

Report submitted for July – December 2012 reporting period

UTC Project Information	
Project Title	SSI Bridge: Evaluation of soil-structure interaction effects on PNW bridges
University	Oregon State University
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Funding Source(s) and Amounts Provided (by each agency or organization)	\$39,999 (UTC/Pactrans) + \$39,999 (OSU Matching Funds)
Total Project Cost	\$79,998
Agency ID or Contract Number	UW 125 A
Start and End Dates	09/01/2012 - 08/31/2013
Brief Description of Research Project	<p>The Pacific Northwest (PNW) is prone to large subduction zone earthquakes, large basin-and-range earthquakes, and smaller, shallow, crustal earthquakes. Each of these different types of earthquakes creates a different type of demand on a soil-bridge system. To improve the seismic resiliency of bridges in the PNW, each of these possible scenarios must be considered. A subduction zone event, for instance, creates large magnitude, long-duration and long-period events that can damage long, flexible bridges. A shallow, crustal event, when it occurs near a bridge, can create an intense velocity pulse that can damage shorter, more brittle bridges.</p> <p>In addition to the challenges presented by considering multiple earthquake scenarios, the soil underlying bridge columns and abutments can significantly affect the seismic response of the overlying bridge superstructure. Thus, to truly examine the seismic performance of a bridge, one must consider soil-structure interaction. In this research, we propose to create a finite element model of a typical PNW soil-bridge system within the program OpenSees. We will consider different soil conditions by using a series of complex, nonlinear Winkler springs. For this research, we will focus on large, subduction zone earthquakes, because this scenario is possibly the most damaging event in the PNW. However, for completeness, we will also examine shallow, crustal earthquakes as well as the longer-return period basin-and-range earthquakes. The end-product of the research will be guidance for how a typical bridge in varying soil conditions performs during differing, realistic earthquake motions. Future research will examine different bridge-foundation-soil models and different earthquake motions.</p>
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links · Reports · Project website	SSI-Bridge: Soil-Bridge Interaction During Long-Duration Earthquake Motions http://depts.washington.edu/pactrans/wp-content/uploads/2012/12/PacTrans-8-739437-Mason-Ben-Small-Project.pdf