

ROCK FOR THE Columbia Jetty



FIRST OF TWO PARTS

Contractor Overcomes Challenges Presented by Basalt Quarry

Story and Photos by Carl Molesworth

When the U.S. Army Corps of Engineers awarded Kiewit Pacific Co. the contract for the Mouth of the Columbia River South Jetty Interim Repair project in February 2006, a key element of the contractor's bid proposal was the rock to be used for the job.

The project involves placing upwards of 145,000 tons of jetty stone in two areas over a 5,300-foot-section of the jetty, which extends into the Pacific Ocean on the south side of the river just west of Astoria, Ore., said Lance Helwig, project manager for the Corps of Engineers.

Ideally, the jetty stone for the project would come from a single source able to produce rock of sufficient size (up to 30 tons apiece) and toughness to do the job. Kiewit Pacific found just such a source at Martin Marietta's Beaver Lake Quarry in rural Skagit County, Wash.

Helwig described the Beaver Lake basalt formation as "volcanic rock that metamorphosed to a monolith" that pokes up out of an open field. The blue basalt rock it produces is very hard and very dense, just right for jetty work, he added.

Kiewit contracted with Martin Marietta Aggregates to extract 145,000 tons of rock out of the quarry. Martin Marietta Aggregates is a division of Raleigh, N.C.-based Martin Marietta Materials Inc., the second-largest producer of crushed stone, sand and gravel in the United States. The company's network of more than 300 quarries and distribution facilities spans 28 states, the Bahamas and Nova Scotia.

Basalt Formation

The rocky mound of metamorphosed basalt at Beaver Lake will look more like a mesa by the time Kiewit's 25-person



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Left: This basalt formation in Skagit County, Wash., is the location of the Beaver Lake Quarry.

Above: Two Ingersoll Rand ECM660 IIIs drill blast holes into the rock.

Right: A Hitachi EX1800 shovel loads shot rock into a Caterpillar 777C haul truck at the base of the cliff.



crew finishes working on it. Starting this spring, they have been taking it down from the top in layers that leave it with a flat top as each layer is removed.

The process sounds simple: blast, split, sort, and load. The work itself is quite a bit more complicated, especially given the limited working space available in the confines of the quarry.

The work begins at the top of the formation, where the Kiewit crew uses two Ingersoll Rand ECM660 III drills to punch a pattern of blast holes on a 10-degree angle, 55 feet deep into the rock at the edge of the cliff. The holes are drilled in various patterns depending on rocks quality and fracture planes. Explosive charges are placed in the bottoms of the blast holes to minimize fragmentation.

The shots are designed so that the blast kicks out the toe of the cliff, and then the rock above collapses down to the floor.

Blasting, which is only allowed from noon to 5 p.m. Monday through Friday due to permit constraints, is accomplished in two phases. Half of the charges are detonated, a Hitachi EX1800 mining shovel digs out the section, and then a second shot repeats the process.

“It’s a big deal to get those shots done before 5 o’clock,” observed Don Neary, Kiewit’s superintendent at Beaver Lake.

The EX1800 loads the rock into Caterpillar 777C haul trucks for removal from the blast area to a sorting

area. There, a Caterpillar 992G loader weighs the rocks to determine which need to be scaled down to size and which are within specification. The rest is left at the quarry for Martin Marietta to sell to other customers.

Safety With Production

Though maintaining a high level of production is an obvious goal at Beaver Lake, Neary said safety is the top priority.

“If you get this much equipment working a little postage stamp, you’ve got to have your safety in order,” he said.

Weekly and monthly safety meetings are held on the job site, and all workers get Part 46 MSHA mine safety training before they can go to work there.

One technique Kiewit is using at Beaver Lake to maintain both safety and high production is the use of Nonex low-explosive charges in conjunction with a rock splitter to reduce the number of times that operations must be shut down at the quarry while over-size rocks are being scaled down.

Though the basalt rock at Beaver Lake is quite dense, the Nonex is very effective at breaking it up. Once a large rock is weighed by the scale-equipped 992G, its weight is spray-painted on the rock. A Tamrock Commando 300, fitted with three Darda rock splitters, drills holes in the rock at key points, and the Nonex Systems PBC charge – which can range from 50 grams to 200 grams depending on the size of rock – is detonated to split the rock down to spec size.

Nonex, a Class 14C explosive, offers several advantages. As mentioned, other work can continue on the site while it is in use, but also the blast created by Nonex doesn't put microscopic fractures in the rock as high explosives do.

"It's more expensive," Neary observed, "but the time savings evens it out."



Blast Foreman Mac McClary detonates a Nonex charge to split a large rock.

Neary credited his crew with maintaining a safe and productive operation, singling out Mac McClary, blast foreman; Dean Terry, excavation foreman; Mike Witt, loadout foreman; and Bob Lang, maintenance foreman, for their leadership on the job.

"This is the best crew I've ever worked with," Neary said. "Everybody works their tails off to get things done."

Long Haul to Oregon

The Beaver Lake operation is producing several hundred tons of rock per day for the Columbia River South Jetty. Moving it from the quarry to the job site is no small task.

From the sizing area, the rocks are moved out of the quarry to a sorting

yard next to the truck scales. The rocks are arranged by size and loaded onto tandem flatbed trailers in a careful process to keep the trucks within weight limits imposed on the local roads. As each rock is weighed at the scale, its weight is again spray-painted on it to aid in sorting and placing when the rock reaches the Columbia River South Jetty.

A fleet of 12 to 14 trucks hauls the rock from the quarry through Skagit County to the Port of Anacortes. There it is loaded on a barge for shipment. The barge can carry approximately 9,000 tons of rock at a time and makes deliveries to Oregon roughly every 10-12 days. The route takes the barge 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.

"We hope to get all the rock to Astoria by the end of October," Neary said.

Work on the jetty will be halted around that time, due to the onset of winter weather, and will restart next spring. But that's another story. ■

Editor's Note: The second part of the story, covering the Columbia River South Jetty repairs, will appear in the next edition of PB&E.

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A rock is loaded onto a truck at the quarry scales for shipment to the Port of Anacortes dock.