

FINAL REPORT

Cobourg Harbour

Boat Lifting Options Analysis



prepared by

**Shoreplan
Engineering Limited**

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**Boat Lifting Options Analysis
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Prepared for

The Corporation of the Town of Cobourg

by

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1 Introduction

This report examines boat lifting options for the Cobourg Marina. It details the current operations and presents two new options for seasonal boat lifting. A site plan details existing and proposed locations for the option in Figure 1. It is understood that these operations take place twice a year, once in the spring to lift boats in and once in the fall to lift boats out. Although the planning of the transportation portion of the operation is the responsibility of the Town of Cobourg (the Town) the lifting plan is the responsibility of the Cobourg Yacht Club (CYC) with many responsibilities falling to individual members and boat owners.

2 Current Operation – Lifting Crane

Current operations taken from “2019 Lift in Lift out Procedures” Cobourg Yacht Club (CYC).

1. *Town of Cobourg is responsible to plan, organize and coordinate the transportation of all boats on cradles and empty cradles as part of the spring and fall boat hoisting operations. This transport will relocate equipment between the lifting areas and the storage compound at the foot of Hibernia Street. The transport of boats on trailers is the responsibility of that boat owner.*
2. *CYC is responsible to plan, organize and coordinate the lifting of boats into or out of the water as part of the spring and fall hoisting operations. These operations shall include but are not limited to contracting a crane service, sling handling, tag line handling, traffic control, as well as on site supervision of hoisting operations*

Currently equipment is rented seasonally to complete the lifts off the north and east wall. The movement of the boat from the compound to the lifting locations is completed using a rented truck and trailer that moves the boats in their cradles to the staging area. Boats are lifted in/out in as little as two to three days, using a rented crane. It has been previously noted that the heaviest boat is approximately 15,000lbs. Boats are lifted directly on to/off of their cradles. Boats are staged on the east wall and north parking lot areas and are stored either off site (as arranged by the boat owner) or at the Marina’s storage compound at the base of Hibernia Street. Masts are often removed prior to lift out, placing them along the north wall lawn area. Mast removal is completed in the days before the lift out of boats and are put back on in the days after lift in operations.

2.1 Lifting Locations Options

Various location options exist for operation of a lifting crane. These include:

- East and North seawall – Current Operation
- East Pier West side - inside the harbour – Past Operation
- East Pier East side - outside the harbour

Following the condition report by Shoreplan in 2019 it was recommended that lifting operations be restricted due to the poor condition of the seawalls on the north and east side of the marina. Repair of these seawalls is included in the scope of the design services being provided by Shoreplan to the Town. The

design can be robust enough to allow for regular lifting operations to resume without restrictions regardless of the chosen lifting plan moving forward.

Lifting at the East Pier has in the past allowed for a greater staging area for the boats and ease of maneuverability within the harbour prior to lifting. The pier was a single staging area instead of the multiple locations currently used. The single point of access at the pier also allowed for better control of pedestrian entry to the area reducing safety concerns during lifting. Although it would be possible to lift boats on the outside (east) wall of the pier, weather variability during both lifting seasons would have made for difficult conditions, so it is not advised.

Lifting boats from the inside (west) wall of the East Pier was ideal due to the aforementioned space and maneuverability conditions however the condition of the pier itself is no longer suitable. Previous investigations have found that the pier is experiencing areas of settlement which have been attributed to issues with the fill material that results in voids forming under the deck. This issue would need to be addressed before a crane could be operated safely from the pier. Shoreplan has previously prepared an options report (2018) that provided options to rectify this issue however this is no longer being considered.

As a result of the 2018 options report for the east pier, the Town of Cobourg Council voted to implement Option 4, which entailed rehabilitation of the east pier to accommodate only light vehicle and pedestrian traffic. The costs associated with rehabilitation of the east pier to accommodate the lifting operations, Option 3, was determined to be too expensive. The town has since retained a consultant to design the implementation plan for Option 4.

2.2 Limitations of Current Operations

Currently the only locations suitable for using the crane lift without infrastructure upgrades are those presently being used, the north and east seawall. These locations are between 400 and 650m travel distance from the storage compound. These spaces limit the number of boats that can be staged and requires a tight configuration and a high degree of coordination to ensure efficiency and safety. These locations restrict public access during operations and close down local streets and public parking spaces. These sites are difficult to control access to and have widespread public safety concerns. The current lifting procedure requires a high level of coordination of staff and volunteers to ensure the operation runs smoothly.

Lifting with the crane requires various people to be involved including a crane operator, a truck driver, marina personnel to coordinate and the boat owner who sets the lifting sling locations for each boat. Rental of equipment seasonally introduces a risk to cost increases and availability of equipment. Scheduling is inflexible in this respect. Delays during lifting introduce the possibility of additional costs due to increased rental times. The procedure as-is does not result in any profit for the Town, and is operated at a break even rate.

It has also been noted that because the equipment is rented, it is only available at the time of the lift in/out. There are often times during the year where a damaged boat needs to be removed from the water, however due to the lack of equipment it cannot happen immediately. Delays can result in further damage to the boat or issues surrounding navigation if the boat is blocking access. If a boat owner cannot be located or refuses to pay for the removal the Town is left with the task of renting equipment and potentially paying for the operation.

2.3 Advantages of Current Operations

Seasonal rental of lifting equipment means there is no additional equipment to store or keep onsite when not in use and no requirement to maintain said equipment. There is also no capital cost to purchase this equipment.

The current lifting procedure has been in place for a long time and is a known process by all those involved. Any new option will involve a loss of productivity initially as boat owners and officials alike learn the new procedure.

Alternative 1, presented below, may be considered as a replacement for the truck and trailer portion of the current operation. It would allow movement of the boats to the staging area with only the crane being rented to lift in/out the boats.

3 Alternative 1 Self-Propelled Trailer

Self-propelled trailers have various options but all include a self-contained drive and steer system attached to a trailer. Boats can be loaded and unloaded in their storage location on to the trailer either with or without their cradle depending on the features chosen for the trailer. Single person operation of the trailer for this loading is possible but at least two people is best to guide the operation. Submersible options would allow the trailer to be driven down a ramp into the water for boat launching.

One Canadian manufacturer, Kropf Industrial, produces various trailer options. Their self-propelled sling lift trailer option would allow boats to be loaded from their cradles without any additional equipment. This is accomplished by way of an open design that allows the trailer arms to be placed on either side of the boat while still supported, and slings to be strapped under the boat which then hydraulically lift the boat for its supports. The inside width of the trailer is adjustable to accommodate a range of boat sizes. Considering the current lifting requirements of the CYC, Kropf's SL-10 model would be adequate with a capacity up to 20,000lbs, however the SL-20 has also been considered for added capacity. Additional details are provided in the appendices. The width of these trailer models are 5.18 and 5.8m respectively making the SL-10 model the only one with sufficient clearance at the current boat ramp as the ramp inside width is approximately 5.8m wide. This trailer allows for sailboat lengths up to 38' LOA and drafts of 6'6" with a ramp grade capability of 10%. This would service the majority of the fleet currently being lifted in/out by the CYC. Both these models have speeds up to 180 FPM (3.3km/hr).

The self-propelled trailer could also be used in conjunction with the mobile crane currently being used, or the travel lift proposed in Alternative 2. This would allow movement of boats to the staging or lifting location and eliminate the requirement for a truck rental with the mobile crane and provide some flexibility during the rest of the year as onsite equipment available for use. It could potentially speed up the operation with the travel lift option that will be presented in Alternative 2.



Photo 1- Sling lift on land



Photo 2 - Sling lift in water

3.1 Location

This option would be operated from the boat ramp on the west side of the outer harbour. This ramp is approximately 5.8m wide and the lakebed at the end of the ramp, in line with the steel sheet pile walls on either side, is at an elevation of approximately 73.5m IGLD. The ramp is at a 10% grade. At low water levels of 74.2m (Chart Datum) this would result in only 0.7m of water depth. The ramp would need to be extended and the area dredged to accommodate the draft on a greater variety of boats. The limits of draft for the trailer is 6.5' (1.98m) so an additional 1.3m of depth could be useful. Accomplishing this would involve extending the ramp up to an additional 15m and providing additional lakebed depth through the aforementioned dredging. This would include extending the concrete ramp deck itself as well as the wall on the southwest side of the ramp at an estimated high level cost of \$180,000.

3.2 Limitations and Restrictions

Current lifting procedures place the largest boats into an area where the lakebed is at approximately 70.5m IGLD. At low water levels of 74.2m this is 3.7m of draft. The end of the current boat launch ramp is significantly shallower and dredging of this area and extension of the ramp will be required to ensure adequate draft. Although dredge of this area is completed every year with owned equipment, the current dredging plan is not sufficient to clear the boat launch and area and permit timing restrictions do not allow sufficient time to add this area. Additional dredging would be an added cost as it is expected that this dredging would be completed by an outside source initially to be able to dredge the quantities required within the DFO restricted timing windows. Long term it may be possible to maintain this area with Town operated equipment as annual infill volumes would be significantly less than the initial dredge required. The dredging required for the boat launch ramp may also be paired with other areas of the harbour that could benefit from additional dredging. Alone the boat launch ramp would have an estimated rate of 110\$/m³ however paired with other areas this rate may be as little as 60\$/m³ depending on volume. Estimated volumes of sand and access channel for the boat launch ramp alone are 700m³, resulting in a high level estimate of \$80,000.

The cost of the mobile trailer would require a capital investment and regular maintenance costs would be a new expenditure. The trailer itself would require a space for storage potentially taking up space in the yard that would otherwise generate income as a rental space. There may be the possibility of buying the equipment used, however new equipment would cost in the range of \$240,000 to \$280,100 depending on the model chosen. Quotes from Kropf have been included in the appendices of this report.

Training will be required of Town staff to ensure safe operation of the new equipment. Several staff will need to receive this training so that the Town can provide sufficient staff resources to cover multiple shifts and regular staff absences. It is also expected that staff turnover will require additional training at future dates.

3.3 Advantages

Having equipment on hand for use any time allows for greater flexibility in scheduling the lift in/out. There are no added costs of extending equipment rental due to delays and no risk associated with price increases or equipment availability. As the trailer only requires one person to operate, fewer people are required to complete the maneuver. The equipment would also be on-site and available to move boats at other times of the year should it become necessary for such things as out of water maintenance or removal of a derelict vessel. Although this trailer would be bought to move boats around, it may also be useful for moving other heavy items as needed. There is also a potential added revenue stream from renting out the equipment during the year when not in use.

4 Alternative 2 - Travel Lift

A travel lift is a type of gantry crane that allows the boat to be lifted out of the water at a dedicated slip. It is mobile with a wheel on each corner and is operated remotely. Various options exist on these lifts including four wheel steering, radio remote control, and hydraulic sling positioners. These options result in increases in efficiency and safety. Travel lifts can be used to lift a range of boats including boats with their masts on. Kropf Industrial fabricates various models with a capacities up to 120,000lbs, however their base model, the 20-Tonne MML 20, having a capacity of 40,000lbs would be more than adequate for CYC's current needs. Similar to the self-propelled trailer the travel lift has a speed up to 180 FPM (3.3km/hr).



Photo 3 Example Travel Lift at Fifty point Marina

4.1 Location

The travel lift would require a dedicated lifting location with two walls extending from shore on which the lift would travel. The water depth between these two walls would need to provide adequate draft for the boats to be lowered into. Currently there are no such structures at the harbour. Possible options for locating new structures include the option to operate the lift from the boat ramp if the walls were extended. They would need to be designed to extend far enough to provide the required draft and support the load of the crane. The high level estimate cost of extending the existing ramp structure to provide a lifting location for the travel lift is \$265,000.

A separate structure could be built adjacent to the boat launch ramp, along the same shoreline, keeping the two structures separate however this would be more expensive. Similarly construction of a separate location would be possible along the east or north wall, however access for the lift would be difficult and travel distance to the storage area longer. A separate location could be considered along the inside of the east pier with travel walls constructed perpendicular to the pier, however this location is highly visible and the travel distance from the storage area is much further. Also, as mentioned previously, the option to rehabilitate the east pier to support the boat lifting operations has previously been decided against due to the high costs of construction and the communities' desire to rehabilitate the pier into a pedestrian friendly area.

4.2 Limitations and Restrictions

Similar to the self-propelled trailer this is a piece of equipment that will be bought, requiring a capital investment as well as budget for ongoing maintenance. It will also require a dedicated storage location potentially taking away a rentable space. Due to its size and visibility it may not be well received by the public so a location that is out of sight would be advisable if at all possible.

With this option there is also an additional cost for the design and construction of the appropriate walls and basin where the travel lift will operate. This would involve extending the ramp walls approximately 15m.

Similar to alternative 1, dredging will be required if the equipment is operated from the boat ramp. As a new piece of equipment, it will require training and a new movement plan for execution of the lift in/out.

The Kropf MML 20 would cost in the range of \$326,000 depending on features. A quote from Kropf has been included in the appendices of this report.

As with alternative 1, training will be required of Town staff to ensure safe operation of the new equipment. Several staff will need to receive this training so that the Town can provide sufficient staff resources to cover multiple shifts and regular staff absences. It is also expected that staff turnover will require additional training at future dates.

4.3 Advantages

Similar to the self-propelled trailer having the equipment on hand for use any time allows for greater flexibility in scheduling the lift in/out, there are no added costs for extending equipment rentals due to delays and fewer people are required to complete the operation.

Boats could also be moved with their masts up, saving time and effort involved in their removal. If the travel lift were combined with the self-propelled trailer that could move the boats to the lift in staging area while the travel lift placed boats in the water, the operation would be very efficient. The equipment would also be on-site and available to move boats at other times of the year should become necessary for such things as maintenance to be completed out of water.

5 Summary

The options presented in this report include ways of maintaining the current operations as well as options to add equipment and change the lift in lift out procedure to increase efficiency and enhance safety.

Below is a summary of the advantages and disadvantages of each option explored and the associated cost to proceed with each. Costs associated with infrastructure upgrades do not consider tax, contingency or design fees.

Option	Advantages	Disadvantage	Cost
Current Crane Lifting Operation			Annual Rental Expense
East and North Wall	Known operation Adequate space Adequate draft	Safety concerns due to pedestrian control Distance from storage compound Cost of rental and unavailability of equipment year round Liability concerns with yacht club involvement Unknown availability of resources/ potential high reliance of yacht club members	Upgrades to east and north wall lifting areas \$50,000 to \$100,00 premium on repairs.
Past Crane Lifting Operation			Annual Rental Expense
East Pier	Best location for pedestrian control One location for staging Adequate draft	Closing down public amenity Distance from storage compound	\$3.8M (Shoreplan 2018) to repair the entire pier to accommodate lifting

Option	Advantages	Disadvantage	Cost
		Cost of rental and unavailability of equipment year round Public consultation resulted in Council decision to not upgrade the east pier to support lifting operations Conflicts with intended plan to naturalize pier	operations in the way it was done previously.
New Proposed Lifting Operation			
Alternative 1			
Self-Propelled Trailer	Operated close to storage compound Minimal disruption to public space Better control of lifting site for enhanced safety Available year round	Initial capital investment and ongoing maintenance costs and operation costs for additional resources Upgrades required to ramp	SPSL 10 – \$240,000 OR SPSL 20 – \$280,000 Dredging - \$80,000 Upgrades to ramp - \$180,000 Resources - \$100,000
Alternative 2			
Travel Lift	Operated close to storage compound Minimal disruption to public space Better control of lifting site for enhanced safety Available year round	Initial capital investment and ongoing maintenance costs and operation costs for additional resources Upgrades required to construct operation area and basin	MML 20 - \$326,000 Dredging – \$80,000 Extension and upgrades of ramp walls – \$265,000 Resources - \$100,000



Figure 1 – Site Layout