

Ultra-High Performance Concrete Connections Between Precast Bridge Deck Elements

Description

Meta Fields

Category : Completed Projects

Group : Ultra-High Performance Concrete (UHPC)

Subject : Deck Panels

Abstract :

The demand for accelerated construction of highway bridges and the historically sub-optimal performance of cast-in-place bridge decks has led to a demand for the use of prefabricated concrete bridge decks. Although this decking system presents many advantages, one fundamental hurdle to its use is the field-cast connections which join the panels to the supporting superstructure. The intent of this research project is to redesign the composite connection in a way that provides for simple, constructible details which do not present field fit-up issues and which provide good long-term durability performance. A relatively new construction material, ultra-high performance concrete (UHPC), was engaged for this project. UHPC presents a unique set of rheological, mechanical, and durability properties which are particularly well suited to meeting these goals. Full-scale girder/deck structural elements were fabricated and tested under cyclic fatigue and static structural loadings. The variables assessed within the study included the performance of both a conventional connection and the novel UHPC connection when installed on both steel and precast concrete girders. The test setup involved loading the 12.2-m (40-foot) long, 1.3-m (51-inch) deep test specimens in four-point bending. The cyclic testing involved application of more than eleven million of cycles fatigue loading, which was followed by static loading of each specimen to failure. The applied loadings surpassed the design loads required by the AASHTO LRFD Bridge Design Specifications. Assessment of performance of the connection and recommendations for future use are based on experience with fabrication of test specimens and on observations and analyses from the structural testing.

Key Words :

Accelerated construction, Bridge decks, Bridge design, Bridge(Structures), Charts(Graphs), Composite connections, Connection detail, Construction, Cyclic testing, Federal Highway Administration(FHWA), Performance, Precast concrete, Prefabricated bridge decks, Prestressed concrete, Statistical data, Tables(Data), Ultra-High Performance Concrete(UHPC)

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