

Chatham Bridge Superstructure Replacement and Widening

The Chatham Bridge Project consisted of a \$17.8 million dollar accelerated bridge widening and superstructure replacement in the City of Fredericksburg, Virginia. The project replaced the existing structural deficient 4-lane structure built in 1941 over the Rappahannock River. The replacement also provided an opportunity to widen the superstructure to allow for the construction of a shared use path connecting the Stafford County Belmont Trail to downtown Fredericksburg. The shared use path also included a scenic overlook for the Rappahannock River

The replacement required extensive coordination with local stakeholders to gain approval for a full superstructure replacement under complete traffic closure for just 16 months. The project had originally contemplated a 30+ month phased construction. Fredericksburg District staff devised an innovative sister project to improve critical intersections along the proposed detours that would remain as permanent improvements following the construction. The project completed right on schedule with the accelerated timeframe and met all historical, cultural resources, and environmental commitments without incident.

The project itself required extensive innovation in concrete construction. The existing structure to be replaced featured an aesthetic church railing that had become synonymous with the aesthetic of Downtown Fredericksburg. The railing would have to be replaced in kind while meeting modern traffic safety and durability standards also incorporating new LED street lighting. The shared use path required construction of a separation barrier wall and terminal walls to physically separate shared use path users from vehicular traffic. This barrier too had to be constructed in a manner to not detract from the historical character of the bridge.

The City of Fredericksburg Bank abutment and approach slab featured a very unique constraint. The existing abutment had only a 4' separation from the adjacent Historic Old Stone Warehouse. Significant resources were invested in the structural evaluation of the Old Stone Warehouse, which yielded that the building itself was extremely susceptible to construction vibrations and/or any imposed loading from the new construction. The widened structure would bring the limits of the new bridge to within an inch of the Old Stone Warehouse itself. To accommodate the constraints of the Old Stone Warehouse, a special design moment slab was designed allowing the structure to be widening without any additional loading to the Old Stone Warehouse. The design was so successful in its function that no significant excavation had to be performed in the limits of the Old Stone Warehouse.

To add even further innovation and complexity to the project, the new widened superstructure was to be jointless in nature featuring only two expansion joints overlying special designed Virginia Pier Caps. These caps feature a unique design to prevent water contact with the underlying weathering steel girders and therefore reducing long term maintenance and corrosion, the jointless nature also required a highly controlled and planned pour sequence. In the end the new Chatham Bridge deck is one of the highest quality decks constructed by VDOT. The low shrink lightweight concrete deck is near flawless with regard to shrinkage cracking and final finish.

Final quantities of concrete used on Chatham included 1,754 CY of Lightweight Deck Concrete, 359 CY of Lightweight Railing Concrete, 372 CY of Lightweight Pier Cap Widening Concrete, 249 CY of Abutment Widening and Wingwall Concrete, and approximately 8 CY of Substructure Repair Concrete.