

Civil Engineering Publishes "Rebuilt to Last"



Baltimore, MD - In March 2009, "Civil Engineering," an ASCE international engineering magazine published, "Rebuilt to Last," written by John Watts, P.E., M.ASCE, Senior Project Engineer in WR&A's Marine Engineering Division and Paul A. Harren, A.M.ASCE, Engineering Specialist and Dry Dock Maintenance Engineer at General Dynamics Electric Boat.

The article explains how a short-term repair, concentrated on the failed sheet pile interlock in one graving dock, evolved into an investigation to determine the existing condition of all three of General Dynamic Electric Boat's graving docks. The comprehensive data collection and subsequent study ultimately led to the wall strengthening, and life-extension project at Graving Dock Nos. 1 and 2. WR&A conducted the long-term life extension study,

designed the renovation solution, provided construction support services, and supported U.S. Navy Recertification efforts.

The development of design criteria required cooperation and acceptance between Electric Boat, Whitman, Requardt & Associates, LLP, and the U.S. Navy. The chosen strengthening scheme involved an innovative hybrid design, which utilized the existing cellular cofferdam fill for global stability, and placement of new reinforced concrete to encapsulate the existing structure. The \$67 million renovation involved placement of 37,000 cubic yards of marine-grade concrete, 2,750 tons of reinforcing steel, 260 high-strength tie-rods, and over 100 rock anchors. In addition to extending the service life of two aging cellular cofferdam graving docks by more than fifty years, the renovation also allowed Electric Boat to significantly reduce facility operation and maintenance costs.

To read more about this project, visit [www.wrallp.com/services/marine/dry docks](http://www.wrallp.com/services/marine/dry%20docks). For more information on WR&A's graving dock and other marine engineering capabilities, please visit our web site at www.wrallp.com