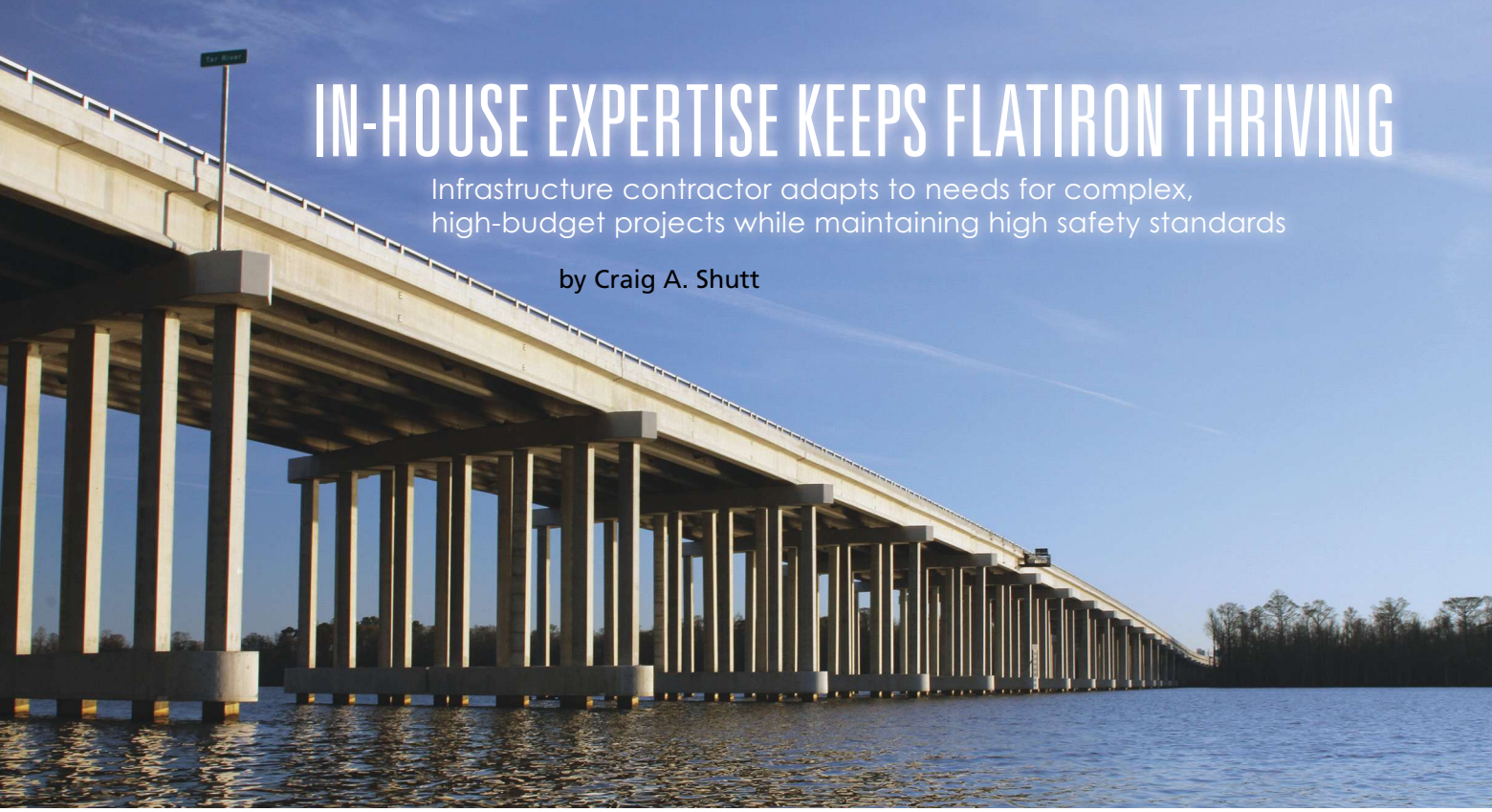


IN-HOUSE EXPERTISE KEEPS FLATIRON THRIVING

Infrastructure contractor adapts to needs for complex, high-budget projects while maintaining high safety standards

by Craig A. Shutt

The $192-million U.S. Route 17 Washington Bypass project in Beaufort County, N.C. All Photos: Flatiron.

Bridge projects are evolving in many ways, including delivery methods, complexity, and increased environmental sensitivity. Project teams are required to adapt and use technical expertise to innovate. Infrastructure contractor Flatiron meets the needs of this evolution through a determined focus on constructability, which is enhanced by using in-house resources to design a best-value concept for clients. The company also prides itself on having award-winning safety procedures that minimize the risk of accidents.

"Our technical expertise and in-house engineering capabilities make us stand out," says Allan Brayley, chief engineer at the Firestone, Colo.-based firm. "We do a lot of construction engineering in-house and have access to a lot of specialized equipment for all types of bridges, including segmental and those requiring falsework and formwork. It gives us an edge because we work closely with the estimators in the office at bid time and with the field people at construction time to ensure the plans come together efficiently."

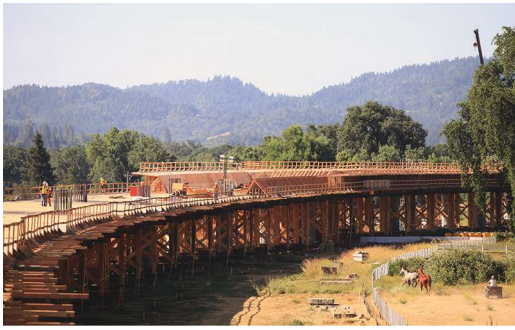
Adds Richard Grabinski, vice president of Flatiron's western region, "We're respected as being good builders. We build the projects ourselves—we're out there with the tools doing it. We compete for bid-build projects, but we also win many based on our best-value proposals. We offer our services, skills, experience, ingenuity, and people, and that often wins the day. We prefer that approach—it's competitive in a way that plays to our strengths."

Flatiron has participated in traditional bid-build projects, as is shown by its current work on a bypass project in Willits, Calif., for the California Department of Transportation (Caltrans). A joint venture, the $107.9-million project provides a new segment for Route 101. Two interchanges and 15 bridges are included, most consisting of cast-in-place concrete box girder bridges with one having a length of 6000 ft.

Alternative Methods

The company also specializes in other delivery methods, which provide more opportunity to utilize their skills and to innovate, while increasing efficiency, lowering cost, and decreasing risk for clients. Owners are noticing. "More states are open to design-build projects today," says Brayley.

The firm worked on the Minnesota Department of Transportation's first design-build project, the I-35W St. Anthony Falls replacement bridge, which used construction speed as



Flatiron's work on the $107.9-million Willits, Calif., bypass project included work on two interchanges and 15 bridges, including a 6000-ft-long, cast-in-place concrete box girder bridge.

For the Willits, Calif., bypass project, the team created an Environmental Hazard Analysis for communicating environmental hazards to the pile-driving crew and integrating permit, wildlife, and pollution concerns into the operations.

a deciding factor. (See *ASPIRE*™ Fall 2008.) "We had the highest bid price but the shortest time frame, and it was accepted," he notes. "Design-build sets up scoring for different elements—technical expertise, design, schedule, and pricing. States always want low pricing, but they also factor in other elements."

A recently completed design-build bridge project on Interstate 85 over the Yadkin River near Salisbury, N.C., shows its creative approach. (See *ASPIRE* Winter 2014.) The $136-million project, consisting of precast concrete girders and a cast-in-place concrete deck, reconstructed a 55-year-old deteriorating bridge using a single temporary work bridge constructed between the two new parallel structures. "Creating this trestle is something we do on a fairly regular basis now, because it offers a lot of flexibility and minimizes disruption," Brayley says.

Flatiron has also found success with public-private-partnership (P3) projects. "We are well-versed in P3 projects from work in Canada, where the laws make it more common," says Grabinski. Those projects often require different construction criteria, he notes, as concessionaires, who will maintain the bridge for decades after construction, look more long-term—and often have more resources to invest upfront to avoid later costs. "They have a heightened awareness of life-cycle costs."

Both Brayley and Grabinski see this format growing in the United States. "The lack of steady government funding for transportation projects is a growing concern," says Grabinski. "States and cities are asking how they can build new infrastructure and maintain so many bridges with limited funds. P3 projects bring private equity into the equation and add funds with longer repayment terms."

Grabinski also notes growing interest in the construction manager/general contractor (CM/GC) format, in which the contractor consults on the early stages of design, which is produced by the owner's team. "While popular in construction of buildings, CM/GC is being used more regularly for infrastructure projects," he says. That's especially true in California. Caltrans is now running a six-project demonstration pilot program to study CM/GC more closely. Flatiron has worked with the Federal Highway Administration in California, recently completing one CM/GC bridge project and performing preconstruction services on a second.

"Owners understand that early input from the contractor offers benefits for constructability and maximizing schedule efficiency," says Grabinski. "It helps the owner identify and mitigate risks before construction begins. It also allows us to set a firm price earlier in the process, providing owners with greater price certainty."

'Owners understand that early input from the contractor offers benefits for constructability and maximizing schedule efficiency.'

The $136-million concrete bridge on Interstate 85 over the Yadkin River in Salisbury, N.C., features precast concrete girders and a cast-in-place concrete deck that were constructed using a single temporary work bridge between the new structures.

All of the pieces for the U.S. Route 17 Washington Bypass project were set in place from an overhead gantry system, which was used to drive piles, set precast concrete bents, and erect beams. Once the deck was cast, the gantry moved forward to the next span.

The U.S. Route 17 Washington Bypass project features 140 spans of precast, prestressed concrete girders as well as precast, prestressed concrete hollow piles, beams, post-tensioned pile caps, and a cast-in-place concrete deck.

Pile placement for the U.S. Route 17 Washington Bypass project took place from an overhead gantry system.

Shared Risk

Risk is being shared more often as projects grow in complexity and budget. Many of Flatiron's larger projects are undertaken as joint ventures, often with Flatiron as the lead. "As projects grow, we need to share resources, risk, and financial backing," Brayley explains.

One of its more prominent joint ventures was the $192-million U.S. Route 17 Washington Bypass project in Beaufort County, N.C., a design-build project that Flatiron led with joint-venture partner United Contractors of Chester, S.C. The project featured 140 spans of precast, prestressed concrete girders plus precast, prestressed concrete hollow piles, prestressed beams, post-tensioned pile caps, and a cast-in-place concrete deck. (See *ASPIRE* Fall 2008.)

The bridge was constructed with an overhead gantry system, which was used to drive piles, set precast concrete bents, and erect the girders. Once the deck was cast, the gantry pushed forward to the next span. "This approach was taken because of the sensitive environmental area, which is becoming a bigger concern overall," says Brayley.

Choosing joint-venture partners is an art and science, he notes. Key factors include finding someone with expertise in the type of bridge being built, familiarity with the owner, and past success. "We want to work with people who have been successful with this owner and type of project, and they look at us the same way," says Brayley. "A lot of this industry is about personal relationships and past experience."

The industry focuses on mitigating risk in many ways. One approach Flatiron has emphasized is safety training throughout its culture. "When people talk about risk, the first thing I think of is safety," says Brayley. "That's the major way we can mitigate risk for our company."

A few years ago, the company updated and expanded its safety program. That led, in 2012, to Flatiron working more than 4 million worker-hours without a lost-time safety incident. The firm received a First Place Safety Excellence Award from the Associated General Contractors of America to note that accomplishment. Flatiron has been recognized by the Alberta Roadbuilders

Commitment to Safety

Flatiron's enhanced safety plan permeates the company's entire culture:

Programs. It operates a variety of high-visibility campaigns, including "Don't Walk By—Take Action," which encourages workers to take corrective action at the site. It also emphasizes a "Stretch & Flex" exercise program, mandatory protective gloves, data-capture analysis, jobsite walk-throughs, Supervisor Training in Accident Reduction (START), field-safety coaching, and a two-day Leadership for Safety Excellence.

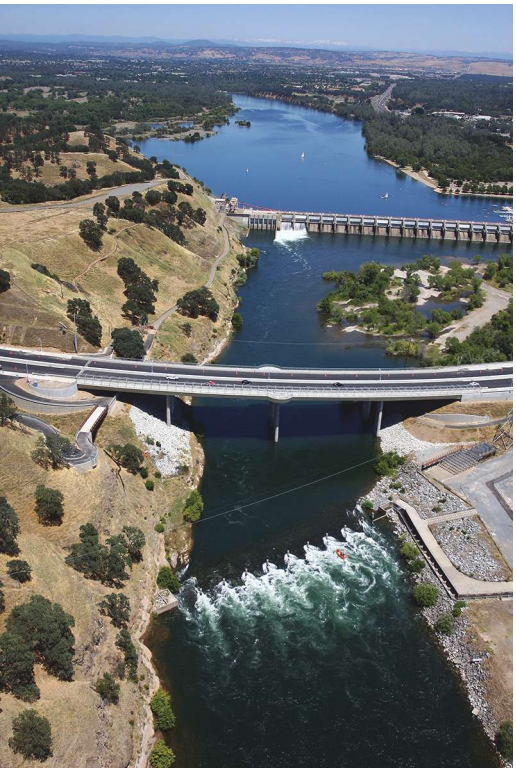
Incentives. The company launched an employee safety-suggestion program in 2010 to recognize safe behavior and implement suggestions with points redeemed for prizes and gift cards.

Leadership. Every operational meeting begins with a review of safety requirements and each manager receives annual safety training. The managers also participate in several site-safety self-assessment audits each year.

Training. Employees receive 20 hours of annual safety training through classes, online courses, and external training. Biannual "Safety Stand Down" events are held in each region, at which managers present material and bring in guest speakers.

Communication. The firm runs a Zero/Zero campaign designed to create a full year of no recordable or lost-time safety incidents. It also publishes a quarterly employee magazine with a "Spotlight on Safety" section.

Outside Influence. Flatiron encourages safety programs for subcontractors and sponsors a scholarship through the American Society of Safety Engineers. Flatiron was also one of 31 contractors to participate in the first annual Safety Week in 2014, designed to raise safety awareness industry-wide.



Precast, prestressed concrete girders with a length of 145 ft were used for the Hazel Avenue Bridge over the American River in Sacramento, Calif., reducing the number of piers in the sensitive river, which had a salmon-hatching area downstream and a dam upstream.

and Heavy Construction Association, the American Road & Transportation Builders Association, and the Government of Alberta for safety excellence.

More Concrete Designs

The firm's focus on controlling the process and using in-house expertise has led to more concrete bridges, especially precast concrete. "Our preference is to build concrete bridges, because there's more for us to self-perform in those structures," says Brayley. "With concrete segmental bridges, we can do our own precasting. That means we control the manufacturing process, scheduling, cost, and quality in-house." Concrete also has benefits on larger projects, he notes. "There are fixed costs for yard production and forms, so the more spans we create using those assets, the cheaper each one becomes. We can spread the costs further."

Concrete pricing also has been more consistent, adds Grabinski. "We are building more with concrete because there's a bigger push by owners in that direction. Pricing is less volatile, making it easier to estimate, and long-term maintenance costs are lower. That's making owners ask for more concrete designs."

Concrete also has benefits for high-seismic regions, due in part to changes in connection detailing. "California works mostly in concrete due to seismic concerns," Brayley says. Adds Grabinski, "In many ways, bridges are designed as they were 20 years ago, but with nuances for increased seismic capacity. Many connections on concrete bridges, including those between columns and footings, girders and pier caps, and girders and abutments, are more forgiving today. The bearing plates are different to allow more movement with seismic forces."

Transportation innovations also have opened more opportunities for concrete girders, Grabinski notes. "Transportation issues are a key issue and are evolving quickly. There's more ability to transport precast concrete units efficiently and not worry about cracking. Precasters are now casting and transporting longer girders than ever before. Pieces are getting bigger and longer, which helps reduce material and erection costs."

Evolving erection technology also is making components easier to handle. "Cranes have improved and can handle much larger units," Grabinski says. "Self-erecting cranes and large-capacity ones can set larger units and maneuver on difficult sites." Brayley agrees, "The size of the equipment has grown to meet the new capabilities. We've handled concrete segments up to 140 tons, although our target weight is 80 to 90 tons. That's a practical size and economical to use."

One recent project to use large girders was the Hazel Avenue Bridge over the American River in Sacramento, Calif., which had a salmon hatching area downstream and a dam upstream. "It was an especially sensitive area that required minimizing impacts to the river," says Grabinski. The company used sixteen 145-ft-long precast concrete girders, erected with 200-ton cranes, to reduce the number of piers. The format also sped construction, requiring roadway closures for only one weekend.

"Quite often, we're facing the challenge of building projects in ever-more environmentally sensitive areas," Grabinski says. "These projects will require creating solutions we haven't used before or refining past solutions. The nature of bridge construction is evolving. It's a lot different than it was 25 years ago when I started, and those changes will continue."

For additional photographs or information on this or other projects, visit www.aspirebridge.org and open Current Issue.

67 Years of Growth

Named after the unique rock formations found near Boulder, Colo., Flatiron has grown from a small materials company at its founding in 1947 to one of the largest transportation and infrastructure contractors in North America.

Its expansion didn't begin until 1991, when it opened an office in southern California. In 1997, it secured its first design-build project in Maine and began work on Boston's "Big Dig" project. In 1998, it expanded into northern California, and the next year it won projects in the Carolinas, Florida, Texas, Louisiana, and Utah.

In 2005, it expanded into Canada, from where it secured its largest project ever, the Port Mann Bridge in Vancouver, B.C., in 2008. In 2007, the firm was acquired by Hochtief Aktiengesellschaft (HOCHTIEF), a German construction company. In 2010, it acquired E.E. Crux of Holmdel, N.J., to expand into the Northeast, and in 2011 it formed a joint venture with Leighton to pursue work in Hong Kong. It currently operates 10 offices in North America.

Engineering News Record lists the firm as the sixth largest bridge contractor, the seventh largest highway contractor, and the eleventh largest in transportation overall.