PEER/ATC-72-1

Modeling and Acceptance Criteria for Seismic Design and Analysis of Tall Buildings

Prepared by

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

in collaboration with
Building Seismic Safety Council (BSSC)
National Institute of Building Sciences (NIBS)
Federal Emergency Management Agency (FEMA)

Prepared for

PACIFIC EARTHQUAKE ENGINEERING RESEARCH CENTER (PEER)
Jack P. Moehle, Principal Investigator
Stephen Mahin, Director
Yousef Bozorgnia, Executive Director

TASK 7 PROJECT CORE GROUP
James O. Malley (Technical Director)
Gregory Deierlein
Helmut Krawinkler
Joseph R. Maffei
Mehran Pourzanjani
John Wallace
Jon A. Heintz

October 2010

Preface

In October 2006, the Applied Technology Council (ATC) began work on a contract assisting the Pacific Earthquake Engineering Research Center (PEER) in developing guidelines for the seismic design of tall buildings as part of the PEER Tall Buildings Initiative. The purpose of this work was to prepare recommendations for modeling the behavior of tall building structural systems and acceptance values for use in seismic design. Shortly thereafter, ATC secured additional funding on behalf of PEER from the Federal Emergency Management Agency (FEMA), through the Building Seismic Safety Council (BSSC) of the National Institute of Building Sciences, in support of this effort.

A *Workshop on Tall Building Seismic Design and Analysis Issues* was conducted in January 2007. The purpose of this workshop was to identify and prioritize seismic design and analytical challenges related to tall buildings by soliciting the opinions and collective recommendations of leading practitioners, regulators, and researchers actively involved in the design, permitting, and construction of tall buildings. The outcome of this workshop is recorded in a companion report, ATC-72 *Proceedings of Workshop on Tall Building Seismic Design and Analysis Issues*, which includes a prioritized list of the most important tall building modeling and acceptance criteria issues needing resolution, based on the opinions of those in attendance.

Using the workshop as a starting point, this report is the result of further work under the PEER Tall Buildings Initiative to develop modeling recommendations and acceptance criteria for design and analysis of tall buildings. It is intended to serve as a resource document for the *Guidelines for Seismic Design of Tall Buildings*, published as a companion report by PEER (2010).

ATC is indebted to the leadership of Jim Malley, Project Technical Director, and to the members of the PEER/ATC-72 Task 7 Project Core Group, consisting of Greg Deierlein, Helmut Krawinkler, Joe Maffei, Mehran Pourzanjani, and John Wallace, for their efforts in researching and assembling the information contained herein. A group of experts on tall building design and analysis was convened to obtain feedback on the

recommendations as they were being developed, and input from this group was instrumental in shaping the final product. The names and affiliations of all who contributed to this project are included in the list of Project Participants at the end of this report.

ATC also gratefully acknowledges Jack Moehle, Yousef Bozorgnia, and the PEER Tall Buildings Project Advisory Committee for their input and guidance in the completion of this report, Ayse Hortacsu and Peter N. Mork for ATC report production services, and Charles H. Thornton as ATC Board Contact.

Jon A. Heintz
ATC Director of Projects

Christopher Rojahn
ATC Executive Director

Table of Contents

List of Figures

List of Tables