

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 55031

5<sup>th</sup> STREET NW

OVER THE

SOUTH BRANCH, MIDDLE FORK, ZUMBRO RIVER

OLMSTED COUNTY

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SEPTEMBER 12, 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. 55031, Piers 1 and 2, were found to be generally in satisfactory condition with no defects of structural significance observed. All of the steel shells of the cast-in-place concrete piles typically exhibited loss of protective coating and minor surface corrosion from channel bottom to 10 feet above the waterline. Heavy accumulations of timber debris were observed at both piers extending a maximum of 8 feet above waterline. A scour pocket was observed at the upstream pile of Pier 2 with a maximum depth of 1 foot.

INSPECTION FINDINGS:

- (A) Steel piles exhibited coating failure with light surface corrosion over 100 percent of the surface area from channel bottom to 10 feet above waterline.
- (B) The channel bottom material consisted of silty sand allowing 1 foot of maximum probe rod penetration.
- (C) A heavy accumulation of timber debris, consisting of 1.5 foot diameter and smaller logs and branches, was observed around the perimeter of Pier 2 extending from the channel bottom up 5 feet.
- (D) A heavy accumulation of timber debris, consisting of 2 feet diameter and smaller logs and branches, was observed at the north side of Pier 1 extending from the channel bottom to 8 feet above the waterline.
- (E) A scour depression measuring 4 feet in radius by 1 foot deep was observed at the upstream pile at Pier 2.

RECOMMENDATIONS:

- (A) Monitor accumulations of timber debris during future inspections and consider removal operations in order to reduce channel obstruction, additional lateral loads on the substructure, as well as scour susceptibility at the bridge site.
  
- (B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

**Inspection Team Leader**



**Roy A. Forsyth, PE**  
**Date 6/30/2014 License# 49270**

Respectfully submitted,

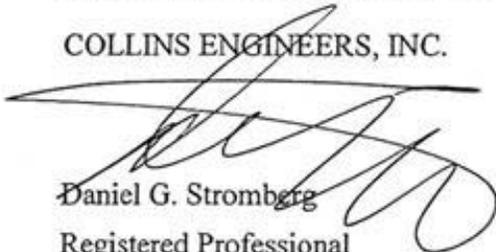
PROFESSIONAL ENGINEER

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: 55031

Feature Crossed: South Branch, Middle Fork, Zumbro River

Feature Carried: 5<sup>th</sup> Street NW

Location: Olmsted County

Bridge Description: The superstructure consists of a concrete deck resting on three prestressed concrete multi-girder spans supported by two reinforced concrete abutments and two cast-in-place pile piers. The substructure units are designated as North Abutment, Piers 1 and 2, and South Abutment.

2. INSPECTION DATA

Professional Engineer/Team Leader: Roy A. Forsyth, P.E.

Dive Team: Charles R. Euwema, Brandon Corr

Date: September 12, 2012

Weather Conditions: Overcast, 60° F

Underwater Visibility: 0.5 feet

Waterway Velocity: 0.5 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2.

General Shape: Each pier consists of concrete pier cap supported by a single row of eight cast-in-place (CIP) concrete piles.

Maximum Water Depth at Substructure Inspected: Approximately 2.9 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap at downstream end of Pier 2

Water Surface: The waterline was approximately 16.5 feet below reference.  
Waterline Elevation = 943.6

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/9/12

Item 113: Scour Critical Bridges: Code R/07

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

X  Yes   No

6. STRUCTURAL ELEMENT CONDITION RATING

| Item # | Element Description         | Quantity | Unit | Conditions |    |   |   |   |
|--------|-----------------------------|----------|------|------------|----|---|---|---|
|        |                             |          |      | 1          | 2  | 3 | 4 | 5 |
| 382    | Cast-In-Place (CIP) Piling  | 16       | LF   |            | 16 |   |   |   |
| 985    | Slopes and Slope Protection | 1        | EA   | 1          |    |   |   |   |



Photograph 1. View of Pier 1, Looking Southwest.



Photograph 2. View of Pier 2, Looking Southeast.



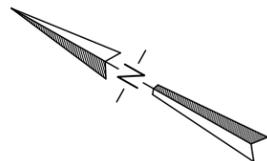
Photograph 3. Overall View of the Structure, Looking East.



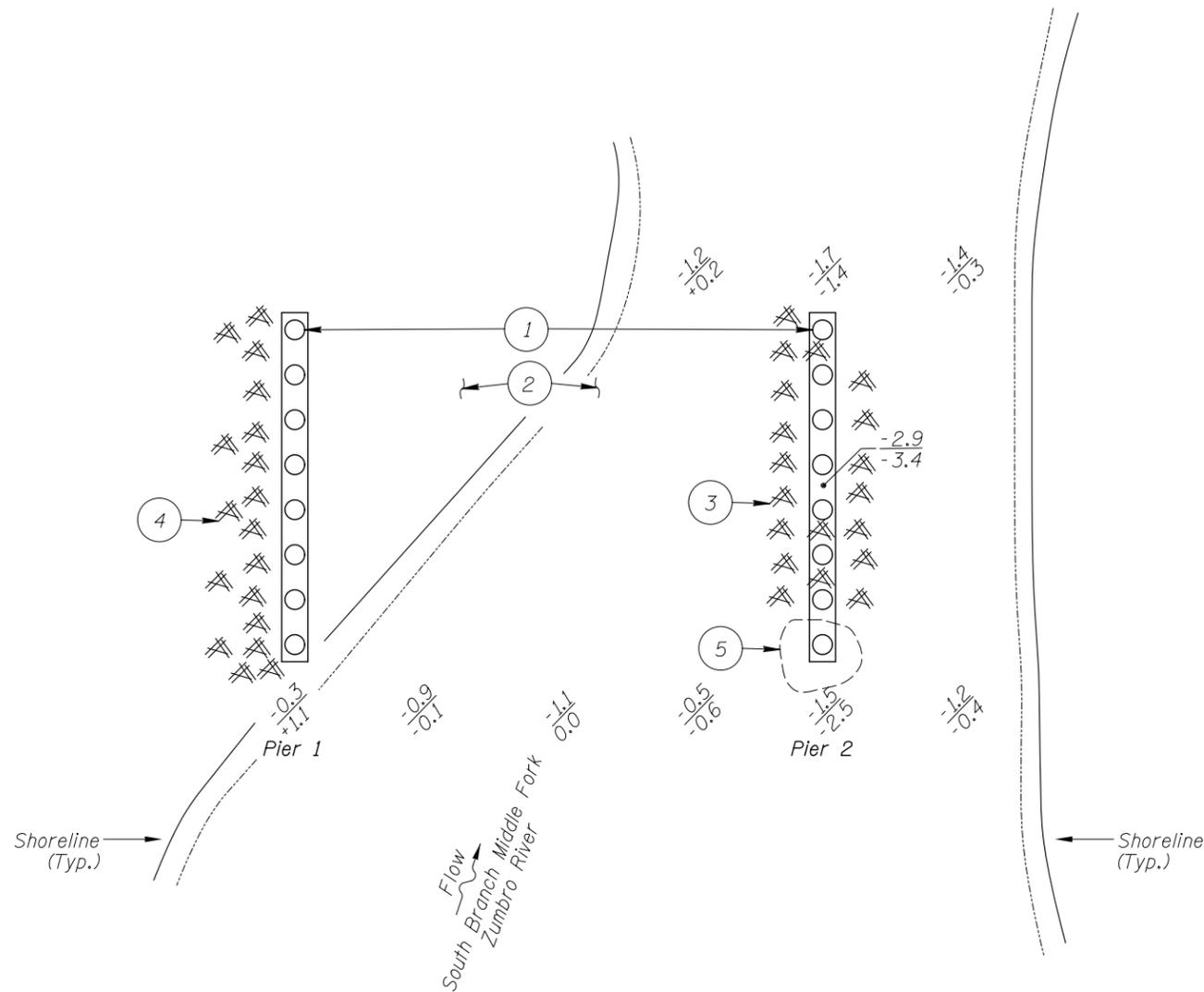
Photograph 4. View of North Abutment, Looking Northwest.



Photograph 5. View of South Abutment, Looking Southwest.

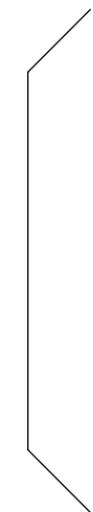


North Abutment



INSPECTION NOTES:

- ① Steel piles exhibited coating failure with light surface corrosion over 100 percent of the surface area from channel bottom to 10 feet above the waterline.
- ② The channel bottom material consisted of silty sand allowing 1 foot of maximum probe rod penetration.
- ③ A heavy accumulation of timber debris, consisting of 1.5 foot diameter and smaller logs and branches, was observed around the perimeter of Pier 2 extending from the channel bottom up 5 feet.
- ④ A heavy accumulation of timber debris, consisting of 2 feet diameter and smaller logs and branches, was observed along the north side of Pier 1 extending from the channel bottom to 8 feet above the waterline.
- ⑤ A scour depression measuring 4 feet radially by 1 foot deep was observed at the upstream pile at Pier 2.



South Abutment



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection, on September 12, 2012, the waterline was located approximately 16.5 feet below the top of pier cap of the downstream end of Pier 2. This corresponds to waterline elevation of 943.6 feet based on bridge design plans dated February 26, 1985.
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.

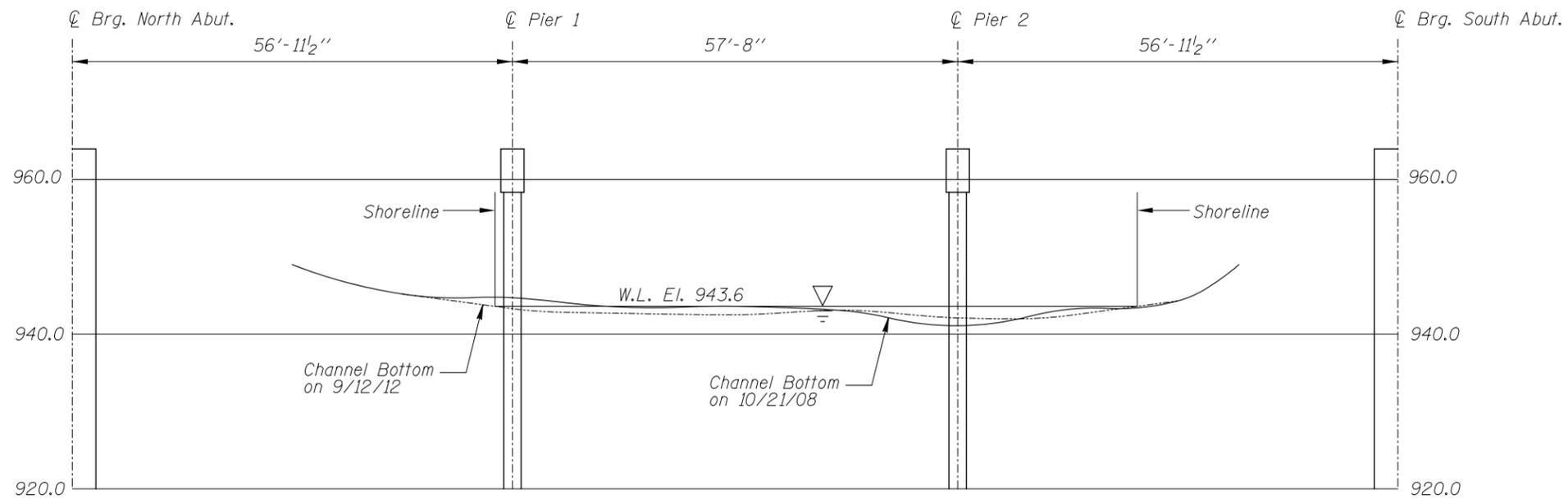
Legend

- 0.4 Sounding Depth (9/12/12)
- 0.4 Sounding Depth (10/21/08)
- Timber Debris

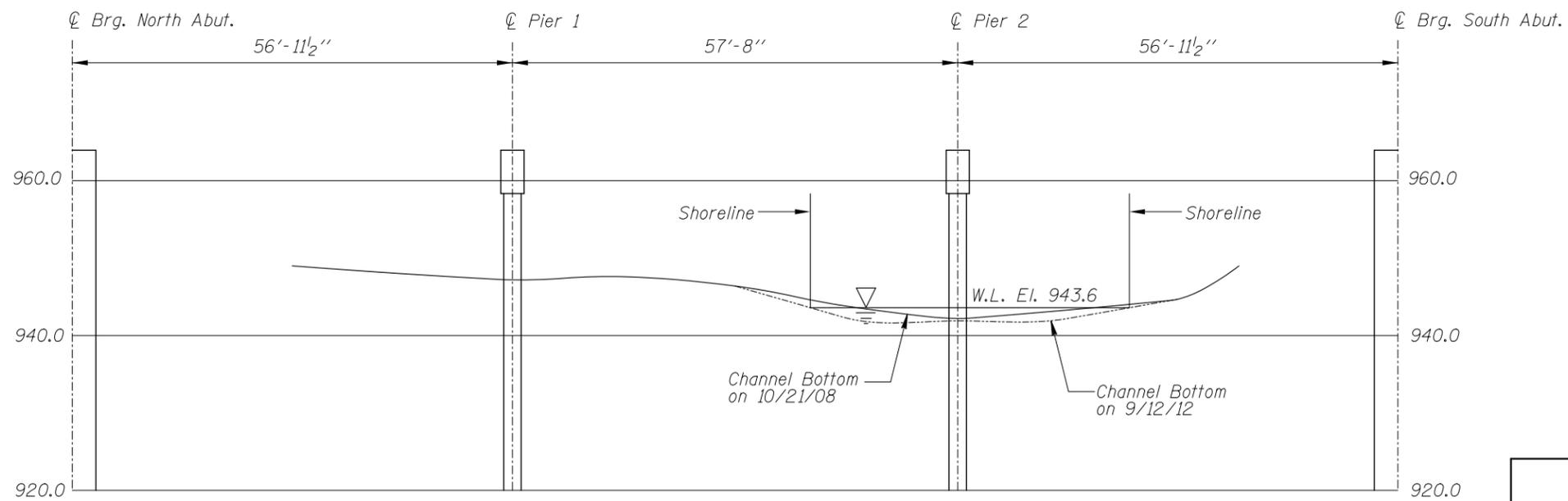
Note:

All soundings based of 2012 waterline location.

|   |  |                  |
|---|--|------------------|
| <b>MINNESOTA<br/>DEPARTMENT OF TRANSPORTATION<br/>UNDERWATER BRIDGE INSPECTION</b>      |  |                  |
| STRUCTURE NO. 55031<br>OVER THE SOUTH BRANCH MIDDLE FORK ZUMBRO RIVER<br>OLMSTED COUNTY |  |                  |
| <b>INSPECTION AND SOUNDING PLAN</b>   |  |                  |
| Drawn By: CRE   | <b>COLLINS ENGINEERS</b>   | Date: SEPT. 2012 |
| Checked By: LJ  | <small>123 North Wacker Drive<br/>Suite 900<br/>Chicago, IL 60606<br/>(312) 704-9300<br/>www.collinsengr.com</small> | Scale: NTS       |
| Code: 742355031   |  | Figure No.: 1    |



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:  
Refer to Figure 1 for General Notes.

|   |  |                  |
|---|--|------------------|
| <b>MINNESOTA<br/>DEPARTMENT OF TRANSPORTATION<br/>UNDERWATER BRIDGE INSPECTION</b>      |  |                  |
| STRUCTURE NO. 55031<br>OVER THE SOUTH BRANCH MIDDLE FORK ZUMBRO RIVER<br>OLMSTED COUNTY |  |                  |
| <b>UPSTREAM AND DOWNSTREAM<br/>FASCIA PROFILES</b>                                      |  |                  |
| Drawn By: CRE   | <b>COLLINS<br/>ENGINEERS</b><br><small>123 North Wacker Drive<br/>Suite 900<br/>Chicago, IL 60606<br/>(312) 704-9300<br/>www.collinsengr.com</small> | Date: SEPT. 2012 |
| Checked By: LJ  |  | Scale: 1"=20'    |
| Code: 742355031   |  | Figure No.: 2    |

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

INSPECTORS: Collins Engineers, Inc. DATE: September 12, 2012  
ON-SITE TEAM LEADER: Roy A. Forsyth, P.E.  
BRIDGE NO: 55031 WEATHER: Overcast, 60° F  
WATERWAY CROSSED: South Branch, Middle Fork, Zumbro River  
DIVING OPERATION: SCUBA SURFACE SUPPLIED AIR  
X OTHER Inspection by Wading  
PERSONNEL: Charles R. Euwema, Brandon Corr  
EQUIPMENT: Camera, Sounding Pole, Hand Sounder  
TIME IN WATER: 6:30 P.M.  
TIME OUT OF WATER: 6:45 P.M.  
WATERWAY DATA: VELOCITY 0.5 ft/sec  
VISIBILITY 0.5 feet  
DEPTH 2.9 feet at Pier 2

ELEMENTS INSPECTED: Piers 1 and 2  
REMARKS: Overall, Piers 1 and 2 were found to be generally in satisfactory condition with no defects of structural significance observed. All of the steel shells on the cast-in-place concrete piles typically exhibited loss of protective coating and minor surface corrosion from channel bottom to 10 feet above the waterline. Heavy accumulations of timber debris were observed at both piers at a maximum of 8 feet above the waterline. A localized scour pocket was observed at the upstream pile of Pier 2 with a maximum depth of 1 foot.

FURTHER ACTION NEEDED: YES X NO

Monitor accumulation of timber debris during future inspections, and if found to be increasing to an excessive extent, removal operations may become warranted at that time.

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. 55031  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER. Roy A. Forsyth, P.E.  
 WATERWAY CROSSED South Branch, Middle Fork, Zumbro River

INSPECTION DATE September 12, 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           | 0.3'                   | 6            | N                          | N        | 8            | N     | 6                                    | 8     | 8                  | 8                     | 5                    | 6                                      | N        | 7     | N      | 7               | N                              | N     |
|                    | Pier 2           | 2.9'                   | 6            | N                          | N        | 8            | N     | 6                                    | 7     | 8                  | 8                     | 5                    | 6                                      | N        | 7     | N      | 7               | N                              | N     |
|                    |                  |                        |              |                            |          |              |       |                                      |       |                    |                       |                      |  |          |       |        |                 |                                |       |
|                    |                  |                        |              |                            |          |              |       |                                      |       |                    |                       |                      |  |          |       |        |                 |                                |       |

\*UNDERWATER PORTION ONLY

REMARKS: Overall, Piers 1 and 2 were found to be generally in satisfactory condition with no defects of structural significance observed. All of the steel shells on the cast-in-place concrete piles typically exhibited loss of protective coating and minor surface corrosion from channel bottom to 10 feet above the waterline. Heavy accumulations of timber debris were observed at both piers at a maximum of 8 feet above waterline. A localized scour pocket was observed at the upstream pile of Pier 2 with a maximum depth of 1 foot.

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.