



*of the National Institute of Building Sciences*

*Program on  
Improved Seismic Safety  
Provisions*

**2003 Edition**

**NEHRP RECOMMENDED PROVISIONS  
FOR SEISMIC REGULATIONS  
FOR NEW BUILDINGS  
AND OTHER STRUCTURES (FEMA 450)**

**Part 1: Provisions**

The **Building Seismic Safety Council (BSSC)** was established in 1979 under the auspices of the National Institute of Building Sciences as an entirely new type of instrument for dealing with the complex regulatory, technical, social, and economic issues involved in developing and promulgating building earthquake hazard mitigation regulatory provisions that are national in scope. By bringing together in the BSSC all of the needed expertise and all relevant public and private interests, it was believed that issues related to the seismic safety of the built environment could be resolved and jurisdictional problems overcome through authoritative guidance and assistance backed by a broad consensus.

The BSSC is an independent, voluntary membership body representing a wide variety of building community interests. Its fundamental purpose is to enhance public safety by providing a national forum that fosters improved seismic safety provisions for use by the building community in the planning, design, construction, regulation, and utilization of buildings.

See the back of the *Commentary* volume for a full description of BSSC activities.

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(National Earthquake Hazards Reduction Program)  
**FOR SEISMIC REGULATIONS**  
**FOR NEW BUILDINGS AND**  
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**Part 1: PROVISIONS**

Prepared by the  
Building Seismic Safety Council  
for the  
Federal Emergency Management Agency

**BUILDING SEISMIC SAFETY COUNCIL**  
**NATIONAL INSTITUTE OF BUILDING SCIENCES**  
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Building Seismic Safety Council activities and products are described at the end of this report. For further information, see the Council's website ([www.bssconline.org](http://www.bssconline.org)) or contact the Building Seismic Safety Council, 1090 Vermont Avenue, N.W., Suite 700, Washington, D.C. 20005; phone 202-289-7800; fax 202-289-1092; e-mail [bssc@nibs.org](mailto:bssc@nibs.org).

Copies of this report on CD Rom may be obtained from the FEMA Publication Distribution Facility at 1-800-480-2520. Limited paper copies also will be available. The report can also be downloaded in pdf form from the BSSC website at [www.bssconline.org](http://www.bssconline.org).

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## PREFACE

One of the goals of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) and the National Earthquake Hazards Reduction Program (NEHRP) is to encourage design and building practices that address the earthquake hazard and minimize the resulting risk of damage and injury. Publication of the 2003 edition of the *NEHRP Recommended Provisions for Seismic Regulation of New Buildings and Other Structures* and its *Commentary* is a fitting end to the 25<sup>th</sup> year of the NEHRP and reaffirms FEMA's ongoing support to improve the seismic safety of construction in this country. Its publication marks the sixth edition in an ongoing series of updating of both the *NEHRP Recommended Provisions* and several complementary publications. FEMA was proud to sponsor the Building Seismic Safety Council for this project and we encourage the widespread dissemination and voluntary use of this state-of-the-art consensus resource document.

The 2003 edition of the *NEHRP Recommended Provisions* contains several significant changes, including: a reformatting to improve its usability; introduction of a simplified design procedure, an updating of the seismic design maps and how they are presented; a modification in the redundancy factor; the addition of ultimate strength design provisions for foundations; the addition of several new structural systems, including buckling restrained braced frames and steel plate shear walls; structures with damping systems has been moved from an appendix to a new chapter; and inclusion of new or updated material industry reference standards for steel, concrete, masonry, and wood.

The above changes are but a few of the 138 ballots submitted to the BSSC member organizations. The number of changes continues to be significant and is a testament to the level of attention being paid to this publication. This is due in large part to the role that the *NEHRP Recommended Provisions* has in the seismic requirements in the ASCE-7 Standard *Minimum Design Loads for Buildings and Other Structures* as well as both the *International Building Code* and *NFPA 5000 Code*. FEMA welcomes this increased scrutiny and the chance to work with these code organizations.

Looking ahead, FEMA is contracting with BSSC for the update process that will lead to the 2008 edition of the *NEHRP Recommended Provisions*. As is evidenced by the proposed date, this next update cycle will be expanded to a five-year effort to conclude in time to input into the next update of the ASCE-7 standard. This update will include referencing of the ASCE-7 standard to avoid duplication of effort and a significant update and revision to the *Commentary* along with the normal update of current material and the inclusion of new, state-of-the-art seismic design research results.

Finally, FEMA wishes to express its deepest gratitude for the significant efforts of the over 200 volunteer experts as well as the BSSC Board of Directors and staff who made possible the 2003 *NEHRP Provisions* documents. It is truly their efforts that make these publications a reality. Americans unfortunate enough to experience the earthquakes that will inevitably occur in this country will owe much, perhaps even their very lives, to the contributions and dedication of these individuals to the seismic safety of new buildings. Without the dedication and hard work of these men and women, this document and all it represents with respect to earthquake risk mitigation would not have been possible.

*Department of Homeland Security/  
Federal Emergency Management Agency*

## INTRODUCTION and ACKNOWLEDGEMENTS

Since its creation in 1978, the National Earthquake Hazard Reduction Program (NEHRP) has provided a framework for efforts to reduce the risk from earthquakes. The Building Seismic Safety Council (BSSC) is extremely proud to have been selected by the Federal Emergency Management Agency (FEMA), the lead NEHRP agency, to play a role under NEHRP in improving the seismic resistance of the built environment. Further, the BSSC is pleased to mark the occasion of its twenty-fifth anniversary with delivery to FEMA of the consensus-approved 2003 *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and other Structures*, the seventh edition of this landmark publication. The *Provisions* and its accompanying *Commentary* have developed over the past quarter century into widely available, trusted, state-of-the-art seismic design resource documents with requirements that have been adapted for use in nation's model building codes and standards.

Work on the 2003 *Provisions* began in September 2001 when NIBS entered into a contract with FEMA for initiation of the BSSC 2003 *Provisions* update effort. In mid-2001, the BSSC member organization representatives and alternate representatives and the BSSC Board of Direction were asked to identify individuals to serve on the 2003 Provisions Update Committee (PUC) and its Technical Subcommittees (TSs).

The 2003 PUC and its 13 Technical Subcommittees (TS) were then established and addressed the following topics during the update effort: design criteria and analysis, foundations and geotechnical considerations, cast-in-place/precast concrete structures, masonry structures, steel structures, wood structures, mechanical-electrical systems and building equipment and architectural elements, quality assurance, low rise and residential structures, composite steel and concrete structures, energy dissipation and base isolation, and nonbuilding structures.

Early in the update effort, a series of editorial/organizational changes were made to the 2000 version of the *Provisions* to improve the document's usability and eliminate inconsistencies and duplications that had crept in over the years; this edited document was submitted to the BSSC membership for ballot in October 2001 and was then adopted as the document to which further update changes would be proposed. All draft TS and PUC proposals for change were finalized in June 2003 and approved by the BSSC Board of Direction for balloting by the BSSC member organizations. Because of time limitations, there would be no second ballot; therefore, the BSSC Board authorized the PUC to resolve, to the extent possible, comments submitted by the membership and to defer for reconsideration during the next update cycle any comments that could not be resolved in the limited time available.

Of the 138 proposals submitted to the members for ballot, 137 received the required two-thirds affirmative vote. Of those, 3 were withdrawn for reconsideration during the next update cycle and 83 required some revision in response to comments. A summary of the results of the ballot and comment resolution process are available from the BSSC upon request and will be posted on the BSSC website ([www.bssconline.org](http://www.bssconline.org)).

As in the past, the 2003 *Provisions* would not now be available without the expertise, dedication, and countless hours of effort of the more than 200 dedicated volunteers who participated in the update process. The American people benefit immeasurably from their commitment to improving the seismic-

resistance of the nation's buildings. These seismic design professionals are identified in Appendix B of the *Provisions* volume with list of BSSC Board members and member organizations.

I would like to acknowledge a few individuals and groups who deserve special thanks for their contributions to this effort. As Chairman of the BSSC Board of Direction, it is my pleasure to express heartfelt appreciation to the members of the BSSC Provisions Update Committee, especially Chairman Ronald Hamburger, and to Michael Mahoney, the FEMA Project Officer. Special thanks also are due to the BSSC staff who work untiringly behind the scenes to support all the groups mentioned above and who bring the finished product forward for acceptance. Finally, I wish to thank the members of the BSSC Board of Direction who recognize the importance of this effort and provided sage advice throughout the update cycle. We are all proud of the *2003 NEHRP Recommended Provisions* and it is my pleasure to introduce them.

*Charles Thornton*  
*Chairman, BSSC Board of Direction 2001-2003*



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