

Marc Basnight Bridge

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Oregon Inlet, NC

Since 1963, the Herbert C. Bonner Bridge has spanned Oregon Inlet, providing a vital link along North Carolina's pristine Outer Banks, but requiring near-constant maintenance and repair as it battled treacherous currents, constantly shifting bathymetry, and violent storms. Its \$252M replacement, the Marc Basnight Bridge, provides a 100-year service life, resists up to 84 feet of scour, and provides a reliable, safe passageway for residents and visitors. The collaboration afforded by design-build delivery, with HDR as lead designer, produced an optimized design with minimal environmental impacts and a bid price \$25.8M below NCDOT's estimate.

The existing bridge crossed the Oregon Inlet from Bodie Island to Hatteras Island on the Outer Banks barrier island system, and lied within both the Cape Hatteras National Seashore and the Pea Island National Wildlife Refuge. At 56 years old, it suffered from severe deterioration and scour problems. It is the only access route to and from Hatteras Island and is a critical hurricane evacuation route. The replacement bridge provides a new link to Hatteras Island with a 100-year service life.

The 2.8-mile long replacement bridge includes a 3,550-foot long post-tensioned segmental superstructure unit with 350-ft spans crossing a 2,400-foot navigation zone. The remaining 71 spans consist of prestressed girders and cast-in-place deck with spans ranging from 85 feet to 182 feet.

The Oregon Inlet—a highly dynamic and constantly shifting inlet—was a challenging site for bridge construction. Scour of up to 84 feet is anticipated, and the bridge will be subject to high wind loads, wave action forces and vessel collision. The project involved extensive, complex 2D hydraulic modeling, scour analysis and physical model scour testing to quantify the depth of scour under various conditions, and extensive use of refined soil-structure interaction analysis to optimize the foundation designs. Precast concrete was used extensively to enhance the quality and durability of the structure, facilitate faster, safer and more economical construction, limit environmental impacts, and to help mitigate challenges posed by the remote site and dangerous

construction conditions.

Precast elements include 36-inch square prestressed piles, 54-inch prestressed cylinder piles, post-tensioned solid segmental columns, post-tensioned hollow segmental columns, bent caps, prestressed FIB girders, and post-tensioned segmental box girders erected using the balanced cantilever method.

HDR was the lead design firm, responsible for all structural design, roadway design, geotechnical design, drainage design, and environmental permitting, as well as management of 2D hydraulic and scour analysis, subsurface investigations, utility coordination, and survey and design services.

Key Features

Design-Build Project Delivery
Post-Tensioning
Segmental
Navigation Channel

Project Construction Cost

\$252M

Year Completed

2019

HDR Scope of Services

Lead Designer

