Ultra High Performance Concrete for Bridge Repair

OVERVIEW OF INNOVATION

An NJDOT pilot project demonstrated that UHPC overlay will provide durable bridge decks that will extend the service life of the structures. Additionally, the project showed that UHPC overlay construction methods can minimize traffic interruptions and shorten the total construction time.

NJDOT installed three UHPC bridge deck overlays as pilot projects. One of these projects, completed on a bridge spanning the Newark Turnpike, included both a UHPC bridge deck overlay and field-cast UHPC joint headers.

This curved 3-span bridge, originally built in 1979, feeds nearly 30,000 vehicles per day from the New Jersey Turnpike onto I–280. The heavy traffic and the impact of de-icing salts resulted in corrosion of the reinforcing steel in the existing bridge deck, as well as the deterioration of all abutment and pier expansion joints.

Prior to installation of the UHPC overlay and field cast UHPC headers, the existing asphalt overlay and deteriorated expansion joints were removed. A new UHPC header expansion joint solution was installed, and after installation the finished UHPC overlay was covered with asphalt.

The resulting 340-foot UHPC overlay is currently the longest continuous overlay installation in North America.

Source: New Jersey Department of Transportation

BENEFITS

UHPC bridge overlays offer superior bond strength, compressive strength, lower permeability, more resistance to freeze thaw-damage, good abrasion resistance, and rapid cure times, among other benefits.

Increases safety and efficiency due to fewer days required for construction, and less impact on the traveling public due to traffic interruptions.

FIND OUT MORE . . .

NJ STIC, UHPC for Bridge Preservation and Repair in NJ
https://www.njdottechtransfer.net/UHPC-bridge

UHPC Overlays for Bridge Preservation—Lessons Learned, NJDOT
https://www.njdottechtransfer.net/UHPC-workshop

New Jersey Department of Transportation

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Structures, Construction, Pavement, Materials

EXAMPLE - Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE)

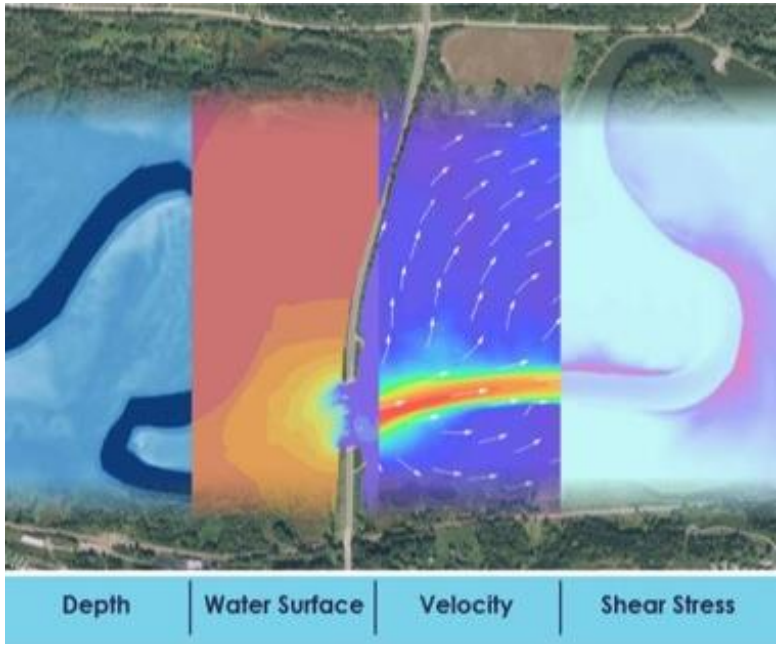
OVERVIEW OF INNOVATION

Next-generation hydraulic tools improve the understanding of complex interactions between river or coastal environments and transportation assets, enabling better design, enhanced communication, and more efficient project delivery.

Two-dimensional (2D) hydraulic modeling software, graphical interfaces, and supporting resources are now available that can be applied to infrastructure design to improve understanding of the complex interactions between river or coastal environments and transportation assets. Recent advances in computer hardware, modeling software, Geographic Information Systems, and survey practices have made 2D modeling very efficient, intuitive, and accessible to engineers and designers.

Because 2D models avoid many of the limiting assumptions required by 1D models, the results can significantly improve the ability of highway agencies to design safer, more cost-effective, and resilient structures on waterways.

In addition, the 3D visualization capabilities of these modeling tools aid in communicating design results and implications to a variety of stakeholders through intuitive and visually rich graphical output.



Source: FHWA

BENEFITS

The benefits of using CHANGE include Improved Quality and Resiliency, Enhanced Collaboration, and Streamlined Delivery.

In the past 3 years, the Colorado DOT saved more than $14 million using 2D hydraulic modeling to develop more detailed analyses of bridges, culverts, and roadways than with 1D modeling.

FIND OUT MORE . . .

CHANGE Website
https://www.fhwa.dot.gov/innovation/everydaycounts/edc_5/change2.cfm

FHWA Hydraulics Website
https://www.fhwa.dot.gov/engineering/hydraulics/

Colorado DOT Video https://youtu.be/C-_c8UTpbSo

FHWA Resource Center

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Process, Hydraulics