

FOURTH EDITION

BUILDING SYSTEMS FOR INTERIOR DESIGNERS



CORKY BINGGELI
TAYLOR LUCAS



WILEY

Building Systems for Interior Designers

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FOURTH EDITION

**Corky Binggeli[†]
Taylor Lucas**

WILEY

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Thank you.

About the Companion Website

Don't forget to visit the companion website for this book:

www.wiley.com/go/buildingsystemsforinteriordesigners/4e



There you will find valuable material designed to enhance your learning, including:

- PowerPoint slides
- Instructor's Manual
- Other material for instructors

PART

I

THE ENVIRONMENT, SUSTAINABILITY, AND HEALTH AND SAFETY

Interior designers today work closely with other design and construction professionals to provide functional, sustainable, and healthy buildings. Sustainable design supports a holistic approach to building systems, and older territorial distinctions between various architectural and engineering disciplines are opening up. Existing buildings are valued for the materials and energy they embody, and many projects involve the renovation of building interiors.

Interior designers are increasingly working as part of environmentally aware design teams. Sustainable design involves interior designers observing the impact of a building's site, climate, and geography on its interior spaces. Building interiors are increasingly open to natural settings and views, and the interior designer's work may bridge interior and exterior spaces. Wise energy use dictates awareness of how sun, wind, and heat or cold affect the building's interior.

While focusing on building elements that affect interior designers, *Building Systems for Interior Designers, Fourth Edition* addresses this multidisciplinary approach to building design. Additional academic resources for the design student and educator help to build a connection between the informative text and real-world interior environments and experiences. We begin our study of building systems in Part I by looking at the relationships among the environment, sustainable design, and human health and safety.

Chapter 1, "Environmental Conditions and the Site," looks at climate change, energy sources and consumption, and how site conditions affect building design.

Chapter 2, "Designing for the Environment," investigates energy efficient design and the building design process. Sustainable design strategies and rating systems are introduced.

Chapter 3, “Designing for Human Health and Safety,” addresses the interaction of the human body with the built environment and how building codes protect us.

A common thread . . . is the attitude that buildings and sites should be planned and developed in an environmentally sensitive manner, responding to context and climate to reduce their reliance on active environmental control systems and the energy they consume. (Francis D.K. Ching, *Building Construction Illustrated* [5th ed.], Wiley, 2014, Preface)

CODES AND REGULATIONS

Within this text, the code references discussed in each part will be collected from the International Code Council’s I-Codes. This is meant to help begin code research within the focus areas. Building codes that relate to a project are unique depending on many aspects of that project including size, occupancy, location, and use. I-Codes include the International Building Codes, International Energy Conservation Codes, and the International Plumbing Codes. These I-Codes are the most widely adopted, but are not the only regulations a designer works with, as states and cities may adopt additional codes, standards, or revisions. The standard most widely relating to sustainable design is the ASHRAE 90.1 that states the energy standards for building except low-rise residential buildings. ASHRAE is the American Society of Heating, Refrigerating and Air Conditioning Engineers, a nonprofit organization that develops and publishes standards for the HVAC industry.

During the beginning phases of a building project, it is the designer’s responsibility to research applicable codes. Understanding the codes and related standards of a project help the designer to communicate clearly and effectively with the rest of the project team. Code research will be unique to each building project, so the information given here should aid in the research, not complete it.

2021 ICC CODES THAT PERTAIN TO THE BUILDING SITE AND SUSTAINABLE DESIGN

International Building Codes

Chapter 5: General building heights and areas

This chapter covers regulations on the height and area of structures and additions to existing structures. The allowed number of stories and finished height of a building is determined by a number of factors including building construction type, occupancy, surrounding buildings, and local zoning regulation.

Chapter 18: Soils and foundations

This chapter covers tests and considerations concerning the site soil, as well as regulations on the building foundation. Codes relating to the foundation construction type, for both shallow and deep foundations. Required soil testing to determine the structural load capacity, and possible effect the soil will have on the foundation.

Chapter 13: Energy Conservation

This chapter simply states that buildings should comply with the ICC International Energy Conservation Codes.

International Energy Conservation Codes

The International Energy Conservation Codes (IECC) are divided into Residential and Commercial regulations. These regulations apply to systems such as the building envelope, mechanical systems, and electrical and plumbing systems. Within the commercial and residential provisions, chapter 3 section 1, climate zones are identified. In chapter 5, existing buildings are covered. The IECC cover many regulations on energy and should be completely reviewed during the code research phase.

International Green Construction Codes

The International Green Construction Codes (IgCC) provide a whole systems approach to the design, construction, and operation of buildings. It provides codes and references that encourage sustainable design practices, resulting in healthy interior environments, a lower impact on natural resources, a higher level of neighborhood integration, and a site design that leads to a healthier environment. The IgCC is coordinated with other model codes such as IECC, and ASHRAE 90.1, as well as other referenced standards to provide a comprehensive set of codes. The development of the IgCC allows for governing jurisdictions to reference a uniform code without having to take on the high cost of creating one. The United States Green Building Council (USGBC), is developing connections between specific IgCC codes and its Leadership in Energy and Environmental Design (LEED) credits, enabling a streamlined approach to environmentally minded building design, construction, and commission.

Chapter 5 of the IgCC covers site sustainability. This chapter specifies requirements for building projects that pertain to site selection, site development, mitigation of heat island effect, light pollution reduction, and mitigation of transportation impacts.

Chapter 9 covers materials and resources. This chapter specifies requirements related to the environmental and human health impacts of materials including resource conservation, reduced life cycle, impact of building materials, impacts on the atmosphere, product transparency, and waste management.

SUSTAINABLE STRATEGIES

Sustainable design strategies address the design process, construction policies, and material acquisition. They range greatly depending on the many factors of a building project. Sustainable strategies focused on within this part emphasize the use of the building site and natural resources to reduce the energy a built environment needs. Sustainable strategies that focus on site and energy will capitalize on passive systems, building orientation, the design team, and renewable energy sources.

Sustainable strategies noted in this part coincide with the Sustainable Site, location and transportation, integrative process, and Energy and Atmosphere categories of LEED. The strategies listed are examples from the digital LEED scorecard. LEED certification can be earned by accruing points, each strategy, or credit, listed is worth a specific number of points if completed. (Digital scorecard, <https://www.usgbc.org/leed-tools/scorecard>, accessed 8 November 2023)

Location and Transportation

- **Sensitive land protection.** This credit is intended to cultivate community resilience, avoid the development of environmentally sensitive lands that provide critical ecosystem services and reduce the environmental impact from the location of a building on a site.
- **High priority site and equitable development.** This credit is intended to build the economic and social vitality of communities, encourage project location in areas with development constraints and promote the ecological, cultural, and community health of the surrounding area while understanding the needs and goals of existing residents and businesses.
- **Surrounding density and diverse uses.** This credit is intended to conserve land and protect farmland and wildlife habitat by encouraging development in areas with existing infrastructure. It is also intended to support neighborhood and local economies, promote walkability, and low or no carbon transportation, and reduce vehicle distance traveled for all. Furthermore, it is intended to improve public health by encouraging daily physical activity.
- **Bicycle facilities.** This credit is intended to promote bicycling and transportation efficiency and reduce vehicle distance traveled. It is also intended to improve public health by encouraging utilitarian and recreational physical activity.
- **Reduced parking footprint.** This credit is intended to minimize the environmental harms associated with parking facilities, including automobile dependence, land consumption, and rainwater runoff.
- **Electric vehicles.** This credit is intended to reduce pollution by promoting alternatives to conventionally fueled automobiles

Sustainable Sites

- **Construction activity pollution prevention.** This credit is intended to reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust that disproportionately impact frontline communities.
- **Site assessment.** This credit is intended to assess site conditions, environmental justice concerns, and cultural and social factors, before design in order to evaluate sustainable options and inform related decisions about site design.
- **Protect or restore habitat.** This credit is intended to conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.
- **Open space.** This credit is intended to create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activity.
- **Heat island reduction.** This credit is intended to minimize inequitable effects on microclimates and humans, especially frontline communities, and wildlife habitats by reducing heat islands.
- **Light pollution reduction.** This credit is intended to increase night sky access, improve nighttime visibility, and reduce the consequences of development for wildlife and people.

Energy and Atmosphere

- **Minimum energy performance.** This credit is intended to promote resilience and reduce the environmental and economic harms of excessive energy use that disproportionately impact frontline communities by achieving a minimum level of energy efficiency for the building and its systems.
- **Optimize energy performance.** This credit is intended to achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use that disproportionately impact frontline communities.
- **Renewable energy.** This credit is intended to reduce the environmental and economic harms associated with fossil fuel energy and reduce greenhouse gas emissions by increasing the supply of renewable energy projects and to foster a just transition to a green economy.

Indoor Environmental Quality

- **Quality views.** This credit is intended to give building occupants a connection to the natural outdoor environment by providing quality views.

Integrative Process

- **Integrative process.** This credit is intended to support high-performance, cost-effective, equitable project outcomes through an early analysis of the interrelationships among systems.

NCIDQ REFERENCES

The Council for Interior Design Qualification (CIDQ) is the premier certifying organization for interior design professionals. CIDQ develops and administers the three-part NCIDQ Examination, which tests interior designers' knowledge of core competencies required for professional practice in the industry. The exam is based on CIDQ's independent, comprehensive analysis of the profession and the daily practice of interior design in a range of settings. CIDQ continually updates the exam's contents to ensure they reflect the most current skills required to design secure, functional and innovative interior spaces. (CIDQ.org, accessed 8 November 2023)

This text can be referenced while preparing to take any of the three parts of the NCIDQ examination. The following highlights the connections between the exam content areas and the focus areas of Part I.