

elements



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Growth



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Carpe Diem

CEC has always been about seizing opportunities. That's essentially how CEC started 24 years ago and it's why we enjoy enabling our clients to seize their own opportunities. We continue to grow each day while in support of our clients—hiring industry experts, opening offices in new regions, and expanding our service offerings with additions like Cultural Resources Management and Pipeline Integrity Management. With sound growth strategies in place, we can better position ourselves to pursue those paths that will yield positive outcomes for everyone. We celebrate that entrepreneurial spirit throughout CEC by recognizing those who are willing to step forward and lead us in new directions.

Kenneth R. Miller, P.E.
President and CEO

On the Cover:

The existing Cumberland River Bridge was used to deliver supplies and pour concrete for the new 109 Gateway Bridge, saving time and money.

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Gateway to Growth

Gallatin Bridges the Gap Between the Present and the Future

Pier seven took the longest to complete because it was in the deepest water and also the tallest pier at 153'.

Welcome to Gallatin!

That's what officials in this Tennessee town will communicate to travelers, visitors and residents through the new 109 Gateway Bridge Project, which will create an inviting "front door" to this growing community.

The green two-lane Cumberland River Bridge, a classic example of Warren through-truss-with-verticals design, has stood watch over the City of Gallatin since 1954. For years, the people of Gallatin have traversed this bridge south to Interstate 40, which spans the U.S. from coast to coast, and travelers have crossed the bridge into Gallatin when heading north to Kentucky and beyond.

Gallatin was established in 1802 as the permanent county seat for Sumner County. Located less than 30 miles northeast of Nashville, it had been referred to as a "bedroom commuter suburb." But that

"We're in a prime location for further growth," said Rosemary Bates, Director of Special Projects for the Mayor's Office. "Gallatin's Mayor, Jo Ann Graves, believes strongly in controlled and progressive growth for the town. We want to protect our history, and also want people to grow with us."



The new bridge is a composite deck slab bridge with precast, prestressed 72" bulb-tee beams and welded steel girders. It will have four lanes, eight piers, and be 1,616 feet long.

sleepy description just doesn't hold true any longer.

Gallatin is a town that's on the move. The city's population increased 33% between 2000 and 2010. A lot of what has helped that growth (residential, industrial and commercial) is easy access into Nashville.

A short distance away, the Tennessee Department of Transportation (TDOT) was working to build a loop around Nashville. The southern portion was completed in 2012, but the northern portion would instead involve widening and improving existing state and U.S. routes. One of those routes is SR 109, which runs right over the storied old green truss bridge and into the City of Gallatin. According to TDOT studies, the average daily traffic total over this portion of SR 109 for 2010 was 21,570 vehicles. TDOT projects that the number will increase to 32,370 vehicles by 2030. That's slightly more than a 50% increase over a 20-year period.

TDOT already had planned to replace the old bridge, which had become structurally

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“We trust CEC to position all those critical things for us.”

- Josh Randall, Mountain States Contractors



Pier Survey

An eight-pier bridge that spans challenging topography and a deep-water navigable channel is not the product of your standard construction staking job. “To survey, we had to set up points on either side of a wide river with banks at different elevations, and even then, not everything was perfectly visible,” said John Gravely, CEC Principal. But for CEC, determining the position of structural components for the new 109 Gateway Bridge into Gallatin was a goal within sight.

Working primarily on a barge, CEC lined up seven cofferdams—steel enclosures that are sealed off and pumped dry for construction below the water. The dams protect the forms into which concrete is poured for the footings and columns of each pier. But the first step was to determine the design location of the piers in moving water of varying depths.

The first six piers would stand in shallow water, but the gradually-sloping river bottom suddenly makes a steep drop nearly 70 feet, creating a logical location for barge traffic. The seventh pier would need to be positioned in that deep water to properly support a 385-foot span over the channel to the last pier, which would sit on top of a vertical river bank.

“The atypical details on this project took time from an engineering and survey perspective,” said Josh Randall of Mountain States Contractors. “CEC determined where to put the cofferdams down in the river and where to build the foundation that the public will drive on. ■

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deficient. Once Mayor Graves realized the bridge project was fast-tracked, she seized the opportunity to get in on the front end and initiated talks with TDOT, as well as Sumner and Wilson Counties, both of which would be affected. She felt strongly that the bridge should serve as a true gateway into the city and be impressive when traveling in either direction.

Nashville-based Mountain States Contractors was awarded the project as the prime contractor, with Britton Bridge as the structural steel erection subcontractor, and Civil & Environmental Consultants, Inc. (CEC) for construction staking, environmental and CQA services. Mountain States looked to CEC because there are only a few firms in the state that can do the challenging work for the planned bridge project. “There’s a history of a good working relationship,” said Josh Randall, Project Manager for Mountain States. “We have worked with CEC successfully on a number of jobs. Mountain States has a great deal of confidence in CEC’s work.”

It wasn’t your standard bridge-building project. In fact, nothing like it has been built in the area before. The bid cost of the

project was more than \$29.6 million to replace the Cumberland River Bridge and construct an additional backwater bridge. Both were to be built over Old Hickory Lake—a mainstream storage impoundment to the Old Hickory Lock and Dam built on the Cumberland River between 1952 and 1954. The river backs up and spreads out because of the dam, forming the lake.

TDOT generously welcomed Gallatin and Wilson and Sumner Counties to collaborate on the incorporation of amenities and aesthetic design of the bridge. The partnership agreed on bicycle lanes and pedestrian pathways over the bridge. These connect to a trail that runs along the side of the abutment and curves under the bridge to provide a view of the river. Having the counties come together, without competition, to provide input for the Gateway Bridge helped TDOT to move forward on this important project. Construction began in April of 2011, and the new bridge is slated to open to traffic this fall. The entire project will be completed in the spring of 2014 when the old green truss bridge will be relieved of its post. ■

Cofferdams allowed the surveyors to continue lining up their equipment with an instrument positioned on land or on one of the newly-constructed piers.



Cincinnati Nature Center's new natural wastewater treatment system serves as an educational tool for visitors and hikers of all ages.

Star Treatment

INNOVATION AT THE CINCINNATI NATURE CENTER EXCEEDS EXPECTATIONS

The Cincinnati Nature Center

hosts more than 100,000 visitors a year. Its Rowe Woods site is located roughly 20 miles east of Cincinnati and spans 1,025 acres (including 65 acres of old growth forest) with more than 16 miles of hiking trails. With no available connection to public sewers, the Center must perform wastewater treatment on site. They had been exhausting valuable time and resources on the maintenance of two separate and failing 40-year-old subsurface wastewater treatment plants whose capacity had long since been outgrown. Jason Brownknight, Director of Conservation and Stewardship, began a lengthy investigation before arriving at a new environmentally-sustainable solution that would be in line with one of the Center's primary values: stewardship of the land.

The Center initiated talks of implementation with the Algaewheel's creator and soon learned that an Ohio-licensed engineer would be needed. Brownknight was familiar with CEC due to previous investigations into firms with wastewater and site engineering expertise. When the Center approached CEC to manage the project for the entirely new sanitary sewer system and wastewater treatment plant, they learned that CEC already had been working with the Algaewheel inventors to identify a project opportunity to implement the technology

The Ohio EPA was understandably skeptical and cautious when the Cincinnati Nature Center in Milford, Ohio, selected a low-energy, low-maintenance, innovative system featuring newly-patented Algaewheel® technology for its on site wastewater treatment.



Algaewheels grow algae in a controlled environment. In turn, algae produce oxygen, which bacteria in the system use to convert wastewater organics into carbon dioxide.

in Ohio. "We were impressed," said Brownknight. "The fact that CEC was familiar with the technology made us feel that much more comfortable working with them."

To help the Center obtain its permits, CEC diligently met with the OEPA early and often to explain the technology. "This plant treats wastewater to a final effluent quality equal

to municipal treatment plant standards as required by the OEPA," said Matt Gramza, CEC's project manager responsible for all permitting and design of the wastewater collection system and site. "It isn't a glorified septic system; it will treat the water for surface discharge into a stream on a nature preserve. There is absolutely no shortcutting of water quality." Completed in 2011, it was the first on-site surface discharging wastewater treatment plant featuring Algaewheel technology permitted and built in Ohio.

The goal for the project was minimal disturbance to both the natural environment and center operations. The centralized system's 0.25-acre footprint also was designed to allow new facilities to connect directly without additional footprint requirements, saving plenty of space for future projects. "CEC also was able to offer field assessment and provide an on-site geotechnical expert during excavations," said Brownknight. "They offered a lot of additional benefits, and it really worked in our favor."

Surface discharge tests for ammonia and carbonaceous biological oxygen demand (CBOD) are showing water quality results much better than limits required by the OEPA. Brownknight added that the system has consistently maintained levels well below OEPA requirements. ■

IN THE NEWS

PROJECT OF THE YEAR

➕ MarkWest Liberty Midstream & Resources' Houston natural gas processing plant (featured in our last issue of *Elements*) was recently named the 2012 Project of the Year in the Industrial Category by the Engineers' Society of Western Pennsylvania (ESWP). The ESWP annual Awards of Distinction recognize outstanding projects from the Western Pennsylvania region. ■



(From left to right) Joe Lex (MarkWest), Scott Mills (CSD Engineers), Shane Hecht (MarkWest), Harry Watson (Chapman Corporation), Tim Miller (CEC), Tom Clawson (URS Corporation), Chuck Come (Cimation)

Spotlight



Digging for info with archeologist Beth Hillen

Q What are Cultural Resource Management services?

A Cultural Resource Management services stem out of the need to comply with Section 106 of the National Historic Preservation Act (NHPA) of 1966. Any undertaking with federal funding, federal permits, or that needs federal approval, must take into account cultural resources. How the various agencies define what an "undertaking" is can determine whether cultural resources investigations must be performed, or to what extent. There are two types: archeological resources (below-ground resources like prehistoric or early historic sites) and architectural/history resources (above-ground resources like structures and buildings).

Q What do you think the addition of Cultural Resource Management means for CEC?

A I think it was a missing piece in the integrated services we could provide to our clients. Now, if a client needs a Corps permit, as an example, we can handle all of the necessary services in house—one point of contact. It allows us to offer clients the full suite of services necessary to take care of a project, simplifying project coordination and reducing project schedules.

Q As CEC continues to focus on the Electric Utilities, Manufacturing, Mining, Real Estate, Natural Gas and Solid Waste industries, as well as on the Public Sector, is Cultural Resource Management going to play a role in more than one of these primary markets?

A Definitely! Cultural Resource Management is a natural fit for all of the markets CEC supports. We can now serve as a single point of contact for our Natural Gas clients, particularly in the Marcellus and Utica shale plays. Electric Utilities, in addition to having massive sites, are not unlike the Natural Gas industry with their transmission lines traversing the

ENGINEER THE FUTURE THE WOW MOMENT

CEC joined 46 exhibitors and roughly 4,400 kids of all ages at Carnegie Science Center in Pittsburgh for its Engineer the Future event in observance of National Engineers Week.

Engineer the Future is a two-day celebration of the science of engineering and highlights the region's achievements and advances in architecture, building and construction. Professional societies, universities and some of the region's prominent companies each develop unique science and engineering-related exhibits and activities to engage young visitors.

CEC volunteers energetically led three hands-on learning experiences: A tin foil boat design competition explored basic

principles of structural integrity, buoyancy, surface tension and weight distribution; a land-planning coloring activity had kids thinking about where to place residential, commercial and recreational properties; and a chemistry activity demonstrated how different polymers affect samples of various soil types.

"We're trying to stimulate the minds of the next generation of engineers and scientists," said Ryan Adam, one of CEC's senior associates. "These displays

encourage kids to try something different. Our goal is to create interest in the field by shedding light on the paths that are available in engineering and science."

"You never know what event or what experience is going to lead a person down his or her path," said Carol Schoemer, program coordinator of Carnegie Science Center's Engineer the Future event. "You're helping us share the science that sparks a little 'Wow!' moment." ■

landscape over streams and protected wildlife areas. Because of the funding stream, Public Sector work obviously must comply with Section 106. Examples are work at military bases, surveys on National Forest lands, or FHWA-funded transportation projects, which I've performed in a number of different states.

Manufacturing facilities and Real Estate developments can require cultural resources investigations for Corps or federal permits. A housing development may require Cultural Resource Management services if it is a HUD project with federal funding. Waste clients who are expanding or have wetlands impacts that require permitting will need archeology. In those cases where private development is several hundred acres, the Corps may not look at just a single stream; they might look at the whole site from an archeological standpoint.

And Mining also requires many permits, whether on the reclamation side or initial mine development. For instance, the Department of Natural Resources and the Environmental Protection Agency require permits whether it is coal, gravel or other aggregates and mineral resources.

Q Do the regulations that guide Cultural Resource Management ever change?

A There have been periodic amendments; a tweaking of language to clarify how things

are interpreted or to streamline procedures. Section 106 is a process, the implementation of which varies from state to state or from agency to agency. For example, what we do for FHWA may not be what we do for FTA, though they both fall under USDOT.

Q How is CEC better equipped to handle these variances?

A We are lucky to have professionals who have built solid relationships while working in many different states and with multiple agencies. The agencies tend to be comfortable with what we are producing and providing, and also with our knowledge level. These relationships can help avoid lengthy delays in project approval beyond the required 30 days.

Q How will our services enable clients as they continue to grow?

A Cultural Resource Management is a compliance-driven field. We can help each of our industry clients with compliance and with their own expansion and evolution. They are going places; we can help get them there. My job is to make it easy for everybody else; to know the laws well enough to meet the regulations and to know how to negotiate the process so that it is both beneficial to the resource, which I care about as an archaeologist, and to the client's objectives. ■



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PHOTO CONTEST WINNER
JOHN SIENERTH | CEC PITTSBURGH

CEC sponsors a Photo-of-the-Month contest encouraging employees to submit pictures from their work sites. The winning photo is published on CEC's internal website and Facebook page.





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These enormous CAT engines will utilize landfill gas to create electricity at a new Landfill Gas to Electric plant.