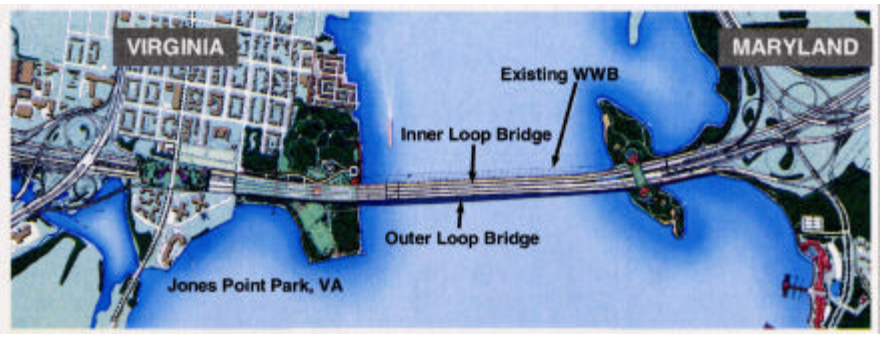

Mueser Rutledge
Consulting Engineers

Top: Location of Bridge. Lower left: Potomac River Cofferdams. Center: Pile driving under water. Lower right: Production piles under construction and a static load test frame.

Woodrow Wilson Bridge Replacement

Washington, DC

Scour-prone subsurface conditions, the fast-moving Potomac River, and a need for a new high traffic volume bridge along a key route in suburban Washington DC complicated the foundation design for the new Woodrow Wilson Bridge. Construction started in June 2001, with the foundations completed in April 2005. The superstructure of the bridge will be completed in 2006 with opening of the north (outerloop) bridge in 2007. Mueser Rutledge Consulting Engineers (MRCE) of New York City, subconsultant to the Parsons Transportation Group (PTG) team, served as the geotechnical and foundation engineer to the Maryland State Highway Administration for this much-needed new bridge.

The 6,000 foot long new bridge is a twelve-lane structure that incorporates a 367-ft long moveable bascule span that crosses the main river channel where the water depth is about 36 ft., providing a 174 ft wide navigation channel. It is designed to accommodate 300,000 vehicles daily and is being constructed next to the existing bridge over the Potomac River where it is a key route to the Washington DC metro area.

MRCE performed vital design phase testing, including a Pile Demonstration program and a Soil-Structure Interaction analysis involving state-of-the-art seismic modeling techniques. Vibration monitoring was performed during pile driving at varying distances, including on the existing bridge foundations. These tests enabled the designers to optimize the foundations for the new bridge, resulting in significant cost savings for the project. Additional services involved the evaluation of subsurface conditions, advising the team on alternative foundations for piers, design of pile foundations, bridge piers, ship collision protection and fendering. The design of the bridge foundations utilized high capacity steel pipe piles and prestressed concrete piles. The vessel collision design study utilized the 1991 AASHTO Guide Specifications (Method II Analysis) for Vessel Collision Design of Highway Bridges. MRCE studied alternative pier protection systems and prepared the final design for the selected pier protection structure, a concrete ring beam on steel pipe piles, to satisfy pier protection requirements while limiting scour at the bascule span. Seismic loading, vessel impact, and scour were critical elements in designing for lateral loading while limiting deflection of the bascule piers.