



ACCELERATED BRIDGE CONSTRUCTION
UNIVERSITY TRANSPORTATION CENTER

UTC Project Information	
Project Title	Performance Evaluation of Structural Systems for High Speed Rail in Seismic Regions
University	UW
Principal Investigator	John Stanton
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Funding Source(s) and Amounts Provided (by each agency or organization)	ABC-UTC Fund: \$70,000 Match Fund by PEER: \$35,000
Total Project Cost	\$105,000
Agency ID or Contract Number	69A355174121
Start and End Dates	04/15/18 – 05/31/21
Brief Description of Research Project	<p>High Speed Rail (HSR) imposes demands on the supporting structure that differ significantly from those imposed on highway bridges. Furthermore, the CAHSR project travels through several very different physical environments, each of which creates its own demands. For example, the section passing through the Central Valley (flat and hot, easy construction access) faces construction challenges that differ from the sections that traverse the mountainous regions closer to the coast (widely varying column lengths, more difficult construction access, etc.) Thus, any work aimed at developing an optimal system must start by understanding the design criteria and knowledge gaps perceived by the CAHSR design team. Only then can research be targeted and effective.</p> <p>The structural systems to be used for the bridges along the route presently focus on large, stiff structures that are intended to minimize displacements and that do not rely on the development of ductile response to the same extent that highway bridges typically do. However, such stiff structures induce large forces in the substructures, which are consequently expensive. CAHSR has</p>

	<p>identified cost containment as a critical issue, so the “strong” approach faces budgetary constraints.</p> <p>At the other end of the stiffness spectrum, seismic isolation offers reduced forces (and potentially lower cost), but the displacements at the track level are likely to be much larger (Li and Conte 2017), and may exceed levels for safe vehicle operation. Thus, careful concept design will be necessary to resolve the conflicts between these two requirements (low forces and low displacements). Selection of a suitable concept must precede any detailed design considerations.</p> <p>The overall goals of the proposed research are to:</p> <ul style="list-style-type: none"> • Evaluate the structural systems presently under consideration by CAHSR. • Develop alternative concepts, and to obtain feedback from CAHSR to guide their further development. • To develop preliminary calculations and drawings for selected Conceptual Designs, so that CASHR can evaluate their expected structural performance, their speed of construction and cost.
<p>Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here</p>	<p>Match funds from Pacific Earthquake Engineering Research Center (PEER)</p>
<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>Potential change in design methodology due to identified failure mode in column/shaft (placeholder)</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project website 	<p>https://abc-utc.fiu.edu/research-projects/uw-research-projects/performance-evaluation-of-structural-systems-for-high-speed-rail-in-seismic-regions/</p>