UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 2440 TRUNK HIGHWAY NO. 65 OVER THE MISSISSIPPI RIVER DISTRICT 5 - HENNEPIN COUNTY



PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 2912

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

1. EXECUTIVE SUMMARY

The substructure units inspected at Bridge No. 2440, Piers 1 through 8, were found to be mostly in satisfactory, to at times fair condition. The previously noted deterioration around the waterline and above is progressing, at times rather significantly, especially at Piers 1 and 2. Overall, the extent of footing/foundation exposure at most of the piers is comparable to that which was previously noted. At Pier 5, the deterioration/undermining at the pier foundation/channel bottom interface has increased since the last inspection such that the entire upstream nose exhibited a 5 to 6 foot deep cavity. There continues to be a moderate to heavy accumulation of timber debris along the spillway side of Pier 5 as well.

2. <u>INSPECTION FINDINGS</u>

Around the perimeter of both Piers 1 and 2 between 3 feet above and below the waterline, there was moderate to heavy scaling and loss of section with 2 to 9 inch penetrations and occasional exposed reinforced steel.

There was a 1/8 inch wide vertical crack near the midpoint of the west face of Pier 1 extending from 5 feet above the waterline to the channel bottom.

There was a 1/8 to 1/4 inch wide vertical crack between the middle and downstream arches on both the east and west faces of Pier 1. The crack on the west face extended from the top of the pier to the top of footing and the crack on the east face extended from 10 feet above the waterline to the top of footing.

The top of footing at Pier 1 was exposed from the upstream quarter point on the east face, around the upstream nose, and along the west face to the downstream nose, with 1 foot typical vertical footing exposure at the northwest side and 2 foot typical vertical footing exposure along the west face.

The top of footing at Pier 2 was exposed around the downstream nose and from the midpoint on the east face, around the upstream nose, to the upstream eighth point on the west face, with 5 foot typical vertical footing exposure.

The top of footing at Pier 5 was exposed from the upstream third point on the east face, around the upstream nose, to the midpoint on the west face, with 6 foot typical vertical footing exposure.

The upstream nose of Pier 5 was undermined from the start of the nose on the upstream east side to the centerline of the upstream arch on the west side. The void was 1 to 3 feet high with more than 4 feet of penetration back under the footing.

The top of footing at Pier 6 was exposed from the west corner of the downstream nose to approximately 10 feet upstream on the west face and from the midpoint on the east face to the upstream third point on the west face, with 3 and 6 foot typical vertical footing exposures, respectively.

The top of footing at Pier 7 was exposed from the west corner of the downstream nose to approximately 10 feet upstream on the west face, with 5 foot maximum vertical footing exposure.

Along the majority of the west side of Pier 5 adjacent to the spillway, there was a moderate to heavy timber debris accumulation extending from the channel bottom to 2 feet above the waterline.

The above notes represent either new or prior conditions of structural significance or previously noted conditions that have changed significantly. For additional conditions not noted herein, refer to the 1996 inspection report.

3. <u>RECOMMENDATIONS</u>

Reinspect the submerged substructure units at the normal maximum recommended interval of five (5) years and during future inspections particularly monitor the upstream undermining at Pier 5 and the waterline deterioration at Piers 1 and 2 until these conditions

are addressed. At Pier 5, the undermining at the foundation/channel bottom interface can be rectified with the placement of riprap and pumped grout (pre-placed aggregate repair). At Piers 1 and 2, as well at other piers with waterline deterioration, concrete patching/reforming repairs should be accomplished in conjunction with above water repairs.

Item	Element	Code
60	Substructure	6
61	Channel and Channel Protection	7
92B	Underwater Inspection	B/10/2000
113	Scour Critical Bridges	F/2000

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

Bridge is scour critical because abutment or pier foundation is rated as	Yes	No
unstable due to observed scour at bridge site.		Х

5. <u>PONTIS CODING INFORMATION</u>

		Conditions									
No.	Element/Quantity	1	2	3	4	5					
60	Reinforced Concrete Pier Wall 1726 LF		1294	432							
65	Reinforced Concrete Submerged Footing 5 EA		4	1							
180**	Channel and Protection 8 EA		7	1							
185**	Slope Protection 1 EA		1								

* Smart Flag.

** Other Items.

Respectfully submitted,

COLLINS ENGINEERS, INC.

Daniel G. Stromberg Registered Professional Engineer, State of Minnesota



GENERAL NOTES:

- 1. Piers 1 through 8 were inspected underwater.
- 2. At the time of inspection on October 23, 2000, the waterline was located approximately 51.0 feet below the top of the sidewalk at the centerline of the upstream pier face of Pier 1. This corresponds with a waterline elevation of 798.1 feet based on previous report dated August 30, 1996.
- 3. Soundings indicate the water depth at the time of inspection and are measured in feet. The 1996 soundings have been converted for the 2000 waterline.
- 4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.
- 5. The inspection notes shown on this drawing represent either new or previously noted conditions of structural significance or previously noted conditions that have changed significantly. For additional conditions not noted herein, refer to the 1996 inspection report.

Legend	
<u>-11.2</u>	Sounding Depth from Waterline (10/23/00)
-11.2	Sounding Depth from Waterline (8/30/96)
ÂĂ	Timber Debris
	Undermining



TYPICAL END VIEW OF PIERS

INSPECTION NOTES:

- 1) There was a 1/8 inch wide vertical crack near the midpoint of the west face of Pier 1, which extended from 5 feet above the waterline to the channel bottom.
- 2 There was an 1/8 to 1/4 inch wide vertical crack between the middle and downstream arches on both the east and west faces of Pier 1. The crack on the west face extended from the top of the pier to the top of footing and the crack on the east face extended from 10 feet above the waterline to the top of footing.
- Around entire perimeter of Piers 1 and 2 between 3 feet above and below the waterline, there was moderate to heavy scaling and loss of section with 2 to 9 inch penetrations and occasional exposed reinforcing steel.
- 4 The top of footing at Pier 1 was exposed from the upstream quarter point on the east face, around the upstream nose, and along the west face to the downstream nose, with 1 foot typical vertical footing exposure at the northwest side and 2 foot typical vertical footing exposure along the west face.
- (5) The top of footing at Pier 2 was exposed around the downstream nose and from the midpoint on the east face, around the upstream nose, to the upstream eighth point on the west face, with 5 foot typical vertical footing exposure.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION									
D	STRUCTURE NO. 2440 OVER THE MISSISSIPPI RIVER DISTRICT 5, HENNEPIN COUNTY								
INSPEC ⁻	TION AND SOUNDING	G PLAN							
Drawn By: MDK	COLLINS ENGINEERS, INC.	Date: 0CT. 2000							
Checked By: BAS	6458 CITY WEST PARKWAY, STE. 100	Scale: NTS							
Code: 29120156	(612) 941-0327	Figure No.: 1							



TYPICAL END VIEW OF PIERS

Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION										
D	STRUCTURE NO. 2440 OVER THE MISSISSIPPIRIVER DISTRICT 5, HENNEPIN COUNTY									
INSPEC	TION AND SOUNDING	G PLAN								
Drawn By: MDK	COLLINS ENGINEERS, INC.	Date: OCT. 2000								
Checked By: BAS	6458 CITY WEST PARKWAY, STE. 100	Scale: NTS								
Code: 29120156	(612) 941-0327	Figure No.: 2								





TYPICAL END VIEW OF PIERS

Note:

Refer to Figure 1 for General Notes.

INSPECTION NOTE:

- 1) The top of footing at Pier 7 was exposed from the west corner of the downstream nose to approximately 10 feet upstream on the west face, with 5 foot maximum vertical footing exposure.
- 2) The top of footing (step) was exposed along a portion of the west face with 1 foot maximum vertical exposure.
- (3) Band of light to moderate scaling, 1 to 1.5 foot high with 1 to 3 inch penetration, at waterline around perimeter of pier.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION									
D	STRUCTURE NO. 2440 OVER THE MISSISSIPPIRIVER DISTRICT 5, HENNEPIN COUNTY								
INSPEC	<u>TION AND SOUNDIN</u>	G PLAN							
Drawn By: MDK	COLLINS ENGINEERS, INC.	Date: OCT. 2000							
Checked By: BAS	6458 CITY WEST PARKWAY, STE. 100	Scale: NTS							
Code: 29120156	(612) 941-0327	Figure No.: 3							



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE







Note:

Refer to Figure 1 for General Notes.

MINNESOTA Department of transportation Underwater bridge inspection									
STRUCTURE NO. 2440 OVER THE MISSISSIPPI RIVER DISTRICT 5, HENNEPIN COUNTY									
UPSTI	REAM AND DOWNST FASCIA PROFILES	REAM							
Drawn By: MDK	COLLINS ENGINEERS, INC.	Date: OCT. 2000							
Checked By: BAS	6458 CITY WEST PARKWAY, STE. 100	Scale: 1''=60'							
Code: 29120156	(612) 941-0327	Figure No.:6							

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

INSPECTORS: Collins Engineers, Inc. DATE: October 23, 2000 ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E. BRIDGE NO: 2440 WEATHER: Overcast, 70° F WATERWAY CROSSED: Mississippi River **DIVING OPERATION:** Х SCUBA SURFACE SUPPLIED AIR OTHER PERSONNEL: Clayton G. Brookins, Kevin P. Mullins EQUIPMENT: Scuba, Boat w/Motor, Lead Line, Fathometer, Scraper, U/W Light, Probe Rod, Camera TIME IN WATER: 11:15 AM TIME OUT OF WATER: 3:00 PM WATERWAY DATA: VELOCITY 0.5 ft/s VISIBILITY 1.0 ft. DEPTH Maximum depth of 13.8 feet at substructure (Pier 5) and 14.9 feet

maximum in the channel

ELEMENTS INSPECTED: Piers 1 through 8

REMARKS: The previously noted deterioration around the waterline and above is progressing, at times rather significantly, especially at Piers 1 and 2. Overall, the extent of footing/foundation exposure at most of the piers is comparable to that which was previously noted. At Pier 5, the deterioration/undermining at the pier foundation/channel bottom interface has increased since the last inspection such that the entire upstream nose exhibited a 5 to 6 foot deep cavity. There continues to be a moderate to heavy accumulation of timber debris along the spillway side of Pier 5 as well.

FURTHER ACTION NEEDED: X YES NO

Reinspect the submerged substructure units at the normal maximum recommended interval of five (5) years and during future inspections particularly monitor the upstream undermining at Pier 5 and the waterline deterioration at Piers 1 and 2 until these conditions are addressed. At Pier 5, the undermining at the foundation/channel bottom interface can be rectified with the placement of riprap and pumped grout (pre-placed aggregate repair). At Piers 1 and 2, as well at other piers with waterline deterioration, concrete patching/reforming repairs should be accomplished in conjunction with above water repairs.

MINNESOTA DEPARTMENT OF TRANSPORTATION OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO.: 2440 INSPECTORS: Collins Engineers, Inc. ON-SITE TEAM LEADER: Daniel G Stromberg, P.E., WATERWAY CROSSED: Mississippi River

INSPECTION DATE: October 23, 2000 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.

				SUBSTRUCTURE						CHANNEL				GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	отнек	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
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	7.5'	Ν	6	7	8	Ν	6	6	Ν	Ν	7	7	5	Ν	Ν	5	N	Ν
	Pier 2	12.0'	Ν	6	7	8	Ν	6	6	Ν	N	7	7	5	Ν	Ν	5	Ν	Ν
	Pier 3	3.0'	Ν	7	7	8	N	7	7	Ν	N	7	7	7	Ν	Ν	7	Ν	N
	Pier 4	3.5'	Ν	7	7	8	Ν	7	7	Ν	N	7	7	7	Ν	Ν	7	Ν	Ν

CONDITION RATING

*UNDERWATER PORTION ONLY

REMARK: The previously noted deterioration around the waterline and above is progressing, at times rather significantly, especially at Piers 1 and 2. Overall, the extent of footing/foundation exposure at most of the piers is comparable to that which was previously noted. At Pier 5, the deterioration/undermining at the pier foundation/channel bottom interface has increased since the last inspection such that the entire upstream nose exhibited a 5 to 6 foot deep cavity. There continues to be a moderate to heavy accumulation of timber debris along the spillway side of Pier 5 as well.

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.

MINNESOTA DEPARTMENT OF TRANSPORTATION OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

CONDITION RATING

BRIDGE NO.: 2440 INSPECTORS: Collins Engineers, Inc. ON-SITE TEAM LEADER: Daniel G Stromberg, P.E., WATERWAY CROSSED: Mississippi River INSPECTION DATE: October 23, 2000 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.

				SUBSTRUCTURE					CHANNEL				GENERAL						
JNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	DILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	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
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 5	14.9'	Ν	6	6	8	Ν	6	6	Ν	Ν	5	6	5	Ν	N	5	N	Ν
	Pier 6	11.0'	Ν	6	7	8	N	6	6	N	N	7	7	6	N	Ν	6	Ν	Ν
	Pier 7	10.0'	Ν	6	7	8	Ν	6	7	Ν	Ν	6	7	6	Ν	Ν	6	N	Ν
	Pier 8	5.2'	Ν	6	7	8	Ν	6	7	7	6	7	7	6	Ν	N	6	N	Ν

*UNDERWATER PORTION ONLY

REMARK: The previously noted deterioration around the waterline and above is progressing, at times rather significantly, especially at Piers 1 and 2. Overall, the extent of footing/foundation exposure at most of the piers is comparable to that which was previously noted. At Pier 5, the deterioration/undermining at the pier foundation/channel bottom interface has increased since the last inspection such that the entire upstream nose exhibited a 5 to 6 foot deep cavity. There continues to be a moderate to heavy accumulation of timber debris along the spillway side of Pier 5 as well.

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.