ATC 50

Simplified seismic assessment of detached, single-family, wood-frame dwellings

Applied Technology Council

Funded by
City of Los Angeles, Department of Building and Safety
California Governor's Office of Emergency Services

ATC-50

Simplified Seismic Assessment of Detached, Single-Family, Wood-Frame Dwellings

by

APPLIED TECHNOLOGY COUNCIL
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Funded by

CITY OF LOS ANGELES
DEPARTMENT OF BUILDING AND SAFETY
Nick Delli Quadri, Project Officer
and
CALIFORNIA GOVERNOR'S OFFICE OF EMERGENCY SERVICES
(Federal Emergency Management Agency Hazard Mitigation Grant)

Prepared for ATC by

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Preface

In September 1998 the Applied Technology Council (ATC) was awarded a contract by the City of Los Angeles, Department of Building and Safety, to develop and test a series of standardized procedures for the voluntary seismic evaluation and rehabilitation of detached single-family wood-frame dwellings (ATC-50 project). The project was prompted by high economic losses resulting from damage to single-family wood-frame dwellings during the 1994 Northridge earthquake. The concept for the project, however, had been conceived in the early 1990s by the Financial Services Subcommittee of the City of Los Angeles Mayor's Blue Ribbon Panel for Seismic Hazard Reduction, with input from the banking and insurance industries.

The project contract called for ATC to: (1) develop and test a seismic performance grading system for detached single-family wood-frame dwellings that reflected expected economic losses in future damaging earthquakes; (2) develop and test seismic rehabilitation guidelines for detached single-family wood-frame dwellings that would enable a homeowner to improve the seismic grade; (3) prepare a set of examinations to certify that inspectors, contractors, and design professionals have been trained to implement the procedures developed under the project, and (4) plan and conduct a seminar to introduce the ATC-50 project products to home inspectors, contractors, and design professionals in the Los Angeles area. As part of the project, ATC was also asked to provide guidance on how to develop and implement a market-driven, incentives-based program to encourage homeowner use of the seismic assessment and seismic rehabilitation procedures developed under the project.

This report, ATC-50: *Simplified Seismic Assessment of Detached, Single-Family, Wood-Frame Dwellings*, provides inspection procedures and a four-page Simplified Seismic Assessment Form to evaluate detached single-family wood-framed dwellings and to assign to each a seismic performance grade. The procedure considers the potential for damage or collapse in a manner that is consistent and useful to owners, purchasers, insurers, lenders, contractors, design professionals, and regulatory officials. The report development effort included a pilot testing program whereby 500 dwellings in the City of Los Angeles were evaluated using a preliminary version of the Simplified Seismic Assessment Form. The purpose of the Pilot Seismic Assessment Testing Program was to evaluate the utility and ease-of-use of the Form, and results from the pilot program were used to update the Form.

The companion ATC-50-1 report, *Seismic Rehabilitation Guidelines for Detached, Single-Family, Wood-Frame Dwellings*, contains prescriptive methods, simplified engineering methods, and fully engineered methods that, if implemented, allow a homeowner to improve the seismic performance grade. Another companion report, the ATC-50-2 report, *Safer at Home in Earthquakes: A Proposed Earthquake Safety Program*, provides recommendations for the development and implementation of a market-driven, incentives-based program to encourage homeowners to have their homes evaluated and rehabilitated, if necessary, using the procedures developed under the ATC-50 project.

All three reports were initially completed in 2002 in time to be made available for an introductory training seminar in Los Angeles on the ATC-50 project products. The second printing of this report in 2007 contains minor edits (e.g., corrected web addresses and phone numbers for various references) and Appendices D, E, and F, which were not available in 2002.

Funding for the ATC-50 report and the Pilot Seismic Assessment Testing Program was provided by the City of Los Angeles and by a Federal Emergency Management Agency Hazards Mitigation Grant from the California Governor's Office of Emergency Services.

The ATC-50 report was developed under the direction of Ronald T. Eguchi, who served as ATC-50 Project Director. Breiholz Qazi Engineering (BQE), Inc., a California-based engineering company, served as the ATC-50 Report Development Subcontractor. Shafat Qazi, and David Breiholz of BQE served as principals in charge, and Nels Roselund, Craig Taylor, and John Wiggins were technical consultants. The Pilot Seismic Assessment Testing Program was carried out by personnel from four engineering firms: ABS Consulting (formerly EQE International); BQE; Thornton-Tomasetti/Coil & Welsh, LZA; and

Wiss Janney Elstner Associates. Overview and guidance were provided by the Project Engineering Panel, consisting of John Coil, Edward F. Diekmann, Susan Dowty (Steering Committee representative), Laurence M. Kornfield, Onder Kustu, Timothy McCormick, Doc X. Nghiem, James Russell, Robin Shepherd, and John G. Shipp (ATC Board representative). Nancy Sauer served as technical editor, and Gerald Brady, Peter Mork, Bernadette Mosby, and Michelle Schwartzbach were responsible for final editing and report production. The affiliations of these individuals and the personnel who led the Pilot Seismic Assessment Testing program are provided in the list of Project Participants.

ATC gratefully acknowledges the patience, input and guidance provided by Nick Delli Quadri, who served as Project Officer for the Department of Building and Safety, City of Los Angeles. ATC also acknowledges the encouragement and assistance provided by other City of Los Angeles personnel, including Scott McGill (Department of Building and Safety) and Perry Singerman (Mayor's Office), who nurtured the project from the outset, and Thomas Grant and Ann Ormiston, who guided ATC through the Department of Building and Safety's contractual requirements. The support of Andrew Adelman, General Manager of the Department of Building and Safety, is also gratefully acknowledged.

Special thanks also go to the members of the Steering Committee who provided overarching guidance for the ATC-50 project: Susan Dowty, (Chair), S.K. Ghosh Associates, Inc.; John Brown, California Real Estate Inspection Association; Dave Carey, Fannie Mae (Washington DC); Kenneth Cooley, State Farm Insurance; Karl Deppe (retired), Los Angeles Department of Building and Safety; Mike Edwards, California Department of Insurance; Mike Grottkau, California Earthquake Authority; Do Kim, Institute for Business and Home Safety; Eugene Lecomte (deceased), Insurance Industry Consultant; Richard McCarthy, California Seismic Safety Commission; Tim McCormick, City of Santa Monica; Duane McCutcheon, California Real Estate Inspection Association; Dave Nelson, International Conference of Building Officials; Jeff Paggi, Farmers Insurance; William Petak, University of Southern California; Patricia Schumate, Freddie Mac; Earl Schwartz, Structural Engineers Association of California; and Barbara Zeidman, Fannie Mae (Los Angeles).

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