

ATC-54

Guidelines for Using Strong-Motion Data and ShakeMaps in Postearthquake Response

by

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Preface

In 2000, the Applied Technology Council (ATC) was awarded a Data Utilization Project by the California Strong Motion Instrumentation Program (CSMIP) of the California Geological Survey, Department of Conservation, to develop *Guidelines* for using strong-motion data and computer-generated ground motion maps (ShakeMaps) in postearthquake response. The impetus for the project was the need to provide emergency response personnel with state-of-the-art tools for rapidly identifying areas likely to be severely affected by strong earthquakes and for rapidly assessing the potential for damage in buildings and other structures. A related goal was to increase the utilization of strong-motion data from ground sites and instrumented structures routinely gathered by the CSMIP and other agencies, such as the U. S. Geological Survey.

The project involved a variety of activities, including (1) an extensive review of the literature and interviews with emergency response personnel and practicing engineers to determine the state of the practice in strong-motion data utilization, including the extent to which ShakeMaps are used in emergency response; (2) the development of draft *Guidelines* for review by the advisory Project Resource Panel, and the volunteer Strong-Motion Instrumentation Advisory Committee (SMIAC) of the CSMIP; (3) the development of technical papers for presentation at the annual data utilization seminars conducted by CSMIP and at other technical seminars and conferences; (4) the conduct of a Users Workshop to enable potential users from the emergency response community and the structural engineering community to review and comment on the draft *Guidelines*; and (5) revision and finalization of the *Guidelines* based on review comments received from the Users Workshop, the Project Resource Panel, CSMIP staff, and the SMIAC.

The finalized *Guidelines*, as presented herein, address two main topics: (1) effective means for using computer-generated ground motion maps (ShakeMaps) in postearthquake emergency response; and (2) procedures for rapidly evaluating (on a near-real-time basis) strong-motion data

from ground sites and instrumented buildings, bridges, and dams to determine the potential for earthquake-induced damage in those structures. The document also provides guidance on the form, type, and extent of data to be collected from structures in the vicinity of strong-motion recordings, and pertinent supplemental information, including guidance on replacement of strong-motion instruments in/on and near buildings, bridges, and dams.

ATC is indebted to a broad range of individuals who participated in the *Guidelines* development and review process. Craig Comartin, as Project Director, organized the overall effort, and Stephanie A. King, as Co-Project Director, served as one of the principal authors, along with the Principal Investigator, Christopher Rojahn. A Working Group, composed of A. Gerald Brady, Sarah Nathe, Maurice S. Power, and Evan Reis, carried out the literature review, conducted interviews with a broad range of practicing personnel to establish the state-of-the-practice and to identify practice needs, and prepared draft portions of the *Guidelines*. The Project Resource Panel, which consisted of Thalia Anagnos, Mehmet Celebi, Lloyd S. Cluff, Charles Eadie, Sigmund A. Freeman, Terry Haney, Anne S. Kiremidjian, Ronald L. Mayes, Andrew T. Merovich, Stephen H. Pelham (ATC Board Representative), Lawrence D. Reaveley, James E. Russell, and Chris V. Tokas, provided review comments on a continuing basis, with a constant eye on practicality and clarity. Peter N. Mork and Michelle Schwartzbach provided report production services. The affiliations of these individuals are provided in the list of Project Participants.

ATC also gratefully acknowledges the input of CSMIP staff, particularly Tony Shakal and Moh Huang, the many individuals who attended the Users Workshop, and the Strong-Motion Instrumentation Advisory Committee (for a complete listing of these individuals, see committee roster in Project Participants list).

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