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U.S. Cold War Submarine Memorial

The versatility of Keystone retaining walls offer solutions to a whole host of construction challenges—but new ground was broken with the ambitious re-creation of a nuclear submarine in Charleston, South Carolina,

Planners of the U.S. Cold War Submarine Memorial at Patriots Pointe in Charleston, South Carolina had a major design challenge to overcome. How do you faithfully recreate the smooth black hull of a submarine, short of actually transporting the mammoth vehicle to the site? And, whatever the method for re-creating the hull, it would also have to mesh seamlessly with the submarine sail planned to sit atop the memorial.

Robbie Boland of Keystone supplier Keystone Group developed the solution. The project planning group made up of retired Navy admirals, architects and contractors embraced his proposal for building the submarine with Keystone Straight Faced Compac units. “In order to replicate the hull of a real submarine, we decided that a mortarless masonry unit would provide the most flexibility in terms of creating and constructing the unique shape,” said Boland. “If conventional masonry had been used, the mortar joints would have been visible, thus taking away from the authenticity of the structure. And, in order to make the color match the conning tower (or sail) on top of the hull, it was decided that a masonry stain could be fabricated to a rich black color and applied after the walls were completed.”

Area soil conditions were a substantial challenge for the project planners. “The building site on Charleston Harbor was constructed over the course of many years with fill from harbor-dredging,” said Mike Revis, a geotechnical engineer with S&ME, Inc. of Spartanburg, South Carolina. “The bearing capacity of the area was obviously going to be inadequate.”

The submarine structure is supported by over forty 12” precast driven piles that are interconnected with a precast pile cap. The 55-ton sail and fairwater planes from the decommissioned USS Lewis and Clark are supported with cast-in-place concrete walls and attached to the Keystone units with a geogrid connection to steel angles. The Keystone Compac walls are assembled in the near-vertical pin position with the wall footings angled toward the inside of the structure. This 14-degree “tilt” mimics the taper of an actual submarine without showing the staggered setbacks common to segmental retaining wall construction. The top deck of the submarine is constructed with a flexible paving system that utilizes clay paving bricks— also tinted black with masonry stain.

This unique wall application was a welcome challenge for project contractor Jay Foreman of Colony Construction Company. “I could tell it was going to be a very different kind of job during the bidding process,” he said. “We had never done anything remotely like it before— but it still turned out to be one of my favorite jobs. And, locally, it’s gotten a lot of positive recognition. People are always interested when I tell them we worked on the memorial.”

According to Boland, a Keystone design was selected for the project because Keystone proposed a total team approach with coordination between Keystone and the wall engineer, soils engineer, wall installer and general contractor. Oversight by the wall engineer was critical because of the substantial ground improvement that had to be completed prior to construction.

Keystone is proud to be associated with this memorial project that honors the contributions of the men and women serving around the world in our Armed Forces.

