RESIDENTIAL INTERIOR DESIGN

A GUIDE TO PLANNING SPACES

Maureen Mitton, CID, IDEC

Courtney Nystuen, AIA, CSI

With CAD Illustrations by Melissa Brewer

JOHN WILEY & SONS, INC.

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Table of Contents

Title Page
Copyright Page
Acknowledgments

CHAPTER 1 - INTRODUCTION

WHAT THIS BOOK IS ABOUT
AN OVERVIEW: QUALITY AND QUANTITY
HUMAN BEHAVIOR AND HOUSING
BASIC RESIDENTIAL BUILDING CONSTRUCTION AND STRUCTURE
AN OVERVIEW OF CHAPTER TOPICS
BIBLIOGRAPHY

CHAPTER 2 - VISUAL THINKING AND DESIGN GRAPHICS

ORTHOGRAPHIC PROJECTIONS
THE SAMPLE PROJECT
SITE PLANS
FLOOR PLANS
DIMENSIONS
SECTIONS
INTERIOR ELEVATIONS
REFLECTED CEILING PLANS
FINISH SCHEDULES
BIBLIOGRAPHY

CHAPTER 3 - BEDROOMS

ACCESSIBILITY

ERGONOMICS AND REQUIRED CLEARANCES
ORGANIZATIONAL FLOW
RELATED CODES AND CONSTRAINTS
ELECTRICAL AND MECHANICAL
LIGHTING
BIBLIOGRAPHY

CHAPTER 4 - BATHROOMS

ACCESSIBILITY
FIXTURES
STORAGE AND CABINETRY
ERGONOMICS AND REQUIRED CLEARANCES
RELATED CODES AND CONSTRAINTS
ELECTRICAL AND MECHANICAL
LIGHTING
BIBLIOGRAPHY

CHAPTER 5 - KITCHENS

ACCESSIBILITY
FIXTURES AND APPLIANCES
KITCHEN STORAGE AND CABINETRY
THE PANTRY
ERGONOMICS AND REQUIRED CLEARANCES
ORGANIZATIONAL FLOW
RELATED CODES AND CONSTRAINTS
ELECTRICAL AND MECHANICAL
LIGHTING
BIBLIOGRAPHY

CHAPTER 6 - LEISURE SPACES

ACCESSIBILITY
ERGONOMICS AND REQUIRED CLEARANCES

ORGANIZATIONAL FLOW
RELATED CODES AND CONSTRAINTS
ELECTRICAL AND MECHANICAL
LIGHTING
BIBLIOGRAPHY

CHAPTER 7 - UTILITY SPACES

ACCESSIBILITY
APPLIANCES
ERGONOMICS AND REQUIRED CLEARANCES
ORGANIZATIONAL FLOW
RELATED CODES AND CONSTRAINTS
ELECTRICAL AND MECHANICAL
LIGHTING
BIBLIOGRAPHY

CHAPTER 8 - CIRCULATION SPACES

ACCESSIBILITY
ERGONOMICS AND REQUIRED CLEARANCES
ORGANIZATIONAL FLOW
RELATED CODES AND CONSTRAINTS
ELECTRICAL AND MECHANICAL
LIGHTING
BIBLIOGRAPHY

APPENDIX A - Anthropomorphic Data
APPENDIX B - ANSI/Fair Housing Bathrooms
APPENDIX C - ANSI/Fair Housing Kitchens
INDEX

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Having worked in the design portion of the construction industry for many years, I am well aware of the collaborative nature of the entire industry. Throughout the duration of every project (conception to occupancy), everyone needs to rely on the competence of those whose work precedes one's own. Short of that, it all starts to fall apart.

There is a list as long as my arm of people I have worked with and learned from over the years. You know who you are; you have made a de facto contribution to this book and you have my ongoing gratitude.

I must make mention of a few individuals who made direct contributions to this book: Melissa Brewer has consistently been the "go-to-gal," competent, diligent, organized, and thorough; William P. Halgren and Todd Armstrong contributed their expertise; and Gail Kann, a friend and colleague, is the hardest-working woman south of Duluth.

And, of course, the prime mover, the leader of the pack, et cetera, et cetera, in this entire enterprise—the results of which you hold in your hands—has been Maureen Mitton. Absent her vision and tenacity, it would not have happened, period!

And then, there is always a family that sticks with you through thick and thin; in my case, J / S,T,K,H / P,M,E / A,N,K,S.

COURTNEY NYSTUEN
April 2006

We live in times in which the word *teamwork* is used often, in many cases by people who are not very good at it. In the case of this book, I have been a very happy member of a working team of three.

Working with Courtney is delightful; he works hard, he delivers, he makes me laugh, and most importantly, he always makes me think. This book would not exist without Courtney, who taught this subject matter for years and educated so many interior design students over his academic tenure. He has influenced the design community a great deal over the years. He has also kept a full range of professional projects going throughout his academic career and into his alleged retirement. His ability to consider the information and content most useful to students and present it in an approachable manner made this book happen. Courtney contributed all of the hand-drawn illustrations in this book; his wonderful hand is evident and makes the drawings a pleasure to view.

Melissa Brewer, the other member of this team, has been a miracle worker, taking messy, sometimes undecipherable sketches and turning them into easy-to-read figures; she contributed all of the CAD illustrations contained in this book. Her positive attitude, talent, kindness, incredible organizational skills, and roundthe-clock hard work have made this project happen—color-coded paper clips and pristine files were simply an added bonus.

Two of my colleagues at UW-Stout have been very helpful and supportive. Thanks to Shelley Pecha for understanding, and hanging in there, without much first-year support from me, and a special thank-you to Kristine Recker-Simpson for doing all the FIDER/CIDA work cheerfully and well. My students always suffer when I work on a big project like this, due to my lack of time for preparation, and I thank all of them for the ongoing support and energy they provide.

My family, as usual, paid the price on this project. Thank you, Anna and Luc, for putting up with many weeks of a distracted, frazzled mother. Thank you to the Mitton parents and siblings for your support and understanding, and as always, thank you to Roger Parenteau, the husband who makes everything possible.

MAUREEN MITTON
April 2006

CHAPTER 1

INTRODUCTION

"Every cubic inch of space is a miracle."
WALT WHITMAN (*Leaves of Grass,* "Miracles")

WHAT THIS BOOK IS ABOUT

This book has a very specific focus: the space planning of individual rooms in homes. Many current publications are available that offer an overview of the principles of residential design combined with information about materials, finishes, and furnishings. Also available are beautiful books that provide lavish photographs and descriptions of residential design projects. Unlike those books, this one is meant to serve as a primer on space planning for major rooms/spaces in a home, and to offer related information regarding codes, mechanical and electrical systems, and a variety of additional factors that impact each type of room/space. In addition, this book includes information about accessible design in each chapter in order to provide a cohesive view of residential accessibility.

This book is meant to serve as a reference for use in the design process, and as an aid in teaching and understanding the planning of residential spaces. For purposes of clarity, most chapters follow a similar format, starting with an overview of the particular room or space and related issues of accessibility, followed with information about room-specific furnishings and appliances. Chapters continue with information about sizes and clearances, organizational flow, related codes and constraints, and issues regarding electrical, mechanical, and plumbing. At the end of each chapter, basic information is provided about lighting the specific room.

This book describes the minimum requirements for specific spaces and rooms so that students and designers can get a sense of the amount of space that is minimally

necessary in order for rooms to function usefully. Examples of larger spaces are also given, but at its heart, this book is intended to show students how to use space wisely and make good use of space throughout the dwelling. Put another way: The book is about meeting the minimum standards required to create spaces that work functionally. Such minimum standards are dictated by building codes and manufacturers' recommendations, and/or reflect good design practice. With clear knowledge about minimums, designers and students of design can learn when it is appropriate to exceed such standards for a variety of reasons that reflect specific project criteria based upon clients needs, budget, site, and other constraints.

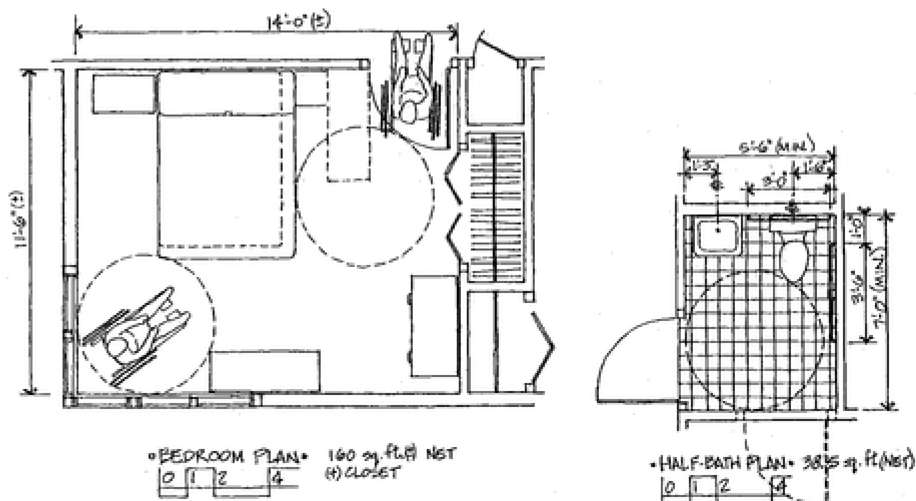
This book is meant as an introduction to the topics covered with the intention of getting the reader comfortable with basic concepts so that he or she might move forward in design education or on to additional research in certain areas. To that end, an annotated bibliography section is provided at the end of each chapter. Thinking of the information provided in each chapter as basic building blocks that allow for the discovery of the basic issues involved is a helpful approach to this book. We state this because there is much that goes into the design of a dwelling that is not covered in this book; our intent is to focus on the use and design of individual rooms (again, a building-block approach) so that the reader will have the core information required to understand the design of these individual spaces. See Figure 1-1.

This building-block or basic informational approach may bring up questions about the role of the interior designer versus the role of the architect. Clearly, the design of the totality of the structure is the role of the architect (or engineer); however, in many cases, the interior designer is taking an increasingly larger role in the design of rooms and spaces. Interior designers engaged in renovation work can

take a lead role in the design of the interior architecture of a space, with a significant hand in the design of a room or many rooms.This is in contrast to notions of the interior designer as the person in charge of materials and furnishings selections only.

Home renovation and remodeling continues to be a multibillion-dollar industry providing continuing work for interior designers, architects, builders, and others in the construction trades. Home remodeling and improvements reached a record of $275 billion in 2005, with industry experts predicting continued growth for the next several years. The most common home remodeling jobs continue to be kitchen and bathroom projects. Readers will note that the detailed kitchen and bathroom information contained in this book is applicable to remodeling as well as new construction.

Figure 1-1 This book covers the design of houses using a room-by-room approach as an aid in understanding the use and design of each room.



In new custom-home design, interior designers may take on a variety of roles from materials and furnishings selection

to the design of the interior architecture of the dwelling. New-home construction has also shown continued strength, with a decade of incredibly strong sales, providing continued work for those in design, construction, and related industries. The authors believe that interior designers and design students must be well versed in the aspects of residential design covered in this book.

AN OVERVIEW: QUALITY AND QUANTITY

Readers may note that throughout the book, the authors mention the evolution of the use of rooms, room sizes, and growth of the overall size of the American home. It's worth noting that the authors have a bias toward careful consideration of the *quality of design* rather than the *quantity of space* in a given home. We hope to make clear that the successful design of space requires careful consideration of the real needs of clients measured against budgetary, code, climate, and site restrictions—all of which require careful development of a project program prior to the beginning of the actual design of the project.

The last hundred years have brought dramatic changes related to the public perception of the design, furnishing, and size of the American house. According to the National Association of Home Builders (NAHB), the "typical" American house built in 1900 was between 700 and 1200 square feet, with two or three bedrooms and one or no bathrooms (2006). The average home built in 1950 was 983 square feet, with 66 percent of homes containing 2 bedrooms or fewer. These earlier homes are quite a contrast to the 2349-square-foot average found in new single-family homes sold in 2004. A majority of these new homes (those built since 2004) have three or four bedrooms, two and one-half bathrooms or more, with at least one fireplace. A visual

representation of the ever-expanding North American home can be found in Figure 1-2.

Interestingly, family size has decreased in this period to the point where the average American household size in 2004 was 2.57 persons-in contrast to 3.67 in 1940 (according to the U.S. Census). Based on a review of available figures, new homes are larger than ever, and yet they house fewer people per building than houses held, on average, in the past. The authors argue that a larger house is not necessarily a better house, and that designing a house that works well on a functional level is more important than mere size in creating a useful and pleasant environment. Additionally, large single-family homes are currently out of the financial reach of many citizens and are seen by some as wasteful in a time when issues of sustainability are increasingly engaging the national consciousness.

Figure 1-2 The average new home in the United States has grown in size over the last 50 years—despite the fact that family size has grown smaller. However, larger is not necessarily better, and well-planned spaces need not be excessively large. Given land and construction costs, as well as environmental concerns, smaller, well-designed houses may be a future trend. Numbers for square footage shown do not include garage spaces.

Consideration of housing size and use of related resources is not unique to this publication. Architect Sarah Susanka's book *The Not So Big House* has proven very popular, has helped many people to consider quality over quantity of space, and has certainly had an impact on the design of many homes (1998). *A Pattern Language*, by Christopher Alexander and colleagues, an earlier book and one considered seminal by many, has at its core the notion that spaces should be designed for the way people really live and that good design can be accessible for all (1977).

The notion of seeking quality of design, rather than quantity of space, is shared by many, and yet larger and larger houses continue to be built to house very small family groups. This dichotomy suggests that two opposing popular views of space exist. Although the architect Phillip Johnson was once quoted as saying "architecture is the art of wasting space," clearly that was a bit tongue-incheek, and we concur more with Walt Whitman's notion that "Every cubic inch of space is a miracle"—or should be.

HUMAN BEHAVIOR AND HOUSING

Environmental designers—including interior designers—benefit from gaining an understanding of human behavior as it relates to privacy, territoriality, and other issues related to the built environment studied by social scientists. Privacy can be defined as having to do with the ability to control our interactions with others. According to Jon Lang: "The ability of the layout of the environment to afford privacy through territorial control is important because it allows the fulfillment of some basic human needs" (1987). Lang goes on to state that the single-family detached home "provides a clear hierarchy of territories from public to private."

Lang also states that "differences in the need for privacy are partially attributable to social group attitudes." He continues, "Norms of privacy for any group represent adaptation to what they can afford within the socioeconomic system of which they are a part." From Lang's comments we can learn that the need for privacy is consistent but varies based on culture and socioeconomic status.

The notion of territory is closely linked to privacy in terms of human behavior. There is a range of theories about the exact name and number of territories within the home. One, developed by Claire Cooper, describes the house as divided into two components: the intimate interior and the public exterior (1967). Interestingly, Cooper (now Cooper Marcus) later wrote *House as a Mirror of Self: Exploring the Deeper Meaning of Home* (1995), which traces the psychology of the relationship we have with the physical environment of our homes, and in which she refers to work being done by Rachel Sebba and Arza Churchman in studying territories within the home. Sebba and Churchman have identified areas within the home as those used by the whole family, those belonging to a subgroup (such as siblings or parents), and those belonging to an individual, such as a bedroom or a portion of a room or bed (1986). Figures 1-3a and 1-3b illustrate various theoretical approaches to territory and privacy.

The term *defensible space,* coined by Oscar Newman, refers to "a range of mechanisms—real and symbolic barriers . . . that combine to bring an environment under the control of its residents." Defensible space as described by Newman includes public, semi-public, semi-private, and private territories (1972).

For the most part, Newman's *public* spaces, such as streets and sidewalks, are those not possessed by any individual. Semi-public spaces include those areas that may

be publicly owned but are cared for by homeowners such as planted parkways adjacent to sidewalks. *Semi-private* spaces can include yards or spaces owned in association (some theoreticians include porches and foyers in this category). *Private* territory is the interior of one's home or fenced areas within a yard, or, for example, the interior of a student's dorm room.

Newman's notions of defensible space and related territories have significant implications for planners, architects, and interior designers because taking them into account in designing homes can help to create spaces in which residents feel safe and have a genuine control over their immediate environment. See Figures 1-3a and 1-3b.

Figure 1-3a An illustration of territories as identified by theoreticians. Cooper identifies a public exterior and an intimate interior. Newman identifies public territories, which are not possessed or claimed; semi-public territories such as sidewalks, which are not "owned" but are seen as being possessed, nonetheless; semi-private territories, which are shared by owners or seen as being under surveillance by neighbors, such as front yards or shared swimming pools.

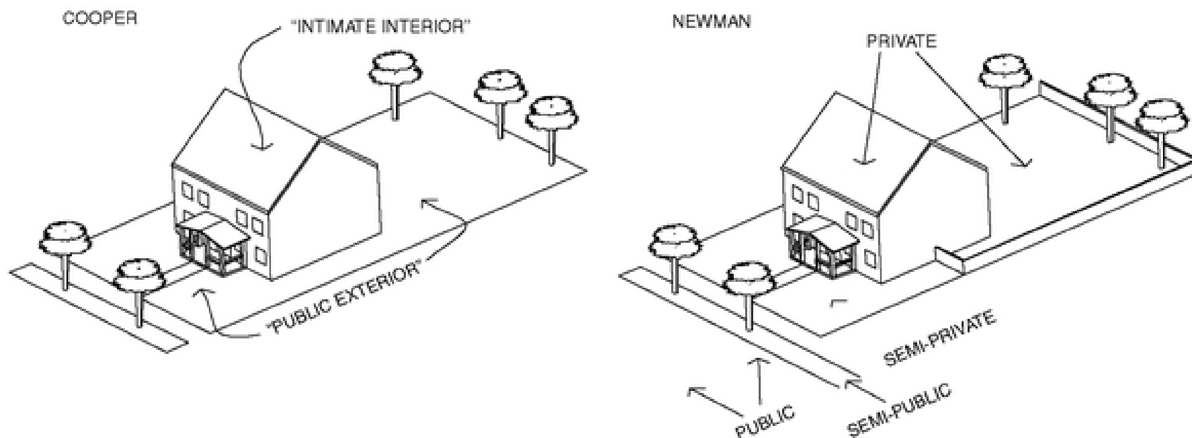


Figure 1-3b An illustration of territories related to interior space as identified by theoreticians. Newman describes the need for a buffer between the public world and private interior territories. Sebba and Churchman describe areas within a home as “shared territory” when used by all, with limited privacy; “individual primary territories” are those seen as belonging to individuals, such as a bedroom, which becomes the private sanctuary of the individual. Alexander et al. describe an intimacy gradient with the most public spaces related to the entrance leading to a sequence of increasingly private spaces.

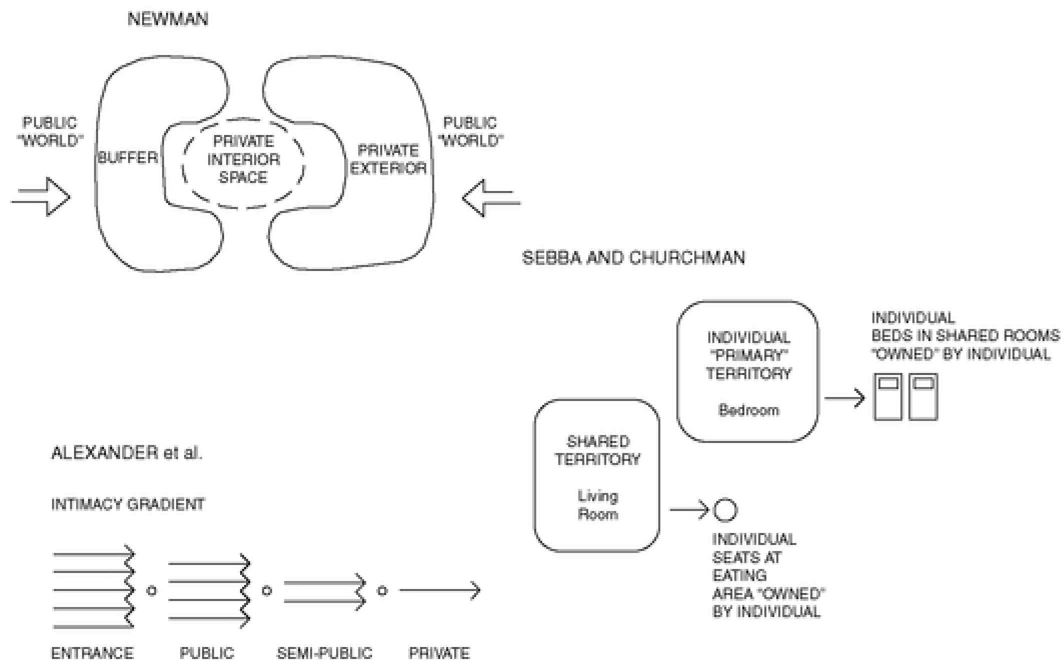
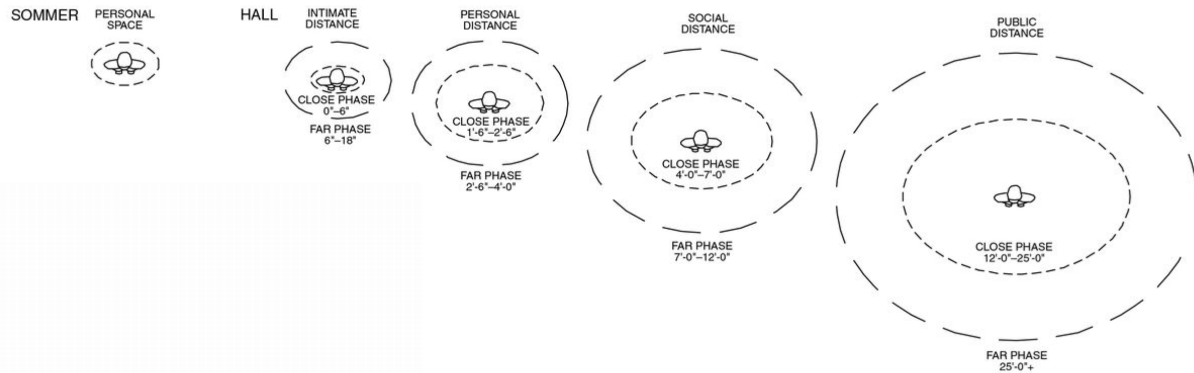


Figure 1-3c Sommer’s *personal space* and Hall’s *body distances*.



In *A Pattern Language*, mentioned earlier, Christopher Alexander and his colleagues describe territories as falling along an "intimacy gradient," which is a sequence of spaces within the building containing public, semi-public, and private areas.The bedroom and bathroom are the most private, and the porch or entrance space are the most public. Alexander writes, "Unless the spaces in a building are arranged in a sequence which corresponds to their degrees of privateness, the visits made by strangers, friends, guests, clients, family will always be a little awkward." See Figure 1-3b. Chapter 8 provides additional information about public and private spaces as they relate to the entry spaces.

Personal space is a term introduced by Robert Sommer in the 1960s. According to Sommer, "personal space refers to an area with an invisible boundary surrounding the person's body into which intruders may not come" (1969). See Figure 1-3c.

A similar sounding term expresses a different concept and comes from work done by Edward Hall, an anthropologist who coined the term *proximics*—for the "interrelated observations and theories of man's use of space as a specialized elaboration of culture" (1966). Hall identified four distinct body *distances* or boundaries that people will maintain in varying social situations: *intimate* (0 to 18

inches), *personal-casual* (1 foot, 6 inches to 4 feet), *social-consultative* (4 to 12 feet), and *public* (12 and beyond). Hall found that while actual spatial boundaries vary based on cultural differences, the concepts of intimate, personal, social, and public distances are consistent cross-culturally. Figure 1-3c also illustrates the spatial boundaries identified by Hall.

Hall's term *personal distance* refers to the distance maintained between friends and family members for discussion and interaction, whereas Sommer used the term *personal space* to refer to the invisible, territorial boundary around each person. Similarly, Hall's *intimate space* is a "bubble" of space around a person that can only be entered by intimates, whereas *social-consultative spaces* are those in which people feel comfortable engaging in routine social interaction for business or in conversation with strangers. *Public space* is that where there is little interaction and people are generally comfortable ignoring one another; this distance also allows one to flee when danger is sensed.

Considering Hall's spatial boundaries can be useful for designers in planning living spaces. For example, most casual social interaction takes place within personal distances. Later portions of this book focus on specific room-related dimensional information for encouraging interaction and creating privacy. It is also worth noting that in designing public and commercial spaces that encourage interaction and help users attain privacy, the designer will find it helpful to reference the work of social scientists such as Hall, Newman, Lang, and others. For those seeking additional information about environmental psychology and the related work of other social scientists, the bibliography section of this chapter includes related bibliographic information.

BASIC RESIDENTIAL BUILDING CONSTRUCTION AND STRUCTURE

Interior designers are not responsible for the design of structural or mechanical systems; however, practicing interior designers must understand the basic structural and mechanical building systems in order to work well within them. Our discussion here is limited to *common* standards of current residential construction and is a brief overview of the basic components of construction intended to supply the reader with the knowledge required to begin to gain an understanding of this topic. This book does not examine any of the myriad alternative, less common modes of construction that are used in residential construction, such as straw bale, adobe, timber frame, rammed earth, geodesic domes, and others. These and others have a place in the construction of homes, in special circumstances, and are covered in detail in specialty publications.

Houses sit on some type of concrete or wood *platform,* which together with the foundation, supports the portions of the house that rise above it. These include the following:

1. A *concrete slab* platform that sits directly on the ground. Concrete can resist termites, moisture, and rot and can serve as a suitable substrate for a wide variety of finish floor materials. The platform (slab) is most typically on a single plane, but it can be designed as a multilevel platform—a more complicated and more expensive option. In some cases, a very slight indentation in the slab is created to accommodate floor finishing materials of varying thicknesses, such as wood flooring, or to provide slopes for drainage (for example, a roll-in shower). In geographic areas subject to frost upheaval due to low temperatures and/or soil conditions (such as water-

retaining clays), it is necessary to augment the concrete slab platform with a perimeter foundation wall that extends deep enough into the ground to reach stable soil. Figure1-4 illustrates slab foundations.

2. A *wood platform* that sits off the ground to avoid rot and/or termite infestation. It can sit off the ground far enough to form a crawl space or a basement. Figure 1-5 illustrates wood-frame floors over crawl spaces and basements, and Figure 1-6a shows a basement foundation.

Figure 1-4 Houses sit on some type of a platform. One type is a concrete slab.

a. Slab is typically 4-inch-thick reinforced concrete and serves as suitable substrate for a full range of floor materials.
b. Perimeter of slab is thickened and reinforced.
c. Compacted granular fill (6 inches plus or minus).
d. Well-drained compacted substrate under floating slab.
e. Depth of footings (E1) (below grade) is a function of climate (frost depth) and soil conditions (some layers of soil may be more stable—under load—than others).
f. Foundation wall(s) are commonly 8-inch-thick concrete or concrete blocks (called CMUs), less commonly are brick or stone.
g. Ground line.
h. Rigid insulation (dashed line) required in cold climates.
i. Walls of the building envelope (walls and roof) are anchored to the concrete slab or foundation wall.
j. This is an uncommon multilevel slab, which can be costly but can provide for an interesting ground floor.

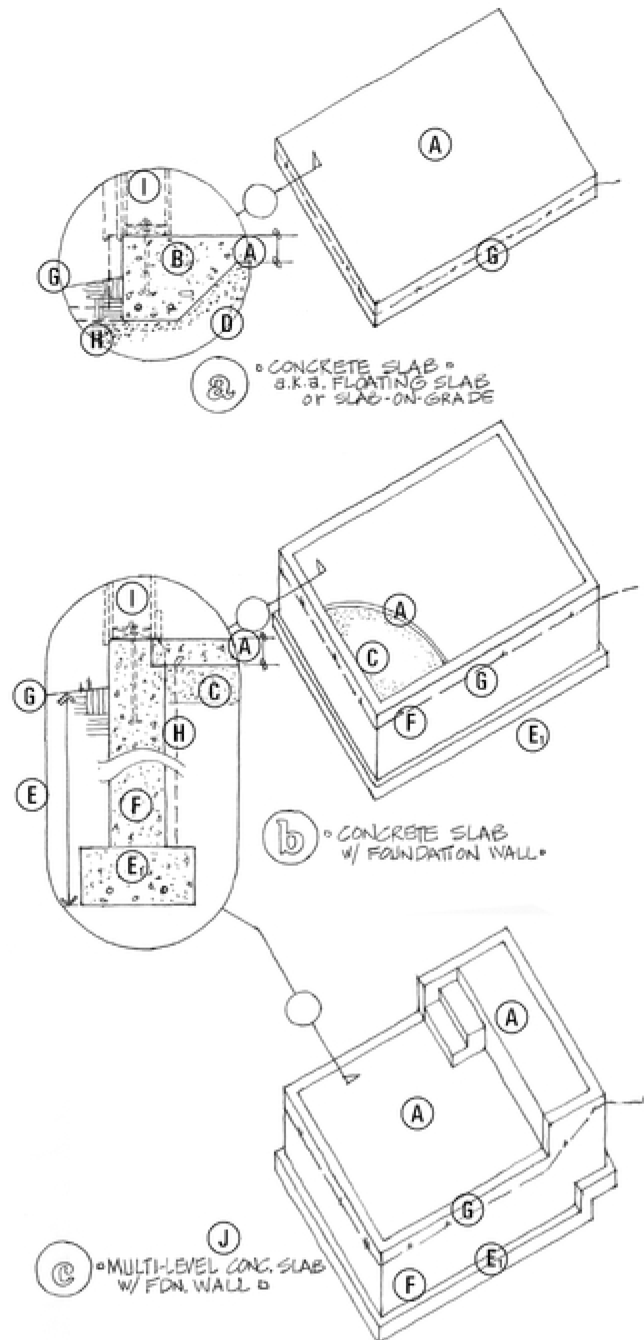
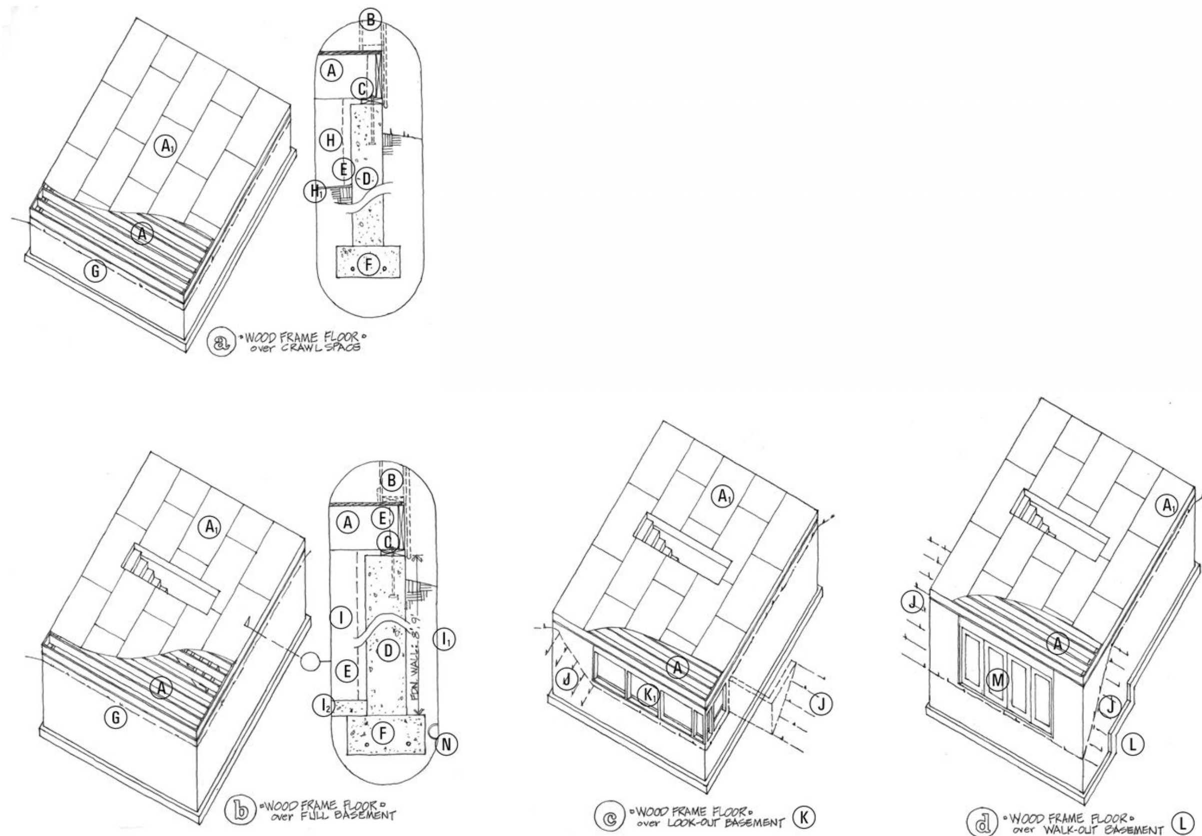


Figure 1-5 Another type is a wood platform that sits off the ground (on some type of foundation wall). It can sit off the ground far enough to form a crawl space or a basement as shown. Figure 1-6a also shows a basement foundation.

a. Floor joists. Floor structure is typically constructed of wood joists (the longer the span, the deeper the joist) and structural sheets (A1) (4 feet by 8 feet) of plywood or oriented strand board (OSB) that is ¾ inch plus-or-minus thick.
b. Frame walls. The floor serves as the platform for the construction of the building envelope (walls and roof) above.
c. Sill plate. Floor joists rest on this “plate” (typically 2 by 6 inches) that rests on and is anchored to the foundation.
d. Foundation wall. Typically reinforced concrete (8 to 10 inches) or concrete block, known as CMU (10 to 12 inches). The higher the foundation wall, the thicker the wall must be.
e. Insulation (shown with a dashed line). Required in colder climates.
f. Footing. Reinforced concrete. Typically the width is twice the thickness of the foundation wall and thickness (depth) is half the width.
g. Grade. Ground line, 8 inches (minimum) below the wood structure.
h. Crawl space. 18-inch height (minimum) with vapor barrier (H1).
i. Full basement. 8-foot-high foundation wall (minimum) (I1) with a 3- to 4-inch-thick concrete slab floor (I2).
j. Look-out and walk-out basements require a site that slopes sufficiently to accommodate the required change of grade and yet drain properly—away from the building.
k. Look-out basement can provide legal egress windows (K1), allowing bedroom(s) without requiring changing the footing depth.
l. Walk-out basement requires stepping down the footings and associated foundation walls in colder climates.

m. Door(s).
n. Drain tile to carry away excess groundwater and reduce the pressure of groundwater against the foundation wall.



There are methods of support for the wood platform apart from foundation walls. These include piers (posts) of wood, steel, or concrete supporting beams that, in turn, support the platform. While this method is less common, it is useful on hillsides or sites that are prone to flooding.

Major construction elements of a wood-frame building system are illustrated in Figures 1-6a and 1-6b. These include elements that combine to form the roof and walls, including structural and insulating elements and related finish materials, as shown in Figure 1-6a. Electrical,

plumbing, heating, and air-conditioning elements are shown in Figure 1-6b, with detailed notes. Information about doors and windows are shown in Figures 1-7a to1-7c.

Figure 1-6a This is a “peel away” exploded view of a wood frame house meant as an illustration of the most common residential construction techniques currently used in the United States.

a. Roofing. Commonly asphalt shingles; less commonly clay tile, wood (cedar shingles), sheet metal (includes copper and other metals), fiber reinforced cement, and slate.
b. Roofing felt. Commonly #15 asphalt-impregnated paper.
c. Roof sheathing (also known as the roof deck). Typically 4-foot-by-8-foot-by-5/8-inch-thick (plus or minus) sheets of structural plywood or oriented strand board (OSB).
d. Roof trusses. Commonly 2 feet on center; shown in this case as attic trusses (see Figure 2-11). Most commonly prefabricated off-site using dimensional lumber (such as 2 by 4 inch, 2 by 6 inch, etc.); less frequently fabricated of light gauge steel.
e. Subfloor. 4-foot-by-8-foot-by-¾-inch-thick (plus or minus) structural plywood or OSB; provides a walkable surface in the unfinished attic (as shown); serves as the structural base (support) for the finished flooring materials.
f. Attic insulation. Commonly fiberglass (batts, blankets, or blown-in); see Figure 2-11.
g. Gas fireplace. Requires venting to the outdoors (G1); shown here, venting to the roof.
h. Chimney. The chimney (in this case a gas vent); the chimney housing can be of light frame construction, as shown, or masonry, such as brick or stone.

i. Interior wall material. Commonly gypsum board, ½ inch thick (also called drywall) serves as a suitable surface for application of paint or wall covering. Alternatives include wood or composite paneling (boards or sheets); composite options include Homasote and medium density fiberboard (MDF).
j. Vapor barrier. Polyethylene sheet, placed on the room side of the insulation in cold climates in order to prevent water vapor from entering (from the interior) and condensing within the insulation.
k. Wall insulation. Commonly fiberglass blanket (batts) fills the entire wall stud cavity.
l. Studs. Commonly 2-by-4-inch or 2-by-6-inch wood 1 foot, 4 inches on center. An alternative is steel (C-studs). These carry roof loads to the floor and/or foundation and serve as a structural entity to attach interior and exterior sheeting/sheathing materials. Exterior studs shown here are 2 by 6 inches; interior studs are commonly 2 by 4 inches.
m. Wall sheathing. Structural sheets (commonly 4-feet-by-8-feet-by-½-inch-thick (plus or minus) fastened securely to the studs (L) to resist lateral forces (such as wind or earthquake).
n. Infiltration barrier (also known as building wrap). Resists air (wind) penetration; does not (and should not) impede water vapor transmission.
o. Exterior finish (also known as siding). Cedar shingles are shown; wood, vinyl, and metal products are used for lap or vertical siding. Alternatives to items mentioned are stucco (and stuccolike products), brick, stone veneers, and so on.
p. Underlayment. ¼-inch- to 5/8-inch-thick wood fiber material (4-foot-by-8-foot sheets); used to level substrate under finish floor materials such as carpet; plywood is used under vinyl; cement based products are used under ceramic tile.