

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 93280
CR NO. 119
OVER THE
EAST BRANCH OF THE RAT ROOT RIVER
DISTRICT 1 - KOOCHICHING COUNTY



AUGUST 13, 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 Bridge No. 93280, the East and West Abutments and Piers 1 and 2, were found to generally be in satisfactory condition with only minor checking of the timber piles below water. Above water, the checking on the timber piles increased in size, and reduced pile cap bearing was observed for the piles at the West Abutment. The diagonal bracing on Piers 1 and 2 had full depth splits at the connection points. The channel bottom appeared stable with no significant scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS:

- (A) The channel bottom material at the West Abutment consisted of soft, silty, sandy clay with 6 inches to 1 foot of probe rod penetration.
- (B) The channel bottom material around Piers 1 and 2 and the East Abutment consisted of 6 inch to 12 inch diameter riprap with silty sand infill.
- (C) The east diagonal brace at Pier 1 exhibited a full depth split from Pile 2 extending 3 feet to the north, located 2 inches from the top face.
- (D) Curved steel ice-breaker plates from just below the pile caps down to approximately 1 foot below the waterline were attached to the south face of Pile 6 at Piers 1 and 2.
- (E) The east diagonal brace of Pier 2 exhibited a full depth split from Pile 1 to Pile 4, located 2 inches to 6 inches from the top face.
- (F) The pile cap of the West Abutment was slightly rotated back with 75 percent typical bearing on the piles.
- (G) A row of abandoned piles cut off at 2 inches above the channel bottom between Pier 2 and the East Abutment.

- (H) A large vertical split approximately 2 feet high by 1/4 inch wide, with 1 inch penetration located at top of Pile 1 of the East Abutment.
- (I) Light accumulation of timber debris at Piles 2 through 5 of Pier 2, with up to 6 inch diameter pieces, typically extending from the channel bottom to the waterline.
- (J) Escaping fill was observed at 1 inch gap in horizontal planking of the West Abutment, 4 feet above mudline, with 3 inches maximum penetration.
- (K) Escaping fill was observed at 1 inch gap in horizontal planking of the West Abutment, 3 feet above mudline, with 3 inches maximum penetration.

RECOMMENDATIONS:

- (A) The diagonal timber cross braces that are split and/or deteriorated through the fasteners at Piers 1 and 2 should be replaced during routine maintenance.

- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader



Roy A. Forsyth, PE
Date 6/30/2014 License# 49270

Respectfully submitted,

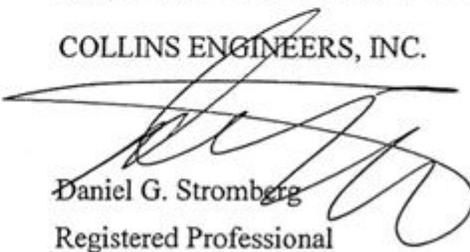
PROFESSIONAL ENGINEER

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: 93280

Feature Crossed: The East Branch of the Rat Root River

Feature Carried: CR No. 119

Location: District 1 - Koochiching County

Bridge Description: The superstructure is a three span, timber stringer/deck bridge. The superstructure is supported by two timber pile abutments and two timber pile piers. The piers are numbered 1 and 2 from west to east.

2. INSPECTION DATA

Professional Engineer Diver: Roy A. Forsyth, P.E.

Dive Team: Jordan T. Furlan, P.E., Charles R. Euwema

Date: August 13, 2012

Weather Conditions: Sunny, 80 °F

Underwater Visibility: ± 1.0 Feet

Waterway Velocity: Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: East and West Abutments, and Piers 1 and 2.

General Shape: The piers and abutments consist of six timber piles with a square timber pile cap. The piers have timber cross bracing attached to the piles. The embankments are contained behind the abutments by timber lagging and adjacent timber pile and lagging wingwalls.

Maximum Water Depth at Substructure Inspected: Approximately 9.9 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pile cap at the north end of Pier 1.

Water Surface: The waterline was approximately 5.2 feet below reference.
Assumed Waterline Elevation = 94.8.

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 7

Item 92B: Underwater Inspection: Code B/08/12

Item 113: Scour Critical Bridges: Code K/95

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
216	Timber Abutment	52	LF	26	26			
386	Wing Wall	4	EA	4				
228	Timber Piling	32	EA		31	1		



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



Photograph 2. View of Pier 1, Looking Southeast.



Photograph 3. View of Pier 2, Looking Southeast.



Photograph 4. View of West Abutment, Looking Southwest.



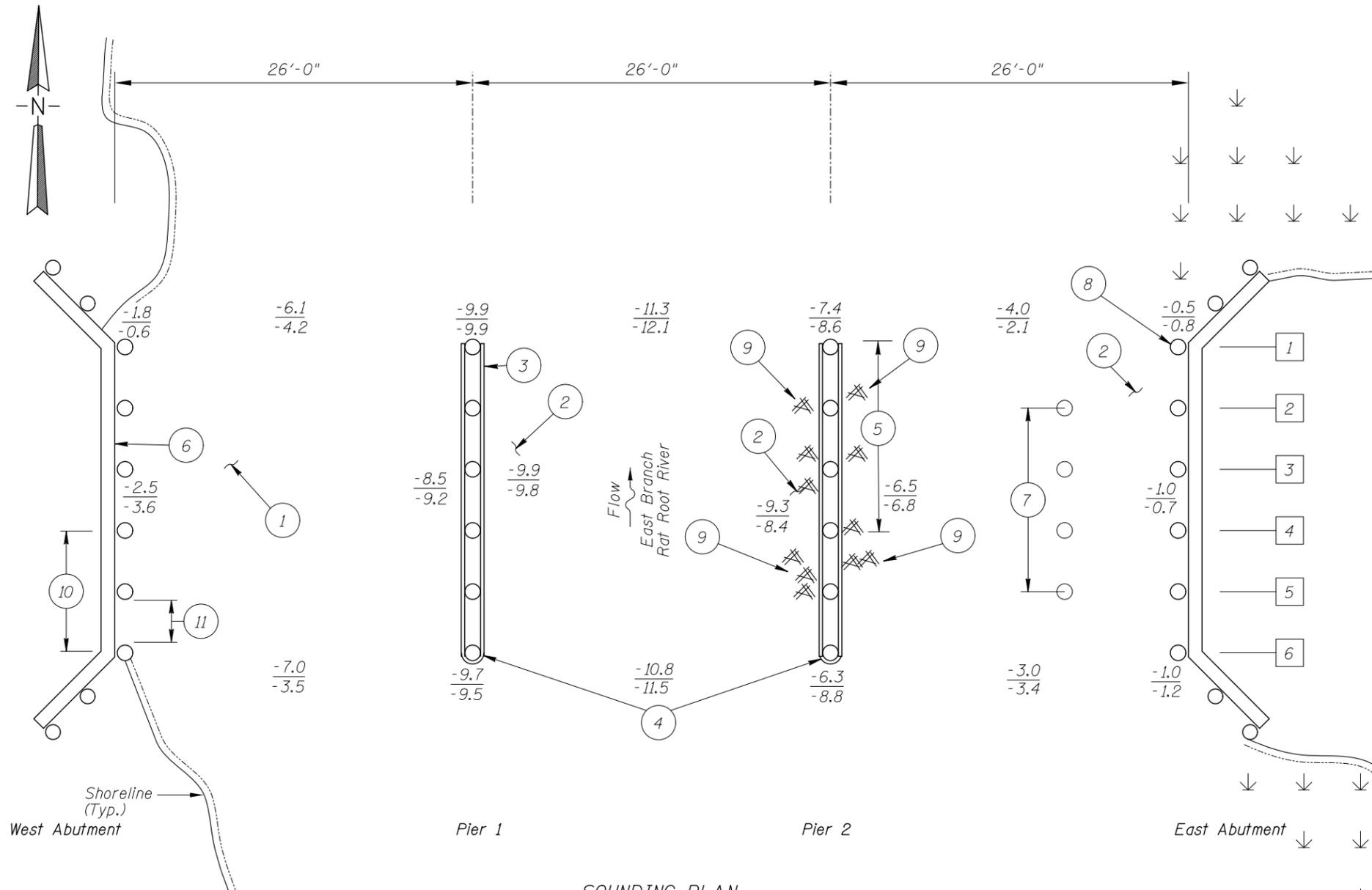
Photograph 5. View of East Abutment, Looking Southeast.



Photograph 6. View of Split in Diagonal Brace at Pier 2, Looking West.



Photograph 7. View of Split in Diagonal Brace at Pier 1, Looking West.



SOUNDING PLAN

GENERAL NOTES:

1. Piers 1 and 2, and the East and West Abutments were inspected below water.
2. At the time of inspection on August 13, 2012, the waterline was located approximately 5.2 feet below the top of pier cap at the north end of Pier 1. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 94.8.
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 mid point intervals between the substructure units.
5. Piles exhibited random checking from the waterline to 3 feet below the waterline with up to 1/4 inch maximum width. The full height of all piles sounded slightly hollow.

INSPECTION NOTES:

- ① The channel bottom material at the West Abutment consisted of soft, silty, sandy clay with 6 inches to 1 foot of probe rod penetration.
- ② The channel bottom material around Piers 1 and 2 and the East Abutment consisted of 6 inch to 12 inch diameter riprap with silty sand infill.
- ③ The east diagonal brace at Pier 1 exhibited a full depth split from Pile 2 extending 3 feet to the north, located 2 inches from the top face.
- ④ Curved steel ice-breaker plates from just below the pile caps down to approximately 1 foot below the waterline were attached to the south face of Pile 6 at Piers 1 and 2.
- ⑤ The east diagonal brace of Pier 2 exhibited a full depth split from Pile 1 to Pile 4, located 2 inches to 6 inches from the top face.
- ⑥ The pile cap of the West Abutment was slightly rotated back with 75 percent typical bearing on the piles.
- ⑦ A row of abandoned piles cut off at 2 inches above the channel bottom between Pier 2 and the East Abutment.
- ⑧ A large vertical split approximately 2 feet high by 1/4 inch wide, with 1 inch penetration located at top of Pile 1 of the East Abutment.
- ⑨ Light accumulation of timber debris at Piles 2 through 5 of Pier 2, with up to 6 inch diameter pieces, typically extending from the channel bottom to the waterline.
- ⑩ Escaping fill was observed at 1 inch gap in horizontal planking of the West Abutment, 4 feet above mudline, with 3 inches maximum penetration.
- ⑪ Escaping fill was observed at 1 inch gap in horizontal planking of the West Abutment, 3 feet above mudline, with 3 inches maximum penetration.

Shoreline (Typ.)
West Abutment

Pier 1

Pier 2

East Abutment

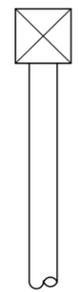
Note: _____

All soundings based on 2012 waterline location.

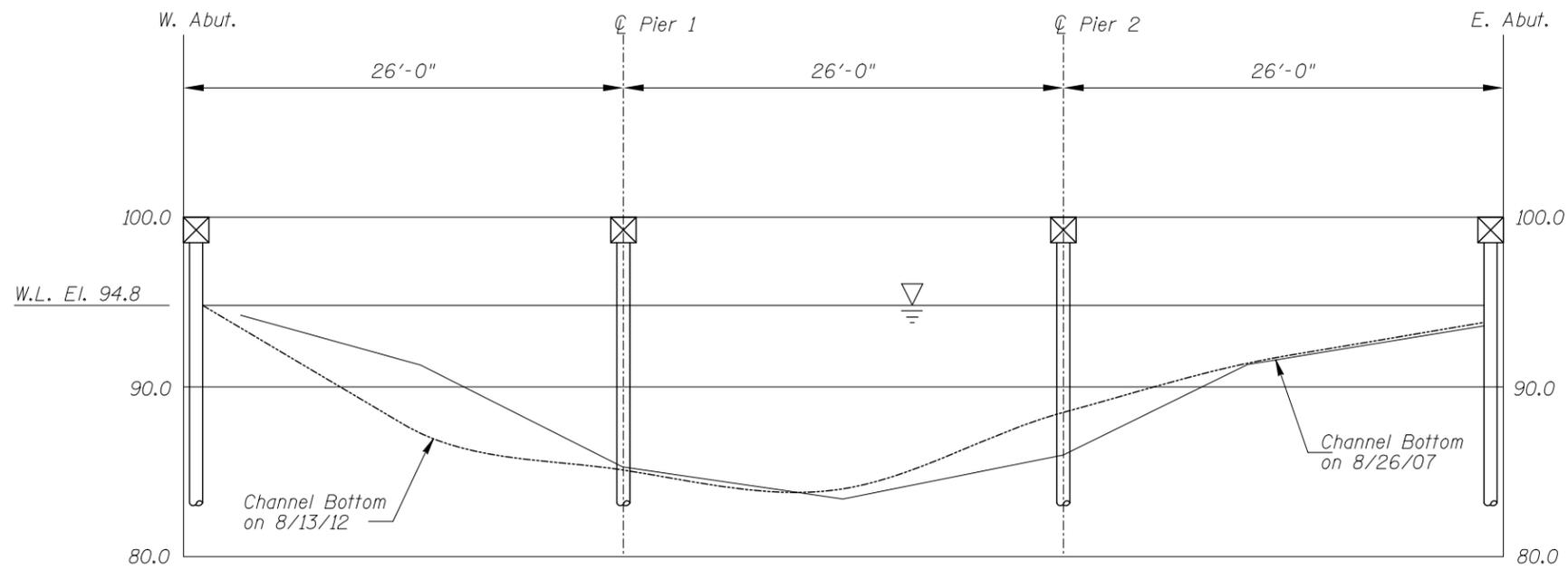
Legend

- 2.0 Sounding Depth (8/13/12)
- 5.2 Sounding Depth (8/26/07)
- Timber Pile
- ⑥ Pile Designation Number
- Timber Debris
- ↓ Grassy Vegetation

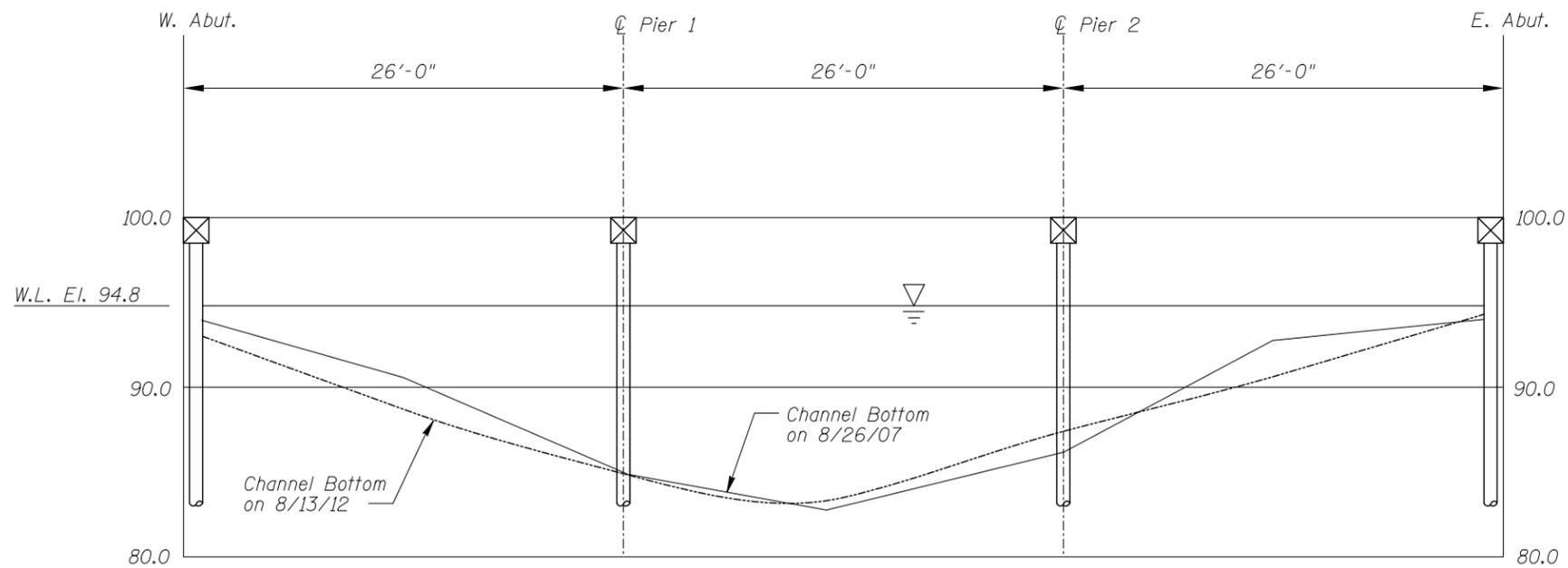
TYPICAL END VIEW OF PIERS



MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 93280 OVER THE EAST BRANCH OF THE RAT ROOT RIVER DISTRICT 1, KOOCHICHING COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: CRE	COLLINS ENGINEERS	Date: AUGUST 2012
Checked By: DGS	<small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Scale: NTS
Code: 52210015		Figure No.: 1



UPSTREAM FASCIA PROFILE
Vertical Scale: 1"=10'-0"



DOWNSTREAM FASCIA PROFILE
Vertical Scale: 1"=10'-0"

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 93280 OVER THE EAST BRANCH OF THE RAT ROOT RIVER DISTRICT 1, KOOCHICHING COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: CRE	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST 2012
Checked By: DGS		Scale: NTS (U.O.N.)
Code: 52210015		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: August 13, 2012

ON-SITE TEAM LEADER: Roy A. Forsyth, P.E.

BRIDGE NO: 93280 WEATHER: Sunny, 80 °F

WATERWAY CROSSED: The East Fork of the Rat Root River

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Jordan T. Furlan, Charles R. Euwema

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

TIME IN WATER: 12:17 P.M.

TIME OUT OF WATER: 12:45 P.M.

WATERWAY DATA: VELOCITY Negligible/None

VISIBILITY 1.0 feet

DEPTH 9.9 feet maximum at Pier 1

ELEMENTS INSPECTED: Piers 1 and 2, East and West Abutments

REMARKS: Overall, the East and West Abutments and Piers 1 and 2, were found to generally be in satisfactory condition with only minor checking of the timber piles below water. Above water, the checking on the timber piles increased in size, and reduced pile cap bearing was observed for the piles at the West Abutment. The diagonal bracing on Piers 1 and 2 had full depth splits at the connection points. The channel bottom appeared stable with no significant scour or appreciable changes since the previous inspection.

FURTHER ACTION NEEDED: YES NO

The diagonal timber cross braces that are split and/or deteriorated through the fastener at Pier 1 and 2 should be replaced during routine maintenance.

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. 93280
 INSPECTORS Collins Engineers, Inc.
 ON-SITE TEAM LEADER Roy A. Forsyth, P.E.
 WATERWAY CROSSED The East Branch of the Rat Root River

INSPECTION DATE August 13, 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 (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 (BACKWALLS)
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	7
	West Abutment	2.5'	7	7	N	8	N	7	N	8	8	N	7	N	N	7	N	N	N
	Pier 1	9.9'	7	N	N	8	5	6	N	N	N	N	7	N	N	7	N	N	N
	Pier 2	9.3'	7	N	N	8	5	6	N	N	N	7	7	N	N	7	N	N	N
	East Abutment	1.0'	7	7	N	8	N	7	N	8	8	N	7	N	N	7	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the East and West Abutments and Piers 1 and 2, were found to generally be in satisfactory condition with only minor checking of the timber piles below water. Above water, the checking on the timber piles increased in size, and reduced pile cap bearing was observed for the piles at the West Abutment. The diagonal bracing on Pier 1 and 2 had full depth splits at the connection points. The channel bottom appeared stable with no significant scour or appreciable changes since the previous inspection.

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.