

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 31516

CR 441

OVER THE

MISSISSIPPI RIVER

ITASCA COUNTY



OCTOBER 2, 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. 31516, Piers 1, 2 and 3, were found to be in satisfactory condition with no defects of structural significance. The submerged steel piles exhibited approximately 100 percent coating failure and 50 to 100 percent nodular corrosion from 8 feet above the waterline to the mudline. There was minimal loss of section below the waterline with typical 1/32 inch deep to maximum 1/16 inch deep (very infrequent) pitting. From the waterline to 6 feet above there was moderate corrosion with rust delaminations and pitting ranging from 1/16 to 1/8 inch in depth. There was very light scattered timber drift around the piles of Pier 3 with a moderate accumulation of up to 1-foot-diameter timber debris across both upstream piles of Pier 2. There was a 2 feet deep scour depression around the upstream piles of Pier 2.

INSPECTION FINDINGS:

- (A) The steel pipe piles exhibited 100 percent coating failure from 8 feet above the waterline to the mudline with 50 to 100 percent coverage of nodular corrosion. The rust nodules were 1/4 to 1/2 inch in diameter typically and up to 1-1/2 inch in diameter on Piers 2 and 3.
- (B) From 6 feet above the waterline down to the waterline at all pier piles there was moderate corrosion with rust delaminations and pitting having depths ranging from 1/16 to 1/8 inch. There was minimal loss of section associated with pitting that was typically 1/32 inch to maximum of 1/16 inch in depth from the waterline to the channel bottom.
- (C) The upstream two piles at Pier 2 exhibited minor scour pockets that were 2 feet in depth and 5 feet in radius.

- (D) A moderate accumulation of timber debris was observed at the upstream nose of Pier 2 and a light accumulation of timber debris was present at the upstream end of Pier 3.

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: 31516

Feature Crossed: The Mississippi River

Feature Carried: TWP No. 441

Location: Itasca County

Bridge Description: The superstructure consists of four spans of prestressed concrete beams supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and three steel pipe (CIP) pile piers. The piers are numbered 1 through 3 from west to east across the bridge.

2. INSPECTION DATA

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

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

Date: October 2, 2012

Weather Conditions: Sunny, 55°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 are each made up of a single line of 10 steel pipe (CIP) piles.
Pier 2 consists of two lines of 6 steel pipe (CIP) piles each.

Maximum Water Depth at Substructure Inspected: Approximately 5.5 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap on the south end of Pier 1.

Water Surface: The waterline was approximately 22.0 feet below reference.
Assumed Waterline Elevation = 78.0.

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 N

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	32	EA		32			
985	Slopes & Slope Protection	1	EA	1				



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



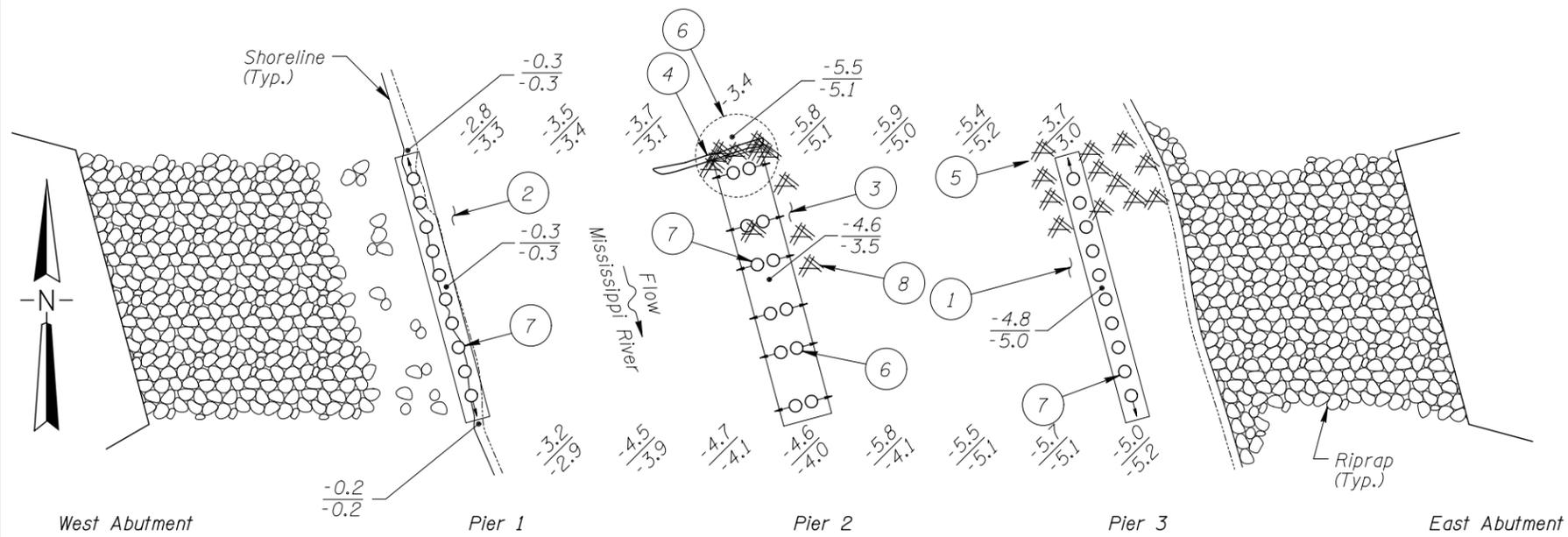
Photograph 2. View of Pier 1, Looking Southwest.



Photograph 3. View of Pier 2, Looking Northeast.



Photograph 4. View of Pier 3, Looking Northeast.



SOUNDING PLAN

GENERAL NOTES:

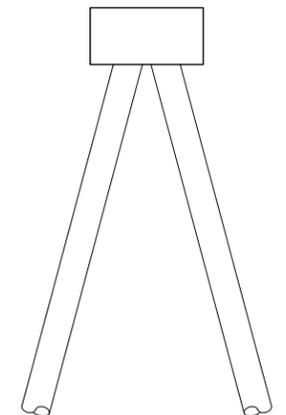
1. Piers 1, 2, and 3 were inspected at this bridge.
2. At the time of inspection on October 2, 2012, the waterline was located approximately 22.0 feet below the top of the cap at the south end of Pier 1. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 78.0.
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 firm sandy gravel with cobbles and 1 foot diameter riprap allowing 2 to 3 inches of probe rod penetration.
- 2 The channel bottom material consisted of silty sand with cobbles and scattered riprap allowing up to 6 inches of probe rod penetration.
- 3 The channel bottom consisted of silty sand allowing up to 1 foot of probe rod penetration.
- 4 Moderate accumulation of up to 1 foot diameter timber debris extending from the channel bottom to waterline. Also 1 foot and 6 inch diameter logs across both upstream piles of Bent 2 that extend off to the west of pier.
- 5 Light random accumulation of timber debris consisting of 4 inch diameter and smaller logs and branches on the channel bottom in and around all piles of the pier.
- 6 Minor scour pockets, 1 to 2 feet deep with 1 to 2 feet radius, were observed at all piles. At upstream end of Pier 2 scour was 2 feet deep and 5 feet in radius.
- 7 Steel pipe piles exhibited 100% coating failure from 8 feet above the waterline to the channel bottom with 50 to 100% coverage of typically 1/4 to 1/2 inch diameter rust nodules and up to 1 1/2 inch diameter rust nodules from the waterline to the channel bottom of Piers 2 and 3. From 6 feet above waterline to waterline corrosion was moderate with delaminations and pitting 1/16 inch to 1/8 inch maximum in depth. From waterline to channel bottom there was minimal loss of section with pitting that was typically 1/32 inch to maximum 1/16 inch deep.
- 8 A light random accumulation of timber debris consisting of 8 inch diameter and smaller logs and branches on the channel bottom east of the pier extending from the upstream nose to the pier midpoint.



END VIEW PIERS 1 & 3



END VIEW PIER 2

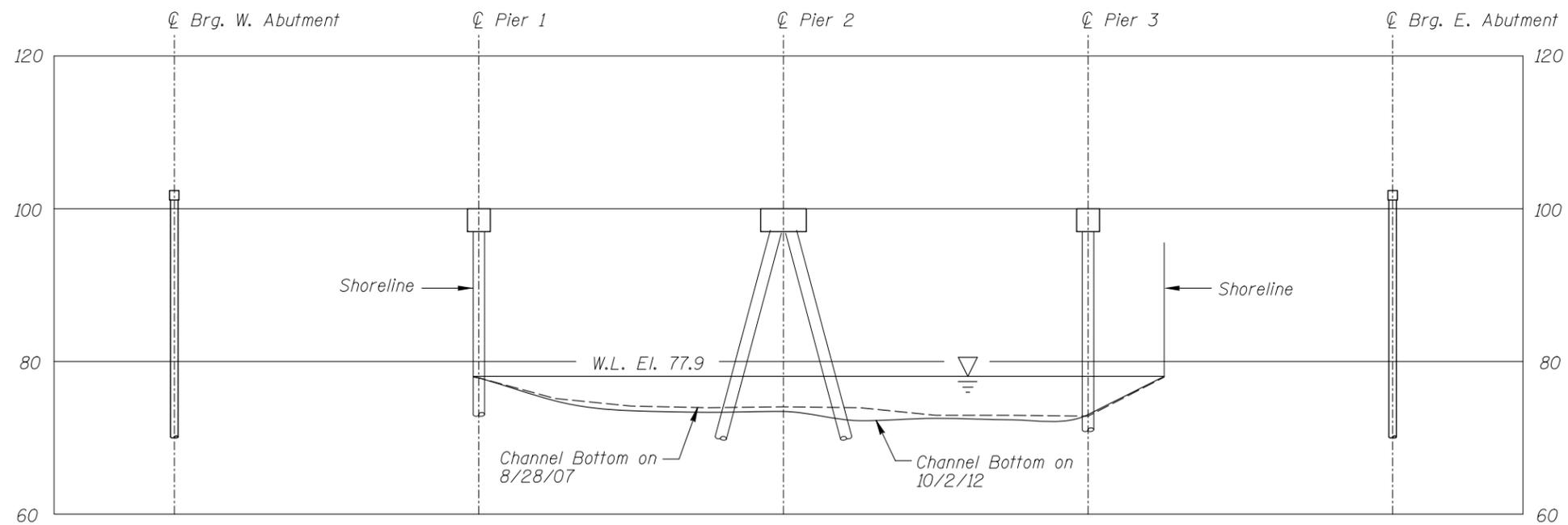
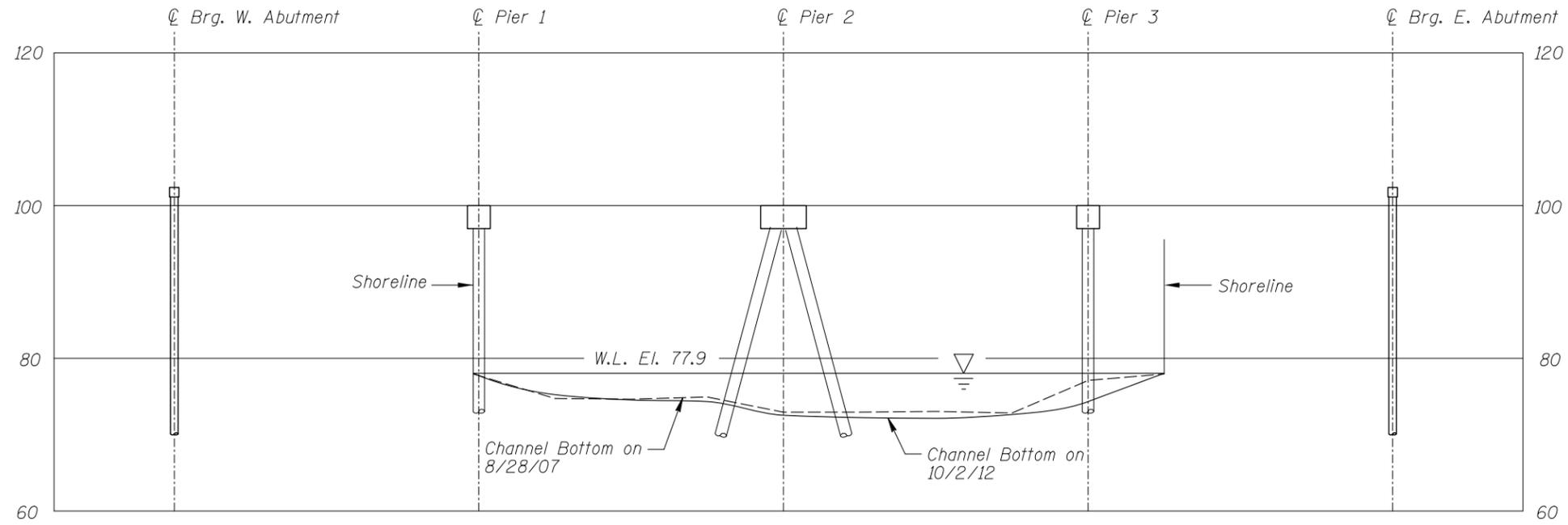
Legend

- 2.0 Sounding Depth (10/2/12)
- 5.2 Sounding Depth (8/28/07)
- Steel Pipe Pile
- Battered Steel Pipe Pile
- Scour Depression
- ⊗ Timber Debris

Note:

All soundings based on 2012 waterline location.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 31516 CR 4410VER THE MISSISSIPPI RIVER ITASCA COUNTY		
INSPECTION AND SOUNDING PLAN		
Drawn By: MBP	COLLINS ENGINEERS	Date: JAN., 2013
Checked By: LJ	<small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Scale: NTS
Code: 742331516		Figure No.: I



Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 31516 CR 441 OVER THE MISSISSIPPI RIVER ITASCA COUNTY		
NORTH AND SOUTH 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: NTS (U.O.N.)
Code: 742331516		Figure No.: 2

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

INSPECTORS: Collins Engineers, Inc. DATE: October 2, 2012

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

BRIDGE NO: 31516 WEATHER: Sunny, 55 °F

WATERWAY CROSSED: The Mississippi River

DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR
 OTHER

PERSONNEL: Clayton G. Brookins, Marc B. Parker

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

TIME IN WATER: 9:00 A.M.

TIME OUT OF WATER: 10:00 A.M.

WATERWAY DATA: VELOCITY None/Negligible

VISIBILITY 5 feet

DEPTH 5.5 Feet maximum at Pier 2

ELEMENTS INSPECTED: Piers 1, 2, and 3

REMARKS: Overall, the submerged steel piles exhibited approximately 100 percent coating failure and 50 to 100 percent nodular corrosion from 8 feet above the waterline to the channel bottom. There was minimal loss of section below the waterline with typical 1/32 inch deep to maximum 1/16 inch deep (very infrequent) pitting. From the waterline to 6 feet above there was moderate corrosion with rust delaminations and pitting ranging from 1/16 to 1/8 inch in depth. There was very light scattered timber drift around the piles of Pier 3 with a moderate accumulation of up to 1-foot-diameter timber debris across both upstream piles of Pier 2. There was a 2 feet deep scour depression around the upstream piles of Pier 2.

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. 31516
 INSPECTORS Collins Engineers, Inc.
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.
 WATERWAY CROSSED The Mississippi River

INSPECTION DATE October 2, 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 1	0.2'	6	N	N	9	N	6	8	8	8	8	8	N	6	N	6	N	N
	Pier 2	5.5'	6	N	N	9	N	6	7	N	N	6	6	N	6	N	6	N	N
	Pier 3	5.0'	6	N	N	9	N	6	8	8	8	7	7	N	6	N	6	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the submerged steel piles exhibited approximately 100 percent coating failure and 50 to 100 percent nodular corrosion from 8 feet above the waterline to the channel bottom. There was minimal loss of section below the waterline with typical 1/32 inch deep to maximum 1/16 inch deep (very infrequent) pitting. From the waterline to 6 feet above there was moderate corrosion with rust delaminations and pitting ranging from 1/16 to 1/8 inch in depth. There was very light scattered timber drift around the piles of Pier 3 with a moderate accumulation of up to 1-foot-diameter timber debris across both upstream piles of Pier 2. There was a 2 feet deep scour depression around the upstream piles of 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.