Be better at it.

At URS, we believe that a successful result seldom comes about by chance. So whether it’s an airport, bridge, highway, light rail line, health care facility or wastewater treatment plant, our determination never changes. To do it better. Which is why, when it comes to the Infrastructure sector, more people are turning to us to get it done. We are the new URS.
The Big I project in Albuquerque, N.M., is the only full freeway-to-freeway interchange in the state. The $300-million project included 62 bridges and was completed ahead of schedule and within budget.

Since URS established its roots more than a century ago, the bridge industry has evolved and adapted to meet new needs and challenges. The company has done likewise, expanding and building on its expertise to secure its position as the largest bridge design firm in the country. While reaching those heights, the firm has tackled projects of every size, every material, and nearly every style, watching trends develop along the way.

“We have a wide experience with every type of bridge and material, including concrete, steel, timber, and even composites,” explains Steven L. Stroh, vice president and deputy director of surface transportation for major bridges. “We don’t limit ourselves to one bridge type, and we’ve handled everything from simple-beam bridges to complex, cable-supported structures and even movable bridges; the entire gamut.”

That expertise ensures the designers find the best solution to each challenge, adds David Jeakle, senior structural engineer.

Using expertise gained from a 100-year history with all types of bridges to meet owners’ needs
The cable-stayed Kap Shui Mun Bridge in Hong Kong, China, is part of the crossing to the Hong Kong International Airport. The side spans use post-tensioned concrete box girders that were incrementally launched into their final position.

The double-deck bridge is 4040 ft long, with a cable-stayed steel main span of 1410 ft and side spans featuring post-tensioned concrete box girders that were incrementally launched into their final position. “The combination of materials resulted in a very efficient and cost-effective design that could be completed within the project’s stringent time frame of 42 months from notice-to-proceed to turnover of the rail envelope for testing,” says Stroh.

The bridge, which provides 164 ft of vertical navigational clearance, provides three vehicle lanes in each direction on the upper deck while the lower deck contains dual rail-transit lines and enclosed roadways for emergency vehicles during tropical storms. It is the world’s largest fully enclosed, double-deck cable-stayed bridge that carries auto and heavy commuter rail traffic.

The adjoining viaduct structure is approximately 1630 ft long and consists of twin six-span, cast-in-place on falsework, multi-cell, concrete box girders, with span lengths of 240 to 285 ft. The traffic arrangement replicates the format for the main bridge. The viaduct's...
Precast concrete deck panels are being used to replace the deck on the Chesapeake Bay Bridge.

The Arapaho Road Bridge, Addison, Tex. won a PCI 2006 Design Award for Best Bridge with Spans Greater than 135 ft for extensive use of precast, prestressed U-beams and deck panels.

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The design approaches considered depend on the owners’ comfort level and familiarity with designs, notes Stroh. “Some owners have very clear standards for what they want, while others rely on our expertise,” he says. “Some are more sophisticated in their approach, with huge research programs that help them create clear ideas of what works best for them. There are always opportunities to promote new ideas if we can make a case, but some states are more willing to listen and learn new techniques.”

Many times, designs are determined by the local landscape, as well as local expertise, in an effort to play to local strengths. Similarly, states often learn new techniques from each other, picking up successful approaches. For the recent expansion of the Paseo Bridge in Kansas City, Mo., for instance, the Missouri Department of Transportation officials used a design-build delivery system in which they allowed any technology already used successfully in other states, even if they were unfamiliar with it.

Owners are trying new techniques—and demanding more creativity from their construction teams—because their needs are more diverse, the designers say. “Owners’ needs are changing,”
URS is the engineer of record for the cast-in-place segmental, cable-stayed bridge across the Ohio River between Pomeroy, Ohio and Mason, W.Va.

‘The goal today is to get in, install the bridge, and get out.’
The Palm Valley Bridge over the St. John River in Florida uses spliced, post-tensioned concrete I-girders for the main span of 290 ft.

with the bridge reopening at 5 a.m. each day. Included in the work is the installation of a new deck-joint system and an aerodynamic-stabilization system for the main suspension spans.

Design Options Expand

Another tool being used more often is the spliced concrete girder, says Jeakle. “For many of our projects today, owners are requiring at least one segmental alternative be considered during the preliminary phase,” he says. “Previously, we’d create one only in special situations. It’s becoming very popular.”

Stroh adds, “It’s an economical way to create relatively long spans. We have designed spliced concrete I-girder spans as long as 290 ft, and that’s an attractive alternative to steel bridges.”

The firm has designed a plethora of segmental concrete and spliced-girder concrete structures across the country, including the segmental box girders used in the Big I interchange in Albuquerque, N.M.; two segmental concrete box-girder bridges designed for the I-35 Crosstown connector project in Minneapolis, Minn.; eight segmental concrete bridges created for the Palmetto/Dolphin Interchange project in Miami, Fla.; and the spliced, post-tensioned concrete, I-girder design, complete with a 290-ft main span, for the Palm Valley Bridge over the St. Johns River in Florida.

“Overall, I do believe we’re creating more concrete bridges today than any other kind,” says Jeakle. “When we provide steel and concrete alternatives for long-span bridges, the steel alternative may be more competitive...
at first, but the owners have recently been selecting the concrete design due to its durability and minimal long-term maintenance. It’s challenging to quantify life-cycle costs appropriately versus in-ground costs, but when steel and concrete are reasonably cost competitive, more clients are choosing the concrete alternative. They have the money to build the bridge but not to maintain it. They want something today that is less maintenance intensive.”

Encouraging New Ideas

For that reason alone, URS’ designers continue to stay abreast of new techniques and new ideas. These come from their suppliers, owners, and their own efforts, which are funneled into their Center of Excellence in Tampa, Fla., where both Stroh and Jeakle work.

URS’ designers, for instance, currently are conducting experiments with the Florida Department of Transportation and the University of Southern Florida on double-composite box girders. The girders feature a steel box section with a concrete slab on top, as well as a concrete slab in the negative-moment region on the bottom. The girder currently is being fatigue tested at Florida DOT’s structures laboratory in Tallahassee, after which it will be tested for serviceability and ultimate strength.

“We’re always looking at new research and new concepts,” says Stroh. “We’re seeing more places where lightweight concrete, self-consolidating concrete, and high-strength or high-performance concrete can be used effectively. Whenever anyone has something new to talk about, we’ll listen.”

The impact on the environment has led to a variety of new erection processes, including girder launchers and other techniques that allow top-down construction to minimize disruptions to the land and waterways below. The firm’s work on the Isle of Palms Connector Bridge in Charleston County, S.C., shows one way this is happening. URS led a joint venture that provided complete service, including an environmental impact study, for creation of one of the longest bridges in the state.

The structure provides the only access between the mainland and the barrier island community, and was constructed after the previous access, via an obsolete swing bridge, was destroyed during Hurricane Hugo. The 2-mile-long bridge spans a pristine saltwater marshland and shell fishery. “The prescribed environmental conditions required that we keep construction out of the waterway,” Stroh explains.

To achieve that, the design used precast, prestressed concrete I-girders, which were erected using a work bridge that only touched the pilings within the tight environmental requirements. Completed in 1993, it was one of the first projects to use this approach, providing the top-down construction that left the waterway intact. “This solution is being use more today in these situations, as are gantries and other techniques,” he says. “It gives us one more tool in our tool box.”
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