

Old slabs get a new life: The Volmer and Johnson Creek bridge project

In 1999, Knife River precasters produced one hundred 21 in. × 4 ft (530 mm × 1.2 m) wide precast concrete slabs for an emergency detour bridge over Spencer Creek on Highway 101 in Oregon. The detour was meant to last five years but remained in place almost a decade. When the new bridge was finally completed in 2008, the detour came down, and its owner, the Oregon Department of Transportation (ODOT), put the slabs into storage.

Precast concrete slabs may be built to last for decades, but when bridges are dismantled, it is often the end of the line for these valuable structural elements, says Keith Kaufman, chief engineer for Knife River Corp.—Northwest.

“Slabs are rarely designed for reuse,” he says. They are expensive to ship and store, their lifting strands are usually burned off once they are positioned on the pad, and engineers rarely consider the existence of old slabs when they design new bridges.

“Engineers have no idea those slabs are even available unless someone points it out to them,” Kaufman says. “It takes a lot of foresight on the part of engineers and owners to make reuse happen.”

In the case of the Spencer Creek slabs, the stars aligned. In 2011, 16 of the 100 slabs got a new life as part of the Volmer and Johnson Creek bridges project on US Route 26 between Portland, Ore., and the coast.

The \$1.8 million project received accelerated bridge construction (ABC) funding, which meant that the contractors had to use techniques to reduce

on-site environmental impacts and construction time. ODOT decided that using the repurposed slabs would help meet the accelerated schedule, and because ODOT owned the slabs and knew they were sitting in storage, it made reuse a condition of the project.

Making it work

It was a good idea, but it created many challenges for the engineers and contractors.

Before the designers could even move forward with a plan to reuse the slabs, the contractors, Hamilton Construction, first had to figure out how they would lift, ship, and place the slabs without lifting strands. “They had no way to pick them up,” Kaufman says.

To solve the problem, the crew built a custom C-shaped clamp that could be used to grasp the slabs and move them safely into place on the deck. “Contractors are an ingenious group,” he says.

With that solution in place, the engineers designed the new bridges using the old 50 ft (15 m) long slabs as a scale reference to make sure they would fit within the new structure. “They had to match the existing span length or it wouldn’t work,” Kaufman says.

The engineers also had to incorporate new edge slabs into the design that could hold the custom rails for the Volmer and Johnson Creek bridges.

Because the original project was an emergency detour, the rails were basic and were designed for a traffic speed of 35 to 45 mph (56 to 72 kph), Kaufman says. Those slabs couldn’t accommodate the custom rails for the new project, which were designed to meet aesthetic goals and to withstand 65 mph (105 kph) impacts.



Special exterior slabs produced by Knife River Corp.—Northwest for the Volmer and Johnson Creek bridges project on US Route 26 between Portland, Ore., and the coast are cast to receive the bridge rail and match the interior slabs. *Courtesy of Knife River Corp.*



The old slab from an emergency detour bridge over Spencer Creek on Highway 101 in Oregon is being erected as part of the Volmer and Johnson Creek bridges project on US Route 26 between Portland, Ore., and the coast. The patches at the end of the slab indicate the locations where the strands were cut, recessed, and patched. **Courtesy of Hamilton Construction Co.**

Patchwork

Once the designs were complete, contractors readied the old slabs for the new project. There was some concern that the slabs might have suffered corrosion or wear and tear from sitting outside on the Pacific coast for three years, but they were in good condition. “Precast is durable, and the quality concrete protected the internal reinforcement from corrosion,” Kaufman says, “so it was no problem.”

However, the contractors did need to clean each slab with a grinder to remove structural grout and asphalt, and patch holes where the steel rods were cut and the lifting strands had been removed. They also had to address any residual damage caused during deconstruction and storage. “There will always be some damage on reused slabs,” Kaufman says. “Contractors don’t take a lot of care in taking these down.”

Once they were ready for reuse, the slabs were shipped to the bridge site and both bridges were erected over four weeks. The result was two beautiful and durable structures that met the accelerated construction schedule using 80% repurposed slabs, which cut the cost of material substantially.

The new slabs were \$325 per linear foot (\$1070 per meter), whereas the used slabs cost \$75 per linear foot (\$246 per meter), Hamilton says. The contractor estimates that the use of the repurposed beams saved close to \$100,000 on the job as well as diverting more than 160,000 tons of material from the waste stream.

“The owners are happy with the result,” Kaufman says.

Not our business

While Kaufman is also pleased with the way the project turned out, he says he doesn’t believe repurposing concrete slabs for bridge projects will become a trend. “DOTs don’t think about the future when they build bridges,” he says. They don’t factor things like permanent anchors and easy-to-remove grout into plan designs, which would make repurposing easier.

“Those things all cost money,” he says. And the return on that extra investment is hard to justify when it’s impossible to plan where or when a slab might someday be reused. Add to that the cost of storage and the lack of infrastructure to track and plan for the reuse of these huge precast concrete elements, and it makes the option an unrealistic one for most precasters.

This is rightfully so, Kaufman says. “Precasters are in the business of selling concrete, not storing it. The owners and contractors are the ones who receive the benefits of reuse.”

—Sarah Fister Gale 