

Engineering Consulting Giant Spans the Globe

WSP leverages local and global talent to bring the best solutions to its clients

by Monica Schultes

WSP led the design team for the Tom Staed Veterans Memorial Bridge over the Halifax River in Daytona Beach, Fla. The 1884-ft-long, 15-span, high-level bridge was completed in 2020. Its main span was the first precast concrete deck through-arch structure in the United States. Prestressed concrete Florida I-beams were used on the approach spans. All Photos: WSP.

WSP's acquisitions of iconic consulting firms have created an engineering powerhouse of approximately 66,000 employees around the world. The firm's global headquarters are located in Montreal, Quebec; WSP also has 300 offices in the United States and maintains a presence in the Middle East, Europe, Asia, and Australia.

Matthew Chynoweth, national bridges and structures market leader for WSP, believes the global presence of WSP is an asset. Whether colleagues are across the country or across the world, employees can readily tap into a deep pool of technical expertise to the benefit of clients.

Shared Resources

"We do a good job of communicating with each other, understanding the needs of our clients, and assembling the right people into the best project team," says Barton Newton, national bridge asset management leader for WSP. "We operate in a matrix organization—a team approach—not individual silos of talent," he adds.

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While sharing work across offices is commonplace for many large firms, what differentiates WSP is its ability to operate across so many sectors. "There is not much that we can't do at WSP," says Newton. "That is the strength of this company. We can provide expertise to our clients in every field. If by chance we lack a specialty or expertise, we augment our project teams with qualified outside partners. We do it all."

WSP's expertise extends to all types of bridges, including concrete segmental, post-tensioned, viaducts or interchanges, and movable and long-span bridges for all transportation modes. Having designed, analyzed, maintained, and managed thousands of bridge projects, WSP is able to offer fully integrated services. The firm can also provide a range of rehabilitation services such as seismic retrofits, cable replacements, and deck replacements using orthotropic systems. When appropriate, WSP project teams use innovative materials such as ultra-high-performance concrete (UHPC) and fiber-reinforced polymer (FRP) reinforcement.

To further advance the strategy of WSP, the firm recently rebranded the business line focusing on complex bridges in the United States as the National Bridges and Structures Practice. This change ensures greater integration and connection between national resources and regional staff, allowing WSP to put together the best technical teams and collaborative solutions for WSP's clients.

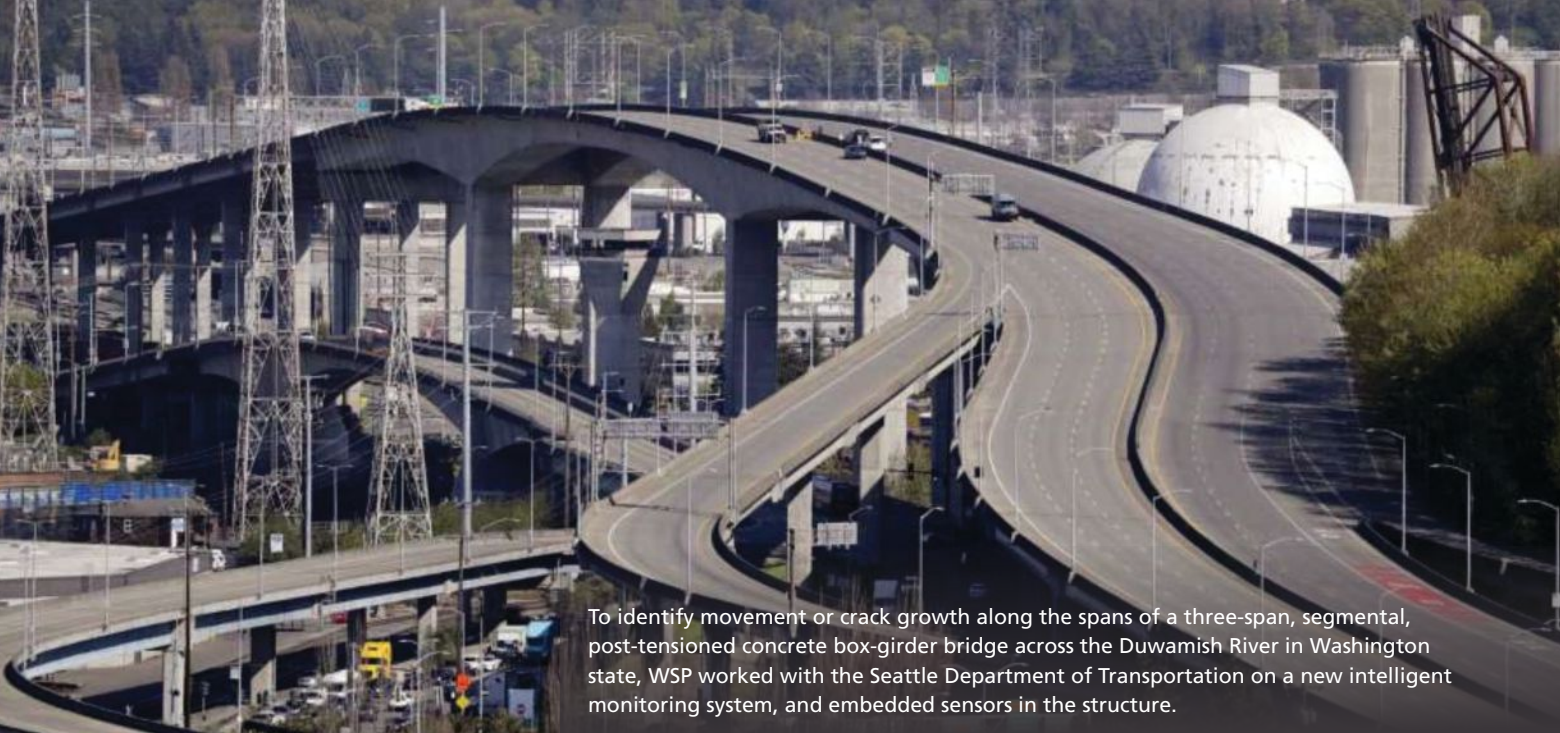
Technical Bench

WSP makes every effort to ensure that all bridge professionals, not just engineers, have the skills and know-how to use the latest technology and stay abreast of industry advancements. Involvement in associations such as the American Segmental Bridge Institute, American Association of State Highway and Transportation Officials, Transportation Research Board, and National Cooperative Highway Research Program, and others, is encouraged. "We want to be part of the conversation in the transportation industry and part of the future," says Newton.

Local Ties

WSP believes that local connections happen through being present in local communities. These connections also help the company retain top talent, including young engineers who will be future leaders.

Therefore, WSP encourages employees to engage at the local level. Every office has a developing professionals' network to facilitate interactions among WSP professionals, and, more importantly, to establish a framework for volunteering and networking in the local community. Some employees get involved at the high school level to support science, technology, engineering, and math (STEM) programs. Others teach the practical side of structural engineering at the university level. Such grassroots efforts give back to the community and are personally rewarding for the employees.



To identify movement or crack growth along the spans of a three-span, segmental, post-tensioned concrete box-girder bridge across the Duwamish River in Washington state, WSP worked with the Seattle Department of Transportation on a new intelligent monitoring system, and embedded sensors in the structure.

Client Involvement

The WSP approach involves a deep commitment to excellence and a dedicated focus on the needs of its clients. The technical aspect of client services is important, but WSP also helps clients manage stakeholders, apply for grants, and seek funding. Before joining WSP, Chynoweth was the chief bridge engineer for the Michigan Department of Transportation. “My experience as a former bridge owner hopefully brings credibility during discussions with agency clients. I know what keeps them up at night, as I used to walk in their shoes,” he says. “Our approach is focused on their goals and not just selling them services. We don’t advocate for a specific type of bridge or material, but we do advocate for the best solution,” he adds.

One key strategy is to communicate to the owner the potential and probable consequences of decisions made at every stage in the life of an asset. Design decisions affect constructability, maintenance, and, ultimately, the overall life-cycle cost of the asset. WSP’s portfolio ranges in size and scope from simple studies and assessments to complex multi-billion-dollar projects. In every case, the firm is committed to responding to clients with cost-effective, sustainable solutions that promote safe and efficient travel. “At the end of the day, we are concerned about the owner, the traveling public, and the bridge,” says Newton.

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A good example of client collaboration occurred when WSP led the design team for the Tom Staed Veterans Memorial Bridge over the Halifax River in Daytona Beach, Fla. The owner wanted a durable, resilient structure with very limited post-tensioning and no exposed steel. The 1884-ft-long, 15-span, high-level bridge was completed in 2020, and the main span was the first precast concrete deck through arch in the United States. Prestressed concrete Florida I-beams were used on the approach spans.

The main challenges for the bridge design involved the constructability of the arch approaches and main span through arch. The use of precast concrete components significantly simplified erection for this “maintenance-free” structure. Interaction among steel reinforcement, post-tensioning ducts and tendons, and other elements caused for congestion that required careful planning, execution, and inspection during fabrication.

Digital Twins

WSP is keeping pace with advancements in digital-delivery technologies. According to Newton, digital delivery

History of WSP

WSP, which was founded in London in 1969, entered the U.S. transportation market in 2007 via the acquisition of Chas. H. Sells Inc. With the acquisition of Parsons Brinckerhoff in 2014, WSP can now trace its origins in the United States back more than a century, with early projects including the design of the original New York City subway system and the original Sunshine Skyway Bridge over Tampa Bay in Florida. The firm has worked on many major U.S. transit systems and has designed countless highways, bridges, and tunnels.

Other major acquisitions that have expanded WSP’s capabilities in the transportation sector include:

- Louis Berger and its subsidiaries BergerABAM and Ammann & Whitney (2018),
- Golder Associates (2021),
- Knight Engineers and Architects (2021), and
- the Environment & Infrastructure business of John Wood Group PLC (2022).

In total, more than 85 companies have been joined together in a shared future under the WSP brand. Frequently ranked in the top five of *Engineering News-Record’s* list of global design firms, WSP has used acquisitions to help create a \$10 billion professional-services giant.



WSP designed the Genesee Avenue Viaduct in La Jolla, Calif. It was the first curved, spliced precast concrete U-girder light-rail transit bridge in Southern California. The use of precast concrete girders eliminated several months of nighttime closures. The construction of a straight section is shown here. (For more information, see the Spring 2020 issue of *ASPIRE*®.)

involves assembling the available data for an asset, accessing that information throughout the planning process, updating it during design and construction, and maintaining it over the asset's lifetime.

WSP is at the forefront of planning and using digital twins. "The industry is moving that way, but slowly. Requirements for a digital-delivery approach are starting to be included in a few RFPs [requests for proposals]. In comparison, five years ago we saw none. This is going to be a new way of doing business," predicts Newton.

Digital twins and multiple independent bridge models are often used to supplement in-person inspections and subsequent safe load-carrying capacity analyses and determination. Such was the case with the West Seattle Bridge (see the Concrete Bridge Preservation article in the Summer 2022 issue of *ASPIRE*®). Working with the Seattle Department of Transportation, WSP tracked the performance of that bridge structure over the years. The 2600-ft-long structure was shut down in March 2020 after inspections conducted by WSP indicated accelerated growth of new and existing structural cracks.

Finite element modeling of the bridge and input of restraint conditions

observed in the field resulted in models accurately predicting structural behavior and distress that was visually observed on the bridge. This validation allowed inputs of various strengthening techniques using external longitudinal post-tensioning and FRP wraps for flexural strengthening and confinement. WSP then developed and implemented a repair scheme.

After repairs were completed and before the bridge was reopened to the public, a load-testing program was performed using gauges to measure strain and deflections, which were then compared with theoretical strains and deflections from the analytical bridge models. The load-testing program provided excellent results and validated the repairs as being sufficient. The bridge was reopened in 2022.

Internal Challenges and Goals

Like the rest of the industry, WSP is on the lookout for talent. "Whether you are a private or public entity, you are resource challenged," says Chynoweth. And like other firms, WSP must continually educate employees and clients about the benefits of today's best bridge solutions.

"We have made vast improvements in concrete materials and construction methodology," Chynoweth says. "Take

post-tensioning, for example. There are robust specification and material requirements now, which include inspection, verification, and best practices, which were not available two decades ago. Materials are getting better and better every year, and there is a constant need for education to advance the concrete bridge industry. Another example is UHPC. Since its infancy, WSP has been involved in the research and study of UHPC and deploying it on projects. The possibilities that await with UHPC are quite exciting."

In 2021, with an eye toward the future, WSP committed to making changes to reach net-zero emissions status as outlined in the WSP climate transition plan. The plan presents key strategies and actions to reach the firm's science-based targets, which will eventually lead to net-zero emissions across WSP's value chain by 2040. WSP has also committed to the SE 2050 Commitment Program developed by the Structural Engineering Institute to reduce embodied carbon from structural systems, and it has published an embodied carbon action plan. An entire group within WSP is focused on climate, resiliency, and sustainability. "We are very proud of these efforts," says Newton. "It is really about how we contribute to the health of the planet and the public at large." 