UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 7183

CSAH 100

OVER

ST. LOUIS RIVER

ST. LOUIS COUNTY

SEPTEMBER 19, 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 at Bridge No. 7183, Piers 1 and 2, were found to be in satisfactory to fair condition with several noteworthy concrete defects. Since the previous inspection, the concrete scaling around the waterline has increased in depth and total surface area coverage. The channel bottom inspected upstream and downstream of the substructure units appeared stable; however, a 5-foot-radius scour depression was observed around both columns of Pier 2. A light to moderate accumulation of timber debris was observed around Pier 2.

INSPECTION FINDINGS:

(A) Moderate scaling with some aggregate exposure from 4 feet above the waterline to 1.5 feet below the waterline with typical penetrations of 1/8 to 1/4 inch and up to 1 inch maximum penetration was present at the all columns of Piers 1 and 2. The scaling was heaviest from 1 foot below to 1.5 feet above the waterline on the south face of all columns, the west face of the downstream column of Pier 2 and the east face of the upstream columns of Piers 1 and 2

(B) An area of section loss, 2-foot-high by 2.5-feet-wide, was observed 0.5 feet below to 1.5 feet above the waterline with a maximum penetration of 2.5 inches on the downstream column of Pier 1. The concrete substrate within the area of section loss was typically flakey and unsound.

(C) A scour depression measuring 5 feet in radius with a depth of 2 feet was observed at the upstream and downstream columns of Pier 2.

(D) A light to moderate accumulation of 6 inch diameter and smaller timber debris was observed at the upstream column of Pier 2. The debris extended from the channel bottom up 3 feet.

RECOMMENDATIONS:

(A) Due to the current section loss and the apparent progression of concrete deterioration since the previous inspection, consideration could be given to repairing the concrete defects at the columns of Piers 1 and 2. Until the repairs are implemented, the defected areas should be monitored during future underwater inspections for any progression of section loss and/or exposure of reinforcing steel.

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

Respectfully submitted,

Inspection Team Leader:

Nicholas R. Triandafilou, P.E.

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: 7183

Feature Crossed: St. Louis River

Feature Carried: CSAH 100

Location: St. Louis County

Bridge Description: The structure consists of a three span concrete beam superstructure supported by two concrete abutments and two concrete piers. The piers are numbered 1 and 2 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Nicholas R. Triandafilou, P.E.

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

Date: September 19, 2012

Weather Conditions: Cloudy, 50^{o}F

Underwater Visibility: 2.0 Feet

Waterway Velocity: 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2.

General Shape: Piers 1 and 2 consist of the reinforced concrete cap supported by two concrete columns. The concrete columns are supported by rectangular footings founded on piles.

Maximum Water Depth at Substructure Inspected: Approximately 5.3 feet.

4. WATERLINE DATUM

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

Water Surface: The waterline was approximately 9.4 feet below reference.
Assumed Water Elevation = 90.6.

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/09/12

Item 113: Scour Critical Bridges: Code O/02

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
205	Reinforced Concrete Column	4	EA	0	4	0	0	n/a
361	Scour	1	EA	1	0	0	n/a	n/a
985	Slopes & Slope Protection	1	EA	0	1	0	n/a	n/a

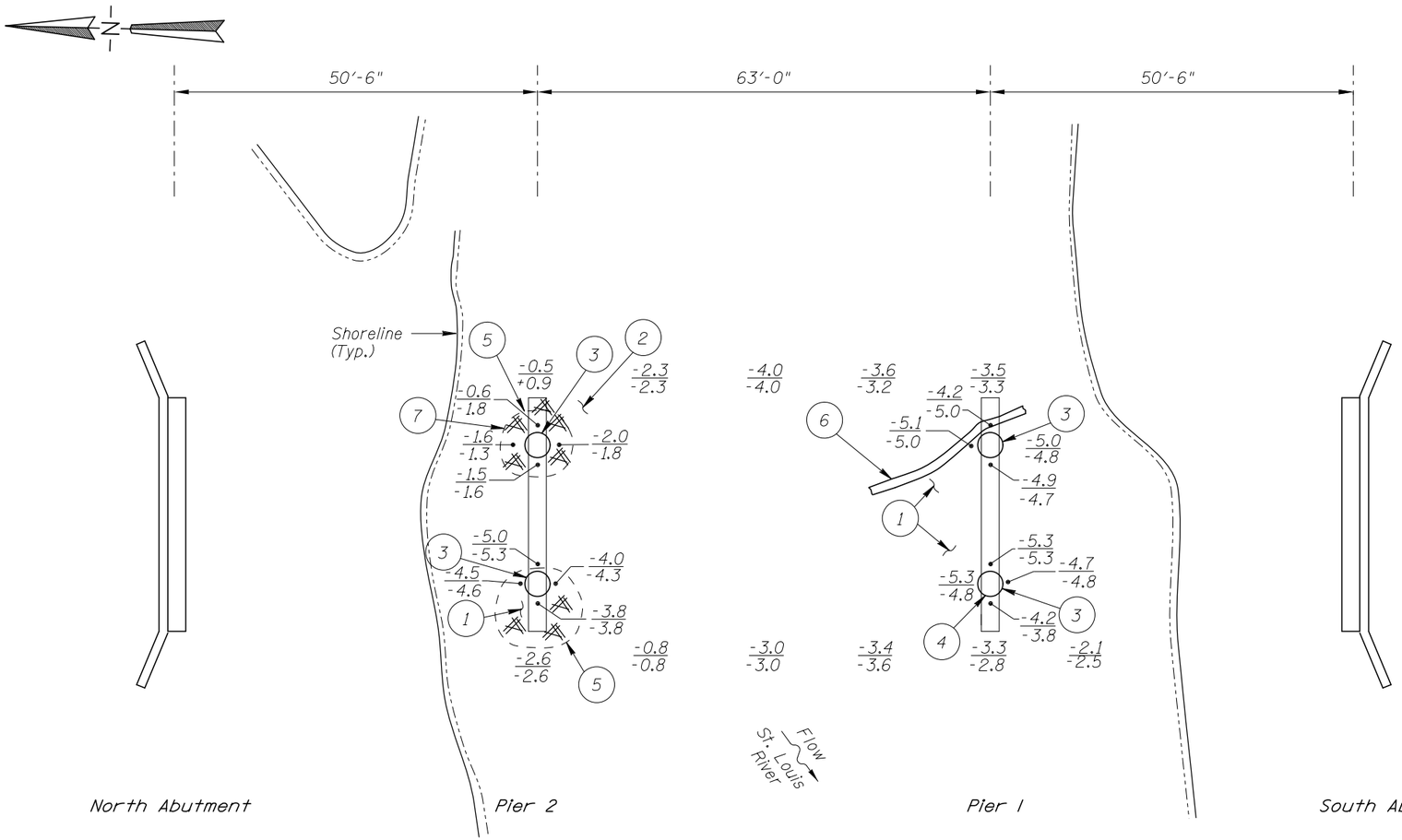
Photograph 1. Overall View of the Structure, Looking West.

Photograph 2. View of Pier 1, Looking Northeast.

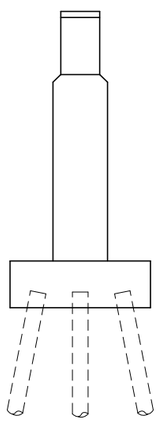
Photograph 3. View of Pier 2, Looking Northeast.

Photograph 4. View of Typical Scaling at the Waterline at the Downstream Column of Pier 2, Looking East.

Photograph 5. View of Heavier Scaling at the Downstream Column of Pier 1, Looking North.



SOUNDING PLAN



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on September 19, 2012, the waterline was located approximately 9.4 feet below the top of the cap at the upstream 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 90.6.
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 6 inch-diameter and smaller cobbles and random 1-foot-diameter riprap and a maximum probe rod penetration of 1 inch.

(2) The channel bottom consisted of soft silt and organic material with typical 1.5 feet of probe rod penetration at the upstream column of Pier 2.

(3) Moderate scaling with some aggregate exposure from 4 feet above the waterline to 1.5 feet below the waterline with typical penetrations of 1/8 to 1/4 inch and up to 1 inch maximum was observed around all columns of both piers.

(4) An area of heavy scaling/section loss was observed around the downstream column of Pier 1, 2-foot-high by 2.5-feet-wide at 0.5 feet below to 1.5 feet above the waterline with a maximum penetration of 2.5 inches. The concrete within the heavy scaling was flakey and unsound.

(5) A scour depression, 5 feet in radius with a depth of 2 feet, was observed at the upstream and downstream column of Pier 2. The accumulation of timber debris was observed within the depression.

(6) 6-to 12-inch-diameter log was observed from the channel bottom to the waterline along Pier 1 as shown.

(7) A light to moderate accumulation of 6-inch-diameter and smaller timber debris was at the upstream end of Pier 2. Accumulations extended from the channel bottom up 3 feet.

Legend

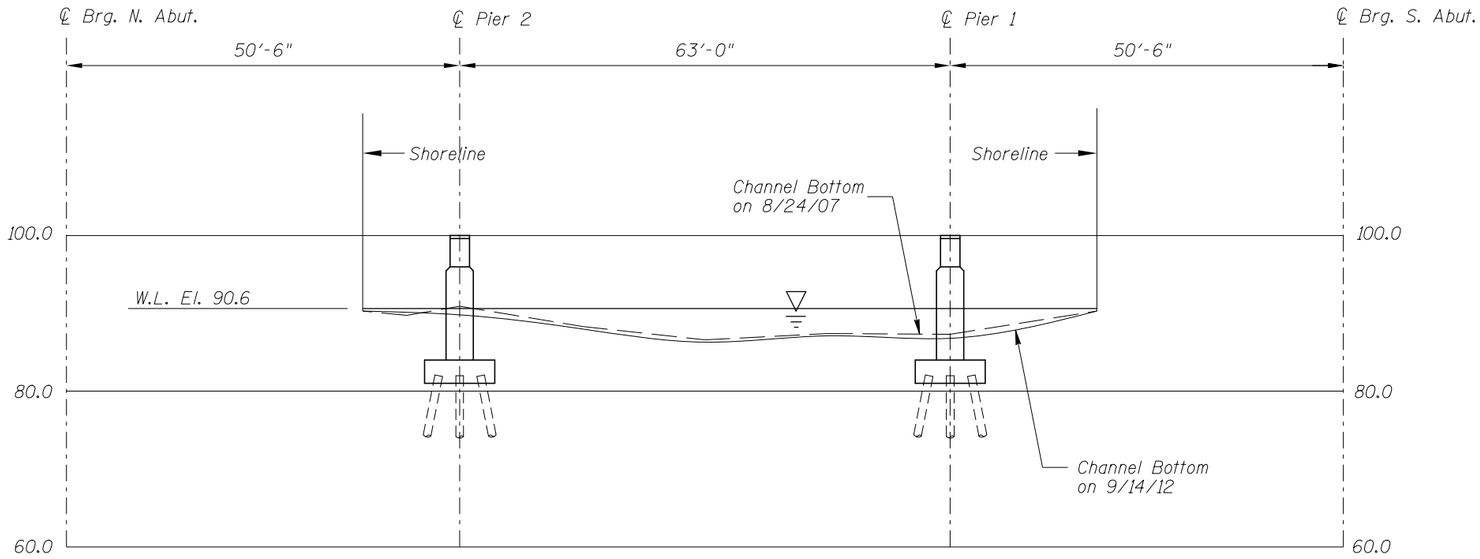
-2.5	Sounding Depth from Waterline (7/19/12)
-3.0	Sounding Depth from Waterline (8/24/07)
	Timber Debris
	Scour Depression

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

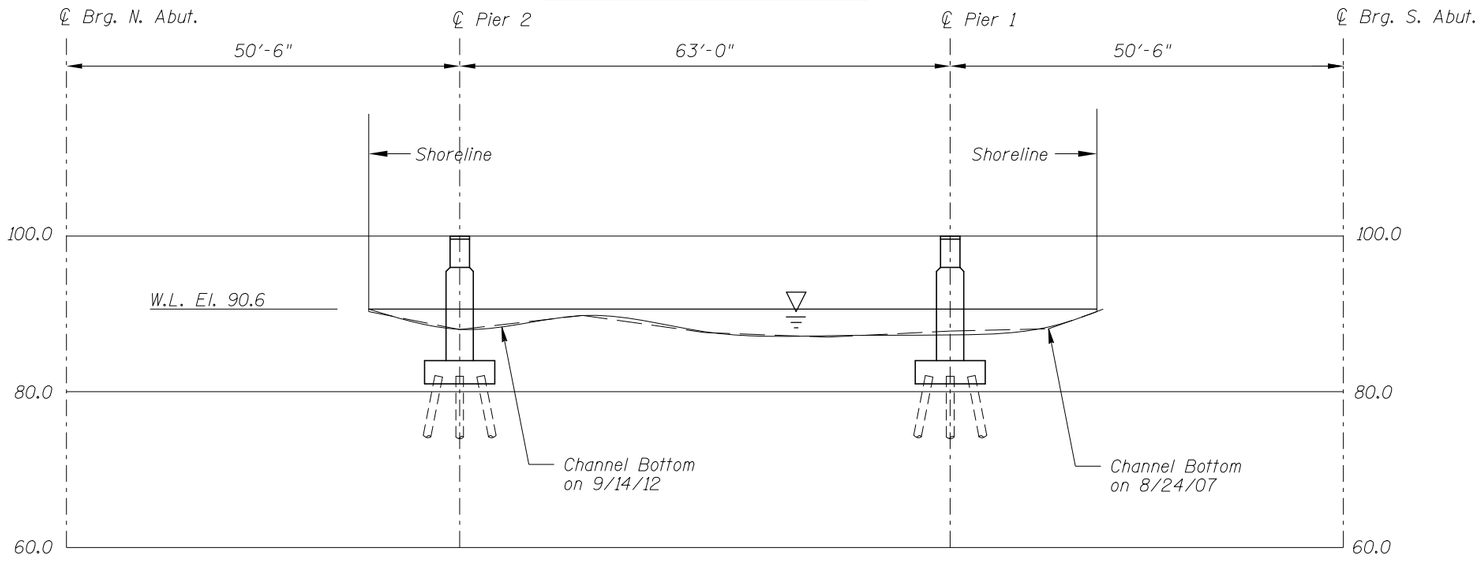
STRUCTURE NO. 7183
OVER THE ST. LOUIS RIVER
DISTRICT 1, ST. LOUIS COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: BMS	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: NOV. 2012
Checked By: LJ		Scale: NTS
Code: 742307183		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 7183
OVER THE ST. LOUIS RIVER
DISTRICT 1, ST. LOUIS COUNTY

UPSTREAM AND DOWNSTREAM
FASCIA PROFILES

Drawn By: BMS	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 900 Chicago, Il. 60606 (312) 704-9300 www.collinsengr.com	Date: NOV. 2012
Checked By: LJ		Scale: 1"=20'
Code: 74237183		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: September 19, 2012
ON-SITE TEAM LEADER: Nicholas R. Triandafilou, P.E.
BRIDGE NO: 7183 WEATHER: Cloudy, 50° F
WATERWAY CROSSED: St. Louis River
DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR
_____ OTHER _____
PERSONNEL: Marc B. Parker, Clayton G. Brookins
EQUIPMENT: Commercial Scuba, Hand Tools, Sounding Pole, Probe Rod, Camera
TIME IN WATER: 3:30 P.M.
TIME OUT OF WATER: 4:10 P.M.
WATERWAY DATA: VELOCITY 0.5 ft/sec
VISIBILITY 2.0 feet
DEPTH 5.3 feet at Piers 1 and 2
ELEMENTS INSPECTED: Piers 1 and 2
REMARKS: Overall, the substructure units inspected underwater were found to be in satisfactory to fair condition with several noteworthy concrete defects. Since the previous inspection, the concrete scaling around the waterline has increased in depth and total surface area coverage. The channel bottom inspected upstream and downstream of the substructure units appeared stable; however, a 5-foot-radius scour depression was observed around both columns of Pier 2. A light to moderate accumulation of timber debris was observed around Pier 2.

FURTHER ACTION NEEDED: _____ YES X NO

Due to the current section loss and the apparent progression of concrete deterioration since the previous inspection, consideration could be given to repairing the concrete defects at the columns of Piers 1 and 2. Until the repairs are implemented, the defected areas should be monitored during future underwater inspections for any progression of section loss and/or exposure of reinforcing steel.

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. 7183
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Nicholas R. Triandafilou, P.E.
WATERWAY CROSSED St. Louis River

INSPECTION DATE September 19, 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

			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	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	5.3’	N	6	N	8	N	6	7	7	8	6	6	6	N	N	6	N	N
	Pier 2	5.0’	N	6	N	8	N	6	6	7	8	6	6	6	N	N	6	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the substructure units inspected underwater were found to be in satisfactory to fair condition with several noteworthy concrete defects. Since the previous inspection, the concrete scaling around the waterline has increased in depth and total surface area coverage. The channel bottom inspected upstream and downstream of the substructure units appeared stable; however, a 5-foot-radius scour depression was observed around both columns of Pier 2. A light to moderate accumulation of timber debris was observed around Pier 2.

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.