

The NEHRP “Recommended Provisions” and the National Model Building Codes:

How NEHRP Interacts with the Code-Making Bodies

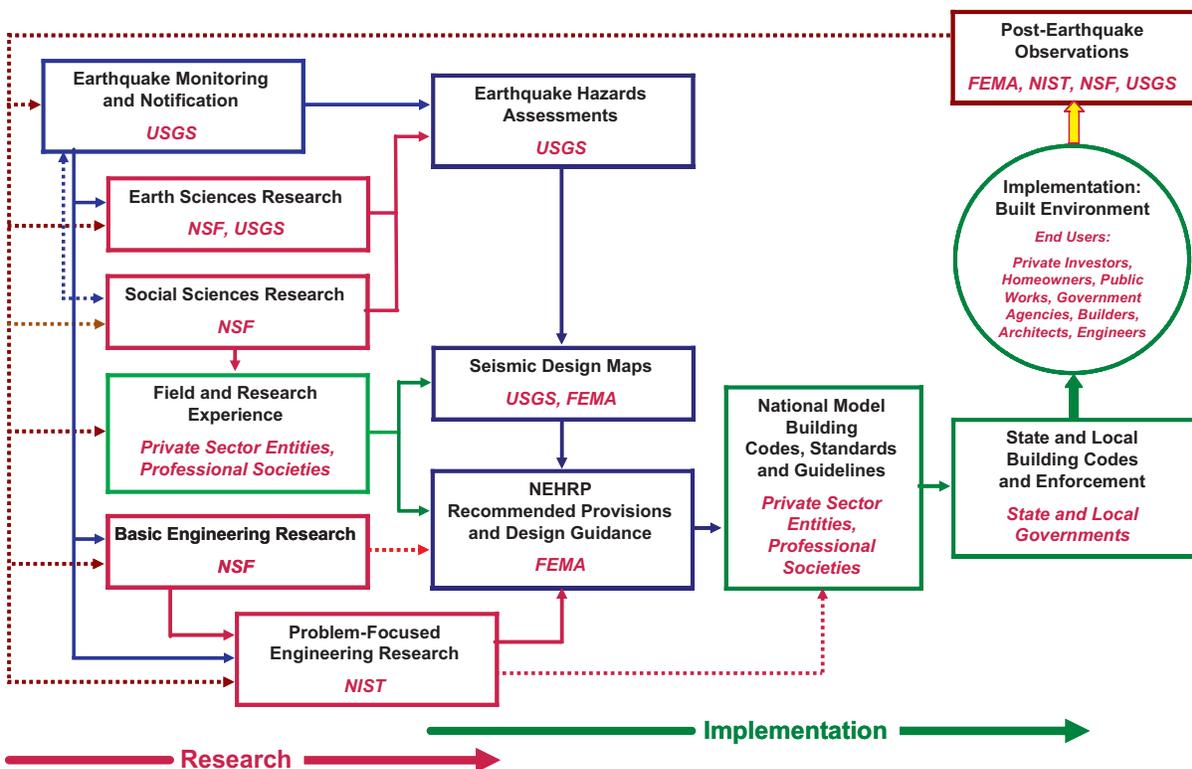
There is no single mandatory national building code or standard for designing and constructing buildings and other structures in the United States. Building codes are adopted and enforced by individual States, by local jurisdictions within the States, or by both State and local authorities. State or local building codes are usually based on a “model” building code or other voluntary consensus standards. State and local governments may either directly adopt the model code or adopt the code with amendments. Today, the model building code that is predominantly adopted in the United States is the *International Building Code (IBC)*, which is promulgated by the International Code Council (ICC). The ICC also promulgates other model codes that impact the building process, such as the *International Residential Code (IRC)*. In addition to the IBC and IRC, some localities have adopted the *NFPA 5000 Building Construction and Safety Code*, which is promulgated by the National Fire Protection Association.

The IBC and its companion ICC documents form the basis of the building codes in 47 States and the District of Columbia.

The remaining three States have elected to adopt the IBC at a planned future date. Some States adopt the IBC fully, while others permit local government amendments. The widespread use of the IBC means that State and local building codes adopted throughout the United States share a common origin. Over time, as States and localities have based their codes upon the model codes, the performance of buildings constructed in accordance with the newer building codes has improved.

The National Earthquake Hazards Reduction Program (NEHRP) works cooperatively with appropriate national building codes and standards organizations, such as the ICC and NFPA, to ensure that the most up-to-date and technically sound earthquake engineering design technology is available for use around the Nation. The NEHRP agencies view the building code development process as the best means to ensure that buildings and other structures in local communities are adequately protected against natural hazards.

Through the efforts of the Federal Emergency Management Agency (FEMA) and the U.S. Geological Survey (USGS),



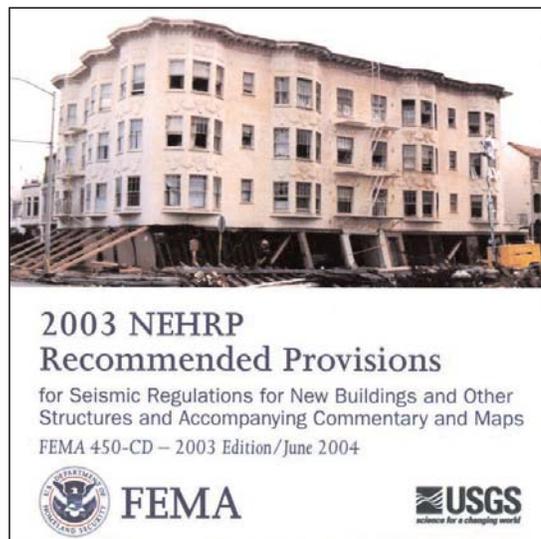
NEHRP Impact on the Built Environment

NEHRP has been involved in the national model building code and consensus standards development processes for over 25 years. In addition, the National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST) support the FEMA and USGS activities through sponsoring and, at NIST, performing fundamental and problem-focused research that advances the technologies that are implemented via the building codes.

Some of the earliest work on codes and standards was done by NIST (then the National Bureau of Standards, or NBS), which was a significant contributor to the first major consensus standard on design loads, American National Standards Institute (ANSI) A58.1, which later became American Society of Civil Engineers (ASCE) *Minimum Design Loads for Buildings and Other Structures*, known as ASCE 7. NIST has also served on numerous other committees to advance the state of the art in a wide range of technical areas. FEMA first recognized the value of model building codes for reducing future losses from natural hazards, such as earthquakes, in the early 1980s, and has for a number of years led NEHRP participation in the model code development process. Both FEMA and USGS have committed staff and resources to improving earthquake hazard provisions in the model codes by working supportively and cooperatively within that process. Although most State and local codes are based on the ICC-developed codes, both FEMA and USGS work with all model code development bodies, including NFPA, to ensure that their products contain adequate provisions to address all natural hazards.

Resource documents serve an important role within the building code development framework. One important resource document was the Structural Engineers Association of California (SEAOC) *Blue Book*, which served as the basis for the original International Conference of Building Officials (ICBO) *Uniform Building Code*. In order to develop a nationally applicable resource document for all model codes and standards, FEMA funded the Building Seismic Safety Council (BSSC) to develop the *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures (NEHRP Recommended Provisions)*, which was originally based on Applied Technology Council report ATC-3-06, *Tentative Provisions for the Development of*

Seismic Regulations for Buildings, as amended with the results of a FEMA/NIST project. The first edition of the *NEHRP Recommended Provisions* was published in 1985. The 1991 edition of the *NEHRP Recommended Provisions* became the basis for seismic code language in the original Building Officials and Code Administrators (BOCA) *National Building Code* and the Southern Building Code Congress International (SBCCI) *Standard Building Code*.¹ The 1997 edition of the *NEHRP Recommended Provisions* (FEMA 302/303) served as the basis for the seismic code language in the first editions of the IBC and IRC, which were released in 2000. The most recent edition of the NEHRP resource document is the 2003 edition, which was published as FEMA 450; it was used as the basis for code changes submitted for the 2006 IBC and IRC and for ASCE 7-05. Through the completion of FEMA 450 in 2003, this NEHRP resource document has been recently updated every 3 years to maintain its technical strength and to align it with the development cycles of the model codes.



Recently, in a decision made mutually with ASCE, FEMA has determined that future updates to the *NEHRP Recommended Provisions* will be typically planned for 6-year cycles, instead of 3-year cycles, coinciding with every second national model code update cycle. The conversion to a 6-year publication cycle will reduce the volume and frequency of changes, providing relief both to those who draft the provisions and to practitioners who must implement them. Any significant mid-cycle discoveries that might provide major national impact could still be considered on a case by case basis. In conjunction with lengthening

the update cycle, FEMA has determined that it will focus more attention on the Commentary for the provisions, to facilitate training and educational applications.

Over the years, the model building codes have come to rely upon the direct referencing of private-sector developed “consensus standards” for their design provisions, including those for seismic design. Consensus standards are documents that have been developed following a specific, rigorous process that has been reviewed and approved by ANSI. Standards that have been developed through such an “ANSI-accredited” or similar process may be adopted directly by reference in a model building code, thereby making it far more probable that States and localities will adopt them directly into law.

¹ In 2003, BOCA, ICBO, and SBCCI were consolidated as the ICC.

FEMA and USGS work with ASCE to ensure that ASCE 7 adequately addresses seismic, wind, and flood loads. Since its 1995 version (it is typically updated every 3 to 5 years), ASCE 7 has addressed seismic loads and design in a manner that is “substantially equivalent” to guidelines recommended by the *NEHRP Recommended Provisions*. The IBC now directly adopts large portions of the seismic provisions of ASCE 7 by reference and permits the entire ASCE 7 seismic provisions to be used as a suitable alternative to the IBC. NFPA 5000 directly adopts the entire ASCE 7 seismic provisions by reference.

ASCE 7-05 is the current version of the ASCE standard. It incorporates many of the provisions found in FEMA 450, *NEHRP Recommended Provisions*, 2003 Edition. The development of ASCE 7-10 (slated for publication in 2010) is just getting under way. FEMA and USGS are currently undertaking the efforts required to produce an updated 2009 version of the *NEHRP Recommended Provisions* that will serve as the primary resource document for ASCE 7-10.

In summary, to continually improve the resistance of buildings to earthquakes, the national model building code development process today consists of maintaining the technical quality of four documents:

- The *NEHRP Recommended Provisions*. This document presents the state of the art of earthquake engineering research and practice in a form usable by the engineering community in a non-regulatory manner. FEMA leads recurring efforts to update this document. FEMA has typically updated the *NEHRP Recommended Provisions* via contracts with the National Institute of Building Sciences’ BSSC, which uses a series of technical committees staffed by volunteer expert researchers and practitioners. USGS directly supports the update process by providing appropriate updated seismic ground motion maps and soil/site condition parameters that incorporate the latest seismological findings. USGS also prepares seismic design maps based on the hazard levels and other modifications recommended by technical committees participating in the update process. Appropriate basic (NSF-sponsored) and applied (NIST-sponsored) research results are included in the updates. The document also often serves the needs of the Federal Government by being a baseline for Executive orders that direct activities related to Federal building design and construction. Proposed changes to the provisions require

approval by two-thirds of the ballots cast by BSSC’s relevant Technical Subcommittees (TS), full Provisions Update Committee (PUC), and membership organizations.

- ASCE 7. ASCE passes all seismic design requirements through an ANSI-accredited consensus process so that the resulting standard may be adopted by reference by the model codes and ultimately into State and local building code laws and regulations. The ASCE 7 process includes a working arrangement whereby the ASCE 7 Seismic Subcommittee considers changes proposed in the *NEHRP Recommended Provisions*. The Subcommittee has agreed that it will not approve any changes that have been disapproved by the BSSC PUC during the *NEHRP Recommended Provisions* update process. ASCE’s ANSI-accredited standards development process requires that committee membership be balanced among stakeholders (producers, consumers, and those with regulatory interests). The process requires that no less than 65 percent of the approved committee membership return ballots covering proposed changes, and that all changes be approved by no less than 75 percent of the ballots that are cast. Those submitting negative ballots are encouraged to submit comments explaining their ballots and suggesting revisions that could change their votes to the affirmative. All review comments must be resolved formally by the Seismic Subcommittee and the main ASCE 7 Committee. Finally, there is a specified public review and comment period for the proposed new standard. The Seismic Subcommittee and ASCE 7 Committee must also resolve any comments received during the public review period.
- The International Codes and NFPA 5000. Most State and local jurisdictions use the IBC and the IRC as the basis for their building code laws and regulations; a few local jurisdictions have adopted NFPA 5000. The IBC and NFPA 5000 adopt ASCE 7 by reference for most seismic design requirements, and the IRC incorporates NEHRP-based seismic requirements directly. The IBC model code change process occurs on an 18-month cycle, with a new edition being issued every 3 years and a supplement to the existing edition being issued 18 months following it. Proposed changes may be submitted by any interested party; are vetted by a balanced code change committee at code development hearings; and are subsequently approved, modified, or disapproved by the ICC voting members at final action hearings.

For more information, visit www.nehrp.gov or send an email to info@nehrp.gov.