

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 31510

CSAH NO. 62

OVER THE

MISSISSIPPI RIVER

ITASCA COUNTY



OCTOBER 1, 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. 31510, Piers 1, 2, and 3, were found to be in good to satisfactory condition with no defects of structural significance. The submerged steel of the piles at all piers exhibited coating failure and nodular corrosion from the waterline to the mudline. The overall extent of corrosion has not changed appreciably since the 2007 underwater inspection and has minimal related section loss with most of the associated pitting exhibiting penetrations of no more than 1/32 inch. In isolated infrequent instances, the pitting was up to 1/16 inch deep. There was scattered, light to moderate, steel debris and/or timber drift on the channel bottom at each of the piers with a moderate accumulation of organic material and vegetation along the upstream and bank sides of Pier 3. A prior crack defect at a Pier 2 pile continues to be adequately repaired with a bolted collar. The previously noted deformed downstream battered pile on Pier 3 (possible installation related deformation) continues to be stable and not compromising the overall pier stability.

INSPECTION FINDINGS:

- (A) Moderate corrosion was observed on the steel pipe piles from the waterline to the mudline. The piles exhibited minimal section loss with typical pitting penetrations of no more than 1/32 inch and up to a maximum of 1/16 inch in random instances.
- (B) The vertical crack noted in a prior inspection at a Pier 2 pile has been adequately repaired with a bolted steel collar extending from the top of the pile to 3 feet below the waterline. The repair was in good and sound condition.
- (C) Minor scour depressions, up to 2 feet deep with up to a 2 feet radius, were observed around the two upstream piles of Pier 2.
- (D) A moderate accumulation of organics/vegetation with occasional timber debris was observed at the upstream nose and along the entire bank side of Pier 3 extending from

the channel bottom to 2 feet above the channel bottom. Scattered steel and timber debris was also observed on the channel bottom at Piers 1 and 2 along with a 55 gallon drum at both Piers 1 and 2.

- (E) The downstream battered pile at Pier 3 exhibited a 15 degree bend 5 feet below the waterline where the pile then extends vertically into the channel bottom. (appears to be related to driving the pile during original bridge construction) The pile continues to be stable and not compromising the overall stability of the pier.

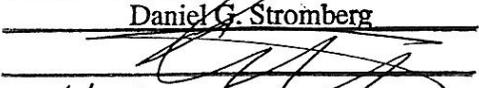
RECOMMENDATIONS:

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

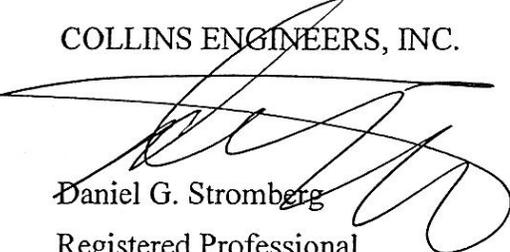
Inspection Team Leader:
Daniel G. Stromberg, P.E.

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: 31510

Feature Crossed: The Mississippi River

Feature Carried: CSAH No. 62

Location: Itasca County

Bridge Description: The superstructure consists of four spans of multiple prestressed concrete beams. The superstructure is supported by two reinforced concrete abutments and three steel pipe (CIP) pile bent piers. The piers are numbered 1 through 3 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg, P.E.

Dive Team: Clayton G. Brookins, Marc B. Parker

Date: October 1, 2012

Weather Conditions: Sunny, 50 °F

Underwater Visibility: 5 feet

Waterway Velocity: None/Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1, 2, and 3.

General Shape: Piers 1 and 3 consist of a single line of 10 steel pipe (CIP) piles supporting a reinforced concrete cap. Pier 2 consists of two lines of 5 steel pipe (CIP) piles supporting a reinforced concrete cap.

Maximum Water Depth at Substructure Inspected: Approximately 13.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the east end of Pier 3.

Water Surface: The waterline was approximately 8.2 feet below reference.

Waterline Elevation = 1272.8.

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/10/12

Item 113: Scour Critical Bridges: Code R

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
382	Cast-In-Place (CIP) Piling	30	EA	30				
985	Slopes & Slope Protection	1	EA	1				



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



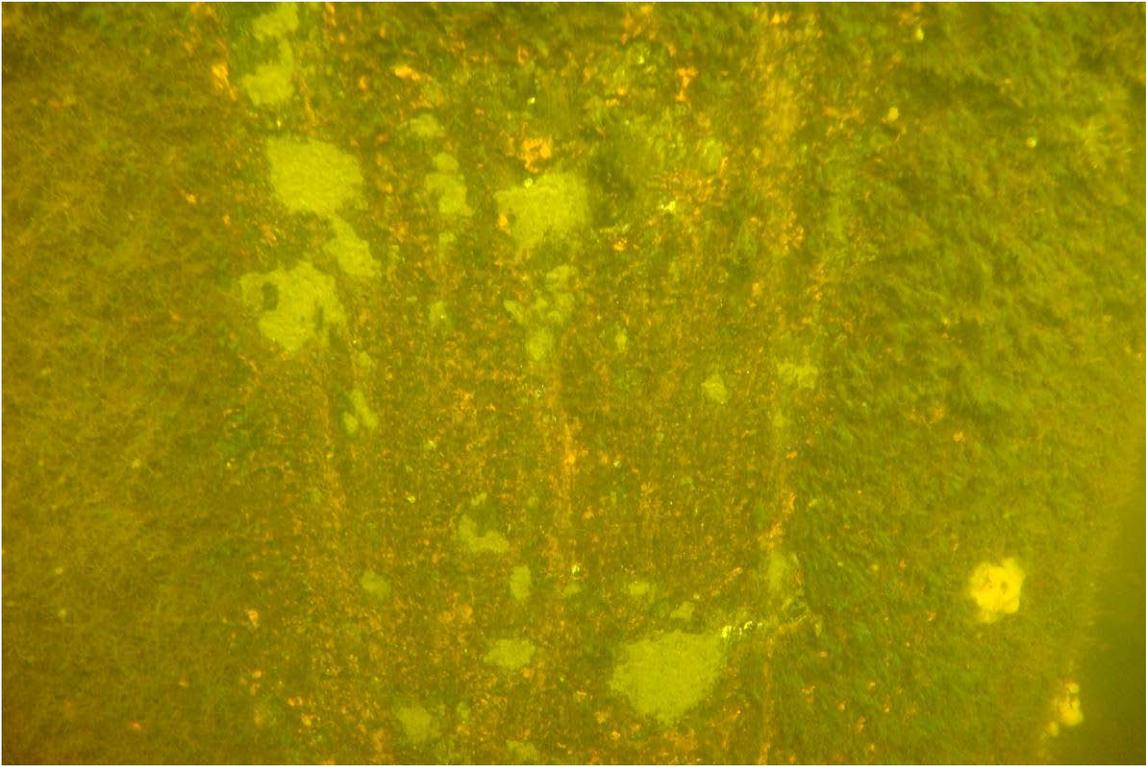
Photograph 2. View of Pier 1, Looking Northeast.



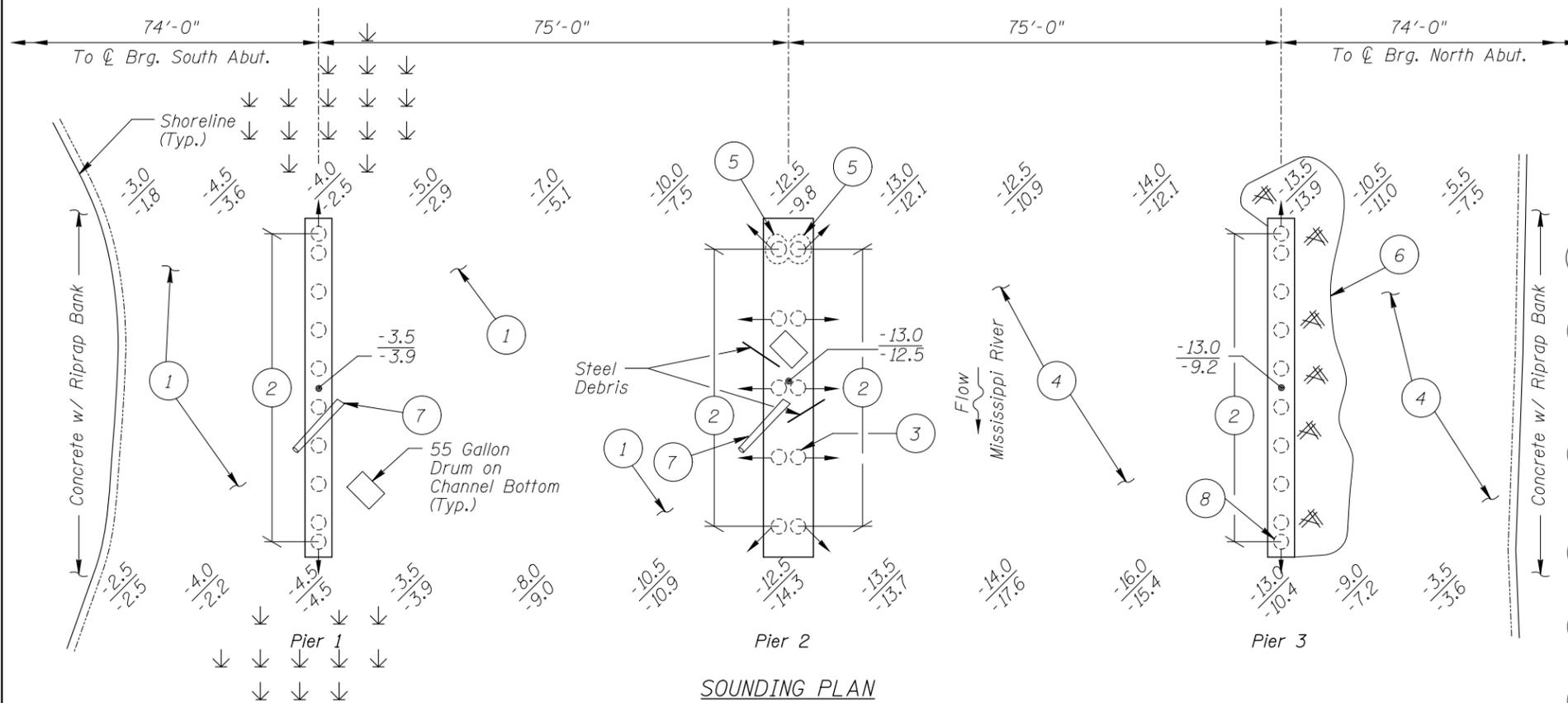
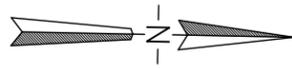
Photograph 3. View of Pier 2, Looking Southwest.



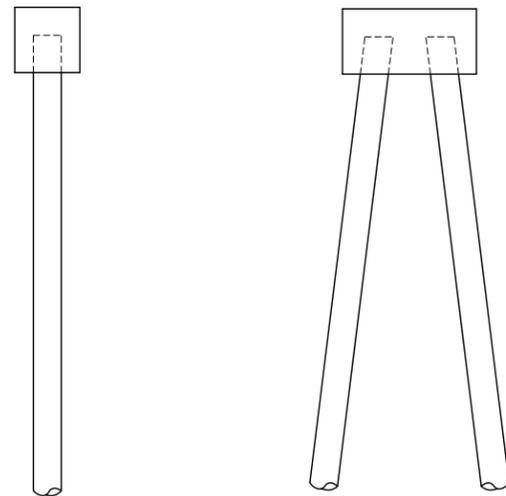
Photograph 4. View of Pier 3, Looking Southwest.



Photograph 5. View of the Typical Pile Condition Underwater, Looking North.



SOUNDING PLAN



PIERS 1 & 3 END VIEW

PIER 2 END VIEW

Note:

All soundings based on 2012 waterline location.

Legend

- 2.2 Sounding Depth (10/1/12)
- 3.0 Sounding Depth (8/28/07)
- Steel Pipe Pile
- Battered Steel Pipe Pile
- ↓ Vegetation/Grass
- ⌘ Timber Debris
- Scour Depression

GENERAL NOTES:

1. Piers 1, 2, and 3 were inspected underwater.
2. At the time of inspection on October 1, 2012, the waterline was located approximately 8.2 feet below the top of pier cap at east end of Pier 3. This corresponds to a waterline elevation of 1272.8 feet based on previous report dated August 28, 2007.
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 substructure units

INSPECTION NOTES:

- 1 The channel bottom material consisted of soft silty sand allowing maximum probe rod penetrations of 1 to 1.5 feet.
- 2 Moderate corrosion covered 75 to 100 percent of the pile surfaces from the waterline to the channel bottom. Minimal section loss was observed with typical pitting up to 1/32 inches deep and maximum pitting in random instances up to 1/16 inches deep near the waterline.
- 3 Vertical crack along welded joint noted in previous inspection, August 27, 1997, has been repaired with a bolted steel collar extending from the underside of the pile cap to 3 feet below the waterline. The repair was in good and sound condition.
- 4 The channel bottom material consisted of firm sandy gravel with 6 inch to 2 foot diameter rocks and probe rod penetrations of 2 to 4 inches.
- 5 Minor scour depressions, up to 2 feet deep with up to 2 feet radius, were observed around the upstream piles of Pier 2.
- 6 Moderate accumulation of organics/vegetation was observed at the upstream nose and along the entire bank side of Pier 3 with occasional 1 foot diameter timber debris extending from the mudline to 2 feet above the channel bottom.
- 7 One approximately 8 inch diameter piece of timber debris was observed on the channel bottom along the midpoint of the pier.
- 8 The downstream battered pile at Pier 3 exhibited a 15 degree bend 5 feet below the waterline where the pile then extends vertically into the channel bottom. (appears to be related to driving the pile during original bridge construction)

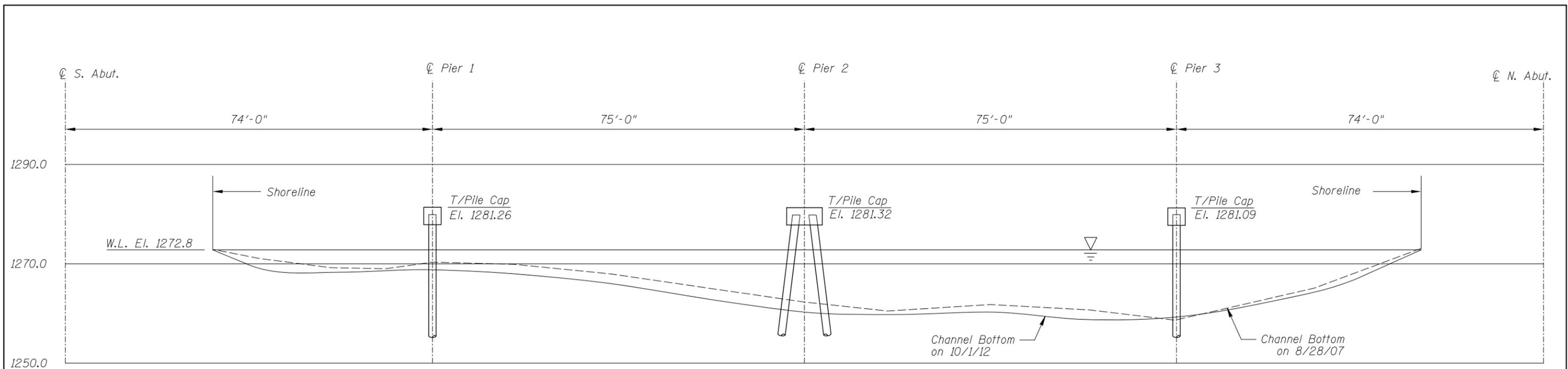
MINNESOTA
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UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 31510
CSAH 62 OVER THE MISSISSIPPI RIVER
ITASCA COUNTY

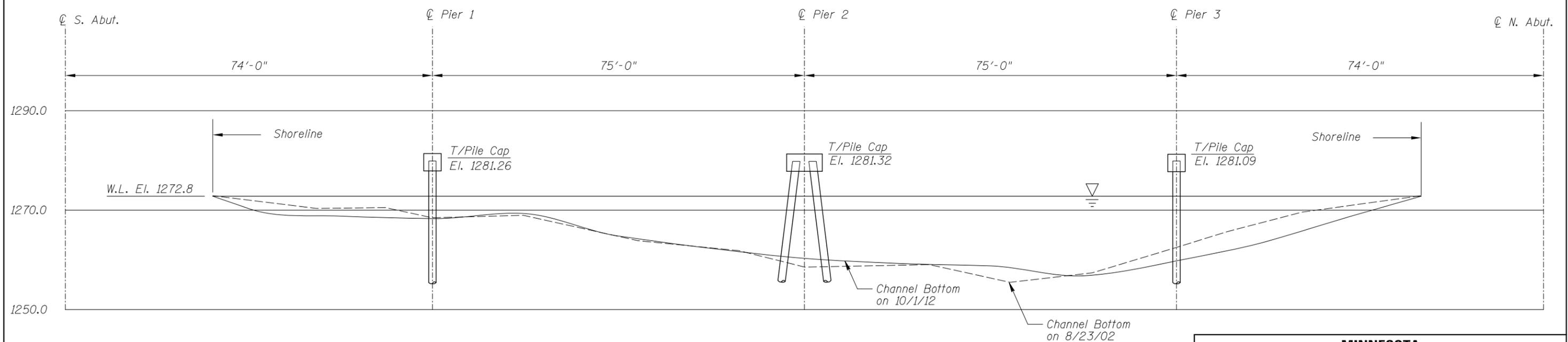
INSPECTION AND SOUNDING PLAN

Drawn By: MBP		Date: Jan. 2013
Checked By: LJ		Scale: NTS
Code: 742331510		Figure No.: 1

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Chicago, IL 60606
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UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 31510 CSAH 62 OVER THE MISSISSIPPI RIVER ITASCA COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: MBP	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: Jan. 2013
Checked By: LJ		Scale: 1"=20'
Code: 742331510		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: October 1, 2012

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.

BRIDGE NO: 31510 WEATHER: Sunny, 50 °F

WATERWAY CROSSED: The Mississippi River

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Clayton G. Brookins, Marc B. Parker

EQUIPMENT: Commercial Scuba, Scraper, Lead Line, Sounding Pole, and Probe Rod

TIME IN WATER: 12:00 P.M.

TIME OUT OF WATER: 1:00 P.M.

WATERWAY DATA: VELOCITY None/Negligible

VISIBILITY 5 feet

DEPTH 13.0 feet at Piers 2 and 3

ELEMENTS INSPECTED: Piers 1, 2, and 3.

REMARKS: Overall, the submerged steel of the piles at all piers was in good to satisfactory condition with coating failure and nodular corrosion from the waterline to the mudline. The overall extend of corrosion has not changed appreciably since the 2007 underwater inspection and has minimal related section loss with most of the associated pitting exhibiting penetrations of no more than 1/32 inch. In isolated infrequent instances, the pitting was up to 1/16 inch deep. There was scattered, light to moderate, steel debris and/or timber drift on the channel bottom at each of the piers with a moderate accumulation of organic material and vegetation along the upstream and bank sides of Pier 3. A prior crack defect at Pier 2 pile continues to be adequately repaired with a bolted collar. A previously noted deformed downstream battered pile on Pier 3 (possible installation related deformation) continues to be stable and not compromising the overall pier stability.

FURTHER ACTION NEEDED: YES NO

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. 31510
 INSPECTORS Collins Engineers, Inc.
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.
 WATERWAY CROSSED The Mississippi River

INSPECTION DATE October 1, 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
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	4.5'	6	N	N	9	N	6	8	8	8	7	7	N	6	N	6	N	N
	Pier 2	13.0'	6	N	N	9	N	6	8	N	N	7	7	N	6	N	6	7	N
	Pier 3	13.0'	6	N	N	9	N	6	8	8	8	6	7	N	6	N	6	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the submerged steel of the piles at all piers was in good to satisfactory condition with coating failure and nodular corrosion from the waterline to the mudline. The overall extend of corrosion has not changed appreciably since the 2007 underwater inspection and has minimal related section loss with most of the associated pitting exhibiting penetrations of no more than 1/32 inch. In isolated infrequent instances, the pitting was up to 1/16 inch deep. There was scattered, light to moderate, steel debris and/or timber drift on the channel bottom at each of the piers with a moderate accumulation of organic material and vegetation along the upstream and bank sides of Pier 3. A prior crack defect at Pier 2 pile continues to be adequately repaired with a bolted collar. A previously noted deformed downstream battered pile on Pier 3 (possible installation related deformation) continues to be stable and not compromising the overall pier stability.

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.