

Innovative Geotextile Fabric Formwork

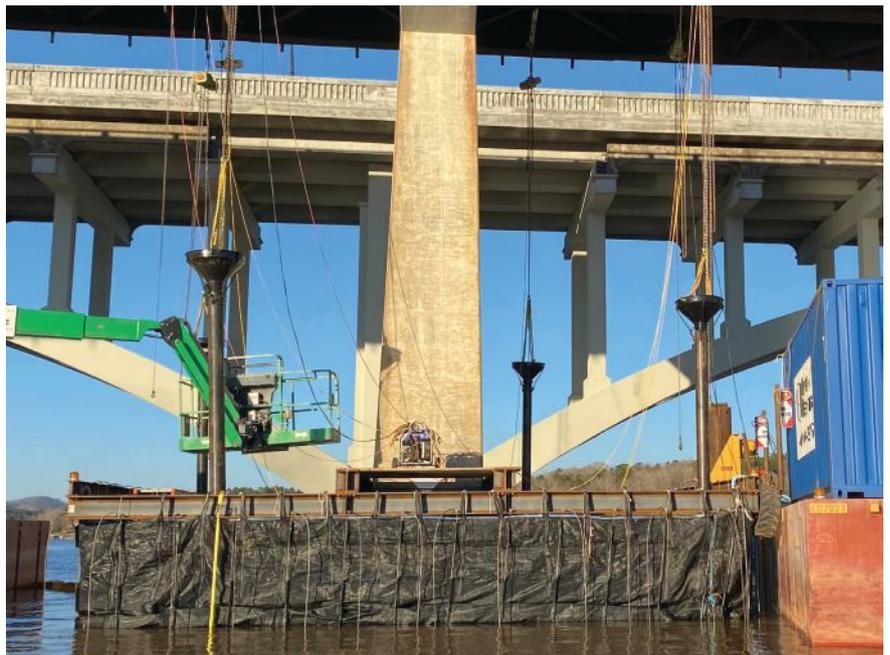
by Nick Fasano, TrapBag

When PCL Construction reached out to TrapBag Barrier Systems, a leading manufacturer of geotextile fabric forming products and other patented geotextile products, about the Lake Tillery Bridge rehabilitation project in North Carolina, we were presented with a unique situation (see the Project article on page 18 for additional details). The project involved placing concrete underwater to encase an existing bridge pier footing that was cracked due to alkali-silica reactivity. After reviewing the original plans and scope for the required underwater footing encasement on this bridge, the contractor realized that the means and methods could be improved. There were safety concerns about installing standard forming systems on the uneven surfaces at 35 ft of water depth and zero visibility, as well as containing the concrete silica plume.

The bridge that needed pier repairs required a 2-ft-thick reinforced concrete protective layer to be cast around the pier footing more than 30 ft below the surface of the water. A cofferdam was ruled out as unfeasible at this challenging location, and conventional forming was impractical due to irregularities below the footing, congested reinforcing steel in the encasement layer, zero visibility in the water, and concerns about silica being introduced to the water. To address this challenging situation, the PCL and TrapBag teams worked together for months to design a reinforced-fabric forming system that would satisfy the requirements of the contract drawings and structurally withstand the anticipated loadings. Ultimately, they designed a custom 170 × 40 ft forming system that used multiple layers of reinforced proprietary geotextile fabric as the concrete formwork material to encase the entire pier footing and extend out of the water. The fabric forming system was constructed with three layers of fabric and vertical webbing as well as vertical fabric channels for suspension cables. The fabric and cables were anchored to the uneven pier footing base and then suspended from a frame that was supported from the pier shaft. Hoists suspended from the bridge above were used to support and move the tremie tubes for placing concrete under water. This facilitated a safer and faster installation, accommodated the uneven surfaces to be repaired, and provided excellent containment for the underwater concrete silica plume. Upon completion, the fabric form was easily removed. 



The North Carolina Department of Transportation approved the fabric concrete forming system using multiple layers of reinforced proprietary geotextile fabric developed by TrapBag Barrier Systems for the repair of a footing for the Lake Tillery Bridge rehabilitation project. All Photos: PCL Construction.



Innovative concrete formwork was developed for the footing repair on the Lake Tillery Bridge rehabilitation project. The 170 × 40 ft custom reinforced-fabric forming system encased the entire pier footing and extended out of the water. The fabric and cables were anchored to the uneven pier footing base and suspended from an I-beam frame above the water surface. Tremie pipes with attached funnels that were used for placing concrete under water are visible near each corner of the forming system.

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