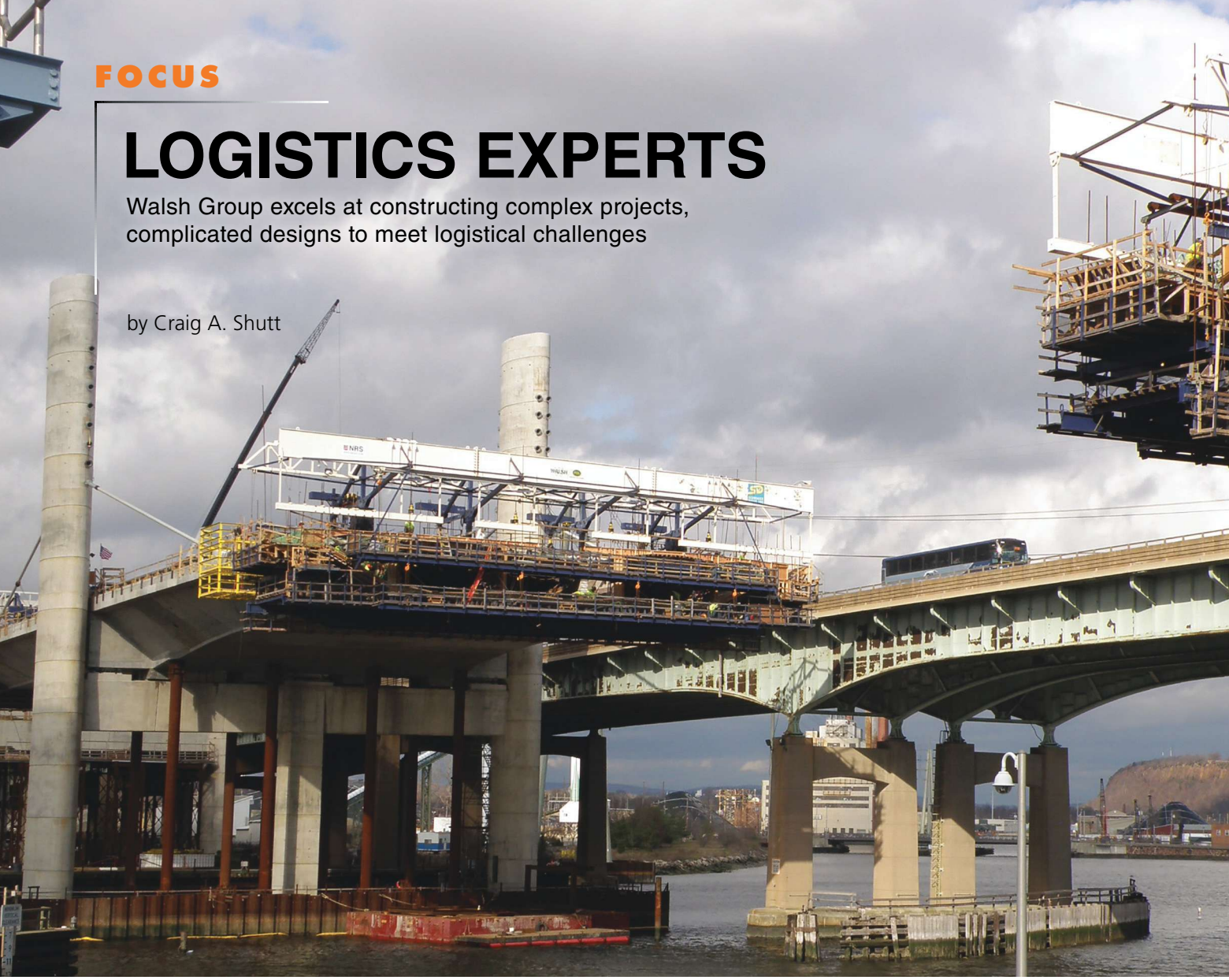
FOCUS

LOGISTICS EXPERTS

Walsh Group excels at constructing complex projects, complicated designs to meet logistical challenges

by Craig A. Shutt



As part of the $1-billion revamp of the highways, the new I-95 Q-bridge features cast-in-place concrete cantilevered segmental box-girder structures. Photo: Walsh Group.

The Walsh Group has gained a reputation for handling complex, signature bridges and creating innovative techniques that influence later designs. But project complexity often goes beyond unique designs to encompass scheduling issues and constructability challenges on major multi-bridge projects. Walsh also excels at those needs, as proven by its recent contract with the Pennsylvania Department of Transportation (PennDOT) to replace 558 bridges in the state by the end of 2017. Nearly all of them will feature concrete designs.

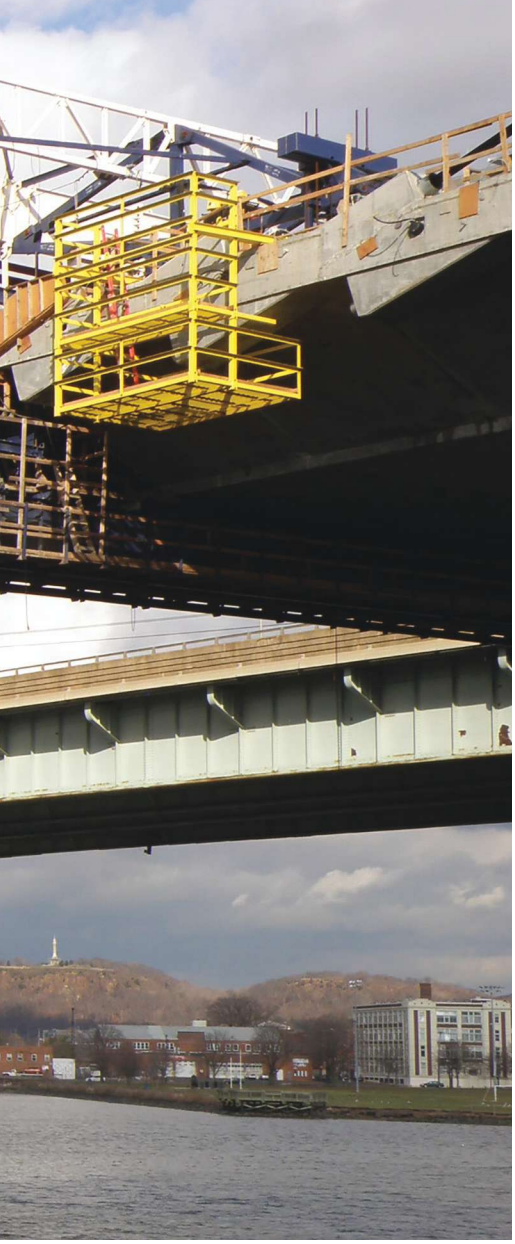
"Our key strength is our ability to execute work for our clients and manage the projects at a practical level every day," says Will Johnson, project manager in the New Haven, Conn., office. "Our company structure allows us to make decisions at the project level rather than go through levels of corporate discussion that can slow down activities. We also have the largest equipment fleet in North America, with a tremendous amount of resources to pull from that gives us an edge over competitors. Those advantages keep us focused on the end product."

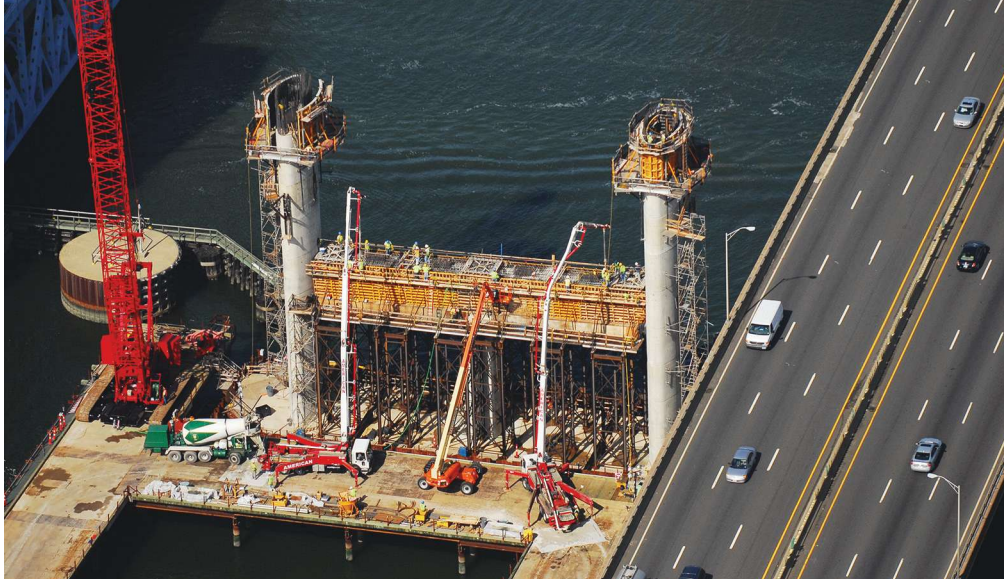
PennDOT's P3 Project

These resources are apparent in the PennDOT Rapid Bridge Replacement Project, which was let last October. The public-private partnership (P3) program will replace 558 aging bridges—primarily crossings on smaller state highways and in rural areas—in 3 years. Walsh is part of Plenary Walsh Keystone Partners, comprising Plenary Group, Granite Construction Co., HDR Engineering, and Walsh (Walsh Investors, Walsh Infrastructure Management, and Walsh Construction). The group is not only designing and constructing the bridges, but it is also financing and maintaining them for 28 years.

At least 548 of the bridges will feature concrete beams and concrete box culverts, says Arik Quam, project manager in the Pittsburgh office. Approximately 428 will consist of concrete box girders, spread girders, or I-beams, while about 120 will be composed of precast concrete box culverts.

Walsh's concrete bridge design was a key to their winning proposal, he notes. "As we have to maintain the bridges, we wanted to ensure they were low





The 4649-ft-long I-95 Q-bridge, carries 10 lanes of traffic and features a 1000-ft-long main span. Photo: Walsh Group.

maintenance, and concrete will help with that. We expect fewer long-term maintenance costs with the concrete designs." The size of the bridges—most no larger than 50 ft long and 30 ft wide—played to concrete's strengths. "Concrete offered the most cost-competitive approach. Our goal is to emphasize standardization and create a few basic designs that can be repeated, allowing for rapid construction."

The schedule calls for varying closure times, ranging from 14 to 110 days. For those with 110-day closures, cast-in-place concrete substructures and decks will be used; for those with 35-day closures, the team will use cast-in-place concrete substructures and precast concrete deck panels. On those with 14-day closures, precast concrete components will be erected in 14 days.

PennDOT fast-tracked the program by designating 87 of the bridges for early completion, doing the planning, permitting, utility coordination, and other long-lead activities during the bidding stage. That ensured they were ready for construction when the project was let. "They called it the 'Rapid Bridge Project,' and they wanted to live up to that name," he says. "It let us get shovels in the ground quickly." HDR also has about 20 "squads" of engineers focused on sectors, preparing plans before moving to the next area.

P3 projects like the PennDOT program give Walsh a chance to shine, Quam notes. "We've become very successful with P3 and design-build projects. We do well with complex projects, in both design and logistical applications. We often can be more competitive on that size and type of project."

Johnson agrees. "There are more design-build and P3 projects today, and they work well for us. They allow us to be involved from day one and mitigate any issues early. We can often jump in due to our bonding capacity, which other companies can't match."

Those projects "definitely change how we work," he adds. "When we can partner with the designer, you can understand what the owner wants and give them a more streamlined and efficient design that encourages lower costs. Without those tight relationships between contractor and designer, we couldn't create the efficiencies necessary to do these massive projects in such a short time period."

Speed, Closures Are Key

Owner demands also are rising, focused on two key areas: construction time and road closures. "The public isn't interested in delays," Johnson says. "There is impatience with construction, especially in dense urban areas. Owners don't want construction to interfere with traffic any more than is necessary. And they want it done as quickly as possible."

One example is the company's recent work for the Connecticut Department of Transportation (ConnDOT) on the I-95 Q-bridge, a $417-million, three-span extradosed superstructure bridge over the Quinnipiac River in New Haven, Conn. Part of the $1-billion revamp of the highways, the new structure features cast-in-place concrete cantilevered segmental box-girder structures. The 4649-ft-long bridge, carrying 10 lanes of traffic, features a 1000-ft-long three-span main bridge. The project is phased in three stages to accommodate traffic shifts, keeping traffic moving throughout construction.

"The owners wanted a signature look but the location is near the airport, so we couldn't provide the height that cable-stayed towers would need," Johnson explains. "The extradosed design provided a lower profile and increased the span length over the channel, while also creating a wider design for future maintenance work."

The project was the first extradosed bridge in the United States. "We expect them to become more

The I-4 Lee Roy Selmon Expressway Connector project in Tampa, Fla., features 12 precast concrete segmental bridges plus 11 precast concrete bulb-tee girder bridges and 12 bridges with Florida U-beams or AASHTO I-beams. Photo: Walsh Group.

The precast concrete segments and precast concrete bulb-tee girder bridges of the I-4 Lee Roy Selmon Expressway Connector project use more than 500,000 ft^2 of concrete bridge decks. Photo: Walsh Group.

common," he notes. "It's more cost efficient than other designs. We're bidding more of these now and expect to win some."

Need for Speed

In addition to keeping traffic flowing and meeting unusual terrain requirements, concrete designs also are aiding the need for speed. "We often cast the concrete components alongside the project and then slide in the finished pieces over the weekend."

Walsh's sister company, Archer Western, was one of the first to take this approach, notes Jeffery Will, an estimator and project manager in the Tampa, Fla., office. "In some cases, we can cast new superstructure elements and reinforce the pier caps to give the bridge new life." Lightweight concrete has been aiding this effort, he notes, reducing weights by as much as 40% on some projects and speeding construction.

Although replacement and rehabilitation projects account for much of the company's work, new structures continue to be commissioned—and are enjoyed. "I love brand new, open-field jobs," says Will. "You're unlimited in your approach and where you can work. If there's an issue, you can move crews to another area until it's resolved. It can create logistics problems to jump out of sequence, but the work doesn't have to be linear when it's not a replacement project that travelers are counting on."

New projects alleviate concerns about unknown foundation problems or undocumented materials in buried temporary works. "By far, new projects are much better because there are so many fewer unknowns."

Archer Western put these ideas into practice for the I-4 Lee Roy Selmon Expressway Connector project in Tampa, Fla., on which Will served as deputy project manager. The $405-million road and bridge project created a 1-mile-long connector consisting of 12 precast concrete segmental bridges made of 2765 precast segments using balanced-cantilever and span-by-span construction plus 11 precast, pretensioned concrete bulb-tee girder bridges and 12 bridges with Florida U-beams or AASHTO I-beams. The work was completed in one phase, but there were also tie-ins requiring four minor phases, which involved 29 precast concrete mechanically stabilized earth walls and other ancillary construction.

Joint Ventures Growing

The Tampa project, like the Q-Bridge and others, was done in a joint venture (with PCL), which Walsh has been participating in more often, Will notes. "The jobs have gotten larger and everyone wants to share the risk, so they are looking at partner options more often," he explains. Walsh was reluctant to enter such partnerships in the 1990s, he notes, as several bad experiences caused the owners to back away. In the early 2000s, Walsh returned as the primary sponsor. "After a while, we put our toe in the water to reciprocate with some of our previous partners to serve as the minority partner."

PCL made a perfect partner, he adds, due to previous work with the firm in the Northwest, on which Walsh served as the sponsoring firm. "They suggested teaming up, and it made sense. They have a lot of experience with precast concrete

The 2765 precast concrete segments and 11 precast concrete bulb-tee girder bridges were used for the I-4 Lee Roy Selmon Expressway Connector project. Photo: PCL Civil Constructors and Archer Western Construction, joint venture.

The Mon River Bridge 51H near Brownsville, Pa., features a contractor alternate design created by FIGG Engineering Group consisting of dual-cell concrete box girders. Photo: Walsh Group.

segmental designs and are based in Tampa." Many joint ventures begin as conversations at conferences and other meetings, where executives talk about upcoming projects, he notes.

Officials at the Florida Department of Transportation offered four options for the project: steel tub girders, steel tub girders with precast concrete I-girders, precast concrete segments, and spliced precast concrete I-girders. They chose concrete segments and concrete girders. "It's really easy on a project like this to plunk in Florida I-girders. It was the least expensive option by far."

Value Engineering Concrete

Many projects are being bid in concrete, even as steel prices decline, due to concrete's efficiency. "Overall, we're doing more concrete projects. With every project, it seems concrete is trumping steel. Many times, we look at a design and ask if we can replace it with concrete. We're finding we can, and it's more economical. We haven't converted any concrete projects to steel, but we do convert steel projects to concrete." The Florida I-beams especially make that efficient. "Every chance we get, we're using Florida I-beams and stretching their spans to the maximum to save substructure work."

Value engineering often creates efficiencies, as happened with the $95.6-million Mon River Bridge 51H near Brownsville, Pa. The 3200-ft-long bridge features a cast-in-place concrete segmental design that was erected in mountainous terrain. The structure carries the Mon/Fayette Expressway over the Monongahela River, Norfolk Southern Railroad, SR 4022 Labelle Road, and SR 2026 Main Street. It includes a 518-ft-long main span consisting of cast-in-place concrete, dual-cell box girders. The seven-span bridge has piers ranging in height from 100 to 206 ft.

FIGG Engineering Group and Walsh suggested a contractor-alternate design when they realized that the repetitive casting of the segments could save significant costs—$8 million in all. "We took on the risk, but we knew the concrete design would be more cost competitive," says Quam. Savings especially accrued by erecting concrete components high in the air. "That played to concrete's strengths. It would have been costly and complicated to erect big steel members that high in the air over water."

Walsh used its experience on an earlier project, the Allegheny River Bridge near Pittsburgh, Pa., as a template for the Mon/Fayette Expressway project. It consisted of dual bridges carrying the Pennsylvania Turnpike over the Allegheny River, Allegheny Valley Railroad, Canadian National Railroad, and SR 1008. The project consists of twin 2350-ft-long, cast-in-place concrete segmental designs constructed with the balanced cantilever method (its first use in Pennsylvania) and features a 532-ft-long main span.

Value engineering to concrete occurs more often today, says Will. "There are a lot of challenges out there, but we find most can be met if we gravitate to concrete. It provides a lot of possibilities. There are very few times that we need to go to steel."

Savings in time, money, and travel delays will continue to be the focus at Walsh. "Every company has talented people," Johnson says. "But we encourage ours to think outside the box to help the owner overcome design issues. We want to resolve any constructability issues as soon as possible to everyone's benefit and create a cost-effective structure."

The six-span Allegheny River Bridge, the first segmental concrete box-girder bridge in Pennsylvania constructed with the balanced cantilever method, used nearly 50,000 cubic yards of concrete and more than 3 million pounds of post-tensioning. Photo: Walsh Group.

117 Years of Experience

The Walsh Group, a 117-year-old company headquartered in Chicago, Ill., is currently in its fourth generation of family leadership. The Walsh Group is ranked as one of the nation's top 15 contractors, according to *Engineering News-Record*, as well as the largest bridge builder and the fourth largest firm among Transportation Sector Contractors. The company maintains a national presence within the industry through 19 regional offices.

The Walsh Group provides general contracting, construction management, and design-build services through subsidiaries Walsh Construction and Archer Western.

EDITOR'S NOTE

The I-4 Lee Roy Selmon Expressway Connector project, the I-95 Q-bridge, the Mon River Bridge 51H, and the Allegheny River Bridge were featured in the Fall 2013, Fall 2012, Fall 2011, and Spring 2009 issues of ASPIRE,™ *respectively.*