

Conсор Emerges as a Driving Force in the Transportation Industry

This coast-to-coast infrastructure firm focuses on going above, below, and beyond the surface to move people and communities forward.

by Monica Schultes

In 2018, four regional consultancies merged to create Conсор, a civil infrastructure consulting firm with sufficient breadth and depth to compete on the national stage, win high-profile projects, and provide excellent service.

With approximately 1700 employees based in 95 offices across North America, Conсор focuses on public infrastructure for transportation and water. While the Conсор name and brand are technically young, the firm's roots date back to the 1980s. Their services include planning, design, strategic planning and communications, structural assessment, program management, and construction.

Meeting Client Expectations

Transportation and bridge design are at the core of Conсор's offerings. The firm's engineers and other professionals

are recognized as industry leaders in roadway and bridge engineering, and their decades of experience have included new bridge designs, bridge-widening projects, bridge repairs and rehabilitations, and pedestrian bridges, as well as bridge inspections and load ratings. Conсор also provides design services for a wide range of ancillary highway structures, including traffic signal and sign structure supports, noise walls, retaining walls, and culverts.

"Conсор takes a regional approach to designing bridges across the country to make sure the design considers local construction practices, materials, and techniques to meet client expectations," says Sandeep Patil, chief engineering officer at Conсор. "Having local offices in multiple states allows us to share best practices across the country to better serve our client partners. Our nationwide structural-assessment

practice provides insight into the types and causes of deterioration in bridges, which we draw upon to design resilient structures."

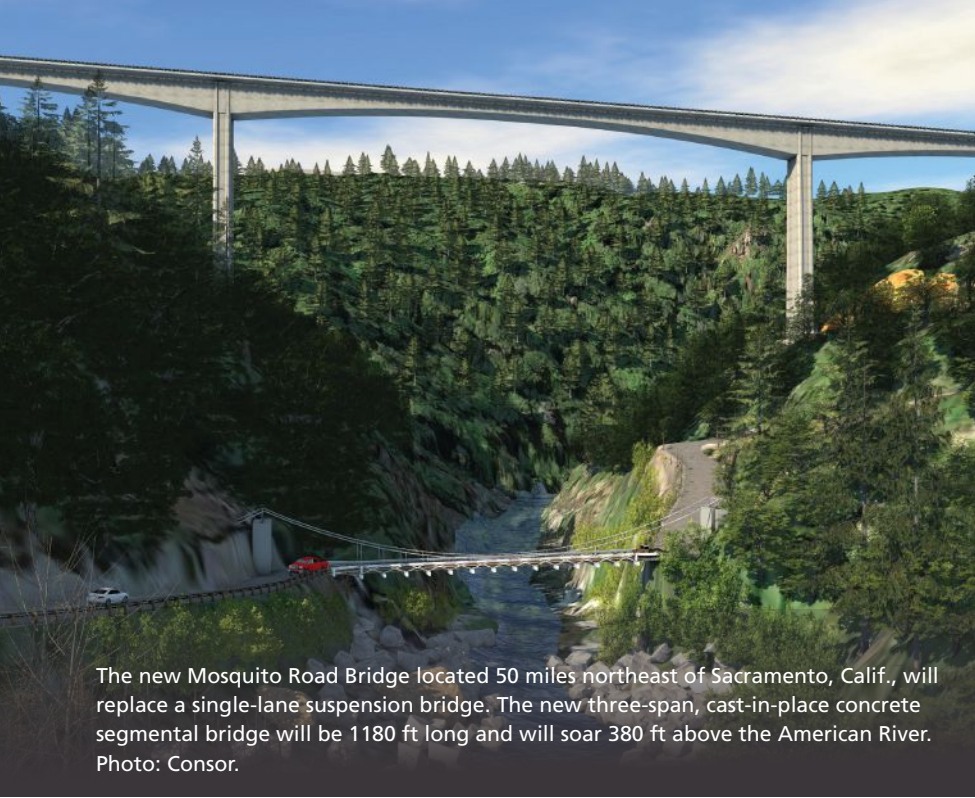
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Mosquito Road Bridge

Conсор is the prime consultant responsible for the design of the Mosquito Road Bridge project, which is currently under construction

A rendering of part of the \$1.5 billion Northeast Expansion Central Project in the San Antonio, Tex., area. The project is part of the Texas Clear Lanes Initiative. Conсор, in coordination with Alamo NEX Construction, used a cutting-edge software platform to improve information exchange and develop a digital twin model of the project. Figure: Alamo NEX Construction.





The new Mosquito Road Bridge located 50 miles northeast of Sacramento, Calif., will replace a single-lane suspension bridge. The new three-span, cast-in-place concrete segmental bridge will be 1180 ft long and will soar 380 ft above the American River. Photo: Consor.

and scheduled to be completed in 2025. Located 50 miles northeast of Sacramento, Calif., the new structure spanning the American River Canyon is a three-span (322-536-322 ft), cast-in-place concrete segmental bridge. The bridge deck soars 380 ft above the American River on columns that are nearly 200 ft tall. Given the significant structure height, a balanced-cantilever construction method was used to eliminate the need for falsework.

The Mosquito Road Bridge will improve access for El Dorado County's emergency vehicles. The project is replacing a single-lane suspension bridge and eliminating more than 1 mile of roadway switchbacks, which are subject to landslides. Consor is the engineer of record for the bridge foundation design as well as several combination ground-anchor/soil-nail retaining walls, which are approximately 60 ft tall. Consor also performed an

Consor designed the 22nd Street Bridge project in Tucson, Ariz., as a three-span, cast-in-place concrete segmental structure over Union Pacific Railroad tracks and city streets. Construction to build the new bridge, which will replace a functionally obsolete structure, is scheduled to begin in 2025. Rendering: Consor.



History of Consor

Consor was established in 2018 when four regional consultant leaders—AIA Engineers, Infrastructure Engineers, Target Engineering Group, and Johnson-Adams & Associates—joined forces.

Following the merger, Consor has built a coast-to-coast presence and expanded to add complementary services to their portfolio. This growth has included the addition of significant industry players: Structural Grace, TKW Consulting Engineers, U.S. Underwater, Apex Design, Murraysmith + Quincy Engineering, Civic Engineering & Information Technology, CPM Associates, Project Engineering Consultants, and, most recently, American Consulting Professionals.

Going forward, Consor is focused on continuing to deepen their technical services while cultivating an industry-leading employee experience.

independent peer review of the superstructure and column design.

22nd Street Bridge

Consor is serving as the engineer of record for the 22nd Street Bridge project in Tucson, Ariz. The bridge consists of a 1433-ft-long, three-span, cast-in-place



On the Interstate 35 Northeast Expansion Central Project in the San Antonio, Tex., area, Consor was responsible for the design of 7.6 miles of elevated structures, which included more than 350 prestressed concrete hammerhead bent caps on top of cast-in-place columns. The left photo shows prestressed concrete girders on prestressed concrete hammerhead bent caps, and the right photo shows the architectural details of the cast-in-place columns and the protruding reinforcement for the connection to the precast concrete bent caps. Photos: Alamo NEX Construction.

concrete segmental structure combined with four AASHTO girder back spans over a series of Union Pacific Railroad tracks and city streets. The bridge will increase lane capacity from two to three, provide pedestrian and bicycle access, and increase horizontal and vertical clearances.

According to Mike Keller, technical practice manager of complex bridges at Consor, the existing structure is “functionally obsolete.” Keller adds that the balanced-cantilever construction method will reduce falsework and move construction above and away from the railroad operations. The project is minimizing impacts to traffic and the environment, which in turn benefits the community. With the project being developed under a construction-manager-at-risk contract, Consor has worked with the City of Tucson, Union Pacific Railroad, the contractor, and the local community to meet the needs of all project stakeholders. Construction is scheduled to begin in early 2025.

Wildlife Bridge Crossings

Consor collaborated with the Florida Department of Transportation (FDOT) on unique wildlife crossing structures near Interstate 75 (I-75) in southern Florida, commonly known as “Alligator Alley.” What began as a resurfacing project was expanded to include wildlife

crossings over canals that run parallel to I-75. The crossings were needed to prevent wildlife-vehicle collisions after fencing was placed along a 9-mile stretch of I-75.

When the structures were added to the project, the team used low-cost materials in unique ways to stay within FDOT’s budget. Prestressed concrete piles placed horizontally were used to span distances of up to 75 ft. Concrete end blocks were used to keep concrete beam members from washing downstream when water is anticipated to overtop the bridges during rainy seasons or storm events.

The new structures enable wildlife such as black bears and Florida panthers to access existing culverts to cross under the interstate.

Digital Advancements for the Interstate 35 Northeast Expansion Central Project

The Texas Department of Transportation launched a \$1.5 billion project to construct a viaduct that will add one high-occupancy-vehicle lane and two general-purpose lanes in each direction along Interstate 35 (I-35) in northeast San Antonio as well as the neighboring municipalities of Live Oak, Selma, and Schertz. Alamo NEX Construction (ANC), a joint venture between Ferrovial

Bridge Inspection Standards

In 2022, after more than a decade of review, the Federal Highway Administration (FHWA) issued an update to the highway bridge inspection standards. Their recommendations include a risk-based, data-driven approach to inspection intervals and rigorous professional licensing and training requirements for bridge inspectors. Consor played an active role in the development of the new provisions, offering input on the mandatory qualifications for inspection program team leaders as well as the requirements for training bridge inspectors.

Consor has also been involved in the training of inspectors. Since 2007, the FHWA has tasked them with teaching bridge inspection courses across the country. According to Jeff Rowe, executive vice president of structural assessment at Consor, his firm has trained individuals on underwater bridge inspection in partnership with the FHWA’s National Highway Institute. Rowe, himself an engineer diver, has performed thousands of inspections and trained hundreds of inspectors. Consor is also helping to update FHWA’s *Underwater Bridge Inspection Manual*.



In southern Florida, wildlife crossings allow black bears, cougars, and other animals to traverse the canals running along Alligator Alley (Interstate 75) and safely cross under the interstate at existing culverts. For some of the crossings, Consor used a cost-efficient design with prestressed concrete piles placed horizontally in a simple-span configuration. Photo: Consor.

Construction US Corp. and Webber LLC, was selected for the design, construction, and maintenance of the I-35 Northeast Expansion Central Project and brought Consor onto the team for design services. To overcome the challenges of working in a limited space and integrating the new structure with existing infrastructure, the team turned to a collaborative three-dimensional (3-D) technology solution. ANC used a cutting-edge software platform to improve information exchange and develop a digital twin model of the project. During the design phase, an automated clash-detection program identified more than 3500 potential conflicts between various

components. Early identification helps prevent disruptions and enhances overall efficiency.

Consor was responsible for the design of 7.6 miles of elevated structures, including the corresponding roadway, drainage, illumination, intelligent transportation systems, signing, and pavement marking designs. The bridge submittals were broken down by segment and bridge element, with separate deliverables for bridge superstructures, substructures, and foundations. There were 23 bridge units with a total of 298 spans. These were split into six segments with four bridge submittal packages each. This

arrangement allowed crews to begin construction on the highest-priority locations while the design elsewhere was being finalized. All of the Consor bridge elements were modeled in 3-D as part of the design, which included over 2.2 million ft² of deck, nearly 1700 girders (156 Tx82, 1279 Tx70, and 251 Tx60) totaling over 230,000 ft in length, and 21,000 ft of concrete drilled shafts. In addition, Consor designed more than 350 prestressed concrete hammerhead bent caps to optimize the design for fabrication and installation. The prestressed concrete bent caps were typically 40 or 52 ft long, with depths ranging from 7 to 9.5 ft, and were supported on cast-in-place concrete columns.

Structural Assessment

Consor is a national leader in full-service structural inspections, and its team of bridge inspectors has delivered more than 60,000 bridge inspections in 49 states. Every Consor inspector is certified in specific areas of expertise, from climbing inspection to underwater inspection. Visual inspection of bridges is the first step of federally mandated bridge inspection. The firm's engineer divers and technicians perform commercial diving and underwater structural assessments—specialty areas that are vitally important but often overlooked.

According to Jeff Rowe, executive vice president of structural assessment at Consor, the firm's inspection services

A drone captures an aerial view of the new viaduct under construction northeast of San Antonio, Tex. Consor optimized the design with the use of precast concrete Tx82 girders on all but two spans. Photo: Alamo NEX Construction.



often lead to additional work, such as rehabilitation projects. Rowe believes that the combination of bridge inspection and complementary construction inspection and design services gives Consor a unique perspective on each project. “We don’t work in a vacuum. Any deterioration we witness firsthand informs our design,” he says.

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Keller agrees, explaining that “we get the opportunity to see what works well in design, during construction, and in service. Then we use that knowledge to avoid problematic details or field issues.

A Consor bridge engineer diver enters the water to inspect the piers supporting Interstate 526 over the Wando River in Charleston, S.C. Underwater structural assessment is one of the firm’s unusual areas of expertise. Photo: Consor.



Not everyone has that trifecta in the consulting world.”


Technology

Unmanned aircraft systems (UAS), or drones, have become ubiquitous in bridge inspections. “Drones supplement the visual inspection and are among the many tools available to assess a structure,” says Rowe. “We look at a drone as a tool. It is not intended to replace an inspector; however, it can provide information efficiently and gain access more easily. We have nearly 30 UAS for our teams to use,” he adds.

Drones can record heat signatures emanating from concrete bridges to locate areas of delamination, and they can be used in underwater systems to measure scour and record images of piers. A promising area of use is to document cracks in concrete structures. Rowe predicts that artificial intelligence (AI) may perform this time-

consuming task in the future. The AI software identifies cracks, measures and monitors their sizes, and informs the inspectors of areas to investigate.

Inspired Employees

Consor’s complete services, from inspection through design and construction, allow the firm to meet the needs of clients at any point in the life cycle of structures. The diversity of service offerings also helps Consor recruit and retain qualified employees. Whether designing a complex structure or inspecting a signature bridge, “it goes back to having opportunities for people to pursue their passion,” says Rowe. “We try to have opportunities for everyone at Consor to fulfill their passion and develop as professionals and as people.” The firm’s ideal project allows them to inspire the people involved, which is effective in attracting and keeping their talented workforce. 

As part of Consor’s statewide inspection work for the South Carolina Department of Transportation, inspectors certified by the Society of Professional Rope Access Technicians climb the cables anchored to the diamond-shaped concrete towers supporting the Arthur Ravenel Jr. Bridge over the Cooper River in Charleston, S.C. Photo: Consor.

