

FINAL TECHNICAL REPORT

Earthquake Hazards Information for Multifamily Housing Owners and Public Policy - San Francisco Bay Area

External Grant Award Number 03-HQGR-0010

Jeanne B. Perkins Association of Bay Area Governments (ABAG)
P.O. Box 2050 - Oakland, CA 94604

Telephone (510) 464-7934 FAX (510) 464-7970 jeannep@abag.ca.gov
<http://quake.abag.ca.gov>

NEHRP Element IV Key Words - Education-Lay, Mitigation, Loss Estimation

Abstract

The Association of Bay Area Governments (ABAG) has developed a web-based *Home Quake Safety Toolkit* at <http://quake.abai.ca.gov/fixit>. The toolkit section on structures includes an innovative quiz to "self-assess" structural vulnerability based on shaking intensity and structural type. Structural retrofit resources include information on the retrofit process, lists of contractors, engineers, and home inspectors, success stories, and money. The nonstructural section includes a non-threatening quiz on causes of contents damage, ways to anchor contents, and chimney safety. In the third section, infrastructure disruptions and liquefaction are creatively explained using a quiz focusing on the importance of emergency planning. Resources in this section include family emergency plans, emergency supplies, and natural gas safety.

Research Objectives

The effort had three main objectives:

1. Effectively communicate the risk of earthquake hazards to owners and tenants of multifamily residential buildings in the Bay Area using the Internet to enable that information to be neighborhood specific.
2. Provide mitigation and preparedness information appropriate to those owners and tenants in an easily accessible format on the same Internet site, linking mitigation to loss reduction.
3. Work to encourage use of this information to change the risk environment.

Research supported by the U.S. Geological Survey (USGS), Department of the Interior, under USGS award number 03-HQGR-0010. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

Investigations Undertaken

This project focused on the following tasks:

1. Developing and evaluating a number of new ways to access the earthquake hazard information, including both ground shaking and liquefaction, risk, based on the geographic location of the residential building.
2. Rethinking ways to provide information on typical nonstructural damage for the shaking hazard level, as well as basic mitigation measures related to building contents.
3. Providing information on the types of damage to multifamily residential buildings by shaking hazard level, as well as basic ways to contact engineers, contractors, and building departments to initiate further analysis.
4. Developing basic information on the effects of liquefaction and shaking on transportation and utilities in residential neighborhoods, as well as associated preparedness information.
5. Collecting personal accounts of preparedness activities in order to use them to help motivate other multifamily residential building owners to act on the information provided.
6. Developing ways to publicize the availability of these data in creative ways.

Results

Accessing Ground Shaking and Liquefaction Hazard Information - The way in which the ground shaking and liquefaction hazard maps are accessed has been modified. The new "driver" for these maps asks the question about city and earthquake scenario on the same graphics-based web page, thus simplifying access for the user. Clearer links to "Frequently Asked Questions" and other information are now available. In addition, new ways to access the maps using zip code and address have been programmed. These new search tools are not yet "live" due to technical and policy considerations related to scenarios versus "maximum" or probabilistic shaking maps, as well as related to the appropriate resolution of the maps, that will again be discussed by the Review Committee for this project at its December 2003 meeting.

Nonstructural Damage and Mitigation Information - Prior to work on this project, ABAG had posted general ways of bracing and anchoring typical building contents on its web site. As a first step in improving that information, typical "solutions" have been separated so that bracing and anchoring of residential contents is now separate from office contents. The new residential pages are being dramatically expanded, as well as placed in a more "home"-based setting to make them appear more useful to the audience. Because many residents do not understand the cause-and-effect relationships between shaking and contents damage, we developed a new "quiz" that "tests the user's knowledge of the causes of nonstructural damage in a non-threatening way and, in the process, improves that knowledge.

Structural Damage and Mitigation Information - The information section that deals with the home's structure includes an innovative quiz that owners and tenants of single-family homes, mobile homes, and apartments can take to "self-assess" the structural vulnerability of their home based on a combination of shaking intensity and structural type. It is based on the screening information developed by the Applied Technology Council (ATC 21 or FEMA 154) (Rojahn and Scawthorn, 2002), as well as a structural quiz developed for the City of San Jose for apartments with "tuck-

under" parking (Vukazich, 1998). This quiz was completed in October 2003. The documentation for this quiz is located at -

<http://www.abag.ca.lovlbayarea/egmaps/fixit/quiz/QuizPaperA.pdf>

(Perkins and Peterson, 2003). Structural retrofit resources include information on the retrofit process, lists of contractors, engineers, and home inspectors, success stories, money, and answers to frequently asked questions.

Infrastructure and Liquefaction Information - A creative way in getting Bay Area residents to be concerned about infrastructure disruptions and liquefaction was developed using another quiz focusing on the importance of family emergency plans. The effect of these impacts on travel and utilities was emphasized as an impetus for residents to develop family plans. Resources in this section include how to make a family emergency plan, appropriate emergency supplies, information on natural gas safety and shut-off valves, and other resources.

Success Stories Information - While many owners of single-family homes have retrofitted and several owners of mobile homes have retrofitted, few multifamily building owners have done so. ABAG staff contacted several local government building departments, particularly those with retrofit incentive programs, to get names of these owners. The final section on the web contains several success stories of single-family and mobile home owners. Only two stories currently discuss multifamily buildings. One documents the story of an apartment owner on the peninsula south of San Francisco). A second involves an apartment that had been retrofitted after the 1971 San Fernando earthquake that had minimal damage in the 1994 Northridge earthquake. We continue to contact additional apartment and condo owners who have retrofitted their buildings.

Publicity Planning - This new section of ABAG's popular web site was "released" on October 17, 2003 (the 14th anniversary of the Loma Prieta earthquake) with a press release and open house. ABAG also did a second press release in conjunction with a presentation with the Earthquake Engineering Research Institute Northern California Chapter at the October meeting of the Emergency Management Board of the City of Oakland. This second event received almost as much publicity as the first, and actually received better television coverage. Work on this effort, including issues more concerned with public policy related to soft-story apartments, is continuing.

Non-Technical Summary

The Association of Bay Area Governments (ABAG) has developed a web-based ***Home Quake Safety Toolkit*** at <http://quake.abag.ca.p-ov/fixit>. The toolkit section on structures includes an innovative quiz to "self-assess" structural vulnerability based on shaking intensity and structural type. Structural retrofit resources include information on the retrofit process, lists of contractors, engineers, and home inspectors, success stories, and money. The nonstructural section includes a non-threatening quiz on causes of contents damage, ways to anchor contents, and chimney safety. In the third section, infrastructure disruptions and liquefaction are creatively explained using a quiz focusing on the importance of emergency planning. Resources in this section include family emergency plans, emergency supplies, and natural gas safety.

Reports Published

Perkins, J.B., and Peterson, K.G., 2003. *Earthquake Internet Information Documentation Paper A - Development and Comparison of the ABA G Residential Structural Quiz Scoring for Earthquake Vulnerability with Other Available Scoring Systems*: Association of Bay Area Governments, Oakland, CA, 18 pages. On the Internet at:
<http://www.abag.ca.gov/bayarea/egmaps/fixit/quiz/QuizPaperA.pdf>.

Perkins, J.B., 2004. "Web Based Tools for Bay Area Residents and Small. Businesses" to be presented May 3, 2004, at the *Disaster Resistant California Conference, Sacramento, California*: sponsored by the California Office of Emergency Services and the Collaborative for Disaster Mitigation (CDM).

References Cited

Perkins, J.B., and Peterson, K.G., 2003. *Earthquake Internet Information Documentation Paper A - Development and Comparison of the ABA G Residential Structural Quiz Scoring for Earthquake Vulnerability with Other Available Scoring Systems*: Association of Bay Area Governments, Oakland, CA, 18 pages. On the Internet at:
<http://www.abat.ca.gov/bayarea/egmaps/fixit/quiz/QuizPaperA.Pdf>.

Rojahn, C, and Scawthorn, C., 2002. *Second Edition - Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook* Applied Technology Council (ATC 21) for the Federal Emergency Management Agency (FEMA 154): Washington, DC, 140 pp.

Vukazich, S.M., 1998. *The Apartment Owner's Guide to Earthquake Safety - A Handbook for Owners to Identify Seismic Hazards in Low Rise Apartment Buildings*. The City of San Jose Residential Seismic Safety Program: San Jose, 23 pp.