SEISMIC AND WIND FORCES
Structural Design Examples

6th EDITION

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Dr. Mustafa Mahamid is currently a Research Associate Professor at the University of Illinois at Chicago and a structural engineering consultant for multiple structural engineering firms in the United States and abroad. Additionally, he has been serving as an associate research fellow at the Technion-Israel Institute of Technology in Haifa, Israel since 2022. He worked as a structural engineer at GRAEF and Skidmore, Owings & Merrill (SOM) in Chicago. His designs include a wide variety of projects, including healthcare, commercial, residential, industrial, and high-rise buildings located in the United States, Europe, Middle East, and China.

His experience extends to various building materials, including concrete, steel, wood, and masonry. His research interests encompass steel, concrete and wood structures; earthquake engineering; and fire structural engineering. He is the editor-in-chief of the *Structural Engineering Handbook,* 5th edition, and *Cross-Laminated Timber Design*, 1st edition. Both books were published in May 2020 with McGraw-Hill. Dr. Mahamid is also a co-author of *Steel Connection Design by Inelastic Analysis* with Wiley, 2024, and author of *Steel, Concrete, and Composite Design of Tall and Super Tall Buildings,* 3rd edition, with McGraw-Hill. He is a licensed Structural Engineer (SE) and Professional Engineer (PE & P.Eng) in multiple US states and in Canada. He is a fellow of ASCE, SEI, and ACI.

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Dr. Alan Williams was educated in the United Kingdom where he obtained his B.Sc. and Ph.D. degrees at Leeds University. He subsequently has had extensive and diverse experience in the practice and teaching of structural engineering.

Dr. Williams' practical experience includes bridge design with the Division of Roads in Zimbabwe and the design of bridges and industrial and commercial structures as a Consulting Engineer in South Africa and the United States. He has been employed as a Senior Engineer with the State of California Department of Transportation and as Principal for structural safety with the California Division of the State Architect.

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The author's published works include textbooks on structural engineering design, structural analysis, seismic design, and steel and reinforced concrete design. He has authored numerous technical papers for international journals and conferences.

Dr. Williams is a Fellow and Life Member of the Institution of Civil Engineers, a Chartered Engineer in the United Kingdom, and a registered Structural Engineer in California.

Introduction

The purpose of this publication is to provide an understanding of the application of the 2024 *International Building Code*®[1] (IBC®) to current design practice. The IBC is a design standard that is adopted by jurisdictions throughout the world as the mandated building code.

This text is intended to facilitate the transition of designers, teachers, and students from the previous code and aid with code compliance. In the text, sections of the code are presented, analyzed, and explained in a logical and simple manner and are followed by an illustrative example. Each example concentrates on a specific section of the code and provides a clear and concise interpretation of the issue.

The text is organized into six chapters that correspond to the primary structural design sections of the code. These are:

- earthquake loads
- wind loads
- design of steel structures
- design of concrete structures
- design of wood structures
- design of masonry structures

Chapter 16 of the IBC deals with structural design loads. These provisions are derived from ASCE 7[2] and the NEHRP[3] provisions. In this text, seismic design loads are covered in Chapter 1 and wind design loads are covered in Chapter 2.

Chapter 22 of the IBC deals with the seismic design of steel structures and is based on the AISC[4] seismic provisions. These requirements are covered in Chapter 3 of this text.

Seismic design of concrete structures is covered in Chapter 19 of the IBC and Chapter 4 of this text. These provisions are derived from the ACI[5] building code.

Seismic design of wood structures is covered in Chapter 23 of the IBC and Chapter 5 of this text. These requirements are derived from the NDS[6] code.

Seismic design of masonry structures is dealt with in Chapter 21 of the IBC. These provisions are derived from Masonry Society code TMS 402.[7] Chapter 6 of this text covers these requirements.

About the International Code Council®

The International Code Council is the leading global source of model codes and standards and building safety solutions that include product evaluation, accreditation, technology, codification, consulting, training and certification. The International Code Council's codes, standards and solutions are used to ensure safe, affordable and sustainable communities and buildings worldwide.

The International Code Council family of solutions includes the ICC Evaluation Service (ICC ES), S. K. Ghosh Associates, the International Accreditation Service (IAS), General Code, ICC NTA, ICC Community Development Solutions, Alliance for National & Community Resilience (ANCR) and American Legal Publishing.

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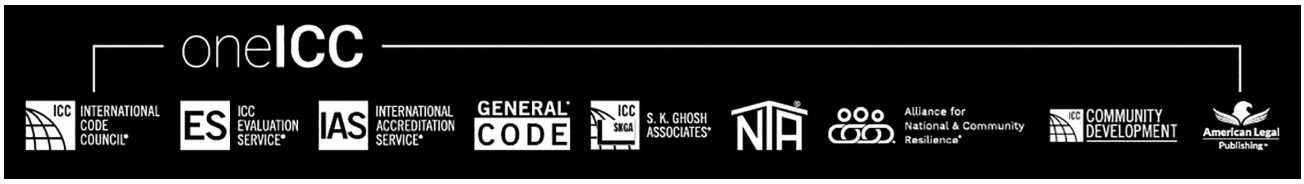

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