
# NATURAL HAZARD MITIGATION SAVES: An Independent Study to Assess the Future Savings from Mitigation Activities

## Volume 2 − Study Documentation

## THE MULTIHAZARD MITIGATION COUNCIL

The ***Multihazard Mitigation Council (MMC)***, a council of the National Institute of Building Sciences (NIBS), was established in November 1997 to reduce the total losses associated with natural and other hazards by fostering and promoting consistent and improved multihazard risk mitigation strategies, guidelines, practices, and related efforts. The scope of the Council's interests is diverse and reflects the concerns and responsibilities of all those public and private sector entities involved with building and nonbuilding structure and lifeline facility research, planning, design, construction, regulation, management, and utilization/operation and the hazards that affect them. In recognition of this diversity, the Council believes that appropriate multihazard risk reduction measures and initiatives should be adopted by existing organizations and institutions and incorporated into their legislation, regulations, practices, rules, relief procedures, and loan and insurance requirements whenever possible so that these measures and initiatives become part of established activities rather than being superimposed as separate and additional. Further, the Council's activities are structured to provide for explicit consideration and assessment of the social, technical, administrative, political, legal, and economic implications of its deliberations and recommendations. To achieve its purpose, the Council conducts activities and provides the leadership needed to:

- Improve communication, coordination, and cooperation among all entities involved with mitigation;

- Promote deliberate consideration of multihazard risk reduction in all efforts that affect the planning, siting, design, construction, and operation of the buildings and lifelines systems that comprise the built environment; and

- Serve as a focal point for the dissemination of credible information and sage counsel on major policy issues involving multihazard risk mitigation.

*The Multihazard Mitigation Council,*
*a council of the National Institute of*
*Building Sciences*

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Prepared with funding from the Federal Emergency Management Agency of the U.S. Department of Homeland Security by the Multihazard Mitigation Council of the National Institute of Building Sciences with the assistance of the Applied Technology Council

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***In Memoriam***

*The Multihazard Mitigation Council wishes to acknowledge James M. Delahay, PE, for his contributions to the Applied Technology Council's research/analysis efforts and his significant contributions to the profession of structural engineering and the nation's codes and standards development efforts. The built environment and all those who use it have benefited tremendously from his work.*

# PREFACE

The National Institute of Building Sciences through its Multihazard Mitigation Council is pleased to submit this report to the Congress of the United States on behalf of Federal Emergency Management Agency (FEMA) and the Department of Homeland Security. This report presents the results of an independent study to assess the future savings from hazard mitigation activities.

This study shows that money spent on reducing the risk of natural hazards is a sound investment. On average, a dollar spent by FEMA on hazard mitigation (actions to reduce disaster losses) saves the nation about $4 in future benefits. In addition, FEMA grants to mitigate the effects of floods, hurricanes, tornados, and earthquakes between 1993 and 2003 are expected to save more than 220 lives and prevent almost 4,700 injuries over approximately 50 years. Hurricane Katrina painfully demonstrates the extent to which catastrophic damage affects all Americans and the federal treasury.

The MMC Board wishes to acknowledge the efforts of its subcontractor, the Applied Technology Council (ATC). Further, it applauds the innovative and painstaking work of the ATC research team under the guidance of Ronald T. Eguchi of ImageCat, Inc., the project technical director. The team members were: Adam Z. Rose of The Pennsylvania State University, leader of the benefit-cost analysis portion of the study; Keith Porter, Consultant, co-leader of that portion of the study; Elliott Mittler, Consultant, leader of the community research portion of the study; Craig Taylor of Natural Hazards Management Inc., co-leader of that portion of the study; Corey Barber of the University of California, Berkeley; Jawhar Bouabid of PBS&J; Linda B. Bourque of the University of California, Los Angeles; Stephanie Chang of the University of British Columbia; Nicole Dash of the University of North Texas; James Delahay of LBYD, Inc.; Charles Huyck, ImageCat, Inc.; Christopher Jones, Consultant; Megumi Kano of the University of California, Los Angeles; Karl Kappler of the University of California, Berkeley; Lukki Lam of the University of California, Berkeley; Rebecca C. Quinn, CFM, RCQuinn Consulting, Inc.; Archana More Sharma of the University of California, Los Angeles; Kenneth Strzepek of the University of Colorado; John Whitehead of Appalachian State University; Michele M. Wood of the University of California, Los Angeles; Kathryn Woodell of the University of California, Berkeley; and Bo Yang of The Pennsylvania State University. Thanks also go to the ATC Independent Project Review Team members William Petak of the University of Southern California, David Brookshire of the University of New Mexico, Stephanie King of Weidlinger Associates, Inc., Dennis Mileti of the University of Colorado, Doug Plasencia of AMEC Earth and Environmental, and Zan Turner of the City and County of San Francisco; to the ATC project staff including Thomas R. McLane and Christopher Rojahn; and to additional consultants engaged by ATC (James R. McDonald of McDonald-Mehta Engineers, Bruce Miya, and Douglass Shaw of Texas A&M University).

The MMC also offers its thanks to the Project Management Committee established to oversee the project on its behalf. The committee members have spent countless voluntary hours reviewing study materials and providing guidance to the MMC subcontractor conducting the data analysis effort, and the MMC Board thanks them very much for their extraordinary contribution of time and expertise.  Serving on the committee were:  Philip T. Ganderton, Ph.D., Professor and Chair, Department of Economics, University of New Mexico; David Godschalk, Ph.D., Stephen Baxter Professor, Department of City and Regional Planning, University of North Carolina, Chapel Hill; Anne S. Kiremidjian, Ph.D., Professor of Civil and Environmental Engineering, Department of Civil and Environmental Engineering, Stanford University, Palo Alto; Kathleen Tierney, Ph.D., Professor and Director, Natural Hazards Research and Applications Center, University of Colorado; and Carol Taylor West, Ph.D., Professor, Department of Economics, University of Florida.

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*Brent Woodworth*
*Chair, Multihazard Mitigation Council*

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