# MINERS BAY DOCK FACILITY

# CONDITION ASSESSMENT REPORT

Prepared for:

**Capital Regional District**

479 Island Highway

Victoria, BC V9B 1H7

**FINAL**

Prepared by:

moffatt & nichol

777 W. Broadway, Suite 301

Vancouver, BC V5Z 4J7

December 11, 2015

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M&N Project No. 8985 VC15


Prepared by:

**MOFFATT & NICHOL**

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Staff Engineer

Reviewed by:

**MOFFATT & NICHOL**

Paul Hoo, P.Eng.
Senior Project Manager


| Revision | Purpose of Issue | Date | Author | Reviewed | Approved |
|---|---|---|---|---|---|
| C | Final Report | December 11, 2015 | JT | PH | PH |
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| A | Draft Report | September 20, 2015 | JT | PH | PH |

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# 1 INTRODUCTION

Facility: Miners Bay Dock

Inspected by:

Moffatt & Nichol
James Traber, E.I.T
Engineer-Diver

All-Sea Underwater Solutions
Lance Hiney
Dive Supervisor

Inspection Date: August 13, 2015

## 1.1 PURPOSE OF INSPECTION

The purpose of the inspection is to assess the current condition of Capital Regional District's Miners Bay facility and determine the structural defects and improvements required for the facility to continue to be used safely.

# 2 SCOPE OF WORK

Moffatt & Nichol (M&N) was retained by Capital Regional District (CRD) to provide a condition assessment for their Miners Bay facility located on the North side of Mayne Island. The condition assessment follows the requirement delineated in the ASCE Manual and Reports on Engineering Practice No. 101, Underwater Investigations Standard Practice Manual (ASCE, 2001) and Procedures for Inspecting and Assessment of Fixed Timber Docks (Sexsmith, 1994).

ASCE 101 describes the types of inspections and specific structure considerations depending on objective, frequency of inspection and the level of damage. Three basic levels of inspection are used for inspecting marine facilities. The type and extent of damage/deterioration that can be detected depends on the level of inspection performed. The following general descriptions for Levels I through III comply with the ASCE 101. Refer to Appendix B for the inspection level descriptions. A level I inspection was performed on this facility.

Individual components are categorized into six condition ratings: not inspected, no damage, minor, moderate, major, and severe. Each component condition rating is defined in Appendix B.

Work by M&N include, but not be limited to the following:

1. Project initiation meeting with CRD and M&N
2. Review of existing facility documentation provided to M&N by CRD
3. Conduct a visual above water (M&N) and underwater inspection (All-Sea) of the facility reviewing the following structural components:
    - Abutment, access trestle, wharf, gangways, and floats;
    - Piles, pile caps, braces, stringers, decking, bull rails, handrails, rub boards, and anchorage systems;
    - Attenuation components and breakwaters;
    - Ancillary equipment including electrical systems, fuel dispensing equipment, and lifting devices; and,
    - Decommissioned works including fuel.
4. Produce an engineering condition assessment report, identifying any structural defects
5. Identify all repair work required at the facility
6. Provide a Class C budget estimate for required repair work
7. Estimation of remaining service life of dock and components

## 2.1 REFERENCE MATERIALS

CRD provided M&N with the following documents.

### 2.1.1 Reports

The following documents were provided as reference materials prior to the inspection:

- "Miners Bay Wharf, Mayne Island Inspection Report" dated May 27, 2008 by Hugh Tuttle Engineering.
- "SGIHC - Miners Bay Bracing and Decking Jobsite Inspection Notes" dated May 25, 2009 by Hugh Tuttle Engineering.
- "Miners Bay Dock Inspection" dated May 8, 2009 by Mainroad South Island Contracting.
- "Miners Bay - Float Anchoring Assessment" dated July 17, 2007 by __?
- "Site Visit Inspection Report" dated January 8, 2007 by Mainroad South Island Contracting Ltd.

- "Miners Bay Wharf, Mayne Island Site Inspection Report" dated August 1, 2007 by Hugh Tuttle Engineering.
- "SGIHA_Letter and Inspection Reports", dated September 12, 2005, by North Island Engineering.
- Pile Diving Record, August 11-12, 2005, from North Island Engineering.
- "SGIHC - Miners Bay Wharf Inspection" 1st Edition, dated September 3, 2003, by North Island Engineering.
- Outer Gulf Island Harbours Commission "Miners Bay Dock Inspection", dated August 20, 2001 by Pacific Marine Construction.
- Outer Gulf Islands Harbours Commission "Miners Bay Dock - Risk Assessment", dated March 2001 by EmergPro.
- Transport Canada "Phase 1 Environmental Site Assessment, Miners Bay, Mayne Island, BC" dated August 1996 by Castor Consultants.
- Transport Canada "Underwater Inspection of Fixed Timber Wharfs, Miners Bay, Mayne Island, BC" Final Report, dated May 19, 1998 by SNC♦LAVALIN
- Transport Canada "Miners Bay (Mayne Island) Wharf and Float Inspection" 1st Edition dated August 9, 1996 by North Island Engineering Ltd.

# 3 FACILITY DESCRIPTION

The facility is comprised of an approach and four floats connected via two gangways. The approach is timber piles supporting timber pile caps and deck. The floats are of typical timber construction and is anchored in place by timber piles and chain anchors.

## 3.1 APPROACH/WHARFHEAD

The approach and wharfhead consists of timber piles supporting timber pile caps, stringers and decking. Both sides on the approach have timber handrails and bull rails.

| | |
|---|---|
| Handrails | 2” x 6” top rails with 2” x 4” mid rail and 4” x 4” posts every 8ft |
| Bull Rails | 8” x 10” with 1.5”riser |
| Decking | 4” x 12” spanning 20” |
| Pile Caps | 12” x 14” |
| Braces | 6” x 8” |

## 3.2 FLOATS

There are four timber floats at the terminal. Float A is located on the south side of the wharfhead and Floats B, C, and D is located on the east side of the wharfhead.

| | |
|---|---|
| Bull Rails | 4” x 6” with 4” Riser |
| Decking | 2” x 12” |
| Rub-Boards | 2” x 12” |

## 3.3 GANGWAYS

The gangways are painted steel with a wooden deck.

## 3.4 SERVICES

There are six LED lamp standards at the facility servicing the approach, wharfhead, and floats.

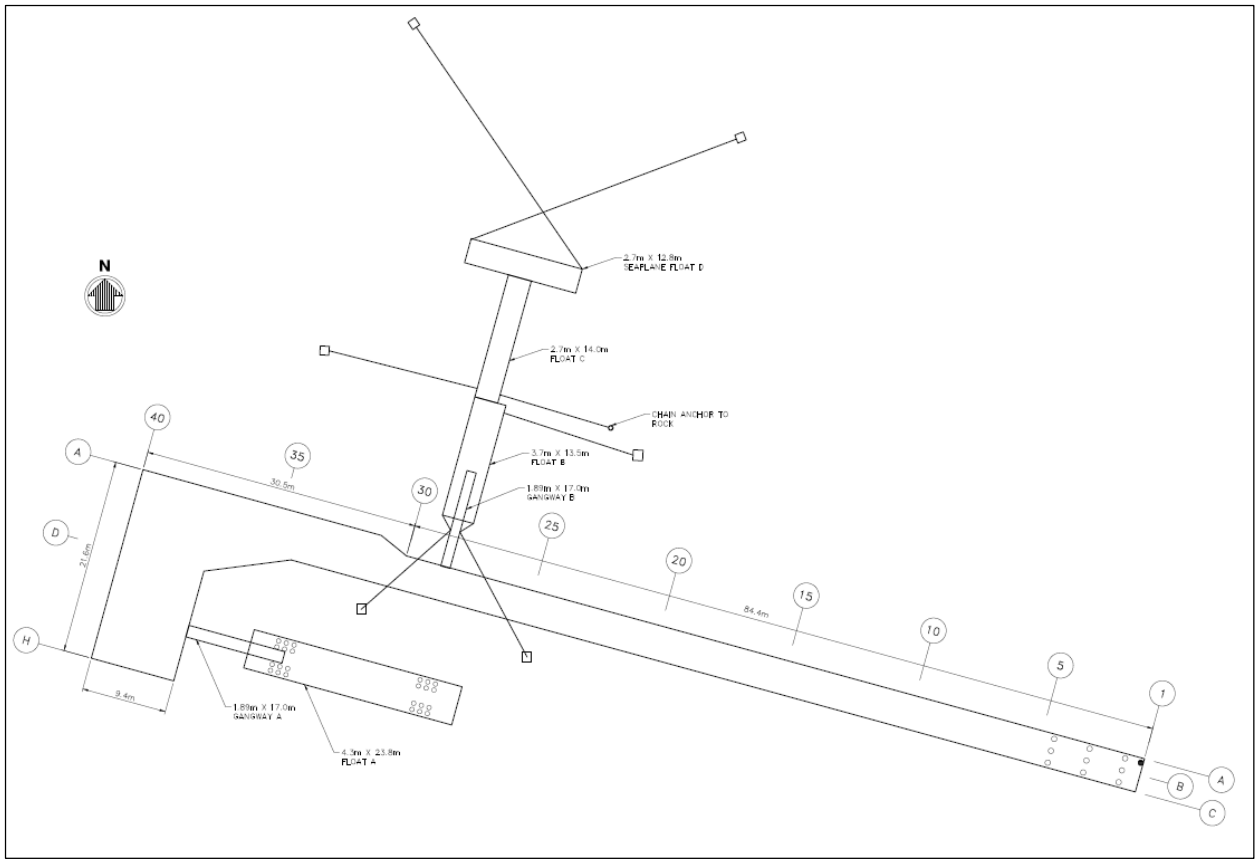



**Figure 1: Site Plan**

# 4 INSPECTION RESULTS

The general condition from the above and underwater inspection are reported below.

## 4.1 APPROACH/WHARFHEAD

### 4.1.1 Topsides

The timber topsides are in poor condition. The approach and wharfhead have multiple boards that are weathered and starting to rot.

**Table 1: Topside Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Handrails and bull rails | Weathered, need to be cleaned and painted | | Monitor |
| Decking | Weathered and starting to rot | | Monitor |
| Wharfhead | Severe rot in decking boards and holes near berth face | Photographs 5 to 20 | Repair |
| Wharfhead | Cleat supports at end of wharfhead are deteriorating | Photograph 18 to 19 | Repair |

### 4.1.2 Abutment

The abutment is in good condition with no notable defects.

**Table 2: Abutment Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Abutment | | Photographs 22 to 24 | |

### 4.1.3 Pile Caps

The pile caps are in good condition.

**Table 3: Pile Caps Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Bent 25 | Split Pile Cap | Photograph 26 | Monitor |

### 4.1.4 Stringers

The stringers are in good condition.

**Table 4: Stringer Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Bent 24 to 29 | Burnt stringers | Photographs 27 to 28 | Monitor |

### 4.1.5 Bearing Piles

The bearing piles are in fair condition with a couple area of localized deterioration as noted below.

**Table 5: Bearing Pile Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| **Piles** | | | |
| Bent 2 Pile B | Crack | | Monitor |
| Bent 3 Pile A | Crack | | Monitor |
| Bent 5 Pile A | Concrete foundation spall | | Monitor |
| Bent 5 Pile C | Concrete foundation spall | Photograph 30 | Monitor |
| Bent 6 Pile C | Concrete foundation spall | | Monitor |
| Bent 8 Pile A | Gouge | Photograph 31 | Monitor |
| Bent 18 Pile B | Hole with severe marine borer damage | Photograph 32 | Replace |
| Bent 21 Pile B | Hole | Photograph 33 | Monitor |
| Bent 24 Pile B | Cracking with severe marine borer damage | Photograph 34 | Replace |
| Bent 25 Pile C | Hole 1” in diameter | | Monitor |
| Bent 28 Pile B1 | Cracking | Photograph 36 | Monitor |
| Bent 32 Pile C | Cracking with severe marine borer damage | | Replace |
| Bent 38 Pile H | Batter Pile severe marine borer damage | Photograph 40 | Replace |
| Bent 38 Pile B | Marine borer damage 30% section loss | | Replace |
| Bent 40 Pile A | Severe marine borer damage | | Replace |
| Bent 40 Pile A | Batter pile severe marine borer damage | Photograph 44 | Replace |
| Bent 39 Pile A | Severe marine borer damage | Photograph 45 | Replace |
| Bent 38 Pile A | Batter pile severe marine borer damage | Photograph 46 | Replace |
| **Bracing** | | | |
| Bent 25 | Broken | Photograph 35 | Repair |

## 4.2 FLOATS

### 4.2.1 Float A

The float A is in good condition overall with no notable defects. The individual components are as follows:

| | |
|---|---|
| Bull rails | Fair Condition |
| Decking | Fair Condition |
| Rub Boards | Fair Condition |
| Frame | Fair Condition |
| Floats | Fair Condition |
| Guide Piles | Fair Condition |
| Pile Well | Fair Condition |

The freeboard on float A was as follows:

| | | | |
|---|---|---|---|
| NW | - | NE | 405mm |
| SW | - | SE | 430mm |

Freeboard is measured from waterline to underside of deck

The floats are in fair conditional overall. The individual components are in the following condition:

**Table 6: Float A Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Typical condition of floats photographs 47 to 48 | | | |
| **Bull Rails** | | | |
| South East Side | Worn bull rails | | Monitor |
| **Decking** | | | |
| Typical | 10+ boards are loose, split, or warped | | Repair |
| **Rub Boards** | | | |
| South and West Side | Worn rub rails | | Monitor |
| **Floats** | | | |
| All | Foam billets are exposed foam with scattered areas of 20% section loss | | Replace |
| All | Fasteners are corroded with 10% section loss | | Replace |
| **Guide Piles** | | | |

| | | | |
|---|---|---|---|
| Piles 1A, 1B, 1C, 1D, 2A, 2B, 2C, 3A, 3C, 4A, 4C, 5A, 5C, 6C | Abrasion from the floats | Photograph 52 | Monitor |
| Piles 4D and 6A | Severe abrasion from floats | Photograph 53 | Replace |
| Pile 2D | Cavity approximately 100mm penetration x 75mm high x 25mm wide | | Monitor |
| **Pile Well** | | | |
| All | Poor condition and requires UHMW on multiple sides of the pile well | Photograph 52 | Replace worn rub boards and add UHMW pads |

### 4.2.2 Float B

The float B is in good condition overall with no notable defects. The individual components are as follows:

| | |
|---|---|
| Bull rails | Fair Condition |
| Decking | Fair Condition |
| Rub Boards | Fair Condition |
| Frame | Fair Condition |
| Anchor chains | Fair Condition |
| Floats | Fair Condition |

The freeboard on float B was as follows:

| | | | |
|---|---|---|---|
| NW | 265mm | NE | 340mm |
| SW | 390mm | SE | 355mm |

Freeboard is measured from waterline to underside of deck

The floats are in fair conditional overall. The individual components are in the following condition:

**Table 7: Float B Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Typical condition of floats photograph 54 to 55 | | | |
| **Bull Rails** | | | |
| Typical | Fair condition | Photograph 56 | Monitor |
| South Side | Missing bull rail | Photograph 59 | Repair |
| **Decking** | | | |

| | | | |
|---|---|---|---|
| Typical | Grating on deck is disconnecting from the timber boards. | Photograph 55 | Remove grating and install a lower gauge of grating |
| South Side | Missing board | Photograph 59 | Replace |
| Middle | Heavy abrasion from gangway landing | Photograph 57 | Repair gangway landing to prevent abrasion |
| **Rub Boards** | | | |
| Typical | Worn boards | | Monitor |
| **Anchor Chains** | | | |
| Typical | Chains have 15% loss, Fair Condition | | Monitor |
| **Floats** | | | |
| Typical | Foam billets are encapsulated, good condition | | Monitor |
| **Connection** | | | |
| Between Float B and C | Poor Condition | Photographs 60 and 61 | Repair |
| Transition Plate | Rusted | | Replace |
| Decking and rub rails | Significant abrasion | | Replace |

### 4.2.3 Float C

The float C is in good condition overall with no notable defects. The individual components are as follows:

| | |
|---|---|
| Bull rails | Good Condition |
| Decking | Good Condition |
| Rub Boards | Good Condition |
| Frame | Good Condition |
| Anchor chains | Good Condition |
| Floats | Good Condition |

The freeboard on float C was as follows:

| | | | |
|---|---|---|---|
| NW | 380mm | NE | 510mm |
| SW | 460mm | SE | 405mm |

Freeboard is measured from waterline to underside of deck

The floats are in fair conditional overall. The individual components are in the following condition:

**Table 8: Float C Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Typical condition of floats photograph 62 to 63 | | | |
| **Bull Rails** | | | |
| Typical | Fair condition | | Monitor |
| **Decking** | | | |
| Near North End | Cracked boards | Photographs 64 to 65 | Monitor |
| **Rub Boards** | | | |
| Typical | Fair condition | | Monitor |
| **Anchor Chains** | | | |
| Typical | East anchor chain have 80% loss, West anchor chain has 50% loss Poor condition | | Replace |
| **Floats** | | | |
| Typical | Foam billets are encapsulated, good condition | | Monitor |
| Typical | Fasteners corroding | | Replace |
| **Connection** | | | |
| Between Float C and D | Fair Condition | Photographs 66 and 67 | Monitor |
| Transition Plate | No transition plate | Photograph 67 | Add |
| West side | Missing tire | Photograph 68 | Replace |

### 4.2.4 Float D

The float D is in good condition overall with no notable defects. The individual components are as follows:

| | |
|---|---|
| Bull rails | Fair Condition |
| Decking | Fair Condition |
| Rub Boards | Fair Condition |
| Frame | Fair Condition |
| Anchor chains | Fair Condition |
| Floats | Fair Condition |

The freeboard on float D was as follows:

| | | | |
|---|---|---|---|
| NW | 390mm | NE | 380mm |
| SW | 380mm | SE | 470mm |

Freeboard is measured from waterline to underside of deck

The floats are in fair conditional overall. The individual components are in the following condition:

**Table 9: Float D Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Typical condition of floats photograph 69 to 70 | | | |
| **Decking** | | | |
| Typical | Fair condition, boards are starting to warp | | Monitor |
| **Anchor Chains** | | | |
| Typical | Chains have 15% loss, Fair Condition | | Monitor |
| **Floats** | | | |
| Typical | Foam billets are encapsulated, good condition | | Monitor |

## 4.3 GANGWAY

### 4.3.1 Gangway A

Gangway A is in fair condition overall. The individual component condition are as follows:

| | |
|---|---|
| Frame | Fair Condition |
| Wood Deck | Fair Condition |
| Roller | Poor Condition |
| Guide Rails | Poor Condition |
| Hinges | Fair Condition |

**Table 10: Gangway A Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Frame | Some loss of paint and rust | Photographs 73 to 76 | Clean and repaint |
| Roller | Clearance between pile wells is too small for the gangway roller | Photograph 77 | Repair |
| Roller | Broken roller | Photograph 78 | Replace |
| Guide Rail | Out of alignment and worn out | Photograph 79 | Replace |

### 4.3.2 Gangway B

Gangway B is in fair condition overall. The individual component condition are as follows:

| | |
|---|---|
| Frame | Poor Condition |

| | |
|---|---|
| Wood Deck | Fair Condition |
| Roller | Poor Condition |
| Guide Rails | Poor Condition |
| Hinges | Fair Condition |

**Table 11: Gangway B Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Overall | | Photograph 25 | |
| Frame | Some loss of paint and rust | Photograph 86 | Clean and repaint |
| Frame | Broken brace on both sides | Photographs 83 and 84 | Repair |
| Frame | Rusted beams and braces | Photograph 86 | Repair |
| Guide Rails | Rusted | Photograph 87 | Repair |
| Roller | Rusted | Photograph 87 | Replace |
| Landing platform | Poor condition | Photograph 82 | Replace |

## 4.4 SERVICES

There are six LED lamp standards at the facility servicing the approach, wharfhead, and floats. In general the lighting is in good condition. The ground to shore is broken and will need to be replaced.

**Table 12: Services Defects**

| Location | Damage/Condition | Comments | Recommendations |
|---|---|---|---|
| Bent 1 | Broken ground | | Repair |

The facility in the past provided a fuel filling service for boat traffic. The float and fuel pumps have since been removed and the system decommissioned, however the pipe lines still run along the southern side of the approach. These lines are starting to rust but are in Fair Condition and do not, at this time, need to be removed. Close monitoring of these pipes is recommended to prevent damage.

## 4.5 REVIEW OF OPERATIONAL, STRUCTURAL, AND MAINTENANCE ISSUES

Based on discussions with the wharfinger when the site inspection was conducted the facility is used by seaplanes, recreational boaters, Canadian Postal service, and emergency personal. The wharfinger expressed that there are discussions to reduce the loading zone area on Float B and transition loading services to Float D. Since there are no transition plates between Float C and Float D, the Ambulance service could have issues with getting patients to Float D. It is recommend to install a transition plate between Float C and Float D before reducing the 15

minute loading zone on Float B. A few times a year a vessel berths along the end of the wharfhead. Based on the current condition of the cleat supports it is recommended to repair these supports before vessels are allowed to berth along the wharfhead.

# 5 RESIDUAL LIFE ESTIMATES

The residual life estimates are based on section 2.5 in Procedures for Inspection and Assessment of Fixed Timber Docks. The residual life estimates are rough estimated values based on subjective judgment of the current deterioration and observed damages in the structural elements and in no way provides a guarantee on actual life span. It is important to note that components could last shorter or longer depending on the surrounding environment and level of use. Rot and marine bores can spread very quickly greatly reducing the estimated values.

Assuming that the facilities will be routinely inspected and scheduled maintenance repairs done, review of the residual life estimates can be updated resulting in the service life of the structures extended beyond their design life of the structures.

## 5.1 APPROACH/WHARFHEAD

| | |
|---|---|
| Handrails | 3 to 6 years |
| Bull Rails | 3 to 6 years |
| Decking | 3 to 6 years |
| Pile Caps | 8 to 10 years |
| Stringers | 8 to 10 years |
| Bearing Piles | 5 to 10 years |

## 5.2 FLOAT A

| | |
|---|---|
| Bull Rails | 3 to 6 years |
| Decking | 3 to 6 years |
| Rub Boards | 3 to 6 years |
| Floatation | 3 to 6 years |
| Guide Piles | 3 to 6 years |
| Pile Wells | 3 to 6 years |

## 5.3 FLOAT B

| | |
|---|---|
| Bull Rails | 3 to 6 years |
| Decking | 3 to 6 years |

| | |
|---|---|
| Rub Boards | 3 to 6 years |
| Floatation | 8 to 10 years |
| Chain Anchors | 3 to 6 years |

### 5.4 FLOAT C

| | |
|---|---|
| Bull Rails | 3 to 6 years |
| Decking | 3 to 6 years |
| Rub Boards | 3 to 6 years |
| Floatation | 8 to 10 years |
| Chain Anchors | 3 to 6 years |

### 5.5 FLOAT D

| | |
|---|---|
| Bull Rails | 3 to 6 years |
| Decking | 3 to 6 years |
| Rub Boards | 3 to 6 years |
| Floatation | 8 to 10 years |
| Chain Anchors | 3 to 6 years |

### 5.6 GANGWAY

| | |
|---|---|
| Gangway A | 8 to 10 years |
| Gangway B | 3 to 6 years |

### 5.7 SERVICES

| | |
|---|---|
| Lighting | 8 to 10 years |

## 6 COST ESTIMATES OF REPAIRS

An order of magnitude cost estimate is provided in this report for the purpose of assisting CRD with an approximate cost to repair or replacement of various structural elements.

This cost estimate is an opinion of cost made by M&N. In providing the cost estimate, it is recognized that neither CRD nor M&N has control over the costs of labor, equipment, materials, or contractors' methods of determining prices or bidding. This cost estimate is based

on the consultant's reasonable professional judgment and experience and does not constitute a warranty, express or implied, that contractors' bids or negotiated prices of the work will not vary from CRD budget or from any costs prepared by M&N.

The costs shown in this report are based on a combination of current material and labour prices obtained from various material suppliers and contractors as well as parametric unit rates from historical data and updated to reflect the location of site and current date.

In addition to the general limitations discussed above, our cost estimate is based on the following assumptions:

- All costs are given as Canadian Dollars (1 USD = 1.35 CAN);
- Due to lack of maintenance and the limitations of a visual inspection of the facility, further deterioration may be present in components and may increase repair or replacement costs.
- Construction assumed to be performed by a local contractor to reduce mobilization and demobilization costs, which are included in the final cost;
- 12% tax, and 20% for contractors overhead and profit is included in estimate,
- Contingency of 25% is included in final costs; and,
- The funding plan can prioritize repair work to accommodate per annum budgets while allowing the facility to continue to operate.

**Table 13: Cost Estimate**

| Component | Mobilization Type | Year | Cost |
|---|---|---|---|
| **Utilities Repair Cost:** | **Minor** | **Immediate** | **$3,400** |
| **Mobilization/Demobilization** | **Minor** | **Immediate** | **$3,500** |
| **Sub Total** | | **Immediate** | **$6,900** |
| **Approach Repair Cost:** | **Minor** | **1 Year** | **$22,800** |
| **Gangway Repair Cost:** | **Minor** | **1 Year** | **$13,800** |
| **Mobilization/Demobilization** | **Minor** | **1 Year** | **$10,600** |
| **Escalation @ 2% per annum** | | | **$700** |
| **Sub Total** | | **1 Year** | **$47,900** |
| **Float Repair Cost:** | **Major** | **5 Years** | **$119,200** |
| **Approach Pile Cost** | **Major** | **5 Years** | **$82,700** |
| **Utilities Upgrades** | **Minor** | **5 Years** | **$11,800** |
| **Mobilization/Demobilization** | **Minor** | **5 Years** | **$19,900** |
| **Escalation @ 2% per annum** | | | **$2,300** |
| **Sub Total** | | **5 Year** | **$255,800** |
| **Grand TOTAL** | | | **$310,600** |

# 7 RISK, STRATEGIES, AND POLICY ADAPTATION

Typical operations at the facility are able to continue as normal due to the current state of the facility. It is recommended to prevent any vessels berthing at the wharfhead until the cleats are repaired. A transition plate is recommended to be installed between Float C and Float D before the loading zone size is decreased on Float B.

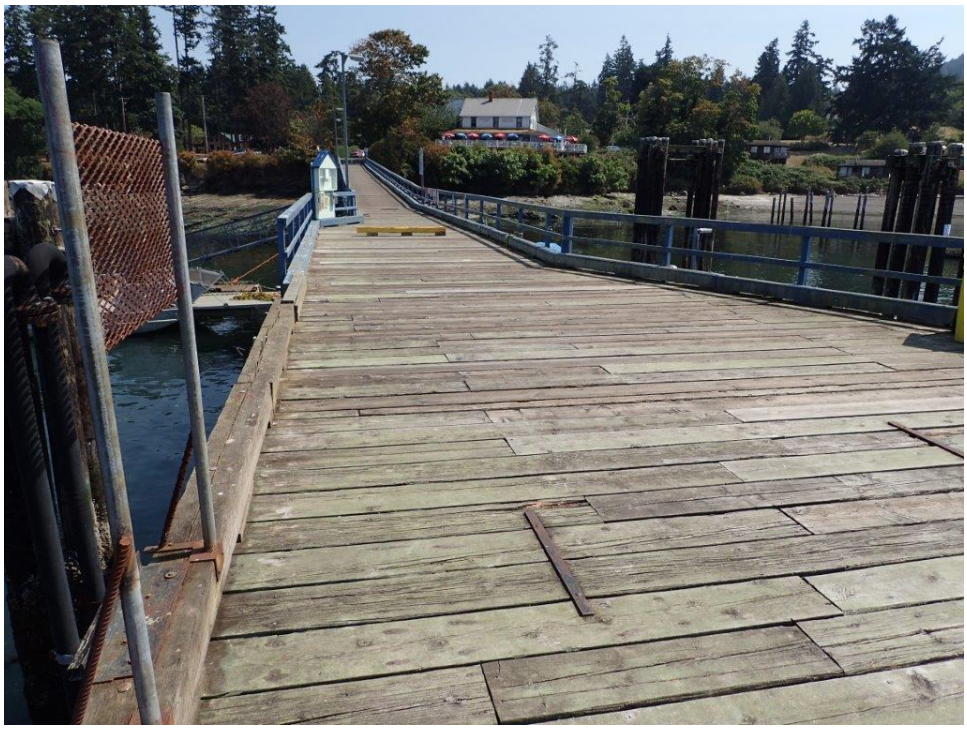
# 8 CONCLUSIONS AND RECOMMENDATIONS

The facility at Miners Bay in overall fair condition. This facility is one of the two that provide accesses to Mayne Island. The critical repairs include fixing the broken ground wire to the abutment, repairing the bearing piles on the approach and wharfhead, repairing the broken braces on gangway B, repairing the four cleat supports on the wharfhead. All other repairs are recommended to be done in a timely manner to ensure the dock remains operational.

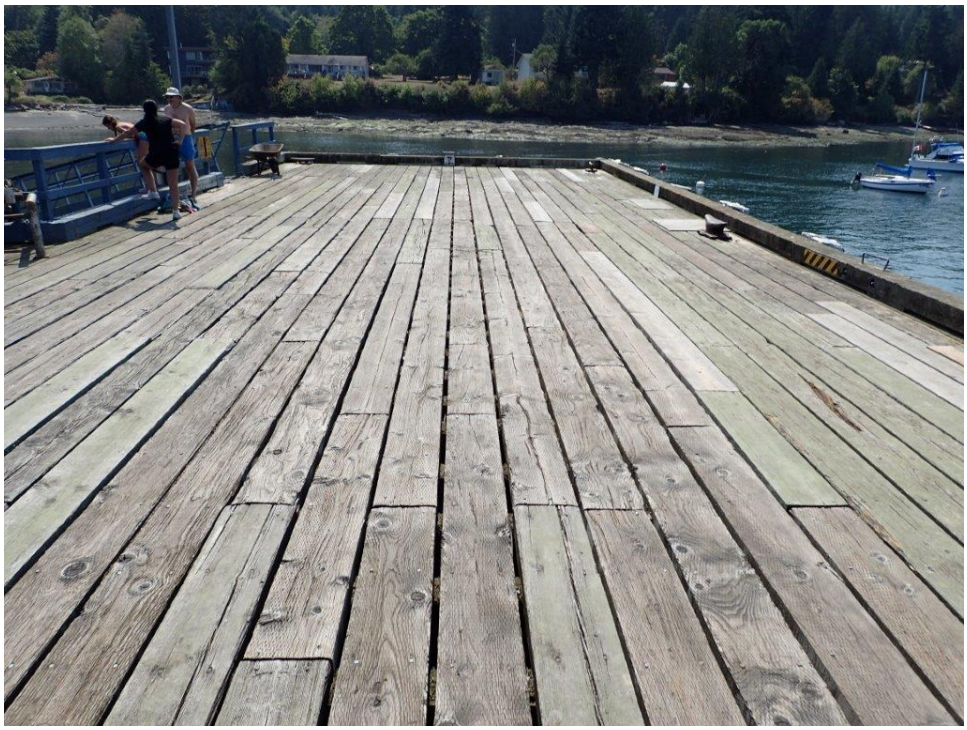
# APPENDIX A:
# PHOTOGRAPHS

**Photograph 1: General Layout**

**Photograph 2: Topside**



**Photograph 3: General Condition of Approach**

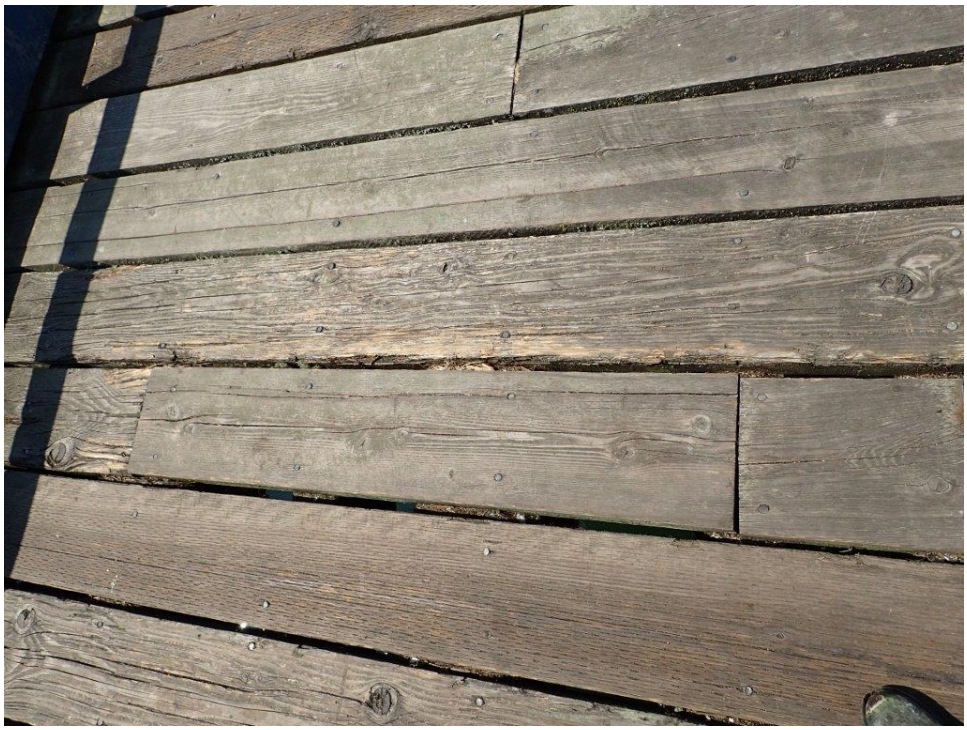


**Photograph 4: General Condition of Wharfhead**

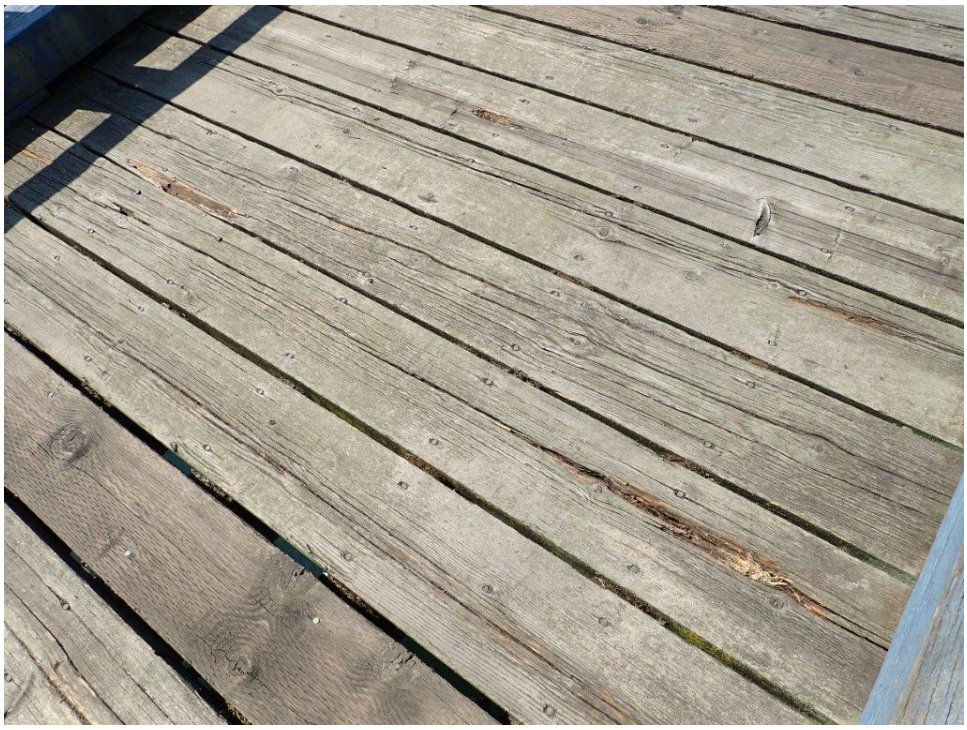
**Photograph 5: Deck Rot at Bent 17**

**Photograph 6: Deck Rot at Bent 22**

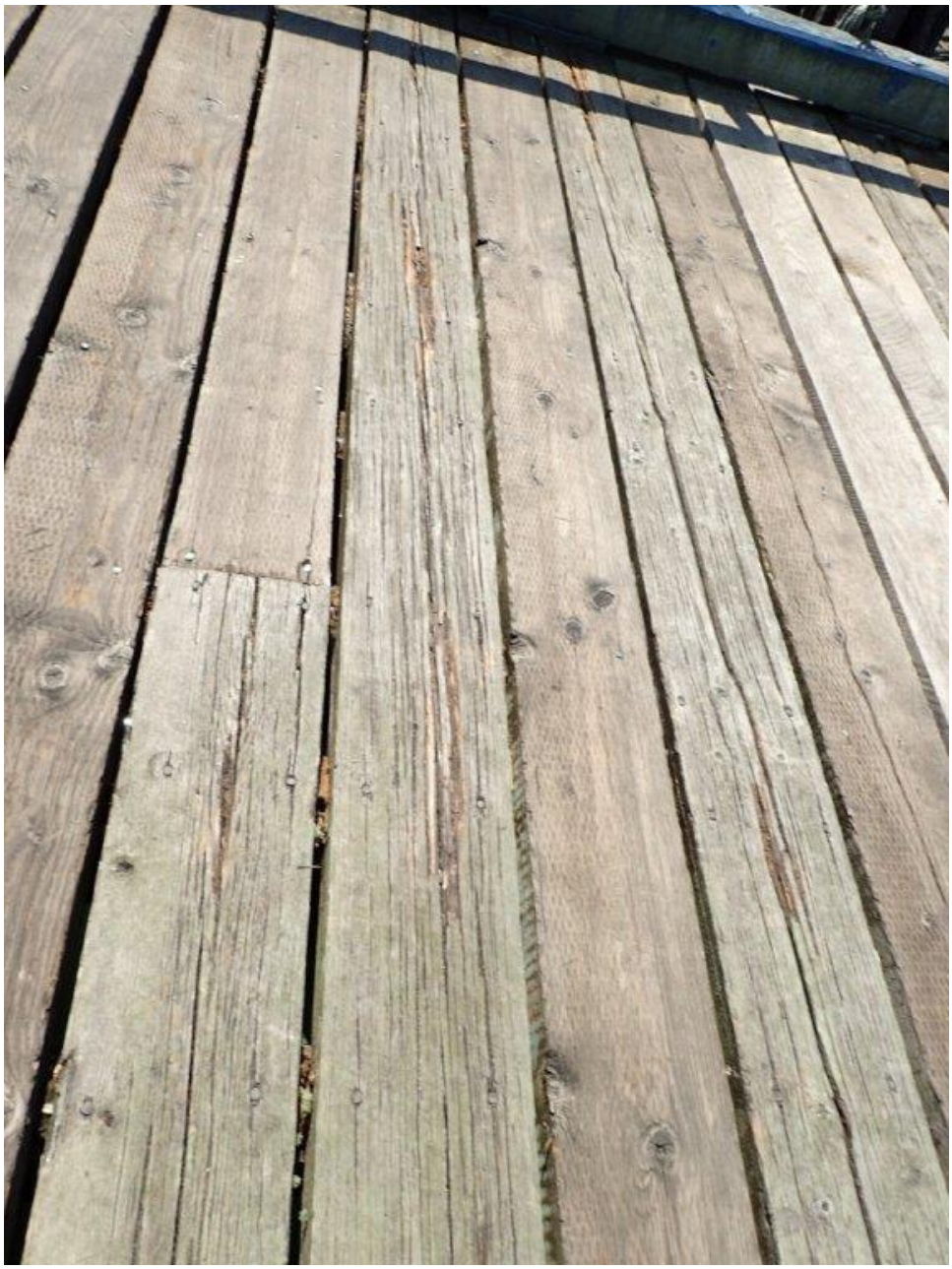
**Photograph 7: Deck at Bent 23**



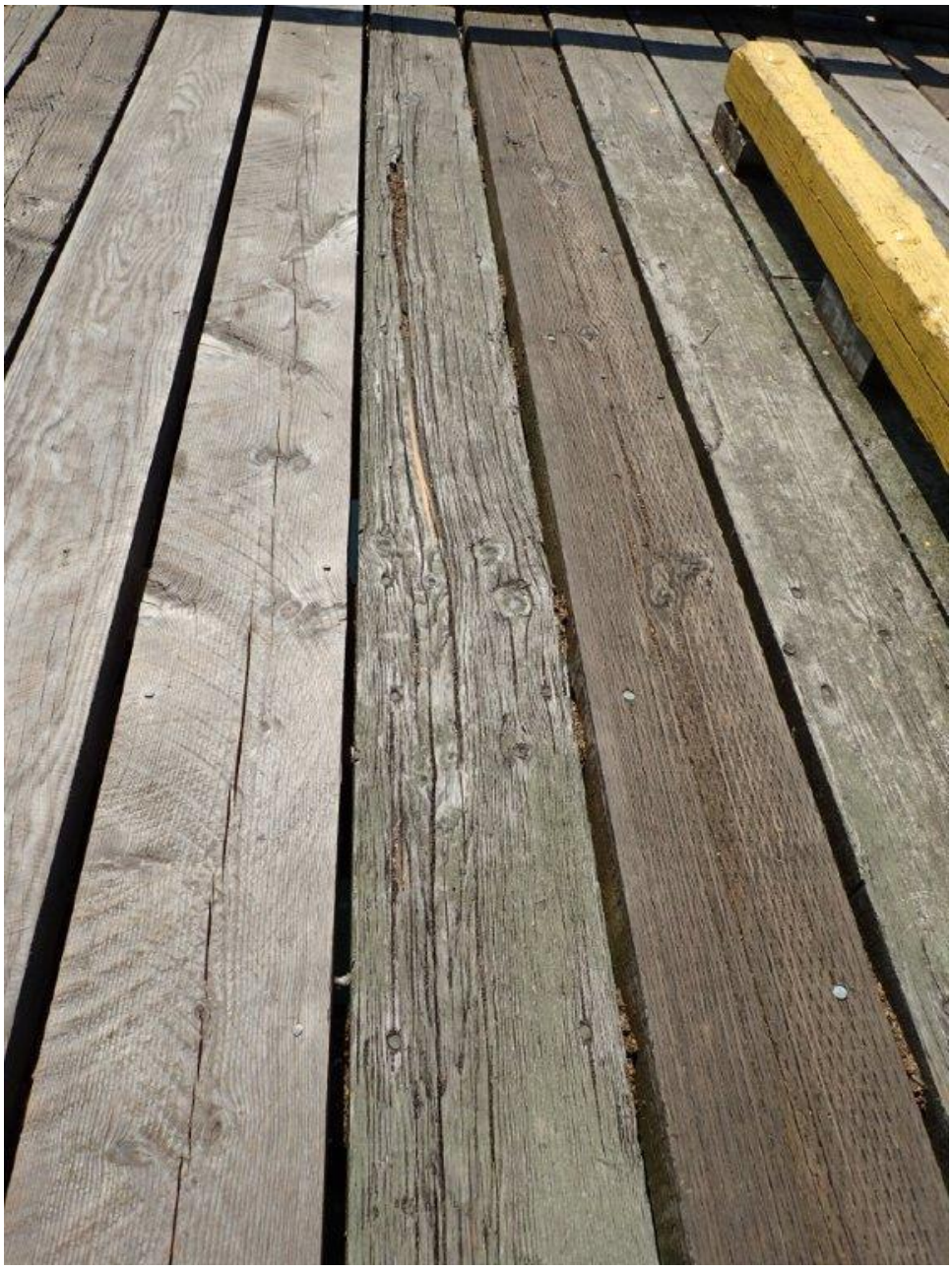
**Photograph 8: Deck at Bent 25**



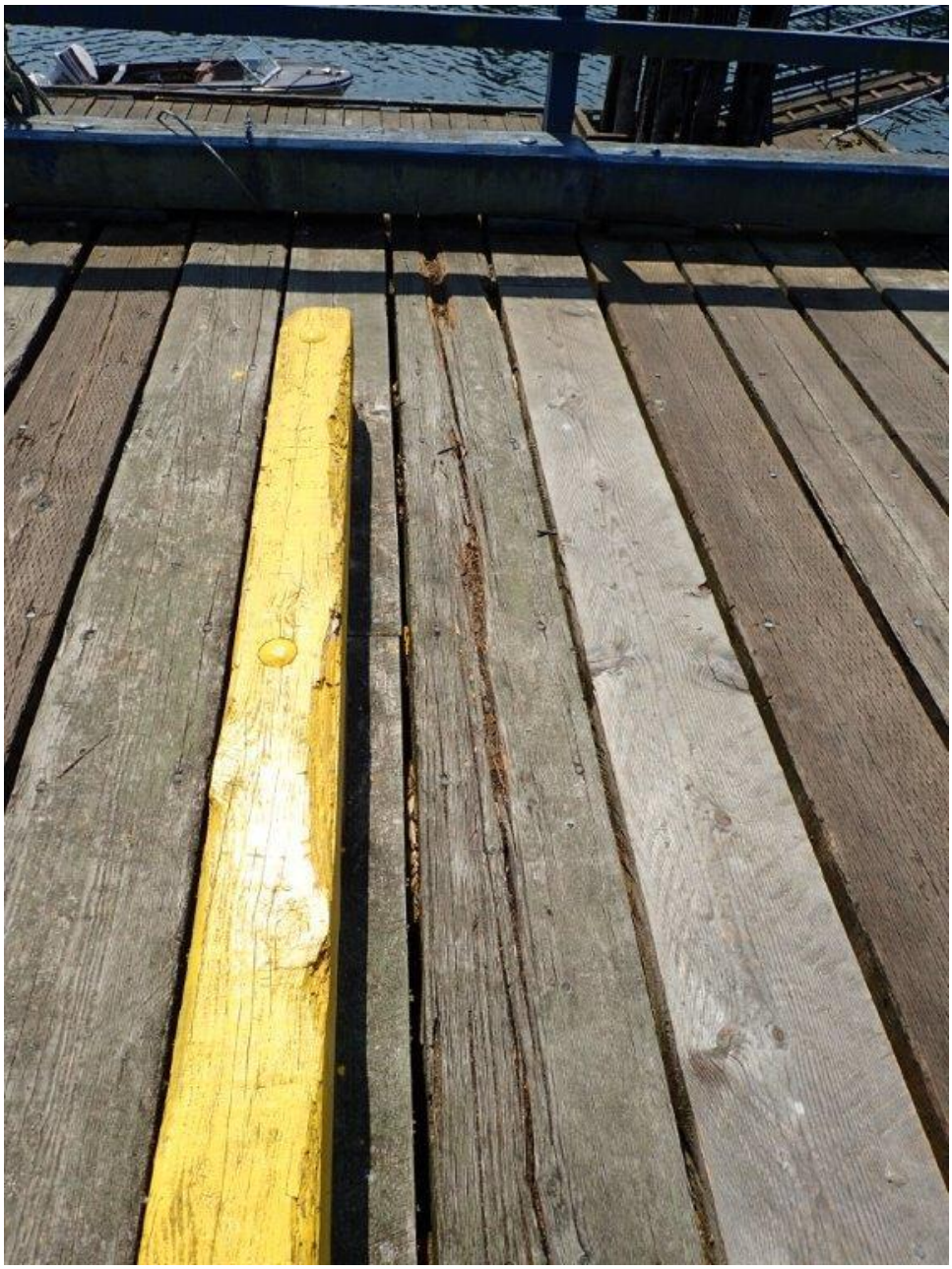
**Photograph 9: Deck Rot between Bent 29 to 30**



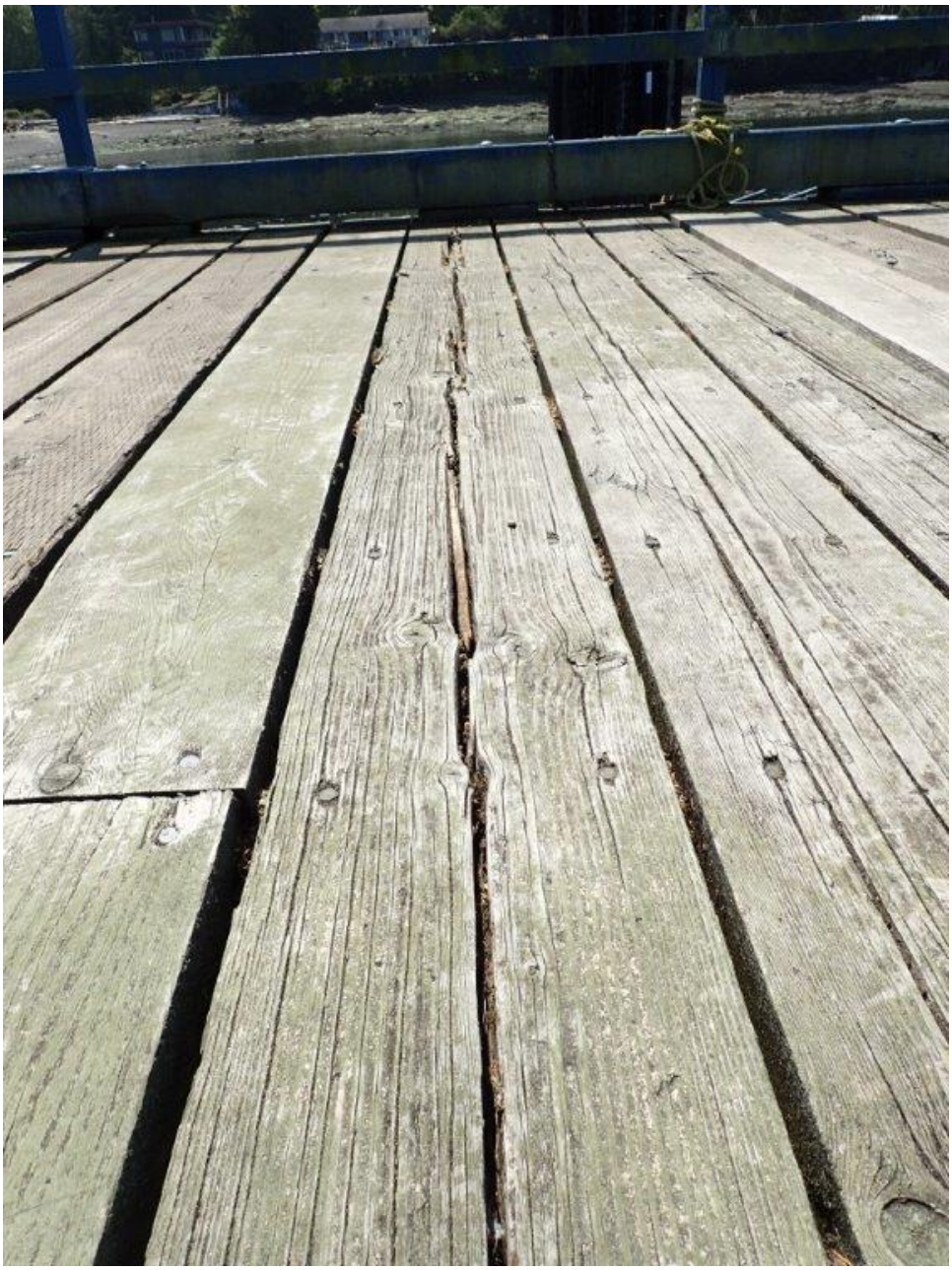
**Photograph 10: Deck Rot at Bent 31**



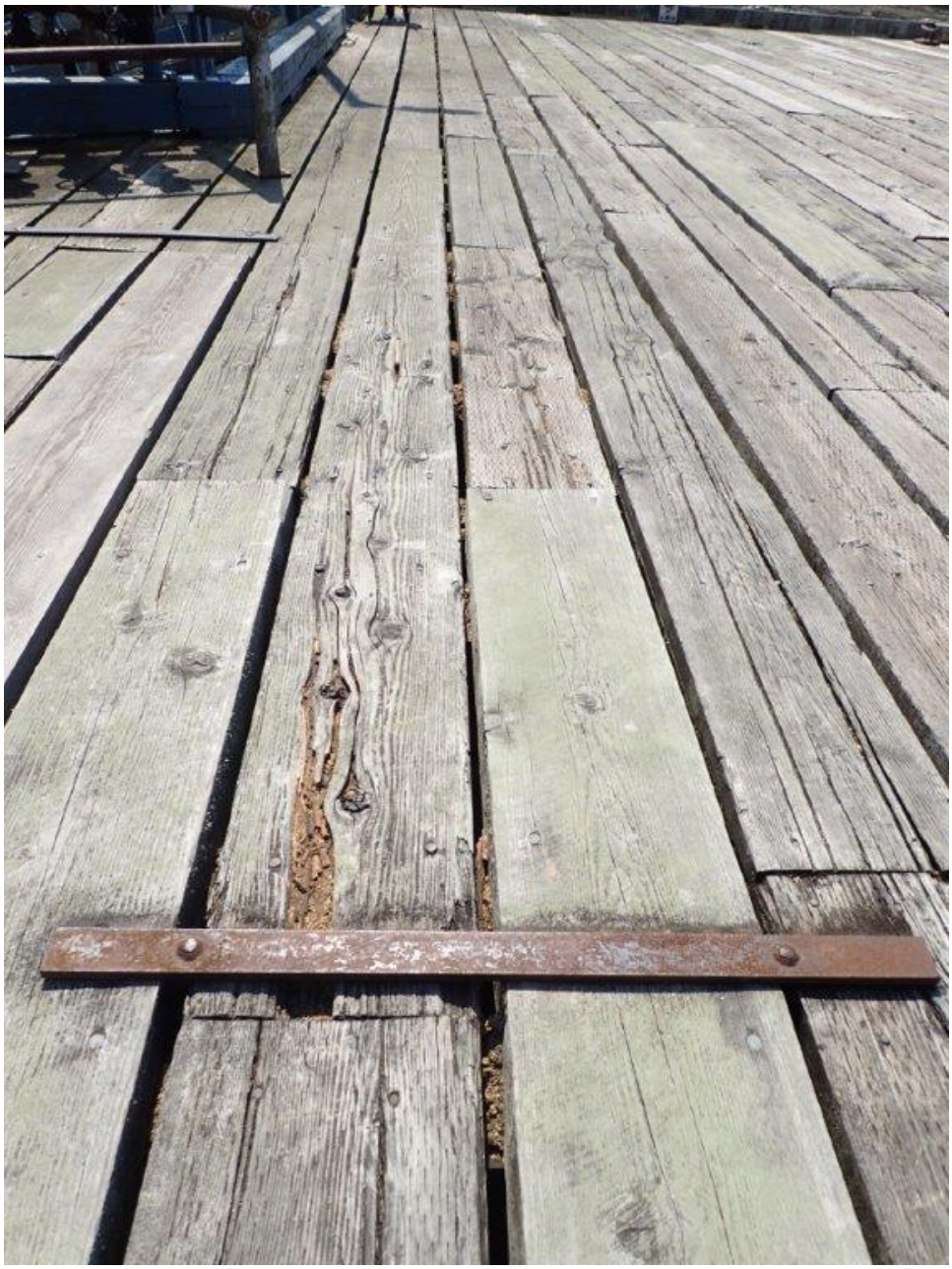
**Photograph 11: Deck Rot between Bent 31 to 32**



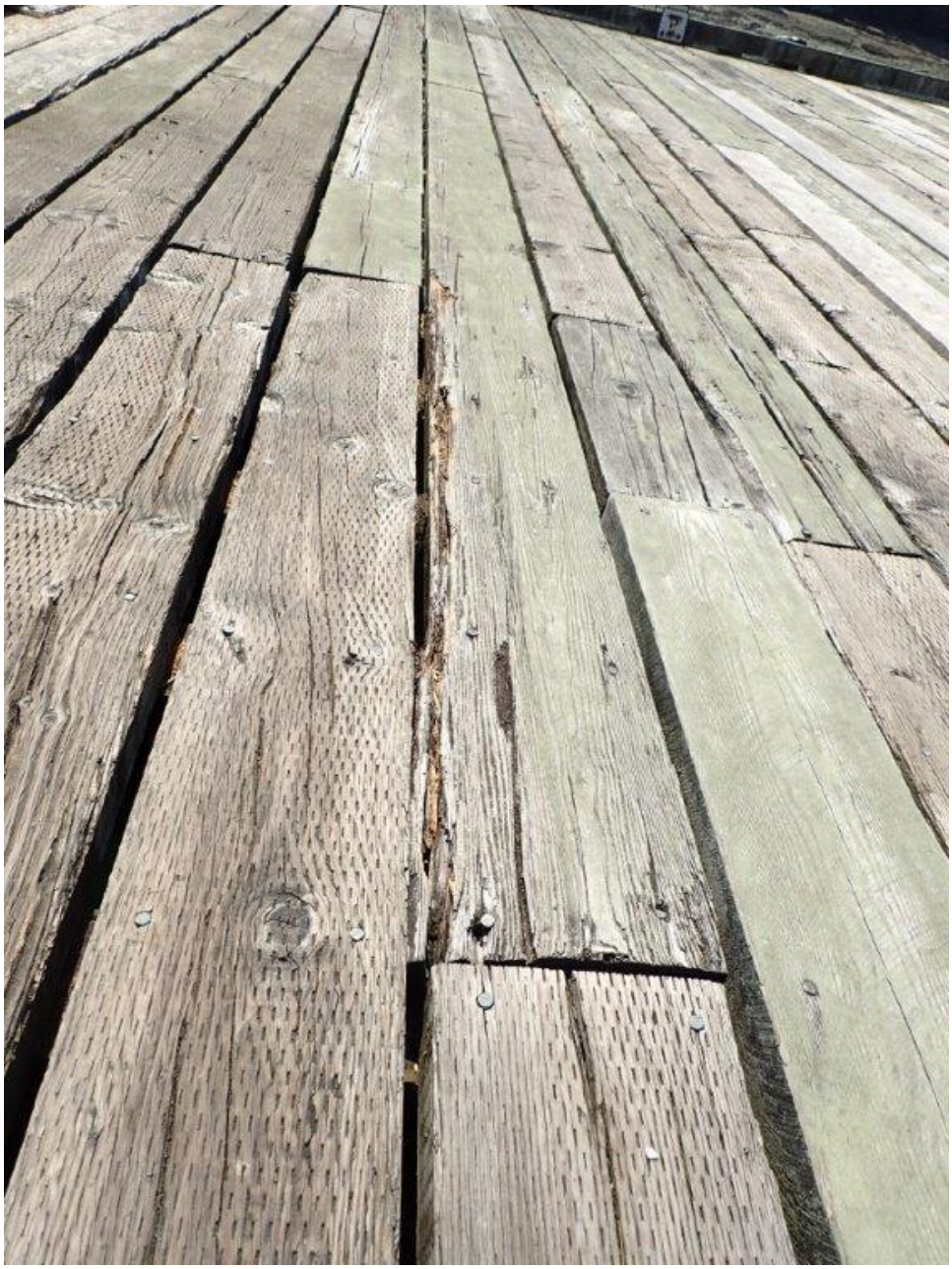
**Photograph 12: Deck Rot at Bent 32**



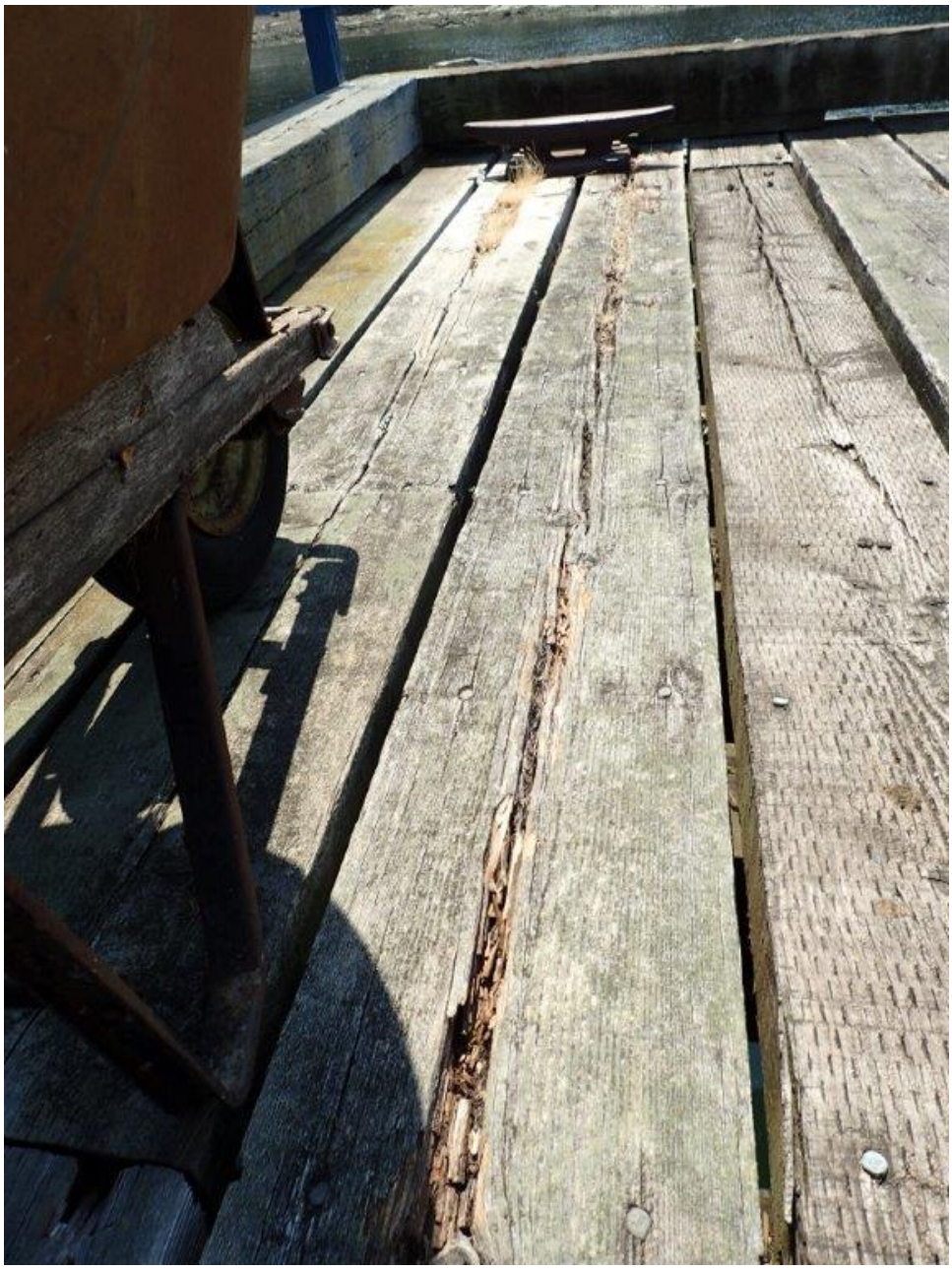
**Photograph 13: Deck Rot at Bent 33**



**Photograph 14: Deck Rot at Bent 37**



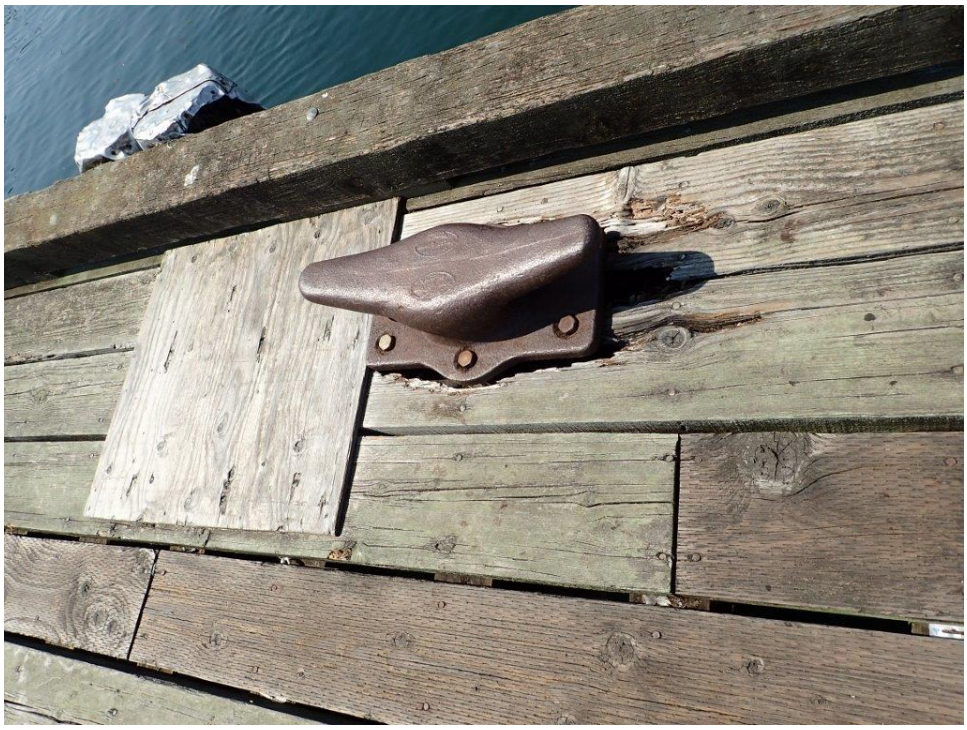
**Photograph 15: Deck Rot at Bent 37**



**Photograph 16: Deck Rot at Bent 37**

**Photograph 17: Deck Rot at Bent 39**

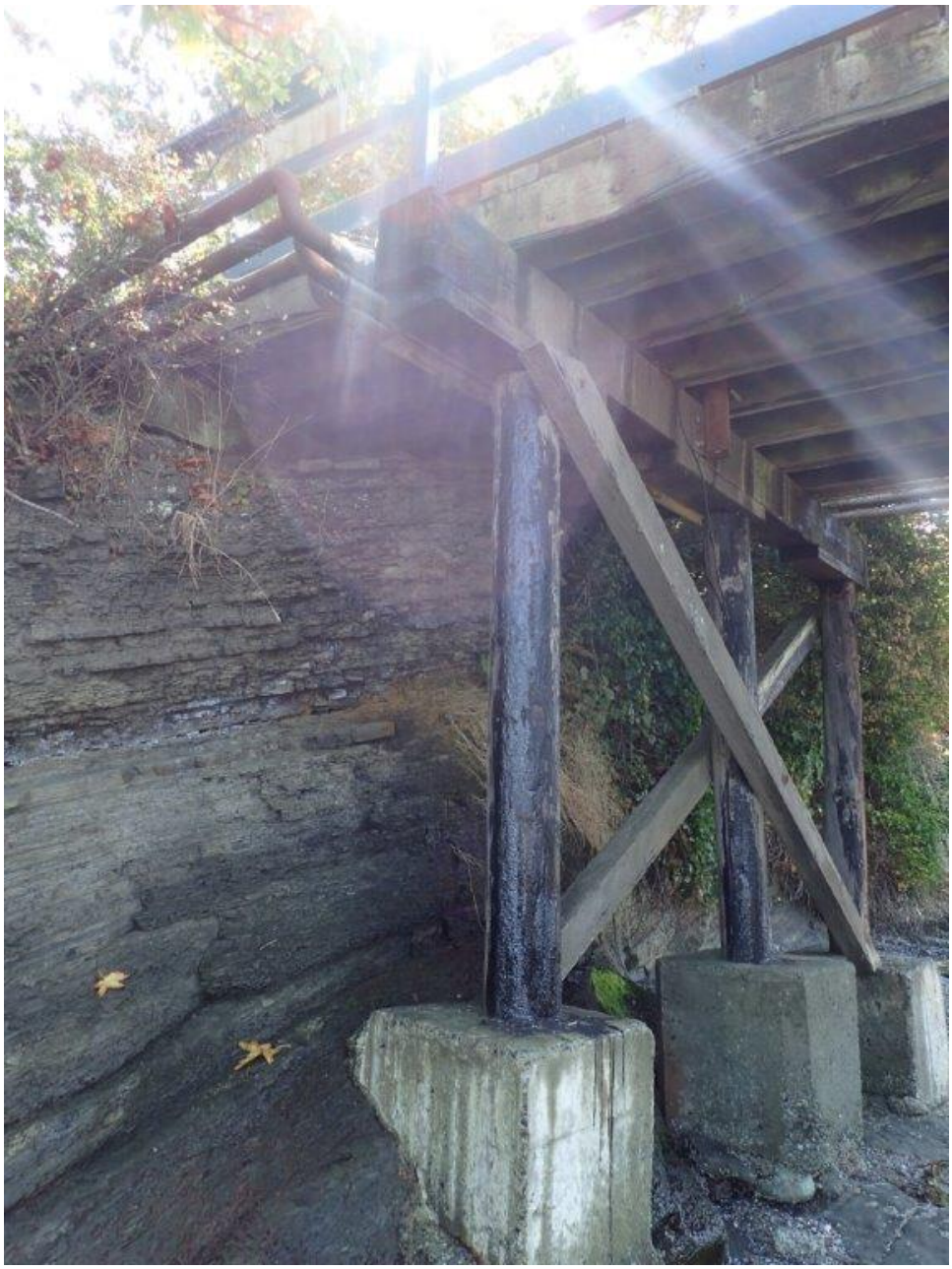
**Photograph 18: Deck Rot at Bent 40**



**Photograph 19: Deck Rot and Hole Patch at Bent 40 and Cleat**

**Photograph 20: Deck Rot at Patches**

**Photograph 21: Warped Handrail at Bent 19**



**Photograph 22: Abutment**

**Photograph 23: Abutment**


**Photograph 24: Abutment**

**Photograph 25: Pile Caps**

**Photograph 26: Pile Cap Split at Bent 25**

**Photograph 27: Burnt Stingers between Bent 24 to 29**

**Photograph 28: Burnt Stingers between Bent 24 to 29**

**Photograph 29: Typical Approach Bent**

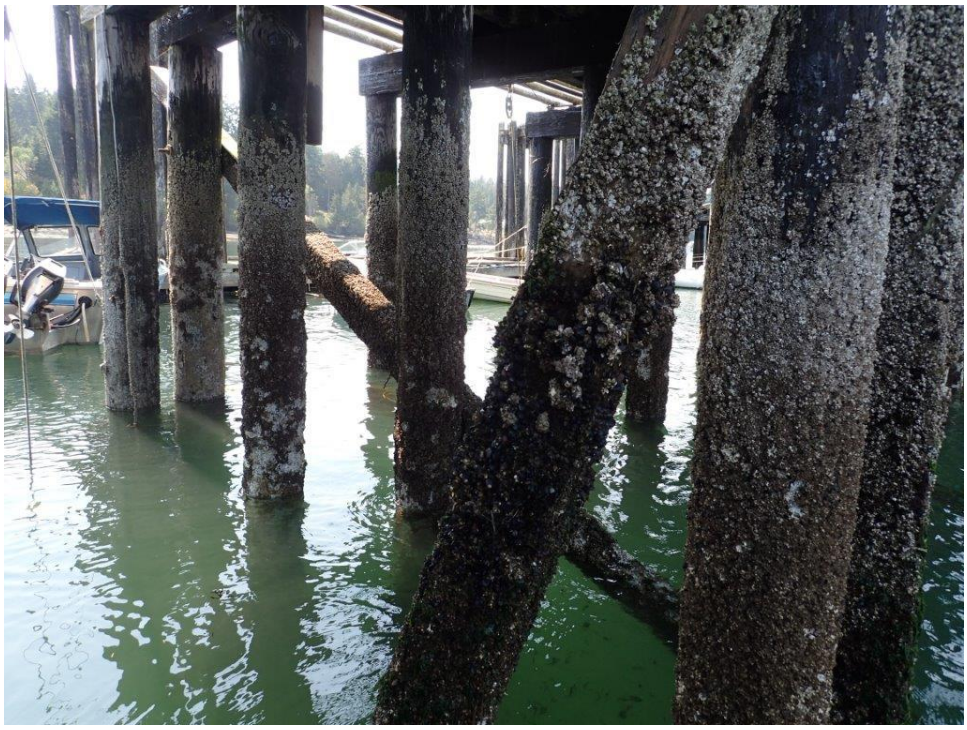
**Photograph 30: Concrete Spall at Pile 5C**

**Photograph 31: Gouge in Pile 8A**

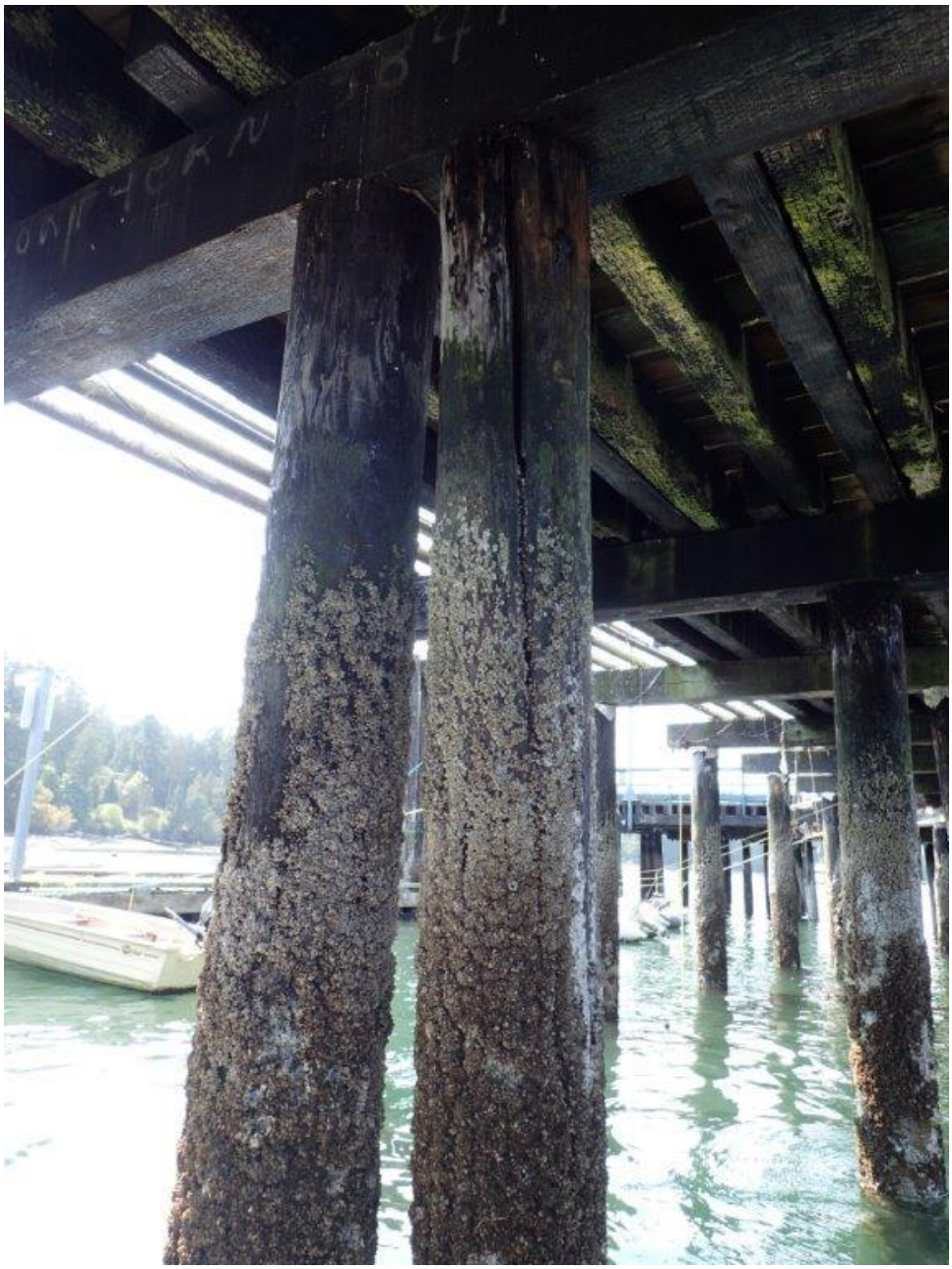
**Photograph 32: Pile 18B Hole and Severe Marine Borer Damage**

**Photograph 33: Pile 21B Hole**

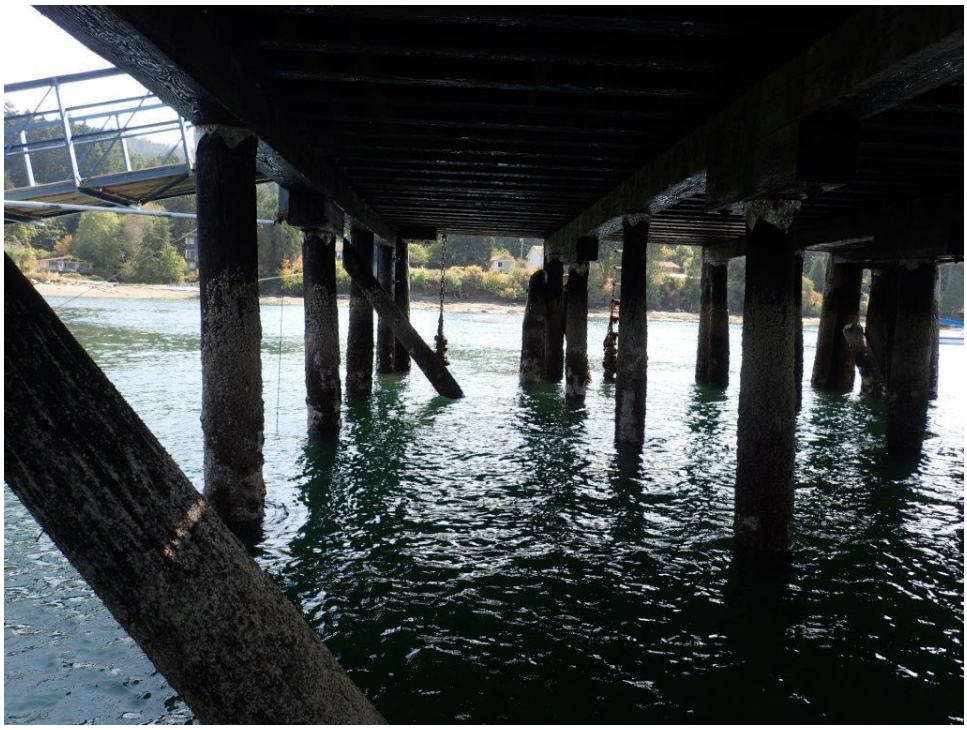
**Photograph 34: Cracking in Pile 24B**



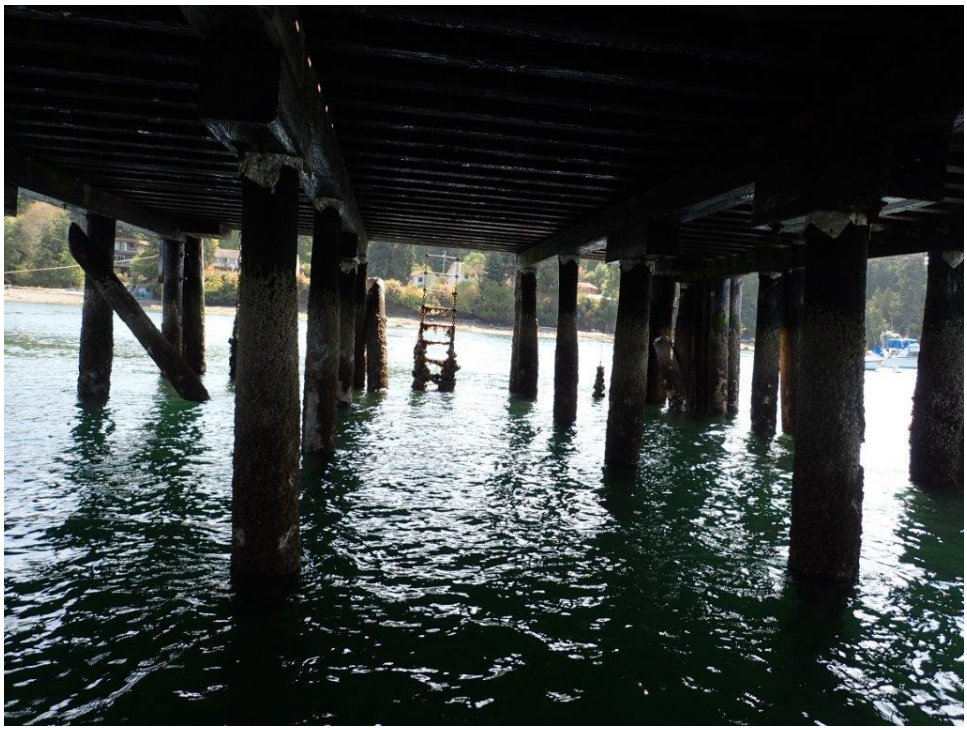
**Photograph 35: Broken Bracing Bent 25**



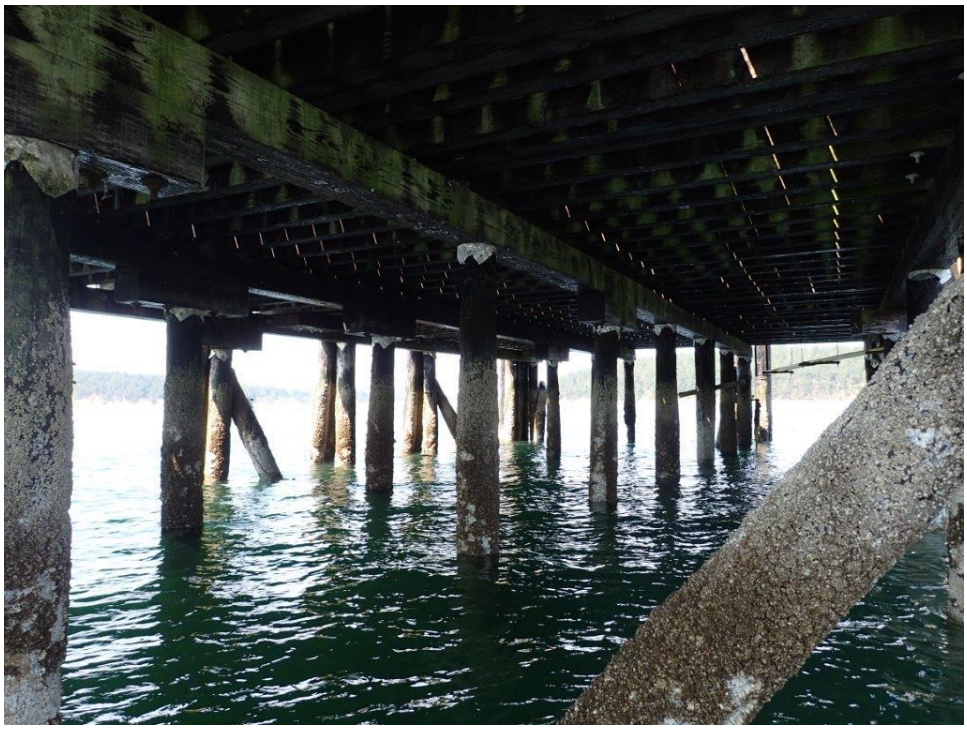
**Photograph 36: Cracking in Pile 28B1**



**Photograph 37: Typical Wharfhead Pile Layout**



**Photograph 38: Typical Wharfhead Pile Layout**



**Photograph 39: Typical Wharfhead Pile Layout**

**Photograph 40: Pile 38H Batter Severe Marine Borer Damage**

**Photograph 41: Fender Piles**

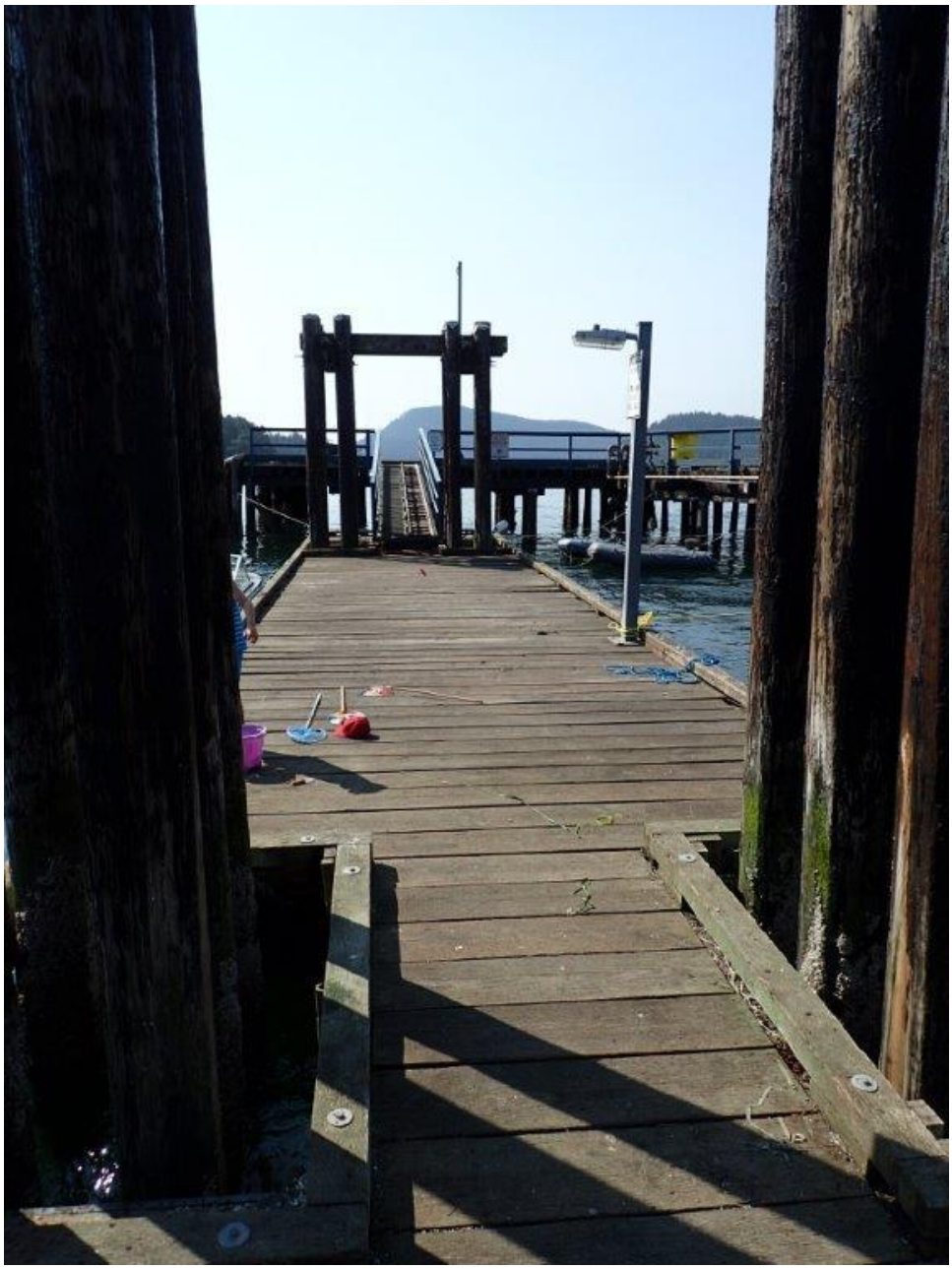
**Photograph 42: Fender Piles**

**Photograph 43: Fender Face**

**Photograph 44: Pile 40A Batter Severe Marine Borer Damage**

**Photograph 45: Pile 39A Severe Marine Borer Damage**

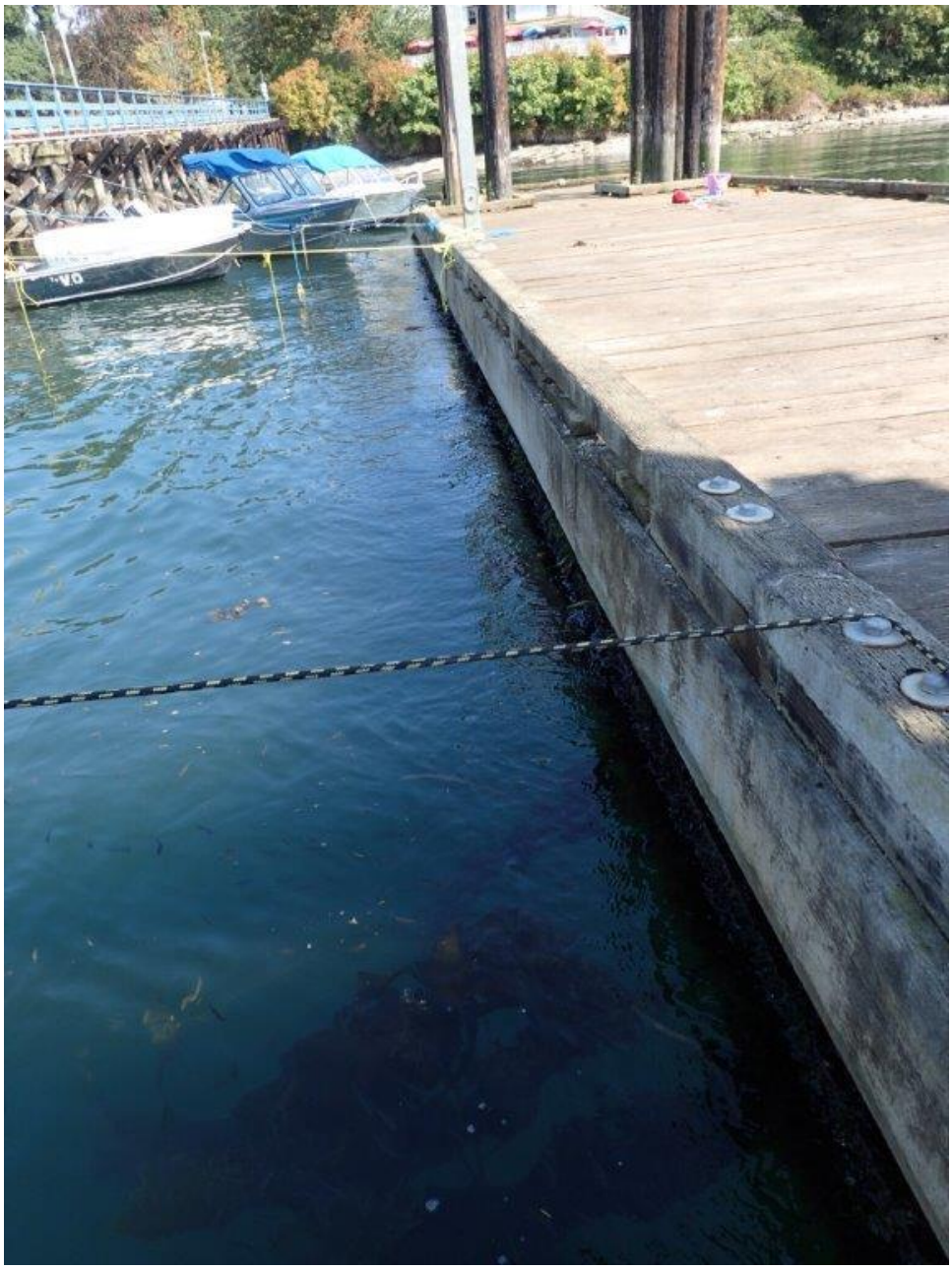
**Photograph 46: Pile 38A Batter Severe Marine Borer Damage**



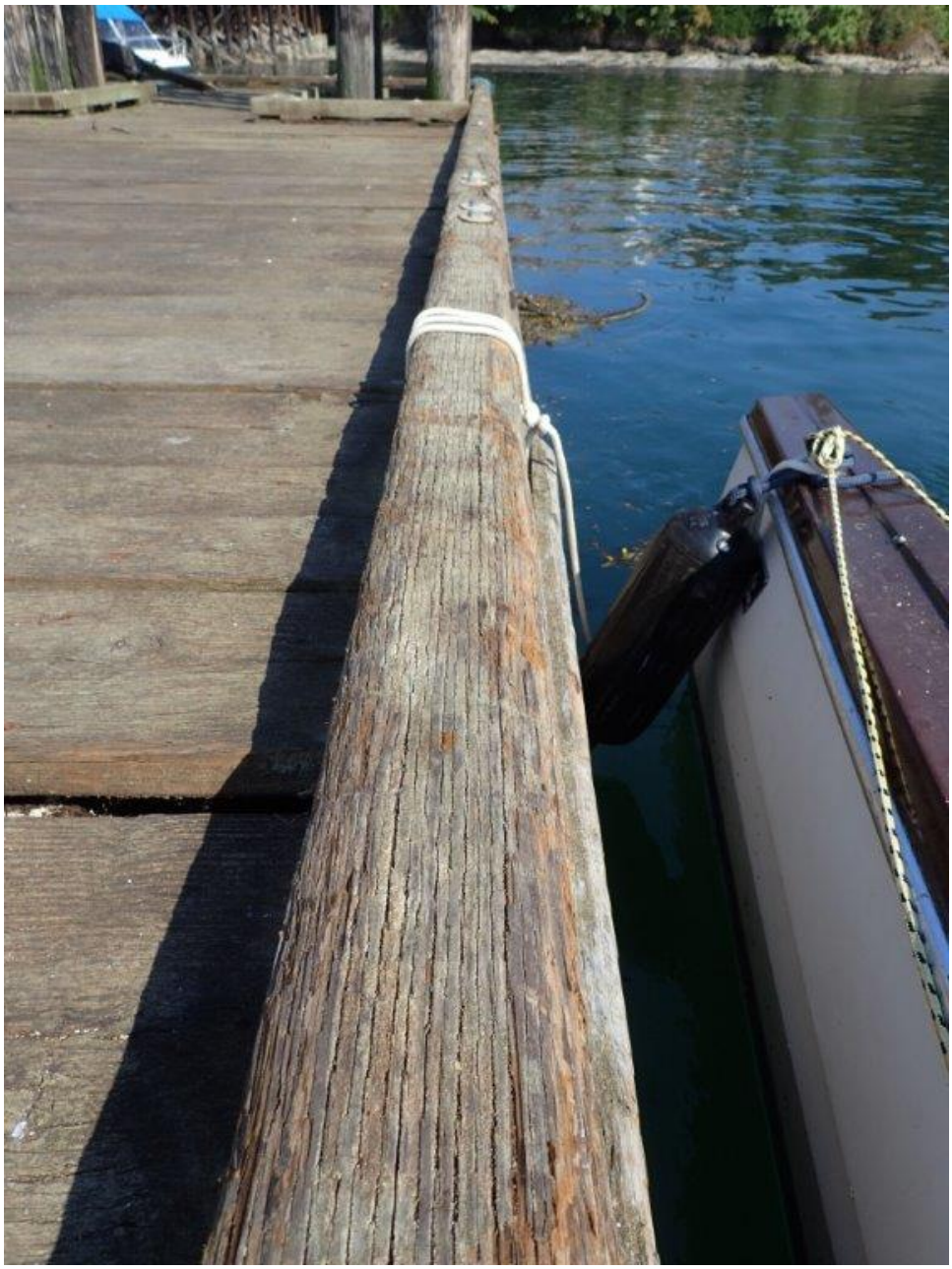
**Photograph 47: Float A General Condition**

**Photograph 48: Float A General Condition**

**Photograph 49: Float A Decking**

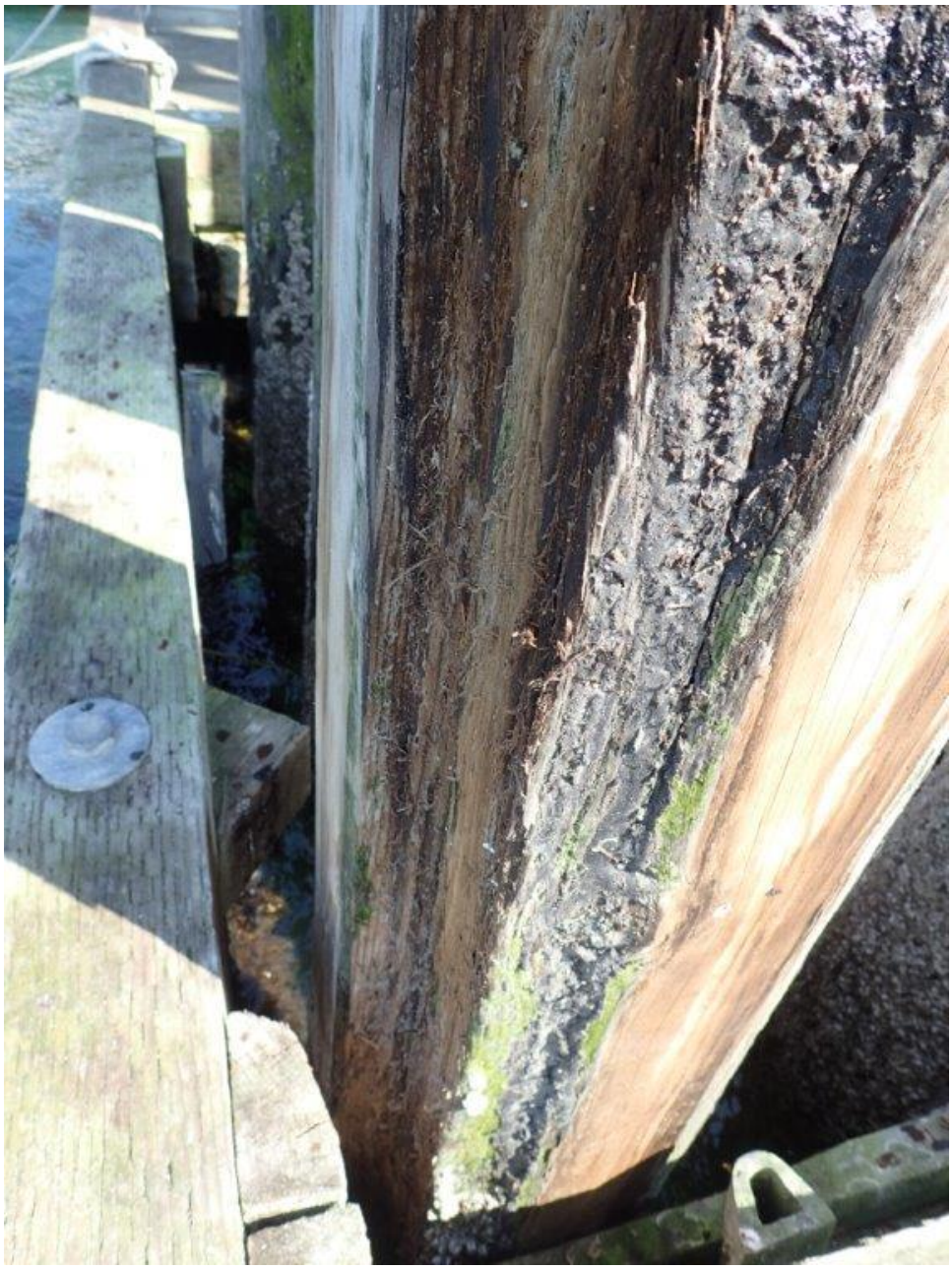


**Photograph 50: Float A Bull Rail and Rub Rail**

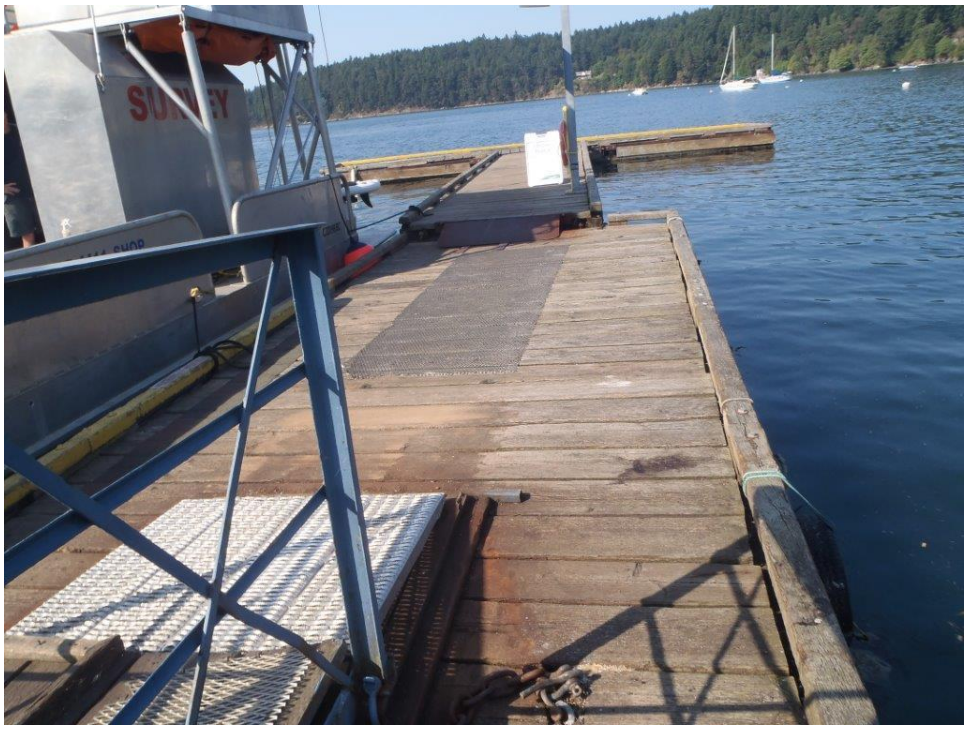


**Photograph 51: Float A Bull Rail**

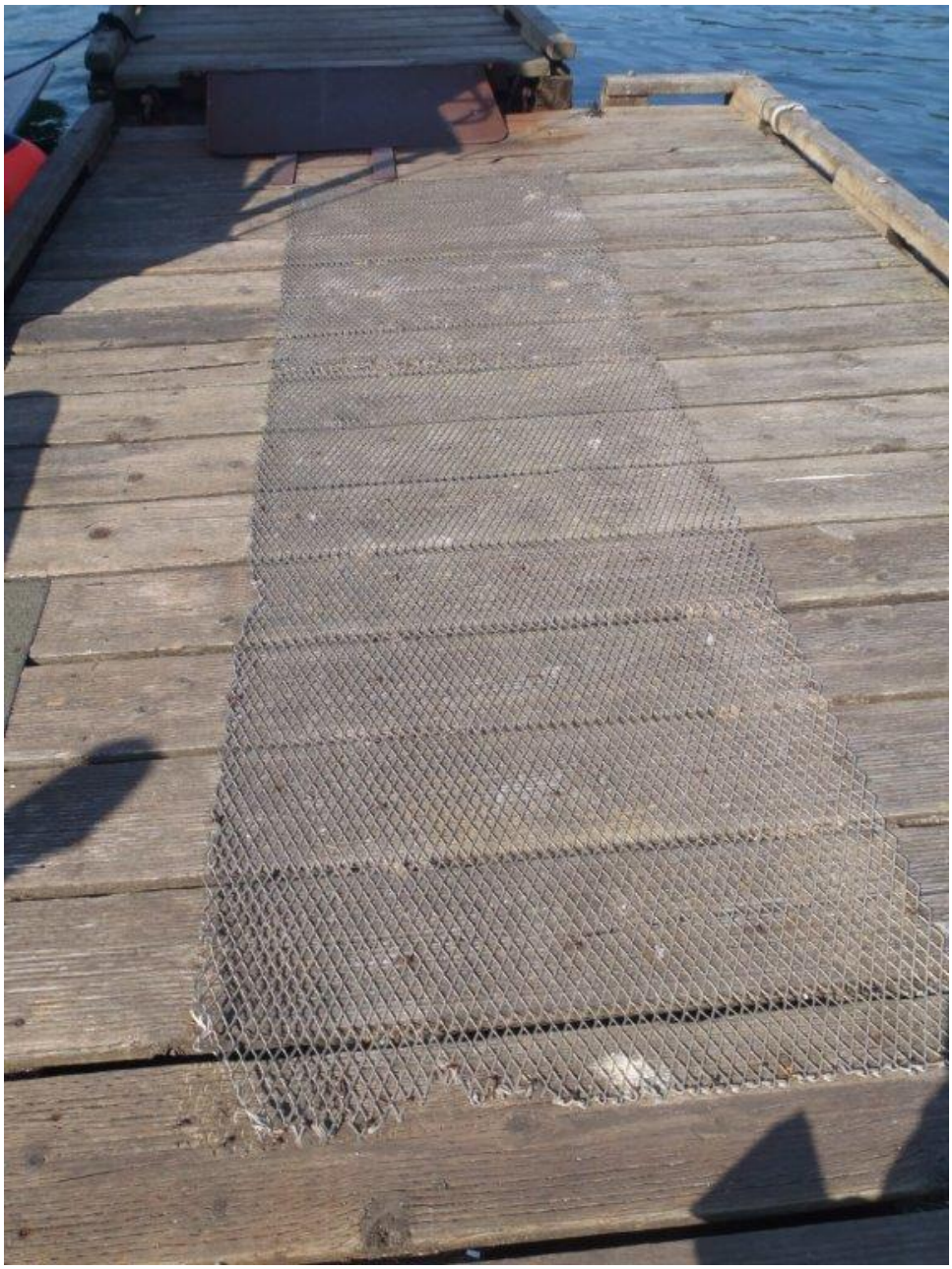
**Photograph 52: Typical Pile Well Condition**



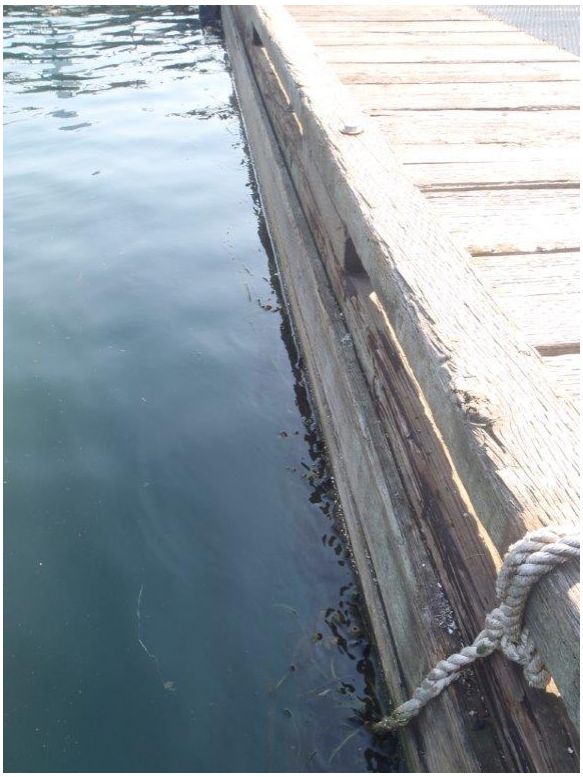
**Photograph 53: Guide Pile Abrasion**

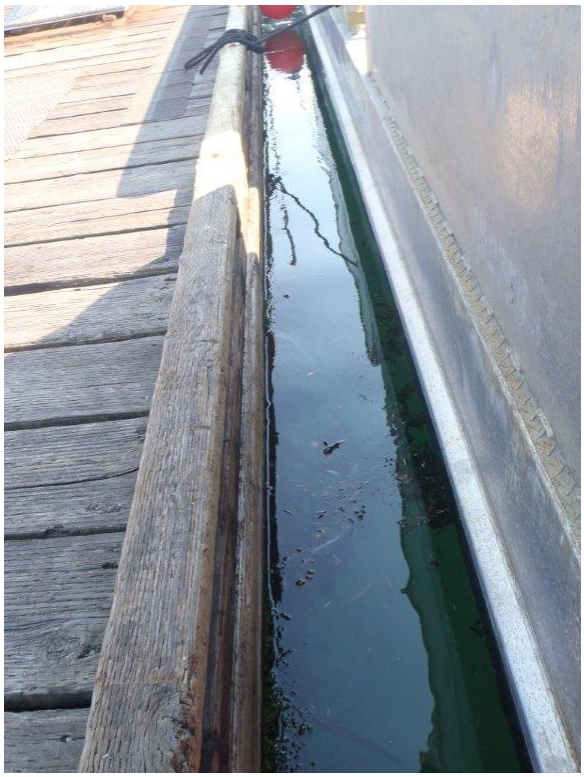


**Photograph 54: Float B Condition**



**Photograph 55: Float B Deck Condition**

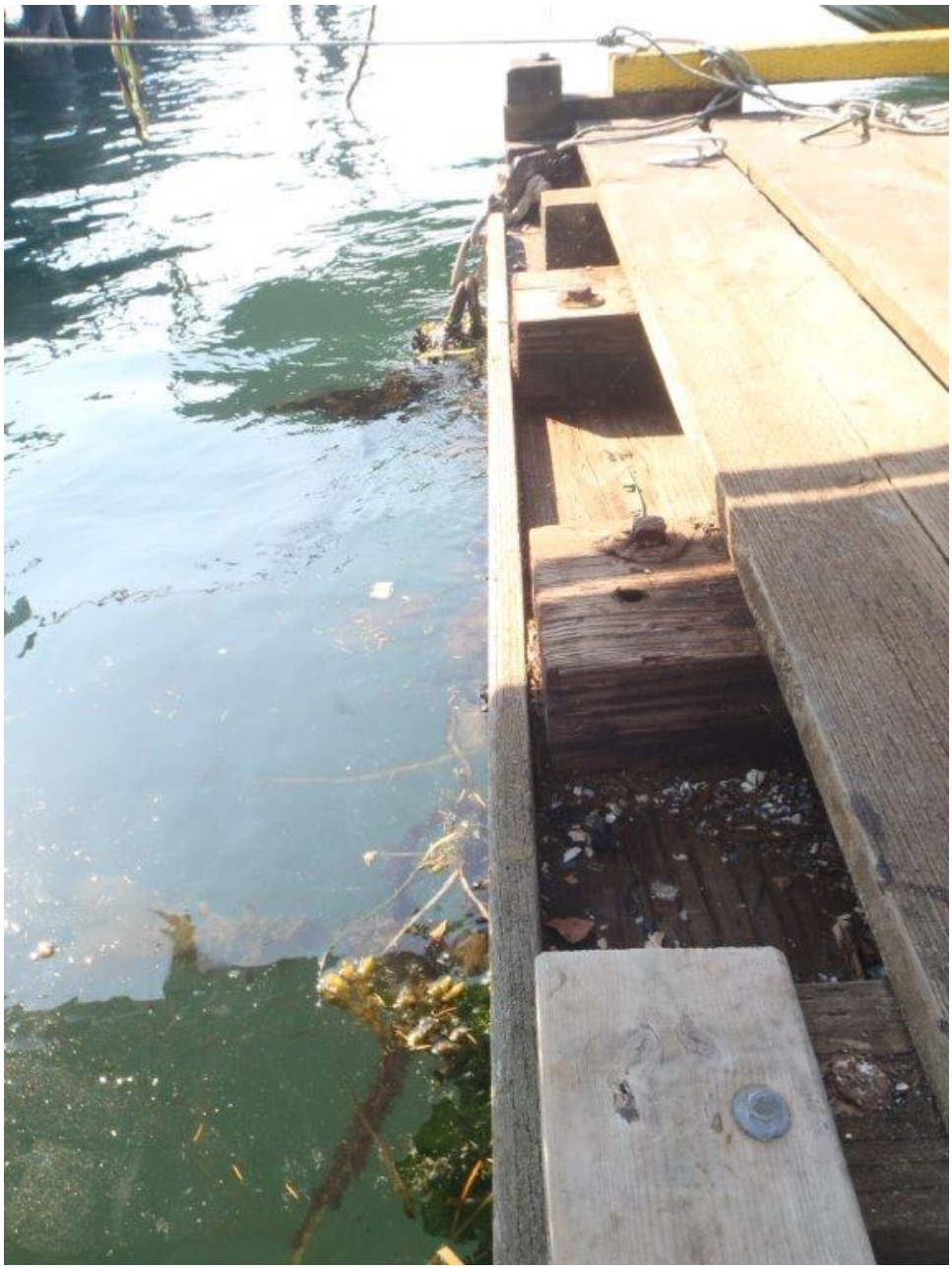




**Photograph 56: Float B Bull Rail and Rub Rail**

**Photograph 57: Float B Deck Worn out due to transition plate**

**Photograph 58: Float B Alignment Line**



**Photograph 59: Float B missing Bull Rail and Deck Board**

**Photograph 60: Connection between Float B and C**

**Photograph 61: Connection between Float B and C**

**Photograph 62: Float C**

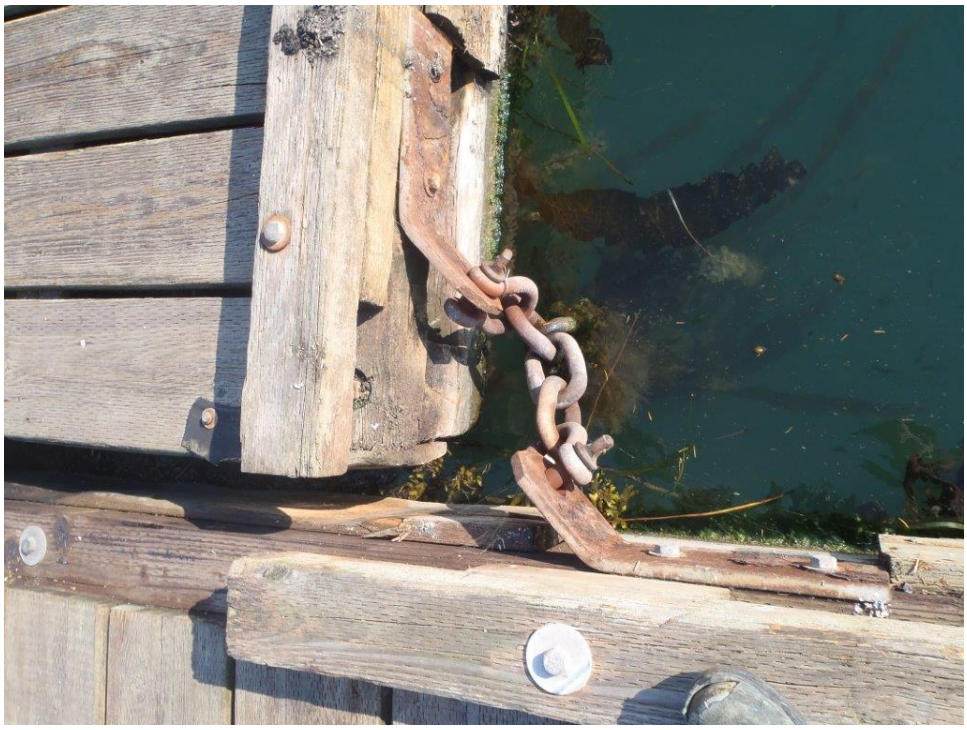
**Photograph 63: Float C**

**Photograph 64: Float C Deck**

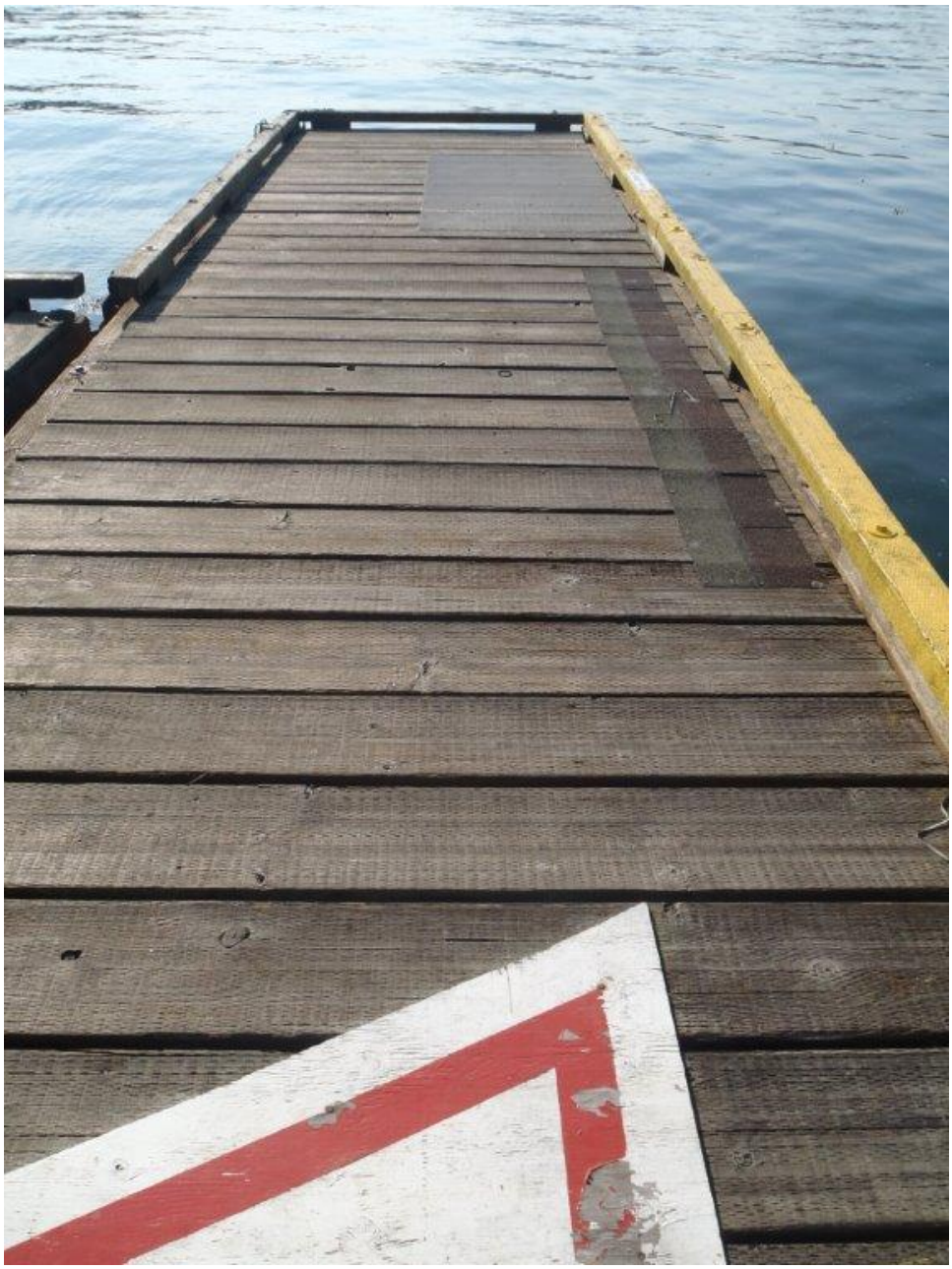
**Photograph 65: Float C Deck**

**Photograph 66: Float C Rub Board**

**Photograph 67: Connection between Float C and D**



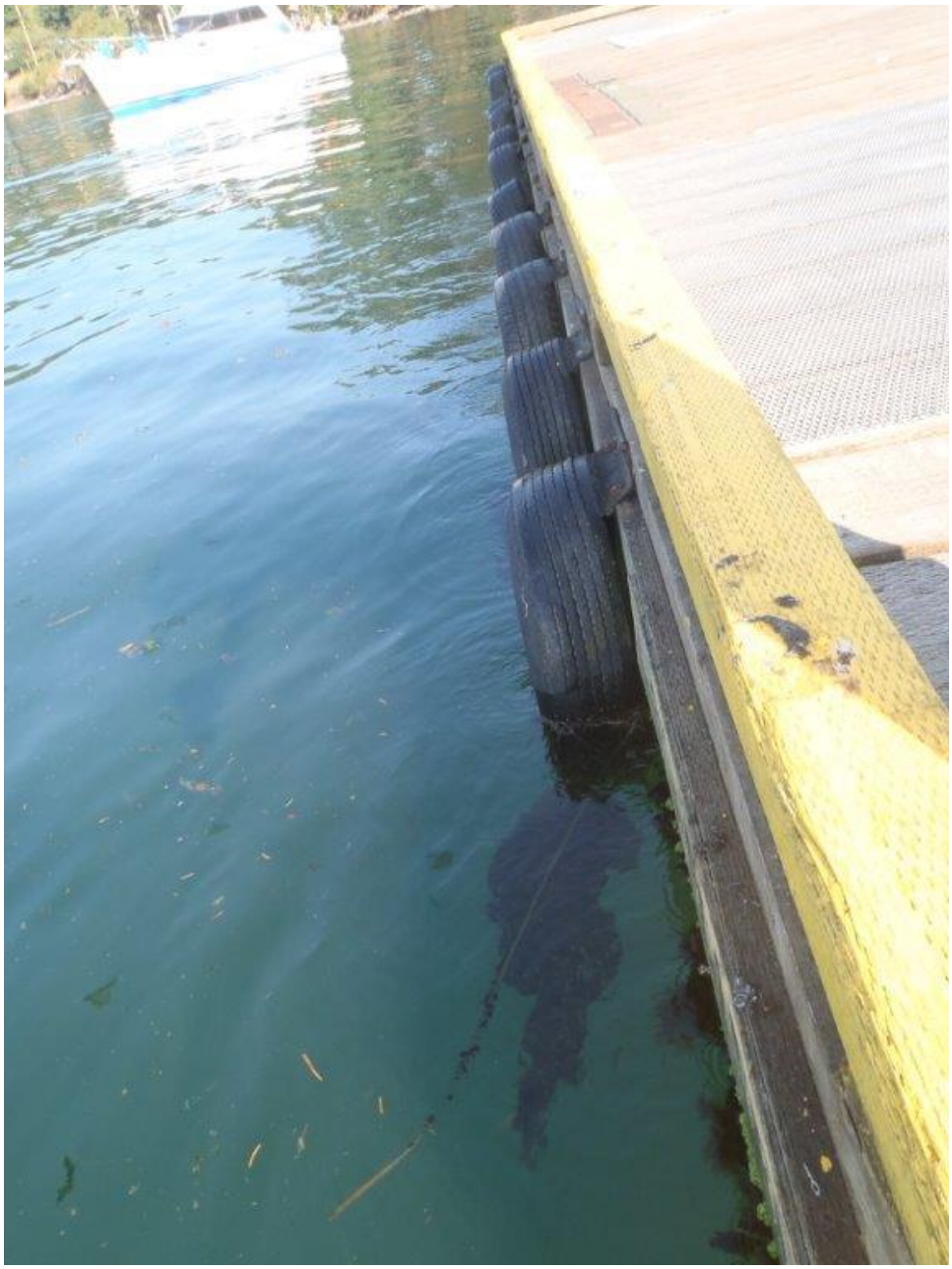
**Photograph 68: Connection between Float C and D**



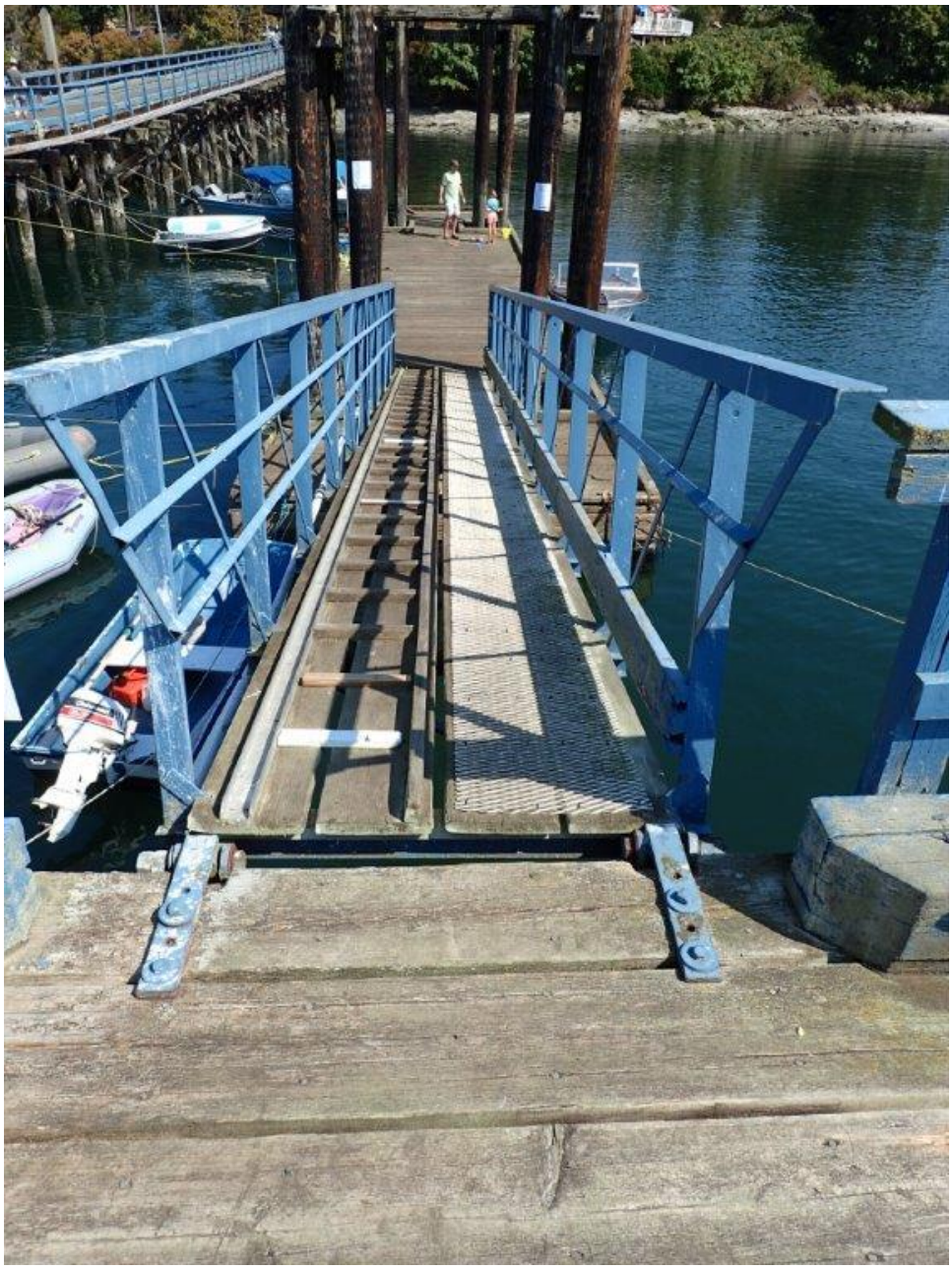
**Photograph 69: Float D**

**Photograph 70: Float D**

**Photograph 71: Float D Rub Rail**



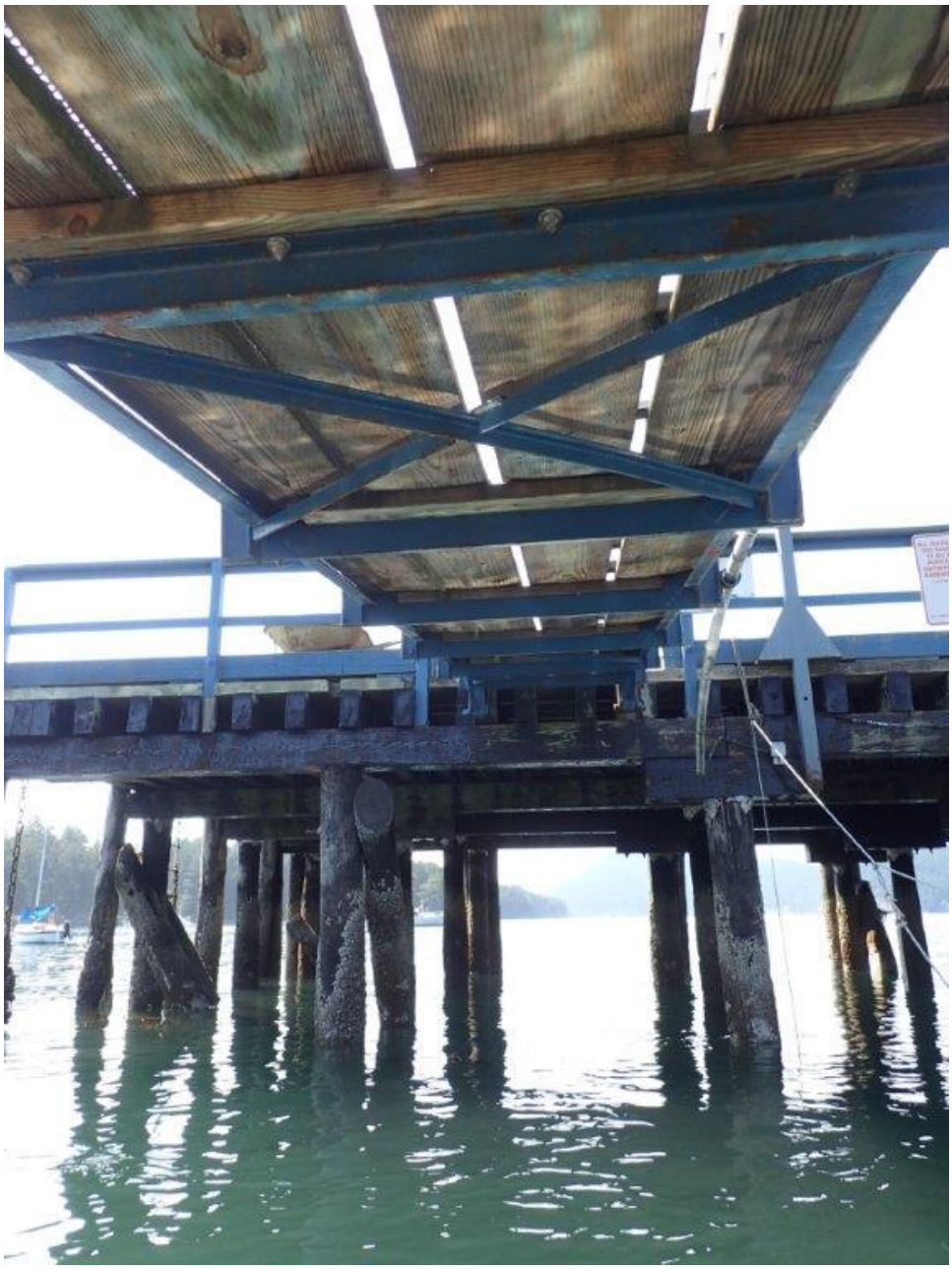
**Photograph 72: Float D Rub Rail and Bull Rail**



**Photograph 73: Gangway A**

**Photograph 74: Gangway A**

**Photograph 75: Float A**



**Photograph 76: Gangway A**

**Photograph 77: Gangway A Guide Rails and Roller**

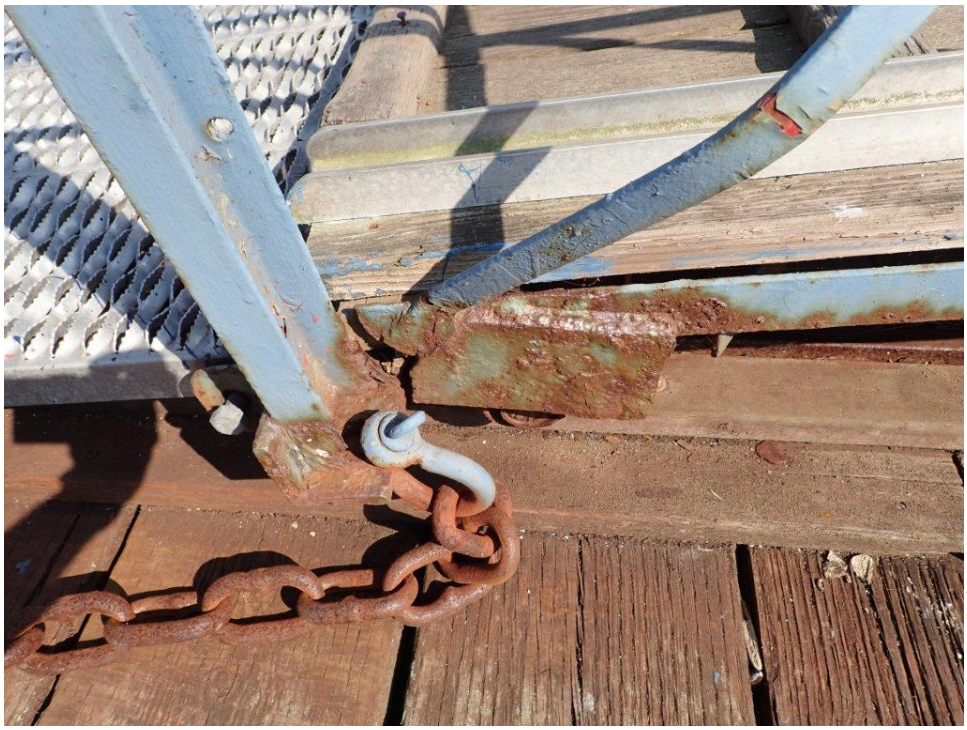
**Photograph 78: Gangway A Roller**

**Photograph 79: Gangway A Roller**


**Photograph 80: Gangway B**

**Photograph 81: Gangway B Hanger Support**

**Photograph 82: Gangway B**



**Photograph 83: Gangway B Broken Support**

**Photograph 84: Gangway B Broken Brace**


**Photograph 85: Gangway B**

**Photograph 86: Gangway B**

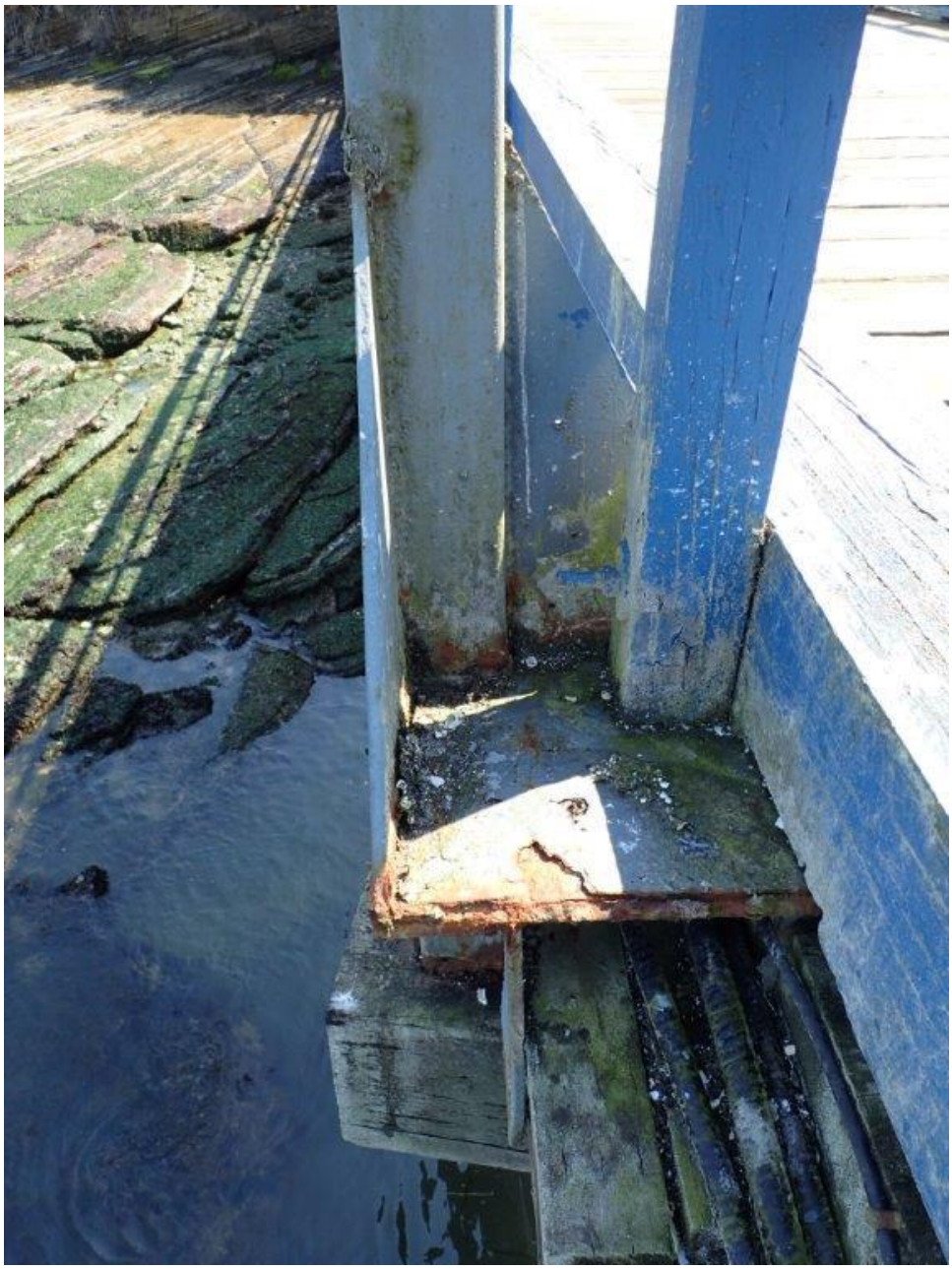
**Photograph 87: Gangway B Roller**

**Photograph 88: Electrical Services**

**Photograph 89: Lamp Standard at Bent 3**

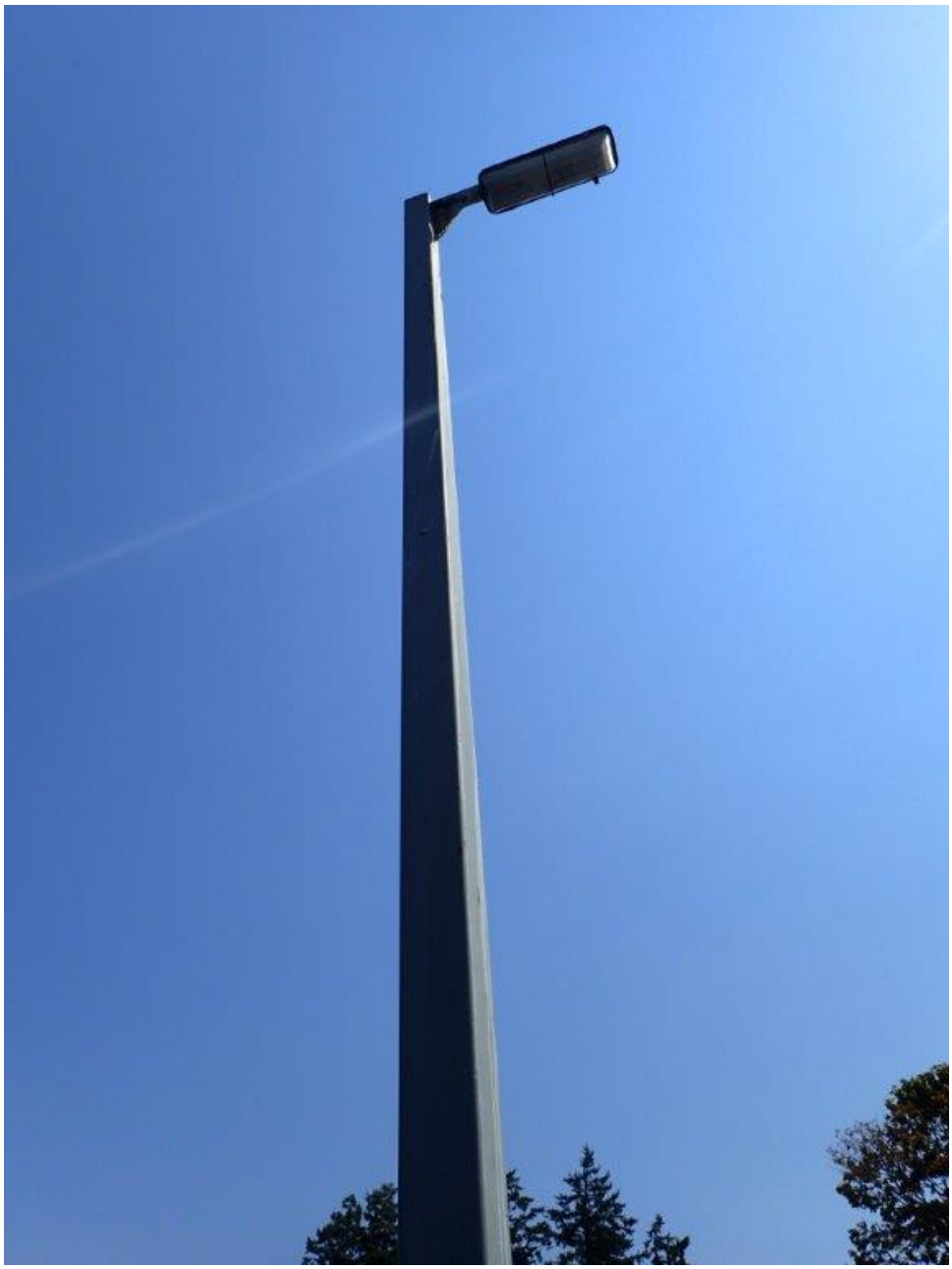
**Photograph 90: Lamp Standard at Bent 3**

**Photograph 91: Broken Electrical Wire at Bent 16**



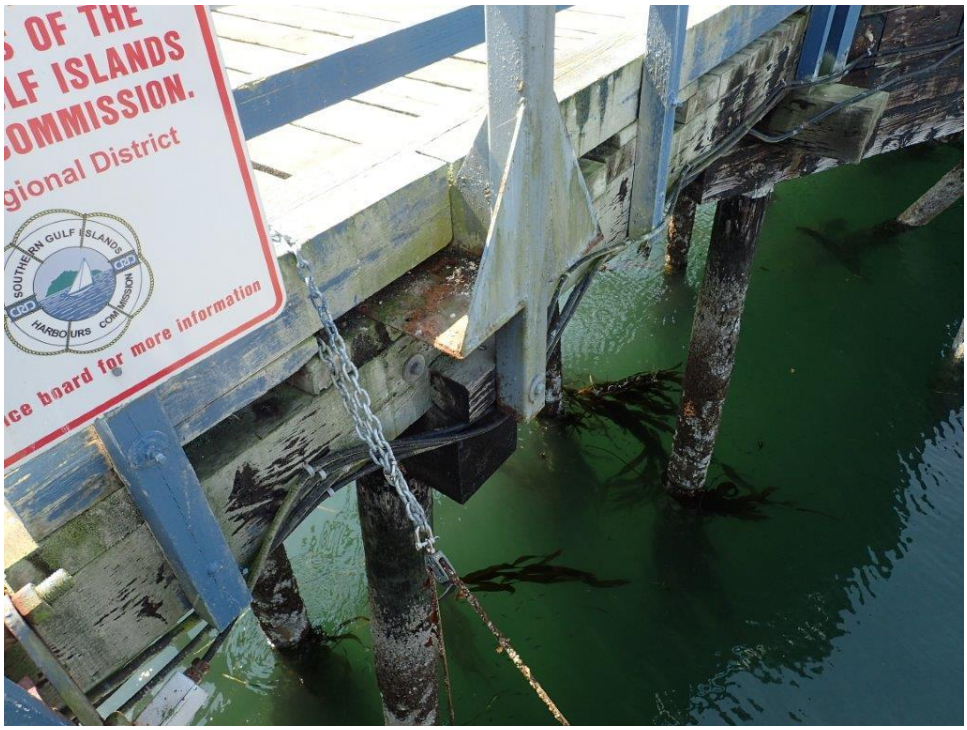
**Photograph 92: Lamp Standard at Bent 16**

**Photograph 93: Lamp Standard at Bent 16**



**Photograph 94: Lamp Standard at Bent 16**

**Photograph 95: Lamp Standard at Bent 28**

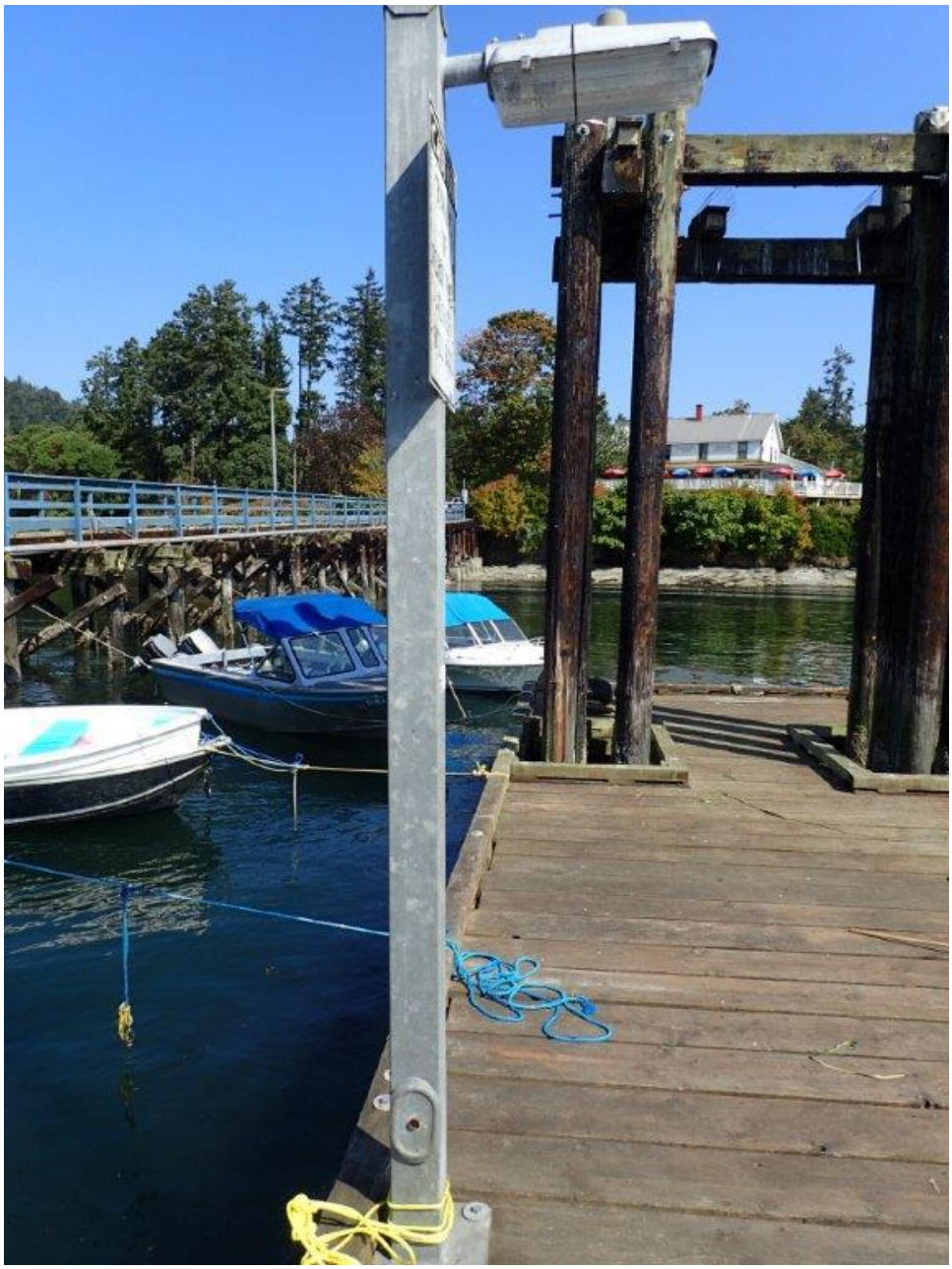



**Photograph 96: Lamp Standard at Bent 28**

**Photograph 97: Lamp Standard at Bent 28**

**Photograph 98: Lamp Standard at Bent 37 Pile F**


**Photograph 99: Electrical Services to Float A**



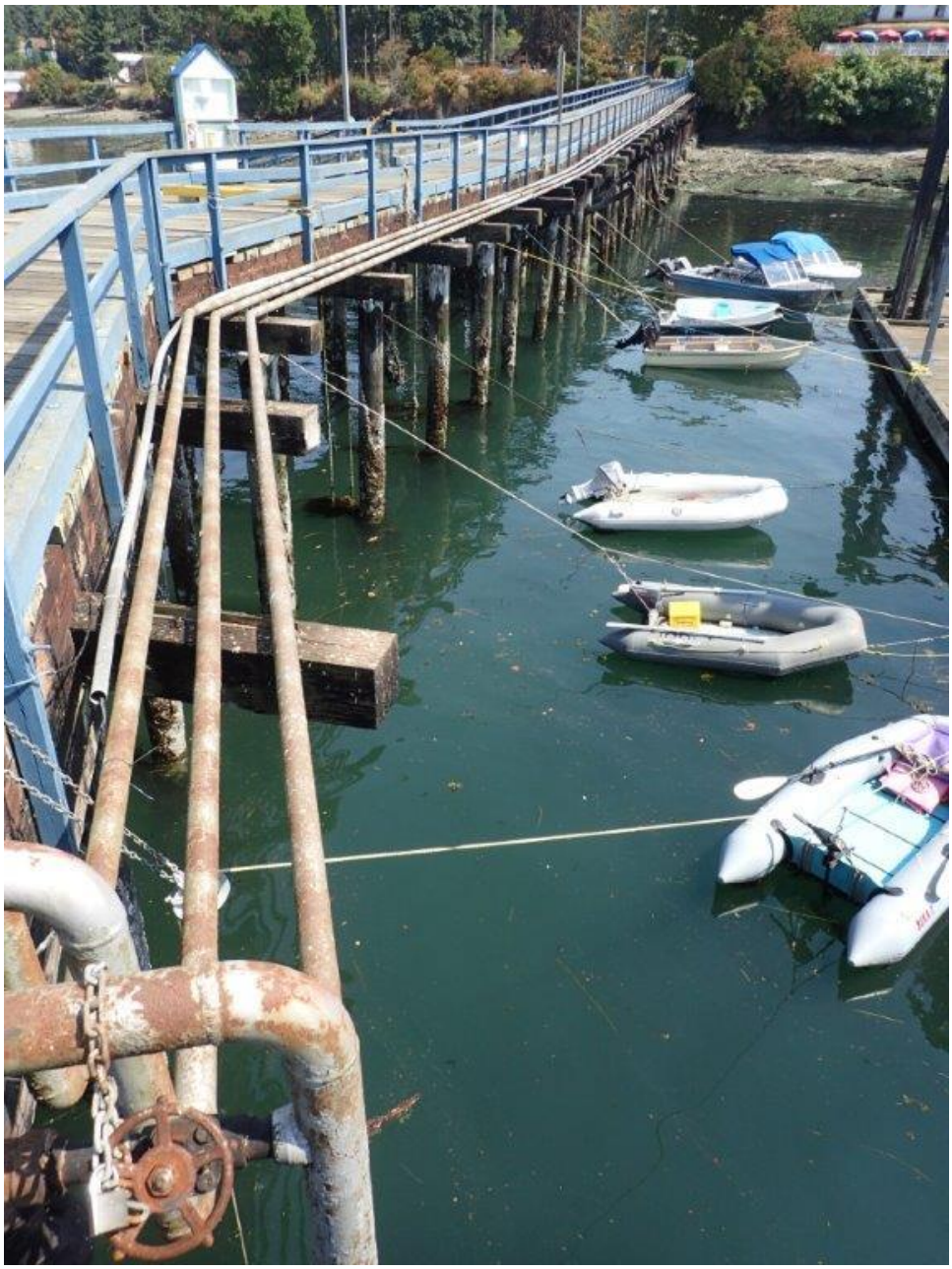
**Photograph 100: Lamp Standard on Float A**

**Photograph 101: Electrical Services to Float B**

**Photograph 102: Electrical Services to Float C**

**Photograph 103: Lamp Standard on Float C**


**Photograph 104: Lamp Standard on Float C**



**Photograph 105: Decommissioned Fuel Lines**


**Photograph 106: Decommissioned Fuel Lines**

# APPENDIX B:
# OPINION OF PROBABLE REPAIR/REPLACEMENT COSTS

| OPINION OF PROBABLE COST | | | DATE PREPARED 13-Sep-15 | | SHEET | OF |
|---|---|---|---|---|---|---|
| OWNER AND LOCATION<br>Capital Regional District<br>Vancouver Island, British Columbia | | CONSTRUCTION CONTRACT NO. | | moffatt & nichol | | |
| PROJECT TITLE<br>Miners Bay | | ESTIMATED BY<br>Moffatt & Nichol | | | | |
| | | STATUS OF DESIGN<br>Draft | | M&N JOB ORDER NUMBER<br>8985 | | |

| | QUANTITY | | MATERIAL & EQUIPMENT COST | | LABOUR COST | | ENGINEERING ESTIMATE | |
|---|---|---|---|---|---|---|---|---|
| ITEM DESCRIPTION | NUMBER | UNIT | UNIT COST | TOTAL | UNIT COST | TOTAL | UNIT COST | TOTAL |
| Sales Tax (British Columbia) | 12.0% | | | | | | | |
| Overhead and Profit | 20.0% | | | | | | | |
| Contingency | 25.0% | | | | | | | |
| **General** | | | | | | | | |
| **Major Mobilization/Demobilization** | | | | | | | | |
| Mobilization/Demobilization | 1 | Lump Sum | $5,000 | $5,000 | $1,680.00 | $1,680 | $6,680.00 | $6,680 |
| Insurance/Bonds | 1 | Lump Sum | $4,000 | $4,000 | $0.00 | $0 | $4,000.00 | $4,000 |
| Total | | | | $9,000 | | $1,680 | | $10,680 |
| Sale Tax, Overhead and Profit, and Contigency | | | | $6,120 | | $1,142 | | $7,262 |
| Total Estimated Construction Cost | | | | $15,120 | | $2,822 | | $17,942 |
| **Total Opinion of Probable Cost** | | | | | | **Major Mobilization/Demobilization Cost:** | | **$18,000** |
| **Minor Mobilization/Demobilization** | | | | | | | | |
| Mobilization/Demobilization | 1 | Lump Sum | $2,500 | $2,500 | $1,680.00 | $1,680 | $4,180.00 | $4,180 |
| Insurance/Bonds | 1 | Lump Sum | $2,000 | $2,000 | $0.00 | $0 | $2,000.00 | $2,000 |
| Total | | | | $4,500 | | $1,680 | | $6,180 |
| Sale Tax, Overhead and Profit, and Contigency | | | | $3,060 | | $1,142 | | $4,202 |
| Total Estimated Construction Cost | | | | $7,560 | | $2,822 | | $10,382 |
| **Total Opinion of Probable Cost** | | | | | | **Minor Mobilization/Demobilization Cost:** | | **$10,400** |
| **Miners Bay** | | | | | | | | |
| **Approach Repair** | | | | | | | | |
| Timber Handrail 2"x6" - Bent 19 | 16 | ft | $1.58 | $25 | $52.50 | $840 | $54.08 | $865 |
| Timber Decking 4"x12" Bents 22-40 | 408 | ft | $12.65 | $5,156 | $13.74 | $5,600 | $26.39 | $10,756 |
| Repair cleat supports | 4 | ea. | $200.00 | $800 | $280.00 | $1,120 | $480.00 | $1,920 |
| Paint handrails & bullrails (option not incl. in rpt) | 2135 | sq ft | $0.83 | $1,772 | $1.57 | $3,360 | $2.40 | $5,132 |
| Total | | | | $5,981 | | $7,560 | | $13,541 |
| Sale Tax, Overhead and Profit, and Contigency | | | | $4,067 | | $5,141 | | $9,208 |
| Total Estimated Construction Cost | | | | $10,049 | | $12,701 | | $22,750 |
| **Total Opinion of Probable Cost** | | | | | | **Approach Repair Cost:** | | **$22,800** |
| **Approach Piles** | | | | | | | | |
| Remove damaged piles | 1 | No. | $1,500.00 | $1,500 | $560.00 | $560 | $2,060.00 | $2,060 |
| Bent 18 Pile B - replace pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Bent 24 Pile B - replace pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Bent 32 Pile C - replace pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Bent 38 Pile A - replace pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Bent 38 Pile B - replace pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Bent 38 Pile H - replace batter pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Bent 39 Pile A - replace pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Bent 40 Pile A - replace pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Bent 40 Pile A - replace batter pile | 45 | ft | $16.15 | $727 | $53.33 | $2,400 | $69.49 | $3,127 |
| Disposal of damage piles | 5.5 | tons | $450.00 | $2,473 | $1,800.00 | $9,894 | $2,250.00 | $12,367 |
| **Approach Brace Repair** | | | | | | | | |
| Barge for transport brace to underside of deck | 1 | No. | $1,500.00 | $1,500 | $560.00 | $560 | $2,060.00 | $2,060 |
| One X-brace at Pile Bent 25 (6"x 8") | 20 | ft | $172.04 | $3,441 | $56.00 | $1,120 | $228.04 | $4,561 |
| Disposal of damage bracing | 0.0 | tons | $450.00 | $0 | $2,650.00 | $0 | $3,100.00 | $0 |
| Total | | | | $15,456 | | $33,734 | | $49,190 |
| Sale Tax, Overhead and Profit, and Contigency | | | | $10,510 | | $22,939 | | $33,449 |
| Total Estimated Construction Cost | | | | $25,967 | | $56,672 | | $82,639 |
| **Total Opinion of Probable Cost** | | | | | | **Approach Piles Cost:** | | **$82,700** |
| **Float Repair** | | | | | | | | |
| **Float A Repair** | | | | | | | | |
| Repair decking 2" x 12" | 168 | sq. ft | $0.43 | $73 | $8.00 | $1,344 | $8.43 | $1,417 |
| Remove old piles - 40ft | 2 | No. | $0.00 | $0 | $1,000.00 | $2,000 | $1,000.00 | $2,000 |
| Replace piles - 40 ft | 2 | No. | $810.00 | $1,620 | $2,400.00 | $4,800 | $3,210.00 | $6,420 |
| Repair pile well rub rail 2" x 12" | 80 | ft. | $0.43 | $35 | $8.00 | $640 | $8.43 | $675 |
| Install UHMW wearing pads pile wells | 4 | No. | $500.00 | $2,000 | $280.00 | $1,120 | $780.00 | $3,120 |
| Repair rub rails 2" x 12" | 40 | ft. | $0.43 | $17 | $8.00 | $320 | $8.43 | $337 |
| Replace bull rails 4" x 6" | 40 | ft. | $3.35 | $134 | $140.00 | $5,600 | $143.35 | $5,734 |
| Remove old floatation - 10 (1220x1220x2440) | 14 | No. | $0.00 | $0 | $357.14 | $5,000 | $357.14 | $5,000 |
| Replace floatation - 10 | 14 | No. | $700.00 | $9,800 | $714.29 | $10,000 | $1,414.29 | $19,800 |
| Replace foam billet fasteners | 1 | No. | $100.00 | $100 | $5,600.00 | $5,600 | $5,700.00 | $5,700 |
| **Float B Repair** | | | | | | | | |
| Replace bull rails 4" x 6" | 44 | ft. | $3.35 | $148 | $140.00 | $6,201 | $143.35 | $6,350 |
| Replace decking 2" x 12" at gangway & grating | 140 | sq.ft. | $0.43 | $211 | $8.00 | $1,120 | $8.43 | $1,181 |
| Repair connection between floats B&C incl transit | 1 | No. | $500.00 | $500 | $280.00 | $280 | $780.00 | $780 |
| Repair rub rails 2" x 12" | 40 | ft. | $0.43 | $17 | $8.00 | $320 | $8.43 | $337 |
| **Float C Repair** | | | | | | | | |
| Replace anchor chains Float C | 100 | ft | $24.20 | $2,420 | $33.00 | $3,300 | $57.20 | $5,720 |
| Replace decking 2" x 12" | 20 | sq.ft. | $0.43 | $9 | $8.00 | $160 | $8.43 | $169 |
| Repair connection between floats C&D incl transit | 1 | No. | $500.00 | $500 | $280.00 | $280 | $780.00 | $780 |
| Replace foam billet fasteners | 1 | No. | $100.00 | $100 | $2,240.00 | $2,240 | $2,340.00 | $2,340 |
| **Float D Repair** | | | | | | | | |
| Repair decking 2" x 12" | 360 | sq. ft | $0.43 | $157 | $8.00 | $2,880 | $8.43 | $3,037 |
| Total | | | | $17,841 | | $53,205 | | $70,896 |
| Sale Tax, Overhead and Profit, and Contigency | | | | $12,132 | | $36,179 | | $48,210 |
| Total Estimated Construction Cost | | | | $29,973 | | $89,385 | | $119,106 |
| **Total Opinion of Probable Cost** | | | | | | **Float Repair Cost:** | | **$119,200** |
| **Gangway Repair** | | | | | | | | |
| **Gangway A Repair** | | | | | | | | |
| Sandblast and re-paint rusted areas | 1 | No. | $500.00 | $500 | $560.00 | $560 | $1,060.00 | $1,060 |
| Remove and replace roller, and roller bearings | 1 | No. | $200.00 | $200 | $280.00 | $280 | $480.00 | $480 |
| Replace rusted L-guide rails | 2 | No. | $100.00 | $200 | $280.00 | $560 | $380.00 | $760 |
| Add Transition plate on top and bottom | 2 | No. | $100.00 | $200 | $280.00 | $560 | $380.00 | $760 |
| **Gangway B Repair** | | | | | | | | |
| Install UHMW wearing pads to transition plates | 2 | No. | $500.00 | $1,000 | $280.00 | $560 | $780.00 | $1,560 |
| Sandblast and re-paint rusted areas | 1 | No. | $500.00 | $500 | $560.00 | $560 | $1,060.00 | $1,060 |
| Replace broken and rusted L-Braces - 3x 3x6lbs/ft | 2 | No. | $100.00 | $200 | $280.00 | $560 | $380.00 | $760 |
| Replace rusted angles and I beams assume 3"x3" | 2 | No. | $150.59 | $301 | $280.00 | $560 | $430.59 | $861 |
| Add Transition plate on top | 1 | No. | $100.00 | $100 | $280.00 | $280 | $380.00 | $380 |
| Remove and replace roller, and roller bearings | 1 | No. | $200.00 | $200 | $280.00 | $280 | $480.00 | $480 |
| Total | | | | $3,401 | | $4,760 | | $8,161 |
| Sale Tax, Overhead and Profit, and Contigency | | | | $2,313 | | $3,237 | | $5,550 |
| Total Estimated Construction Cost | | | | $5,714 | | $7,997 | | $13,711 |
| **Total Opinion of Probable Cost** | | | | | | **Gangway Repair Cost:** | | **$13,800** |
| **Utilities Repair** | | | | | | | | |
| Repair ground | 1 | No. | $1,000.00 | $1,000 | $1,000.00 | $1,000 | $2,000.00 | $2,000 |
| Total | | | | $1,000 | | $1,000 | | $2,000 |
| Sale Tax, Overhead and Profit, and Contigency | | | | $680 | | $680 | | $1,360 |
| Total Estimated Construction Cost | | | | $1,680 | | $1,680 | | $3,360 |
| **Total Opinion of Probable Cost** | | | | | | **Utilities Repair Cost:** | | **$3,400** |
| **Utilities Upgrades** | | | | | | | | |
| Replace with LED fixtures | 1 | LS | $4,000.00 | $4,000 | $3,000.00 | $12,000,000 | $7,000.00 | $7,000 |
| Total | | | | $4,000 | | $12,000,000 | | $7,000 |
| Sale Tax, Overhead and Profit, and Contigency | | | | $2,720 | | $8,160,000 | | $4,760 |
| Total Estimated Construction Cost | | | | $6,720 | | $20,160,000 | | $11,760 |
| **Total Opinion of Probable Cost** | | | | | | **Utilities Upgrades Cost:** | | **$11,800** |

# APPENDIX C:
# UNDERWATER INSPECTION REPORT

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UNDERWATER INSPECTION REPORT

# CRD Docking Facilities

**Southern Gulf Islands**
**August 10- 14th, 2015** **Ref# 35332**

## BACKGROUND

Over the week of August 10-14th, 2015, All-Sea Underwater Solutions diving personnel performed underwater inspections of 12 CRD docking facilities located among the Southern Gulf Islands. The observations include the floats, pilings, anchor chains and anchor points. This inspection was directed by the onsite representative from Moffet and Nichol.

## DIVING OPERATIONS

The diving was carried out using a three man dive team with surface supplied diving equipment, two way diver to topside communication and u/w video recording capability and conducted from a dive support vessel.

## FACILITES INSPECTED

Twelve docking facilities were underwater inspected at the following locations;

August 10, 2015

1. Piers Island Harbour, Piers Island.
2. Swartz Bay, Vancouver Island

August 11, 2015

1. Port Browning, N Pender Island
2. Lyall Harbour, Saturna Island
3. Hope Bay, N Pender Island

August 12, 2015

1. Retreat Cove, Galiano Island
2. Fernwood Dock, Salt Spring Island
3. Montague Harbour, Galiano Island

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August 13, 2015

1. Sturdies Bay, Galiano Island
2. Minors Bay, Mayne Island

August 14, 2015

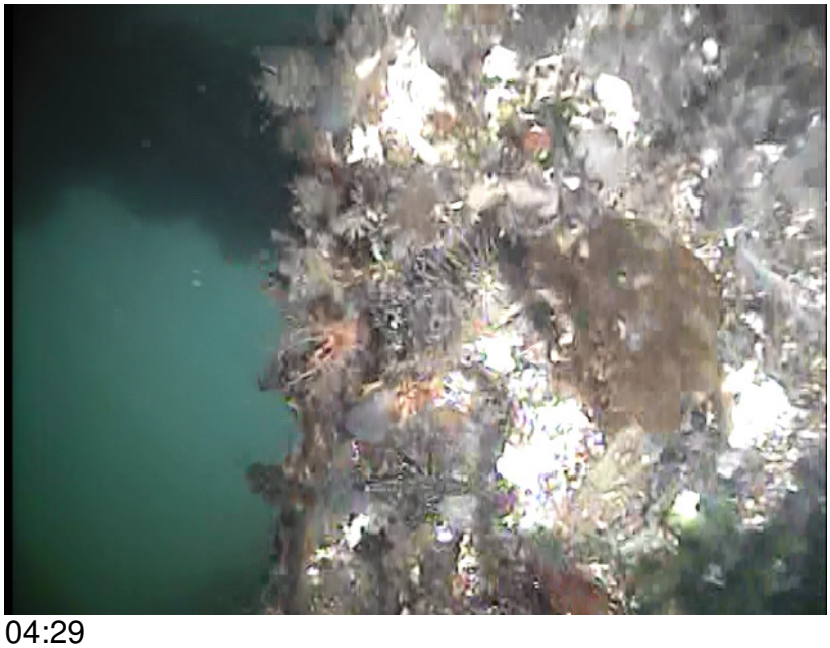
1. Horton Bay, Mayne Island
2. Port Washington, N Pender Island

## ***FINDINGS***

The data recorded is itemized from the site plan and general arrangement that was provided by the onsite representative from Moffet and Nichol. Each facility inspection was recorded via u/w cc video. The following is a list of abnormalities sighted; all other points inspected shall be considered free of significant damage.
Each photo has is marked with Chapter number and time in minutes from the video.

**Piers Island Harbour, August 10, 2015. Time: 800am. Max depth 15 feet**

A) Foam billets were not encapsulated, exposed foam deteriorated approx 10-15% and were covered in marine growth.



04:29

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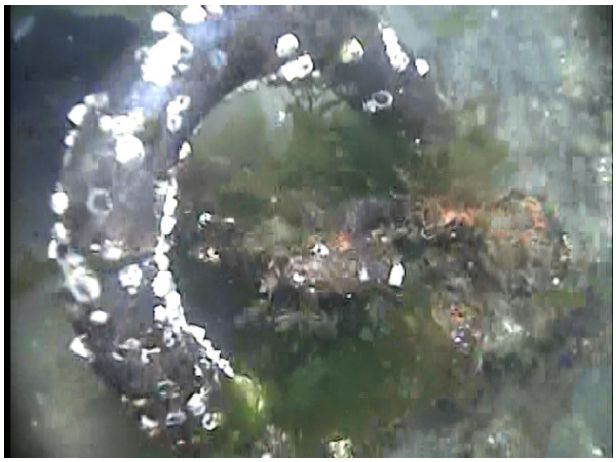
B) Southwest 4 pile cluster, piling on the NE corner; two cavities sighted approx 50mm deep x 130mmL x 30mmW near mud line.

12:33

12:40

C) Anchor chains from N end of triangular float, 3 connections, up to 50% wastage on links in the tidal zone. Anchor connections secure approx 20% wastage on shackle

22:59



29:26

D) Gangway pilings inspected; Row 8, three piles, 2' water depth, no abnormalities sighted.

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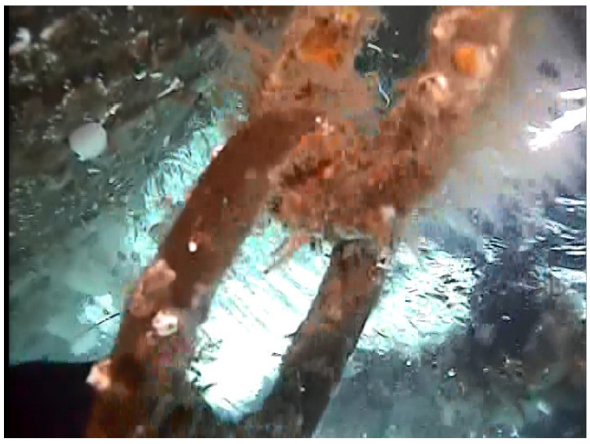
**Swartz Bay August 10, 2015. Time: 1115am, Max depth 18 feet**

A) Anchor chain in tidal zones from dock connection has approx 10-20% wastage at the links. Chain along bottom up to 10% wastage.



B) Float A, East anchor chain at block connection, chain link has up to 30% wastage.

C) Anodes fitted to the anchor chains were found to average approx 80% depleted.
D) Foam billets were encapsulated; no signs of deterioration were sighted.

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E) Concrete pilings #5 and #6: vertical fractures sighted up from mud line approx 400mmL.

**Port Browning, August 11th, 2015, Time: 830am, Max depth 22 feet**

A) Anchor chain connections at North float running east, chain wastage up to 15%

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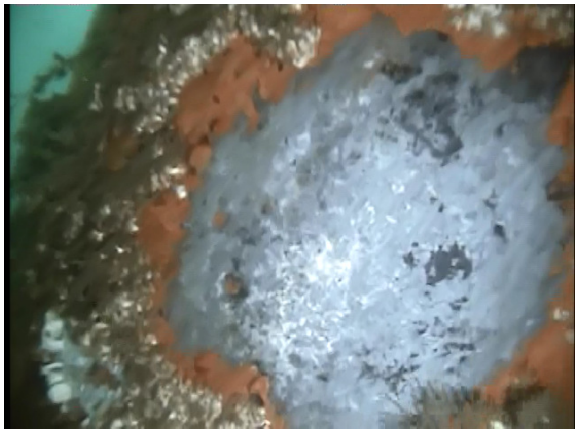
B) Gangway pilings exhibit few small cavities to 20mm depth, very scattered.

C) Foam billets are encapsulated and remain intact.
D) No sign of significant damage to the u/w portion of the floats.

**Lyall Harbour, August 11th, 2015, Time: 1210. Max depth 26 feet**

A) Approach steel pilings exhibiting surface corrosion and pitting in way of scattered areas void of coatings. Second row from shoreline pilings are pitted to 2mm depths. Remaining steels piles to the North reveal pitting to 1mm depths.
No anodes were fitted to the piling.



35:53

45:38

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B) Non encapsulated foam billets under floats are deteriorated 10-20%

51: 45

52:02

C) Float contact on wooden pile, wear approx 12mm. Steel pile wear from float approx 2mm, weld seam flush with pile surface. Scattered areas on steel pile, exposed corrosion to 1mm depths.

108:52 Wood pile

Ch.2: 2:25 Steel pile

D) Floats and remaining wooden piles in fair condition.

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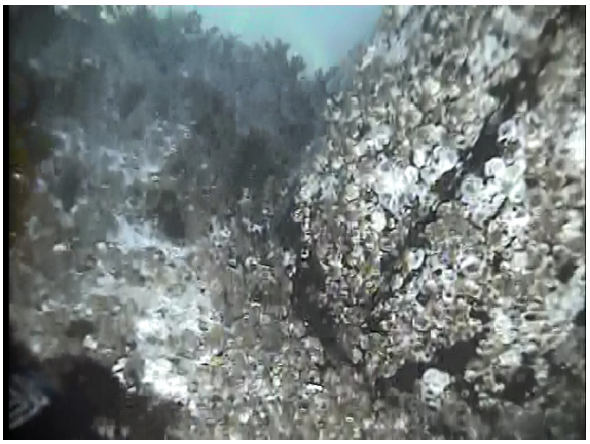
E) Float fasteners exhibit moderate corrosion.

Ch.2; 17:56

**Hope Bay, August 11th, 2015, Time: 1515pm**

A) Pile row #6 angle cross timber, hollowed out at end in way of piling C
B) Crack lines evident in pile 6B at concrete pile foot

00:26 Cross timber



01:57 Split line at pile foot

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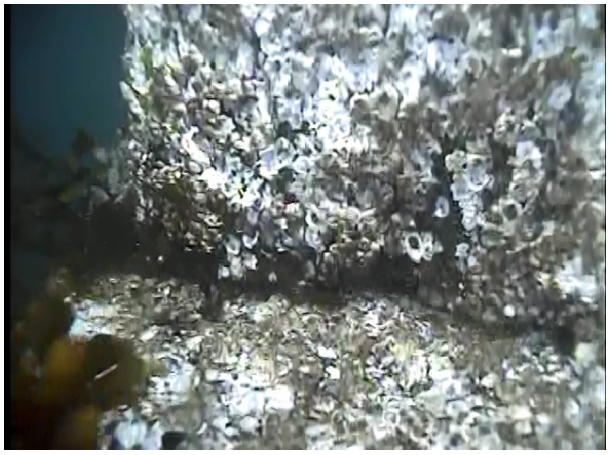
C) Scattered areas of small hole amongst the Wharf head and approach pilings to depths of 90mm opening to inner cavities. Each pile exhibits a certain degree of holes.

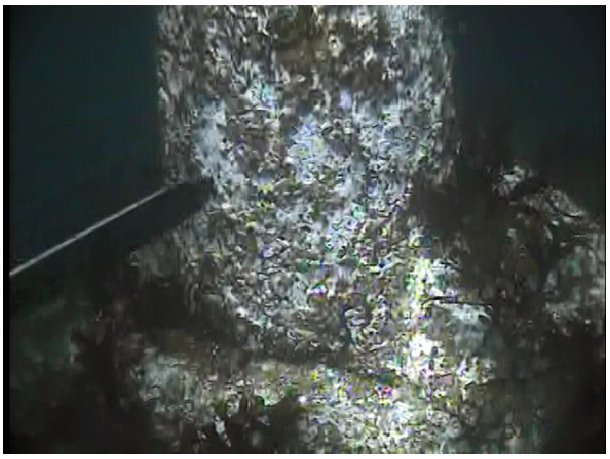
04:08

19:14

D) Row 8 Pile C, concrete footing deteriorated to exposed pile bottom.



09:13



09:32

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E) Row 8 Pile D, Cross timber hollowed out at low end. Pile bottom contact on rocks approx 20%.


12:43


11:48

F) Row 10 Pile C, lower end of cross timber eroded out to a depth of 200mm


25:39

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G) Float A, south side, east of gangway horizontal board dropped due to timber fasteners failing


34:36


36:11

H) Float A & C timber fasteners, scattered areas of wasted nuts.


39:22


41:39

I) Foam billets are encapsulated, no abnormalities sighted.

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**Retreat Cove, August 12th, 2015; Time: 800am, Max depth 18 feet**

A) 3 pile cluster fender piles at west end of the approach. Multiple holes and outermost pile hollowed out at the bottom.

02:22

03:06

B) 3 bands scraped bottom, mid way and below water line, no abnormalities found

13:04 Row 9, Pile C (bottom)

24:53 Row 7 Pile B (mid way)

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C) Row 8 Pile B has a large cavity approx 1.5M from bottom, measures 180mmDeep x 130mmw x 250mmH

20:08

21:10

D) Scattered areas of small holes in pilings from Rows 6, 5 and 4, lines A and B. Depths up to 100mm.

35:25

26:48

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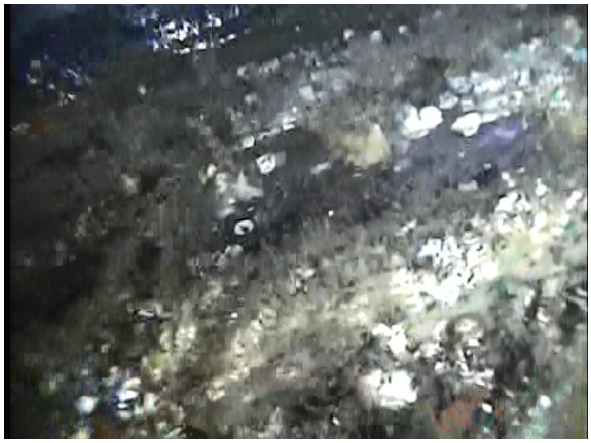
E) Scraped pile located at west cluster of three on pontoon float near gangway, north most pile. No abnormalities sighted.
F) Very scattered shallow cavities found on the float piles, max depth 20mm.


43:28 Scraped pile


46:40 Cavities

G) Side boards on pontoon float show signs of erosion at scattered areas, timber bolts are at varying degrees of metal wastage, still remains secure, bolts at max are 70% wasted


49:28


52:24

H) Foam billets are encapsulated, no abnormalities

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**Fernwood Dock, August 12th, 2105 Time: 1015am. Max depth 17 feet**

A) Piling condition generally good with very few scattered small cavities to depths of 40mm max and widths of 40mm. Diver u/w inspected the approach piles to row 22

02:37

07:04

B) Older exposed foam billets show deterioration to approx 10%. Newer billets fiberglass coated are in good shape.

22:07 Exposed foam

31:18 Encapsulated foam

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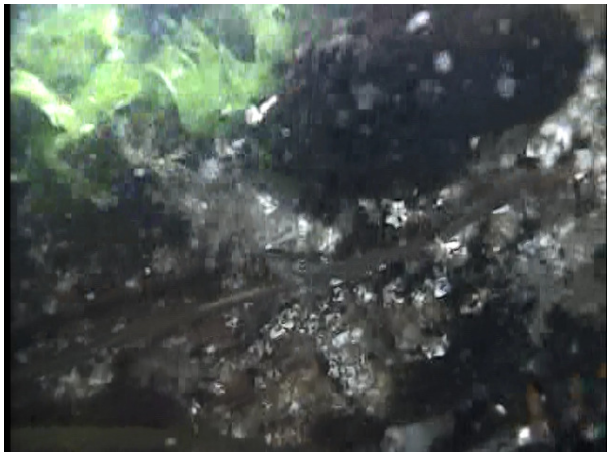
C) Scattered timber bolts found to be corroded, many remaining in fair condition, floats appear secure and solid. Side horizontal timbers are deteriorated and loose, mainly at the west end of the float.

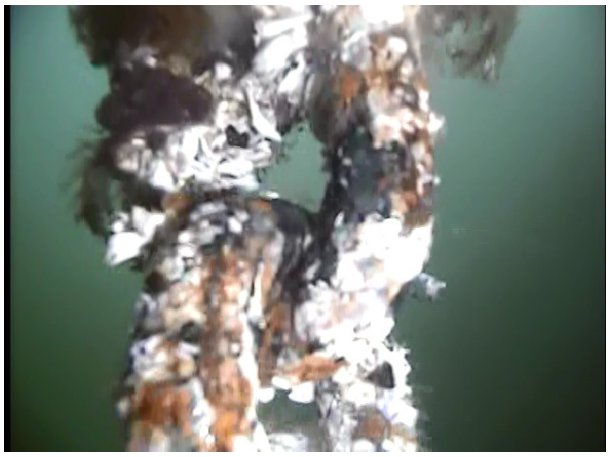
39:33 Corroded nut



40:55 Deteriorated timber

**Montague Harbour, August 12, 2015. Time 1230pm, Max depth 26 feet**

A) Anchor chain condition wear average approx 1mm with exception to the connection at float A anchor block extending from the north corner to offshore block. The shackle connection is approx 70% worn through. Anchor chain anodes sighted are 30% depleted.



02:30 Typical anchor chain wear

08:52 Severe shackle link wear

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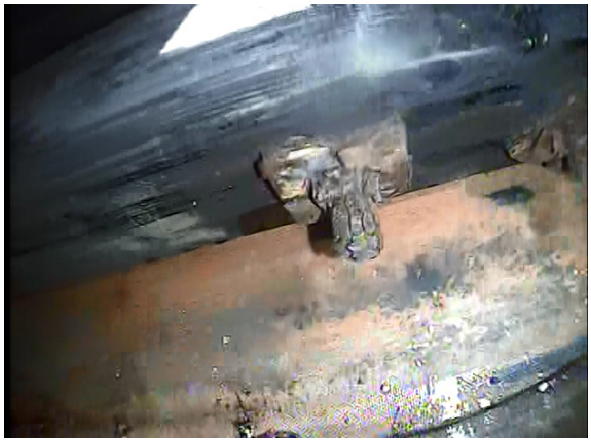
A) Steel pilings total of 4 exhibited corrosion spots to 2mm depths. Fitted anode brackets were 100% depleted of anodes.

17:45 Pitting to 2mm depths

18:38 Anode brackets

B) Float fasteners found to be corroded, scattered areas up to 80% of bolt wasted.

31:58



31:51

C) Foam blocks encapsulated and in good condition.

D) Float structure appears in fair condition with scattered area of moderate wood deterioration on the side planks.

E) Wooden pilings are overall in good condition.

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**Sturdies Bay, August 13, 2015, Time 810am, Max depth 21 feet**

A) Inspection of Float and pile clusters found no significant defects.

B) Break water piles are numbered 1 -93 beginning from north end. Piles 15, 40, 60 and 80 were scraped below water line, mid way and mud line, no defects sighted on those piles.

32:06 Pile 15 scraped band (Mid)

43:50 Pile 40 scraped band (lower)

52:32 Pile 60 scraped (lower)

1:10:19 Pile 80 scraped (upper)

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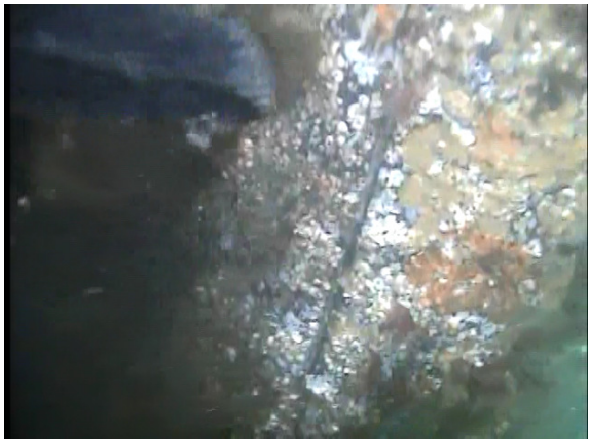
B) Piling 63, west face of break water, crack running up from mud line for approx 1.2M then a second crack alongside starting and running approx 2M up the pile.

57:45

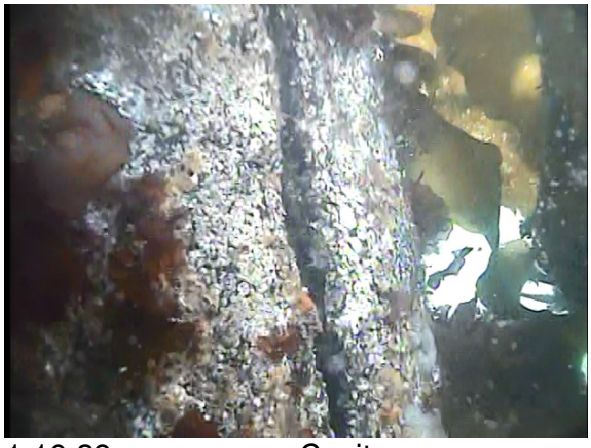
57:36



58:28

57:49

C) Pile 93 west face, approx 1.5M from bottom; cavity 75mmD x 400mmH x 25mmW
D) Pile 52 east face, small hole 25mm deep x 20mmW



1:19:39 Cavity

Ch.2; 10:46 Small Hole

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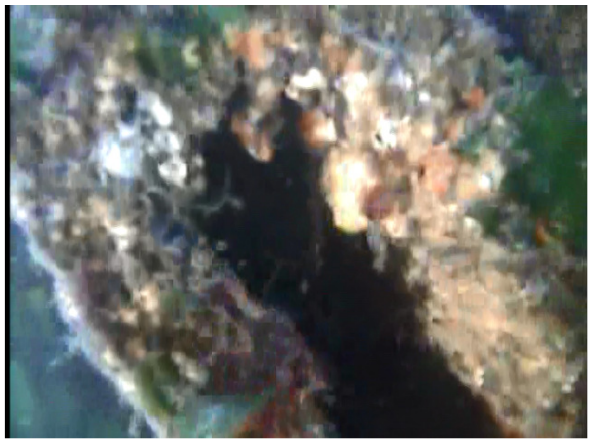
E) Row 14 pile F cross timber hollowed out at lower end approx 100mm deep


Ch.3; 00:35


Ch.3; 00:45

F) Scattered holes found on approx 7 of the 23 piles on the main approach. Max depths 60mm x 25mm wide.


Ch.3; 2:10


Ch.3; 4:23


Ch.3; 5:22


Ch.3; 8:39

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G) Row 9 Pile H, east pile of the pair; 1 meter crack from mud line up and approx 12mm wide at max.


Ch.3; 49:11


Ch.3; 49:18

**Minors Bay, Aug 13th, 2015. Time; 1200 Max depth 26 feet**

A) Float C east anchor chain, wear near connection 40%. Run of chain to anchor approx 80% wastage.


Ch.1; 01:58


Ch.1; 02:34

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B) Float C west anchor chain, wear near connection 30%. Run of chain to anchor approx 50% wastage.


Ch. 1; 10: 55


Ch. 1; 11:45

C) Anchor chains on floats D and B have link wastage to 15% and are in fair condition. All anchor points on shore and concrete blocks are secure with wastage 15-25%.

D) Float timber fasteners have varying degrees of corrosion. No loose boards were sighted.


Ch1: 39:04


Ch1; 39:15

E) Foam billets are encapsulated, no abnormalities sighted.

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Main Approach pilings were inspected u/w from Row 14 to row 40. The following photos show defects, the remaining are in fair condition;
A) Row 18 Piles A and B small cavities and cracks

Ch2: 51:55 Cavity 40mm deep x 25mmW

Ch2; 53:14, 2 cracks 50mm deep x 150mmH

Ch2; 42:35 Row 21, pile B cavity 50mmD

Ch2; 47:01 Row 21, pile C cavity 30mmD

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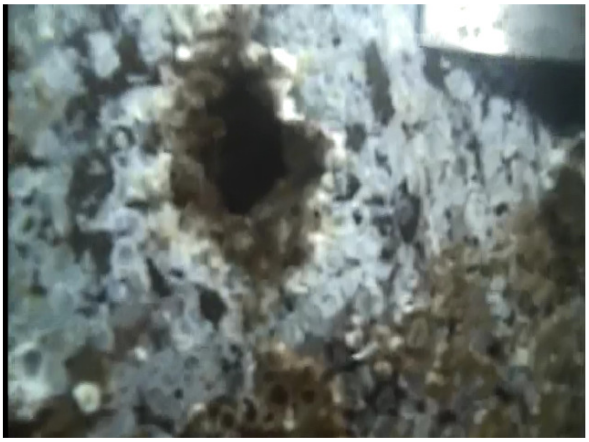
B) Row 26 Pile C scraped, 3 bands; Mud line ,mid way and below water line


Ch2; 14:45 Mid way


Ch2; below water line (cavity)

C) Row 30, pile B cavity approx 25mmD mid way up pile.
D) Row 32 Pile C cavity split at mud line approx 200mmD x 600mmH x 150mmW


Ch2 108:08 Row 30 pile B (cavity)


Ch3; 06:57 Row 32 Pile C Large cavity split

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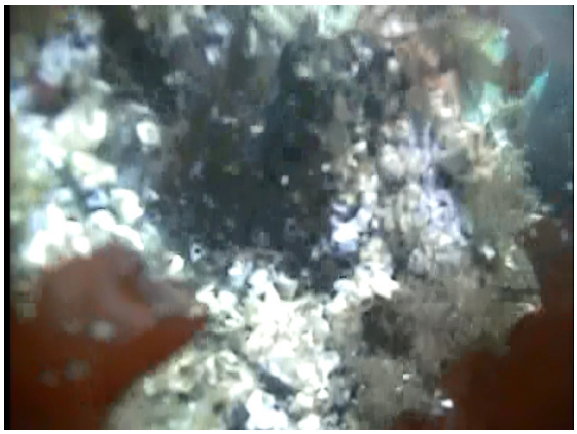
E) Row 33 Pile B 3 bands scraped at waterline, mid way and mud line, No abnormalities sighted.
F) Row 34, batter pile, 75mmDeep x 25mmW cavity approx 1M from mud line.


Ch3; 09:47 Row 33 Pile B Scraped


Ch3; 17:53 Row 34 Batter Pile cavity

G) Fender pile clusters at North face of the wharf, to sets in way of Rows 39 and 37, piles exhibit large cavities, splits and small holes. Outer piles are cladded with a steel plate half sleeve. Piles are deteriorating, but appear to be moderately sound. They are not part of the wharf structure.


Ch3 29:58  large cavity approx 200mmD


Ch3; 29:24  fender cluster

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H) Row 38 Pile B line, At mud line eroded approx 80mm deep x 200mmW approx 30% around pile.

Ch3;47:17

G) Row 39 Pile A below water line pile is rotted out almost completely.

Ch4: 00:29

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H) Row 40 Pile A, Vertical support pile, hollow section approx 2m up from mud line. Approx 25% absent x 400mmH


Ch4: 11:15


Ch4: 12:10

I) Rub marks on outer piles on row 40.

J) Majority of the pilings from Row D toward row H are fitted with pile wrap, no significant defects were sighted.


Ch4:1:03:07


Ch4: 23:31

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K) Float A, NW 6 pile cluster center N pile; cavity approx 100mm deep x 75mmH 25mmW.

Ch4: 110:49 Cavity

L) Float A foam billets are exposed foam with scattered areas of loss to 20% in sections. The float appears in good condition with fasteners moderately corroded to 10 % depletion.

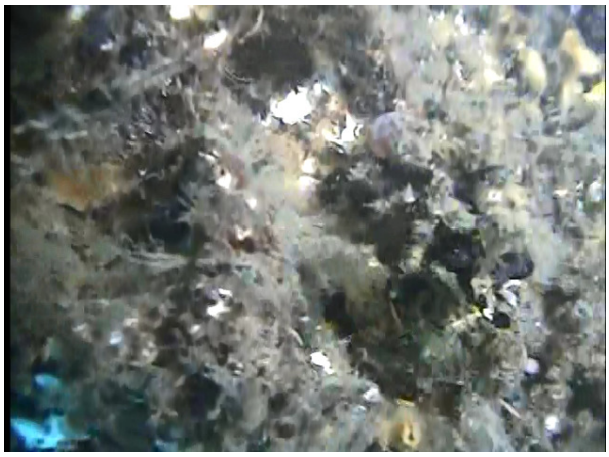
**Horton Bay, August 14th, 2015; Time: 805am Max depth 22 feet**

**Note:** Horton Bay facility lay out differs from the provided plan, fingers A to D are not present. Fingers E and F remain.

A) Float timber fasteners on fingers E and F approx 5-10% corroded.

B) Finger floats E and F have exposed foam billets with deterioration to 10-15%

03.:36



01:03

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C) Billets from the connection section of float A toward the shore are encapsulated and are in good condition.

D) Float A North section, timber fasteners exhibiting corrosion.

E) Section of float horizontal timber, located at north end of float A on west side in way of the 3 piles at corner. Rotted section from outside running inward about half way.


20:01


23:21

F) Row 6 pile diagonal cross member on main approach has a crack from propagating from both ends in way of the vertical pile fastening bolt. Each runs for approx 1 meter.


31:03


31:10

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G) Pile row 2, first row where piles are set in concrete, a hole found in the east and west piles near the concrete setting. The holes run completely through and are bored out in the inside approx 75mm diameter.

41:55 East pile

44:37 West Pile

**Port Washington, August 14th, 2015; Time: 11:00am**

A) All Anchor chain connections and chains are in good condition.

11:54

16:57

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B) Row 12 Pile B, two cavities sighted approx 50mm depths.

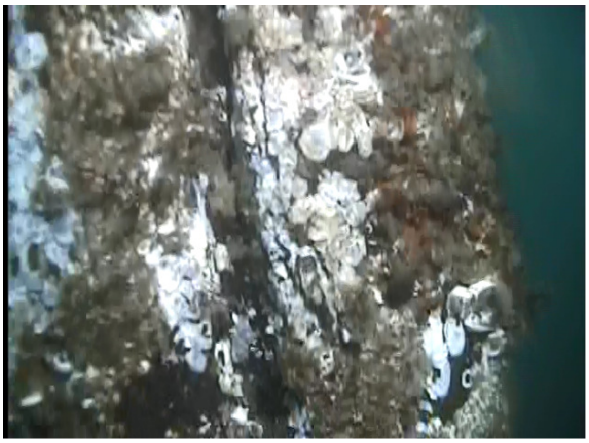
C) Row F Pile D, Pile was scraped in 3 locations, mud line section; small cavity sited, less than 20mm depth.

24:57 Pile B cavity

40:43 Scraped pile D

D) Row 11 Pile D, opening in the wood approx 300mm H x 20mmW

E) Batter pile running from Row 8 Line A toward Row 10. Near mud line a hollow area approx 75mmDiamter x 80mm deep.



46:24 Pile D

59:02 Batter pile

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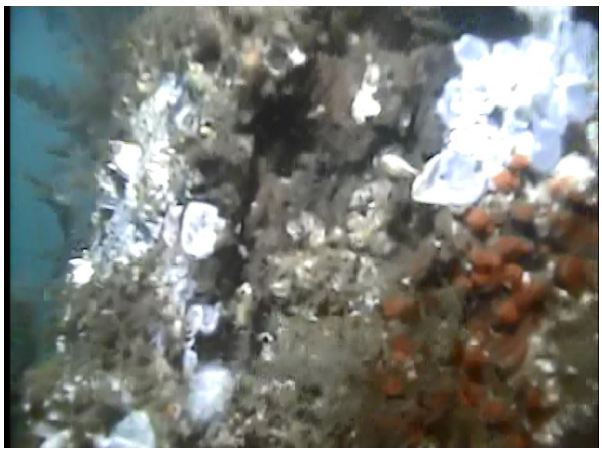
F) Row 10 batter pile at C line, two cavities approx 70mm deep x 100mmL approx half way down pile.

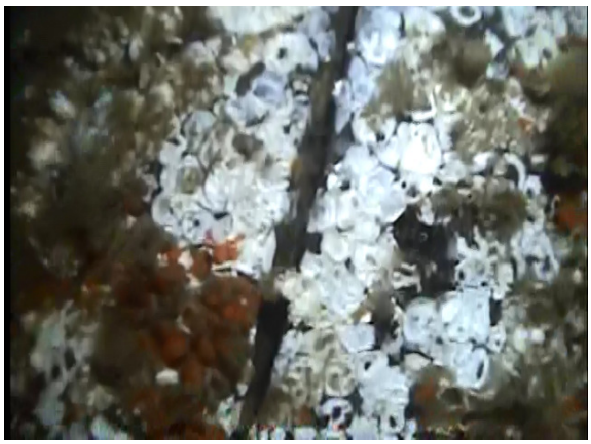
G) Row 9 Pile F, split in pile 1.5m from water line down and continues up and out of the water for approx 2m.



1:07:33 Cavity

Ch 2; 01:04 Split pile

H) Row 8 pile D, split in the pile approx 300mmL x 50mm deep.



Ch2; 5:12

Ch2: 5:20

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I) Row 6 pile D (adjacent to second pile). Two cavities approx 80mm deep


Ch2: 23:52


Ch2: 23:37

J) Row 4 West pile, cavity just above concrete, 80mm depth x 30mm wide.


Ch2: 31:26

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K) Float B under gangway at west end has dropped due to the washer and bolts wasted away.

L) General condition of timber fasteners on float B and C

Ch2: 39:06

Ch2: 41:26

M) Billets on floats B and C encapsulated and in good condition.

N) Pile cluster eastern set on float B, outboard center in rubbing area. Cavity approx 50mm deep.

Ch2: 40:40 Billets

Ch2: 44:38

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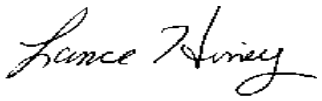
Photos are included with this report taken from the video provided of each facility.

For any additional information please contact the writer at the numbers provided.

Report Submitted By:
ALL-SEA ENTERPRISES LTD.



Lance Hiney