Chapter C11
SEISMIC DESIGN CRITERIA

C11.1 GENERAL

In preparing the seismic provisions for the 2005 edition of this standard, the Seismic Task Committee of ASCE 7 established a Scope and Format Subcommittee to review the layout and presentation of the seismic provisions and to make recommendations to improve the clarity and use of the standard. As a result of the efforts of this subcommittee, the seismic provisions are now presented in Chapters 11 through 23 and Appendices 11A and 11B, as opposed to prior editions, wherein the seismic provisions were presented in a single section (Section 9). The increase in number of sections has greatly reduced the depth of paragraph numbering. The goal was to keep the section numbering to four deep or less and, except for a few isolated sections, the goal was achieved. Users will also note that the major subject areas are now identified as "chapters" whereas in ASCE 7-02 they were called sections. Individual provisions within a chapter are referred to herein as "sections."

Of foremost concern in the reformat effort was to organize the seismic provisions in a logical sequence for the general structural design community and to clarify the various headings to more accurately reflect their content. Accomplishing these two primary goals led to the decision to create 13 separate chapters and to relocate provisions into their most logical location.

The provisions for buildings and nonbuilding structures are now distinctly separate, as are the provisions for nonstructural components. Less commonly used provisions, such as those for seismically isolated structures, have also been located in their own distinct section. We hope that the users of ASCE 7 will find the reformatted seismic provisions to be a significant improvement in organization and presentation over prior editions and will be able to more quickly locate applicable provisions. Table C11-1 of ASCE 7-05 was created to assist users in locating provisions between the 2002 and the 2005 editions of this standard and was deleted for this edition.

Many of the technical changes made to the 2010 edition were primarily based on the 2008 edition of the *NEHRP Recommended Provisions for the Development of Seismic Regulations for New Buildings and Other Structures,* which is prepared by the Building Seismic Safety Council (BSSC) under sponsorship of the Federal Emergency Management Agency (FEMA). The National Earthquake Hazards Reduction Program (NEHRP) is managed by FEMA. Since 1985, the NEHRP Provisions have been updated every 3 to 5 years. The efforts by BSSC to produce the NEHRP Provisions were preceded by work performed by the Applied Technology Council (ATC) that originated after the 1971 San Fernando Valley earthquake,which demonstrated the design rules of that time for seismic resistance had some serious shortcomings. Each subsequent major earthquake has taught new lessons. ATC, BSSC, and ASCE have endeavored to work individually and collectively to improve each succeeding document to provide the best earthquake engineering design and construction provisions possible and to ensure that the provisions would have nationwide applicability.

Content of Commentary. The commentary of Chapters 11 through 23 does not attempt to explain the earthquake loading provisions in great detail. The reader is referred to two excellent resources:

- Part 2, Commentary, of the *NEHRP Recommended Provisions for the Development of Seismic Regulations for New Buildings and Other Structures,* Building Seismic Safety Council, Federal Emergency Management Agency, 2008 edition
- *Recommended Lateral Force Requirements and Commentary,* Seismology Committee, Structural Engineers Association of California, 1999

Most of the commentary contained herein is devoted to noting and explaining the differences of major substance between ASCE 7 and the *NEHRP Recommended Provisions*.

Nature of Earthquake "Loads." The 1988 edition of ASCE 7 and the 1982 edition of ANSI A58.1 contained seismic provisions based upon those in the *Uniform Building Code* (UBC) of 1985 and earlier. The UBC provisions for seismic safety have been based upon recommendations of the Structural Engineers Association of California (SEAOC) and predecessor organizations. Until 1988, the UBC and SEAOC provisions had not yet been fully influenced by the ATC and BSSC efforts. The 1972 and 1955 editions of A58.1 contained seismic provisions based upon much earlier versions of SEAOC and UBC recommendations.