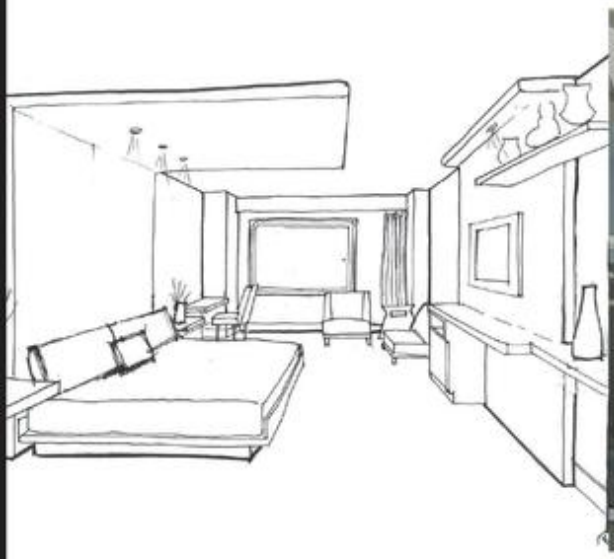

INTERIOR DESIGN

VISUAL PRESENTATION

A Guide to Graphics, Models & Presentation Methods

FIFTH EDITION 5

MAUREEN MITTON

WILEY

Interior Design Visual Presentation

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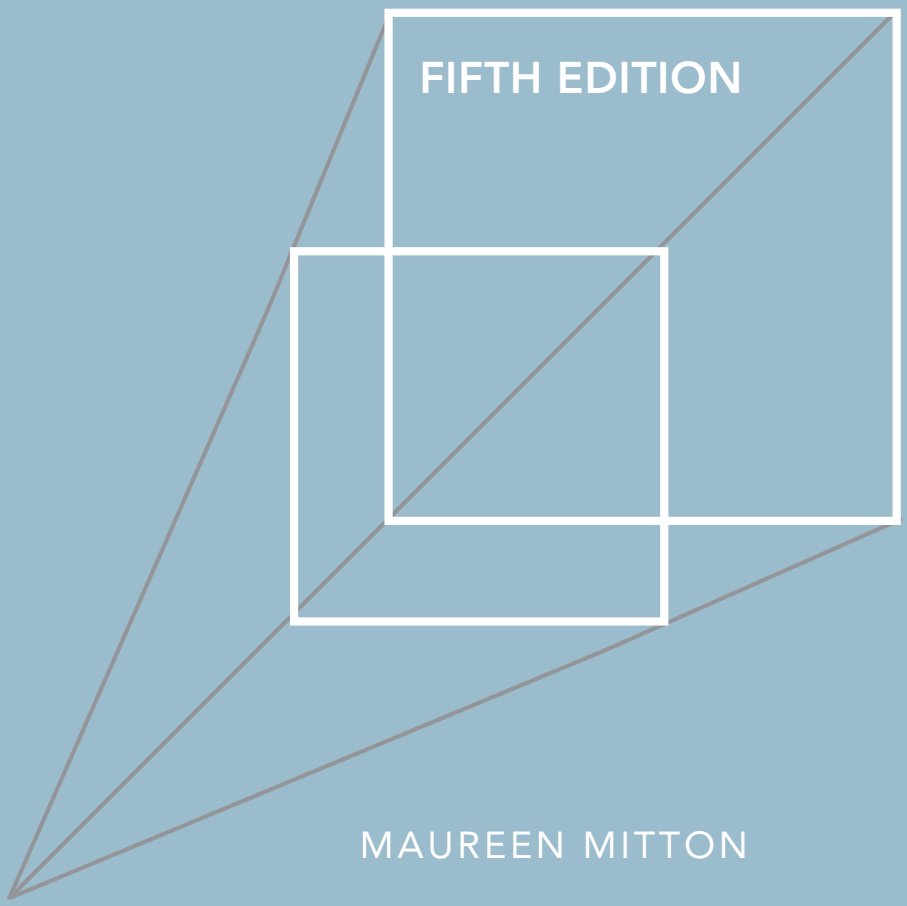
A Guide to Graphics, Models, and Presentation Methods



MAUREEN MITTON

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Introduction

The first edition of this book was intended as a primer on visual communication in interior design with a range of styles and techniques presented. The goal with that and each later edition has been to provide students and practitioners with up-to-date information on visual presentation techniques. Like earlier editions, this book identifies methods used in the visual presentation of interior spaces and articulates them in written and visual language. Various phases of the design process are discussed in order to reveal the connection between process and presentation.

Research for this edition made clear that interior designers working today are expected to know more than ever before and are expected to have an incredibly broad skill-set. Skills and knowledge related to hand drawing, digital drawing and rendering, and a range of CAD, image editing, and graphics programs are all considered necessary for current design practice—not to mention actual design talent, product knowledge, project experience, and the ability to communicate with a range of individuals throughout a project. Expectations are quite high for today's entry-level and practicing designer.

In thinking about how to approach this edition, given the wide range of skills required of today's design professional, it became clear that I should continue to focus on some of the quicker “go to” skills necessary for success in the current workplace. By focusing on drawing, rendering, and modeling options that are approachable and can be used every day in a wide range of work settings, this edition can provide a toolkit for current students and professionals.

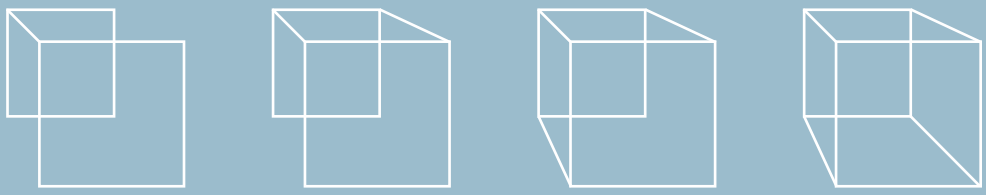
The focus here is on quick, estimated sketching and quick modeling (using SketchUp) because I believe these skills are useful for all designers. My approach with rendering is similar: all designers need “go to” quick rendering skills that are serviceable in a range of situations. My goal is for this book to provide an overview of accessible approaches to drawing, modeling, and rendering that will serve as a foundation for design students. The goal then is to create a comfort level with drawing and rendering so that those skills can be used throughout the design process.

As this edition goes into production, designers continue to present projects using traditional physical presentation boards, and yet many designers are creating completely

digital and virtual presentations. Both physical and digital presentations are covered in detail in this edition.

As with earlier editions, many of the examples included here were executed by undergraduate design students. Work done by professional illustrators, industrial designers, digital illustrators, and model makers is also included in order to demonstrate what is being done in current practice.

In completing this edition, I once again came to the conclusions that, while much has changed since the first edition—particularly related to digital technology, many things have stayed the same, particularly the process of design and the complex, yet flexible ways of thinking required of a professional designer. This continues to be a profession populated by bright, creative individuals, who are required to call upon a broad range of talents and skills in everyday practice. While technology has made many things easier—and faster—today's designers are required to know more and to possess more skills than at any time previously. I hope this book will help today's designers in their acquisition of some of the many skills required in current practice.



1

An Introduction to Drawing for Interior Design

Interior design is a multifaceted and ever-changing discipline. The practice of interior design continues to evolve due to technological as well as societal changes.

The sentences above were written many years ago in the introduction to the first edition of this book, and they continue to hold true today. Digital technology continues to influence—and to catalyze—the ongoing evolution of design practice. Current interior design practice has evolved to require the use of software throughout the design process, and yet manual drawing and sketching continue to be seen as highly useful as well.

While the profession continues to evolve, in many ways, the design process itself is a constant, whether it is practiced with a pencil or a powerful computer running special software. There are many stories about designers drawing preliminary sketches on

cocktail napkins or on scratch paper, and these anecdotes lead us to a simple truth: design drawing is a key part of the design process.

Professional designers conduct research and generate piles of information, then wrap this all together with inspiration and hard work in what is referred to as the *design process* to create meaningful and useful environments. An enduring and key factor in interior design is that human beings—and other living creatures—occupy and move within interior spaces. To create interior environments, professional designers must engage in a process that involves *research, understanding, idea generation, evaluation*, and *documentation*—all significant constants in an ever-changing world.

This book covers the drawing and presentation elements used in *design communication* throughout the design process. These processes and basic concepts are consistent, whether generated manually or by computer. Practicing designers currently use computers for most finalized design drawings as well as for many in-process drawings. Manual drawings are usually used earlier in the design process or to create quick, idea-oriented sketches throughout the process as needed.

This chapter covers what is often referred to as drafting, as well as other forms of two-dimensional graphics. The term *drafting* refers to measured drawings done with specialized drawing tools or computers.

Drawings created in the preliminary stages of the design process are often rough, or schematic, sketches and might be done by hand. As designs are refined, there is a need for highly accurate, measured, and detailed drawings, and these are most commonly generated via computer. Put another way, as a design is refined, the drawings for that design are also refined: the design process is one of refinement, as is the drawing process. Figures 1-1a, b, and c illustrate drawing refinement occurring during the design process.

This chapter presents an overview of the most common drawings used in interior design practice. The information presented is meant as an overview, not a definitive drawing or drafting reference. Subsequent chapters cover the other forms of drawing and design graphics used in sketching, as well as other forms of idea generation.

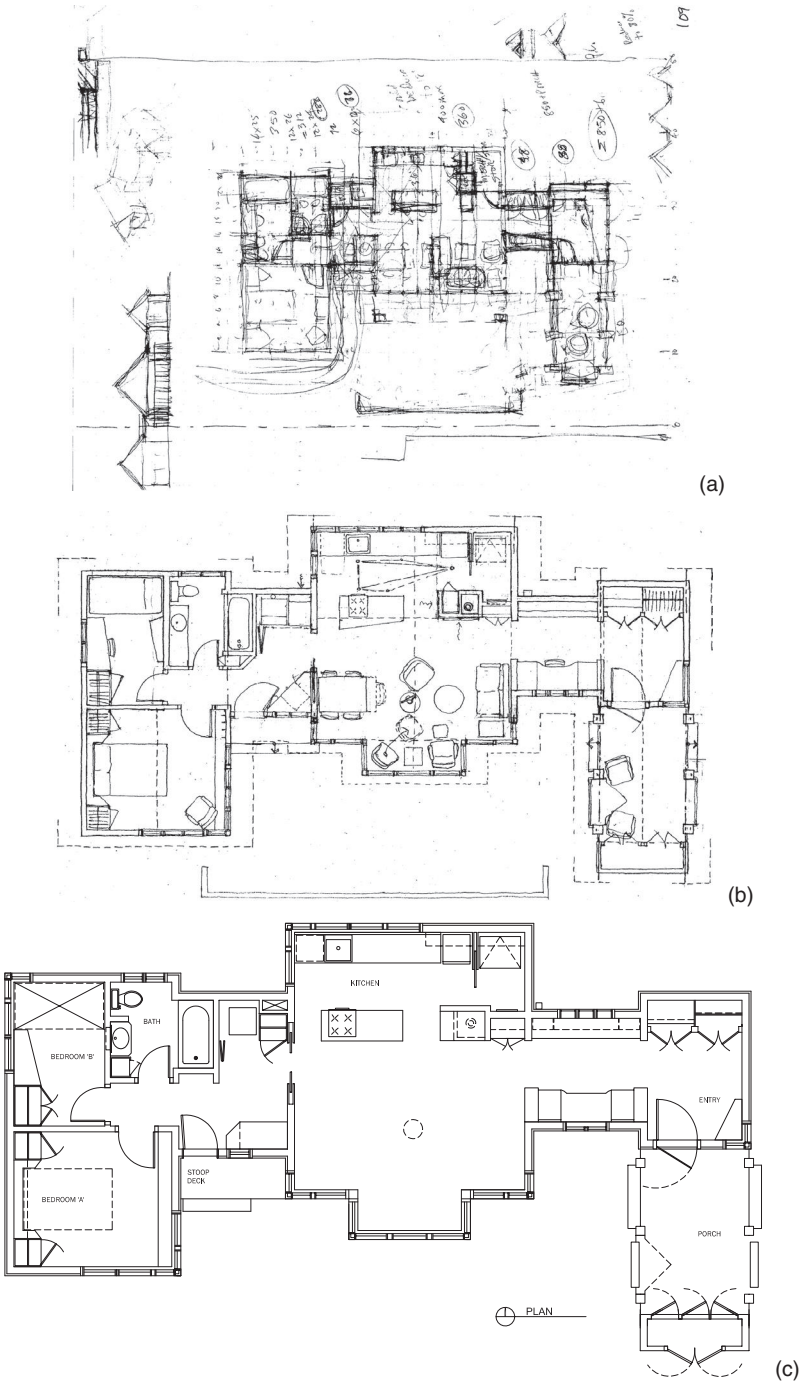


FIGURE 1-1A THROUGH 1-1C
Drawings are refined as the design process moves forward in a continual process of refinement, as one can see from early hand-drawn exploration sketches (1-1a), to more refined (1-1b) to the finalized design drawn using AutoCAD (1-1c). DESIGN AND SKETCHES BY COURTNEY NYSTUEN; AUTOCAD DRAWING BY SHELLEY PECHA

The practice of interior design requires the creation and use of various types of drawings. These can be divided into three broad categories based on purpose.

Interior Design Drawings Types and Purposes

1. Ideation

   Conceptual or preliminary drawings that allow the designer to explore ideas and work conceptually, often in the form of sketches.

2. Communication

   These drawings allow the designer to communicate to others, including members of the design team, the client, end users, consultants, and other professionals, usually through presentation drawings.

3. Construction

   This type of drawing conveys the technical information required for construction through construction documents or working drawings.

This book focuses on the first two types of drawing: those used for exploration and presentation or for graphic communication of ideas.

To create the appropriate type of drawing with the level of detail required, one can begin by asking what the purpose of the drawing is. For example, if ideation is the goal, then the drawings should be sketchy and executed quickly by hand, using few (or no) drawing tools.

Interestingly, as modeling software becomes more advanced, students and designers are well served by quick sketches generated by hand as a means of developing ideas. These sketches can then be used use as a reference when refining the design and modeling the project digitally.

For example, using software such as Revit requires having a clear understanding of the finished form while modeling and therefore may require one to commit to the final design early. It can be difficult to fully explore ideas visually if one becomes bogged down in the software. Hand sketching can aid in generating and developing ideas quickly prior to committing the ideas to software. The need for skills related to hand sketching is the reason that this book emphasizes quick sketching techniques.

This chapter focuses on the drawings used most for communication and construction, but designers do many other types of drawings, from diagrams to perspective

sketches all of which are covered in subsequent chapters: diagrams are covered in chapter 2, and perspective drawing is covered in chapters 3 and 4.

Understanding Orthographic Projection Drawings

Presentation drawings and construction documents use certain standard drawing conventions in order to clearly communicate and delineate the proposed design; these often involve drafting in scale. Design drawings are highly standardized and follow specific conventions so that they can carry universal meaning. Or as one early reviewer of this book put it, "Design drawing is much like a language; the drawings must convey the designer's meaning clearly."

The design drawings most commonly used in scaled delineation of interior environments are *floor plans, interior elevations, sections*, and *reflected ceiling plans*. These drawings, called *multiview orthographic projections*, are created by projecting information about an object onto an imaginary plane known as the *picture plane*. This direct projection of an object's dimensions allows orthographic projections to retain both shape and proportion, making these drawings accurate and precise.

Multiview orthographic projections create *fragmentary* views of an object, resulting in the need for multiple drawings (hence the "multiview" portion of the name). Because of their fragmentary nature, orthographic projections therefore become parts of a system and are mutually dependent on one another. By their nature, these orthographic projections appear flat and lack the three-dimensional quality of perspective drawings. One way to visualize orthographic projection is to imagine an object enclosed in a transparent box. Each transparent plane of the enclosing box serves as the picture plane for that face of the object.

The view through the top plane of the enclosing box is called a plan. In a *plan* view, only those elements seen when looking directly down at the object are drawn. Figure 1-2 depicts a roof plan.

The views through the picture planes that form the sides of the enclosing box are called *elevations*. Elevations depict only what is visible when the object is viewed directly through the side picture planes. Figure 1-3 is an exterior elevation.

A *section* portrays a view of the object or building with a vertical plane sliced through it and removed. One way of understanding section views is to imagine that a very sharp plane has been inserted into the object or building, cutting neatly into it and revealing the structure and complexity of the object's form (see Figure 1-4).

A *floor plan*, also known as a *horizontal section*, portrays a view of the building with a horizontal plane sliced through it and removed, exposing the thickness of the walls and the elements below the cut line, such as floor finishes and furniture (see Figure 1-5).

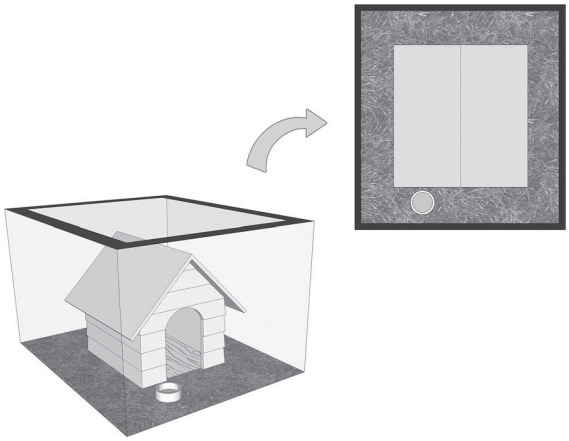


FIGURE 1-2

Roof plan. When an object is enclosed in a glass box, each plane of the box can serve as a picture plane. The view drawn through the top plane (picture plane) creates a plan view—in this case a roof plan.

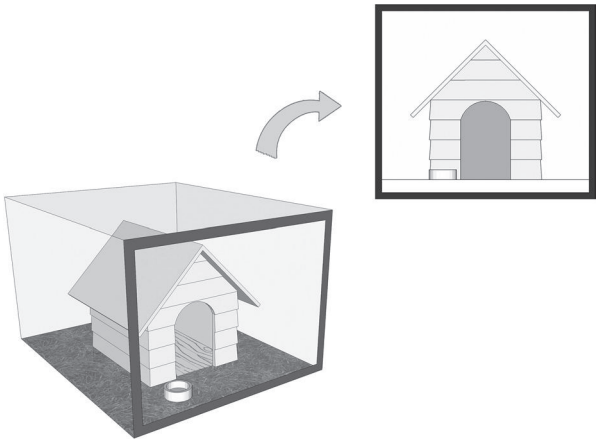


FIGURE1-3

Elevation. The view drawn through the picture plane enclosing the side of the box is called an elevation. This view shows the front elevation.

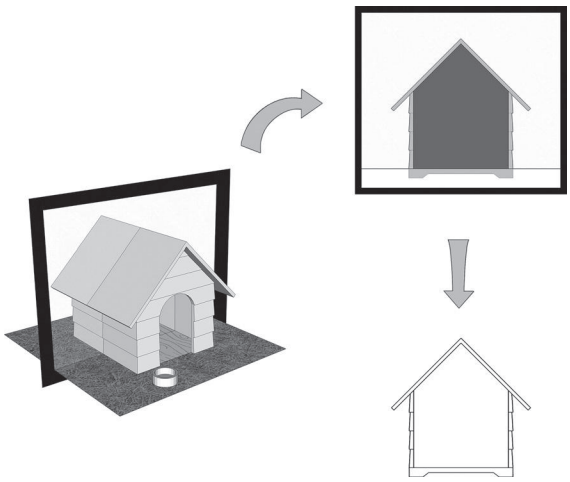


FIGURE 1-4

Section. A section is a view of an object with the picture plane slicing neatly through it.

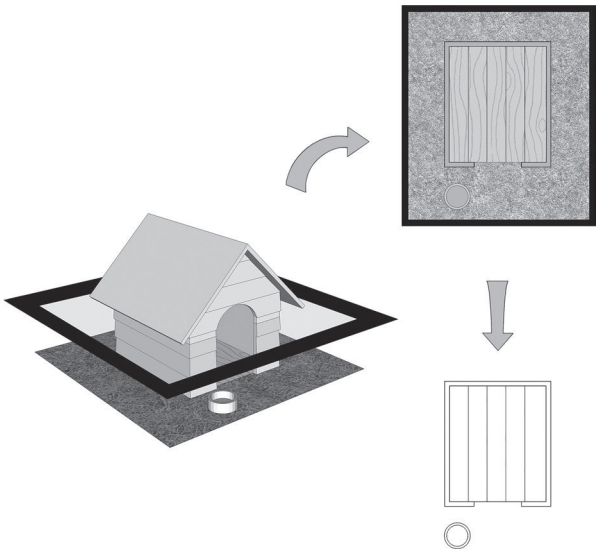


FIGURE 1-5

Floor plan. A view of the building from above, with a horizontal plane sliced through it and removed to expose the thickness of the walls is called a floor plan. FIGURES 1-2 THROUGH 1-5 DRAWN WITH CIARAH COENEN

Orthographic Projection Drawings for Interior Environments

The special orthographic projection drawings used in the delineation of interior environments are based on the concepts discussed above. These drawings impart information particular to interior construction.

Floor Plans

Floor plans are also called *horizontal building sections* because they are drawn as though a horizontal cut has been made through the building (typically between 3′-6″ and 5′-6″ above the floor), as shown in Figure 1-6. Cutting into the building at this location exposes the thickness of walls and other structural elements, shows windows and doors, and can reveal floor finishes and furnishings, all of which are located below the location of the cut.

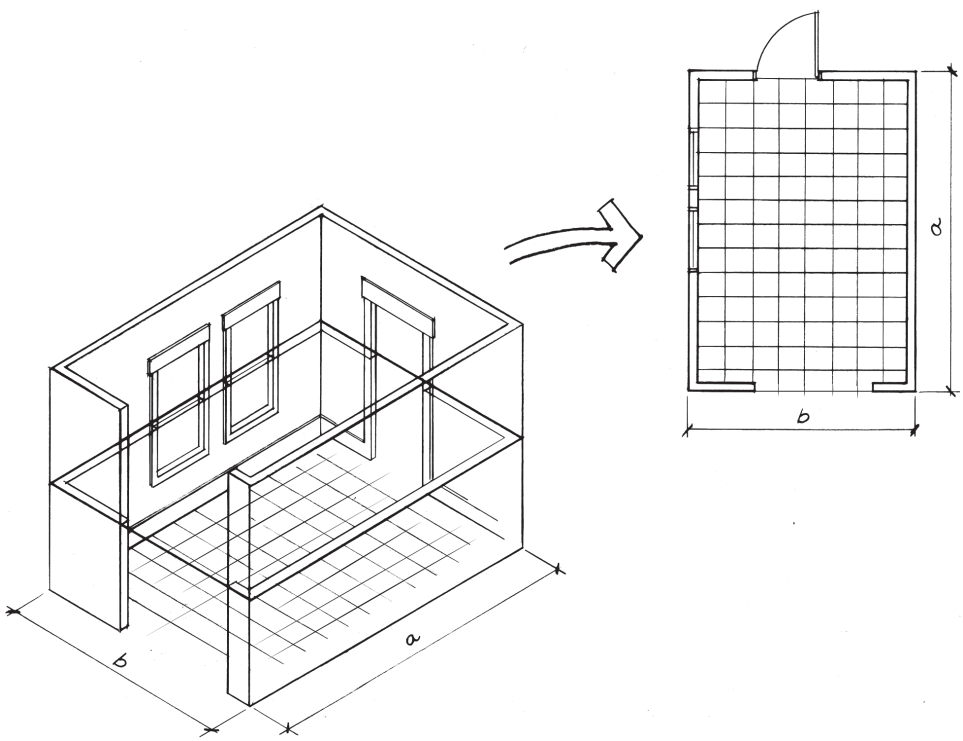


FIGURE 1-6
A floor plan is created when the picture plane cuts through the building horizontally, at 3′-6″ and 5′-6″ above floor level.

In the United States, floor plans are most often drawn at a scale of 1/8″ = 1′-0″ or ¼″ = 1′-0″, although this varies according to project conditions. Larger-scale floor plans are useful for the presentation of complex or highly detailed spaces. Smaller-scale floor plans are required for large projects and are also used as key plans in complex presentations. In creating floor plans using metric measurements, a scale of 1:50 is relatively common; it is somewhat similar to ¼″ = 1′-0″ scale (the ratio is precisely 1:48). Architectural drawings—other than small-scale interior-related drawings such as the floor plans mentioned—are commonly drawn using a metric scale of 1:100.

Floor plans must convey significant spatial relationships with consistent graphic conventions. The conventions for those are listed below.

Floor Plan Drawing and Line Weight Conventions (See also Figures 1-7, 1-8, and 1-9)

Various line weights are used to convey depths and qualities of form.

In standard floor plans, the boldest line weight is used to outline those elements that have been cut through and are closest to the viewer (such as full-height wall lines).

An intermediate line weight is employed to outline objects that lie below the plane of the cut but above the floor plane, such as fixtures, built-ins, and furnishings.

A finer line weight is used to outline the surface treatment of floors and other horizontal planes, such as tile and wood grain.

Objects that are hidden (such as shelves) or above the plane of the cut are dashed or ghosted in a manner that is consistent throughout the presentation.

Standard doors are drawn open at 90 degrees to the wall and are often shown with the arc of their swing. The door frame and the space it requires must be considered in the drawing of the door system; the dimensions of the frame itself must be dealt with as well.

Nonstandard doors, such as smaller swinging closet doors, bifold doors, sliding doors, and pocket doors are drawn in a manner consistent with their construction.

Windowsills are typically outlined, often with a lighter line weight at the sill only. Window frames and sheets of glass are shown at various level of detail, as the scale allows.

Stairs are generally shown broken off past the height of the plane of the cut; this is signified with a special cut or break line, as shown in Figure 1-10a. An arrow should be included to indicate the direction of the stairs from the level of the floor plan, with the word up (UP) or down (DN) adjacent to the directional arrow.

A title, north arrow, and some type of scale notation should be included on all floor plans. Scale notation can be stated numerically (e.g., ¼″ = 1′-0″). The use of a graphic scaling device, which allows for the reduction, enlargement, and electronic transmission of drawings, is often necessary.

Symbols relating the floor plan to additional orthographic views or details are often drawn on the floor plan and serve as cross-references.

Figures 1-7 and 1-8 are examples of town house floor plans drawn using AutoCAD and employing standard conventions and reference symbols. Figure 1-9 is an enlarged portion of the floor plan showing detailed information. Figures 1-10a and 1-10b are examples of the same town house floor plans drawn using Revit.

Successful floor plan presentation drawings require an understanding of drafting conventions. Presentation floor plans may be drawn fastidiously with tools or sketched freehand. Regardless of the drawing style, presentation floor plans must be accurate and drawn to the appropriate scale so that they communicate the design and can be used by the designer as the project progresses. Presentation floor plans are enhanced by the use of tone, value, color, and other graphic devices. The graphic enhancement of floor plans is discussed in greater detail in Chapters 5 and 7. Additional examples of plans for commercial projects can be found at the end of this chapter.

Interior Elevations

Just as exterior elevations are created to reveal exterior elements and features, interior elevations reveal a building's interior features. To understand the creation of interior elevations, imagine yourself inside the room you are drawing, directly facing one wall, with a large sheet of glass (the picture plane) inserted between you and the wall. The interior elevation is then created by outlining (i.e., projecting onto the picture plane) the wall's significant features. Each wall of the room can be drawn in elevation by projecting what is visible as you face that wall directly, as illustrated in Figure 1-11.

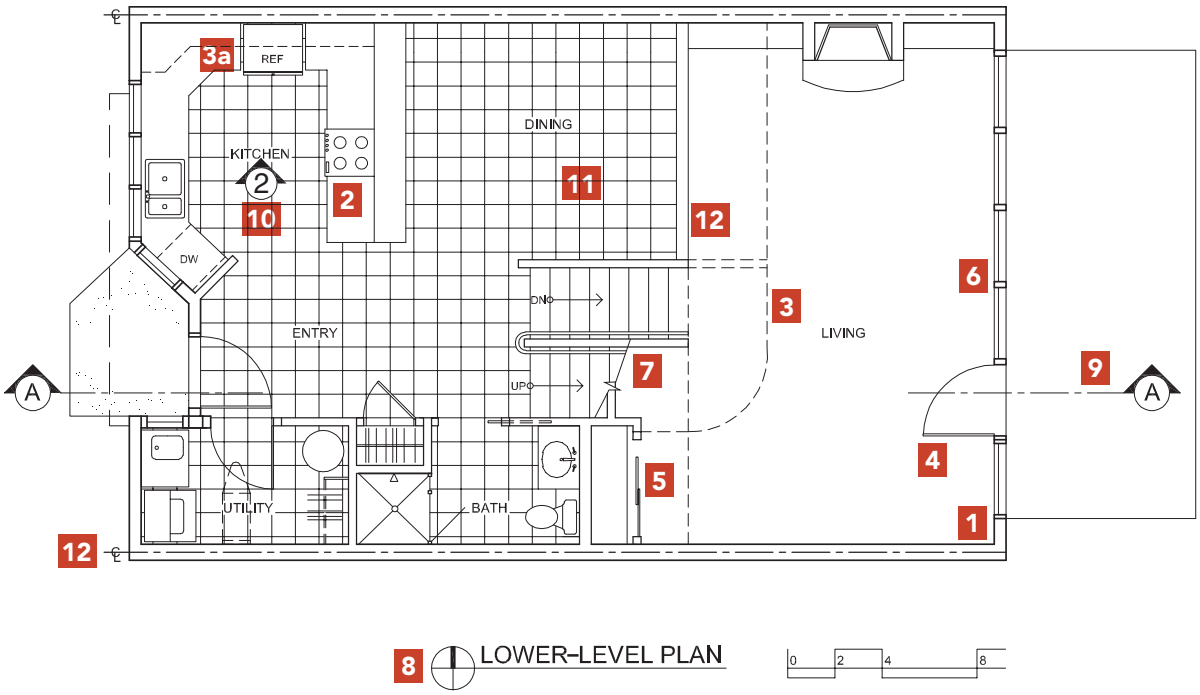


FIGURE 1-7

The lower-level floor plan of a town house employing standard drafting conventions as noted.

1. Boldest lines indicate the location of cut, meaning full-height walls are bold. Lower walls may be shown with lighter line weights (1a).
2. Fixtures, cabinetry, and finish materials are drawn with progressively lighter lines as they recede from the cut location.
3. Elements that are above or below the cut line—such as cabinets (3a) and soffits—or hidden such as dishwashers, are indicated with dashed lines.
4. Standard doors are drawn open at 90 degrees with the arc of swing shown; showing the full swing can ensure that nothing impedes the full swing of the door.
5. Specialized doors, such as smaller closet doors (shown), bifold doors, sliding doors, and pocket doors, are drawn in a way that indicates size and construction.
6. Window glass and sill lines are shown, often with a lighter-weight line than walls.
7. Stairs are drawn as broken off past the line of the cut; a special breakline is used. See also Figure 1-8, item 7.
8. A title, north arrow, and scale notation are required on all plans. Because this drawing was reduced, a standard written scale was omitted; instead, a graphic scale device is included.
9. This is a section reference symbol. The arrow indicates the direction of the view of the section.
10. This is an elevation reference symbol. The arrow indicates the direction of the elevation view. The number indicates the particular drawing that is referenced.
11. Flooring materials may be shown as required (using a light line weight).
12. This is a centerline, indicating the centerline of the shared wall in the town house.

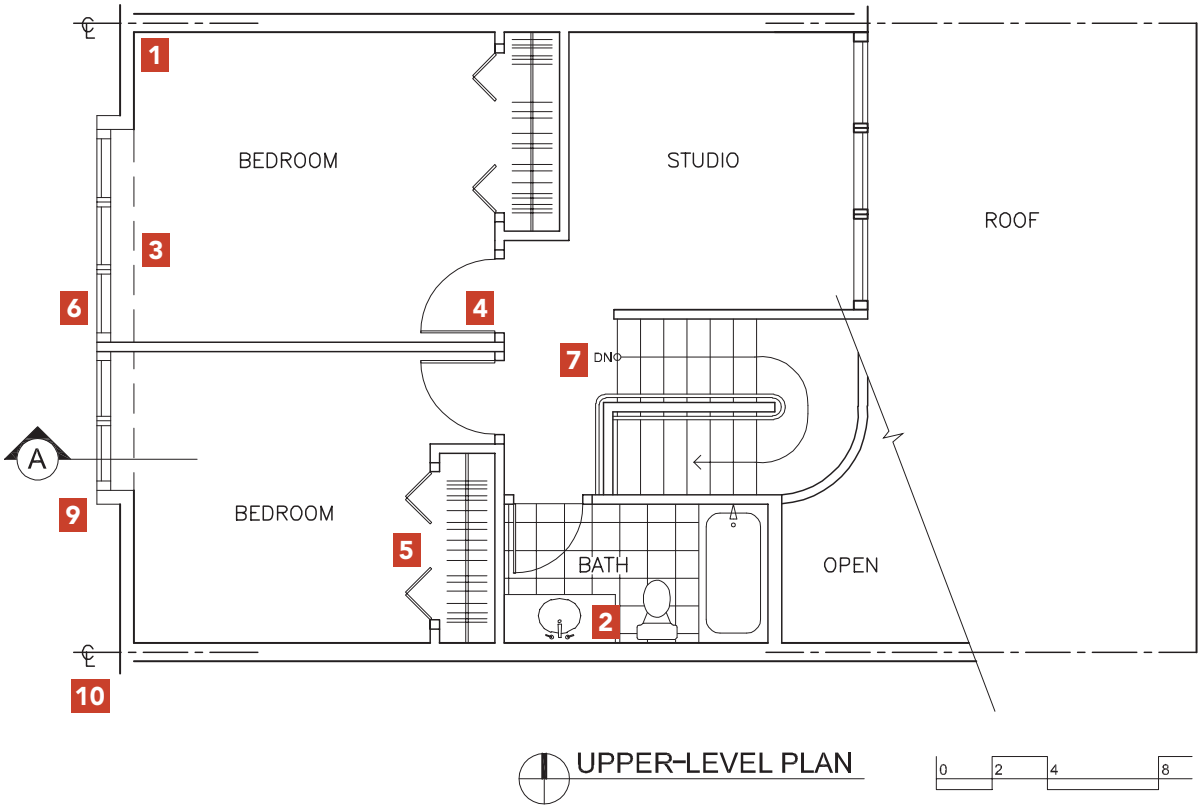
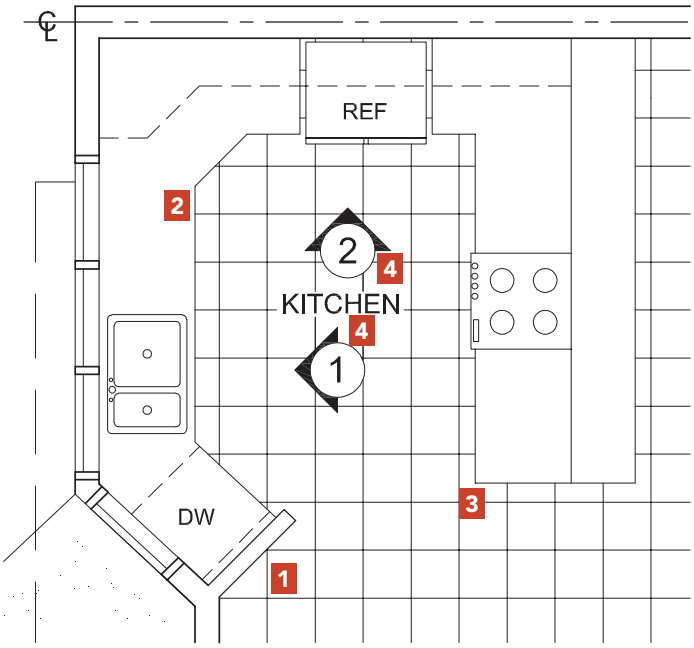


FIGURE1-8

The upper-level floor plan of a town house employing standard drafting conventions as noted

1. Boldest lines indicate the location of cut, meaning full-height walls are bold. Lower walls may be shown with lighter line weights (1a).
2. Fixtures, cabinetry, and finish materials are drawn with progressively lighter lines as they recede from the cut location.
3. Elements that are above or below the cut line—such as cabinets and soffits (shown) are indicated with dashed lines.
4. Standard doors are drawn open at 90 degrees with the arc of swing shown; the full swing can be shown ensure that nothing impedes the full swing of the door.
5. Specialized doors, such as smaller closet doors (shown), bifold doors, sliding doors, and pocket doors, are drawn in a way that indicates size and construction.
6. Window glass and sill lines are shown, often with a lighter-weight line than walls.
7. Stairs are drawn as broken off past the line of the cut; stairs from lower floors are shown.
8. A title, north arrow, and scale notation are required on all plans. Because this drawing was reduced, a standard written scale was omitted; instead, a graphic scale device is included.
9. This is a section reference symbol. The arrow indicates the direction of the view of the section. See Figure 1-9 for an example of a section reference symbol.
10. These are elevation reference symbols. The arrow indicates the direction of the view of the elevation.
11. This is a centerline, indicating the centerline of the shared wall in the town house.

FIGURE 1-9
A detailed view of varying line weights for floor plans with elevation symbols. FIGURES 1-7 THROUGH 1-9: DESIGN BY COURTNEY NYSTUEN; DRAWN BY SHELLEY PECHA

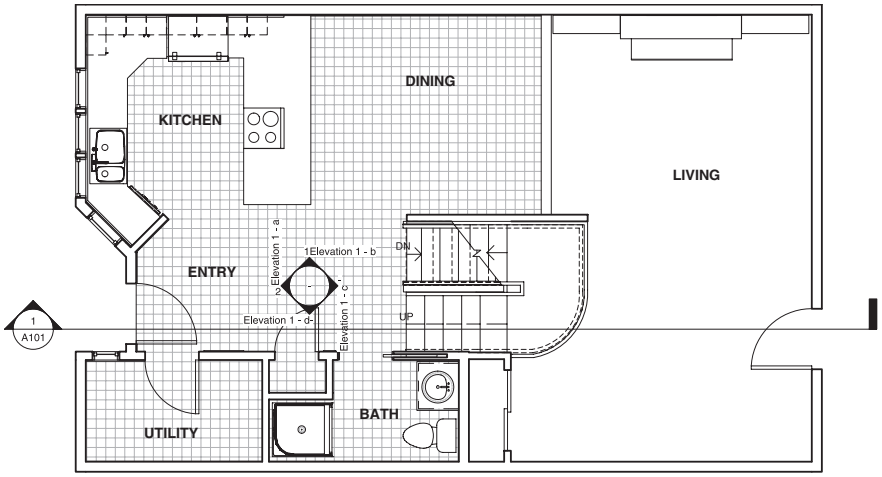


1. Boldest line
2. Secondary line weights
3. Lighter line weight.
4. These are elevation reference symbols. Arrows indicate the direction of the view.

ENLARGED PLAN

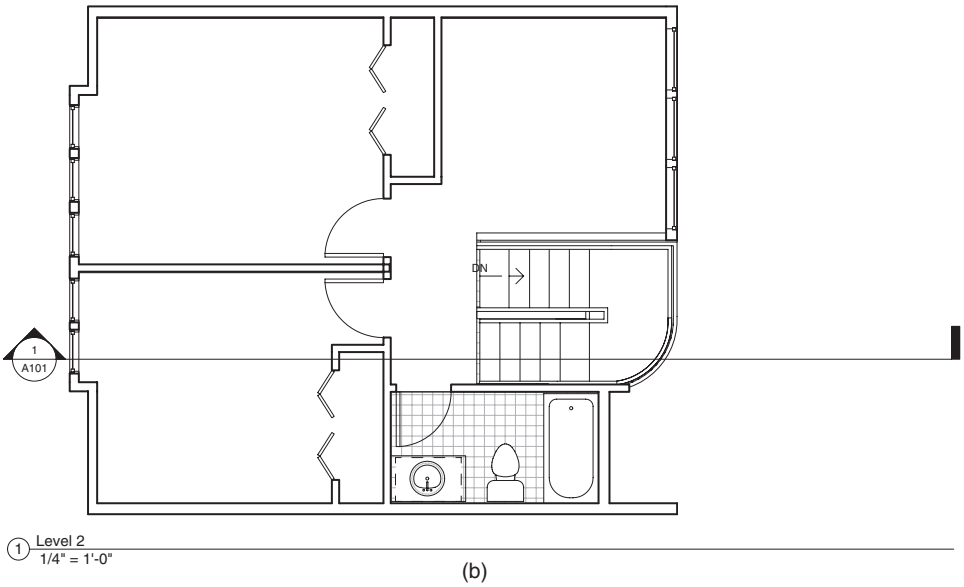
0 1 2 4

FIGURE 1-10A and 1-10B
Revit-generated floor plans of the town house project shown in Figures 1-7 through 1-9 DRAWN BY KATEY FORTUN



1 Level 1
1/4" = 1'-0"

(a)



(b)

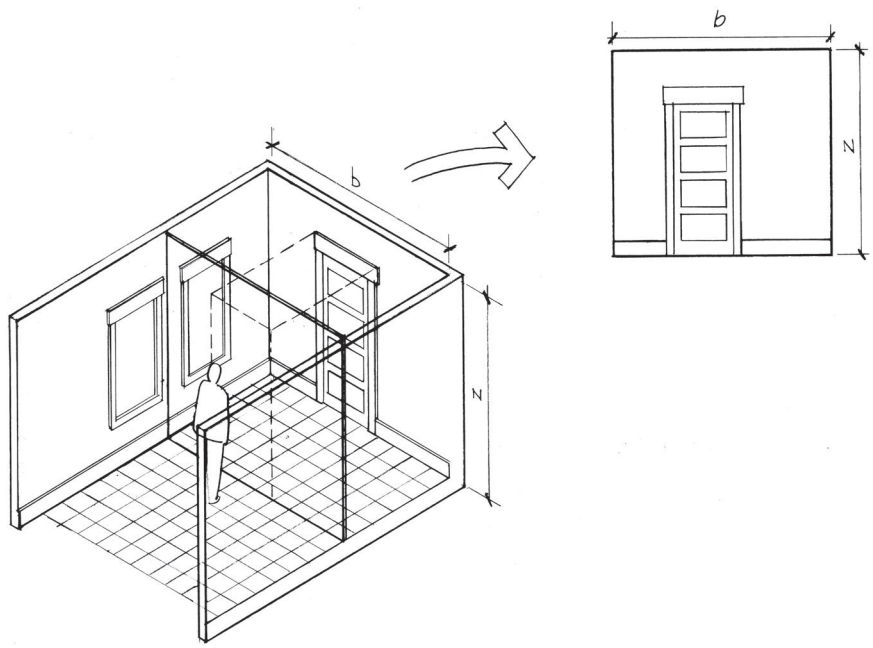


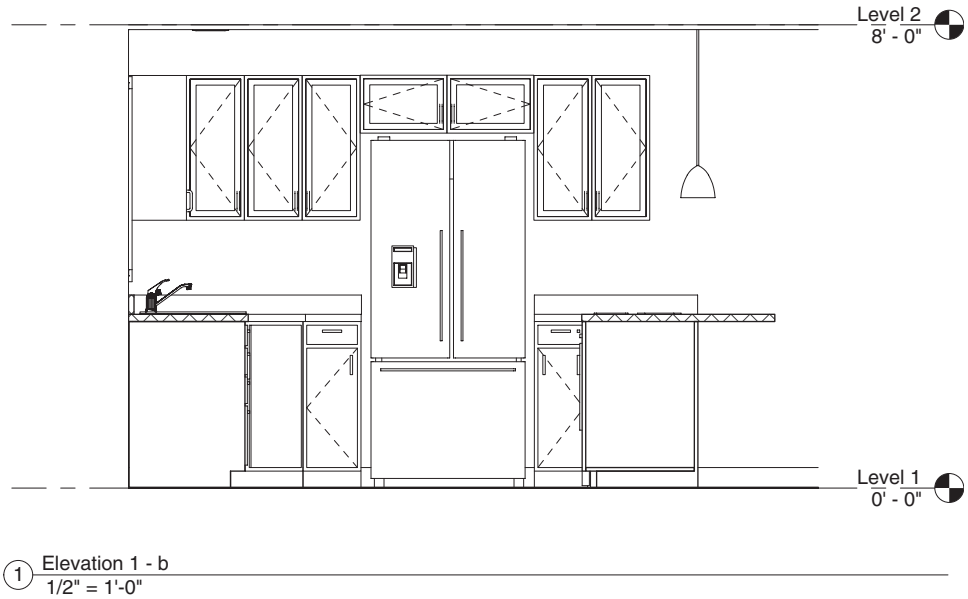
FIGURE 1-11
In drawing interior elevations, the picture plane is inserted between the viewer and wall(s). What is visible through the picture plane is drawn in elevation.

Successful elevations must follow the drafting conventions in the following list and illustrated in Figures 1-12 and 1-13.

FIGURE 1-12
Kitchen elevations for the town house shown in Figures 1-7–1-10b. DRAWN BY SHELLEY PECHA

1. Portions of walls cut into or closest to viewer are bold.
2. Receding elements are drawn with progressively lighter lines.
3. In elevations cabinetry and millwork, details such as countertops, door frames, and hardware should be included.
4. Interior elevations require titles, reference symbols (names or numbers), and scale notation.

FIGURE 1-13
This elevation was created using Revit. It represents the area shown in Figure 1-12: elevation 1. While a properly created Revit model can generate accurate interior elevations, the correct placement of the elevation symbol relative to the viewing location is a key to accuracy. DRAWN BY KATEY FORTUN



Interior Elevation Drawing and Line Weight Conventions (See also Figures 1-13 and 1-14.)

Interior elevations must clearly depict all interior architectural elements in a consistent scale.

Interior elevations are typically drawn in a scale ranging from ¼″ = 1′-0″ to 1″ = 1′-0″. Elevations drawn to depict accessories, equipment, cabinetry, fixtures, and design details are often drawn at ⅜″ = 1′-0″ or ½″ = 1′-0″. Millwork and other highly complicated elevations are often drawn at ½″ = 1′-0″ or larger.

Elevations require the use of differing line weights to clearly communicate spatial relationships.

Typically, any portion of walls cut through, as well as those closest to the viewer, are drawn using a bold line weight.

Elements become progressively lighter in line weight as they recede from the picture plane.

Some designers draw the ground line the boldest, with those lines representing the top and sides of the wall drawn just slightly lighter in weight.

Drawing interior elevations by hand or digitally using two-dimensional drafting programs requires a clear understanding of the concepts mentioned here and can be difficult for beginning students to master; therefore, additional examples are presented at the end of this chapter (see Figures 1-23 through 1-28). Revit and other parametric modeling programs can create highly accurate interior elevations. Although these modeling programs basically draw the elevations for you, an understanding of elevations is nonetheless required to obtain the intended view, as indicated in Figure 1-13.

Interior elevations are an excellent vehicle for developing and refining interior details. For elevations to work well in visual presentations, they must be clearly keyed, noted, or referenced to the floor plan. Regardless of the referencing method, titles must be included beneath all elevations, and the scale should always be noted. Like floor plans, elevations used for design presentations vary greatly from those used for construction. Figure 1-14 is a preliminary elevation sketch, created to convey design elements in the early phases of a professional project.

Elevations used for construction drawings must contain significant dimensions and appropriate technical information, as illustrated at the end of this chapter.

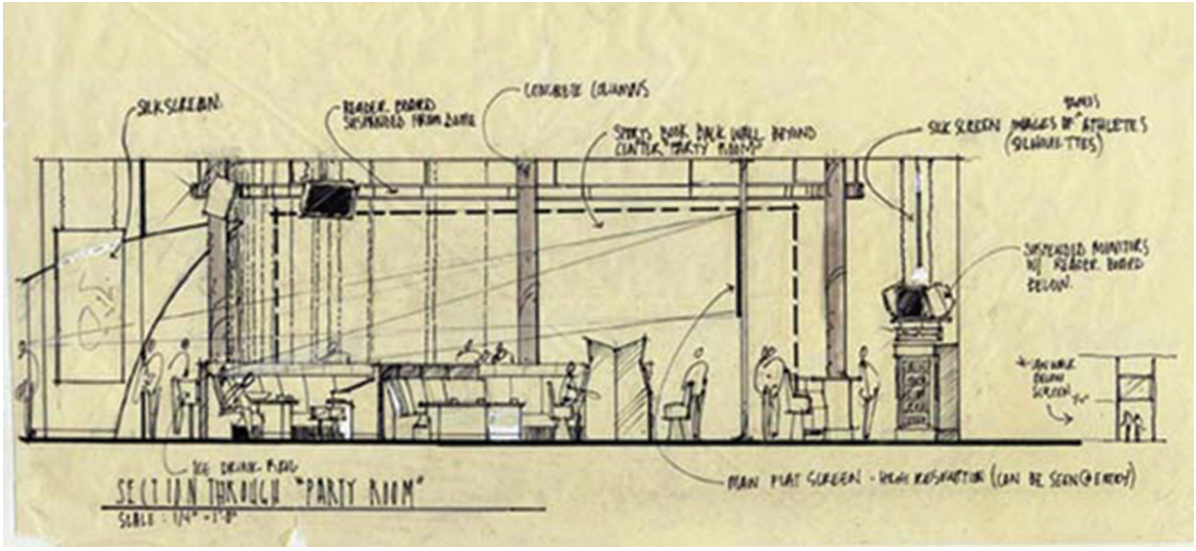


FIGURE 1-14
A preliminary hand-drawn elevation sketch for a professional project, drawn on tracing paper with markers.
BY THE CUNINGHAM GROUP

Sections

As previously described, a building section is a view created as though a vertical plane has cut through the building and been removed. Unlike interior elevations, which depict only what appears inside the interior, sections can expose the structure of the building. Section drawings should include the outline of the structural elements as well as the internal configuration of the interior space. Sections require varied line weights to describe depths and spatial relationships. It is typical to show what is cut through, and therefore closest to the viewer, in the boldest line weight; receding features and details are drawn using progressively lighter line weights.

Carefully consider the most useful location(s) of a building to show in section. The section should be cut through the building as a single continuous plane. Sections should expose and convey important interior relationships and details such as doors, windows, changes in floor level, ceiling heights, and, in some cases, finish material locations.

Design and presentation sections differ greatly from construction sections, which include technical information about building systems. In contrast, design and presentation sections focus on form, finish materials, and the definition of interior space. For sections to work well in visual presentations, they must be clearly keyed, noted, or referenced to the appropriate floor plan. Generally, sections are referenced to the floor plan through the use of a symbol that denotes the locations of the vertical cut. Figure 1-15 is an example design section for the town house project.

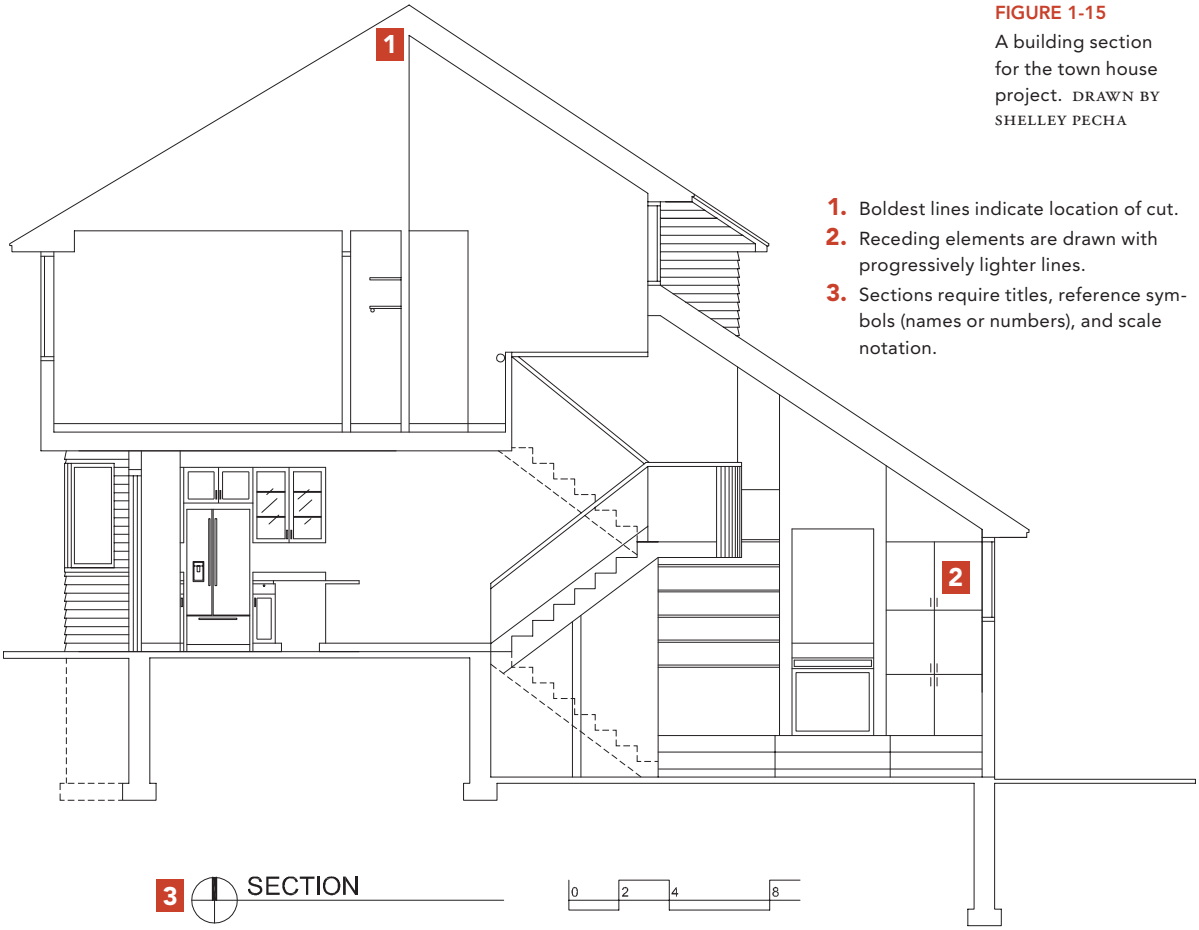


FIGURE 1-15
A building section for the town house project. DRAWN BY SHELLEY PECHA

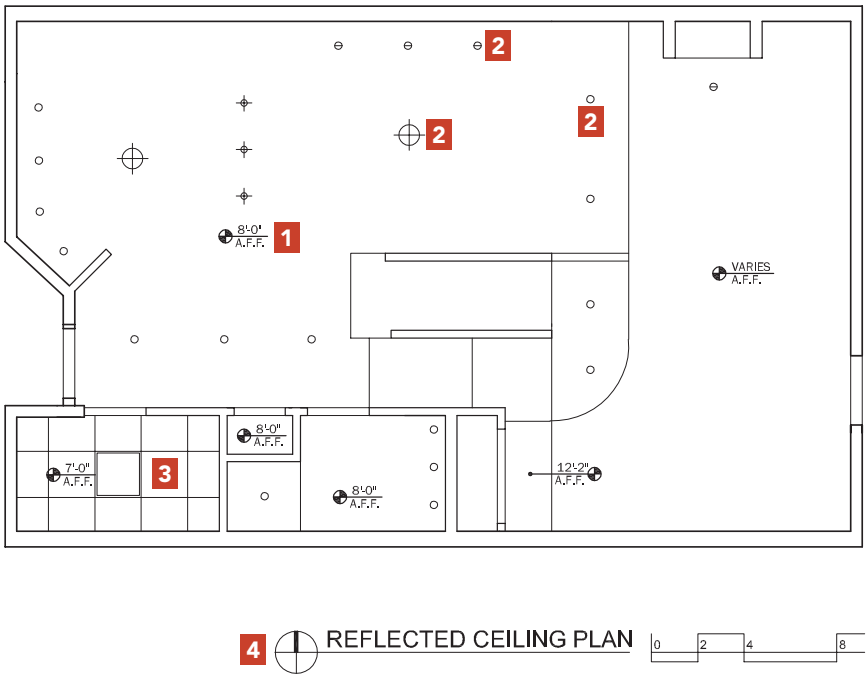
1. Boldest lines indicate location of cut.
2. Receding elements are drawn with progressively lighter lines.
3. Sections require titles, reference symbols (names or numbers), and scale notation.

Reflected Ceiling Plans

Reflected ceiling plans are often used in conjunction with floor plans, elevations, and sections to communicate interior design. Reflected ceiling plans convey important information about the design of the ceiling, such as materials; the layout and locations of light fixtures; items such as sprinklers, diffusers, and grilles; and ceiling heights. A reflected ceiling plan is drawn as though a giant mirror on the floor were reflecting the elements located on the ceiling. Using reflective imagery means the ceiling plan will have exactly the same orientation as the floor plan.

Ceiling plans used for presentation and those used for construction differ. Ceilings plans created for construction are typically highly technical and include a great deal of information. Reflected ceiling plans used in design presentations can be simplified to include basic ceiling lighting information, ceiling heights, and finish materials, as shown in Figure 1-16. Precisely measured, complex technical ceiling plans are required for construction (as illustrated at the end of this chapter).

FIGURE 1-16
A simple reflected ceiling plan for the town house project. DRAWN BY SHELLEY PECHA



1. Ceiling heights are noted (A.F.F. means above finished floor).
2. Light fixture locations are noted with various symbols and are keyed to a legend.
3. Finish materials such as gypsum board, wood, and ceiling tiles are indicated in scale.
4. Reflected ceiling plans require titles, north arrows, and scale notation. Note: reflected ceiling plans require legends (keyed to symbols used); in this example, the legend has been omitted.

Dimensions

Dimensions, required on most construction drawings, are also sometimes needed on drawings used for presentation purposes. The decision to include them is based on the project and the presentation's audience. The following is a list of dimensioning conventions.

Rules and Conventions for Creating Dimensioned Drawings

When included, dimensions must be accurate, complete, and readable, and are generally listed in feet *and* inches: write *2′-4″*, for example, rather than *28″*, except for dimensions of less than a foot, which can be written either *11″* or *0′–11″*. Dimensions should be located so that they are underlined by the dimension line; place them so that the reader does not have to rotate the sheet to read them.

For standard construction, dimensions and dimension lines are located outside of the object (such as the building), as shown in Figure 1-17. Specific dimensions are placed close to the particular object they are related to, while overall distances are placed in the position farthest from the construction, as shown in Figure 1-17.

Openings except for masonry openings (MO), such as windows and doors, are dimensioned to centerlines or to rough frame openings (RO). Dimension things once and only once; repetition from one drawing to another can lead to discrepancies.

Dimensions typically run from the outside of exterior walls to the centerline of interior walls.

Where interior tolerances are critical, dimensions can be run from the face of the finished wall to the face of the other finished wall ("paint to paint"), as shown in Figure 1-18. This type of dimension can be employed for interior design projects created within existing architecture. When dimensioning walls for the interior renovation of an existing office or retail space, for example, it is common to dimension only the paint-to-paint dimensions rather than the exterior to centerline dimensions, as shown in Figure 1-18. Additional examples of dimensioned drawings can be found in Figures 1-24 and 1-25.

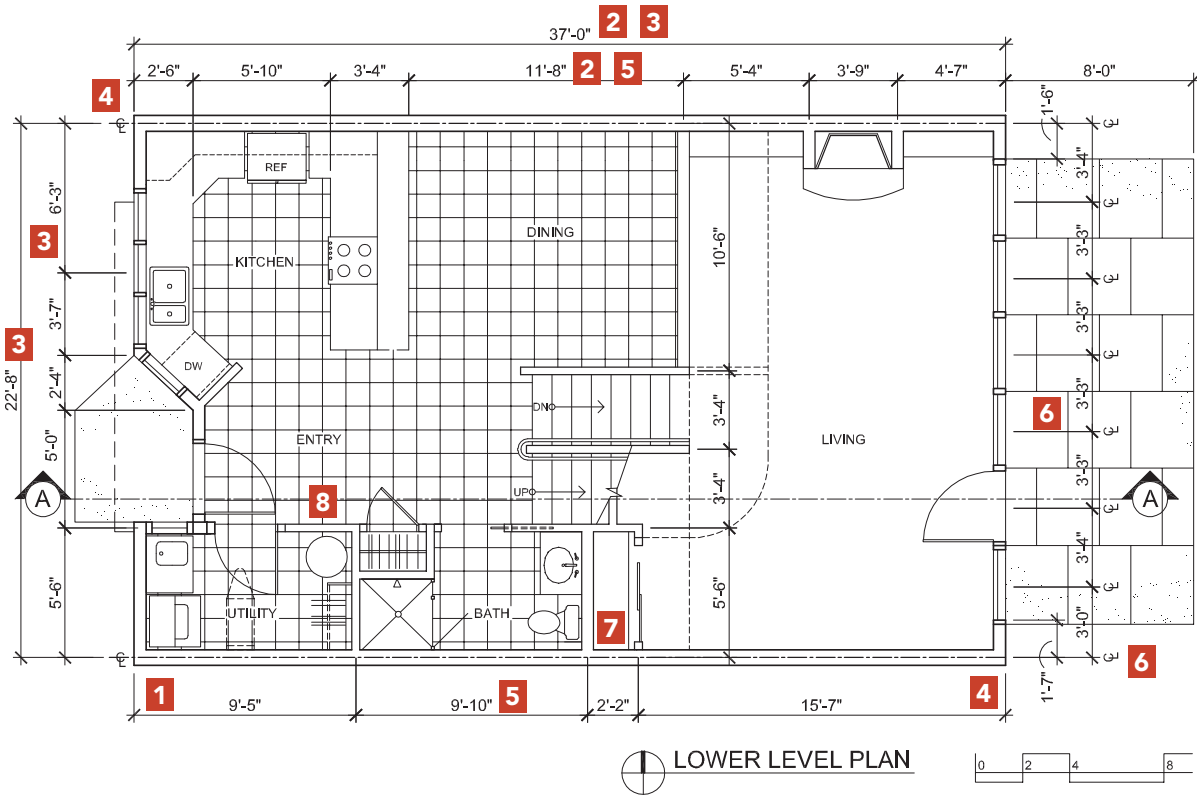


FIGURE1-17

A dimensioned lower-level floor plan for the town house project, employing standard conventions for locating interior and exterior dimensions outside the plan boundaries.

1. Dimension lines and leader lines should be lighter than wall lines or objects measured.
2. Horizontal written dimensions sit above the dimension lines, so they are underlined by the dimension line as shown, or are written in a break in the dimension line.
3. Note location of dimensions: they should not read by rotating the sheet counterclockwise (as in reading from the left side of the sheet) and one absolutely should not have to turn the sheet upside down to read these dimensions.
4. Leader lines run from the building location being dimensioned to the dimension lines. Leader lines should not touch the building; instead, they should be drawn slightly away.
5. Dimensions are written in feet and inches unless less than 1 foot.
6. Dimensions measured from centerlines must be clearly indicated (with centerline symbol). Windows are commonly measured to centerlines or rough openings as shown.
7. Exterior walls (and plumbing walls) are shown as nominal 6" thick (actual: $6\frac{1}{2}$" to $7\frac{1}{2}$").
8. Interior walls are shown as nominal 4" thick (actual: $4\frac{1}{2}$" typically).

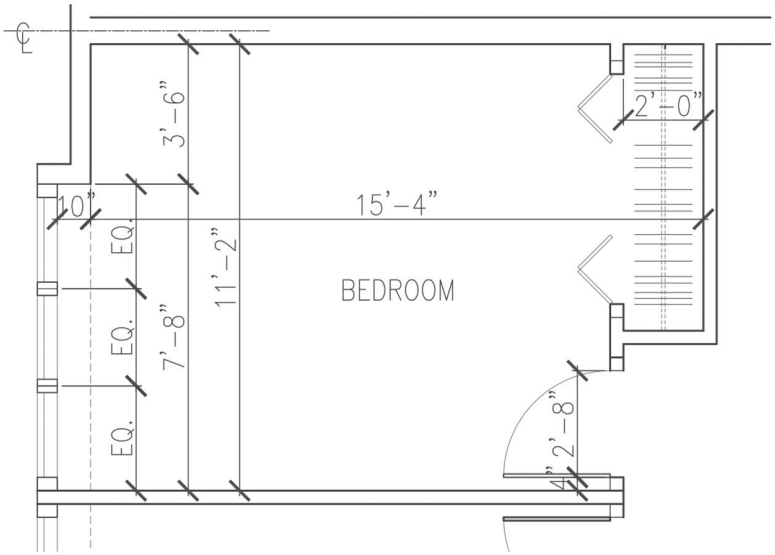


FIGURE 1-18

A portion of a dimensioned upper-level floor plan for the town house project illustrating conventions for interior paint-to-paint (or finish-to-finish) dimensions. Note that the dimension lines run from interior finish to interior finish. FIGURES 1-17 AND 1-18: DESIGN BY COURTNEY NYSTUEN; DRAWN BY SHELLEY PECHA

Lettering

In the days before CAD, floor plans, elevations, and sections contained notes and dimensions written in a standardized style of hand lettering. Today, digital lettering and labels can be applied to hand-drawn orthographic projections, and presentation boards. In addition, all of the commonly used CAD and modeling programs provide consistent, standardized type to be used within drawings.

Although hand-lettering skills are not used to the extent that they were in the past, designers still create quick sketches, preliminary design details, and some presentation drawings by hand. Developing hand-lettering skills is helpful in the creation of visually consistent hand sketches. There are some basic rules for lettering design drawings, as well as some stylistic elements that influence letterform; these are outlined in Figure 1-19.

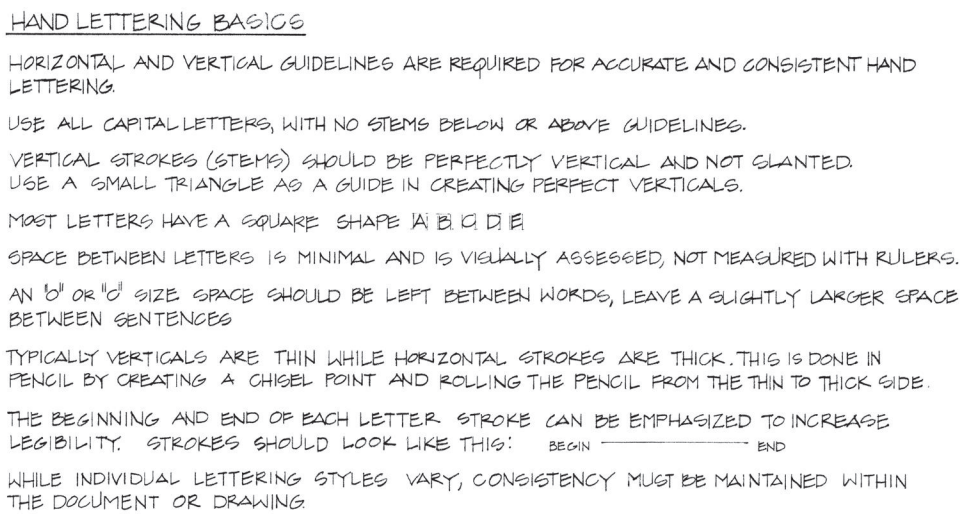


FIGURE 1-19
Hand-lettering reference. Notes about letter form and spacing are contained within the reference.

More about Orthographic Projections

Together, floor plans, elevations, sections, and ceiling plans communicate information about the quality of an interior environment. Because these drawings are abstracted, fragmented versions of three-dimensional form, they depend on one another to communicate effectively.

The orthographic projections covered in this chapter relate directly to the communication and design of interior space. Differing versions of orthographic projections are used for construction and presentation, but they are used in one form or another on virtually all projects.

Orthographic projection drawings are an abstraction of reality and use specific conventions to delineate spatial and material information. Items such as walls, doors, windows, property boundaries, and references to other drawings are represented by specific graphic symbols or combinations of lines. Figures 1-20, 1-21, and 1-22 illustrate some graphic notations used in these types of drawings, including wall lines, door and window symbols, and reference and notation symbols.

Additional types of orthographic drawing are used to communicate the features of buildings and building sites. Site plans, foundation plans, demolition plans, roof plans, framing plans, exterior elevations, wall sections, and design details are also used in the

design of buildings. Designers of interior space must be knowledgeable about the nature of these drawings, how they are created, and how they relate to the interior architecture of a building. It is common for interior designers to work as part of a team producing sets of these drawings. Figures 1-23 through 1-28 are orthographic projection drawings for professional design projects.

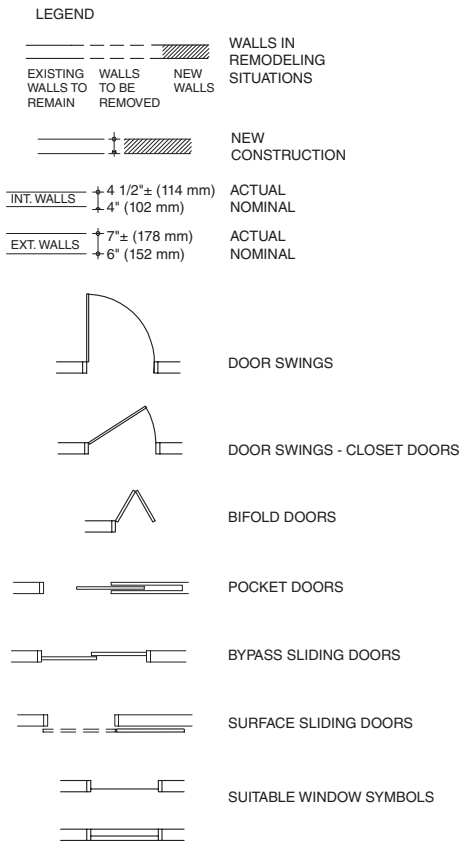


FIGURE 1-20
Common graphic notations used in orthographic projection drawings.

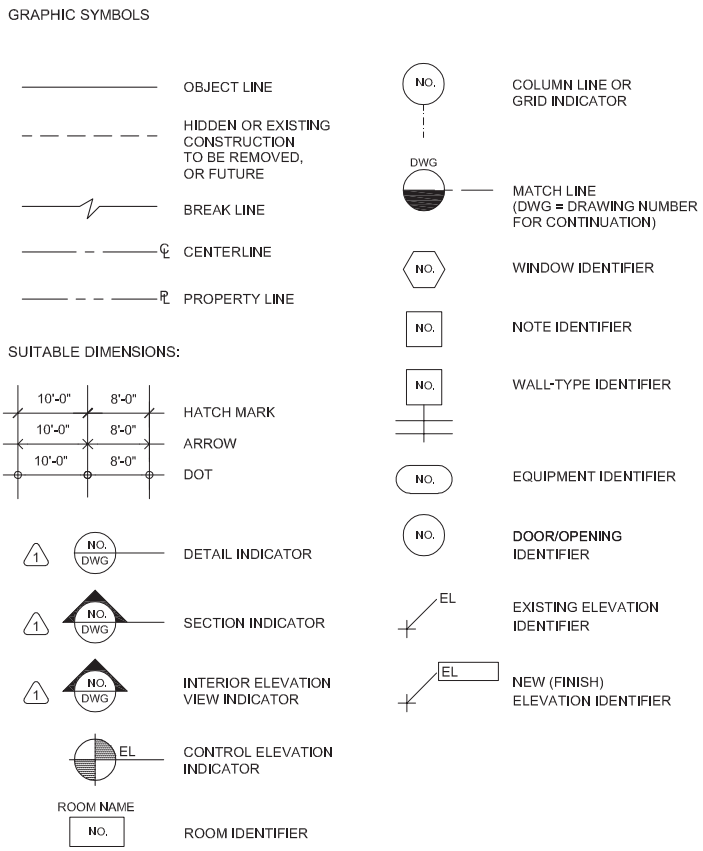


FIGURE 1-21
Graphic symbols used for references and notes. Items shown with the numeral 1 near them are reference symbols; these typically include a number on top of another number. The number on top refers to the drawing number, and the lower number refers to the sheet the drawing can be found on.

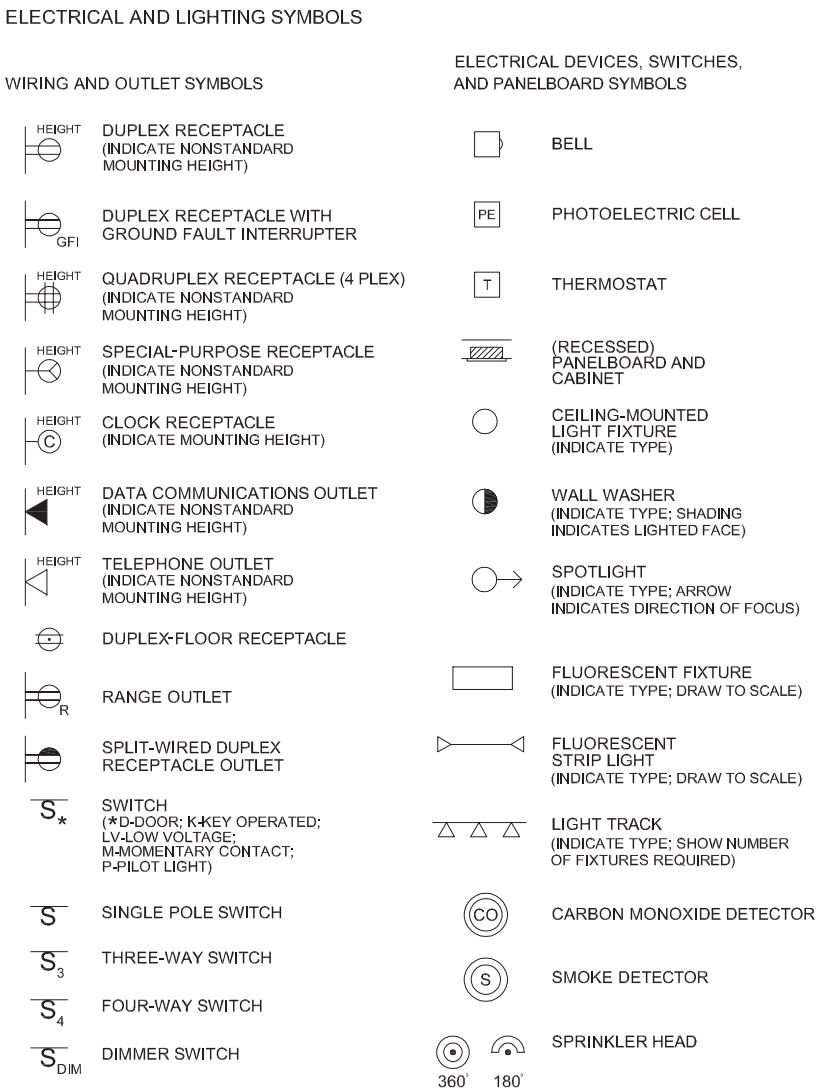


FIGURE 1-22

Graphic symbols used for lighting and electrical information. FIGURES 1-20 THROUGH 1-22 BY SHELLY PECHA

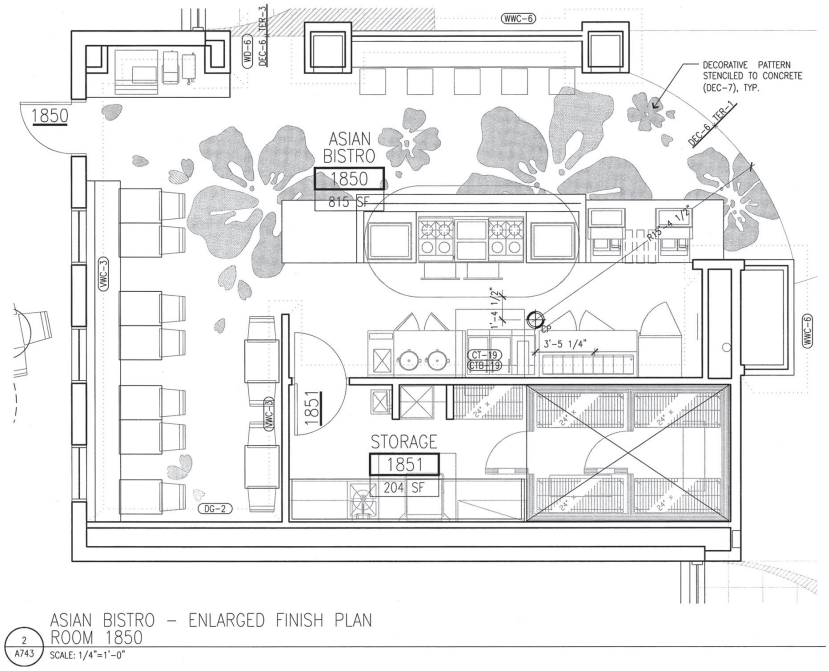


FIGURE 1-23
A floor plan for a professional restaurant design project. This is part of a set of construction documents.

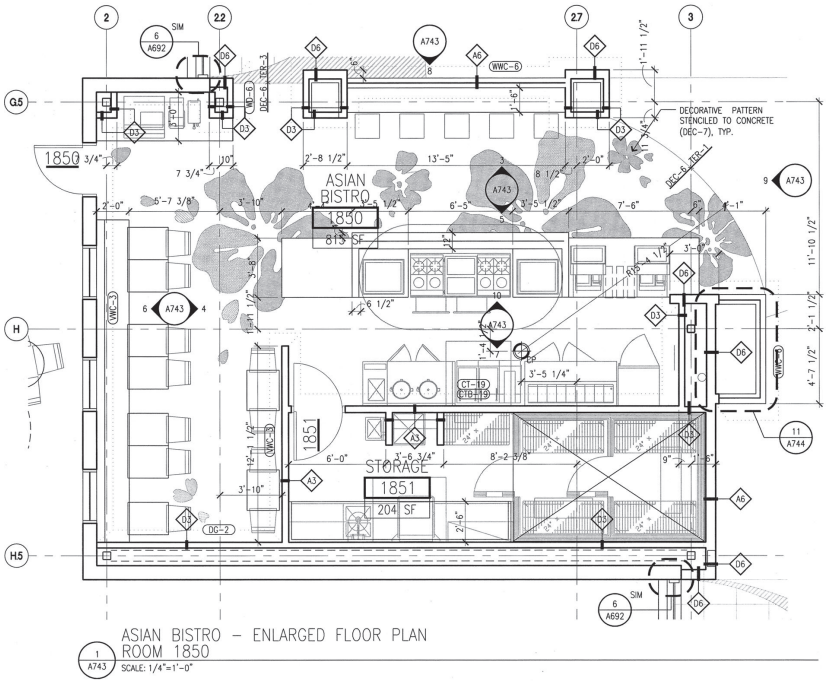
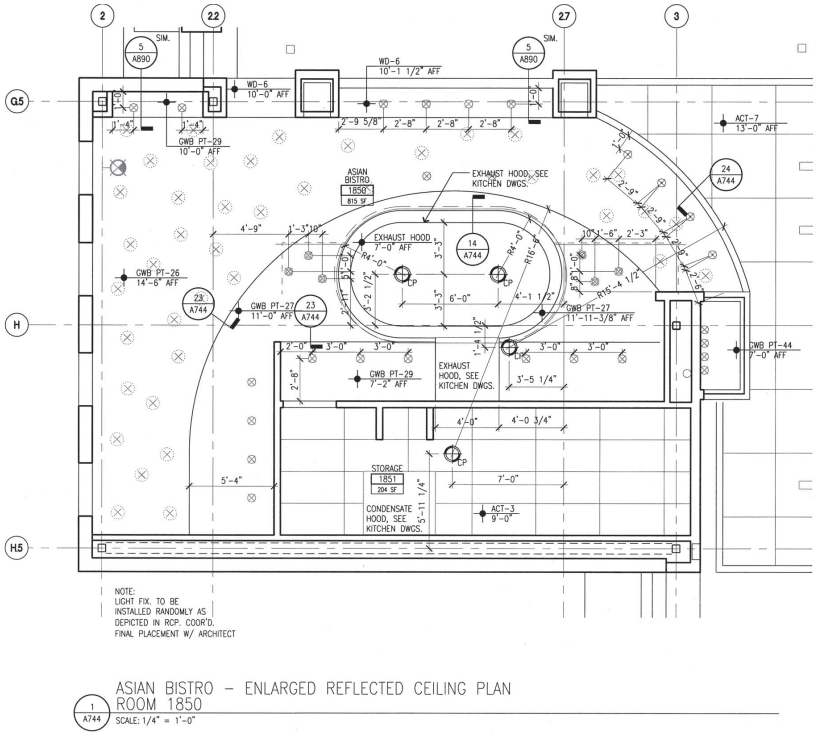


FIGURE 1-24
A dimensioned floor plan for the project featured in the previous figure.

FIGURE 1-25

A reflected ceiling plan for the project featured in the previous figure.



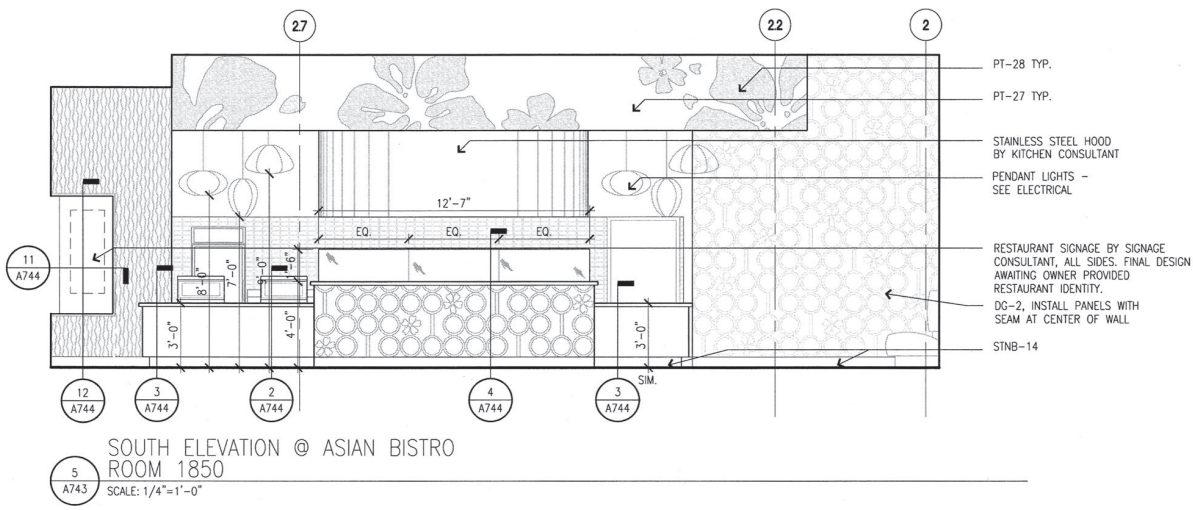


FIGURE 1-26

An elevation for the project featured in the previous figure. FIGURES 1-23 THROUGH 1-26 BY CUNINGHAM GROUP ARCHITECTURE, P.A.

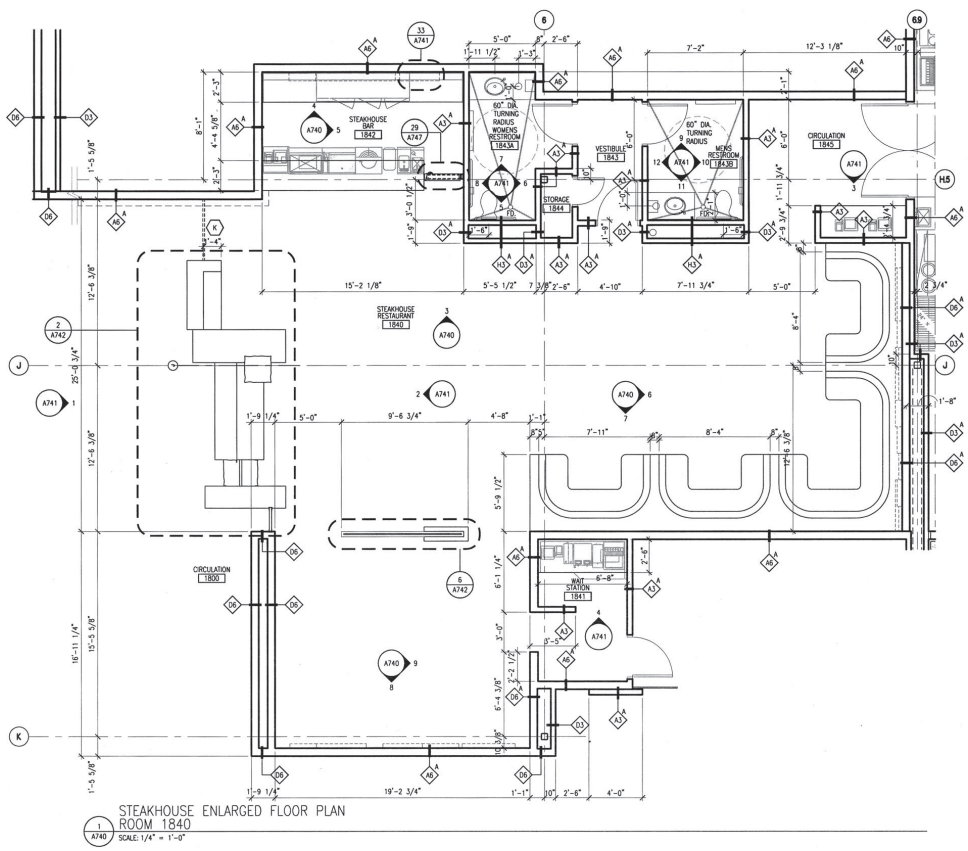


FIGURE 1-27

A dimensioned floor plan for a professional restaurant design project. This is part of a set of construction documents.

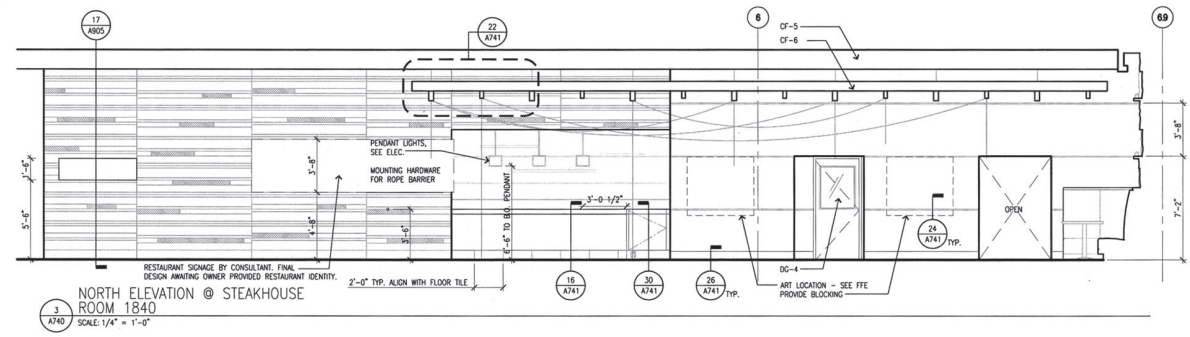


FIGURE 1-28

Elevations for the project featured in the previous figure. FIGURES 1-27 AND 1-28 BY CUNINGHAM GROUP ARCHITECTURE, P.A.

Although the software and hardware used in design and design presentations continues to evolve, the conceptual basis for orthographic drawings and drafting conventions is the same whether they are created by hand or through the use of digital tools.

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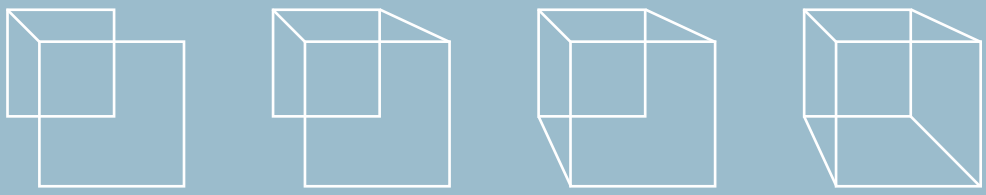


2

The Design Process and Related Graphics

Because the reasons for communication may change as a project advances, design communication and the design process are inextricably linked. Having a thorough understanding of the process of design means the appropriate form of communication can be successfully employed at the appropriate time. To that end, this chapter covers the design process and related design communication methods.

The design process is complex, and designers must communicate different aspects (and potential outcomes) of the process to clients and consultants at various points along the way. Design students present in-process projects to team members, instructors, and guest critics. Visual presentations must vary to accommodate the process of design and to communicate both process and outcome.

In *Interior Design Illustrated* (2012), Francis Ching identifies three basic stages of design process.

Analysis involves defining and understanding the problem.

Synthesis involves the formulation of possible solutions.

Evaluation involves a critical review of the strengths and weaknesses of the proposed solutions.

These three basic stages of the design process are used by design practitioners in a variety of disciplines. *Industrial designers, graphic designers, exhibition designers*, and others often engage in a similar process. But the actual interior design process and project phases are distinct, and they are more elaborate than these three basic stages may indicate.

For the purpose of contractual organization, the process of design engaged in by architects and interior designers in the United States has been divided into basic project phases, spelled out here in a list derived from the American Institute of Architects (AIA) Owner-Architect Agreement for Interior Design Services and the American Society of Interior Designers (ASID) Interior Design Services Agreement.

Table 2-1 identifies generally accepted project phases and the related visual presentation methods.

Interior Design Project Phases

Programming

Schematic design

Design development

Construction documentation

Bidding or negotiation

Contract administration

William Peña, Steven Parshall, and Kevin Kelly, writing in *Problem Seeking* (2012), conclude that the actual design process takes place in the first three project phases. They state that "programming is part of the total design process but is separate from schematic design." The authors classify schematic design and design development as the second and third phases of the total design process, respectively. This chapter is an exploration of the three phases of the design process identified by Peña, Parshall, Kelly, and others, and a study of the drawings and graphics used to communicate, document, inform, and clarify the work done during these phases.

TABLE 2-1
Project Phases and Related Visual Communication Methods

PROJECT PHASE	TYPICAL TASKS AND ACTIVITIES	TYPICAL MEANS OF VISUAL PRESENTATION
Programming, also known as pre-design	In-depth analysis and documentation of needs, requirements, goals, and objectives. Can include identification of: space and adjacency requirements and assessment of; assets, specialized needs, Identification of conceptual issues, analysis of: codes, accessibility requirements, architectural, site parameters, scheduling, and budget.	Most often written information compiled in a programming report. Can include problem identification, diagrams, charts, matrices, some orthographic drawings, early fit studies, and preliminary scheduling graphics.
Schematic design, also known as the preliminary design phase	Preliminary conceptual, spatial, and technical design of project. Includes preliminary space planning, using relationship diagrams matrices, bubble diagrams, blocking diagrams, stacking and fit plans, as well as initial furnishings, fixtures, and equipment design and layout. Development of project's conceptual issues. Color, material, and finish studies. Review of code, zoning, health, safety, and budgetary information.	Graphic presentation of preliminary design. Can include relationship diagrams, blocking and fit plans, preliminary space plan(s), preliminary furnishing and equipment layouts, preliminary elevations and sections, preliminary 3-D drawings, preliminary color and materials studies, and study models. Presentation may also include graphic presentation of conceptual issues using sketches, diagrams, and mixed media.
Design development	Refinement of finalized design. Includes space plan and design of interior construction elements and details. Often involves incorporation of lighting, electrical, plumbing, and mechanical systems design, as well as data and telecommunication systems integration. Often includes millwork design and detailing. Also includes color, materials, and finish selection. Design and specification of furnishings, fixtures, and equipment, as well as refinement of budgetary and scheduling information.	Finalized, refined design presentation incorporating all necessary components of design. Graphic presentation of finalized design can include conceptual diagrams; space plan(s); and plan(s) for furnishings, fixtures, and equipment, as well as elevations, sections, and ceiling plans; 3D drawings and models; colors, materials, and finish samples; scale models; and mockups. Multimedia presentations can incorporate all of these elements plus sound animation and virtual reality.

TABLE 2-1 (CONT.)
Project Phases and Related Visual Communication Methods

PROJECT PHASE	TYPICAL TASKS AND ACTIVITIES	TYPICAL MEANS OF VISUAL PRESENTATION
Construction documentation	Preparation of drafted, working drawings and/or contract documents. Includes preparation of drawings, schedules, details, and specifications, as well as coordination and integration of consultant's documents. Can include preparation of specialized equipment and furnishings documents for bidding by purchasing agents. May include purchasing documents.	Preparation of contract documents. Often includes submission to general contractor(s) and purchasing agents for bid and to appropriate agencies for plan check.
Bidding or negotiation	Assist in review of bidding.	Limited visual presentation/design communication for this phase.
Contract administration	Guide and review construction and installation. Can include periodic site visits and creation of progress reports. Coordination and review of shop drawings and sample submittals. May include clarification and interpretation of drawings, as well as review of billing and payment. Preparation of punch list. May include move coordination and supervision of furnishings, fixtures, and equipment installation.	Primarily written and verbal communication with contractors, agencies, and clients. May include scheduling, budgetary, administrative graphics, and revised drawings.

Adapted from the AIA Owner-Architect Agreement for Interior Design Services and the ASID Interior Design Services Agreement.

Programming

The experienced, creative designer withholds judgment, resists preconceived solutions and the pressure to synthesize until all the information is in. He refuses to make sketches until he knows the client's problem…. Programming is the prelude to good design.

—William Peña, Steven Parshall, and Kevin Kelly in Problem Seeking (2012)

Programming, also known as pre-design or strategic planning, involves a detailed analysis of the client's (or end user's) needs, requirements, goals, budget, and assets, as well as an analysis of any architectural or site parameters and constraints. Information gathered about the user's needs and requirements is often documented in written form, whereas architectural or site parameters are often communicated graphically through orthographic projection. These two distinct forms of communication, verbal and graphic, must be brought together in the early stages of design.

Some firms employ professionals to work as programmers and then hand the project over to designers. It is also common for project managers and designers to work on project programming and then continue to work on the design or management of the project. Programmers and designers could be seen as separate specialists, given the distinctions between programming (analysis) and design (synthesis). However, many firms and designers choose not to separate these specialties or do so only on very large or programming-intensive projects.

In practice, programming varies greatly depending on the type and size of the project and on the quantity and quality of the information supplied by the client (or end user). In some cases, clients provide designers with highly detailed written programs. In others, clients begin with little more than general information. In the latter situation, research and detective work must go into creating programming information that will allow for the development of successful design solutions.

It is difficult to distill or summarize the programming process. Clearly, the programming required for a major metropolitan public library is very different from that needed in a small-scale residential renovation. Given this complexity, it is helpful to consider what programming requirements all projects relating to interior environments share.

All projects require a careful analysis of space requirements for current and future needs, as well as an analysis of work processes, adjacency requirements, and organizational structure (or lifestyle and needs-assessment factors in residential design). Physical inventories and asset assessments are needed to evaluate existing furniture and equipment as well as to plan for future needs. Building code, accessibility, and health and safety factors must also be researched as part of the programming process.

In addition to this primarily quantitative information, there are aesthetic requirements. Designers must also identify the project's cultural, behavioral and sociological aspects. All of these should be researched and can be documented in a programming report that is reviewed by the client and used by the project design team. When possible, a problem statement—a concise identification of key issues, limitations, objectives,

and goals that provides a clearer understanding of the project—should be included with the programming report. With the programming report complete, designers can begin the job of synthesis and continue the design process.

Writing in Problem Solving, Peña and Parshal have summed up the programming process in the following five steps:

1. Establish goals.
2. Collect and analyze facts.
3. Uncover and tests concepts.
4. Determine needs.
5. State the problem.

There are several visual tools that can be used by designers in the programming process, particularly for steps 3–5 from the previous list, and some of those are covered in the following section.

Diagrams and Programming Analysis Graphics

Before continuing a discussion of programming, a description of the use and importance of diagrams and visual notes—especially in the preliminary phases of design—is necessary. In *Visual Notes for Architects and Designers* (1995), Norman Crowe and Paul Laseau have defined a diagram as

> . . . a simple, rapid method for representing the underlying structure or relationships in either a physical setting, physical design or in the process by which something operates. Diagrams help make sense out of a complex whole. . . .

Diagrams can be considered "graphic thinking" (Paul Laseau, *Graphic Thinking for Architects and Designers*, 2001) and can distill written project information graphically in ways that are useful to the designer or design team. Many diagrams serve as a sort of visual brainstorming session, allowing visual information to be recorded quickly during design ideation and sorted through later. Put another way, diagrams are a useful way to get ideas outside of our heads and onto paper so they can be refined and used later.

Many of the types of diagrams designers use can serve as a bridge between information uncovered in the programming phase of a project and the creation of ideas generated in the schematic or preliminary design phase. Most diagrams employ symbols that serve as abstract representations of information or ideas. In architecture and interior design, these most commonly include the representation of relationships, adjacencies, size and area, and context (see Figures 2-1 through 2-3). In some cases, early diagrams are abstractions of preliminary plans.

More examples of diagrams and preliminary design graphics can be found at the end of this chapter.

In addition to using them for idea generation, clients, consultants, and designers may also utilize diagrams and graphic analysis as a way to understand and gain insight into programming data and information. Some images used to create presentation diagrams are illustrated in Figures 2-4 and 2-5. Diagrams, charts, matrices, and visual imagery are easier to comprehend than pages of written documentation; it is helpful to develop ways of sorting and simplifying programming information so that it can be easily assimilated.

Many designers obtain early programming data and incorporate it into graphic worksheets. Using a flip-chart pad, brown kraft paper, or other heavy paper, programmers can generate large, easy-to-read graphic documents that can be understood easily by the client, who is then able to comment on or approve them. Even the eventual project designers often find such sheets useful for project documentation.

The book *Problem Seeking* provides an additional technique for recording information generated in the early stages of programming graphically: the use of analysis cards, which facilitate comprehension, discussion, clarification, and feedback. The cards are drawn from interview notes and early programming data. Based on the premise that visual information is more easily comprehended than verbal information, the cards contain simple graphic imagery with few words and concise messages.

Residential projects generally require less intensive programming graphics. Programming is a significant element of the residential design process; however, the relationships, adjacencies, and organization of the space are often simpler than in large commercial and public spaces. The following discussion therefore focuses primarily on commercial design, where a significant amount of visual communication of programming information is often required.

A sample project is used to illustrate some of the design process concepts covered in this chapter. Table 2-2 contains programming information for the sample project. Figure 2-6 is a floor plan for the sample project, and Figure 2-7 illustrates some program-based diagrams for the project.

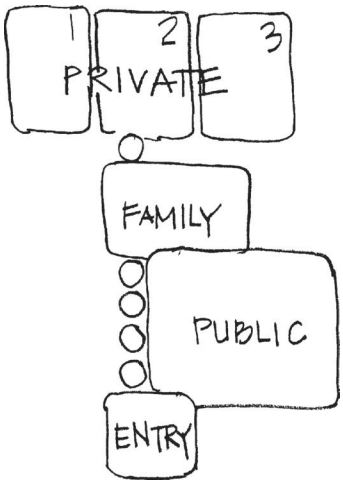


FIGURE 2-1
A diagram showing the relationships between the various spaces in a dwelling.

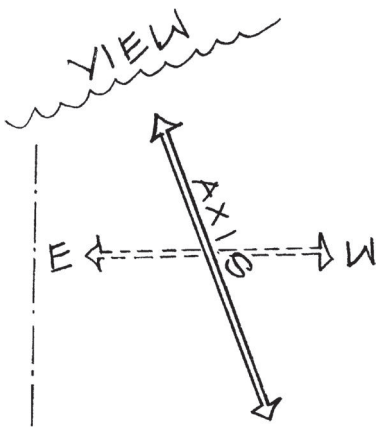


FIGURE 2-2
A diagram showing the possible relationships within a building site.

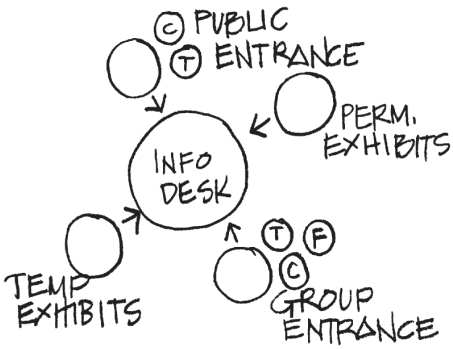


FIGURE 2-3
A diagram showing the relationships between entrances, exhibition spaces, and an information desk used in planning a museum.

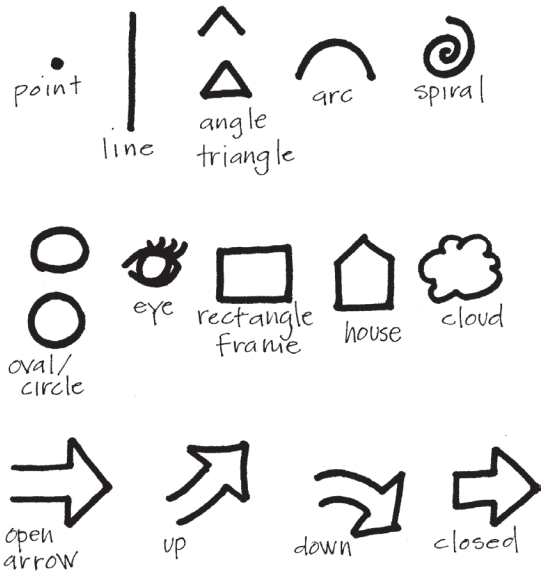


FIGURE 2-4
These are some basic shapes often used in combination, in diagrams. Arrows or horizontal and vertical lines are often used to link these shapes.

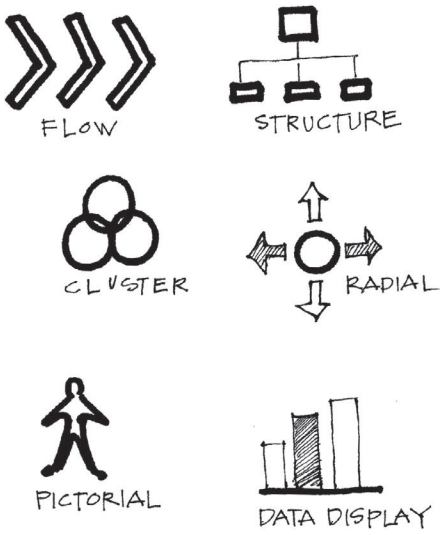


FIGURE 2-5
Some types of diagrams used for conveying information and relationships, and for ideation. They are employed in addition to bubble diagrams, blocking diagrams, and others shown throughout this chapter.

TABLE 2-2
Programming Information for the Sample Project

ECO TOYS PROGRAMMING INFORMATION
Company History: EcoToys is a young, dynamic company that designs and produces toys made from recycled products. Owing to recent growth, the company must move to a larger design and marketing offices.
Company Structure and Organization: The president is at the center of operations and interacts daily with most employees. The company is organized in a horizontal structure, meaning that all members of the staff are seen as having relatively equal status, and this should be reflected in the design of the new workspace.
General Requirements: Due to the non-hierarchical organizational structure, all workstations must be the same size. As a result of complicated egress conditions, the existing exit door locations must be retained.
Department Information and Area Requirements: **Entry/Reception:** Needs: Very public, must represent company's mission. Requirements: Receptions desk with transaction ledge, task seating, guest seating for 6, circulation space for multiple children at a time. Adjacencies: Conference room, toy test center, near marketing.
Conference Room: Needs: Very public, appealing, must represent company's mission. Requirements: Seating for 10 at table with additional seating available, with multimedia center, and coffee/snack station. Adjacencies: Toy test center (with visual connection/window), close to reception and near marketing.
Toy Testing Center: Needs: Open, flexible space for use by 4–6 preschool-age children. Requirements: Seating for 10 at table with additional seating available, with multimedia center, and coffee/snack station. Adjacencies: Conference room (with visual connection/window), close to reception/entry.
Design Department: Needs: Team meeting space (for 4) in addition to individual workspaces, shared plotter station, shared filing, display area/pin-up space. Requirements: Space for 2 designers and 2 assistants, workspaces must be 120 square foot minimum and accommodate computer stations with two monitors on adjustable height work surfaces with a minimum of 3 lineal feet additional layout space, two file drawers, and binder storage. Adjacencies: Engineering dept.

TABLE 2-2 (CONT.)
Programming Information for the Sample Project

Model Making Area:
Needs: Part of the Design Dept, must be enclosed, will require sound attenuation and specialized ventilation
Requirements: 15 lineal ft. of workbench type space, must accommodate 3D printers and wood-working tools/machinery.
Adjacencies: Design dept. and near engineering dept.
Engineering Department:
Needs: Share team meeting space (for 4) with design dept. in addition to individual workspaces.
Requirements: Space for 2 engineers, workspaces must be 120 sq. ft. minimum and accommodate computer stations with two monitors on adjustable height work surfaces with a minimum of 3 lineal feet additional layout space, two file drawers, and binder storage.
Adjacencies: Design dept. and design team meeting space.
Marketing Department:
Needs: Team meeting space (for 4) in addition to individual workspaces.
Requirements: Space for 2 marketing managers and 1 assistant, workspaces must be 120 sq. ft. minimum with adjustable height work surfaces space for a computer and one monitor, two file drawers, and binder storage.
Adjacencies: Conference room, toy test and near reception.
Accounting Department:
Needs: Requires some privacy.
Requirements: Space for 1 accounting/human resources manager, and 1 assistant, workspaces must be 120 sq. ft. minimum with adjustable height work surfaces, space for a computer and one monitor, four file drawers, and binder storage.
Adjacencies: No major adjacency requirements
President and Assistant:
Needs: Small conference table (to seat 4).
Requirements: 1 president, and 1 assistant, workspaces must be 120 sq. ft. minimum with adjustable height work surfaces, space for a computer and one monitor, four file drawers, and binder storage.
Adjacencies: Near most departments.
Break Room:
Needs: Consider location in terms of noise, odors, and employee privacy (in relationship to work areas).
Requirements: Generous counter space, kitchen base and wall cabinets, sink, refrigerator, microwave, commercial coffee station, dining seating for 10.
Adjacencies: Ease of access for all employees should be balanced with privacy at individual workstations.

Copy Mail/Storage:

Requirements: Room for copy machine, scanner, and adjacent 5 lineal ft. of collating space, room for 16 mailboxes, shelves, or cabinets for paper and supply storage.

Adjacencies: Convenient to entry corridor for shipping/mail.

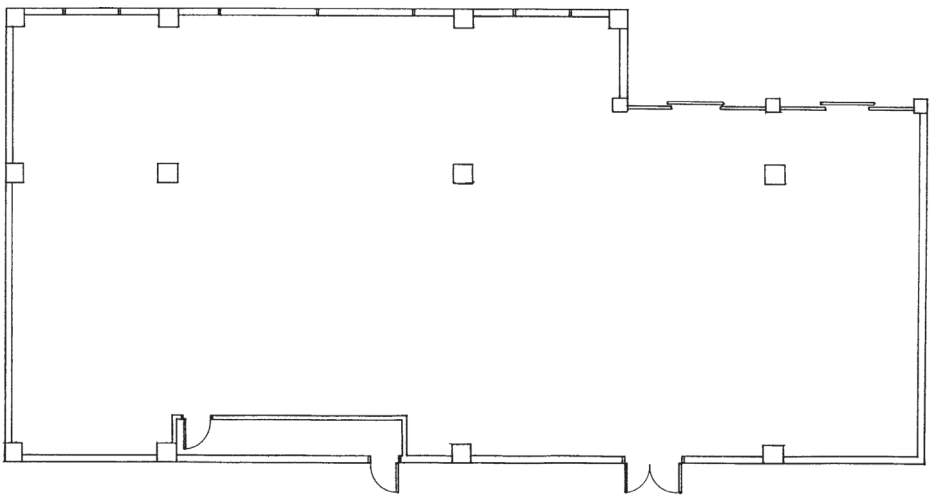
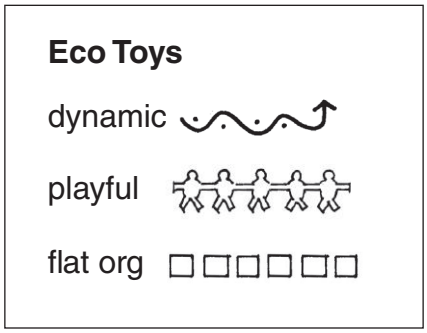


FIGURE 2-6

Floor plan for the sample project.

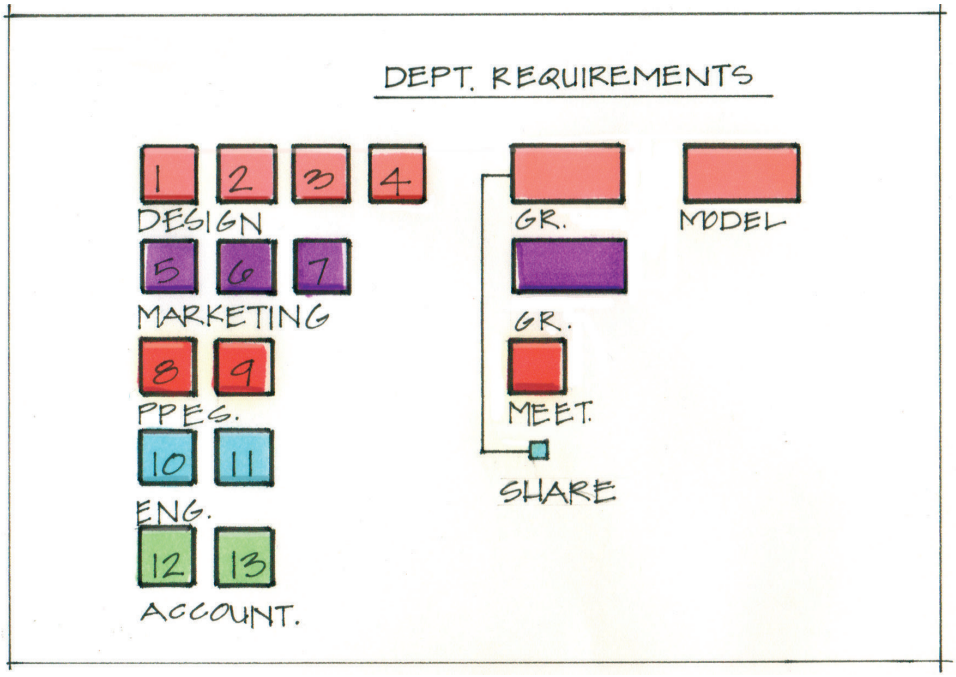


(a)

FIGURES 2-7A AND 2-7B

Examples of preliminary diagrams for the sample project. These include diagrams reference corporate culture (Figure 2-7a), and referencing space requirements and department identification by color (Figure 2-7b).

FIGURE 2-7B



(b)

Programming Matrices

Matrices are another useful programming tool; they incorporate a wealth of information into an easily understood visual aid. An *adjacency matrix* is commonly used as a means of visually documenting spatial proximity, identifying related activities and services, and establishing priorities. The complexity of adjacency matrices varies in relation to project requirements. Large-scale, complicated projects often require highly detailed adjacency matrices. Figures 2-8 and 2-9 illustrate two types of adjacency matrices.

A *criteria matrix* can distill project issues such as needs for privacy, natural light, and security into a concise, consistent format. Large-scale, complex design projects may necessitate numerous detailed, complex matrices, whereas smaller, less complex projects may only need simple ones. Criteria matrices are used in residential design projects and in the programming of public spaces. In smaller projects, criteria matrices

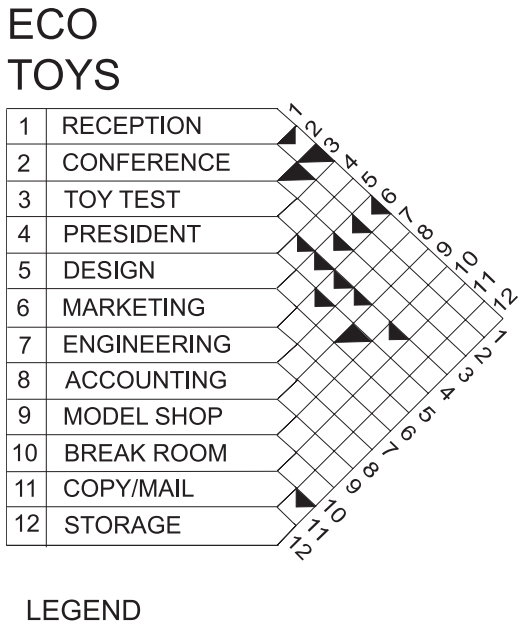


FIGURE 2-8

Simple adjacency matrix for the sample project.
BY MELISSA BREWER

ECO TOYS	RECEPTION	CONFERENCE	TOY TEST	PRESIDENT	DESIGN	MARKETING	ENGINEERING	ACCOUNTING	MODEL SHOP	BREAK ROOM	COPY/MAIL	STORAGE
RECEPTION	-	●	●	○	○	◑	○	○	X	○	○	○
CONFERENCE	●	-	●	○	○	◑	○	○	X	○	○	○
TOY TEST	●	●	-	○	○	◑	○	○	X	○	○	○
PRESIDENT	○	○	○	-	◑	◑	◑	◑	○	◑	○	○
DESIGN	○	○	○	◑	-	○	◑	○	●	○	○	○
MARKETING	◑	◑	◑	◑	○	-	○	○	○	○	○	○
ENGINEERING	○	○	○	◑	◑	○	-	○	○	○	○	○
ACCOUNTING	○	○	○	◑	○	○	○	-	○	○	○	○
MODEL SHOP	X	X	X	○	●	○	○	○	-	○	○	○
BREAK ROOM	○	○	○	◑	○	○	○	○	○	-	○	○
COPY/MAIL	○	○	○	○	○	○	○	○	○	○	-	○
STORAGE	○	○	○	○	○	○	○	○	○	○	○	-

LEGEND
- ● Major Adjacency
- ◑ Minor Adjacency
- ○ Not Closely Related
- X Undesirable

FIGURE 2-9

Another type of adjacency matrix for the sample project. BY MELISSA BREWER

can be combined with adjacency matrices. Figure 2-10 illustrates a criteria matrix that includes adjacency information. Special types of matrices are used by designers on particular projects.

Programming graphics, such as project worksheets, diagrams, and a variety of matrices, are widely used in interior design practice. These are presented to the client or end user for comment, clarification, and approval. Many of these graphics are refined, corrected, and improved upon during the programming process and are eventually included in the final programming report.

	ECO TOYS	Adjacencies	# of Dept Members	Seating Req's	Public Access	Privacy	Plumbing	Data/Phone	Special Req's	Comments
1	Reception	②③6	1	6 min	●			●	Y	Visually rep mission; used by adults & children; "dynamic & playful"
2	Conference	①③6		10+	●			●	Y	"Dynamic & playful"; multimedia center; multiple lap-top /computers
3	Toy Test	①②		4-6	●			O	Y	Used by preschoolers; open, flexible, playful
4	President	5 6 7 8 10	2	4				●	Y	PC, printer, 2 file drawers, ref storage for each 8' x 8' work space
5	Design	⑨⑦	4	4 min				●	Y	CADD, lay-out, 2 file drawers, ref storage for each 8' x 8' work space
6	Marketing	①②3	3	5 min				●	Y	PC, printer, 2 file drawers, ref storage for each 8' x 8' work space
7	Engineering	⑤	2					●	Y	CADD, lay-out, 2 file drawers, ref storage for each 8' x 8' work space
8	Accounting	4	2			●		●	Y	PC, printer, 2 file drawers, ref storage for each 8' x 8' work space
9	Model Shop	⑤				O	●	O	Y	Messy & noisy; enclosed
10	Break Room	4		8 min			●	O	Y	Relaxing & inviting; gen counters; refrig, microwave, sink, coffee makers req
11	Copy/Mail							O	Y	5 lineal feet collating space; 16 mailboxes; storage
12	Storage					●			Y	Generous heavy-duty shelving; ventilation

Legend

①	Major Adjacency	O	Secondary Requirement
1	Minor Adjacency	Y	Yes, See Comments
●	Mandatory Requirement	X	Undesirable

FIGURE 2-10

A combination criteria and adjacency matrix. BY LEANNE LARSON

Schematic Design

With the programming phase completed and the problem clearly stated, designers can begin the work of synthesis and problem solving can begin. The creation of relationship diagrams is often a first step in the schematic (or preliminary) design of a project. Relationship diagrams allow designers to digest and internalize the programming information. They also permit designers to begin to use graphics in order to better understand the physical qualities of the project.

One such diagram explores the relationship of functional areas to one another and uses information completed on the criteria and adjacency matrices. This type of one-step diagram may be adequate for smaller commercial and residential projects; larger-scale, complex projects often require a series of relationship diagrams. Diagrams of this type do not generally relate to architectural or site parameters and are not drawn to scale. Most specialized or complex projects need additional diagrams that examine issues such as personal interaction, flexibility, and privacy requirements.

Bubble Diagrams

As relationship diagrams begin to incorporate and account for requirements and adjacencies, they can become refined into *bubble diagrams*, which take the project one step further in the schematic design process. Bubble diagrams often approximate the actual architectural parameters (or building space) in rough scale. They may also incorporate elements identified in criteria and adjacency matrices through the use of graphic devices keyed to a legend. Figures 2-11 and 2-12 are a sequence of bubble diagrams for the sample project.

A primary purpose of these early schematic diagrams is to generate a number of options. Brainstorming many ideas is highly advisable. Designers with years of experience use brainstorming techniques, as should students of design. Successful design requires sparks of creativity in every project phase, and such sparks are fostered by nurturing idea generation. Rarely does the first try (or even the first several) beget a masterpiece or even a workable solution. It is often the combination of several diverse schemes that eventually generates a good solution.

Blocking Diagrams

Bubble diagrams are part of a continuous process of refinement. One diagram may have useful components that can be combined with elements of another. As this process of refinement continues, designers often proceed to *blocking diagrams*.