

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 7185

CSAH 5

OVER THE

STURGEON RIVER

ST. LOUIS COUNTY



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 below water at Structure No. 7185, Bents 1 and 2, were found to be in satisfactory condition with only minor defects of structural significance. The concrete piles were typically sound with moderate scaling with a typical penetration of 1/4 inch, extending from 1 foot above the waterline to the channel bottom. Heavier scaling was observed at one pile with a maximum penetration of 1 inch. An area of section loss was observed on one pile measuring 1 foot high by 6 inches wide with a maximum penetration of 1 inch. The concrete pile caps had random hairline cracking and areas of rust staining, and one area of spalling and impending spalling was observed at Bent 1.

INSPECTION FINDINGS:

- (A) The channel bottom material consisted of rocks, up to 2 feet in diameter, and areas of sand infill with a maximum probe rod penetration of 6 inches.
- (B) The concrete piles were typically sound with moderate scaling extending from 1 foot above the waterline to the channel bottom. The scaling typically had a penetration of 1/4 inch.
- (C) An area of section loss was observed on the north side of Pile E at Bent 2, extending from 6 inches above to 6 inches below the waterline. The deterioration measured 6 inches wide with a maximum penetration of 1 inch. No reinforcing steel was exposed.
- (D) An area of heavier scaling was observed on the west face of Pile D at Bent 2. The scaling extended from 6 inches above the waterline to the channel bottom and had a maximum penetration of 1 inch.
- (E) A 4 foot wide by 1 foot high area of spalling and impending spalling was observed on the east face of the Bent 1 pile cap above Piles C and D. The area had a maximum penetration of 1 inch with exposed reinforcing steel. The exposed steel exhibited less than 10 percent loss of section.

- (F) The concrete pier cap at Bents 1 and 2 exhibited random hairline cracks with efflorescence and random areas of rust staining.

RECOMMENDATIONS:

- (A) The spalled area with exposed reinforcing steel is not a structural concerns at this time; however, it should be repaired to prevent further deterioration. The repair should include removal of concrete to a minimum of 1 inch behind the reinforcing steel, cleaning and replacing reinforcing steel as required, and placing concrete designed to provide high durability with low permeability.
- (B) The scaling and section loss observed at Piles C and D, respectively, are not a structural concern at this time given their size compared to the overall pile size, and as a result, no repairs are recommended. These areas should be monitored during future inspections for increasing extent or severity. If the extent is observed to be increasing or reinforcing steel becomes exposed, it may be necessary to repair the areas at that time.
- (C) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader:



Nicholas R. Triandafilou, P.E.

Respectfully submitted,

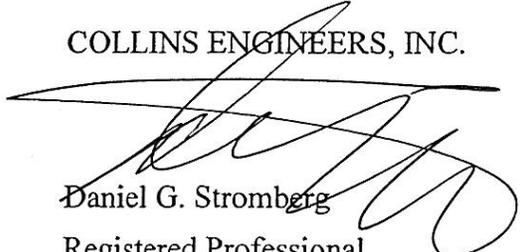
PROFESSIONAL ENGINEER

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

Registered Professional

Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 7185

Feature Crossed: Sturgeon River

Feature Carried: CSAH 5

Location: St. Louis County

Bridge Description: The structure consists of a concrete deck slab supported by two concrete abutments and two concrete pile bents.

2. INSPECTION DATA

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

Dive Team: Marc B. Parker, Clayton Brookins

Date: September 17, 2012

Weather Conditions: Cloudy, 55°F

Underwater Visibility: 3.0 feet

Waterway Velocity: None/Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Bents 1 and 2

General Shape: The superstructure consists of a reinforced concrete slab. The superstructure is supported by two reinforced concrete abutments and two concrete pile bents. Each bent consists of six 15 inch octagonal precast concrete piles with a reinforced concrete pile cap.

Maximum Water Depth at Substructure Inspected: Approximately 3.1 feet.

4. WATERLINE DATUM

Water Level Reference: The top of pile cap at the upstream nose of Bent 2..

Water Surface: The waterline was approximately 5.3 feet below reference.
Assumed Waterline Elevation = 94.7 feet.

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

Item 60: Substructure Condition: Code 6

Item 61: Channel and Channel Protection: Code 7

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

Item 113: Scour Critical Bridges: Code I/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
226	Precast Concrete Piling	12	EA	0	12	0	0	n/a
234	Reinforced Concrete Pier Cap	62	LF	56	2	4	0	n/a
985	Slopes and Slope Protection	1	EA	1	0	0	n/a	n/a



Photograph 1. Overall View, Looking Southwest.



Photograph 2. View Bent 1, Looking Southwest.



Photograph 3. View of Bent 2, Looking Southwest.



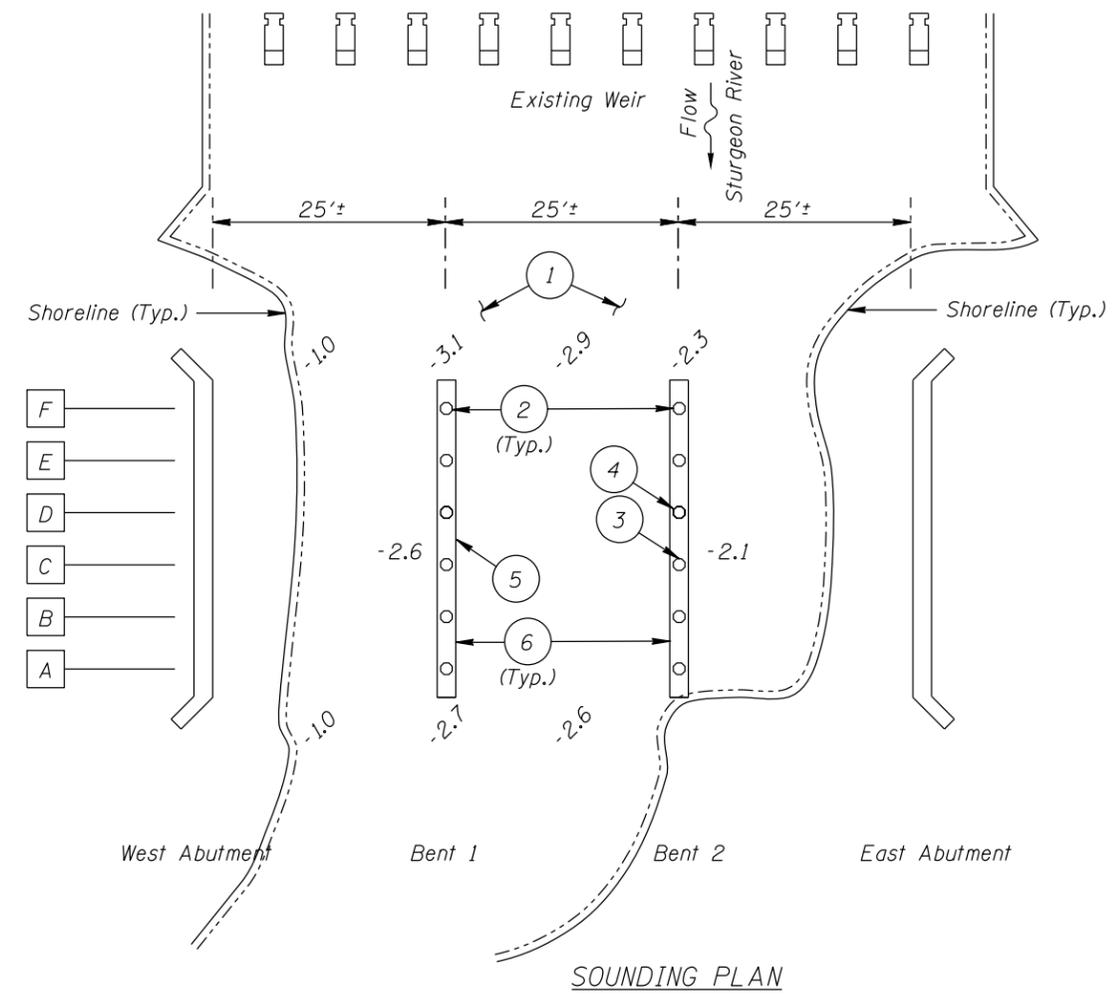
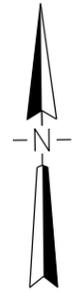
Photograph 4. View Typical Concrete Condition at the Waterline and Section Loss on Pile C of Bent 2, Looking West.



Photograph 5. View of Heavy Scaling on Pile D of Bent 2, Looking East.



Photograph 6. View of Spall and Impending Spall on the Bent 1 Pile Cap, Looking West.



SOUNDING PLAN

INSPECTION NOTES:

- 1 The channel bottom material consisted of rocks, up to 2 feet in diameter, and areas of sand infill with a maximum probe rod penetration of 6 inches.
- 2 The concrete piles were typically sound with moderate scaling extending from 1 foot above the waterline to the channel bottom. The scaling typically had a penetration of 1/4 inch.
- 3 An area of section loss was observed on the north side of Pile E at Bent 2, extending from 6 inches above to 6 inches below the waterline. The deterioration measured 6 inches wide with a maximum penetration of 1 inch. No reinforcing steel was exposed.
- 4 A area of heavier scaling was observed on the west face of Pile D at Bent 2. The scaling extended from 6 inches above the waterline to the channel bottom and had a maximum penetration of 1 inch.
- 5 A 4 foot wide by 1 foot high area of spalling and impending spalling was observed on the east face of the Bent 1 pile cap above Piles C and D. The area had a maximum penetration of 1 inch with exposed reinforcing steel. The exposed steel exhibited less than 10 percent loss of section.
- 6 The concrete pier cap at Bents 1 and 2 exhibited random hairline cracks with efflorescence and random areas of rust staining.

GENERAL NOTES:

1. Bents 1 and 2 were inspected underwater.
2. At the time of inspection on September 17, 2012, the waterline was located approximately 5.3 feet below the top of the bent cap at the upstream end of Bent 2. Since insufficient elevation information was available, an elevation of 100 was assumed. This corresponds to a waterline elevation of 94.7.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.

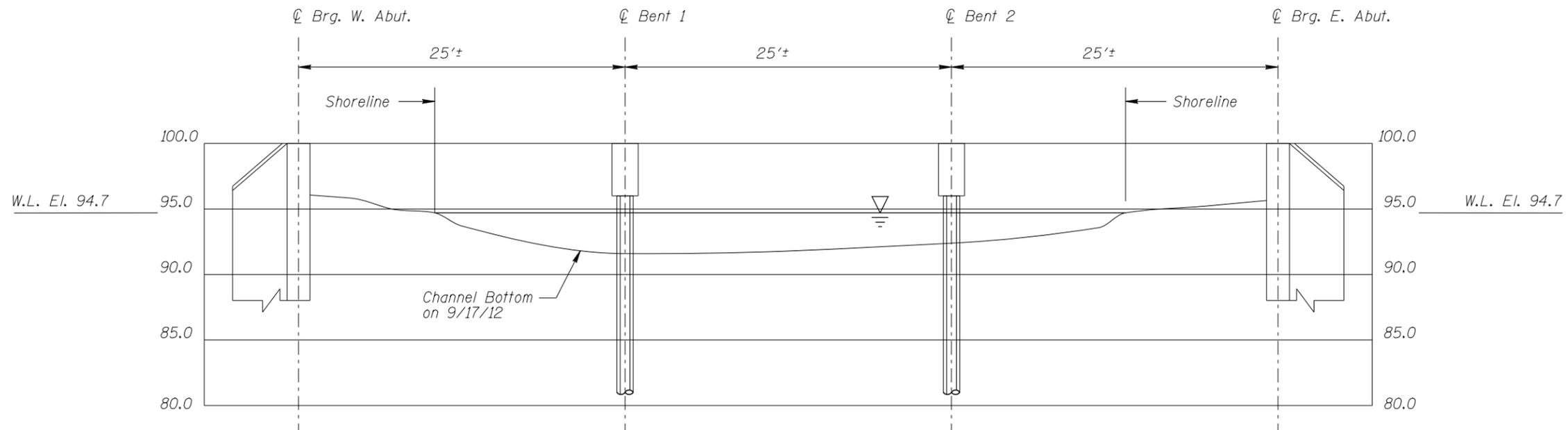
Legend

- 2.5 Sounding Depth from Waterline (9/17/12)
- 15" Precast Octagonal Concrete Piles
- A Pile Identification Designation

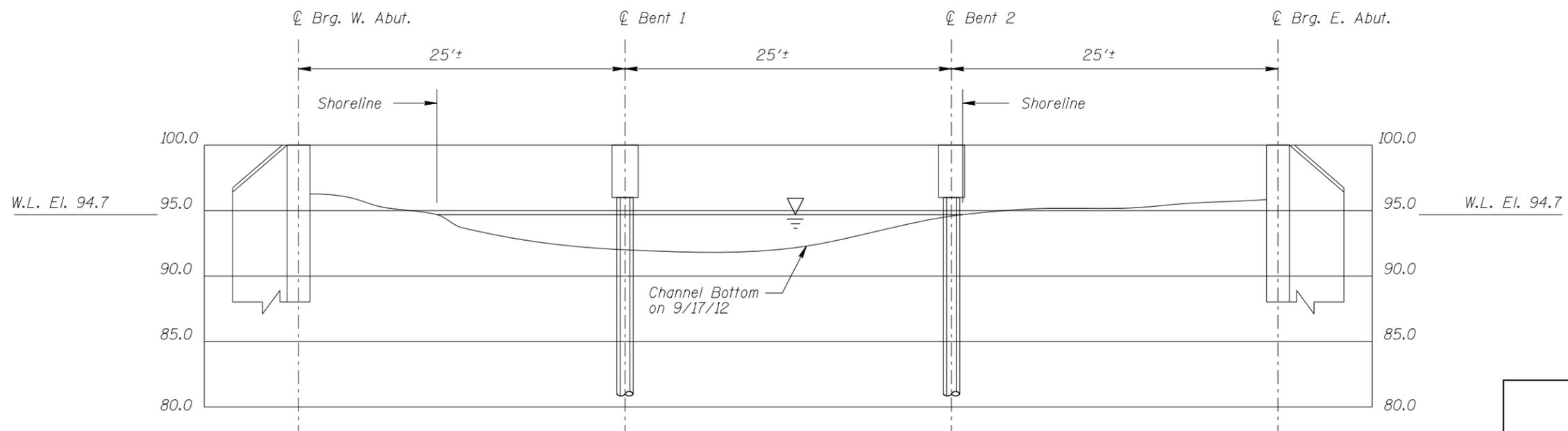


TYPICAL END VIEW

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 7185 CSAH 5 OVER THE STURGEON RIVER ST. LOUIS COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: MBP	COLLINS ENGINEERS	Date: OCTOBER 2012
Checked By: LJ	<small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Scale: NTS
Code: 74237185		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 7185 CSAH 5 OVER THE STURGEON RIVER ST. LOUIS COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: MBP	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: OCTOBER 2012
Checked By: LJ		Scale: 1"=10'
Code: 74237185		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: 7185 WEATHER: Cloudy, 55° F

WATERWAY CROSSED: Sturgeon River

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Clayton Brookins, Marc B. Parker

EQUIPMENT: Commercial Scuba, Sounding Pole, Hand Tools, Camera, Underwater Light

TIME IN WATER: 3:10 P.M.

TIME OUT OF WATER: 3:40 P.M.

WATERWAY DATA: VELOCITY None/Negligible

VISIBILITY 3.0 feet

DEPTH 3.1 feet maximum at the upstream nose of Bent 1

ELEMENTS INSPECTED: Bents 1 and 2

REMARKS: Overall, the substructure units inspected, were found to be in satisfactory condition with only minor defects of structural significance. The concrete piles were typically sound with moderate scaling with a typical penetration of 1/4 inch, extending from 1 foot above the waterline to the channel bottom. Heavier scaling was observed at one pile with a maximum penetration of 1 inch. A loss of section was observed on one pile measuring 1 foot high by 6 inches wide with a maximum penetration of 1 inch. The concrete pile caps had random hairline cracking and areas of rust staining, and one area of spalling and impending spalling was observed at Bent 1.

FURTHER ACTION NEEDED: X YES NO

The spalled area with exposed reinforcing steel is not a structural concerns at this time; however, it should be repaired to prevent further deterioration. The repair should include removal of concrete to a minimum of 1 inch behind the reinforcing steel, cleaning and replacing reinforcing steel as required, and placing concrete designed to provide high durability with low permeability.

The scaling and section loss observed at Piles C and D, respectively, are not a structural concern at this time given their size compared to the overall pile size, and as a result, no repairs are recommended. These areas should be monitored during future inspections for increasing extent or severity. If the extent is observed to be increasing or reinforcing steel becomes exposed, it may be necessary to repair the areas at that time.

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. 7185
 INSPECTORS Collins Engineers, Inc.
 ON-SITE TEAM LEADER Nicholas R. Triandafilou, P.E.
 WATERWAY CROSSED Sturgeon 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					
			PILING	REINFORCED CONCRETE BOX CULVERT	FOOTINGS	DISPLACEMENT	OTHER (PILE CAP)	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
1	Bent 1	3.1'	6	N	N	N	5	6	N	N	7	N	7	6	N	N	6	N	N
2	Bent 2	2.3'	6	N	N	N	6	6	N	N	7	N	7	6	N	N	5	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the substructure units inspected, were found to be in satisfactory condition with only minor defects of structural significance. The concrete piles were typically sound with moderate scaling with a typical penetration of 1/4 inch, extending from 1 foot above the waterline to the channel bottom. Heavier scaling was observed at one pile with a maximum penetration of 1 inch. A loss of section was observed on one pile measuring 1 foot high by 6 inches wide with a maximum penetration of 1 inch. The concrete pile caps had random hairline cracking and areas of rust staining, and one area of spalling and impending spalling was observed at Bent 1.

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.