

## Precast Electrical Duct Bank

### CASE STUDY: EAST NEUSE REGIONAL PUMP STATION AND FORCE MAIN

**Project Details:** East Neuse Regional Pump Station and Force Main Raleigh, N.C.

**Owner:** City of Raleigh

**Precast Producer:** Contech Engineered Solutions, Nicholas Krug, PE - Engineering/Sales

**Project Engineer:** CDM Smith, John Carr - Lead On-site Inspector

**Contractor:** Park Construction of North Carolina, Joshua Rogers - Project Manager

### RED-E-DUCT SPEEDS DUCT BANK INSTALLATION UNDER NEUSE RIVER IN RALEIGH, N.C.

#### Description

The river crossing for the East Neuse Regional Pump Station and Force Main project in Raleigh, N.C., faced an extremely tight construction window and high potential for flash flood-inducing storms. Finding an efficient solution for getting in and out of the river quickly was essential.

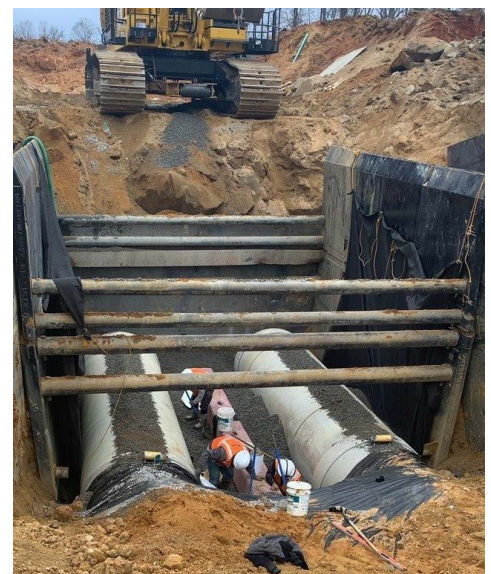
The project was a component of system improvements designed to divert wastewater flow from the Neuse River drainage basin directly to the East Neuse Pump Station, according to the City of Raleigh. The project will also eliminate one upstream pump station and relieve demands on existing infrastructure.

As part of that project, Park Construction was required to install dual 1,000-foot 72-inch gravity sewer lines, crossing under the Neuse River and terminating at the future East Neuse Regional Pump Station. In addition to the dual pipeline, they installed an electrical duct bank at approximately the same depth, with the four required conduits that will carry electrical and communication from the pump station to junction boxes across the river.

#### Numerous Obstacles

Approaching the water-tight duct bank installation with traditional cast-in-place techniques would have amplified the project's many challenges. First was the deep excavation and 1,000-foot length, which presented time constraints, shoring requirements, and additional safety concerns. Closing off the river (at low flows) could only be accomplished in 60 percent intervals and required extensive coordination with the project team. Since the success of this portion of the project relied heavily on river levels, proper coordination was paramount to success.

In addition, the installation had to take place during a three-and-a-half-month period—May 1 to August 15—due to environmental restrictions for work in the river. That time of year also coincides with frequent storms that lead to significant water level rise, so crews had to monitor weather closely and get in and out of the river as quickly as possible.



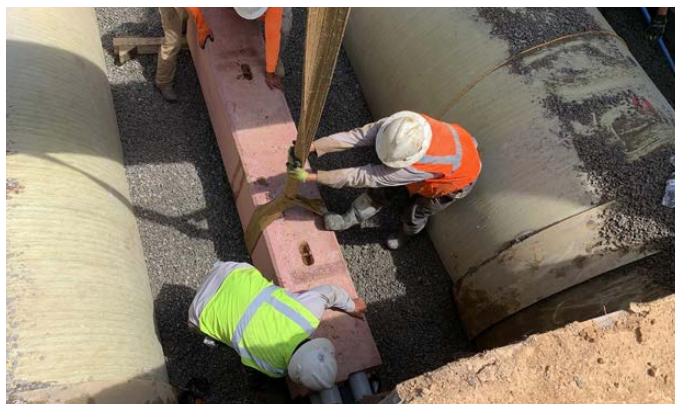
## A Precast Duct Bank Solution

Due to the number and types of challenges, Park Construction consulted with Contech about RED-E-DUCT, a precast underground duct bank solution. Precast in a factory setting, RED-E-DUCT was able to be produced prior to any field work commencing. RED-E-DUCT met the project requirements, including water-tightness, and eliminated the need for forms, tying reinforcing, placing concrete, and on-site concrete curing, allowing crews to complete installations more quickly and commence above-ground construction faster.

Park Construction's plan of action was to set up a cofferdam and lay about 60% of the pipe and precast duct bank across the river before the water rose above a manageable level. If they had used cast-in-place duct bank, the installation rate would have hindered their ability to efficiently complete the river crossing in the short window of low flows.

RED-E-DUCT's speed was essential for the short construction window. Park Construction waited for the river level to lower and for a favorable weather forecast before mobilizing into the river. A few days into the installation, the weather forecast changed for the worse, with 3 inches of rain projected. Utilizing RED-E-DUCT's precast construction, the Park Construction crew was able to complete the first phase of installation prior to the inclement weather. The duct bank installation would have taken considerably longer had they used the cast-in-place method.

"We were able to cut our time in half, at least," says Joshua Rogers, Park Construction's project manager. "We were able to install a section of pipes and duct bank much more efficiently. With cast-in-place, we would have had to utilize a more extensive shoring system in order to open up a much longer trench, cast the duct bank, and then backfill."



The project manager notes that RED-E-DUCT's attributes were just as beneficial for the sections outside of the river. "If we hadn't installed RED-E-DUCT, it would have changed our entire approach to laying the pipeline at those depths," he explains. "With this RED-E-DUCT system, we were able to install the duct bank sections quickly because they are set similarly to the pipe. This allowed us to progress with our work as we typically do, with very few changes. Ultimately, we were able to lay additional joints of pipe and precast duct bank during a day's time because of RED-E-DUCT."

The Park Construction team is more experienced with pipes, rather than conduit, so RED-E-DUCT made the unfamiliar process much easier, helping to avoid delays due to unfamiliarity. "To us, RED-E-DUCT is just like laying pipe—it fits into what we do well," he says. "There were so many things that allowed us to be more efficient."

John Carr, the CDM Smith lead inspector on the project, also hadn't worked with precast duct bank prior to the East Neuse project, and was extra cautious with his inspections, checking for proper seating of the joints and stone bedding, along with verifying the product's water-tight joints through video testing for leaks and other performance factors. No leaks were observed. "I was impressed with how everything went together," he says. "We didn't have to wait for crews to build the forms. It sped the process up quite a bit."

Along with its fast installation, RED-E-DUCT has undergone extensive testing to ensure a water-tight gasketed joint, along with traffic load joint testing, thermal resistivity, compressive strength, and more. The project engineer reviewed the system and determined it would remain water-tight, even at that depth. "It's a great product," Rogers says. "You don't have to worry about your frames, spacers, forming boards. You dig your trench, bed it, get it compacted, and roll. It's fast and easy."



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**CONTECH**  
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9100 Centre Pointe Drive  
Suite 400  
West Chester, OH 45069  
800-338-1122  
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U.S. Patent 20120298244. Other patents pending.