

UTC Project Information	
Project Title	MPC-483 – Interaction Analysis of Girder Bridges and Traffic System subjected to Earthquakes, Year 2
University	Colorado State University
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Funding Agencies	USDOT, Research and Innovative Technology Administration
Agency ID or Contract Number	DTRT13-G-UTC38
Project Cost	\$30,000
Start and End Dates	September 30, 2013 to September 30, 2018
Project Duration	September 30, 2013 to September 30, 2018
Brief Description of Research Project	<p>Long-span bridges support a large amount of traffic every day. Even when an earthquake strikes, a long-span bridge often still has many vehicles present due to the low predictability of earthquake events. To study the seismic performance of bridge and traffic systems, a new full-response prediction methodology for the coupled bridge-traffic interaction system under spatially varying earthquake excitations was developed by capturing the interaction effects not only between the bridge and moving vehicles, but also between earthquake excitations and the coupled bridge-traffic system. Different from existing bridge seismic analyses in which only traditional earthquake loads in terms of inertial forces are applied on the bridge structure, the new formulation can also incorporate coupled earthquake forces on the bridge and vehicles, which are expressed as functions of the bridge-traffic coupling matrices and earthquake displacement inputs. The proposed methodology was numerically demonstrated on a prototype long-span bridge and traffic system under spatially varying earthquake excitations. Responses of the bridge and vehicles were predicted when the bridge-traffic system was subjected to earthquake excitations. It was determined from the numerical analysis that the coupled earthquake force, as derived in this study, has notable influence on the dynamic performance of the bridge and vehicles under seismic excitations.</p>
Describe Implementation of Research Outcomes (or why not implemented)	The proposed approach could be adopted by stakeholders and incorporated in future design specifications.
Place Any Photos Here	

<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>The new analytical approach as proposed offers a new method to more accurately predict the bridge seismic response. Future bridge seismic response can be predicted more rationally.</p>
<p>Web Links</p> <ul style="list-style-type: none">• Reports• Project Website	<p>https://www.ugpti.org/resources/reports/details.php?id=957</p>