

**Modeling UHPC Link Slabs for the Wilmington Viaduct Bridge Rehabilitation Project**

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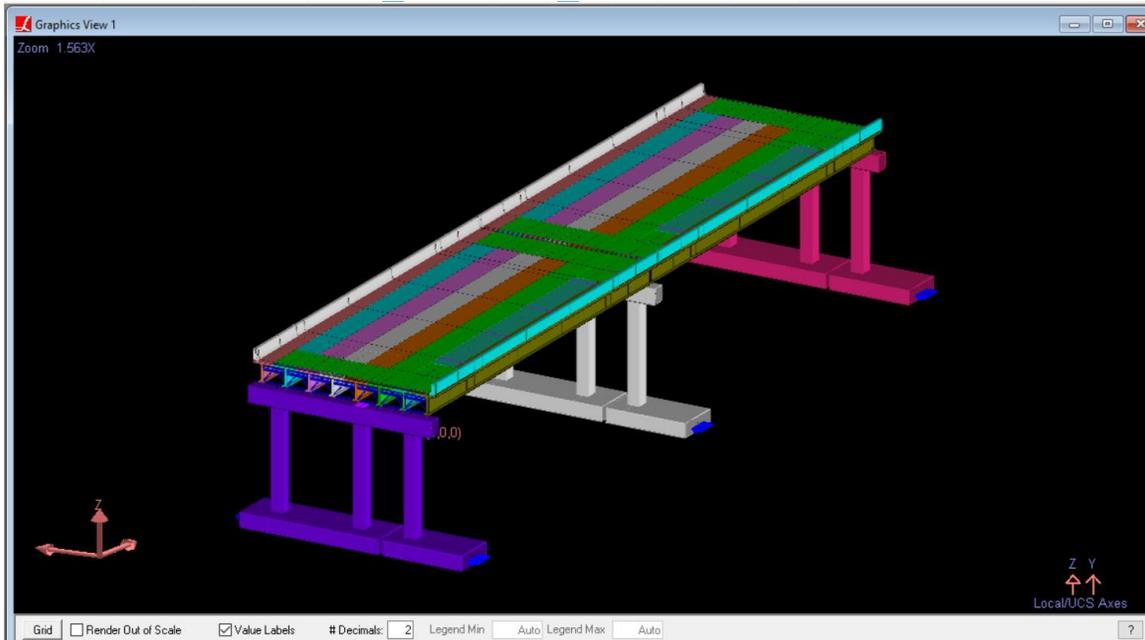
Modeling Structural Behavior of Jointless Bridge Decks Using UHPC Link Slabs

ABC Bridge Rehabilitation

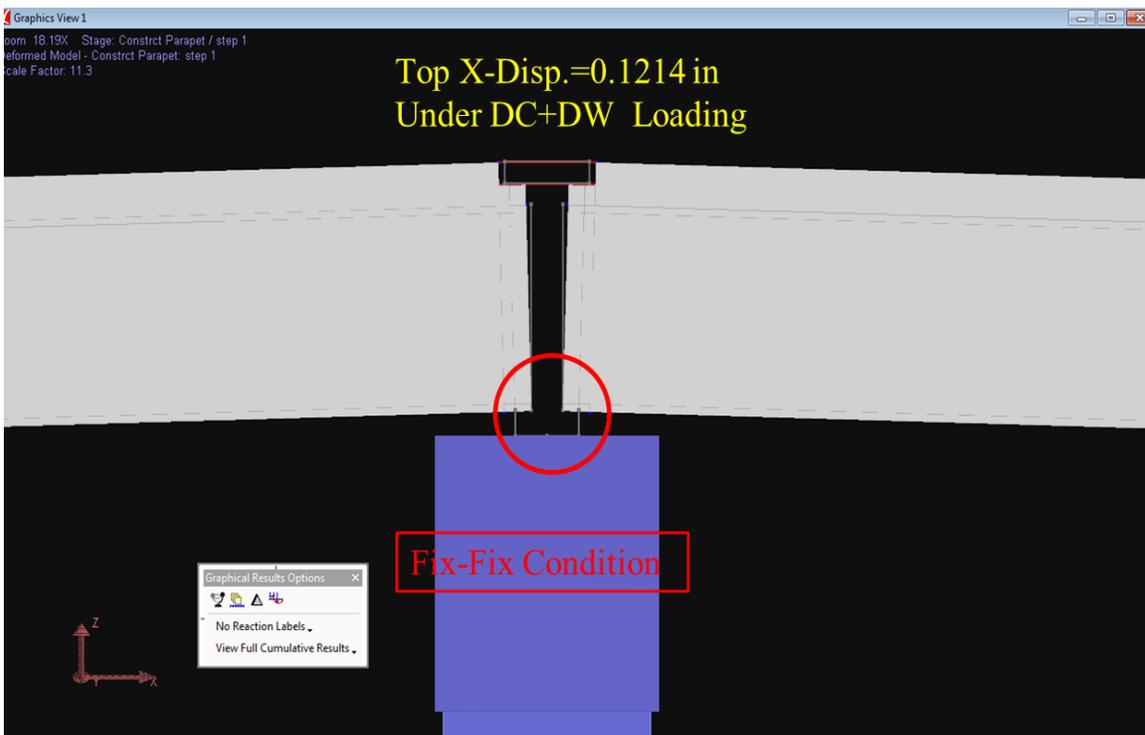
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**Extended Abstract**

The I-95 Willington Viaduct in Wilmington, Delaware is a sixty-simple span steel multi-beam bridge scheduled to undergo major rehabilitation in 2021. Work will include substructure repair, deck overlay replacement, and transverse bridge deck joint replacements. The owner, the Delaware Department of Transportation (DelDOT), is investigating the concept of removing fifteen (15) failing transverse bridge deck joints via Ultra High Performance Concrete (UHPC) link slabs. Similar applications recently completed by the New York State Department of Transportation (NYSDOT) suggests that the UHPC material is performing adequately with suitable crack spacing control to prevent moisture and chloride penetration within the depth of the link slab. The NYSDOT application was based on using the link slab over elastomeric expansion bearings (i.e., at Exp.-Exp. locations). DelDOT is exploring the use of the NYSDOT approach to extend the application of UHPC link slabs at superstructure locations with different support conditions, i.e., Fix-Fix, Exp.-Exp. and/or Fix-Exp. Analytical 3-D non-linear computer models of the superstructure were developed to determine the structural response of the UHPC link slab with different support conditions. Results of the computer models have shown that the UHPC link slabs can be considered for use beyond just the Exp.-Exp. conditions and may extend the use of this detail to more structures. The UHPC link slab proposed by DelDOT has the potential to accelerate the rehabilitation process, reduce future maintenance costs, and increase bridge deck durability. In addition to the benefits of lower future maintenance due to the removal of the transverse bridge joints, UHPC link slabs can also be considered an Accelerated Bridge Construction (ABC) technique due to the time and cost savings compared to traditional full joint replacement.



**LARSA 4D model of a link slab on the I-95 Wilmington Viaduct**



**LARSA 4D model of link slab behavior at a Fix-Fix condition at the pier**