

PROJECT NAME: NEWPORT BRIDGE UHPC OVERLAY



Photo: View of the 3.4 km long Newport Pell Suspension Bridge, Rhode Island, USA

Location: Rhode Island, United States

Owner: RITBA

Product: ceEntek ce200SF-t™

Product Volume: 4.5m³ (5.85cy)

Job Area: 10' x 81' x 1.75" (3m x 24.7m x 45mm)

Completion Date: September 2020

PROJECT SITE

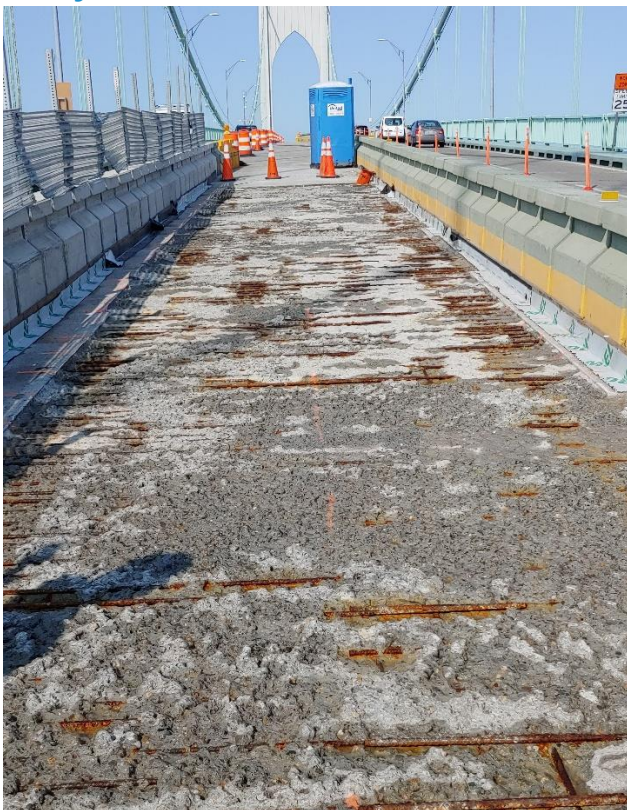


Photo: Deck after hyro-demo and prior to placing overlay

The Claiborne Pell Bridge, commonly known as the Newport Bridge, is a suspension toll bridge built in 1969 in Rhode Island (northeastern United States). It is operated by the Rhode Island Turnpike and Bridge Authority (RITBA) and spans the East Passage of the Narragansett Bay. The bridge, part of RI 138, connects the City of Newport on Aquidneck Island and the Town of Jamestown on Conanicut Island. The Newport Bridge is 3,428 meters (11,247 ft) long, placing it at number 87 among the longest suspension bridges in the world. Its main towers reach 122 meters (400 ft) above the water surface, and the roadway height reaches as high as 66 meters (215 ft). The bridge is four lanes wide, two in each direction. The lanes had undergone severe damage due to frequent traffic of heavy fleet of cars and required rehabilitation since it is an important transit zone for the residents of Aquidneck and Conanicut Islands.

PROJECT PROFILE

PROJECT DESCRIPTION

When Rhode Island Turnpike and Bridge Authority (RITBA) evaluated the options to provide a rapid rehabilitation of the concrete roadway deck of 4,500 feet to the bridge eastbound center lane they decided to apply a 4.5 cm (1 ¾") thick UHPC overlay to extend the life of the bridge deck. Two challenges when rehabilitating a suspension bridge deck are no increase in dead load and placing an overlay while the suspension bridge is constantly moving from heavy traffic and high winds. ceEntek was selected for this project due to its "Best in Class" service and the ability of its Next Generation UHPC 2.0™ thixotropic system to meet the project demands.



Photo: Batching of ce200SF-t™ in ceEntek's Model 30 UHPC mixer

PROJECT EXECUTION

The thixotropic ce200SF-t™ UHPC was supplied in 2370 lb (1075 kg) bulk-bags and batched on site with ceEntek's UHPC Mixers, with addition of 0.2 mm x 13 mm (0.008" x 0.5") steel fibers and ceEntek's CNF enhanced paste. One bulk-bag per batch provided 0.65 cy (0.5 m³) of UHPC. The batched material was transported in buggies from the mixing station to the adjacent work lane where it was deposited at a 4% slope, consolidated, and graded with a vibrating screed. The mixes were designed to have a very low flow in-order to stay in place on the sloping bridge deck. Once the vibrating screed induced the energy into the mix, it was fluidized to be self-leveling to facilitate a smooth surface and a good bond at the interface of the substructure. After the vibrating screed had passed over the material it held its profile on the sloping grade. Immediately following the passing of the screed over the surface of the material, curing was started by the application of two coats of spray-on white pigmented curing compound. The material achieved compressive strength of over 10,000 PSI (70 Mpa) in 32 hours. This UHPC overlay will provide RITBA with a durable riding surface and reduced future "out of service" time from fewer lane closures due to repairs.



Photos: Placement of ce200SF-t™ (L); Leveling of ce200SF-t™ with vibrating screed and applying curing compound (C); Freshly placed overlay (R).