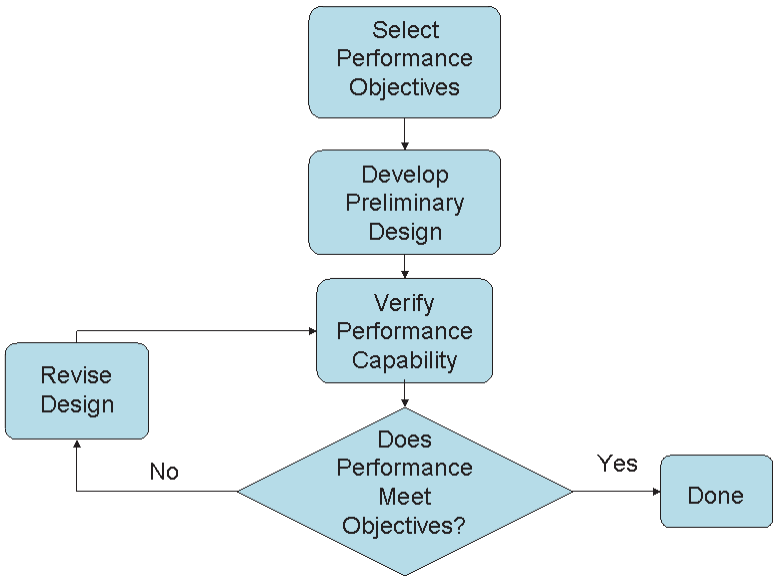
ATC 58-3

Proceedings of
FEMA-sponsored workshop on performance-based design



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.

2003-2004 Board of Directors

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Federal Emergency Management Agency Notice

ATC-58-3

Proceedings of

FEMA-Sponsored Workshop on Performance-Based Design

February 24-25, 2003
San Francisco, California

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 Monitor
Washington, D.C.

2003

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,* and the *NEHRP Guidelines for the Seismic Rehabilitation of Buildings* (FEMA, 273), and its successor documents (e.g., FEMA-356 *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*).

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 focused on communicating earthquake risk and was held on June 18, 2002 in Chicago, Illinois (ATC, 2002). The purpose of Workshop One was 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.

Workshop Two, the proceedings of which are presented in this document, was held on February 24-25, 2003 in San Francisco, California, to introduce the ATC-58 project to the building design, research and regulation communities, to obtain feedback on significant advances that have occurred since the development of the FEMA-349 report, and to assist in identifying appropriate updates to the FEMA-349 recommendations considering the state of current knowledge. The Workshop program included updates on recent international developments, updates on relevant research conducted by the National Science Foundation-funded earthquake engineering research centers, and breakout sessions that focused on the following program components; performance-based design of structures, performance-based design of nonstructural components and systems, and risk management and communication considerations.

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, Donald Anderson, Mark Aschheim, Nuray Aydinoglu, Robert Bachman, Deborah Beck, Fouad Bendimerad, Vitelmo Bertero, David Bonowitz, Roger Borcherdt, Michel Bruneau, Philip Caldwell, James Carlson, Kelly Cobeen, Craig Comartin, Allin Cornell, Anthony Court, Gregory Deierlein, Weimin Dong, Richard Drake, John Eidinger, Amr Elnashai, Mohammed Ettouney, Gregory Fenves, Andre Filiatrault, William Gates, John Gillengarten, Barry Goodno, James Hackett, Ronald Hamburger, Robert Hanson, Perry Haviland, William Holmes, John Hooper, Ahmad Itani, William Iwan, James Jirsa, Brian Kehoe, Robert Kennedy, Petros Keshishian, Andrew King, Stephanie King, Charles Kircher, Anne Kiremidjian, Helmut Krawinkler, H.S. Lew, Joe Maffei, Michael Mahoney, Praveen Malhotra, James Malley, Zeno Martin, Peter May, Gary McGavin, Brian Meacham, Ali Memari, Andrew Merovich, Eduardo Miranda, Elliott Mittler, Jack Moehle, Andrew Mole, Linda Noson, James Partridge, William Petak, Maryann Phipps, Chris Poland, Andrei Reinhorn, Charles Roeder, Christopher Rojahn, Daniel Shapiro, John Silva, M.P. Singh, Paul Somerville, T.T. Soong, William Staehlin, Jonathan Stewart, Akira Tasai, James Tauby, Andrew Taylor, Craig Taylor, Christine Theodoropoulos, Jon Traw, and John Wallace. Bernadette Mosby coordinated all workshop logistics and served as the workshop registrar. The affiliations of these individuals are provided in Appendix A.

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 Monitor).

Christopher Rojahn
ATC Executive Director

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