



UHPC-Connected Novel Prefabricated Bridge Pier: Structural Configuration and Seismic Performance

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Abstract

With the rapid development of new materials, Ultra-High Performance Concrete (UHPC) has attracted widespread attention from researchers worldwide due to its superior material properties. The characteristics of UHPC, such as high strength, good ductility, and strong anchorage performance, provide new solutions for the connection of precast assembled bridge piers. In this report, two novel connection configurations (enlarged-head connection configuration and ring-type connection configuration) for prefabricated bridge piers using UHPC connections are developed. The report first introduces the two configurations of the novel prefabricated bridge piers with UHPC connections. Through experimental and theoretical analysis methods, the UHPC force transfer mechanism, failure modes, hysteretic behavior, backbone curves, and energy dissipation capacity of UHPC bridge pier models under seismic loading are investigated. Based on this, a seismic design method for UHPC bridge piers is proposed and verified through shaking table model tests. Results indicate that prefabricated bridge piers with UHPC connections feature simple

configuration, convenient construction, reliable connections, and good energy dissipation capacity. Currently, UHPC-connected UHPC-Connected novel prefabricated bridge pier have been applied in urban elevated bridges in Shanghai and Xinjiang.

Keywords: UHPC, Novel Prefabricated Bridge Piers , Seismic Performance