

# THE BUILDING SEISMIC SAFETY COUNCIL

---

## Contents

<b>About the Building Seismic Safety Council .....</b>	<b>1</b>
<b>2012-2013 BSSC Board of Direction.....</b>	<b>4</b>
<b>BSSC Member Organizations .....</b>	<b>6</b>
<b>BSSC Publications.....</b>	<b>8</b>

## About the Building Seismic Safety Council

The **Building Seismic Safety Council (BSSC)**, which became part of the National Institute of Building Sciences in 1979, deals with the complex technical, regulatory, social, and economic issues involved in developing and promulgating building earthquake risk 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 organizational 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 planning, design, construction and regulation in the building community. To fulfill its purpose, the BSSC: (1) recommends, encourages and promotes the improvement and update of seismic safety provisions for adoption by the national standards and model building codes; (2) help to assess progress in the implementation of such provisions by federal, state, and local regulatory and construction agencies; (3) identifies issues and opportunities for improving seismic safety regulations and practices and encourages public and private organizations to effect such improvements; (4) promotes the development of training and educational courses and materials for use by design professionals, builders, building regulatory officials, elected officials, industry representatives, other members of the building community, and the general public; (5) advises government bodies on their programs of research, development, and implementation; and (6) periodically reviews and evaluates research findings, practices, and experience and makes recommendations for incorporation into seismic design practices.

In 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act to plan effective ways to protect the lives of building occupants during an earthquake and mitigate the impact of such disasters on the national economy. The law established the National Earthquake Hazards Reduction Program (NEHRP) and designated four federal agencies to tackle seismic issues: the Federal Emergency Management Agency (FEMA), National Institute of Standards and Technology (NIST), National Science Foundation (NSF) and the United States Geological Survey (USGS). The Building Seismic Safety Council (BSSC) under contract with the Federal Emergency Management Agency developed and maintains the *NEHRP Recommended*

*Seismic Provisions for New Buildings and Other Structures*. This code development resource document played a key role in the national code and standard development. It was used to form the seismic provisions for the first edition of the International Building Code (IBC); it was also the primary resource for the professional design standard *ASCE/SEI 7-05 Minimum Design Loads for Buildings and Other Structures*. The 2009 edition of the *NEHRP Provisions FEMA P-750* was developed as a knowledge-based resource document focusing on translation of new knowledge and technologies for implementation. The 2014 edition of the *NEHRP Provisions* is currently under development by the Provisions Update Committee (PUC) formed by the BSSC.

The BSSC also develops educational, training materials and explanatory information to support the customers of the *NEHRP Provisions*. The *Provisions* provide in-depth and complete commentary on the seismic design requirements in the ASCE 7. The *NEHRP Recommended Seismic Provisions: Design Examples, FEMA P-751*, based on the *Provisions*, are intended for those who are experienced structural designers, but are relatively new to the field of seismic design. The design examples explain the principles behind the *Provisions* and include types of structures, materials, and specific seismic load resisting elements that illustrate to the reader how to apply the new requirements and to handle critical issues when conducting seismic design of the specific structural system. Practitioners and academics also will find useful training and educational slides to be published in *FEMA 752*. Seminars and workshops will be held based on the *FEMA 752* materials. Additionally, the BSSC develops the *Simplified Seismic Design Procedures* to help those engineers who may face the challenge of providing seismic designs for certain structures in a short time and under a tight budget. The procedures are intended for targeted structural systems or regions to achieve seismic performance equal to or above code requirements.

Understanding the *Provisions* as a basis for seismic-related codes and standards is important to many others outside the technical community. To support this transfer of knowledge, the BSSC has developed *Earthquake-Resistant Design Concepts, FEMA P-749* for use by builders, elected officials, industry representatives, decision-makers in the insurance and finance communities, individual business owners, other members of the building community and the public. The document provides a nontechnical explanation of the concepts of the earthquake-resistant design and requirements of the *Provisions*.

BSSC's mission to improve the regulation of seismic resistant planning, design and construction also is accomplished through the Codes Resource Seismic Committee (CRSC). This group of volunteers develops, submits, monitors, and supports code changes, particularly in the *International Building Code (IBC)*, for both new and existing buildings based on the most recent edition of the *Provisions*.

Periodically, the BSSC advises government bodies on their programs of seismic research, development, and implementation. For example, for the National Institute of Standards and Technology (NIST) the BSSC in 2012 and 2013 prepared the *Development of NIST Measurement Science R&D Roadmap: Earthquake Risk Reduction in Buildings, NIST GCR 13-917-23* to assist NIST in planning future research efforts related to seismic safety for new and existing buildings over the next eight years. Recommended research topics are intended to fulfill the broad objectives of the NIST program - Earthquake Risk Reduction in Buildings and Infrastructure. Research that is implemented will support the development of seismic-related codes and standards.

The BSSC also supported NIST on behalf of the Interagency Committee on Seismic Safety in Construction (ICSSC) in development of the *Standards of Seismic Safety for Existing Federally Owned and Leased Buildings, ICSSC Recommended Practice 8 (RP 8), NIST GCR 11-917-12*. As part a continuing effort to achieve seismic safety in existing Federal buildings, this *Standards* document is intended provide Federal agencies with minimum and extended standards for the evaluation and mitigation of seismic risks posed by

their building inventories. The *NEHRP Provisions*, among other code documents, provides the basis for defining these performance objectives.

The success of the BSSC is due to the efforts of its voting organizational members and volunteer experts, which include: engineers, architects, academics, researchers, code officials, manufacturers and suppliers. The *Provisions* are developed by a technical committee of seismic experts that identify and apply the most advanced seismic technology available. The committee is supported by expert issue teams that address specific aspects of seismic design methodology and construction. These committee and team members ensure that lessons learned from the building performance during the earthquakes, as well as new research to improve earthquake resistance, are reflected in state-of-the-art seismic requirements. The organizational members ensure that in this process accounts for the interests of the building community. Believing that the achievement of its purpose is a concern shared by all in the public and private sectors, the BSSC's activities are structured to provide all interested entities with the opportunity to participate. The BSSC also believes that the regional and local differences in the nature and magnitude of potentially hazardous earthquake events require a flexible approach to seismic safety that allows for consideration of the relative risk, resources, and capabilities of each community. BSSC support States and local jurisdictions to adopt and enforce the full strength of national model building codes. The BSSC is committed to lasting technical improvement of seismic design provisions, assessment of advances in engineering knowledge and design experience and evaluation of earthquake impacts.

## 2012-2013 BSSC Board of Direction

### Officers

**Jim. W. Sealy, FAIA, Chair**

Dallas, TX

**James R. Cagley, P.E., S.E., Vice Chair**

Chairman of the Board Cagley & Associates

Rockville, MD

Representing: Applied Technology Council

**Melvyn Green, Secretary**

Melvyn Green & Associates

Torrance, CA

Representing: Earthquake Engineering Research Institute

### Members

**Remington B. Brown**

Insurance Institute for Building and Home Safety

Tampa, FL

Representing: Insurance Institute for Building and Home Safety

**Charles J. Carter, PhD., P.E., S.E.**

Vice President of Engineering and Research

American Institute of Steel Construction

Chicago, IL

Representing: American Institute of Steel Construction

**Bradford K. Douglas, P.E.**

Vice President, Engineering

American Wood Council

Leesburg, VA

Representing: American Wood Council

**Jennifer Goupil, P.E.**

Director, Structural Engineering Institute

American Society of Civil Engineers

Reston, VA

Representing: American Society of Civil Engineers

**Perry Haviland**

Oakland, CA

Representing: American Institute of Architects

**John R. Hayes, Jr. ("Jack"), PhD., P.E.**

NEHRP Director

National Institute of Standards and Technology (NIST)

Gaithersburg, MD

Representing: National Institute of Standards and Technology

FEMA P-751, *NEHRP Recommended Provisions: Design Examples*

**Jay W. Larson, P.E., F. ASCE**

Managing Director, Construction Technical  
American Iron and Steel Institute  
Bethlehem, PA  
Representing: American Iron and Steel Institute

**Ron Lynn**

Clark County Government Center  
Las Vegas, NV  
Representing: Code Officials

**Stephen S. Szoke, P.E.**

Director, Codes and Standards  
Portland Cement Association  
Skokie, IL  
Representing: Portland Cement Association

**Jason J. Thompson**

Vice President of Engineering  
National Concrete Masonry Association  
Herndon, VA  
Representing: National Concrete Masonry Association

**BSSC Staff**

Phillip Schneider, AIA, Executive Director, Building Seismic Safety Council  
Drew N. Rowland, PMP, Program Director  
Roger J. Grant, CSI, CDT, Program Director

## **BSSC Member Organizations**

### **Voting Members**

- American Concrete Institute
- American Council of Engineering Companies
- American Institute of Architects
- American Institute of Steel Construction
- American Iron and Steel Institute
- APA - The Engineered Wood Association
- American Society of Civil Engineers
- American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
- American Welding Society
- American Wood Council (formerly the American Forest & Paper Association)
- Applied Technology Council
- Association of Engineering and Environmental Geologists
- Brick Industry Association
- Building Owners and Managers Association International
- California, Division of the State Architect, California
- California Seismic Safety Commission
- Concrete Masonry Association of California and Nevada
- Concrete Reinforcing Steel Institute
- Earthquake Engineering Research Institute
- General Services Administration-Seismic Program
- Institute for Business and Home Safety
- International Code Council
- International Masonry Institute
- Masonry Institute of America
- Metal Building Manufacturers Association
- National Association of Home Builders
- National Concrete Masonry Association
- National Council of Structural Engineers Associations
- National Institute of Building Sciences
- National Institute of Standards and Technology
- National Ready Mixed Concrete Association
- Portland Cement Association
- Precast/Prestressed Concrete Institute
- Rack Manufacturers Institute
- Steel Deck Institute

- Structural Engineers Association of California
- Structural Engineers Association of Central California
- Structural Engineers Association of Colorado
- Structural Engineers Association of Illinois
- Structural Engineers Association of Kansas & Missouri
- Structural Engineers Association of Kentucky
- Structural Engineers Association of Northern California
- Structural Engineers Association of Oregon
- Structural Engineers Association of San Diego
- Structural Engineers Association of Southern California
- Structural Engineers Association of Texas
- Structural Engineers Association of Utah
- Structural Engineers Association of Washington
- The Masonry Society
- Western States Clay Products Association
- Wisconsin Department of Administration

## **BSSC Publications**

For a complete list of all BSSC publications and to download copies free of charge, visit the BSSC website at [http://www.nibs.org/?page=bssc\\_pubs](http://www.nibs.org/?page=bssc_pubs).

BSSC Publications are also available free of charge from the Federal Emergency Management Agency at 1-800-480-2520 (by FEMA Publication Number).

For detailed information about the BSSC and its projects, visit the BSSC website at <http://www.nibs.org/?page=bssc> or contact the Council directly at:

**BSSC**

1090 Vermont Avenue, N.W., Suite 700, Washington, D.C. 20005;

Phone: 202-289-7800; Fax 202-289-1092

e-mail [pschneider@nibs.org](mailto:pschneider@nibs.org)

## **NONLIN and EQ-TOOLS SUMMARY**

NONLIN and EQ-Tools are simple computer programs for earthquake engineering education. Both programs were developed using Visual Basic and were designed to run only on Microsoft Windows based PC's. The programs can be downloaded from NEESHub (<http://nees.org>) and are also available online through NEESHub running in a web-based Java environment. The programs use a graphic user interface. A summary of the features of the programs is provided below.

### **NONLIN, Version 8.0**

NONLIN provides a variety of tools for analysis of simple elastic and inelastic systems. Four basic modules are included:

- Damped Single Degree of Freedom (SDOF) Systems
- Multiple Degree of Freedom (MDOF) Systems (maximum of 3-DOF)
- Modal Properties of Classically Damped Elastic Systems
- Modal Properties of Non-classically Elastic Systems

The SDOF module provides a number of tools for linear and nonlinear analysis, as well as a variety of material force-deformation relationships. The program handles a variety of loadings, including a large library of pre-recorded ground motions. Response spectrum tools are provided for ground motion analysis. Also provided is a tool that automatically performs Incremental Dynamic Analysis (IDA) for the simple SDOF Systems. The MDOF tool allows for ground motion analysis under suites of ground motions or sequences of motions. Several material relationships are available for the MDOF tool, as is the capability to model added linear or nonlinear viscous damping.

### **EQ-Tools, Version 2.0**

EQ-Tools is divided into several modules that allow the user to select, analyze, scale, and modify ground motions. The basic modules are as follows:

- Selection and analysis of ground motion records
- Scaling of Ground Motion Records for Response History Analysis
- Plotting of Ground Motion Attenuation Relationships
- Modification of Ground Motions for Site Effect

In the selection tool, several hundred record sets of horizontal and vertical motion are provided. Tools are provided for plotting the records in a variety of formats; include acceleration velocity and displacement histories, amplitude spectra, and response spectra. The scaling tool provides a large number of options for scaling records against several types of target spectra, including the ASCE 7 spectrum, spectra from attenuation relationships, and conditional mean spectra. The attenuation tools provide a number of models used in the development of the maps for the 2009 NEHRP Provisions. The user may explore these relationships by providing parameters such as magnitude and distance. The ground motion modification tools allow the analyst to start with a motion recorded on firm soil, and modify it by providing information on soil characteristics below the surface. Either linear or nonlinear analysis provides revised acceleration histories and related spectra at the surface and at designated locations below the surface.