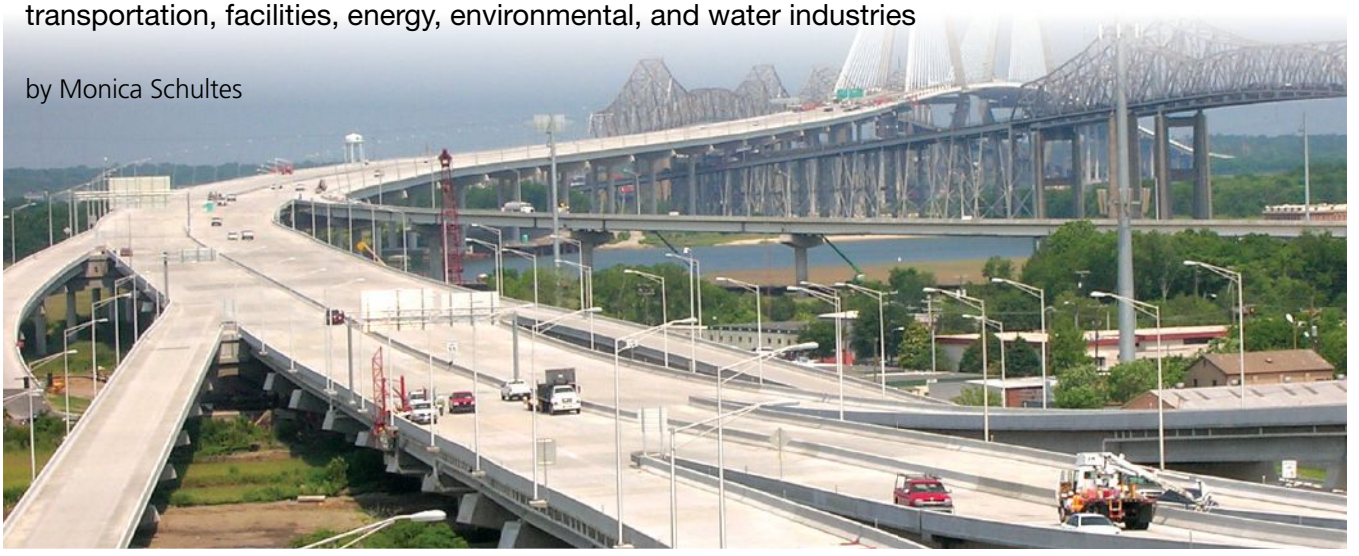
Global Firm with Local Perspective

Civil engineering firm CDM Smith is broadly diverse with in-house professionals who specialize in transportation, facilities, energy, environmental, and water industries

by Monica Schultes



CDM Smith worked with Sverdrup to perform preliminary design for the South Carolina Department of Transportation's Ravenel Bridge near Charleston. At the time of design, the bridge was the largest cable-stayed bridge in the United States. This photo was taken shortly after completion of the new bridge in 2005, but before the truss bridges that it replaced were demolished. All Photos: CDM Smith.

CDM Smith is a consulting engineering firm that specializes in the transportation, facilities, environmental, energy, and water industries. On separate trajectories in the civil and infrastructure design world, Camp Dresser McKee (CDM) and Wilbur Smith Associates (WSA) pursued parallel markets for many years. The two professional engineering companies joined forces in 2011, consolidating their efforts and offices across the United States and around the world.

Established 75 years ago, CDM specialized in water treatment and civil design, whereas WSA, which was established in 1952, specialized in transportation and planning. Today, CDM Smith employs more than 5000 professionals across more than 100 offices worldwide, enabling the firm to take on a wide range of projects with in-house resources. In the bridge sector alone, the firm has designed almost 1000 new or rehabilitated bridges, performed maintenance inspection on tens of thousands of structures as part of the National Bridge Inspection Program, and performed construction inspection of bridges for more than 50 years.

Frank Bale, principal structural engineer and leader of the bridge discipline at CDM Smith, believes that their involvement in all aspects of bridge design, construction, inspection, and asset management gives them a unique perspective—not just for their clients, but for employees as well.

Nurturing Talent

"The most difficult aspect of a successful service industry is finding and keeping good employees," says Bale. Before the COVID-19 pandemic, there was a sense that employees could easily change jobs across the engineering field, but they were tethered to a regional or corporate office. "Now if we find a talented employee, we can offer them a position wherever they may be," he adds.

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Take summer internships, for example. A candidate may reside in a city where there is no CDM Smith office, but that is no longer a significant barrier to employment. CDM Smith nurtures a healthy intern program that has been very successful in providing a steady stream of talent from engineering campuses. "Most of our interns become full-time employees," says Bale. Despite COVID-19 restrictions, that invaluable influx of talent has continued.

Leveraging Technology

Young professionals are more tech savvy than ever before and are more likely to use technology to overcome project challenges. At CDM Smith, the use of cloud-based platforms has improved productivity and enables the firm to allocate staff and resources to reflect market conditions.

Bill Huffstetler, senior engineer, transportation structures, and previous bridge discipline leader, says that CDM Smith was ready to shift to remote collaboration when the pandemic hit. They had previously invested in mobile devices, and the firm's established inter- and intra-office communication systems

and work-share technologies were already in place.

"If there is an upside to COVID-19, it is that we were better positioned than many other firms," says Huffstetler. "We had already begun to modernize our infrastructure and internal communication and had set up networking between offices. When the lockdown was enforced, it was a much easier transition to work from home," he adds.

Like most engineering companies, CDM Smith is trying to decide how to move forward with balancing work at the office and at home. "I don't think we will return to an office-based company like before," predicts Huffstetler. "The professional service industry will never be the same."

While younger staff enjoy the remote work and are amenable to working from home, some of the senior staff feel differently. "I miss the casual hallway conversations," says Huffstetler. Bale agrees that there is less chance for office comradery and fewer group interactions when communication is virtual.

Professional Associations

CDM Smith's leadership believes that engineers have a fundamental responsibility to advance the practice of engineering. The company encourages participation in technical associations such as the American Association of State Highway and Transportation Officials (AASHTO), the American Society of Civil Engineers, or the Transportation Research Board. Huffstetler has had a front-row seat to many changes over the years. "I have attended many AASHTO bridge subcommittee meetings and witnessed the evolution of our industry," he recalls. "It is invaluable to pass on those technical developments and industry contacts."

"The AASHTO bridge specifications have grown from a few hundred pages to over a thousand pages during my career. While I don't endorse using a slide rule, it seems that the pendulum has swung too far in the other direction, and we tend to overcomplicate our standard code practices," Huffstetler says. However, staying abreast of both technical advancements and changes to the LRFD Design Specifications is essential to keep the firm on the leading edge of design.

Everyday Innovations

Most bridges in the United States have short to medium span lengths. Many of those structures are classified as being in "poor" condition. CDM Smith specializes in just those types of structures. "Those small- to medium-span bridges are where we do most of our work in the bridge market. That is our bread and butter," Huffstetler says.

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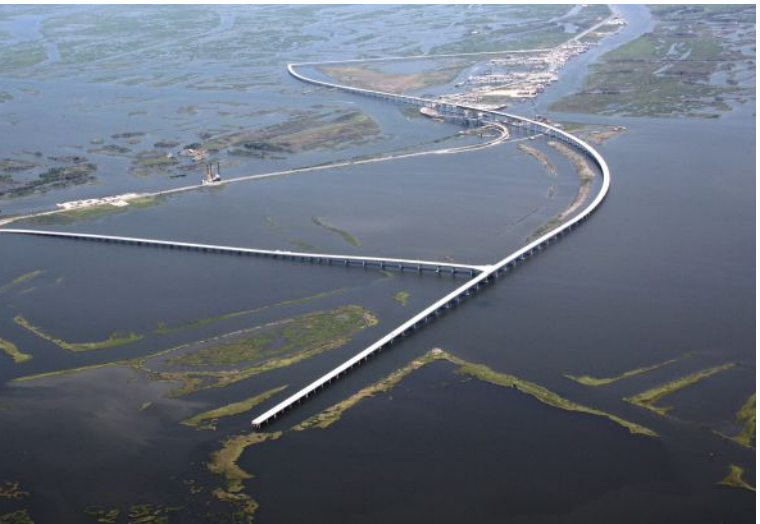
Not every transportation project graces the cover of a magazine, but what did capture the industry's attention was a new way to integrate bridge superstructure and substructure. The use of an integral post-tensioned concrete pier cap was developed by WSA in 1978. Their design of the Interstate 75/Interstate 640 interchange in Knoxville, Tenn., first pioneered this innovative concept. Since then, the post-tensioned concrete pier cap system has proven popular in the construction of interchanges where there is insufficient headroom for conventional pier caps or where road profiles need to be lowered.

Local Bridge Centers

In its early years, WSA had a strong centralized bridge design division. As bridge owners increased their use of consultants, the firm decided that the marketplace was best served by independent bridge groups and decentralized operations. Their bridge centers now operate autonomously, similar to the state departments of transportation (DOTs) that they serve. "State agencies have become more proprietary, which can make it difficult to share work across offices," explains Huffstetler. However, there is still work-sharing across the bridge production offices using their cloud-based network.

CDM Smith is frequently found in the state capitals where the DOTs are located. Working on open-ended contracts with the New York State DOT, CDM Smith is providing bridge maintenance inspection services from their Albany, N.Y., office. In its Pennsylvania locations, CDM Smith

The Louisiana Department of Transportation and Development tasked CDM Smith with the design of a 9-mile portion of Louisiana Highway 1 that uses a precast concrete two-lane elevated highway to provide reliable access to Port Fourchon, a major port on the Gulf of Mexico. The new alignment and high-level structure provided a fixed-span crossing of Bayou Lafourche with 73 ft vertical clearance. The photo on the left was taken shortly after completion and before the existing moveable-span bridge was removed.



CDM Smith field personnel inspect the placement of concrete for a bridge deck.

has been awarded numerous bridge design projects. Farther south, the North Carolina DOT has outsourced many of their bridge design and construction inspection projects to CDM Smith.

Cross-Training

In addition to bridge design, CDM Smith supports a large bridge inspection practice in the Northeast and construction engineering services in the Southeast. The firm tries to cycle their people through all disciplines. "That cross-training has been consistent, and we use it to bolster our design staff," says Bale. Bridge construction inspection and inspection for maintenance have become important parts of their business. "With today's focus on finding and keeping valued employees, training across several disciplines enables them to customize a career path," adds Huffstetler.

"The cross-training of bridge design and construction inspection is helpful. You are a better design engineer when you have been in the field," observes Huffstetler. Inspecting aging bridges provides insights that are invaluable to a designer. The fact that the company has a balanced staff helps them recruit and retain young engineers.

Technology for Asset Management

In bridge inspection, CDM Smith stays abreast of advancing technologies and sometimes uses their own unmanned aerial vehicles. Currently, they use drones as a tool, although that does not supplant the need for bridge inspectors in the field. "Typically, drones have not been used to identify defects, but to provide supporting data and documentation of the work," explains Bale. "We will continue to utilize and promote that

CDM Smith provided emergency design services for a critical substructure repair of the historic Ashley River Bridge located near downtown Charleston, S.C.

Wilbur S. Smith, Innovator in Modern Transportation Systems

World-renowned transportation designer and engineer Wilbur S. Smith was the chair and president of Wilbur Smith & Associates, the engineering consulting firm based in Columbia, S.C., that he founded in 1952.

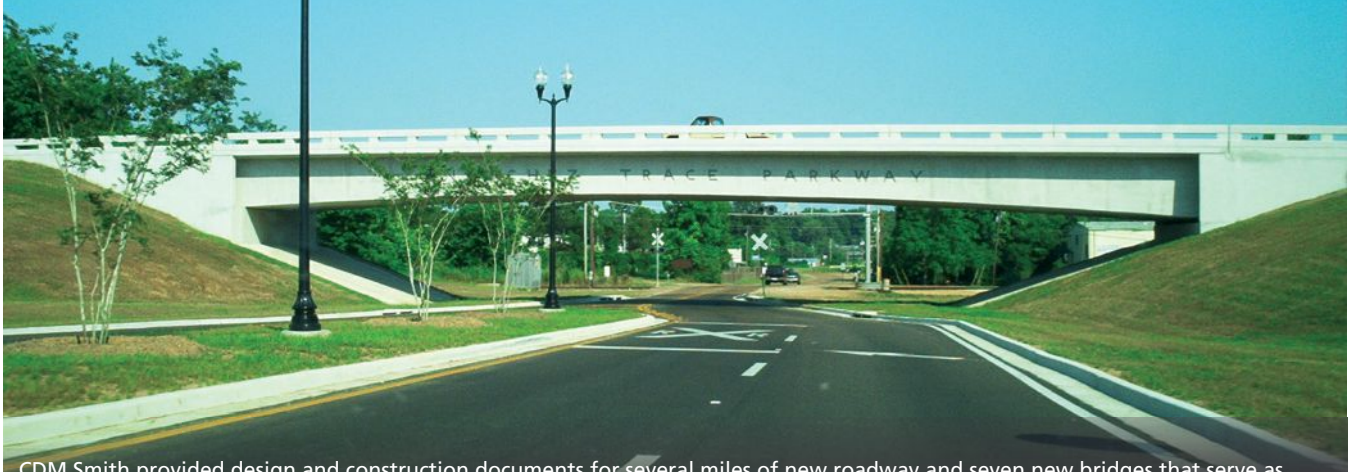
Smith began his career by working for the South Carolina Department of Highways, where he became the first state traffic engineer. He left to study traffic engineering at Harvard and Yale and founded Wilbur Smith & Associates while he was a faculty member at Yale and serving as the associate director of the Bureau of Highway Traffic.

An innovator in modern transportation systems, Smith helped design and develop major parts of the Interstate Highway System, the New Jersey Turnpike, the Chesapeake Bay Bridge-Tunnel, and the mass transit system in Washington, D.C.

Bill Huffstetler, a senior engineer with CDM Smith, says Smith is referred to as "one of the fathers of traffic engineering." This moniker stems from Smith's background in electrical engineering that he translated into traffic-signal design. The signal coordination we rely on today was untested then, but with its implementation, the improvement to traffic flow was so dramatic that he was sought after by agencies around the world. That concept and similar innovations in traffic and transportation engineering were the impetus to start his own company. "I was fortunate to work with him, and his energy was infectious," recalls Huffstetler.

The firm expanded rapidly with the growing interstate system and developed expertise in designing roads, bridges, airports, railroads, waterways, subways, and urban redevelopment, and in performing transportation-systems planning and feasibility analyses. Smith's company covered everything related to transportation, as CDM Smith continues to do today.

Throughout his illustrious career, Smith was active in and recognized by many trade organizations. He received honors from the National Society of Professional Engineers and the Transportation Research Board. The Highway Division of the American Society of Civil Engineers honored him with an annual award that bears his name, and the Institute of Transportation Engineers presented him with an award for distinguished service.



CDM Smith provided design and construction documents for several miles of new roadway and seven new bridges that serve as part of the final link into Natchez, Miss. The designs maintain the aesthetics desired by the National Park Service.

technology as we see broader use of it across all states," he adds.

While CDM Smith envisions wider use of drones for asset management, it will take some time before drone use is widely adopted. "There is a disparity across the states, which makes it a challenge for consultants. We are cautious as to how drone images and models will be utilized," Bale says.

Nothing compares to boots on the ground to evaluate structures and provide feedback on structural conditions, especially in emergencies. The U.S. Route 17/Ashley River Memorial Bridge in Charleston, S.C., was such a project. The bridge was eligible for the historic register when significant foundation deficiencies were discovered. When the South Carolina DOT determined that the concrete foundations had delaminated and deteriorated, CDM Smith assisted with the immediate partial closure. "We went to emergency design mode and in a few weeks designed a post-tensioned transfer beam cap replacement method to repair the foundation without total replacement," Huffstetler recalls. The result was a successful pier replacement that was achieved while maintaining traffic on the bridge and maintaining the structure's historic appearance.

As U.S. bridges age, the emphasis on preservation and maintenance has increased. CDM Smith has kept pace with new testing methods. Along with drones, other nondestructive evaluation methods and technologies such as ground-penetrating radar are useful for assessing bridge conditions. These methods allow CDM Smith engineers to identify problems earlier and more cost effectively while prioritizing employee and public safety.

As a global engineering firm with a broad perspective, CDM Smith has its sights on new opportunities, looking to grow while dealing with the challenges that come with today's evolving workspace.