DEMOLITION

Rubble and Bubbles Mark Green Bridge Demolition

PEACEFUL PILE DRIVING Foam-lined platforms, a hydro-acoustic noise attenuator and compressors were used to minimize vibrations, create an air curtain and avoid disturbing fish in the Willamette River.

Like the London Bridge of the nursery rhyme, the Willamette Bridge is coming down. Under its $140-million general contract, Hamilton Construction Co., Springfield, Ore., orchestrated a complex and eco-friendly demolition for the Oregon Dept. of Transportation's fair lady.

The 2,000-ft-long box-girder bridge, built in 1962, was a key Interstate 5 link between Eugene and Springfield until shear cracks were found in 2002. Truck traffic had to be diverted by 200 miles until a temporary structure could be built in 2004.

Eugene-based subcontractor Scaton Cos. earlier this year completed demolition of the old bridge, starting with construction of a 120-ft-wide wood-and-steel work platform and a structure 10 ft above the high-water level to contain debris. "There had to be no rubble in the river," says Karl Wieseke, ODOT construction project manager.

Excavators positioned on the platform pulled the bridge apart and hoisted the pieces to a yard to be sorted and sent for recycling. ODOT will repurpose 30 million lbs of wood, concrete and steel. Crews separated the concrete and steel and rolled the rebar into massive balls—"like so much spaghetti," says Wieseke.

Hamilton used a hydro-acoustic noise attenuator, also called a "bubbleator," during pile driving to minimize underwater sound levels. Two 1,600-cu-ft-per-minute compressors vaporized the water to create an air curtain and minimize fish disturbance. The circular sheet-metal platforms, lined with a vibration-minimizing high-density yellow polystyrene foam, were customized around each pile template and supported the pile drivers.

The pile drivers used to install the platform piers ran on canola-oil biodiesel, which—compared to petroleum-based diesel—emits 30% less carbon monoxide, 93% less unburned hydrocarbons and no sulfates. It also biodegrades four times faster than conventional diesel.

Once the contractor demolished the deck, the summer construction window closed. But before the new structure could be built, crews had to remove the submerged piers. ODOT got a waiver to use an innovative cut-and-remove process, facilitated and streamlined by a team of 11 state and federal regulatory agencies.

Springfield-based American Concrete Cutting used a sediment curtain and a wire saw to remove the piers. Jeff Firth, Hamilton project manager, describes the process as a 100-ft-long string of diamonds slicing through the sediment like a knife through butter, cutting off the piers flush with the riverbed over a two-week period. The method saved the time and cost of an underwater jackhammer operation, limited noise and didn't leave rebar and rubble behind.

The $200-million new bridge will consist of two 1,759-ft deck-arch spans, 16 ft apart, each carrying a lane of traffic and a pedestrian path. It will touch the river just once, in the middle on a natural island that is sometimes submerged, compared to the old bridge's five piers and the temporary bridge's eight supports.

TEMPORARY BRIDGE AWAITS DEMOLITION Some slabs from the temporary bridge will be reused on the northern span of the permanent bridge as part of the project's environment-friendly nature.

PHOTOS COURTESY OF ODOT

ARCHED CROSSING New Willamette bridge piers will touch down in the river at only one point.

Hamilton began work in 2009 on the southbound span by drilling 50-ft-deep, 8-ft-dia shafts with an auger bit attached to an excavator. The shafts are reinforced with rebar and filled with concrete, then topped with poured-concrete shaft caps.

The shaft cap in the middle of the river was particularly challenging, says Kate Blackmore, an ODOT spokeswoman. The custom-poured, 8-ft-wide, 12-ft-tall, 6-ft-thick icebreaker shaft's concrete cap supports the north- and southbound arch ribs and two vertical pillars.

A temporary steel frame and wooden platform supports the rebar cages and forms used to shape the poured-concrete arches. Then, 1,000-ton hydraulic rams will jack the ribs off the falsework over a three-day period. The contractor will weld the pieces together and reinforce them with concrete using the eight cast-in-place closure pours.

Once that span is ready to handle traffic next summer, the temporary bridge will be demolished. Some of its slabs will be reused on the northbound span. Along with precast caps, this will reduce the enviornmental impact on Alton Baker Park and the Whilamut Natural Area.

The bridge is scheduled for completion in fall 2013, with total project completion, including ODOT improvements to surrounding parkland, in 2014. ■

By JT Long