

## Experimental investigation of precast assembled bridge columns with UHPC-filled connections

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## 1 Abstract

Accelerated bridge construction (ABC) has attracted substantial attentions around the world owing to advantages of minimizing construction delivery time, improving component material quality and promoting overall-economy performance. An essential factor in widespread and successful implementation of the ABC lies in the reliable connections between precast units. In this study, the distinction of seismic performance between the high and short precast reinforced concrete pier columns with a new column-to-footing (or cap beam) connection filled with ultra-high performance concrete (UHPC) were experimentally investigated through the quasi-static testing. Based on the observations of test results, although the phenomena of sliding and uplifting around the joints were obvious, the failure modes of high and short columns were the flexural failure and the shear failure on the non-joint zone, respectively. Moreover, the damage process, the ductility capacity, the resilience behavior and the hysteresis energy response of the two large-scaled prefabricated piers were described and discussed.

**Keywords:** accelerated bridge construction; bridge columns; UHPC; seismic performance; cyclic test.

## 2 Introduction

In the past decade, many successful applications of accelerated bridge construction (ABC) technique for bridge column have been realized, largely in the low

seismic regions. However, in the areas of moderate and high seismic activity, this implementation has been limited due to the uncertainty and fuzzification about the performance of column ends connections, which are essential to transfer seismic