
Client: WILD ROSE BAY STRATA CORPORATION**Date: January 22, 2006****DRAFT****Project: WILD ROSE BAY MARINA EXPANSION****Project No.: 06177****Subject: MARINA LAYOUT AND PRELIMINARY DESIGN****Page 1 of 9**

1 Introduction

Westmar Consultants Inc. (Westmar) was retained by Wild Rose Bay Strata Corporation to provide engineering services for the layout and preliminary design on the expansion of the private marina at Wild Rose Bay. Wild Rose Bay is located on Shuswap Lake, BC. The current water lot is described as District Lot 1804, KDYD 82L.095.

2 Scope of Work

Upon meeting with Mr. St. Germaine on August 11, 2006, Westmar was informed that Wild Rose Bay Strata Corporation plans to expand their current marina facility from 67 boat slips to 112 boat slips. Current water lot boundaries, depths and the configurations of the existing marina were supplied by the client.

Photographs of the site have been provided by the client and ARC Environmental. Select photographs can be found in *Appendix A*.

3 Description of Existing Structures

The current marina is a U-shaped dock with individual slips for 67 boats. This arrangement can be viewed in *Photograph No. 1* in *Appendix A*. The dimensions and a cross-section of the current marina were supplied by the client and can be found on *Drawing No. 06177-00-100* in *Appendix D*. The present marina is a piled and anchored structure. The existing marina and piles are to be removed and/or reused for the construction of the new facility. The existing marina is for summer use only, with the fingers being removed for winter storage. A summary of the current walkway, finger floats and piles are shown in *Table 1* on the following page.

TABLE 1: Existing Walkways, Finger Float and Pile Dimensions

Element	Construction Material	Quantity	Length (m)	Width/Diameter (m)	Total Plan Area (m ²)
Walkways	Timber	1	8.9	2.6	23.1
		1	8.1	2.6	21.1
		36	6.3	2.6	589.7
		1	5.6	2.6	14.6
		1	5.4	2.6	14.0
Finger Floats	Timber	63	6.2	1.0	390.6
Piles	Timber	4	---	---	---
	Steel	2	---	---	---

A public boat launch is also located on this site. This structure is expected to be re-orientated and improved by re-grading and installing a new surface. *Photograph No. 3* in *Appendix A* shows the existing boat launch.

3.1 Existing Piles

Currently, there are six piles located within the marina basin. Four of these piles are constructed of wood; these piles are closer to the shoreline. The other two are steel, which are located farther out in the marina basin. These piles can be observed in *Photograph No. 1* in *Appendix A*, while the layout can be observed on *Drawing No. 06177-00-100* in *Appendix D*. From discussions with the owner's representative, Brian St. Germaine, the four wooden piles are functioning well. The steel piles were installed after the wooden piles and Mr. St. Germaine does not believe them to be performing well. Upon discussions with Mr. St Germaine, the soil conditions did not seem suitable for piles, as the topsoil was not deep enough to achieve the necessary embedment for the use of piles. These geotechnical and historical reasons are why a chain and anchor system was selected for the marina's mooring system.

4 Design Criteria

4.1 Wind Speeds

Wind data was collected from Environment Canada for the Salmon Arm airport as well as from the British Columbia Ministry of Transportation for Squilax Mountain (approximately 24 km west south-west of Wild Rose Bay). Wind speeds were generated for eight compass directions with the Salmon Arm data, while wind speeds for 16 compass directions were generated with the Squilax Mountain data. The calculated wind speeds for Salmon Arm can be found in *Table 2* on the following page.

TABLE 2: 1 in 30 year Wind Speeds for Salmon Arm Airport

Wind Direction	Wind Speed (km/hr) Salmon Arm
North	86.8
North North-East	---
North-East	71.4
East North-East	---
East	55.0
East South-East	---
South-East	65.7
South South-East	---
South	88.9
South South-West	---
South-West	88.9
West South-West	---
West	88.9
West North-West	---
North-West	88.9
North North-West	---
All Directions	84.2

Note: Wind speeds have been scaled to the National Building Code of Canada (NBCC 2005) to Salmon Arm by 1.58.

Wind roses for both the Salmon Arm data and Squilax Mountain can be found in *Appendix B*.

4.2 Wave Heights

Wind generated waves were then calculated using Westmar's in-house computer program which utilizes the Shore Protection Manual (1984) and the Coastal Engineering Manual (2001) methods. The data from Salmon Arm airport resulted in higher wind speeds; therefore, these scaled values were used when calculating the wind generated wave heights. The results can be found in *Table 3* on the following page.

TABLE 3: Wind Generated Significant Wave Heights (H_s) and Peak Periods (T_p)

Wind Directions	H_s (m)	T_p (s)
North	0.81	2.6
North-East	1.20	3.7
North-West	0.89	2.8

Note: Wind directions not shown do not have an associated fetch length (i.e. fetch length is equal to zero).

The significant wave height (H_s) is defined as the average of the highest 33% of the waves, where wave height is defined as the vertical distance from the trough to the crease of a wave. The breakwaters, mooring chain and anchors were designed using the maximum wave height which is two times the significant wave height ($H_{max} = 2 H_s$). The peak period (T_p) is defined as the wave period of the most energetic wave in the wave train, where wave period is defined as the time between successive crests measured at a stationary point.

Wave transmission design criteria have been extracted from two guidelines as follows:

- Small Craft Harbours (SCH) Directorate of the Department of Fisheries and Oceans Canada (DFO).
- American Society of Civil Engineers (ASCE) Ports and Harbours Task Committee on Marinas.

The boat mix for the proposed Wild Rose Bay Marina Expansion allows for 112 boats, with a total of 766 lin. m. SCH classifies marinas with 300 to 900 vessel meters as Class B marinas. Table 4 below contains recommended wave heights for Class B marina's with recreational boats less than 15 m in length.

TABLE 4: Wave Heights for Class B Marinas

Location	Wave Heights (m)
Entrance	1.00
Mooring Basin	0.50 <i>19.6"</i>
Berthing Area	0.25 <i>10"</i>

4.3 Datum and Water Levels

The vertical datum is to Mean Lower Water depths which is 345.0 m. This is Chart Datum (CD) surveyed by the Canadian Hydrographic Service, 1984, Chart 3053, 1986. Design water levels are as follows:

- Low Water Datum: 0.0 m above CD (345.0 m)
- High Water Level: +3.0 m above CD (348.0 m)

Horizontal datum was provided by the client in *Figure 1* in *Appendix C*.

4.4 Water Depths

Water depths were based on spot elevations provided by the client. These elevations were surveyed on June 11, 2006, when the water level was 348.47 m Geodetic Survey of Canada (GSC). The elevations were then corrected for CD. Contours were then assumed using these elevations and Canadian Hydrographic Service (CHS) Chart 3053. A sounding survey should be conducted to ensure water depths are sufficient for moorage and the design of the proposed marina.

5 Proposed Improvements

The proposed marina is to be located within the common area of Wild Rose Marina Strata. The location of the access pier is between Lot Nos. 14 and 15, approximately 0.3 m from the east property line of Lot 14. This locale is shown on *Drawing No. 06177-00-100* which can be found in *Appendix D*. *Table 5* below summarizes the information relating to the proposed marina.

TABLE 5: Data on Proposed Marina

Element	Construction Material	Quantity	Length (m)	Width/ Diameter (m)	Total Plan Area (m ²)
Pier - Piles	Steel	10	10	0.61	2.9
Pier - Deck	Timber	1	35	1.8	63.0
Gangway	Aluminum	1	18	3.0	54.0
Main Walkway Floats	Concrete or Timber	1	66.4	2.6	172.6
	Deck on Steel Frame	1	64.0	2.6	166.4
	with Polystyrene	1	44.4	2.6	115.4
	Floatation Material	1	29.6	2.6	77.0

Element	Construction Material	Quantity	Length (m)	Width/ Diameter (m)	Total Plan Area (m ²)
Slip Floats	As Above	24	6.1	1.0	146.4
		22	6.7	1.0	147.4
		4	7.9	1.0	31.6
		2	9.1	1.0	18.2
Floating Breakwater	As Above	1	135	6.0	810.0
		1	94	6.0	564.0
Chain	Steel	16	75	0.0318	38.2
		12	90	0.0318	34.4
Anchor Blocks	Concrete	28	2	2	112.0
Rock Pins	Steel	5	1	0.06	0.01
Sinker Weight Anchors for Semi-Mains	Concrete	28	1.3	1.3	47.3

- Notes:
1. All timber material will be pressure treated with ACA (ammoniacal copper zinc arsenate) or ACZA (ammoniacal copper zinc arsenate), a waterborne wood preservative. ACA and ACZA protect timber immersed in water against insect attack and decay.
 2. All uses of ACA and ACZA treated timber will be in accordance with Best Management Practices.

Some of the materials from the existing marina can be used when constructing the proposed marina. The main walkways and finger floats are constructed using wood and steel. These floats are in good condition and can be reused in the construction of this marina. The current walkways have a total length of 254.8 m, while the proposed marina will require 204.4 m. Therefore, if the proposed marina reuses the existing floats, there will be no need to construct new floats.

There are currently 63 finger floats that are 6.2 m long by 1.0 m wide. 24 of these could be reused as finger floats on Walkways A, C and D (refer to *Drawing No. 06177-00-100* in *Appendix D*).

6 Dimensions from Property Lines

The proposed access pier for the marina will be located within the property lines as shown on *Drawing No. 06177-00-100* in *Appendix D*, approximately 0.3 m from the east property line of Lot 14, and 9.8 m west of Lot 15's property line. Therefore, the access pier is located between Lot Nos. 14 and 15, which is the common area for the strata.

7 Public Access

Public access to the beach will be maintained to the west and the east along the shoreline (this is shown on *Drawing No. 06177-00-100* in *Appendix D*). The proposed marina will provide private strata moorage and will not be available to the public.

8 Types of Boats

The proposed marina will include slips for up to 112 boats. *Table 6* below provides the boat mix and the general arrangement can be viewed on *Drawing No. 06177-00-101* in *Appendix D*. The marina is expected to be most heavily used during the summer months, but the marina will be accessible during winter months.

TABLE 6: Boat Mix

Aug. 24'

Length of Boat	Percentage	Number of Boats
6.1 m (20 ft.)	50 0	58
7.3 m (24 ft.)	38 100	42 112
7.9 m (26 ft.)	7 0	8
9.1 m (30 ft.)	5 0	6
Total	100	112

9 Dredging

The proposed marina will not require dredging, as the floats nearest the shoreline are located in water depths where the floats would not be grounded during low water levels.

10 Proximity to Other Marine Facilities

Anglemont is located approximately 5 km west north-west of the site. There are also several marinas located in and around Blind Bay, which is approximately 20 km south-west of the proposed marina. All of these marinas are privately owned.

11 Agency Requirements Checklist Information

11.1 Department of Fisheries and Oceans Requirements

11.1.1 Foreshore Impacts

There may be some foreshore impact associated with the construction of the proposed marina access piers, locations of rock pins, mooring anchor, breakwater and walkway floats. Environmental issues associated with the marina will be dealt with in an Environmental Impact Assessment (EIA) report by ARC Environmental Ltd., and will be submitted under a separate cover. Best Management Practices (BMP) objectives will be followed when designing and construction of the marina.

11.1.2 Fish Habitat

There will be some changes to the fish habitat due to pile footprints and shading from the walkway, finger floats and the breakwater. These environmental issues will be dealt with in an EIA report by ARC Environmental Ltd., and will be submitted under a separate cover at a later date.

11.1.3 Wood Preservatives

Timber materials used in the construction of the access pier and floats will be treated with ACZA or ACA compounds to protect the timber from rotting and attack from insects. The use of the wood preservatives will be used in accordance with BMP.

11.2 Coast Guard Requirements

The proposed marina will result in new floating structures on the lake and will require Canadian Coast Guard (CCG) navigation markers. *Drawing No. 06177-00-101 in Appendix D* shows the proposed locations of CCG approved navigation markers and signs.

11.3 Wildlife, Habitat and Enforcement Division Requirements

The possible presence of red, blue or yellow listed species is being investigated by ARC Environmental Ltd., and will be dealt with in an EIA report to be submitted under a separate cover.

12 Parks Division Requirements

The proposed marina is located 2 km south-east of Horseshoe Bay Park, which is part of the Shuswap Lake Provincial Marine Park. Cinnemousun Narrows Park is located approximately 6 km north-east of the site.

12.1 Water Use Planning and Water Rights, Allocation and Licensing Requirements

The proposed marina will be located on Shuswap Lake, which is licensed for domestic, agricultural and other uses under the Water Act. No information relevant to this has been collected.

End of Project Memorandum

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APPENDIX A

Photographs



Photograph No. 1: Wild Rose Bay Private Marina - current configuration looking north-east. Taken in October 2006 showing the dismantling for winter storage.



Photograph No. 2: View from existing marina looking west.



Photograph No. 3: View of existing boat ramp.