

Spanning Communities

Quick switch to precast saves time and money and improves the quality for a sister city bridge.

BY FERNANDO PAGÉS RUIZ | PHOTOS COURTESY PACIFIC PRECAST INC.

If you visit Olympia, the scenic capital of Washington state, you'll find the best views of Puget Sound when you walk across the Olympia-Yashiro Friendship Bridge. Mt. Rainier rises cloud-shrouded in the east; the Yacht Club and a trail of blooming salmonberry shrubs enliven the crossing into downtown. The recently completed Olympia-Yashiro Friendship Bridge replaces a historic structure destroyed by an earthquake in 2001. The new bridge's artistic elements, including sidewalk mosaics, traditional lamp posts and a picturesque precast concrete railing, complement the subtle, historic environment of maritime Olympia.

The Federal Highway Administration's Excellence in Highway Design Awards Program, which recognizes outstanding examples of highways, bridges and pedestrian facilities, honored the city of Olympia with its 2004 award for contributing not only to the safety and mobility of its citizens but to the

THE PRECAST CONCRETE RAILINGS ARE POLISHED AND FEATURE KEEN, STRAIGHT LINES THAT RESEMBLE TERRA COTTA CASTING RATHER THAN ROUGH-HEWN CONCRETE. SIDEWALK MOSAICS LINE THE WALKWAY OF THE OLYMPIA-YASHIRO FRIENDSHIP BRIDGE.



THE FEDERAL HIGHWAY ADMINISTRATION'S EXCELLENCE IN HIGHWAY DESIGN AWARDS PROGRAM HONORED THE CITY OF OLYMPIA WITH AN AWARD FOR CONTRIBUTING NOT ONLY TO THE SAFETY AND MOBILITY OF ITS CITIZENS BUT TO THE AESTHETICS OF THE NATURAL WORLD. 1,784 FEET OF PRECAST RAIL WERE INSTALLED ON THE BRIDGE, WHICH SPANS BETWEEN 700 AND 800 FEET LONG.

Switching to Precast

Because of its historic setting and the keen aesthetic sensibilities of Olympia's discerning citizens, the railings across the Olympia-Yashiro Friendship Bridge had to look good on close inspection. Unfortunately, the first 400 feet fell short. When contractors removed the

formwork, the modified Texas-style railing with a rounded top "didn't produce a product the city or the contractor were happy with," explains Frare. The railing had shrinkage cracks, discoloration and a roughly finished appearance.

Fortunately, says Frare, "One of the consultants on our team suggested we look into precast



THE SLICK, ROUNDED TOP RAIL IS NOT ONLY BEAUTIFUL, IT'S PRACTICAL: WHEN RAIN WATER FALLS, INSTEAD OF ALLOWING CORROSIVE ELEMENTS TO LEACH INTO THE RAILING AND EAT AT THE REINFORCING STEEL LIKE TOOTH DECAY, THE POLISHED, CRACK-FREE PRECAST SURFACE ALLOWS BIRD DROPPINGS AND OTHER CORROSIVES TO RINSE OFF.

aesthetics of the natural world. Such is the pedigree of the Olympia-Yashiro Friendship Bridge and the reason Tom Frare, project manager for the city of Olympia, had to stop work on a cast-in-place bridge railing under construction and switch to a precast concrete railing instead.

bridge rail, [which] he had used on a similar project."

Mike Terrell, consultant with the engineering firm Entranco in Olympia, led the contractor and Olympia officials on a field trip to see the Meydenbauer Bridge upstate in Bellevue. The precast concrete railings on this bridge, made by Pacific Precast Inc. of Vancouver, Wash., looked polished and the straight lines resembled terra cotta casting rather than rough-hewn concrete. Best of all, there were no cracks.

Impressed by what they saw, Frare and Brad Sullivan, the project superintendent for Hamilton Construction Co. of Springfield, Ore.,

contacted Jim Morrison, owner of Pacific Precast Inc. Together they priced the remaining 1,784 feet of railing and presented Olympia officials with a change order: The precast concrete railing would cost more than the cast-in-place railing originally specified. But then again, the precast railing would shave 10 weeks off the project schedule.

Sticker shock didn't last long. A little number crunching revealed that administrative cost savings from shortening the construction calendar actually exceeded the costs associated with upgrading the railing. Still, when Frare signed the change order, he didn't expect that this award-winning project would not only come in ahead of schedule, but nearly \$750,000 under budget.

"In retrospect we would have made the change even paying a premium," says Frare. The high quality of precast railing and having the bridge in service



SOME OF THE FIRST FOOT TRAFFIC EXPERIENCES THE NEW BRIDGE.

almost three months sooner made a persuasive argument for precast. "Of course, the overall cost reduction made the decision even easier," says Frare.

Precast Railing Advantages

Speed and cost savings tell only half the story. The advantages of precast railing come with construction details you may never think about while admiring a sunset as you walk across the bridge. For one, you can run your hand along the smooth, rounded rail top without developing calluses.

"Precast railing has such a slick finish because it's poured into a polished steel mold upside-down," explains Norm Smit, field project engineer for TY Lin International/DGES in Olympia. You'll find no trowel marks or rough spots on this railing. The upside-down pour also means that any shrinkage cracks that do occur will occur at the bottom of the rail, where cracks remain hidden and protected from corrosive elements.

But obtaining a uniform, crack-free concrete product of any kind involves more than precision molds: It requires the quasi-laboratory setting available in a highly controlled environment, such as a precast manufacturing plant. Years before Jim Morrison became owner of Pacific Precast Inc., he worked as an aeronautical engineer. Morrison applied the same high standards of manufacturing when building precast bridge railing as he did while working on stealth aircraft.



reinforcing steel." The rounded top with a polished, crack-free finish assures that bird droppings and other corrosives wash off the railing for decades of maintenance-free service.

Because of its location by a pristine shoreline, bird watching has become one of the major attractions along the Olympia-Yashiro Friendship Bridge. From the pebble-paved walkway you can spot double-crested cormorants, kingfishers and even a great blue heron perched on old pilings.

Do it yourself

Long-lasting and highly valued concrete products require consistent, high-quality pour operations. To obtain this, Morrison realized he had to control the pour. If he had ordered ready-mix concrete, chemical changes would have already occurred in the mix by the time trucks arrived at his yard. Compounding the problem, each truck would have had a slightly different blend of portland cement and aggregates. So Morrison constructed his own concrete batch plant and spent considerable time perfecting the chemistry and consistency needed for a totally crack-free railing.

Even after pouring the perfect concrete mix into perfect molds, the quality of any concrete product develops from proper curing. Concrete cools faster on the outside than it can internally, causing what's commonly known as shrinkage cracks. "It's like wood that dries too quickly and splits," says Morrison. So Morrison embedded electrodes into the concrete to monitor temperatures and humidity. With his probes connected to a computer and his casting molds nestled in a warm, insulated room, Morrison was able to



NO SUCH COMRADE: THE WINGED ENEMY OF THE OLYMPIA-YASHIRO FRIENDSHIP BRIDGE.

control the humidity and cool-down rate of his concrete to yield a flawless, crack-free product.

Birds do do damage

Aside from the aesthetic pleasure of an excellent craft, crack-free precast railings solve a serious long-term maintenance problem endemic to bridges along coastal waters. "In a place like Olympia, you get birds all over the bridge. If you have a rough, cast-in-place rail with thousands of little cracks, rainwater washes bird droppings into the concrete," says Morrison. "Bird urine is highly acidic. When it mixes with concrete it creates corrosive salts that chew up the

In this idyllic setting, Morrison recalls one breezy afternoon spent admiring the views as a photographer he hired snapped pictures of the recently completed railing for his company's project portfolio. Two women happened by, and as they passed, Morrison overheard one wonder out loud why the photographer was on his knees focusing on a close-up of the precast concrete railing instead of the shoreline. "Well," responded her companion, "it really is a beautiful railing." Morrison smiled to himself, rested both hands on the smooth, precast concrete railing and gazed out across Puget Sound.

Project Profile

Project: Olympia-Yashiro Friendship Bridge Railing, Olympia, Wash.

Owner: City of Olympia, Wash.

Engineers: Entranco, Olympia, Wash., and TY Lin International/DGES, Olympia, Wash.

Precast Manufacturer: Pacific Precast Inc., Vancouver, Wash. (www.precastrail.com)

Contractors: Hamilton Construction Company, Springfield, Ore.



INSTALLATION OF THE RAILING ON THE OLYMPIA-YASHIRO FRIENDSHIP BRIDGE PROGRESSED MUCH QUICKER AFTER SWITCHING TO PRECAST CONCRETE.