

CASE STUDY

# Blaine Harbor

## Wave Barrier – Blaine, Washington

### HISTORY

The Port of Bellingham, in Washington State, is the northwestern most point on the United States border with Canada. At the peak of the port, near the Peace Arch, is Blaine Harbor and its marina boasting a capacity for more than 600 commercial and pleasure boats, some measuring up to 120 feet in length.

### PROBLEM

The timber piers protecting the entrance to the Blaine Harbor marina slowly came apart after years of heavy wave action. The Port of Bellingham wanted to replace the crumbling structure at a reasonable cost, increase its wave protection and reduce the marina's susceptibility to seismic damage, all with minimal intrusion on marine life.

### SOLUTION

Nucor Skyline worked in step with PND Engineers to produce a partial penetrating wave barrier. Designed to protect against moderate-size waves, the plans called for two separate barriers that totaled nearly 600 linear wall feet.

To create the partial wave barriers, interlocked steel sheet piles of PZ 27 and PS 31 were welded to large-diameter pipe piles. The length of the piles is truncated— at 20 to 50 feet above the mudline — to create cavity space between the bottom of the piles and the sea floor.

In the shallower water, a cantilever-type wave barrier was designed with the sheet pile barrier wings. The designers incorporated “spin fin” batter clusters and conical points in the deeper water. The spin fin (small pieces of steel welded at an angle at the bottom of



the pipe piles) corkscrewed the wave barriers during difficult driving and also provided uplift resistance against wave action.

According to PND, the design surface waves have a significant height of 6.2 feet, with a period of 4.6 seconds. In 2006, the wave barriers provided sufficient protection against the highest storm surge in 40 years.

The designs improved wave protection, limited disruption to marine life and added the desired moorage coverage inside the marina. The original timber piers were rehabbed and turned into a pedestrian walking area.

### PROJECT PARTNERS

#### Owner

Port of Bellingham  
Bellingham, WA

#### Engineers

PND Engineers  
Seattle, WA

### PRODUCTS

580 linear wall feet of PZ 27 and PS 31