

# 2016 Engineering Excellence Awards

## ACEC

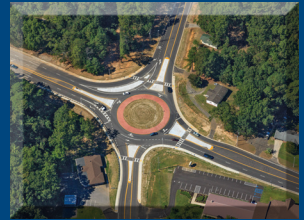
AMERICAN COUNCIL OF ENGINEERING COMPANIES  
*of South Carolina*



2015



2013



2014

**Tuesday**  
**February 2, 2016**  
**Columbia Museum of Art**



# ENGINEERING EXCELLENCE AWARDS

Engineering Excellence is an annual competition sponsored by the American Council of Engineering Companies (ACEC) and its member organizations. It recognizes engineering achievements which demonstrate the highest degree of merit and ingenuity.

The ACEC-SC Palmetto Award (top overall project) and the three other entries judged to be the best overall were eligible to enter the national competition. National winners are announced in April at a gala event in Washington, D.C.

The ACEC-SC competition is open to all firms engaged in the practice of consulting engineering. Projects must have been designed in the state of South Carolina with construction substantially completed between Nov. 1, 2013 and Oct. 31, 2015. Projects could have been constructed anywhere in the world as long as they were designed in South Carolina.

A distinguished panel of judges was selected. Each judge separately reviewed the projects. Criteria for judging included: original or innovative application of new or existing techniques; future value to the engineering profession and perception by the public; social, economic and sustainable design considerations; complexity; and exceeding owner/client needs.

We applaud and congratulate all the firms that entered the 2016 Engineering Excellence Awards Competition. Project panels will be displayed at locations throughout the state to increase public awareness of the important role consulting engineers have in our society.



# PALMETTO AWARD

## AECOM

Camden Wastewater Treatment Plant Expansion  
City of Camden, South Carolina  
*Water and Storm Water, Over \$10 Million*



## ACEC FINALIST · ENGINEERING EXCELLENCE AWARD

The City of Camden engaged AECOM to design a new wastewater treatment plant (WWTP) that would replace their existing lagoon plant and be able to adequately treat the City's wastewater to stricter effluent limits required by its NPDES permit and to provide additional capacity for future area growth. The new WWTP has a design capacity of 4.0 million gallons per day (MGD), an increase from 3.0 MGD. Several unit processes were designed for future expansion to 8.0 MGD.



The WWTP includes a headworks facility for influent flow monitoring, coarse and fine screening, grit removal and influent pumping; a multi-stage Biological Nutrient Removal aeration system with anaerobic, anoxic and aerobic treatment zones; secondary clarifiers and scum pumps; an effluent facility for ultraviolet disinfection, post aeration and effluent flow monitoring; an effluent diffuser in the Wateree River; and a liquid lime facility for pH control. Solids treatment includes a solids processing building that houses the return activated sludge and waste activated sludge pumps, rotary drum thickeners, thickened sludge transfer pumps and aeration system blowers; an aerobic digester and sludge holding tanks; and a sludge transfer pump station that houses the sludge system blowers and digested sludge transfer pumps. The WWTP also includes an administration building with a laboratory, maintenance shop, offices, break room and control room; a maintenance storage facility; and a septage receiving station.

# ACEC FINALISTS

## HDR | ICA

US 601 Bridge Replacements  
South Carolina Department of Transportation  
Transportation, Over \$10 Million



### ACEC FINALIST · ENGINEERING EXCELLENCE AWARD



The US-601 project involved the replacement of the main bridge over the Congaree River and three relief bridges that are downstream from the Congaree National Park. The four bridges are located in a 4.2 mile section of US-601 from SC-48 in Richland County to just south of the Congaree River in Calhoun County. The project corridor crosses a wide floodplain bounded by large power transmission lines on one side and Congaree National Park property on the other. The existing main bridge over the Congaree River was a 1,743-foot long structural steel girder and stringer bridge built in 1942.

The three relief bridges were also constructed in the early 1940's and were all comprised of 30' concrete t-beam spans with concrete bents, and with total lengths of 150 feet, 1,390 feet and 630 feet. All of the bridges in the corridor were functionally and structurally obsolete.

HDR | ICA was responsible for project management, environmental documentation and permitting, surveying, geotechnical investigations and engineering, roadway design, bridge design, utility coordination, and construction support services. The completed project provides a context sensitive solution across this environmentally sensitive corridor with modern bridges that have greatly enhanced safety by providing 12-foot lanes and 10-foot shoulders on the bridges. The new bridges are constructed primarily of concrete with limited steel components, thus reducing long-term maintenance costs.

## Infrastructure Consulting & Engineering, PLLC

Marshland Roundabout  
Town of Hilton Head  
Small Projects, \$500,000-\$2 Million



### ACEC FINALIST · ENGINEERING EXCELLENCE AWARD



Prior to the construction of the new roundabout at the T-intersection of Marshland Road and Mathews Drive, it was not uncommon for more than a dozen cars to be lined up on Marshland Road waiting to make the dangerous left turn onto Mathews Drive. In addition to completing the final phase of the Mathews Drive Corridor Improvement Plan, the Town of Hilton Head proposed the concept of adding a roundabout at the intersection of Marshland Road and Mathews Drive in order to increase safety, circulation and the

aesthetic character of the area. The Town solicited professional engineering services to provide plans for the improvements. With extensive input from the Town's Engineers, Infrastructure Consulting & Engineering, PLLC (ICE) developed the plans included in the Solicitation Request for Qualifications and was ultimately awarded the contract.

ICE designed an efficient system while minimizing the impacts to the surrounding area including a few large oak trees, an outfall to the tributary leading to Broad Creek, and a section of wetlands, while also minimizing right-of-way acquisitions. In the original concept, the roundabout sits in a superelevated curve with multiple lanes coming to the roundabout. ICE provided designs to reduce the access on Mathews from two to one lane to allow for the construction of a single-lane roundabout with a slip lane from Marshland Road.

## The Sheridan Corporation

Seawall Repairs for the City of Charleston, S.C.  
City of Charleston  
Structural Systems, \$2 Million-\$10 Million



### **ACEC FINALIST · ENGINEERING EXCELLENCE AWARD · SMALL FIRM AWARD**



In 2004, a comprehensive study of the historic seawalls of Charleston found that the concrete superstructure and the timber pile substructure of “The Turn” were severely deteriorated. The report concluded that “The Turn,” the most recently constructed portion of the historic seawall structures, was in poor condition and recommended replacement. The City of Charleston had a longevity requirement for the new design.

The design of “The New Turn” focused on maximizing the durability and impermeability of the concrete and preventing the premature corrosion of the steel reinforcing. Careful reconsiderations of the standard concrete cover requirements and other design features, specifications, and material durability, should successfully achieve the desired 100 yearlong service life required by the City of Charleston.

Additionally, the design of “The New Turn” provided an effective economical and sustainable solution and increased public usage. For economic and sustainable marine waterfront structures, value is not equivalent to just cost; value is a function of both cost and duration of service life. The economic and sustainable value of “The New Turn” is substantial with its anticipated very long service life.

The future value to the engineering profession is that this project proved that a 21st century solution can achieve outward compatibility with the historic past, while inwardly correcting the structural engineering errors of the past century.

## STV Incorporated

US 17 Bypass and SC 707/Farrow Parkway Interchange  
South Carolina Department of Transportation  
Transportation, Over \$10 Million



### **ACEC FINALIST · STATE FINALIST**



With more than 14 million annual visitors, traffic congestion in Myrtle Beach is common, especially at the U.S. 17 Bypass and SC 707/Farrow Parkway interchange. The location is a key access way to The Market Common, a mixed-use development situated on the site of the former Myrtle Beach Air Force Base.

To improve conditions, Horry County and the South Carolina Department of Transportation (SCDOT) contracted with STV to provide a wide range of design services for the replacement of an at-grade intersection with dual 1,246-foot bridges.

Spanning a single-point urban interchange, the new bridges provide uninterrupted traffic flow and improved roadway access. To streamline access, all intersecting roads were realigned and reconstructed, as necessary. In total, the project improved 5.7 miles of roadway covering 71 acres.

Due to the project’s proximity to the South Carolina coast, poor-bearing soils required geotechnical modifications to support the structure, roadway, walls, and drainage features. Solutions for this issue included prefabricated vertical drains to expedite settlement time on all ramp and bridge approaches; lightweight aggregate borrow, which was deployed around mechanically stabilized earth walls to decrease settlement time and produce adequate soil-bearing capacity; and deep soil cement mixing, which was used in isolated adjacent areas, strengthening the soil and allowing construction to proceed swiftly while maintaining a viable traffic control plan.

## **Vaughn & Melton Consulting Engineers, Inc.**

Cherokee Casino Access Road and Bridge  
North Carolina Department of Transportation  
Transportation, \$2 Million-\$10 Million



### **ACEC FINALIST • ENGINEERING EXCELLENCE AWARD**



V&M provided design and full construction plans for a new NCDOT  $\frac{3}{4}$  mile access road off US19/74/129. This project provided access to a new Harrah's Casino, an important economic development project for one of North Carolina's more economically depressed counties. The project also included intersection improvements, a 198' bridge over a river, and a roundabout. It was designed to NCDOT Complete Streets Standards to provide multi-modal access.

The necessary infrastructure investments required to accommodate the new Casino included the new access road and the construction of a bridge that could accommodate heavy construction vehicular traffic access to build the Casino. The design phase alone on a project of this scale usually takes between 18-24 months. But it was imperative that the road and bridge construction did not postpone the construction

of the Casino. V&M was cognizant of the partnership between the NCDOT, the Eastern Band of Cherokee Indians, and Harrah's necessary to boost the economy. Knowing that it was imperative to meet the project's aggressive scheduling goals, V&M finished all construction plans in a mere six months!

This project illustrates cooperation between the NCDOT, multiple design consultants, a local government, a federal tribal entity, and a private corporation – all working together to leverage transportation infrastructure to bring a much needed economic development project to fruition in an economically depressed region of the state.



# ENGINEERING EXCELLENCE AWARDS

## **CDM Smith**

Clean Water 2020: Columbia's Clear Vision for Clean Water  
City of Columbia  
Special Projects, Over \$10 Million

### **ENGINEERING EXCELLENCE AWARD**



The City of Columbia, South Carolina developed an infrastructure improvements program branded Clean Water 2020 (CW2020) in response to a Consent Decree. CW2020 is designed to rebuild and expand the City's existing wastewater infrastructure, and to implement best business practices across the organization.

Columbia, like many large cities across the United States, was challenged with delivering vital wastewater services with aged infrastructure, limited budgets, and outdated management, operations and maintenance support systems.

The City chose a program management services approach to address the management, operations, and maintenance improvement needs, and to accelerate the planning and implementation of infrastructure investment, and selected CDM Smith to serve as the Program Manager in July of 2012. The program includes assessing and upgrading a significant portion of the wastewater system to increase the capacity, efficiency, and reliability. These infrastructure improvements are being matched with proactive approaches to operations and maintenance activities, revised and well-documented business processes, and implementation of best management practices across the organization. The strong partnership between the City and CDM Smith has resulted in significant organizational improvements and ensures that this multi-year, \$750 million program results in a successful "Clear Vision for Clean Water" in the City of Columbia.

## **Civil Engineering Consulting Services, Inc.**

"Fast Track" Road Design and Construction  
Richland County Department of Public Works  
Special Projects, \$2 Million-\$10 Million

### **ENGINEERING EXCELLENCE AWARD**



The engineering skills for paving roads are routine – especially for an experienced firm like Civil Engineering Consulting Services, Inc. (CECS). But when there are multiple stakeholders with unique objectives, road paving can present significant challenges. This is exactly the scenario that CECS faced in performing an engineering services contract for the County of Richland, South Carolina. The county issued the contract as a means to improve transportation infrastructure for Richland County residents.

Such projects are of a high priority due to the county's rapid growth coupled with its relatively large number of unpaved roads. Under the contract, CECS has designed and paved a combined total of 30 dirt roads through multiple separate projects – a remarkable total for road improvements programs in an amount of time that is almost unheard of in this field. The firm has worked collaboratively with each major stakeholder to ensure important considerations are adequately addressed. The results have been safer roadways that accurately reflect the input of those with the most at stake. CECS used innovative solutions such as created the Low Volume Traffic Design Manual, using "design to fit" approach to reduce costs, and developing a tracking system to be used by the County in future projects. CECS is proud of these improvements in transportation infrastructure and the resultant increases in community economic potential.

## **Collins Engineers, Inc.**

Patriots Point USS Yorktown Structural Assessment  
Patriots Point Development Authority  
Studies, Research, and Consulting, \$500,000-\$2 Million

### **ENGINEERING EXCELLENCE AWARD**



The seventy-three-year-old USS Yorktown is a decommissioned Essex-class aircraft carrier berthed at the Patriots Point Naval & Maritime Museum in Mount Pleasant, South Carolina. It played a role in World War II and Vietnam, recovered the Apollo 8 astronauts and capsule, and is now a National Historic Landmark visited by over 275,000 people annually.

Patriots Point Development Authority (PPDA) needed a complex and comprehensive structural evaluation of the Yorktown and selected Collins Engineers, Inc. (Collins) to provide the evaluation. Collins worked with PPDA to meet PPDA's budget while still adding value to the project and providing a comprehensive final report that included a clear and concise summary of the condition of each space, with a cost estimate for each space and the overall repair project.

Collins completed the project in eight months allowing PPDA to expedite its request to Congress for federal funding of portions of the repairs. Restoration and preservation of this monument will ensure the continued economic viability of Patriots Point. PPDA has a path forward for required repairs, an ability to budget for the repairs, and a maintenance protocol to ensure that future repairs are more minor in nature with a less burdensome cost.

This project has set a standard for engineering assessment of historic museum vessels and can be a model for other facility owners to follow.

## **Design South Professionals, Inc.**

Oconee Nuclear Station Flow Loop Simulator  
Duke Energy  
Energy, \$2 Million-\$10 Million

### **ENGINEERING EXCELLENCE AWARD**



Oconee Nuclear Station (ONS) has safely and reliably generated more than 500 million megawatt-hours of electricity, and is the first nuclear power plant in the United States to achieve this milestone. Design South provided a full range of planning, engineering, and construction administration services to design and construct a

Flow Loop Simulator to aid in the training of ONS operation and maintenance personnel. These services included project development, cost estimating, preparing plans and specifications, contractor selection, and construction administration.

Duke Energy desired to create a world class Flow Loop Simulator for training at the ONS. Their requirements were that the Flow Loop Simulator be comprised of the same mechanical, hydraulic, electrical and control elements that are contained in the nuclear plant. The team faced some challenges that included integrating controls from the 1970s with modern technology; however, overcoming these challenges created a simulator that supports full-scale training for realistic plant scenarios in a controlled environment. The versatility of the Flow Loop Simulator is impressive because it performs not only for the operators in a specific field but for students and instructors who work in Maintenance, Operations, I&E, Electrical, and Radiation Protection. More importantly, the safety of the environment and public is better assured with the use of a Flow Loop Simulator to train plant operations personnel using "hands on" training methods with realistic scenarios.

## **GWA, Inc.**

Devro Manufacturing Facility  
Devro, Inc.

*Building/Technology Systems, \$2 Million-\$10 Million*

### **ENGINEERING EXCELLENCE AWARD**



If you think security is tough working for the government, you haven't worked in the food industry. Born from Johnson & Johnson in the 1950s, the name, Devro is an acronym for "Development and Research Organization," where researchers developed a material suitable for the manufacture of sausage casings from collagen. With 2200 employees globally, Devro is headquartered in Scotland with sales offices in Germany, Russia, Hong Kong, Japan and New Zealand, and manufacturing and technical plants in Australia, the Czech Republic...and Sandy Run, SC.

The addition of a new 100,000-square foot facility allows for eight new production lines at full buildout with anticipated savings to the company of a reported \$14 million annually as a result in the increase of production efficiency.

GWA Inc. coordinated closely with SCE&G for upgrades to the existing substation to provide a distribution voltage of 13,800 volts with four 277/480-volt switchboards distributing power throughout the new facility. A "main-tie-main" configuration with double-ended transformers allows for redundancy in the event of a transformer failure.

In addition to the medium-voltage work, GWA, Inc. designed the IT, fire alarm, security and lighting systems along with on-site emergency generator backup, all-the-while working around the very confidential nature of the process and proprietary nature of the equipment.

## **KCI Technologies, Inc.**

US 176 Bridge over the Broad River  
Lane/South Carolina Department of Transportation  
*Structural Systems, Over \$10 Million*

### **ENGINEERING EXCELLENCE AWARD**



The bridge on US 176 over the Broad River is an 89-footwide, 1,126-foot-long, 10-span superstructure consisting of a cast-in-place deck on AASHTO 72-inch modified Bulb-T beams. The substructure consists of drilled shaft and rock socket deep foundations. KCI coordinated the efforts of the value engineering team to provide revisions to the stage two substructure design.

The re-design of the substructure was proposed to provide reduced drilled shaft sizes and lengths from what was constructed in stage one of the project. KCI design efforts led to a decrease in the foundation elements size for bents two through 10. The end result was a reduction in the amount of drilling, rock excavation, and in material quantities for concrete, reinforcing, and construction casing. These reductions were provided while still allowing similar stiffness of the substructure elements between stages one and two. The reinforcing cages were also modified to eliminate telescopic rebar at seven of the bents. In addition to the substructure re-design, KCI also revised the geometric design of the proposed pedestrian pathway traveling below the bridge, to ensure that maintenance vehicles would have the proper clearance. The value engineering allowed the contractor to complete the construction of the substructure in a reduced amount of time and below their original budget. KCI's innovative value engineering study and design saved the client and SCDOT more than \$2 million.

## **Stantec Consulting Services, Inc.**

Hutchinson Square Master Plan  
Town of Summerville

*Studies, Research, and Consulting, Less than \$500,000*

### **ENGINEERING EXCELLENCE AWARD**



Stantec was selected by the Town of Summerville to provide a Master Plan for Hutchinson Square Park, a rectangular park in the heart of downtown Summerville, the center of the central business district. Improvements to Hutchinson Square were identified as one of the key objectives in the town's Vision Plan. The redevelopment of the park is considered a key objective to revitalize and rejuvenate the downtown urban core. Stantec created a list of programmatic elements that were presented to

the public at both workshops and online. Stantec provided visualization, landscape architecture, traffic and utility planning services for the project.

Through a process of analysis and public involvement, Stantec finalized a Master Plan for Hutchison Square Park that addressed the citizen's concerns and suggestions. The Master Plan, once implemented, will create a signature gateway to the downtown urban core. The plan will also improve circulation and accessibility, increase safety, provide open green space for events, integrate public art, improve the park's visibility, and protect the existing grand live oaks.

# STATE FINALISTS

## **Design South Professionals, Inc.**

Oconee Nuclear Station Support Complex

Duke Energy

*Structural Systems, Over \$10 Million*



Design South Professionals, Inc. designed a 91,520 square foot Station Support Complex for Duke Energy Oconee Nuclear Facility in South Carolina. The five story building provided various team rooms, offices, and support amenities such as an auditorium, conference rooms, briefing rooms, and break rooms.

The design team had many challenges with the placement of this building due to the limitations of the site. The only real estate available was on or in an existing hillside. The Design team decided to design the building into the hillside while providing adequate light, views, and egress to the occupants. Design

South strategically arranged programmatic elements such as storage rooms and workshops along the underground portions of the building while allowing offices, team rooms, and conference rooms access to light and views. The need to minimize the site excavation due to the proximity of existing utilities necessitated the use of soil nailing to stabilize the construction excavation. The building foundation consisted of grade beams supported by micro-piles.

The exterior cladding of insulated precast concrete panels offered strength and fast installation. In order to alleviate the soil pressure on the below grade precast concrete panels, the design team used light weight Geofoam, which makes an ideal fill material. The use of Geofoam provided the benefit of reducing both vertical and lateral pressures on the below grade walls.

## **KCI Technologies, Inc.**

Federal Aid Bridge Replacements, Package C

United Contractors/South Carolina Department of Transportation

*Transportation, Over \$10 Million*



In March 2012, KCI received notice that Team United had won the bid for this project. Before receiving notice of the winning bid, our team strategized of how to exceed the aggressive schedule and demands of the project and drastically cut the budget. We used SCDOT provided minimum span lengths and superstructure types for all seven of the bridges and developed span configurations and structure types that would maximize the structural capabilities of the various bridge components and capitalize on cost saving ideas that gave our team a competitive edge in the bid.

Additional hydrology work was also performed to minimize roadway costs associated with raising grade. KCI provided all bridge plans efficiently to the contractor for this fast-paced construction project. In addition, KCI reviewed shop drawings, coordinated the design and schedule with precasters, material suppliers and contractors, and coordinated all design activities with the various subs including roadway, geotechnical, hydraulic, environmental, and utility. KCI's team worked rigorously to keep the project moving assertively and within the required public notification process established by the SCDOT.

Once the project was released for construction, having attained the approval from the rigorous SCDOT review process, KCI's construction inspection effectively managed the appropriate manpower at multiple sites to assure the bridge replacements were constructed according to plan and specifications, within the environmental regulations established during preconstruction.



## **Judges**

*A special thanks is extended to the competition judges who volunteered valuable time to carefully review of each project.*

**Joey Derby, P.E.**

Lexington County Engineer

**Robert W. King, Jr., P.E.**

Retired

**Mary Katherine Watson, PhD**

Assistant Professor

Civil and Environmental Engineering, The Citadel

American Council of Engineering Companies of South Carolina (ACEC-SC) is a member organization of the American Council of Engineering Companies. For information on ACEC-SC or the Engineering Excellence Awards competition, please contact us at P.O. Box 11937, Columbia, SC 29211 · (803) 771-4271 · [www.acecsc.org](http://www.acecsc.org)

