UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 2441

FRANKLIN AVENUE (CSAH NO. 5)

OVER THE

MISSISSIPPI RIVER

DISTRICT 5 - HENNEPIN COUNTY

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221 (CEI 121)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 2441, Piers 2 and 3, were found to be in satisfactory to fair condition. Both piers exhibited substantial section loss with exposed and corroded reinforcing steel; however, due to the massive size of the piers, the deterioration has not yet significantly compromised the overall structural capacity of the piers. The channel bottom around the substructure units appeared stable with no evidence of significant scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS:

(A) The concrete of both pier shafts was typically deteriorated from 2 feet above the waterline to 3 feet below the waterline. The heaviest deterioration has occurred along the middle portion of the piers on both faces and it extended from up to 6 feet above the waterline to up to 5 feet below the waterline. The heavier deterioration has exposed reinforcing steel with maximum penetrations into the concrete of 14 inches. Deterioration at the various corners of the shafts has typical penetrations of up to 1 foot.

(B) Steel and concrete debris was observed on the channel bottom around the entire perimeter of Pier 2.

RECOMMENDATIONS:

(A) The deterioration with exposed reinforcing steel should be addressed before it progresses and becomes more detrimental. At the minimum, the exposed reinforcing steel should be cleaned and covered with an epoxy grout. Due to the significant loss of concrete section, however, a more desirable repair would be to remove all loose and unsound concrete, clean the exposed reinforcing steel, and reform the shaft to the original dimensions and lines with a concrete mix designed for underwater applications.

(B) 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 6/30/2008 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: 2441

Feature Crossed: Mississippi River

Feature Carried: Franklin Avenue (CSAH No. 5)

Location: District 5 - Hennepin County

Bridge Description: Bridge No. 2441 has a five span, open-spandrel concrete arch superstructure. The superstructure is a supported by two reinforced concrete abutments and four reinforced concrete piers. The available design drawings did not indicate the type of footing or foundation construction of the piers. The piers are numbered 1 through 4 starting from the south end of the bridge.

2. INSPECTION DATA

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

Dive Team: Clayton G. Brookins, Valerie Roustan

Date: October 4, 2007

Weather Conditions: Sunny, 65^{o} F

Underwater Visibility: 0.5 feet

Waterway Velocity: 0.5 f.p.s

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 2 and 3.

General Shape: The piers consist of large oblong rectangular shafts with rounded noses and various corners / recesses in the construction. The drawings furnished did not provide any foundation information.

Maximum Water Depth at Substructure Inspected: Approximately 11.0 Feet.

4. WATERLINE DATUM

Water Level Reference: The benchmark reference at Elevation 731.0 located on Pier 2.

Water Surface: The waterline was approximately 5.7 feet below reference.
Waterline Elevation = 725.3.

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

Item 60: Substructure: Code 5

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/10/07

Item 113: Scour Critical Bridges: Code R/02

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

X Yes _____ No

Photograph 1. View of Pier 2, Looking West.

Photograph 2. View of Pier 2, Looking West.

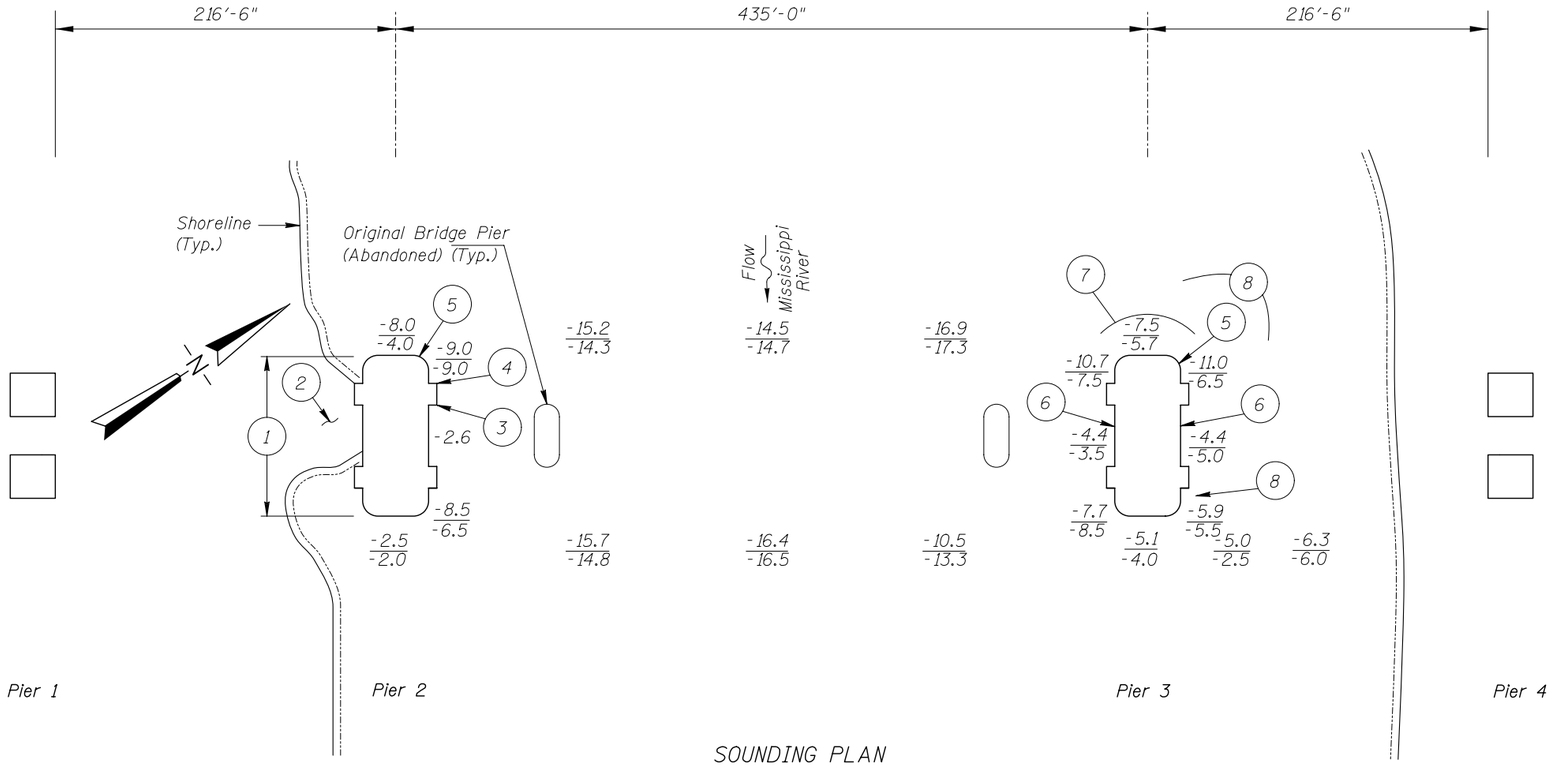
Photograph 3. View of the Upstream End of Pier 2, Looking West.

Photograph 4. View of Deterioration along the West Side of Pier 2, Looking South.

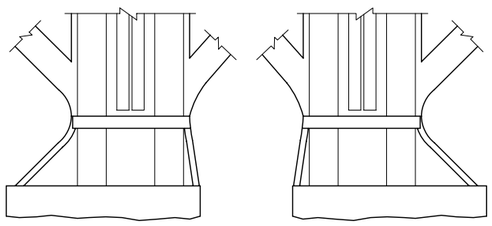
Photograph 5. View of Pier 3, Looking North.

Photograph 6. View of the Heavy Deterioration and Section Loss along the West Side of Pier 3, Looking Northeast.

Photograph 7. View of the Heavy Deterioration and Section Loss along the East Side of Pier 3, Looking Northeast.



SOUNDING PLAN



UPSTREAM PIER 2 UPSTREAM PIER 3

TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 2 and 3 were inspected underwater.
2. At the time of inspection on October 4, 2007, the waterline was located approximately 5.7 feet below the benchmark reference at Elevation 731.0 on Pier 2. Based on the reference this corresponds with a waterline elevation of 725.3.
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 concrete along the west face of Pier 2 was in fair to poor condition with extensive scaling and areas of section loss observed from approximately 4 feet above the waterline to the channel bottom. Typically, the areas of section loss exhibited exposed heavily corroded reinforcing steel and up to 14 inches of penetration.

(2) Accumulation of concrete rubble and steel debris was observed around Pier 2 and extended approximately 1 foot above the waterline along the west face of the pier.

(3) An area of section loss with exposed reinforcing steel was observed from 4 feet above the waterline to approximately 4 feet below the waterline with up to 10 inches of penetration.

(4) An area of section loss with exposed reinforcing steel was observed from 4 feet above the waterline to approximately 5 feet below the waterline with up to 12 inches of penetration.

(5) Typically, Piers 2 and 3 exhibited heavy scaling from 2 feet above the waterline to 3 feet below waterline with areas of exposed reinforcing steel and up to 8 inches of penetration.

(6) Heavy section loss was observed from 6 feet above the waterline to 3 feet below the waterline along the middle portion of the pier along both faces with exposed reinforcing steel and up to 1 foot of penetration.

(7) Large diameter riprap has been stacked up in front of the upstream nose of Pier 3.

(8) Rocks and boulders were observed on the channel bottom along the east side of Pier 3.

Legend

-4.1 / -3.7	Sounding Depth (10/4/07) / Sounding Depth (10/1/02)

Note:

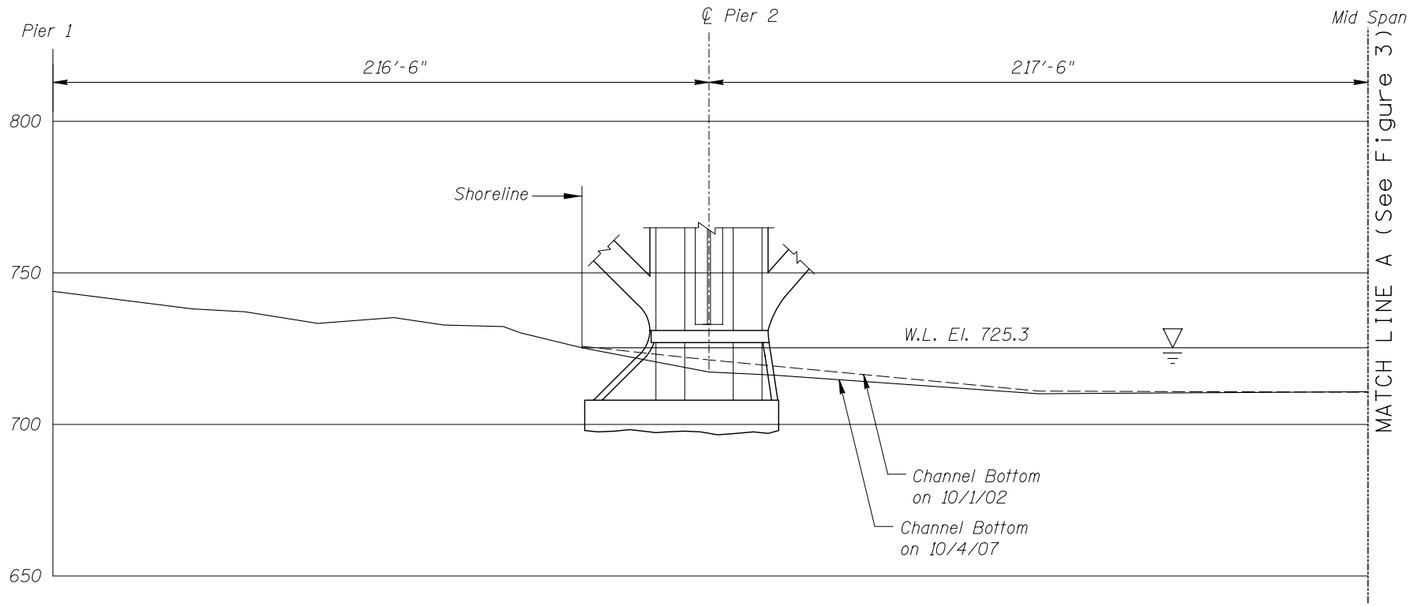
All soundings based on 2007 waterline location.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

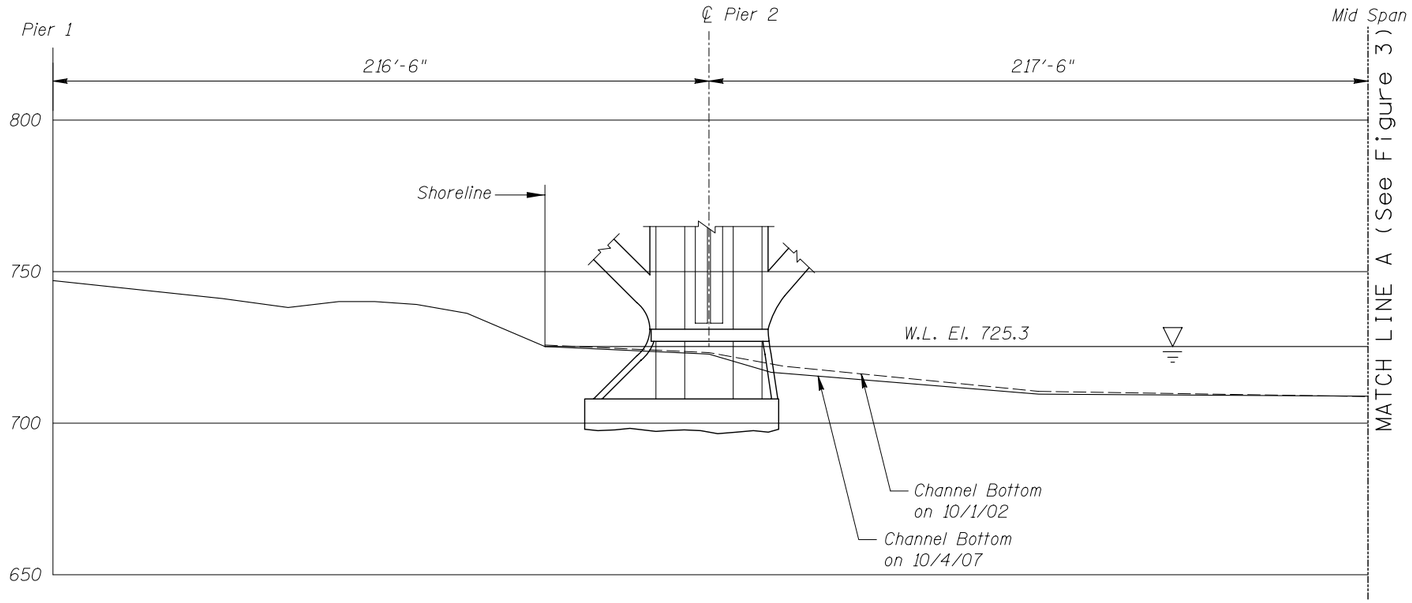
STRUCTURE NO. 2441
OVER THE MISSISSIPPI RIVER
DISTRICT 5, HENNEPIN COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: PRH	COLLINS ENGINEERS, INC. 123 North Wacker Drive Suite 300 Chicago, Il. 60606 (312) 704-9300 www.collinsengr.com	Date: OCT., 2007
Checked By: MDK		Scale: NTS
Code: 52210121		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

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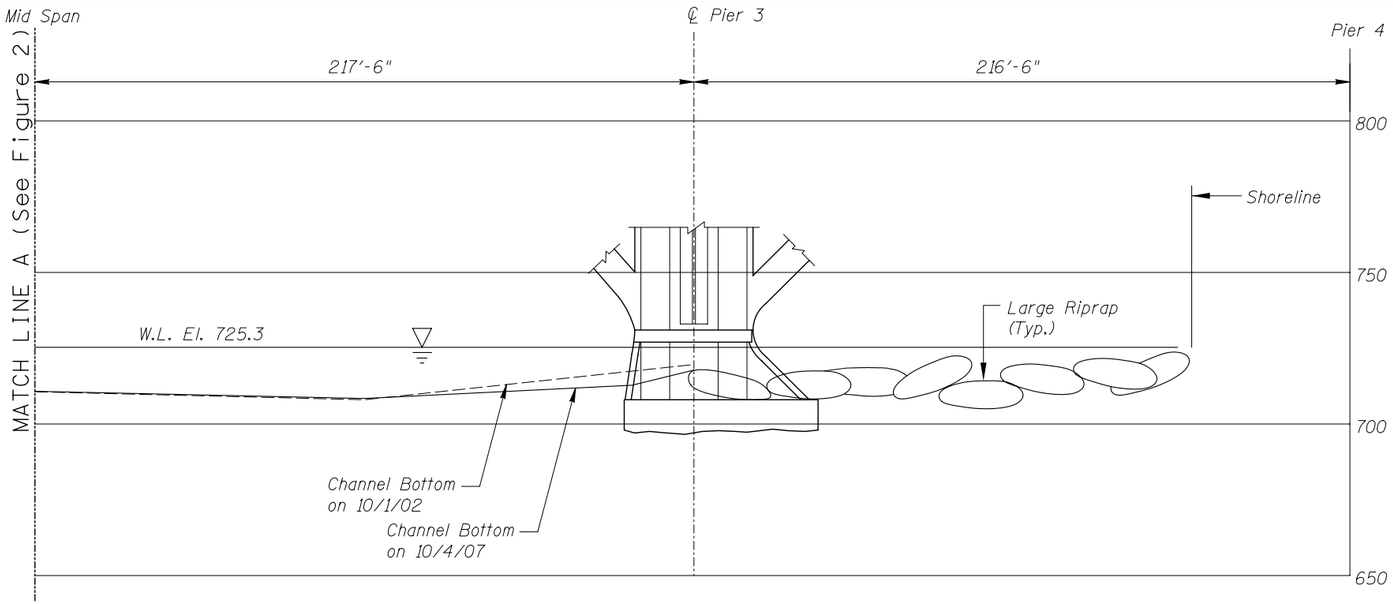
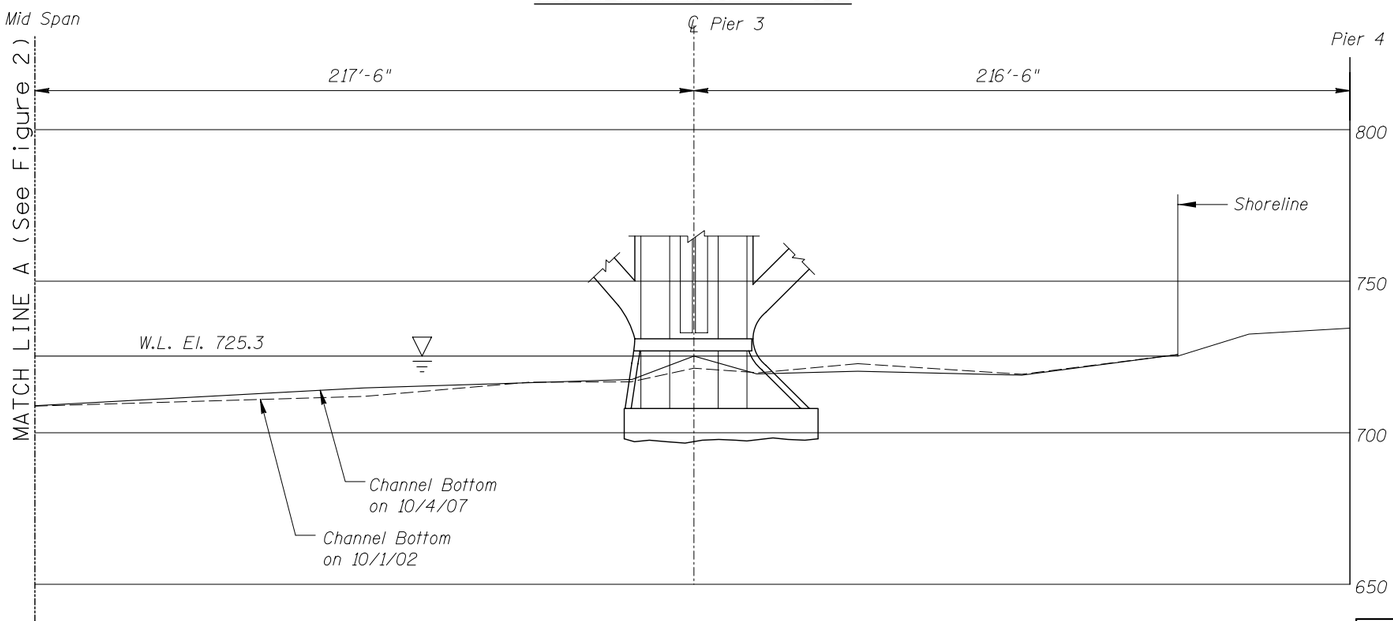
UPSTREAM AND DOWNSTREAM FASCIA PROFILES – I

Drawn By: PRH	COLLINS ENGINEERS, INC. 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: OCT., 2007
Checked By: MDK		Scale: 1"=50'
Code: 52210121		Figure No.: 2



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 2441
OVER THE MISSISSIPPI RIVER
DISTRICT 5, HENNEPIN COUNTY

UPSTREAM AND DOWNSTREAM FASCIA PROFILES – II

Drawn By: PRH	COLLINS ENGINEERS, INC. 123 North Wacker Drive Suite 300 Chicago, Il. 60606 (312) 704-9300 www.collinsengr.com	Date: OCT., 2007
Checked By: MDK		Scale: 1"=50'
Code: 52210121		Figure No.: 3

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

INSPECTORS: Collins Engineers, Inc. DATE: October 4, 2007
ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.
BRIDGE NO: 2441 WEATHER: Sunny, 65° F
WATERWAY CROSSED: Mississippi River
DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR
_____ OTHER
PERSONNEL: Clayton G. Brookins, Valerie Roustan
EQUIPMENT: Scuba, U/W Light, Scraper, Sounding Pole, Fathometer, Lead Line, Probe Rod, Camera
TIME IN WATER: 3:30 P.M.
TIME OUT OF WATER: 4:20 P.M.
WATERWAY DATA: VELOCITY 0.5 f.p.s
VISIBILITY 0.5 feet
DEPTH 11.0 feet maximum at Pier 3
ELEMENTS INSPECTED: Piers 2 and 3
REMARKS: Overall, the concrete of both pier shafts from up to 6 feet (2 feet typical) above the waterline to 5 feet (3 feet typical) below the waterline was in fair condition with heavy scaling / spalling, extensive section loss, and exposed / corroded reinforcing steel observed at both piers. An accumulation of concrete rubble and steel debris was observed around Pier 2. The channel bottom appeared stable (well armored) with no signs of significant scour or appreciable changes since the previous inspection.

FURTHER ACTION NEEDED: X YES _____ NO

At a minimum, the exposed reinforcing steel should be cleaned and covered with an epoxy grout. Due to the substantial loss of section, however, a more desirable repair would be to remove all loose and unsound concrete, clean the exposed reinforcing steel, and reform the concrete to the original dimensions and lines.

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. 2441
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.
WATERWAY CROSSED Mississippi River

INSPECTION DATE October 4, 2007

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

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	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 (REINFORCING)	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 2	9.0’	N	5	N	9	N	5	8	8	6	7	7	5	5	N	4	N	N
	Pier 3	11.0’	N	5	N	9	N	5	8	8	6	N	7	5	5	N	4	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the concrete of both pier shafts from up to 6 feet (2 feet typical) above the waterline to 5 feet (3 feet typical) below the waterline was in fair condition with heavy scaling / spalling, extensive section loss, and exposed / corroded reinforcing steel observed at both piers. An accumulation of concrete rubble and steel debris was observed around Pier 2. The channel bottom appeared stable (well armored) with no signs of 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.