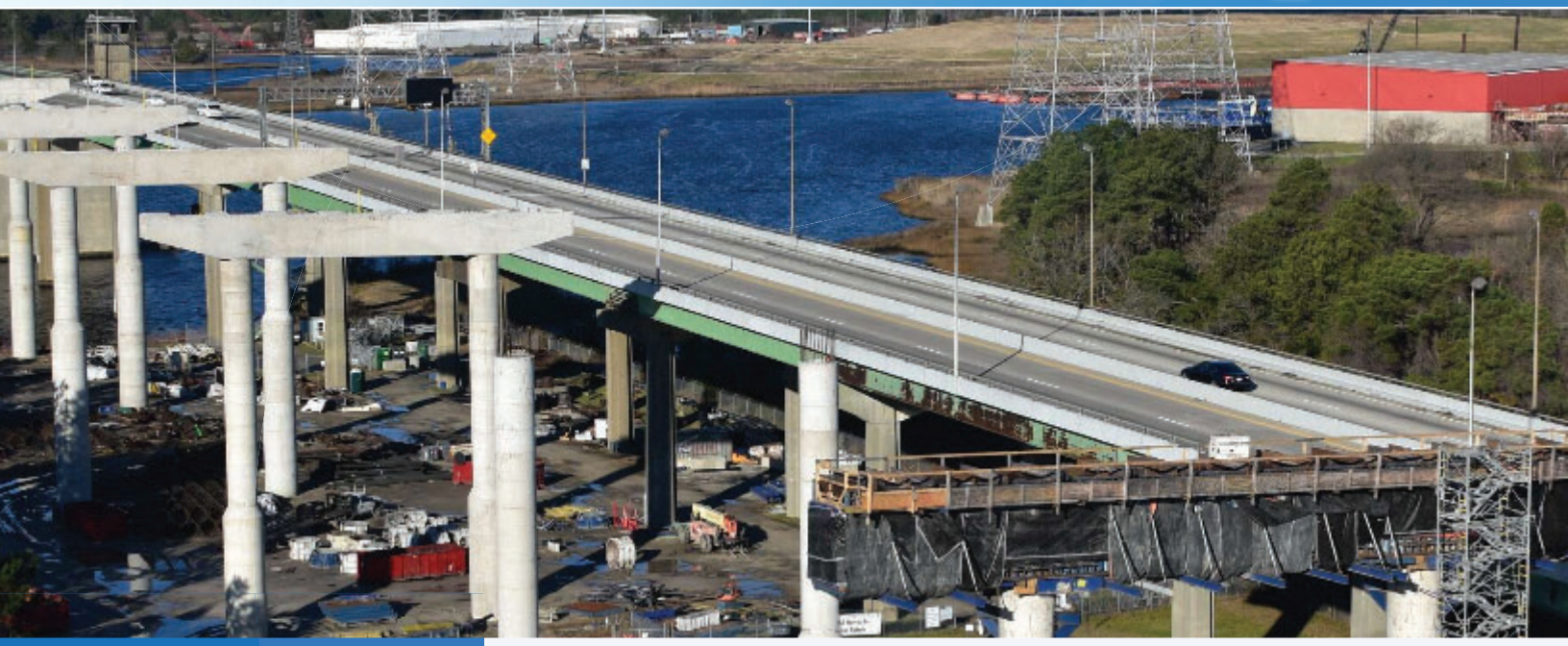
AASHTO

AASHTO INNOVATION INITIATIVE



FAST FACTS:

Carbon Fiber Reinforced Polymer Strands

PROJECT LOCATION:	Chesapeake, Virginia
AGENCY	Virginia Department of Transportation Hampton Roads Transportation Accountability Commission Federal Highway Administration
URL:	*64highrise.org/about_the_project/default.asp* *aii.transportation.org* (select *Carbon Fiber Reinforced Polymer Strands*)
PROJECT NAME:	I-64 Southside / High Rise Bridge
PROJECT DESCRIPTION:	The project includes roadway and bridge improvements along nine miles of I-64, including adding one managed lane in each direction and an additional high rise bridge south of an existing bridge. At the completion of the project, the existing bridge will carry only I-64 east traffic (toward I-264/ Bower's Hill), while the new bridge will carry I-64 west traffic (toward Virginia Beach).
STATUS: IN PROGRESS:	The project has been under construction for approximately 1.5 years. Work is currently proceeding at night and on weekends on various segments of the roadways and bridges.

PROJECT PURPOSE AND NEED:

In March 2013, the Hampton Roads 2034 Long-Range Transportation Plan was amended to include an environmental study for the improvement of the Interstate 64 (I-64) corridor from I-464 to I-664/264, including the High Rise Bridge. The purpose of the environmental study was to develop alternative solutions to address insufficient transportation capacity and correct roadway and bridge deficiencies throughout the corridor. The Draft Environmental Assessment was approved by Federal Highway Administration in October 2014.

In March 2015, the Commonwealth Transportation Board (CTB) identified Candidate Build Alternative 2 – the addition of two lanes of capacity in each direction including the construction of a new bridge and replacement of the existing bridge, with a decision regarding the management option to be made at a later date. In its resolution, the CTB encouraged the Hampton Roads Transportation Planning Organization (HRTPO) and the Hampton Roads Transportation Accountability Commission (HRTAC) to work with VDOT to identify funding for inclusion in the HRTPO planning documents and to determine the appropriate management option(s) for the corridor.

OVERALL BUDGET / COST ESTIMATE:

$409.6 million

WHAT WAS UNIQUE ABOUT THIS PROJECT?

Currently, the project is one of the largest highway construction projects in Virginia, with significant highway traffic and maritime traffic crossing under the bridge. The elevation of the new bride was increased to address maritime traffic.

DESCRIBE TRADITIONAL APPROACH:

Concrete with traditional steel materials, which mainly follow the ASTM A 416, grade 270 low relaxation strand designation, are uncoated, and subject to corrosion, section loss, and eventually loss of prestressing force. This becomes an even greater issue with piles in certain geographic locations since a pile can be placed in a splash zone of a saltwater environment resulting in the pile being exposed to salt with daily wetting and drying cycles. This aggressive environment can reduce the service life of these elements, leading to costly repairs.

DESCRIBE NEW APPROACH:

The project will use a corrosion free option for prestressed piles that requires special handling during production but once cast performs like conventional piles.

During casting, CFRP strands are handled with care and ends prepared with protective material to prevent damage since they are brittle especially in the direction perpendicular to the fibers. During placement and while in service, CFRP strands behave similarly to steel strands at service loads. Concrete handles compression whereas the CFRP strands handle tension in piles. The main difference between the two options is at ultimate load. The CFRP used in the project has higher ultimate strength compared to the steel strands. However, the more brittle nature of CFRP strands when compared to conventional steel strands and the limited experience of fabricators with this material has capped the prestressing stress to 65% of the ultimate strength at this time.

TOP INNOVATIONS EMPLOYED:

CFRP reinforced piles will be corrosion free.

PRIMARY BENEFITS REALIZED TO DATE:

Due to the limited exposure to date of this structure, the primary benefit of longevity has not been realized.

OTHER BENEFITS REALIZED / EXPECTED:

This location has significant highway traffic with maritime traffic crossing under the bridge, so corrosion free prestress piles will minimize maintenance and traffic disruptions.

PROJECT START DATE / SUBSTANTIAL COMPLETION DATE:

Summer 2018 through July 2021

AFFILIATIONS:

Granite Parsons Corman Joint Venture

PROJECT CONTACT:

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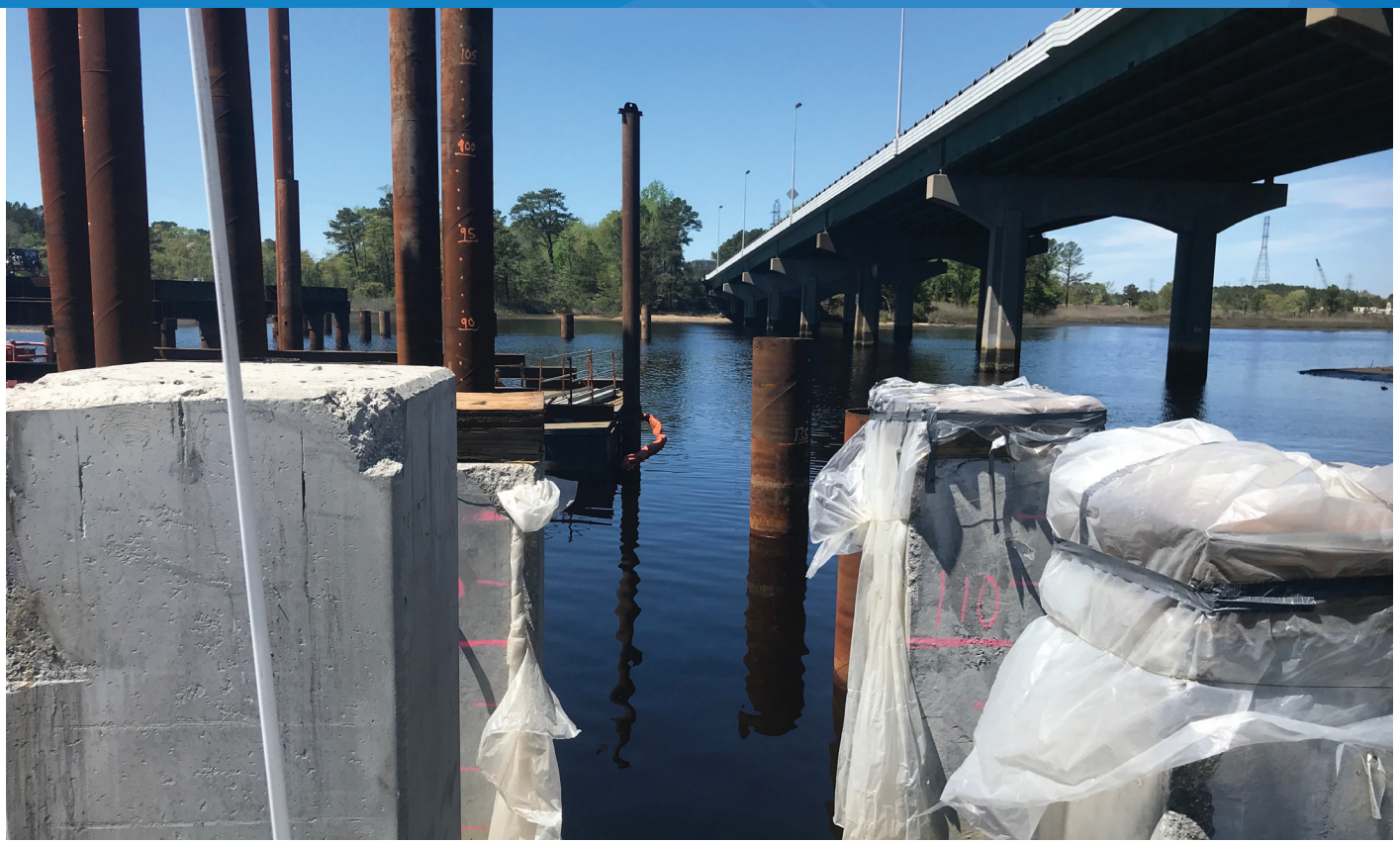
REFERENCES:

Project Website: *http://www.64highrise.org/about_the_project/default.asp*

AASHTO Innovation Initiative

Visit *aii.transportation.org* and click on
Carbon Fiber Reinforced Polymer Strands



This photograph shows precast concrete CFRP reinforced piles after driving. These piles are part of the High Rise Bridge with the CFRP used as the reinforcement for the 36-inch square prestressed concrete piles that are located in the water.

This photograph shows construction underway on High Rise Bridge.