ATC 58-1

Proceedings of
FEMA-sponsored workshop on communicating earthquake risk

Applied Technology Council

Funded by
Federal Emergency Management Agency

Applied Technology Council

The Applied Technology Council (ATC) is a nonprofit, tax-exempt corporation established in 1971 through the efforts of the Structural Engineers Association of California. ATC's mission is to develop state-of-the-art, user-friendly engineering resources and applications for use in mitigating the effects of natural and other hazards on the built environment. ATC also identifies and encourages needed research and develops consensus opinions on structural engineering issues in a non-proprietary format. ATC thereby fulfills a unique role in funded information transfer.

ATC is guided by a Board of Directors consisting of representatives appointed by the American Society of Civil Engineers, the National Council of Structural Engineers Associations, the Structural Engineers Association of California, the Western Council of Structural Engineers Associations, and four at-large representatives concerned with the practice of structural engineering. Each director serves a three-year term.

Project management and administration are carried out by a full-time Executive Director and support staff. Project work is conducted by a wide range of highly qualified consulting professionals, thus incorporating the experience of many individuals from academia, research, and professional practice who would not be available from any single organization. Funding for ATC projects is obtained from government agencies and from the private sector in the form of tax-deductible contributions.

2002-2003 Board of Directors

James R. Cagley, President
Stephen H. Pelham, Vice President
Anthony B. Court, Secretary/Treasurer
Andrew T. Merovich, Past President
Stephen M. Baldridge
Patrick Buscovich
James M. Delahay
Lawrence G. Griffis
Robert W. Hamilton
Richard L. Hess
Eve Hinman
Jeremy Isenberg
Christopher P. Jones
Lawrence D. Reaveley
William E. Staehlin

ATC Disclaimer

Federal Emergency Management Agency Notice

Cover Photo: Building damaged by the 1989 Loma Prieta, California, earthquake. Courtesy of the Earthquake Engineering Research Institute, Oakland, California.

ATC-58-1

Proceedings of

FEMA-Sponsored Workshop on Communicating Earthquake Risk

June 18, 2002
Chicago, Illinois

by

APPLIED TECHNOLOGY COUNCIL
201 Redwood Shores Parkway, Suite 240
Redwood City, California 94065
www.ATCouncil.org

Funded by

FEDERAL EMERGENCY MANAGEMENT AGENCY
Michael Mahoney, Project Officer
Robert Hanson, Technical Consultant
Washington, D.C.

2002

Preface

In September 2001 the Applied Technology Council (ATC) was awarded a contract by the Federal Emergency Management Agency (FEMA) to conduct a long-term project to prepare next-generation Performance-Based Seismic Design Guidelines (ATC-58 Project). The project is to consider and build on the FEMA-349 report, *Action Plan for Performance-Based Seismic Design* (EERI, 2000), which provides an action plan of research and development activities to produce and implement design guidelines that specify how to design buildings having a predictable performance for specified levels of seismic hazard. Ultimately FEMA envisions that the end product from this overall project will be design criteria for performance-based seismic design that could be incorporated into existing established seismic design resource documents, such as the *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (BSSC, 2001), the FEMA 273 *NEHRP Guidelines for the Seismic Rehabilitation of Buildings* (ATC/BSSC, 1997), and its successor document, the FEMA 356 *Prestandard and Commentary for the Seismic Rehabilitation of Buildings* (ASCE, 2000).

The ATC-58 Project is being conducted in several phases, as resources become available. In Phase 1, which commenced in late 2001, ATC developed a management process for the project, identified and engaged key project management and oversight personnel, developed a project Work Plan, commenced development of a report on performance characterization, and conducted two workshops to obtain input on project needs and goals.

Workshop One, the proceedings of which are presented in this document, focused on communicating earthquake risk. Held on June 18, 2002 in Chicago, Illinois, Workshop One was organized to obtain preliminary feedback from a cross section of building stakeholders, including real estate developers, building owners, corporate tenants, lenders, insurers and other interested parties as to how performance-based seismic design guidelines can most usefully deal with issues of earthquake risk. In particular, the workshop dealt with three important issues:

- identification of those aspects of earthquake-related risk that are of most concern to the stakeholders;
- appropriate means to communicate the low-probability but potentially significant consequences of earthquakes; and
- appropriate means to communicate the considerable uncertainties associated with prediction of the effects of earthquakes and the performance of individual affected structures.

The Applied Technology Council gratefully acknowledges the members of the ATC-58 Project Team, who planned and organized the Workshop, and the representatives from a broad range of organizations who participated in the workshop: Daniel Abrams, Daniel Alesch, Randall Berdine, Michel Bruneau, Clifford Carey, Bruce Ellingwood, Mohammed Ettouney, Bruce Hall, Ronald Hamburger, Robert Hanson, Jack Hayes, Robert Hendrickson, Hildo Hernandez, William Holmes, Michael Mahoney, James Malley, Peter May, Ronald Mayes, Jack Moehle, William Moor, Willaim Mott, Christopher Rojahn, Randy Schreitmueller, John P. Scott, Jim Sealy, Debra Stein, Christopher Terzich, Jon Traw, Paul Tucker, Steven Weinryb, and Larry Wong. The affiliations of these individuals are provided in Appendix A, which contains a list of Workshop Attendees. Members of the ATC-58 Project Team, and their respective responsibilities, are identified in the List of Project Participants.

ATC also gratefully acknowledges the financial support provided by the Federal Emergency Management Agency and the guidance and oversight provided by Michael Mahoney (FEMA Project Officer) and Robert Hanson (FEMA Technical Consultant).

Christopher Rojahn
ATC Executive Director

Table of Contents