2015 02 11

FINAL DRAFT REPORT

Cobourg Marina Expansion

Operations and Facilities Study

prepared by

Shoreplan
Engineering Limited

February 2015

SHOREPLAN

Cobourg Marina Expansion
Operations and Facilities Study

Prepared for

Corporation of the Town of Cobourg

by

SHOREPLAN ENGINEERING LIMITED

VERSION	DATE	STATUS	COMMENTS
01	2014-10-31	preliminary draft	for review
02	2014-12-10	draft	for review
03	2015-02-10	final draft	
04	2015-02-11	final draft	

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1 Introduction

Shoreplan Engineering Limited was retained by the Town of Cobourg (Town) to undertake a study of the supporting facilities and operational needs of Cobourg Marina. The study includes an analysis of current and future operating needs of the marina and a review and analysis of proposed expansion plans. A site plan of the existing Cobourg Marina and the surrounding area is shown on Figure 1.1.

Cobourg Marina is located on Lake Ontario, approximately 300 metres south of King St W in the Town of Cobourg. The marina is sited between a cobble beach to the west and the sandy Cobourg Beach to the east. To meet increased demand and ensure viable operations, Cobourg Marina is undergoing a phased expansion over three years. Cobourg Marina's facilities currently include 7 floating docks and 220 serviced berths, able to accommodate pleasure craft between 18 and 70 feet in length with electrical and water services to each.

1.1 Proposed Expansion

Expansion of the marina was planned to take place over three phases. Phase I was completed in the spring of 2014. It included the repositioning of the existing dock on the north wall (dock F) and the addition of a new G dock, accommodating 32 slips. Phase II includes the upgrade of electrical and water services on the central pier to accommodate a 120 slip expansion. Phase III will include the addition of 120 serviced slips, for a total capacity of 340 slips. Of the 340 slips, 60 will be transient and the remaining 280 slips will be reserved for seasonal use. The expansion will be coordinated with the addition of a dedicated lifting well and boat handling equipment and improved boat storage and parking facilities.

A preliminary dock layout plan was prepared by the Town's staff in 2014, with the corresponding slip sizes shown in Table 1.1. Docks A to E are existing docks on the east side of the central pier. Docks F and G are located on the northern wall of the marina and were installed during 2014. Docks H, I and J are proposed to be added during Phase III of the expansion.

Table 1.1: Slip sizes per Dock

		Existing					*Proposed*					
Total Linear	Total	A	B	C	D	E	F	G	H	I	J	Boats Length
750	30	-	30	-	-	-	-	-	-	-	-	20' to 25'
1620	54	11	-	-	11	-	-	-	32	-	-	26' to 30'
2870	82	10	2	24	10	-	36	-	-	-	-	31' to 35'
4760	119	1	-	-	1	20	-	16	-	52	29	36' to 40'
1920	40	-	-	-	-	-	-	16	-	-	24	41' to 50'
165	3	-	-	-	-	-	-	-	-	-	3	51' to 55'
12085	328	22	32	24	22	20	36	32	32	52	56	Total

Figure 1.1
Cobourg Marina Expansion
Existing Site Plan

1.2 Study Approach

The study approach involved the following work tasks:

- Reviewing pertinent background information;
- Consultation meetings with the public and interest groups;
- Review of marina operating needs, both existing and proposed;
- Review of operating needs of the Cobourg Yacht Club and Cobourg Dragon Boat and Canoe Club;
- Review and preparation of parking requirements and plans;
- Review and preparation of boat storage plans;
- Analysis of options for East Pier;
- Analysis of options for West Headland;
- Identifying optimum placement of parking, boat storage and boat handling facilities;
- Identifying optimum East Pier recreational and commercial development

1.3 Report Structure

Chapter 1 provides an introduction to the study with a brief description of the site and approach. Chapter 2 describes the existing conditions of structures, existing operations and existing facilities. Chapter 3 considers the future operating needs of the marina, including dock layouts and facility sizing. Development of the East Pier is discussed in Chapter 4.

2 Existing Conditions and Operations

A plan showing existing structures and facilities is shown on Figure 2.1.

2.1 Existing Structures

The East Pier is paved and accessible to the public and vehicles. The pier is approximately 400 metres long from the end of Division Street, and approximately 30 metres wide at its widest point. The coastguard pier is located on the west side of the East Pier, and adjacent to Cobourg Beach. A breakwater is located at the end of the pier and is oriented approximately towards the south. It extends a further 200 meters into the lake. A lighthouse is located at the southern tip of the breakwater. The most landward portion of the breakwater consists of a concrete deck and steel sheet pile walls. The most lakeward portion of the breakwater, extending to the lighthouse, is a concrete capped mound structure, possibly a timber crib. Stone has been added to the southern part of the breakwater. Significant deterioration of the surface of the structure was observed during site visits. Chunks of concrete have broken off the structure and there are signs of undermining. The breakwater is reported to be overtopped by easterly waves.

The west breakwater is a conglomerate structure of timber crib, randomly placed armour stone, concrete rubble and a concrete structure. A sand beach has formed naturally within Cobourg Harbour along the West Headland.

The majority of the marina's existing slips are accessed via a pier extending from the marina building. The pier is approximately 8 m wide at its widest point. Five docks are accessed from this pier. In 2014, the single dock on the north wall of the marina was replaced with two docks orientated perpendicular to the north wall.

2.2 Existing Harbour Users

The municipal marina operation is the primary user of the existing harbour. As noted in the introduction, the marina currently operates 220 slips. This is an increase from 188 slips in 2014.

The Canadian Coastguard has a station located within Cobourg Harbour and operates from late March until early December. The Coastguard requires sufficient space to manoeuvre when towing boats back into the harbour and access to the boat ramp for ambulances.

The Cobourg Yacht Club (CYC) operates out of the Cobourg Harbour with a membership of 289. The CYC occupies a club building adjacent to the marina building. A club restaurant is a part of the facility. The club hosts events and offers learn to sail programs.

The Cobourg Dragon Boat and Canoe Club (CDBCC) is a non-profit incorporated organization that has been in operation in the Cobourg Harbour for over 15 years. The club offers a variety of programs to members including dragon boating and sprint boating. The club estimates 17,220 person hours were spent in Cobourg Harbour during the 2014 season. The club trains in the water area west of the central pier.

The Survivor Thrivers Breast Cancer Survivor Society is a dragon boat team made up of breast cancer survivors. The team has been training within Cobourg Harbour since 1998. The team trains in the water area west of the central pier.

The Willow Beach Field Naturalists is a club formed in the communities of Port Hope, Cobourg and surrounding areas in Northumberland County, Ontario. The club is concerned with the preservation of natural heritage. In Cobourg Harbour, club members enjoy bird watching on the beach and west headland.

The harbour area is also enjoyed by the general public. The shores of the Marina basin are open to the public.

2.3 Existing Marina Support Facilities

Existing marina support facilities are indicated on the site plan on Figure 2.1. The supporting land-based amenities include a parking area, winter storage and the marina office building.

The marina building currently provides space for washroom and shower facilities, as well as an office/reception area. The existing washroom facilities in the marina building contain 12 men's lavatories, 12 women's lavatories, 7 men's toilets/urinals, 9 women's toilets, 8 women's showers and 7 men's showers.

The existing parking area for the marina is located south-west of the marina building, in front of the launch ramp. The parking area is gravel surfaced and approximately 2700 m^2 in size. Other parking areas are located close to the marina. Two parking areas are located along the north wall of the marina. Each parking area provides 36 regular parking spaces plus two accessible parking spaces. Formal parking is also provided at the north end of the East Pier at the end of Division Street..

South-west of and backing onto the marina parking area is a storage area used by the Cobourg Dragon Boat & Canoe Club and Cobourg Yacht Club. The two clubs occupy an area of approximately 1800 m^2 in total. The area is enclosed by a chain link fence around the perimeter and also dividing the two clubs. Each club has a small, temporary building within their respective areas.

The CYC operates a club building adjacent to the marina building. The building is two stories with a floor area of approximately 1400 sq.ft. (130 m^2) on each level. There is a deck on the south side of the building on the upper level. We understand that the CYC is considering an expansion to the existing building which would increase the floor size of each storey to approximately 1800 sq.ft. (170 m^2).

The existing winter storage site is located south-west of the marina building and docks, close to the base of the west breakwater. The compound is approximately 3000 m^2 in area and enclosed by chain link security fencing.

A launch ramp is located in the south-east corner of the parking area. Car and trailer spaces are provided within the main parking area next to the marina building. The number of launchings per day from the ramp is estimated to rarely exceed 15 (Paul Gauthier, personal communication). The ramp use is occasionally constrained by sand deposits.

Figure 2.1
Cobourg Marina Expansion
Outline of Existing Facilities

2.4 Existing Coastal Conditions

The 100 year peak instantaneous water level, or design high water level (DHWL), for Cobourg is 75.7 m GCS. This represents the water level that has a 1% probability of occurrence in any year and considers both mean lake levels and wind setup. This water level is typically required to be considered a design condition by the approving agencies that review development applications along the shores of Lake Ontario.

Deep water wave data and the nearshore wave climate were reviewed in the 1995 development plan (Hough Stansbury Woodland Naylor Dance Limited et al, 1995). The two references reviewed for deep water wave data were the MNR hindcast (MacLaren Plansearch, 1988) and the PWC hindcast (Skafel, Bishop and Glodowski, 1979). Significant differences in the predications made by the two sources were noted. Offshore wave heights are predicted to be in the range of 2.0 to 3.5 metres during the boating season and 5.5 m during the entire year. The largest waves will come from the east and south-west.

The nearshore wave climate was also reviewed in the 1995 study. The PWC report suggests that wave heights from the south west and east will be reduced by 91% and 80% of their deep water heights respectively. The maximum wave height that can exist at the marina entrance as predicted by a depth limited approach can vary between 3 to 3.9 metres depending on the water level.

The waves generated within the harbour were estimated. A fetch (the length over which the wind blows) of 300 metres and a wind speed of 80 km/hr were used. Based on the provided sounding survey by the Public Works of Canada (February 15, 1954), the water depth adjacent to the East Pier is estimated to be 4 to 6 metres at datum water level. Design charts predict that waves generated at average to high water levels would have a period of approximately 1.2 seconds and a wave height of less than 0.25 m (US Army Corps, 1984). However, the required duration of wind is very short. Higher wind speeds can generate higher waves, but these are not expected to exceed 0.4 m. Based on this estimate, any ongoing wave related problems within the harbour are likely the result of waves entering the harbour rather than locally generated waves.

3 Future Operating Needs of Cobourg Marina

In this chapter, the future operating needs of Cobourg Marina are considered. Dock layouts during Phase III of the expansion have been developed and are presented in Section 3.1. The increased requirements for parking and other facilities to support a 340 slip marina are considered in Section 3.2. The areas required to support the launch ramp and the CYC and CDBCC storage needs are considered in Sections 3.3 and 3.4 respectively. In section 3.5, an accessible dock on the west headland is discussed. Finally, potential layouts of facilities on lands west of the marina building are presented in Section 3.6.

3.1 Docks

The Town wishes to expand the capacity of Cobourg Marina to 340 slips. We understand that the additional slips will generate additional revenue and help the marina to remain self-sufficient in the long-term. We have developed four options for the addition of 120 slips during Phase III of the expansion. The layouts were developed with the needs of all harbour users in mind.

3.1.1 Dock Layout Options

Four layout options for the addition of 120 slips during Phase III of the expansion were considered. For all options, a 30m clearance was provided between docks and the East Pier. An approximately 21 m wide clearance has been provided between adjacent docks. The four options are displayed on Figure 3.1.

Option 1 includes the addition of a main floating dock from the end of the existing central pier. The dock is oriented at 90 degrees to the central pier, towards the west headland. Three docks are located off the main dock and extend towards the East Pier. Since the docks are located away from the west headlands and are accessed from the south, frequent dredging may not be required to maintain operational depths under the proposed docks. The maximum distance to the Marina building is 390 m (from the end of dock J) and 210 m to the end of the central pier.

Option 2 proposes the addition of a main floating dock at a 90 degree angle to the central pier, extending towards the west headland. The main floating dock is located approximately 70 m from the end of the central pier. Two docks are located off the main dock and run parallel to the central pier. In this option, the maximum distance from any slip to the marina building is 330 m and 220 m to the connection to the central pier.

Option 3 includes the addition of a main floating dock as an extension to the existing central pier and four new docks. Three docks are added off the main floating dock; one to the north and two to the south. A fourth single-loaded dock, accommodating smaller boats, is located off the south side of the existing central pier. The maximum distance between the furthest slip and the marina building is approximately 360 m. The maximum distance to the connection to the centre pier is approximately 190 m.

In Option 4, docks have been added on the south side of the central pier. The maximum distance between the furthest slip and the marina building is 315 m and 140 m to the central pier. Dredging may be required to maintain operational depths, particularly for the docks closer to the boat launch.

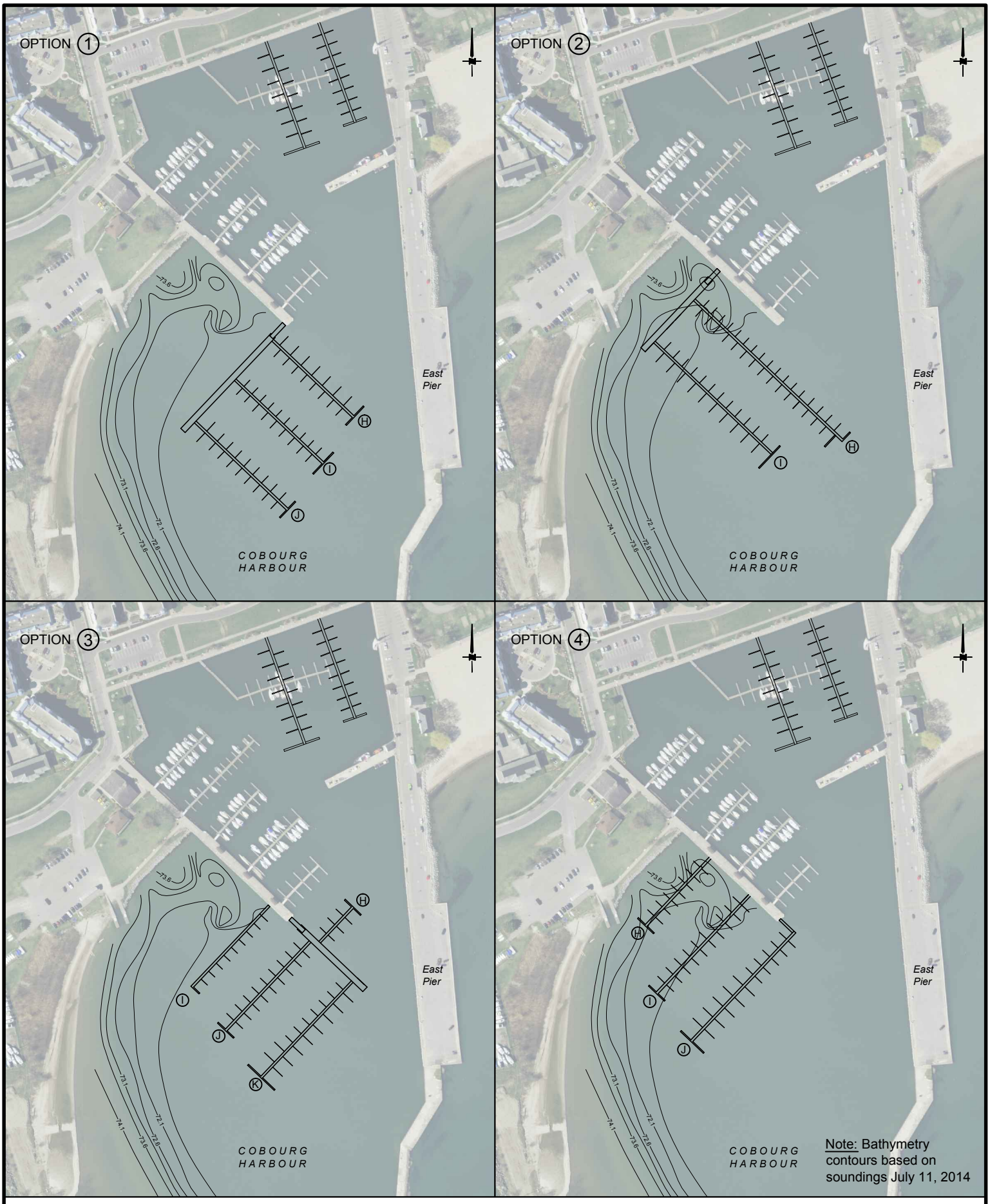

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Figure 3.1
Cobourg Marina Expansion
Dock Layout Options

3.1.2 Conflict between Docks and Existing CDBCC Paddling Area

Shoreplan considered the potential conflict between new docks and training area currently used by various paddling groups.

The CDBCC included in a submission, following the first public meeting, a plan showing their existing small boat paddling area within the harbour. The club currently uses an approximately 400 m long “corridor” of water, from the central pier and following the west headland to the west breakwater. The club has identified that they wish to continue training in the same water as this provides the most suitable conditions in the harbour. In our analysis we have used the existing CDBCC small boat paddling area. The approximate limits of the area were traced and are shown as a red dashed line overlaying the four dock layout options in Figure 3.2.

Option 1 results in minimal intrusion into the CDBCC small boat padding area. In addition, the configuration is unlikely to result in a significant increase in boat traffic in area. Option 3 results in a small amount of conflict with the CDBCC small boat padding area. The single-loaded dock closest to the launch ramp will help reduce boat traffic in this area. Option 4 results in the maximum intrusion into the CDBCC small boat padding area of all the options considered. In addition, access to the slips may increase boat traffic in the remaining CDBCC practice area. Option 2 has a medium level of conflict. The orientation of the docks may result in boat traffic within the remaining practice area.

We have also anticipated an approximate area that could be used for dragon boating. A dragon boat is 42’ in length and requires a minimum 150’ (45.7m) circle to complete a 180° turn using the sweep alone (Letter from Siobhan Kenny, Survivor Thrivers President, June 30, 2014). The International Canoe Federation (ICF) recommends a minimum depth of water of 2 metres for dragon boat courses in the Dragon Boat Rules, 2013. For our analysis we have taken an average water level during the boating season of 74.8 m. For each dock layout we have approximated a potential dragon boat course which allows a 150’ turning diameter and provides a water depth of at least 2 m. The areas are outlined by the blue dashed lines on Figure 3.2.

Options 1 and 3 are able to accommodate a course suitable for dragon boats in the order of 400 m long. Option 2 is accommodates a dragon boat course approximately 300 m long. Option 4 can accommodate a dragon boat course in the order of 200 m long. The reorientations of the rowing channel at the south end towards the entrance, shown on Figure 3.2 are due to the water depth restriction along the West Headland; they are not the result of additional docks.

The CYC also operates a dinghy sailing school within the harbour. Areas potentially available to the dingy sailing school under each option are outlined on Figure 3.2. These areas overlap with those potentially used by paddlers and rowers and scheduling of formal training sessions would need to address this conflict. Options 1 and 3 would adequately accommodate the needs of the boaters, CDBCC and CYC.

Option 1 could be further refined to reduce the potential conflict between the docks and the paddlers/rowers. Figure 3.3 shows the potential layout. The outer part of the main access dock has been deflected in the south-easterly direction to maximize the space available to the rowers/paddlers. The angled connections between the main dock section and secondary main

would increase supply cost slightly. These refinements can be considered further in the detailed design phase.

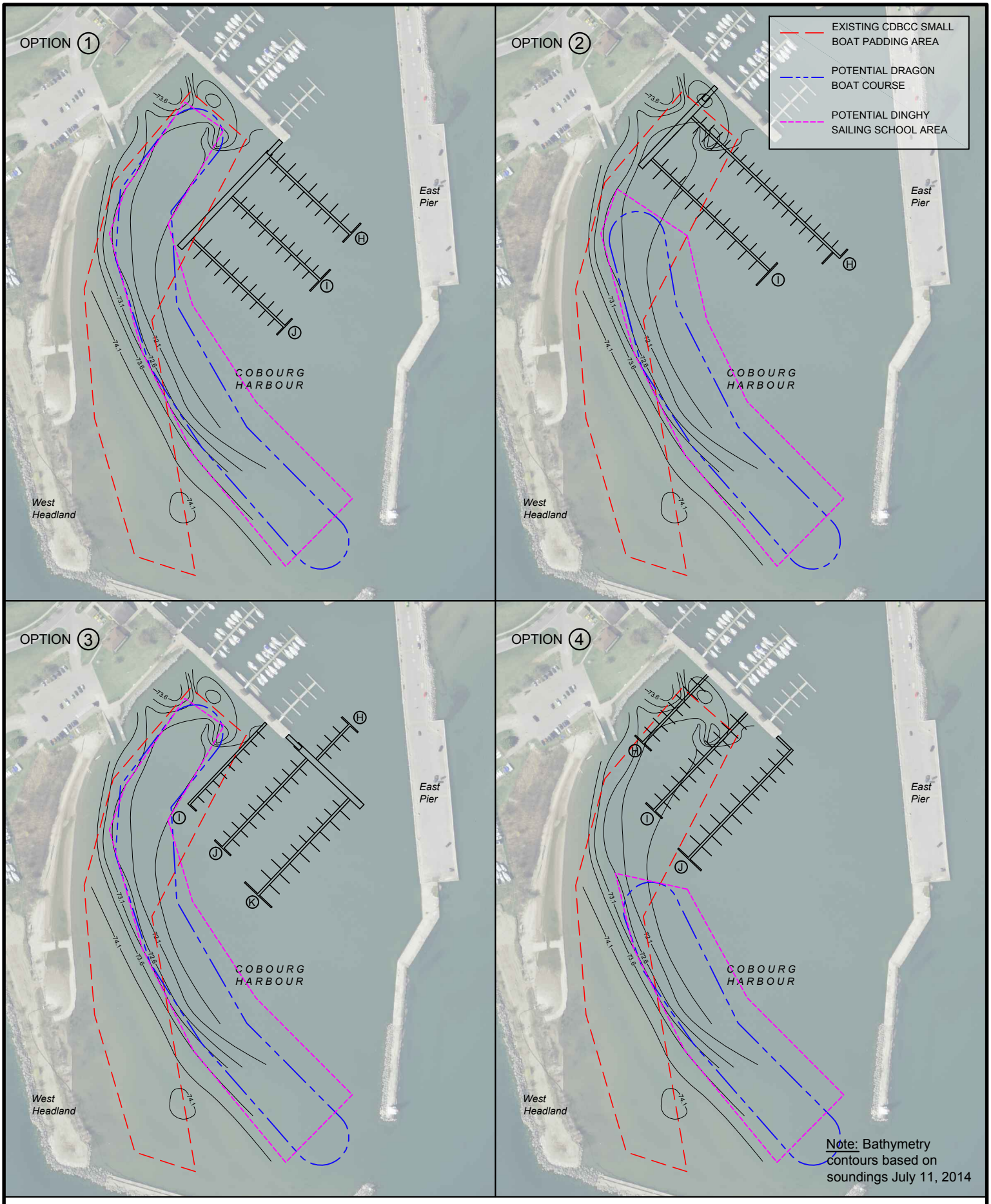

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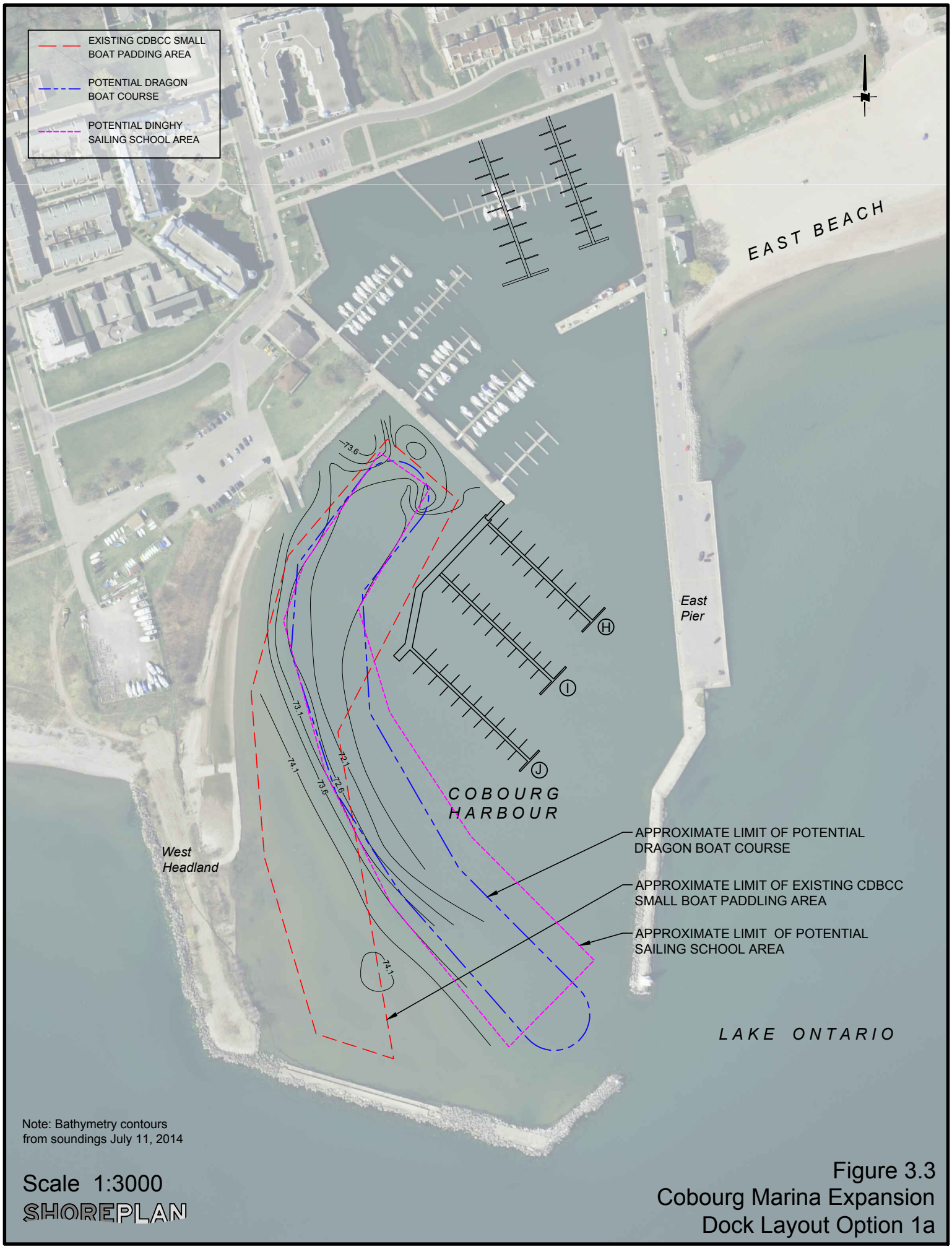
Figure 3.2
Cobourg Marina Expansion
Dock Layouts with Dragon Boat and Paddling Areas



Note: Bathymetry contours from soundings July 11, 2014

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SHOREPLAN

Figure 3.3
Cobourg Marina Expansion
Dock Layout Option 1a

3.2 Marina Basin Supporting Facilities

Supporting facilities required by a marina of 340 slips are discussed below in this section. These facilities include car parking, winter storage, lift out facilities and associated access roads and marina centre. Launch ramp and CYC and CDBCC storage areas are discussed separately in the following sub-sections of the report. Section 3.2 discusses the size/quantity requirements associated with the expanded marina. The layout options are presented in section 3.6.

3.2.1 Car Parking

Car parking at marinas should typically allow capacity for boaters, non-boaters, marina employees, commercial boaters and other users of the waterfront facility.

Small Craft Harbours Branch (1992) recommends ratios of 0.5 to 0.7 cars per slip (peak) and 0.3 to 0.4 cars per slip (typical). Ross (1989) completed a US-wide survey of car parking in marinas during the 1988 boating season. The average August weekend and weekday ratios were 0.51 car/boat berth and 0.21 car/boat berth capacity. A maximum ratio of 0.71 car/boat berth was recorded during the July 4th weekend. We have employed a ratio of 0.6 cars per slip for Cobourg Marina, equating to 204 spaces (340 slips x 0.6 parking spaces/slip).

Parking spaces should be 2.6 to 2.8 metres wide and 5.2 to 5.6 metres long (Small Craft Harbours Branch, 1992). ASCE gives a planning density of 200-250 parking spaces per hectare including parking, aisles and landscaping. The average density equates to an area of approximately 44 m^2/parking space. An area of approximately 9100 m^2 is estimated to be required to accommodate the 204 parking spaces.

The number of accessible parking spaces is determined by Ontario regulation 191/11 based on the total number of parking spaces. For 201 to 1,000 parking spaces, two parking spaces plus an additional two percent of parking spaces for the use of persons with disabilities (clause 80.36.4) are required. For 204 parking spaces, seven accessible spaces are required (2 + 2% x 204 spaces). These spaces should be located on the shortest accessible route to the building or facility entrance. To comply with CAN/CSA-B651-04 (Accessible Design for the Built Environment) accessible parking spaces should be a minimum of 2.4 metres wide plus a 1.5 metre wide adjacent access aisle.

3.2.2 Access Roads

The preferred width of access roads is 3.4 metres per lane for two way circulation and 4.6 metres for one-way circulation (ASCE 2012).

3.2.3 Marina Centre and Services

For marinas with greater than 201 berths, ASCE (2012) recommends 1 women's and 1 men's urinal/toilet and 1 women's & 1 men's lavatory for every 50 berths. Two showers are recommended for every three toilets. The quantities of washroom items recommended for 340 slips are listed in Table 3.1.

Table 3.1: Washroom Requirements

Item	Quantity
Women's toilet	7
Men's urinal/toilet	7
Women's lavatory	7
Men's lavatory	7
Showers	9

As indicated in Section 2.3, the existing marina building contains 12 men's lavatories, 12 women's lavatories, 7 men's toilets/urinals, 9 women's toilets, 8 women's showers and 7 men's showers. Currently, one half of the facilities are closed for cleaning at any given time. With the expansion, the marina would open both and increase cleaning staff. The existing washroom facilities are expected to be sufficient to meet the needs of the marina after expansion. Washroom facilities are also located in the CYC club building. Plans for the proposed expanded CYC club building indicate 3 women's toilets, 3 men's toilets/urinals and 4 lavatories.

We understand that the possibility of combining the functions of the two existing buildings, that is the Cobourg Marina and the Cobourg Yacht Club, into one combined building has been considered in the past. The present position of the two buildings, in close proximity yet not connected, does not enhance the function nor aesthetics of the site. The area of the two buildings could be combined into one. The most efficient way of creating the space may be an addition onto the existing marina building and the removal of the CYC building. Figure 3.4 shows an outline of an addition to the existing marina building on the west side of an area equal to the floor area of the expanded CYC building which we understand is under discussion. The total floor area is approximately 340 sq.m on a single level. It is not intended to suggest that the outline illustrated on Figure 3.4 is an actual configuration. The design of that is beyond the scope of this assignment. The subsequent removal of the CYC building would open the view to the marina basin from 3rd Street.

The potential advantages to combining the location of the operations would include sharing of certain services and facilities such as reception, security, washrooms, banquet room(s) and kitchen. While sharing some aspects of the building, the building can be configured to provide some exclusive space for the private use of the Club and private club entrance, if desired. The layout of the building is beyond the scope of this assignment.

3.2.4 Winter Storage

An increased quantity of slips at the marina will result in an increase in dry-land storage requirements during the winter months. Currently, the marina operates at a seasonal docking to dry land storage ratio of approximately 2 to 1 (Gauthier, 2014). Based on 280 seasonal slips after the expansion, storage for approximately 140 boats would be required.

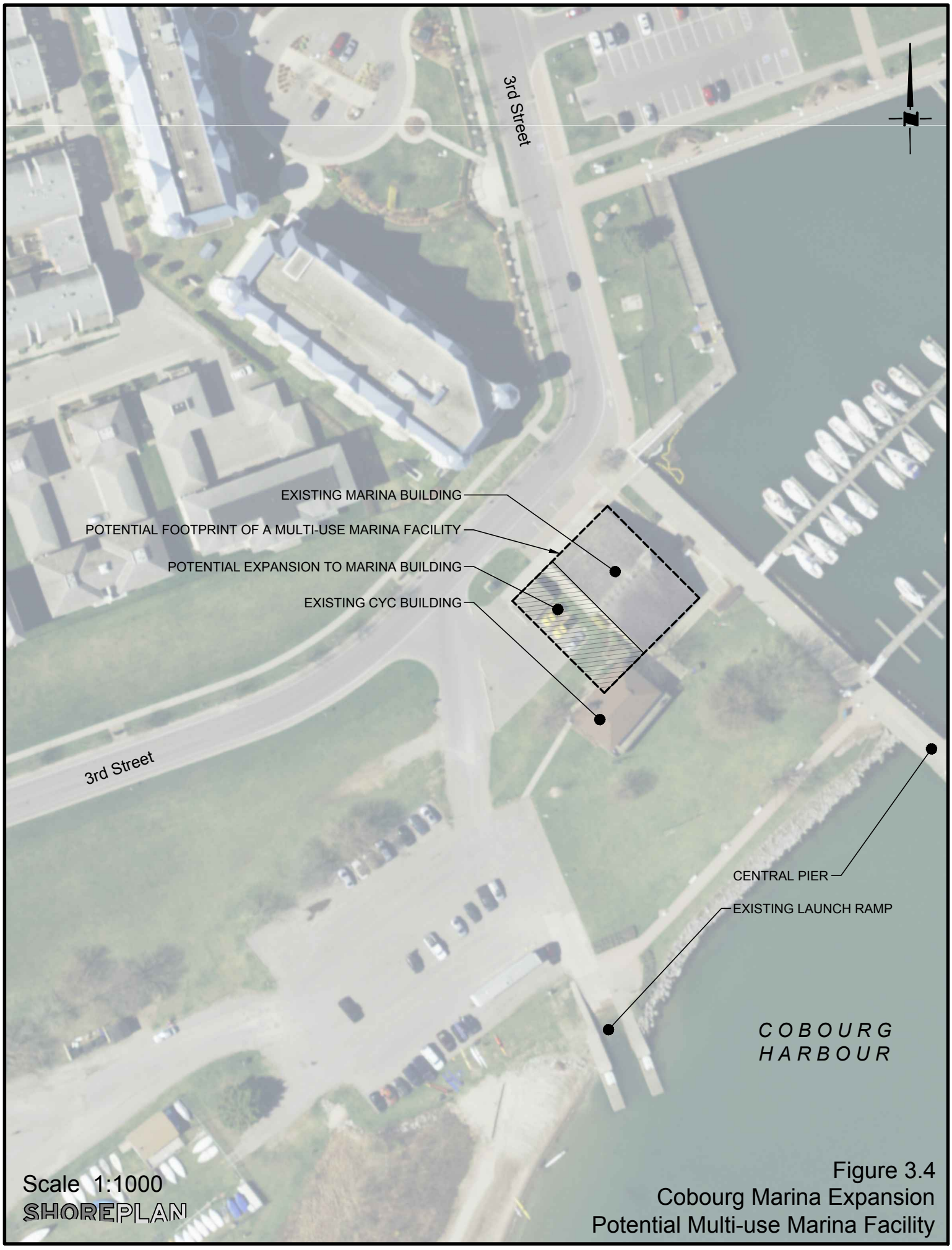

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Figure 3.4
Cobourg Marina Expansion
Potential Multi-use Marina Facility

For an average boat length of 10.5 to 12m (34 – 39'), a winter storage boat density of approximately 138-163 boats/hectare is recommended (ASCE, 2012). This density includes allowances for storage, aisles and landscaping. Boat storage should allow for 6 – 8 metre wide access aisles. The actual density of the boat storage will depend on the shape of the area available and the filling of the boats within it. Ideally, all travel lanes will be double loaded, that is, have boats placed on both sides.

An average density of 150 boats per hectare equates to a per boat area requirement of 67 m^2 per boat. This estimate is in line with other previous marina projects completed by Shoreplan. For 140 boats, the approximate area required for winter storage is estimated to be 9400 m^2 (140 boats x 67 m^2/boat).

3.2.5 Lift Out and Boat Handling

There are several ways of handling boat launching in the spring and boat retrieval in the fall in any marina facility. The present operation includes the use of a rental crane and assistance of boat owners and the CYC members in removal of the boats. Scheduling of the operation and the availability of manpower to assist with the removal is critical for success of the operation. An approach less reliant on the assistance of volunteers should be established as part of the marina operation. Such an operation could include the use of a self-propelled trailer on the existing ramp or the use of a haul-out travel lift and lift out well.

The use of a self-propelled trailer on the existing ramp provides an economic way to handle most power boats and small sail boats and can make efficient use of the existing launch ramp. However, the equipment is not capable of handling large fixed keel sail boats or to load boats onto trailers. It could potentially also create conflict between launch ramp users and the boat handling operations during peak removal times. It would need to be supplemented with an occasional use of a crane to handle large sail craft and to load boats onto trailers.

A marine travel lift provides more versatility as it can handle a full range of boat sizes and types. It can also handle the loading/unloading of the boats from trailers. A lifting well or haul out slip is required for the travel lift. A suggested location of the lifting well is adjacent to the launch ramp on the east side. This location reduces the area required to be paved for access. The exact location may need to be adjusted depending on the layout of docks installed during Phase III of the expansion. This location would provide access to any winter storage areas located within the usable marina landbase without the use of any municipal roads. The suggested location for the lifting well is shown on Figure 3.5. The dimensions of the lifting well would be based on the size of the travel lift selected.

A hydraulic trailer could supplement the travel lift for transporting boats to and from off-site winter storage. This will permit greater operational efficiency, more efficient use of storage space and more flexibility for using offsite storage facilities.

We recommend installing a groyne to the west of the launch ramp. Sediment within the harbour appears to flow north following the beach. A groyne would interrupt the sediment flow and reduce the frequency of dredging required at the launch ramp and the lifting well. Dredging history at the launch ramp should be reviewed to confirm the financial benefit of the groyne.

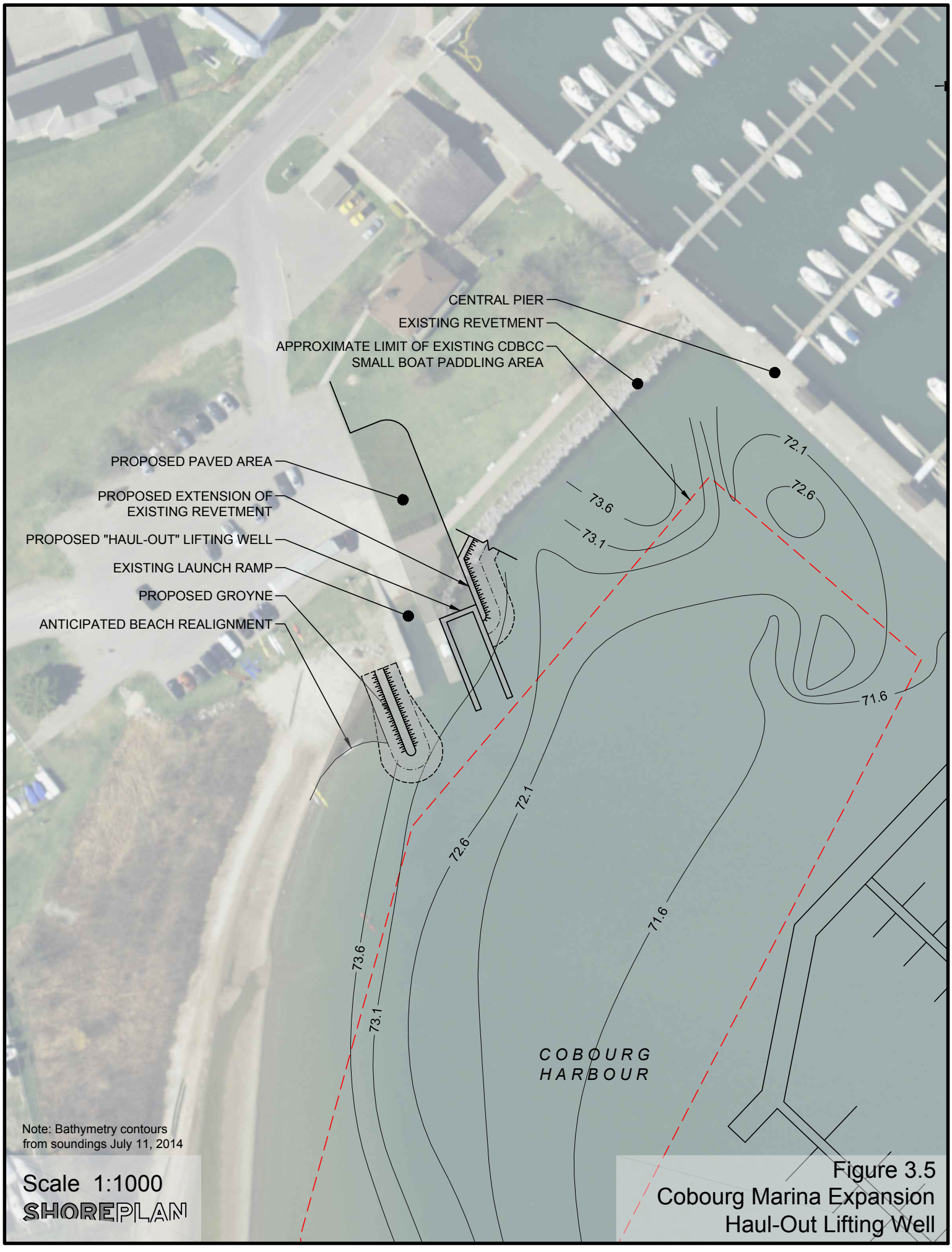


Figure 3.5
Cobourg Marina Expansion
Haul-Out Lifting Well

3.3 Launch Ramp

A single launch ramp has the capacity to handle up to 50 launchings and 50 retrievals each day. To support this level of activity, 40 combined car and trailer parking spaces are generally recommended (Small Craft Harbours Branch, 1992). Each parking space should be 15 m long by 3.5 m wide with an angle of 60° suitable for pull-through parking. Small Craft Harbours Branch (1992) recommends allowing approximately 10,000m^2 for 40 parking spaces, or 250 m^2 per car and trailer parking space, including parking aisles and planting islands. For auto-trailer parking, ACSE (2012) gives a planning ratio of 62-74 auto-trailers per hectare including allowances for parking, maneuvering and minimal landscaping. Using the average density, this equates to an area of 147 m^2 per car and trailer parking space, or 5900 m^2 for 40 spaces. Based on our estimates, the planning ratio given in Small Craft Harbours (1992) is likely conservative and can be reduced by incorporating some one-way circulation. We have used a planning density of 200 m^2, an average of the two references, for planning purposes.

The launch ramp caters to a different sector of the boat market than the marina. Additional marina activity and facilities could generate some increased use of the launch ramp. Boat launchings are not, however, expected to increase by the same factor as the increase in slips. Providing the recommended 40 car and trailer parking spaces is likely unnecessary, especially since space is limited on the site. Twenty parking spaces are likely sufficient to support the current level of activity (see Section 2.3) and allow a small surplus capacity to support a small future increase in use. The parking area can also be designated for boat storage during the winter months. Approximately 4000m^2 (200 m^2/auto-trailer x 20 spaces) is estimated to be sufficient for planning purposes.

The boat launch should be supported by a hard surface extending inland approximately 20 – 30 metres for manoeuvring. Waiting lanes and expanded turning and maneuvering areas can also be incorporated at busy launch ramps to streamline launchings and reduce wait times.

3.4 Cobourg Yacht Club and Cobourg Dragon Boat & Canoe Club Storage Area

The Cobourg Yacht Club and Cobourg Dragon Boat & Canoe Club currently have storage compounds located on the adjacent to the beach and south-west of the existing marina parking area. Currently, they occupy a combined area of approximately 1800 m^2.

We have no information indicating that the current storage area is insufficient for their continuing needs.

3.5 Accessible Docks

Accessibility standards are provided in CAN/CSA-B651 – Accessible Design for the Built Environment. The code specified a maximum grade of 12h:1v (8.33%) for ramps with level landings located every 9 metres. Landing platforms must be at least 1.5 m by 1.5 m.

The Town wishes to consider the installation of an accessible dock on the west headland for use by various water sport groups. A possible design of the ramp is shown on Figure 3.5. The ramp foundation is located on the existing beach at an elevation of 75.8 m. A ramp from the existing beach to the ramp foundation may be required depending on existing conditions in the backshore. From the ramp foundation, a 9 m long ramp descends to a mid-way landing at an

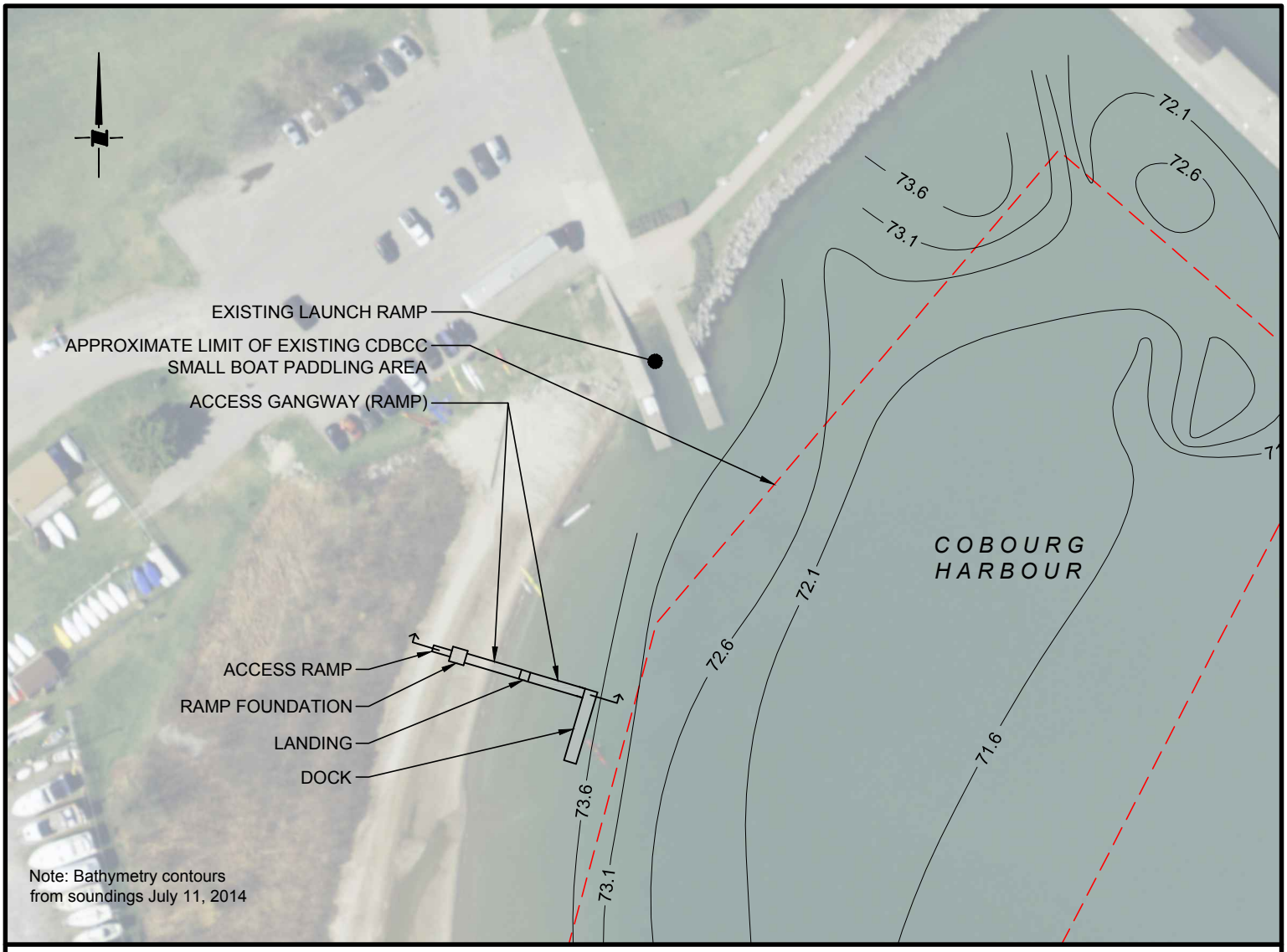
elevation of 75.5 m. A second ramp connects the landing to the floating dock. The freeboard on the dock is approximately 0.5 m. The slope of the ramp will vary according to water levels in the harbour. This configuration meets the requirements of the code to a minimum water level of 74.3 m IGLD 1985 (as drawn in Figure 3.5). Should the Town wish to install a ramp that meets the codes at lower water levels, the fixed landing platform could be replaced with an adjustable platform on piles. At lower water levels, the platform would be dropped to ensure the ramp slope does not exceed the maximum slope of 1v:12h (8.33%) given in the code. Water levels down to approximately 73.8 m IGLD 1985 could be serviced by using an adjustable landing platform.

The cost of the ramp with a fixed landing as shown in Figure 3.5 is estimated to be approximately $90,000. This estimate does not include the provision of access from the beach to the ramp foundation nor the cost of the dock itself. The cost includes a 20% allowance for design costs and a 30% construction contingency but does not include HST.

The Town also wishes to consider accessible docks for power and sail boaters within the marina. Providing accessible connections to the existing docks off the central pier would require the replacement of the existing ramps and reconfiguration of the docks. Based on photos and the supplied 1 m contours, the top of the pier appears to be at an elevation of 76 to 77 m. For our analysis we assumed the top of the pier to be at 76.5 m. Based on this elevation, at least one landing platform and two 9 m ramps would be required to provide an accessible connection to the docks. This would provide access that meets the code to a water level of approximately 74.5 m. To meet the code at water levels lower than 74.5 m a second landing platform and third ramp would be required. Upgrading all connections between the pier and docks to this standard would represent a significant cost to the marina.

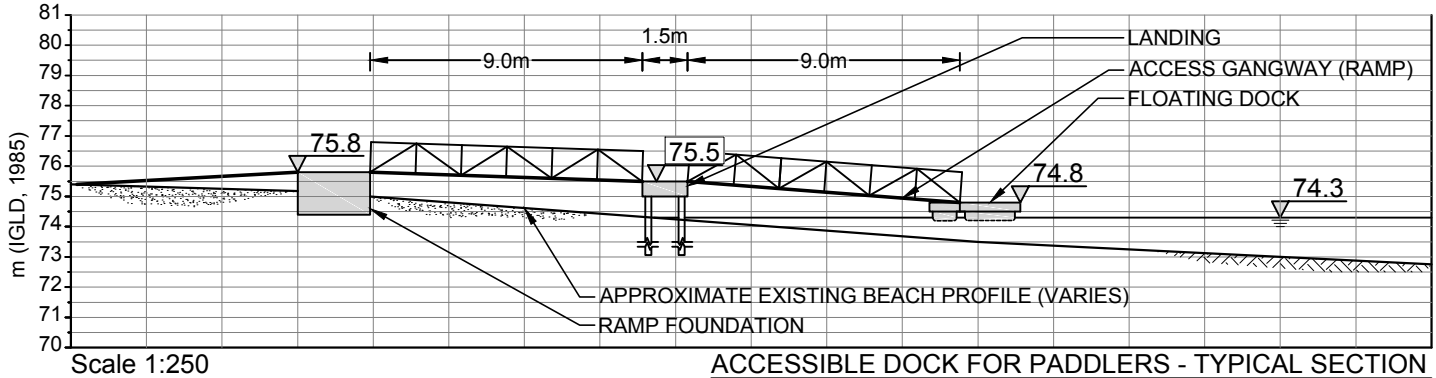
We recommend providing an accessible dock or an accessible connection to the main floating dock added during Phase III of the expansion. As an example, we have developed an accessible dock that could be incorporated with the dock layout in Option 1a (see Figure 3.3). The concept is depicted on Figure 3.7. We estimate that three landing platforms and three ramp sections would be required to provide a connection between the central pier and a floating dock in accordance with the code. Note that this depends on the elevation of the pier and the lowest water level that the Town wishes to meet the code for. In Figure 3.7 the ramps are shown running parallel to the central pier on the west side. The floating dock is oriented perpendicular to the central pier and parallel to the main dock in Option 1a. Should the Town wish to provide more than one dock with an accessible connection, the floating dock could be extended (as shown in the figure) to connect to the main floating dock added during Phase III of the expansion. Since the accessible dock and ramp “hug” the central pier and main floating dock, this conceptual accessible dock results in little intrusion into the paddling area.

The town could consider providing accessible docks described above for a narrower range of water levels. This would reduce the capital cost, but the ramp would exceed the maximum slopes when water levels are outside the range. A single ramp with no landing can only accommodate water level fluctuation of 0.75 meters.



Scale 1:1000

Site Plan



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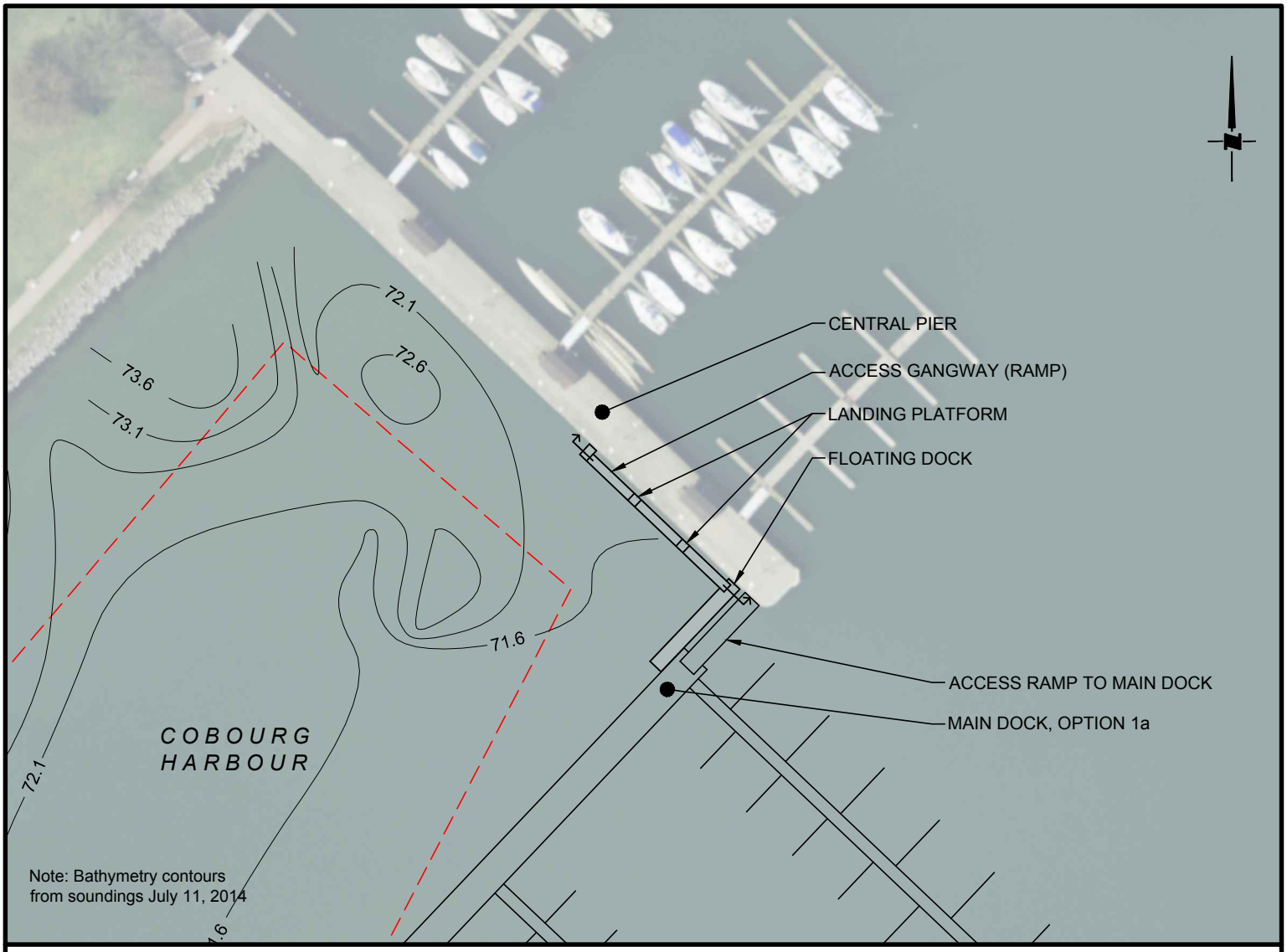
ACCESSIBLE DOCK FOR PADDLERS - TYPICAL SECTION

SHOREPLAN

Figure 3.6
Cobourg Marina Expansion
Accessible Dock for Paddlers



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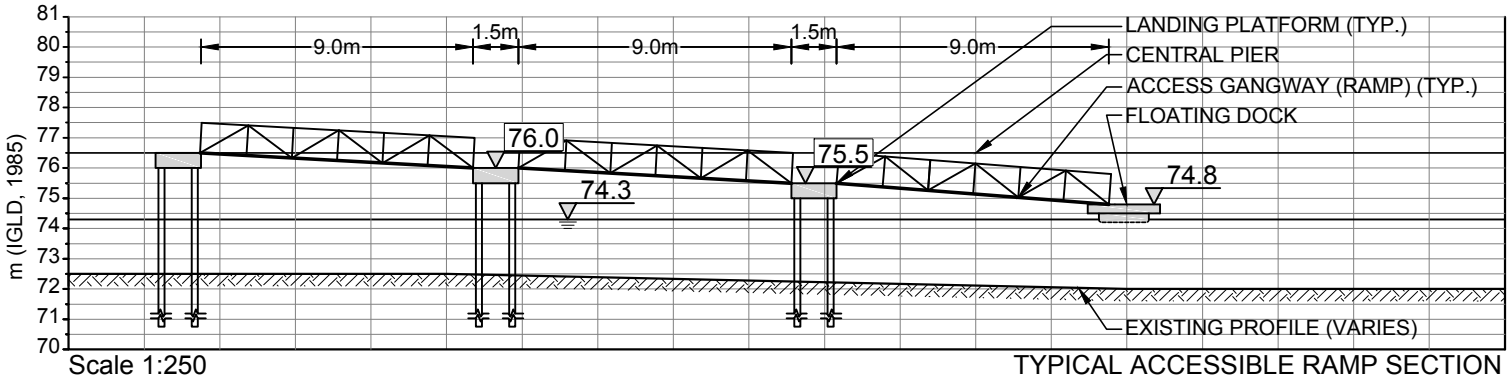
Site Plan



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TYPICAL ACCESSIBLE RAMP SECTION

SHOREPLAN

Figure 3.7
Cobourg Marina Expansion
Accessible Dock in Marina

3.6 Layout of Marina Support Facilities

We have considered the potential layout of facilities, including car parking, car and trailer parking, winter storage and the CYC and CDBCC storage areas.

The approximate areas required for each supporting activity/facility were estimated as discussed in the preceding subsections. The areas required for car parking, car and trailer parking and CYC and CDBCC storage are summed in Table 3.2. The total area required is estimated to be 14,900 m^2, excluding winter storage. We have estimated a usable marina landbase area of approximately 17,000 sq.m. This area includes the existing parking area, winter storage area, CYC and CDBCC storage compounds and lawn area south of 3rd Street.

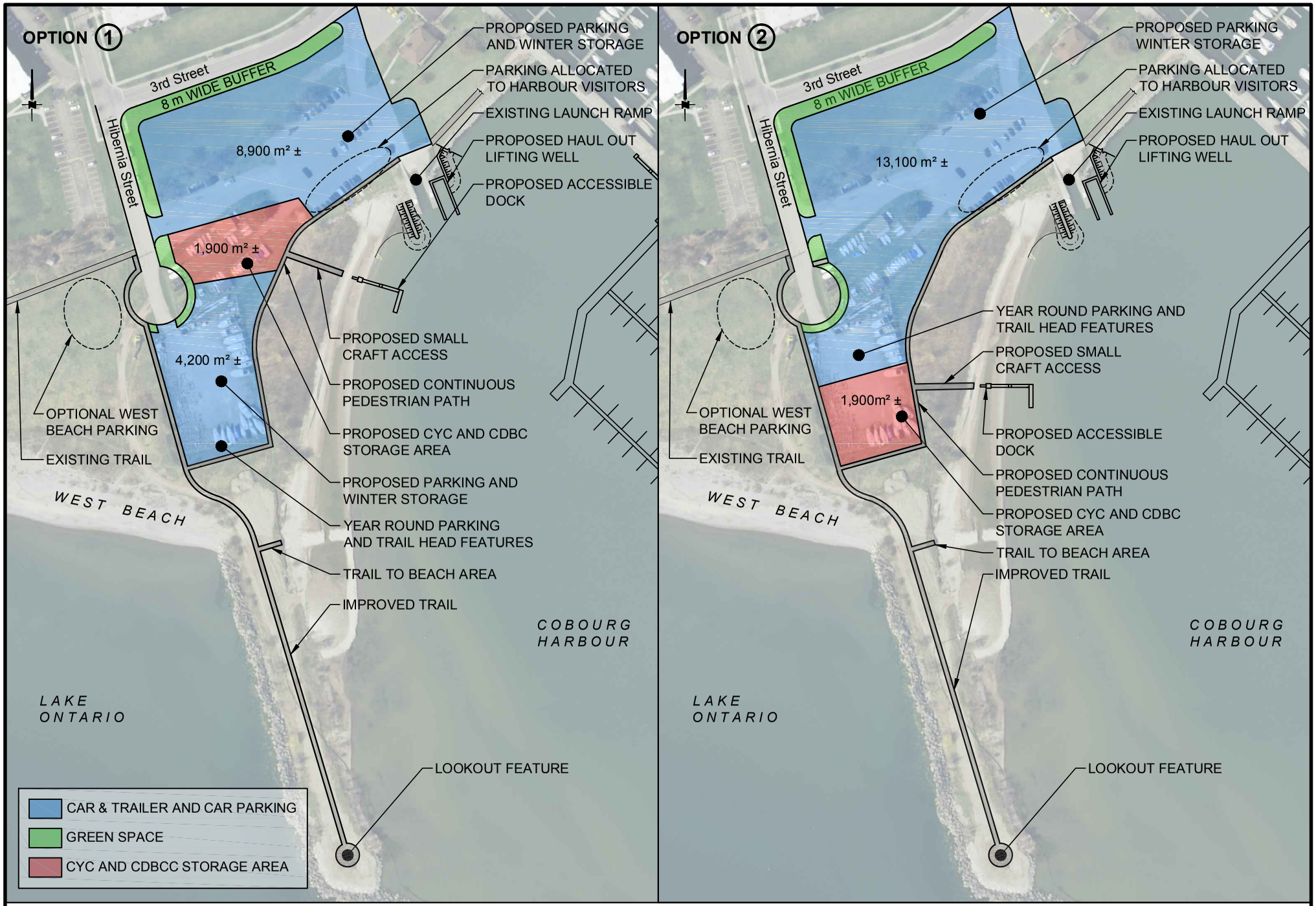
Table 3.2: Supporting Facilities and Corresponding Area Required

Facility	Required Area
Car and trailer parking for boat launch	4,000 m^2
Car parking	9,100 m^2
CYC and CDBCC	1,800 m^2
Subtotal	***14,900 m^2***
Winter Storage	9,400 m^2
Total	***24,300 m^2***

We developed several conceptual layouts of the car and trailer parking, car parking and CYC and CDBCC storage areas on the west headland. We present two of these layouts on Figure 3.8. We have chosen to combine the car parking and car and trailer parking as one area for two reasons. First, if the car and trailer parking is integrated into the car parking, empty car and trailer spaces can be used to accommodate two parked cars during high parking demand more readily. Second, a detailed development and optimization of a parking lot layout is beyond the scope of this study.

The layout of the facilities in the area addresses the comments received during the public meeting and in the subsequent submissions with respect to expressed concerns over the negative impacts to their existing views as a result of increased parking and boat storage. We have allowed for an 8 m wide green buffer between the road and parking or storage facilities in both options. A green buffer is also proposed along the east side of Hibernia Street within the road ROW. The green buffer occupies an area of approximately 1700 m^2. We noted during our site visits that parking of cars and truck with trailers already occurs on the grassed area adjacent to 3rd Street. The proposed green buffer would improve this situation.

In Option 1, the main parking area is located adjacent to the marina and boat launch. The car and trailer parking and approximately 110 car parking spaces would be accommodated within this area. The remaining car parking would be accommodated in an overflow parking area, located at the site of the existing winter storage. The CYC and CDBCC storage area is located in roughly the same place as existing. It has been moved and reoriented slightly to fit in with the parking areas and provide improved access to the existing path to the beach.



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SHOREPLAN

Figure 3.8
Cobourg Marina Expansion
Layout Options for Marina Support Facilities

In Option 2, the CYC and CDBCC storage area has been located on the site of the existing winter storage. The remainder of the site to the north accommodates car & trailer and car parking.

In Option 1, the CYC and CDBCC storage area is closer to the deeper water at the north end of the beach for launching boats. As discussed in the preceding subsection, this is also the preferred location for the accessible dock. Option 2 may be preferred should the CYC and CDBCC wish to locate their storage area in a quieter part of the harbour. Option 2 provides a more segregated storage area that would be quieter and likely subject to less dust than in Option 1. The location preferred by the CYC and CDBCC may also depend on the location of the new docks installed during Phase III of the expansion.

In both options, accessible car parks, a portion of the car parking and car & trailer parking would be conveniently located next to the marina building and launch ramp. Option 1 would provide car parking immediately adjacent to the west headland for use during the summer months and a portion of this parking area could be reserved for park users during the off-season. Option 2 provides this parking further north by approximately fifty meters.

We understand that the Town wishes to consider constructing a walking path or boardwalk to the south tip of the west headland. Access to the waterfront was identified as one of the waterfront goals in the Town of Cobourg Parks Master Plan (Peter J. Smith & Company Inc., 2013). We have included a path and a lookout feature on the west headland on the layouts shown on Figure 3.8.

To meet all winter storage needs, an area of approximately 9,400 m^2 is required (see Table 3.2). We understand that the Town is considering developing the old Public Works Yard at 390 King Street West into an off-site storage area to accommodate some of the winter storage needs. The site consists of a 2.15 acre parcel of land with a compacted granular surface suitable for boat storage. The site is enclosed with a security perimeter fence which includes a lockable entrance gate and security alarm. The site is also reasonably well lit. There is a 650 sq.m. heated building with a 14’ (4.3m) high by 16’ (4.9 m) wide overhead door at each end of the building. This building could be rented to a marina repair contractor or divided into stalls which could be rented to individuals looking to do maintenance work on their boats. There is a second 30’ (9 m) by 60’ (18 m) building on the site. It is currently used as a salt shed. It could be used to store marina equipment such as a hydraulic trailer, boat stands or blocking.

The Town could also consider using the proposed parking area(s) in Options 1 and 2 to meet some or all of the winter storage needs. To meet all of the winter storage needs onsite would require that nearly ¾ of the parking area be turned into winter storage during the off-season. The temporary winter storage area(s) would need to be enclosed by temporary security fences. This would leave enough of the proposed total parking area to accommodate approximately 80 cars in the off-season.

The proposed parking and winter storage areas associated with the expanded marina would be located mostly on the existing parking and storage areas and would expand into the lawn area directly south of 3rd street. This area is already being used for overflow parking under existing

conditions. The natural areas located between the marina basin and further south, to the West Headland and the West Beach west of Hibernia Street remain as they are now except for the formalization of existing walking paths/trails to accommodate the general public. A review of these areas by a qualified biologist prior to the implementation of these plans may be a prudent undertaking.

4 East Pier

In this chapter, a review of the potential development of the east pier is presented. The Town of Cobourg wishes to consider options for development of the East Pier. The Town's vision includes some docks for charter fishing boats, the inclusion of parking and enhanced walking, planting and passive recreation areas. The Town also wishes to consider constructing a boardwalk along the existing breakwater to the lighthouse.

4.1 Commercial Activity

Any permanent structure on the East Pier would need to be designed to withstand the exposed conditions on the pier year-round. A permanent commercial venture, such as a restaurant or a shop, is likely to be more profitable during the summer months than during winter. It is of our opinion that commercial activity would be more feasible on a temporary or seasonal basis as weather and lake conditions permit. Accessing the East Pier, beyond the extent of the East Beach, may be difficult during severe winter conditions.

4.2 Coastguard

The Coastguard's building is currently located to the east of the Coastguard pier, on the other side of the docking area. The Town has indicated that it may wish to consider moving the Coastguard in order to improve access between the East Beach and the East Pier.

In order to move the Coastguard building to the other side of the pier, a permanent expansion could be added to the existing Coastguard Pier. This option is likely to be very costly. A less expensive option would be to relocate the Coastguard building to a floating structure, similar to a house boat. Although house boats are not widely seen on Lake Ontario compared to other coastal areas, this option is likely to be much less expensive. However, compliance with local by-laws and municipal requirements would need to be considered.

If the Coastguard remains in the same existing building, an agreement could be reached to use part of the south side of the property for beach access. The access could consist of a boardwalk on piles from the beach to the East Pier. A potential location of the access from the beach to the East Pier is shown on Figure 4.1.

4.3 Cruise Ships, Tour Boats and Charter Fishing Boats

Touristics considered the potential for cruise ships and tour boats calling on Cobourg Marina. They were only able to identify one Cruise Line offering cruises with ports of call in Ontario. The Great Lakes Cruise Company in Ann Arbor, Michigan, has three ships on the Great Lakes. The cruise season occurs between May and October and a typical cruise ranges from 7 to 15 nights.

Name of Ship	Number of Passengers	Draft	Length	Beam
Pearl Mist	210	12 ft./3.1 m	225 ft./100 m	56 ft./17 m
Grande Caribe	96	6ft 6"/1.98 m	184 ft./56 m	40 ft./12.2 m
Grande Mariner	96	6ft 6"/1.98 m	184 ft./56 m	40 ft./12.2 m

Pearl Mist is the only ship calling on Ontario Ports. The *Great Lakes, Georgian Bay & St. Lawrence Seaway* Cruise is currently scheduled once each season. September 10 to 21, 2014,

14 nights, Chicago to Montreal with Ontario stops in Little Current, Parry Sound, Midland, Windsor, Niagara Falls, Toronto, and Kingston. The *Great Lakes & Georgian Bay Cruise* between Chicago and Toronto and Toronto and Chicago is scheduled 4 times each summer, July 30 to August 9, August 9 to August 20, August 20 to August 20, and August 30 to September 10, 2014, 10 or 11 nights, with Ontario stops in Toronto, Niagara Falls, Windsor, Midland, Parry Sound, and Little Current.

While there are no plans to increase the number of sailings on these routes, each has been sold out every year that it has been offered, including 2014, and has had a waiting list for each cruise in 2013 and 2014. Paul Gauthier's name and number were given to their marketing representative in the event that additional cruises or ports of call are added in the future.

Touristics also contacted tour boat operators in Kingston, Toronto and Hamilton regarding any potential for operating in or out of Cobourg Marina.

Kingston:

- St Lawrence Cruise Lines
- Kingston 1000 Island Cruises
- Heritage Cruise Lines
- St. Lawrence Cruise Lines Inc.

Toronto:

- Great Lakes Schooner Company
- Toronto Harbour Tours Inc.
- Mariposa Cruises
- Empress of Canada Cruises
- Toronto Tall Ship Boat Cruises
- Toronto Harbour Schooner Cruises

Hamilton:

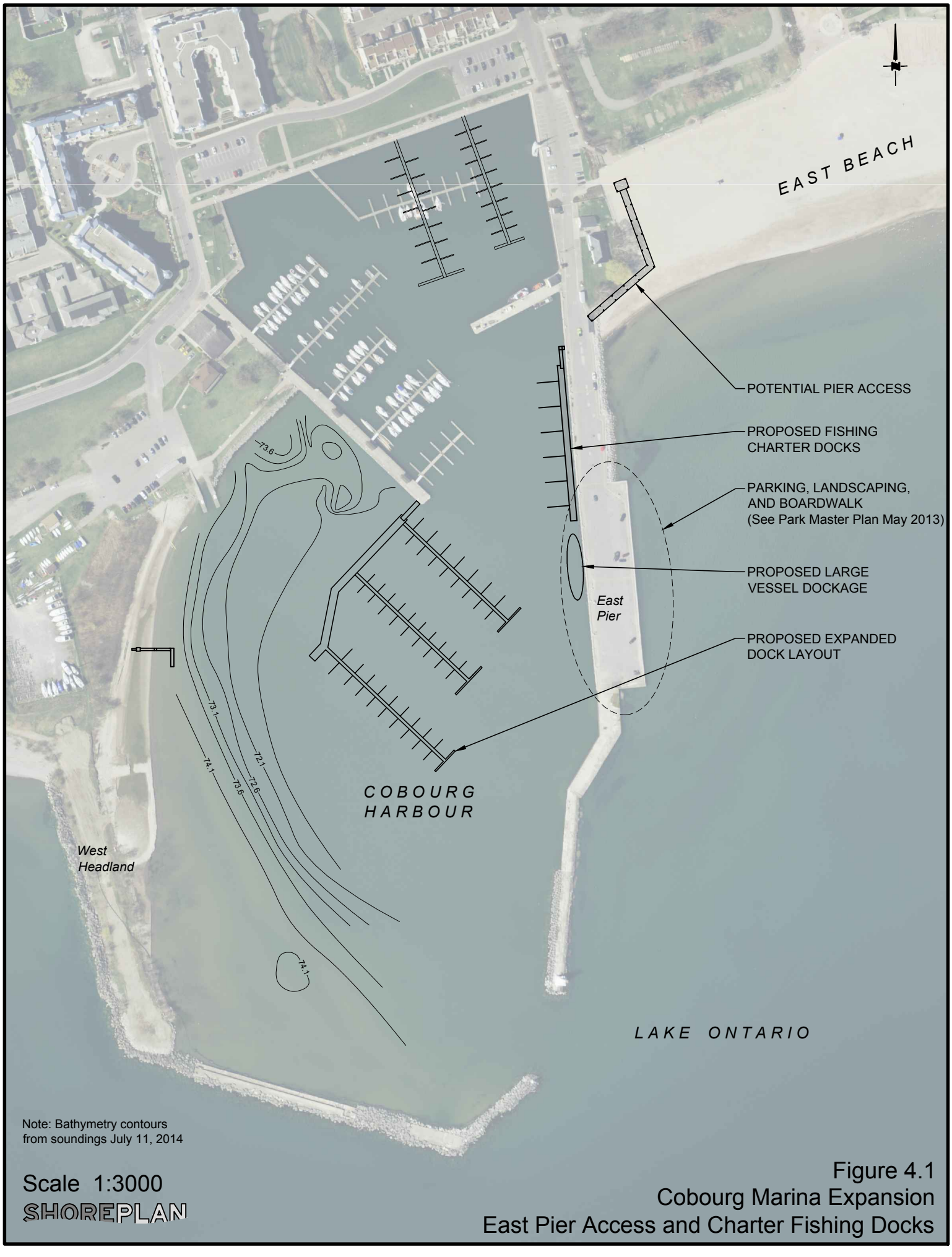
- Hamiltonian Boat Tour
- Hamilton Harbour Queen Cruises

These tours operate throughout the morning, afternoon and evening from mid-April until mid-October. July and August are typically the months with the highest passenger loads. Although all tour operators indicated an annual passenger load ranging from 65 percent to 85 percent capacity, none expressed an interest in expanding their tour area to include Cobourg. Proximity to a large resident and tourist base was viewed as the most important factor in achieving the passenger loads, and the opportunity to offer multiple, relatively short tours each day reduced the operating costs per passenger.

Charter fishing activities are operated out of most harbours on the north shore of Lake Ontario. Although a specific market analysis of this activity in Cobourg is beyond the scope of this study, it is expected that a small fleet of fishing charter boats can be supported at this location. The

present fleet of approximately 4 boats (P. Gauthier, personal communication) is likely to expand in the future, particularly if this activity is supported by the expanded marina facility.

The East Pier is a preferred location for the fishing charter boats. It is preferred to separate the activities of the fishing charter boats from the main marina operation since this fleet caters mostly to a non-boating population that may use the charters during quiet times in the remainder of the basin. A potential location for a fishing charter boats dock is shown on Figure 4.1. The dock for the fishing charters could be installed in two stages; first as a shore parallel dock to provide parallel docking for the existing fleet and could accommodate some growth up to approximately 7 boats. Finger docks could be installed at a later date to accommodate a further expansion up to approximately twelve boats.



Note: Bathymetry contours from soundings July 11, 2014

Scale 1:3000

SHOREPLAN

Figure 4.1
Cobourg Marina Expansion
East Pier Access and Charter Fishing Docks

4.4 Development Options

Development options were considered in the Park Master Plan developed by the Town of Cobourg in 2013. The plan shows a number of potential uses on the east pier including overlook seating, sun shelters, boardwalk and parking.

Minimum requirements for emergency vehicle access are typically governed by local by-laws. Using a 5 metre lane-width, an inside turning radius of approximately 9 metres is the maximum that can be accommodated on the approximately 30 metre wide pier. If the Town wishes to maintain a continuous path between the north end of the pier and the east breakwater, the turning radius will reduce.

The pier is estimated to have a top elevation of approximately 77.0 metres. The true elevation is likely to be lower than this since the 77 m contour in the supplied 1 m interval contour lines is not located on the pier. At the DHWL, the water level will be approximately 1.2 m below the top of the pier. Based on an assumed wave height and period at the pier of 3 metres and 8 seconds respectively, the overtopping rate is predicted to be close to 1000 l/s/m (using the method by Pullen et al, 2007). At an average water level during boating season of approximately 75.0 metres and using a wave height of 2.5 m, the estimated overtopping is in the order of 100 l/s/m. Damage to a paved or armoured promenade behind the seawall is expected to commence from an overtopping discharge of 200 l/s/m (Pullen et al, 2007).

The overtopping will take place along the east sides of the pier and will be greater on the south end of the pier. From an engineering perspective, locating parking closer to the west side of the pier and providing a buffer between the east side of the pier and parking spaces is desirable.

4.5 Boardwalk to Lighthouse

The Town of Cobourg wishes to consider options for a boardwalk over the existing east breakwater beyond the presently open portion leading to the lighthouse. This part of the pier is approximately 200 metres long and is closed to the public at present. The first part, approximately 75 metres long, consists of a flat concrete surfaced pier with steel sheet pile sides. The outer part, approximately 125 metres long, consists of a concrete capped structure with unknown underwater support structure. Both sections of the pier show some damage and deterioration. A detailed review of the structure, both below and above water is required as the first step of any improvement plan for the boardwalk.

The inner part of the pier with a flat surface could be modified to a boardwalk readily if inspections confirm overall stability of the structure. We would recommend a moderately high wave reflecting wall be installed along the portion of the pier facing southeast. Although the pier is quite wide in this part, approximately 10 to 14 meters wide, the orientation will increase wave overtopping in this area. The wall should be in the order of 1 meter high and designed as a concave deflector. A typical section is shown on Figure 4.2, Section A. We caution that some maintenance of this part of the pier, in addition to the deflector wall, is likely to be required.

Two conceptual boardwalk sections for the outer concrete mound section of the breakwater are presented on Figure 4.2, Sections B and C. It is anticipated, based on casual above water observations, that a substantial rehabilitation of the outer portion of the pier will be required to accommodate a boardwalk.

In Option 1 (Figure 4.2, Section B), steel sheet piling encases the existing breakwater structure. The structure is capped by a concrete deck and stone fill is placed within the cavity between the deck and existing structure. To reduce overtopping from the east, an approximately 1 m high wall runs along the east side of the boardwalk. A smaller curb is proposed along the west side. An armour stone berm runs along the east side of the structure.

For Option 2 (Figure 4.2, Section C), the east side of the existing breakwater structure would be reinforced. The east side of the boardwalk runs along the centreline of the breakwater structure and is founded on the reinforced section of the breakwater. The west side of the boardwalk is supported by piles driven on the west side of the existing breakwater. As with Option 1, this option includes a wall on the east side of the boardwalk and a curb on the west side. Since the boardwalk is located further to the west of the existing breakwater compared to in Option 1, it is expected that the elevation of the boardwalk could be reduced slightly.

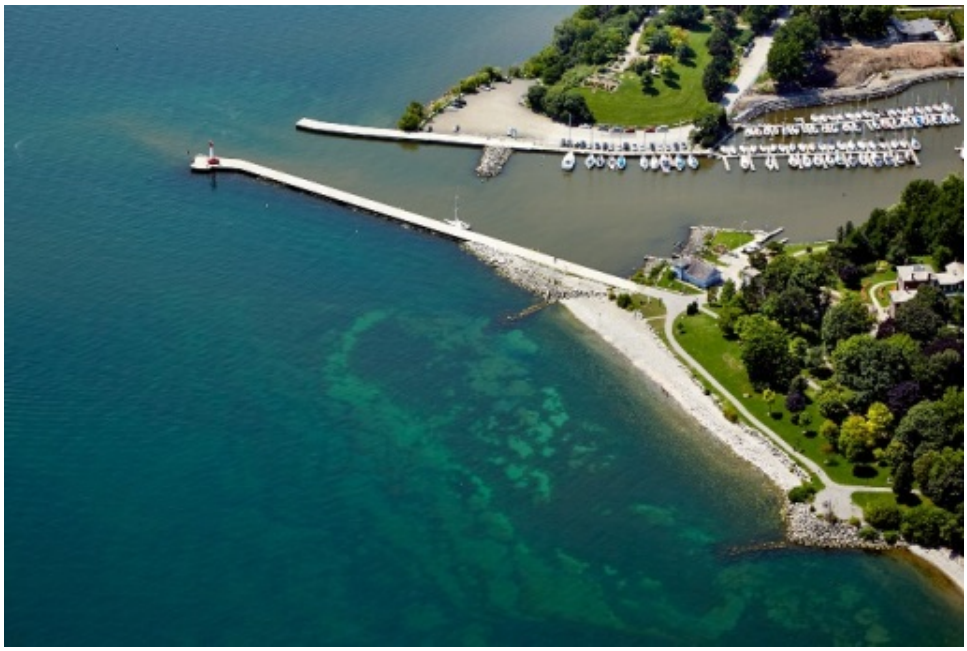
Construction costs of the two typical sections were estimated but the costs vary greatly based on the assumptions made regarding the condition of the existing structure. The range of costs, is between $15,000 and $25,000 per meter. These estimates do not include construction contingencies or evaluation and design costs or HST.

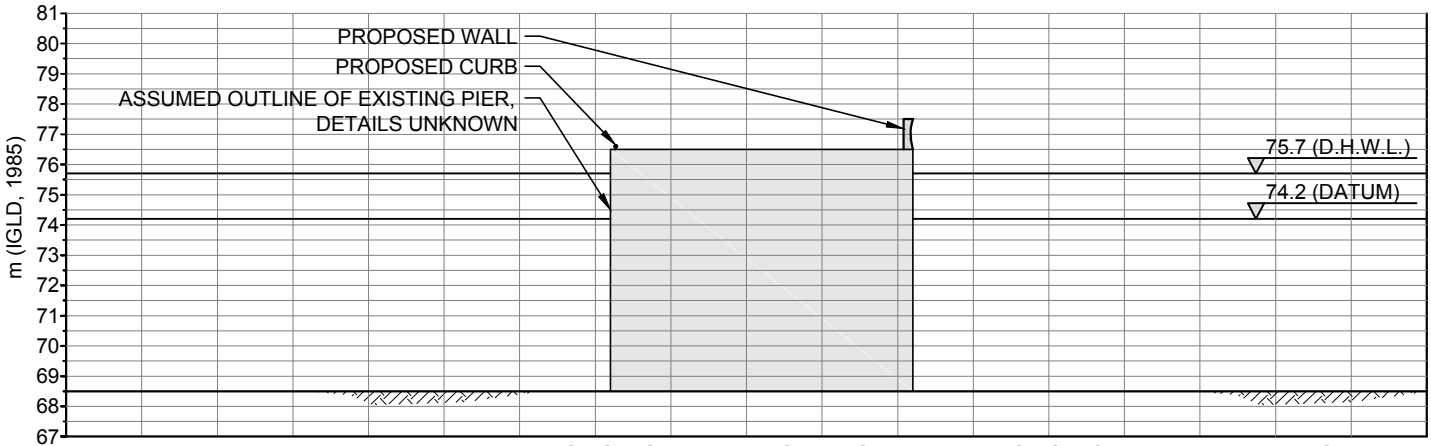
Shoreplan strongly recommends that the Town undertake a detailed condition inspection of the breakwater prior to further pursuing a boardwalk option.

Two examples of a recently reconstructed pier with a boardwalk are illustrated on Photos 4.1.and 4.2. The first photo is of a pier at the entrance of Frenchman's Bay in Pickering. The second is a pier at entrance to the Sixteen Mile Creek in Oakville. .

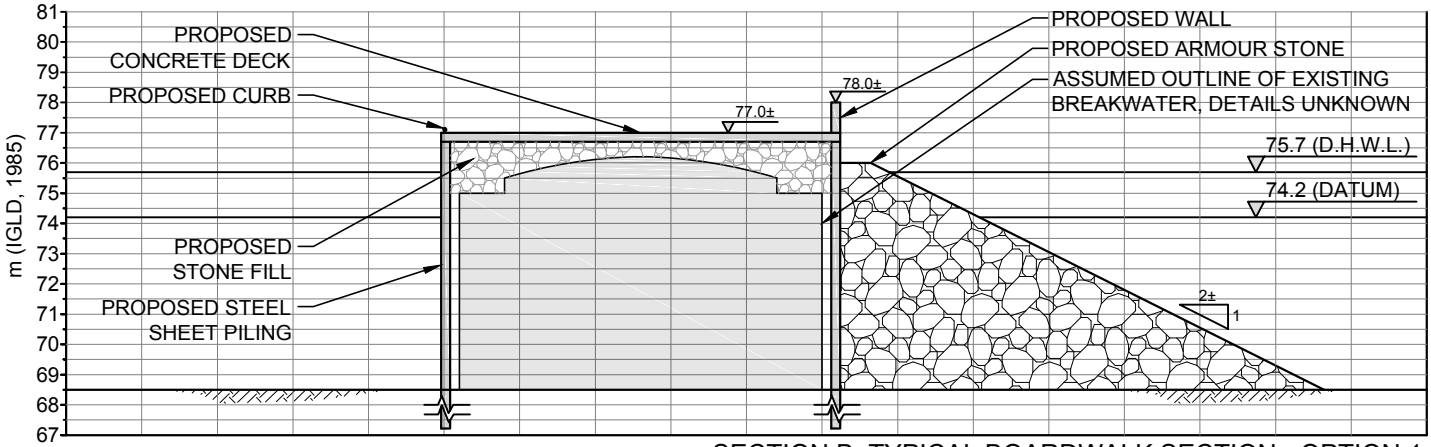
Photo 1

Photo 2

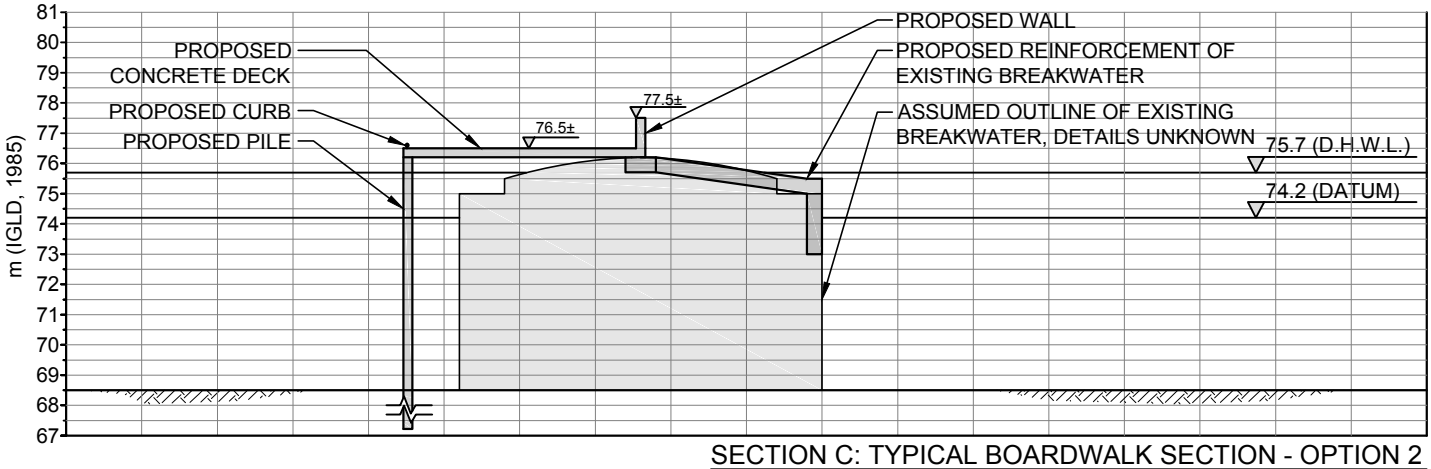




SECTION A: TYPICAL BOARDWALK SECTION - INNER PART OF PIER



SECTION B: TYPICAL BOARDWALK SECTION - OPTION 1



SECTION C: TYPICAL BOARDWALK SECTION - OPTION 2

Scale 1:250

SHOREPLAN

Figure 4.2
Cobourg Marina Expansion
Conceptual Boardwalk Sections

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