2009 IBC Handbook

Structural Provisions

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Preface

Internationally, code officials recognize the need for a modern, up-to-date building code addressing the design and installation of building systems through requirements emphasizing performance. The 2009 *International Building Code*® (IBC®) is designed to meet those needs through model code regulations that safeguard the public health and safety in all communities, large and small.

This comprehensive code establishes minimum regulations for building systems using prescriptive and performance-based provisions. It is founded on broad-based principles that make possible the use of alternate materials as well as new, improved design methodologies.

The changes in the structural provisions of the 2009 IBC when compared to previous editions of the IBC and legacy codes (*Uniform Building Code, National Building Code, Standard Building Code*) create the need for a comprehensive work that discusses the changes and expands on many of the new or improved provisions. This book, the *2009 IBC Handbook—Structural Provisions,* is intended to do just that.

By helping code users understand and properly apply the structural provisions in Chapters 16 through 23 of the 2009 IBC, this handbook is a valuable resource for those who design, plan review, inspect or construct buildings or other structures regulated by the 2009 IBC. Although it will prove useful to a broad range of individuals, it was written primarily so that architects, engineers and code officials can understand the IBC's provisions and gain insight into their underlying basis and intent. To that end, the handbook's numerous figures, tables and examples help clarify and illustrate the proper application of many code provisions.

One of the significant differences between the structural provisions in the UBC and the IBC is that the IBC adopts national (structural) standards by reference rather than transcribing the structural provisions of the standards into the code itself. This is true for structural loads as well as structural materials. This trend has continued with each subsequent edition of the IBC to the extent that the 2009 IBC relies on the referenced standards even more than the previous editions. Therefore, in many cases the discussion in this handbook pertains to the provisions in the referenced standard rather than the IBC itself.

The *2009 IBC Handbook—Structural Provisions* covers four major structural categories:

- Structural load effects and design provisions of Chapter 16
- Special inspection, structural testing and structural observation provisions of Chapter 17
- Foundation and soil provisions of Chapter 18
- Specific structural material provisions for concrete, masonry, steel and wood in Chapters 19 through 23

As an added benefit to readers, ICC has included a CD-ROM containing the complete structural handbook as well as a variety of helpful resource documents such as 2003 NEHRP *Recommended Provisions for Seismic Regulations for New Buildings and Other Structures with Accompanying Commentary* (FEMA 450 parts one and two), NEHRP *Recommended Provisions: Design Examples* (FEMA 451), NEHRP *Recommended Provisions for New Buildings and Other Structures: Training and Instructional Materials* (FEMA 451B), *Seismic Considerations for Steel Storage Racks Located in Areas Accessible to the Public* (FEMA 460), *Homebuilders' Guide to Earthquake-Resistant*

Design and Construction (FEMA 232), *Communicating with Owners and Managers of New Buildings on Earthquake Risk: A Primer for Design Professionals* (FEMA 389), *Designing for Earthquakes: A Manual for Architects* (FEMA 454) and *CodeMaster—2006 IBC Seismic Design—2006 IBC*, 2003 NEHRP, ASCE 7-05.

Dedication

This book is dedicated to John Nosse, first president of ICC Evaluation Service; first and only president of ICBO Evaluation Service; a 45-year veteran of the model-code groups; a first-rate engineer, a dedicated code professional, and a respected leader; and, ever and always, a true gentleman.

Foreword

The era of regional model codes in the United States is over. The 2006 *International Building Code*® (IBC®) is the official model code of the land. Understanding its provisions and the intent behind them is of critical importance for practicing engineers. This is particularly true for those who have practiced for a long time using one of the three earlier regional model codes [*Uniform Building Code* (UBC), *National Building* Code (NBC) or *Standard Building Code* (SBC)].

The *2009 IBC Handbook—Structural Provisions* contains the most recent information on the structural provisions as they pertain to the 2009 IBC and by implication to local codes that are based on the 2009 IBC. The scope and treatment of the various provisions of the code presented in this handbook will benefit designers, students and code officials alike. In addition to explaining code provisions, the handbook chronicles the history behind many of these provisions. The *2009 IBC Handbook—Structural Provisions* represents the most thorough, comprehensive coverage of the IBC structural provisions to date.

A unique feature of this handbook is the inclusion of a CD-ROM containing essential references that support the IBC. Although no single reference can hope to replace the code or substitute for on-the-job experience, the *2009 IBC Handbook—Structural Provisions* comes as close as possible, providing in-depth coverage in a consistent and coherent manner.

As a member of the design community and one who is intimately familiar with structural codes and standards, I am pleased to be a part of the historic movement toward code consolidation across the United States and applaud the efforts of the authors in producing a comprehensive handbook to help practicing structural engineers in the understanding and correct application of various structural provisions of the 2009 IBC.

Farzad Naeim, Ph.D., S.E., Esq.
Editor of the *Seismic Design Handbook*

Acknowledgements

Appreciation goes to the original authors of the 2000 edition of this handbook, S.K. Ghosh, Ph.D., and Robert Chittenden, S.E., both of whom have extensive knowledge, expertise and experience in the development of many of the structural provisions of the IBC. Dr. Ghosh authored the introductory chapter, Chapters 16 and 19, and the appendices of this handbook; Mr. Chittenden authored Chapters 17, 18, 20, 21, 22 and 23 of the 2000 edition. John Henry updated Chapters 17, 20, 21, 22 and 23 to the 2009 IBC and expanded the discussion where appropriate.

Dr. Ghosh would like to acknowledge the significant contributions of Prabuddha Dasgupta, Ph.D., his colleague at S. K. Ghosh Associates, Inc. Dr. Dasgupta was involved in the update of Chapters 16 and 19 of the *2006 IBC Handbook—Structural Provisions* from the inception of the project until the final manuscripts were sent to the ICC. He contributed to every aspect of the update effort. The project indeed could not have been completed without his help. Dr. Ghosh is also indebted to John Henry, P.E., for his thorough and constructive review of Chapters 16 and 19. His review comments led to significant improvements in those chapters.

This publication was produced by a team of talented and highly qualified people who put in many hours of effort. Thanks to Mary Lou Luif for editing; and to Beverly Ledbetter for typesetting and creating the illustrations and figures.

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