 feet maximum at Bent 1

ELEMENTS INSPECTED: East and West Abutments and Bents 1 through 3

REMARKS: Overall, the East and West Abutments and Bents 1 through 3, were generally in good to satisfactory condition with no significant deterioration or any other deficiencies of immediate concern. Both abutments were missing lower timber lagging members with evidence of backfill escaping, but with no adverse effects to the roadway behind the abutments. The timber piles, caps, and lagging were all in good and sound condition with no notable deterioration or indications of decay.

FURTHER ACTION NEEDED: YES NO

Monitor the roadway behind the East and West Abutments for any settlement related to the lack of timber lagging and backfill material loss. If notable settlement occurs, countermeasures may be warranted to arrest further backfill from escaping.

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. 7883
 INSPECTORS Collins Engineers, Inc.
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.
 WATERWAY CROSSED Hawkinson Creek

INSPECTION DATE June 21, 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 (TIMBER LAGGING)	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
	East Abutment	2.0'	7	N	N	8	5	6	N	7	N	7	7	N	N	7	8	N	N
	Bent 1	4.2'	7	N	N	8	N	7	N	N	N	7	7	N	N	7	8	N	N
	Bent 2	3.3'	7	N	N	8	N	7	N	N	N	6	6	N	N	7	8	N	N
	Bent 3	3.8'	7	N	N	8	N	7	N	N	N	6	6	N	N	7	8	N	N
	West Abutment	1.0'	7	N	N	8	5	6	N	7	N	6	6	N	N	7	8	5	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the East and West Abutments and Bents 1 through 3, were generally in good to satisfactory condition with no significant deterioration or any other deficiencies of immediate concern. Both abutments were missing lower timber lagging members with evidence of backfill escaping, but with no adverse effects to the roadway behind the abutments. The timber piles, caps, and lagging were all in good and sound condition with no notable deterioration or indications of decay.

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.