Call on Us

For further information about Bellingham Marine products, or to discuss a project or expansion that may be in the study or planning stage, please call the nearest Bellingham Marine representative. Our staff is always available to answer your questions and provide information. We're proud of our reputation as the most experienced and respected marina builder in the world. Let us put that experience to work for you.

Wave Attenuator Installations

This represents a selection of our clients.

Port Orchard Marina, Port Orchard, WA
TYPE: Caisson attenuator, post-tensioned
WIDTH: 10 feet
APPROX. WAVE HEIGHT: 4 feet
BUILT: 1974

Camas/Washougal, Columbia River, WA
TYPE: Heavy Duty Unifloat®
WIDTH: 12 feet
APPROX. WAVE HEIGHT: 2.5 feet
BUILT: 1978

Port of Brownsville, Brownsville, WA
TYPE: Caisson attenuator, post-tensioned
WIDTH: two units – one 16 feet wide and one 18 feet wide
APPROX. WAVE HEIGHT: 4 to 5 feet
BUILT: 1981

Port of Friday Harbor, Friday Harbor, WA
TYPE: Caisson attenuator, post-tensioned
WIDTH: 15 feet
APPROX. WAVE HEIGHT: 4 feet
BUILT: 1982

S. Downtown Waterfront Development, Portland, OR
TYPE: Caisson attenuator, post-tensioned
WIDTH: 16 feet
APPROX. WAVE HEIGHT: 3 feet
BUILT: 1984

Fernandina Wave Attenuator, Fernandina Beach, FL
TYPE: Heavy duty caisson attenuator with double walers
WIDTH: 13.5 feet
APPROX. WAVE HEIGHT: 4 feet
BUILT: 1986

Oak Harbor Marina, Oak Harbor, WA
TYPE: Waveguard floating wave attenuator
WIDTH: 16 feet
APPROX. WAVE HEIGHT: 4 feet
BUILT: 1988

Elliott Bay Marina, Seattle, WA
TYPE: Heavy duty caisson attenuator with double walers and wave fences
WIDTH: 13'-6"
APPROX. WAVE HEIGHT: 3 to 4 feet
BUILT: 1992

Willow Berm Marina, Isleton, CA
TYPE: Heavy duty Unifloat®
WIDTH: 12 feet
APPROX. WAVE HEIGHT: 3 feet
BUILT: 1995

Coal Harbour Marina, Vancouver, BC, Canada
TYPE: Steel waler, fenced heavy duty Unifloat®
WIDTH: 14 feet
APPROX. WAVE HEIGHT: 4 feet
BUILT: 1997

Centennial Harbor Marina, Fort Myers, FL
TYPE: 1275' caisson attenuator, pile supported
WIDTH: 11 feet
APPROX. WAVE HEIGHT: 2.5 feet
BUILT: 1998

Tred Avon Yacht Club, Oxford, MD
TYPE: Heavy Duty caisson with Parallam walers
WIDTH: 10 feet
APPROX. WAVE HEIGHT: 2.6 feet
BUILT: 2002

Signal Point Marina, Boothbay, ME
TYPE: Heavy duty caisson attenuator with Parallam walers
WIDTH: 10 feet
APPROX. WAVE HEIGHT: 3.3 feet
BUILT: 2002

Greenwich Bay Marina, Warwick, RI
TYPE: Heavy duty caisson attenuator with Parallam walers
WIDTH:10 feet
APPROX. WAVE HEIGHT: 3.3 feet
BUILT: 2002

Norfolk Yacht and Country Club, Norfolk, VA
TYPE: Heavy duty caisson attenuator
WIDTH: 10 feet
APPROX. WAVE HEIGHT: 2.3 feet
Built: 2003

Bayswater Auckland Harbour, New Zealand
TYPE: Waveguard and heavy duty caisson
WIDTH: 4.0 metres
WAVE HEIGHT: 750mm to 900mm
BUILT: 1996

Opua, Bay Of Islands, New Zealand
TYPE: Heavy duty skirted pontoons
WIDTH: 4.0 metres
WAVE HEIGHT: 1.0 metres
BUILT: 1999

Blairgowrie Yacht Squadron, Victoria, Australia
TYPE: Heavy duty skirted pontoons "I" beam steel walers
WIDTH: 4.5 metres
WAVE HEIGHT: 1.0 metre
BUILT: 2001

St. George Motor Boat Club, New South Wales, Australia
TYPE: Heavy duty skirted pontoons
WIDTH: 4.2 metres
WAVE HEIGHT: 760mm
BUILT: 2002

Royal Brighton Yacht Club, Victoria, Australia
TYPE: Heavy duty skirted pontoons "I" beam steel walers
WIDTH: 4.5 metres
WAVE HEIGHT: 1.3 metres
BUILT: 2002

Birkenhead Point Marina, New South Wales, Australia
TYPE: Heavy duty caisson
WIDTH: 4.5 metres
WAVE HEIGHT: 650mm
BUILT: 2002

*Note: All wave heights indicated above are estimated Hs

Bellingham MARINE®
The World's Most Comprehensive Marina Builder

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Brisbane, Australia
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Sydney, Australia
Kuala Lumpur, Malaysia
Singapore
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International Partners:
Bellingham Harbor Management Company (Japan)
CKIPM Marine Group (Korea)
C.M. Ferrer (Western Europe)
Kingleader (Central China)
Marine Structures & Consultancy (Fiji)
Rayomarine (Philippines)
Septech Emirates (Middle East)

UNIFLOAT®
Precision engineered flotation systems

Bellingham MARINE®
The World's Most Comprehensive Marina Builder

UNIFLOAT®
Precision engineered flotation systems

UNIFLOAT® Wave Attenuator Systems

UNIFLOAT® Wave Attenuation Systems from Bellingham Marine

From The Leading Designers And Builders Of Wave Attenuators In The World

Boaters in marinas around the world are enjoying comfortable conditions in their slips thanks to a Bellingham Marine Wave Attenuator.

As with anything to do with weather phenomenon, the study and practice of controlling the energy in waves did not lend itself to simple and elegant mathematical understanding. It is an art and a science that is gradually, over time, becoming better understood.

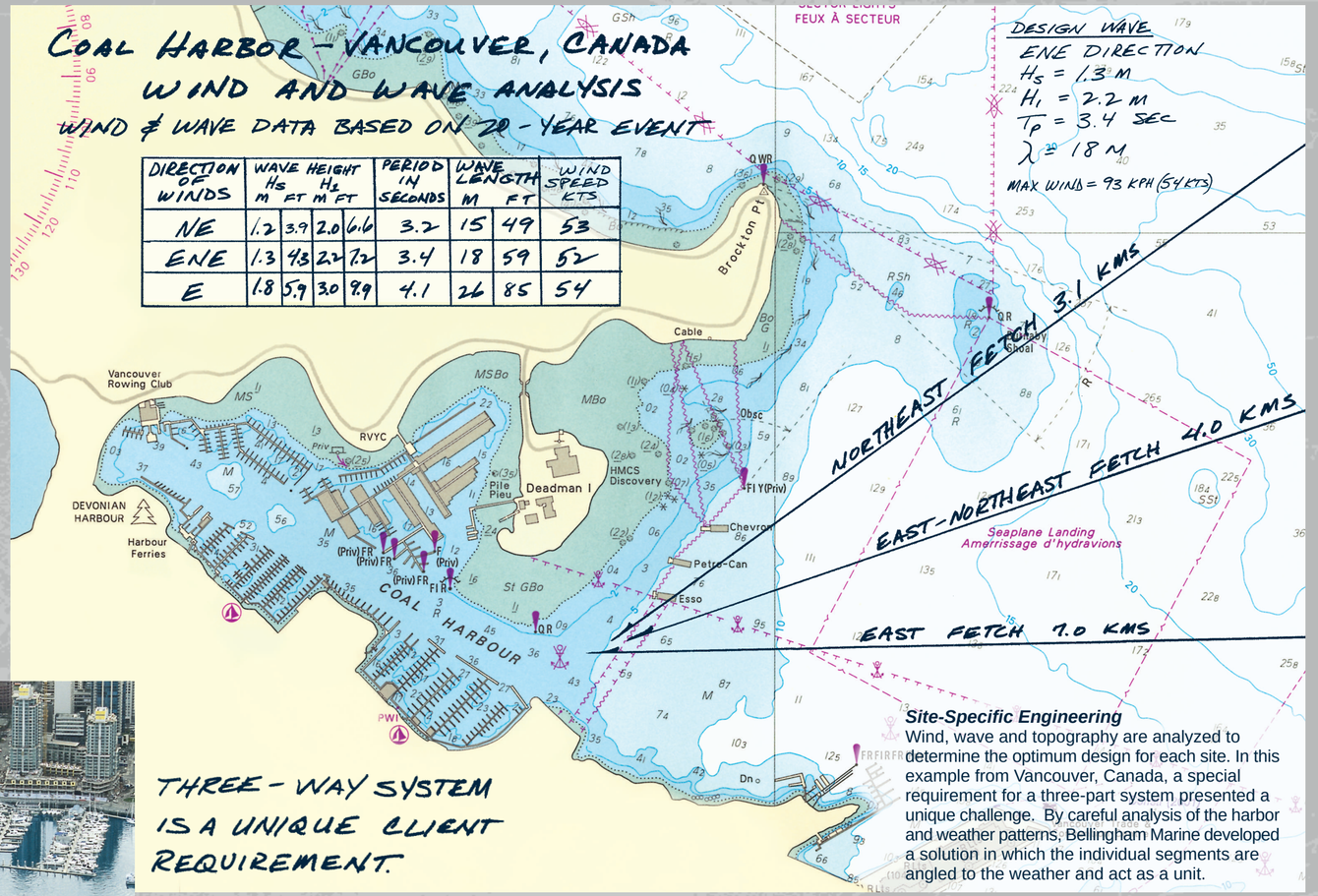
The process of quantifying wave attenuation dynamics started in earnest more than 25 years ago, when the U.S. Army Corps of Engineers turned to Bellingham Marine to make the prototype wave attenuators for a new study. From that effort the first practical empirical test data began to be collected.

From that beginning, Bellingham Marine has continued its collaboration with the leading engineers in the field. Together we were able to build on that body of knowledge and develop the most durable and effective wave attenuator systems in the world. Today, Bellingham Marine Wave Attenuators are ceaselessly at work from Alaska to Australia and from Maine to Florida with an impeccable record for durability and cost-effective results.

When planning and engineering wave attenuation, there is no substitute for experience. Wave attenuation by cost-effective flotation devices has had only a quarter of a century of practical and theoretical experience. By contrast, the science of seismic engineering – protecting buildings from earthquake damage – is approaching 100 years old and new information is learned in every significant earthquake.

No other company has the engineering resources and the comprehensive knowledge of marina design and construction to compare with Bellingham Marine. We design your wave attenuator through a process called Site-Specific Engineering, and our record is proof of its value.

Our wave attenuators are not one-size-fits-all products. We employ marine engineering, meteorology, geology, basin and river ecology and structural and civil engineering to engineer a system to exactly fit your needs, your desired risk levels, and your budget. And we help you get through the arduous permitting process always attendant to shoreline development.



DIRECTION OF WINDS	WAVE HEIGHT H_S M	FT	H_1 M	FT	PERIOD IN SECONDS	WAVE LENGTH M	FT	WIND SPEED KTS
NE	1.2	3.9	2.0	6.6	3.2	15	49	53
ENE	1.3	4.3	2.2	7.2	3.4	18	59	52
E	1.8	5.9	3.0	9.9	4.1	26	85	54

Site-Specific Engineering

Wind, wave and topography are analyzed to determine the optimum design for each site. In this example from Vancouver, Canada, a special requirement for a three-part system presented a unique challenge. By careful analysis of the harbor and weather patterns, Bellingham Marine developed a solution in which the individual segments are angled to the weather and act as a unit.

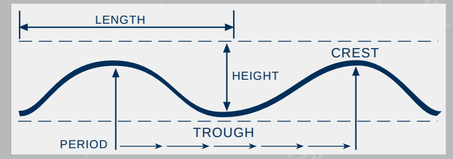
What is a Wave Attenuator?

A wave attenuator is a floating device designed to greatly reduce wave energy from the exposed side to the protected side. Wave attenuators help create comfortable moorage conditions, protecting against natural, wind-borne waves and boat or ship wakes.

Fixed structures, such as rubble mound breakwaters and sea walls, are high in cost and may have negative effects on the environment. In many cases, they are impractical due to water depth and other factors. For all these and other reasons, the floating wave attenuator is the perfect answer for many marinas.

Wave Dynamics

Waves are measured by height, length and period (see diagram). Engineers are interested in the average of the highest 1% (H_1) and/or the average of the highest 1/3 (H_S) of the waves during a design storm event. Height and period are determinators of the energy to be managed, and wave length is also an important consideration in the design.



Determining wave effects in a basin or harbor is not a simple matter. Waves effects accumulate, and may reflect, or bounce off, nearby land masses and structures. In addition, waves change their dynamics as they impact shallow water. Waves can also defract, which is to say they can bend around corners to some extent. Mass, breadth, depth and configuration are design factors important to developing an effective wave attenuator.

The Right Solution for Your Marina

With site-specific design, Bellingham Marine is able to offer the right wave attenuator for your situation. That is why your system will not under-perform nor will it wastefully cost too much because it is overbuilt for the purpose.

Wave attenuators from Bellingham Marine serve many dual-purpose functions, such as visitor docks, fuel docks, and other uses. While specially designed, particularly below the water, they are similar in appearance to other floats in the marinas they protect. They require no special maintenance procedures, contributing to the low cost of ownership.

Our wave attenuators are designed especially for your marina by the most experienced engineering experts in the world in this discipline. The superior performance of our Unifloat® Wave Attenuators in every kind of application is your assurance of quality, durability and effectiveness.