



DISTRICT OF WEST VANCOUVER
750 17TH STREET, WEST VANCOUVER BC V7V 3T3

COUNCIL REPORT

Date:	May 12, 2024
From:	Jenn Moller, Director of Engineering & Transportation Services
Subject:	Eagle Island Access Infrastructure
File:	1700.09

RECOMMENDATION

THAT

1. staff prepare a bylaw designed to regulate the use of the District's public access and dock infrastructure for Eagle Island, and bring forward at an upcoming regular Council meeting no later than Q3 2024, for consideration; and
2. the bylaw includes conditions of use and enforcement measures, a permitting scheme for vessel moorage, and a user fee to be applied with vessel moorage permitting.

1.0 Purpose

This report has been prepared to provide Council with an update on District provided servicing in relation to Eagle Island access infrastructure, and to seek direction from Council on next steps towards the management and regulation of the infrastructure.

2.0 Legislation/Bylaw/Policy

Community Charter

Section 8 (2) and (3) of the *Community Charter* authorizes the council of a municipality to provide any service that the council considers necessary or desirable, and by bylaw, to regulate, prohibit and impose requirements in relation to that service.

Pursuant to the *Community Charter*, a service is defined as an “activity, work or facility undertaken or provided by or on behalf of the Municipality”; Section 15 provides that when regulating a service, including regulating Municipal services, such as a dock facility, a council may provide for a system of licences, permits, or approvals. Similarly, Section 194 enables a council to impose a fee in relation to a bylaw and a service it regulates.

3.0 Council Strategic Objective(s)/Official Community Plan

Official Community Plan

Within the Districts Official Community Plan (OCP), Part 450 which regulates Marine Zones, allows for permitted uses including private floats, wharves, piers, and walkways, on the condition that M1 Zoning, which includes the foreshore area surrounding Eagle Island, conditional to:

“Private floats, wharves, piers, and walkways are only permitted where necessary for practical access to property immediately abutting the foreshore lying within the District boundaries, but only within the boundaries of a water lease or licence of occupation issued by the District. Private floats and wharves shall be used for purposes of private access only and no commercial or industrial activity or use shall take place thereon.”

With this “condition of use”, it is only Eagle Island residents within the District that are permitted to have a dock under the Zoning Bylaw as they have no road access. They are required to have a license agreement with the District under the Head Lease for the dock to extend onto the foreshore from their property.

Council’s Strategic Objectives do not apply.

4.0 Background

Eagle Island, located in Eagle Harbour, is home to 33 West Vancouver households. Currently, it is understood that 9 households access their residences from the West Vancouver Yacht Club where they receive limited boat moorage, vehicle parking, and garbage disposal. The remaining property owners moor their boats at the District owned Eagle Harbour Public Dock. The parking of vehicles and the disposal of garbage occurs at the foot of Eagle Harbour Road

Vessel Moorage

The District owns and maintains a public dock facility on both the island and mainland. Both the mainland and island docks consist of a gangway ramp connecting the shoreline to a series of attached float sections. Each dock facility has a total deck area of roughly 160 m², intended to provide moorage for “small barges and row boats”.

There is limited moorage capacity associated with the public dock facilities; with the current occupancy as described above there is no excess moorage capacity. To date, the moorage of vessels by Eagle Island residents has been structured on a social contract basis, with an understanding and practice of one moorage slip for each dock facility per household (33 minus 9, for a total of 24 households). More recently staff have received complaints regarding a purported disruption to the current moorage slip per household arrangement.

Historically, the docks have been maintained on a reactionary, complaint basis, with provision for a limited maintenance budget of \$3,000 annually within the Roads & Transportation Operating budget to support this operating model. Between the period of 2015 to 2018 major capital rehabilitation works were carried out by the District in relation to the public dock structures, for a total expenditure of roughly \$500,000.

In addition to moorage, the District also provides electrical service vis-a-vis the mainland public dock for the purposes of charging for some of the vessels. The service has failed and is being maintained on an interim basis with plans pending equipment delivery and contractor availability, to renew the service for an estimated cost of \$7600; it is anticipated this work will be completed later this spring. Electrical consumption associated with the service is paid for by the District.

Vehicular Parking and Solid Waste Collection

To ensure the availability of parking, Eagle Island residents have assigned one stall per household marked with a personalized name sign; the District has historically provided that signage. In addition, residents typically store a wheelbarrow at the head of the parking stall for the purpose of moving goods to and from their home on the island. From time to time, civil and drainage works are necessary for maintaining the parking lot area for resident use. Currently, there is no dedicated operation budget associated with this asset, maintenance and replacement costs are addressed through the Roads & Transportation capital or operating budget on an as and when need basis.

In 2023, \$19,000 was budgeted to carry out more significant repair and maintenance needs for the parking access infrastructure described above due to safety reasons.

4.1 **Previous Decisions**

At its **November 16, 2009, regular Council meeting**, Council passed the following resolution:

THAT

1. Council direct staff to establish a Resident Parking Zone at the foot of Eagle Harbour Road for Eagle Island residents with an annual permit fee of \$10;
2. An annual Occupancy fee of \$100 be established should Eagle Island residents desire a dedicated parking stall; and
3. Costs of \$150 per stall for manufacture and installation of personalized name signage be borne by Eagle Island residents.

At its **October 27, 2008, regular Council meeting**, Council passed the following resolution:

THAT funding in the amount of five hundred thousand dollars (\$500,000) for the replacement of Eagle Island mainland and island docks be considered by Council through the 2009 Capital Budget deliberation process as a municipal capital project.

5.0 Analysis

5.1 Discussion

At present, the vessel moorage facilities (“the Docks”), owned by the District and used to provide access to Eagle Island is currently unregulated. Due to the capacity of the Docks, the limited space on Eagle Island, and the lack of publicly accessible lands, services, and amenities on Eagle Island, the Docks are overwhelmingly, if not exclusively, used by the residents of Eagle Island, and that is likely to remain the case in the foreseeable future.

Notwithstanding the existing operations and maintenance approach to address needs of the Docks and parking infrastructure associated with Eagle Island resident access and egress, and in recognition of the cost and significance of the assets, staff commissioned a structural review of the Docks. The review was carried out by a qualified professional as part of the Bridge and Major Structures Review Programming, excerpt of report attached as **Appendix A**. The outcome of the assessment provides for current condition rating, as well as identifying near and longer-term rehabilitation and replacement needs for the structures.

Resident feedback

On August 3, 2023, residents of Eagle Island were mailed a letter advising a review of the Eagle Island access infrastructure was being undertaken and inviting residents to provide feedback; of the 33 properties, 14 responses were submitted in writing from residents. Feedback is summarized as follows:

- one barge per household for a “standard size” barge (13)
- no change to current “social contract” system (12)
- create a permit system for barges (1)
- create EV Charging station for parking lot (1)
- add additional parking (1)
- create/renew permanent electrical service for barge charging (5 plus the support of the Eagle Island Association)
- various operational improvement requests (requires funding)

As mentioned earlier in this report, Eagle Island residents have expressed concerns regarding the use of the Docks and the availability of mooring space at the Barge Dock.

With regard to the other matters for which feedback was received, increasing parking is not possible due to the existing site conditions, configuration of the roadway, and limited footprint of the existing parking lot. In connection with the request for an electric vehicle (EV) charger, the District does not have a public EV Charging Station Policy to guide such an application where some considerations include but are not limited to upfront capital costs, ongoing operations and maintenance costs, charging infrastructure including necessary power, cost recovery and metering, and regulation of use. Should this be something the local residents wish to pursue, one avenue to explore this would be through a local area service improvement for a community EV charging station within the Eagle Island parking lot. A local area service is a municipal service that is to be paid for in whole or in part by a local service tax as set forth in the Community Charter. The District has a policy in place to guide local service area improvement applications.

Regulation Bylaw

The introduction of a bylaw to consider and regulate the Dock facilities for marine barge access to and from Eagle Island would serve to regulate the use of these facilities, including short and long-term moorage.

The regulation bylaw could establish a permitting scheme designed to support the current allocated capacity use and extend to contemplate the associated use of the parking lot, on a legal parcel basis. Beyond this, and as part of the permitting requirements, permit holders would be required to maintain insurance for any vessel which is moored at the Docks. Other regulatory measures could include conditions under which the Docks can be utilized along with enforcement measures.

5.2 Climate Change & Sustainability

Not applicable.

5.3 Public Engagement and Outreach

Staff contacted property owners of Eagle Island by letter, advising a review of the Eagle Island access infrastructure was being undertaken and inviting residents to provide feedback. A summary of that feedback is provided in an earlier section of this report.

6.0 Financial Implications

As outlined in earlier sections of this report, costs associated with annual operations and maintenance and more significant capital reinvestment for the Eagle Island access infrastructure have predominantly been addressed on an as and when need basis; currently there is an allocated operations budget of \$3000/year.

Through the detailed structural condition assessment that was conducted, it was determined that the annual maintenance needs of the Docks structures exceed the existing annual budget, creating a shortfall of \$12,000 per annum. For the 2024 budget year, funds for bridge programming will be redirected to fund the maintenance on these dock structures as it is more critical to address.

Were the District to introduce a bylaw to regulate the Eagle Island access infrastructure, it could impose a user fee as part of a permitting scheme to help recover some or all of the routine maintenance costs associated with providing vessel moorage service.

7.0 Options

7.1 Recommended Option

THAT

1. staff prepare a bylaw designed to regulate the use of the District's public access and dock infrastructure for Eagle Island, and bring forward at an upcoming regular Council meeting no later than Q3 2024, for consideration; and
2. the bylaw includes conditions of use and enforcement measures, a permitting scheme for vessel moorage, and a user fee to be applied with vessel moorage permitting.

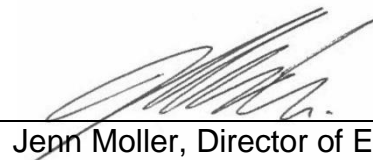
7.2 Considered Options

Council could instead choose to provide alternate direction, to be specified, relative to the proposed recommendations, and direct staff to report back accordingly at a future Council meeting.

8.0 Conclusion

A bylaw to regulate the use of the District's public dock facilities and ancillary infrastructure providing access to Eagle Island will provide a framework which will serve to enhance clarity, consistency, and equity in the management of the infrastructure, ultimately benefiting both the District and its residents.

Author:



Jenn Moller, Director of Engineering & Transportation Services


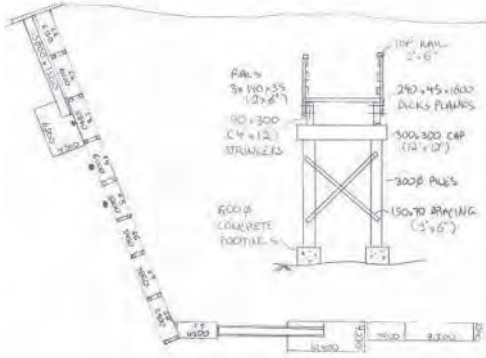
Appendices:



Appendix A: Bridge and Pier Inspection Program – Eagle Harbour Island Pier & Mainland Dock

STRUCTURE ID: 401 – EAGLE HARBOUR MAINLAND PIER

DATE: 09/05/2022

DESCRIPTION

 		
CONSTRUCTION DATE:	Unknown	
PIER ORIENTATION:	East-West	
FEATURE SUPPORTED:	Eagle Harbour mainland access	
FEATURE CROSSED:	Eagle Harbour	
SUBSTRUCTURE:	Abutments – concrete abutment at East end connected to aluminum gangway and mainland pier float at West end supported by timber piles with concrete footings (at rock-supported pier)	
SUPERSTRUCTURE:	Timber stringers supporting a timber decking with an aluminum truss gangway (replaced in 2015) to a floating timber dock.	
WEARING SURFACE:	Expanded metal mesh over timber decking on inclined surfaces and docks	
APPROACHES:	Bridge connects with entrance to/from Eagle Harbour Rd. on the East end	
GENERAL:	TOTAL LENGTH:	Mainland pier - 9-span timber pier = 51m long, floating dock = 24.6m long
	DECK AREA:	162m ²
	BEARINGS:	Steel
	BANK/PIER PROTECTION	None
	GUARDRAIL:	timber
	CURB:	Timber bottom railing
	UTILITIES	Power for the lighting along railing on mainland pier.
	CLEARANCE:	4m
	ROADWAY CLASS:	Local
	SIGNAGE:	Eagle Island resident use only; use at own risk.
SEISMIC ASSESSMENT:	None	
DIAGONISTIC TESTING/STUDY:	1994: Watermain and hangers relocated 1996: Pier 1 foundation footing scour repaired 2007: Deck strengthening – installation of transverse steel beams 2013: Focused pier inspection report	
PAST REHABILITATION WORKS:	2002: Column strengthening to Pier 1 (West) and Pier 2 (East) 2015: Major rehabilitation works	

OVERALL CONDITION:	Fair-Poor Condition – Urgency Rating = 3
ESTIMATED REMAINING SERVICE LIFE:	15 yr (based on major rehabilitation completion date and inspection findings)
RECOMMENDED UPGRADE LIFE CYCLE TIMELINE:	<ol style="list-style-type: none"> 1. Shim Bearing Seats Above Each Pier (~5 yr) 2. Re-deck Float (~10 yr) 3. Re-deck Pier (~15 yr) 4. Bearing Replacement (~25 yr)
FIVE-YEAR REMEDIATION AND REHABILITATION PROGRAM: 	<ol style="list-style-type: none"> 1. Re-deck Float Deck Adjacent to Ramp and Add Pile Slider (~\$7,500) 2. Reapply Blackout Paint for Deck Lighting (~\$1,000) 3. Reposition or Replace Bearing Pins at Aluminum Ramp (~\$2,000) 4. Realign Pier 4 Footing and Cap (~\$20,000) 5. Replace Pier Bracing at All Piers and Grout All Pier Pedestals (~\$15,000)
RECOMMENDED INSPECTION FREQUENCY:	Monitoring Inspection Frequency: 1 / year Principal Inspection Frequency: 1 / 5 years
ANNUAL ROUTINE MAINTENANCE PROGRAM: 	<ol style="list-style-type: none"> 1. Monitoring Inspection (~\$500; no associated specification). 2. Clean Pier and Float Decks (~\$2,000; no associated specification). 3. Clean Debris from Bearing Areas (~\$2,000; no associated specification). 4. Touch-Up Coating of Galvanized Components (~\$1,000; BC MoTI 2020 Standard Specifications for Highway Construction Volume 1, Cl. 216.12.05a and SS 308 using corresponding BC MoTI Recognized Products List suppliers). 5. Repair or Float Edges due to Boat Strikes, As Needed. 6. Tighten Loose Connection Bolts to Snug-Tight Condition, As Needed. 7. Remove Debris from Channel Under Pier and Float (~\$1,500; no associated specification).

Structure Number **401**

Structure Name **Eagle Island Docks: Mainland Dock**

Inspection Date (yyyy/mm/dd) **9/5/2022**

COMPONENT

PERCENT CONDITION RATING

Enter % in each condition.
See BMIS User Manual 15.2.2

INSPECTION NOTES BY COMPONENT

All poor or very poor conditions should be explained with notes and documented by photos. Label explanation(s) with component numbers.

HYDROTECHNICAL

- 1 Debris Risk
- 2 Channel
- 3 Erosion Protection
- 4 Substructure Scour

	E	G	F	P	V	X	N	CU
1			100					R
2							N	
3	20				80			R
4			80	20				R

Estuary with potential for drift wood accumulation around piers.
 No channel.
 Most piers unprotected; however, two at the end of the pier are on bedrock.
 A couple of pier foundations have become exposed but most remain covered.

SUBSTRUCTURE

- 5 Foundation Movement
- 6 Abutments
- 7 Wing/Retaining Walls
- 8 Embankment
- 9 Footings/Piling
- 10 Pier Columns/Walls/Cribs
- 11 Bearings
- 12 Caps
- 13 Corbels
- 14 Dolphins/Fenders

	E	G	F	P	V	X	N	CU
5		20	50	20	10			1
6		30	50	20				1
7		40	50	10				1
8		100						R
9		50	50					R
10			80	10	10			R
11			50	50				R
12			80	20				1
13							N	
14		50	50					R

Most piers have rotated to some degree, but Pier 4 has rotated 4 degrees.
 Some cracks and voids present but do not appear to be propagating.
 Adjoining walls in generally good condition except for moderate cracking.
 No issues with land embankment.
 Piles generally good fair, but tops cut out of plumb on some and others have rot.
 Pile pedestals at Piers 8 and 9 have significant vertical cracks.
 Direct bearing of girders on caps.
 Most creasote caps not fully bearing on piles.
 Anchor piles for float in good-fair condition.

SUPERSTRUCTURE

- 15 Floor Beams/Transoms
- 16 Stringers
- 17 Girders
- 18 Portals
- 19 Bracing/Diaphragms
- 20 Truss Chords/Arch Ribs
- 21 Arch Ties
- 22 Truss Diagonals
- 23 Truss Rods/ Verticals
- 24 Cables
- 25 Panels
- 26 Pins/Bolts/Rivets
- 27 Camber/Sag
- 28 Live Load Vibration
- 29 Coating (structure)

	E	G	F	P	V	X	N	CU
15							N	
16							N	
17		50	35	15				R
18							N	
19		50	15	30	5			3
20		100						R
21							N	
22		100						R
23		90			10			R
24							N	
25							N	
26	50	20	20	5	5			2
27			90	10				3
28		100						R
29							N	

Creosote 4x12s in good-fair condition with longitudinal cracks some members.
 Aluminum members in good condition. Timber bracing fair to poor.
 Aluminum members in good condition.
 Aluminum members in good condition. Most timber posts are cracked.
 Fasteners on pier generally good. Joint pins on float and ramp are good to poor.
 Significant sag on float near north edge of ramp.
 Short span lengths with little live load vibration.

DECK

- 30 Sub Deck/Cross Ties
- 31 Wearing Surface
- 32 Deck Joints
- 33 Curbs/Wheelguards
- 34 Sidewalk(s)
- 35 Railings/Parapets
- 36 Median Barrier
- 37 Drains/Pipes
- 38 Coating (Railings)

	E	G	F	P	V	X	N	CU
30		30	50	10				3
31	50		40	5	5			3
32			70	30				R
33		15		85				3
34							N	
35		40	50	10				R
36							N	
37							N	
38							N	

Mostly good condition aside from surface wearing and centre ramp panel.
 Float planks good to very poor. Severe deflection in middle tread of ramp.
 Deck panel joints on ramps heavily deformed, replacement/strengthening required.
 No kick plates except on the aluminum ramp.

APPROACHES

- 39 Signing/Lighting
- 40 Roadway Approaches
- 41 Roadway Flares

	E	G	F	P	V	X	N	CU
39		15	85					R
40			100					R
41		100						R

Conditions Codes			
E	Excellent	V	Very Poor
G	Good	X	Not Inspected
F	Fair	N	Not Applicable
P	Poor		

Urgency Rating
3

For definition see BMIS User Manual 15.2.8
 "4" and "5" rating must be explained.

For Condition Guidelines see BMIS User Manual 15.2.2.

Brook Robazza PhD, PEng, PE, Jesse Gallop MEng, EIT

Inspector(s) (please type or print)

Signature 

Posted Weight Restriction (*print actual message on sign(s)*)

No posted weight restrictions.

Other Posted Hazard Warning Signs

Underwater cable utility sign and sign designating use only for Eagle Island residents.

Drainage Area Description (*water level fluctuation, logging debris, etc.*)

Protected harbour affected by tidal water level fluctuations. Low levels of logging debris, but the pier lies at the entrance to a large marina.

Scour Notes

Most pier foundations are supported by exposed loose sand/mud/silt substrate except at the southernmost piers, which lie on bedrock. The foundationson the loose soils are partially scoured around most their respective perimeters. The abutment is supported by a masonry wall which has been subjected to minor scour at its base.

Rehab Work Notes

Pier 4 is rotated approximately 4 degrees and should be straightened to plumb. Large portions of float, particularly on north side of ramp on the float section closest to the pier has suffered from moderate to severe decay and should be redecked within 4 years. Regrout pile bars on piers 8 and 9, which are founded on the bedrock outcrop at the southern end of the pier. Almost all of the pier cross-bracing members require replacement within 4 years. Replace pile sliders/rub rails that have detached on floats. While likely not needed at this time, erosion protection to the piers not founded on bedrock is recommended in the future to mitigate the high erosion potential of those piers.

Maintenance Work Notes

Pier caps require straightening from their currently rotated orientation. Replace rub rails on pile connections. Tigthen loose connection on ramp joint leading down to float or replace the bearing pin. Monitor splitting on hand rails and mid rails. Monitor longitudinal crack in Span 1 of west girder. Blackout paint on deck lights needs to be reapplied.

Structure Type	Aluminum and Timber Pier
Structure Number	401

Additional Partial Inspection Notes

Only general inspection completed.

Additional General Inspection Notes

Main Dock: 1.6m x 51m deck, 1.82m out-to-out, 1.05m railing height, 2x12 x 1.6m long planks + 2x6 mid rails, 4x4 x 53.5"@79.5" post spacing.

Aluminum Ramp: 20m long x 47.5" wide with 48" posts. 2x6 running planks, 3 on each side of a centre bay with aluminum tread that is heavily deformed, with a width of 12" and depth of 1".

14.4m long x 2.4m wide pier float. 9.7m long x 4.4m ramp float.

9.5' max clearance, 7ft min clearance (not including bedrock piers).

19' pier spacing.

Overall, the structure is heavily aged, with the superstructure of the pier in overall fair condition, whereas the substructure is in a general fair-poor condition.

Given the current condition, there are no immediate safety concerns with the structure. Most of the pier footings appear to have high erosion potential;

however, given the site conditions and past performance, urgent action is likely not needed at this time.

Additional Utility Concern Notes

Power cables to deck lights are aging and may require refurbishment to ensure reliable function.

Additional Urgency Rating Notes

While the structure is likely vulnerable to seismic loading, gravity load-carrying capacity is not significantly reduced. Moderate urgency of repairs are required to reduce further decay of float decking, wear on the ramp connection, and ensure adequate performance of the piers in a seismic event.

The greatest risk to the structure is likely from boat or large driftwood impact to the piers in a storm scenario.

Seismic Vulnerability Notes

The cross-bracing on the piers is in poor condition and almost completely failed on some piers. The seismic demands are likely low due to the low seismic mass (the structure is entirely timber or aluminum), but the structure does not have a reliable seismic force resisting system, and therefore is likely moderately vulnerable to seismic loading.

Brook Robazza, Jesse Gallop

Inspector(s) (please type or print)



Signature(s)

Brook Robazza

Professional Engineer (EoR) (please type or print)



Signature(s)

STRUCTURE ID: 401 – MAINLAND DOCK

DATE: 09/05/2022

GENERAL ARRANGEMENT



001. Upstream



002. Downstream



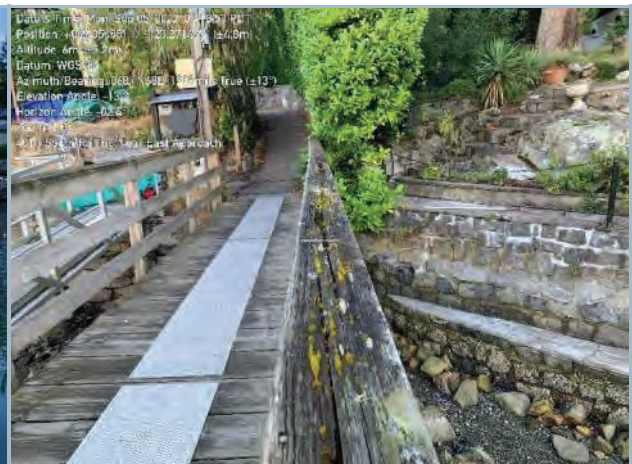
003. North Elevation



004. South Elevation



005. East Approach



006. West Approach
(Note: Splitting and Warping of Top-rail)

STRUCTURE ID: 401 – MAINLAND DOCK

DATE: 09/05/2022

GENERAL ARRANGEMENT



007. East Abutment



008. West Pier Abutment on Concrete Pedestal and Bedrock



009. Braced Timber Piers, Typ.



010. West Pier Abutment on Bedrock



011. Aluminum Gangway Soffit Viewing South



012. Timber Pier Soffit

STRUCTURE ID: 401 – MAINLAND DOCK

DATE: 09/05/2022

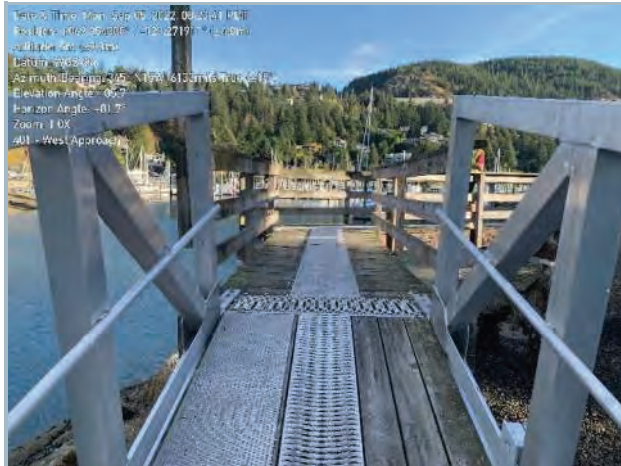
CONFIGURATION



013. Timber Railing, Typ.



014. Aluminum Gangway Truss Rail, Typ.



015. Gangway Access Approach to Timber Pier
(Note: Skewed Corner Orientation)



016. Gangway Slider Connection Mechanism

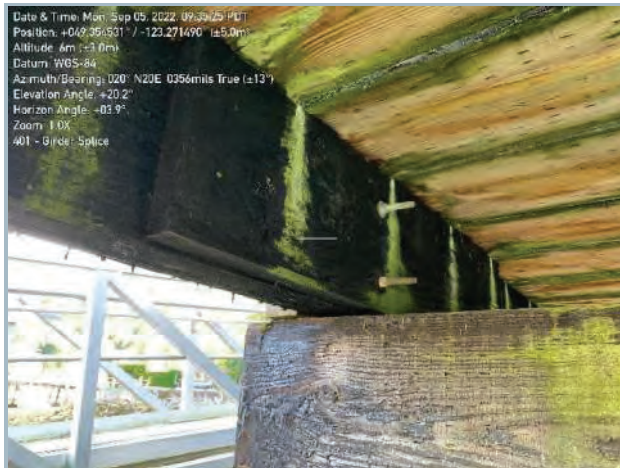


017. Extended Gangway Connection

STRUCTURE ID: 401 – MAINLAND DOCK

DATE: 09/05/2022

SEISMIC FORCE REISISTING SYSTEM



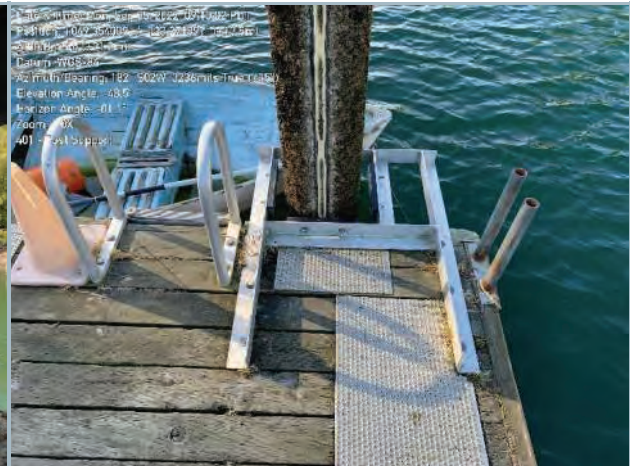
018. Timber Girder Splice Connection



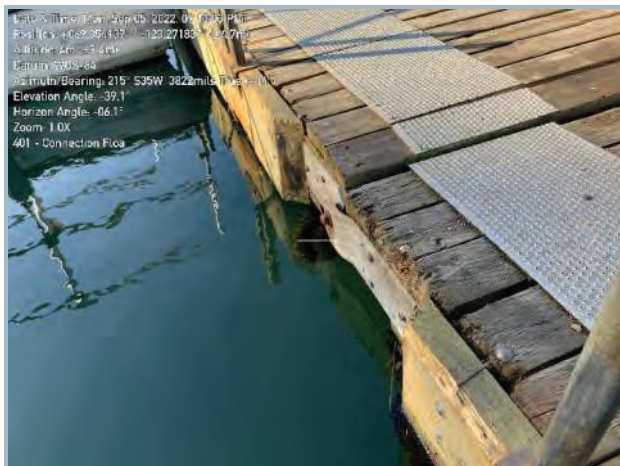
019. Interior Bolted Angle Connection



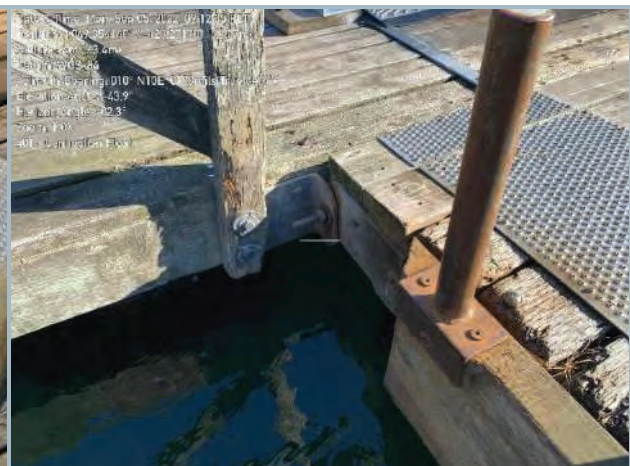
020. Gangway Access Platform to Timber Pier Connection



021. Timber Pile Dock Restraint Connection, Typ.



022. Anchored Plate Dock Connection



023. Anchored Bracket Dock Connection

STRUCTURE ID: 401 – MAINLAND DOCK

DATE: 09/05/2022

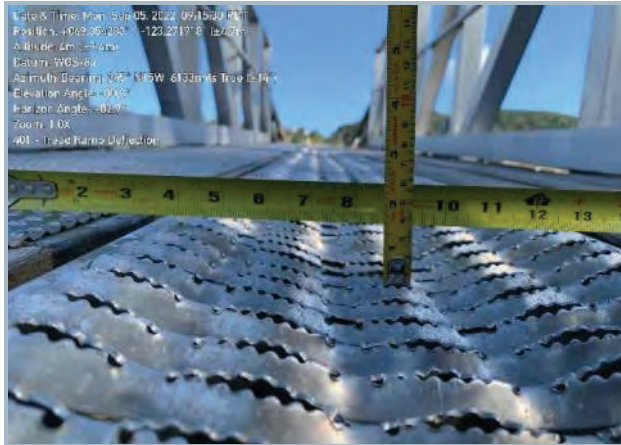
NOTABLE DEFICIENCIES



024. Vertically Unsupported Timber Splice at Bedrock Pier



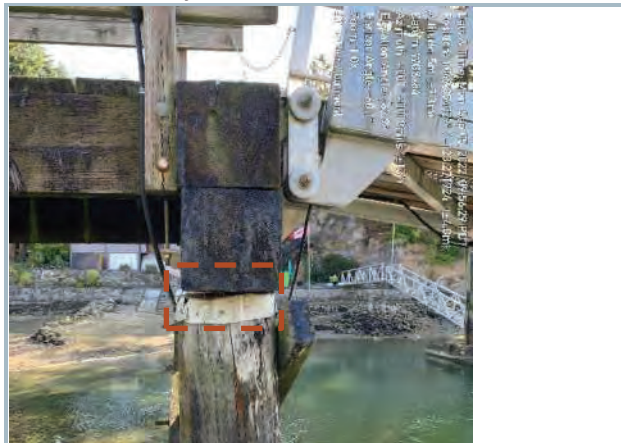
025. Cracked Concrete Pedestal at Bedrock Pier



026. 1.5" Deflection of Unsupported Central Walkway Tread



027. Decaying Timber Brace at Pier, Typ.



028. Non-bearing Pier Cap at Gangway Transition



029. Diminishing Black Paint on Light Fixtures, Typ.

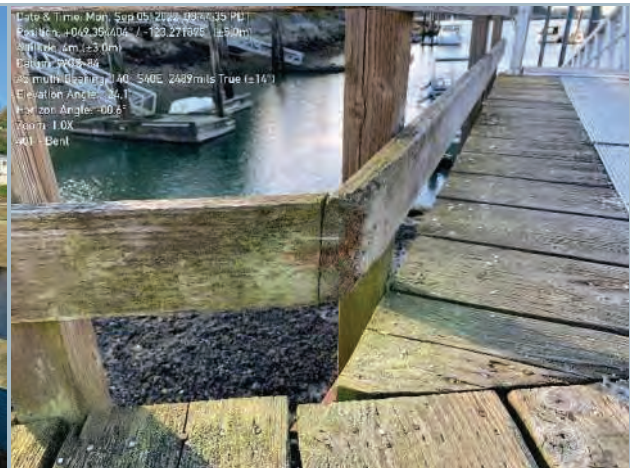
STRUCTURE ID: 401 – MAINLAND DOCK

DATE: 09/05/2022

NOTABLE DEFICIENCIES



030. Localized Lifting of Decaying Top-rail, Typ.



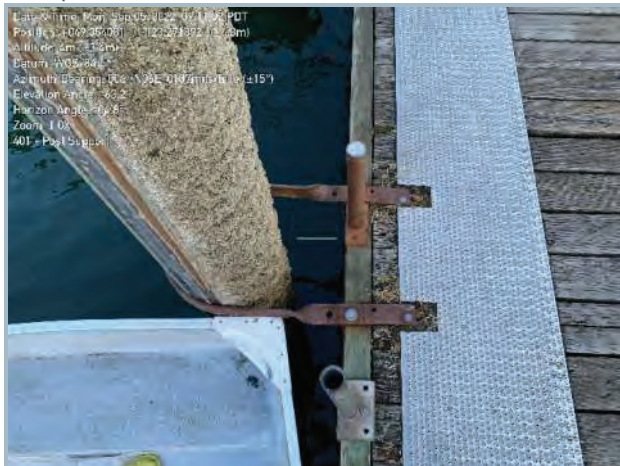
031. Unsecure Mid-rail at Pier Abutment



032. Timber Pier Dock Restraint Missing Teflon Bumper



033. Decay Deck Members at East Profile of Dock



034. Dissimilar Timber Pile Restraint



035. Overlapping Plates at Dock Connection

STRUCTURE ID: 401 – MAINLAND DOCK

DATE: 09/05/2022

NOTABLE DEFICIENCIES



036. Unbalanced Longitudinal Beam Bearing Seat



037. Full Longitudinal Splitting of Timber Splice

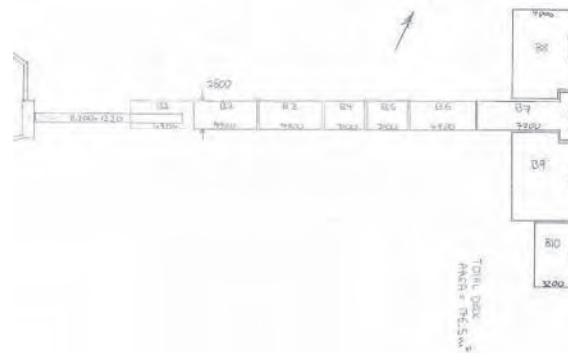


038. Inadequate Placement of Anchors at Bedrock Pier

STRUCTURE ID: 402 – EAGLE ISLAND PIER

DATE: 09/05/2022

DESCRIPTION



CONSTRUCTION DATE:	Unknown	
PIER ORIENTATION:	East-West	
FEATURE SUPPORTED:	Eagle Island access	
FEATURE CROSSED:	Eagle Harbour	
SUBSTRUCTURE:	Abutments – concrete abutment at West end leading to float on East end supported by timber piles	
SUPERSTRUCTURE:	Single span aluminum truss and aluminum gangway spanning to a series of floating timber docks	
WEARING SURFACE:	Expanded metal mesh over timber decking on inclined surfaces and docks	
APPROACHES:	Bridge connects with entrance to from Eagle Harbour Rd. on the East end	
GENERAL:	TOTAL LENGTH:	33.5m
	DECK AREA:	163.8m ²
	BEARINGS:	Elastomer
	BANK/PIER PROTECTION	None
	GUARDRAIL:	Timber
	CURB:	Timber bottom railing
	UTILITIES	Charging station
	CLEARANCE:	4m
	ROADWAY CLASS:	Local
	SIGNAGE:	Eagle Island resident use only; use at own risk.
SEISMIC ASSESSMENT:	None	
DIAGONISTIC TESTING/STUDY:	2013: Focused pier inspection report	
PAST REHABILITATION WORKS:	2015: Major Rehabilitation Works	

OVERALL CONDITION:	Good-Fair Condition – Urgency Rating = 2
ESTIMATED REMAINING SERVICE LIFE:	15 yr (based on major rehabilitation completion date and inspection findings)
RECOMMENDED UPGRADE LIFE CYCLE TIMELINE:	<ol style="list-style-type: none"> 1. Shim Bearing Seats Above the Pier (~10 yr) 2. Re-deck Float (~15 yr) 3. Re-deck Pier (~20 yr) 4. Bearing Replacement (~25 yr)
FIVE-YEAR REMEDIATION AND REHABILITATION PROGRAM:	<ol style="list-style-type: none"> 1. Remove Excess Corrosion at Piles and Coat or Add Anodes (~\$2,500) 2. Perform Localized Redecking on Float (~\$2,500) 3. Repair Pile Sliders at (2) Locations (~\$1,500)
RECOMMENDED INSPECTION FREQUENCY:	Monitoring Inspection Frequency: 1 / year Principal Inspection Frequency: 1 / 5 years
ANNUAL ROUTINE MAINTENANCE PROGRAM:	<ol style="list-style-type: none"> 1. Monitoring Inspection (~\$500; no associated specification). 2. Clean Pier and Float Decks (~\$1,500; no associated specification). 3. Clean Debris from Bearing Areas (~\$1,000; no associated specification). 4. Touch-Up Coating of Galvanized Components (~\$1,000; BC MoTI 2020 Standard Specifications for Highway Construction Volume 1, Cl. 216.12.05a and SS 308 using corresponding BC MoTI Recognized Products List suppliers). 5. Repair or Float Edges due to Boat Strikes, As Needed. 6. Tighten Loose Connection Bolts to Snug-Tight Condition, As Needed. 7. Remove Debris from Channel Under Pier and Float (~\$1,000; no associated specification).

BRIDGE CONDITION INSPECTION

Inspection Type
 Routine Partial
 Detailed

Structure Number **402**

Structure Name **Eagle Island Docks: Island Dock**

Inspection Date (yyyy/mm/dd) **9/5/2022**

COMPONENT

PERCENT CONDITION RATING

Enter % in each condition.
 See BMIS User Manual 15.2.2

INSPECTION NOTES BY COMPONENT

All poor or very poor conditions should be explained with notes and documented by photos. Label explanation(s) with component numbers.

HYDROTECHNICAL

	E	G	F	P	V	X	N	CU
1 Debris Risk			100					R
2 Channel							N	
3 Erosion Protection	20				80			R
4 Substructure Scour			80	20				R

Estuary with potential for drift wood accumulation around piers.
 No channel.
 Abutment is lightly rippapped, but to an adequate degree.
 Anchor brackets on land side have exposed anchors.

SUBSTRUCTURE

5 Foundation Movement			100					R
6 Abutments			90	10				1
7 Wing/Retaining Walls			100					R
8 Embankment			85	15				1
9 Footings/Piling		75	20	5				2
10 Pier Columns/Walls/Cribs		75	20	5				2
11 Bearings		40	60					1
12 Caps		65	30	5				1
13 Corbels							N	
14 Dolphins/Fenders							N	

No evidence of significant foundation movement.
 Abutment shelf has visible signs of debris accumulation on concrete from deck.
 Riprap abutmented with only small wing walls.
 Embankment is steep but is relatively well rippapped.
 Up to 1mm corrosion on pile surfaces.
 Piles act as pier columns, with up to 1mm corrosion on the pile surfaces.
 Deformation visible on bearing pad.
 Steel channel section showing signs of deterioration and surface corrosion.

SUPERSTRUCTURE

15 Floor Beams/Transoms		50	50					R
16 Stringers							N	
17 Girders		20	75	5				R
18 Portals							N	
19 Bracing/Diaphragms		50	50					R
20 Truss Chords/Arch Ribs		50	50					R
21 Arch Ties							N	
22 Truss Diagonals		70	30					1
23 Truss Rods/ Verticals		70	30					R
24 Cables							N	
25 Panels							N	
26 Pins/Bolts/Rivets		40	60					R
27 Camber/Sag			100					R
28 Live Load Vibration			100					R
29 Coating (structure)							N	

Aluminum floorbeams in generally good condition.
 Longitudinal girder members in generally good-fair condition.
 Aluminum vierendeel bracing in generally good condition.
 Aluminum truss chords in good condition.
 Connections have significant debris buildup.
 Aluminum truss verticals/posts in good condition.
 Pin connections in generally condition.
 No sag issues.
 Live load vibration as expected for aluminum ramp.

DECK

30 Sub Deck/Cross Ties		60	40					R
31 Wearing Surface		70	30					R
32 Deck Joints		10	90					1
33 Curbs/Wheelguards		40	60					R
34 Sidewalk(s)							N	
35 Railings/Parapets		40	60					R
36 Median Barrier							N	
37 Drains/Pipes							N	
38 Coating (Railings)							N	

Moisture accumulation from water entering through gaps in adjoining deck sections.
 Visible signs of moisture accumulation on wearing surface from deck soffit.
 No visible signs of deterioration at hinge location between adjacent ramps.
 Aluminum kick plates in generally good condition.

APPROACHES

39 Signing/Lighting			100					R
40 Roadway Approaches			100					R
41 Roadway Flares			100					R

Conditions Codes			
E	Excellent	V	Very Poor
G	Good	X	Not Inspected
F	Fair	N	Not Applicable
P	Poor		

Urgency Rating
2

For Condition Guidelines see BMIS User Manual 15.2.2.

For definition see BMIS User Manual 15.2.8 "4" and "5" rating must be explained.

Brook Robazza PhD, PEng, PE, Jesse Gallop MEng, EIT
 Inspector(s) (please type or print)

Signature

Posted Weight Restriction (*print actual message on sign(s)*)

No posted weight restrictions.

Other Posted Hazard Warning Signs

No other posted hazard signs.

Drainage Area Description (*water level fluctuation, logging debris, etc.*)

Protected harbour affected by tidal water level fluctuations. Low levels of logging debris, but the pier lies at the entrance to a large marina.

Scour Notes

The pier foundations are all steel piles except for the abutment, and none are significantly affected by scour.

Rehab Work Notes

Remove excess corrosion on piles supporting pier and coat with an approved product or add anodes to inhibit further corrosion.

Maintenance Work Notes

Repair pile sliders/rub rails in two locations. Replace localized decking planks on float that are exhibiting above-average decay.

Structure Type	Aluminum Pier
Structure Number	402

Additional Partial Inspection Notes

Only general inspection completed.

Additional General Inspection Notes

21 x 5m float with 2x5 cut out of southeast corner.

2.7x11.3m East Float Section

5x6m West Float Section

15.2x9.4m x 1.2 ramp

Consider installing protective screen on railings to minimize accessible gap between railing members.

Overall condition is good-fair, with the primary area of concern being the relatively high level of corrosion present on the piles on the pier closest to the abutment.

Additional Utility Concern Notes

Electrical utility attached to deck soffit, but no immediate concern.

Additional Urgency Rating Notes

Only minor repairs are required at this time, none of which have significant effect on the load-carrying capacity of the structure.

Seismic Vulnerability Notes

The superstructure is lightweight, being composed almost entirely of aluminum and timber members, and with relatively robust piled foundations, the structure is considered to have low vulnerability to seismic loading.

Brook Robazza, Jesse Gallop

Inspector(s) (please type or print)




Signature(s)

Brook Robazza

Professional Engineer (EoR) (please type or print)



Signature(s)

STRUCTURE ID: 402 – EAGLE ISLAND PIER

DATE: 09/05/2022

GENERAL ARRANGEMENT



001. North Elevation



002. South Elevation



003. West Approach (Access from Eagle Island Trail)



004. East Approach (Access from Landing Dock)



005. West Abutment



006. Steel Pile West Pier

STRUCTURE ID: 402 – EAGLE ISLAND PIER

DATE: 05/09/2022

GENERAL ARRANGEMENT



007. Southwest Abutment Wingwall



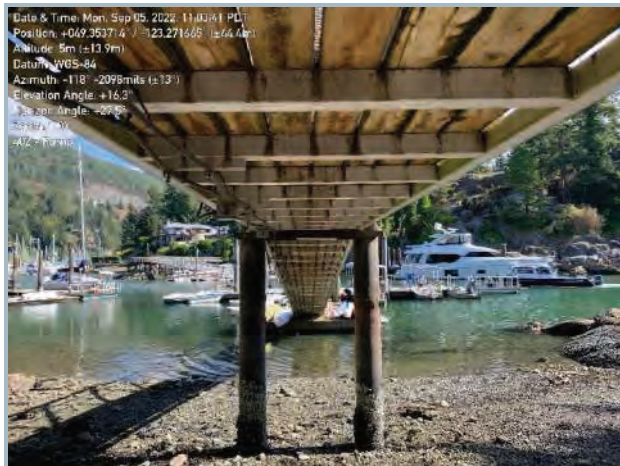
008. Aluminum Gangway Deck Tread



009. Deck of East Intermediate Landing Dock



010. Deck of East Landing Dock



011. West Segment Gangway Soffit



012. East Segment Gangway Soffit

STRUCTURE ID: 402 – EAGLE ISLAND PIER

DATE: 09/05/2022

CONFIGURATION



013. Exterior Dock-Timber Pile Restraint Connection, Typ.



014. Electrical Utility Along North Profile of Deck Soffit

SEISMIC FORCE REISISTING SYSTEM



015. Shear Key at Abutment



016. Anchored Pier Connection with Elastomer Bearing



017. Timber Pile Dock Restraint System, Typ.
(Note: Missing Roller Support)

STRUCTURE ID: 402 – EAGLE ISLAND PIER

DATE: 09/05/2022

NOTABLE DEFICIENCIES



018. Minor Surface Corrosion of Pier Cap



019. Minor Undermining at Northwest Section of West Backwall

STRUCTURE ID: 403 – EAGLE HARBOUR MAINLAND SERVICE FLOAT

DATE: 09/05/2022

DESCRIPTION



CONSTRUCTION DATE:	Unknown	
PIER ORIENTATION:	North-South	
FEATURE SUPPORTED:	Eagle island access	
FEATURE CROSSED:	Eagle Harbour	
SUBSTRUCTURE:	Abutments – stone abutment at East end leading to float on East end supported by timber piles	
SUPERSTRUCTURE:	Single span aluminum truss gangway spanning to a service floating timber dock supported by anchored by timber connections and timber piles	
WEARING SURFACE:	Expanded metal mesh over timber decking on inclined surfaces and docks	
APPROACHES:	Bridge connects with entrance to from Eagle Harbour Rd. on the East end	
GENERAL:	TOTAL LENGTH:	N/A
	DECK AREA:	6.8 m long x 4.5 m = 30.6 m ²
	BEARINGS:	None
	BANK/PIER PROTECTION	None
	GUARDRAIL:	Timber
	CURB:	Timber bottom railing
	UTILITIES	Charging station
	CLEARANCE:	N/A
	ROADWAY CLASS:	Local
	SIGNAGE:	Eagle Island resident use only; use at own risk.
SEISMIC ASSESSMENT:	None	
DIAGONISTIC TESTING/STUDY:	2013: Focused pier inspection report	
PAST REHABILITATION WORKS:	2015: Major rehabilitation works	

OVERALL CONDITION:	Good-Fair Condition – Urgency Rating = 2
ESTIMATED REMAINING SERVICE LIFE:	15 yr (based on major rehabilitation completion date and inspection findings)
RECOMMENDED UPGRADE LIFE CYCLE TIMELINE:	<ol style="list-style-type: none"> 1. Re-deck Float (~15 yr) 2. Re-deck Pier (~20 yr) 3. Bearing Replacement (~25 yr)
FIVE-YEAR REMEDIATION AND REHABILITATION PROGRAM:	<ol style="list-style-type: none"> 1. Reposition or Replace Bearing Pins at Aluminum Ramp (~\$1,000) 2. Perform Localized Redecking on Float (~\$1,000)
RECOMMENDED INSPECTION FREQUENCY:	<p>Monitoring Inspection Frequency: 1 / year Principal Inspection Frequency: 1 / 5 years</p>
ANNUAL ROUTINE MAINTENANCE PROGRAM:	<ol style="list-style-type: none"> 1. Monitoring Inspection (~\$500; no associated specification). 2. Clean Pier and Float Decks (~\$1,000; no associated specification). 3. Clean Debris from Bearing Areas (~\$500; no associated specification). 4. Touch-Up Coating of Galvanized Components (~\$500; BC MoTI 2020 Standard Specifications for Highway Construction Volume 1, Cl. 216.12.05a and SS 308 using corresponding BC MoTI Recognized Products List suppliers). 5. Repair or Float Edges due to Boat Strikes, As Needed. 6. Tighten Loose Connection Bolts to Snug-Tight Condition, As Needed. 7. Remove Debris from Channel Under Pier and Float (~\$500; no associated specification).

BRIDGE CONDITION INSPECTION

Inspection Type
 Routine Partial
 Detailed

Structure Number **403**

Structure Name **Eagle Island Docks: Service Dock**

Inspection Date (yyyy/mm/dd) **9/5/2022**

COMPONENT

PERCENT CONDITION RATING

Enter % in each condition.
 See BMIS User Manual 15.2.2

INSPECTION NOTES BY COMPONENT

All poor or very poor conditions should be explained with notes and documented by photos. Label explanation(s) with component numbers.

HYDROTECHNICAL

	E	G	F	P	V	X	N	CU
1 Debris Risk			100					R
2 Channel							N	
3 Erosion Protection			80	20				R
4 Substructure Scour			80	20				R

Estuary with potential for drift wood accumulation around piers.
 No channel.
 Abutment is lightly ripped, but to an adequate degree.
 Anchor brackets on land side have exposed anchors.

SUBSTRUCTURE

5 Foundation Movement			100					R
6 Abutments		30	50	20				1
7 Wing/Retaining Walls		40	50	10				1
8 Embankment		100						R
9 Footings/Piling			75	25				2
10 Pier Columns/Walls/Cribs							N	
11 Bearings			75	25				R
12 Caps			100					R
13 Corbels							N	
14 Dolphins/Fenders							N	

No evidence of significant foundation movement.
 Some cracks and voids present but do not appear to be propagating.
 Adjoining walls in generally good condition except for moderate cracking.
 No issues with land embankment.
 Pile footings generally good, but timber bracket footings beginning to deteriorate.
 Directly pin-connected to abutment. Pin bolts require tightening.
 No significant issues.

SUPERSTRUCTURE

15 Floor Beams/Transoms		25	75					R
16 Stringers							N	
17 Girders								R
18 Portals							N	
19 Bracing/Diaphragms		50	50					R
20 Truss Chords/Arch Ribs		50	50					R
21 Arch Ties							N	
22 Truss Diagonals		70	30					R
23 Truss Rods/ Verticals		70	30					R
24 Cables							N	
25 Panels							N	
26 Pins/Bolts/Rivets		20	70	10				3
27 Camber/Sag			100					R
28 Live Load Vibration			100					R
29 Coating (structure)							N	

Floor beams on float are in good-fair condition overall.
 Float girders in generally good condition.
 Aluminum vierendeel bracing in generally good condition.
 Aluminum truss chords in good condition.
 Connections on ramp have significant debris buildup.
 Connections have significant debris buildup.
 Pin connections in generally good condition but require tightening.
 No sag issues.
 Live load vibration as expected for aluminum ramp.

DECK

30 Sub Deck/Cross Ties		30	50	10				3
31 Wearing Surface		5	60	30	5			3
32 Deck Joints			70	30				R
33 Curbs/Wheelguards		40	60					R
34 Sidewalk(s)							N	
35 Railings/Parapets		40	60					R
36 Median Barrier							N	
37 Drains/Pipes							N	
38 Coating (Railings)							N	

Mostly good condition aside from surface wearing and centre ramp panel.
 Float planks good to very poor. Severe deflection in middle tread of ramp.
 Deck panel joints on ramps heavily deformed, replacement/strengthening required.
 Aluminum kick plates in generally good condition.

APPROACHES

39 Signing/Lighting			100					R
40 Roadway Approaches			100					R
41 Roadway Flares			100					R

Conditions Codes			
E	Excellent	V	Very Poor
G	Good	X	Not Inspected
F	Fair	N	Not Applicable
P	Poor		

Urgency Rating
2

For Condition Guidelines see BMIS User Manual 15.2.2.

For definition see BMIS User Manual 15.2.8 "4" and "5" rating must be explained.

Brook Robazza PhD, PEng, PE, Jesse Gallop MEng, EIT

Inspector(s) (please type or print)

Signature 

Posted Weight Restriction (*print actual message on sign(s)*)

No posted weight restrictions.

Other Posted Hazard Warning Signs

Underwater cable utility sign and sign designating use only for Eagle Island residents.

Drainage Area Description (*water level fluctuation, logging debris, etc.*)

Protected harbour affected by tidal water level fluctuations. Low levels of logging debris, but the pier lies at the entrance to a large marina.

Scour Notes

The structure is supported by an abutment supported by a masonry wall which has been subjected to minor scour at its base. A steel pile is the primary anchor point for the float; however, two other shear key style anchorages on the north deck edge are supported by creasote timber foundations that have moderate scour around their perimeter, which is surrounded by sand and mud.

Rehab Work Notes

Replace localized decking planks on float that are exhibiting above-average decay.

Maintenance Work Notes

Reposition or replace bearing pins at aluminum ramp.

Structure Type	Aluminum Pier
Structure Number	403

Additional Partial Inspection Notes

Only general inspection completed.

Additional General Inspection Notes

15.2 x 1.2m ramp

7.2m x 5m float

The structure is in generally good-fair condition, with the primary of concern being the foundations of the two smaller anchorages on the north deck edge of the float.

Additional Utility Concern Notes

No utility concerns.

Additional Urgency Rating Notes

Only minor repairs are required at this time, none of which have significant effect on the load-carrying capacity of the structure.

Seismic Vulnerability Notes

The superstructure is lightweight, being composed almost entirely of aluminum and timber members, and with relatively robust piled foundations, the structure is considered to have low vulnerability to seismic loading.

Brook Robazza, Jesse Gallop

Inspector(s) (please type or print)



Signature(s)

Brook Robazza

Professional Engineer (EoR) (please type or print)



Signature(s)

STRUCTURE ID: 403 – SERVICE DOCK

DATE: 09/05/2022

GENERAL ARRANGEMENT



001. North Elevation

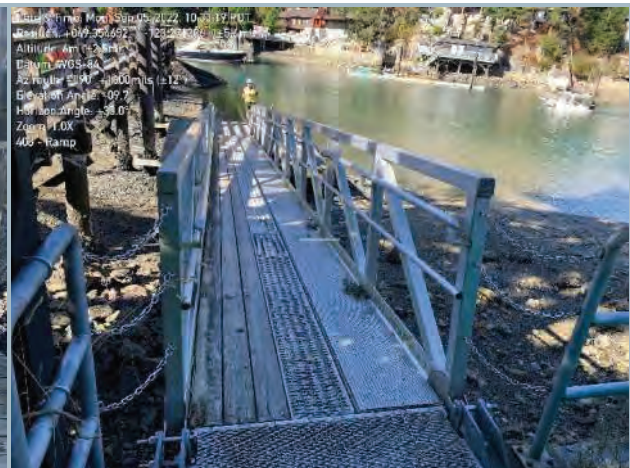


002. West Elevation

(Note Connection to Timber Pile at Southwest)



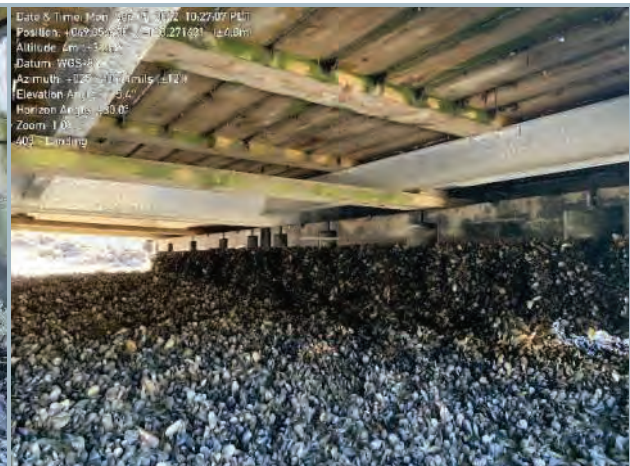
003. East Approach Gangway Viewing East



004. East Approach Gangway Viewing West



005. East Abutment



006. Dock Soffit

STRUCTURE ID: 403 – SERVICE DOCK

DATE: 09/05/2022

CONFIGURATION



007. Gangway Railing & Truss Orientation



008. Gangway Connection to East Abutment

SEISMIC FORCE REISISTING SYSTEM

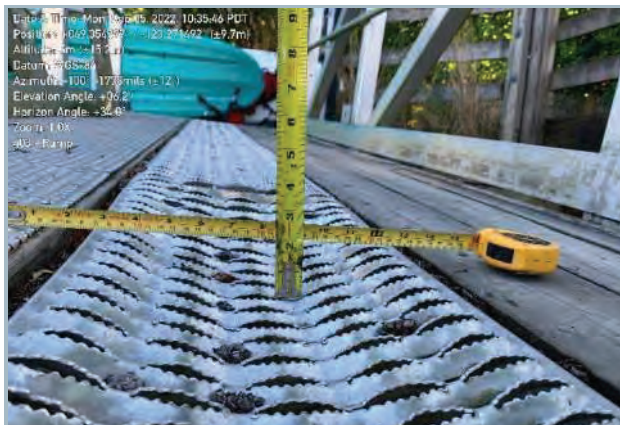


009. Dock Corner Restraint Connection, Typ.



010. Dock Restraint Timber Pier Connection

NOTABLE DEFICIENCIES



011. 2" Deflection of Unsupported Central Walkway Tread



012. Debris Accumulation at Rail Truss Base