Strathcona REGIONAL DISTRICT

STAFF REPORT

DATE: March 8, 2023 **FILE:** 0550-04 Board

TO: Chair and Directors,
Regional Board

FROM: Dave Leitch
Chief Administrative Officer

RE: **BYLAW NO. 487- ELECTORAL AREA C WHARVES SERVICE**

PURPOSE/PROBLEM

To consider first 3 readings of Bylaw No. 487 which would establish a service to fund the operation and maintenance of wharves within Electoral Area C (Discovery Islands and Mainland Inlets).

EXECUTIVE SUMMARY

At its January 11, 2023, meeting, the Board considered the attached report regarding an unsuccessful attempt to establish a wharves service for Electoral Area C and passed the following resolution:

> Mawhinney/Whalley: SRD 21/23
>
> THAT Option C be selected as the preferred alternative as outlined in the January 6, 2023 report from the Chief Administrative Officer.
>
> [Option C — develop a new service establishing bylaw that will be seen more favourably by ratepayers in Electoral Area C. This may require that additional consultation with users and other interested parties be conducted from the outset to ensure that identified objectives of the service can be met by the Regional District.]

Based on the direction provided above, Regional District representatives attended two public open houses with residents of Electoral Area C in February 2023 and responded to several questions about the AAP including clarification of the steps and intention of using that approach. The feedback received and expressed during the sessions resulted in a better understanding and reduced apprehension about the process and proposed service, and confirmed that the 3 existing wharves that are managed under the parks service (Evans Bay, Granite Bay and Hoskyn Channel) were not intended to be transitioned to the wharves service. Therefore, the updated feasibility study reflects only the anticipated costs of maintaining the wharves at Owen Bay, Port Neville and Surge Narrows which were divested in 2014 by Transport Canada. The study has also been updated to reflect 2023 statistics for Electoral Area C and the revised service costs.

With the deadline for spending the $2.9 million of divesture funding provided by Transport Canada in 2014 coming to an end, and other environmental constraints restricting the timing of the necessary capital upgrades to all three wharves, time is becoming more critical for establishing a wharves service. While the feasibility study details the options for obtaining elector approval, it is believed that an AAP remains the most cost-efficient and expedient option.

In the event a separate service is not established to operate and maintain wharf infrastructure in Electoral Area C, any costs associated with the management of that infrastructure (including legal costs) would be cost-shared by all electoral areas through the Electoral Area administration service.

RECOMMENDATIONS

1. THAT the report from the Chief Administrative Officer be received.

2. THAT Bylaw No. 487, being a bylaw to establish a wharves service within Electoral Area C (Discovery Islands-Mainland Inlets), be now introduced and read a first time.

3. THAT the rules be suspended and Bylaw No. 487 be given second and third readings.

4. THAT approval of the electors for Bylaw No. 487 be authorized to be obtained using an alternative approval process.

Respectfully:

Dave Leitch
Chief Administrative Officer

Prepared by: *S. Fisher, Engineering Services Coordinator*

Attachments: FAQ's drafted to support the Public Engagement session in February 2023
Updated Wharves Feasibility Study
Bylaw No. 487
Copy of January 6, 2023 report to the Board

FEASIBILITY STUDY

ELECTORAL AREA C WHARVES SERVICE

March 2023

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(*Cover photo: Owen Bay wharf - May 2022*)

Executive Summary

In 2014, Transport Canada Divested three wharves to the Strathcona Regional District (SRD). These facilities are located at Owen Bay, Port Neville and Surge Narrows within Electoral Area C. The other locally owned wharf facilities in Electoral Area C are located at Evans Bay, Granite Bay and Hoskyn Channel but are considered park assets and outside the scope of this study.

Under Transport Canada's port divestiture program, approximately $2.9 million was provided to the Regional Board for much-needed capital upgrades and maintenance. Those upgrades must be completed by November 2024, and any divestiture funds remaining after that deadline must be returned to Transport Canada.

To fund the ongoing maintenance and operation of the wharves a service must be established, which includes the adoption of a bylaw and financial plan to support the service. This requirement was known in 2014 when the SRD accepted the wharves and associated funding. Establishing the service was delayed by the elected officials for several years, and the SRD's ability to complete the upgrades before the funding expiry date is now in jeopardy.

Significant milestones in creating a wharves service for Electoral Area C:

- On November 14, 2014 the SRD entered into an Agreement to Transfer, a Contribution Agreement and an Operation Agreement with Transport Canada for the divestment of the Owen Bay, Port Neville and Surge Narrows wharves.

- On May 8, 2017 the Strathcona Regional Board passed a resolution directing the preparation of a bylaw to establish a wharves service for Electoral Area C for consideration by the Board.

- On April 27, 2022 the Board reviewed the original feasibility study, gave first 3 readings to Bylaw 461, and passed a resolution that approval of the electors be obtained using an Alternative Approval Process (AAP).

- On July 6, 2022 the AAP commenced and was closed on August 11th, 2022 with more than 10% of the eligible electors expressing their objection to service establishing Bylaw No. 461.

- On September 21, 2022 the Regional Board voted to defer further consideration of the issue until after the 2023 local elections. A review of the AAP results suggested that misinformation, a lack of understanding of the AAP process, and statements made by the elected director at the time questioning the proposal and the Regional District's motivations for creating the service, fueled the public's opposition.

- On January 11, 2023 the Regional Board resolved that a new service establishing bylaw should be developed that would be seen more favourably by ratepayers in Electoral Area C and that additional consultation with users and other interested parties be conducted.

- On February 14, 2023 the Regional District held two open houses in Electoral Area C to clarify the process and receive feedback from the public. A wharves service webpage was developed to answer questions and comments received during the 2022 AAP process and to provide additional information on the divestiture process and funding-related requirements.

As a result of the foregoing research, a number of recommendations are herewith presented for the consideration of the Regional Board, including:

- THAT a service be established to ensure that capital and operating costs can be met in accordance with the Transport Canada divestiture agreement and good engineering practice;

- THAT the entirety of Electoral Area C (Discovery Islands-Mainland Inlets) be designated as the area benefiting from the wharves service;

- THAT the costs of operating the service that cannot be recovered by other means should be secured through taxation of real property within the area benefiting from the wharves service;

- THAT property taxes for the wharves service would most appropriately be levied against both land and improvement assessments within the benefiting area.

The transfer of ownership did not provide sufficient resources for long-term or ongoing operational or maintenance costs, which is the reason for this initiative. Having a service in place will ensure that regular and appropriate maintenance of the wharf infrastructure can be undertaken as required. If the Regional District fails to establish a service, all costs related to maintenance or non-maintenance of the wharf infrastructure (including legal costs and damage awards) would need to be charged to the electoral area administration service.

For the reasons outlined above, it is recommended that the Regional Board give serious consideration to the establishment of a wharves service for Electoral Area C.

Introduction

The intent of this study is to examine the feasibility of establishing a service to cover the costs of operating and maintaining wharf infrastructure for Electoral Area C. The wharves in question represent important and vital infrastructure for local residents, businesses and recreational users throughout the area. Historically, the maintenance and upgrading of the wharves in question was the responsibility of the Government of Canada. However, in 2014 the decision was made by Canada to divest itself of these facilities and turn them over to local authorities that had an interest in ensuring their continued operation.

At that time the Strathcona Regional District made a decision to accept responsibility for the wharves and an agreement was entered into that provided $2.9 million in funding to ensure that major upgrades and repairs to these facilities would be done. Under the terms of the agreement, the Regional District was given until 2024 to effect the necessary upgrades following which any funds remaining would have to be returned to Transport Canada.

There is still much work required to be done at these facilities, including maintenance, repair or replacement of the following within the next 2-10 years:

Wharves

- piers and approaches
- topsides
- decking
- stringers
- pile caps
- piles
- fender piles

Floats

- gangways
- floats
- mooring dolphins
- seaplane floats

The wharves in question are predominantly wood construction and, to withstand the harsh marine environment, the various components must be inspected, maintained, and repaired or replaced as necessary to ensure their long-term viability and the safety of the boating public.

Figure 1 – Port Neville wharf (McElhanney Ltd., 2021)

Background

There are several public wharf facilities within the boundaries of Electoral Area C. Some of these wharves have been divested to the Regional District from Transport Canada on the condition that they will be upgraded and maintained to proper safety standards. These include wharves located at Port Neville, Owen Bay and Surge Narrows. Other wharves owned by the Regional District in Electoral Area C are currently operated in connection with community parks and are not included in this study.

Figure 2 – Typical configuration of wharf piles and cross-bracing.

(*McElhanney Engineering Ltd*. *2021*)

The three wharves that are the subject of this study are believed to have sufficient funds set aside for capital improvements that will meet applicable engineering standards. However, since they are not associated with any Regional District service there is no reliable source of funding to cover operating and maintenance costs over the long term. Therefore, the purpose of this study is to identify the amount of revenue that would be required in a typical year to ensure that proper maintenance of this infrastructure can be done. Based on estimates from consulting engineers that were retained to investigate such costs, it is estimated that between $40,000 and $49,000 per wharf would be required in an average year to perform such maintenance. It has also been estimated that in years when storm damage has occurred that the cost of maintenance could be higher. These costs would need to be met by the Regional District using whatever funding is available through local channels such as property taxation.

Figure 3 – Owen Bay wharf
(*McElhanney Engineering Ltd*. 2019)

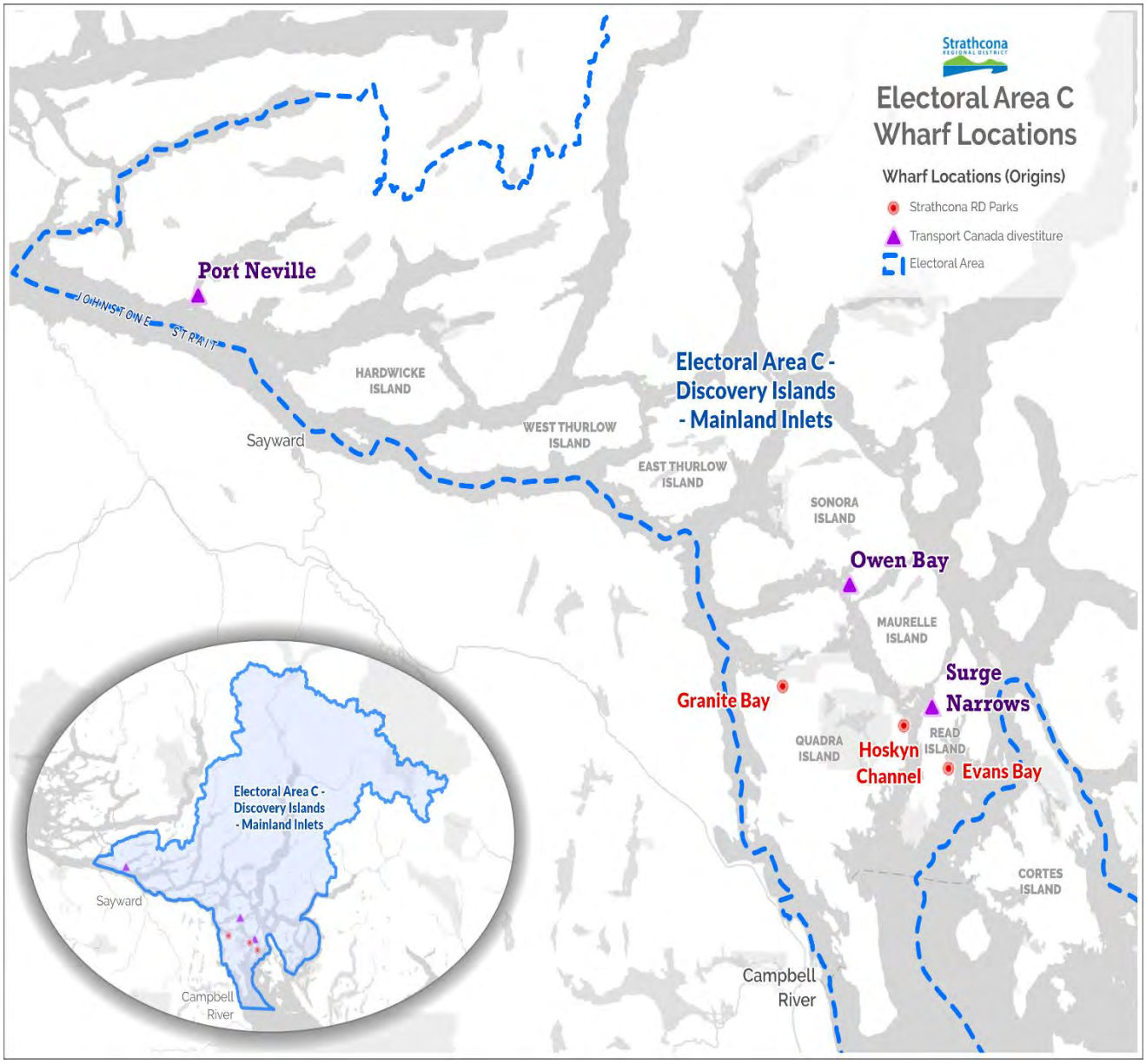

Figure 4 – Location map of SRD wharves in Electoral Area C

Capital and Operating Costs

As a result of the upgrades and improvements that have been or will be funded through the Transport Canada divestiture agreement, there is little in the way of capital expenditure that must be funded through local contributions in the short term. However, to ensure that the area receives full benefit of the work already undertaken, it is necessary to have a program that ensures regular maintenance and repairs are done to this important infrastructure.

A breakdown of the anticipated costs associated with the proposed wharves service is shown in the following table. The maintenance tasks shown are based on the recommendations from McElhanney Engineering Ltd. which conducted condition assessment studies of the wharf facilities in late 2021 and early 2022. The totals below are the projected ongoing maintenance and operating costs after the capital upgrades have been completed using the Transport Canada contributions.

Table 1: Annual Maintenance Cost Estimates for Wharves Infrastructure, post capital upgrades

Item	Annual Cost Estimate
Wharf Inspection and Reporting	$7,500
Routine Maintenance & Repairs	$32,500
Engineering Costs	$15,000
Insurance	$19,975
Administration and Overhead	$23,213
Reserve Contributions	$39,000
Total	**$137,187**

Based on the preceding information, annual operational costs will vary between $40,000 and $49,000 per wharf in a given year and possibly higher in years when additional inspection, maintenance or repair tasks must be performed. It is also noted that insurance costs constitute a major portion of the annual cost of wharf operations due to the specialty nature of such insurance and the high premiums associated with marine liability policies. Reserve contributions are funds set aside specifically for the purpose of covering future major repairs, replacement costs or upgrades to an asset. Reserve contributions are essential for proper asset management, as they allow for the infrastructure's life cycle replacement needs, including the cost increases associated with inflation, to be accounted for and funded.

Service Area Boundaries

With respect to the proposed Electoral Area C wharves service, it was necessary to determine the geographic area which would receive a benefit from having existing and future infrastructure in place. Accordingly, four distinct benefiting area scenarios were considered for this study:

Option A - properties immediately adjacent to the wharf facilities.
Option B – all properties within Electoral Area C.
Option C – all properties within Electoral Area C (except those on the mainland of BC).
Option D - all properties within the Strathcona Regional District.

Not unlike roads, schools, libraries and other public infrastructure, the connection between infrastructure and the beneficiaries of that infrastructure may not be immediately apparent. Different ways in which the benefits of infrastructure may be determined include the desirability of living in an area (ie. market value of real estate) or the popularity of an area with tourists. The concept may be subtle and is distinct from the concept of 'users' of the infrastructure.

Additional information on the different service areas that were considered and the issues relevant to each is shown in the table below.

Table 2: Comparison of Possible Service Area Alternatives for Electoral Area C Wharves Service

Benefiting Area Scenario	Comments
A. Properties adjacent to wharf facilities	A large number of properties receiving benefit from the wharves service would not pay towards infrastructure upkeep or maintenance.
B. Properties located within the boundaries of Electoral Area C.	-Reflects the unique marine culture and heritage of Electoral Area C. -Acknowledges the historical significance of wharf facilities in the area.
C. Properties located within the boundaries of Electoral Area C (except properties on BC Mainland).	Arbitrarily excludes properties that share Electoral Area C's marine heritage.
D. All properties within the Strathcona Regional District	Properties located outside of Electoral Area C would receive little or no direct benefit from the wharves service.

After careful consideration of the pros and cons associated with each of these alternatives and, respecting the principle that those properties receiving benefit from a Regional District service should contribute to its funding, it was concluded that a benefiting area boundary that included all properties within Electoral Area C would be the most appropriate.

Potential Revenue Sources

Having considered the issue of an appropriate boundary for the wharves service and the annual budgetary requirements to maintain the related infrastructure, it was necessary to consider possible sources of revenue that could be used to ensure annual maintenance and repair needs would be met. The following list includes the various sources of funding that are typically relied upon for covering the costs of local infrastructure operations and maintenance.

User Fees - As with all local government services, the incorporation of user fees is always attractive as it can help to minimize reliance on property taxes. Currently the only revenues being generated from operation of these wharf facilities is a license fee of approximately $250 annually for the Post Office at the Surge Narrows location. It is not known how long this source of revenue will be available in the future. In the event other fees are implemented in relation to the use of wharf infrastructure, these would be available to offset the amount of taxes required from the service area.

Grants - Revenue received by way of grants is another possible source of funding, however such funding is usually reserved for capital works rather than ongoing maintenance costs. Since the proposed budget for the service is based on annual maintenance and upkeep (rather than major capital improvements) it is suggested that reliance on grant funding to cover these costs would probably lead to the wharves being maintained at a lower standard that does not meet proper engineering guidelines or public expectations.

Donations – Although the Regional District is able to accept voluntary donations to cover operating costs for any service (and to issue tax receipts for such donations), the Regional District is not aware of any donations being received in the past to support public wharves infrastructure. Should such contributions be received in the future they could be used to offset reliance on other revenue sources.

Property Taxation - The use of property taxation in such circumstances is often the only reliable method for ensuring that sufficient financial resources are available when needed to attend to scheduled and unscheduled maintenance requirements. As with all Regional District services, the use of property taxes to operate a service must be limited to the area deemed to benefit from the existence of the service.

Based on the foregoing, it is suggested that accessing the local property tax base (while not the only source of funding) is probably the most reliable method for ensuring that sufficient funding is available to meet the annual requirements associated with wharf operations and maintenance.

Property Taxation Options

If the annual costs of maintaining wharf infrastructure are to be shared collectively within the service area through a system of property taxation, it will be necessary to consider the various types of taxation that are available and to select the method deemed most appropriate. Following are the most common types of property taxes that are used, depending on the nature of the service and the relationship of the service to the properties benefiting from the service:

- taxation of land only (based on the value of the land)
- taxation of improvements only (based on the value of the improvements)
- taxation of land and improvements (based on the value of the land and improvements)
- taxation of each property at a uniform rate (parcel tax)
- taxation of each property based on road frontage or parcel area (frontage tax or area tax)

While no perfect taxation system exists, it is generally accepted that the most appropriate system would be one that has the strongest relationship between the benefit received by properties and the amount of tax paid by those properties. In the present case, it is believed that the benefit received is strongly correlated to the value of assets which is the default system for Regional District requisitions. This philosophy would tend to discourage the use of parcel taxes, frontage taxes or area taxes as preferred methods for sharing costs since these systems are typically related to utility infrastructure such as water distribution or community sewer systems.

The table below illustrates the relative costs projected for the wharves service using a variety of property taxation methods. As may be seen, the sharing of costs based on land and improvement assessments not only yields a lower tax rate in comparison to other methods but also recognizes the broad constituency that would benefit from a proper maintenance program. For the reasons outlined above, it is suggested that the fairest and most appropriate method of sharing annual service costs would be through a tax on land and improvements with the amount of taxation for each property based on the value of that property.

Table 3: Analysis of Residential Rates Using Various Property Taxation Formulas

Taxation Method	Occurrences	Assessment Values (2023)	Annual Residential Rate
Land only	2,006	$813,842,800	$0.1432 per 1,000 of taxable land assessments
Improvements only	1,909	$546,800,762	$0.2076 per 1,000 of taxable improvement assessments
Land and improvements	2,128	$1,360,643,562	$0.0848 per 1,000 of taxable land and improvement assessments
Uniform parcel tax	2,625	n/a	$52.26 per separate parcel of land
Frontage or area tax	Data not available		

Tax Rate Calculations

Using land and improvement assessments as the basis for allocating annual costs it is possible to estimate the tax rates that would likely result if the maximum annual requisition was levied within the proposed service boundary. The calculations in the table below are based on 2022 property valuations supplied by the Assessment Authority of BC and, while property values may change over time, the calculations are believed to be accurate enough for purposes of this study.

Table 4: Calculation of Annual Tax Rates for Electoral Area C Wharves Service

Assessment Class	Occurrences	2023 Net Taxable Values	Conversion Factor	Converted Assessments	% Share	Requisition Share	Tax Rate* (per $1,000)
1. Residential	2128	$1,360,643,562	0.100	$136,064,356	84.1	$115,328	0.0848
2.Utility	20	1,923,800	0.350	673,330	0.4	571	0.2967
3.Supportive Housing	-	-	0.100	-	-	-	-
4.Major Industry	-	-	0.340	-	-	-	-
5.Light Industry	138	7,009,700	0.340	2,383,298	1.5	2,020	0.2882
6.Business/Other	188	81,453,000	0.245	19,955,985	12.3	16,915	0.2077
7.Managed Forest Land	51	6,353,600	0.300	1,906,080	1.2	1,616	0.2543
8.Rec./Non-Profit	28	7,848,400	0.100	784,840	0.5	665	0.0848
9.Farm	72	863,136	0.100	86,314	0.1	73	0.0848
Total	2,625	$1,466,095,198		$161,854,203	100.0	$137,187	0.0935

*Note: the various tax rates shown for different property classes is a result of the Province of BC rural property taxation system which uses converted (weighted) assessments when calculating tax rates.

Whether or not the maximum requisition will be required in any given year would be determined when that specific year's budget is being considered. Generally speaking, property taxation would only to be relied upon when other sources of revenue are not sufficient to cover the anticipated operational and maintenance costs for that year.

Annual Property Owner Costs

On the assumption that the annual costs of maintaining the wharves infrastructure are to be supported by all properties located within Electoral Area C, it is possible to estimate the annual costs to be borne by the owners of homes, businesses and other types of property within the area. The table below provides an estimate of those costs for each type of property found within the service area based on the value of that property. Property owners can easily determine the estimated annual costs for their specific property by using the rates shown in the table below or by multiplying the applicable tax rate shown in Table 4 against their assessed values as specified in their most recent property assessment notice.

Table 5: Annual Wharves Service Cost* by Property Class and Valuation

Taxable Value	Class 1 (Residential)	Class 2 (Utilities)	Class 5 (Light Industry)	Class 6 (Business & Other)	Class 7 (Managed Forest)	Class 8 (Rec/Non-Profit)	Class 9 (Farm)
50,000	$4.24	$14.83	$14.41	$10.38	$12.71	$4.24	$4.24
100,000	8.48	29.67	28.82	20.77	25.43	8.48	8.48
200,000	16.95	59.33	57.64	41.53	50.86	16.95	16.95
300,000	25.43	89.00	86.45	62.30	76.28	25.43	25.43
400,000	33.90	118.66	115.27	83.06	101.71	33.90	33.90
500,000	42.38	148.33	144.09	103.83	127.14	42.38	42.38
600,000	50.86	178.00	172.91	124.60	152.57	50.86	50.86
700,000	59.33	207.66	201.73	145.36	178.00	59.33	59.33
800,000	67.81	237.33	230.55	166.13	203.42	67.81	67.81
900,000	76.28	266.99	259.36	186.89	228.85	76.28	76.28
1,000,000	84.76	296.66	288.18	207.66	254.28	84.76	84.76

*It should be noted that some of the costs of maintaining these wharf facilities is currently being covered out of the Transport Canada divestiture funding which will not be available over the long term.

The decision to establish a wharves service is subject to the collective approval of the electors for Electoral Area C by assent voting or alternative approval process.

The options available for seeking the approval of the electors are described in more detail in the following sections of this report.

Approval Process

In the event it is decided to proceed with establishment of a wharves service, there are several steps that must be undertaken by the Regional Board including the presentation of the initiative to the electors for approval:

Step 1 - A service establishing bylaw must be introduced and given first 3 readings by the Regional Board. The bylaw must set out the nature of the service to be provided, the geographic area that would benefit from the service, the method of taxation to be employed for recovering annual costs, and the maximum amount that can be requisitioned each year from property owners for the service.

Step 2 - The Regional Board must decide whether it will seek approval of the electors for the establishing bylaw through an assent voting process or alternative approval process (AAP).

Step 3 - The service establishing bylaw must be submitted to the Inspector of Municipalities for approval.

Step 4 - Once approved by the Inspector of Municipalities the service establishing bylaw may then be submitted for approval by the electors. If assent voting is to be used, the approval threshold is a simple majority of the votes actually cast by qualified electors. If using an alternative approval process, the threshold for approval is less than 10% of the electors objecting in writing to passage of the bylaw. An assent voting process is relatively expensive (especially when used for a small geographic area) while an AAP is much more cost effective while still allowing elector opposition to an initiative to be accurately gauged.

Step 5 – If elector approval is received the Regional District may proceed to adopt the service establishing bylaw.

Given the relatively high cost associated with the assent voting option, it is recommended that serious consideration be given to using an AAP for obtaining elector assent. Should the bylaw fail to receive elector approval using that method, the ability to use an assent voting process would still be an option and, depending on the number of electors who objected via AAP, there may be a rationale for continuing with that process.

A proposed schedule with milestones for establishing the proposed Electoral Area C wharves service is outlined below.

Implementation Schedule

The following table provides more detailed information on the various steps that would need to be undertaken to implement a wharves service assuming that the initiative is to be established using an alternative approval process (AAP). The dates shown are approximate only and are the earliest dates for which the corresponding action could be taken.

Table 6: Schedule of Milestones for Creation of Electoral Area C Wharves Service

Schedule	Action
March 15, 2023	Regional Board gives first 3 readings to Bylaw No. 487, being Electoral Area C Wharves Service Establishing Bylaw 2023, and authorizes approval of the electors to be obtained by alternative approval process (AAP).
March 17, 2023	Bylaw No. 487 submitted to Inspector of Municipalities for approval under s.342 of *Local Government Act*.
May 3, 2022	Inspector of Municipalities approval received for Bylaw No. 487.
May 10, 2023	Regional Board establishes elector response form, elector response deadline and determines total number of eligible electors for AAP.
May 17, 2023	First publication of AAP notice for Bylaw No. 487.
May 24, 2023	Second publication of AAP notice for Bylaw No. 487.
June 23, 2023	Deadline for filing AAP responses with Regional District.
June 28, 2023	If elector approval received, Regional Board adopts Bylaw No. 487.
July 12, 2023	Certified copy of Bylaw No. 487 filed with Inspector of Municipalities.
September 14, 2023	Regional Board awards contract for capital upgrades to wharves.
November 1, 2023 to February 15, 2024	Fisheries Window No. 1 open for works below high-water mark (eg. pile driving for piers and floats).
March 20, 2024	Board adopts 2024 operating budget for Electoral Area C wharves service.
July 2, 2024	Deadline for payment of property taxes for wharves service.
July1, 2024 to September 1, 2024	Fisheries Window No. 2 open for works below high-water mark (eg. pile driving for piers and floats).
October 15, 2024	Deadline for completion of wharves upgrades with Transport Canada capital funding.
November 14, 2024	Deadline for payment of wharves upgrades using Transport Canada capital funding.

Schedule 'A'

August 24th, 2022 | Revision 0

Marine Facility Condition Assessment of the Surge Narrows Wharf

Submitted to: Strathcona Regional District (SRD)
Prepared by McElhanney Ltd.

Contact
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Contents

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1. Introduction

1.1. PROJECT BACKGROUND

McElhanney Ltd. (McElhanney) has been retained by the Strathcona Regional District (SRD) to complete a condition assessment of the public wharf located at Surge Narrows located on Read Island, BC. Figure 1 shows the site location of the wharf.

The marine facilities are generally in fair condition. Repairs were completed in 2013, according to the reference drawings, and it has been assumed that limited maintenance and repairs were completed in the years following. McElhanney's assessment will be used to determine the need for repairs and/or replacements.

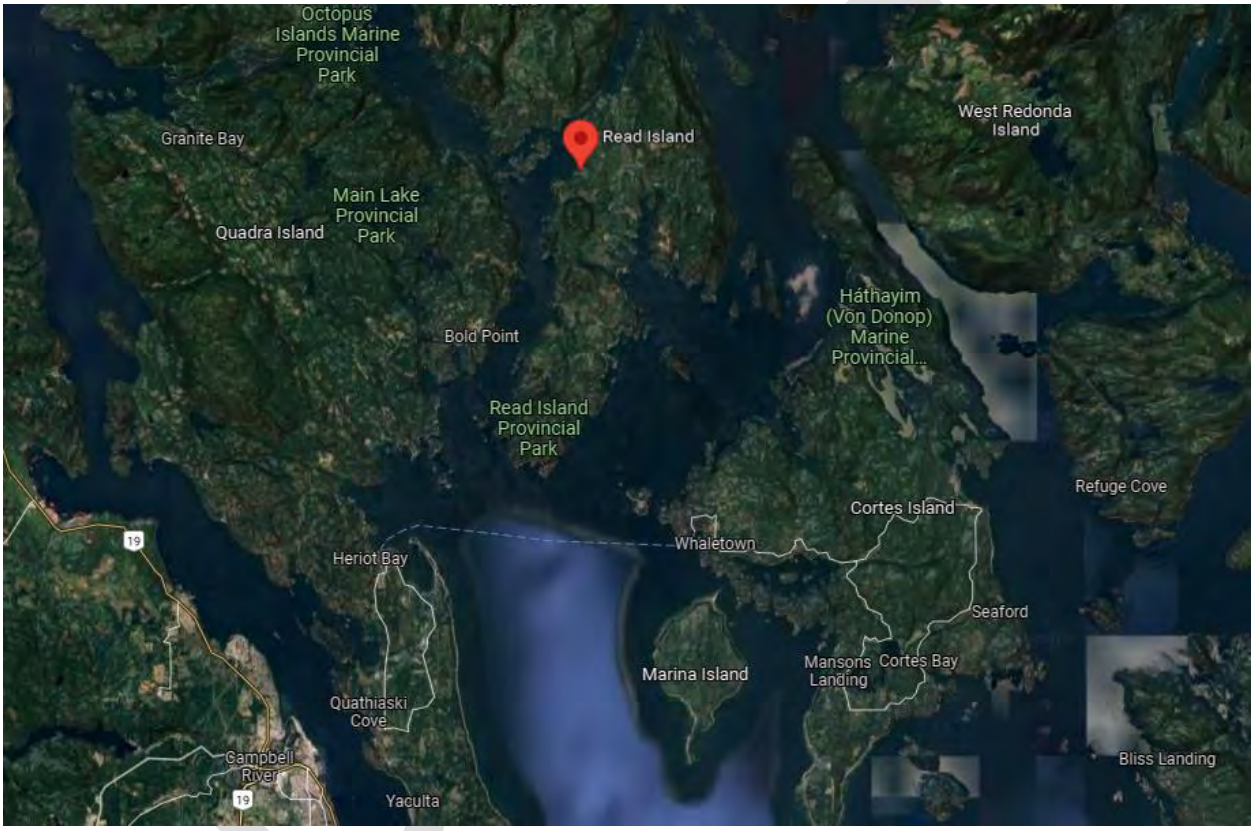

Figure 1 – Site Location

The above water site inspection was completed on September 22nd, 2021, and the underwater inspection was completed January 21st, 2022 by the following McElhanney personnel:

- Hannah Hladkowicz, EIT, Marine Structural Engineer
- Zach Tillapaugh, EIT, Structural Engineer

1.2. REFERENCE DRAWINGS

The following reference drawings and documents are available and have been reviewed by McElhanney:

- Sub-Tidal Dock and Piling Review – McElhanney, October 2013
- Surge Narrows Location Map
- Derrick Inspection and Servicing Report – Arrowsmith Engineering Services Ltd., June 2017
- Wharf and Float Repairs, Surge Narrows, BC – Herold Engineering Ltd., March 2013
- Surge Narrows Port Divestiture Program Final Report – McElhanney, January 2014
- Structure Condition Inspection and Report – Herold Engineering, February 2014
- Surge Narrows Wharf License Area

1.3. REFERENCE SYSTEM

The reference system used in the inspection is consistent with Figure 2 below.

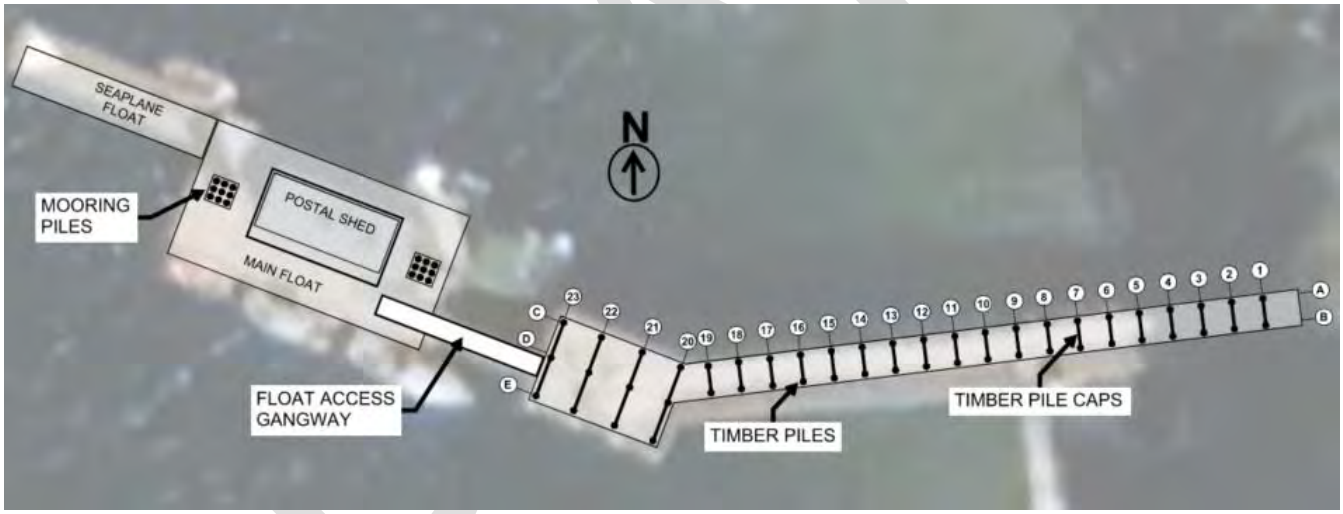

Figure 2 – Inspection Reference System

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2. Description of Facilities

The wharf structure is a conventional treated timber wharf, approximately 170 feet long, and consists of the following:

- Painted timber handrails including a top rail, (2) mid-rails, and bull rail curb secured to handrail posts bolted to the edge stringer and bull rail
- Treated timber deck planks, typically 2” x 10”
- 6” x 12” stringers, typically at 12” centers
- Either 10” x 12” or 12” x 12” pile caps, typically at 8’ centers
- 12” nominally sized creosoted treated piles typically at 6’ centers along the bent, however varying in some locations. Bent Nos. 20, 21, 22 and 23 have (3) piles along the bent at the wharf head.
- 40 ft long aluminum truss gangway
- 30’ x 60’ main float consisting of timber framing, topsides and decking, and buoyancy billets.
- 9’ x 45’ seaplane float consisting of timber framing, topsides and decking, and buoyancy billets.
- (18) treated timber mooring piles, (9) at both the west and the east end of the main float, secured in mooring wells.

Inspection photographs can be found in Appendix A.

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3. Inspection Methodology and Limitations

An above water inspection of the marine assets was completed using visual inspections. The inspection methodology was completed in accordance with the procedures and recommendations provided in “Procedures for Inspection and Assessment of Fixed Timber Docks”, by RG Sexsmith Ltd. and dated September 1994, 4th Edition. This reference has been widely adopted by the Canadian Coast Guard, Department of Fisheries and Oceans Small Craft Harbours Branch, and Transport Canada in the evaluation and assessment of timber docks, piers, and wharves along the BC Coast.

The inspection methodology used is summarized as follows:

- Visual inspection of the timber elements from the lower intertidal zone to underside of deck was completed during a low tide window.
- An underwater inspection was completed to assess the condition of the piles and the floats. The inspection was completed using an underwater ROV mobilized from the floats.

The following inspection limitations should be considered when evaluating the results of the inspection findings:

- Both bankia and limnoria marine borers species are actively present on the BC Coast and can damage the timber pilings from the seabed to the intertidal zone. This should be identified during underwater inspections.
- The findings and recommendations are for the use of the SRD only.
- A detailed coring inspection of the timber members was not completed as part of the condition assessment.
- Users of the facility should always report any unusual conditions so that they can be evaluated by a Professional Engineer registered in British Columbia.
- Inspection is limited to what was observed on site, with the possibility that hidden defects and damage may not have been visible.

In accordance with the Ministry of Transportation and Infrastructure, Asset Performance Measures, for each structural element type, the overall condition state is provided based on a site inspection of each structure component.

- Excellent Condition – as-built condition, no observed defects.
- Good Condition – normal wear and deterioration
- Fair Condition – minor loss in condition or minor observed defects.
- Poor Condition – advanced loss in condition or significant defects.
- Very Poor Condition – serious loss in condition or serious defects.

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4. Inspection Findings

4.1. WHARF STRUCTURE

4.1.1. Approach

The approach is in generally good condition (Photo 1). There are no signs of settlement in this area, and the slope around the abutment appears stable. The load rating sign specifies a maximum gross vehicle weight of 5,300kg (Photo 2).

Repairs are not considered necessary at this time; however ongoing monitoring of the approach is recommended. Consideration should be given to extending the safety barriers to the approach area.

4.1.2. Topsides and Decking

The topsides are generally in good condition with minor widespread weathering (Photo 3). Inspection findings are as follows:

- The timber handrails are well secured and in good condition (Photo 4). These were replaced in 2013 according to the repair drawings by Herold Engineering. One section of the handrails on the south end is missing the lower mid-rail (Photo 5).
- The timber deck planks are in good condition with widespread minor weathering (Photo 6). All deck planks appear generally well secured. The decking was also replaced in 2013.
- There is one section along the wharf structure which leads to private property. This area is closed off to the general public (Photo 7).

The lower mid rail of the handrails should be installed where it is missing. Consideration should be given to removing access to the private property. Ongoing monitoring of the condition of the topsides is recommended.

4.1.3. Stringers

The timber stringers are generally in good condition (Photo 8). The stringers appear well secured between the decking and the pile caps, and there are no signs of significant splitting or structural distress.

Repairs are not considered necessary at this time; however ongoing monitoring of the stringers is recommended.

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4.1.4. Pile Caps

The treated timber pile caps are generally in fair condition, with widespread weathering and green algae growth, and damage to isolated members (Photo 9 to Photo 10). The pile caps appear well secured, and are typically aligned well over the piles, with no signs of shifting. Inspection findings are as follows in Table 1 below:

Table 1 – Pile Cap Inspection Findings

Location	Description of Findings	Photo
Bent No. 1	The pile cap is split on the north end.	Photo 11
Bent No. 2	The pile cap has a minor split at the south end grain.	Photo 12
Bent No. 4	The pile cap is fractured at the base in the center, and the end of one of the through bolts is exposed.	Photo 13
Bent No. 6	The pile cap is above 2 corbels on each pile. The corbels are in fair condition and secured vertically with a steel angle on one side. The top corbel at the north end is showing signs of splitting.	Photo 14 to Photo 15
Bent No. 7	The pile cap is above 2 corbels on the south pile. The corbels are in fair condition and stabilized vertically with a steel angle on one side. The bottom corbel is showing minor signs of splitting at the end grain.	Photo 16 to Photo 17
Bent No. 10	The pile cap is fractured at the base in the center, and the end of one of the through bolts is exposed.	Photo 18
Bent No. 11	The pile cap is splitting at the north end grain.	Photo 19
Bent No. 12	The pile cap is fractured at the base in the center, and the end of one of the through bolts is exposed.	Photo 20
Bent No. 13	The pile cap at is above 2 corbels on the south pile. The corbels are in fair condition and stabilized vertically with a steel angle on one side. The corbel is showing minor signs of splitting at the end grain.	Photo 21
Bent No. 14	The pile cap has some damage at the end grain on the north end.	Photo 22
Bents Nos. 2, 4, 6, 8, 10, 12 and 14	The pile caps do not extend the full length of the deck. The pile caps end approximated one foot before the end stringer on the south end. The end stringers therefore span 2 bents at these locations.	

Replacements of piles caps at Bent Nos. 1, 2, 4, 6, 7, 8, 10, 11, 12, 13 and 14 is strongly recommended. It is recommended that the corbels at bent 6 are laterally braced with sister channels, and all the corbels at Bent Nos. 6, 7, and 13 are braced vertically on both sides of the pile with either strapping or steel angles. Ongoing monitoring of the remaining pile caps is recommended.

4.1.5. Piles

The timber piles are generally in fair condition, with widespread fungal decay. Inspection findings are as follows:

- Pile No. 2B has a minor split at the top of the pile (Photo 23)
- Pile No. 4B has a split at the top of the pile. It has previously been banded to prevent further splitting (Photo 24).
- Pile No. 10B has multiple minor bolt holes in the intertidal zone (Photo 25).
- Pile No. 11B has a severe marine borer cavity in the intertidal zone (Photo 26).
- Pile 19A has a minor split in the intertidal zone (Photo 27).
- Pile 22A has some damage in the intertidal zone (Photo 28).
- The majority of the existing capping over the piles is deteriorated or missing.

The missing and deteriorated capping should be replaced to prevent further damage to the tops of the piles. Ongoing monitoring of the piles and areas of damage is recommended. It is recommended that any holes be plugged with a treated timber dowel if possible. It is anticipated that the piles identified with holes and splitting will have established internal fungal decay in the next 5-10 years and should be considered for replacement.

4.1.6. Fendering System

The timber fender piles are generally in fair condition, with no signs of significant deterioration or mechanical damage (Photo 29 to Photo 30).

McElhanney understands that the fender piles are not longer used for vessel moorage and repairs are not considered necessary at this time. Continued monitoring of the fender piles is recommended.

4.1.7. Cross Bracing

The timber cross bracing is generally in fair to good condition (Photo 31 to Photo 32). Inspection findings are as follows:

- There is widespread weathering, and minor fungal decay to the end grains of the members, however all cross braces appear well secured to the piles.
- There are two locations where timber log debris is trapped under the wharf structure and is resting on the cross-bracing. (Photo 33 to Photo 34).
- It appears a timber member was added as a side brace from the deck to pile 11B, however it is no longer secured to the pile and is hanging from the deck (Photo 35).

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It is recommended that the timber log debris and the hanging side brace at pile 11B are removed. Ongoing monitoring of the cross bracing is recommended.

4.1.8. Derrick Loading Crane

The Derrick Loading Crane appears to be in fair condition with signs of corrosion (Photo 36 to Photo 38). The crane appears to still be in use. The hanging tackle is being secured to the timber handrails with a rope.

Consideration should be given to removing the crane if usage cannot be monitored.

4.2. FLOATS

4.2.1. Access Gangway

The access gangway is in good condition with no significant corrosion or deterioration of the welded connections (Photo 39). According to the repairs drawings it was replaced in 2013. The inspection findings are as follows:

- The gangway slider plate is in good condition and is well aligned with the gangway rollers (Photo 40).
- The upper hinge connections are well aligned, and the bolted connections are in good condition (Photo 41).

Repairs are not considered necessary at this time; however ongoing monitoring of the gangway is recommended.

4.2.2. Main Float

The main float is in fair condition (Photo 42). Inspection findings are as follows:

- The timber deck planks were replaced in 2013 and are in good condition with minor weathering (Photo 43 to Photo 45).
- The bull rails and fascia board are in fair to good condition, with minor weathering (Photo 46).
- The floating dock does not appear to have consistent floatation, with flotation loss of 6 inches noted at the middle east side of the float. It appears there are no floatation elements in this area, which is directly surrounding the mooring well (Photo 47 to Photo 49). Additionally, the freeboard at the north end of the dock is about 6inches less than the south end. This could be due to the weight of the postal shed, which is further on the north end of the dock.
- The mooring piles and mooring dolphins have moderate abrasion with the dock structures (Photo 50 to Photo 57).

Consideration should be given to adding and/or replacing some of the flotation elements to improve the consistency of the freeboard of the main dock. Ongoing monitoring of the main float is recommended.

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4.2.3. Seaplane Float

The seaplane float is in fair condition (Photo 58). Inspection findings are as follows:

- The timber deck planks, bull rails and fascia boards have widespread weathering and fungal decay (Photo 59 to Photo 60).
- On the north end of the seaplane float, rubber tires have been bolted to the fascia boards as fenders (Photo 60).
- There is some floatation loss at the west side of the seaplane float end, with the freeboard approx. 5 inches less than the east side. Additionally, the seaplane float freeboard is about 5 inches less than the main float, resulting in a step down between the docks which may pose a tripping hazard. A rubber mat has been installed as a transition mat (Photo 61).
- The seaplane float is secured by mooring anchor chains, on concrete anchors.

Consideration should be given to replacing the seaplane float along with the mooring system rather than continue regular minor maintenance/repairs. Consideration should also be given to the addition of a security gate to prevent access to the seaplane float.

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5. Residual Life Estimates

The marine facility is typically in fair condition. For the purpose of this evaluation, the residual life represents the estimated period of time between the inspection date and the time when the component will typically require repair or replacement.

For timber docks in a saltwater/marine environment, the residual life estimate is based on the follow:

- Where no established deterioration (marine borer cavities / fungal decay / mechanical abrasion) is noted in creosote treated timber, the remaining residual life is estimated to be 10+ years. As deterioration can progress rapidly in timber members once established, residual life estimates greater than 10 years are typically not given.
- Where deterioration has been established, the remaining residual life is estimated to be 2-7 years, depending on the extent of deterioration and likelihood to progress rapidly.
- Where there is deterioration which has significantly affected the structural capacity of the member the residual life is assumed to be minimal.

Based on McElhanney's understanding of the environment, usage, and familiarity with similar structures, Table 2 provides the estimates of the remaining service life of the wharf elements:

Table 2 - Summary of Recommendations

Location / Structure	Residual Life Estimate
Wharf Structure	
Approach	+10 years
Topsides	8-10 years
Decking	8-10 years
Stringers	8-10 years
Pile Caps	1-2 years
Piles	2-4 years
Fender Piles	5-7 years
Floats	
Gangway	+10 years
Main Float	2-4 years
Seaplane Float	4-6 years

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6. Facility Recommendations and Cost Estimates

The Surge Narrows Wharf facility is generally in fair condition and is expected to continue servicing public access for small craft vessels. Based on the inspection findings, there are multiple maintenance items recommended. Table 2 provides recommendations and cost estimates based on McElhanney's understanding that the SRD intends to invest significant maintenance effort in the facility before 2024.

The cost estimates for the repairs are shown in Table 3.

Table 3 – Cost Estimates

Item	Priority	Description	Units	Quantity	Unit Cost	Subtotal
1	High	Repair and replace the handrails where needed.	m	10	$200	**$2,000**
2	High	Miscellaneous pile cap repairs / replacements	Ea.	11	$5,000	**$55,000**
3	High	Miscellaneous pile repairs/replacements	Ea.	3	$12,000	**$36,000**
4	Medium	Install new flotation billets on Main Float	Ea.	6	$5,000	**$30,000**
5	Medium	Full replacement of Seaplane Float	m^2	37	$1,200	**$44,400**
					High Priority Subtotal	$93,000
					Contingency (25%)	$23,250.0
					High Priority Total	**$116,250**
					Medium Priority Subtotal	$74,400
					Contingency (25%)	$18,600.0
					Medium Priority Total	**$93,000**
					Total Capital Cost Estimate	**$209,250**

In reviewing the cost estimates above, please note the following:

- The current vessel moorage capacity is sufficient for future use. No expansion or increase in vessel moorage capacity is anticipated.
- Estimated is based on available cost estimate material and labour rate data from recent projects between 2019 to 2021 and assumes competitive contractor pricing.
- Estimate is considered accurate to ± 50%. A contingency of 25% has been provided to account for cost items which have not been considered due to the extent of engineering work completed to date.
- McElhanney recommends that a coring inspection be completed within 12 months of significant timber repairs to the stringers, pile caps, or piles to identify locations with internal fungal decay which are not identifiable from a visual inspection.

7. Closure

Please do not hesitate to contact the undersigned with any questions or comments.

Sincerely,
McElhanney Ltd.

Prepared by:

Hannah Hladkowicz, EIT
Marine Structural Engineer
hhladkowicz@mcelhanney.com

Reviewed by:

Matthew Friderichs, P.Eng.
Marine Structural Engineer / Division Manager
mfriderichs@mcelhanney.com

Revision History

Date	Status	Revision	Author
Nov. 29, 2021	Draft Issue	A	HH
Mar. 04, 2022	Draft Issue	B	HH
August 24, 2022	For Use	0	HH

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Statement of Limitations

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Independent Judgments. McElhanney will not be responsible for the independent conclusions, interpretations, interpolations and/or decisions of the Client, or others, who may come into possession of this report, or any part thereof. This restriction of liability includes decisions made to purchase, finance or sell land or with respect to public offerings for the sale of securities.

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APPENDIX A – INSPECTION PHOTOS

Photo 1 - Approach area

Photo 2 - Load rating sign

Photo 3 - Wharf Structure Topsides

Photo 4 - Wharf Structure Handrails

Photo 5 - Missing lower mid-rail

Photo 6 - Wharf Structure Decking

Photo 7 - Access to private property

Photo 8 - Typical View of Timber Stringers

Photo 9 - General View facing south of the timber pile caps

Photo 10 - Weathering and green algae growth on pile caps

Photo 11 - Split at the north end of the pile cap at Bent 1

Photo 12 - Minor splitting of the pile cap at Bent 2

Photo 13 - Pile cap at Bent 4

Photo 14 - Pile cap at Bent 6 and corbels

Photo 15 - Split in corbel at Bent 6

Photo 16 - Pile cap at Bent 7 and corbels

Photo 17 - Split in corbel at Bent 7

Photo 18 - Pile cap at Bent 10

Photo 19 - Pile cap at Bent 11

Photo 20 - Pile cap at Bent 12

Photo 21 - Pile cap at Bent 13 with corbels

Photo 22 - Pile cap at Bent 14

Photo 23 - Pile 2B

Photo 24 - Pile 4B

Photo 25 - Pile 10B

Photo 26 - Pile 11B

Photo 27 - Pile 19A

Photo 28 - Pile 22A

Photo 29 - North end fender piles

Photo 30 - North end fender piles and log debris

Photo 31 - General condition of the Cross Bracing

Photo 32 - General view of Cross Bracing

Photo 33 - Log resting on the Cross Bracing

Photo 34 - Log resting on the Cross Bracing

Photo 35 - Hanging side brace at pile 11B

Photo 36 - Derrick Loading Crane

Photo 37 - Derrick Loading Crane

Photo 38 - Derrick Loading Crane

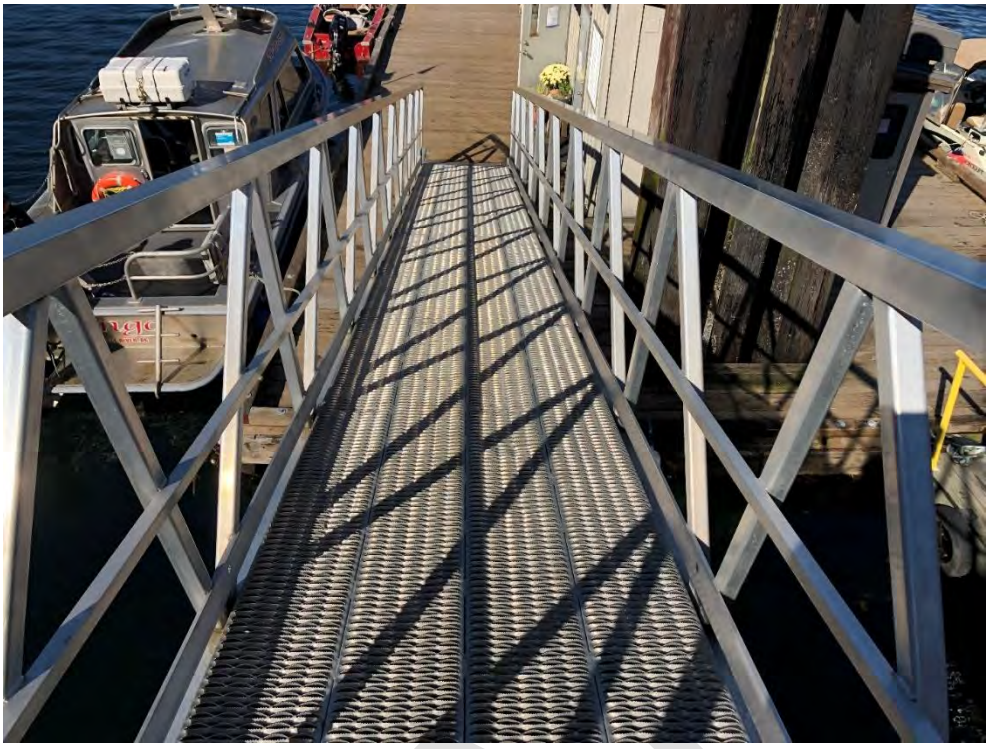

Photo 39 - General View of Aluminum Gangway

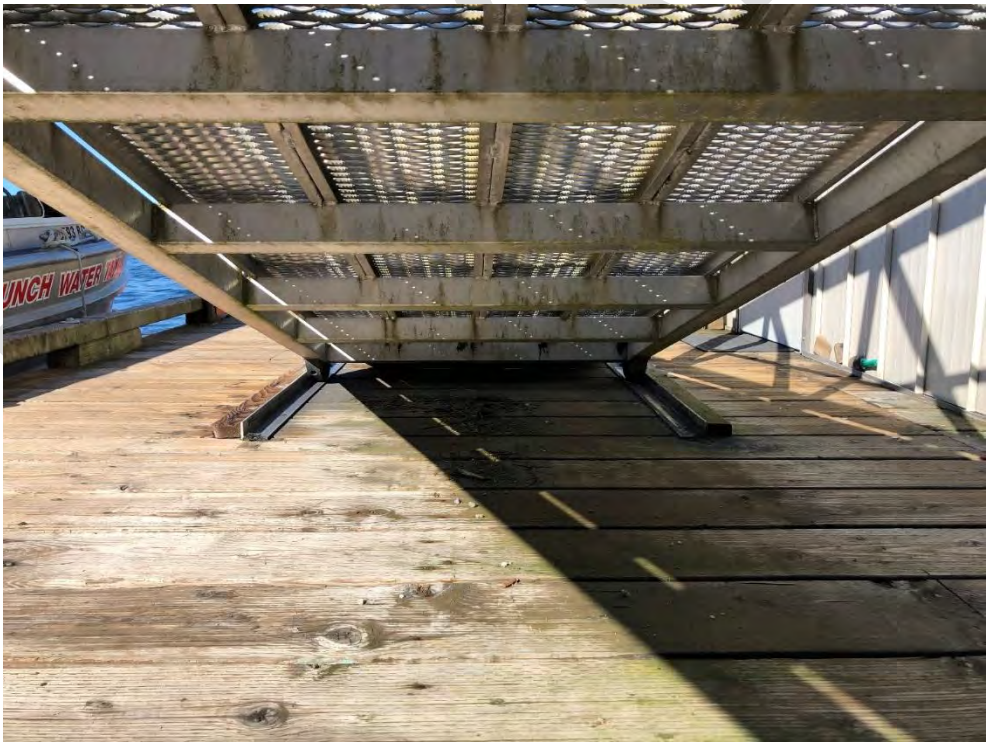

Photo 40 - Gangway slider plate and rollers

Photo 41 - Gangway Upper Hinge Connection

Photo 42 - General View of the Main Float

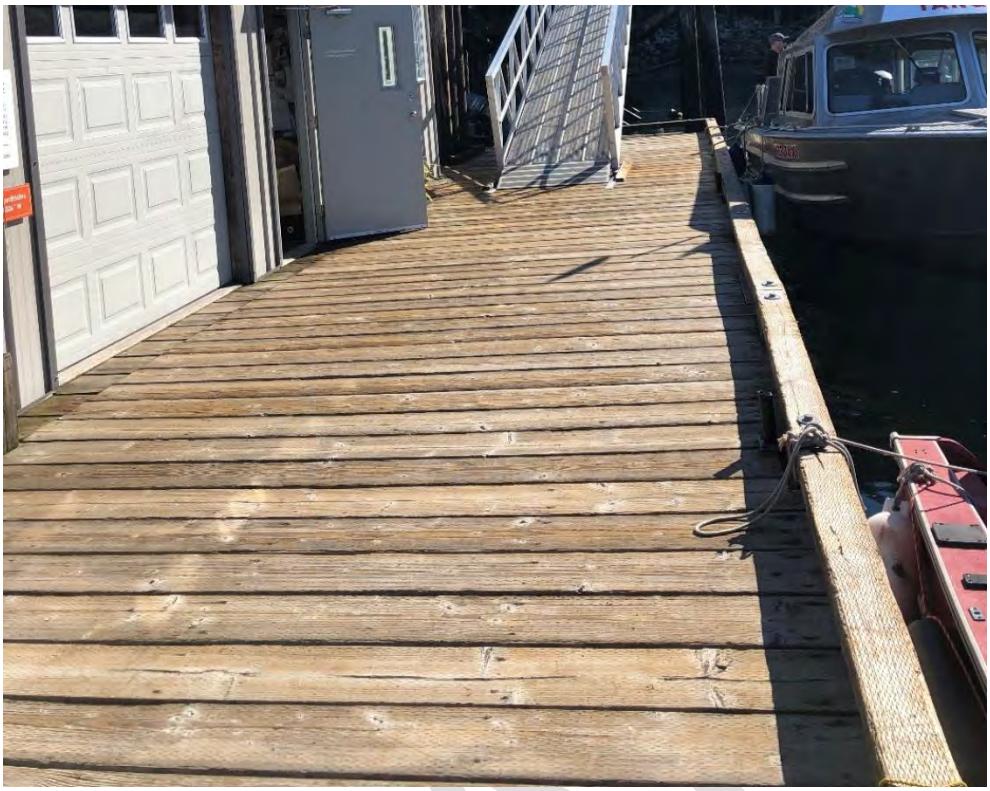

Photo 43 - Typical condition of the Main Float deck

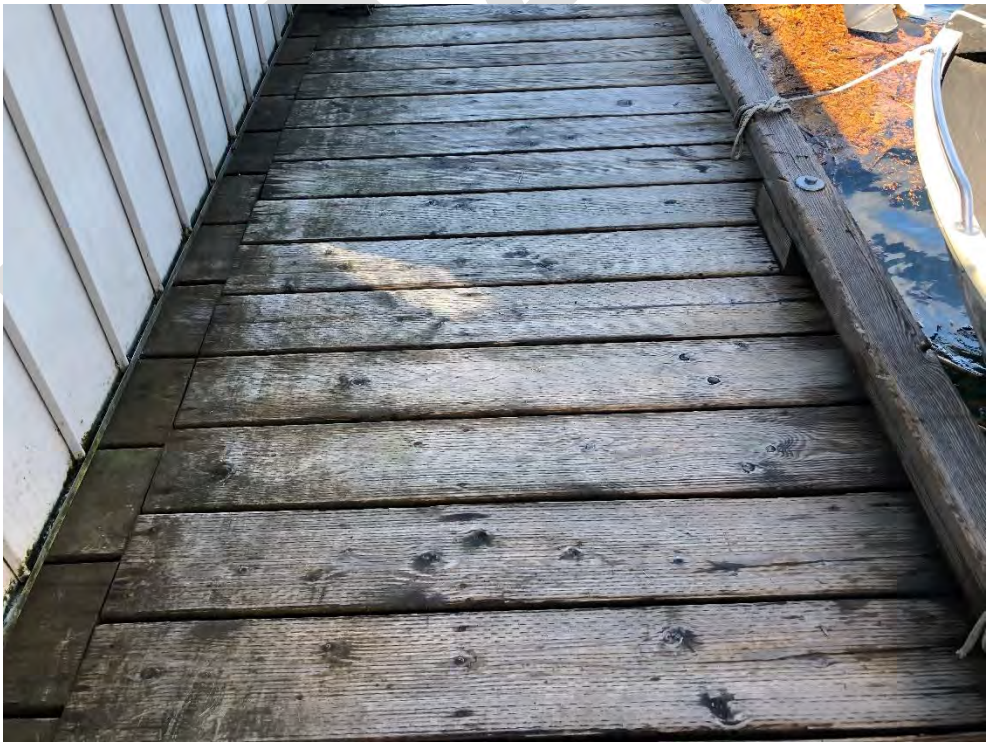

Photo 44 - Typical condition of the Main Float deck

Photo 45 - Typical condition of the deck beneath the postal shed

Photo 46 - Typical condition of the timber bull rails and fascia board on the Main Float

Photo 47 - Flotation loss at centre of the Main Float on the east end

Photo 48 - Main Float on the east end

Photo 49 - Main Float on the east end

Photo 50 - East end Mooring Piles

Photo 51 - East end Mooring Piles

Photo 52 - East end Mooring Piles

Photo 53 - West end Mooring Piles

Photo 54 - West end Mooring Piles

Photo 55 - West end Mooring Piles – up to 10% CSL

Photo 56 - West end Mooring Piles

Photo 57 - West end Mooring Piles

Photo 58 - General view of the Seaplane Float

Photo 59 - Typical condition of the Seaplane Float deck

Photo 60 - Typical condition of the timber bull rails, fascia board and rubber tire fendering on the Seaplane Float

Photo 61 - Transition from the Main Float to the Seaplane Float

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Schedule 'B'

Marine Facility Condition Assessment of the Port Neville Wharf

January 20, 2022 | Revision A

Submitted to: Strathcona Regional District (SRD)
Prepared by McElhanney Ltd.

Contact
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Canada V9N 3R6

Contents

1. Introduction

1.1. PROJECT BACKGROUND

McElhanney Ltd. (McElhanney) has been retained by the Strathcona Regional District (SRD) to complete a condition assessment of the marine facilities at the public wharf located in Port Neville, BC. Figure 1 shows the site location of the wharf.

The marine facilities are generally in moderate condition with assumed limited maintenance and inspection having been completed over the last 10 years. McElhanney's assessment will be used to determine the need for repairs and/or replacements.

Figure 1 – Site Location

The visual site inspection, completed on September 1, 2021, and the coring inspection, completed on December 7th, 2021, was by the following McElhanney personnel:

- Hannah Hladkowicz, EIT, Marine Structural Engineer
- Zach Tillapaugh, EIT, Structural Engineer

1.2. REFERENCE DRAWINGS

The following reference drawings and documents are available and have been reviewed by McElhanney:

- Drawings 1-3: Port Neville, BC – Wharf and Float Repairs
- Port Divestiture Program – Final Report, January 2014
- Port Neville Location Map
- Transport Canada: Approach & Floats, Plan & Description Drawing
- Structure Condition Inspection and Report, Herold Engineering Ltd, February 2014.

1.3. REFERENCE SYSTEM

The reference system used in the inspection is consistent with Figure 2 below.

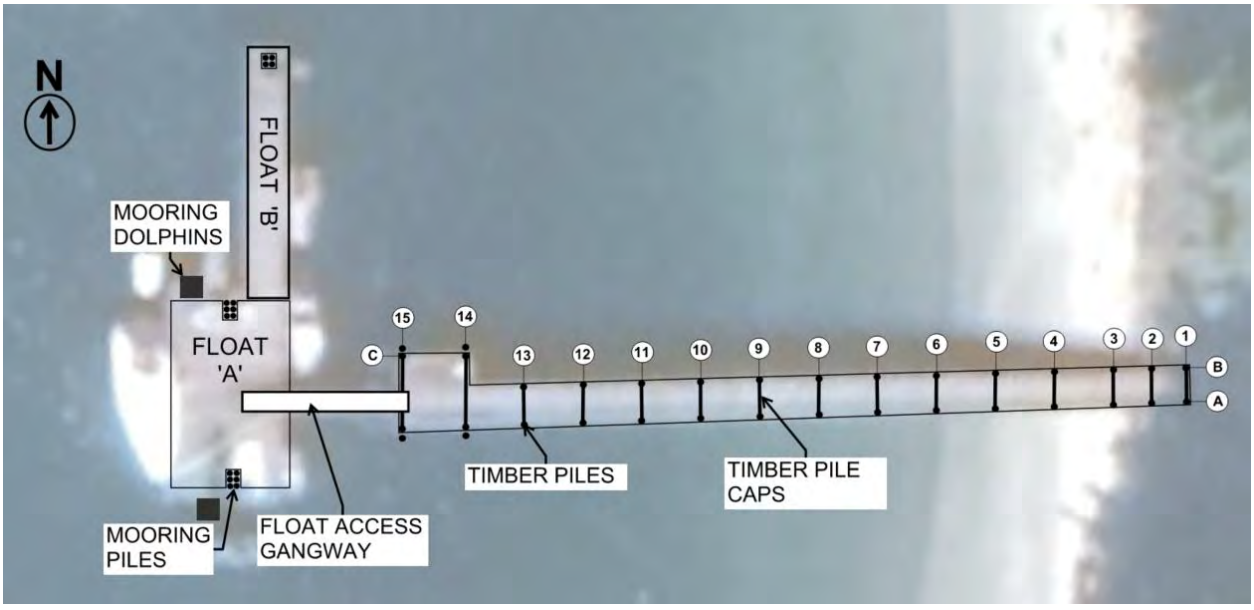

Figure 2 – Inspection Reference System

2. Description of Facilities

The wharf structure is a conventional treated timber wharf, approximately 60 meters long, and consisting of the following:

- Painted timber handrails including a top rail, mid-rail, and bull rail curb secured to handrail posts bolted to the edge stringer and bull rail
- Treated timber deck planks, typically 3” x 12”
- 6” x 12” stringers, typically at 30” centers
- 10” x 12” pile caps, typically at 15’ centers
- 12” nominally sized creosoted treated piles at 8’ centers along the bent. Bent Nos. 14 and 15 have (3) piles along the bent at the pierhead
- 12” fender piles at bents 14 and 15
- 12m long steel truss gangway
- The floating docks consist of treated timber decking and framing, and buoyancy billets.
- Float A has (12) mooring piles, (6) at the north end and (6) at the south end. There are two timber mooring dolphins, one at the north side of Float A, and one at the south side. Float B has 4 mooring piles at the north end.
- The North dolphin consists of 15 vertical timber piles and 4 batter piles, the South dolphin consists of 16 vertical piles. The mooring piles and dolphins are creosote coated timber piles.

Figures 3 and 4 provide reference sketches of the timber wharf approach trestle. Inspection photographs are provided in Appendix A.

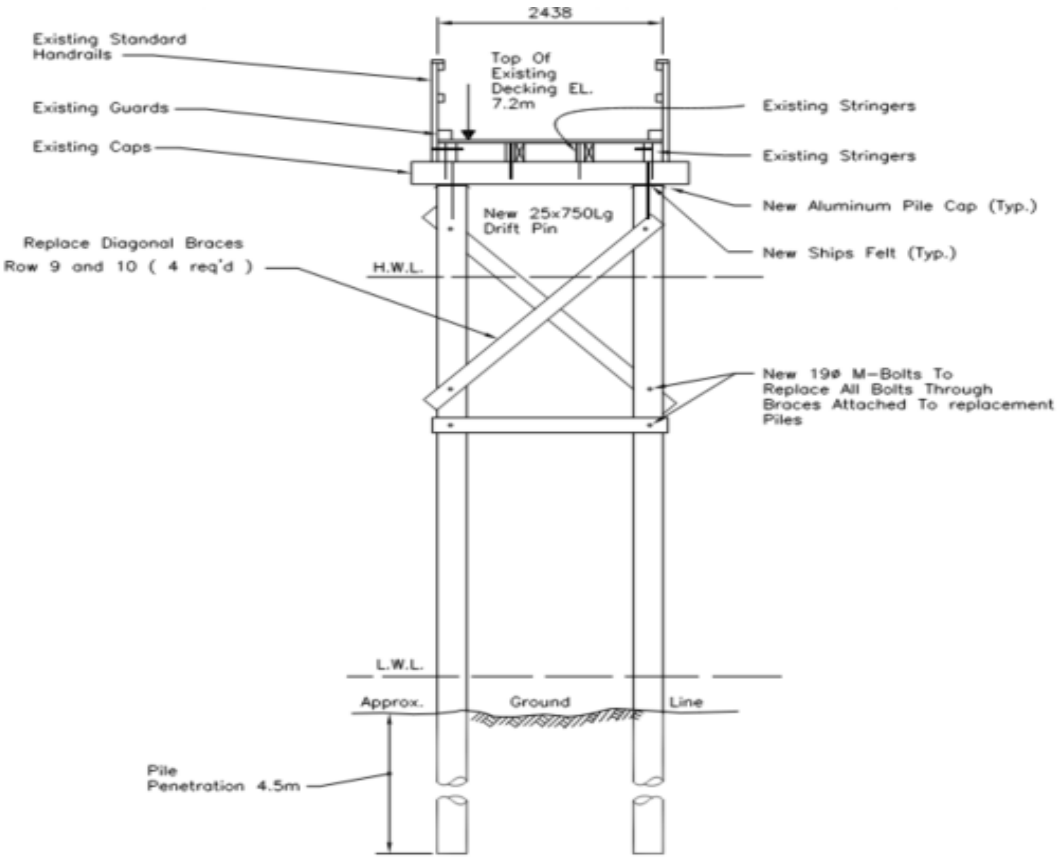

Figure 3 – Typical Structure Cross Section (Abutment to Bent No. 13)

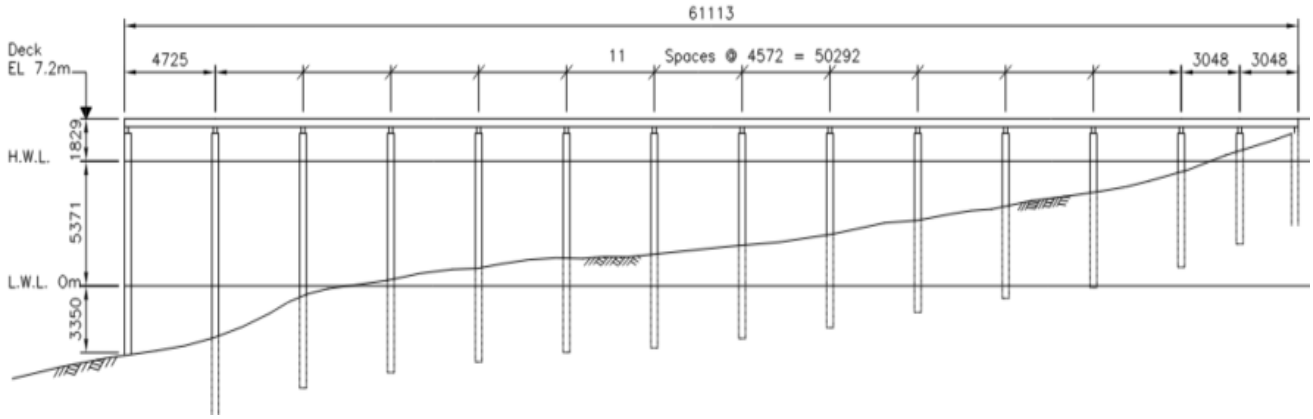

Figure 4 – Typical Structure Elevation

3. Inspection Methodology and Limitations

3.1. INSPECTION METHODOLOGY

An above water inspection of the marine assets was completed using visual inspections on September 1st, 2021, and timber coring on December 7th, 2021. The inspection methodology was completed in accordance with the procedures and recommendations provided in “Procedures for Inspection and Assessment of Fixed Timber Docks”, by RG Sexsmith Ltd. and dated September 1994, 4th Edition. This reference has been widely adopted by the Canadian Coast Guard, Department of Fisheries and Oceans Small Craft Harbours Branch, and Transport Canada in the evaluation and assessment of timber docks, piers, and wharves along the BC Coast.

The inspection methodology used is summarized as follows:

- Visual inspection of the timber elements from the lower intertidal zone to underside of deck was completed from land and from a small boat during a low tide window.
- An underwater inspection was completed to assess the condition of the piles. The inspection was completed using an underwater ROV mobilized from a small boat underneath the wharf structure.
- Timber coring was completed at the tops of the piles, pile caps, and stringers where steel drift pins are present, from bents 1-8. The timber coring is completed using a 13mm diameter drill which extends approximately 50% to 75% through the timber member. Fungal decay has significantly less resistance for the drill and so the resultant torque and drill cuttings from fungal decay are obvious to the inspector. From timber coring, the extent of fungal decay and cross-sectional loss (CSL) is expressed in intervals of 10%, 25%, 50%, 75%, and 90% CSL.

3.2. INSPECTION LIMITATIONS

The following inspection limitations should be considered when evaluating the results of the inspection findings:

- Both bankia and limnoria marine borers species are actively present on the BC Coast and can damage the timber pilings from the seabed to the intertidal zone. This should be identified during underwater inspections.
- The findings and recommendations are for the use of the SRD only.
- Users of the facility should always report any unusual conditions so that they can be evaluated by a Professional Engineer registered in British Columbia.

3.3. CONDITION

In accordance with the Ministry of Transportation and Infrastructure, Asset Performance Measures, for each structural element type, the overall condition state is provided based on a site inspection of each structure component.

- Excellent Condition – as-built condition, no observed defects.
- Good Condition – normal wear and deterioration
- Fair Condition – minor loss in condition or minor observed defects.
- Poor Condition – advanced loss in condition or significant defects.
- Very Poor Condition – serious loss in condition or serious defects.

4. Inspection Findings

4.1. PIER STRUCTURE

4.1.1. Approach

The pier approach is in generally good condition (Photos 1). There are no signs of settlement in this area, and the slope around the pier abutment appears stable. No load rating sign has been posted.

Repairs are not considered necessary at this time; however ongoing monitoring of the pier approach is recommended. Consideration should also be given to posting a load rating sign and extending safety barriers to the approach area.

4.1.2. Topsides and Decking

The pier topsides are generally in poor to fair condition with widespread weathering and fungal decay (Photos 2 & 3). Inspection findings are as follows:

- The handrails appear generally well secured. The handrail posts are connected to the pier structure with two bolts, one through the outer stringer, and one through the bull rail. In some locations, the bull rails are deteriorated or not fully secured, and the handrail posts can shift, however they are still well secured to the stringer. There is significant deterioration to multiple other top rail connections, the approximate locations are directly above the following piles:
    - Between piles 4B and 5B (Photo 4)
    - Between piles 7A and 8A (Photo 5)
    - Between piles 8B and 9B (Photo 6)
    - Between piles 9A and 10A (Photo 7)
    - Between piles 11A and 12A (Photo 8)
    - Between piles 12A and 13A (Photo 9)

- Identified during the second inspection on December 7th, 2021, the top rail connection directly above pile 14B has deteriorated and is only connected on one end (Photo 10). *It is recommended that the bull rails and handrail posts be fully replaced and secured in places with deterioration and/or missing bolts. Consideration should be given to painting the handrails to extend the service life of the existing timber. Consideration should also be given to a full phased replacement of the topsides over the next 2-4 years.*

- The timber deck planks have widespread minor weathering, however, are generally in good condition. All deck planks appear well secured. *Installation of an anti-slip grating to improve the safety during wet weather conditions is recommended. Continued monitoring of the condition of the topsides should be regularly completed.*

4.1.3. Stringers

The treated timber stringers are generally in good condition (Photo 11). The stringers appear well secured between the decking and the pile caps, and there are no signs of significant splitting or structural deterioration. The ends of the stringers, where the end grain is present, does not show significant evidence of moisture or fungal decay. No cross-sectional loss was found in the stringers during the timber coring inspection.

Repairs are not considered necessary at this time; however ongoing monitoring of the stringers is recommended.

4.1.4. Pile Caps

The treated timber pile caps are generally in fair to good condition (Photo 12 & 13). The pile caps appear well secured, and there are no signs of significant splitting or structural deterioration. The pile caps are typically aligned well over the piles, with no evidence of shifting or displacement. There is minor weathering and deterioration to the end grains of the pile caps, notably at Bent 12 (Photo 14). No cross-sectional loss was found in the pile caps during the timber coring inspection.

Repairs are not considered necessary at this time, however ongoing monitoring of the pile caps and of the deterioration at the end grains is recommended.

4.1.5. Piles

The structural timber piles are generally in fair to good condition, with some damage to isolated piles. Table 1 provides a location of specific timber pile findings.

Table 1 – Pile Inspection Findings

Location	Description	Recommendation
Pile 2A	Large split at the top of the pile. (Photo 15) 50% CSL due to internal fungal decay in the top 0.6m.	Replace timber pile.
Pile 2B	25% CSL due to internal fungal decay in the top 0.3m.	Monitor.
Pile 3A	25% CSL due to internal fungal decay in the top 0.3m.	Monitor.
Pile 3B	Moderate splitting at the top of the pile. (Photo 16) 25% to 75% CSL due to internal fungal decay in the top 0.9 m.	Replace timber pile.
Pile 4B	25% CSL due to internal fungal decay in the top 0.3m with wet fibres. Concrete footing is exposed, with signs of undermining and spalling of the concrete. (Photo 17)	Monitor.
Pile 5A	Moderate splitting at the base of the pile. (Photo 18)	Monitor.
Pile 5B	25-50% CSL due to internal fungal decay in the top 0.3m with wet fibres.	Replace timber pile.
Pile 7A	Pile is slightly misaligned. (Photo 19)	Monitor.

Pile 8A	Moderate splitting at the top of the pile. (Photo 20)	Monitor.
Pile 9A	Large open bolt hole at the top of the pile, likely from a previous cross-brace bolted connection. (Photo 21)	Monitor.
Pile 10A	Moderate splitting at the top of the pile. (Photo 22)	Monitor.
Pile 12A	Large open bolt hole at the top of the pile, likely from a previous cross-brace bolted connection. (Photo 23)	Monitor.
Pile 15B	Moss growing out of the top, indicating that there is fungal decay in the interior of the pile in this location. (Photo 24)	Monitor.

Repairs are not considered necessary at this time; however ongoing monitoring of the piles and areas of damage is recommended. It is anticipated that the piles identified with splitting and open holes will have established internal fungal decay in the next 5-10 years and should be considered for replacement.

4.1.6. Fendering System

The timber fender piles are generally in poor to fair condition, with one fender pile with severe fungal decay/marine borer cavities. Inspection findings are as follows:

- Fender Pile 10B has a marine borer cavity in the lower intertidal zone with 25% cross-sectional loss (CSL) (Photo 25).
- Fender pile 14A has a large marine borer cavity with 50% CSL, and likely severe cross section loss due to fungal decay (Photos 26 & 27). Marine growth appears to be coming out of the pile.
- Fender pile 15C has a large marine borer cavity with 50% CSL, and likely severe cross section loss due to fungal decay (Photo 28).

McElhanney understands that the fender piles are not longer used for vessel moorage and repairs are not considered necessary at this time as the fender piles are not structurally important to the pier.

4.1.7. Cross Bracing

The timber cross bracing is generally in fair to good condition (Photo 29 to 30). Inspection findings are as follows:

- There is widespread weathering, and minor fungal decay to the end grains of the members, however all cross braces appear well secured to the piles, apart from two locations.
- The cross bracing at Bent 8 appears to not be connected to pile 8A and is only resting on a timber block secured to the pile. (Photo 29)
- The cross bracing at Bent 15 is connected to the fender pile 15C, which has signs of significant cross-section loss. (Photo 30)

It is recommended that the cross braces at Bents 8 and 15 are re-secured. Ongoing monitoring of the cross bracing is recommended.

4.2. FLOATS

4.2.1. Access Gangway

The access gangway is in fair condition. The inspection findings are as follows:

- The upper hinge connection is slightly misaligned (Photos 31 and 32) which is likely to result in advanced wearing of the pinned connection.
- The timber gangway slider plate is in good condition with minor wearing and is well aligned with the gangway roller (Photo 33)
- The deck planks and anti-slip surface have moderate wearing (Photo 34).
- The steel truss members have typical minor to moderate coating failures and corrosion. No significant deterioration of the welded connections was noted (Photo 35).

McElhanney recommends that the access gangway be replaced in conjunction with future replacement of the floating docks.

4.2.2. Floats A and B

Float A is in poor to fair condition with minor deterioration to the topsides (Photo 36). Inspection findings are as follows:

- The timber deck planks have widespread moderate weathering and fungal decay, with localized deterioration. There is one location on Float B with plywood repair to the decking which is a tripping hazard (Photo 37)
- The floatation elements appear in fair condition.
- The west connection between Float A and Float B is rope (Photo 38). This is currently functioning properly, however this may be subject to rapid wearing and should be replaced with a steel chain in the future.
- The bull rails and fascia boards have widespread mechanical damage (Photo 39). The bull rail is missing in two locations.
- The east connection between Float A and Float B is chain which is causing moderate wearing to the floats (Photo 40).
- The mooring piles and mooring dolphins have moderate abrasion with the dock structures (Photo 41 to 33).

Consideration should be given to replacing Floats A and B along with the mooring system rather than continue regular minor maintenance/repairs.

4.2.3. Timber Mooring Dolphins

The timber mooring dolphins are in very poor condition. There is severe cross section loss due to internal fungal decay and marine borer cavity, as well as mechanical damage due to wearing of the floats. Inspection findings are as follows:

- The north dolphin has vegetation growth near the tops of some of the piles. The timber blocking near the tops of the piles is deteriorating, and the cable wraps are loose (Photo 44)

- The south dolphin has significant vegetation growth near the tops of the piles. There is also severe cross section loss due to internal fungal decay and marine borer cavity in the intertidal zone, specifically on the front facing piles. The timber blocking is in poor condition, and the cable wraps are loose, but remain in place (Photo 45).

McElhanney understands that the mooring dolphins are no longer in service. To mitigate the risk of timber members contacting the dock, it is recommended that the timber dolphins be entirely removed and disposed of.

5. Residual Life Estimates

The marine facility is typically in fair condition. For the purpose of this evaluation, the residual life represents the estimated period of time between the inspection date and the time when the component will typically require repair or replacement.

For timber docks in a saltwater/marine environment, the residual life estimate is based on the follow:

- Where no established deterioration (marine borer cavities / fungal decay / mechanical abrasion) is noted in creosote treated timber, the remaining residual life is estimated to be 10+ years. As deterioration can progress rapidly in timber members once established, residual life estimates greater than 10 years are typically not given.

- Where deterioration has been established, the remaining residual life is estimated to be 2-7 years, depending on the extent of deterioration and likelihood to progress rapidly.

- Where there is deterioration which has significantly affected the structural capacity of the member the residual life is assumed to be minimal.

Based on McElhanney's understanding of the environment, usage, and familiarity with similar structures, Table 2 provides the estimates of the remaining service life of the wharf elements:

Table 2 - Summary of Recommendations

Location / Structure	Residual Life Estimate
Pier Structure	
Approach	+10 years
Topsides	1-2 years
Decking	5-7 years
Stringers	8-10 years
Pile Caps	5-7 years
Piles	5-7 years
Fender Piles	1-2 years
Floats	
Gangway	2-4 years
Float A	2-4 years
Float B	2-4 years
Mooring Dolphins	1< years

6. Facility Recommendations and Cost Estimates

The Port Neville Wharf facility is generally in fair condition and is expected to continue servicing public access for small craft vessels. Based on the inspection findings, there are a number of small maintenance items recommended. Table 2 provides recommendations and cost estimates based on McElhanney's understanding that the SRD intends to invest significant maintenance effort in the facility before 2024.

The cost estimates for the repairs are shown in Table 3.

Table 3 – Cost Estimates

Item	Priority	Description	Units	Quantity	Unit Cost	Subtotal
1	High	Install a load rating sign and approach barriers	LS	1	$1,000	**$1,000**
2	High	Repair and replace the handrails and bull rails where needed.	m	120	$200	**$24,000**
3	High	Phased replacement of the timber decking	m^2	150	$250	**$37,500**
6	High	Miscellaneous pile repairs/replacements (allowance)	Ea.	8	$12,000	**$96,000**
7	Medium	Replacement of the existing gangway.	m	15	$2,000	**$30,000**
8	Medium	Full Replacement of Float A and Float B	m^2	191	$1,200	**$229,200**
9	Medium	New steel mooring piles for Float A and B	Ea.	6	$10,000	**$60,000**
10	Medium	Remove and dispose of timber mooring dolphins.	LS	2	$10,000	**$20,000**
					High Priority Subtotal	$158,500
					Contingency (25%)	$39,625.0
					High Priority Total	**$198,125**
					Medium Priority Subtotal	$339,200
					Contingency (25%)	$84,800.0
					Medium Priority Total	**$424,000**
					Total Capital Cost Estimate	**$622,125**

In reviewing the cost estimates above, please note the following:

- The current vessel moorage capacity is sufficient for future use. No expansion or increase in vessel moorage capacity is anticipated.
- Estimated is based on available cost estimate material and labour rate data from recent projects between 2019 to 2021 and assumes competitive contractor pricing.
- Estimate is considered accurate to ± 50%. A contingency of 25% has been provided to account for cost items which have not been considered due to the extent of engineering work completed to date.

7. Closure

Please do not hesitate to contact the undersigned with any questions or comments.

Sincerely,
McElhanney Ltd.
Permit to Practice No. 1003299

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Revision History

Date	Status	Revision	Author
October 6, 2021	Draft Issue	A	M.Friderichs
January 20, 2022	For Use	0	M.Friderichs

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APPENDIX A – INSPECTION PHOTOS

Photo 1 – Pier Approach Area

Photo 2 – Pier Structure Topsides

Photo 3 – Pier Structure Handrails

Photo 4 – Handrail deterioration between piles 4B and 5B

Photo 5 – Handrail deterioration between piles 7A and 8A

Photo 6 – Handrail deterioration between piles 8B and 9B

Photo 7 – Handrail deterioration between piles 9A and 10A

Photo 8 – Handrail deterioration between piles 11A and 12A

Photo 9 – Handrail deterioration between piles 12A and 13A

Photo 10 – Handrail deterioration between piles 14B and 14C

Photo 11 – Typical View of Timber Stringers

Photo 12 – General View of Timber Pile Cap Bents

Photo 13 – Typical Timber Pile Cap End Grain

Photo 14 – Timber Pile Cap at Bent 12

Photo 15 – Split in Pile 2A

Photo 16 – Split in Pile 3B

Photo 17 – Pile 4B concrete footing

Photo 18 – Split in Pile 5A

Photo 19 – Pile 7A

Photo 20 – Split in Pile 8A

Photo 21 – Hole in Pile 9A

Photo 22 – Small split in Pile 10A

Photo 23 – Hole in Pile 12A

Photo 24 – Moss growth in Pile 15B

Photo 25 – Underwater image of damage to fender Pile 10B

Photo 26 – Fender Pile 14A

Photo 27 – Underwater image of marine borer cavity of fender pile 14A

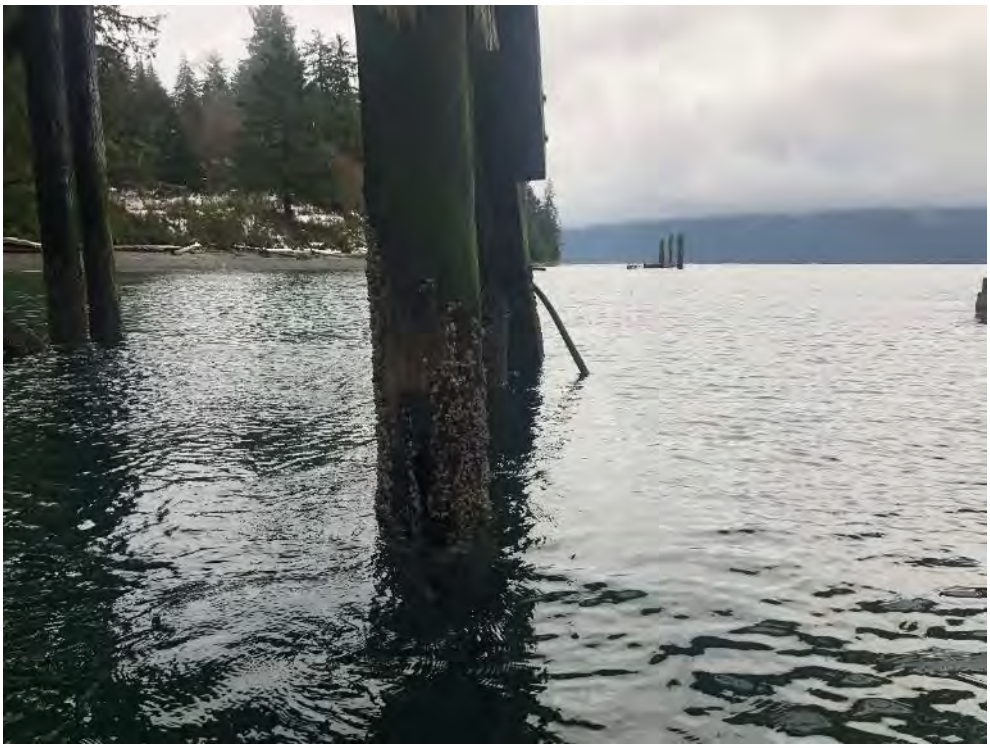

Photo 28 – Fender Pile 15C

Photo 29 – Cross Bracing at Bent 8

Photo 30 – Cross Bracing at Bent 15

Photo 31 – Gangway Upper Hinge Connection

Photo 32 – Gangway Upper Hinge Connection

Photo 33 – Gangway Timber Slider Plate and Roller

Photo 34 – Gangway Timber Deck Planks

Photo 35 – Steel Gangway

Photo 36 – General view of Float A

Photo 37 – General view of Float B

Photo 38 – Rope connection to Float B

Photo 39 – Missing Bull rail on Float A

Photo 40 – Chain Connection to Float B

Photo 41 – Wearing to Float A from North Mooring Dolphin

Photo 42 – Wearing to Float A from South Mooring Piles

Photo 43 – Float A North Mooring Piles

Photo 44 – North Mooring Dolphin

Photo 45 – South Mooring Dolphin

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McElhanney

BEST MANAGED COMPANIES CANADA

McElhanney

BEST MANAGED COMPANIES

Marine Facility Condition Assessment of the Owen Bay Wharf

August 24th, 2022 | Revision 0

Submitted to: Strathcona Regional District (SRD)
Prepared by McElhanney Ltd.

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Contents

1. Introduction

1.1. PROJECT BACKGROUND

McElhanney Ltd. (McElhanney) has been retained by the Strathcona Regional District (SRD) to complete a condition assessment of the public wharf at Owen Bay, located on Sonora Island, BC. Figure 1 shows the site location of the wharf.

The marine facilities are generally in moderate condition with assumed limited maintenance and inspection having been completed over the last 10 years. McElhanney's assessment will be used to determine the need for repairs and/or replacements.

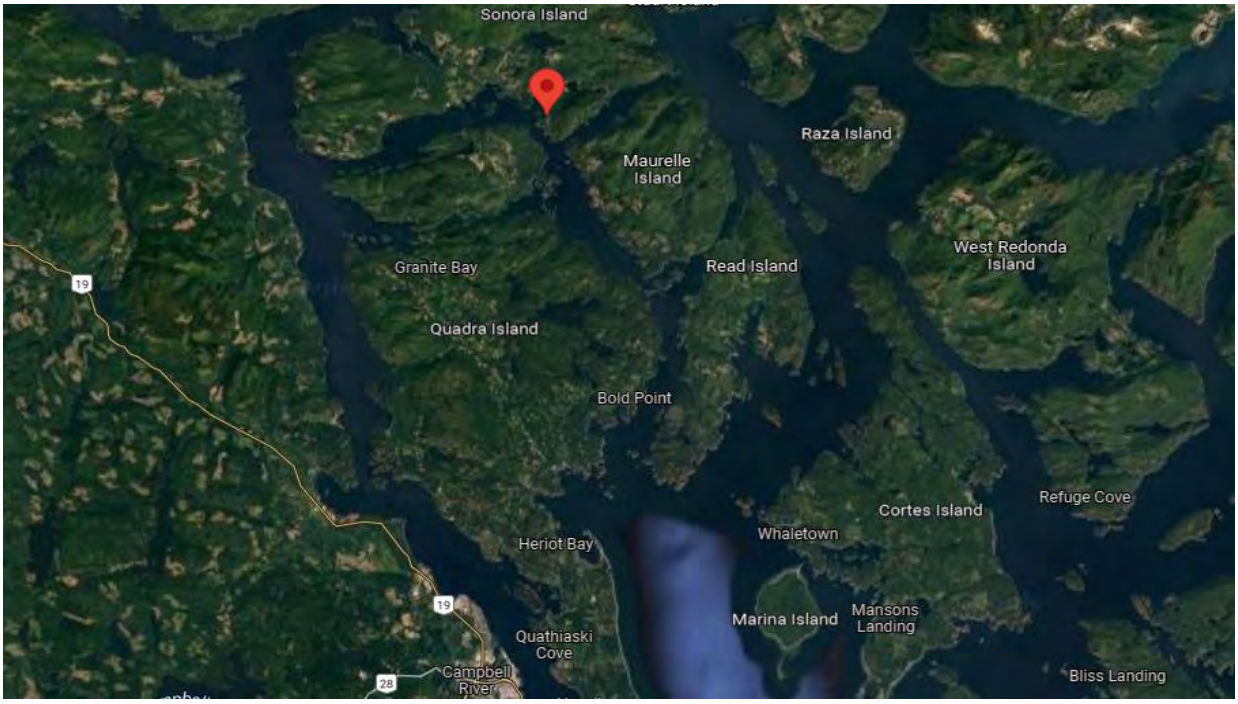

Figure 1 – Site Location

The above water site inspection was completed on September 22nd, 2021, and the underwater inspection was completed January 21st, 2022 by the following McElhanney personnel:

- Hannah Hladkowicz, EIT, Marine Structural Engineer
- Zach Tillapaugh, EIT, Structural Engineer

1.2. REFERENCE DRAWINGS

The following reference drawings and documents are available and have been reviewed by McElhanney:

- Drawings 1-3: Wharf Repairs, Owen Bay B.C., Transport Canada Harbours and Ports – Herold Engineering, March 2011
- Owen Bay Port Divestiture Program Final Report – McElhanney, January 2014
- Owen Bay Location Map

1.3. REFERENCE SYSTEM

The reference system used in the inspection is consistent with Figure 2 below.

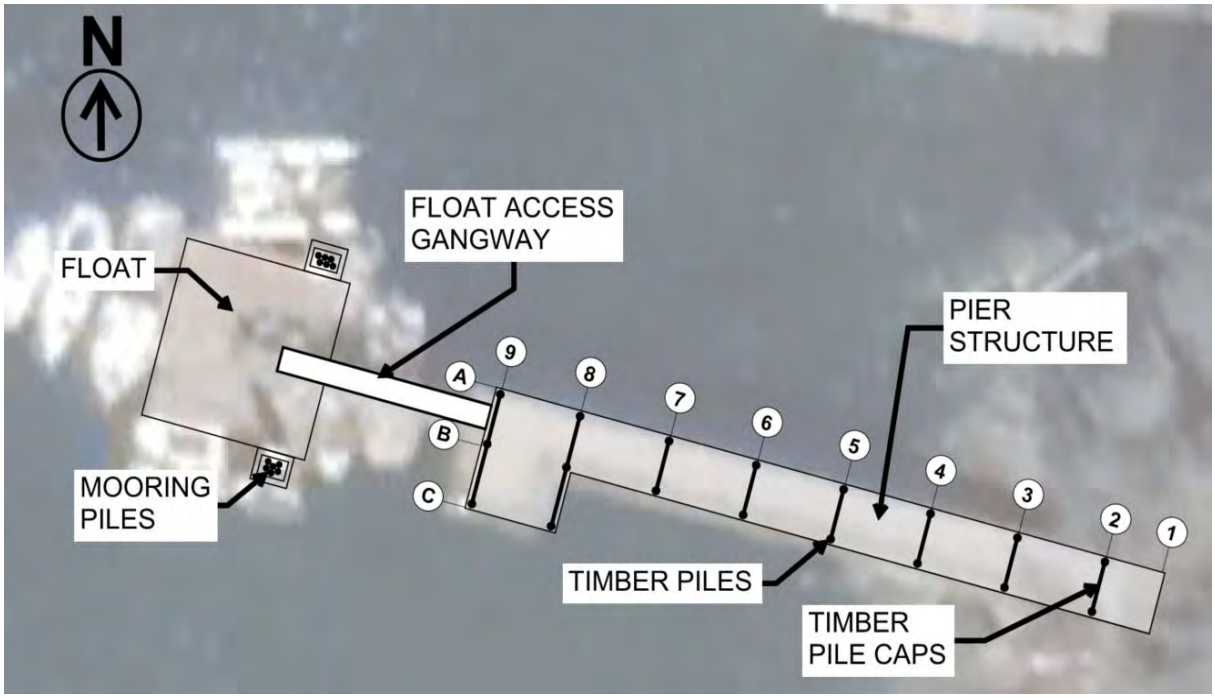

Figure 2 – Inspection Reference System

2. Description of Facilities

The wharf structure is a conventional treated timber wharf, approximately 105 feet long, and consists of the following:

- Conventional painted timber handrails including a top rail, mid-rail, and bull rail curb secured to handrail posts bolted to the edge stringer and bull rail
- Deck planks, typically 2” x 12”
- 6” x 12” stringers, typically at 30” centers
- 10” x 12” pile caps, typically at 15’ centers
- 12” nominally sized creosoted treated piles at 10’ centers along the bent. Bent Nos. 8 and 9 have (3) piles along the bent at the wharf head.
- 40 ft long aluminum truss gangway.
- 27’ x 29’ floating dock consisting of timber framing, topsides and decking, and buoyancy billets.
- (14) treated timber mooring piles, (6) at the south end and (8) at the north end, secured in mooring wells.

Figure 3 provides a reference sketch of the timber wharf structure. Inspection photographs can be found in Appendix A.

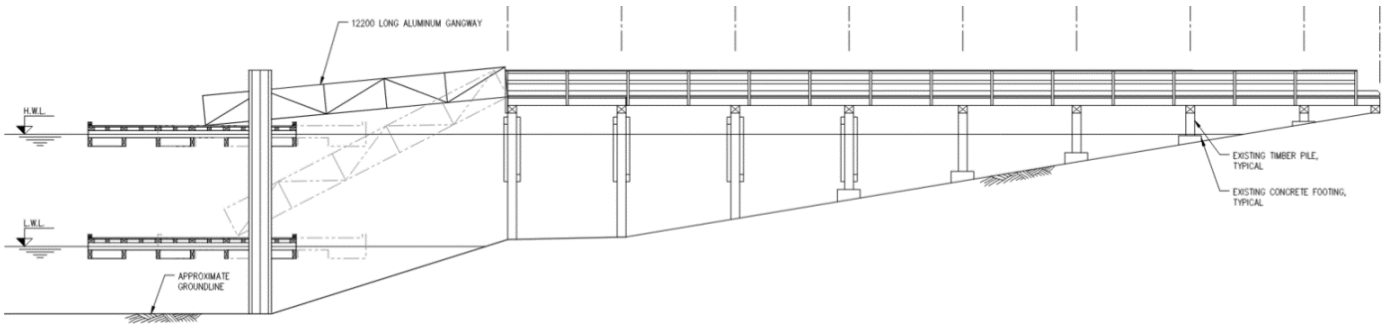

Figure 3 – Wharf Structure Elevation

3. Inspection Methodology and Limitations

An above water inspection of the marine assets was completed using visual inspections. The inspection methodology was completed in accordance with the procedures and recommendations provided in “Procedures for Inspection and Assessment of Fixed Timber Docks”, by RG Sexsmith Ltd. and dated September 1994, 4th Edition. This reference has been widely adopted by the Canadian Coast Guard, Department of Fisheries and Oceans Small Craft Harbours Branch, and Transport Canada in the evaluation and assessment of timber docks, piers, and wharves along the BC Coast.

The inspection methodology used is summarized as follows:

- Visual inspection of the timber elements from the lower intertidal zone to underside of deck was completed during a low tide window.
- An underwater inspection was completed to assess the condition of the piles and float using an underwater ROV mobilized from the floating dock.

The following inspection limitations should be considered when evaluating the results of the inspection findings:

- Both bankia and limnoria marine borers species are actively present on the BC Coast and can damage the timber pilings from the seabed to the intertidal zone. This should be identified during underwater inspections.
- The findings and recommendations are for the use of the SRD only.
- A detailed coring inspection of the timber members was not completed as part of the condition assessment.
- Users of the facility should always report any unusual conditions so that they can be evaluated by a Professional Engineer registered in British Columbia.
- Inspection is limited to what was observed on site, with the possibility that hidden defects and damage may not have been visible.

In accordance with the Ministry of Transportation and Infrastructure, Asset Performance Measures, for each structural element type, the overall condition state is provided based on a site inspection of each structure component.

- Excellent Condition – as-built condition, no observed defects.
- Good Condition – normal wear and deterioration
- Fair Condition – minor loss in condition or minor observed defects.
- Poor Condition – advanced loss in condition or significant defects.
- Very Poor Condition – serious loss in condition or serious defects.

4. Inspection Findings

4.1. WHARF STRUCTURE

4.1.1. Approach

The approach is in generally good condition (Photo 2). There are no signs of settlement in this area, and the slope around the abutment appears stable. No load rating sign has been posted.

Repairs are not considered necessary at this time; however ongoing monitoring of the approach is recommended. Consideration should also be given to posting a load rating sign and extending safety barriers to the approach area.

4.1.2. Topsides and Decking

The topsides are generally in fair to good condition with moderate widespread weathering and fungal decay (Photo 3 and Photo 4). Inspection findings are as follows:

- The timber handrails are well secured and in good condition. They were replaced approx. 10 years ago according to previous reference drawings provided by the SRD.

- The timber deck planks have widespread minor weathering and fungal decay, however, are in fair to good condition. The deck planks appear generally well secured, with some missing/loose nails.

Installation of an anti-slip grating to improve the safety during wet weather conditions is recommended. Consideration can be given to replacing and adding more nails to the decking. Ongoing monitoring of the condition of the topsides is recommended.

4.1.3. Stringers

The treated timber stringers are generally in good condition, with green algae growth (Photo 5). The stringers appear well secured between the decking and the pile caps, and there is no evidence of significant splitting or structural deterioration. The ends of the stringers, where the end grain is present, does not show significant evidence of moisture or fungal decay.

Repairs are not considered necessary at this time; however ongoing monitoring of the stringers is recommended.

4.1.4. Pile Caps

The treated timber pile caps are generally in fair to good condition with minor widespread weathering and green algae growth (Photo 6 and Photo 7). The pile caps appear well secured, and are typically aligned well over the piles, with no obvious evidence of shifting or displacement. Inspection findings are as follows:

- The pile cap at Bent No. 3 is in good condition and was replaced about 10 years ago according to the Wharf Repair drawings.

- The pile cap at Bent No. 4 has minor splitting at the end grain and top of the member on the south end (Photo 8).
- The pile cap at Bent No. 5 has severe splitting at the south end of the member (Photo 9).
- The pile cap at Bent No. 6 shows signs of deterioration at the end grain at the north end, as well as moderate to severe splitting at the south end (Photo 10 and Photo 11).
- The pile cap at Bent No. 8 has minor to moderate splitting at the north end (Photo 12).
- The through bolts from the bull rails directly above the pile caps at bents 8 and 9 connect to the pile caps (Photo 13).

Pile caps at Bent Nos. 8 and 9 should be monitored for potential fungal decay where the through-bolts are. Replacements of the pile caps at Bent Nos. 5 and 6 should be considered. Ongoing monitoring of the remaining pile caps is recommended.

4.1.5. Piles

The timber piles are generally in fair condition, with some minor damage to isolated piles, and widespread minor weathering and green algae growth (Photo 14 and Photo 15**Error! Reference source not found.**). Inspection findings are as follows:

- The existing capping over all piles (excluding piles 3A, 3B, 7A, 7B, 8B, 8C, 9A, 9B, and 9C) is deteriorated or missing, with some biological growth where this occurs (Photo 16).
- The piles are supported on concrete footings which are in fair to good condition. There are minor signs of scouring, and minor signs of undermining at bents 2 and 3.
- Pile No. 4B has a minor split down the length of the pile (Photo 17).
- Pile No. 5A has split at the top of the pile. It has been banded in 2 locations to prevent further spitting (Photo 18).
- Pile No. 6B has split at the top of the pile. It has been banded in 2 locations to prevent further spitting.

The missing and deteriorated capping should be replaced to prevent further damage to the tops of the piles. Pile 4B should be continually monitored and banded to prevent further splitting. Ongoing monitoring of the piles and footings and areas of damage is recommended. It is anticipated that the piles identified with splitting will have established internal fungal decay in the next 5-10 years and may be considered for replacement.

4.1.6. Cross Bracing

The timber cross bracing is generally in good condition (Photo 19 and Photo 20). There is widespread weathering, however the cross braces show no obvious sign of deterioration and are well secured to the piles.

Repairs are not considered necessary at this time; however ongoing monitoring of the cross bracing is recommended.

4.2. FLOATS

4.2.1. Access Gangway

The access gangway is in good condition with no significant corrosion or deterioration noted (Photo 21). According to the reference drawings it was replaced approximately 10 years ago. The inspection findings are as follows:

- The timber gangway slider plate is in fair condition with wearing and fungal decay and is well aligned with the gangway rollers (Photo 22).
- The structural members and welded connections appear to be in good condition.
- The upper hinge connections are well aligned, and the bolt connections are in good condition. The lower bolt on the south end connection has loosened slightly (Photo 23).

Repairs are not considered necessary at this time; however ongoing monitoring of the gangway is recommended.

4.2.2.Float

The float is in poor to fair condition (Photo 24). Inspection findings are as follows:

- The timber deck planks, bull rails and fascia boards have widespread weathering and fungal decay, (Photo 25 and Photo 26).
- The mooring wells are in good condition with repairs assumed to have been completed in the past 10 years. Wear strips have been installed on the inside of the wells.
- The timber mooring piles are in fair to good condition, with widespread minor fungal decay and weathering. There are no significant signs of abrasion from the floats to the pile faces. The connections at the top of the mooring piles are in good condition, and the wire rope lashing is secure (Photo 27 to Photo 31).
- One of the north mooring piles has some minor damage in the lower intertidal zone (Photo 32).
- The flotation elements are uncoated styrofoam billets (Photo 33).
- There is significant floatation loss at the southeast corner of the float; the freeboard is approx. 300mm less than at the northwest corner. The mooring well is cantilevered off this end of the float and is partially submerged in the water (Photo 34 and Photo 35).

The float capacity is a significant concern for the community. At the time of the inspection, the float was at full capacity, and multiple pleasure craft vessels had to be tied up to other vessels to access the float. In addition, other vessels must tie up at the mooring point to the southwest of the facility when spots have not been available. Consideration should be given to expanding the floating dock footprint for increased need. Consideration should be given to replacing the float along with the mooring system rather than continue regular minor maintenance/repairs.

5. Residual Life Estimates

The marine facility is typically in fair condition. For the purpose of this evaluation, the residual life represents the estimated period of time between the inspection date and the time when the component will typically require repair or replacement.

For timber docks in a saltwater/marine environment, the residual life estimate is based on the following:

- Where no established deterioration (marine borer cavities / fungal decay / mechanical abrasion) is noted in creosote treated timber, the remaining residual life is estimated to be 10+ years. As deterioration can progress rapidly in timber members once established, residual life estimates greater than 10 years are typically not given.

- Where deterioration has been established, the remaining residual life is estimated to be 2-7 years, depending on the extent of deterioration and likelihood to progress rapidly.

- Where there is deterioration which has significantly affected the structural capacity of the member the residual life is assumed to be minimal.

Based on McElhanney's understanding of the environment, usage, and familiarity with similar structures, Table 1 provides the estimates of the remaining service life of the wharf elements:

Table 1 – Summary of Recommendations

Location / Structure	Residual Life Estimate
Wharf Structure	
Approach	+10 years
Topsides	5-7 years
Decking	2-4 years
Stringers	8-10 years
Pile Caps	5-7 years
Piles	5-7 years
Floats	
Gangway	8-10 years
Float	2-4 years

6. Facility Recommendations and Cost Estimates

The Owen Bay Wharf facility is generally in fair condition and is expected to continue servicing public access for small craft vessels. Based on the inspection findings, there are several small maintenance items recommended in addition to replacement of the floating dock elements. Table 2 provides recommendations and cost estimates based on McElhanney's understanding that the SRD intends to invest significant maintenance effort in the facility as required.

The cost estimates for the repairs are show in Table 2.

Table 2 – Cost Estimates

Item	Priority	Description	Units	Quantity	Unit Cost	Subtotal
1	High	Install a load rating sign and approach barriers	LS	1	$3,000	**$3,000**
2	High	Miscellaneous pile cap repairs / replacements	Ea.	4	$5,000	**$20,000**
3	High	Replacement of deteriorated capping on piles	Ea.	9	$500	**$4,500**
4	High	New float with increased capacity (approx. quantity, to change with new design)	m^2	100	$1,200	**$120,000**
5	High	New steel mooring piles for the float	Ea.	6	$10,000	**$60,000**
6	Medium	Phased replacement of the timber decking	m^2	112	$250	**$28,000**
7	Medium	Miscellaneous pile repairs/replacements	Ea.	3	$12,000	**$36,000**
					High Priority Subtotal	$207,500
					Contingency (25%)	$51,875.00
					High Priority Total	**$259,375**
					Medium Priority Subtotal	$64,000
					Contingency (25%)	$16,000.00
					Medium Priority Total	**$80,000**
					Total Capital Cost Estimate	**$ 339,375**

In reviewing the cost estimates above, please note the following:

- Estimated is based on available cost estimate material and labour rate data from recent projects between 2019 to 2021 and assumes competitive contractor pricing.
- Estimate is considered accurate to ± 50%. A contingency of 25% has been provided to account for cost items which have not been considered due to the extent of engineering work completed to date.
- McElhanney recommends that a coring inspection be completed within 12 months of significant timber repairs to the stringers, pile caps, or piles to identify locations with internal fungal decay which are not identifiable from a visual inspection.

7. Closure

Please do not hesitate to contact the undersigned with any questions or comments.

Sincerely,
McElhanney Ltd.

Prepared by:

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Revision History

Date	Status	Revision	Author
Nov. 29, 2021	Draft Issue	A	HH
Mar. 04, 2022	Draft Issue	B	HH
Aug. 24, 2022	For Use	0	HH

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APPENDIX A – INSPECTION PHOTOS

Photo 1 - General View facing West

Photo 2 - Approach area

Photo 3 - Topsides of the Wharf Structure

Photo 4 - General View of the Handrails

Photo 5 - General view of the Stringers

Photo 6 - General view of the Pile Cap Bents

Photo 7 - Weathering and green algae growth on Pile Caps

Photo 8 - Minor splitting of the Pile cap at Bent 4

Photo 9 - Severe splitting of the Pile cap at Bent 5

Photo 10 - Deterioration of the Pile Cap at Bent 6

Photo 11 - Moderate to Severe splitting of the Pile cap at Bent 6

Photo 12 - Minor to moderate splitting of the Pile cap at Bent 8

Photo 13 - Through bolts in the Pile Cap at Bent 9

Photo 14 - Typical weathering and green algae growth on piles

Photo 15 - Typical condition of undderwater piles

Photo 16 - Typical deteriorated capping on piles

Photo 17 - Minor splitting on Pile 4B

Photo 18 - Pile 5A with typical existing banded repair

Photo 19 - General view of Cross Bracing

Photo 20 - Tyical condition of underwater cross-bracing

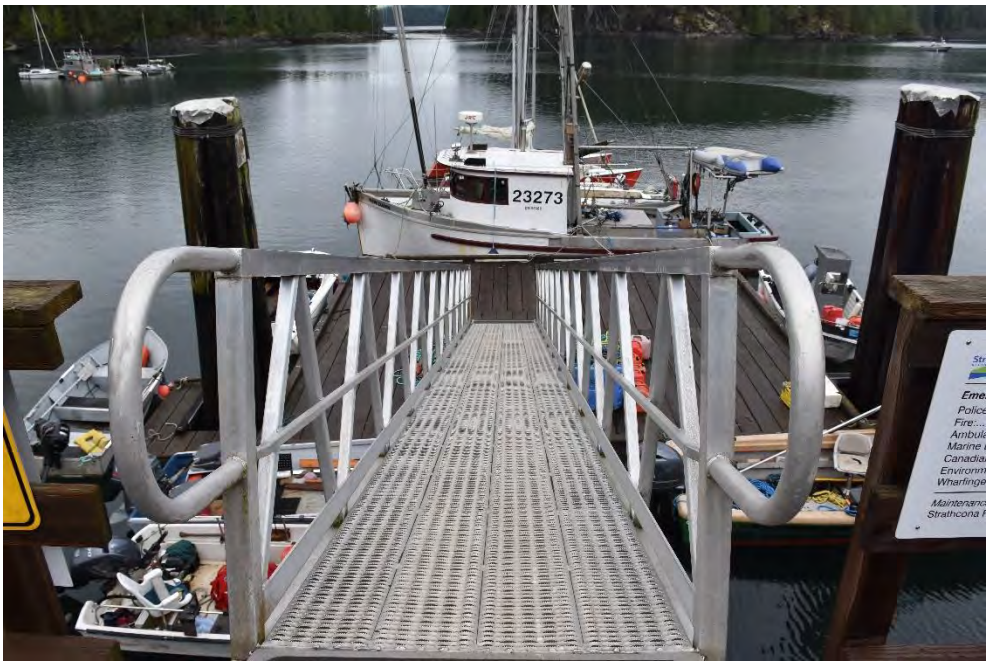

Photo 21 - General View of Aluminum Gangway

Photo 22 - Gangway slider plate and rollers

Photo 23 - Gangway Upper Hinge Connection with loose bolt

Photo 24 - General View of the float

Photo 25 - Typical condition of the timber decking

Photo 26 - Typical condition of the timber bull rails and fascia board

Photo 27 - South Mooring Piles

Photo 28 - North Mooring Piles

Photo 29 - South Mooring Piles

Photo 30 - South Mooring Piles

Photo 31 - North Mooring Piles

Photo 32 - North Mooring Piles

Photo 33 - Condition of exposed uncoated styrofoam billets

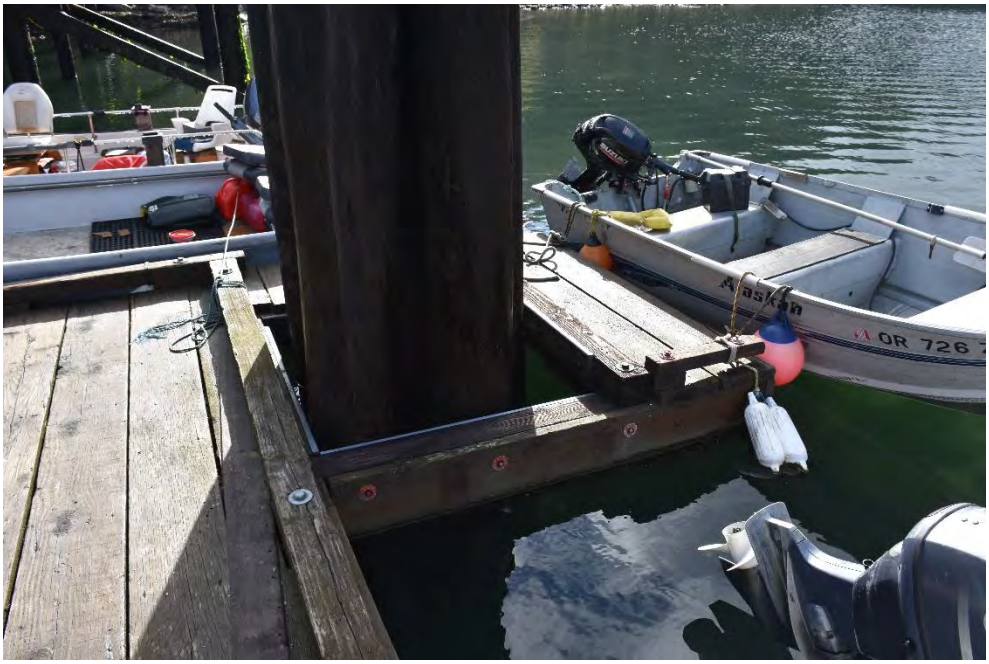

Photo 34 - South Mooring Well with significant flotation loss

Photo 35 - Typical condition under the south end of the float

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Schedule 'D'

CLIENT

STRATHCONA REGIONAL DISTRICT

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PROJECT NAME

2023 MARINE FACILITY REPAIRS

DESCRIPTION

REHABILITATION AND REPAIRS TO THE TIMBER TRESTLES AND FLOATS AT OWEN BAY, PORT NEVILLE AND SURGE NARROWS

McELHANNEY PROJECT

2211-71343-00

STATUS

ISSUED FOR 100% REVIEW

OWEN BAY

PORT NEVILLE

SURGE NARROWS

McElhanney

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DRAWING LIST

SHEET #	SHEET TITLE	REVISIONS						
		PA	PB	PC	0	1	2	3
S000	COVER SHEET							
S001	GENERAL NOTES & DESIGN CRITERIA							
S100	PORT NEVILLE GENERAL ARRANGEMENT AND PIER PLAN							
S101	PORT NEVILLE NEW FLOAT DESIGN							
S200	OWEN BAY GENERAL ARRANGEMENT AND PIER PLAN							
S201	OWEN BAY NEW FLOAT DESIGN							
S300	SURGE NARROWS GENERAL ARRANGEMENT AND PIER PLAN							
S301	SURGE NARROWS NEW FLOAT DESIGN							
S400	TYPICAL PIER SECTION AND REPAIR DETAILS							
S500	STRUCTURAL GANGWAY DETAILS							

ORIGINAL DWG SIZE: ANSI D (22" x 34") McElhanney - 2019-11-10

GENERAL NOTES

1.0 GENERAL

1.1 VERIFY ALL DIMENSIONS PRIOR TO COMMENCING WORK.

1.2 ALL DIMENSIONS ARE METRIC UNLESS NOTED OTHERWISE.

1.3 ALL WORK SHALL CONFORM TO THE BC BUILDING CODE AND INDUSTRIAL HEALTH AND SAFETY REGULATIONS OF THE WORKERS COMPENSATION BOARD OF BRITISH COLUMBIA.

1.4 CLIMATIC DESIGN DATA (FROM BC BUILDING CODE)

LOCATION	SNOW LOAD (kPa)		WIND PRESSURES (kPa)	
	Ss	Sr	1/10	1/50
CAMPBELL RIVER	2.8	0.4	0.40	0.52
POWELL RIVER	1.7	0.4	0.39	0.51

1.5 THE INTENT OF THE TIMBER TRESTLE REPAIR WORK IS TO REINSTATEMENT THE CAPACITY OF THE ORIGINAL DESIGN MEMBERS. NO INCREASE IN STRUCTURAL CAPACITY HAS BEEN CONSIDERED.

1.6 WHERE CODES AND STANDARDS ARE REFERENCED, THE LATEST EDITION APPLIES.

1.7 SUBMIT DETAILS OF PROPOSED SCHEDULE AND WORK METHODS TO THE CONSULTANT PRIOR TO PROCEEDING WITH THE WORK.

1.8 DETAILED REQUIREMENTS FOR MATERIALS AND FABRICATION ARE DESCRIBED IN THE SPECIFICATIONS. FOR CONVENIENCE, CERTAIN EXTRACTS ARE REPRODUCED BELOW. IN THE EVENT OF CONFLICT, THE SPECIFICATIONS SHALL GOVERN.

1.9 MATERIALS AND TESTING HAVE BEEN SPECIFIED TO CONFORM TO THE CURRENT EDITIONS OF RELEVANT STANDARDS PUBLISHED BY THE FOLLOWING ORGANIZATIONS:

-CANADIAN STANDARDS ASSOCIATION (CSA)

-AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1.10 UPON COMPLETION OF THE WORK REMOVE ALL DEBRIS AND SURPLUS MATERIALS FROM SITE. LEAVE THE WORK AREA IN A CLEAN AND NEAT CONDITION TO THE SATISFACTION OF THE ENGINEER.

1.11 CONTRACTOR TO NOTIFY ENGINEER AND ESTABLISH INSPECTION SCHEDULE PRIOR TO INSTALLATION OF PILES.

1.12 NO GEOTECHNICAL ASSESSMENT HAS BEEN COMPLETED FOR THE SITES SHOWN. CONTRACTOR TO INSTALL ALL PILES USING A SUITABLE SIZED VIBRATORY HAMMER AND CONFIRMING PILE REFUSAL USING A DROP HAMMER WITH A MINIMUM 25,000 FOOT POUNDS OF ENERGY WITH A MAXIMUM OF (5) BLOWS PER INCH OF PILE PENETRATION. MINIMUM PILE EMBEDMENT TO BE 12m UNLESS APPROVED BY THE ENGINEER.

1.13 SRD HAS NO OWNERSHIP OR LEASE OF LANDS AROUND THE WHARVES OR PIERS AT OWEN BAY AND SURGE NARROWS. SRD HAS A SMALL RIGHT OF WAY AROUND THE ABUTMENT AT PORT NEVILLE. IF THE CONTRACTOR INTENDS TO USE THE LAND FOR A LAY DOWN AREA OR OTHERWISE DURING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING PERMISSION FROM THE LAND OWNER'S.

1.14 CONTRACTOR MUST ADHERE TO THE ENVIRONMENTAL MANAGEMENT PLAN.

2.0 DEMOLITION

2.1 TAKE ALL NECESSARY PRECAUTIONS TO CONTAIN THE DEMOLITION WITHIN THE LIMITS DESIGNATED. THE CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGE TO EXISTING STRUCTURES.

2.2 ANY DAMAGE INCURRED IN THE EXECUTION OF THIS CONTRACT TO ANY PART OF THE PROPERTY OR STRUCTURE NOT SPECIFICALLY DESIGNATED FOR DEMOLITION SHALL BE REPAIRED, REPLACED, AND/OR RECONSTRUCTED BY THE CONTRACTOR AT THEIR EXPENSE TO ITS ORIGINAL CONDITION.

2.3 REMOVE AND DISPOSE OF ALL DEMOLITION MATERIAL OFF SITE IN ACCORDANCE WITH ALL MUNICIPAL, PROVINCIAL, AND FEDERAL REQUIREMENTS.

3.0 STEEL WORK

3.1 ROLLED STEEL SECTIONS, STEEL BARS AND PLATES TO CAN/CSA G40.21, GRADE 300W UNLESS NOTED OTHERWISE.

3.2 STEEL PILES SHALL BE ASTM A252 GRADE 2 PIPES. PILES ARE NOT TO BE SPLICED WITHOUT PRIOR APPROVAL BY THE ENGINEER.

3.3 SHOP PAINT ALL STEEL COMPONENTS USING COATING SYSTEM APPROVED BY THE ENGINEER.

3.4 BOLTS, NUTS, AND WASHERS SHALL CONFORM TO ASTM F3125 GRADE A307.

3.5 ALL MISCELLANEOUS METAL AND FASTENERS SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH CSA STANDARD G164 UNLESS NOTED OTHERWISE.

3.6 WELDING SHALL BE IN ACCORDANCE WITH CSA W59 AND W47.1.

3.7 ALL RE-USED HARDWARE SHALL BE INSPECTED AND APPROVED BY THE CONSULTANT.

4.0 TIMBER

4.1 ALL TIMBER WORK SHALL CONFORM TO CSA STANDARD 086.

4.2 ALL SAWN TIMBER SHALL BE COAST DOUGLAS FIR, NO.1 STRUCTURAL GRADE OR BETTER, AND UNLESS SPECIFIED OTHERWISE, SHALL BE PROPERLY AIR-DRIED AND SEASONED, CONTAINING NOT MORE THAN 20% MOISTURE.

4.3 DECKING AND GUARDRAIL TIMBERS SHALL BE GIVEN AN ACZA SALT PRESERVATIVE TREATMENT TO A NET RETENTION OF 6.4 kg PER CUBIC METER IN ACCORDANCE WITH CSA 080.

4.4 TIMBER SIZE AND DRESSINGS SHALL BE IDENTICAL TO EXISTING, UNLESS NOTED OTHERWISE. VERIFY PRIOR TO PROCURING.

4.5 THE EXACT LENGTH OF EACH TIMBER TO BE REPLACED SHALL BE MEASURED BY THE CONTRACTOR AND SUBMITTED TO THE CONSULTANT FOR APPROVAL PRIOR TO PROCURING.

4.6 LENGTH OF CORBELS SHOWN ON THE DRAWINGS ARE NOMINAL. CONTRACTOR SHALL VERIFY THAT THE LENGTH SHOWN CAN BE INSTALLED OR ADJUST THE LENGTH REQUIRED TO SUIT ADJACENT PILES. SUBMIT FINAL LENGTHS TO THE CONSULTANT FOR REVIEW PRIOR TO PROCURING.

4.7 FIELD CUTS TO NEW TIMBERS WILL NOT BE PERMITTED UNLESS APPROVED BY THE ENGINEER.

4.8. AFTER CUT-OFF, THE TOPS OF ALL TIMBER PILES SHALL BE TREATED WITH 2 COATS OF COPPER II NAPTHENATE AT 6mm THICK. IN ADDITION, THE TOPS OF ALL PILES SHALL BE COVERED WITH A SHEET OF 22 GAUGE ANNEALED CORROSION RESISTANT ALUMINUM CUT 6" LARGER THAN THE DIAMETER OF THE PILE TOP. THE OVERHANGING EDGES SHALL BE CRIMPED AND TURNED DOWN AND SECURED TO THE PILE WITH 8 ALUMINUM ROOFING NAILS. THE SHEET SHALL NOT BE CUT TO FACILITATE FITTING.

5.0 GANGWAY

5.1 TYPICAL DFO-STYLE STEEL GANGWAY SHOWN IN DWG S500 FOR REFERENCE ONLY. CONTRACTOR IS RESPONSIBLE FOR DETAILED DESIGN (LIVE LOAD 2.4 kPa PER DFO SCH GUIDELINES), SUPPLY AND CONSTRUCTION. SUBMIT SEALED SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO PROCUREMENT OF MATERIALS FOR FABRICATION.

5.2 CONTRACTOR IS TO PROVIDE WEARING PROVISIONS AND ATTACHMENTS TO PIER DESIGN FOR ENGINEERS APPROVAL PRIOR TO PROCUREMENT OF MATERIALS FOR FABRICATION.

GENERAL NOTES (CONT.)

6.0 FLOAT DESIGN REQUIREMENTS

6.1 THE FLOAT SHALL BE DESIGNED TO MEET THE REQUIREMENTS OF CANADIAN CODES FOR THE APPLICABLE MATERIAL, AS WELL AS THE REQUIREMENTS SHOWN ON THE DRAWINGS AND OTHER CONTRACT DOCUMENTS. THESE CODES MAY INCLUDE:

a. CSA A23.3 DESIGN OF CONCRETE STRUCTURES

b. CSA O86 ENGINEERING DESIGN IN WOOD

c. CSA S16 DESIGN OF STEEL STRUCTURES

d. CSA S157 STRENGTH DESIGN IN ALUMINUM

6.2 THE BRITISH STANDARD (BS 6349) MAY BE USED AS A MARINE CODE, AS APPLICABLE WHERE THE CANADIAN CODES DO NOT PROVIDE MARINE GUIDANCE. ALTERNATIVELY, REFERENCE CAN BE MADE TO OTHER INTERNATIONAL CODES, STANDARDS OR GUIDELINES, SUBJECT TO THE ENGINEERS APPROVAL.

6.3 THE DRAWINGS INDICATE THE GENERAL INTENT OF THE FLOAT. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE DETAILED DESIGN, CONSTRUCTION, INSTALLATION AND QUALITY CONTROL.

6.4 THE SURFACE OF THE FLOATS SHALL BE NON-SLIP FRP MINI MESH GRATING OR EQUIVALENT, APPROVED IN WRITING BY THE ENGINEER.

6.5 THE MINIMUM SERVICE LIFE OF THESE FLOATS SHALL BE 25 YEARS.

6.6 THE CONTRACTOR SHALL SUBMIT DRAWINGS AND CALCULATIONS SEALED BY A PROFESSIONAL ENGINEER LICENSED IN BRITISH COLUMBIA. THESE DRAWINGS SHALL IDENTIFY DESIGN REQUIREMENTS, DESIGN CODES USED, LAYOUT, MEMBER SIZES, CONNECTIONS, DIMENSIONS, MATERIALS AND FINISHES.

7.0 FLOAT PERFORMANCE CRITERIA

7.1 THE FLOAT SHALL SIT LEVEL WITH A MAXIMUM CROSS SLOPE OF 2%, AND A MINIMUM ACCEPTABLE FREEBOARD OF 400mm.

7.2 A POSITIVE METACENTRIC HEIGHT IS REQUIRED FOR ALL EXPECTED LOADING CONDITIONS AND ANGLES OF TILT.

7.3 FLOATS SHALL BE DESIGNED TO CARRY A UNIFORMLY DISTRIBUTED LOAD OF 3.0 kPa OVER THE WHOLE OR ANY PART OF THE DECK. STABILITY SHALL BE CHECKED AND VERIFIED FOR THIS LOADING CONDITION INCLUDING THE SUBMERGED ELEMENTS, MAXIMUM ANGLE OF HEEL SHALL NOT EXCEED 6 DEGREES.

7.4 FLOATS SHALL BE DESIGNED TO CARRY, AT ANY LOCATION ON THE FLOAT DECK, A CONCENTRATED LOAD OF 1.8 kN PLACED AT ANY LOCATION, NO CLOSER THAN 300mm TO ANY EDGE. STABILITY SHALL BE CHECKED AND VERIFIED FOR THIS LOADING CONDITION INCLUDING THE SUBMERGED ELEMENT, MAXIMUM ANGLE OF HEEL SHALL NOT EXCEED 6 DEGREES.

8.0 FLOAT APPURTENANCES AND HARDWARE

8.1 FENDERS OR RUB STRIPS SHALL BE PROVIDED AROUND THE PERIMETER OF THE FLOAT. THESE CONTINUOUS ITEMS SHALL HAVE HIGH RESISTANCE TO ENVIRONMENTAL ELEMENTS, SUCH AS UV LIGHT, AND MARINE GROWTH.

8.2 FIXED SAFETY LADDERS SUFFICIENT FOR EGRESS FROM THE WATER SHALL BE PROVIDED, SPACED AT INTERVALS LESS THAN 30M. THE LADDERS SHALL EXTEND A MINIMUM OF 1M BELOW THE WATER SURFACE. CORROSION SHALL BE CONSIDERED IN THE MATERIAL SELECTED AND FABRICATION DETAILS OF THE LADDER.

8.3 FLOATS SHALL PROVIDE MOORING WELL IN THE LOCATIONS PROVIDED FOR THE MOORING SYSTEM.

Rev	Date	Description	App'd
PC	2022-12-02	ISSUED FOR 100% REVIEW	GH
PB	2022-11-11	ISSUED FOR 90% REVIEW	GH
PA	2022-08-25	ISSUED FOR CONCEPT	MF

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JTH	MF	HH	MF	GH

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STRATHCONA REGIONAL DISTRICT

GENERAL NOTES & DESIGN CRITERIA

Drawing No.

S001

Project No.	Rev.
2211-71343	PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

SAVED BY: JTHayden DATE: 2022-12-02, 15:31 FILE: K:\2211\2-PROJECTS\71300-71399\71343.SRD Wharf Inspections\10.0 Drawings\10.1 Engineering\10.1.1 Sheets\71343-S00-S000 - Cover Sheet and General Notes.dwg

ORIGINAL DWG SIZE: ANSI D (22" x 34") McElhanney - 2019-11-10
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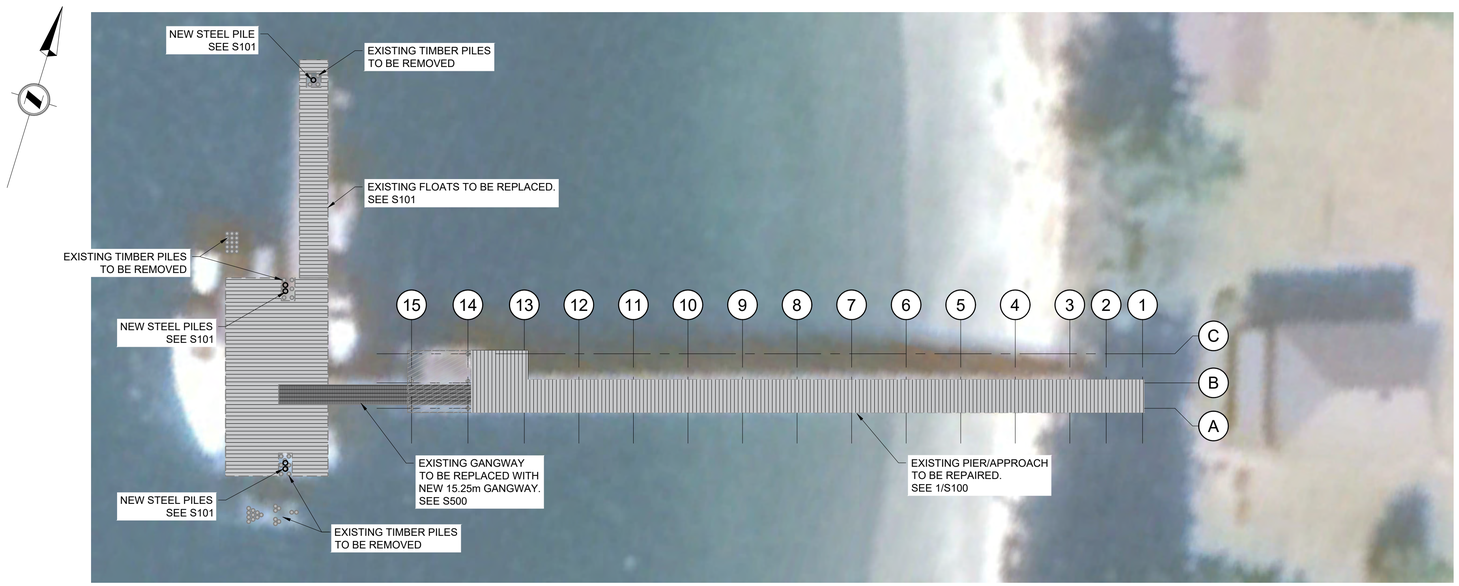
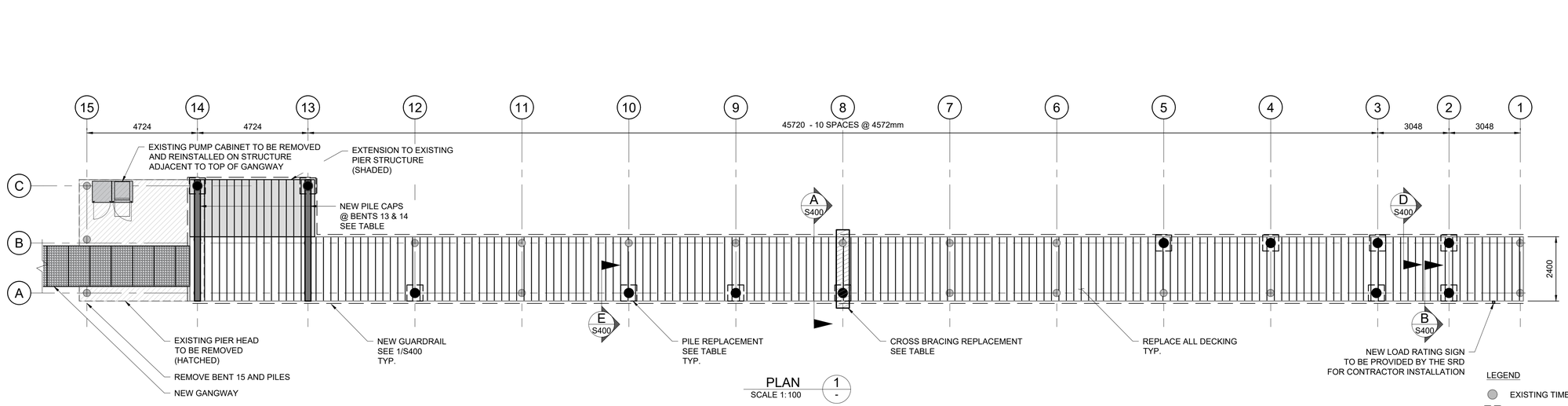
SAVED BY: JThrasher DATE: 2022-12-02, 15:31



PLAN
SCALE 1:250

KEY PLAN
NTS



PLAN 1
SCALE 1:100 -

PILE REPAIRS	
PILE NO.	REPAIRS
2A	REPLACE PILE
2B	FRESH HEAD AND INSTALL NEW SINGLE CORBEL
3A	FRESH HEAD AND INSTALL NEW SINGLE CORBEL
3B	REPLACE PILE
4B	FRESH HEAD AND INSTALL NEW SINGLE CORBEL
5B	REPLACE PILE
8A	INSTALL GALVANIZED STEEL PILE CLAMPS
9A	REPLACE PILE
10A	INSTALL GALVANIZED STEEL PILE CLAMPS
12A	REPLACE PILE
13-15	MODIFICATIONS TO TRESTLE. SEE PLAN

NOTE:
1. CONTRACTOR TO PROVIDE 3 ADDITIONAL PILES ON SITE IF NEEDED
2. CONDITIONS OF PILES AT BENT 13 AND 14 TO BE INSPECTED PRIOR TO INSTALLATION OF NEW PILE CAPS, AND REPLACED IF REQUIRED.

LEGEND
- EXISTING TIMBER PILE
- NEW TIMBER PILE
- NEW TIMBER PILE CAP
- REPLACE TIMBER CROSS BRACING
- NEW GUARDRAIL

PILE CAP REPAIRS	
BENT NO.	REPAIRS
13	REPLACE PILE CAP
14	REPLACE PILE CAP

CROSS BRACE REPAIRS	
BENT NO.	REPAIRS
8	REPLACE CROSS BRACE

NOTES:
1. FOR GENERAL NOTES SEE S100.
2. SEE SHEET S400 FOR ALL TIMBER REPAIR DETAILS FOR PILES, PILE CAPS, AND CROSS BRACING.

Rev	Date	Description	App'd
PC	2022-12-02	ISSUED FOR 100% REVIEW	GH
PB	2022-11-11	ISSUED FOR 90% REVIEW	GH
PA	2022-08-25	ISSUED FOR CONCEPT	MF

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JTH	MF	HH	MF	GH

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STRATHCONA REGIONAL DISTRICT

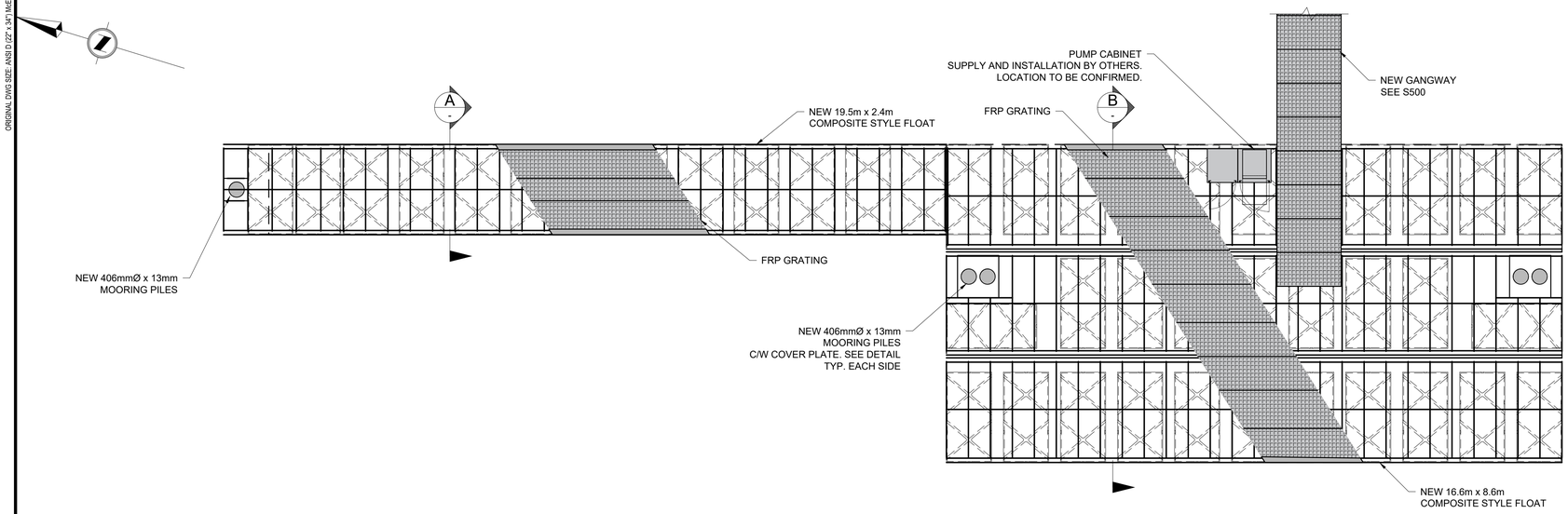
PORT NEVILLE
GENERAL ARRANGEMENT
AND PIER PLAN

Drawing No.
S100

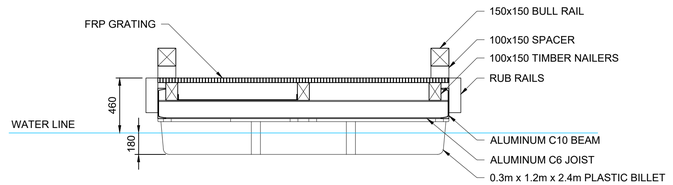
Project No. 2211-71343
Rev. PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

ORIGINAL DWG SIZE: ANSI D (22" x 34") McElhanney - 2019-11-10



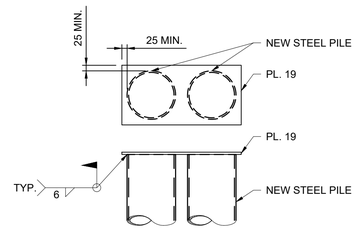
PLAN
SCALE 1:75



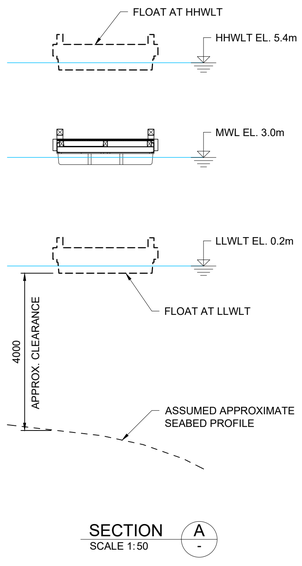
TYP. FLOAT SECTION
SCALE 1:25

NOTE:

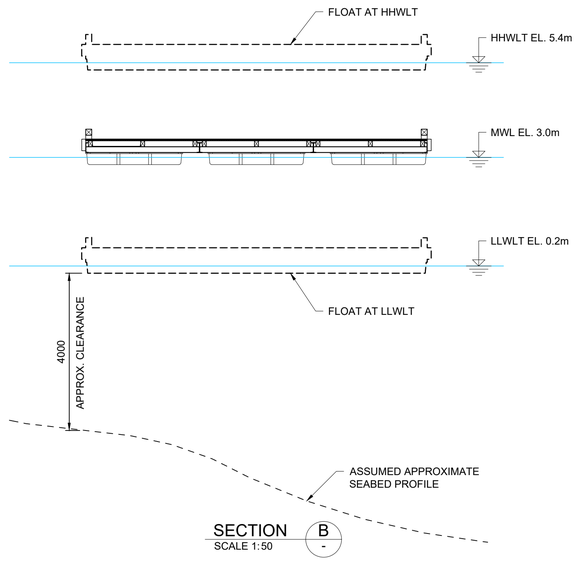
COMPOSITE FLOAT ARRANGEMENT SHOWN IS INDICATIVE ONLY. CONTRACTOR IS RESPONSIBLE FOR THE FINAL DESIGN OF THE FLOATING DOCKS AND WILL PROVIDE SEALED SHOP DRAWINGS TO THE ENGINEER FOR REVIEW PRIOR TO MATERIAL PROCUREMENT AND FABRICATION



COVER PLATE DETAIL
SCALE 1:25



SECTION A
SCALE 1:50



SECTION B
SCALE 1:50

NOTES:

1. FOR GENERAL NOTES SEE S100

Rev	Date	Description	App'd
PC	2022-12-02	ISSUED FOR 100% REVIEW	GH
PB	2022-11-11	ISSUED FOR 90% REVIEW	GH
PA	2022-08-25	ISSUED FOR CONCEPT	MF

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CLIENT:

Strathcona REGIONAL DISTRICT

990 CEDAR ST, CAMPBELL RIVER, BC, V9W 7Z8

McElhanney

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T 250 338 5495

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STRATHCONA REGIONAL DISTRICT

PORT NEVILLE
NEW FLOAT DESIGN

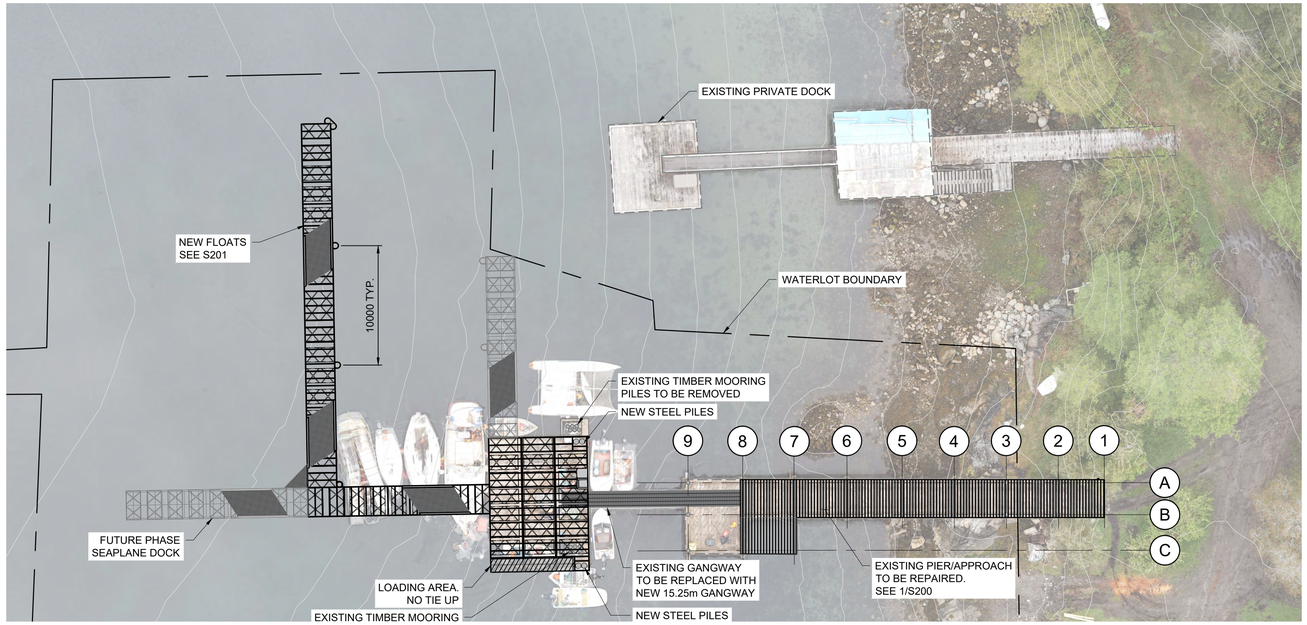
Drawing No.
S101

Project No.	Rev.
2211-71343	PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

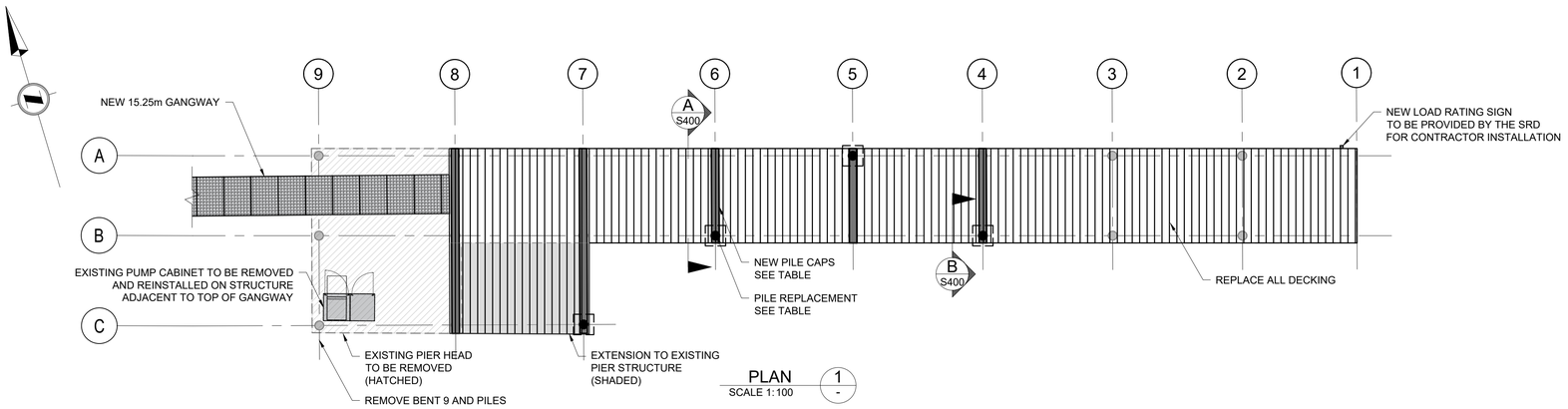
SAVED BY: JTHayden DATE: 2022-12-02, 15:32 FILE X:\2211\2-PROJECTS\71300-71399\71343.SBD Wharf Inspections\10.0 Drawings\10.1 Engineering\10.1.1 Sheets\71343-S0L-S101 - Port Neville New Float New Float Design.dwg

ORIGINAL DWG SIZE: ANSI D (22" x 34") McElhanney - 2019-11-10



PLAN
SCALE 1:250

KEY PLAN
NTS



PLAN
SCALE 1:100
1
-

LEGEND

- EXISTING TIMBER PILE
- NEW TIMBER PILE
- NEW TIMBER PILE CAP

PILE CAP REPAIRS	
BENT NO.	REPAIRS
4	REPLACE PILE CAP
5	REPLACE PILE CAP
6	REPLACE PILE CAP
7	REPLACE PILE CAP
8	REPLACE PILE CAP

PILE REPAIRS	
PILE NO.	REPAIRS
4B	REPLACE PILE
5A	REPLACE PILE
6B	REPLACE PILE
7C	NEW PILE

NOTES:

1. FOR GENERAL NOTES SEE S100
2. SEE SHEET S400 FOR ALL TIMBER REPAIR DETAILS FOR PILES, PILE CAPS, AND CROSS-BRACING

Rev	Date	Description	App'd
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STRATHCONA REGIONAL DISTRICT

OWEN BAY
GENERAL ARRANGEMENT
AND PIER PLAN

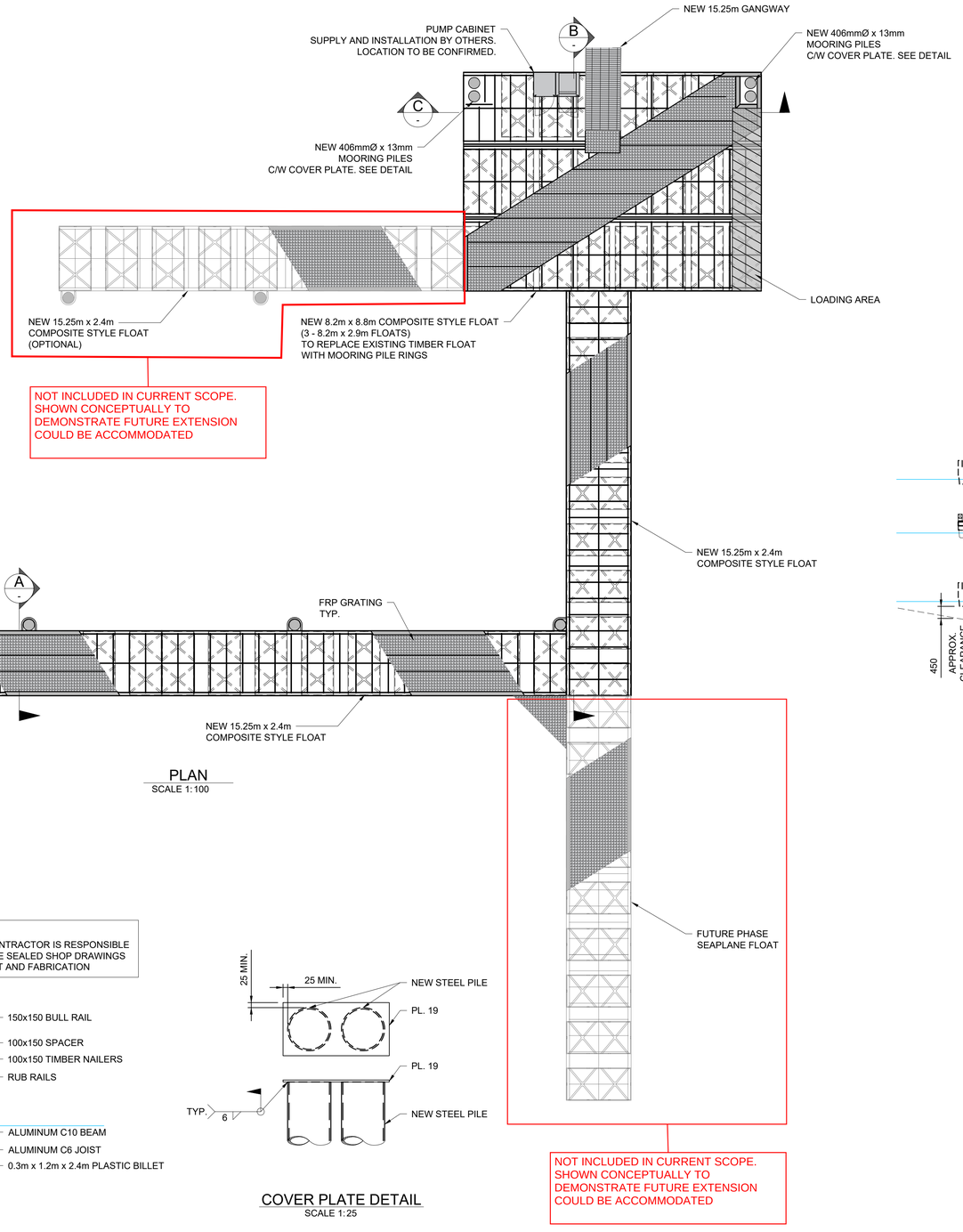
Drawing No.
S200

Project No. 2211-71343
Rev. PC

SAVED BY: JThryden DATE: 2022-12-02, 15:32 FILE: K:\2211\2-PROJECTS\71300-71399\71343 SRD Wharf Inspections\10.0 Drawings\10.1 Engineering\10.1.1 Sheets\71343-SS-S200 - Owen Bay General Arrangement.dwg

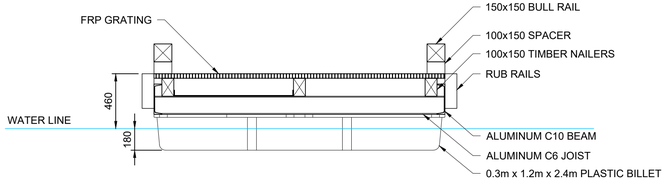
DESTROY ALL PRINTS BEARING PREVIOUS REVISION

ORIGINAL DWG SIZE: ANSI D (22" x 34") McElhanney - 2019-11-10



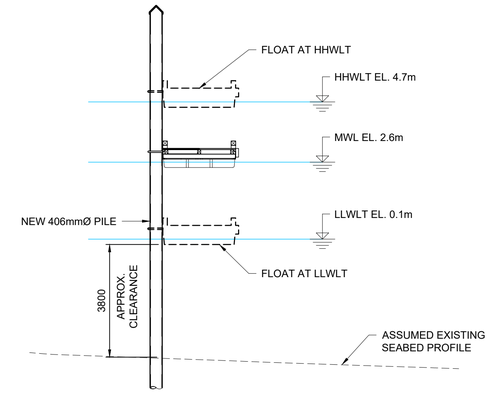
PLAN
SCALE 1:100

NOTE:
COMPOSITE FLOAT ARRANGEMENT SHOWN IS INDICATIVE ONLY. CONTRACTOR IS RESPONSIBLE FOR THE FINAL DESIGN OF THE FLOATING DOCKS AND WILL PROVIDE SEALED SHOP DRAWINGS TO THE ENGINEER FOR REVIEW PRIOR TO MATERIAL PROCUREMENT AND FABRICATION

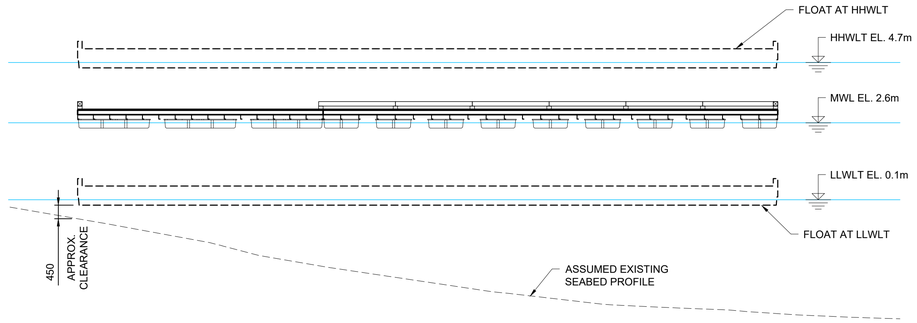


TYP. FLOAT SECTION
SCALE 1:25

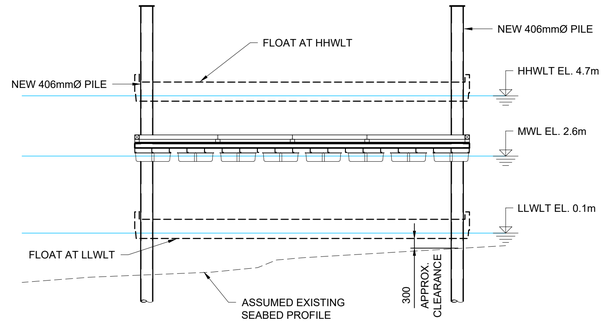
COVER PLATE DETAIL
SCALE 1:25



SECTION A
SCALE 1:100



SECTION B
SCALE 1:100



SECTION C
SCALE 1:100

NOTES:
1. FOR GENERAL NOTES SEE S100

Rev	Date	Description	App'd
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PB	2022-11-11	ISSUED FOR 90% REVIEW	GH
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STRATHCONA REGIONAL DISTRICT

OWEN BAY
NEW FLOAT DESIGN

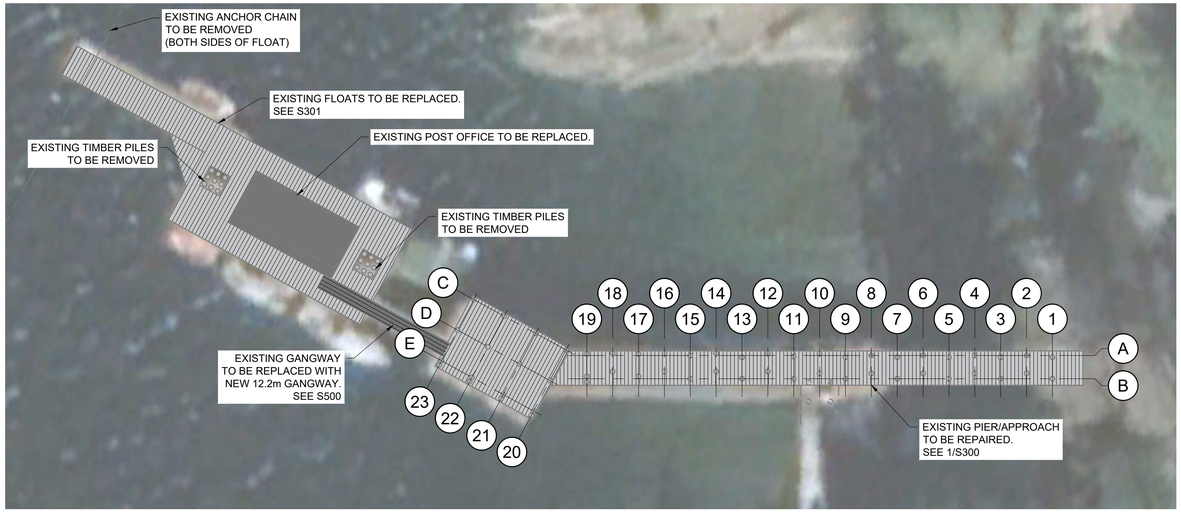
Drawing No.
S201

Project No. 2211-71343
Rev. PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

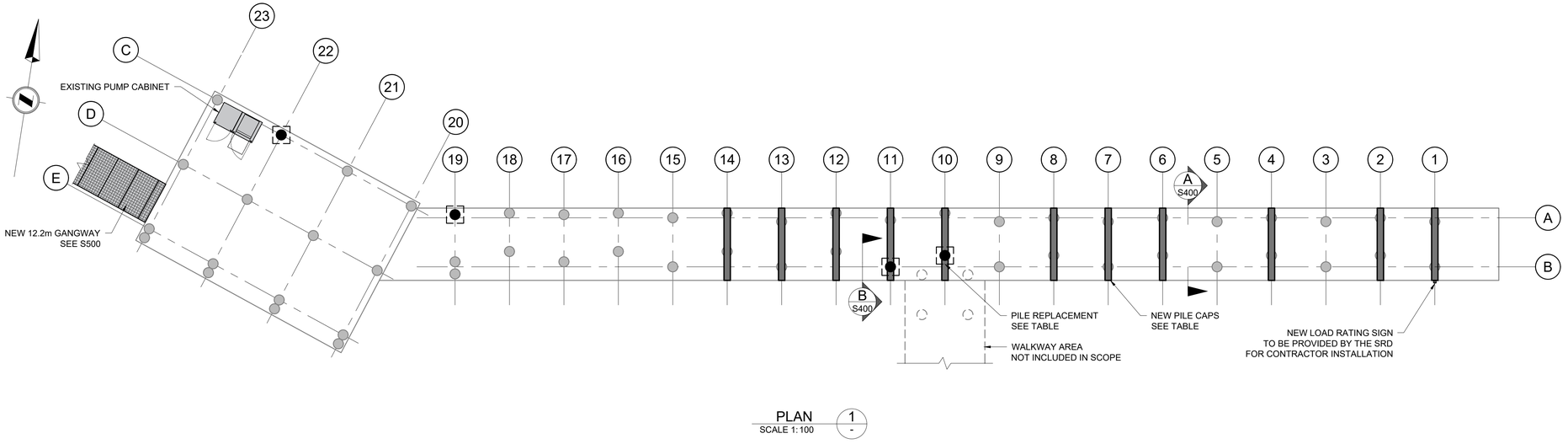
SAVED BY: JTHayden DATE: 2022-12-02 15:33 FILE: V:\2211\0_PROJECTS\71300-71999\71343 SRD Wharf Inspections\10.0 Drawings\10.1 Engineering\10.1.1 Sheets\71343-S0-S201 - Owen Bay New Float Design.dwg

ORIGINAL DWG SIZE - ANSI D (22" x 34") McElhanney - 2019-11-10



PLAN
SCALE 1:250

KEY PLAN
NTS



PLAN 1
SCALE 1:100 -

LEGEND

- EXISTING TIMBER PILE
- NEW TIMBER PILE
- NEW TIMBER PILE CAP

PILE REPAIRS	
PILE NO.	REPAIRS
10B	REPLACE PILE
11B	REPLACE PILE
19A	REPLACE PILE
22C	REPLACE PILE

PILE CAP REPAIRS	
BENT NO.	REPAIRS
1	REPLACE PILE CAP
2	REPLACE PILE CAP
4	REPLACE PILE CAP
6	REPLACE PILE CAP
7	REPLACE PILE CAP
8	REPLACE PILE CAP
10	REPLACE PILE CAP
11	REPLACE PILE CAP
12	REPLACE PILE CAP
13	REPLACE PILE CAP
14	REPLACE PILE CAP

NOTES:

1. FOR GENERAL NOTES SEE S100.
2. SEE SHEET S400 FOR ALL TIMBER REPAIR DETAILS FOR PILES, PILE CAPS, AND CROSS-BRACING.

Rev	Date	Description	App'd
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STRATHCONA REGIONAL DISTRICT

SURGE NARROWS
GENERAL ARRANGEMENT
AND PIER PLAN

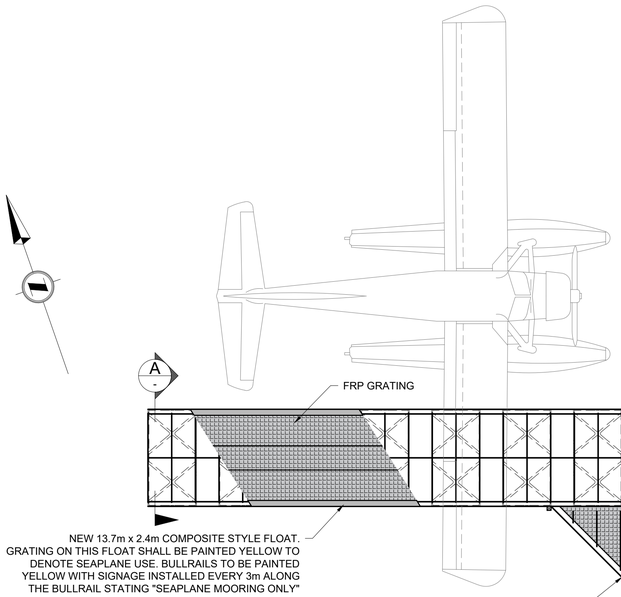
Drawing No.
S300

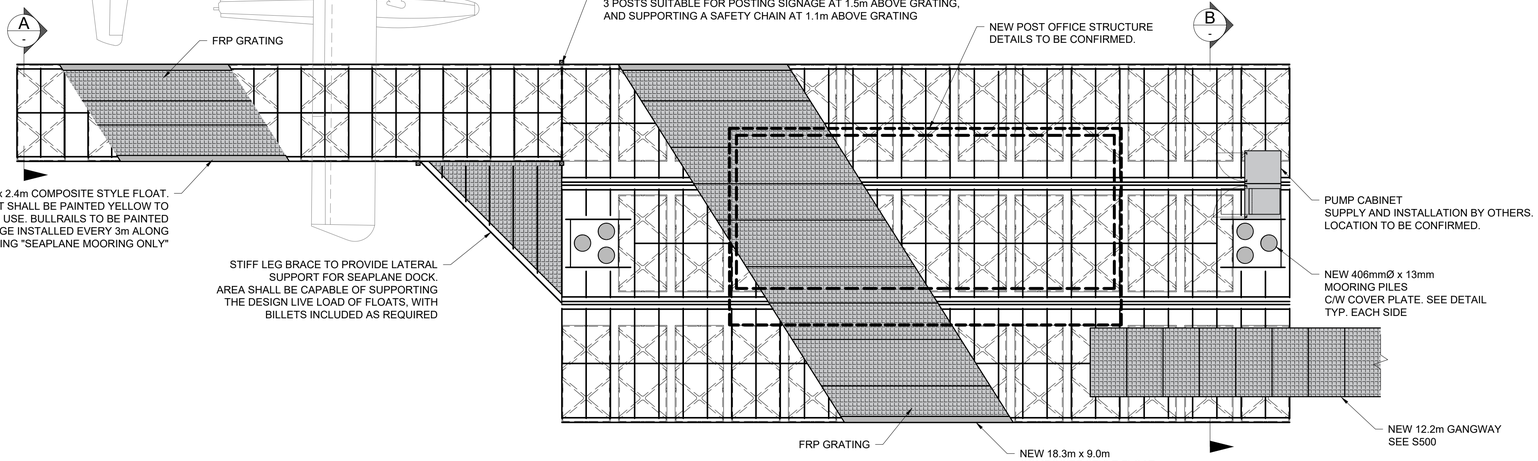
Project No. 2211-71343
Rev. PC

SAVED BY: JTHayden DATE: 2022-12-02 15:33 FILE: X:\2211\0-PROJECTS\71300-71599\71343.SRD Wharf Inspections\10.0 Drawings\10.1 Engineering\10.1.1 Sheets\71343-S5-S300 - Surge Narrows General Arrangement.dwg

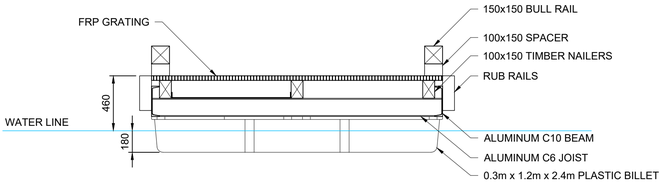
DESTROY ALL PRINTS BEARING PREVIOUS REVISION

ORIGINAL DWG SIZE: ANSI D (22" x 34") McElhanney - 2019-11-10





PLAN
SCALE 1:75



TYP. FLOAT SECTION
SCALE 1:25

NOTE:

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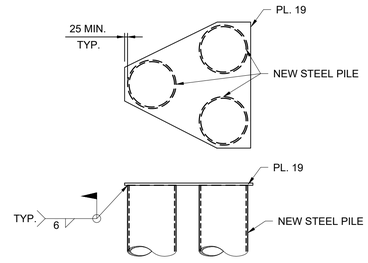
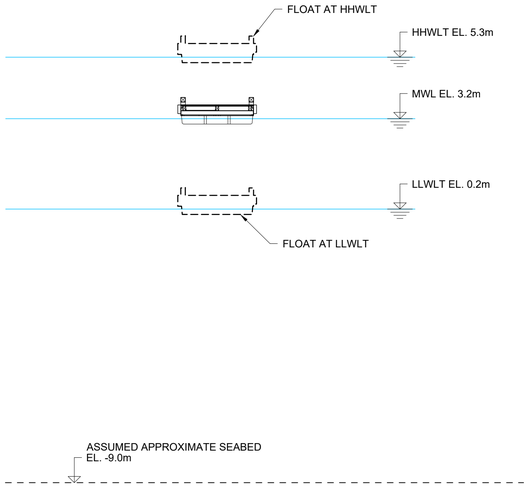
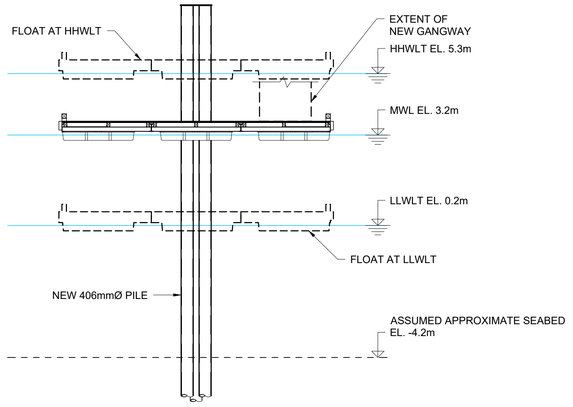


COVER PLATE DETAIL
SCALE 1:25



SECTION A
SCALE 1:100



SECTION B
SCALE 1:100

NOTES:

1. FOR GENERAL NOTES SEE S100

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STRATHCONA REGIONAL DISTRICT

SURGE NARROWS
NEW FLOAT DESIGN

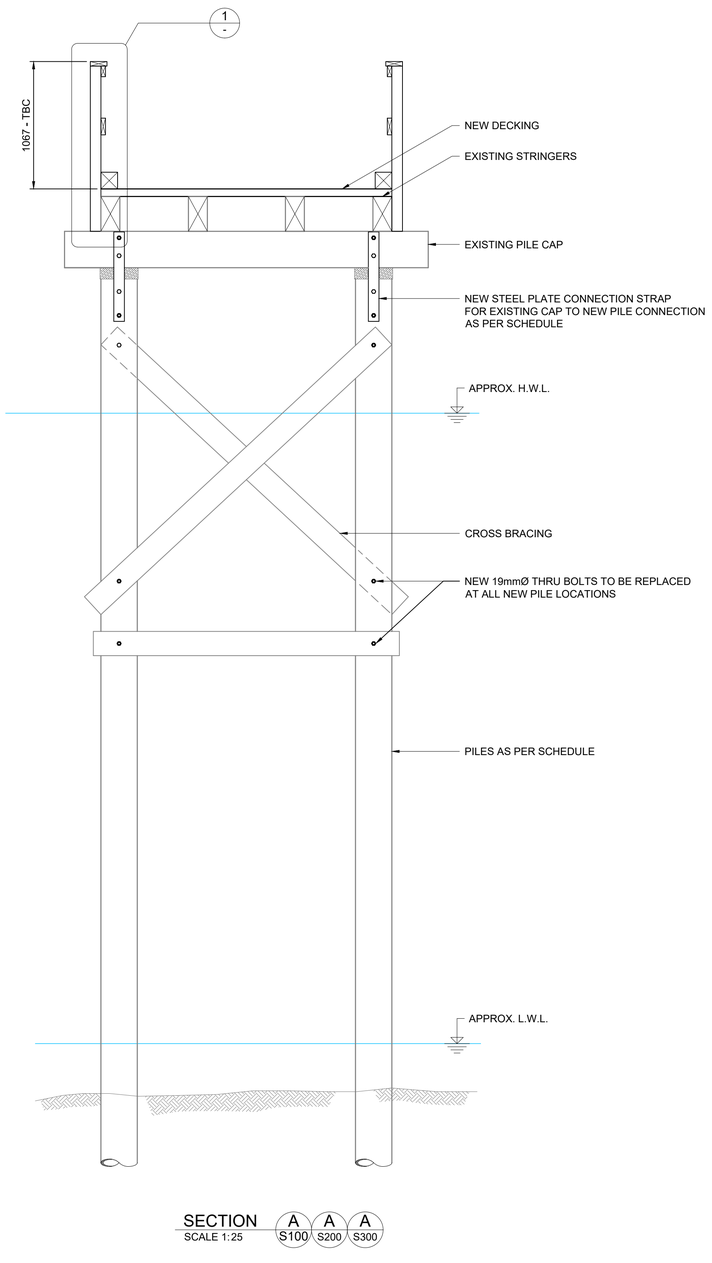
Drawing No.
S301

Project No. 2211-71343
Rev. PC

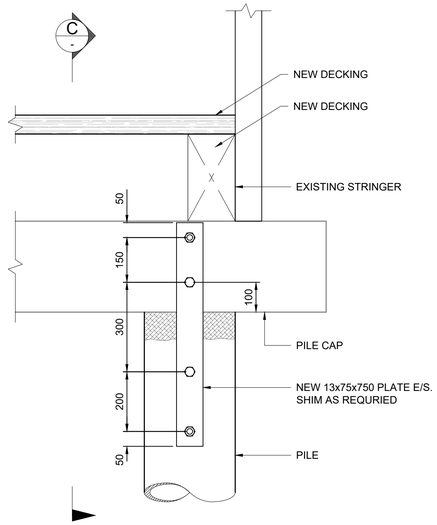
SAVED BY: JTHayden DATE: 2022-12-02 15:33 FILE: X:\2X11\5-PROJECTS\71300-71399\71343.SRD Wharf Inspections\10.0 Drawings\10.1 Engineering\10.1.1 Sheets\71343-S0-S301 - Surge Narrows New Float Design.dwg

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

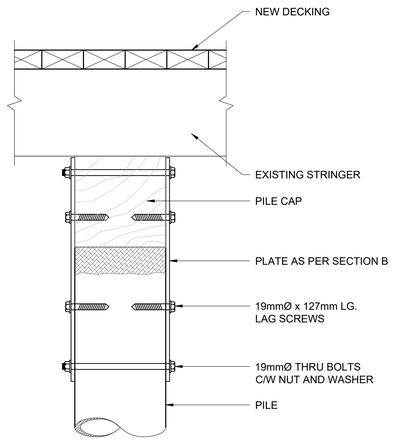
ORIGINAL DWG SIZE: ANSI D (22" x 34") McElhanney - 2019-11-10



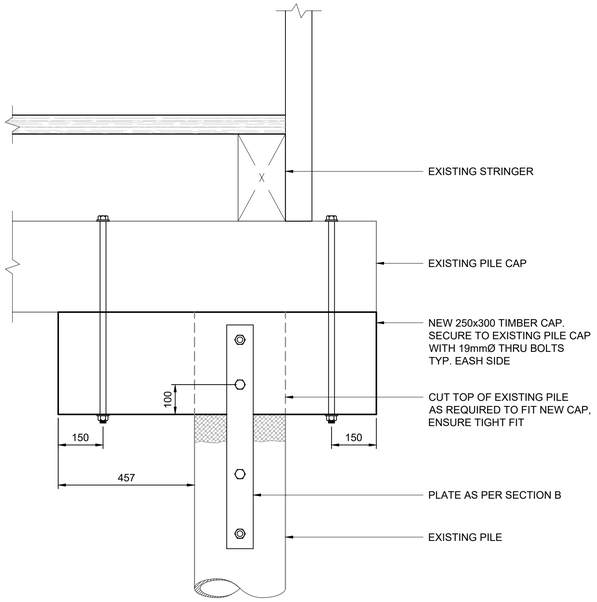
SECTION A S100 / A S200 / A S300
SCALE 1:25



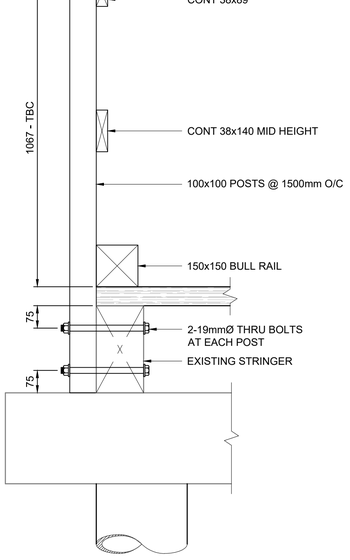
SECTION B S100 / B S200 / B S300
SCALE 1:10



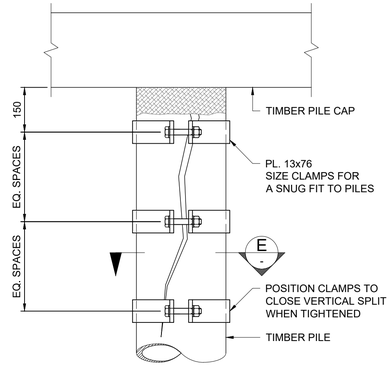
SECTION C -
SCALE 1:10



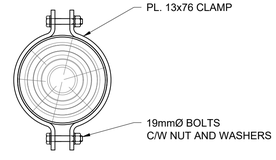
SECTION D S100
SCALE 1:10



DETAIL 1 -
SCALE 1:10



GALVANIZED STEEL CLAMPS
SCALE 1:10



SECTION E S100
SCALE 1:10

NOTES:

1. FOR GENERAL NOTES SEE S100

NOTE:

CONTRACTOR TO CONFIRM TRUE PILE DIAMETER
PRIOR TO FABRICATION OF CLAMPS.

Rev	Date	Description	App'd
PC	2022-12-02	ISSUED FOR 100% REVIEW	GH
PB	2022-11-11	ISSUED FOR 90% REVIEW	GH
PA	2022-08-25	ISSUED FOR CONCEPT	MF

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McElhanney

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Courtenay BC
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T 250 338 5495

Drawn:	Drawing Check:	Designed:	Design Check:	Approver:
JTH	MF	HH	MF	GH

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STRATHCONA REGIONAL DISTRICT

TYPICAL PIER SECTION
AND REPAIR DETAILS

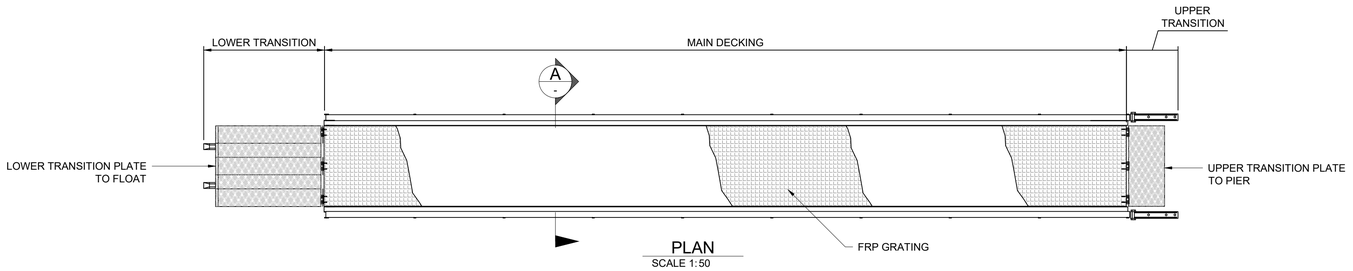
Drawing No.
S400

Project No. 2211-71343
Rev. PC

SAVED BY: JThryden DATE: 2022-12-02, 15:53 FILE: X:\2211\2-PROJECTS\71300-71399\71343 SRD Wharf Inspections\10.0 Drawings\10.1 Engineering\10.1.1 Sheets\71343-S00-S400 - Typical Pier Section and Repair Details.dwg

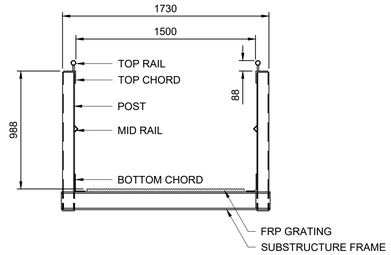
DESTROY ALL PRINTS BEARING PREVIOUS REVISION

ORIGINAL DWG SIZE: ANSI D (22" x 34") McElhanney - 2019-11-10

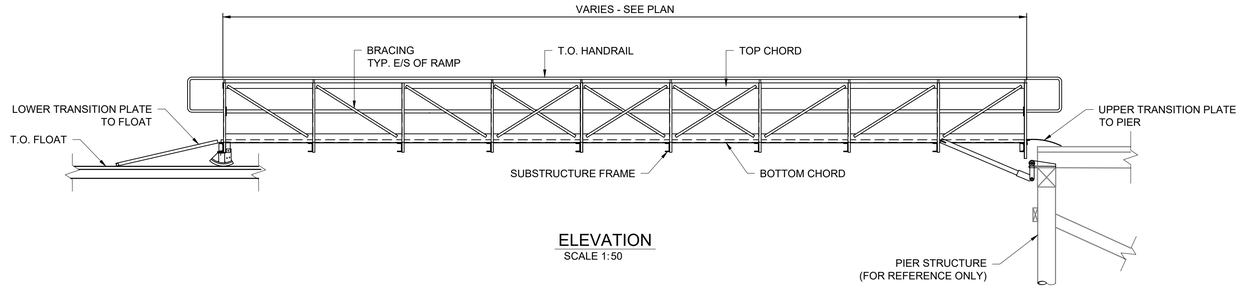


PLAN
SCALE 1:50

NOTE:
HANDRAIL NOT SHOWN FOR CLARITY



SECTION A
SCALE 1:25



ELEVATION
SCALE 1:50

NOTE:
STEEL GANGWAY ARRANGEMENT SHOWN IS INDICATIVE ONLY. CONTRACTOR IS RESPONSIBLE FOR THE FINAL DESIGN OF THE GANGWAY AND WILL PROVIDE SEALED SHOP DRAWINGS TO THE ENGINEER FOR REVIEW PRIOR TO MATERIAL PROCUREMENT AND FABRICATION.

NOTES:
1. FOR GENERAL NOTES SEE S100

Rev	Date	Description	App'd
PC	2022-12-02	ISSUED FOR 100% REVIEW	GH
PB	2022-11-11	ISSUED FOR 90% REVIEW	GH
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Courtenay BC
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T 250 338 5495

Drawn:	Drawing Check:	Designed:	Design Check:	Approver:
JTH	MF	HH	MF	GH

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STRATHCONA REGIONAL DISTRICT

STRUCTURAL GANGWAY DETAILS

Drawing No.
S500

Project No. 2211-71343
Rev. PC

DESTROY ALL PRINTS BEARING PREVIOUS REVISION.

SAVED BY: JThrasher DATE: 2022-12-02, 15:34 FILE: X:\22112-PROJECTS\71300-71999\71343-SRD Wharf Inspections\10.0 Drawings\10.1 Engineering\10.1.1 Sheets\71343-S01-S500 - Structural Gangway Details.dwg