

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 1811

CSAH NO. 33

OVER THE

KETTLE RIVER

DISTRICT 1 - PINE COUNTY



PREPARED FOR THE
MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 3512

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 1811, Piers 1 and 2, were found to be generally in satisfactory condition below water with areas of section loss and heavy scaling with up to 5 inches of penetration and exposed reinforcing steel. Footing exposure was observed at Pier 1 with up to 1 foot of vertical exposure with no undermining. In addition, the footings of the East and West Abutments were exposed with a portion of the East Abutment undermined.

INSPECTION FINDINGS:

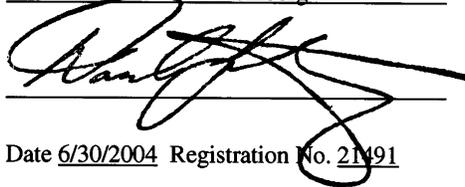
- (A) A band of heavy scaling with up to 4 inches of penetration and exposed reinforcing steel extended from the waterline to 1 foot below the waterline on the upstream column of Pier 1 and the downstream column of Pier 2.
- (B) The southeast corner of the upstream column of Pier 2 exhibited an area of section loss extending 2 feet on each face and from 1 foot above the waterline to the channel bottom with up to 5 inches of penetration and exposed reinforcing steel.
- (C) The footing at Pier 1 was exposed and exhibited approximately 1 foot of vertical face exposure at the upstream end of each column with no undermining detected.
- (D) The East and West Abutments exhibited footing exposure along the downstream half with undermining detected at the East Abutment with up to 4 inches of penetration.

RECOMMENDATIONS:

- (A) Armor the embankments around the East and West Abutments with properly designed riprap to prevent further undermining and erosion.
- (B) Repair areas of section loss with exposed reinforcing steel on both piers by patching and recasting with a concrete mix of high durability and low permeability.
- (C) 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 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 1811

Feature Crossed: The Kettle River

Feature Carried: CSAH No. 33

Location: District 1 - Pine County

Bridge Description: The superstructure consists of a three span, multiple steel beam structure and steel truss center span. The superstructure is supported by two concrete abutments and two concrete piers, numbered 1 and 2 starting from the east. The substructure units are all founded on timber piles.

2. INSPECTION DATA

Professional Engineer/Team Leader: Shirley M. Walker, P.E.

Dive Team: Clayton Brookins, Michelle D. Koerbel

Date: September 26, 2002

Weather Conditions: Sunny, $\pm 40^{\circ}$ F

Underwater Visibility: ± 3 Feet

Waterway Velocity: ± 1 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2

General Shape: The piers consist of a reinforced concrete cap supported by two pentagonal columns founded on rectangular footings supported by timber piles.

Maximum Water Depth at Substructure Inspected: Approximately 6 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier at the downstream end of Pier 1.

Water Surface: The waterline was approximately 12.6 feet below reference.
Waterline Elevation = 86.3.

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

Item 60: Substructure: Code 6

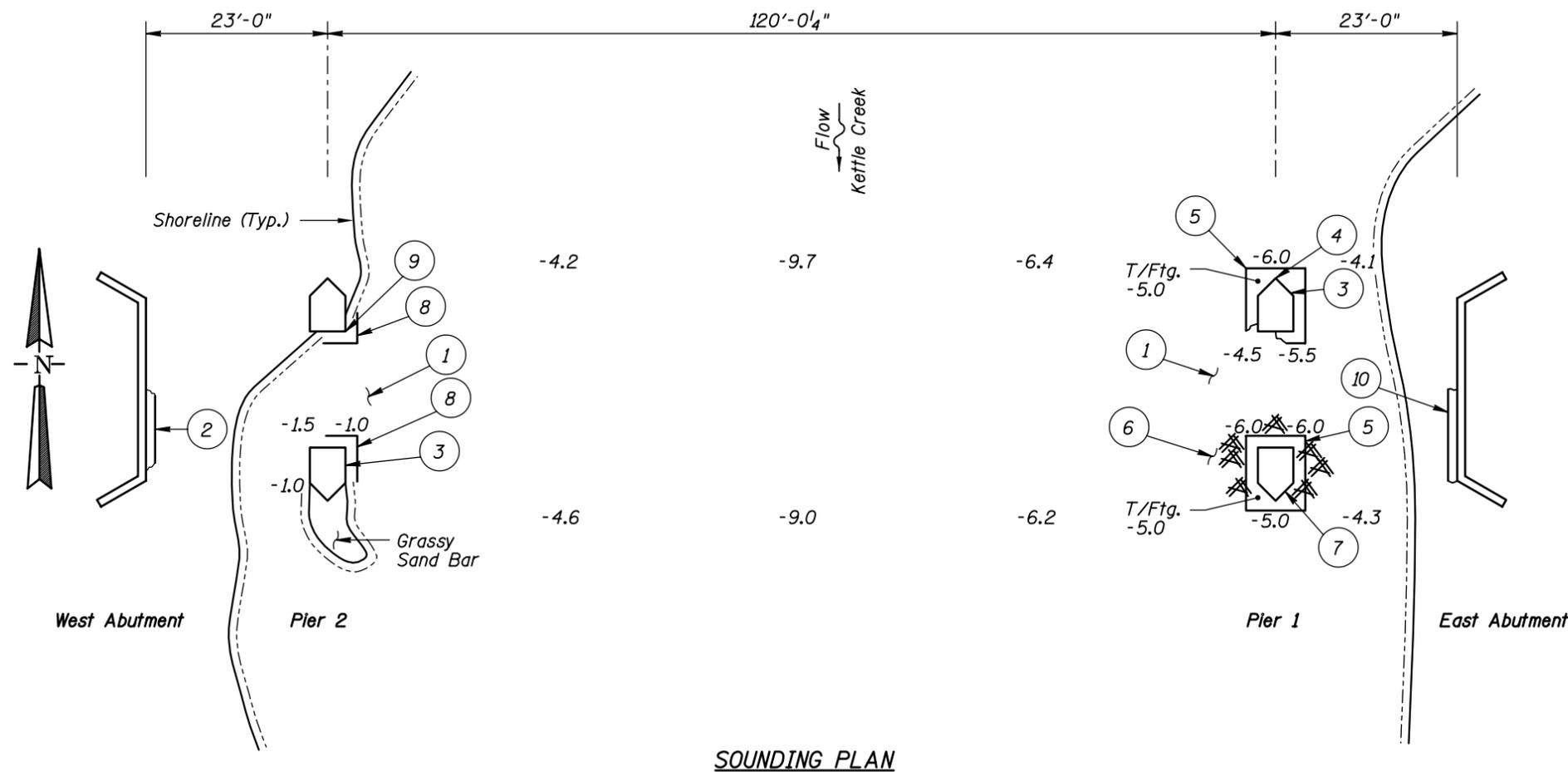
Item 61: Channel and Channel Protection: Code 6

Item 92B: Underwater Inspection: Code B/09/02

Item 113: Scour Critical Bridges: Code __G/02__

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

_____ Yes X No



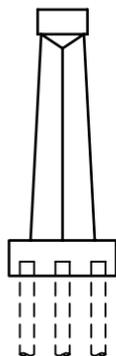
SOUNDING PLAN

GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on September 26, 2002, the waterline was located approximately 12.6 feet below the top of the pier cap at the downstream end of Pier 1. This corresponds with a waterline elevation of 86.3 based on design drawings.
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 The channel bottom consisted of sand and gravel with random riprap.
- 2 The footing of the West Abutment was exposed along 4 feet of the southern portion of the abutment with 6 inches of vertical face exposed.
- 3 A 1-foot-high band of heavy scaling, with up to 4 inches of penetration and exposed reinforcing steel, was observed 1 foot below the waterline.
- 4 The concrete of upstream nose exhibited several areas of section loss with penetrations up to 1 inch.
- 5 The footing of Pier 1 was exposed and exhibited up to 1 foot of vertical face exposure at the upstream end of each column.
- 6 A moderate accumulation of timber debris consisting of 8-inch-diameter and smaller branches was observed around the downstream column of Pier 1.
- 7 A 1-foot-high band of moderate scaling, with up to 1 inch of penetration with no exposed reinforcing steel, was observed 1 foot below the waterline.
- 8 Top of timber cofferdam was detected protruding from channel bottom.
- 9 The southeast corner of the upstream column exhibited an area of section loss extending 2 feet on each face and from 1 foot above the waterline to the channel bottom with up to 5 inches of penetration and exposed reinforcing steel.
- 10 The footing of the East Abutment was exposed along the southern portion of the abutment wall, and exhibited an area of undermining with approximately 4 inches of penetration.

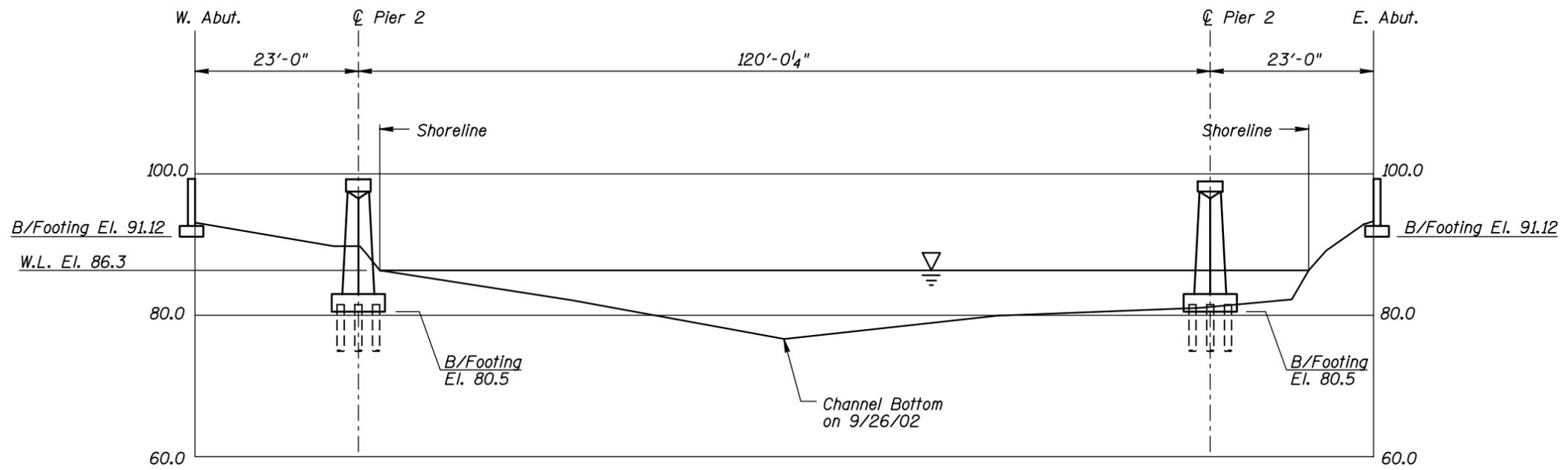


TYPICAL END VIEW OF PIERS

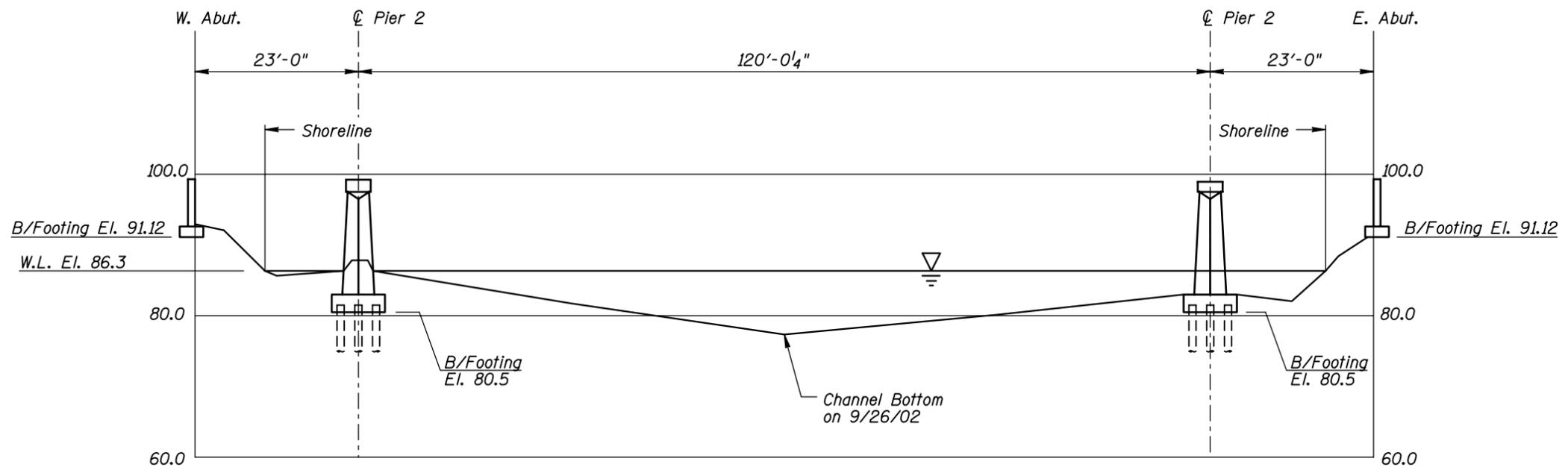
Legend

- 9.0 Sounding Depth from Waterline (9/26/02)
- Timber Debris

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 1811 OVER KETTLE CREEK DISTRICT I, PINE COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: SEPT. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35121811		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 1811 OVER KETTLE CREEK DISTRICT I, PINE COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: PRH	 COLLINS ENGINEERS, INC. 300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Date: SEPT. 2002
Checked By: MDK		Scale: 1"=20'
Code: 35121811		Figure No.: 2



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



Photograph 2. View of East Abutment, Looking Southeast.



Photograph 3. View of Pier 1, Looking Southeast.



Photograph 4. View of Pier 2, Looking Northwest.



Photograph 5. View of Downstream Nose of Pier 2, Looking Northeast.



Photograph 6. View of Section Loss at the Southeast Corner of the Upstream Column of Pier 2, Looking North.

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

INSPECTORS: Collins Engineers, Inc.

DATE: September 26, 2002

ON-SITE TEAM LEADER: Shirley M. Walker, P.E.

BRIDGE NO: 1811

WEATHER: Sunny, " 40° F

WATERWAY CROSSED: The Kettle River

DIVING OPERATION: X SCUBA

SURFACE SUPPLIED AIR

OTHER

PERSONNEL: Clayton G. Brookins, Michelle D. Koerbel

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

TIME IN WATER: 8:00 A.M.

TIME OUT OF WATER: 8:45 A.M.

WATERWAY DATA: VELOCITY " 1 f.p.s.

VISIBILITY " 3 Feet

DEPTH 6 feet maximum at Pier 1

ELEMENTS INSPECTED: Piers 1 and 2

REMARKS: Overall, the concrete was in satisfactory condition with areas of heavy scaling and 4 to 5 inches of maximum penetration and exposed reinforcing steel detected. The southeast corner of the upstream end of Pier 2 exhibited an area of section loss extending 2 feet along each face with 5 inches of penetration and exposed reinforcing steel. The footing of Pier 1 was exposed and exhibited approximately 1 foot of vertical exposure with no undermining. The downstream portion of both abutments exhibited partial footing exposure with undermining detected at the East Abutment with 4 inches of penetration. A moderate accumulation of timber debris was observed around the downstream column of Pier 1.

FURTHER ACTION NEEDED: X YES _____ NO

Armor the East and West Abutments with riprap to prevent further undermining and erosion of the embankments.

Repair areas of section loss with exposed reinforcing steel on both piers by patching and recasting with a concrete mix of high durability and low permeability.

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. 1811
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Shirley M. Walker, P.E.
WATERWAY CROSSED Kettle River

INSPECTION DATE September 26, 2002
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 (BRACING)	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
	Pier 1	6.0'	N	6	7	9	N	6	7	6	6	6	6	6	N	N	6	N	N
	Pier 2	1.5'	N	6	N	9	N	6	N	6	6	N	6	6	N	N	6	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete was in satisfactory condition with areas of heavy scaling and 4 to 5 inches of maximum penetration and exposed reinforcing steel detected. The southeast corner of the upstream end of Pier 2 exhibited an area of section loss extending 2 feet along each face with 5 inches of penetration and exposed reinforcing steel. The footing of Pier 1 was exposed and exhibited approximately 1 foot of vertical exposure with no undermining. The downstream portion of both abutments exhibited partial footing exposure with undermining detected at the East Abutment with 4 inches of penetration. A moderate accumulation of timber debris was observed around the downstream column of Pier 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.