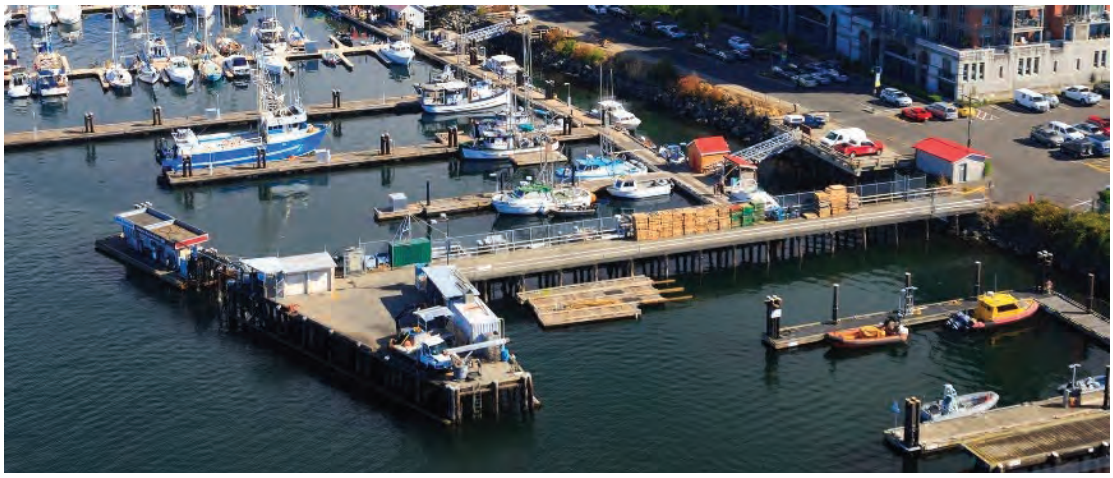
GREATER VICTORIA HARBOUR AUTHORITY

Request for Expression of Interest (RFEOI) to Develop and Operate a Fueling Facility and Commercial Pier at the Fisherman's Wharf, Victoria BC.

RFEOI # 2020– 28013



Issued February 24, 2020

RFEOI Due: Thursday April 23, 2020

14.00 hrs. Pacific Daylight Time

1.0 Invitation

The Greater Victoria Harbour Authority ("GVHA") is seeking experienced and qualified Respondents to Design, Finance, Build, Maintain and Operate a Marine Fuel Dock, with the potential to include the upgrade or redevelopment of Huron Pier as part of an integrated development opportunity at Fisherman's Wharf, Victoria BC. This RFEOI is seeking written Expressions of Interest (EOI) from interested parties.

The current fuel dock facility is nearing end of life and is critical to local and regional fueling of commercial and recreational vessels. The fuel dock is attached to Huron Pier, by which fuel lines are secured supplying an upper (pier) and lower (dock) dispensing system. Respondents are also invited to consider upgrading or redeveloping Huron Pier as part of their EOI.

The Fuel Dock Replacement is a priority of GVHA; therefore, Respondents may opt to:

1. **Respond to the Fuel Dock opportunity only, or**
2. **provide an integrated proposal for both assets that could be phased within a reasonable timeframe.**

This document outlines the prerequisites, requirements, selection process and documentation necessary to submit an RFEOI for the Opportunity.

The purpose of this RFEOI is to:

- Raise awareness of the opportunity,
- Seek EOIs from interested parties with the necessary experience and capability to deliver the type of products and/or services the opportunity may require,
- Shortlist Respondents to proceed to a possible Request for Detailed Proposals stage of the procurement process at a future date.

This RFEOI document describes the information and qualification sought by the GVHA, and sets out the GVHA's RFEOI process, evaluation, selection process, and submission requirements. A Respondent makes a submission under this RFEOI for information only. A submission does not entitle or oblige the Respondent or the GVHA to enter into any contractual relationship with each other.

2.0 Objectives of the RFEOI

Respondents should in their EOIs demonstrate the ability and clear commitment to implement an operation that will meet the following objectives:

- Develop, construct, equip, operate and maintain a high-quality facility to ensure full compliance with local, provincial and federal legislature and regulations;
- Maintain concession facilities and premises in good condition in accordance with GVHA standards set out in a future Operating Agreement or other contract;
- Work effectively with the Local Fisherman's Wharf Residential and Commercial Community;
- Provide quality customer service;
- Provide quality, variety and unique products suited to the market;
- Introduce and maintain value for money and competitive value pricing;
- Maximize sales and optimize revenues;
- Be responsive to the changing needs of the local boating and working harbour community; and
- Provide reasonable financial compensation to GVHA.

3.0 Background

GVHA was incorporated as a not-for-profit corporation in February 2002 under the BC Society Act. GVHA's Board is comprised of Directors representing its member agencies and organizations (Esquimalt Nation, Songhees Nation, City of Victoria, Township of Esquimalt, the Victoria/Esquimalt Harbour Society, Destination Greater Victoria, the Greater Victoria Chamber of Commerce, and the Capital Regional District). It also comprises four independent Directors.

GVHA is responsible for the operation, maintenance and development of waterfront lands and facilities located on Victoria's Inner and Outer harbour, including Ogden Point, Fisherman's Wharf, the Steamship Terminal, the Lower Causeway, Ship Point and Wharf Street, as well as the Hyack Air Terminal. GVHA receives no government grants or subsidies by taxpayers for its operations. GVHA must pay property taxes and operate its facilities as a self-sustaining business, while at the same time facilitating the economic development of the local community.

Acting as an advocate for the harbour, GVHA is working to improve its function as a working harbour and a marine transportation centre with a strong focus on tourism.

Vision

We envision:

- A harbour where people live, learn, work, and play; a spectacular gateway into Victoria's past and into its future, monumental in look and feel, linking communities and all people together.

- A GVHA organization that is recognized by the community as an effective marine asset manager, and as a trusted advocate and partnership, working for the common good of the Harbour and the Region.

Mission

In fulfilling our Constitution, we perform three distinct yet complementary roles:

- Owners and managers of the properties entrusted to us through divestiture or under lease;
- Advocates for best water and marine-related use and development of the whole Harbour and its assets, regardless of ownership, in accordance with our guiding principles; and
- Partners or collaborators with others in implementing Harbour initiatives that drive economic, social and environmental benefits for the Region.

Guiding Principles

GVHA's actions and decisions will be guided by the following principles:

- First Nations Relationship - We commit to working in partnership with the Esquimalt Nation and the Songhees Nation as they pursue their cultural and economic aspirations in the Harbour.
- Financial Self-Sustainability – We commit to structuring and managing GVHA in a financially prudent manner, and to ensuring the long-term sustainability of the organization and its assets without recourse to local subsidies.
- Working Harbour - We commit to promoting the Harbour as a working Harbour seeking out opportunities to help advance industrial, commercial and tourism related enterprises – "where commerce requiring the connection between the land and water takes place".
- Triple Bottom Line - We commit to generating broad economic and social benefit from the use of our properties, while continuously mitigating adverse social and environmental impacts in local neighbourhoods and to our land, air and water.
- Accountability - We commit to act in the public interest of the Harbour on behalf of GVHA's Member Agencies, their stakeholders and the people of the region, and to be held publicly accountable for our activities and results,

4.0 GVHA Properties

GVHA is the owner of several major iconic waterfront properties. A key map of owned properties and facilities under lease is provided below (Figure 1).

1. Ogden Point Deep Water Terminal – Nearly nine hectares of land and seabed, including four berths, breakwater, warehouse, staging area, helicopter terminal, and other commercial buildings.
2. Fisherman's Wharf – Four and a half hectares of land and seabed, providing moorage for general moorage vessels including commercial fishing vessels, fish off-loading facilities, fuel dock, float home community, and other commercial and tourist recreational activities.
3. Raymur Point – a pocket marina leased from Transport Canada east of Fisherman's Wharf housing the new customs dock owned by GVHA.
4. Steamship Terminal – The Steamship Terminal Building and Water Lot Area is leased from the Province of BC.
5. Ship Point and Lower Causeway – Tourist recreational area and guest moorage facilities, public pathway around the Harbour, host to various Victoria marine and community events, eco-tourism activities, and other commercial activities.
6. Wharf Street and Johnson Street Marinas – Commercial, annual and guest moorage for vessels, commercial vessels, tourist recreational areas and float plane moorage at the Hyack Terminal.

Figure 1: GVHA Properties

Figure 2: Fuel Dock and Huron Pier

5.0 Development Permit and Zoning

Fisherman's Wharf falls under Development Permit Area, DPA 11, James Bay and Outer Harbour.

The facility is zoned as "FWM Zone, Fisherman's Wharf Marine District." Part 7.54. Permitted uses, density maximum and regulations can be found at: https://www.victoria.ca/assets/Departments/Planning~Development/Development~Services/Zoning/Bylaws/7.54.pdf .

Development of the project will require both Stakeholder , Community Consultation and City of Victoria Planning Approval and Development Permits.

6.0 Environmental Considerations

The Respondents are advised that a future development scheme will likely require Federal and Provincial Environmental Assessment and Permitting. GVHA has undertaken some detailed environmental studies to identify any remediation requirements but does not have a Certificate of Completion in place for the Property. This process should be considered (time, costs, etc.) in the Respondent's submission to GVHA.

7.0 The Opportunity

The RFEOI represents a unique opportunity to be part of the Fisherman's Wharf Community and Working Harbour, (Figure 2). This RFEOI seeks to determine the level of private sector interest in developing and operating a new fuel dock and potentially integrating Huron Pier at Fisherman's Wharf, to create both a functional facility meeting the demands of the working harbour, as well as a vibrant and sustainable commercial opportunity. The Fisherman's Wharf Plan Design Guidelines 2012-14 outlines the total development of the facility, and specifically the Huron Pier, as an opportunity for increased access through widening, the inclusion of a focal building and integrated lookout area. The City of Victoria Fisherman's' Wharf Plan Design Guidelines (2014), are provided in **Appendix A**. Respondents are encouraged to offer alternate options, that should be supported by strong market and financial evidence.

Fuel Dock

The current fuel dock, located at Fisherman's Wharf, (Figure 3) is located at the west end of the facility adjacent to Huron Pier. Three underground fuel tanks are located upland within the existing parking area, with the supply lines running parallel under the pier to pumps at pier level and over down to the fuel floating dock, where two additional pumps are located. The water area occupied by the fuel dock float is approximately 90 sq.m/968.75 sq. ft.

The current capacity of the upland fuel tanks is as follows:

- 3 Underground Tanks (1 gasoline, 2 diesel) approximately 45k litres each. The tanks are estimated at 15 years. old – (double wall fiberglass with brine between walls, electronically monitored.) Approximate 10-15 years left in lifespan – not verified.
- Fuel Delivery:
    - Winter turnover monthly on gas is very low so deliveries are generally only a couple of times per month. Diesel 80-100k per month (more frequently).
    - In summer, gas is 150k plus per month, Diesel 500-600k per month. Operator may receive multiple deliveries per day during peak requirements.

The proposed Fueling Facility shall be designed to accommodate high volumes of various pleasure and commercial marine vessel types, with sufficient clearances for safe berthing, loading, unloading and fueling operations. Respondents should consider the current navigational channels, working in close coordination with the Transport Canada Harbour Master and other key stakeholders in this area and incorporate all necessary turning radius and entrance/exit points that minimize congestion. Respondents are encouraged to identify other commercial or retail opportunity as part of the fuel dock package.

Huron Pier

Built in 1974, Huron Pier has been utilized for recreational and commercial fishing vessels

loading and unloading of product, maintenance, and use of a derrick crane. Identification of creative solutions to either repurpose this asset, whether through full replacement, or repair and upgrade is part of this RFEOI. GVHA recently completed a Facility Condition Assessment (FCA) of Huron Pier which has resulted in the closure of the Pier to vehicular access due to deterioration of the wood pile caps and piles. Key findings of the FCA is provided for information only in the **Appendix B** of this Document. Basic layout information of the Fuel Dock and Pier is provided in **Appendix C** .

GVHA makes no representations or warranties with respect to the market demand for the Fuel Dock and Pier. GVHA is seeking to explore an opportunity with an experienced fuel dock and commercial operator. Notwithstanding the information provided in this RFEOI, Respondents must satisfy themselves through their own due diligence with respect to the market characteristics and demand. In addition to undertaking their own demand study (including local demand and transient demand), Respondents will be expected to satisfy themselves on key issues including, but not limited to the following:

- Servicing and infrastructure needs;
- Installation of a New Derrick Crane
- Dredging requirements (if needed);
- Potential environmental issues (Water and Land)
- The preparation of a Business and Financial Plan that assesses the market and demand for the products and services to be offered
- Any Federal, Provincial and Municipal regulations affecting the development of the facility
- Design and construction considerations of a replacement fuel dock, and upgraded or redeveloped pier
- Seasonal Tourism impacts to development of the facilities
- Fuel demand projections for various recreational and commercial vessels over the near, medium, and long term utilizing the facility
- Alternate fuel infrastructure opportunities

8.0 Considerations

In responding to this document, the following points identify some of the <u>initial considerations</u> of GVHA in establishing an agreement with a private sector partner with the goal of developing and operating a Fuel Dock and Pier.

A. GVHA sees this opportunity to enhance Fisherman's Wharf as a critical component of the working harbour, by facilitating a community service but also to enhance the overall waterfront experience by creating a point of interest and activity. Respondent

should consider offering other opportunities to provide public experiences beyond commercial services outlined above.

B. Respondents are encouraged to examine opportunities for offering alternate energy options such as Compressed Natural Gas and electrical charging for vessels, and integrate or plan for near or future inclusion in their infrastructure plans.

C. Indigenous Business Opportunities: GVHA is committed to working with its First Nation Partners in developing and encouraging business opportunities that are of demonstrable benefit to members of the First Nations. GVHA supports the engagement of Indigenous communities, businesses and individuals through the terms of its contracts with contractors generally, and particularly where work is within a First Nations traditional territory.

D. Any agreement will be based on a land lease and percentage of fuel sales with a regular payment to GVHA.

E. GVHA is open to negotiate the terms of the lease. Lease terms would be subject to appropriate renewal periods. The exact term of the lease will be negotiable depending on the nature of the Expression of Interests brought forward and the capital investment proposed.

F. GVHA envisions a "carefree" lease where the lessee of the Fuel Dock and Pier would be responsible for the provision and cost of the infrastructure as well the operations and maintenance of the facility including dredging, if required. The lessee would be responsible for items such as the direct payment of utilities, business license fees, commercial property taxes, and all other fees required to operate the Leased facilities.

G. The Respondents shall consider a wide range of creative accessory commercial activities that are necessary to support the Fuel Dock and Pier, potentially including washrooms, pump outs, retail, educational limited food and beverage services, and vessel maintenance, marine services and storage. See Section zoning by-law provides a list of permitted uses and is attached as Appendix A. Respondents are recommended to review this and GVHA 's Official Plan.

H. Respondents **will not** be required to assume any **existing** environmental liabilities associated with the lands prior to any future agreement with GVHA however note that the future owner and operator of facility will be responsible for environmental liabilities during the construction and operational lifecycle of the new development and operation.

9.0 Process

GVHA is seeking Expressions of Interest from Respondents that have demonstrated experience in the development and operation of a marine fuel facilities, commercial piers and wharves. Respondents must provide their level of experience. Respondents should have a minimum of five (5) years' continuous experience within the last ten (10) years in the operation and management of a marine fuel station, and other commercial operations that

are relevant to this opportunity. In determining whether a Respondent has sufficient qualifications to operate a marine fuel station at Fisherman's Wharf adjoining Huron Pier, the GVHA will consider the Respondent's historical and existing financial stability, operating history of the Respondent and other information deemed relevant by GVHA Staff.

Respondents may partner with another development party if required.

The Respondent must be incorporated or organized under the laws of British Columbia in and must be authorized to conduct business in Victoria, British Columbia at the time any formal agreement is executed.

The Respondent shall:

A. Provide the process and steps the Respondents would follow to Design, Finance, Build, Maintain Operate and Operate a new Fuel dock, independently or as part of an integrated Fuel Dock/Pier facility;

B. Provide a proposed development scheme, suitable to GVHA, that will result in the timely establishment of an operational fuel dock and/or pier, and make a positive contribution to the working harbour and its industries; and,

C. Develop the facilities and a business plan to operate it within a reasonable timeframe.

As this is an Expression of Interest and not a proposal call, the level of detail provided in the Respondent's submission should demonstrate that they are capable of developing and operating the required facilities on the site and generally described in the development scheme for the site.

GVHA is prepared to coordinate a site visit for prospective Respondents. A non-mandatory Site visit will be held for interested parties on **March 6, 2020, 10.30-11.30 am PDT**., starting at the GVHA office located at Fisherman's Wharf.

No binding contracts will be formed between the GVHA and any respondent as result of any submission under this RFEOI. Please note that:

1. A Respondent makes a submission for information only. A submission does not entitle or oblige the respondent or the GVHA to enter into any contractual relationship with each other.
2. GVHA reserves the right to negotiate or accept future proposals with any party whether they have submitted an EOI under this RFEOI or not.
3. GVHA may not accept or negotiate any future proposals with any party and may elect not to proceed with the project, in its sole discretion.

10.0 Evaluation of Responses

In order for responses to be evaluated by GVHA, the Respondent's Expression of Interest should provide at a minimum:

A. Sufficient information to allow an evaluation of the Respondent's relevant experience and ability to undertake a project of this nature and scale;

B. A general outline of your development scheme to enable GVHA to determine whether it will result in the timely development of the operation that will positively contribute to the Working Harbour and GVHA's objectives;

C. A general outline of approach to develop the project in a reasonable timeframe;

D. A general outline of proposed business arrangements in terms of capital financing and subsequent operation and management of the project,

E. A general outline of how the development scheme proposes to maximize financial returns for GVHA ; and,

F. A general outline of what is required of GVHA.

Evaluation of the responses shall be based on a weighted scoring tabulated as follows:

Table 1: RFEOI 20-28013 – Evaluation Criteria and Weighting

item	Criteria	Max Points per Criteria	Weighting %	Max Score Weighted
1	Experience, Market knowledge and background of Respondent's Organization to meet GVHA Objectives	20	25%	5
2	Quality and completeness of Response	5	5%	0.25
3	Quality of proposed development scheme in meeting GVHA's Objectives	25	30%	7.5
4	Proposed business arrangements and financial approach	25	25%	6.25
5	Value Added Options	10	5%	0.5
6	First Nation Opportunities	15	10%	1.5
				21

11.0 Next Steps

GVHA may interview or contact respondent submitting Expressions of Interest to better understand their experience, development scheme, timing and proposed business arrangements.

12.0 Submission Requirements

Expressions of Interest are to be submitted in the following format:

A. A Sealed envelope, containing two (2) colour, 8 x11 bound copies of the proposal, (11x 17 foldouts are permitted.)

B. A data stick with a PDF version of the Proposal package;

C. and addressed as outlined below clearly referencing:

"Request for Expression of Interest to Develop and Operate a Fueling Facility and Commercial Pier at Fisherman's Wharf, Victoria BC. Reference No. RFEOI – 20-28013"

NO FAX or Electronic Submissions will be accepted.

A. The package shall include a letter expressing your interest in developing the site. The letter is to describe the development package and your ability to undertake this work.

B. Submissions are to be received at the address shown below no later than **14.00 hrs., PDT, Thursday April 23, 2020**

C. Submissions are to be addressed to:

Reference No. RFEOI – 20 28013
Attention: Mark Crisp , Director, Infrastructure,
C/o Greater Victoria Harbour Authority
100 – 1019 Wharf Street, Victoria BC.
V6W2Y9

13.0 Enquiries and Addenda

All questions from Respondents must be submitted in writing, electronically, to mcrisp@gvha.ca, no later than 15.00 hrs. **(**PDT), April 9 2020, (question/clarification deadline). **No inquiries directed to other parties providing information for this RFEOI is permitted.** It will be the sole responsibility of Respondents to ensure questions are submitted in a timely manner. Addenda to this RFEOI (if any), to provide clarification of written questions submitted by Respondents, shall be posted on the GVHA's website and BC Bid. Receipt of addenda (if any) must be **acknowledged (addenda number and date)** in the **covering letter of interest** that must be submitted with the EOI package.

Oral communications and emails from the GVHA, its staff, agents, employees or external advisor, or any other person associated with this RFEOI shall not be binding on the GVHA and shall in no way modify any provision of the RFEOI.

Only formally issued addenda shall modify the terms of this RFEOI. Any addenda issued for this RFEOI will be published at the following website address: GVHA www.gvha.ca. and BC Bid. Respondents are responsible for checking the website prior to submission of proposals for any addenda. If you are unable to download the addenda, you may contact the GVHA Contact noted in this Section.

Appendices

Appendix A

The Fisherman's Wharf Plan Design Guidelines 2014

Fisherman's Wharf Plan
DESIGN GUIDELINES

Updated January 2014

GREATER VICTORIA HARBOUR AUTHORITY

CITY SPACES

Table of Contents

A. Introduction & Purpose

The *Design Guidelines* for Fisherman's Wharf are intended to assist the Greater Victoria Harbour Authority – GVHA (as the landowner), existing and future tenants, and the City of Victoria (as the regulator) with ensuring that future buildings, improvements, and amenities are compatible with the vision for the Fisherman's Wharf facility.

These guidelines should be used in association with the GVHA's *Fisherman's Wharf Plan (2013)*, which describes the long term development plan for the facility, and forms the basis for zoning amendments to the City of Victoria to reflect the Plan's goals and aspirations. For reference, copies of the Facility Plan map and architectural renderings are included in the Appendix of this document.

These design guidelines support the *Fisherman's Wharf Plan* vision, which is:

> *"to reinforce and enhance Fisherman's Wharf as an economic generator and as a cohesive community, while retaining its scale, mix of uses, and form and character that define it as a special place and unique attraction for residents and visitors alike" (Fisherman's Wharf Plan, June 2013)*

In response to this vision, the *Fisherman's Wharf Plan* has been developed with three overarching objectives:

1) The current mix of uses should be retained;

2) Future development will be limited, and low in scale, to minimize intrusion on neighbouring properties; and

3) The facility is part of Victoria's working harbour lands and, as such, all proposed improvements should be consistent with a *marine activity* idiom.

Fisherman's Wharf has a distinct and special character that has evolved gradually, over time, with few rules and little regulation. It is this lack of *prescription* that has shaped its form and character. These guidelines serve to augment the *Organizing Principles* for the facility as a whole. Described below, these principles introduce the design standards that all future development or improvements should strive to achieve.

Organizing Principles

The key organizing principles guiding development at Fisherman's Wharf also apply to these design guidelines:

- Acknowledge the existing mix of marine uses, and the facility's distinct character and ambience. Fisherman's Wharf already has an identifiable character, and future improvements should not detract from this character.
- Recognize Fisherman's Wharf for its contributions to, and enhancement of, the local economy.
- Acknowledge that future facility plans and uses should reflect, and reinforce, GVHA's established vision, mandate, and principles, which:
  - Support the working harbour, and ensure best water, marine, and marine-related uses;
  - Consider Songhees and Esquimalt Nations' opportunities in the planning process;
  - Support a commitment to sustainability, and incorporate and balance social and environmental impacts, while achieving financial sustainability; and,
  - Act in the best interest of the whole Victoria Harbour.
- Be respectful of neighbours in development considerations.
- Augment and enhance the character of Fisherman's Wharf, and strengthen it as a destination for the community and tourists.
- Encourage and improve linkages between Fisherman's Wharf and the Victoria/Esquimalt waterfronts, reflecting the City of Victoria's Waterfront Walkway objectives.
- Include environmental best practices in the planning and development process.

B. General Building Design

Floating and fixed structures within Fisherman's Wharf are governed by the following guidelines:

- Buildings should be reminiscent of the working waterfront, i.e., generally a variety of forms and shapes, typically containing sloped, shed, or gabled roofs, dormers with facia accents, and liberal use of colour.
- Hard wearing marine materials, such as corrugated and sheet metal, wood or clapboard siding, cementitious body, shingle, and trim details should be used;
- Nautical detailing, such as rounded openings and metal trim, is encouraged; and
- Ample use of fenestration and entrance ways that are not necessarily symmetrical, to enhance the sense of the eclectic and whimsical, is also encouraged.

Form, Mass & Scale

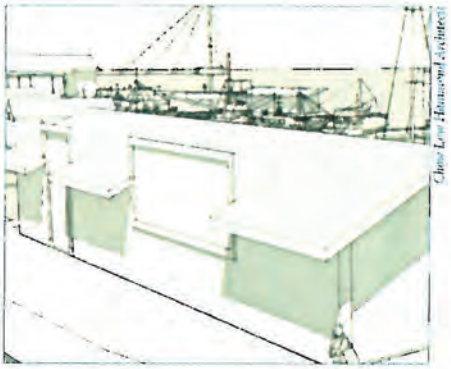
FIXED STRUCTURES

In the *Facilities Plan*, three areas are identified for fixed commercial buildings (do not float up and down with the tide). While the development concept aims to add amenities to the area, all buildings should be designed to emphasize the ground level, pedestrian environment. A low ratio of building height to façade length should be targeted to maintain an intimate feeling and scale to the area. Form, mass, and scale considerations for these structures include:

- Maintaining view corridors, particularly on the upland sites;
- Limiting building heights to minimize infringement on views for residential areas along Erie and St. Lawrence Streets, and Shoal Point;

Maintain view corridors. (Source: VicMap)

- Applying simple massing forms that maintain engagement with pedestrians, i.e. limit blank walls, use of roof overhangs;
- Allowing for pedestrian linkages between places of business and the public waterfront;
- Adding architecturally diverse and varied treatments to create a sense of individuality between structures, but not lose the Fisherman's Wharf identity and sense of place;
- Where appropriate, allowing buildings and public walkways to be cantilevered with no required setback from the water; and
- Including opportunities for overlooking fish unloading areas.



Importance of "working" pier.

FLOATING STRUCTURES

Much of the Fisherman's Wharf character can be attributed to the forms of its floating buildings, which are mostly float homes and commercial units. These are often described as *whimsical, fanciful,* or *eclectic,* without being *corny* or *distasteful.* It is important that the form and character of the facility's floating structures maintain this sense of the unusual.

Form, mass, and scale for floating structures should relate to the following guidelines:

- Floating structures, whether float homes or commercial units, should be organized into groupings to create a sense of intimacy, activity, relationship and character, with the docks forming the *street* between opposite structures. Groupings also create better opportunities to provide view corridors seaward;
- Floating structures should be unique, high-quality designs that are complementary to the eclectic environment;
- Diversity of building volume and form is encouraged;
- Long buildings with blank windowless/featureless walls visible from the public realm, including docks, are strongly discouraged;
- Floating commercial structures should be small in scale, and sited close together to create a *storefront* atmosphere;
  a variety of structure sizes is preferable;

Docks as "streets" & community gathering areas.

Building groupings create intimacy & activity.

- Construction projections and overhangs (such as canopies and eaves) are encouraged, but should not extend beyond the perimeter of the float structure, except for floating commercial structures with projections over the dock that do not interfere with public travel, access or safety, and comply with GVHA standards; and
- Float homes should be designed and sited with particular regard to their orientation, privacy, views, and setbacks from adjacent float homes.

Colourful fixed or awning overhangs.

Roof Forms

- Roof construction for the fixed and floating structures should either be sloped or, where flat, treated as a roof deck.
- Gable, shed, hip, and flat roofs, including dormer projections are preferred.
- Awnings, overhangs, and shed covers are encouraged and should relate to the height above the deck level.

A variety of roof forms is encouraged.

Materials & Colours

- The scale of application may vary between the differing forms of structures, with the fixed structures generally being larger, thus more appropriate for larger expanses of similar materials.
- A range of façade treatment materials and combinations of materials are acceptable, and are identified below. Materials should be weather-tight, marine-oriented, and durable.

ROOF FINISHES

- Materials traditional and suitable to a marine environment should be used, including metal and other standing seam products, fiberglass or simulated shingle, or cedar shingle/shake.

EXTERIOR WALLS & FINISHES

- High quality building materials associated with a harbour setting are encouraged, such as corrugated metal cladding, horizontal siding, board and batten, and cementitious and other panel board. These materials may be further enhanced by the introduction of transoms, clerestories, and awnings.

- Trim, including cornices, corner boards, windows, doors, window boxes, bay windows, brackets, exterior posts and railings, and exposed rafter ends are encouraged to enrich building character.
- Personalized *knickknacks* that do not clutter, but add to the eclectic nature of the floating buildings, are encouraged.

COLOURS

- All colours should be derived from a marine environment, with an emphasis on vivid hues, including rich reds, yellows, blues, whites, and greens, using a painted or stained base.
- Multiple colours on individual exterior walls are discouraged.
- Window/door frames and other trim (including awnings and other projections) should be highlighted in colours complementary to the base wall colour.

C. Environmental Considerations

Foreshore and waterfront environments are unique in their physical challenges and opportunities, constantly changing with the rhythms of the seasons, the weather, and the tides.

As a waterfront neighbourhood, Fisherman's Wharf land forms and natural features are assets, with its buildings enhancing these existing conditions. Any planning for modifications to these conditions should consider adjacent land uses, and maintaining the foreshore environment.

In embracing the principle of sustainability, the GVHA has adopted environmental initiatives that include environmental standards for marina operations and commercial clients. Future development initiatives at Fisherman's Wharf should be reviewed to ensure compliance with these standards:

- To avoid deleteriously impact to the head of Heron Cove, special attention should be paid to pathway design.
- To reduce run-off, permeable pavers should be used as hard surface materials for parking and pedestrian pathways.
- Landscaped buffers should be incorporated between hard surface areas or buildings on the upland and the foreshore environment, except in strategic areas such as cantilevered walkways around the outside of buildings (see Facility Plan – Appendix A) or ramp/loading zone entrances to the wharves.

Natural landscaping to the water's edge.

- Buffer areas should incorporate native plant/grass species suited to maritime conditions along the shoreline interface.
- Vertical seawalls or retaining walls in/near the high water mark or intertidal areas should be avoided.
- All works within the marine environment should follow Provincial and Federal best management practices.
- All solid waste collection areas should be properly ventilated, or in attractively screened outdoor enclosures.
- New buildings should incorporate sustainable building techniques.

D. Safety & Security

To promote a sense of safety and security, which are paramount to the enjoyment of public and private spaces:

- New buildings should address current principles related to *Crime Prevention Through Environmental Design* (CPTED) (refer to the guidelines adopted by the City of Victoria).
- Develop well-defined public/private spaces that are adequately lit, and have clear sight lines.
- New activities should consider operation times, and aim to appropriately overlap with other activities, maximizing opportunities for *eyes on the street* in public and private areas.

E. Circulation, Connectivity, Paths & Parking

The enjoyment of a place is often determined by initial impressions, and ease of access. Waterfronts have two *front doors* – water's edge and street front – to consider. Whether arriving by boat, car, ferry, bike, or on foot, a clear, welcoming presence is important.

- Waterfront areas should support distinct gateway features at key arrival points. In form, character, and detailing, new development should clearly articulate its identity and type of activity.
- A clear definition of the marina facility is served by highly visible key features that *book-end* the area, improving the sense of place and overall navigation of the wharf.
- Parking areas should be clearly defined, and pedestrian routes/plazas should be well connected to internal and external amenities.
- Building entrances should be highlighted by such things as overhangs, porticos, or awnings, with primary entrances clearly expressed, and accessible from the parking area or water's edge. Access from pedestrian paths should be a paramount design consideration.
- Physical accessibility should be maximized for all members of the community.
- Priority for paths and roadways should be indicated with physical features (i.e. raised pedestrian crossings, surface material differentiation between uses, and removal of barriers to pedestrian activity).

Definition between pedestrian & vehicle areas.

- Pathways should tie into the City of Victoria's *Harbour Pathway Plan*, and Fisherman's Wharf Park.
- Pathway materials should differentiate pedestrian areas from vehicle areas with pavers, cedar decking, or other hard surface, permeable materials.
- Parking areas should be broken up with plantings, or physical features to avoid expanses of paved surfaces.
- Physical landscape features, along with signage, should be used to indicate parking areas.

F. Lighting

The GVHA has initiated an upland lighting fixture regime that should be continued throughout.

- Light fixtures should be of a high quality, and human scale.
- Lighting should correspond to the overall architectural concept, and reflect the marine context.
- Pedestrian pathway lighting should be sited downward to prevent overspill, and limit night sky light pollution.
- Dock lighting, adjacent to the commercial floating units, should not be overbearing, but add to its vibrancy.
- Other dock lighting should be consistent throughout. Dock lighting of the float home neighbourhood should illuminate sufficiently to provide safety and security, but not be intrusive or overbearing.

G. Signage

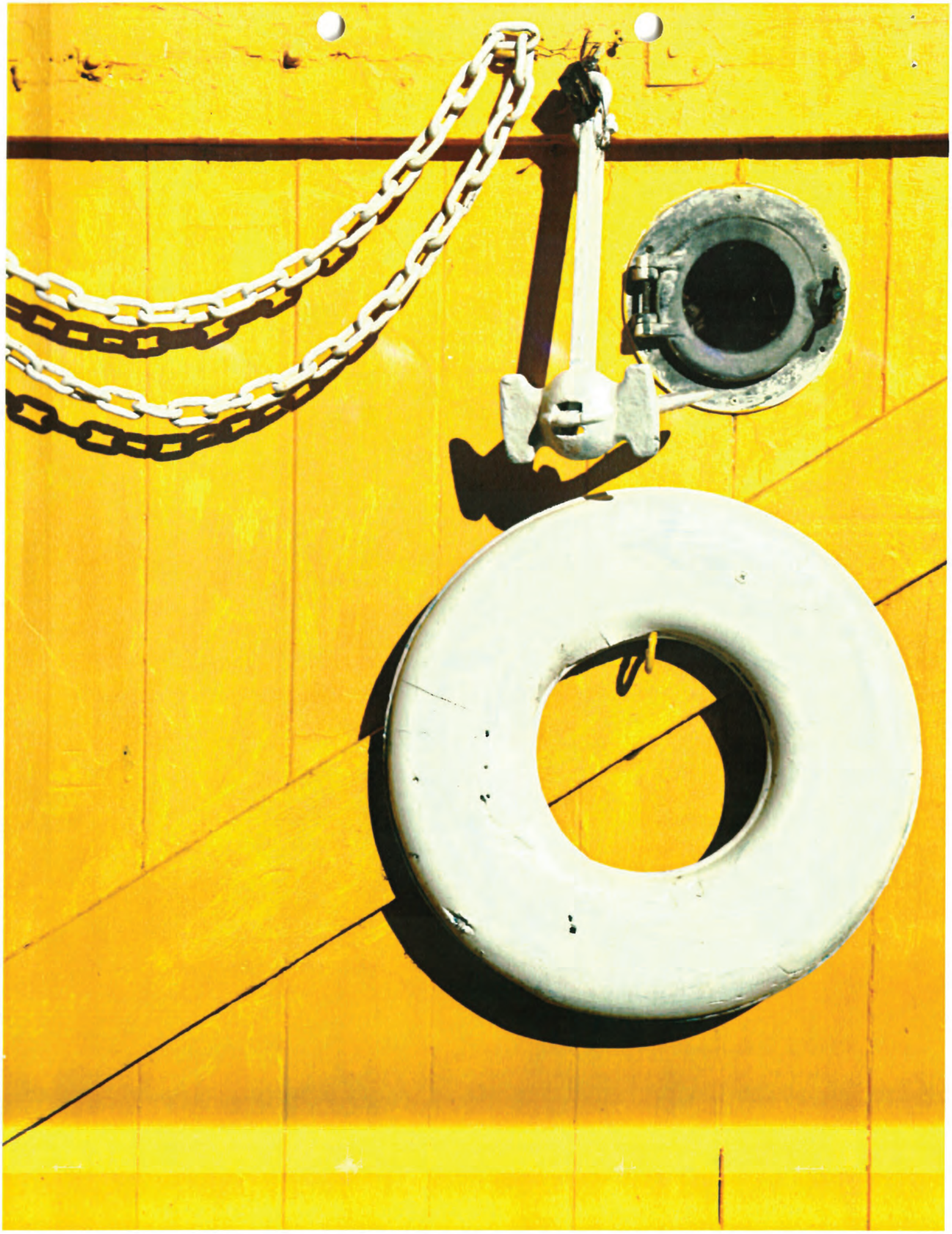
Signage is a critical element of the Fisherman's Wharf *milieu* and, as such, should reflect its unique character. Signage should indicate uses, and provide gateways to areas of activity.

- Upland area signage that communicates directions, gives instructions, or outlines GVHA or other regulatory body regulations, should be consistent throughout, and simple in design and form. A single sign conveying multiple pieces of information should be adopted in place of multiple signs visually and physically *cluttering* the property.
- As access to Fisherman's Wharf can be by land or water, signage communications must consider the multi-modal approaches to the facility.
- Banners and flags are iconic maritime features, and should be considered in the overall signage strategy.
- Backlit, plastic signs, or flashing electronic signs are to be avoided.
- Floating commercial unit signage should evoke a sense of whimsy, playfulness, curiosity, or quaintness.
- Commercial unit signage can be wall-mounted, bracketed raised letters, window lettering, or inscribed banners/canopies:
    - Signage should be colourful, but not overbearing, with a variety of letter types and shapes.
    - Lighting should be indirect, or spotlit, unless it forms part of the integrity of the sign, such as neon lettering.

H. Outdoor Space & Landscaping

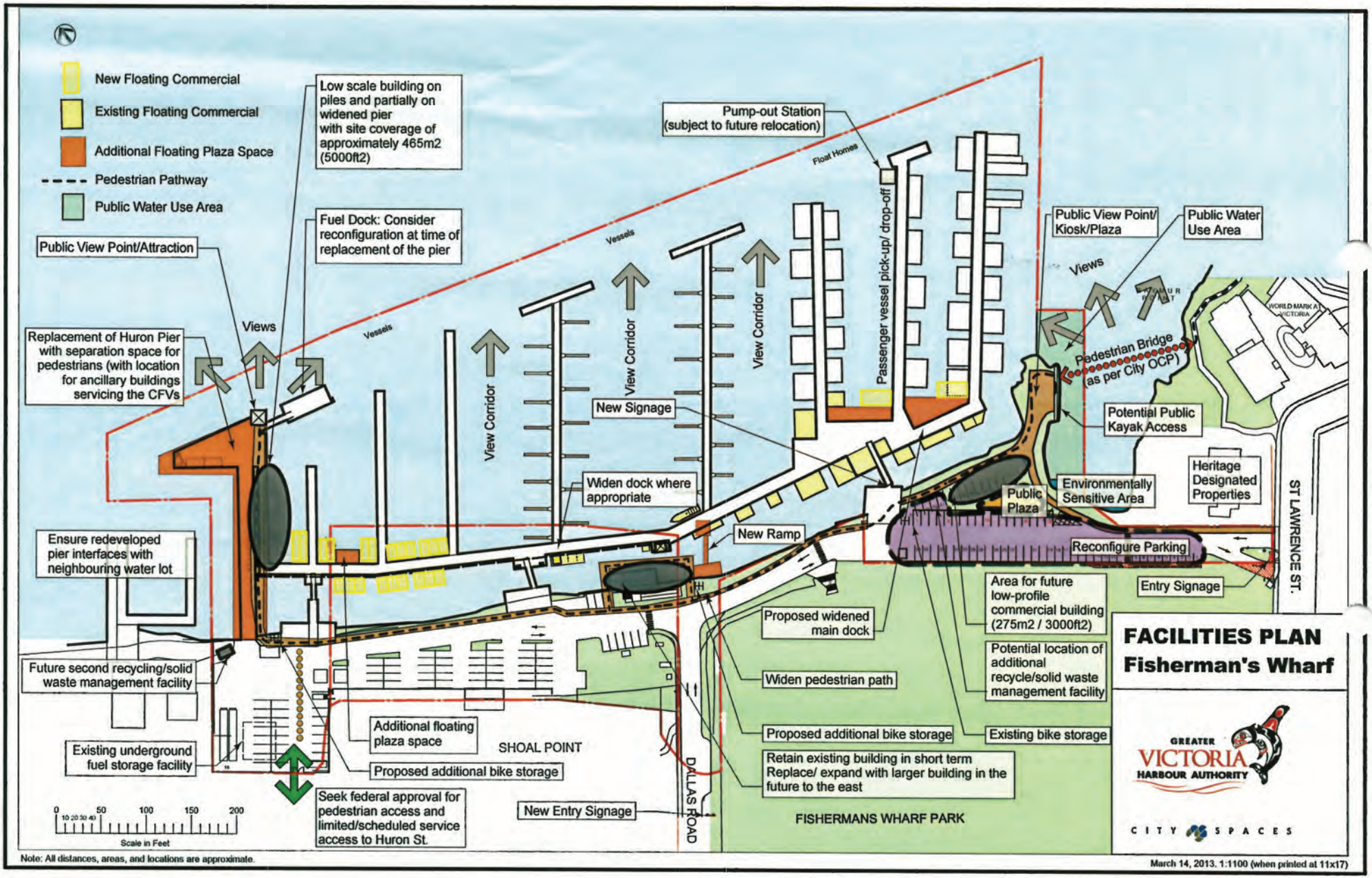
Well-designed outdoor space and landscaping adds to the quality of life in communities. Given the configuration of the upland, there is limited opportunity for a large landscape of plaza features. Where appropriate:

- Patios, decks, and other outdoor spaces should be well connected both physically and visually with other waterfront activities, and be oriented to maximize view opportunities.
- Physical comfort should be considered, including the use of windscreens and arbours, or planting for sun protection.
- Planting schemes based on native or natural looking landscapes, with reduced water and maintenance requirements, should predominate.
- Landscaping should relate to Fisherman's Wharf Park improvements.
- Window box gardens on float homes and floating commercial units are encouraged to add colour, vibrancy, and personality to the outdoor environment.



APPENDICES

- Fisherman's Wharf Facility Plan 2013
- Architectural Renderings



Note: All distances, areas, and locations are approximate.

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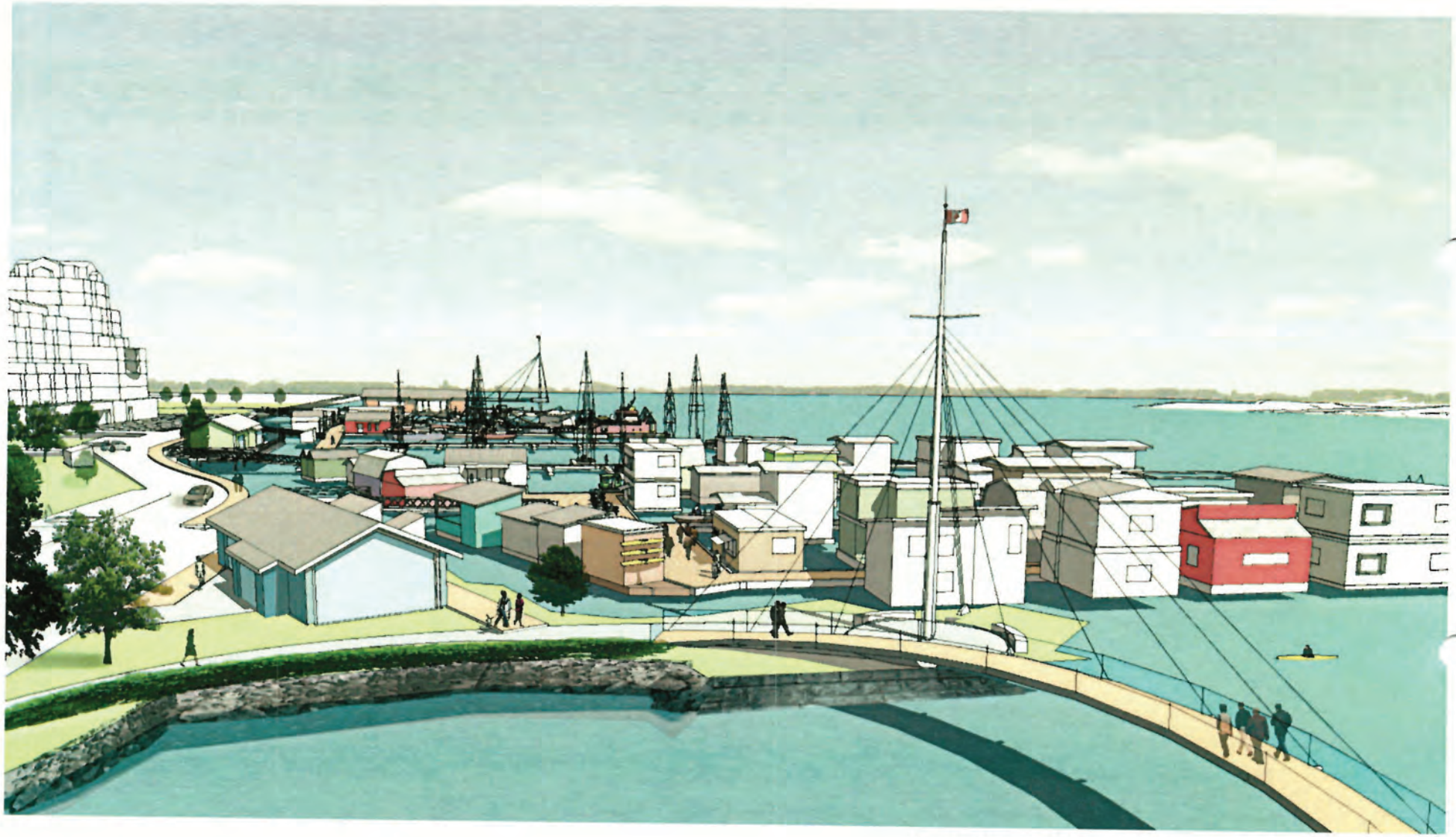

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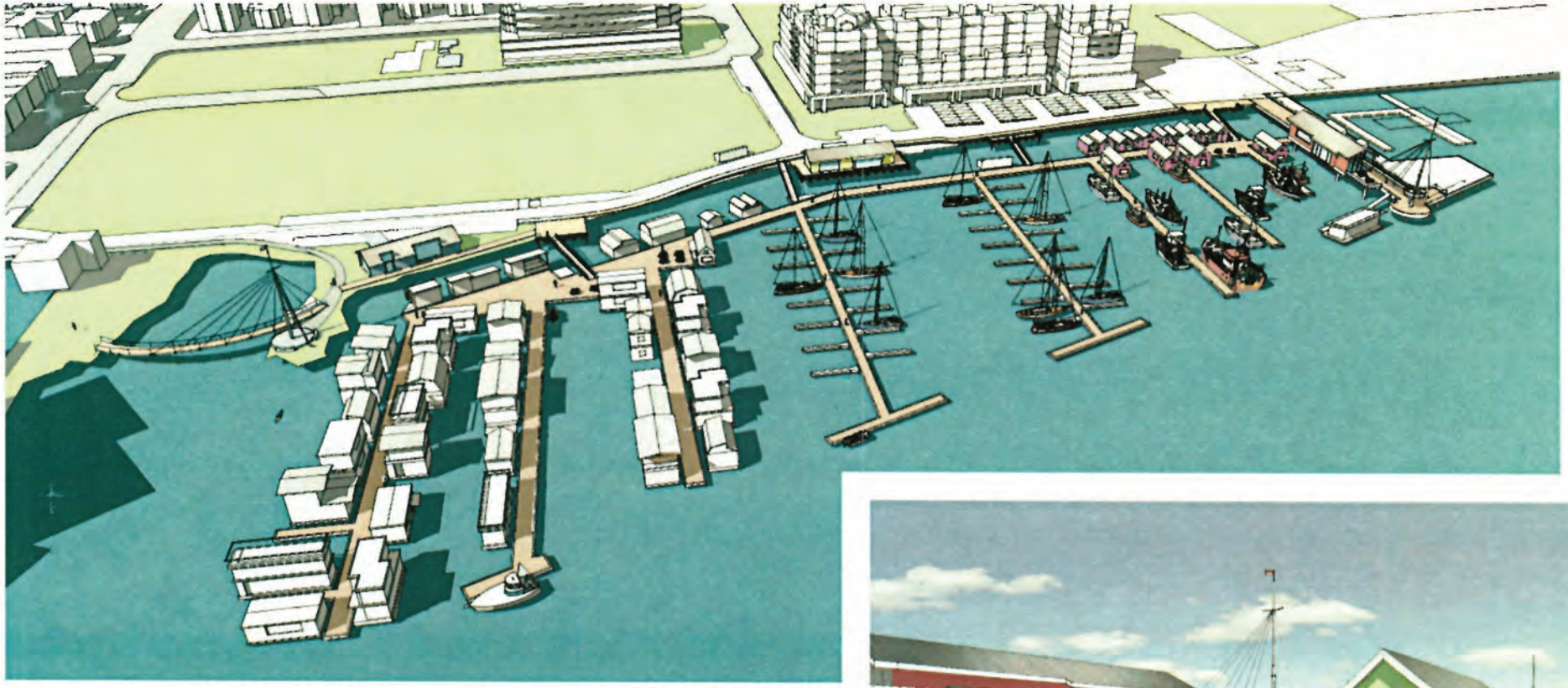
CITY SPACES

Greater Victoria Harbour Authority | Fisherman's Wharf Plan

ARCHITECTURAL RENDERINGS

February 2012



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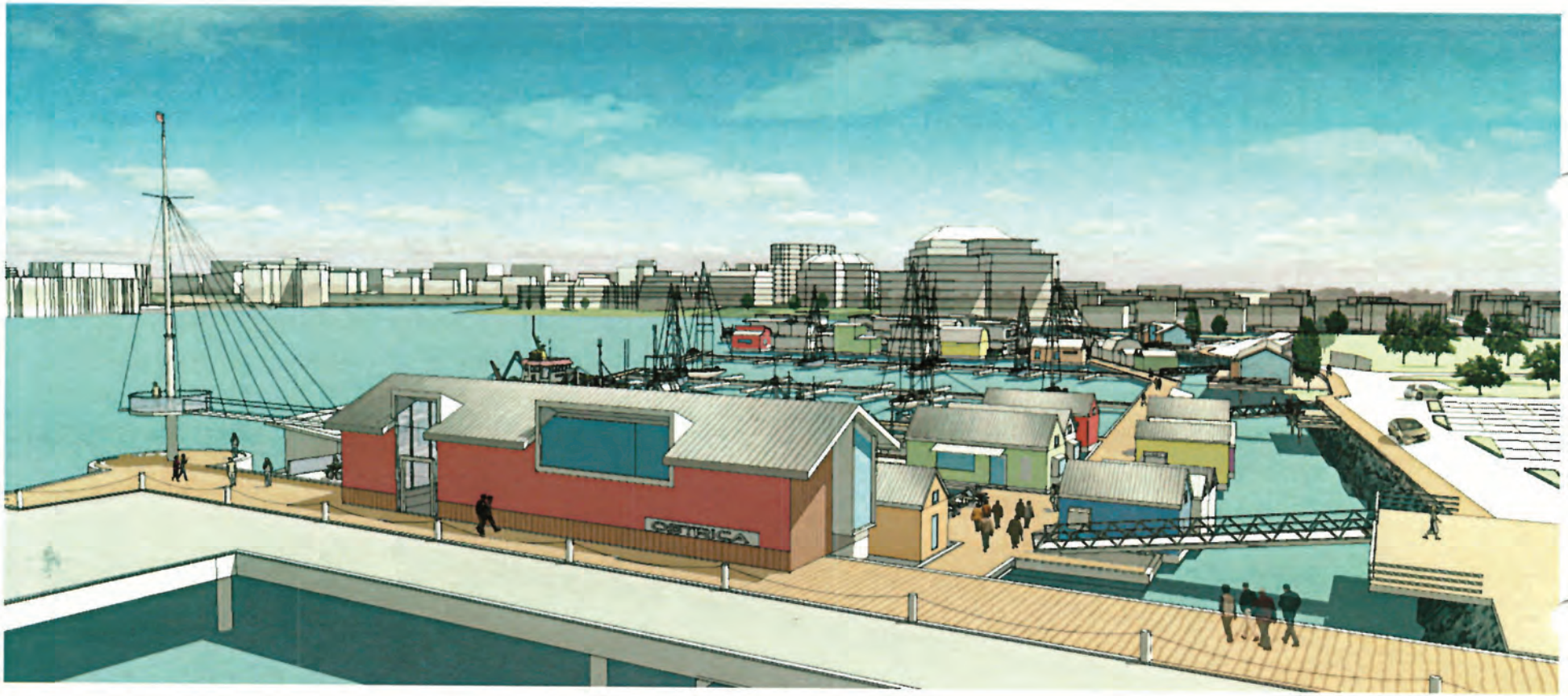

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ARCHITECTURAL RENDERINGS

February 2012

Appendix B

Summary Facility Condition Report 2019 – Huron Pier

GREATER VICTORIA HARBOUR AUTHORITY

Huron Street Pier

Condition Assessment Report

Prepared for:

Greater Victoria Harbour Authority (GVHA)
100 - 1019 Wharf Street
Victoria, BC
V8W 2Y9

Attn: Simon Renvoize, MRICS. BSc (Hons).
Project Manager

Prepared by:

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1051 Vancouver Street
Victoria, BC V8V 4T6
Phone: (250) 590-4875

Submittal Date:

November 22nd, 2019

GVHA Project No. 20FW002-CR-Structures-OW-Pier-FCA-BC

Herold Project No. 2215-010

HEROLD ENGINEERING

Huron Street Pier
Condition Assessment Report

Executive Summary

The scope of this assignment included an above and below water site inspection and subsequent condition assessment report. The report includes the findings of the investigation, materials testing results, load rating, residual life estimates and immediate remediation costs for the facility. These life estimates and costs have been produced on the assumption that the facility will be maintained in its current form. The site inspections upon which this report is based were conducted throughout August 2019.

The Huron Street Pier is in **poor** overall condition. The main concern is the condition of the timber pile caps. The visual survey, supplemented by non-destructive testing, has revealed the pile caps are extensively deteriorated. The severity of this deterioration was described in a letter submitted to the Greater Victoria Harbour Authority (GVHA) dated August 29th 2019. Within the letter Herold Engineering Limited recommended the immediate closure of the pier to all vehicle and forklift traffic.

Currently, the pier is not in a serviceable condition and therefore the remaining service life estimate for this structure is **0 years**. The pier shall be closed to vehicle traffic until repairs are completed. The pier may remain open to light foot traffic provided regular inspections are completed to note any changes to the structural integrity.

Our opinion of probable costs for the immediate repairs described in this report is in the order of **$482,997.00.**

In addition to the components described in this report, the mechanical and electrical system supports were inspected by AME Group and AES Consulting. These reports are included as an appendix to this report (See Appendix F).

1051 Vancouver Street, Victoria BC
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Huron Street Pier
Condition Assessment Report

Table of Contents

1 Introduction

Facility: Huron Street Pier

Reported Construction Date: Circa 1974

Inspected by: Herold Engineering Limited:
Craig Appelman, P.Eng.
Shannon Summerside, EIT
Taylor MacLean, EIT
Mathew Ward, P.Eng.
Westcoast Diving Contractors Ltd.: John Dekker
AES Engineering Ltd.: Iain Barnes, P.Eng., RCDD, LEED AP BC+C
AME Group: Greg Tarnopolsky, P.Eng., CEM, LEED AP

Dates: Multiple Days Throughout August 2019

1.1 Purpose of Inspection & Scope of Work

The purpose of the inspection was to complete a detailed review (including underwater inspection) of various structural, mechanical and electrical pier components. The condition assessment was then used to provide:

- A load rating based on the current condition
- Residual life estimates of the various structure components, and
- A Class 'D' cost estimate for any recommended immediate repairs

It is understood that the Greater Victoria Harbour Authority (GVHA) is seeking an understanding of the current structural condition to assist with asset management activities and maintenance budgeting.

Specifically, the components reviewed included:

Approach	Handrails/Guards, Concrete Deck, Pile Caps, and Bearing/Batter Piles
Wharf Head	Concrete Deck, Pile Caps, Bearing/Batter/Fender Piles, Bull rails, Ladders,
Gangway	Pier Connections
Services	Mechanical and Electrical Services – Hangers, fasteners and Connectors

1.2 Previous Assessment Reports

The following assessments and engineering reports were provided as reference for the completion of this assessment:

- October 20th 2008: "GVHA – Fisherman's Wharf Docks, Victoria, BC", Completed by Hugh Tuttle, P.Eng.
- February 6th 2015: "Huron Street Pier and Fuel Float – Condition Assessment Report", Completed by Herold Engineering Ltd.
- March 10th, 2015: "Huron St. Pier – Additional Pile Cap Assessment", Completed by Herold Engineering Ltd.

1.3 Methodology

The methodology included above-water structural and materials inspection by Herold Engineering Limited (HEL). This work included a visual and tactile review of structural components, cataloging of noted deterioration and non-destructive testing of structural members suspect of deterioration. Non-destructive testing methods are described within the report.

Underwater inspection was completed by Westcoast Diving Contractors Ltd. (WDC), and was visual and tactile in nature. The underwater inspection was conducted under direct supervision by Herold Engineering Limited via live video and audio. Recordings of the diving assessment work has been appended to this report for reference (See Appendix G).

Above and below water photographs of the assessment are located in Appendix A-1. A plan damage drawing and a table documenting structural and material damage noted are located in Appendix B and C, respectively. Material testing results are located in Appendix E.

Mechanical and electrical systems were reviewed AME Group and AES Engineering, respectively. This portion of the assessment focused on the connectors of the mechanical and electrical infrastructure to the structural components and was visual and tactile in nature. Mechanical and electrical assessment reports are appended (See Appendix F).

2 Description

2.1 Reference System

The general arrangement of the facility is as per Drawing No. S1 in Appendix B. For the purpose of this report, the approach is considered to run North-South, the wharf head, gangway and fuel float are considered to run East-West. Reference to locations on the approach and wharf head are made alphanumerically based on the system shown on Drawing No. S1.

The pile bents on the approach are numbered with the shoreward bent being Bent 1, and the seaward bent being Bent 16. Pile reference on each bent is made alphabetically with the easternmost pile being Pile A, and the westernmost being Pile D.

Pile Bents on the wharf head are lettered alphabetically with the easternmost bent being Bent E and the westernmost being Bent N (the letter I is skipped to avoid confusion with the number 1). Pile reference on each bent is made numerically with the shoreward pile being Pile 1, and the seaward pile being Pile 3 through 8 depending on which bent is under consideration.

2.2 Geometry

The approximate geometry of the facility included the following:

Approach	58.8 m x 5.0 m
Wharf head	Near-triangular – Length 26.9 m, width varies 5.9 m to 19.2 m

2.3 Approach

The approach is used to access the wharf head and fuel float. It consists of precast concrete slab decking on timber pile caps supported by bents of four piles each. The outer piles are battered at roughly 4 to 1 from vertical to horizontal to resist transverse lateral loading. There are concrete curbs and aluminum handrails along each edge.

Photo 1 – General view of Huron Pier Approach, looking from shore to the north along the east side of the pier.

Approach Details – Approximate Member Sizes

Decking	3 x 215 mm deep by 1.66 m wide precast concrete slabs.
Pile Caps	343 mm deep by 356 mm wide treated timber.
Bearing Piles	Nominal 350 mm dia. treated timber.
Handrails	89 mm dia. aluminum pipe handrails.

2.4 Wharf Head

The wharf head is used as a loading/unloading area for commercial vessels and includes a derrick crane of 1 tonne capacity and various storage sheds. The derrick crane is supported in place by an unconventional series of under-deck cables. The wharf head also supports the gangway which provides access to the fuel float near its northeast corner.

Wharf head construction consists of a mixture of precast and cast-in-place concrete slab decking on timber pile caps supported by timber piles. The width of the wharf head is tapered, with each pile bent having 3 to 8 vertical piles. There are 29 battered piles distributed beneath the wharf head to resist lateral loading. Along the perimeter of the wharf head there are timber wheel guards, and periodic mooring cleats.

Approach Details – Approximate Member Sizes

Decking	215 mm deep by variable width concrete slabs.
Pile Caps	Nominal 350 mm deep by 350 mm wide treated timber.
Bearing Piles	Nominal 350 mm dia. treated timber.
Wheel Guards	152 mm x 203 mm treated timber.

3 Observations & Inspection Results

The structure requires extensive remedial intervention to return to a serviceable condition. The focus of the remediation is throughout the pier; however, the largest immediate structural concerns are the timber pile caps and piles. Extensive marine borer damage and fungal decay was noted in numerous locations.

3.1 Approach

3.1.1 Abutment

The abutment is in good condition. It is made of a single 356 mm x 356 mm creosote-treated timber which was inspected from the exposed side only, but showed no signs of deterioration.

3.1.2 Bearing Piles

The piles are in variable condition. As described below, some piles have suffered from extensive marine borer attack (See Photo 2, Appendix A-1) and are now effectively 'hollow' (noted as "severely damaged piles"). Other piles ("notable piles") have some form of surface deterioration which is now compromising the long-term durability of the timber. Typical examples of the surface deterioration include checking, bolt holes, and mechanical damage (See Photo 3). The location of the severely damaged piles and noted piles have been provided in the damage drawing and damage table (see Appendix B – Damage Drawings and Appendix C – Inventory of Structural Damage).

Total No. of Piles:	64
No. of Severely Damaged Piles:	5 (8% of total)
No. of Notable Piles:	17 (27% of total)

The bearing pile at gridline 2B was excavated to view the timber condition of the pile below the midline. It was observed that the pile was in good condition below the mudline with no indication of mechanical or biological attack.

3.1.3 Pile Caps

There are two distinct groups of pile caps: the old ones and the newly replaced ones (reportedly replaced in 2019). The newly replaced are in good condition. All of the old pile caps are suffering from extensive fungal decay and can no longer be depended on for sustaining a live load. These require replacement.

Total No. of Pile Caps:	16
No. of Severely Deteriorated Pile Caps:	9 (56% of total)

3.1.4 Decking

The concrete deck is in serviceable condition. Little to no deterioration was noted on the individual concrete members. The grout between the panels however is generally deteriorated, cracking or missing (See Photo 4 & 5). These should be sealed as these joints provide some level of protection from the ingress of water to the pile caps below.

3.1.5 Handrails and Curbs

The handrails and curbs are generally in good condition. At one location on the west side of the approach, from gridlines 4D to 6D a portion of the handrail is deformed likely due to an impact. Welds on 3 of the posts have failed (See Photos 6 & 7). This section of handrail requires repair.

In other locations, the aluminum sleeves which connect sections of the handrails are no longer in place (See appended Photo 8). These should be returned to the original position and re-fastened.

Minor concrete spalling was noted in multiple locations on the upstand concrete curb. The spalled concrete has revealed embedded reinforcing steel. Currently, this damage does not pose a serviceability issue to the pier however repair should be planned for in the short term (1 – 5 years)

3.1.6 Soundings

Three soundings were taken along the length of the approach. The deck elevation to mudline elevations at the time of the inspection were:

At Bent 4	- 4.72 m
At Bent 10	- 9.42 m
At Bent 16	- 10.27 m

3.1.7 Mechanical & Electrical Infrastructure Fasteners

The mechanical and electrical infrastructure were assessed by AME Group and AES Engineering, respectively. The findings of the investigation have been integrated into the inventory of structural damage and life cycle analysis.

3.2 Wharf head

3.2.1 Bearing & Batter Piles

The piles are in variable condition. As described below, some piles have suffered from extensive marine borer attack and are now effectively 'hollow' (noted as "Severely damaged piles"). Other "notable piles" have some form of surface deterioration which is now compromising the long-term durability of each element. Typical examples of the surface deterioration include checking, exposed bolt holes, and mechanical damage. The location of the severely damaged piles and noted piles have been provided in the damage drawing and damage table (see Appendix B – Damage Drawings and Appendix C – Inventory of Structural Damage).

Total No. of Piles:	85
No. of Severely Damaged Piles:	5 (6% of total)
No. of Notable Piles:	29 (34% of total)

3.2.2 Fender Piles and Chocks

The piles are in variable condition with many showing signs of wearing and/or biological attack. These should be repaired to minimize the rate of degradation. Several fender chocks are completely rotten and require replacement.

Total No. of Fender Piles:	32
No. of Severely Damaged Fender Piles:	4 (13% of total)
No. of Notable Piles:	14 (44% of total)

3.2.3 Pile Caps

There are 9 bents of pile caps comprised of a total of 18 individual timber members. The majority of the individual timber members were discovered to be suffering from extensive fungal decay and can no longer sustain a live load. In multiple locations, crush and/or bulging of the timber provides visual evidence of structural failure (see Photos 9 & 10). These members require replacement for the pier to return to a serviceable condition.

Total No. of Pile Cap Members:	18
No. of Severely Damaged Pile Caps:	11 (61% of total)

3.2.4 Decking

The concrete deck is in good condition. There are some isolated signs of deterioration in the form of concrete spalling. This spalling is likely the result of mechanical impact. The grout between deck panels is cracking and/or missing in several places. These should be sealed as these joints provide some level of protection from the ingress of water to the pile caps below.

In one location on the underside of the concrete deck near gridlines 4 and L, concrete honeycombing is present and as a result, embedded reinforcing steel is exposed (see Photo 11). Concrete honeycombing is typically the result of poor concrete consolidation at the time of construction. This area requires concrete patching.

3.2.5 Cleats, Ladders & Wheel Guards

Many cleats are in poor condition due to the poor condition of the timber supports and/or due to extensive corrosion of the fasteners (see Photos 12 and 13).

The ladders are in variable condition. In one location, at gridline 8 and F+, the ladder is missing multiple rugs near the bottom and no longer reaches the low water level. This does not meet OH&S requirements for safety ladders used for water egress. In another location, near gridline 1 and G+, the ladder is fastened to an extensively deteriorated timber. There is no signage indicating the locations of the safety ladders as is required by OH&S.

3.2.6 Soundings

Two soundings were taken at the seaward end of the wharf head. The deck elevation to mudline elevations at the time of the inspection were:

At Northeast Corner	- 10.25 m
At Northwest Corner	- 10.25 m

3.2.7 Derrick Crane

The derrick crane is secured to the deck panels by an unconventional arrangement of steel cables which are secured to the timber piles below (See Photo 14). The cables have suffered corrosion and scaling (See Photo 15) which is now likely compromising the load capacity of the cables. It is recommended that the cable system is replaced with a more conventional support system or the system shall be reviewed by a structural engineer to determine the adequacy of the connections.

3.2.8 Mechanical & Electrical Infrastructure Fasteners

The mechanical and electrical infrastructure were assessed by AME Group and AES Engineering, respectively. The findings of the investigation have been integrated into the inventory of structural damage and life cycle analysis.

3.2.9 Gangway Connection

The gangway support frame to access the fuel float is in poor condition. Timber decking was removed to view the steel I-beam members and extensive corrosion and steel section loss was noted throughout. These steel members require replacement. (See Photos 16, 17 & 18)

3.2.10 Dive Survey

The condition of the piles below the low water level and near the mudline was similar to the condition noted within the intertidal zone. Many piles were noted to be 'severely deteriorated' however all of these piles were also noted to be deteriorated in the intertidal zone and were noted during the boat survey work.

Durability concerns, including bolt holes, mechanical damage and checks, were noted on many of the piles and these issues have been included in the damage drawing and damage table (See Appendix B and C).

4 Materials Test Results

4.1 Resistograph Testing

The Resistograph is a specialized drill which is used to detect unsound (or decayed) material within timber elements. The Resistograph test was conducted on numerous members throughout the structure in an attempt to confirm the soundness of the timber elements. The tests which resulted in identification of unsound timber material have been summarized in the Appendix C – Inventory of Structural Damage. A complete list of Resistograph test reports have been provided in Appendix E.

4.2 Concrete Compressive Strength Testing

Four concrete cores were retrieved from a precast concrete deck element near gridlines 2- and A+. Three of the cores were tested for compressive strength in conformance with CSA A23.2-14C. The fourth core was tested for depth of carbonation, as described in section 4.6. The compressive strength test results are provided below. The complete test report is provided in Appendix E.

Core 2A:	58.5 MPa
Core 2B:	54.8 MPa
Core 2C:	47.9 MPa
Average:	**53.7 MPa**

4.3 Concrete Cover Testing

The depth of concrete cover was measured using a Ground Penetration Radar scanning device. It was observed that the precast panels have reinforcing steel only on the soffit (bottom face) of the panels. The concrete cover to the reinforcing steel was measured to be approximately 38 mm (measured from the lower longitudinal bars to the soffit surface of the concrete).

4.4 Concrete Chloride Ion Testing

Concrete powder samples were retrieved from a precast concrete suspended slab (near gridlines C- and 3+). These samples were tested for chloride content (in accordance with *ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete)*. Samples were retrieved from various depths to determine the ingress of chloride ions from exterior sources (in this case, the most likely source is deicing salts applied to the top surface of the slab and from chloride ions within the ocean water). The results of testing are summarized in Table 1, below.

Table 1 – Summary of Chloride Sample Testing Results

Location	Depth of Sample (mm)	Chloride Concentration by Mass of Concrete (ug/g)	Chloride Concentration by Mass of Cement (%) *
1	0 – 7 mm	1430	0.96%
1	7 – 20 mm	1870	1.26%
1	20 – 95 mm	< 100	< 0.07%
1	95 – 175 mm	< 100	< 0.07%

*Assuming a concrete unit mass of ~2350 kg/m^3 and a cement content of 350 kg/m^3.

According to the American Concrete Institute (ACI), reinforcement corrosion can occur once the chloride concentration within the concrete pore structure reaches a minimum level (referred to as the 'chloride threshold'). The chloride threshold is dependent on a number of physical and environmental factors, however is often considered to be ~0.15% by mass of cement.

As chloride contaminated water continues to be present on concrete surface, the concentration of chlorides at depth will increase. Once the chloride concentration at the depth of the reinforcing steel reaches the chloride threshold, reinforcement corrosion may initiate.

The results of the testing show that the chloride concentration is above the threshold value at locations 1 & 2 at a depth of 0 – 20 mm. The depth of reinforcing steel is greater than 20 mm and thus it is unlikely a sufficient chloride concentration is currently present at the depth of the steel reinforcing to initiate corrosion.

4.5 Concrete Rebound Hammer Testing

Rebound hammer testing (in accordance with *ASTM C805 - Standard Test Method for Rebound Number of Hardened Concrete)* was completed at three locations to estimate the concrete strength. The first location was on the approach precast concrete slab adjacent to the coring location (which serves as a reference). The second was located on the wharf head precast concrete slab. The third test was completed on a cast in place portion of the concrete deck. The results of the testing are summarized in Table 2 below.

Table 2 – Summary of Rebound Hammer Testing

Test No.	Location Description/ Hammer Orientation	Average Rebound Number	Estimated Concrete Compressive Strength (MPa)
1	Precast Concrete Slab – Gridlines 2- & B-	48.3	52 MPa (+/- 7 MPa)
2	Precast Concrete Slab – Gridlines 5 & G	45.6	48 MPa (+/- 6.5 MPa)
3	Cast in Place Concrete Suspended Slab – Near Gridlines 6+ & G+	47.8	51.5 MPa (+/- 7 MPa)

The rebound hammer testing results indicate a consistent estimation of compressive strength.

4.6 Concrete Carbonation Testing

One core sample was retrieved to measure the depth of carbonation. Concrete carbonation is a process in which concrete absorbs carbon dioxide (CO_2). This absorption of CO_2 neutralizes the pH of the concrete. Although this process has little material effect on the concrete, it can create a durability issue for the embedded reinforcing steel as the reinforcing steel is protected by the concrete's alkalinity. Once the concrete becomes carbonated to the depth of the reinforcing steel (in this case, ~25 mm), there is a potential for corrosion of the reinforcing steel.

The depth of carbonation measured on the retrieved core was measured to be 2 – 4 mm from the concrete surface (See Photo 19).

4.7 Timber Pile Creosote Retention Testing

Three timber samples were retrieved from three separate piles on the structure to measure and assess the quality and condition of the preservative treatment. The samples were obtained by removing a small diameter core (~20 mm) from the surface of the pile. The cores were visually

assessed to measure the depth of creosote penetration. The cores where also analytically analyzed to measure the concentration of creosote preservative within the exterior 25 mm of the pile. The results of the observations and tests were compared to the requirements of CSA 080. The results are summarized below:

Table 3 – Summary of Creosote Retention Test Results

Sample No.	Location Description	Measured Depth of Creosote Penetration (mm)	Creosote Content (kg/m^3)
1	Huron Approach – Pile 2C, ~2.5 m down from top of pile, South Face	33	204
2	Huron Approach – Pile 10A, ~2.3 m down from top of pile, East Face	10	114
3	Huron Wharfhead – Batter Pile 3E, ~3.4 m down from top of pile, East Face	17	255
	Min. Per: CSA 080-1954/1975	22	192 – 224
	Min. Per: CSA 080-1997/2017	22	290

The complete test report is provided in Appendix E.

5 Load Rating

The load rating calculations were completed in accordance with the prescribed method in CAN/CSA S6-14 for calculating maximum gross vehicle weight (GVW) for different vehicle model configurations as required.

A maximum GVW for individual elements was determined using the prescribed method in Section 14 of CAN/CSA S6-14. This method is used for standardized posting of commercial vehicle weight limits on structures. The analysis involves determining a Live Load Capacity Factor (F) based on the local dead load effects, live load effects, and evaluated member capacity.

Bending, shear, and compressive capacities of the structural members were determined using methods prescribed in Section 9 and 14 of CAN/CSA S6-14. Member sizes and spacing were determined by field measurements conducted by Herold Engineering

Based on the reported condition of the structure, with emphasis placed on the overall condition of the timber pile caps, **the structure is not capable of supporting any vehicular and/or forklift vehicle loads**. The structure has been recommended, in a letter issued to GVHA dated August 29th, 2019 (See Appendix H), to be closed to vehicle and forklift traffic until such time as significant remedial recommendations can be implemented.

To solidify this recommendation, a vehicle barrier such as a traffic bollard or other means of ingress/egress restriction is recommended to be placed at the entrance to the approach/wharf head to ensure no vehicles access the structure.

6 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. See appropriate tables in Appendix C to determine which members the residual life estimate applies to.

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

6.1 Approach

Topside Components	0 years (based on handrails which require repair, 8-10 years otherwise)
Concrete Deck	> 10 years
Pile Caps	0 years (based on those requiring replacement)
	3-6 years otherwise (based on previously noted deterioration below concrete joints)
Bearing Piles	0 years (based on those requiring replacement)
	3-6 years (based on piles with noted damage)
	8-10 years otherwise

6.2 Wharf head

Topside Components	0 years (based on cleat and wheel guard timber to replace, 8-10 years otherwise)
Concrete Deck	> 10 years
Pile Caps	0 years
Bearing Piles	0 years (based on those requiring replacement)
	3-6 years (based on piles with noted damage)
	8-10 years otherwise
Fender Piles	0 years (based on those requiring replacement)
	3-6 years (based on piles with noted damage)
	8-10 years otherwise
Fender Chock	0 years

7 Inventory of Structural Damage

A summary of the noted damage items has been compiled and provided in Appendix C. Each item also provides a description of the damage, the location and a potential remedial repair solution.

8 Immediate Repairs - Class D Repair Cost Estimate

The repair cost estimate has been based on condition of the structure at the time of the assessment and the recommended repair strategy (as described in the Inventory of Structural Damage noted in Appendix C). The unit costs have been developed based on previous project experience and industry reference. Our opinion of probable cost to return the structure to a serviceable condition is **$482,997.00**. A summary of the cost items has been compiled and provided in Appendix D.

9 Life Cycle Milestone Estimates

9.1 Year 1 – Immediate Repairs (2019/2020)

The immediate repairs which are required for the structure to return to a serviceable condition have been summarized in the Inventory of Structural Damage (see Appendix C) and the cost estimate for these repairs have been summarized in Appendix D. These repairs generally consist of the replacement of main structural members such as bearing piles and pile caps.

9.2 Year 1-5 – Short Term Planned Works (2020-2025)

The planned remedial work for this time frame would include addressing the noted durability issues including items such as repair or sealing of damaged piles and repairing joints between concrete slabs. These items have been presented in the Inventory of Structural Damage (see Appendix C) and the cost estimate for these items have been summarized in Appendix D. It is estimated that the expected cost to completed these planned works will be approximately **$160,832.00** (in 2019 dollars).

9.3 Year 10 – Planned Works (2030)

The planned remedial work for this time frame will be dependent on the implementation and effectiveness of the short-term repairs, discussed previously. Regardless, some amount of timber deterioration can be expected, and it should be budgeted that some piles and pile caps will require replacement. Also, it can be expected that some pile repairs will be required and that the joints between the concrete slabs above will again require maintenance or replacement. It is estimated that the expected cost to complete these planned works will be approximately **$193,200.00** (in 2019 dollars).

9.4 Year 25 – Planned Works (2045)/ Replacement

In 25 years, there is potential that the structural components will no longer be in a serviceable condition and replacement will be required. It is estimated that the expected cost to replace the structure is **$3,535,090.00** (in 2019 dollars).

10 Discussion

Currently, the main concern for the Huron Pier is the poor condition of the pile caps. A significant portion of the pile caps have experienced such extensive deterioration that they can no longer sustain service loads. These will require replacement before the facility can be reopened for use.

The ongoing susceptibility of these pile caps to fungal decay and deterioration is also a concern. This susceptibility appears to be due to the joints between the concrete slabs above. The joints, which have likely been deteriorated for some time, appear to direct water from the deck slab onto the pile caps, which penetrates the timber, likely raising the internal moisture content and thus increasing the potential for fungal decay. If the structure is to be refurbished and a pile cap replacement strategy is to be employed, consideration shall be given to this past failure and potential preventative measures to mitigate similar deterioration in the future. Mitigation measures should include mechanisms to limit the water ingress to the pile caps by means of flexible joint sealants, pile cap waterproofing membranes and/or flashing. Proper detailing at these locations will help extend the life of the new pile caps and thus the overall life of the pier.

Regarding the durability of the piles, the main mechanism for deterioration appears to be attack from marine borers. There are multiple types of marine borers in the Victoria Harbour, which likely include ship worms and limnoria. A potential example of these organisms and their respective forms of deterioration are present on a camel log currently on the wharf head along gridline 1 (See appended Photo 20). In Photo 20, the large holes, (approximately 15 mm in diameter) are likely the remnants of shipworms while the small holes (2 – 5 mm) are likely the result of a limnoria infestation. The protective measure which prevents or limits the likelihood of this attack on the piles is the creosote treatment. The quality of the creosote treatment was tested on 3 pier piles and it was observed that the concentration and penetration did not meet today's standard, however this is still considered to be provide adequate timber protection.

The creosote treatment however, is only a surface protective measure and does not protect the core of the pile members (at depths generally greater than 25 mm). Therefore, if access to the pile core is permitted (through mechanical damage or checking, as examples), marine borers can potentially infest the pile and consume the unprotected timber core. If infestation initiates, little can be done to salvage the pile, slow the deterioration or rehabilitate the pile. Therefore, it is important to protect the pile surface from damage and repair (seal) any penetrations as soon as possible to limit the potential of marine borer infestation. The piles requiring this repair of surface damage have been noted within the appended damage table and drawing.

Some work on repair details is required as traditional approaches of using high density polyethylene (HDPE) wraps do not appear to have been affective at protecting the pile. The wraps also limit the visibility during future assessment work by covering existing damage and deterioration. An approach utilizing a marine grade polymer (epoxy) injected into the surface damage areas might prove to be more effective.

11 Recommendations

1) The deteriorated timber pile caps and piles on the approach and wharf head require replacement before the Pier can return to a serviceable condition.

a. The replacement project shall include an allowance to protect the pile caps from ongoing deterioration due to water ingress from the concrete deck joints. Options for this waterproofing could include pile cap flashing, membranes or flexible sealant in the concrete joints

2) The piles which have been identified with notable durability concerns require the installation of protective measures (such as epoxy injection) to limit the potential for future deterioration.
   a. It is likely that a repair procedure will require some development. It is recommended that patching of checks, bolt holes and other surface damage to timber piles is completed on a regular (perhaps yearly) basis to limit the potential for marine borer infestation and to extend the service life of the timber piles.
   b. Rub strips installed on the fender piles (or any timber element which experiences abrasion) can limit the loss of creosoted timber help to maintain the pile protection mechanism.

3) Replace deteriorated fender piles.

4) Replace deteriorated ladders.

5) Replace the fuel float gangway structural connection.

6) Repair the noted damaged handrail and relocated the connection sleeves which have been displaced.

7) Monitor the existing concrete deck damage locations (due to concrete spalling) for ongoing deterioration.

8) Repair the concrete honeycombing damage noted on the concrete soffit near gridlines 4 and L.

9) Replace concrete deck joint grout.

10) Retain a structural engineer to review the Derrick Crane support details.

12 Conclusions

The Huron Street Pier is in **poor** condition and requires extensive intervention to return the structure to a serviceable condition. Due to the current condition of the pier, a load rating cannot be assigned and it is recommended that loading be limited to light foot traffic until repairs are completed. In addition to the major repairs, there is some maintenance required that is consistent with the age and construction of the facility.

It is understood that the future of the facility is now being considered.

13 Closing

We appreciate the opportunity to assist the Greater Victoria Harbour Authority with this assessment work. Herold Engineering Limited is available to help with the next phases of these projects, including repair designs, tendering and construction services.

We trust this information is sufficient. Please call with any questions.

Per: Herold Engineering Ltd.

Prepared by:

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA C. T. APPELMAN # 38919

22 November 2019

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APPENDIX A1

Huron Pier Site Photographs

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	Photo 2 – View of approach pile at gridlines 7 & E. This provide a typical example of a pile suffering from extensive marine borer attack.
	Photo 3 – View of approach pile at gridlines 8 & E. This provide a typical example of a pile which has suffered mechanical damage which may make the pile susceptible to future deterioration.

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	Photo 4 – View of typical grout deterioration in joints between precast panels.
	Photo 5 – View of typical grout deterioration in joints between precast panels. Note: at the time of the of the inspection, the joint was full of dirt and debris (black substance in the image).

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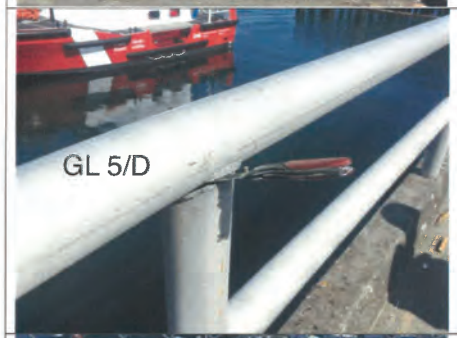
	Photo 6 – View of deflected approach handrail near gridlines 5 & D.
	Photo 7 – Close view of deflected approach handrail near gridlines 5 & D showing failed weld connection.
	Photo 8 – Close view of approach handrail near gridlines 14 & A showing a displaced handrail sleeve connection.

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	Photo 9 – View of a pile cap side near on the wharf head near gridlines 4 & K. The pile cap has experienced 'bulging' due to the deteriorated condition of the pile cap interior.
	Photo 10 – View of a pile cap soffit near on the wharf head near gridlines 3 & L. The pile cap has experienced 'crushing' due to the deteriorated condition of the pile cap interior.

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	Photo 11 – View of the concrete deck soffit on the wharf head near gridline 4 & L. Concrete honeycombing and exposed reinforcing steel is noted.
	Photo 12 – View of cleat currently supported by extensively deteriorated timber member.

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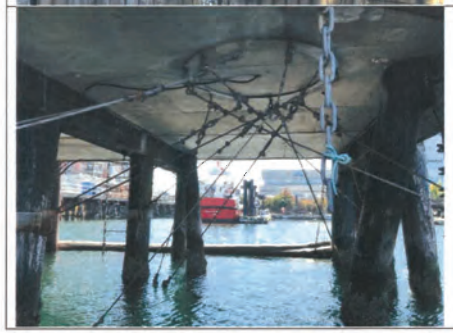
	Photo 13 – View of cleat with extensive corrosion present on fasteners.
	Photo 14 – General view of sub-deck support for Derek Crane.

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	Photo 15 – Close view of Derek crane fastener condition.
	Photo 16 – General view of the gangway ramp support structure.

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	Photo 17 – Close view of structural steel members of the gangway support. Extensive corrosion deterioration noted throughout.
	Photo 18 – Close view of structural steel members and fasteners of the gangway support. Extensive corrosion deterioration noted throughout.

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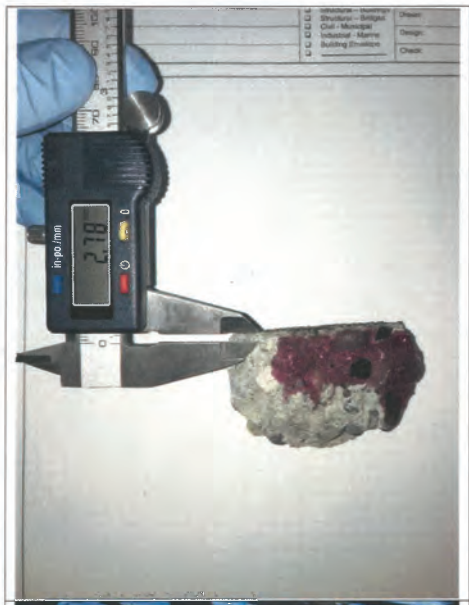
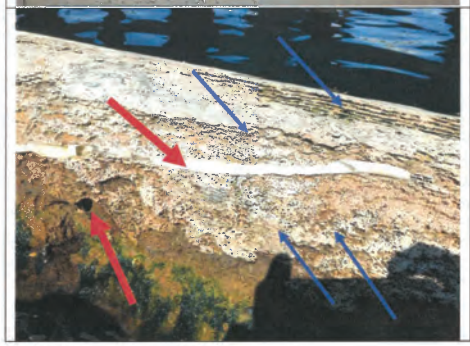
	Photo 19 – View of concrete core tested for depth of carbonation.
	Photo 20 – View of Camel Log on wharf head along gridline 1. Examples of ship worm (red arrows) and Limnoria (blue arrows) deterioration are present.

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Huron St. Pier

Approach				
Item	Location	Damage	Comments	Proposed Remediation
Substructure				
Bearing Pile	2C	Splitting	Large split approx. 1m above mudline	Seal
Bearing Pile	4C	Checking	Check near low water line, approx. 1m above mudline	Seal
Bearing Pile	5A	Checking	Check near low water line	Seal
Bearing Pile	5C	Mechanical	Mechanical damage approx. 1m above low water line	Monitor
Bearing Pile	6A	Checking & Hole	Check near low water line; hole 20mm x 50mm near high water	Seal
Bearing Pile	6C	Checking	Check near low water line	Seal
Bearing Pile	7A	Hollow	Significant decay pocket near low water line	Replace bearing pile
Bearing Pile	7B	Checking	Check near high water line, some peeling noted	Seal
Bearing Pile	7C	Checking	Check 38mm x 4.57m long near high water line	Seal
Bearing Pile	8A	Mechanical	Saw cut noted 1.5m above low water line; mechanical wearing/damage	Seal/Monitor
Bearing Pile	8C	Checking	Check near high water line, firm at depth	Seal
Bearing Pile	9A	Checking	Significant check/split straight through pile cross section at low water line	Seal
Bearing Pile	10A	Checking	Check noted near high water line	Seal
Bearing Pile	10B	Checking	Large check >215mm deep x 1.83m long, straight through pile cross section below high water line	Seal
Bearing Pile	10D	Checking	Check noted	Seal
Bearing Pile	11A	Checking & Mechanical	Check/mechanical damage noted at top of intertidal zone	Seal/Monitor
Bearing Pile	11B	Biological	2015 report noted signs of teredo infestation	Monitor
Bearing Pile	11D	Hollow	Hollow cavity inside pile within intertidal zone	Replace bearing pile
Bearing Pile	12B	Hollow	Hollow cavity inside pile near low water line	Replace bearing pile
Bearing Pile	13B	Checking	Large check >200mm deep	Seal
Bearing Pile	13C	Checking	2015 report noted minor checking, top 1.5m	Monitor
Bearing Pile	14B	Hollow	Hollow near high water line	Replace bearing pile

Approach Continued

Item	Location	Damage	Comments	Proposed Remediation
Substructure Continued				
Bearing Pile	14C	Checking	2015 report noted minor checking, top 1.5m	Monitor
Bearing Pile	15C	Rot	Pile is soft approx 1.22m above mudline	Monitor
Bearing Pile	16B	Checking	Check near low water line, firm at depth	Seal
Bearing Pile	16C	Hollow	Significant decay pocket near high water line	Replace bearing pile
Pile Cap	Cap 2	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap 4	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap 5	Hollow & Crushing	Found to be hollow when tested; bearing pile below is crushing into pile cap	Replace pile cap
Pile Cap	Cap 8	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap 9	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap 10	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap 12	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap 14	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap 16	Hollow	Found to be hollow when tested	Replace pile cap
Superstructure				
Deck Joints	Throughout	Grout Cracked/Missing	Typically, longitudinal deck joints have no grout remaining, while lateral joints and lifting lug pockets have cracked and deteriorated grout.	Replace deck joint grout throghout
Deck Panel	GL 2/A-B	Spalling	Minor spalling noted on deck panel beside longitudinal joint	Monitor
Deck Panel Curb	GL 6-7/A	Spalling	Minor spalling on inside curb face	Monitor
Deck Panel Curb	GL 11-12/A	Exposed Reinforcing	Four locations where reinforcing steel is exposed on inside curb face	Monitor
Deck Panel Curb	GL 13/A	Cracking	Crack on inside curb face at deck panel joint location	Monitor
Deck Panel Curb	GL 14-15/A	Small Hole	Rectangular hole in inside curb face with embedded wood	Monitor
Handrails	Throughout	Dislodged Sleeves	Mid-height and top railing joint sleeves dislodged in multiple locations	Reposition sleeves
Handrail Top Rail	GL 5/D	Bent Railing & Broken Welds	Top railing is bent/creased; top welds broken at three post locations	Remove & replace
Handrail Mid-Height Rail	GL 9/A	Bent Railing & Broken Weld	Mid-height railing is bent and sleeve is dislodged; broken weld at post-railing connection	Remove & replace

Wharfhead

Item	Location	Damage	Comments	Proposed Remediation
Substructure				
Bearing Pile	E1	Rot	Dive survey noted rot below water line	Monitor
Fender Pile	E1	Soft Spot	Dive survey noted a soft spot below water line	Monitor
Batter Pile	E2	Checking	Dive survey noted a check noted below water line	Monitor
Fender Pile	E2	Hollow	Hollow at several locations near mudline	Replace fender pile
Fender Pile	E7	Hollow	Long hollow cavity extending from below low water line through intertidal zone	Replace fender pile
Bearing Pile	E8	Rot	Dive survey noted rot below water line	Monitor
Fender Pile	E8 - NE Corner	Soft Spot	Dive survey noted a soft spot below water line	Monitor
Fender Piles	E8 - N Edge	Wearing	Two piles along north face worn past creosote treatment	Install rub strip
Batter Pile	F1	Checking	Check noted >200mm deep	Seal
Bearing Pile	F4	Checking & Biological	2015 report noted check 300mm long, 3mm wide/deep, signs of teredo	Seal
Batter Pile	F5	Checking	Check noted, firm at depth	Seal
Bearing Pile	F5	Rot	Dive survey noted rot below water line in several spots	Monitor
Bearing Pile	F6	Mechanical	Mechanical damage in multiple locations, firm at depth	Monitor
Bearing Pile	F8	Offset & Splitting	Top of pile offset from pile cap above; banded split at top of pile	Replace bearing pile
Fender Pile	G1	Hollow	Hollow cavity near top of intertidal zone	Replace fender pile
Batter Pile	G1	Checking	2015 report noted check 300mm long, 50mm wide, 75mm deep, 3m from mudline	Seal
Batter Pile	G3	Checking & Hole	Checking, one hole noted	Monitor
Bearing Pile	G7	Poor Connection & Splitting	Pile dislodged from pin above through pile cap; large split in pile where pin pulled out	Band/strap top of pile
Bearing Pile	H1	Checking	Check noted in bearing pile	Seal
Fender Pile	H1	Hollow	Hollow at 1m above low water line	Replace fender pile
Batter Pile	H2	Hollow	Long hollow cavity extending from below low water line through intertidal zone	Replace batter pile
Fender Pile	H7	Wearing	Wear noted on seaward face	Install rub strip
Bearing Pile	J2	Checking & Hole	Check 500mm long, 6mm wide/deep, extending from below mudline; small hole	Seal
Batter Pile	J2	Hole	Dive survey noted a 25mm dia. hole below water line	Monitor
Bearing Pile	J4	Checking & Biological	Dive survey noted multiple checks below water line; 2015 report noted signs of teredo	Monitor

Wharfhead Continued

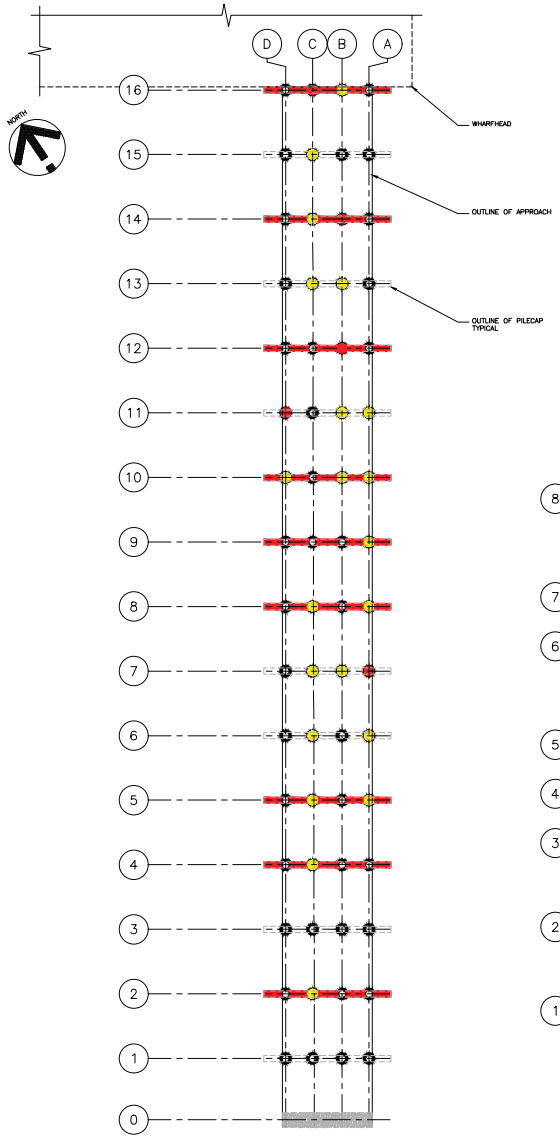
Item	Location	Damage	Comments	Proposed Remediation
Substructure Continued				
Bearing Pile	J3	Checking	Check noted in bearing pile	Seal
Bearing Pile	J5	Checking & Biological	Multiple checks >75mm deep; 2015 report noted signs of teredo near mudline	Seal/Monitor
Bearing Pile	J6	Hollow	Bearing pile is hollow	Replace bearing pile
Fender Pile	J6	Biological	2015 report noted signs of teredo near mudline	Monitor
Fender Pile	K1	Biological	2015 report noted signs of teredo near mudline	Monitor
Bearing Pile	K1	Biological	2015 report noted signs of teredo near mudline	Monitor
Bearing Pile	K3	Hollow	Roughly 2.5m long section is hollow above mudline	Replace bearing pile
Fender Pile	K5	Checking & Biological	2015 report noted small cracks at mudline with signs of teredo	Monitor
Fender Pile	L1	Hole	Dive survey noted a 6mmd deep hole at mudline	Monitor
Bearing Pile	L1	Checking & Biological	2015 report noted small cracks at mudline with signs of teredo	Monitor
Bearing Pile	L2	Hollow	Deep hole above low water line opens into cavity	Replace bearing pile
Batter Pile	L2 - East Batter	Hole	Hole >150mm deep near low water line	Seal
Batter Pile	L2 - West Batter	Checking	Dive survey noted check below water line	Monitor
Bearing Pile	L3	Checking	Check noted in bearing pile	Seal
Bearing Pile	L5	Checking & Biological	2015 report noted cracks 1.2m long, 6mm wide/deep at mudline, signs of teredo	Seal/Monitor
Fender Pile	L5	Biological	2015 report noted sign of teredo near mudline	Monitor
Bearing Pile	M1	Saw Cut	Dive survey noted a saw cut below the water line	Monitor
Fender Pile	M1	Checking	2015 report noted minor checking near mudline	Monitor
Bearing Pile	M2	Checking	Dive survey noted a 6mm x 250mm long check below water line	Monitor
Bearing Pile	M3	Hole	Dive survey noted a 5mm hole below water line	Monitor
Bearing Pile	M4 - Top	Bent	Top 1m of pile is bent out of position	Monitor
Bearing Pile	M4 - Bottom	Hole	Dive survey noted a 25mm dia. x 25mm deep hole, 0.9m above mudline	Monitor
Fender Pile	M4	Mechanical & Splitting	Mechanical damage, firm at depth; banded splits at top	Monitor
Fender Pile	N2	Checking	Minor checking top 2m, firm	Seal
Bearing Pile	N3	Splitting	2015 report noted old splits, have been banded in past	Monitor

Wharfhead Continued

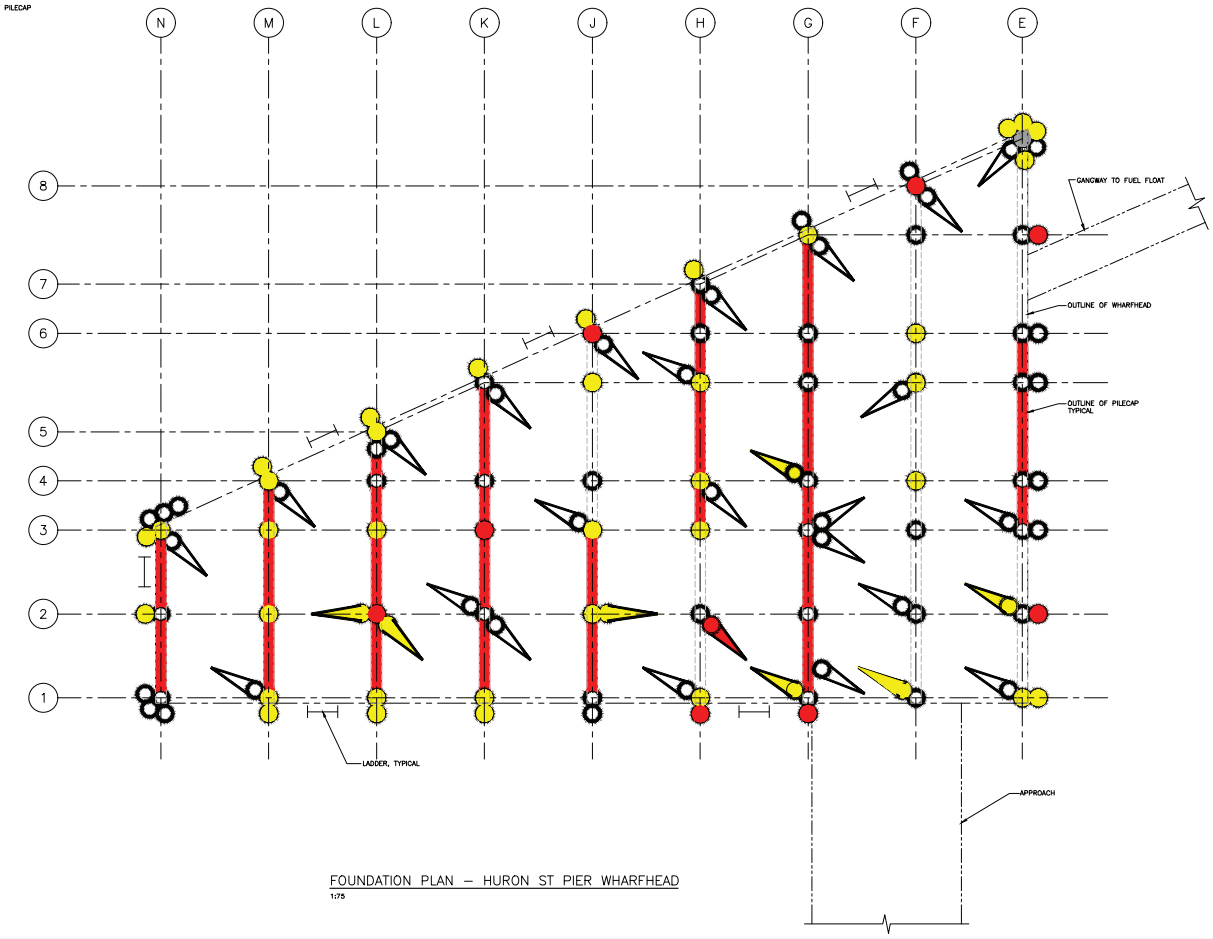
Item	Location	Damage	Comments	Proposed Remediation
Substructure Continued				
Fender Pile	N3 - SW Fender	Hole	Dive survey noted a 25mm deep hole below water line	Monitor
Pile Cap	Cap E, GL 3-6	Hollow	Decay noted, hollow when tested	Replace pile cap
Pile Caps	Cap G, GL 1-7	Hollow	All three pile caps along GL G were found to be hollow when tested	Replace pile caps
Pile Cap	Cap H, GL 3-7	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap J, GL 1-3	Hollow	Found to be hollow when tested	Replace pile cap
Pile Cap	Cap K, GL 1-3	Hollow & Crushing	Pile cap is crushing into pile below, hollow when tested	Replace pile cap
Pile Cap	Cap K, GL 3-5	Hollow & Bulging	Cross section is bulging outwards, hollow when tested	Replace pile cap
Pile Cap	Cap L	Hollow & Crushing	Pile cap is crushing into pile below, hollow when tested	Replace pile cap
Pile Cap	Cap M	Hollow & Crushing	Pile cap is crushing into pile below, hollow when tested	Replace pile cap
Pile Cap	Cap N	Hollow	Found to be hollow when tested	Replace pile cap
Superstructure				
Deck Joints	Throughout	Grout Cracked/Missing	Grout gone along length of panel joints; debondment of mortar cover over bolt tie downs and lifting lugs	Replace grout/mortar along joints and at bolts/lifting lugs
Concrete Deck Panels	Throughout	Chipping	Various location of concrete chipping or spalling, typically at panel edges or corners	Monitor
Concrete Deck Panel	Underside of Panel, GL L/4	Honeycombing	Square area of honeycombing present on underside of cast-in-place deck panel	Patch
Timber Edge Beam	GL G-H/1	Rot & Checking	Edge beam is significantly checked along its length and is rotten	Replace edge beam
Timber Edge Beam	GL M-N/1	Rot & Hole	Edge beam has a large hole through it and is rotten	Replace edge beam
Fender Chock	GL N/1-2	Rot	Fender chock is rotten	Replace fender chock
Fender Chock	Between F8 & G7	Rotten	2015 report noted fender chock rotten and falling off wharfhead	Replace fender chock
Fender Chock	GL K+/5	Loose	Gap >25mm between fender chock and edge beam; connecting pins likely loose	Remove & reconnect
Fender Chocks	Throughout	Loose & Deteriorating	Fender chocks in general are in deteriorating condition around wharfhead	Replace fender chocks as required
Mooring Cleat	GL G+/1	Failed Connection	Edge beam below is rotten, large check runs through mooring cleat bolts	Replace edge beam/reconnect cleat
Mooring Bollard	GL M+/4	Corrosion	Bollard acnhor bolts heavily corroded	Replace anchor bolts
Chain Ladders	Throughout	Corroded/Missing Rungs	Ladders typically haven broken or missing rungs between low water level and top of intertidal	Replace ladders and/or rungs as required

Gangway

Item	Location	Damage	Comments	Proposed Remediation
Gangway Support Frame	Northeast Corner of Wharfhead	Corrosion	Notable corrosion is present over the majority of the support frame member surfaces	Clean and repaint steel support members



FOUNDATION PLAN – HURON ST PIER APPROACH
1:125



FOUNDATION PLAN – HURON ST PIER WHARFHEAD
1:75

SEVERLY DAMAGED STRUCTURAL MEMBERS
NOTABLE DAMAGE TO STRUCTURAL MEMBERS
ABANDONED STRUCTURAL MEMBERS

ISSUES		
No.	DATE	ISSUED FOR

SUB CONSULTANT

NORTH

CONDITION ASSESSMENTS - FISHERMAN'S WHARF & BROUGHTON STREET STRUCTURES

GVHA

HEROLD ENGINEERING
1051 Vancouver St, Victoria, BC V8V 4T6
Tel: 250-590-4875 Fax: 250-590-4392
Email: mail@heroldengineering.com

HURON STREET PIER
FOUNDATION PLAN

DESIGNED	ENGINEER'S SEAL
DESIGN REVIEW	
DRAFTED KJ	
DRAFTING REVIEW	
PROJECT No. 2215-010	CLIENT DRAWING No. n/a
SCALE AS SHOWN	PERMIT No. n/a
HEL DRAWING No. S5	REVISION

DESTROY ALL DRAWINGS SHOWING PREVIOUS REVISION

ARCHITECTURAL D 24" x 36"

File: J:\Projects\2215-010 Condition Assessments - Fisherman's Wharf & Broughton Street Structures\CAD Drawings\Structural\2215-010-S1.dwg Plot Time: Oct. 5, 19 1:48 PM User: kjones

ID	OBSERVATIONS	PICTURES	ACTION REQUIRED	ASSOCIATED WORKS	PRIORITY	CONDITION
G1	**Commercial Fuel Dock – Fuel Piping**					
	Fuel piping to commercial fuel dock appears to be in good condition and is assumed to be single wall with trace tech leak detection cable noted.	 	When pier is replaced, recommend installing new double wall piping with leak detection	None	Short term (1-5 years) Replace	2
G2	**Fuel Piping Connection at Land**					
	Fuel piping isolation valves and connections at land appear to be in good condition however do not have leak detection cable.		When pier is replaced, recommend installing new double wall piping with leak detection	None	Immediate Inspect	2
G3	**Huron Pier Sanitary Force Main**					
	Combination of flexible braided hose and rigid plastic PVC fittings/piping. Appears in fair condition.	 	Recommend annual inspection for leaks. Replace in 2 – 5 years.	None	Short term (1-5 years) Replace	3

G4	**Huron Pier Pipe Supports**					
	Some piping/conduit supported to each other using rope. Proper supports should be provided.	 	Remove ropes and provide proper supports.	None	Short term (1-5 years) Replace	4
G5	**Huron Pier Pipe Hangers**					
	Pipe hangers appear to have had a newer version installed beside older (which is showing signs of failure).	 	Although not required, it's recommended the older hangers are removed (redundant)	None	Short term (1-5 years) Replace	4
G6	**Domestic water back flow device**					
	Insulation box around domestic water backflow preventor has fallen off and currently the piping is at risk of freezing.		Repair box so device is enclosed.	None	Immediate	2

Description	Photo
Sagging or improperly supported cables. Dock to ramp transition.	 
Separated conduit with conductors exposed. Conduit needs to be refastened or supported.	

6. Huron Street Dock

6.1 OBSERVATIONS

The dock structure at Huron Street supports the Fuel Dock as well as commercial operations at Fisherman's Wharf. This dock has a concrete desk structure and wiring and electrical installation differs from the other structures.

Use of Teck cable is prevalent for smaller loads with a suspended conduit rack with threaded rigid steel conduits being used to support larger loads and the Fuel Dock itself. Wiring to the Fuel Dock passes overhead coordinated with the fuel transfer piping.

The Teck cable is more recent and in good condition. Junction boxes are PVC and strapping is generally consistent and in good condition. These installations are farther from the water and corrosion of the screws and fasteners is less severe than other areas but was still noted. Some soil build up was

noted behind some cabling with ferns growing from it. This will degrade the jacketing over time and should be corrected to provide drainage behind the cables to prevent this in the future.

The racking of rigid steel conduits appears to have been modified or doubled up over time. These conduits have a welded steel rack at each beam but some of them have a second set added. Significant corrosion was noted at these locations in addition to the threaded steel couplings on this conduit. Some formed bends were also notably corroded. While this is a robust and thick conduit type, overall condition is becoming a concern.

Within this rack, several conduits have been opened and had Teck cable drawn within it.

The grounding of these conduits appears inconsistent with some missing a jumper. It was not clear if this was intentional or not and should be corrected as bonding via the steel supports cannot be assured due to corrosion.

Power is provided to several pedestals along H dock via submersed drops from the Huron Dock. These appear to have been installed appropriately and are in good condition.

Mounting bolts for kiosks or electrical assemblies on the dock appear to be in good condition and are galvanized.

6.2 RECOMMENDATIONS

The following actions are recommended at Huron Street Dock to maximize the operational life of the installed electrical systems:

1. Consider replacement of existing rigid steel conduits with PVC. We understand that other upgrades to this dock are being contemplated and this would be an appropriate time to improve this installation.
2. Where Teck cable is mounted to the side of the structure, consider installation of spacers to allow debris to flow past. Clean existing areas where soil has built up.
3. Ensure all cabling is correctly supported with corrosion resistant fasteners and straps.
4. Repair grounding of rigid steel conduits.
5. Ensure spare conduits are capped or removed, especially at the shore transition.

6.3 SELECT PHOTOGRAPHS

Description	Photo
PVC wiring and cable drop supporting power to I dock kiosk	
Teck cable with a degree of corrosion to straps and fasteners. Teck cable to kiosk/stanchion along with mounting bolts.	 
Conduit transition from rack to overhead at the Fuel Dock. Corrosion in conduits evident. Terminus of conduit racking.	 

Description	Photo
Corrosion evident in racking, conduits and couplings.	 
Spare and abandoned conduits at shore transition. Wiring along the dock supporting small power loads and I dock.	 
Teck cable, junction box and fasteners, plus power to crane. Grounding installation at conduit rack is inconsistent or missing.	 

Description	Photo
Drop service to I dock.	
Conduit corrosion on rigid conduits and racking. Note that PVC sheath over the rack has been compromised. Teck cable requiring additional support.	 

7. Conclusion

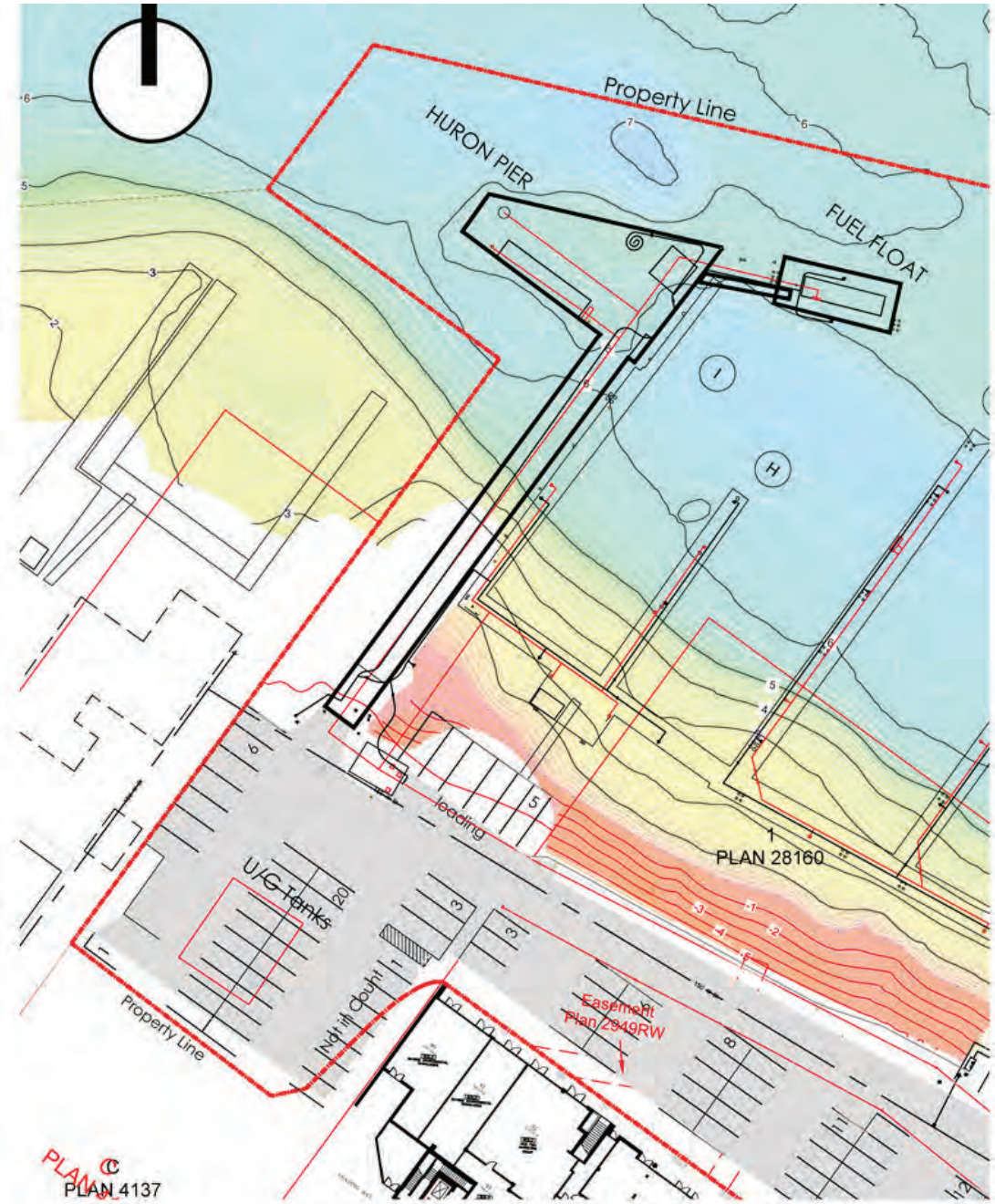
The electrical equipment was reviewed, and the condition and expected lifetime based on the current usage has been provided. In addition, a condition grading has been provided in accordance with the GVHA Asset Management plan and using the Canadian Infrastructure report card grading system as follows:

Condition Grading	Description of Condition
1	Very Good: only planned maintenance required
2	Good: minor maintenance required plus planned maintenance
3	Fair: significant maintenance required
4	Poor: significant renewal/rehabilitation required
5	Very Poor: physically unsound and/or beyond rehabilitation

Location	Condition	Budget Estimate
Broughton Street Dock	Fair	$20,000
Fisherman's Wharf Dock	Good	$7,500
Huron Street Dock	Poor	$40,000

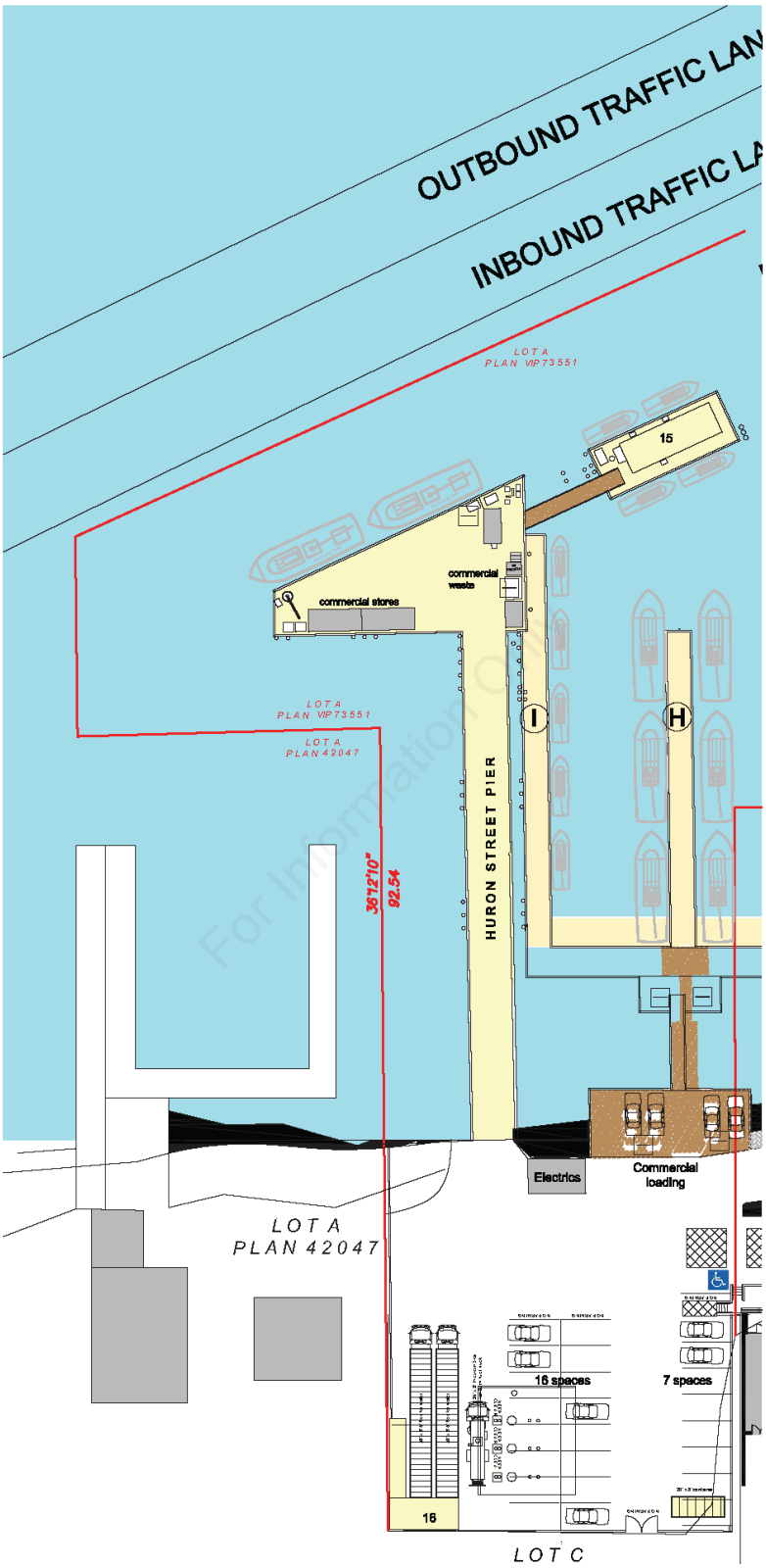
Appendix C

General Layout of Fuel Dock and Huron Pier.



GVHA FISHERMAN'S WHARF - VICTORIA BC
HURON PIER AND FUEL DOCK - NOT TO SCALE

Appendix C


OUTBOUND TRAFFIC LAN
INBOUND TRAFFIC LA
LOT A
PLAN VIP73551
15
commercial waste
commercial stores
LOT A
PLAN VIP73551
LOT A
PLAN 42047
I
H
HURON STREET PIER
36'12'10"
92.54
Electrics
Commercial loading
LOT A
PLAN 42047
16 spaces
7 spaces
16
LOT C

Appendix C

View – North (2015)

View North West (2015)

Appendix C

View - West. (2015)