

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 69518

CSAH 4

OVER THE

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 unit inspected at Bridge No. 69518, Pier 2, was found to be in satisfactory to fair condition below water with some defects of structural significance. The concrete of the pier wall and exposed footing was sound with a band of light scaling. A 2 foot deep scour pocket was observed extending from the upstream nose along the south face to the downstream nose. The footing was exposed at both the upstream and downstream noses and along the entire south face of the pier with a maximum vertical exposure of 4.4 feet at the upstream south corner. A large tree was observed extending from Pier 2 to the shoreline. The upstream and downstream shorelines were heavily eroded with a maximum undercutting of 10 feet.

INSPECTION FINDINGS:

- (A) The channel bottom material on the north face of Pier 2 consisted of stones and cobbles up to 2 feet in diameter with no appreciable probe rod penetration.
- (B) The channel bottom material to the south of Pier 2 consisted of firm sand and scattered cobbles with a typical probe rod penetration of 1 inch.
- (C) The concrete of the pier wall and footing was typically sound with a band of light scaling extending from the top of the footing to 2 feet above the waterline. The scaling had a typical penetration of 1/16 inch and a maximum of 1/8 inch.
- (D) A 2 foot deep scour pocket was observed that extended 8 feet off the upstream and downstream noses and along the entire south face of Pier 2. Within the scour pocket the concrete footing of Pier 2 was exposed with a maximum vertical exposure of 4.4 feet at the upstream south corner.
- (E) A 10 inch diameter tree was observed extending from the upstream nose of Pier 2 to the north shoreline.

- (F) The upstream and downstream shorelines were heavily eroded with a maximum undercutting of 10 feet.

RECOMMENDATIONS:

- (A) Since the foundation design is unknown place riprap or other scour countermeasure along the south face and at the upstream and downstream noses of Pier 2. Until such measures are implemented, monitor the scour and footing exposure during future inspections.
- (B) Monitor shoreline erosion during future inspections.
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Inspection Team Leader:



Nicholas R. Triandafilou, P.E.

Respectfully submitted,

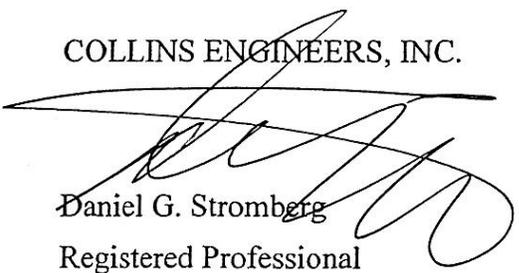
PROFESSIONAL ENGINEER

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: 69518

Feature Crossed: St. Louis River

Feature Carried: CSAH No. 4

Location: St. Louis County

Bridge Description: The superstructure is three spans of multiple concrete girders supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete piers. There was no available foundation detail plans for this structure at the time of the inspection. The piers are numbered 1 through 2 from the south to north.

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°F

Underwater Visibility: 3.0 feet

Waterway Velocity: 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Pier 2

General Shape: Pier 2 was a reinforced concrete hammerhead pier. The pier shaft is supported on a continuous rectangular footing. The footing details were unknown at the time of inspection.

Maximum Water Depth at Substructure Inspected: Approximately 5.5 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at the upstream nose of Pier 2.

Water Surface: The waterline was approximately 20.2 feet below reference.

Water Elevation = 79.8.

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 5

Item 92B: Underwater Inspection: Code B/09/12

Item 113: Scour Critical Bridges: Code I/12

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	2	EA	2	0	0	0	n/a
220	Reinforced Concrete Footing	1	EA	1	0	0	0	n/a
361	Scour	1	EA	0	1	0	n/a	n/a
985	Slopes & Slope Protection	1	EA	0	1	0	n/a	n/a



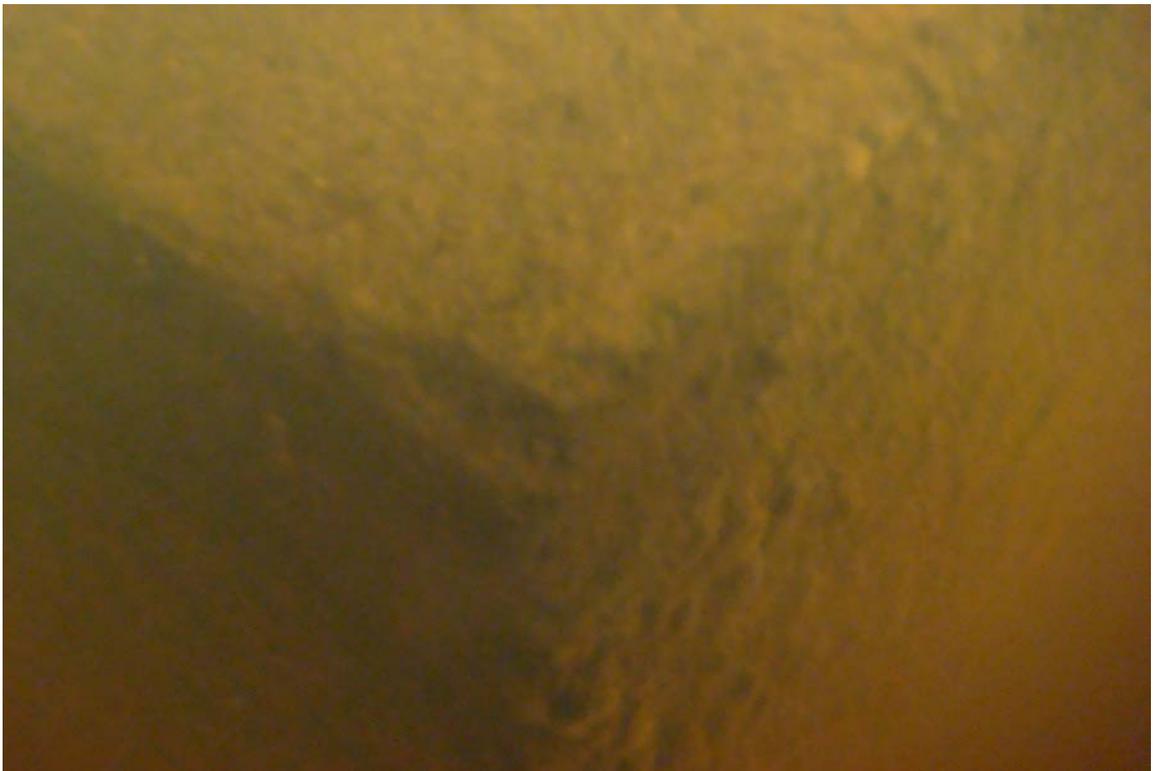
Photograph 1. Overall View, Looking Southwest.



Photograph 2. Pier 1, Looking Southeast.



Photograph 3. Pier 2, Looking Southeast.



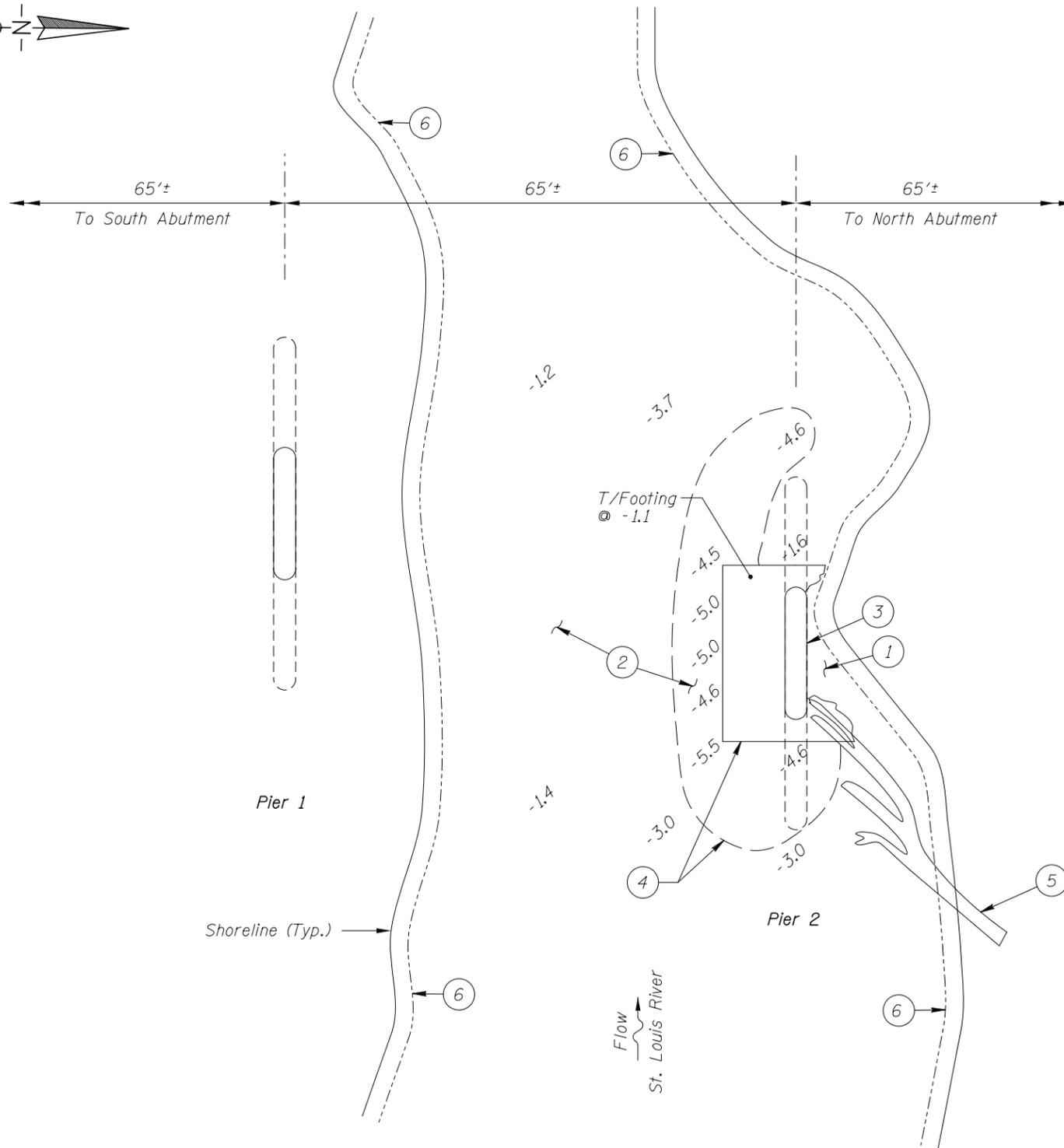
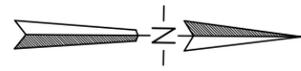
Photograph 4. View of the Pier 2 Footing at the Southwest Corner, Looking Down.



Photograph 5. View of Tree Extending From Pier 2 to the Shoreline, Looking East.



Photograph 6. View of Heavy Shoreline Erosion Downstream of Pier 2, Looking Southeast.



SOUNDING PLAN

GENERAL NOTES:

1. Pier 2 was inspected at this bridge.
2. At the time of inspection on September 19, 2012, the waterline was located approximately 20.2 feet below the top of pier cap on the upstream nose of Pier 2. Since elevation information was not available, a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 98.7
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.

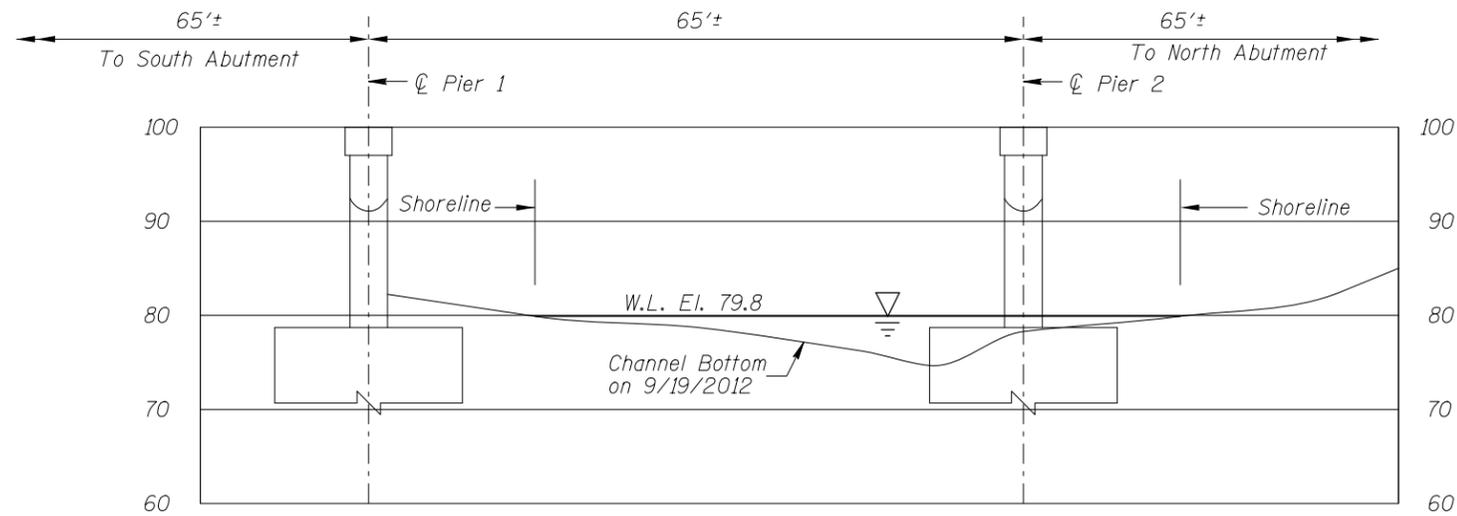
INSPECTION NOTES:

- ① The channel bottom material consisted of stones and cobbles up to 2 feet in diameter with no appreciable probe rod penetration.
- ② The channel bottom material consisted of firm sand and scattered cobbles with a typical probe rod penetration of 1 inch.
- ③ The concrete of the pier wall and footing was typically sound with a band of light scaling extending from the top of the footing to 2 feet above the waterline. The scaling had a typical penetration of 1/6 inch and a maximum of 1/8 inch.
- ④ A 2 foot deep scour pocket was observed that extended 8 feet off the upstream and downstream nose and along the entire south face of Pier 2. Within the scour pocket the concrete footing of Pier 2 was exposed with a maximum vertical exposure of 4.4 feet at the upstream south corner.
- ⑤ A 10 inch diameter tree was observed extending from the upstream nose of Pier 2 to the north shoreline as shown.
- ⑥ The upstream and downstream shorelines were heavily eroded with a maximum undercutting of 10 feet.

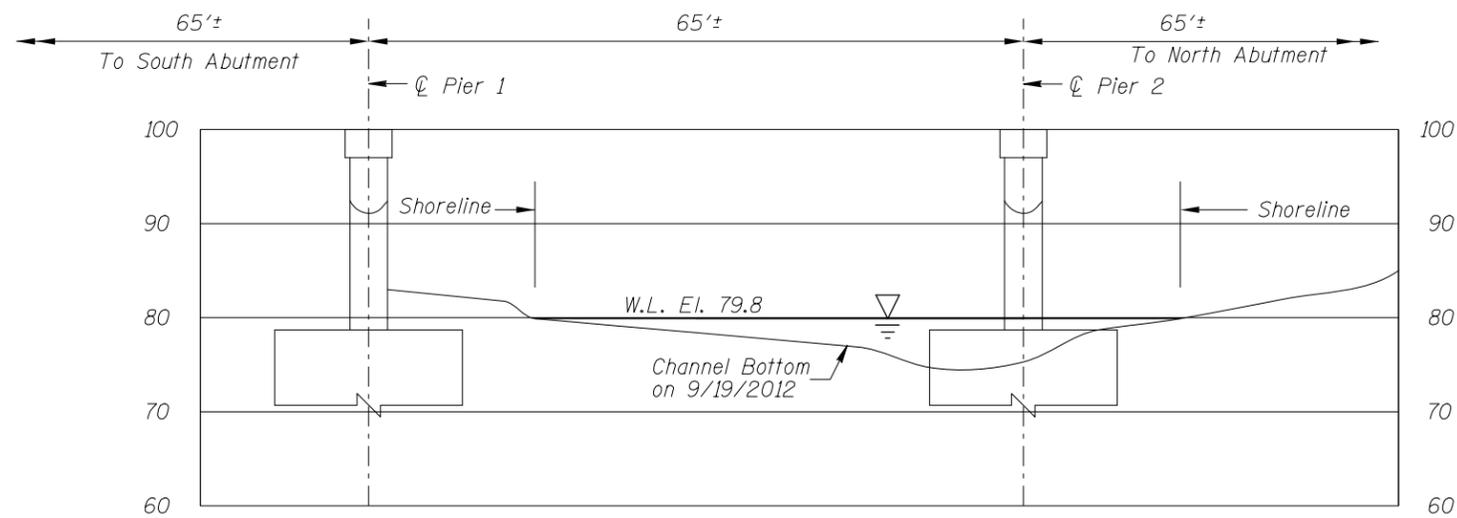
Legend

-1.0 Sounding Depth (8/25/07)

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 69518 CSAH 4 OVER THE ST. LOUIS RIVER ST. LOUIS COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: MBP	COLLINS ENGINEERS	Date: NOVEMBER, 2012
Checked By: LJ	<small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Scale: NTS
Code: 742369518		Figure No.: I



DOWNSTREAM FASCIA PROFILE



UPSTREAM FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 69518 CSAH 4 OVER THE ST. LOUIS RIVER ST. LOUIS COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: MBP	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 200 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: NOVEMBER, 2012
Checked By: LJ		Scale: 1"=20'
Code: 742369518		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 69518
 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

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			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
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 2	5.5'	N	7	6	N	N	6	5	5	6	6	5	7	N	N	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the substructure unit inspected underwater was found to be in satisfactory to fair condition below water with some defects of structural significance. The concrete of the pier wall and exposed footing was sound with a band of light scaling. A 2 foot deep scour pocket was observed extending from the upstream nose along the south face to the downstream nose. The footing was exposed at both the upstream and downstream noses and along the entire south face of the pier with a maximum vertical exposure of 4.4 feet at the upstream south corner. A large tree was observed extending from Pier 2 to the shoreline. The upstream and downstream shorelines were heavily eroded with a maximum undercutting of 10 feet.

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
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: September 19, 2012
ON-SITE TEAM LEADER: Nicholas R. Triandafilou, P.E.
BRIDGE NO: 36517 WEATHER: Sunny, 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, Probe Rod, Camera
TIME IN WATER: 5:00 P.M.
TIME OUT OF WATER: 6:00 P.M.
WATERWAY DATA: VELOCITY 0.5 f.p.s
VISIBILITY 3.0 feet
DEPTH 5.5 feet maximum at Pier 2
ELEMENTS INSPECTED: Pier 2
REMARKS: Overall, the substructure unit inspected underwater was found to be in satisfactory to fair condition below water with some defects of structural significance. The concrete of the pier wall and exposed footing was sound with a band of light scaling. A 2 foot deep scour pocket was observed extending from the upstream nose along the south face to the downstream nose. The footing was exposed at both the upstream and downstream noses and along the entire south face of the pier with a maximum vertical exposure of 4.4 feet at the upstream south corner. A large tree was observed extending from Pier 2 to the shoreline. The upstream and downstream shorelines were heavily eroded with a maximum undercutting of 10 feet.

FURTHER ACTION NEEDED: X YES NO

Since the foundation design is unknown place riprap or other scour countermeasure along the south face and at the upstream and downstream noses of Pier 2. Until such measures are implemented, monitor the scour and footing exposure during future inspections.

Monitor shoreline erosion during future inspections.

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