



2025 ?? Bridges 1-488N&S on N001 US 13 over Blackbird Creek

## Description

### Meta Fields





**Project Summary :** The new bridges are comprised entirely of precast elements: 120-ft-long deck bulb tee beams; stub abutments; prestressed piles; approach, sleeper, and moment slabs; and T-walls. To ensure proper connection between precast elements, Ultra-High Performance Concrete (UHPC) was utilized. This project marks DelDOT's first use of a UHPC mix that was batched off-site at a concrete plant and transported for placement in a ready-mix truck. Additionally, the profile of US 13 was raised approximately 8.5 ft to address pre-existing sight distance issues and improve driver safety. To accommodate the heavily accelerated construction timeline, Foamed Glass Aggregate (FGA) was chosen as a backfill.

**Project Location :** Adjacent bridges on US 13 Northbound and Southbound over Blackbird Creek north of the town of Blackbird, Delaware

**Mobility Impact Time :**

- ABC: closure 44 Calendar Days (BR 1-488N: 43 days & BR 1-488S: 37 days)
- Conventional: approximately 1.5 Years

**Impact Category :** Tier 5 (within 3 months)

**Dimensions :** Two 120-ft-long single-span concrete adjacent deck bulb tee beam bridges, 51.5-ft-wide in each direction

**Average Daily Traffic At Time Of Construction :** 19624

**Traffic Management :** Extended use of contraflow to accommodate phased construction. This would have significantly increased the construction timeline as well as the project limits.

**Existing Bridge Description :** US 13 is 4-lane divided highway, classified as a Minor Arterial. Bridge 1-488S, ranked first on Delaware's list of deficient bridges, was a 42-ft-long concrete arch bridge built in 1920. Bridge 1-488N was a 40-ft-long concrete rigid frame built in 1933. The existing bridge was identified for replacement because it experienced severe corrosion and loss of fill around the pipe culverts that could have led to an eventual failure. Bridge 1-488S was both structurally and hydraulically deficient. The concrete arch had significant spalling, cracks, and corrosion of exposed bar reinforcement. Bridges 1-488N&S both experienced scour issues due to the stream constriction created by their undersized span lengths. Due to their short timber piles, the bridges were considered scour critical. In addition to their structural and hydraulic deficiencies, both bridges were located at the bottom of a severe vertical sag curve. The roadway profile at the location of these bridges was substandard for stopping sight distance, leading to a high accident rate for vehicles trying to merge onto US 13.

**Replacement Or New Bridge :** The two new bridges are comprised entirely of precast elements: 120-ft-long deck bulb tee beams; 55-ft-long stub abutments; 50-ft-long prestressed piles; approach, sleeper, and moment slabs; and T-walls. To ensure proper connection between precast elements, Ultra-High Performance Concrete (UHPC) was utilized. Foamed Glass Aggregate was chosen as a backfill.

**Construction Method :** US 13 is a 4-lane divided highway and one of Delaware's main thoroughfares. Given the high Annual Average Daily Traffic (AADT) and public exposure at this location, DelDOT used ABC techniques in lieu of conventional methods to replace both bridges. To accommodate the accelerated construction schedule and the need to raise the profile of US 13 approximately 8.5 ft, the new bridges are comprised entirely of precast elements, with UHPC transverse joints connecting the adjacent beams and approach slab segments. DelDOT expects the construction of these new bridges will provide a 100-year service life. *Precast Elements* A single row of eight 16-inch x 16-inch, 50-ft-long piles were used to support the abutments on each side of the bridges. The pile driving took roughly one 10-hour shift per abutment and was finished over the course of four days, allowing the rapid erection of the precast abutment sections. Each substructure consists of two 55-ft-long precast concrete variable height stub abutments, each set in roughly an hour over four days. Closure pours consisting of Type I, 4.5-ksi concrete with a 2% high-early-strength admixture were used to connect the piles to the abutments. By using this concrete mix, the contractor was able to place the beams four days after performing the closure pour. With the abutments in place, the contractor then began placing the precast concrete T-Wall segments. The use of the T-Wall system

