At 7 a.m., the sunrise casts dappled light across the Cooper River as it flows into Charleston harbor. The would-be tranquility is interrupted by a thump-thump rhythm that sounds from the stream of traffic crossing the two aging truss bridges that connect Charleston to Mount Pleasant. A tugboat maneuvers a massive container ship into place with steady determination. Nearby at the Maritime Center pier, an otter playfully bobs in and out of the water as Russ Touchberry, ’01, jumps into a small skiff and heads off in the direction of the new Cooper River bridge construction site.

Construction of the new bridge has been the buzz of Charleston in recent years just as it was in the early part of the 20th century. In 1929, the completion of the Grace Memorial Bridge solved the time-honored problem of crossing the Cooper River from Charleston into Mount Pleasant. The bridge took 17 months to build and cost $6 million. With 1,050 feet between supports, it was the fifth longest bridge in the world, and at 150 feet above the river, it was 15 feet higher than New York’s Brooklyn Bridge. The toll to cross was 50 cents.
In 1963, construction began on the Silas N. Pearman Bridge. The $15 million project was completed in 1966. Northbound traffic crossed the new three-lane bridge while southbound traffic used the Grace. A reversible lane on the Silas Pearman allowed motorists to go southbound should the need arise.

At the age of 75, the Grace Bridge is one of the most dangerous bridges in the country, scoring only four on a scale of zero to 100 with 100 being the safest. The decaying condition of the two bridges in recent decades along with an increase in traffic flow made replacement a necessity and had state and local officials scrambling to solve construction problems. How much would a new bridge cost? Who would pay for it? What would it look like?

There is a Citadel imprint in the answer to these questions. Touchberry, a quality assurance inspector for the South Carolina Department of Transportation (SCDOT), is one of seven graduates of The Citadel School of Engineering working on the new bridge project.

Touchberry credits The Citadel not only with his knowledge of engineering, but also with his success in the field. "The Citadel teaches you to be prepared. It's a hands-on college. You're a real person, not just a number."

The college's emphasis on learning time management is also important to Touchberry: "It's now second nature. You either get it or you don't. If you don't, you're not going to make it out there."

The 44-month long project is scheduled to be completed by summer 2005.

ON TOP OF THE LOWCOUNTRY

At the west tower site, Touchberry is hailed by a lone seagull. East of him, the U.S.S. Yorktown, the retired World War II aircraft carrier that thousands of tourists flock to each year, waits large and silent for the day's round of visitors to arrive. Touchberry ties the skiff to the massive barge moored at the foot of the rock island and heads up to work. The site is strewn with equipment and leftover pieces of construction material—scrap metal, wood supports and welding tanks.

An orange steel mesh elevator with a 6,200-pound capacity takes Touchberry to the crossbeam. He takes a second, smaller elevator with a 4,200-pound capacity takes Touchberry to the crossbeam. From there he takes a second, smaller elevator with a 4,200-pound capacity, that rests on the perimeter of the tower at an angle like an old Charleston piazza sagging from the weight of its years. Workers riding up are dressed in similar garb—steel-toe boots, hard hats, safety goggles, and worn pants and shirts. The ride is a little jarring and the motor makes a grinding noise as it ascends, but no one seems to notice.

Out of the elevator Touchberry climbs four ladders to the top platform where workers are tying steel rebar together to form a maze that will later become encased in concrete. The west tower is at 515 feet and will rise to

With a main span of 1,046 feet supported by 128 cables between two signature diamond-shaped towers, the 2.5 mile Ravenel Bridge will be the largest cable-stay span in North America. The state-of-the-art bridge will feature nine 12-foot lanes—four each for northbound and southbound traffic and one for bike and pedestrian traffic with benches and scenic lookout areas. Concrete-filled drilled shafts supporting the diamond towers disappear below the waterline 230 feet into the earth. A vertical clearance of 186 feet and a horizontal clearance of 1,000 feet—a significant increase from the current 155 foot vertical clearance and 500 foot horizontal clearance—will allow larger ships to pass through Charleston's port and allow more than one ship to pass at a time.

The project includes rock islands made of 650,000 tons of Newfoundland limestone at the base of the towers to protect the bridge from the impact of a shipping accident. A special design allows flexibility within the towers which enables them to withstand seismic activity, and cables have been designed to hold more than one million pounds.

The bridge is being built to last 100 years and survive 190 mph hurricane-force winds, seismic activity exceeding 7.4 on the Richter scale, and even terrorist attacks.

AN ENGINEERING MARVEL

The Arthur Ravenel Jr. Bridge, named after the legislator who championed its funding, will cost $630 million to build. That includes preliminary engineering and testing and pays for the office overseeing construction, but it does not include razing the two older bridges. At a price tag twice the state transportation department's annual construction budget, officials were creative in securing funding, including a $125 million loan from the S.C. Transportation Infrastructure Bank, a $215 million grant from federal monies (the Transportation Infrastructure Finance and Innovation Act), and $90 million from the State Ports Authority and local funds.

"The Citadel teaches you to be prepared. It's a hands-on college. You're a real person, not just a number," says Touchberry.
From outside his modular office on Morrison Drive where he begins his day at 6:30 a.m., Tom Messervy has a view of the emerging Ravenel Bridge as it begins its climb over the Cooper River. The first honor graduate from the class of 2000 has been working for PBC for more than two years now. A Citadel Scholar, he earned a master’s degree in civil engineering with a specialization in construction engineering and management. As a field engineer, Messervy is working on the Charleston high-level approach and the main span. 

The project, he says, is a design build project. “Although we know what it’s going to look like, where the piers and the towers are going to be, there are some things—like drainage and electrical specs—that are being figured out along the way. It saves a lot of time to finish the design as you go.” Messervy is supervising the installation of the post-tensioning cables on the Charleston high-level approach. The post-tensioning system gives the pier caps topping the columns the capacity to hold the structural steel, road deck and traffic. A typical cap has four sets of cables stressed to approximately 1.5 million pounds each. After being fitted, the cables are stressed with a jack. One of the jacks being used in this process weighs almost 6,000 pounds.

Working with Messervy as field engineers are Al Hughes, ’99, who was the first Citadel graduate to sign on with PBC, and James Warmoth, ’00, whom Messervy helped recruit. “The size of the project is the most exciting aspect of the job,” says Warmoth, who has a master’s degree in structural engineering from Virginia Tech. “On other projects, there’s a formula. Everything has been done before, but here everything is custom made—everything is unique to this project.” Messervy also helped recruit Joel Wells, ’00, Wells, who earned a master’s degree in international business from the University of South Carolina, is PBC’s cost engineer. Field engineers report to him, and he tracks their work and puts together a labor cost report that helps with quantity reporting and scheduling production crews. Moses Gamez, ’03, also with PBC, is a quality control inspector.

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The Citadel Foundation raises scholarship funds that enable The Citadel to attract top students and prepare them for a lifetime of leadership. Through money donated by alumni, parents and friends, the college is able to provide more than $2 million in scholarships annually to more than 500 cadets. And through their gifts to The Citadel Foundation, donors are helping educate some of the brightest young engineering minds, who, like these young grads, are building a bridge into the future.

All of The Citadel engineers working on the Cooper River bridge project received some form of Citadel Foundation scholarship money. Tom Messervy was a Citadel Scholar, receiving a four-year scholarship for academic distinction, while Russ Touchberry received The Citadel Foundation’s Leadership Scholarship and a Brigadier Foundation track scholarship.

Col. Dennis Fallon, dean of The Citadel School of Engineering, is not surprised by the role these graduates are playing in what will soon become a Charleston landmark.

“The faculty of the civil and environmental engineering department does an excellent job in providing Citadel graduates the groundwork to take on the professional responsibilities required to design and construct structures like the Cooper River bridge,” Fallon says. “But this groundwork could not be provided if it were not for the support of The Citadel Foundation. The Citadel Foundation not only provides for scholarships to help these bright young people attend college, it also provides much of the funds to keep the department technologically abreast with the latest laboratory and computer equipment.”

To find out how you can make an investment in the future of a young cadet, call The Citadel Foundation at 843.953.5297 or go to www.Citadel.edu/tcf. A Citadel Foundation investment—it yields a great return and helps build bridges to the future.

“The Citadel lays a foundation that makes learning new skills in the field that much easier. No school can prepare you for every problem in the field. The Citadel teaches you the method to solve problems and overcome challenges,” says Messervy.

Years from now after the Arthur Ravenel Jr. Bridge has become a Charleston icon and Touchberry and Messervy have built more bridges, young Citadel engineering cadets will look to the bridge for inspiration to continue the tradition of these graduates. A Citadel education, like this construction site, generates a very visible, well-respected product that will weather the storms of time and will have an impact on society for years to come.

Cable casings—white polyethylene pipes 223 to 807 feet long, 8 to 12 inches in diameter—rest on small trolleys fashioned out of halved one-foot lengths of sewer pipe with lawn mower wheels attached by threaded rods. The trolleys, an inspiration of one of the site foremen, are placed about every 15 feet and make maneuvering the unwieldy casings much easier. The pipes will be threaded with 37 to 91 steel strands one inch in diameter to form cables and will be anchored from the roadbed to the tower legs. The cables will vary in size depending on their distance from the towers.