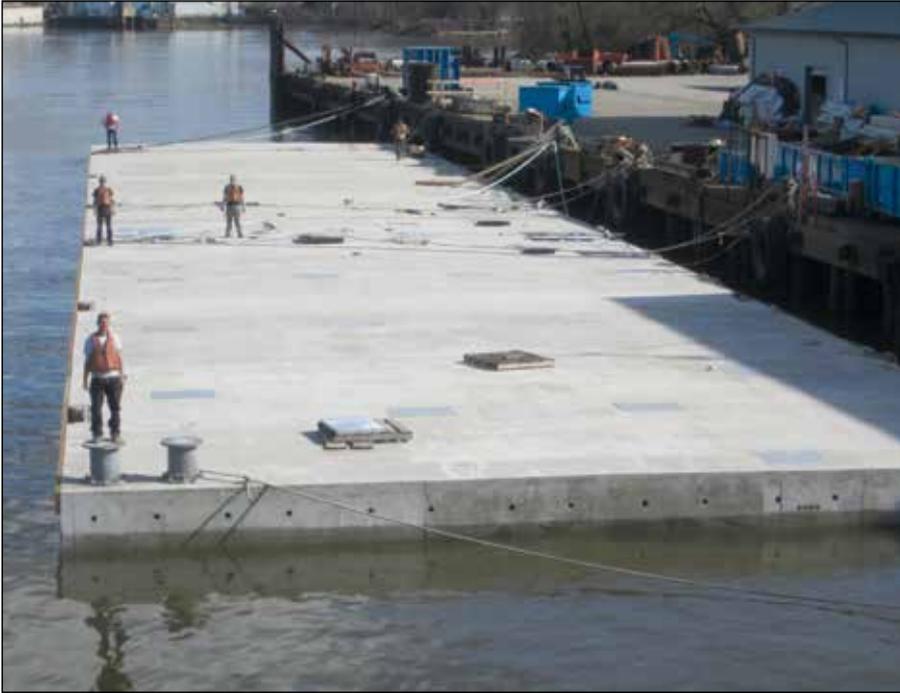


# Canadian Yacht Club Uses Innovative Attenuator System

by Mia Anderson



*Burrard Yacht Club in North Vancouver, British Columbia, installed a water-ballast wave attenuator system by International Marine Flotation System.*

The Burrard Yacht Club in North Vancouver, British Columbia, installed the first new wave attenuator system created by International Marine Flotation Systems (IMFS) earlier this year.

The Burrard Yacht Club provides its 300 members with moorage for power and sailing vessels, mainly 25 to 60 feet in length. The marina has been relying on a breakwater made of wooden sections, old barges and even a decommissioned naval ship. However, the old breakwater was no longer able to withstand the waves caused by adverse weather or wakes of the tractor tug and seabus traffic in Vancouver Harbor.

As far back as 10 years ago, club members understood the facility needed a new breakwater and began researching options. They approached IMFS, located in Delta, British Columbia, but at that time, the company didn't have anything it thought would be sufficient for the marina's needs.

## Breakwater Defense

The IMFS team went back to the drawing board and came up with a new water-ballasted wave attenuator design that has now been patented. IMFS Senior Project Manager Mathias Tobias said the marina worked with Northwest Hydraulic Consultants to determine what size breakwater was needed. From those specifications, IMFS created the IMFS Defender.

"We were lucky enough to have a client in our backyard, and Burrard Yacht Club was in need of something like this," IMFS General Manager Bob Field said.

Tobias said IMFS met with the yacht club to explain how the new breakwater would work and ensure that it would perform properly. The attenuator is a large concrete shell with a foam-filled inner chamber in the upper portion of the float. The remainder of the float is filled with water during installation. The water enters the float via vents

that also allow air to escape in order to achieve the desired draft. The inner design of the float ensures no air space is left, thereby giving it greater stability than other types of attenuators that use water ballast.

The empty shell weighs 1,000 tons, but once filled, it provides 2,000 tons of protection. "It's 1,000 tons of free weight," Tobias said. "Otherwise, you would have to bring in other material such as old concrete."

Field said the use of a free ballast system filled with water is something marina owners should consider when comparing the price of breakwaters. With the IMFS Defender, there is no added expense for the required ballast.

Three 50-foot by 130-foot floats were installed at the south end of the Burrard Yacht Club, providing 6,000 tons of protection for the marina.

## Construction and Installation

Tobias said it took two to four months to build each piece. "We were learning as we went along. Some of that time was because it was a new idea," Tobias said.

Each unit was constructed on a barge and towed eight hours to the marina for installation. The construction crew sank the barge, set the breakwaters, and then re-floated the barge. IMFS uses a specialized connector to attach the floats end to end. The connector is a 24-inch round 70 Durometer rubber bun; six are used for each connecting face. Four of the buns have a 2½-inch flexible swage cable bolt that goes through them to make the connection between two breakwaters; the other two buns help prevent shear. The buns are socketed into a 10½-inch concrete pocket on the face of the breakwater, which acts as a semi-rigid connection.

It took about two months to install the floats, with two being installed first and the finishing touches completed on the third one in June 2014.

"It was a challenge in that this is a custom piece and is anchored differently," Field said. "They wanted the anchoring system on the outside, so large brackets had to be engineered for that purpose."

The anchoring system for the

breakwater is based on a typical chain and concrete anchor system. The yacht club requested that the attachment brackets be mounted to the outside of the breakwater to allow for easier connecting and disconnecting and maintenance over time.

The large brackets were a 1½-inch thick steel plate with 45- and 90-degree lug plates, angled specifically to displace the chain and anchors in different directions.

Because each unit is individually built and then connected on-site, marina owners can add new sections as their budgets allow. Tobias said Burrard Yacht Club is considering adding five sections on the west side of the marina.

## New Waterfront

IMFS said the breakwater provides protection and also creates a new space at the marina.

Field said once the floats are installed they are unsinkable because they are already filled with water.

“It’s not just a rock mound, which is

just that—a pile of rocks. You can’t build anything on it,” Field said.

At the Burrard Yacht Club, power and water were run to the attenuators, and they have storage and cranes on the surface that are being used for boat tenders.

Field said the attenuator surface could be used for a variety of purposes, such as boat repair, marina stores and service buildings.

“If the conditions are right, you could move all the marine buildings that are taking up land and move it to the float,” Field said. “It’s a more dynamic area, and it frees up the land.”

The IMFS website features a floating subdivision of homes built on the IMFS Defender. The company has also been selected to construct a floating, boat-shaped foundation for a new pavilion to be built in the Potomac River at the John F. Kennedy Center for the Performing Arts.

Cars and trucks, weighing 4,000 to 6,000 pounds, can even drive on the attenuator. Field said it would require

33,000 pounds to move the float one inch into the water.

Because the attenuators are made of concrete, they are durable and do not require a great deal of maintenance. The surface may need to be sealed occasionally to keep it clean and looking fresh, and the connectors should be checked periodically, especially after storms.

The attenuators do not require any maintenance below the waterline, they are fire- and earthquake-proof, and IMFS estimates they have a service life of at least 100 years.

“There’s no deterioration, no loss of buoyancy,” Tobias said. “This piece will look the same for years.”

IMFS manufactures other types of breakwaters, but the IMFS Defender is designed for deep-water scenarios.

“It’s a very large piece,” Field said. “We would not use it in a shallow basin. The width and depth are important and what it does to wave action, especially bigger waves and quite turbulent water.” ⚓



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