



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	Design Guidelines for ABC Column-to-Drilled-Shaft Foundation Connections in High Seismic Zones
University	UW
Principal Investigator	Eberhard, Marc Stanton, John
PI Contact Information	eberhard@uw.edu stanton@uw.edu
Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC funds: \$70,000 Match fund by PEER: \$35,000
Total Project Cost	\$105,000
Agency ID or Contract Number	Accelerated Bridge Construction University Transportation Center (ABC-UTC) 69A3551747121
Start and End Dates	2020/01/01- Active
Brief Description of Research Project	<p>Precast columns have the potential to be very cost- and time-efficient for Accelerated Bridge Construction (ABC), but they must be connected effectively to the foundation, particularly in regions of moderate or high seismicity. Most of the relevant research has been conducted using spread footings, but in many applications, drilled shafts are preferred, most commonly with a diameter larger than that of the column. Little research has been performed on connections between precast columns and enlarged drilled shafts.</p> <p>The current AASHTO ABC design recommendations for shafts are based on the results of cast-in-place column behavior and a single cyclic test of a column-to-shaft subassembly. Some research has been conducted for cast-in-place column systems (e.g., Mclean and Smith 1997, Murcia-Delso et al. 2013), but cast-in-place column construction takes time and does not lend itself easily to accelerated bridge construction.</p> <p>As part of his PhD thesis studies at the University of Washington, Hung Tran (2015) reported the results of three tests of connections between precast columns and drilled shafts. These tests provided valuable data, but the tests by themselves are insufficient to understand the complex force transfer mechanism in the real 3-D connection, and to develop specific design guidelines</p> <p>As part of a study funded by the Pacific Earthquake Engineering Research center (PEER), additional tests of column-to-shaft connections will be performed. The tests already performed by Tran (2015) and those to be performed as part of the PEER project will provide much more data</p>

	<p>to calibrate analytical models and design procedures than has been available in the past.</p> <p>A parametric study, with models calibrated by these tests, is required to investigate the wide range of conditions expected in practice. The test results and parametric study will make it possible to develop design recommendations for precast-column-to-drilled-shaft connections.</p> <p>The main objective of the research is to develop guidelines for the design of ABC connections between precast columns and enlarged, cast-in-place drilled shafts in seismic regions.</p>
<p>Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here</p>	<ul style="list-style-type: none"> • Follow-up project to ABC-UTC 2016-C1-UW01 project, "Performance Evaluation of Structural Systems for High-Speed Rail in Seismic Regions" • Invited presentation at 2020 Pacific Earthquake Engineering Research Center (PEER) Annual Meeting on January 17, 2020; speaker was John Stanton • Invited article published in <i>PCI Aspire</i> magazine, July 2021 • Follow-up funding from PEER (Berkeley), \$180,000. Project started in January 2019. Article published June 2021: https://www.ce.washington.edu/news/article/2021-06-15/research-reality
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>This is an active research project. Upon completion, impacts/benefits will be reported.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	<p>https://abc-utc.fiu.edu/design-guidelines-for-abc-column-to-drilled-shaft-foundation-connections-in-high-seismic-zones/</p>