Final Project Summary — PEER Lifelines Program

Project Title—**ID Number**	*Contribution to Ground Motion Synthesis Report*—**1C07**		
Start/End Dates	1/1/01 – 5/30/01	Budget/ Funding Source	$9,935 / PG&E/CEC
Project Leader (boldface) and Other Team Members	**Somerville (URS Corporation)**		

1. Project goals and objectives

The objective of the project was to collaborate with other PEER investigators in a synthesis of contemporary procedures for ground motion evaluation within a performance-based design framework. The report addresses source characterization, attenuation relations, near-fault ground motions, site effects, ground motion simulation, and time history selection.

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.

The report described below is an up-to-date reference that explains how ground motion estimates are developed for use in performance based design.

3. Brief description of the accomplishments of the project

Dr Robert Graves and Dr Paul Somerville made contributions to the report listed below in 8. The two figures that follow this text illustrate the nature of the information that was contributed to the report.

4. Describe any instances where you are aware that your results have been used in industry

5. Methodology employed

Review of current state of practice.

6. Other related work conducted within and/or outside PEER

None.

7. Recommendations for the future work: what do you think should be done next?

Recommendations are given on pages x and xi of the report.

8. Author(s), Title, and Date for the final report for this project

Stewart, J.P., S.-J.-Chiou, J.D. Bray, R.W. Graves, P.G. Somerville and N.A. Abrahamson. "Ground Motion Evaluation Procedures for Performance-Based Design." Report PEER 2001/09.

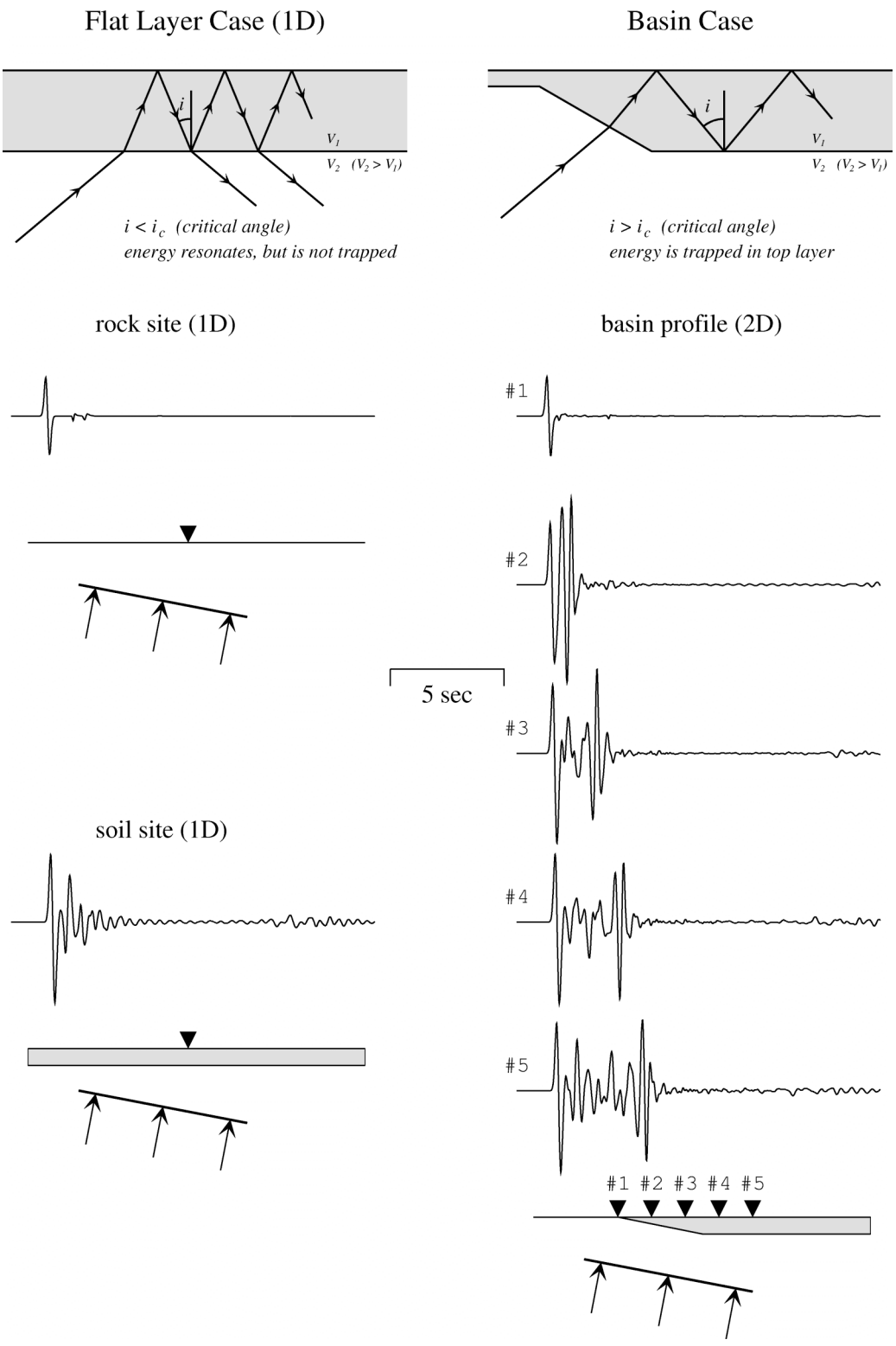

Figure 5.24. Schematic diagram showing that seismic waves entering a sedimentary layer from below will resonate within the layer but escape if the layer is flat (left) but become trapped in the layer if it has varying thickness and the wave enters the layer through its edge (right). Source: Graves (1993).

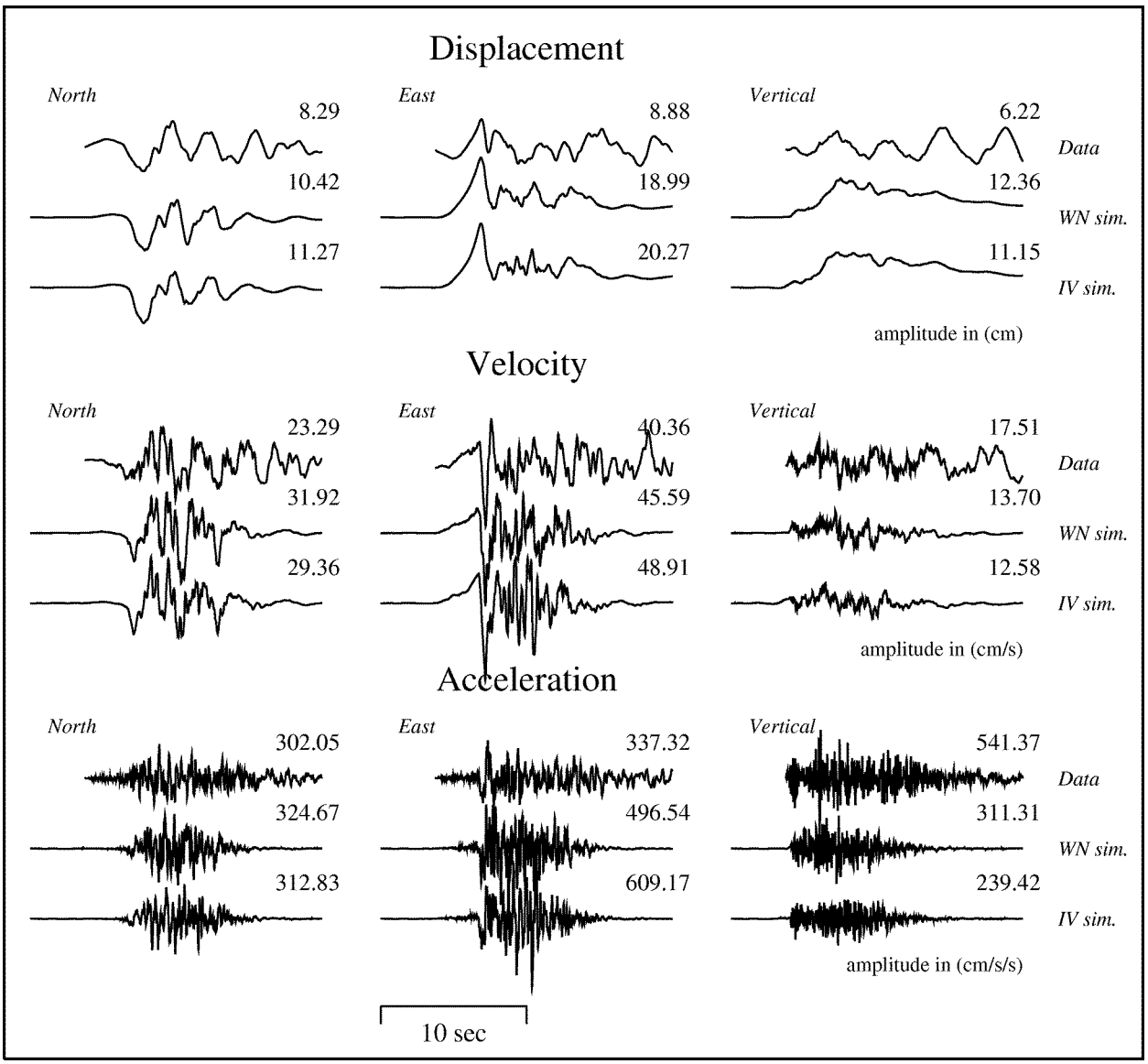

Figure 6.2. Comparison of recorded (top row) and simulated (middle and bottom rows) displacement, velocity, and acceleration time histories at Arleta from the 1994 Northridge earthquake, plotted on a common scale, with the peak value given in the top left corner. Source: Somerville et al., 1995.