

Rehabilitation of Longitudinal Joints of Double-Tee Bridges through Full-Scale Testing

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Connections

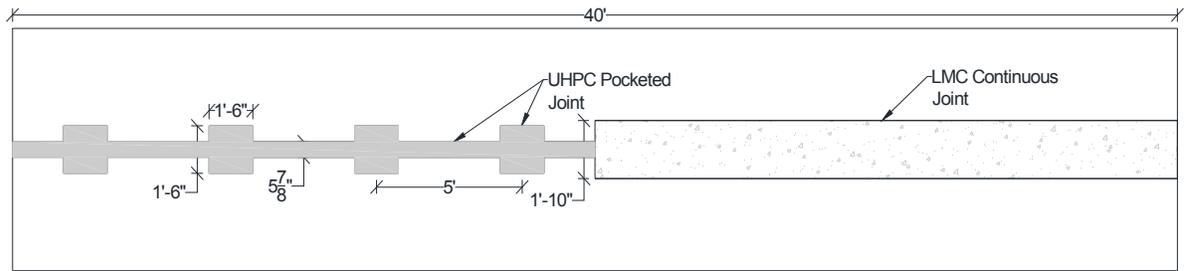
Full-Scale Testing

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Extended Abstract

Prestressed precast double-tee bridges are the most common type of bridges on South Dakota local roads. They are also common in the neighboring states. Nevertheless, longitudinal girder-to-girder joints of many of double-tee bridges are deteriorating after a few years of service mainly due to insufficient joint detailing. The conventional joint consists of discrete welded steel plates embedded in grouted shear key. Twenty joint rehabilitation detailing alternatives were developed, rated, and two joint details were selected for bridge system testing: (1) a continuous joint reinforced with wire mesh and filled with latex modified concrete (LMC), and (2) discrete pockets reinforced with steel bars and filled with ultra-high performance concrete (UHPC). A full-scale 50-ft (12.19-m) long conventional double-tee bridge was constructed and tested under AASHTO fatigue loads. Subsequently, the longitudinal joint of the bridge was rehabilitated using the two proposed details in which each detail was incorporated on one-half of the bridge length. Fatigue and strength testing of the rehabilitated bridge showed that the both proposed joint rehabilitation methods are structurally viable. However, LMC is not a durable material for this application due to prior-to-testing cracks pertaining to restrained shrinkage. Only UHPC should be used in either proposed rehabilitation details. A cost analysis showed that the rehabilitation cost of a double-tee bridge with the proposed UHPC pocket joint method is only 30% of the bridge superstructure replacement cost. The presentation highlights the detailing and performance of both conventional and rehabilitated double-tee bridges, and a summary of findings will be presented.

Second International Interactive Symposium on Ultra-High Performance Concrete
 Extended Abstract (no paper submission)



A Filler Material Plan
 Not to Scale

■ UHPC □ LMC

Rehabilitated Full-Scale 40-ft (12.19-m) Long Bridge Test Specimen



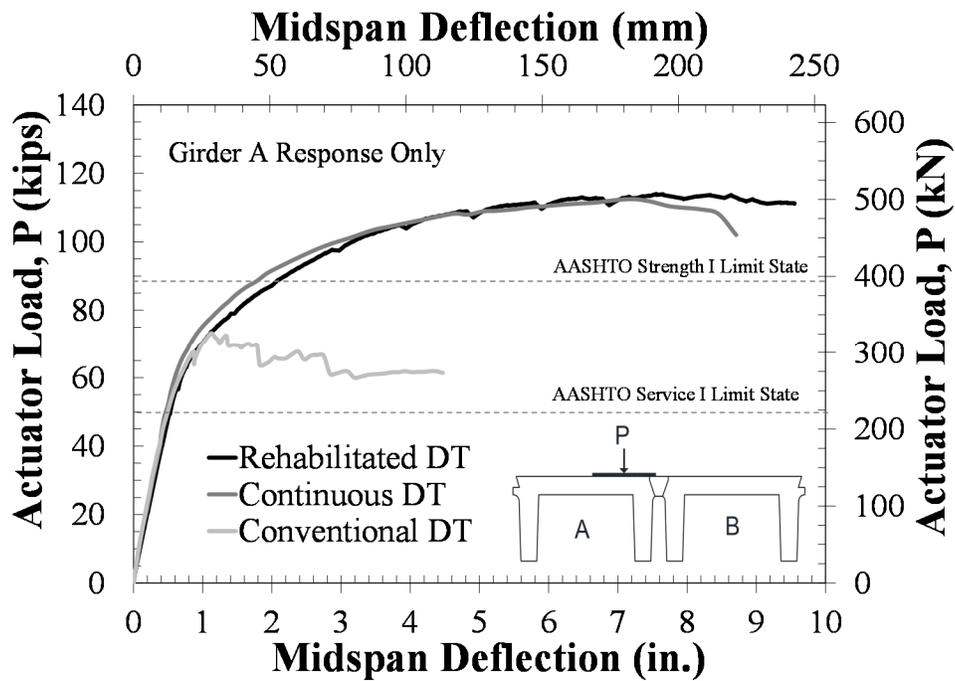
Conventional Joint – Bridge
 Underneath View



Preparing Pocket Joints to
 Rehabilitate Bridge



Pouring UHPC in Pocket Joints



Force-Deflection Relationships for Rehabilitated, Modified, and Conventional Double-Tee Bridges