Hopkins Landing
Ports Load Limit Safety Assessment

February 15, 2019

Prepared for:

Sunshine Coast Regional District
1975 Field Road
Sechelt, BC
V0N 3A1

Attention: Ben Smale, P.Eng, Asset Management Coordinator

Prepared by:

Herold Engineering Limited
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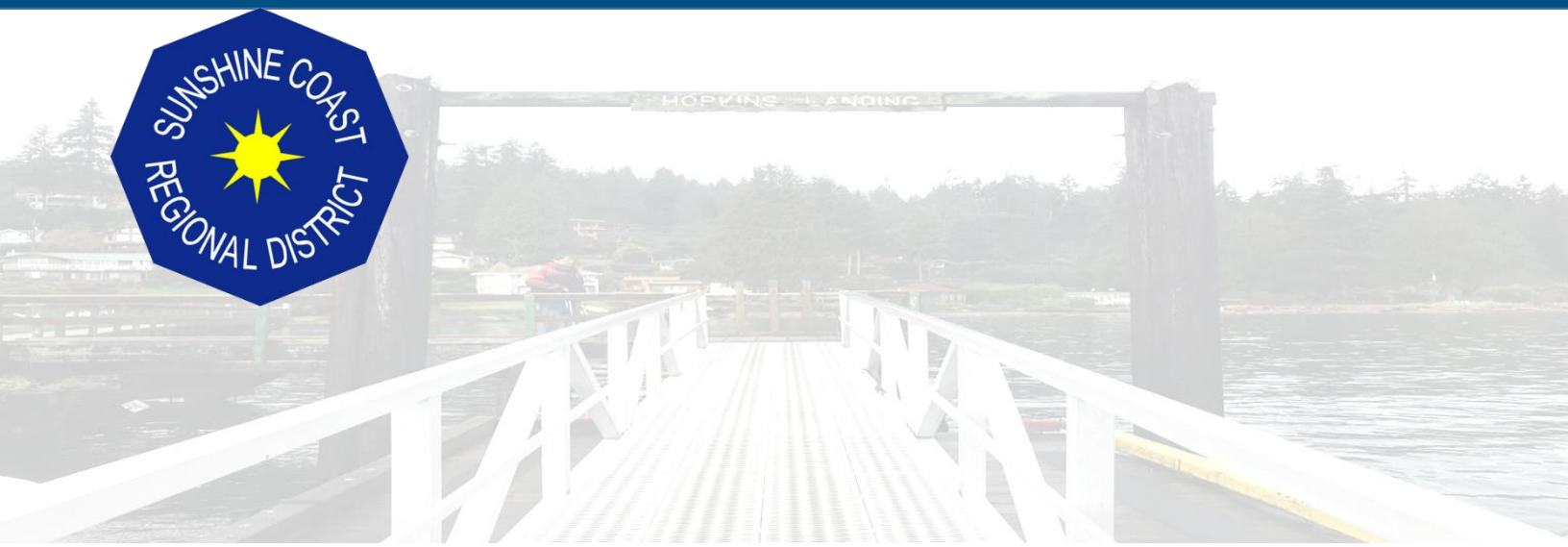
Herold Project #: 4551-002



HEROLD ENGINEERING

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PORT LOADS SAFETY ASSESSMENT

HOPKINS LANDING PORT FACILITY

PREPARED FOR:

Sunshine Coast Regional District
1975 Field Road
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V0N 3A1

Attn: Ben Smale, P.Eng, Asset Management Coordinator

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SUBMITTAL DATE:

February 15, 2019

Herold Project No. 4551-002

Prepared by:

Shannon Summersides, EIT

Reviewed by:

Jeff Duncan, P. Eng

Executive Summary

The scope of the assignment includes above water assessment of the Hopkins Landing port facility and subsequent condition assessment report. The report includes health and safety considerations and loading rated capacities for the overall structure, as well as residual life estimates for individual members.

The assessment was conducted on November 14, 2018. The purpose of the assessment was to document the overall physical condition of the facility through review of provided reference material (previous inspection reports/drawings) and visual and tactile inspection of accessible elements from above water.

The port facility is in overall poor to fair condition. Assessment results indicate that remedial work is recommended throughout the facility.

There are several items which are recommended to be repaired/replaced within the next year as follows:

- Replacement of three handrail posts.
- Replacement of two handrail spans.
- Replacement of seven sections of timber guard.
- Replacement of one pilecap, and two pilecaps to be re-secured.
- Replacement of three bearing piles.
- Replacement of three cross braces, and six cross braces to be repaired/re-secured.

As general good engineering practice, the number of corbels and pilecaps is not recommended to exceed three elements between the stringers and the bearing pile. Once this limit is exceeded, stability begins to be an issue. The three bearing piles recommended for replacement are based on exceedance of this number of corbel installations.

The following recommendations pertain to Health and Safety at the facility:

- Safety ladder spacing and signage does not conform to WorkSafe BC regulations.
- Handrails do not conform to OH&S standards.
- There is no life ring located at the facility.
- There is no guard along the seaward face of the wharfhead.
- There are three derelict dolphins and one abandoned piling which may be hazardous to navigation.

The load rating was established using The Canadian Highway Bridge Code (CAN/CSA S16-14), and assumes that all recommended repairs have been completed prior to qualification of the rating. The approach structure has been rated to a maximum area load of 0.6kPa. The maximum calculated load is not suitable for public assemblies. A steel bollard or lock-block barrier should be installed to prevent driving (vehicles, scooters, Gators, etc.) on the on trestle.

It is to be noted that the reference material indicates that one bearing pile is recommended to be replaced, and five require repairs. Additionally, the timber float substructure has several repairs recommended. The condition was not verified by Herold Engineering due to accessibility. Based on the previously reported condition of the bearing piles and float, noted listing of the float, as well as reduced live load capacity a dive inspection is recommended to ascertain the condition of submerged elements within the next year.

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HOPKINS LANDING PORT FACILITY
STRUCTURE CONDITION INSPECTION AND REPORT
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1 Introduction

Facility: Hopkins Landing, BC, Port Facility

Inspected by: Herold Engineering Limited, Shannon Summersides, EIT
Westcoast Diving Contractors Limited, John Dekker

Date: November 14, 2018

1.1 Purpose of Assignment

The inspection was conducted to identify members either requiring repairs or showing signs of deterioration. The following report provides information regarding maintenance, repair, replacement and health and safety on a 10 year forecasted time period, allowing for a prioritized repair program to be implemented. Other items noticed during the inspection will be reported only in terms of general overall condition.

The inspection included detailed above water visual / tactile inspection of the following facility components:

- Abutment headwall
- Handrails
- Guard
- Safety ladders
- Deck planks
- Stringer
- Pilecaps
- All Piles (from above water)
- Cross Bracing
- Wales

Items inspected specific to floats:

- Gangways and connections
- Bullrails
- Rubboards
- Decking
- Floatation (from above water)
- Mooring system (piles, anchor chains) (from above water)

It is to be noted that the facility was inspected in 2014 by Wakefield Hanson Marine Services (Wakefield). This assessment included the following activities:

- Visual, acoustic, and boring inspection of the timber piles, pilecaps, stringers and bracing above water.
- Visual inspection of the bracing and piles below water.
- Above water inspection of the mooring piles and gangway.
- Visual inspection of the timber components of the float above and below water.

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Damages and recommendations from this inspection have been incorporated into the following report.

The facility was also inspected by Pelagic Technologies Inc. (Pelagic) in 2009. Drawings indicating noted bearing pile condition, as well as the float substructure condition were provided to Herold Engineering. It is assumed that this reporting was conducted via underwater inspection.

It is to be noted that an underwater investigation was not within the Scope of Services. As such, several damages, identified by Wakefield and Pelagic, were not confirmed during the assessment, but are included with the repair and maintenance recommendations in the following report.

1.2 Scope of Work

The inspection and assessment of the facility components was completed to the standards set out below. The inspection work included all facility components noted in Section 1.1. The condition assessment, and residual life estimates were based on previous experience. The load rating and capacity calculations were executed following the recommendations in the reference material noted below and good engineering practice. All recommendations related to health and safety were provided based upon current WorkSafe BC regulations, as well as our experience with facilities similar in form and function.

1.3 Reference Material

- Procedures for Inspection and Assessment of Fixed Timber Docks – 1994 September – 4th Edition by R.G. Sexsmith Ltd.
- Standard Practice Manual for Underwater Investigations by the American Society of Civil Engineers, Ports and Harbours Committee, May 2000.
- Canadian Highway Bridge Design Code CAN/CSA S6-14.
- WorkSafeBC Occupation Health and Safety Regulations for Wharves, Docks and Mooring Floats. Accessed: December 11, 2018. Located: https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-24-diving-fishing-and-other-marine-operations#6AE649CBFEFA441986BB7877A8901131
- NFPA 303 - Fire Protection for Marinas and Boatyards, 2016
- 2014 Wakefield Hanson Marine Services Inspection Report
- 2009 Pelagic Technologies Inc. Reference Drawings

1.4 Methodology

Herold Engineering Limited (Herold Engineering) completed the above water portion of the inspection, as well as report preparation. Westcoast Diving Contractors Limited (WDC) provided a work boat to access portions of the facility.

The above water inspections involved a visual review of the structural condition, and select hammer soundings of timber elements. Refer to Section 4 for inspection results, as well as Appendix D for detailed remediation recommendations.

Load capacity calculations were completed using CAN/CSA S6-14. Residual life estimates for various elements were completed using guidelines provided in the reference material noted in Section 1.3. The findings are based on "as found" conditions at the time of the inspection and any provided historical documentation, refer to Section 5.

2 Description

2.1 Location

Hopkins Landing Port Facility is located approximately 5 kilometers northwest of Gibsons, BC in the Strait of Georgia, approximately 30 kilometers northwest of Vancouver, B.C.

2.2 Geometry

The overall geometry of the facility's main components is as follows:

Approach	-	1.83m x 130m
Gangway Approach	-	1.83m x 9.1m
Wharfhead	-	1.83m x 18.6m
Gangway	-	1.22m x 13.25m
Float	-	4.267m x 17.4m

The general layout of the facility is as per the Herold Engineering Drawings 4551-002 S01 and S02 located in Appendix C.

2.3 Reference System

The reference system used for this report is as per the drawings found in Appendix C. For the purpose of this report, the approach, wharfhead, gangway and float all run east to west.

Along the approach and wharfhead the pile bents are numbered from the abutment (Bent 0) to the wharf face (Bent 28). The pile rows are lettered from north to south as Gridlines A through to G.

There is one float at the facility, accessed via an aluminum truss gangway. The float is moored by one mooring pile spread dolphin, and one compact dolphin.

The general arrangement of the facility is shown in Photograph 1, located in Appendix A.

2.4 Approach & Wharfhead

The approach and wharfhead generally consist of typical timber construction.

Topside elements include handrails and guard timbers along either side of the approach, gangway approach, as well as around the edges of the wharfhead.

The approaches and wharfhead are constructed of timber decking which is supported by timber stringers, pilecaps and bearing piles. The approach has intermittent lateral and longitudinal bracing and wales.

There are two fender piles at Gridlines A, D, and G, as well as single fender piles at B, C, E and F along Bent 28.

Typical member sizes and spans are as follows:

Handrails	-	38mm x 140mm beveled handrail
	-	38mm x 89mm top-rail
	-	38mm x 140mm mid-rail
	-	89mm x 89mm x 1.524m post spaced at 2.44(+/-)
Decking	-	75mm x 305mm spanning approx. 610mm
Guard	-	89mm x 140mm
Risers	-	38mm x 140mm
Stringers	-	140mm x 279mm creosote treated
Pilecaps	-	216mm x 254mm creosote treated
All Piles	-	Size 36 (305Ø) creosoted treated
Cross Bracing	-	152mm x 203mm
Wales	-	152mm x 203mm
Fender Chocks	-	152mm x 203mm

2.5 Gangway

An aluminum truss gangway is located on the gangway approach, on the east edge of the wharfhead. The gangway provides access to the timber float.

The truss is comprised of 75mm x 75mm hollow tube sections which are used for the truss elements. The gangway deck is 51mm thick serrated aluminum decking.

2.6 Float

The float is comprised of timber bullrails supported on timber risers and timber deck. There are timber rubboards along the edges of the float.

Per the 2009 Pelagic facility drawings, the float substructure consists of treated timber cross-ties, joists, stringers, and flanges. The float is moored by a spread dolphin at the east end and a compact dolphin to the west. The spread dolphin is comprised of four timber piles (2 per side) and the compact dolphin is comprised of six timber mooring piles. Timber cross ties secure both arrangements. The floatation has not been defined in either the Wakefield or the Pelagic reports, and is at this time of unknown material.

Typical component sizes and spans are as follows:

Decking	-	51mm x 305mm
Bullrails	-	152mm x 152mm
Risers	-	152mm x 152mm x 305mm long

Rubboards	-	38mm x 292mm

Pelagic has reported the float substructure as follows:

Edge Stringer	-	140mm x 290mm
Joists	-	mixture of 89mm x 140mm and 140mm x 290mm
Cross-tie	-	290mm x 290mm
Flange	-	140mm x 290mm
Flange Splice Block	-	140mm x 140mm

3 Health & Safety Background

Legacy marine facilities of this kind have a typical construction and arrangement which is somewhat consistent within the Pacific Region. The majority of marine facilities do not meet specific areas of governing regulations for Health and Safety. It is at the discretion of the owners of the facility to determine which guidelines (if any) are to be followed. Recommendations have been given throughout the report.

Based on the overall condition of the facility, several of the following specifications may be attainable, if desired, during a major facility renewal/upgrade which is projected to be required within the next 3-5 years.

3.1 OH&S Requirements

3.1.1 Ladders

Fixed ladders must be provided at every dock for access to and egress from the water and must:

- Be spaced at intervals not exceeding 30 meters.
- Extend from the top of the dock to at least 1 meter below the lowest water level.
- Be maintained free of barnacles and marine growth, and
- Have their location identified by high visibility paint on the curb or bullrail.

3.1.2 Lifesaving Equipment

Appropriate lifesaving equipment must:

- Be provided and maintained for the rescue of any worker/user in danger of drowning, and
- Be positioned at intervals not exceeding 50 meters in conspicuous locations as near as practicable to the danger area.

Throwing lines fitted to lifebuoys or similar equipment must be of suitable size and length and made of buoyant material

Lifesaving equipment includes lifebuoys, throwing bags, grapples, boat hooks or other equipment appropriate to the circumstances.

3.1.3 Curbs, Bullrails, Guardrails, and Barriers

A curb or bullrail must be installed along the open sides of each float, dock, wharf, pier and similar other area where mobile equipment might be used.

Each curb and bullrail must be of substantial construction and be at least 250mm high.

Where practical, guardrails meeting the requirements of Part 4 (General Conditions) must be installed at:

- Dangerous breaks in the continuity of the wharf, dock or pier and
- Dangerous corners, edges and other parts of a wharf, dock, or pier.

See section 3.1.5 for Part 4 (General Conditions) requirements (below).

Moveable warning barriers may be used where the use of standard guardrails is impractical.

Effective warning barriers must be installed across the entrances of barge and ship loading ramps when ramps are not in use.

3.1.4 Markings

Where circumstances require, curbs, bullrails, guardrails, and barriers must be painted solid yellow, yellow and black stripes or checkers, or yellow against a suitable contrasting background.

Retroreflective paint or patches must be applied to curbs, bullrails, guardrails, and barriers where mobile equipment is operated at night

3.1.5 Fall Protection (OH&S Part 4 – General Conditions)

An area accessible to workers/users must have guards or guardrails installed in any of the following circumstances:

- If a raised floor, open-sided floor, mezzanine, gallery, balcony, work platform, ramp, walkway, or runway is 1.22 meters or more above the adjacent floor or grade level;
- On both sides of any walkway over or adjacent to any substance which is a hazard if a worker fell in, or on it, or which is over machinery or work areas;
- Around the perimeter of any open container or containment area such as an open vat, bin, tank or pit which is 1.22 meters or more in depth and which has sides that do not extend at least as high as required for a guardrail above the adjacent grade or work surface;

3.2 Fire Protection

The placement of fire-extinguishing equipment shall be planned in cooperation with the authority having jurisdiction and the local responding fire departments at least annually in order to accommodate changing conditions and personnel responsible for fire control in the facility.

The placement of portable fire extinguishers on piers and along bulkheads where vessels are moored or are permitted to be moored shall meet the following criteria:

- Extinguishers listed for Class A, B, and C fires shall be installed at the pier/land intersection on a pier that exceeds 7.62m in length.
- Additional fire extinguishers shall be placed such that the maximum travel distance to an extinguisher does not exceed 22.86 meters.

All portable fire extinguishers shall be maintained in accordance with Chapter 6 of NFPA 10, Standard for Portable Fire Extinguishers, and shall be clearly visible and marked.

4 Inspection Results

The results of the on-site inspection are based mainly on visual inspections and sounding timber with a hammer.

While all the piles were inspected, these inspections are somewhat limited in detecting mechanical damage and all damage due to marine borers.

The general condition of the various elements is as indicated below. For information on specific components, see Appendix D.

The following is an explanation of the rating scale used in Section 4 as it relates to the estimated time before the next required repair to a specific item.

Very Poor:	Immediate repair is required. Element is near failure or is missing.
Poor:	Less than 1 year. Closely monitored for additional deterioration.
Fair:	1 to 3 years
Good:	3 to 10 years

4.1 Approach and Wharfhead

General views of the approach, wharfhead, and floats are shown on Photographs 1.

4.1.1 Topside

Generally the topside elements (handrails, guard timber, and decking) are in fair to poor condition.

The topside elements have significant biological growth and damage. The superstructure is recommended to be power-washed, and one handrail, one top-rail, and three posts are

recommended for replacement, as well as seven sections of the guard. The remaining guards and risers is recommended to be replaced within the next 1-3 years.

The decking is in overall fair condition. Power-washing is recommended, as well as ongoing monitoring.

4.1.2 Abutment

The abutment was not accessible at the time of the inspection. Ongoing monitoring is recommended.

4.1.3 Stringers

The stringers are in overall good condition. Not all of the stringers (Bents 3 – 28) could only be visually inspected, due to accessibility.

Ongoing monitoring is recommended, as well as coring of any suspected areas of deterioration at the next scheduled inspection.

4.1.4 Pilecaps

The pilecaps are in overall fair-good condition. Not all of the pilecaps could be inspected due to accessibility.

There are two pilecaps to be resecured to the bearing piles

There is one pilecap which is recommended to be replaced. Ongoing monitoring and coring of the pilecaps at the next scheduled inspection is recommended.

4.1.5 Bearing Piles

The bearing piles are in overall fair-poor condition. Several piles have been repaired using corbel blocks, strapping, concrete pile replacement, and/or steel angle strapping.

As general good engineering practice, the number of corbels and pilecaps is not recommended to exceed three elements between the stringers and the bearing pile. Once this limit is exceeded, stability begins to be an issue. Three bearing piles are recommended for replacement based on exceedance of this number of corbel installations.

Wakefield has recommended one pile for replacement, and five other piles for repair.

Given the overall submerged condition of the piles as described by Wakefield and Pelagic, and above water condition observed by Herold Engineering, it is recommended that a detailed dive inspection, including coring, be schedule within the next year to ascertain the condition of the submerged length and internal cross section respectively.

4.1.6 Cross-Bracing and Wales

The cross bracing is in overall fair condition.

Three cross braces have been recommended for replacement, and six braces are recommended to be repaired.

The remaining braces have moderate splitting and weathering. The condition of the submerged portion of the wales and cross bracing were not reviewed by Herold Engineering due to accessibility.

4.2 Soundings

Sounding were taken around the wharfhead and approach perimeter. The soundings may be used to identify any scouring, undermining, and/or sediment transport that may be happening at the facility. It is recommended that sounding measurements be taken during scheduled maintenance and inspections to monitor the condition of the seabed.

Table 4.2.1 Wharf and Approach Sounding (m)

Location	2018
10E	6.096m
20E	7.925m
17A	7.01m
28A	10.363m
28G	10.058m

**All soundings were measured from mudline to top of deck*

4.3 Gangway

The gangway truss is in overall good condition.

The landing pad is in overall fair-good condition. There is moderate amounts of biological growth on the timbers. Power-washing of the float deck and landing pad is recommended.

4.4 Main Float

The float is in overall fair condition, and is nearing the end of its service life.

There is a significant amount of biological grown along the float timbers. Power-washing of the float superstructure is recommended.

The bullrails and rubboards have moderate amounts of cross sectional loss (CSL) due to mechanical damage and abrasion. One rubboard is recommended to be replaced. The decking and risers have moderate damage due to weathering.

The substructure of the float was report by Wakefield and Pelagic as requiring replacement of three lengths of timber flanges, as well as one repair to a flange splice block connection.

The mooring piles are in overall good-fair condition. There is moderate abrasion along the intertidal length of the piles, in some areas as much as 10% CSL was observed. Eight piles have been recommended to have UHMW wear strips installed, and one pile and the blocking at this dolphin is also recommended for replacement.

The reference system used by Wakefield does not correspond with the referenced drawings. As such, mooring pile locations cannot be identified for repair/replacement.

Table 4.4.1 Main Float Freeboard Measurements (mm)

Description	2018
Northwest	356
Northeast	432
Southwest	457
Southeast	457

**All freeboards were measured from waterline to top of deck*

The float is listing somewhat, and slightly exceeds the acceptable freeboard differential. Ongoing monitoring is recommended. A dive inspection of the float substructure is recommended within the next year.

4.5 Health and Safety

The following health and safety items were noted during the inspection:

4.5.1 Ladders

- The ladder along Bent 28 has its grab rail installed on the fender chock. This is not sufficient for egress from the water. The grab rail is recommended to be installed along the guard (once replaced).
- Ladders along the float and the approach and wharfhead are spaced at intervals exceeding 30 meters.
- The ladder locations are not identified with signage and/or high visibility paint on either side of the bullrail on the float, as well as at the wharf face.

4.5.2 Lifesaving Equipment

- There is no life ring mounted to the wharf at this facility.

4.5.3 Curbs, Bullrails, Guardrails, and Barriers

- The guard timber along the approach and wharfhead do not meet minimum height requirements of 250mm consistently at the facility. It is recommended that guarding be replaced with minimum height requirements.
- There is no guard along the face of the wharfhead. The wharf deck width is only 1.83m. It is recommended that the edge be guarded.

4.5.4 Fall Protection

- Handrails do not conform to current standards. The existing handrails are climbable, and have openings larger than 102mm at a deck elevation that exceeds 610mm. Should the SCRD feel that OH&S requirements are to be followed, it is recommended that timber pickets be installed with a maximum clear spacing of 102mm to the inside face of the handrails. Alternatively, chain link fencing may also be used.

4.5.5 Lighting

- There is lighting along the approach.

4.5.6 Fire Protection

- No observed portable fire extinguishers and/or fire protocols at the facility. It is recommended that fire protection protocols be implemented, conforming to NFPA 303.

4.5.7 Navigation

- Three derelict dolphins are located within the facility. There is evidence of public use as diving platforms. It is recommended that all three structures be removed from the facility.
- There is an abandoned pile south of the approach, which is not visible at higher tides. This is a navigation hazard and is recommended for removal.

5 Load Rating & Residual Life Estimates

5.1 Load Rating

There is no current posted load rating for the approach, wharfhead, gangway, and float at the facility. The following load rating calculations were completed in accordance with Sections 3 and 9 of The Canadian Highway Bridge Code CAN/CSA S6-14.

5.1.1 Approach and Wharfhead

As discussed, the approach width at Hopkins Landing is less than 3.0m wide. As such, vehicle loads are not to be considered at this facility.

Bending, shear and compressive capacities were determined using methods prescribed in Sections 3 and 9 of CAN/CSA S6-14. Member sizes and spacing were determined by field measurements. The analysis was done based on as-found conditions on site at the time of the inspection. Structural capacities assume that the recommended repairs have been completed.

A maximum uniform load (in kilopascals (kPa), as well as a maximum point load (in kilonewtons (kN)), was determined for the structure, as well as the gangway.

By analyzing each element, an overall governing condition is determined. In the case of this structure, bending in the deck and shear in the pilecap on the approach and wharfhead were determined to be the overall limiting structural conditions.

Material resistance factors used for design are as follows:

- Flexure ($Ø_R$) = 0.9
- Shear ($Ø_R$) = 0.9
- Compression ($Ø_R$) = 0.8

CAN/CSA S6-14 load factors used for the load rating are as follows:

- Dead load factor (α_D) = 1.5 (deck) / 1.2 (other)
- Live load factor (α_L) = 1.7

The following table summarize the results of the load rating, include all factored resistances and design load used and assumed that recommended repairs have been completed.

Table 5.1.1 Approach & Wharfhead Load Rating Results

Element	Live Load Type	Maximum Dead Load Shear (kN)	Maximum Material Resistance Shear (kN)	Maximum Load	
Decking	Area Load	0.083	16.8	26.0	kPa
	Point Load	0.083	16.8	128	kN
		Maximum Dead Load Flexure (kN·m)	**Maximum Material Resistance Flexure (kN·m)**		
Decking	Area Load	0.013	2.03	13.8	kPa
	Point Load	0.013	2.03	69	kN
		Maximum Dead Load Shear (kN)	**Maximum Material Resistance Shear (kN)**	**Maximum Load**	
Stringer	Area Load	2.8	27.3	12.6	kPa
	Point Load	2.8	27.3	376	kN
		Maximum Dead Load Flexure (kN·m)	**Maximum Material Resistance Flexure (kN·m)**	**Maximum Load**	
Stringer	Area Load	4.22	28.6	8.3	kPa
	Point Load	4.22	28.6	248	kN
		Maximum Dead Load Shear (kN)	**Maximum Material Resistance Shear (kN)**	**Maximum Load**	
Pilecap	Area Load	14	40.2	0.60	kPa
	Point Load	14	40.2	421	kN
		Maximum Dead Load Flexure (kN·m)	**Maximum Material Resistance Flexure (kN·m)**	**Maximum Load**	
Pilecap	Area Load	10.16	32.0	0.97	kPa
	Point Load	10.16	32.0	405	kN
		Maximum Dead Load Compression (kN)	**Maximum Material Compressive Resistance (kN)**	**Maximum Load**	
Bearing Pile	Area Load	19.8	114	7.7	kPa
	Point Load	19.8	114	221	kN

Table 5.1.2 Approach & Wharfhead Load Rating Governing Condition

Load Type	Element	Failure Mode	Maximum Load	Units
Area Load	Pilecap	Shear	0.60	kPa

As shown above, the maximum calculated load is not suitable for public assemblies, until the recommended repairs/rehabilitation have been implemented. A steel bollard or lock-block barrier should be installed to prevent driving (vehicles, scooters, Gators, etc.) on the on trestle.

The reduction in pilecap capacity is not a reflection of the overall physical condition of the elements, and is likely a result of the configuration. It appears that the superstructure has been replaced, and the width reduced, at some point in the life span of the facility. This has resulted in uneven loading of the substructure, increasing the shear load experienced by the pilecap above one support. This is further supported by observed pilecaps not having bearing with one of the two supports, indicating unequal load sharing. A second pilecap (sleeper beam) was also installed during the assumed upgrade, which has contributed to the dead load on the lower pilecap. This retrofit has reduced the local live load capacity on the pilecap, which results in a global limiting load of 0.6kPa.

5.1.2 Gangway

The gangway is an aluminum truss construction. There were no load rating stamps identified at the time of the inspection. As such, the following assumptions were made for the load rating:

- Aluminum material grade: 6061-T6
- Wall thickness = 3.2mm

The following load factors and resistance factors were used for the analysis, per CAN/CSA S6-14 Section 3, 9, 17:

- Dead Load Factor (α_D)= 1.1
- Live Load Factor (α_L)= 1.7
- Flexural Resistance Factor ($Ø_R$) = 0.9
- Shear Resistance Factor ($Ø_R$) = 0.9

Table 5.1.1.1 Gangway Governing Condition

Element	Dead Load Compression (kN)	Compressive Resistance (kN)	Maximum Area Live Load (kPa)
Top Chord (75x75x3.2)	6.7	48.2	1.5

5.1.3 Float

The floats were not load rated, as the amount of information regarding the substructure was insufficient to provide a reliable load rating. It is recommended that a dive inspection be undertaken, conducted and/or supervised by a professional engineer registered in British Columbia, to confirm the float configuration and prepare an associated load rating.

Typical Transport Canada timber floats have been historically rated to a maximum uniform load of 122kg/m^2 or 1.2 kPa.

5.2 Recommended Load Limit Signage

No signage is recommended at the facility at this time.

5.3 Residual Life Estimates

The residual life estimates are based on Section 2.5 of “Procedures for Inspection and Assessment of Fixed Timber Docks, 4th Edition” by R.G. Sexsmith Ltd. These estimates represent the worst case members inspected in any member group. For this reason, the overall condition of the member group is not necessarily reflected by the following residual life estimates

As noted in the above referenced material, the following applies:

- Where treated wood has been examined for presence of decay, and found sound, a life of 8-10 years is appropriate.

- Where evidence of some decay, but very limited extent was found present, a life of 3-6 years is appropriate.

- Where an element has weakened cross-section due to decay, the life can be presumed to be negligible (i.e. 0 years).

See Table 3.8.1 (Section 3) to determine which members the residual life estimate applies to.

Approach and Wharfhead

Stringers	- 8-10 years (based on the overall condition of the members)
Pilecaps	- 0 years (based on the condition of one member, 3-6 years overall)
Piles	- 0 years (based on four piles requiring replacement, 3-6 years overall)
Guard	- 0 years (based on the overall condition of the members)
Decking	- 3-6 years (based on the overall condition of the members)
Cross Bracing	- 3-6 years (based on the overall condition of the members)

Main Float

Timbers	- 0 years (based on damage to flanges and mooring piles, 1-3 years otherwise)

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APPENDIX A
Photographs

3701 Shenton Road
Nanaimo, BC V9T 2H1
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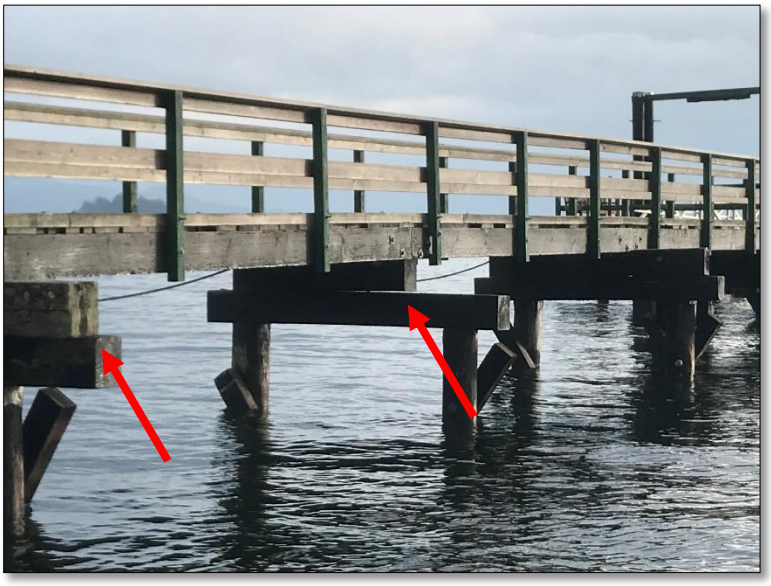
Photograph 1: Hopkins Landing Port Facility, note: general arrangement looking west

Photograph 2: Approach handrails, note: significant biological growth

Photograph 3: Approach handrails, note: biological damage

Photograph 4: Approach guard, note: biological growth and decay

Photograph 5: Approach guard, note: biological damage and splitting

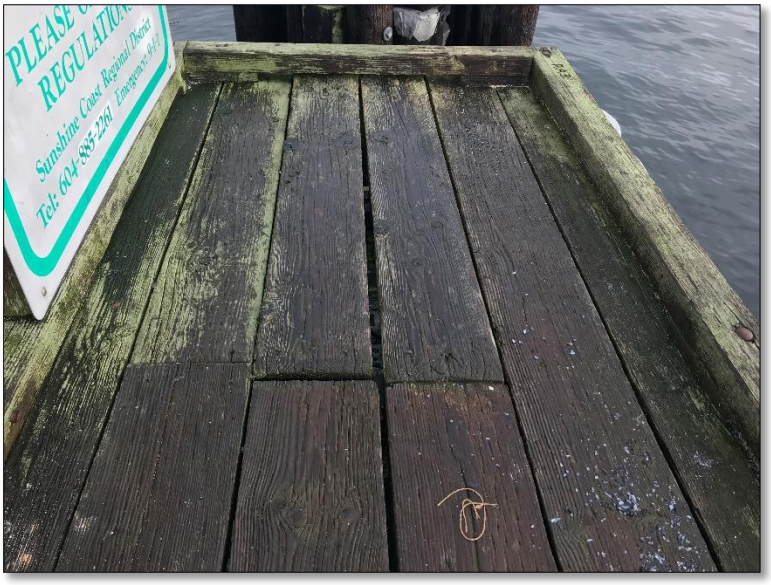


Photograph 6: Bent 11 and Bent 12, note: decayed upper pilecap and pilecap not in bearing respectively

Photograph 7: Bearing pile 13D, note: unstable arrangement

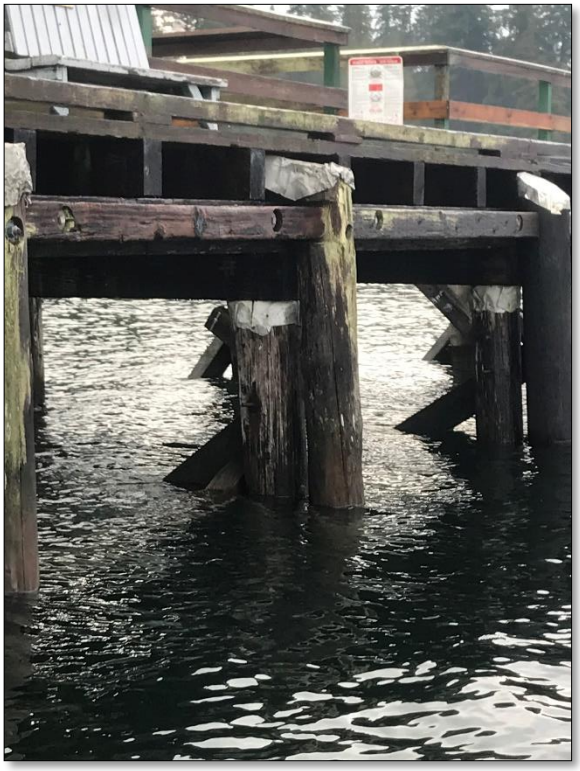
Photograph 8: Bearing pile 17D, note: unstable arrangement

Photograph 9: Bent 6 Cross Bracing, note: missing

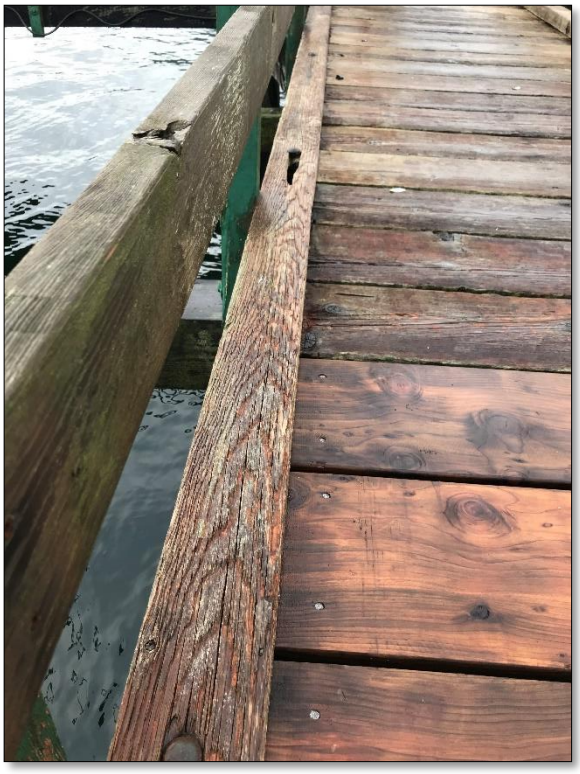


Photograph 10: Decking on wharfhead, note: 13mm trip hazard

Photograph 11: Bearing pile 27B, note: concrete pile repair



Photograph 12: Bearing pile 28F, note: damage at cross brace thru-bolt



Photograph 13: Guard along approach gangway, note: to be replaced

Photograph 14: Gangway landing pad, note: moderate splitting

Photograph 15: Mooring pile, note: abrasion and splitting

Photograph 16: Safety ladder, note: secured to fender chock

Photograph 17: Safety ladder on float, note: high visibility paint at location

Photograph 18: Electrical services box, note: locked

Photograph 19: Derelict mooring dolphin at 28G and south of the facility, note: to be removed

Photograph 20: Derelict mooring dolphin at 28A, note: to be removed

APPENDIX B
Field Notes

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Nanaimo, BC V9T 2H1
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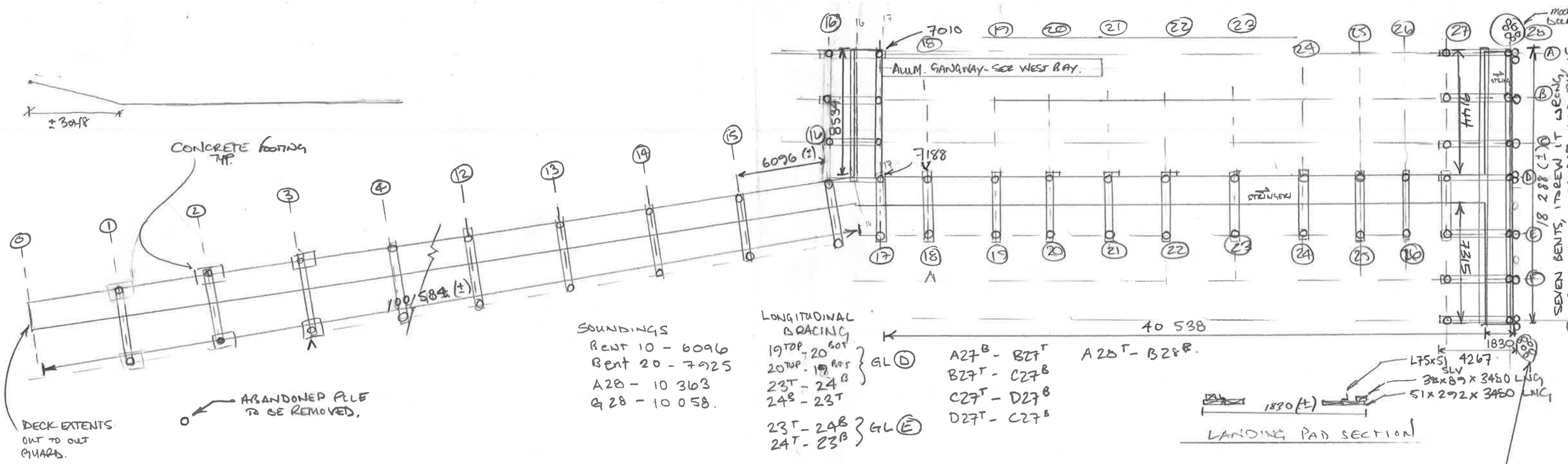
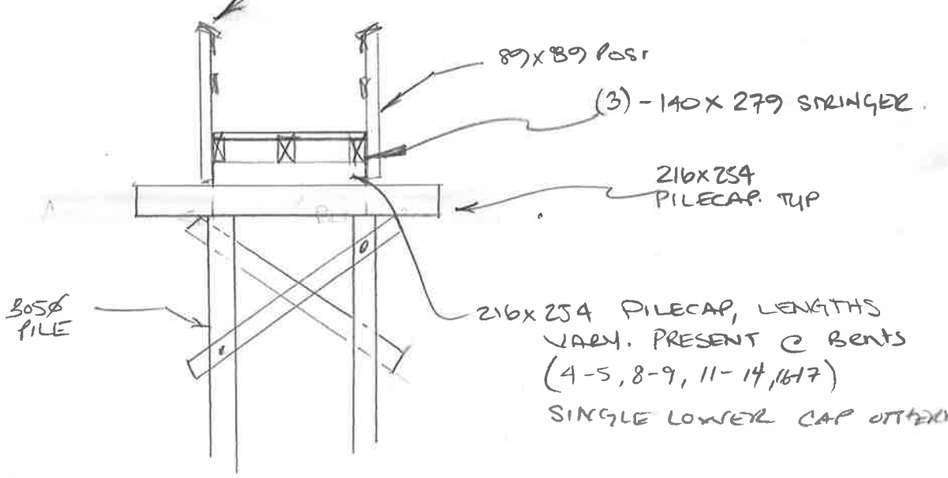
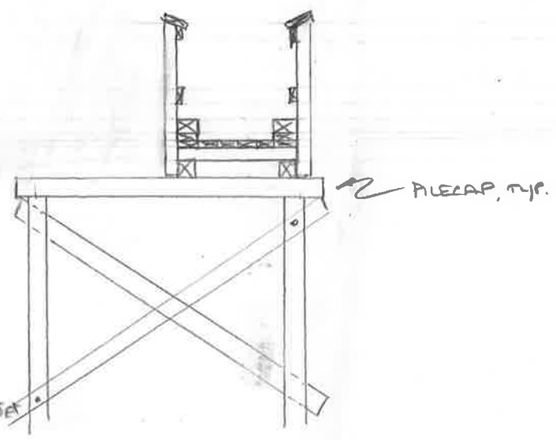




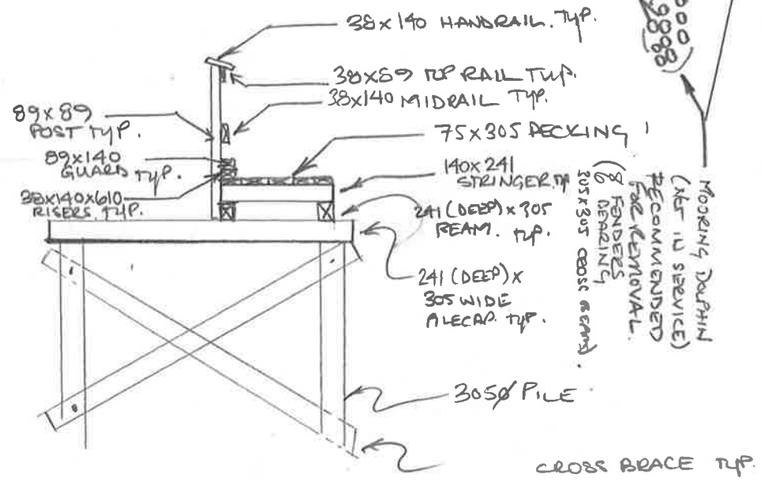
APPROACH SECTION

NOTE: SEVERAL BENTS ALONG THE APPROACH HAVE CORBELS BETWEEN THE PILE AND PILECAP. REFER TO TABLE FOR DETAILS.



GANGWAY APPROACH SECTION

NOTE "



WHARF SECTION

NOTE: "

4551-002.
HOPKINS LANDING
2016.11.14
(0945.)

APPENDIX C
Reference Drawings

3701 Shenton Road
Nanaimo, BC V9T 2H1
Ph: 250-751-8558 Fax: 250-751-8559

ARCHITECTURAL D 24" x 36"

GENERAL:

1. READ STRUCTURAL DRAWINGS IN CONJUNCTION WITH ALL OTHER CONTRACT DRAWINGS AND DOCUMENTS. REPORT ANY CONFLICTS TO THE ENGINEER BEFORE COMMENCING WORK.
2. VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO CONSTRUCTION.
3. NOTIFY THE ENGINEER 48 HOURS IN ADVANCE FOR INSPECTION OF STRUCTURAL CONNECTIONS BEFORE COVERING UP.
4. CONTRACTOR'S RESPONSIBILITY: THESE DRAWINGS SHOW COMPLETED STRUCTURAL COMPONENTS OF THE DOCKS. THE REQUIRED TEMPORARY BRACING AND SHORING TO PERFORM THE WORK SAFELY IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. ENVIRONMENTAL WORK PROCEDURES, TIMING AND SPECIAL PRECAUTIONS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS AND LIMITATIONS OF THE FEDERAL DEPARTMENT OF FISHERIES AND OCEANS, AND THE PROVINCIAL MINISTRY OF WATER, LAND AND AIR PROTECTION.
6. DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS OTHERWISE NOTED.
7. HORIZONTAL DATUM U.T.M. NAD 83.
8. VERTICAL DATUM (ELEVATIONS AND CONTOURS) TO CHART DATUM (C.D.).
9. TIDE ELEVATIONS AT THE SITE ARE BASED ON VALUES PUBLISHED BY THE CANADIAN HYDROGRAPHIC SERVICE (CHS) FOR BEDWELL HARBOUR, PENDER ISLAND AND ARE AS FOLLOWS:

HIGHER HIGH WATER, LARGE TIDE (H.H.W.L.T.)	5.1 METRES
HIGHER HIGH WATER, MEAN TIDE (H.H.W.M.T.)	4.6 METRES
MEAN WATER LEVEL (M.W.L.)	3.2 METRES
LOWER LOW WATER, MEAN TIDE (L.L.W.M.T.)	1.3 METRES
LOWER LOW WATER, LARGE TIDE (L.L.W.L.T.)	0.1 METRES

10. SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION.

DEMOLITION:

1. ALL UNSALVAGEABLE MATERIAL FROM SITE TO BE DISPOSED OF IN ACCORDANCE WITH ALL LOCAL, PROVINCIAL AND FEDERAL REGULATIONS AT THE CONTRACTOR'S EXPENSE.
2. USED TIMBER PILES REMOVED FROM SITE ARE TO BE DISPOSED OF IN ACCORDANCE WITH ALL LOCAL, PROVINCIAL AND FEDERAL REGULATIONS AT THE CONTRACTOR'S EXPENSE.

TIMBER:

1. ALL TIMBER SHALL BE PRESSURE TREATED NLGA NO. 1 COAST DOUGLAS FIR OR BETTER. LUMBER TO BE GRADED TO NLGA STANDARD GRADING RULES FOR CANADIAN LUMBER, 2003.
2. TIMBER PILES TO BE SUPPLIED SIZE 36
3. ALL TIMBERS SHALL BE CUT TO THE REQUIRED LENGTH PRIOR TO TREATMENT. FIELD CUT TIMBERS WILL BE REJECTED AND REPLACED AT THE CONTRACTOR'S EXPENSE, EXCLUDING CROSS BRACE DRILLING AT THE TOP CONNECTIONS.
4. TREATMENT TO BE IN ACCORDANCE WITH CSA O80:

4.1. CATEGORY 3.2 EXPOSED TO WEATHER, NOT IN GROUND CONTACT. INCLUDING BULLRAILS AND RISERS.

4.1.1. ACZA, 4.0kg/m³
4.1.2. CCA, 4.0kg/m³

4.2. CATEGORY UC 4.1 CONTACT WITH SPLASH ZONE. INCLUDING WHARF JOISTS. STRINGERS, FISH PLATES, PLYWOOD NOT COVERED UNDER UC5A, PILECAPS & BLOCKING.

4.2.1. ACZA, 6.4kg/m³
4.2.2. CCA, 6.4kg/m³
4.2.3. CREOSOTE:
4.2.3.1. 160kg/m³ IF THICKNESS LESS THAN 115MM
4.2.3.2. 120kg/m³ IF THICKNESS GREATER THAN OR EQUAL TO 115MM

4.3. USE CATEGORY UC5A, MARINE. INCLUDING WOOD PILES, PLYWOOD, CROSS BRACES, WALES.
4.3.1. ACZA, 30kg/m³ OR
4.3.2. CCA, 24kg/m³ OR
4.3.3. CREOSOTE 290kg/m³
4.3.3.1. PENETRATION IN ACCORDANCE WITH O80

4.4. AFTER CUTOFF, TREAT PILE TOPS WITH TWO COATS OF HOT CREOSOTE OIL AND ONE COAT OF APPROVED MASTIC AT LEAST 6mm THICK.

4.5. ALL FENDER PILES TO BE COVERED A SHEET OF 24 GUAGE ANNEALED CORROSION RESISTANT ALUMINUM, CUT 300mm LARGER THAN THE PILE TOP.

4.6. ALL DRILLED BOLT HOLES COMPLETED AFTER TREATMENT MUST BE FIELD TREATED WITH TWO COATS OF HOT CREOSOTE AND BOLTS/PLUGS MUST BE DIPPED IN CREOSOTE PRIOR TO INSTALLATION.

4.7. PLUG ALL UNUSED BOLT HOLES WITH TIGHT FITTING CREOSOTE TREATED BOLTS, AND NEOPRENE GASKET AND WASHER EACH END.

4.8. TIMBER HANDLING
4.8.1. ALL TREATED TIMBER AS TO NOT PUNCTURE THE TREATED LAYER. ANY MEMBERS IDENTIFIED AS BEING DAMAGED THROUGH THE TREATED LAYER EITHER PRIOR TO OR DURING INSTALLATION WILL BE REJECTED AT THE EXPENSE OF THE CONTRACTOR.

4.9. ALL SHIMS MUST BE CREOSOTE TREATED PLYWOOD AND MUST BE SECURED IN PLACE BY AT LEAST TWO (2) NAILS AT OPPOSITE CORNERS OF THE SHIM OR APPROVED EQUIVALENT

5. PROPOSED ALTERNATIVES TO THE SUPPLIED DESIGN TO BE APPROVED BY ENGINEER.

6. PILE DRIVING
6.1. PILES ARE TO BE DRIVEN TIP DOWN UNTIL A DRIVING ENERGY OF 25–30 kJ IS ACHIEVED OR TO REFUSAL (5 BLOWS / 25mm).
6.2. DRIVE TO THE FOLLOWING TOLERANCES
6.2.1. LOCATION OF PILES: 25mm ±
6.2.2. VERTICAL TOLERANCE: 2% OR 1:50

7. PILE REPLACEMENT
7.1. EXISTING PILES TO BE REPLACED SHALL BE FULLY EXTRACTED
7.2. REPLACEMENT PILES TO ACHIEVE A MINIMUM PENETRATION EQUAL TO THAT OF THE REMOVED PILE AND TO SATISFY THE PILE DRIVING CRITERIA NOTED ABOVE.

METAL FABRICATIONS:

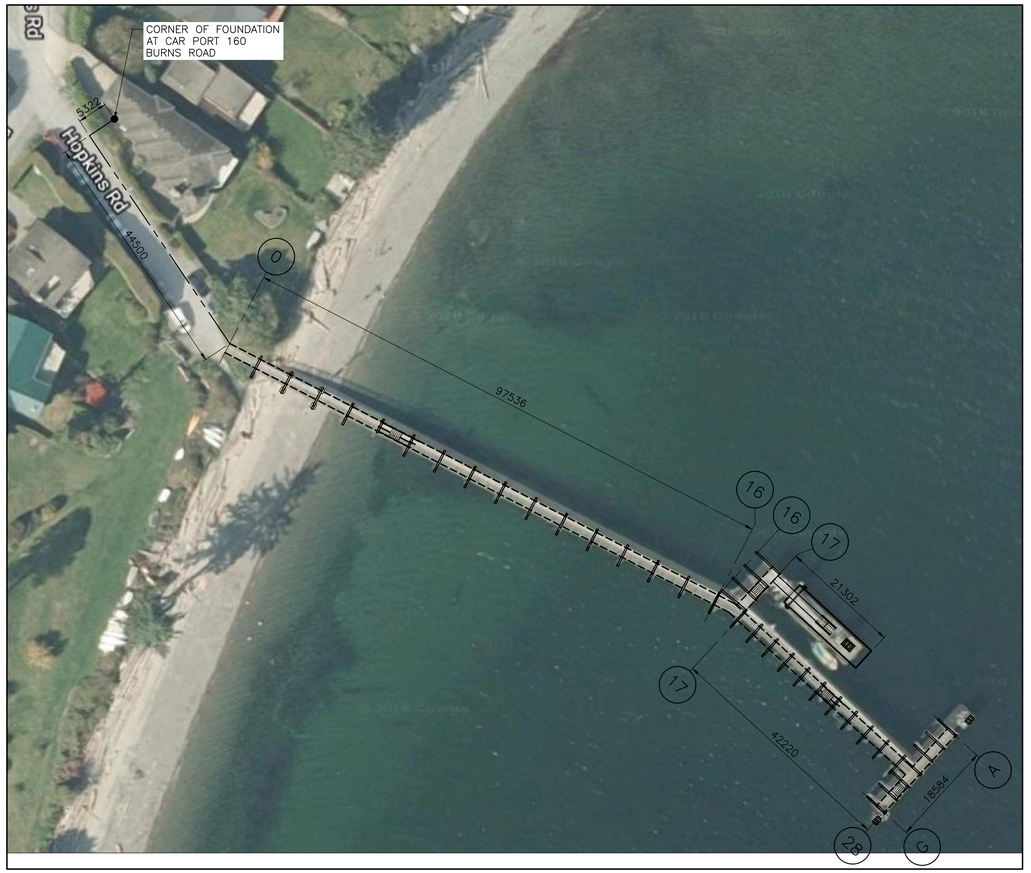
1. UNLESS NOTED OTHERWISE BY THE ENGINEER IN WRITING THE STEEL AND/OR ALUMINUM FABRICATOR SHALL SUPPLY THE ENGINEER WITH SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION. SHOP DRAWINGS SHALL INDICATE ALL DETAILS, MATERIAL SPECIFICATIONS AND DESIGN LOADS.
2. A COPY OF THE FABRICATOR'S CANADIAN WELDING BUREAU CERTIFICATES SHALL BE INCLUDED WITH THE SHOP DRAWING SUBMISSION.
3. ALL WELDING SHALL BE IN ACCORDANCE WITH CSA W59–03 (R2008) AND SHALL BE PERFORMED BY FABRICATORS "FULLY APPROVED" BY THE CANADIAN WELDING BUREAU UNDER CSA W55.3–08. FABRICATING SHOP TO HAVE A MINIMUM DIVISION 2.1 CERTIFICATION BY THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA W47.1 (STEEL). THE FABRICATOR SHALL SUBMIT PROOF OF CERTIFICATION PRIOR TO START OF WORK.
4. DESIGN FABRICATIONS TO CSA–S16–09, LIMIT STATES DESIGN OF STEEL STRUCTURES.
5. EXCEPT PARTS OF MEMBERS TO BE EMBEDDED IN CONCRETE, GALVANIZED OR UNLESS NOTED OTHERWISE ON THE DRAWINGS, ALL STEEL WORK SHALL BE SHOP PRIMED. PRIMING SHALL BE IN ACCORDANCE WITH CISC/CPMA–1–73A "QUICK DRYING PRIMER" WHEN NO TOP COAT IS REQUIRED AND IN ACCORDANCE WITH CISC/CPMA–2–75 WHEN A TOP COAT IS SPECIFIED. IF A TOP COAT IS SPECIFIED THE PRIMER SHALL BE SELECTED ENSURING COMPATIBILITY WITH THE SPECIFIED SYSTEM. ITEMS SPECIFIED TO BE GALVANIZED SHALL BE HOT DIPPED GALVANIZED TO ASTM A–123–08, MINIMUM ZINC COATING OF 600G/SQ.M. FIELD TOUCH–UP ALL ABRASIONS, SCRATCHES, WELDS OR BOLTS
6. ISOLATE ALUMINUM FROM DISSIMILAR METALS EXCEPT STAINLESS STEEL, ZINC OR WHITE BRONZE WITH BITUMINOUS PAINT. ALL FASTENERS TO BE COMPATIBLE WITH THE MATERIALS THROUGH WHICH THEY PASS.
7. DELIVER, STORE, HANDLE AND PROTECT MATERIALS FROM DAMAGE. INSTALL PLUMB AND TRUE IN EXACT LOCATIONS, SECURELY FASTENED TO THE BUILDING STRUCTURE AS DETAILED.
8. THE CONTRACTOR SHALL PROVIDE TEMPORARY BRACING DURING CONSTRUCTION. THE BRACING SHALL BE DESIGNED, INSTALLED AND MAINTAINED BY THE CONTRACTOR. THE BRACING SHALL BE REMOVED ONLY AFTER THE INSTALLATION IS COMPLETE.
9. ALL WELDS TO CONTINUOUS SEAL WELDS.
10. ALL STEELWORK SHALL BE COATED PRIOR TO DELIVERY TO THE SITE WHERE POSSIBLE. ONLY FIELD TOUCH–UP SHOULD BE REQUIRED. IF IT IS NECESSARY TO FIELD PAINT, CONTAINMENT MEASURES SATISFACTORY TO THE ENGINEER SHALL BE IN PLACE BEFORE PREPARATION AND PAINTING COMMENCE

ENVIRONMENTAL CONSTRUCTION REQUIREMENTS:

1. ENVIRONMENTAL WORK PROCEDURES, TIMING AND SPECIAL PRECAUTIONS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF FISHERIES AND OCEANS CANADA AND THE PROVINCIAL MINISTRY OF ENVIRONMENT.
2. CONTRACTOR TO FOLLOW THE REQUIREMENTS OF THE "BEST MANAGEMENT PRACTICES FOR CONSTRUCTING DOCKS AND FLOAT IN THE SOUTH COAST AREA (SUNSHINE COAST – VANCOUVER ISLAND), FISHERIES AND OCEANS CANADA", AND "BEST MANAGEMENT PRACTICES FOR PILE DRIVING AND RELATED OPERATIONS – BC MARINE PILE DRIVING CONTRACTOR'S ASSOCIATION, NOVEMBER 2003", FOR ALL WORK ON THIS PROJECT.
3. SECTION 9 NOTIFICATION AND DFO APPROVAL REQUIRED.
4. CONDITIONS OF MELP AND DFO APPROVALS TO BE FOLLOWED.
5. CONTRACTOR MUST EMPLOY METHODS TO MITIGATE HARM TO FISH AND USE DEBRIS CONTROL DEVICES WHEN DRILLING OR WORKING OVER WATER.
6. ALL DEBRIS, SAWDUST AND SHAVINGS FALLING INTO THE WATER CAUSED BY THE WORK SHALL BE CONTAINED AND PROMPTLY CLEANED UP AND PROPERLY DISPOSED OF.
7. CONTRACTOR MUST HAVE EMERGENCY SPILL EQUIPMENT AVAILABLE WHENEVER WORKING ON OR NEAR THE WATER.
8. WHEN GRINDING OR CORING CURED CONCRETE, THE DUST AND FINES ENTERING THE WATER MUST NOT EXCEED THE ALLOWABLE LIMIT FOR SUSPENDED SOLIDS. WHEN GRINDING GREEN OR INCOMPLETELY CURED CONCRETE AND THE DUST OR FINES ARE ENTERING THE WATER, pH MONITORING SHALL BE CONDUCTED TO ENSURE ALLOWABLE RANGES ARE MAINTAINED. IN THE EVENT THAT THE LEVELS ARE OUTSIDE THE ACCEPTABLE RANGES, PREVENTATIVE MEASURES SHALL BE INTRODUCED. THIS MAY INCLUDE INTRODUCING SILT CURTAINS TO CONTAIN THE SOLIDS AND PREVENT FISH FROM ENTERING A CONTAMINATED AREA OR CONSTRUCTING CATCH BASINS TO COVER THE RUN OFF AND NEUTRALIZING IT PRIOR TO DISPOSAL.
9. SPILLS: WHEN PATCHING CONCRETE, ALL SPILLS MUST BE CONTAINED AND PREVENTED FROM ENTERING THE WATER.
10. WHENEVER THERE IS THE POSSIBILITY OF CONTAMINANTS ENTERING THE WATER, THE CONTRACTOR WILL MONITOR pH LEVELS TO ENSURE ACCEPTABLE LEVELS.
11.

ABBREVIATIONS

CL.	–	CLEAR
C	–	CENTRELINE
CP.	–	COMPLETE PENETRATION
C/W	–	COMPLETE WITH
DWG.	–	DRAWING
EL.	–	ELEVATION
I.D.	–	INSIDE DIAMETER
LLH	–	LONG LEG HORIZONTAL
LLV	–	LONG LEG VERTICAL
MAX.	–	MAXIMUM
MIN.	–	MINIMUM
N.T.S.	–	NOT TO SCALE
OPP.	–	OPPOSITE
PL	–	PLATE
R	–	RADIUS
SIM.	–	SIMILAR
S.S.	–	STAINLESS STEEL
T.O.	–	TOP OF
TYP.	–	TYPICAL
U/S	–	UNDERSIDE
U.N.O.	–	UNLESS NOTED OTHERWISE
WP	–	WORK POINT



KEY PLAN
1:500

ISSUED FOR REPORT

NOT FOR CONSTRUCTION

ISSUES								
No.	DATE YYYY.MM.DD	ISSUED FOR	No.	DATE YYYY.MM.DD	ISSUED FOR	No.	DATE YYYY.MM.DD	ISSUED FOR
A	2018.12.17	CLIENT REVIEW						
B	2019.02.15	REPORT						

SUB CONSULTANT

DRAFTED PHU
DRAFTING REVIEW
DESIGNED SPS
DESIGN REVIEW

HEROLD ENGINEERING
3701 Shenton Rd, Nanaimo, BC V9T 2H1
Tel: 250–751–8558 Fax: 250–751–8559
Email: mail@heroldengineering.com

ENGINEERS SEAL

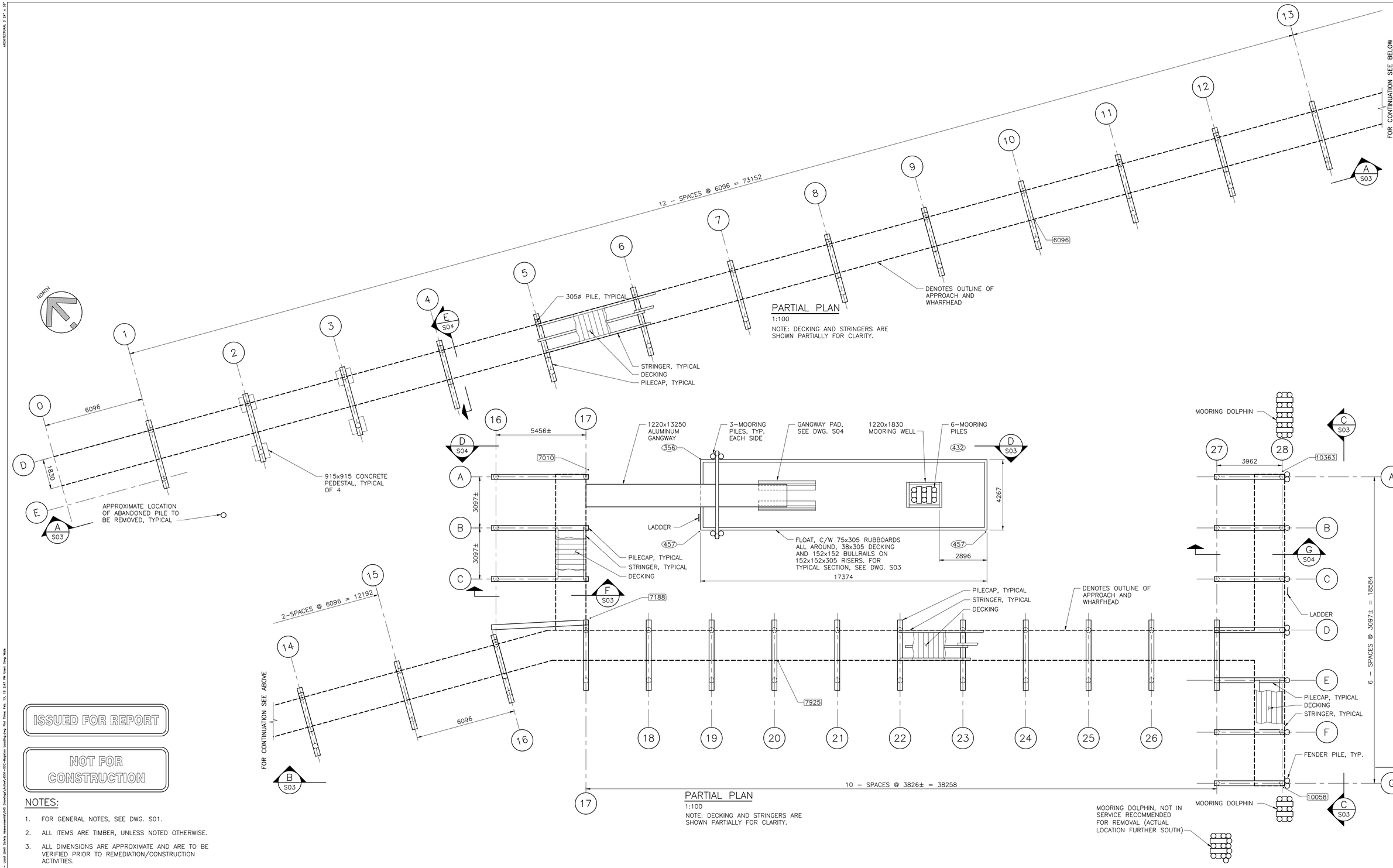
HOPKINS LANDING:
GENERAL NOTES
AND KEY PLAN

SCRD PORT FACILITIES
- LOAD LIMIT SAFETY
1975 FIELD ROAD SECHELT BC V0N 3A1
SUNSHINE COAST REGIONAL DISTRICT

HEL PROJECT No. 4551–002	CLIENT DWG. No. N/A
SCALE AS SHOWN	PERMIT No. N/A
HEL DRAWING No. S01	REVISION B

DESTROY ALL DRAWINGS SHOWING PREVIOUS REVISION

File: \\V\Projects\4551-002 SCRD Port Facilities - Load Limit Safety Assessment\045 Drawings\Autres\4551-002-Hopkins Landing.dwg Plot Time: Feb. 13, 19 2:47 PM User: Greg Wise



PARTIAL PLAN
1:100
NOTE: DECKING AND STRINGERS ARE SHOWN PARTIALLY FOR CLARITY.

PARTIAL PLAN
1:100
NOTE: DECKING AND STRINGERS ARE SHOWN PARTIALLY FOR CLARITY.

ISSUED FOR REPORT

NOT FOR CONSTRUCTION

NOTES:

1. FOR GENERAL NOTES, SEE DWG. S01.
2. ALL ITEMS ARE TIMBER, UNLESS NOTED OTHERWISE.
3. ALL DIMENSIONS ARE APPROXIMATE AND ARE TO BE VERIFIED PRIOR TO REMEDIATION/CONSTRUCTION ACTIVITIES.

ISSUES								
No.	DATE YYY.MM.DD	ISSUED FOR	No.	DATE YYY.MM.DD	ISSUED FOR	No.	DATE YYY.MM.DD	ISSUED FOR
A	2018.12.17	CLIENT REVIEW						
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SUB CONSULTANT

DRAFTED PHU
DRAFTING REVIEW
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DESIGN REVIEW

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Tel: 250-751-8558 Fax: 250-751-8559
Email: mail@heroldengineering.com

ENGINEERS SEAL

HOPKINS LANDING: GENERAL ARRANGEMENT - SHEET 1

SCRD PORT FACILITIES - LOAD LIMIT SAFETY

1975 FIELD ROAD SECHELT BC V0N 3A1
SUNSHINE COAST REGIONAL DISTRICT

HEL PROJECT No.	CLIENT DWG. No.
4551-002	N/A
SCALE: AS SHOWN	PERMIT No.: N/A
HEL DRAWING No.: S02	REVISION: B

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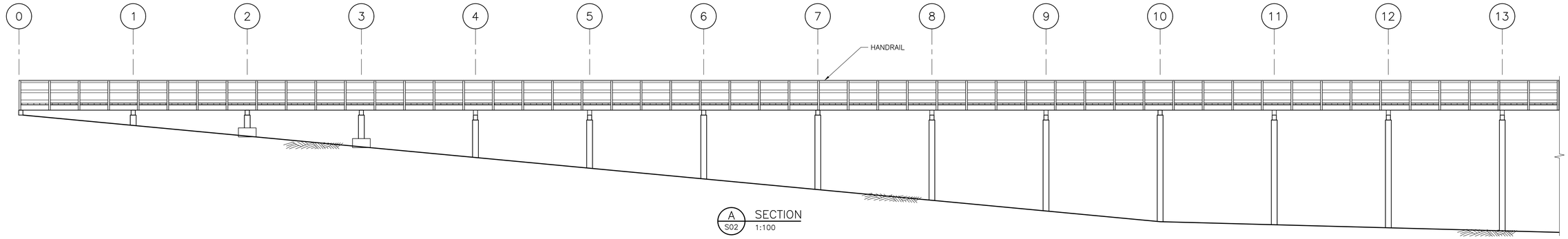

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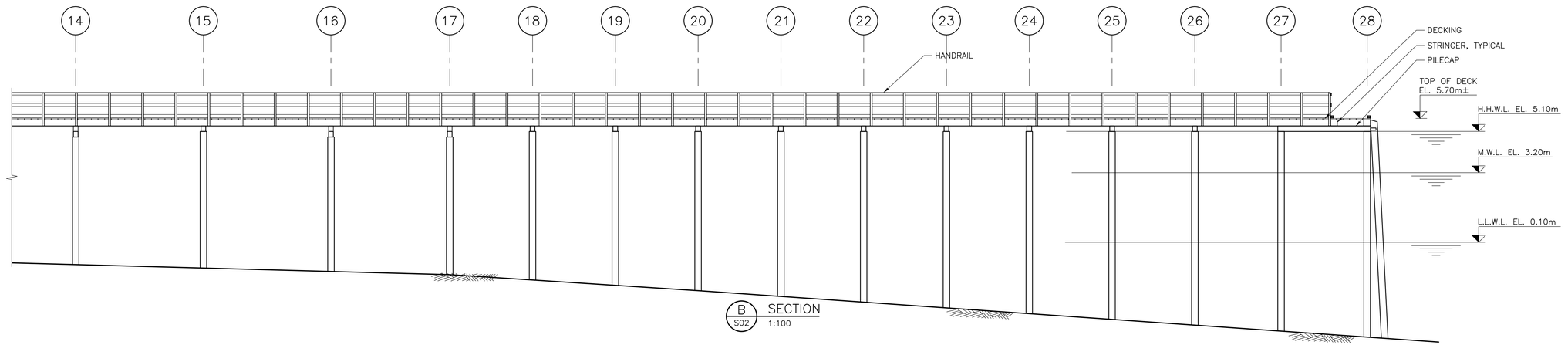

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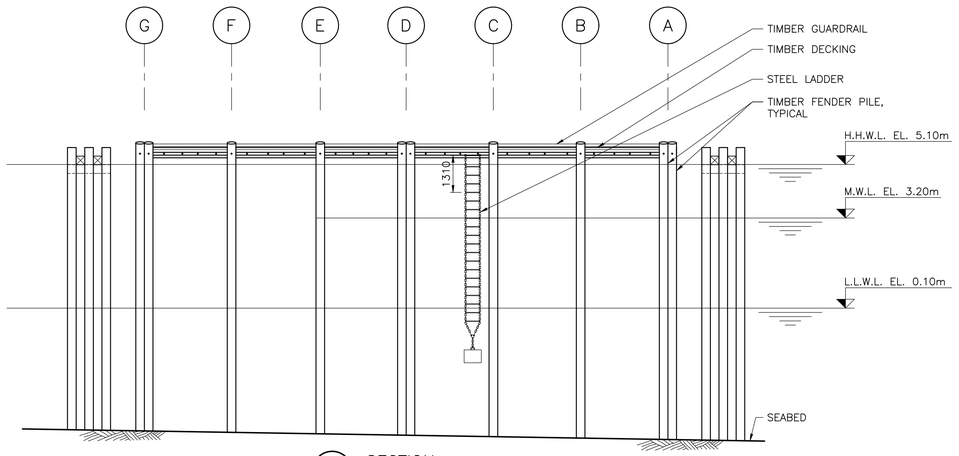

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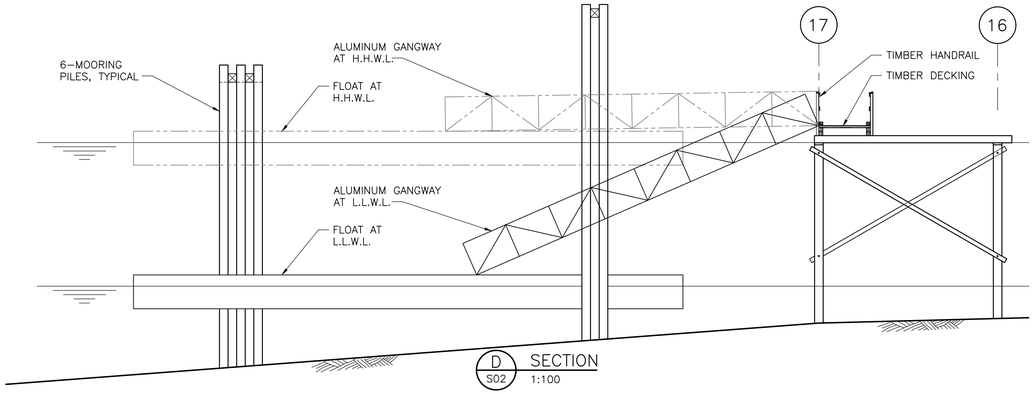

D S02 SECTION 1:100

ISSUED FOR REPORT

NOT FOR CONSTRUCTION

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ISSUES

No.	DATE YYYY.MM.DD	ISSUED FOR
A	2018.12.17	CLIENT REVIEW
B	2019.02.15	REPORT

SUB CONSULTANT

DRAFTED PHU

DRAFTING REVIEW

DESIGNED SPS

DESIGN REVIEW

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ENGINEERS SEAL

HOPKINS LANDING: GENERAL ARRANGEMENT - SHEET 2

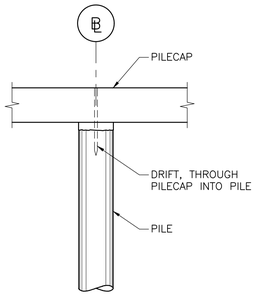
SCRD PORT FACILITIES - LOAD LIMIT SAFETY

1975 FIELD ROAD SECHELT BC V0N 3A1

SUNSHINE COAST REGIONAL DISTRICT

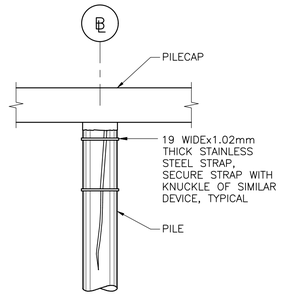
HEL PROJECT No.	CLIENT DWG. No.
4551-002	N/A
SCALE: AS SHOWN	PERMIT No.: N/A
HEL DRAWING No.: S03	REVISION: B

DESTROY ALL DRAWINGS SHOWING PREVIOUS REVISION



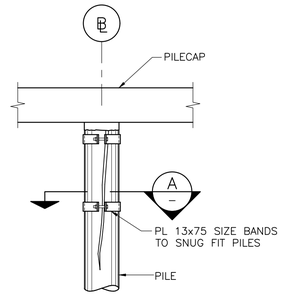
PILE TO PILECAP CONNECTION
1:25

NOTE: STRINGERS, DECKING AND BRACING NOT SHOWN.



PILE STRAPPING DETAIL
1:25

NOTE: STRINGERS, DECKING AND BRACING NOT SHOWN.



PILE BANDING DETAIL
1:25

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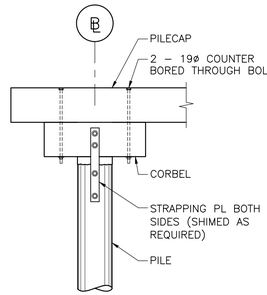
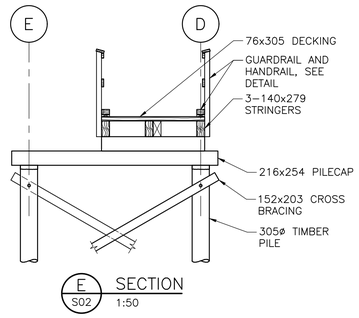
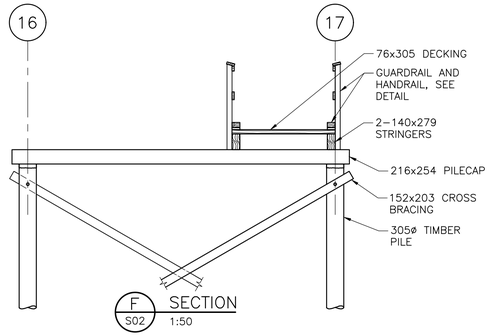


TYPICAL CORBEL DETAIL
1:25

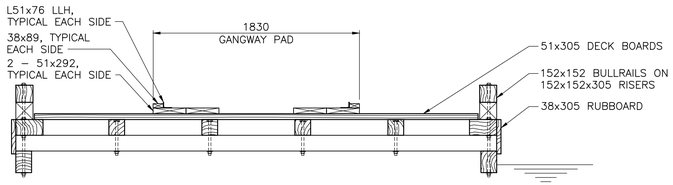
NOTE: STRINGERS, DECKING AND BRACING NOT SHOWN.



E S02 SECTION
1:50

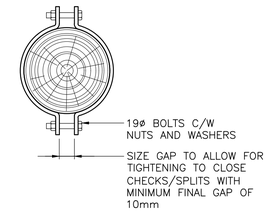


F S02 SECTION
1:50

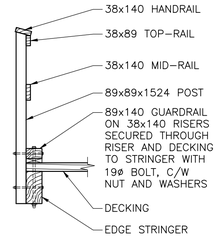


TYPICAL SECTION THROUGH FLOAT
1:25

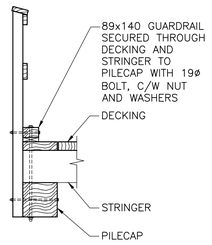
FLOAT DETAILS BELOW WATERLINE AND DECK NOT CONFIRMED AS THEY ARE OUTSIDE OF PROJECT SCOPE. ITEMS BELOW WATERLINE SUCH AS STRINGERS, FLANGES, ETC. ARE SHOWN MERELY FOR CONVENIENCE.



A – SECTION
1:10



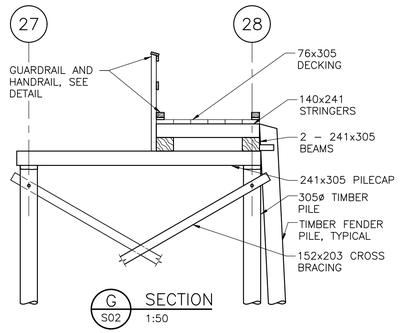
SECTION – HANDRAIL PARALLEL TO STRINGER



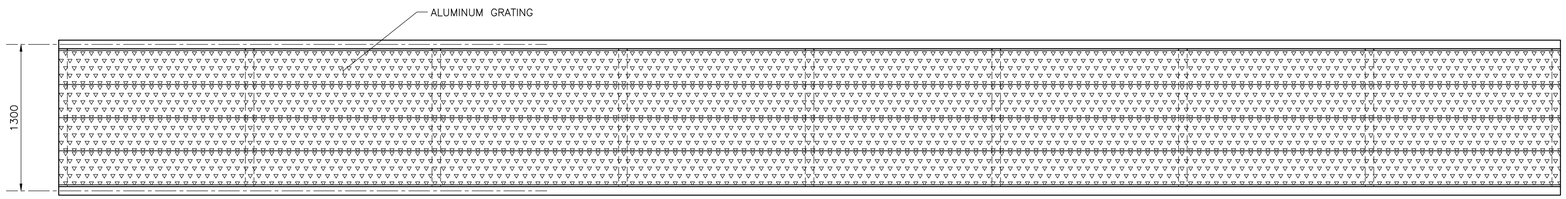
SECTION – HANDRAIL PARALLEL TO PILE CAP

NOTE: SIMILAR TO SECTION – HANDRAIL PARALLEL TO STRINGER, UNLESS NOTED OTHERWISE.

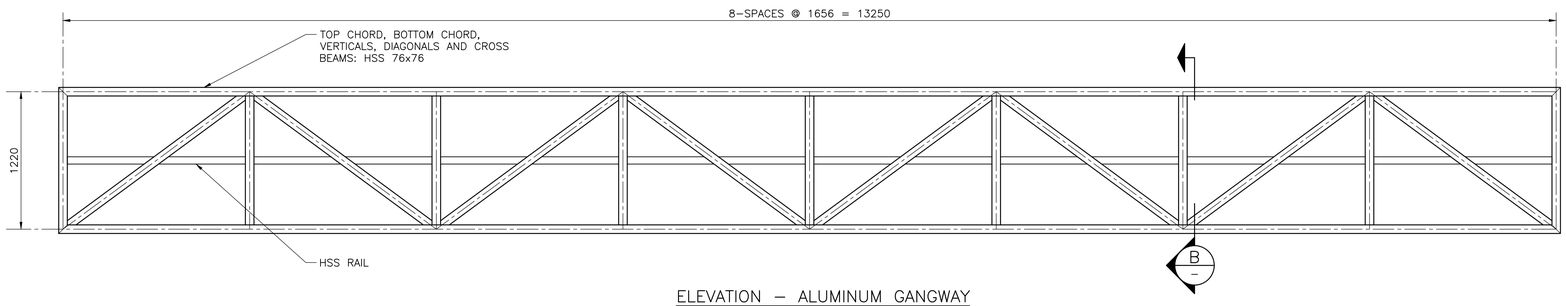
HANDRAIL AND GUARDRAIL DETAILS
1:25



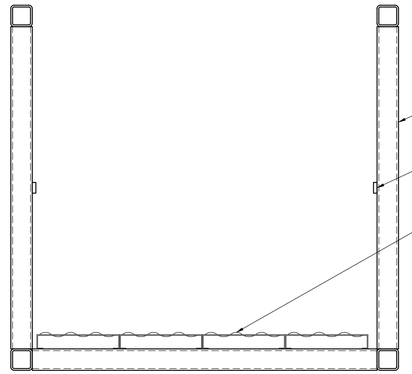
G S02 SECTION
1:50



PLAN – ALUMINUM GANGWAY
1:25



ELEVATION – ALUMINUM GANGWAY
1:25



B – SECTION
1:10

ISSUED FOR REPORT

NOT FOR CONSTRUCTION

NOTES:

1. FOR GENERAL NOTES, SEE DWG. S01.
2. ALL ITEMS ARE TIMBER, UNLESS NOTED OTHERWISE.
3. ALL DIMENSIONS ARE APPROXIMATE AND ARE TO BE VERIFIED PRIOR TO REMEDIATION/CONSTRUCTION ACTIVITIES.

ISSUES

No.	DATE YYYY.MM.DD	ISSUED FOR
A	2018.12.17	CLIENT REVIEW
B	2019.02.15	REPORT

SUB CONSULTANT

DRAFTED PHU
DRAFTING REVIEW
DESIGNED SPS
DESIGN REVIEW

HEROLD ENGINEERING
3701 Shenton Rd, Nanaimo, BC V9T 2H1
Tel: 250–751–8558 Fax: 250–751–8559
Email: mail@heroldengineering.com

ENGINEERS SEAL

HOPKINS LANDING: DETAILS

SCRD PORT FACILITIES
- LOAD LIMIT SAFETY
1975 FIELD ROAD SECHELT BC V0N 3A1
SUNSHINE COAST REGIONAL DISTRICT

HEL PROJECT No.	CLIENT DWG. No.
4551–002	N/A
SCALE: AS SHOWN	PERMIT No.: N/A
HEL DRAWING No.: S04	REVISION: B

DESTROY ALL DRAWINGS SHOWING PREVIOUS REVISION

APPENDIX D
Herold Engineering Damage Table

3701 Shenton Road
Nanaimo, BC V9T 2H1
Ph: 250-751-8558 Fax: 250-751-8559

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
Approach **all locations measured from abutment (Bent 0) datum (0m)*						
Approach	Substructure	Mechanical/Biological/Repairs	Poor	There is severe biological growth, decay and damage throughout the substructure. There are several unstable corbel repairs arrangements. The bearing piles have moderate splitting at the tops.	A dive inspection is recommended to ascertain the submerged condition. The substructure is recommended for replacement in its entirety within the next 1-3 years.	2019 - 2022
Handrail	Overall	Mechanical/Biological/Repair	Poor-Fair	There is significant biological growth along the exterior surfaces of the members. The damage is generally more severe at the seaward end. There are several posts which have significant decay at the connections to the handrail timbers. There is evidence of ongoing replacement with untreated timber, which is not suitable for the marine environment and will have a reduced service life.	Power-wash the superstructure along the approach length. The handrails are recommended for replacement with treated timber elements within the next 1-3 years.	2019
Handrail	Gridline D and E @ 37.19m	Biological	Poor	There are splices in the guard at this location. The guard is secured to the handrail post and all elements are significantly decayed.	Replace 89x89x1524mm long timber handrail post within the next year.	2019
Handrail	Gridline E @ 43.59m	Mechanical	Fair-Poor	>1m long split along the mid-rail length. The mid-ral is not treated and will have a reduced service life in the marine environment.	Ongoing monitoring. Consider replacement of the 38x140 mid-rail timber within the next 1-3 years.	2019 - 2022
Handrail	Gridline E @ 65.23m	Mechanical	Fair-Poor	>1m long split along the mid-rail length. The mid-rail is not treated and will have a reduced service life in the marine environment.	Ongoing monitoring. Consider replacement of the 38x140 mid-rail timber within the next 1-3 years, with treated timber.	2019 - 2022
Handrail	Gridline D @ 100.58m	Mechanical/Biological	Poor	Significant splitting along the length of the top-rail, with evidence of internal biological damage and decay.	Replace 38x89x4877mm long length of top-rail within the next year.	2019
Handrail	Gridline D @ 107.9m	Mechanical/Biological	Poor	Significant biological growth along the exterior surfaces of the timbers. Severe cracking in the handrail post between the mid and top rail connections.	Replace 4877mm long lengths of 38x140 handrail, mid-rail and 38x89 top rail, as well as 89x89x1524mm long timber post within the next year.	2019
Handrail	Gridline E @ 110.34m	Mechanical	Poor	Significant split along the length of the handrail. Evidence of minor biological damage at the handrail locations.	Replace the 89x89x1524mm long timber post within the next year.	2019
Handrail	Gridline D @ 119.79m	Mechanical	Poor	Severe split along the length of the handrail. Evidence of minor biological damage at the handrail locations.	Replace the 89x89x1524mm long timber post within the next year.	2019
Handrail	Gridline E @ 131.98m	Mechanical	Poor	Significant check in handrail at the connection with the post. There is evidence of minor splitting, biological damage, and weathering.	Replace 38x140x4877mm long handrail within the next year.	2019

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
Guard	Overall	Mechanical/Biological	Poor-Fair	Severe checking, splitting and CSL due to mechanical and biological damage. Significant biological growth on the exterior surfaces of the timbers.	Power-wash the approach superstructure. Replace the 89x140 guard along either side of the approach length within the next 1-3 years.	2019
Guard	Gridlines D and E @ 0m	Mechanical/Biological	Fair-Poor	Significant vegetative growth encroaching on the guard. Evidence of moisture accumulation and biological damage due to decay.	Replace 89x140 guard on either side of the approach within the next year.	2019
Guard	Gridline E @ 26.52m	Mechanical/Biological	Poor	Significant check in the guard with evidence of biological damage and decay.	Power-wash the approach superstructure. Replace the 89x140 guard within the next year.	2019
Guard	Gridline D @ 31.10m	Mechanical/Biological	Poor	Significant check in the guard with evidence of biological damage and decay.	Power-wash the approach superstructure. Replace the 89x140 guard within the next year.	2019
Guard	Gridline D and E @ 37.19m	-	Poor	Splices in the guard do not have risers, and the hardware has been secured to the handrail post. There is significant biological damage to the guard at the splice locations, and the hardware is no longer securing the guard to the post. The post is also significantly decayed.	Power-wash the approach superstructure. Replace four (4) lengths of the 89x140 guard at the splice locations within the next year.	2019
Guard	Gridline D @ 59.44m	Mechanical	Fair	Moderate check in the guard with approximately 10-15% CSL. The guard is not treated at this location.	Power-wash the approach superstructure. Replace the 89x140 guard along either side of the approach length within the next 1-3 years, with treated timber.	2019
Guard	Gridline E @ 131.98m	Mechanical/Biological	Poor	Moderate splitting at the connection point. Exposed bolt holes are present and the internal cross section is soft when probed.	Power-wash the approach superstructure. Replace 89x140x6100mm long guard within the next year.	2019
Guard	Gridline E @ 138.4m		Poor	Significant splitting along the length of the guard with evidence of biological damage and decay.	Power-wash the approach superstructure. Replace 89x140x6100mm long guard within the next year.	2019
Risers	Overall	Mechanical/Biological	Poor-Fair	Significant biological growth along the exterior surfaces of the timbers. Several risers are severely decayed.	Power-wash the approach superstructure. Replace the 38x140x305mm long risers with the next 1-3 years.	2019
Decking	Overall	Biological	Fair	Significant accumulation of biological growth. Moderate amounts of splitting and checking due to weathering and mechanical damage. There is evidence of ongoing repairs.	Power-wash the decking and monitor for further deterioration.	2019
Stringers	Overall	Biological	Fair-Good	Moderate amounts of biological growth along the exterior surfaces of the stringers. Inspection was limited due to accessibility.	Ongoing monitoring. Coring of the elements is recommended during the next scheduled inspection to ascertain the condition of the internal cross section.	

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
Pilecap	Overall	Biological	Fair-Good	Moderate amounts of biological growth along the exterior surfaces of the pilecaps. Inspection was limited due to accessibility.	Ongoing monitoring. Coring of the elements is recommended during the next scheduled inspection to ascertain the condition of the internal cross section.	
Pilecap	Bent 9, lower cap	Mechanical	Fair	Pilecap has a minor-moderate amounts of checking, and is not in complete bearing with Pile 9E.	Secure the pilecap to the bearing pile, and monitor for further deterioration.	2019
Pilecap	Bent 11, upper	Biological	Very Poor	Significant damage to the cross section due to biological damage and decay. There is a severe split along the pile length.	Replace 216x254 timber pilecap.	2019
Pilecap	Bent 12, upper cap	-	Fair	Pilecap is not in complete bearing with lower pilecap.	Secure upper cap to lower cap using metal strapping or steel angle straps.	2019
Bearing Pile	Overall	Mechanical/Biological/Repair	Fair-Poor	Several piles have been replaced and/or have corbel arrangements which are not currently stable. Select timber piles have been replaced with concrete piles. The timber piles have moderate amounts of splitting within the top 2m and have moderate amounts of biological growth above the waterline.	All repairs (below) are recommended. A dive inspection is also recommended to determine the condition of the submerged length of pile. Subject to a dive inspection it is recommended that the timber bearing piles are to be replaced within the next 3-5 years.	2022 - 2024
Bearing Pile	5D	Repair	Good	Concrete pile at this location.	Ongoing monitoring.	
Bearing Pile	5D	Repair	-	There is an abandoned timber bearing pile at this location.	Ongoing monitoring. Consider for removal if the pile becomes a safety and/or navigation hazard.	
Bearing Pile	5E	Repair	Very Poor	Double corbel between pilecap and bearing pile. There is no metal strapping securing the arrangement.	The arrangement exceeds the maximum number of corbels prior to instability of the arrangement. Remove the repair and replace the 305Ø bearing pile providing at maximum one intermediate corbel. Secure the arrangement with metal strapping or steel angle straps.	2019
Bearing Pile	7D	Repair	Fair	Double corbel between pilecap and bearing pile. The arrangement is secured with a thru-bolt/drift pin.	Ongoing monitoring.	
Bearing Pile	9E	Repair	Good	Concrete pile at this location.	Ongoing monitoring.	
Bearing Pile	9E	-	Very Poor	Pilecap is not in complete bearing with pile, and there does not seem to be a connection between the pilecap and the concrete pile.	Secure the timber pilecap to the concrete bearing pile.	2019
Bearing Pile	11D	Repair	Good	Single corbel between pilecap and bearing pile.	Ongoing monitoring	
Bearing Pile	13D	Repair	Very Poor	Double corbel between pilecap and bearing pile. There is also an upper pilecap at this location.	The arrangement exceeds the recommended maximum number of corbels for stability.	2019

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
				The arrangement is secured with a metal strapping.	Remove the repair and replace the 305Ø bearing pile.	
Bearing Pile	13E	Repair	Good	Concrete pile at this location.	Ongoing monitoring.	
Bearing Pile	15E	Repair	Fair	Single corbel between bearing pile and lower pilecap. The arrangement is secured with thru-bolts/drift pins.	Ongoing monitoring.	
Bearing Pile	16D	Repair	Very Poor	Double corbel repair between lower pilecap and bearing pile. The arrangement exceeds the number of corbels/pilecaps to remain stable. The arrangement is secured with thru-bolts.	Replace the pile and provide (at maximum) three corbels/pilecaps between the stringers and the bearing pile.	2019
Bearing Pile	16E	Repair	Fair	Single corbel between pilecap and bearing pile. The arrangement is secure with thru-bolts/drift pins.	Ongoing monitoring.	
Bearing Pile	17D	Repair	Very Poor	Double corbel repair between lower pilecap and bearing pile. The arrangement exceeds the number of corbels/pilecaps to remain stable. The arrangement is secured with thru-bolts/drift pins.	Replace the pile.	2019
Bearing Pile	18D	Repair	Good	Concrete pile at this location.	Ongoing monitoring.	
Bearing Pile	18E	Repair	Fair-Poor	Double corbel repair between lower pilecap and bearing pile. The arrangement is secured with steel angle straps.	Ongoing monitoring.	
Bearing Pile	19E	Repair	Very Poor	Single corbel between pilecap and bearing pile. The arrangement does not appear to be secured.	Install thru-bolts, drift pin or metal strapping to secure the arrangement.	2019
Bearing Pile	20E	Repair	Very Poor	Single corbel between pilecap and bearing pile. The arrangement does not appear to be secured.	Install thru-bolts, drift pin, or metal strapping to secure the arrangement.	2019
Bearing Pile	21D	Mechanical	Fair-Poor	1m long split at the top of the pile.	Install metal strapping. Ongoing monitoring.	2019
Bearing Pile	22D	Repair	Very Poor	Single corbel is not secured to the bearing pile nor the pilecap and the corbel has twisted significantly.	The arrangement is not stable. Re-align the corbel and secure to the pile & pilecap with thru-bolts and/or metal strapping.	2019
Bearing Pile	22E	Repair	Fair	Double corbel repair between lower pilecap and bearing pile. The arrangement is secured with thru-bolts/drift pin.	Ongoing monitoring.	
Longitudinal Bracing	Overall	Missing	Very Poor	There is incomplete longitudinal bracing along the approach, as such there is minimal restraint in this direction.	Ongoing monitoring. Consider installation of longitudinal lateral bracing when the substructure is replaced (as recommended above)	
Cross Brace	Overall	Mechanical/Biological	Fair-Good	Minor mechanical damage due to impact and abrasion.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the submerged timber elements.	

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
Cross Brace	$6D^{TOP}$-$6E^{BOT}$	Missing	Very Poor	There is no cross brace at this location.	Install cross brace at this location. Size not determined due to accessibility.	2019
Wharfhead						
Handrail	Bent 27	Mechanical/Biological/Repair	Poor	There is significant biological growth along the exterior surfaces of the members. There are several posts which have significant decay at the connections to the handrail timbers. There is evidence of ongoing replacement/repairs with untreated timber.	Power--wash the superstructure along its length. The handrails are recommended for replacement with treated timber elements within the next year.	2019
Guard	Overall	Mechanical/Biological	Poor-Fair	Moderate checking, splitting and CSL due to mechanical and biological damage. Significant biological growth on the exterior surfaces of the timbers.	Power-wash the structure along its length. The guards and risers are recommended for replacement with treated timber elements within the 1 – 3 years	2019 - 2022
Risers	Overall	Mechanical/Biological	Poor-Fair	Significant biological growth along the exterior surfaces of the timbers. Several risers are significantly decayed.	Power-wash the structure along its length. The risers and guards are recommended for replacement with treated timber elements within the 1 – 3 years	2019 - 2022
Decking	Overall	Biological	Fair	Significant accumulation of biological growth. Moderate amounts of splitting and checking due to weathering and mechanical damage. There is evidence of ongoing repairs.	Power-wash the decking and monitor for further deterioration.	2019
Stringers	Overall	Biological	Fair-Good	Moderate amounts of biological growth along the exterior surfaces of the stringers. Inspection was limited due to accessibility.	Ongoing monitoring. Power-wash the elements to remove biological growth. Coring of the elements is recommended during the next scheduled inspection to ascertain the condition of the internal cross section.	2019
Pilecap	Overall	Biological	Fair-Good	Moderate amounts of biological growth along the exterior surfaces of the pilecaps. Inspection was limited due to accessibility.	Ongoing monitoring. Power-wash the elements to remove biological growth. Coring of the elements is recommended during the next scheduled inspection to ascertain the condition of the internal cross section.	2019
Bearing Pile	Overall	Mechanical	Good	Moderate amounts of splitting due to mechanical damage and weathering at the tops of the piles. The inspection was limited by accessibility.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the submerged length of pile.	

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
Bearing Pile	27A	Repair	Good	Concrete pile at this location.	Ongoing monitoring.	
Bearing Pile	27C	Repair	Good	Concrete pile at this location.	Ongoing monitoring.	
Bearing Pile	27G	Repair	Fair	Double corbel between the bearing pile and pilecap. The arrangement has been secured using metal strapping and thru-bolts.	Ongoing monitoring.	
Bearing Pile	28F	Mechanical	Poor	Moderate check at cross brace connection hardware at the top of the bearing pile.	Ongoing monitoring. Coring of the pile is recommended at the next scheduled inspection.	
Cross Brace	Overall	Mechanical	Fair-Good	Moderate amounts of splitting due to mechanical damage and abrasion. Two cross braces have moderate amounts of splitting at the hardware locations and have been repaired.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the submerged portions of cross brace, including hardware.	
Cross Brace	$27D^{TOP}$-$28D^{BOT}$	Repair	Fair	Metal banding around top of cross brace at hardware location.	Ongoing monitoring.	
Cross Brace	$27F^{TOP}$-$28F^{BOT}$	Repair	Fair	Metal banding around top of cross brace at hardware location.	Ongoing monitoring.	
Fender Chocks	Overall	Mechanical/Biological	Fair-Good	Moderate amounts of biological growth and splitting of the timber.	Power-wash the superstructure and monitor elements for further deterioration.	2019
Fender Pile	Overall	Mechanical/Biological	Fair-Good	Moderate splitting in the top 3m of the piles. Biological growth has accumulated along the tops of the piles.	Monitor elements for further deterioration.	
Gangway Approach						
Handrail	Overall	Mechanical/Biological/Repair	Poor-Fair	There is significant biological growth along the exterior surfaces of the members. There are several posts which have severe decay at the connections to the handrail timbers. There is evidence of ongoing replacement with untreated timber, which is not suitable for the marine environment and will have a reduced service life.	Power-wash the superstructure along the approach length. The handrails are recommended for replacement with treated timber elements within the next 1-3 years.	2019
Guard	Overall	Mechanical/Biological	Very Poor	Significant internal cross sectional loss due to biological damage extending along the lengths of the guard. Vegetative growth has accumulated at the splits in the timber.	Replace entire 89x140 timber guard on the gangway approach (approximately 17680mm total length).	2019
Risers	17A-17D	Missing	Very Poor	Missing risers in this location, the guard is significantly deteriorated and requires replacement.	Install 38x140x305mm long risers at a maximum 1524mm spacing when replacing the guard timber.	2019
Risers	Overall	Mechanical/Biological/Missing	Poor	Significant biological damage and decay. Risers are missing along one edge of the approach.	Replace 38x140x305mm long risers at a maximum 1524mm spacing when replacing the guard timbers.	2019

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
Decking	Overall	Mechanical/Biological	Fair-Good	Moderate amounts of biological growth along the cut ends and walking surface of the decking.	Ongoing monitoring. Power-wash the deck to remove biological growth.	2019
Stringers	Overall	Biological	Fair-Good	Moderate amounts of biological growth along the exterior surfaces of the stringers. Inspection was limited due to accessibility.	Ongoing monitoring. Power-wash the elements to remove biological growth. Coring of the elements is recommended during the next scheduled inspection to ascertain the condition of the internal cross section.	2019
Pilecap	Overall	Biological	Fair-Good	Moderate amounts of biological growth along the exterior surfaces of the pilecaps. Inspection was limited due to accessibility.	Ongoing monitoring. Power-wash the elements to remove biological growth. Coring of the elements is recommended during the next scheduled inspection to ascertain the condition of the internal cross section.	2019
Bearing Pile	Overall	-	Good	The above water portions of the piles are in good condition.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the submerged portion of the timber elements.	
Cross Bracing	Overall	Mechanical	Good	Moderate amounts of splitting due to mechanical damage and abrasion.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the submerged cross brace lengths.	
Gangway						
Aluminum Truss	Overall	-	Good	The aluminum truss is in good condition.	Ongoing monitoring.	
Serrated Aluminum Grating	Overall	-	Good	The decking is in good condition.	Ongoing monitoring.	
Landing Pad	Overall	Mechanical/Biological	Fair-Good	Moderate splitting of the timber elements and evidence of biological damage to the cut ends. Moderate amounts of surface corrosion to the guide angles.	Ongoing monitoring. Power-wash the float superstructure to remove biological growth.	2019
Float						
Float	Overall	Mechanical/Biological	Fair	Moderate amounts of biological growth and decay to the superstructure timbers and visible substructure elements. Moderate amounts of CSL due to abrasion, splitting and checking of the timber.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the substructure and floatation.	
Bullrails	Overall	Mechanical/Biological	Fair-Good	Moderate amounts of mechanical damage due to abrasion and weathering. Moderate biological growth along the surface of the timber	Power-wash the float superstructure. Ongoing monitoring.	2019

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
				elements with biological damage (softness) at the cut ends.		
Risers	Overall	Mechanical/Biological	Fair	Moderate amounts of biological growth and decay. Checking and splitting due to weathering.	Power-wash the float superstructure. Ongoing monitoring.	2019
Pile Well Guards	Overall	Biological	Fair-Good	Moderate-minor biological growth on the exterior surfaces of the pile well guard.	Power-wash the float superstructure. Ongoing monitoring.	2019
Decking	Overall	Biological	Good	Minor amounts of splitting and mechanical damage due to weathering. Minor amounts of biological growth.	Power-wash the float superstructure. Ongoing monitoring.	2019
Rubboards	Overall	Mechanical/Biological	Fair-Poor	Localized areas where the rubboard has been replaced. Minor amounts of biological growth and abrasion above the water line. One area requires replacement (below).	Power-wash the float superstructure. Ongoing monitoring.	2019
Rubboards	East edge of float	Mechanical/Biological	Very Poor	The rubboard has 75% CSL along the full length, and has exposed the float substructure.	Replace with 75x305x4267mm long timber rubboard.	2019
Mooring Piles	Overall	Mechanical/Biological	Fair-Good	The mooring piles have minor-moderate mechanical damage due to abrasion in the intertidal zone.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the submerged portion of the piles.	
Mooring Piles	East mooring dolphin, southwest pile	Mechanical	Fair-Poor	Significant damage due to abrasion with compromise of the treated layer.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the submerged portion of the damage.	
Floatation	Overall	-	Good	The freeboard around the float perimeter is within acceptable limits.	Ongoing monitoring. A dive inspection is recommended to ascertain the condition of the substructure and floatation.	
Health & Safety						
Handrail	Overall	Safety	-	Handrails do not conform to current OH&S standards. They are climbable, and have openings larger than 102mm at a high which exceeds 610mm.	It is recommended that timber pickets be installed with a maximum clear spacing of 102mm to the inside face of the handrails. Alternatively, chain link fencing may also be used.	
Handrail	Bent 28, Gridlines A and G	Safety	Very Poor	There is no handrail system. The wharfhead is only 1830mm wide and is not recommended to be accessible without a guard around the perimeter.	Install handrail system along the specified edges of the wharfhead.	
Decking	Gridline A to Gridline B	Safety	Poor	Two deck boards are 13mm thicker than the surrounding decking. This is a potential tripping hazard.	Replace two (2)-89x305x1854mm long deck boards with (2)-75x305x1854mm long deck boards.	2019
Gangway	Overall	Safety	-	The gangway exceeds a slope of 2% during low tides. This 2% slope is the maximum slope	Should the SCRD require wheelchair access for the facilities, reconfiguration of the facility is recommended.	

Item	Location	Damage	Condition	Comments	Recommendation	Remediation Year
				allowed per OH&S wheelchair access.		
Safety Ladder	28C-28D	Safety	-	Top grab rail is secured to fender chock.	This arrangement is not recommended, the grab rail should be installed on top of the guard timber to provide proper egress from the water.	
Safety Ladder	28C-28D	Safety	-	No signage present.	Provide ladder signage of both the seaward and shoreward faces of the guard at ladder location.	
Life Ring	-	Safety	-	No Life Ring Present	Install Life Ring with Mounting	
Fire Suppression	Overall	Safety	-	There is no fire suppression (extinguisher, water services, etc.) at the facility.	It is recommended that fire suppression measures be considered at the facility.	
Derelict Mooring Dolphin	South of the facility aligned with wharfhead.	Safety	Very Poor	There is a severely deteriorated timber mooring dolphin adjacent to the facility. There is evidence of a makeshift timber ladder installed on the seaward face, indicating that the structure may be being used as a diving platform by the public.	This structure is not in serviceable condition and has several submerged elements which may harm the public if used as a diving platform. The timbers are severely decayed and it is not recommended that the structure be removed.	
Derelict Mooring Dolphin	North of Gridline A	Safety	Very Poor	There is a severely deteriorated timber mooring dolphin adjacent to the facility. This dolphin can be accessed from the wharfhead.	This structure is not in serviceable condition and has several submerged elements which may harm the public and/or become a navigational hazard. The timbers are severely decayed. It is recommended that the structure be removed.	
Abandoned Timber Pile	South of Bent 10 (approx.)	Safety	Very Poor	There is a cut off timber pile adjacent to the facility and is potentially a navigational hazard for boaters.	Remove the timber pile.	