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Title: UHPC Link Slabs and the Wilmington Viaduct Bridge Rehabilitation Project

The I-95 Wilmington Viaduct is a sixty-simple span steel multi-beam bridge which recently underwent rehabilitation from March 2021 to November 2022. Work included concrete repairs, overlay replacement, and bridge joint replacements. In order to reduce maintenance costs, the Delaware Department of Transportation (DelDOT) desired to eliminate as many bridge joints as possible by constructing Ultra-High-Performance Concrete (UHPC) link slabs. Similar applications completed by the New York State Department of Transportation (NYSDOT) revealed that the UHPC material is performing adequately with reasonable crack control spacing to prevent moisture and chloride penetration within the link slab. The NYSDOT application was based on using the link slab in conjunction with elastomeric expansion bearings (i.e., Exp.-Exp. locations). DelDOT evaluated and modified the NYSDOT approach to the use of UHPC link slabs at superstructure locations with different support conditions at each span end, i.e., Fix-Fix, Exp.-Exp. and/or Fix-Exp. supported by steel sliding plate bronze bearings. Results of a 3-D non-linear analysis proved that the UHPC link slabs can be considered for use beyond just the Exp.-Exp. conditions with elastomeric bearings. The link slabs used on the Wilmington Viaduct accelerated construction time, reduced future maintenance costs (thereby improving the safety of maintenance forces), provided a smooth riding surface, and increased the long-term serviceability of the bridge deck. 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.

Keywords: Bridges, Accelerated Bridge Construction, Modeling & Analysis, Link Slabs, Rehabilitation, Resiliency, Life Cycle

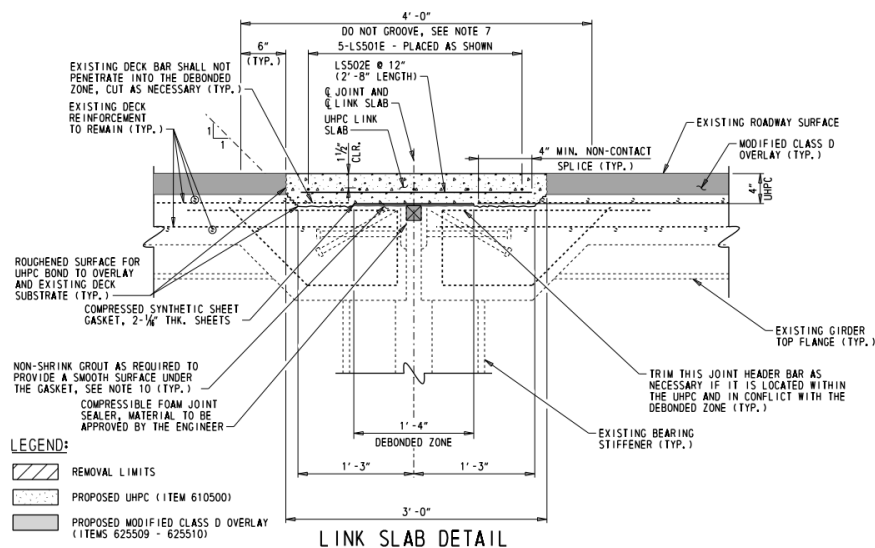


Figure 1: Link Slab Detail



Photo 1: Link Slab Pour



Photo 2: Completed Link Slab