

NEHRP Coalition

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**Testimony of the
NEHRP Coalition
On the
Reauthorization of the
National Earthquake Hazard Reduction Program
Before the
Research Subcommittee
Committee on Science
U.S. House of Representatives
May 8, 2003**

Chairman Smith and Members of the Subcommittee:

The below signed ten members of the NEHRP Coalition, representing the scientific, architecture, design and engineering communities responsible for earthquake hazard mitigation are pleased to offer this testimony on the reauthorization of the National Earthquake Hazards Reduction Program (NEHRP).

The earthquake risk to the nation is unacceptably high and growing daily. We are facing inevitable earthquakes, any one of which alone can cost the nation \$100 to \$200 billion. The reauthorization of NEHRP can address this, but it will require additional continuous research, expanded seismic monitoring, and nationwide mitigation. Earthquake occurrence in the United States is not restricted to any single geographical area. All or parts of 39 states are vulnerable to earthquakes.

NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM

The NEHRP Coalition believes that Congress, in reauthorizing NEHRP, should take the necessary steps to strengthen this critical program. Earthquakes are among the most devastating of all natural hazards. To find ways to reduce the devastation, NEHRP, enacted in 1977, funds earthquake related activities of the U.S. Geological Survey (USGS), National Science Foundation (NSF), National Institute of Standards and Technology (NIST) and Federal Emergency Management Agency (FEMA). Despite continuing need, appropriations for NEHRP have decreased significantly in real dollars since the late 1970's.

Earthquake occurrence in the United States is not restricted to any single geographical area. All or parts of 39 states are within zones where the probability of an earthquake occurring exists. Recent research indicates that areas in the eastern and central United States are at greater risk of earthquake occurrence than earlier evidence indicated.

Recent events substantiate that many public buildings cannot survive a major earthquake. In many cases, federal buildings are less earthquake-resistant than nearby privately owned buildings.

Because of funding cuts, programs to develop safer buildings and other structures, including lifelines, have been reduced and existing research facilities have been underutilized. In addition, some excellent earthquake researchers have left the field. There is also evidence that much of the engineering research that has been accomplished under NEHRP has not been applied effectively. NEHRP has produced numerous recommendations for standards for new and existing buildings, lifelines and other structures. These provisions have yet to be fully implemented by local governments. As such, there is inadequate transfer of findings to those who help communities prepare for earthquakes. Funds have not been available to help localities improve building codes and zoning provisions in order to improve building safety.

SUCCESSSES OF THE NEHRP PROGRAM

Over the past 25 years, NEHRP has provided a wealth of information useful to both the scientific and engineering practice resulting in a significant benefit to the public. The USGS has developed and published uniform earthquake hazard maps that clearly identify the expected earthquake ground shaking at any location in the nation. NSF, through their grants to university researchers, has funded the development of new engineering analysis and design techniques that allow engineers to make better and more cost effective decisions related to seismic design. FEMA has been able to leverage a small amount of funding into an impressive series of design guidelines, standards and codes that have spread the experience of a few to engineers nationwide. NIST has developed standards for Federal Buildings that have encouraged owners nationwide to recognize the earthquake vulnerabilities of their communities. It has been a successful program with significant results.

Determining the proper seismic hazard level for a community is still the most consequential information needed for seismic resistant design. The new USGS hazard maps, developed in conjunction with structural engineers, have significantly influenced the engineering community. Some areas in the Nation, such as the Central Valley of California, have learned that the potential earthquake shaking is much lower than traditionally thought. To reduce their vulnerability, some of California's essential business operational facilities have been relocated to these low seismic areas and the need for and cost of seismic rehabilitation in these areas has been significantly reduced. At the other extreme, areas of the nation, such as the Portland Oregon area, have learned that their seismic exposure is much greater and steps are being taken to increase their resilience to damage through new codes and rehabilitation programs.

Because of the detailed, scientifically based maps, billions of dollars of construction is being spent more wisely, both in terms of reduced initial construction costs and reductions in expected future damage. Similar examples could be cited across the nation.

Buildings today all over the world are being built on isolation systems or have energy absorbing systems built within their structures. These advanced construction techniques grew out of fundamental NSF research begun in the late 1970's by Professor James Kelly and others at the University of California at Berkeley. Their work was "curiosity based" and not held in high regard at the time. Over the past 30 years it has matured into a commonly used system that protects essential facilities and historic structures in a superior manner. Basic NSF funded research such as this has yielded dozens of analysis and design techniques that are of significant benefit to the public and the nation.

The nation's ability to arrest the growth of its seismic vulnerability and reduce it to acceptable levels depends on the efforts of all practicing engineers nationwide. FEMA, recognizing the need for published guidelines and standards, has leveraged the volunteer talents of an army of engineers by providing travel funds, meeting spaces, and publication support. Over the past 20 years, dozens of FEMA "Yellow Books" have been published on various aspects of seismic design and rehabilitation. For example, the American Society of Civil Engineers, has been able to use this material in their standards process to produce state of the art design standards such as ASCE 7 and ASCE 31. These new standards are used to train engineers nationwide and guide their seismic design and rehabilitation efforts. These efforts, in turn are providing the nation with a much more reliable constructed environment.

Coalition Recommendations for Reauthorization

The NEHRP Coalition asks that in reauthorizing NEHRP, Congress provide for stronger leadership, increased authorization and improved inter-agency coordination. In a broad sense, the Coalition supports "Securing Society Against Catastrophic Earthquake Losses," a study recently completed by the Earthquake Engineering Research Institute (EERI) with funding from NSF. The report lays out a vision for the future of earthquake research and outreach focused on securing the nation from the catastrophic impacts of earthquakes. The report was prepared by a cross disciplinary panel of scientists, engineers and social scientists, and has been endorsed by numerous professional organizations involved in earthquake research.

The report comprises the following five research and outreach programs:

- Understanding Seismic Hazards – developing new models of earthquakes based on fundamental physics.
- Assessing Earthquake Impacts – evaluating the performance of the built environment by simulating performance of structures and entire urban systems.

- Reducing Earthquake Impacts – developing new materials, structural and non-structural systems, lifeline systems, tsunami protection, fire protection systems and land use measures.
- Enhancing Community Resilience – exploring new ways to effectively reduce risk and improve the decision-making capability of stakeholders.
- Expanding Education and Public Outreach – improving the education of engineers and scientists from elementary school to advanced graduate education, and providing opportunities for the public to learn about earthquake risk reduction.

Success in research will only matter if that research finds its way into practical use. The translation of research knowledge into practice is more than simply disseminating research findings. The report outlines programs to improve the exchange of knowledge and acceptance of new technology and processes during design and construction of new structures as well as in retrofitting older structures.

Technology – ANSS & NEES

Information technologies will play an increasing role in earthquake research in the future. Two applications central to that vision are the Advanced National Seismic System (ANSS) and the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES).

ANSS, authorized by Congress in 2000, is intended to expand the current monitoring system and provide the needed information to maximize our understanding of how specific buildings performed during earthquakes. Strong motion information is critical to making the next quantum leap in understanding how to economically arrest the growth of earthquake risk. ANSS is a critical new program needed by NEHRP and must be funded at an adequate level.

NEES, established by the NSF, will expand knowledge through new methods for experimental and computational simulation. Currently, many new experimental research sites are being put in place around the country, and a system to link into a sophisticated testing and simulation program is being developed. Unfortunately, funds to carry out the research that will make use of this new equipment and simulation technology have not been authorized. Knowledge developed through experiments and simulation methodologies provide the essential scientific knowledge base for improving codes and guidelines. Social science and education research will complement this by helping to better understand and communicate the implications and choices that must be made. An immediate investment in NEES is needed to reduce the cost of seismic design and to strengthen and stimulate significant mitigation activities.

Funding Levels

In order to implement the plan envisioned by the NEHRP Strategic Plan and the EERI report and to increase the effectiveness of NEHRP, it is essential that Congress raise funding levels for NEHRP. The undersigned organizations support increasing funding levels to \$358 million a year for the first five years of a twenty-year program. Despite

real needs, the funding level for NEHRP has remained flat for many years, which translates into a significant decrease in real funding. This trend must be reversed if we are to reduce our nation's vulnerability to earthquakes to acceptable levels.

Finally, it is important to recognize the immense leverage from NEHRP for improvements in the reliability and security of buildings, transportation systems, water supplies, gas and liquid fuel networks, electric power, telecommunications, and waste disposal facilities. NEHRP provides an enormous return on investment that substantially reduces our nation's vulnerability to earthquakes and, at the same time, improves the performance of its civil infrastructure for both normal operation and extreme events.

CONCLUSION

The first 25 years of NEHRP have proven that limited federal funds, applied to the nation's earthquake vulnerability, can be leveraged 100 times over in terms of savings in construction and limiting the losses after an earthquake. We believe that the program is just now hitting its stride and reaching full maturity, and is well equipped to handle additional funds that will provide new levels of understanding about the vulnerability and tools for the analysis and design. Significant progress will then be made toward reducing the nation's vulnerability to an acceptable level.

Thank you for this opportunity to express our views. The NEHRP Coalition is ready to assist in any way we can. If you have questions or need additional information, contact Martin Hight, Senior Manager, Government Relations, American Society of Civil Engineers at (202) 326-5125 or by email at mhight@asce.org.

This statement is endorsed by the following members of the NEHRP Coalition:

**American Geological Institute
American Institute of Architects
American Society of Civil Engineers
Earthquake Engineering Research Institute
Mid-America Earthquake Center
National Fire Protection Association
Oregon Department of Geology and Mineral Industries
Portland Cement Association
Seismological Society of America
World Institute for Disaster Risk Management**