Final Project Summary — PEER Lifelines Program

Project Title—ID Number	Design Guidelines for Site Response Analysis for Vertical Ground Motion—2F01		
Start/End Dates	05/01/00–11/30/01	Budget/ Funding Source	$65,026 / Caltrans
Project Leader (boldface) and Other Team Members	**Walter Silva (PEA)**		

1. Project goals and objectives
Develop engineering model for developing site-specific vertical design ground motions.

2. Benefits of the results of this project to develop technologies and protocols to mitigate the vulnerability of electric systems and other lifelines to damage directly and indirectly caused by earthquakes. Also, benefits to develop assessment techniques to evaluate damage to electric systems caused by earthquakes and to assess fiscal impacts due to the loss of electric service to the community.
Bridge structures have vulnerabilities to vertical motions. Currently no generally accepted procedure is available to characterize vertical site-specific design motions.

3. Brief description of the accomplishments of the project
Using vertical array (surface and at-depth recordings) data for about 15 earthquakes at 10 vertical arrays, simulated surface motions have been compared to recorded motions. Results have suggested that at low frequency vertical motions are dominated by inclined shear-waves (SV) while high frequency motions are dominated by vertically propagating compression waves.

4. Describe any instances where you are aware that your results have been used in industry
Results of this project (among others) were used to develop design ground motions for the high level nuclear waste repository at Yucca Mtn, Nevada.

5. Methodology employed
Model recorded motions at the surface using at-depth motions as input. Both inclined and vertically incident P and S waves were used.

6. Other related work conducted within and/or outside PEER
Several researchers have analyzed vertical array data but a generally accepted approach to model vertical motions for engineering design has not yet been developed.

7. Recommendations for the future work: what do you think should be done next?
Project not yet completed.

8. <u>Author(s), Title, and Date</u> for the final report for this project
Project not yet completed.