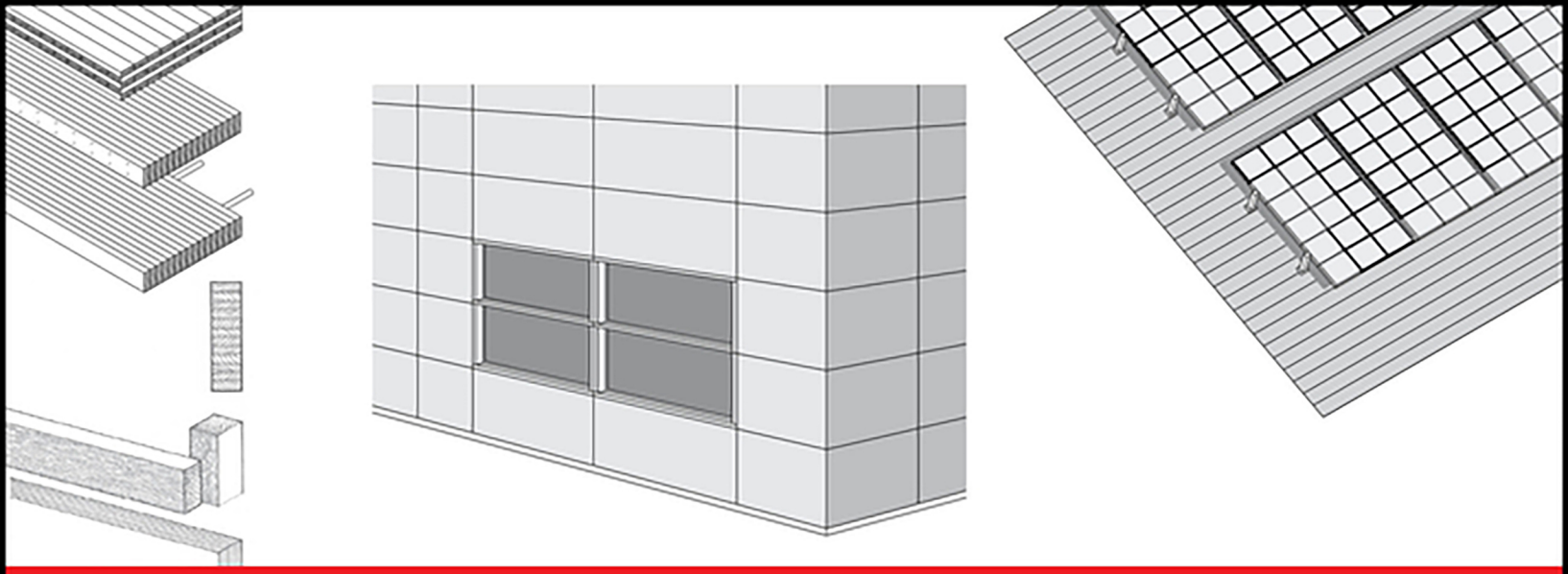


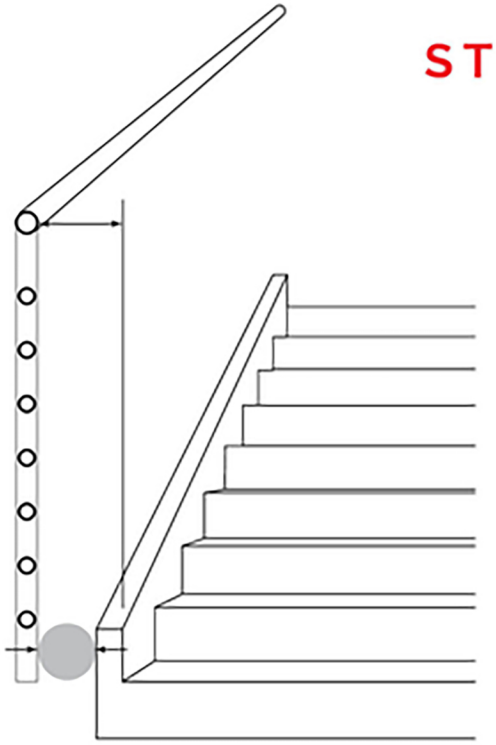
FRANCIS D.K. CHING

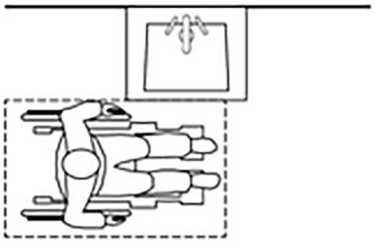
# BUILDING CODES ILLUSTRATED

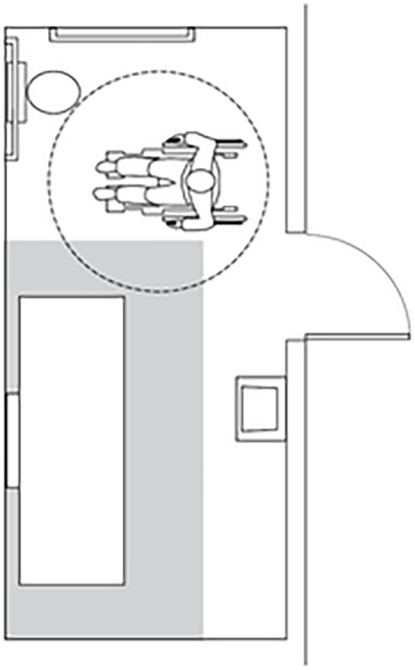
## A Guide to Understanding the 2024 International Building Code®

Eighth Edition

STEVEN R. WINKEL
FAIA, PE, CASp







WILEY

# Building Codes ILLUSTRATED

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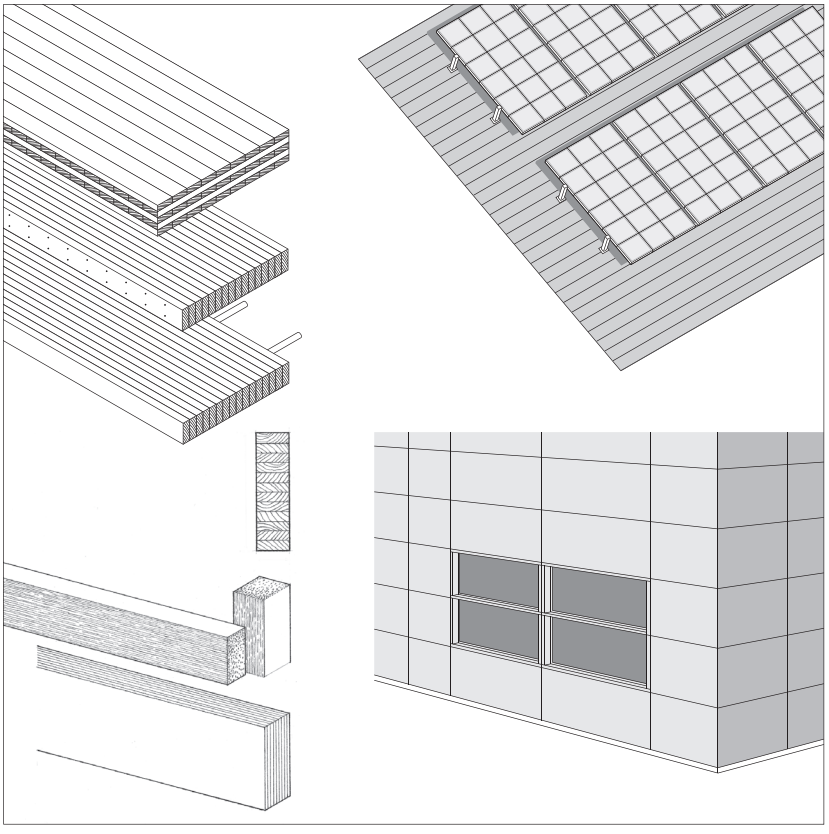
*Eighth Edition*

## *A Guide to Understanding the 2024 International Building Code®*



**FRANCIS D.K. CHING / STEVEN R. WINKEL, FAIA**

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**Disclaimer**

The book contains the authors' analyses and illustrations of the intent and potential interpretations of the *2024 International Building Code*® (IBC). The illustrations and examples are general in nature and not intended to apply to any specific project without a detailed analysis of the unique nature of the project. As with any code document, the IBC is subject to interpretation by the Authorities Having Jurisdiction (AHJ) for their application to a specific project. Designers should consult the local building official early in project design if there are questions or concerns about the meaning or application of code sections in relation to specific design projects.

The interpretations and illustrations in the book are those of the authors. The authors do not represent that the illustrations, analyses, or interpretations in this book are definitive. They are not intended to take the place of detailed code analyses of a project, the exercise of professional judgment by the reader, or interpretive application of the code to any project by permitting authorities. While this publication is designed to provide accurate and authoritative information regarding the subject matter covered, it is sold with the understanding that neither the publisher nor the authors are engaged in rendering professional services. If professional advice or other expert assistance is required, the services of a competent professional person should be sought.

**Acknowledgments**

The authors and John Wiley & Sons would like to thank Jay Woodward, John "Buddy" Showalter, and Sandra Hyde of the International Code Council for their thorough review of the manuscript of the previous edition and for the review of this eighth edition. Their review does not reflect in any way the official position of the International Code Council. Any errors in the interpretations or illustrations in the book are solely those of the authors and are in no way the responsibility of the International Code Council.

We would also like to thank David Collins, FAIA, of The Preview Group, Inc., for his insightful review. The book was made clearer and our interpretations were improved by his comments and suggestions.

**About the International Code Council®**

The International Code Council (ICC) is the leading global source of model codes and standards and building safety solutions that include product evaluation, accreditation, technology, codification, training, and certification. The 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, the International Accreditation Service, General Code, S. K. Ghosh Associates, NTA Inc., Progressive Engineering Inc., ICC Community Development Solutions, and the Alliance for National & Community Resilience. The Code Council is the largest international association of building safety professionals and is the trusted source of model codes and standards, establishing the baseline for building safety globally and creating a level playing field for designers, builders and manufacturers.

Washington DC Headquarters:
500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001

Distribution Center (Lenexa, KS)

888-ICC-SAFE (888-422-7233)
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# Contents

# Preface

The primary purpose of this book is to familiarize code users with the *2024 International Building Code*® (IBC). It is intended as an instructional text on how the code was developed and how it is organized, as well as a primer on how to use the code. It is intended to be a companion to the IBC, not a substitute for it. This book must be read in concert with the IBC.

Many designers feel intimidated by building codes. They can seem daunting and complex at first glance. It is important to know that they are a product of years of accretion and evolution. Sections start simply and are modified, and new material is added to address additional concerns or to address interpretation issues from previous code editions. The complexity of a building code often comes from this layering of new information upon old without regard to overall continuity. It is important to keep in mind that there is no single author of the building code. Each section has a different author. Building codes are living documents, constantly under review and modification. It is vital to an understanding of codes to keep in mind that they are a human institution, written by ordinary people with specific issues in mind or specific agendas they wish to advance. It is also critical in code application to be sure you are using the most current code adopted in the jurisdiction where you are working.

**BUILDING CODE**

*Webster's Third New International Dictionary* defines a building code as: "A set of rules of procedure and standards of materials designed to secure uniformity and protect the public interest in such matters as building construction and public health, established usually by a public agency and commonly having the force of law in a particular jurisdiction."

Over the past several editions of the IBC there has been an increase in the number of code revisions made to "clarify" the code. This trend has often resulted in the reorganization of code sections, often without any substantive changes. For those code users who are familiar with the previous code editions these changes can be upsetting and confusing. It may seem that familiar and well-understood code provisions have disappeared when in actuality they have just been relocated and renumbered. We strongly recommend that code users obtain electronic copies of the codes. These lend themselves to keyword searches that make it possible to find moved provisions based on the unchanged text content. For identifying and understanding the major changes from one edition of the code to the next we suggest obtaining the *Significant Changes to the IBC* published by the International Code Council. Another valuable reference we recommend to accompany this book is the *2024 IBC Code and Commentary*, also published by the International Code Council.

This book is designed to give an understanding of how the *International Building Code* is developed, how it is likely to be interpreted, and how it applies to design and construction. The intent of this book is to give a fundamental understanding of the relationship of codes to practice for design professionals, especially those licensed or desiring to become licensed as architects, engineers, or other registered design professionals. Code knowledge is among the fundamental reasons for licensing design professionals, for the protection of public health, safety, and welfare. It is our goal to make the acquisition and use of code knowledge easier and clearer for code users.

### How and Why to Participate in the ICC Code Development Process

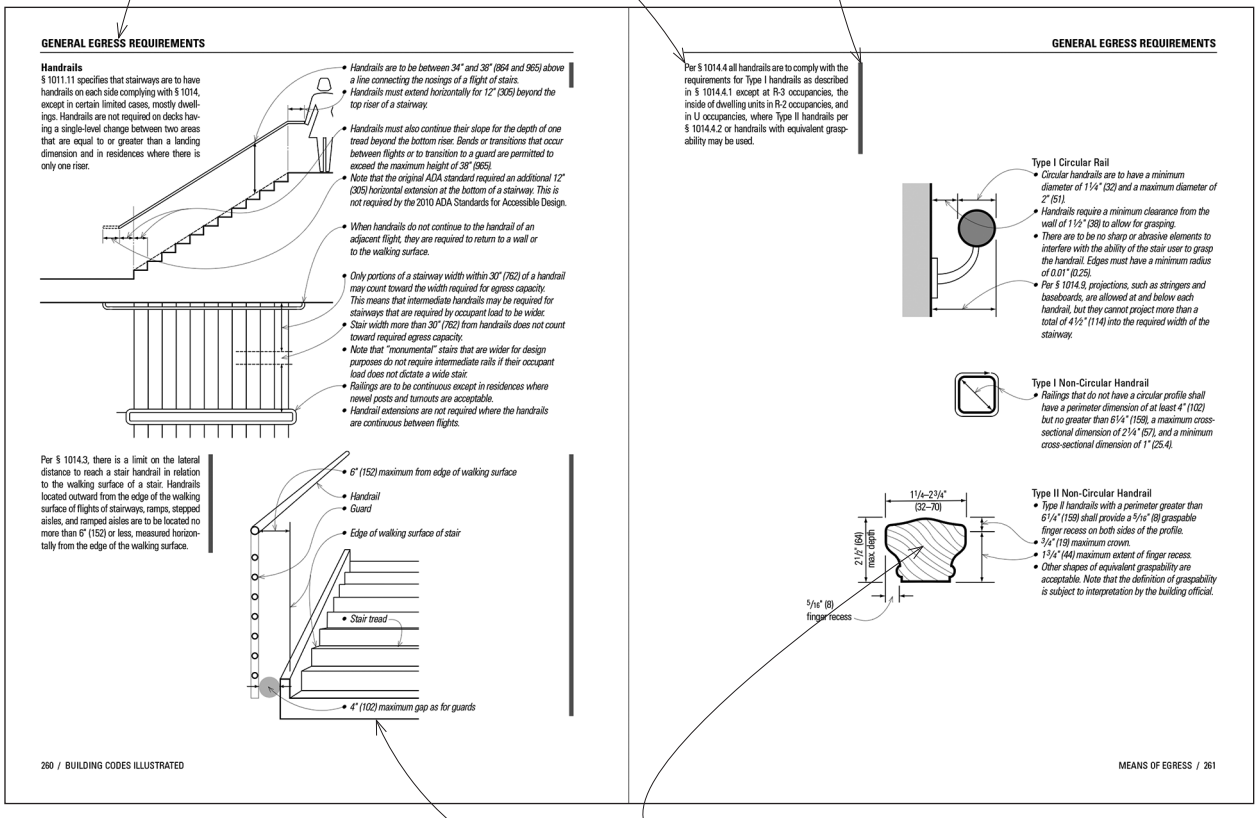
Architects, designers, engineers, and other professionals can freely participate in the ICC Code Development Process by submitting proposed code changes, collaborating with colleagues in developing code language and submitting changes, participating in giving testimony, and becoming ICC members to have voting opportunities in person or online at the Committee Action Hearings. The Code Development Process is conducted via ICC's state of the art cloud-based cdpACCESS system. Committee Action Hearings and Public Comment Hearings are broadcast live so anyone can follow the testimonies and actions taken. All building design and construction professionals are encouraged to participate in the ICC Code Development Process and have a say in the outcome of future International Building Codes or any other of the ICC International Codes. Because architects, engineers, and other design and construction professionals apply the code to actual buildings and experience first-hand the effectiveness of code provisions, it is very critical for them to participate in the code development process and improve the code each cycle. For the details of Code Development Process go to https://www.iccsafe.org/wp-content/uploads/ICC-CDP-How-It-Works.pdf. For information on cdpACCESS go to https://www.iccsafe.org/cdpaccess/.

## How This Book Is Organized

The first two chapters of this book give background and context regarding the development, organization, and use of the IBC. Chapters 3 through 18 are organized and numbered the same as the corresponding subject-matter chapters in the IBC. Chapters 19–22 summarize the requirements in the remaining IBC chapters. Chapter 13 refers briefly to the energy provisions of the International Code family, which are contained in a separate code, the *International Energy Conservation Code*® (IECC), and which are beyond the scope of this book. Chapter 23 touches on the code provisions for existing buildings, which are no longer included in the IBC, but occur in the *International Existing Building Code*® (IEBC). While not addressed exhaustively in this book, new design work often takes place in existing buildings and we want to make code users aware of how the IBC and IEBC are to be applied in such cases.

- *Page headings refer to major sections within each chapter of the Code.*
- *Text is arranged in columns, typically on the left side of a single page or of two facing pages.*

- *Text that is new or revised for this eighth edition is denoted by a vertical gray bar ▌ in the margins. This is similar to markings used in prior editions of the IBC to indicate changes in code provisions. See the next page for a detailed description of the new IBC format and tracking of changes using QR codes.*

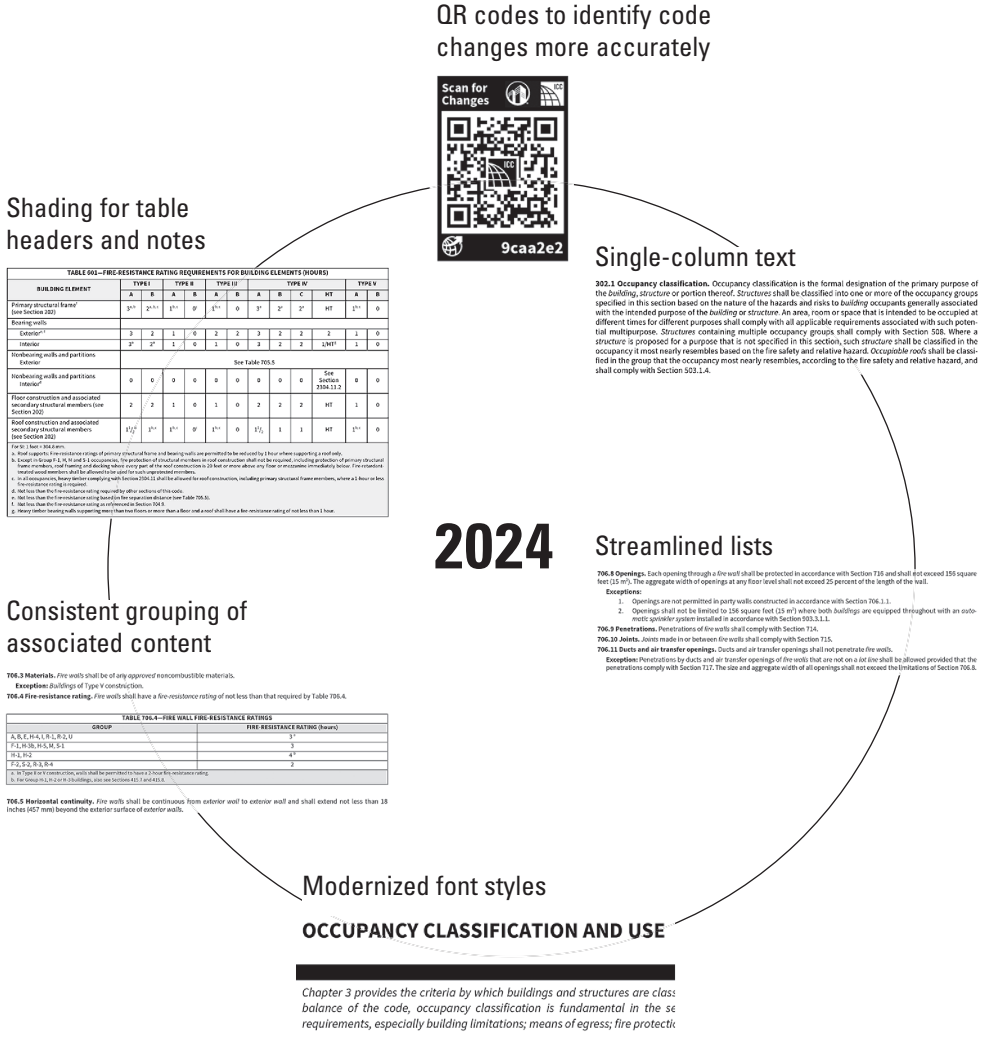



- *Drawings are typically to the right, accompanied by captions or explanatory notes. The illustrations are intended to help the reader visualize what is described in the text. They should therefore be considered to be diagrams that explain and clarify design relationships rather than represent specific design solutions.*

## New IBC Formatting and Tracking of Revisions

The Preface of the 2024 IBC notes that "the 2024 International Codes® (I-Codes®) have undergone substantial formatting changes as part of the digital transformation strategy of the International Code Council® (ICC®) to improve the user experience. The resulting product better aligns the print and PDF versions of the I-Codes with the ICC's Digital Codes® content."

The following changes promote a cleaner, more modern look, and enhance readability and sustainability:




More information can be found at iccsafe.org/design-updates.

### Replacement of Marginal Markings with QR Codes

The Preface of the 2024 IBC states that "through 2021, print editions of the I-Codes identified technical changes from prior code cycles with marginal markings [solid vertical lines for new text, deletion arrows (➡), asterisks for relocations (*)]. The 2024 I-Code print editions replace the marginal markings with QR codes to identify code changes more precisely."

"...

- A QR code is placed at the beginning of any section that has undergone technical revision. If there is no QR code, there are no technical changes to that section.
- In the following example from the 2024 *International Building Code*® (IBC®), a QR code indicates there are changes to § 104 from the 2021 IBC.

**SECTION 104—DUTIES AND POWERS OF BUILDING OFFICIAL**

**[A] 104.1 General.** The *building official* is hereby authorized and directed to enforce the provisions of this code.

**[A] 104.2 Determination of compliance.** The *building official* shall have the authority to determine compliance with this code, to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures:

1. Shall be in compliance with the intent and purpose of this code.
2. Shall not have the effect of waiving requirements specifically provided for in this code.

**[A] 104.2.1 Listed compliance.** Where this code or a referenced standard requires equipment, materials, products or services to be listed and a listing standard is specified, the listing shall be based on the specified standard. Where a listing standard is not specified, the listing shall be based on an *approved* listing criteria.


- To see the changes, the user need only scan the QR code with a smart device. If scanning a QR code is not an option, changes can be accessed by entering the 7-digit code beneath the QR code at the end of the following URL: qr.iccsafe.org/(in the above example, "qr.iccsafe.org/9caa2e2"). Those viewing the code book via PDF can click on the QR code.
- All methods take the user to the appropriate section on ICC's Digital Codes website, where technical changes from the prior cycle can be viewed. Digital Codes Premium subscribers who are logged in will be automatically directed to the Premium view. All other users will be directed to the Digital Codes Basic free view. Both views show the new code language in blue text along with deletion arrows for deleted text and relocation markers for relocated text.
- Digital Codes Premium offers additional ways to enhance code compliance research, including revision histories, commentary by code experts, and an advanced search function. A full list of features can be found at codes.iccsafe.org/premium-features."

### For the Student

The book is part of the introduction to building codes that are an integral part of professional studies in architecture, structural engineering, and civil engineering. It will serve as explanatory text to accompany analysis of the organization, intent, and use of codes in general and the *International Building Code* in particular. The introductory chapters will instill in undergraduate design students the reasons codes exist and how they form an integral part of the design process for every building project. Most design problems in school are at the schematic design level, so that detailed code analysis will not typically be undertaken in most undergraduate classes. In graduate classes the book can serve to organize and facilitate a deeper understanding of detailed requirements common to all building codes. The book also gives guidance on best practices for code analysis to lay a foundation for future practitioners to better meet the health, safety, and welfare criteria that are the basis for professional licensure.

### For Emerging Professionals

Whether you are engaged in design, production, management, or construction administration, codes and standards are an integral and inescapable part of the practice of architecture and engineering. New practitioners need to refine their skills and knowledge of codes to make their projects safe and buildable with few costly changes. The more practitioners know about the code, the more it can become a tool for design rather than an impediment. The better the underlying criteria for code development and the reasons for code provisions are understood, the easier it is to create code-compliant designs. Early understanding and incorporation of code-compliant design provisions in a project reduces the necessity for costly and time-consuming rework or awkward rationalizations to justify dubious code decisions late in project documentation, or even during construction. Code use and understanding should be part of accepted knowledge for professionals, so that it becomes a part of the vocabulary of design.

### For Experienced Practitioners

The greatest value of this book is that it is based on the widely adopted *International Building Code*. This code is similar but by no means identical to the three model codes—the *Uniform Building Code*, the *National Building Code*, and the *Standard Building Code*—that were used in the past. Various jurisdictions may be using differing editions of the IBC. Also, as noted, items have been moving around in recent editions of the IBC and this book can serve as a guide in keeping track of reorganized code sections. This book will guide experienced practitioners out of the old grooves of code use they may have fallen into with the old model codes, or with older editions of the IBC. The code-analysis methods and outcomes may vary from prior IBC editions to the new IBC. While there are seemingly familiar aspects from prior code editions interspersed throughout the new code, the actual allowable criteria and how they are determined are often quite different. It is likely that the illustrations and the underlying reasons for the development of each code section will look familiar to experienced practitioners. The experienced practitioner must not rely on memory or old habits of picking construction types or assemblies based on prior practice. Each building must be looked at anew until the similarities and sometimes-critical differences between the new code and old habits are understood and acknowledged. This admonition also applies to the need to determine local modifications to codes and not assume new projects in new locations are identical to similar prior projects.

The old ways of navigating the code will be altered by the new single-column format, reformatted tables, and new ways of finding and analyzing revisions based on retrieving changes using QR codes. Experienced practitioners on both the design and interpretation sides of code use should be prepared for a learning curve for using the new 2024 code documents. For this edition we will continue to use the change markings from the prior IBC edition, but the actual changes will be found in the code volume reviewed by users by scanning the QR code or entering the change number in the ICC website.

### How to Use This Book

This book focuses on the use and interpretation of the nonstructural provisions of the *International Building Code*. There are references to basic structural requirements, but this book does not attempt to go into structural requirements in depth. That is the subject for another volume.

The organization of this book presumes that the reader has a copy of the latest version of the IBC itself as a companion document. The book is intended to expand on, interpret, and illustrate various provisions of the code. The IBC has been adopted in many jurisdictions. As it has now been extensively applied, there is an evolving body of precedent in application and interpretation. It is our hope that the analysis and illustrations in the book will aid the designer and the Authorities Having Jurisdiction (AHJ) in clarifying their own interpretations of the application of code sections to projects.

The book is not intended to take the place of the *2024 International Building Code*® (IBC) in any way. The many detailed tables and criteria contained in the IBC are partially restated in the book for illustrative purposes only. For example, we show how various tables are meant to be used and how we presume certain parts will be interpreted. When performing a code analysis for a specific project, we anticipate the reader will use our book to understand the intent of the applicable code section and then use the code itself to find the detailed criteria to apply. One can, however, start with either the IBC or this book in researching a specific topic.

Beginning with the *2024 International Building Code*®:

- Search Contents or Index.
- Read relevant section(s).
- Using QR technology, review and absorb new code revisions: amendments, reorganizations, and deletions.
- For further explanation and/or clarification, refer to this book.

Beginning with *Building Codes ILLUSTRATED*:

- Search Code Index for section number or Subject Index for topic.
- Refer back to specific text of *2024 International Building Code*®.

The text is based on the language of the code and interprets it to enhance the understanding of the user. The interpretations are those of the authors and may not correspond to those rendered by the AHJ or by the International Code Council (ICC). This book, while based on a publication of the ICC, does not in any way represent official policies, interpretations, or positions of the ICC. We would encourage the users of the book to confer with the AHJ, using the illustrations from this book to validate interpretations. Reconciling text with construction drawings often benefits from additional illustrations. We trust that this will be the case with the explanations and graphics in this book.

Note that the text of the 2024 IBC contains terms in *italic type*. These italicized terms appear in the definitions in Chapter 2 of the IBC. Where defined terms are used in ways intended by their definitions, they are italicized in the body of the IBC. Italicized type is not used in this book in the same way. The IBC publisher's intent for this notification method is to highlight for the code user that the definitions should be read carefully to facilitate a better understanding of how they are used in the context where they appear in italics. It is critical that the code user go back to the IBC's definitions when attempting to understand the literal and figurative meaning of code requirements. All code definitions are now located in Chapter 2 of the IBC.

The primary purpose of the *International Building Code* (IBC) is to provide reasonable safeguards for the design, construction, use, occupancy, and maintenance of buildings. Participation by numerous volunteers representing all segments of the building community continue to log countless hours to ensure the code is updated every three years and reflects the current state of the art advances in building safety, resiliency, and performance. Developed through an open and transparent process, the IBC provides a balanced approach to safety, affordability, sustainability, and resiliency of buildings.

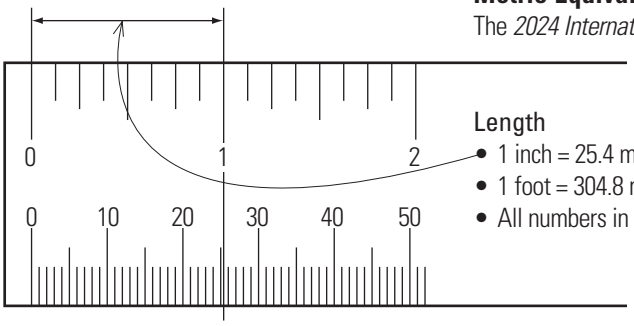
To the uninformed, building codes can appear limiting or even serve as a roadblock to building design and construction. Building codes have also been accused of being too rigid or static and unable to stay abreast of innovation or the latest advances in technology. While no one denies the need for a building regulatory system to address the safety and welfare of the public, everyone wants it to be effective, flexible, and allow for innovation. To the informed user of the IBC, the opportunity has always existed for designers, builders, manufacturers, and code officials to apply the performance-based provisions of the code in a manner that allows for creativity, flexibility, and affordability in building construction. The current *2024 International Building Code* states the following:

*"The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material and method of work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety."*

With advances in technology, competition, and the globalization of our economy, it is critical that building codes be dynamic and provide a pathway for the approval of new and innovative materials, designs, and methods of construction. Often, Code officials utilize research reports, listings, and/or test reports from approved sources providing verification of code compliance. The independent source that code officials frequently use to verify that a product is certified to a standard within the code, or an innovative or new product is evaluated to criteria that meet the building code requirements in terms of strength, effectiveness, fire resistance, durability, and safety, is the ICC Evaluation Service, Inc. (ICC-ES). Functioning as a subsidiary of the International Code Council, ICC-ES works closely with manufacturers, code officials, and the design community in an effort to facilitate the acceptance of products in the marketplace without compromising public safety. Information on products that have been reviewed by ICC-ES for code compliance can be downloaded at no cost by visiting http://www.icc-es.org/Evaluation_Reports/ or http://www.icc-es.org/.

The eighth edition of *Building Codes Illustrated* builds on the successful foundation laid by previous editions. Codes by their very nature tend to be tedious, dry documents that can also serve the late-night insomniac in search of relief. *Building Codes Illustrated* brings the code to life through its use of numerous illustrations accompanied with clear, concise, easy-to-understand text that spares the reader the normal legalese contained in regulatory documents. This updated guide continues its long tradition of serving as a key resource for those interested in not only understanding the code, but applying it as well.

Mark A. Johnson
Executive Vice President and Director of Business Development
International Code Council, Inc.




## Metric Equivalencies

The *2024 International Building Code*® uses the following SI units.

### Length

- 1 inch = 25.4 mm
- 1 foot = 304.8 mm
- All numbers in parentheses are millimeters unless otherwise noted.

### Area

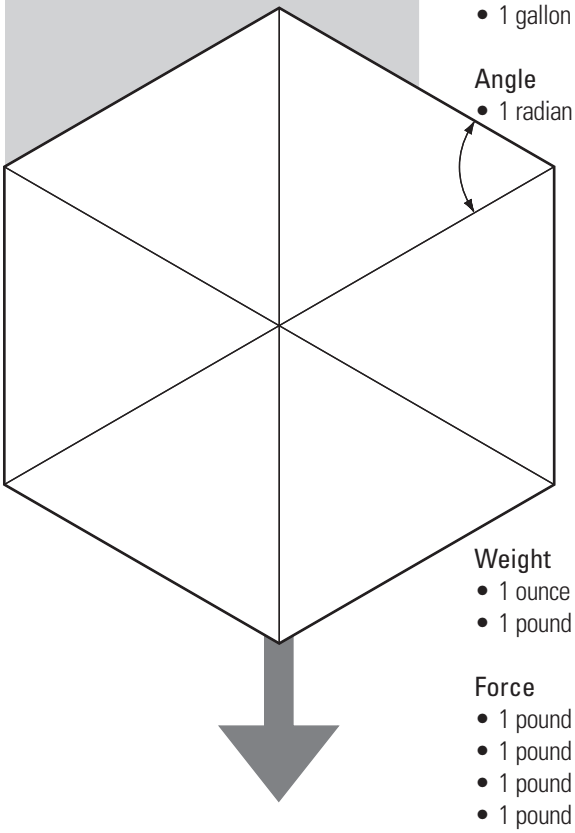
- 1 square inch = 645.2 $mm^2$
- 1 square foot (sf) = 0.0929 $m^2$

### Volume

- 1 cubic foot (cf) = 0.028 $m^3$
- 1 gallon (gal) = 3.785 L

### Angle

- 1 radian = $360/2\pi \approx 57.3°$; 1 degree = 0.01745 radian (rad)

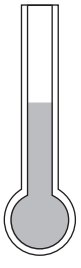


### Weight

- 1 ounce = 28.35 g
- 1 pound = 0.454 kg = 0.004448 kN

### Force

- 1 pound per square inch (psi) = 6.9 kPa
- 1 pound per linear foot (plf) = 1.4882 kg/m = 0.01459 kN/m
- 1 pound per square foot (psf) = 4.882 $kg/m^2$ = 0.0479 $kN/m^2$ = 0.0479 kPa
- 1 pound per cubic foot (pcf) = 16.02 $kg/m^3$



### Light

- 1 foot-candle = 10.76 lux

### Speed

- 1 mile per hour (mph) = 0.44 m/s = 1.609 km/h

### Heat

- 1 British thermal unit (Btu) = 0.293 watts (w)
- °C = [(°F) – 32]/1.8

# 1
# Building Codes

The existence of building regulations goes back almost 4000 years. The Babylonian Code of Hammurabi decreed the death penalty for a builder if a house he constructed collapsed and killed the owner. If the collapse killed the owner's son, then the son of the builder would be put to death; if goods were damaged, then the contractor would have to repay the owner, and so on. This precedent is worth keeping in mind as you contemplate the potential legal ramifications of your actions in designing and constructing a building in accordance with the code. The protection of the health, safety, and welfare of the public is the basis for licensure of design professionals and the reason that building regulations exist.

*"If a builder build a house for some one, and does not construct it properly, and the house which he built fall in and kill its owner, then that builder shall be put to death.*

*If it kill the son of the owner, the son of that builder shall be put to death.*

*If it kill a slave of the owner, then he shall pay slave for slave to the owner of the house.*

*If it ruin goods, he shall make compensation for all that has been ruined, and inasmuch as he did not construct properly this house which he built and it fell, he shall re-erect the house from his own means.*

*If a builder build a house for some one, even though he has not yet completed it; if then the walls seem toppling, the builder must make the walls solid from his own means."*

Laws 229–233
*Hammurabi's Code of Laws*
(ca. 1780 BC)

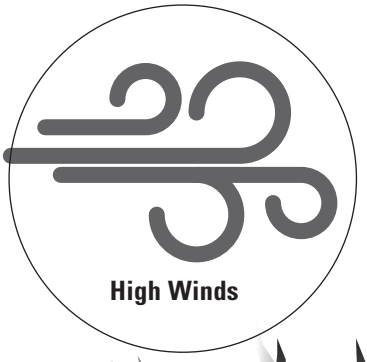
From a stone slab discovered in 1901 and preserved in the Louvre, Paris.

Various civilizations over the centuries have developed building codes. The origins of the codes we use today lie in the great fires that swept American cities regularly in the 1800s. Chicago developed a building code in 1875 to placate the National Board of Fire Underwriters, who threatened to cut off insurance for businesses after the fire of 1871. It is essential to keep the fire-based origins of the codes in mind when trying to understand the reasoning behind many code requirements.

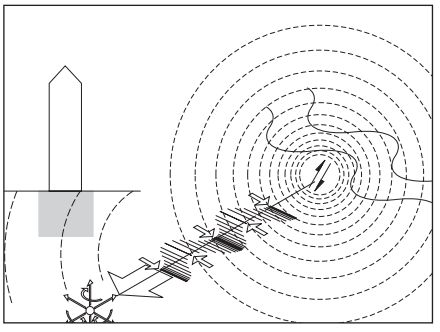
As the nation's population has increased, people have moved nearer to bodies of water, to regions subject to high winds, and into wooded areas on the edges of towns. Mitigating the impact of hazards such as floods, high winds, earthquakes, and wildland fires in populated areas, has increasingly been included in each new edition of the model codes. While fire safety is still a very large component in model codes, new model code documents now also include many provisions above and beyond the traditional fire-based requirements.

The often conflicting city codes were refined over the years and began to be brought together by regional nongovernmental organizations to develop so-called model codes. The first model codes were written from the point of view of insurance companies to reduce fire risks. Model codes are developed by private code groups for subsequent adoption by local and state government agencies as legally enforceable regulations. The first major model-code group was the Building Officials and Code Administrators (BOCA), founded in 1915 and located in Country Club Hills, Illinois. Next was the International Conference of Building Officials (ICBO), formed in 1922, located in Whittier, California. The first edition of their *Uniform Building Code* (UBC) was published in 1927. The Southern Building Code Congress (SBCCI), founded in 1940 and headquartered in Birmingham, Alabama, first published the *Standard Building Code* in 1946. The first BOCA *National Building Code* was published in 1950.

**Flooding**



**High Winds**



**Earthquakes**

**Fire**
Urban, suburban, and wildland/urban interface

These three model-code groups published the three different building codes previously in widespread use in the United States. These codes were developed by regional organizations of building officials, building materials experts, life safety experts, and design professionals to provide communities and governments with standard construction criteria for uniform application and enforcement. The ICBO UBC was used primarily west of the Mississippi River and was the most widely applied of the model codes. The BOCA *National Building Code* was used primarily in the north-central and northeastern states. The SBCCI *Standard Building Code* was used primarily in the Southeast. The model-code groups merged in the late 1990s to form the International Code Council (ICC), and BOCA, ICBO, and SBCCI ceased maintaining and publishing their "legacy" codes.

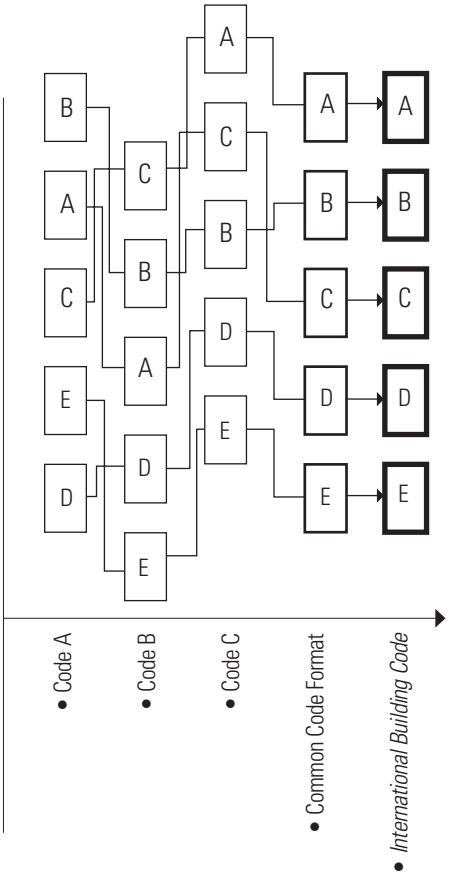
**The International Building Code**

The new ICC process was a real revolution in the development of model codes. There was recognition in the early 1990s that the nation would be best served by a comprehensive, coordinated national model building code developed through a general consensus of code writers. There was also recognition that it would take time to reconcile the differences between the existing codes. To begin the reconciliation process, the three model codes were reformatted into a common format. The ICC, made up of representatives from the three model-code groups, was formed in 1994 to develop a single model code using the information contained in the three current model codes. While detailed requirements still varied from code to code, the organization of each code became essentially the same during the mid-1990s. This allowed direct comparison of requirements in each code for similar design situations. Numerous drafts of the new *International Building Code*® (IBC) were reviewed by the model-code agencies along with code users. From that multiyear review grew the original edition of the IBC, first published in 2000. There is now a single national model code maintained by a group composed of representatives of the three prior model-code agencies, the ICC, headquartered in Washington, D.C. The three organizations accomplished many years ago a full merger of the three model-code groups into a single agency to update and maintain the IBC.

When working on existing buildings constructed under one of the "legacy" codes, research will be required to locate corresponding chapters and sections in the older codes, which will need to be rearranged to correlate with the current IBC since the organization of the IBC is different than that of prior model codes.

Note that in addition to the IBC, most code users should also be familiar with two other "I" codes. The first is the *International Residential Code*® (IRC). This code is meant to regulate construction of detached one- and two-family dwellings and townhouses that are not more than three stories in height. This code supplants residential requirements in the IBC in jurisdictions where it is adopted.

The second code is the *International Existing Building Code*® (IEBC), which contains provisions for additions, alterations, and repairs to existing buildings as discussed further below.




Note also that most local jurisdictions make other modifications to the codes in use in their communities. For example, many jurisdictions make amendments to require fire sprinkler systems where they may be optional in the model codes. In such cases, mandatory sprinkler requirements may change the design trade-offs offered in the model code for inclusion of sprinklers where "not otherwise required" by the code. It is imperative that the designer determines what local adoptions and amendments have been made to be certain which codes apply to a specific project.

Many jurisdictions have not adopted the latest versions of the model codes. It is critical that designers familiarize themselves with the applicable edition of the model codes. All too often, practitioners assume that codes they have been using in one jurisdiction are the same as those in a new locale for their practice. That is often not the case and can lead to a lack of code compliance for some projects.

A major revision took place in the 2015 IBC. The provisions for existing buildings, contained in Chapter 34 of the previous code, were removed. Therefore, the IBC applies only to new buildings. The provisions for existing buildings are now contained exclusively in the IEBC and refer back to the IBC or adopt similar requirements, but the two codes are now intended to be used separately. For the purposes of this book, assume that the requirements discussed are to apply to new buildings or to additions to new buildings unless noted otherwise. Alterations and repairs occur within existing buildings and therefore are to be done under the IEBC.

For jurisdictions that have not yet adopted the 2015 IBC or subsequent editions of the IBC, the existing building provisions may still be found in Chapter 34 of the adopted code. This is yet another reason to determine which code has been adopted for a project's specific location. See Chapter 23 for a more detailed discussion on how to use the IBC and the IEBC together.

There are also specific federal requirements that must be considered in design and construction in addition to the locally adopted version of the model codes. Among these are the Americans with Disabilities Act (ADA) of 1990 and the Federal Fair Housing Amendments Act (FFHAA) of 1988.

**Americans with Disabilities Act**

The ADA of 1990 is federal civil-rights legislation requiring that buildings be made accessible to persons with physical disabilities and certain defined mental disabilities. The original *ADA Accessibility Guidelines* (ADAAG) were administered by the Architectural and Transportation Barriers Compliance Board (ATBCB), and the regulations are administered by the US Department of Justice. Enforcement of the law is through legal actions brought by individuals or groups asserting violations of their rights ofah access, as civil rights. A new version of the ADAAG known as the *2010 ADA Standards for Accessible Design* (2010 Standards) went into effect on March 15, 2012. Designers can obtain copies of the guidelines from the Access Board at www.access-board.gov/ada.

It is critical for designers to understand that unless adopted as the access regulations for a jurisdiction or state, the ADA is not subject to interpretation by local building officials; it is enforced by legal action, through the courts. Access is to be provided for all disabilities, not just for people with mobility impairments. These include hearing, vision, speech, and cognitive impairments, as well as persons of short stature and with limited mobility not necessarily requiring the use of a wheelchair. The ADA applies to all new construction. The ADA also requires that barriers to access be removed from existing buildings where such work is readily achievable. The definition of readily achievable is an economic one and should be addressed by the building owner, not by the building architect.

The ADA is one of the few building regulations—in this case a law, not a code—that requires retrofitting of projects apart from upgrading facilities during remodeling or renovation. Most codes apply to existing buildings only when renovation is undertaken. Under the ADA, those access improvements that are readily achievable should be undertaken by the owner, whether or not any other remodeling work is to be done. The ***owner***, not the architect, must make this determination.

As the ADA is not enforced by local building officials, we will concentrate here only on those accessibility codes that are enforced locally and subject to review and interpretation as part of the permit process. Designers must first concentrate on complying with codes and standards adopted locally but must also keep national statutory requirements such as the ADA in mind. It is prudent to review design work against the 2010 ADAS at the same time as the model-code review. It is often a judgment call as to which is the most stringent requirement where requirements between codes and legislation differ. In these situations, it is essential and prudent to make the client aware of these discrepancies and have them actively participate in any decisions as to which set of requirements will govern the design of project components.

Space requirements for accessibility are related to ergonomics. Bigger is not automatically better. The 16"–18" (406–457) required range between the centerline of a water closet to a side wall or partition with grab bars is based on reach ranges and leverage for movement using one's arms. A longer reach reduces leverage and thus may be worse than too little space.

**Federal Fair Housing Amendments Act**

The FFHAA of 1988 includes Department of Housing and Urban Development (HUD) regulations requiring all residential complexes of four or more dwelling units constructed after March 13, 1991, to be adaptable for use by persons with disabilities. For example, residential complexes must provide access to all units on the ground floor, and all units must be accessible from grade by a ramp or elevator. Many state housing codes also incorporate these requirements. A very good reference for the FFHAA is the *Fair Housing Act Design Manual*, which can be obtained free of charge at https://www.huduser.gov/portal/publications/PDF/FAIRHOUSING/fairfull.pdf.


### State Building Codes

Each state has a separate and distinct code adoption process. In the past, many states adopted one of the three previous model codes, and some states even had their own building codes. The geographic areas for state model-code adoptions corresponded roughly to the areas of influence of the three previous model codes. The BOCA *National Building Code* predominated in the northeastern United States. The *Standard Building Code* was adopted throughout the southeastern United States. The UBC was adopted in most states west of the Mississippi River. Many states allowed local adoption of codes so that in some states, such as Texas, adjacent jurisdictions in the same state had different building codes based on different model codes. Now, the advent of the International Codes has altered this landscape drastically. The "I Codes" are now the basic model codes in essentially every state. However, be aware that most state processes still allow amendments to the IBC, which means that there will likely be state-adopted amendments to the IBC. Make certain you know what code you are working with at the permitting level. Also, as noted, in states or localities that adopt a model code, be sure to verify which edition of the model code has been adopted.


### Local Building Codes

Many localities adopt the model-code documents with little modification except for the administrative chapters that relate to the local operations of the building department. Larger cities, such as Los Angeles, New York City, Chicago, and San Francisco, typically adopt much more sweeping revisions to the model codes. The codes for such cities often bear little resemblance to the underlying model codes and in some cases have no basis in them at all. Interpretations, even of the unaltered model code made by big-city building departments, often tend to be very idiosyncratic and nonuniform when compared to smaller jurisdictions that use less modified versions of the model codes. The adoption of the IBC at the state level has generated a review of big-city building codes so that these city codes are moving toward greater conformity with the model codes. For example, San Francisco and Los Angeles previously used a UBC-based state code, which has now been converted to an IBC-based, locally modified state code. This will require a careful analysis of the city-code amendments to ensure conformance with the new model code. This redevelopment of codes has also been occurring in other large cities, such as Dallas and New York, as their states adopt the IBC. Be aware of local modifications and be prepared for varying interpretations of the same code sections among various jurisdictions. Do not proceed too far in the design process based on review of similar designs in another jurisdiction without verifying the code interpretation in the jurisdiction where the project is located. Similarly, although this book offers opinions of what code sections mean, all such opinions are subject to interpretation by local authorities as codes are applied to specific projects.

## OTHER CODES AND STANDARDS

Codes are related to "standards" but they each serve different purposes. A building code (e.g., the IBC) establishes a jurisdictional "floor" relative to occupants' health, safety, and welfare. A building standard (e.g., NFPA 13, which addresses fire sprinkler requirements) is a "standard practice" often referred to within the codes. In short, a *code* is what you must do (sprinklers, yes or no, per which standard); a *standard* is a guide on how you do it (sprinkler head flow rates, spacing, etc.). There are thus a number of other codes and standards that the designer must be familiar with. They are mentioned here in brief to remind users of the IBC that other documents must also be consulted during project design.

While building code and accessibility regulations are usually the focus of interest for architectural and structural work, you need to be aware of the existence of other separate codes and standards for such work as electrical, plumbing, mechanical, fire sprinklers, and fire alarms. Each of these may impact the work of design consultants and in turn the work of the architect. Detailed consideration of the requirements in these other codes is beyond the scope of this book.

Among other specialized codes is the *Life Safety Code* (NFPA-101) published by the National Fire Protection Association. This code serves as a basis for the egress provisions in the other model codes. Designers may encounter NFPA-101 when doing federal and hospital work. The NFPA also publishes various other standards that are adopted to accompany the model codes. Primary examples are NFPA-13: Standard for the Installation of Sprinkler Systems, and NFPA-70, which is the National Electrical Code.

The National Fire Protection Association has developed a model building code, NFPA 5000, to rival the IBC. The development of this code is meant to offer an alternative to the "I" codes. The NFPA 5000 has, to date, been adopted in only a few jurisdictions. Some jurisdictions may move to adopt either the International Code family or the NFPA family of codes, or even portions of each. This is yet another reason for designers to verify in detail what model code documents are adopted by the Authorities Having Jurisdiction (AHJ)—a catch-all phrase for all planning, zoning, fire, and building officials having something to say about building—where a project is located.

Fire codes are typically considered maintenance codes. They are intended to provide for public health and safety in the day-to-day operation of a structure. They are also meant to assure that building life-safety systems remain operational in case of emergency. The various model-code agencies have developed model fire codes for these purposes. They are developed with primary input from the fire services and less input from design professionals. Note, however, that fire codes can have an impact on building design. They contain requirements for such elements as fire-truck access roads, locations and spacing of fire extinguishers, as well as requirements for sprinklers and wet or dry standpipes. The fire code may also contain requirements for added fire protection related to the ease or difficulty of fire equipment access to structures or access to fire hydrants or other water sources for firefighting.

Plumbing codes often dictate the number of plumbing fixtures required in various occupancies. Some jurisdictions place this information in the building code, some in the plumbing code, and some in appendices that allow local determination of where these requirements may occur in the codes. The designer must determine which course of legal adoption the local authority has chosen. The determination of the required number of plumbing fixtures is an important design consideration. It is essential to use the adopted tables and not automatically assume those in the model building code apply. A discussion of the use of the fixture counts found in Chapter 29 of the 2021 IBC is found in Chapter 20 of this book.

### Code Interactions

The AHJ may not always inform the designer of overlapping jurisdictions or duplication of regulations. Fire departments often do not thoroughly check plan drawings at the time building permit documents are reviewed by the building department. Fire-department plan review deficiencies are often discovered at the time of field inspections by fire officials, usually at a time when additional cost and time are required to fix these deficiencies. The costs of tearing out noncomplying work and replacing it may be considered a designer's error. Whenever starting a project, it is therefore incumbent upon the designer to determine exactly which codes and standards are to be enforced for the project and by which agency. It is also imperative to obtain copies of any revisions or modifications made to model codes by local or state agencies. This must be assured for all AHJs.

The model codes have no force of law unto themselves. Only after adoption by a governmental agency are they enforceable under the police powers of the state. Enforcement powers are delegated by statute to officials at various levels of government. Designers must verify local amendments to model codes to be certain which code provisions apply to specific projects.

There are many different codes that may apply to various aspects of construction projects. Typically, the first question to be asked is whether the project requires a permit. Certain projects, such as interior work for movable furniture or finishes, are usually exempt. Carpeting may be replaced and walls painted without a permit, but moving walls, relocating doors, or doing plumbing and electrical work will require a permit in most jurisdictions.

Traditionally, codes have been written with new construction in mind. In recent years, more and more provisions have been made applicable to alteration, repair, and renovation of existing facilities. One of the emerging trends in code development is the creation of an IEBC. The relocation of IBC Chapter 34, which dealt with existing building provisions, into the IEBC has greatly increased the need to refer to this code for many projects. The reuse of existing buildings is also of concern for accessibility issues. One of the most crucial aspects of remodeling work is to determine to what extent and in what specific parts of your project the building codes and access regulations apply. Most codes are not retroactive. They do not require remedial work apart from remodeling or renovation of a building. However, providing access to spaces like toilets serving altered areas will often require work outside of the area of alteration.

A notable exception to this is the ADA, which requires that renovation be undertaken to provide access for persons with disabilities if access can be readily provided. However, this is a civil-rights law and not a code. As such, it is not enforced by building officials. In existing buildings, it is critical for the designer to determine with the AHJ what the boundaries of the project are to be and to make certain that the AHJ, the designer, and the client understand and agree on the requirements for remedial work to be undertaken in the project area.

**Rating Systems**

There are also rating systems, the most well known and widespread of which is the *Leadership in Energy and Environmental Design*, or LEED program, developed by the US Green Building Council (USGBC). LEED is not intended to be a code, although some jurisdictions have adopted LEED criteria as code language. Typically, a rating system is a voluntary program based on options selected by the owner and the design team rather than being a set of requirements. Rating systems serve as an ever-being-raised "ceiling" for practice. Rating systems are not addressed in this book.

**Standard of Care**

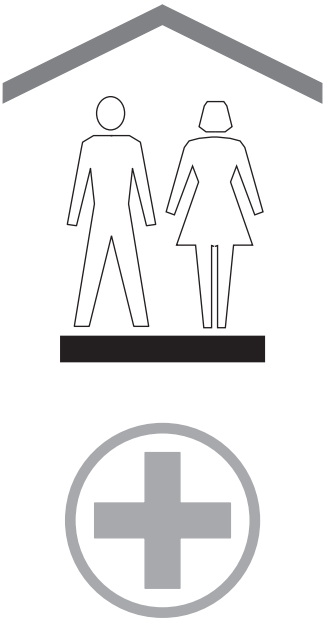
The designer should always remember that codes are legally and ethically considered to be minimum criteria that must be met by the design and construction community. The protection of health, safety, and welfare is the goal of these minimum standards. It is important to also understand that registered design professionals will be held by legal and ethical precedents to a much higher standard than the code minimum.

The so-called "standard of care" is a legal term defining the level of quality of service that a practitioner is expected to meet. This is higher than the minimum standard defined by the code. The code is the level that a practitioner must never go below. Because professional work involves judgment, perfection is not expected of a design professional. The standard of care is defined for an individual designer as being those actions that any other well-informed practitioner would have taken given the same level of knowledge in the same situation. It is a relative measure, not an absolute one.

**Life Safety versus Property Protection**

The basis for building-code development is to safeguard the health, safety, and welfare of the public. The first and foremost goal of building codes is the protection of human life from the failure of life safety provisions in a building, or from structural collapse. But there is also a strong component of property protection contained in code requirements. Sprinkler provisions can serve both purposes. When buildings are occupied, sprinklers can contain or extinguish a fire, allowing the building occupants to escape. The same sprinkler system can protect an unoccupied structure from loss if a fire occurs when the structure is not occupied.

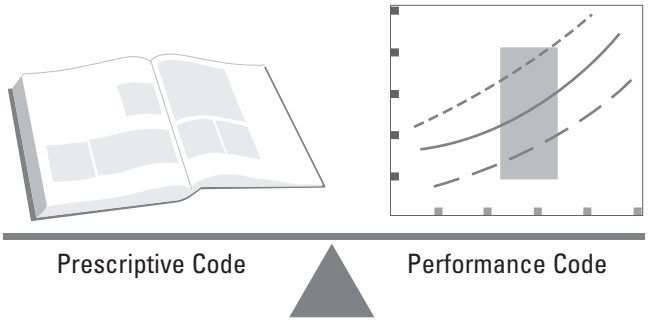
While many systems may perform both life safety and property protection functions, it is essential that code developers keep the issue of life safety versus property protection in mind. For example, security measures to prevent intrusion into a structure may become hazards to life safety. A prime example of this is burglar bars on the exterior of ground-floor windows that can trap inhabitants of the building in an emergency if there is not an interior release to allow occupants to escape while still maintaining the desired security. In no case should property-protection considerations have primacy over life safety.



## THE FUTURE FOR CODE DEVELOPMENT

The IBC is a living document. It is subject to regular review and comment cycles. A new code is published at regular intervals, usually every 3 years. This publication cycle gives some measure of certainty for building designers that the code will remain unchanged during the design-and-construction process for a specific project. In general, but especially when a new code is scheduled to go into effect, it is prudent to determine in concert with the AHJ what code the permit documents are to be based on. The code responds to new information, growing by accretion and adaptation. Since the three model-code agencies merged into one organization, detailed changes in the code-development process have evolved and have been refined. We will give only a general description of the code-development process. For a detailed description of the current code development process, see the ICC website.

Any person may propose a code revision. Any designer, material supplier, code official, or interested member of the public who feels they have a better way to describe code requirements or to accommodate new life-safety developments or new technology may prepare revised code language for consideration. Proposed code changes are published for review by all interested parties. They are then categorized based on what section of the code is being revised and assigned to a committee of people experienced in those matters for review and consideration. Committees are typically organized around specific issues, such as means of egress, fire safety, structural requirements, and so forth. Anyone may testify at these committee hearings regarding the merits or demerits of the code change. The committee then votes to make its recommendation to the Public Comment Hearings, which are held in conjunction with the annual ICC business meeting. At the Final Action Hearing, testimony will be heard from all interested parties, both from non-voting industry representatives and building officials who will be able to vote on the proposed changes. After testimony is heard, only the government members of the organization, typically public employees serving as building and fire officials, are allowed to vote on the proposed changes. This is described as the "governmental consensus process" by the ICC. The ICC Code Development Process is conducted using state-of-the-art cloud-based cdpACCESS. For details of code development process go to https://www.iccsafe.org/wp-content/uploads/ICC-CDP-How-It-Works.pdf. For information on cdpACCESS go to https://www.iccsafe.org/cdpaccess/.




**Performance versus Prescriptive Codes**

There is now an ICC *International Performance Code*. It presents regulations based on desired outcomes rather than prescriptions. It encourages new design methods by allowing a broader parameter for meeting the intent of the International Codes. Where adopted locally, it may be used in place of the regular IBC provisions. We will discuss briefly the distinctions between prescriptive and performance codes.

The IBC, as were the codes that preceded it, is predominately prescriptive in nature, but it does have some performance-based criteria as well. It is developed to mitigate concerns by creating mostly specific and prescribed responses to problems that have been identified. Designers identify the problem to be addressed, such as the height of guardrails, and then they look up the prescribed response in the applicable code section. For example, guardrail heights are prescribed to be 42" (1067) high and are required when adjacent changes in grade exceed 30" (762). The designer follows the prescribed requirements to avoid the problem the code has identified—that is, preventing falls over an edge higher than 30" (762). The code provides a defined solution to an identified problem.

Performance codes, such as the ICC *International Performance Code*, define the problem and allow the designer to devise the solution. The word *performance* in this context refers to the problem definition and to the setting of parameters for deciding if the proposed solution solves the problem adequately. These standards define the problem, but do not define, describe, or predetermine the solution.

The use of performance codes has been increasing in the past few years, due in large part to the development of new modeling techniques for predicting how a building will react under certain fire, earthquake, or other stimuli. Performance codes are used in many countries around the world. Their requirements may be as broad as "the building shall allow all of its prospective occupants to safely leave the building in the event of a fire." Most performance codes in reality have much more tightly defined requirements, but the egress requirement stated above is a good example of the essence of what performance-code requirements can be.

The basic form of modern performance-code language can be described as objective-based. Each code requirement is broken into three sections. We will use fall prevention as our example. Note that provision of guardrails is only one example of many solutions to the performance objective, not the only solution.

- Objective: What is to be accomplished? In this case, the prevention of falls from heights of more than 30" (762).

- Functional Statement: Why do we want to accomplish this? We wish to safeguard building occupants by preventing them from accidentally falling from a height great enough to result in an injury.

- Performance Requirement: How is this to be accomplished? Performance codes could become prescriptive at this juncture, mandating a guardrail. More likely, such a performance standard would require that the barrier be high enough, strong enough, and continuous enough to prevent falls under the objective circumstances. Note that a guardrail meeting current code standards would be deemed to satisfy those requirements, but alternate means and methods could also achieve the same ends. For example, landscaping could prevent access to the grade change, or innovative railing substitutes could be designed to function like automobile airbags to catch falling persons without having a visible rail present in most conditions. Let your imagination provide other alternatives.

Performance codes give designers more freedom to comply with the stated goals. They also require the designer to take on more responsibility for knowing the consequences of their design actions. We anticipate that performance codes will be used in limited ways for innovative projects, but that most typical, repetitive designs will continue to use prescriptive codes for speed, clarity, and assurance of compliance during design review. Also, given the legal climate, designers are often reluctant to take on the responsibility for long-term code compliance for innovative systems.

**Alternate Means and Methods**

There is a pathway for innovation and new methods built into the IBC. The use of this process is known generically as an Alternate Means and Methods Request, typically referred to as an AMMR. The code sets out the criteria for AMMRs in § 104.2.3 of Chapter 1. The basis of the application of these provisions has three key components.

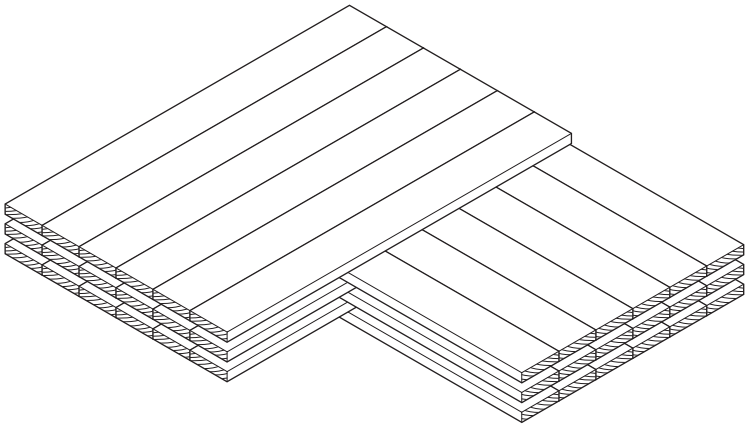
1. The code recognizes that the "intent" of the code language as written may not keep up with construction material innovations and that new methods and materials will be approved where compliance with the performance of an innovative measure can be demonstrated.

2. Key to this process is understanding that the final approval comes from the AHJ after the proponent of the alternative demonstrates that the alternative meets specific criteria:

3.1 The alternative complies with the intent of the provisions of this code.
3.2 The alternative is equal to the basic code for each of the following:

3.2.1. Quality
3.2.2. Strength
3.2.3. Effectiveness
3.2.4. Fire safety
3.2.5. Durability
3.2.6. Safety, other than fire safety

Demonstration of compliance is to be based on backup materials, such as research reports or test reports. Each jurisdiction typically has a form for AMMRs noting the necessary criteria for acceptance. The forms also provide a medium for recording the findings of acceptance of AMMRs in the permit files for each project. It is essential to the success of getting an AMMR approved to engage the AHJ early in the process to determine what backup materials or test data will be required. On the following page is an example form showing the typical range of information that will be required for this process.



A frequent recent AMMR example has been obtaining fire-rating approvals for cross-laminated timber construction. The 2021 IBC caught up with this innovation and AMMRs will likely not be needed under the 2024 IBC for this type of construction.

**Request for Alternate Design Materials & Methods of Construction**

**1. Project Information**

| | | |
|---|---|---|
| Name of Facility: | AHJ File#: | |
| Project Scope: | AHJ App.#: | |
| School District: | Increment # *(if applicable).* | |
| School District Mailing Address: | | |
| City: | State: | Zip Code: |

**2. Contact Information**

| | |
|---|---|
| A. Facilities Director: | |
| Work Email: | Work Phone: |
| B. Firm Architect/Engineer: | |
| Work Email: | Work Phone: |
| C. Architect/Engineer of Record | |
| Work Email: | Work Phone: |

**3. Type of Review Requested**

☐ Structural ☐ Fire & Life Safety

**4. Purpose of Review Request**

☐ Use of Alternate Materials ☐ Propose Alternate Design ☐ Alternate Method of Construction

Applicable Code(s) and Edition:

Applicable Code Section(s):

**5. Description of Condition** *(Add additional pages if necessary.)*

*Description of Proposed Alternate*

**Request for Alternate Design Materials & Methods of Construction**

**6. Description of Requested Alternate** *(Describe the equivalency for each of the following criteria listed in IBC § 104.11. Indicate NA when not applicable.)*

| | |
|---|---|
| 2.1 Quality. | |
| 2.2 Strength. | |
| 2.3 Effectiveness. | |
| 2.4 Fire safety. | |
| 2.5 Durability. | |
| 2.6 Safety, other than fire safety. | |

**Identification of Supporting Documentation** *(List all; attach copies of data.)*

*List of supporting tests, research, and other documentation.*

*For AHJ Use Only*

| Discipline | Reviewer | Return Date | Accepted Date | Rejected Date |
|---|---|---|---|---|
| SS | | | | |
| FLS | | | | |
| ACS | | | | |

**AHJ Special Conditions or Restrictions:**

**Notes:** *(Add comments or rationale relating to above.)*

*Purpose of the form is to request validation of the request and provide for filing of disposition of the AMMR.*

- *This is an example of an AMMR form showing the typical range of information that will be required for demonstrating compliance with the intent of the provisions of the code based on such backup materials as research reports or test reports.*

# 2

# Navigating the Code

The key word to remember about how all building codes are developed and how they all work is *intent*. As we noted in the Preface, code sections have individual authors who had some problem in mind when they wrote a code-change proposal. The intent of the author of a building-code section is to solve a specific design problem with prescriptive language. Designers are usually trying to measure visual and spatial expressions against the language of the code. During this process, the designer should ask what problem or performance criteria the code section is addressing. The language will start to make more sense as one tries to go beyond the specific language to determine why the words say what they say.

Designers also have intent. They are trying to achieve certain functional or formal goals in the design of the building. Designers should measure their own intent for the design against their interpretations of the intent of the code. When examined together, the intent of the code and that of the design solution should be concurrent.

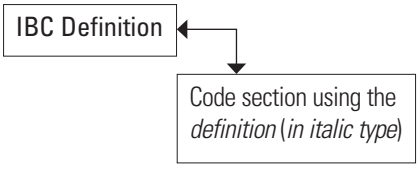
Do not try and ignore the code. Do not try and obfuscate code issues to achieve approvals. The responsibility for understanding, applying, and fulfilling the requirements of the code always rests with the design professional. Approvals by the Authorities Having Jurisdiction (AHJ) do not relieve the designer of social and licensing responsibilities to maintain the health, safety, and welfare of society.

Each section of the code was developed to solve a certain problem. Code sections are typically written in relatively short paragraphs. Sections are organized into chapters based on common themes, but sections may be developed in isolation from one another with little attention to continuity of the entire document. As you look at the code, try and visualize the intent of the writer of that section and try to understand the problem they were addressing. Code language usually arises from a specific issue the code writer wishes to address based on experience or on an actual construction or life safety issue. The writer then makes the requirements general so that they will apply to more typical conditions than the specific instance that generated the concern.

The intent of the code is a crucial idea to understand. *Why* is a much more important question than *what* when you are puzzled by the actual language of a code passage. The code is a general document that must then be interpreted for its specific application to a specific project. If you know the code in general and think about its intent, you will be in a better position to formulate your own interpretation of code sections as they apply to your specific project. You will thus be in a position to help building officials see the validity of your opinion when interpretation of the code is required for a specific design condition. Confidence will come with experience in use of the code. Learning the code is vital to your success as a well-rounded designer.

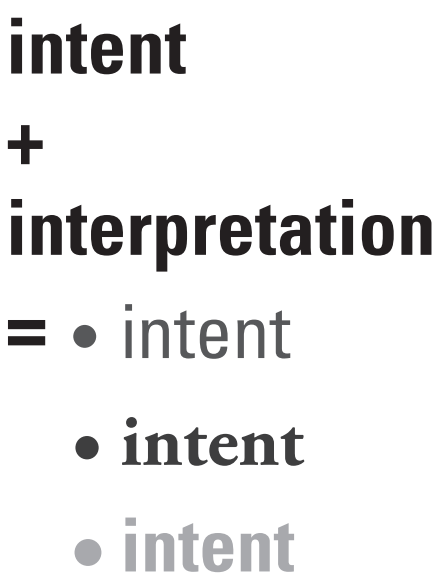
The application of the code requires interpretation on the part of designers and the AHJ. The individual's view of intent can lead to alternative interpretations of code compliance. One of the goals of resolving an unfavorable code interpretation is to convince the AHJ that the proposed design meets the intent of the writer of the code section in question and thus complies with the code.

Note that in the 2024 IBC certain terms are in *italic type*. These italicized terms appear in the definitions in Chapter 2. Where terms are used in ways intended by their definitions, they are italicized in the body of the code. Italicized type is not used in this book in the same way. The code publisher's intent for this notification method is to highlight for the code user that the code's definitions should be read carefully to facilitate better understanding of how they are used in the context where they appear in italics. It is critical that the code user go back to the code definitions when attempting to understand the literal and figurative meaning of code requirements. When attempting to interpret a code section, be sure to examine the code definitions for the terms used in the code section. Do not assume that the meanings of terms are the same as in everyday speech, especially for *italicized* text.




While definitions occur in the *International Buildng Code*® (IBC) in Chapter 2, this book discusses definitions in context with where the defined items are used in the technical requirements in the code. We believe this makes the analysis in this book easier to follow. Defined terms from the IBC are noted in [*bracketed italic type*]. Thus, defined terms will be found throughout the various chapters of this book.

Editions of the code prior to 2018 listed definitions to be found in Chapter 2. The 2018 and later editions have deleted those references, completing the move of definitions wholly to Chapter 2.




Learn the table of contents and use the index. It is very useful to get the code in electronic form for use in your practice. This allows keyword searches. Do not try and memorize passages of the code, because these may change or move around inside the code over time as the code is amended. Learn the organization of the code and learn where to find things that way. Use the index if the table of contents does not get you where you want to be. Think of synonyms for the topic you are researching to facilitate keyword or index searches. You may have to scan large portions of the index to locate potential items. Try to remember associations of ideas, not specific language, to facilitate your use of the code.

In prior editions of the code, solid vertical lines [ ▌ ] in the margins indicated a text change from the previous code edition. An arrow in the margin [—>] indicated a deletion in the section. A single asterisk [*] placed in the margin indicated that text or a table had been relocated within the code. A double asterisk [**] placed in the margin indicated that the text or table immediately following it had been relocated there from elsewhere in the code.

This system of identifying changes has been completely changed in the 2024 IBC. Now, a QR code is placed at the beginning of any section that has undergone technical revision. If there is no QR code shown, there are no technical changes to that section. To see the code changes, the user should scan the QR code with a smart device. If scanning a QR code is not an option, the changes can be accessed by entering the 7-digit code found beneath the QR code at the end of the URL: qr.iccsafe.org/(See Preface, page XII). Those viewing the code book via PDF can click on the QR code. All methods take the user to the appropriate section on the International Code Council (ICC) Digital Codes website, where technical changes from the prior cycle can be viewed. Views show new code language in blue text along with deletion arrows for deleted text and relocation markers for relocated text. Deleted text is also shown in strikeout.