

Columbia Jetty Repairs

**Project Will Shore Up Structure
Until More Permanent Fix Can Be Made**



Story and Photos by Carl Molesworth



Crane operator Bill Pankey carefully places a stone on the jetty.

Crossing the bar at the mouth of the Columbia River is no easy task for mariners, whether their vessel is a huge cargo ship or a small pleasure boat. A constant churn of whitecaps marks the crossing, be it fair weather or foul.

It's not much wonder this stretch of coastline earned the name "Graveyard of the Pacific." It has claimed more than 2,000 ships and 700 lives in recorded history. Fortunately, the completion of the Columbia River jetties by the U.S. Army Corps of Engineers in 1917 marked the end of the death-and-destruction era. Today, an estimated \$16 billion in trade annually passes through the mouth of the river. Besides adding a safety factor, the jetties channel and accelerate the flow of the river in the estuary, scouring sand out of the navigation channel and thus helping to keep traffic moving through it.

But the constant pounding of the wave action and river current against

Left: The last repairs on the Columbia River south jetty were made in 1982.

Right: A Caterpillar 988G fitted with forks loads an armor stone into a Cat 769C haul truck for delivery to the jetty.

the jetties takes its toll on the rubble-mound structures, requiring constant inspection and regular repairs. In this corner of the Pacific, the storm surge can pick up a 20-ton boulder and toss it like a medicine ball.

Fearing the effect of a five-year storm could breach deteriorated sections of the jetty and flood the shipping channel with sand, the Corps of Engineers embarked on a program last year to complete interim repairs that would prevent a jetty breach for the next 10 to 15 years while plans are under way for a more durable long-term rehabilitation of the jetties in the future.

The last repairs on the inland portion of the jetty were made in 1982, and work was done farther out in the mid-1960s, said Lance Helwig, Corps of Engineers project manager for the MCR jetty project.

"They are long overdue," he added.

Repairs of the north jetty, which is



closer to the navigation channel and would present a more immediate threat to it in the event of a breach, were completed in 2005 by Tapani Underground of Battleground, Wash. Focus shifted to the south jetty this year, first with an emergency-response contract to Roglin's Inc. of Aberdeen, Wash., that also included construction of a haul road to the south jetty.

Two Phases

On Feb. 16, the corps awarded a contract for the Mouth of the Columbia

River South Jetty Interim Repair to Kiewit Pacific, of Vancouver, Wash. The base contract was awarded for \$11.4 million to repair the inland reach of the jetty with options of about \$7.7 million that may be exercised for repairs to the seaward reach.

"The interim repair contract for the south jetty will be in two phases with the inland phase scheduled for completion in October 2006 and the seaward reach completed in 2007," Helwig said. The job involves placing upwards of 145,000 tons of jetty stone in two areas over a 5,300-foot-section of the jetty.

The jetty shows evidence of severe deterioration in places. The project will restore it to 30 feet wide at the top, which will be 25 feet over the mean lower low water level, Helwig said.

Kiewit Pacific acquired rock for the project from a single source, Martin Marietta's Beaver Lake Quarry in Skagit County, Wash. (see PB&E, Sept. 18, 2006). Rocks, ranging in size from 11 tons to about 20 tons, are barged from the Port of Anacortes through Puget Sound and the Strait of Juan de Fuca to the Pacific Ocean, down the Washington Coast and through the mouth of the Columbia to the Nygard Logging dock at nearby Warrenton, Ore. They are stockpiled at Nygard and trucked several miles through Fort Stevens State Park to the job site.

A Komatsu PC1250 LC excavator is fitted with a Jewell long stick and an articulated grapple for rock handling.



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The logistics involve each rock being touched seven to nine times before it reaches its resting place on the jetty, said Mike McAleer, project spokesperson for the corps.

The rock placement for this year is taking place on Reach A, the 2,100-foot section of the jetty closest to shore. The W2 stones in this section weigh an average of 11 tons; 2,200-foot-long Reach B will get larger stones – with an average weight of 16 tons – because the wave action is more severe at the ocean end of the jetty.

Starting at the end of the new haul road, Kiewit Pacific's crew is working its way out the jetty and extending the haul road as work progresses oceanward.

Artful Placement

The contractor is using Manitowoc 4600 Vicon crane, specially built to handle the increased side loads of jetty work, to place the rocks, said Morris Frazier, corps project engineer. The crane picks each rock with its grapple from the place where it has been dumped on the haul road, swings it out over the ocean next to the jetty and then puts it down in the most appropriate spot to improve the strength of the structure.

The crane operator, Bill Pankey, is in constant communication with a spotter on the jetty and also with the laydown yard. He radios in orders for specific-sized rocks based on the voids he sees in the jetty ahead of him.

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is more artwork
than science.

– Lance Helwig

Rocks generally have a fat end and a pointed end. When placed properly, they are interlocked slightly vertical, with the butt end toward the center of the jetty and the pointed end sticking out to help break up the waves. Voids between the rocks help to dissipate the power of the wave as well, Frazier said.

“Placing stones is more artwork than science,” Helwig observed. Pankey did not disagree.



Kiewit Pacific's Manitowoc 4600 Vicon crane prepares to pick a 15.7-ton rock.



A second Manitowoc 4600 Vicon crane offloads rocks from the Kiewit barge at the Nygard Logging dock in Warrenton, Ore.



A Cat 988F loads a rock at the Nygard Logging yard.

“Sometimes it looks perfect to me, and it’s not,” he explained. “That’s why we have to have someone (down on the jetty) looking at it. Other times, all a rock needs is a love tap to put it in place.”

The crane is fed by three rock trucks, so that two can be hauling on the road atop the jetty while the third is being

loaded in the laydown area. In the interest of safety and ergonomics, the drivers exit the trucks during loading, Frazier said.

The laydown area is the seaward half of a popular parking lot in the park, which Oregon State Parks turned over for the use of the project temporarily. Park officials also worked with the

– probably through the end of October – and then start up again next year to complete the job. ■

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Columbia Jetty History

The U.S. Army Corps of Engineers has been involved in improving navigation at the Mouth of the Columbia River since the 1870s. Early work at the mouth included detailed surveys of the Columbia River bar and the construction of jetties. Eventually the work included dredging a navigation channel from the ocean to the estuary.

The corps maintains three rubble-mound jetties at the MCR. Their design – boulders stacked one on top of another and extending out into the ocean – is simple. Their purpose, on the other hand, is more critical. These structures not only accelerate the flow of the river, helping maintain the depth and orientation of the navigation channel, they also provide protection for ships of all sizes (both commercial and recreational) entering and leaving the estuary.

In July 1884, Congress authorized construction of the south jetty with an initial appropriation of \$100,000. The improvement called for a 4.5-mile-long low-tide jetty, extending from near Fort Stevens on the south cape by a slightly convex curve northward to a point about three miles south of Cape Disappointment. Completion of the south jetty at the mouth of the Columbia River required 10 years and cost just under \$2

million. The ocean soon began to take its toll on the jetty, and it was rebuilt starting 1906. By 1913, the district completed the new work on the south jetty at a cost of nearly \$8 million. As reconstructed, the average top width of the jetty was 25 feet and the height above sea level varied from 10 feet at the shore end to 24 feet at the outer end.

Construction of the north jetty, on the Washington side of the river, began in the spring of 1914 and was completed by May 1917. As finished, the north jetty had a top width of 25 feet and an elevation varying from 28 feet to 32 feet above mean lower low water. Surveys made the following spring showed the depth across the entrance at all places measured at least 40 feet. When completed, the jetties at the mouth of the Columbia River contained 9 million tons of stone and were the largest in the world.

This project, Col. George A. Zinn reported in 1917, made it possible for the largest vessels operating on the Pacific coast to enter and leave at all normal stages of tide and in any weather except during most severe storms. Never again would vessels stranded on the bar be a common sight.

Information provided by the U.S. Army Corps of Engineers.