



April 5, 2019

TO: Park Board Chair and Commissioners
FROM: General Manager - Vancouver Board of Parks and Recreation
SUBJECT: Harbour Green Dock - Proposed Change of Use, Management and Maintenance

RECOMMENDATION

THAT the Vancouver Park Board direct staff to:

- A. Facilitate a joint public engagement process with Engineering Services about the proposed addition of limited commuter ferry services at Harbour Green Dock, as described in this report;
- B. Report back on the findings of the public engagement for the purposes of considering approval of the change of use of the Harbour Green Dock to include limited commuter ferry services;
- C. Develop a Memorandum of Understanding to transfer the management, maintenance and operation of the Harbour Green Dock to Engineering Services if the addition of limited commuter ferry services is supported by the Board, after the Report back, with all terms and conditions to the satisfaction of the Park Board and Engineering Services General Managers; and
- D. Remove the existing Harbour Green Dock during the interim period for safety.

SUMMARY

The Harbour Green Dock was intended to facilitate self-regulated local pleasure watercraft use and pedestrian enjoyment of a waterside walkway as identified in the 1992 Coal Harbour Official Development Plan (ODP). However, years of unregulated usage and design issues have contributed to premature wear and reduction of its life expectancy. The dock is currently closed due to safety concerns, and repairs are on hold until a determination can be made by the Board for its future use. Staff recommend removing the dock and storing it until that direction is known, for public safety.

Engineering Services has expressed interest in maintaining and operating this facility, if it includes limited ferry services in addition to a pedestrian walkway and recreational motorized boating moorage, to complement their inventory of 8 public docks. Engineering Services also supports a joint public engagement process on the proposed extension of use. This proposal aligns with Park Board's mandate to provide and advocate for recreation, as well as with Engineering's mandate to provide sustainable transportation.

Staff will report back on the findings of the engagement with the intent to transfer management and maintenance of the dock to Engineering Services through a Memorandum of Understanding between the departments, signed by the General Managers, if there is support for limited ferry services. The Board's approval will be sought to finalize the use and transfer of this facility.

POLICY

As per the [Vancouver Charter](#), the Park Board has exclusive jurisdiction and control over park land use in the City of Vancouver, including any structures, programs and activities, fees, and improvements that occur within designated parks.

The Harbour Green Dock was constructed in 2003 during Phase 2 of the Coal Harbour development. The dock is part of Harbour Green Park, which was constructed as stipulated in the [1992 ODP](#) which required that the “major focus of the [proposed] residential neighbourhood [to] be a large waterfront park” where “a significant amount of open water” and “a limited amount of transient moorage, perhaps associated with a floating walkway, shall be provided.” The ODP also included a potential “ferry/water taxi dock” to the east of the floating walkway (Figure 1).

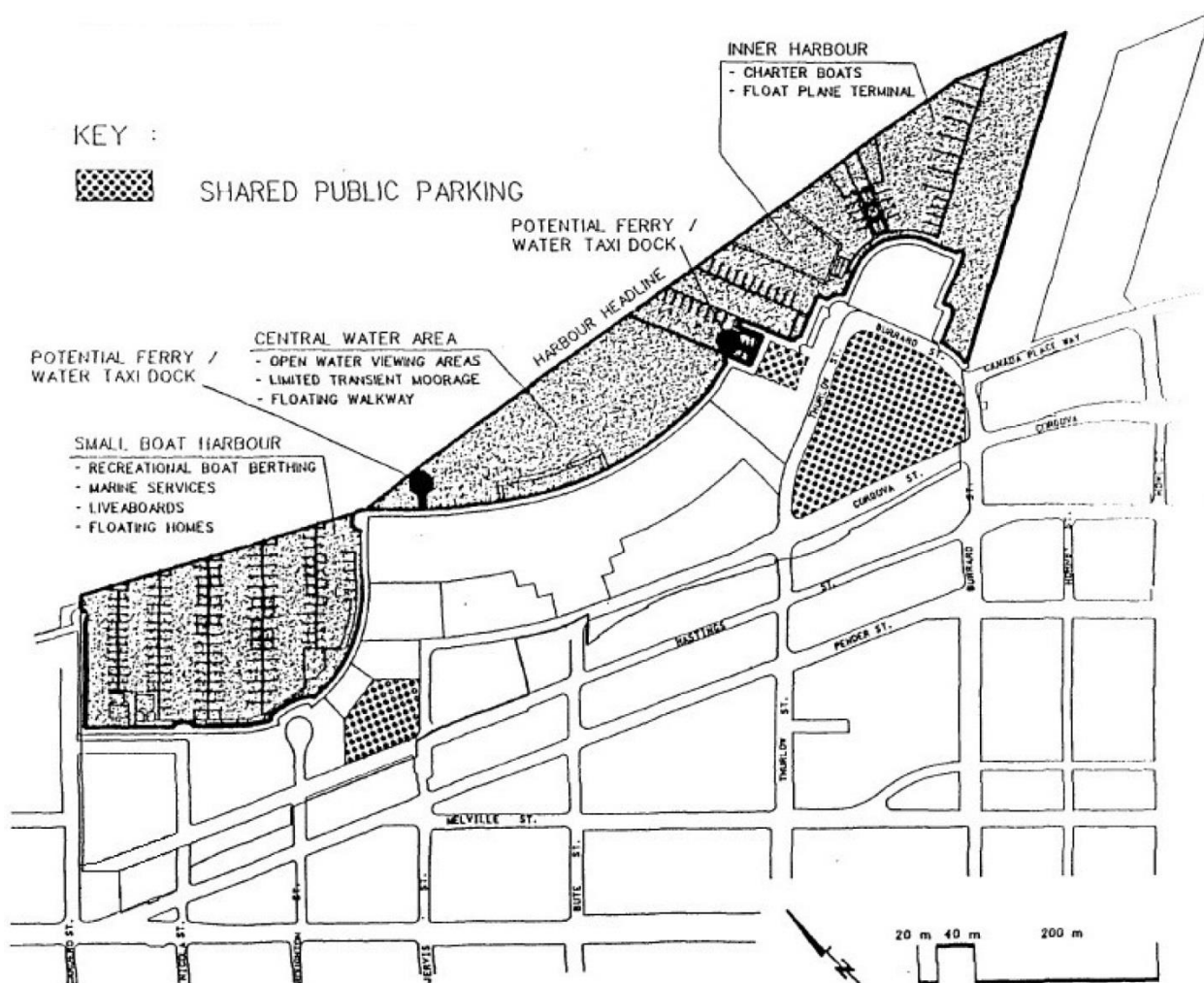


Figure 1: Marinas and water uses plan (Figure 6, Coal Harbour Official Development Plan, 1992)

The details of the floating walkway were further clarified as part of the [rezoning by-law passed in 1996](#), whereby the developer was obligated to execute an agreement “to ensure that a floating, public walkway in front of and connecting to the Harbour Green Park” is designed and

constructed prior to occupancy of the development. Consequently, a Park Agreement was entered into by City of Vancouver and Canadian Pacific Properties in 1996. Under the Agreement, the floating walkway was designated “to provide a means of public passage through the Waterlot and a site for short term moorage” and the City was granted a Right of Way (Article 9) to allow:

- using the Floating Walkway Works as a platform, wharf or pier for recreational benefit; and
- using the Floating Walkway Area for any and all sporting activities, including, but not limited to, pleasure boaters, kayakers and canoers, and to operate temporary moorage facilities, for the temporary, day-time moorage of pleasure craft, for such hours and on such conditions as the General Manager [of Parks and Recreation] may impose.

The Agreement was registered on the title to the City of Vancouver and was attached to a designated road parcel (Part Lot 22 PID 027-112-560) which has been designated for a “Floating Walkway” (see Figure 2). As per the Agreement, the dock has been managed and maintained by the Park Board.



Figure 2: Parcel plan for Harbour Green Park and floating walkway.

BACKGROUND

Dock Design and Current Condition

Harbour Green Dock consists of eight precast concrete floats held in place with steel mooring brackets around steel piles. The floats are accessed via two 30 metre long aluminum gangways at either end. The dock was designed for light pleasure craft less than 10.7 metre in length (35ft) and 6800kg (15,000lbs) in weight. Temporary moorage at the dock is limited to three hours, and

no overnight stays are allowed. Signs on the dock and at the gangway gates inform users about these restrictions. Figure 3 provides an overview of the dock and its various components.

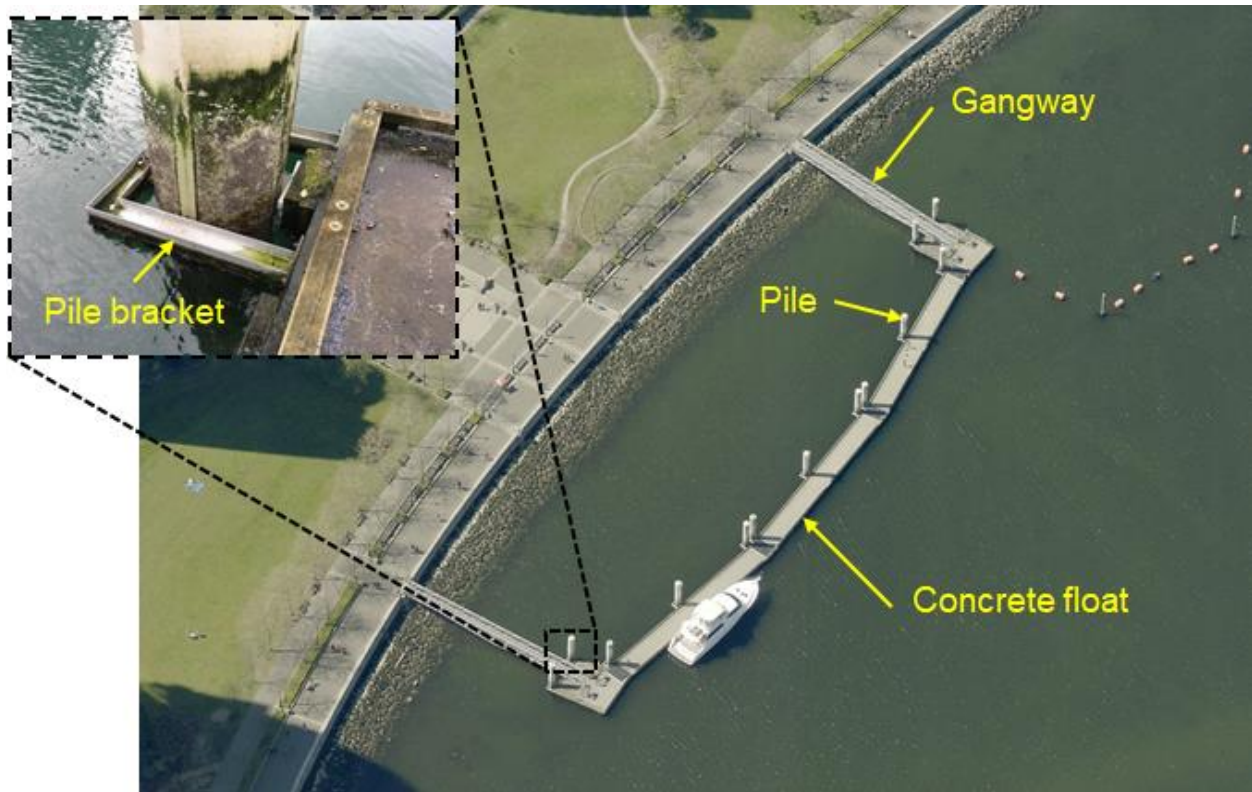


Figure 3: Components of Harbour Green Dock

Upon construction completion in 2003, a number of construction deficiencies were noted that required immediate remedial action, including installation of stabilizers to reduce vertical movement of the floats (completed by the developer) and replacement of the pile mooring brackets in 2005 (completed by the Park Board). Those repairs, along with annual maintenance by Park Operations, allowed the dock to continue operating over the last decade for walkway and pleasure water craft use.

In the summer of 2016, the dock was assessed by an independent marine structural engineering firm as part of a system-wide assessment of Park Board bridges and marine structures. The preliminary assessment indicated structural deficiencies and recommended that a more detailed investigation (including underwater inspections) and repairs be carried out over the next few years. In September 2017, a detailed assessment of the dock was conducted which identified a number of structural and safety issues. Appendix A provides an overview of the dock's current condition and structural and safety issues.

Repairs were completed by October 2017 to correct the immediate concerns raised by the engineers. In addition, heavy rubber mats were installed to address fall hazards on the float transitions. A need for additional capital repairs were also identified in order to address the failing pile brackets and excessive movement of the floats. However, these repairs were not undertaken due to lack of funding as well as a need to re-design critical structural components.

Staff continued to monitor dock conditions until February 2018, when a reassessment by engineers deemed that it was unsafe for use, and as a result the dock was closed. Fencing and signs were installed on the dock and at the entry gates to prevent access to the structure. Regular water patrols by Burrard marina staff have been implemented to ensure that the dock is secure throughout the closure period to ensure public safety. Despite these measures, staff continued to receive reports of unauthorized access to the dock and vandalism on a regular basis.

Dock Usage, Management and Previous Ferry Operations

As previously stated, the dock was intended to be used for temporary moorage by light pleasure craft vessels. For a one-year period in 2004, the Mill Marine Bistro, located at Harbour Green Park, took on the responsibility of managing the dock, including enforcement of the regulations as well as charging a moorage fee for charter boat operations using the dock. However, the arrangement was unsuccessful and the enforcement of the regulations reverted back to the Park Rangers.

In 2010, the City hosted the Olympic and Paralympic Games, during which there was a greater demand for a variety of transit options in the region. During this period, private boater use of the dock was also restricted due to Olympic security requirements. In December 2009, the Board [approved a one year temporary ferry service](#) between Harbour Green Dock and West Vancouver and Bowen Island to serve commuting needs related to the Olympics. The operation did not prove commercially viable and was not pursued after the agreement expired. However, a few years later, operators began to use the dock without a permit or agreement.

In August 2017 staff received formal complaints about unsanctioned use of the dock by ferry operators and watercrafts exceeding its design capacity. Analysis of aerial/satellite photography from 2014-2018 available on Google Earth indicates use by large non-pleasure craft vessels, ranging from commuter and charter services to navy vessels 80' long weighing 400,000 lbs. The result of the analysis is shown in Figure 4. This use by unauthorized commercial operations, as well as berthing and mooring by vessels larger than those that the dock was designed for, have caused crucial elements of the dock to fail prematurely, creating safety risks for users.

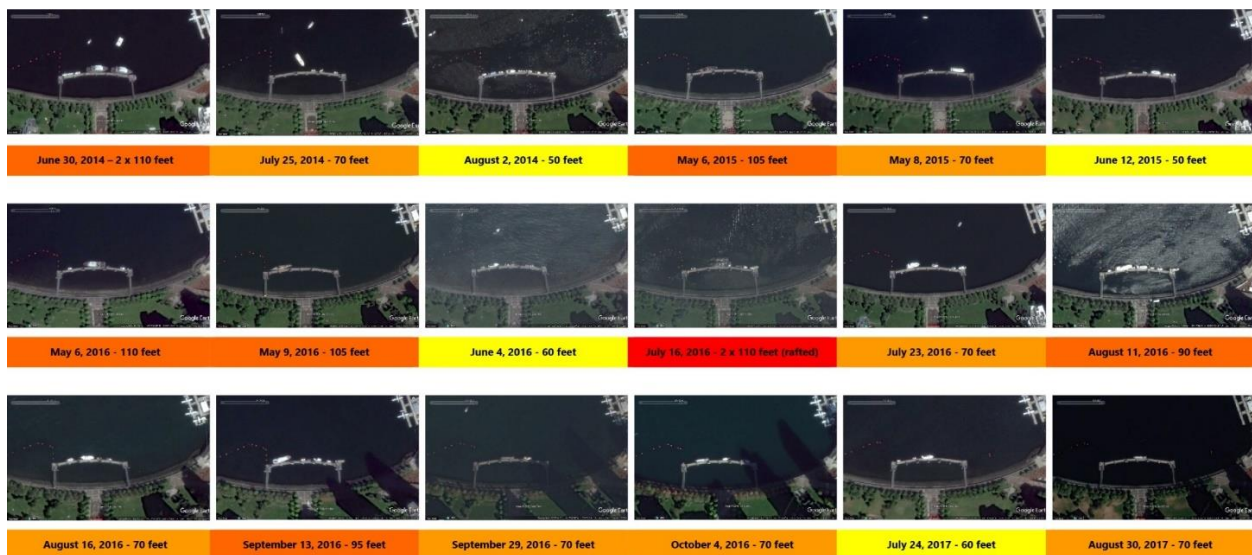


Figure 4: Incidents recorded by aerial photography where vessels larger* than the dock design berthed at Harbour Green Dock (Google Earth) (*Figure C, Harbour Green Dock Operations – Engineering Options, 2018*)

**Note: vessels in Figure 4 are categorized from yellow to red depending upon how far beyond the original design criteria the sizes are. Vessels within the original design criteria would be categorized as green but have not been shown in order to emphasize the exceptions. Smaller yachts are in the yellow range; large yachts, harbour cruise or whale watching boats, sailboats, and navy vessels are in the orange range; and the red range identifies an occurrence where two large navy vessels were rafted together in 2016.*

After learning about two unsanctioned ferry operations at the dock, the Park Board notified the companies to cease operations. However, the shutdown of the ferry services impacted commuters from Gibsons and Bowen Island who raised significant concerns with senior municipal leaders, including Park Board Commissioners. This resulted in dialogue between staff and residents and officials from neighbouring communities on the importance of commuting alternatives. After several meetings and discussions and completion of some repairs to the dock, the Park Board entered into a 3-month temporary fee-for-use agreement with Bowen Land and Sea Taxi in November 2017. This allowed the water taxi to continue their operations using approved vessels while the condition and future of the dock were under investigation. After the third party engineering re-assessment of the dock in February 2018, which resulted in the closure of the dock, the agreement which had terminated in January was not extended. Consequently, Bowen Land and Sea Taxi relocated to a commercial dock in Coal Harbour.

Following the closure, staff continued to meet and communicate with stakeholders including local residents and groups from neighbouring communities to discuss the status of the dock and their concerns for its future. Discussion topics included importance of the dock as part of the transportation infrastructure between nearby communities and Vancouver, implications of ferry operations on the community, possible solutions, and timelines for implementation, as well as how these services fit with the Park Board's mandate.

The Vancouver Police Department (VPD) and Vancouver Fire and Rescue Service (VFRS) also operate a number of vessels that occasionally use the dock to access washrooms and amenities in and around Harbour Green Park. During the Celebration of Lights, the VPD uses the dock to conduct pleasure craft inspections. Some of the vessels used by both forces exceed the design capacity of the dock. Consequently, any future major upgrades will take into account their vessel specifications. In the interim, both VPD and VFRS have permanent dock use at Main Street Dock adjacent to Crab Park.

Strategic Alignment

Park Board's mission is to provide, preserve, and advocate for parks and recreation services to benefit all people, communities, and the environment within the City of Vancouver. The Park Board manages and maintains two civic marinas and four publicly accessible docks at Harbour Green Park, Creekside Community Centre, Vanier Park, and Sutcliffe Park (Alder Bay) in support of its mandate to provide opportunities for access to water and recreational boating. None of these facilities currently provide any transportation services.

With the exception of Harbour Green Dock, all Park Board managed docks are primarily used for non-motorized boating. Non-motorized vessels are not allowed to launch or moor at Harbour Green Dock since the Port of Vancouver, which has jurisdiction over Coal Harbour, does not permit use of non-motorized watercrafts between the Lions Gate and Second Narrows Bridge. This restricts the number of recreational opportunities at the dock in comparison to other facilities operated by the Park Board and places it outside the scope of Park Board's ongoing Non-motorized Watercraft Strategy (On-Water) process.

Engineering Services' Boating and Blueways program is responsible for planning, constructing, and maintaining the marine infrastructure, which provides transportation services, including eight public docks in False Creek that are used for public moorage, recreational access, and contracted ferry services. Since 2005, the Boating and Blueways team has also been responsible for managing agreements with commercial ferry operators in False Creek, including the two docks previously managed by the Park Board at Vancouver Aquatic Centre and Stamps Landing. Although, the program has had limited involvement in Coal Harbour, there has been a strong interest in exploring options for transportation services in this area. In 2004, Engineering staff identified a potential ferry route in Coal Harbour, which included Harbour Green Dock, and developed terms of reference for a feasibility study of a passenger ferry system in the area.

With the adoption of the [Transportation 2040 plan](#), the City has committed to increase and support other modes of transportation, including water-based transit (Direction T1.4). The Boating and Blueways program will be responsible for the implementation of this direction. The plan recognizes that opportunities exist to increase the use of our waterways for both publicly and privately operated transit, similar to the network that has been operating in False Creek since 1983.

DISCUSSION

Harbour Green dock's original design, including the design of the pile brackets and stabilization features, as well as the lack of features like fendering, have contributed to higher maintenance requirements for the structure. Very large vessels and commercial operations, most of which exceed the original design parameters for the dock, have increased the degradation of critical dock components. Furthermore, given its location on open water with a high volume of harbour traffic, the dock is subject to harsher wave conditions than some other facilities of similar type along the inlet. Consequently, a comprehensive repair program coupled with a revisioning of the usage and management of dock is required to secure its future in Coal Harbour.

Review of Management Models

Staff researched public docks within the region to review possible management models and cost recovery options that could be used to regulate temporary recreational moorage at Harbour Green Dock. A common theme across all docks used for transient moorage is a fee structure that changes based on duration of moorage, length of vessel, type of use and season. In all cases, users require a permit for regular use that is often applied for and managed through the municipality, region or harbour authority. Enforcement mechanisms vary across different authorities, but in all cases involve dedicated enforcement agents who regularly patrol areas as well as on site presence to allow vessels to register and apply for permits. A summary of the research is attached as Appendix C to this report.

Based on this research and previous attempts to regulate usage at the site, staff have concluded that charging moorage fees will not cover the cost of management, enforcement, and annual maintenance requirements for the dock and will be unsustainable without additional operating funds. However, staff expect revenues generated from limited commuter ferry services could be used to subsidize ongoing recreational usage. With regular ferry operations on site, there is also an opportunity for recreational usage could be regulated without much additional overhead.

Addition of Limited Commuter Ferry Service

As previously stated, the ferry services which have operated from the dock over the years demonstrate a strong need and opportunity for alternative transportation options in the area.

With the launch of the Transportation 2040 plan, there is also a clear mandate for increase in variety of transportation choice, including water taxis. In recognition of the demand from commuters for a downtown dock, and in light of site opportunities and challenges, staff believe that extending the use of the existing dock to accommodate limited commuter ferry service alongside public recreational pleasure craft presents a viable long-term option.

Based on consultation with residents, commuters, and potential operators, staff will develop the operational parameters for limited commuter ferry service, which will be brought to market through an open procurement process. In general, it is expected that there will be a number of sailings each morning and afternoon on weekdays for commuters. Sailings may be expanded during the summer months to accommodate tourists who wish to visit neighbouring communities. Ferry vessels are expected to remain at the dock for no more than approximately 15 to 20 minutes for each sailing. However, berthing and moorage by tour boats, tugs, and harbour cruise vessels continue to be prohibited at the dock. These types of vessels are currently serviced at other locations in Coal Harbour.

Based on the current fleet operated by local companies, the commuter ferry vessels are expected to be 30 to 60 ft. (9 to 18 meters) long and transport between 10 to 60 passengers in each sailing. In order to accommodate the larger vessels and higher number of passengers, a number of upgrades, including redesigned pile brackets and installation of fendering, will be required in addition to the previously identified repairs. The final configuration and capacity requirements for the dock will be determined through engagement with stakeholders and potential ferry operators. Any upgrades to the dock for commuter vessels could also incorporate usage for emergency vessels described earlier at little to no additional cost.

A legal review of existing planning by-laws and agreements is currently underway to determine if any amendments are required to accommodate this change of use. Further review of regulatory requirements from various permitting authorities will be undertaken if the Board approves the recommendation to move forward with considering limited commuter ferry services at the dock.

Proposed Transfer to Engineering Services

Staff have explored transferring management and maintenance of the dock to Engineering Services to become a part of their Boating and Blueways portfolio. Based on preliminary discussions, Engineering Services is amenable to taking over the management and maintenance of the dock under the condition it includes limited ferry services. Given Engineering's existing expertise and capabilities in maintaining docks and managing commuter ferry operations in False Creek, it is expected that considerable efficiencies and an overall better level of service can be achieved for all stakeholders. Staff will continue discussions with Engineering Services with the aim of developing criteria for the future operation and maintenance of the dock that will:

- ensure availability of public recreational boating facilities in Coal Harbour;
- allow limited use of the dock for ferry services;
- protect the dock through appropriate monitoring and enforcement; and
- maintain public access via a pedestrian walkway.

The result of these discussions will be incorporated into a draft Memorandum of Understanding for review and approval by the Park Board and Engineering General Managers.

Public Engagement

Given the dock's prominent location and previous usage, staff believe that any change of use for the dock requires input from the community. Therefore, subject to Park Board approval to proceed with consideration of limited ferry services at the dock, staff will work with the Engineering Services to develop a detailed engagement plan. The engagement objectives are to:

- confirm the current usage of the dock, including use by pedestrians as well as temporary moorage for recreational boating;
- gauge community interest in expansion of services to include limited commuter services at the dock; and
- seek input from the public and stakeholders on possible operating models and functional requirements for the dock.

This collaborative work with Engineering ensures that accurate information about existing and proposed limited ferry services is provided, and also ensures all staff involved are in tune with local needs, interests and issues.

Through the work to date, staff have identified a list of potential stakeholders, including but not limited to, Coal Harbour Residents' Association, VPD, VFRS, along with businesses, residents and commuters from neighbouring communities, the Downtown Vancouver Business Improvement Association, Boating BC Association and recreational boaters, British Columbia Coast Pilots, commuter ferry and water taxi companies, and members of the general public who use and visit the park.

Public engagement activities are targeted to start in the summer of 2019 to coincide with the boating season. Stakeholder meetings will be held to ask for input into needs and requirements. The public will be engaged through a variety of opportunities, including online surveys, social media outreach and on-site open house(s). A report back to the Board is targeted for the fourth quarter of 2019.

Interim Plan and Costs

Staff have explored various options and costs for interim repairs to enable reopening of the dock. Minimum costs to restore it to its prior condition are approximately \$350K and would take more than 12 months to complete. Based on the previous performance of the dock, it is clear that repairing the dock to its original specifications will be insufficient in addressing the technical and operational challenges of this location.

There is potential to augment the dock and to restrict its use to the original design size and weight. Staff have explored a number of options including adding floats and fingers, floating barriers, and attaching camels to the berthing face to restrict moorage. The latter option (attaching camels) is the most feasible option and would cost \$650K or more in addition to the repair costs cited above, for a total of \$1 million. Additional information about these ideas can be found in Appendix B.

The order of magnitude cost for a full rebuild is up to \$2M, which may be required to accommodate limited ferry services. Funding sources for any work on this dock will be determined in the Park Board and City's budget process when the uses are defined -- funding for these options is not presently available. Repairing the dock to prior condition is not supported by staff since the technical, operational and enforcement challenges remain

unresolved and will likely result in the premature deterioration of the dock in the future. Furthermore, adding physical impediments to limit use is not recommended due to the high cost of design and implementation until more input is collected on the future use of the dock through the proposed engagement process.

In order to eliminate the risk and liability arising from continued unauthorized access to the dock as well as refocus operational effort currently used to monitor and repair it, staff recommend that the gangways and concrete floats be dismantled and transported offsite for storage until a decision is made for its future. Offsite storage will also prevent further damage to the dock resulting from wave action on damaged connections. Staff expect that the removal and storage process can be complete at a minimal cost within a month of the Board's approval to do so.

Schedule

This is a complex issue, and as such, resolution will take time. If public engagement about the limited ferry service begins in the summer of 2019, and use and management for this facility are defined before the end of 2019, design and construction will follow. Regardless of the use, redesign and construction overseen by an independent marine structural engineering is required. Procurement of engineering consultants would start in early 2020, and dock design and tendering could be completed the same year. Construction would start in 2020 or 2021.

CONCLUSIONS

After reviewing the current condition of the dock and available options, staff recommend extending the use of the dock to include limited ferry services, in addition to the existing pedestrian walkway and recreational motorized boating uses. This approach provides the most viable solution to the technical and operational challenges of the site while ensuring continued recreational access.

Considering the Park Board's mission to provide, preserve, and advocate for parks and recreation services to benefit all people, communities, and the environment within the City of Vancouver and Engineering Services Engineering Services' Boating and Blueways program and Transportation 2040 plan, Engineering Services has expressed interest in maintaining and operating this facility as part of their portfolio of commuter docks.

With the Board's approval, a joint public engagement process on the proposed extension of use will be undertaken. Based on the results of the engagement, staff will report back on the feasibility of commuter ferry operations at the dock and transfer of the dock to Engineering for maintenance and management. In the interim, it is recommended that the dock is removed and stored until a final decision is made on the future of the structure.

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Overview of Current Dock Condition & Safety Issues

Recent structural assessments by three structural and marine engineering firms have highlighted many structural and safety issues, resulting in the ultimate decision to close the dock to the public. This appendix provides an overview of the current condition of the dock and its various components.

Pile Brackets

Even before the dock was completed, it was discovered that the floats experience excessive movement with waves, thus requiring stabilizers to be added to dampen the float movement. Furthermore, it appears that the restraint and connection details were not appropriate for the site conditions, since within two years after construction, the ultra-high molecular weight (UHMW) rubbing surfaces on the mooring brackets failed, pulling some of the mooring brackets out of the concrete floats. This was likely due to the high friction and abrasion between UHMW pads and the piles resulting from wave forces that exceeded the design parameters.

The Park Board attempted to retrofit the existing brackets with rollers to reduce the vertical friction forces on the piles. However, the installation of the rollers did not mitigate or reduce the horizontal wave forces which since 2005, has resulted in further pile bracket failures.



Figure 1: Typical damage at pile brackets

Currently, of the thirteen pile brackets on the dock, two have been damaged beyond repair, while a further seven will require major retrofits. Many of the UHMW pads have also failed. However, replacement of the pads has been deemed ineffective since continued movement of the floats will result in premature failure of replacement pads.

Overview of Current Dock Condition & Safety Issues

Piles

It is possible that the piles may have sustained structural damage due to impact from berthing or pull from larger vessels. The scope of previous condition assessments has not included underwater components and so it is not possible at this time to assess the condition of the stabilizers and pilings to assess their structural stability and effectiveness in dampening and withstanding the wave conditions at the site.



Figure 2: Current condition and challenges for steel piles

Gangways/Access Ramps

The aluminium access ramps have not been inspected and it is likely that the ramp connections, including the pins at the seawall and rollers at the float end, require maintenance given the observed vertical accelerations of the floats. The gangway grating requires frequent maintenance which is likely to the excessive movement and vibration of the entire dock.

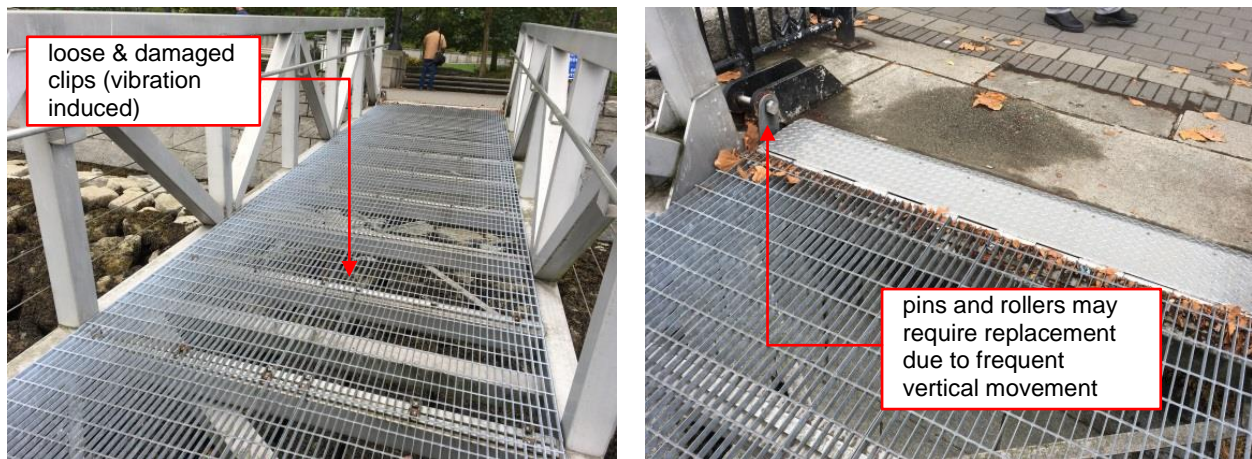


Figure 3: Current condition of the access ramps

Overview of Current Dock Condition & Safety Issues

Floats

The concrete floats of the dock have been damaged through abrasion and impact due to wave conditions as well as berthing and moorage by larger vessels. The damage to the pile brackets has also resulted in anchor failure and chipping and spalling of the concrete floats at the connection points.

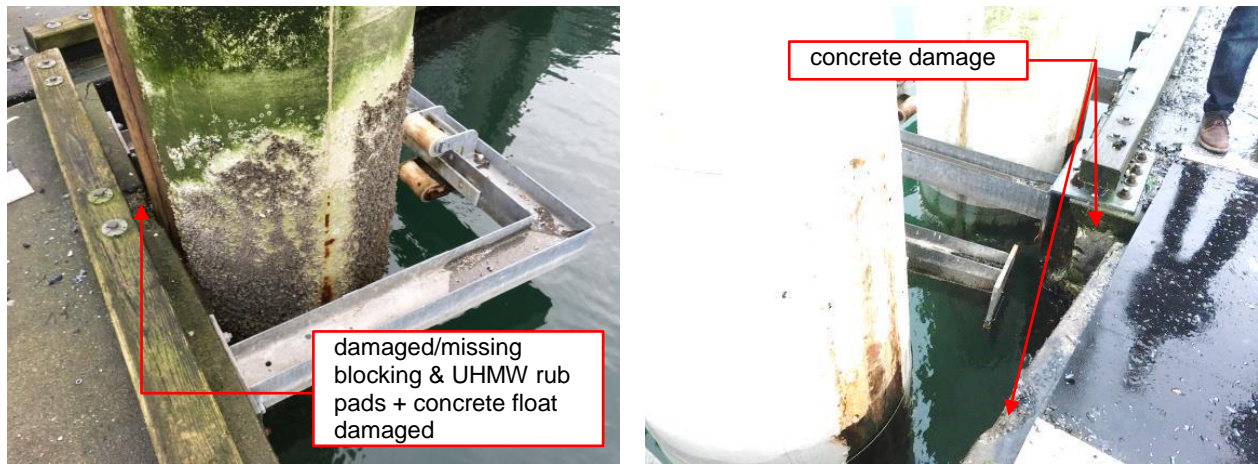


Figure 4: Vertical and lateral movement of the floats along with the loss of rub pads have caused damage to the concrete floats

Stainless steel transition plates between floats have also failed, creating large gaps between floats which under certain conditions can collide against each other and cause further damage. Park Operations staff have installed a series of metal brackets and heavy-duty conveyor belt mats to bridge the gap between the floats temporarily.



Figure 5: Excessive movement of floats has damaged transition plates, requiring temporary brackets and mats to bridge the gap

Overview of Current Dock Condition & Safety Issues

Fixtures

The fixtures on the dock have also been damaged due to improper tie-up and will require repair and strengthening.



Figure 6: Damaged dock fixtures due to improper tie-up and moorage

Overview of Repair Options

Staff have consulted with a number of marine engineering consultants and contractors on possible repair and upgrade options for the dock in order to determine a feasible course of action. The results of this research is presented in this appendix.

Major Structural Repairs

The pile brackets which secure the floats have been a constant issue at the dock. That is why a more robust mooring system is needed to accommodate the real wave conditions at the site. This type of repair will likely reduce the vertical and lateral movement of the floats and reduce the overall wear and tear of the facility and the associated costs in the long term. The engineers consulted by staff believe that the concept of rollers, which was applied when the brackets were retrofitted in 2005 is appropriate. However, the current design is clearly inadequate and requires a different design. Figure 1 shows some possible mooring designs proposed by contractors that may be applicable to Harbour Green Dock.

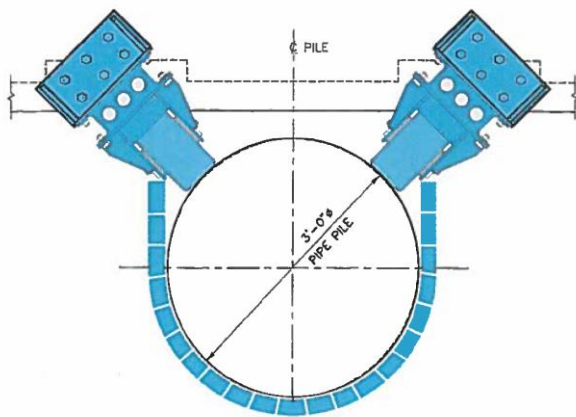


Figure 1: Potential float mooring solutions (left) including hybrid mooring chain and cushion roller fender bracket and standalone mooring chain (right)

It is expected that a redesigned mooring system, in particular one with energy absorption capacity, could also allow vessels larger than the design vessels to call at the facility. In addition to redesigning the mooring system, engineers have also advised staff that installation of fendering along the berthing face of the dock could increase the energy absorption capacity of the floats and reduce the loads on the piles, wearing pads and mooring brackets.

Physical Berthing Restrictions

Staff engaged a marine engineering firm to conduct an analysis and review of three design options that can physically limit access to the dock to vessels within the allowable limits. The considered design options are presented below.

1) Addition of floats in a finger arrangement

Adding floats in a finger arrangement was investigated with the objective of creating geometry such that only vessels of a certain size would be able to access the facility. A potential arrangement is shown in Figure 2. This option requires installation of additional piles at the end of each of the floats as well as construction of additional transition plates or mats. Given the wave conditions and the significant additional construction and maintenance cost, this option was not deemed feasible by the engineers.

Overview of Repair Options



Figure 2: Physical berthing restrictions – additional floats in a finger arrangement concept.

2) Floating barrier with anchored buoys

A floating boom option was also investigated, as shown in Figure 3. It comprises a series of anchored buoys with a floating boom spanning between the buoys. The intent would be that the entrance width would only be sufficient to allow the 35 foot design vessel safe access to the floats. While this option is feasible, skilled boaters would still be able to navigate potentially larger vessels into the controlled area. In addition, there is a high risk that the booms could be damaged by vessels (particularly at night) or marine debris which requires continued and costly maintenance by specialized contractor.

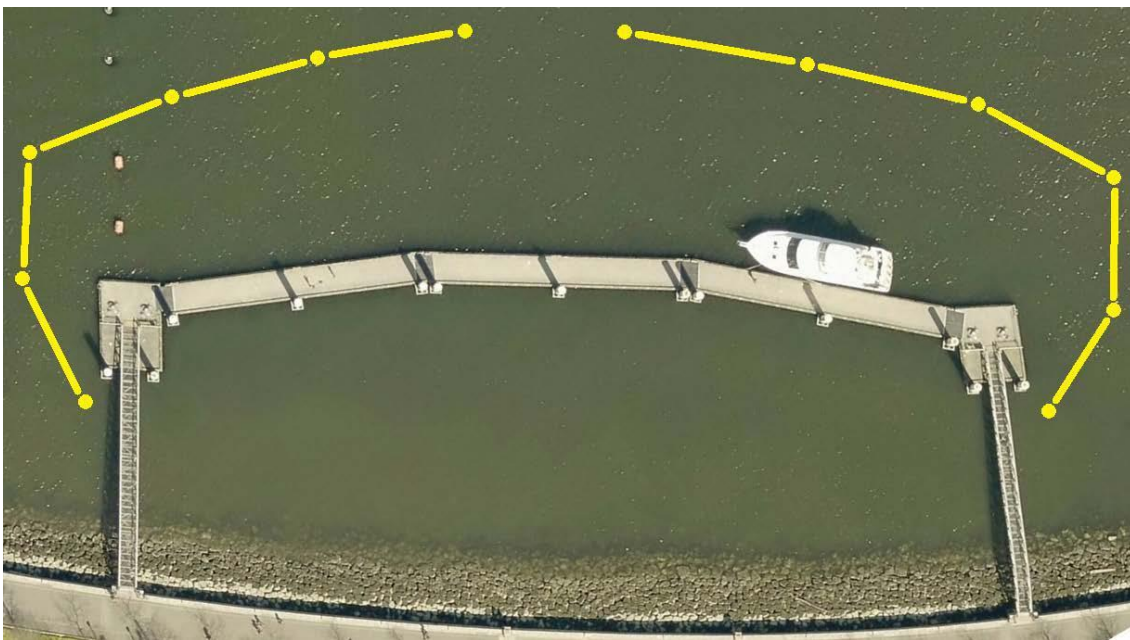


Figure 3: Physical berthing restrictions – floating barrier concept

Overview of Repair Options

3) Interrupted berthing face with floating removable camels

The purpose of this option is to provide an interruption (bump-out) at intervals along the berth face that would only allow vessels with a length of 35 feet or less to maneuver alongside. The bump-out would have to extend outboard a sufficient distance to prevent a larger vessel berthing across adjacent bump-outs and allowing crew access to the main floats. Figure 4 illustrates a possible arrangement of the bump-outs or “camels” at the dock. This arrangement offers significant advantages especially since the installation is easy and does not require any new anchorages or disturbance to the seabed. The camels can also be removed easily, in case berthing by larger vessel is allowed under approved and controlled conditions.



Figure 4: Physical berthing restrictions – interrupted berthing face concept with floating removable camels

The feasibility of each option was evaluated based on the unique characteristics of Harbour Green Dock. Of the three options contemplated, installation of floating removable camels to create an interrupted berthing face was deemed the most feasible solution. This option has a preliminary estimated cost of at least \$650,000. Funding for this addition is not presently available.

Review of Regional Management Models

Staff researched public docks within the region, how they are managed and what services are offered. This information was used to evaluate the feasibility of active management approaches and permit/moorage fee schemes that could be used for cost recovery.

A preliminary scan of docks was done at a range of scales and with differing management models depending on municipality or region. The primary focus was on the docks managed by municipalities in the Greater Vancouver region. A common theme across all docks used for moorage is a fee structure that changes based on season with an increase during summer months and the ability to charge based on size of vessel and type of use. In all cases, users require a permit for long-term or regular use. In some cases enforcement is done by the municipality and in other cases a harbor authority is granted responsibility through a lease agreement with the federal government to operate, maintain and manage and enforce the wharf or dock. A summary table illustrating moorage rates and operation models from several public docks in the region is provided on the next page.

Within the Region, the District of North Vancouver and Steveston both manage public docks with distinct operating models that can serve as a basis for comparison to Harbour Green.

The District of North Vancouver allows watercraft moorage and boat launch for pleasure craft users. The two public docks, Gallant Wharf and Cates Park, require permitting which is enforced through the Parks Department. Moorage is only permitted at Gallant Wharf with differing rates that apply for local residents and for visitors. Boat launch is available at Cates Park with daily and annual fees that apply. Monitoring for compliance and by-law enforcement is done by Park Rangers.

Steveston operates under a Harbour Authority, a not-for-profit organization that holds a lease agreement with the federal government to operate, maintain and manage the wharf. Steveston docks are used by both commercial operators and pleasure craft users with differing rates that apply. The Harbour Authority has ability to enforce and requires users register their boat registration numbers and individual contact information which can be used to enforce compliance.

Review of Regional Management Models

Location	Dock	Management Model	Payment Structure	Enforcement
Port Moody	Rocky Point Boat Launch	Managed by City of Port Moody. Visitors are required to pay for a daily pass that includes launch, retrieval and parking pass.	Boat Launch has daily or annual fees with permits available at the ticket dispenser near the launch or at the Recreation Complex	City is responsible for enforcement. Enforcement officers check for permits and can tow a boat if necessary.
	Designated Anchorage Area (DAA)	Managed by City of Port Moody. DAA is a pilot program that provides reservable anchorage space in the inlet.	Registration with the City is required for a DAA permit and proof of insurance is required. Permits can be reserved online. Boats can be anchored up to 21 nights during a 40-day period.	City is responsible for enforcement. Enforcement officers check for permits and can tow a boat if necessary.
District of North Vancouver	Gallant Wharf	Moorage is available to residents of Indian Arm only with permits available by hour or by month with low season and high season rates. Visitors can purchase day passes for moorage from the District.	Fee based on size of boat and time frame. The fee increases at 3 month increments. The first month during the summer there is a fee of \$10.57 multiplied by boat length. At 3 months this increases and then again at 6 months. Hourly rates are calculated based on size of boat. For example, 16 ft-20ft. vessels for 2 hours costs \$3.48 and for 6 hours \$11.29 Hourly moorage tickets are available from a nearby ticket dispenser machine and monthly passes can be purchased by application with the District. No overnight moorage is permitted. There is a maximum time of 18 hrs based on park operating hours (12am-6am)	The District of North Vancouver Parks Department has a dedicated ranger for enforcement of boat moorage. The Ranger has the ability to enforce the by-law requiring permits and can issue tickets based on violation of the by-law.
	Cates Park	Moorage is not available at this dock. Boat launch permits are available.	There are daily fees for boats up to 36 ft from 6 am to 10 pm. The fee is \$21 per day.	Daily tickets can be purchased from an on-site ticket machine and annual permits from the District Hall through an application form.
Steveston		Harbour Authority - an independent not-for-profit body responsible for managing, operating and or maintaining federally owned harbours	Fees differ depending on use. Active licenced commercial fishing vessels are charged \$0.36 per metre per day with monthly discounts available. For example, there is 45% discount on an annual pass. Pleasure craft use is charged \$3.60 per metre per day. Monthly rates available with discounts based on length of stay. There is a standard launch fee of \$15 per day. Ticket kiosks can be used for payment.	Enforcement is done by the Harbour Authority. The Harbour Authority uses operator information and boat registration numbers to enforce permits. Gates close to prohibit use after hours.

Review of Regional Management Models

Location	Dock	Management Model	Payment Structure	Enforcement
Belcarra	Belcarra Dock	Managed by Metro Vancouver	The cost is flat rate of \$80 per hour with a maximum of two hours	
Capital Regional District	Manage 12 docks for small crafts under 60 ft.		There are set fees for commercial operation, float planes and recreational moorage. Commercial vessels such as float planes using the docks for loading/unloading pay a rate of \$13.50 per visit. This is based on a prepaid rate and an annual schedule. Use is restricted to a maximum of 15 minutes. For other moorage a daily and overnight fee applies based on vessel size. Payment can be deposited in a payment box.	Enforcement is done by a local harbour master
Victoria	Fisherman's Wharf	Greater Victoria Harbour Authority	Moorage is regulated through permitting process available by kiosk, phone or Marina office. Commercial moorage High season vs. low season moorage High season \$18.25/ft Off season \$12.60 /ft Transient moorage rates \$1.33/day under 30 ft. monthly \$20.76 Reservation fees during holidays ex. Canada day fee Long-term moorage rates Under 30 – \$12.59 Live abroad fees \$113.00/boat Winter – under 30 is \$8.73	Enforcement is done by the Harbour Master and Harbour Patrol