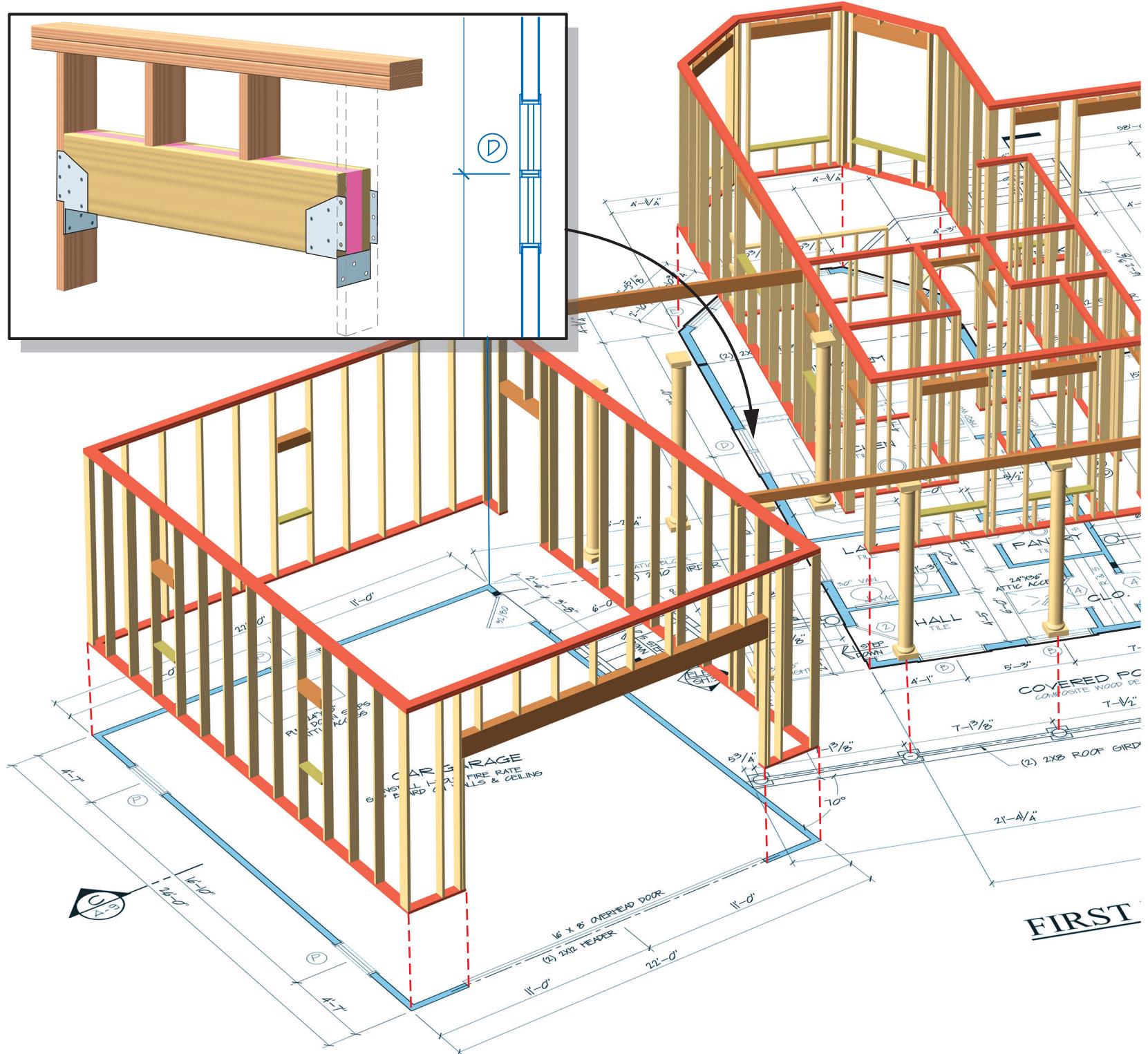
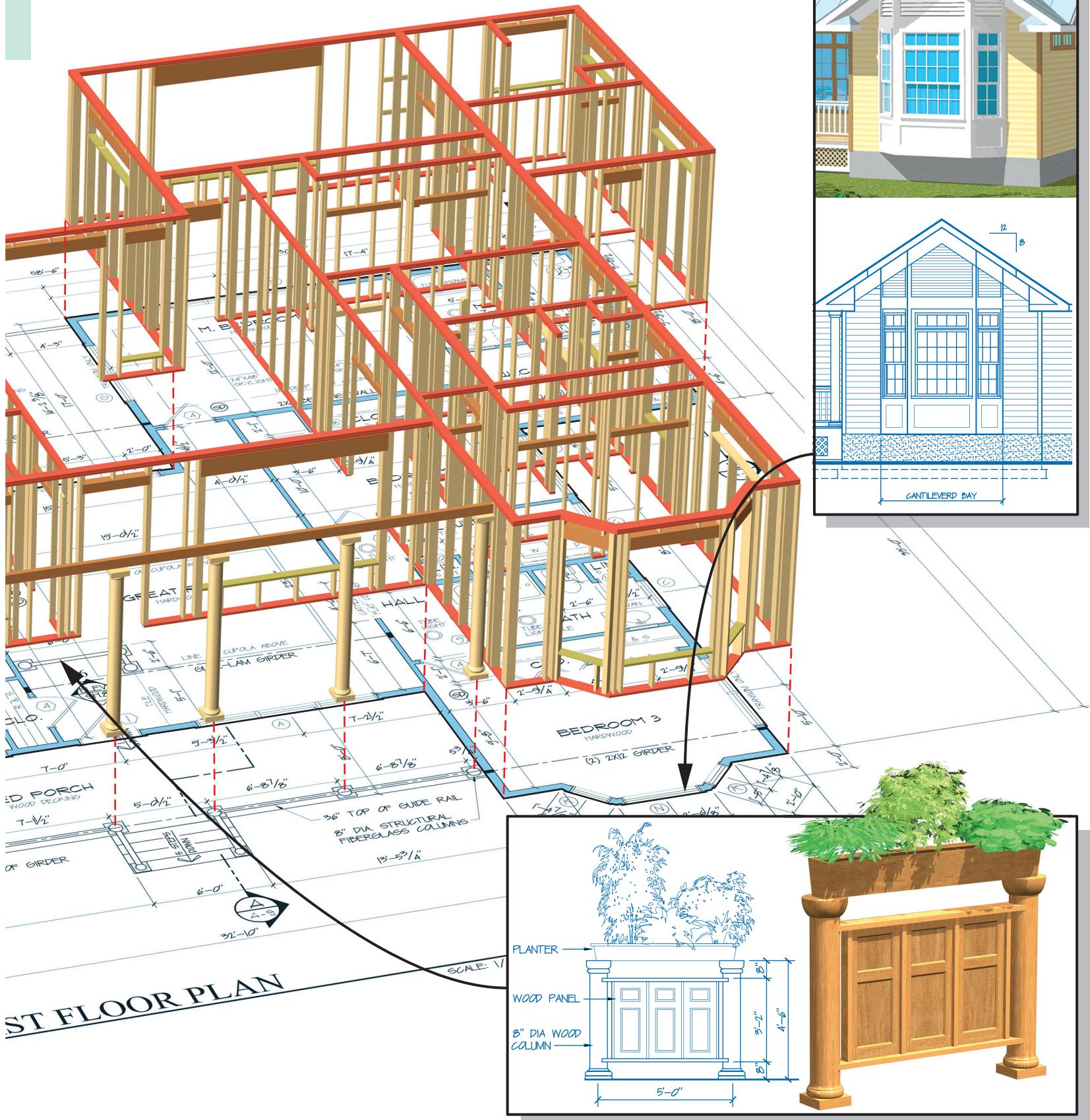


CHAPTER 8

Architectural Working Drawings

Figure 8.1 The La Chapelle floor plan represents real framing to carpenters who read, visualize, and build from a set of plans.





Variation on framing for La Chapelle Plan Set Plan

OBJECTIVES

- Define and explain the various sheets that make up a set of architectural plans.
- Identify the sheets in a set of working drawings and explain the information available from each working drawing.
- Define the most common scales used on architectural plans. Explain why scales are important and what information they make possible on a single plan sheet.
- Give examples of electronic plan scaling aids and software available to estimators and builders. Explain how these tools help estimators work faster and more accurately.
- Explain why section views and details are important plan sheets. How do carpenters and other trade workers use these views?
- Explain how Building Information Modeling software helps build energy-efficient homes.

ARCHITECTURAL PLANS AND PLAN SHEETS

Contract-related documents include the final building contract, detailed specification sheet(s), and working drawings for construction. This set of paperwork becomes part of the legal foundation for the project. Each document is vital to the building process. The various plan sheets listed below make up the working drawings that builders and subcontractors typically use to develop their estimates. Carpenters will use the same drawings to interpret the design and build the structure.

Many people refer to a set of working drawings as plans or blueprints. In fact, working drawings are part of the complete set of **architectural plans**. Architectural plans include working drawings, schedules, and other sheets shown in the list below. Many architectural plan sheets are horizontal (section) views of the building. The most common plan sheets include floor plans, foundation plans, and roof plans. The order of plan sheets generally follows the order of the building process. Elevation views are usually before building plans to give builders, homeowners, and trade workers a sense of how the entire project will look on completion. Not all architectural plan sets will include each sheet listed below.

1. Title and Legend Sheet(s)
2. Plot Plan (site plan)
3. Elevations
4. Foundation Plan
5. Floor Framing Plans
6. Floor Plans
7. Ceiling Framing Plans
8. Roof Framing Plans
9. Window and Door Schedules
10. Details and Section Views
11. Interior Elevations
12. Trade Plans (Mechanical, Electrical, Plumbing)
13. Specifications

The sophistication and detail in a set of construction plans may vary based on building design, owner's need, and the architect. In any case, enough detail is required to help minimize mistakes and facilitate coordination within the various trades, subcontractors, and materials suppliers. In drawing construction plans, architects, drafters, or builders will illustrate many details in only one place to eliminate confusion and redundant information. For instance, specifying the same stud spacing on every wall section is not required for most plans.

Title Sheets

The **title sheet** (Figure 8.2) is the cover for a set of architectural plans. On new construction, the title sheet typically has a front elevation view of the home. The title sheet normally includes all pertinent information about the primary parties involved with the project. The title sheet will list the architect (designer), owner, builder, and major subcontractors, and it may include a green home certification program's seal and the green verifier's information. Other sheets in the plan set will use a *title block*. The title block organizes some of the same information from the title page for quick reference on each page. Page numbers will be part of a title block to help keep drawings organized.

Plan Visualization

Visualizing the finished home or addition by reviewing a set of working drawings is a learned skill developed by builders, carpenters, and other craftspeople. It takes practice to develop the spatial skills necessary to visualize a three-dimensional building represented on a two-dimensional sheet of paper. Experienced carpenters can take a virtual tour in their minds of the finished building as they read and interpret information in a set of architectural plans. As this chapter covers each plan sheet, draw a mental picture to visualize the information and begin developing spatial skills. Figure 8.1 illustrates how the 2-D drawing becomes a real 3-D structure.

Orthographic Projection

Drafters, engineers, architects, and builders use a system known as **orthographic projection** to create drawings of three-dimensional buildings on two-dimensional paper. *Ortho* means "straight line" and this projection provides a graphical representation on a two-dimensional plane. The projection represents *objects drawn with a common relationship*; that is, they are in scale with each other. Common perspectives and drawing techniques are shown in Figure 8.3.

A common drawing perspective providing a three-dimensional view (3D) is the **isometric view**. Isometric views place all horizontal lines at 30° angles relative to the horizon with vertical lines perpendicular to the horizon. With this method, all lines are to scale and remain in proportion. An example is shown in Figure 8.3.



Figure 8.2 Check the title sheet for contact information and other details.

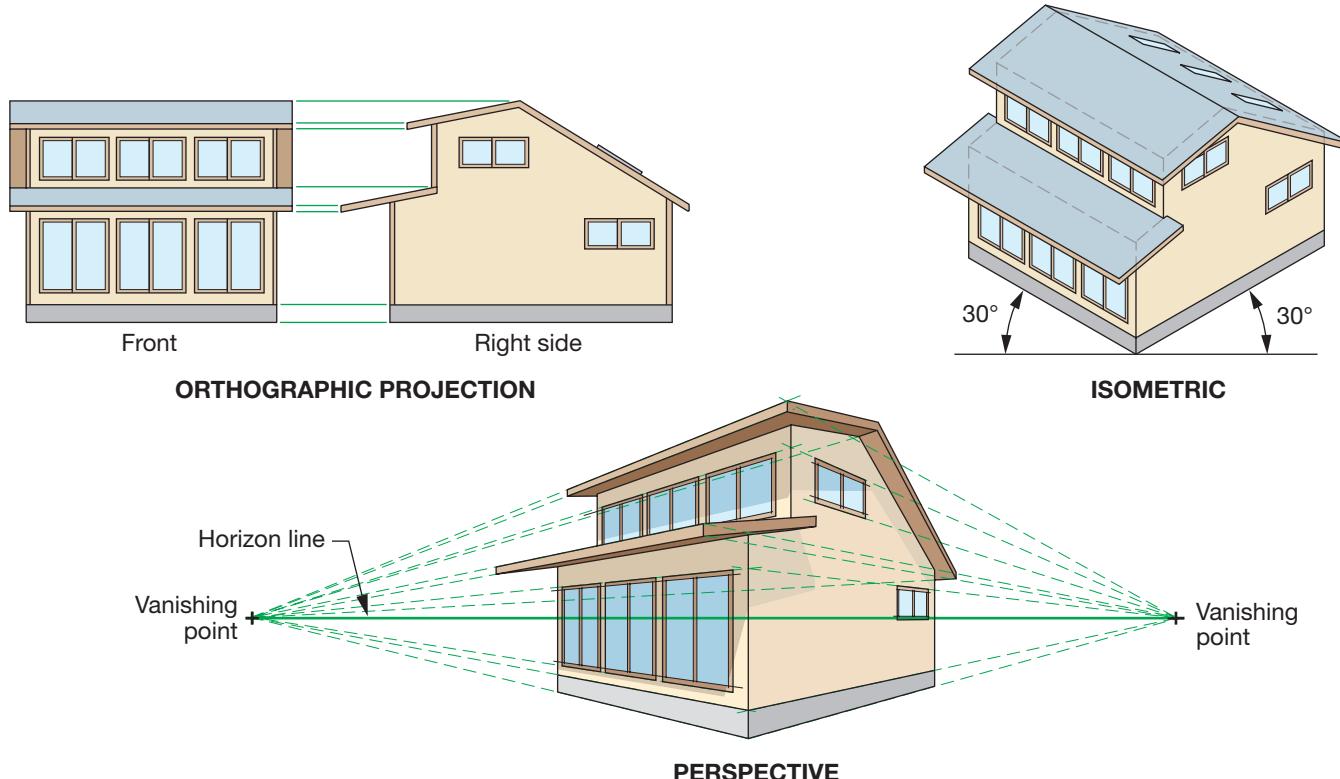


Figure 8.3 A full set of building plans will use many drawing types to relate information using 2D and 3D techniques.

Dimensioning Aids for Working with Architectural Plans

Reading a set of construction plans requires practice, experience, and spatial skills. To quickly read rough dimensions or for estimating; a wide range of computer controlled, electronic, and manual dimensioning aids are available. Even though these tools usually provide enough accuracy for estimating and general drawings, always refer to the architectural plans for exact dimensions and details. Various scaling tools are available to increase accuracy and speed when estimating; see Figure 8.4.

Architect's Scale

There are several versions of the **architect's scale**; the most commonly used is triangular with 11 different scales, one being a full-size ruler. Common plan scales are shown in Figure 8.5. The end of each scale has a fraction that designates the particular scale. In residential construction, $1/4'' = 1'$ is the most common scale used on working drawings, as shown in Figure 8.6. However, some plan sheets, depending on paper size, building size, and objects represented, may use $1/8'' = 1'$ or other scales. Be sure to check each sheet for the appropriate scale before taking measurements.

PROFESSIONAL TIP

Written plan dimensions *always* take precedence over scaled and measured dimensions. Variations in printing and paper can decrease the accuracy of measuring and scaling dimensions from a physical plan set.



(a) Architect's flat scale



(b) Architect's triangular scale

How to Apply the Architect's Scale Learning to use the architect's scale is important to reading and interpreting working drawings. Follow the steps shown below and refer to Figure 8.7 to practice with an architect's scale and develop accuracy and confidence in reading working drawings. The figure in this example is part of plan sheet A-5 the detached garage from the La Chapelle Plan But the technique can be used throughout any scaled set of plans using an architectural ruler.

- Find the appropriate fraction mark at the end of the scale that corresponds to the scale of plan sheet A-5. In this example shown in Figure 8.7, $1/4'' = 1'$ is used.
- Using the $1/4''$ scale, set the architectural ruler on the zero mark and one corner of the garage front.
- Read across the scale to the other end of the garage and note $22'$.
- On a $1/4'' = 1'$ scale, $5\frac{1}{2}$ " is equal to twenty-two $1/4''$ segments; i.e., $22'$ as shown on plan sheet A-5. Take a basic ruler and you will see the garage's *actual* measurement on the plan sheet is $5\frac{1}{2}"$.
- The area to the right of the zero mark on the architect's scale is for measuring inches. For example, you can measure $9"$ on the scale right of the zero mark by counting nine hash marks.

Civil Engineer's Scale

On a building lot or larger land area, surveyors use measuring equipment that divides parts of a foot into a decimal number carried to thousandths of a foot for accuracy; for example, 255.469' may be the length of a property line. Because of the larger scales, decimal formatting, and accuracy, surveyors use this standard to create the property lines on most plot plans. A civil engineer's



(c) Rolling ruler



(d) Scalex PlanWheel

Figure 8.4 Manual and electronic aids help estimate plans quickly estimator work quickly and accurately.

Sources: (a, b, c) Alvin & Company, Inc.; (d) Scalex Corporation

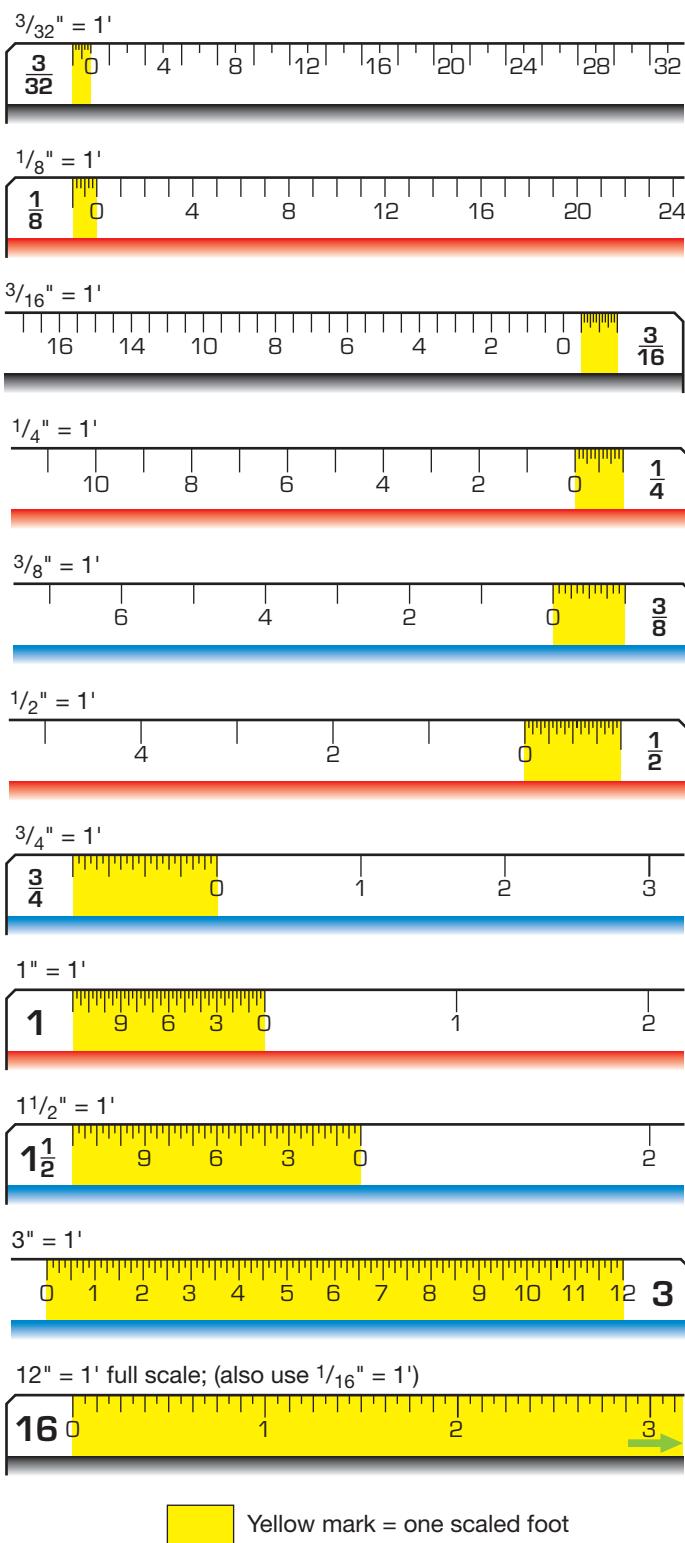


Figure 8.5 Eleven scales are available on a triangular architect's ruler. The most common used in residential construction is $\frac{1}{4}'' = 1'$.

scale can be used to read these large-scale drawings easily. The civil engineer's scale divides into six scales; each scale further multiplies by a factor of 10 for increasingly larger scale drawings. See the engineer's scale chart and example for reading a civil engineering scale in Figure 8.8.

Electronic Scaling Tools

Electronic tools are available for scaling plans when estimating. Two popular types, the *ScaleMaster II* and the *Scalex PlanWheel* (shown in Figure 8.4), can perform linear, area, and volume measurements for easy and accurate estimating. Some electronic measuring aids are wireless and interface with spreadsheets and estimating software. Some versions have a small calculator built in to help with adding and subtracting measurements. All dimensioning aids help with calculations required for estimating. In addition, electronic aids increase accuracy to a higher level and can decrease overall estimating time.

WORKING DRAWINGS

Depending on building complexity, roof design, and other variables, a set of working drawings for a residential home may be 5 to 10 sheets. For basic designs, a simple floor plan, a few specifications, and possibly a roof plan is all many carpenters need once the building corners are determined with a site plan. The point is that working drawings may be very simple or very complex depending on the project and the experience level of the builder and crew members. Using the International Residential Code, experienced carpenters can easily adjust to a particular set of working drawings. The complexity of the drawing is a factor in determining the plan sheet size; standard sizes are shown in Figure 8.9.

The working drawings provided to contractors for bidding serve many purposes in the overall construction process. Below are some applications of working drawings other than physical construction.

- 1. Estimating and Take-offs.** The builder and subcontractors use working drawings to calculate all of their materials, labor, and other expenses.
- 2. Permitting.** In residential construction, the requirement for plans in the permitting process varies by jurisdiction. Some architects create a set of plans specifically for permitting; they may have a slightly different look than actual working drawings.
- 3. Permanent Record.** A set of working drawings constitutes a permanent record of construction and design, along with all details and specifications. Provide a set to the homeowner for future repairs, additions, or remodeling projects.
- 4. Legal Record.** The working drawings become part of the legal record for the building. If legal issues arise during or after construction, courts may use working drawings as a basis for determining important facts.

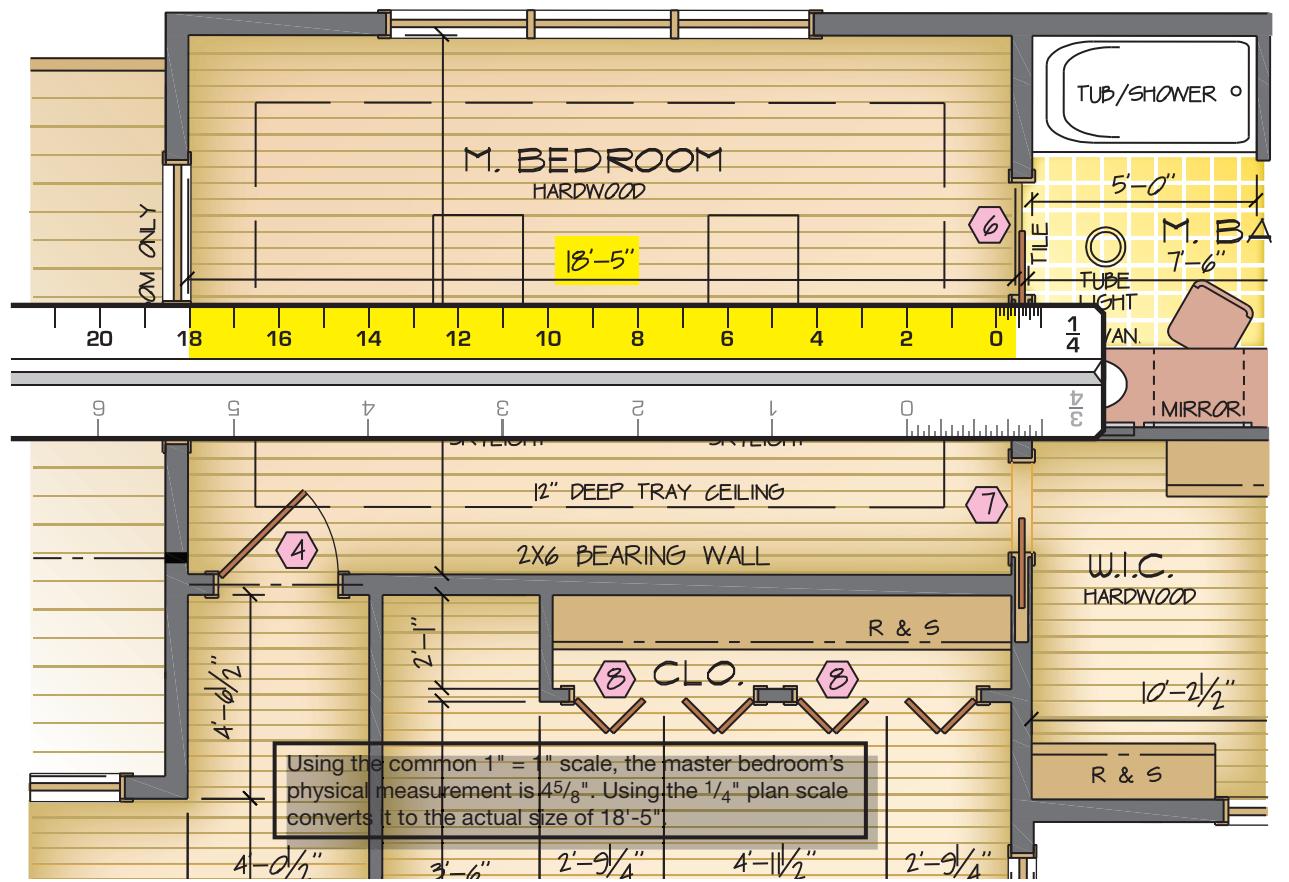


Figure 8.6 Scaled drawings help to illustrate an entire building on a single plan sheet.

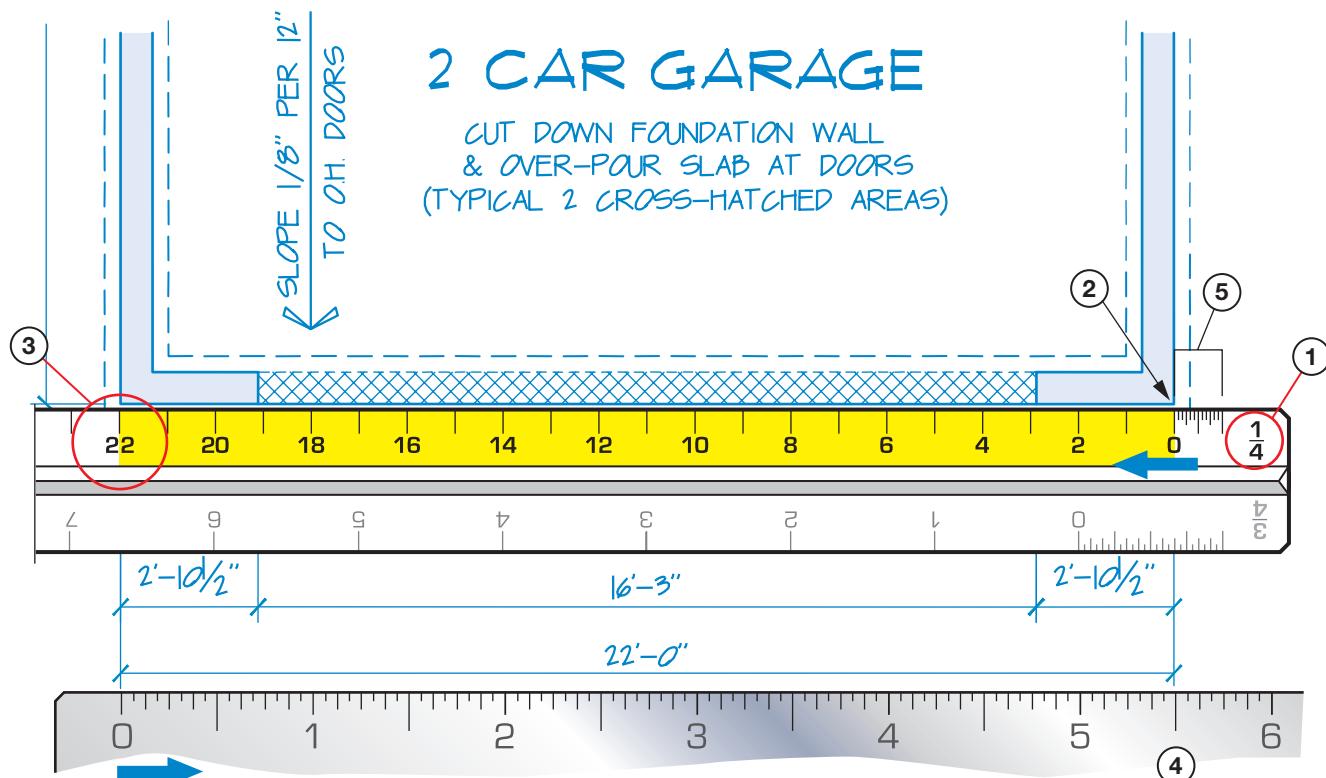


Figure 8.7 Using the scales on an architectural ruler, a carpenter, builder, or designer can draw large-scale areas on plan sheets.

PRESSENTATION AND ELEVATION VIEWING STYLE

Presentation View

Plan books, internet sites, architects, or builders may provide a **presentation view** (Figure 8.10). This is essentially a tool for selling the plans or home and provides little related to actual construction detail. Presentation views, in pencil or color, typically show fully developed landscaping, distinctive features, and even people to present the finished home in a favorable light. Unless the owner specifically requests the added perspective provided by a presentation drawing, it is not included in most construction plans.

Whole House Elevation Views

Elevation views provide a visual and scaled view of the home's exterior or interior. Most plan sets include views with each side shown and detailed. Elevations include references to many specifications for framing and exterior finishes. Roof slopes, ceiling heights, finished floor heights, and roofing and siding materials are usually identified on elevation sheets, as shown in Figure 8.11 and detailed as follows:

Roof slope: Roof slopes may not be the same for all covered sections of the home. For example, dormers, shed roofs, and garages may have different slopes.

Ceiling heights: Ceiling heights are provided on most elevation sheets and may be included on specifications or detail sheets.

Exterior finishes: Exterior finishes are usually illustrated and noted on elevations. In some cases, the street side of a home will be brick and the other three sides are covered with siding or other materials to meet restrictions of the neighborhood or community.

Topography: The actual lot grade (topography) helps estimators calculate foundation materials and grading work. Elevations also illustrate the home's finished look in relation to grade.

Interior Elevations

Interior finish work such as cabinets, trim work, and built-in bookcases may have a plan sheet (see Figure 8.12) with interior elevations so carpenters know where to set these items. Interior elevations dimension universal design features like lowered counters or fixtures so carpenters can install the features according to requirements. Universal design heights and details for doors, cabinets, and other features are discussed in other areas of the text.

LAYOUT AND FRAMING PLAN VIEWS

For plan views, a **cutting plane** is a horizontal line "cutting" the object for a better view. For example, with typical floor plans, the horizontal cutting plane is typically at a height that cuts through doors and windows on exterior walls so they are in the final view. Removing the area above the cutting plane creates a **bird's-eye view** looking down into the structure like the example in Figure 8.13.

PROFESSIONAL TIP

The oldest known plan or drawing dates back to around 2100 BC and is credited to the Chaldean Prince of Lagash, a city-state in ancient Mesopotamia. In his time, the prince was known as an engineer and a builder.

Plot or Site Plan

A **site plan** (Figure 8.14) contains information verified by a surveyor, engineer, and others. It illustrates important features such as utility easements, topography, property lines, setbacks, and elevations. Site plans usually include the building footprint, driveways, auxiliary buildings, and other constructed features on site as references. A **plot plan**, very similar to a site plan, is specifically for recording a piece of land and shows much of the information on the site plan without a house on the lot. Some of the important aspects include the following:

Easements: Any property easements must be specifically located and identified. It is advisable to check with code officials and utility companies for restrictions and setbacks related to property easements.

Setbacks: All property setbacks shown on site plans should be verified with local zoning officials before construction begins. A quick phone call can help eliminate serious code problems related to building within a setback area.

Benchmark: The benchmark sets the elevation of many construction features, including finished floor levels and foundation heights.

Site plans contain very important information about elevation. Each site plan has an elevation called the **benchmark**. The benchmark represents a starting elevation that may be an actual elevation above sea level or, for ease of use, an arbitrary number like 100.00'. In either case, all points of elevation throughout the site plan reference against the benchmark elevation. Carpenters and masons will use these elevations as starting points to calculate foundations and finished floor heights. Masonry workers will use these elevations to build and check all foundation walls, piers, and other structural components of the foundation system.

Site or plot plans have become more significant in today's environment of green building. The orientation of the building is important to operating efficiency. Windows and doors can be oriented and sized to maximize any solar advantages based on the home's location. The site plan can be used to manipulate the scaled building footprint into the best orientation for solar efficiency based on location, building size, and limitations of the building lot. These plan sheets also show protected areas like tree drip zones and natural areas, as well as areas designated for materials storage and heavy equipment.

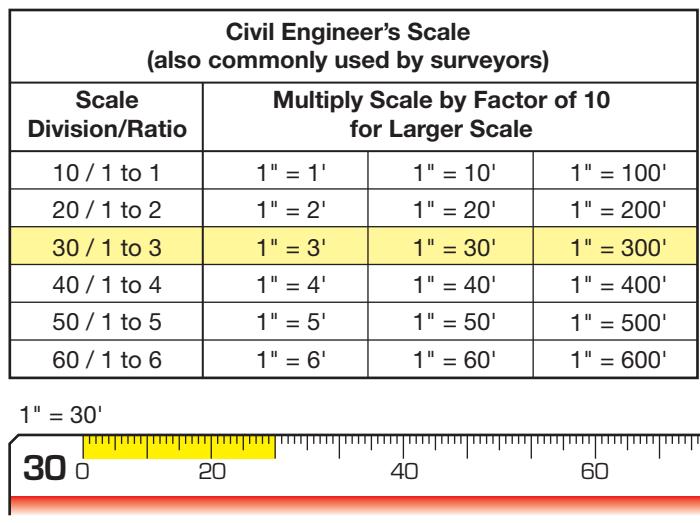


Figure 8.8 Civil engineering scales are designed for working with very large distances.

Foundation Plan

The information on a **foundation plan** provides critical dimensions for structural support features. The height of the cutting plane should be set to “cut through” any windows, doors, or other openings in basement walls so the builder can define locations,

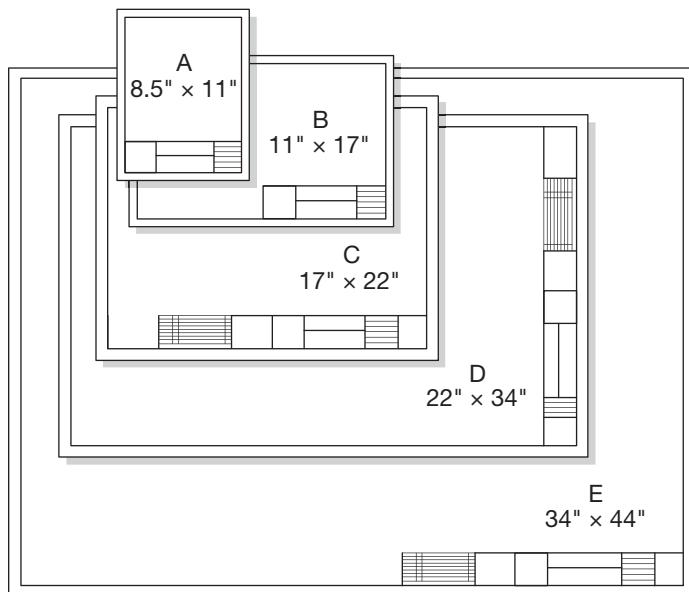


Figure 8.9 The American National Standards Institute (ANSI) developed a standard for working drawings using a letter designation corresponding to each sheet size. Large size E prints provide the most detail and are easier to read.



Figure 8.10 Presentation drawings are used to present the finished home in the best light possible for selling sets of plans or the proposed new home.

type, and other specifics. Take a look at the information below and noted in Figure 8.15 of important specifications provided by foundation plans.

Foundation wall type and width: The foundation width as determined by code or design may not be the same for all areas of the building.

Window openings: Window type, size, and location may not be the same at all locations.

Dimension lines: Carefully note dimension lines and their reference points. They may represent the outside edge, the centerline, or the inside edge of the object referenced.

Footings and piers: Dashed lines represent the footing width for foundation walls, piers, and columns. The footing width beyond the foundation wall, column, or pier on either side is the footing projection (see Figure 8.15).

Concrete: Some concrete specifications may be listed on foundation plans, but refer to specifications sheets for all pertinent details.

Local frost lines: The depth of footings below grade must be defined by local code jurisdictions based on local soil and weather conditions. In the International Residential Code, Table R301.2(1), footnote *b* states, “The jurisdiction shall fill in the frost line depth . . . with the minimum depth of footing below finished grade.” (2015 IRC, p. 29)

MATH TIP

The footing projection is the width of the footing beyond the foundation wall, pier, or column. IRC R403.1.1 Minimum Size states, “Footing projections, P , shall be not less than 2 inches and shall not exceed the thickness of the footing.” (2015 IRC, p. 80) For the example in Figure 8.15, what is the total footing width based on the footing projection and basement wall specifications?

Answer: Foundation wall is 108" concrete with an exterior footing projection of 34" and an interior footing projection of 34" = 16" total footing width.

Floor Plan

Floor plans like the example in Figure 8.16 are usually the most information-packed of all plan sheets. Like the foundation plan, the floor plan cutting plane should be at a height that includes all window and door openings. This sheet defines the size and layout of all rooms and may include electrical, HVAC, and plumbing information. If the home design is more complex, however, electrical, HVAC, and plumbing may be on separate sheets to simplify the view and help eliminate mistakes and oversights during estimating and construction.

The floor plan provides the information needed to estimate many materials like studs, drywall, doors, windows, and floor framing. Many plan sets include framing sheets for floors, walls, and ceilings as shown in the following sections. Although not required, framing sheets help estimators work more accurately and help carpenters reduce material waste.

Room size and layout: As with any dimension, be sure of the reference point so the actual work will match the floor plan. In rooms with appliances, bathroom fixtures, or other equipment, the point of reference for dimensions is critical to design. For example, the kitchen cabinets are often preordered based on floor plan dimensions. A mistake in reference point here during rough framing means the cabinets may not fit in the finished wall space. See Figure 8.17 and the examples of minimum spacing requirements from the International Residential Code Figure R307.1, Minimum Fixture Clearances. Always confirm that dimensions meet any local changes to the model code.

Piers and columns: The surface contact area of support for framing materials over bearing supports (piers and columns) is regulated by IRC section R502.6.1. It requires floor joists ends over bearing support to lap a minimum of 3" and requires the boards to be nailed with three 10d face nails.

Plumbing fixtures: IRC Section R307, *Toilet, Bath and Shower Spaces*, specifies minimum spacing requirements for these fixtures. Reading the floor plans correctly while laying out the walls is critical to assure code-compliant spacing in all areas.

Electrical and HVAC: Floor plans are used by trades workers to position outlets, switches, home integration systems, HVAC supply and return registers, and many other components of the home design.

Exterior features: Floor plans dimensionalize the placement of decks, porches, garages, and other attached, exterior features. Depending on design, exterior features like decks may have details specified and illustrated on other plan sheets.

MATH TIP

A floor plan measures from edge to edge on the exterior. One exterior kitchen wall shows an outside dimension of 12'-8". According to the specifications, all exterior walls are framed with 2 × 6 studs, 1/2" gypsum board on the interior, and 1/2" OSB sheathing on the exterior. Wall-to-wall, what is the maximum width of the cabinet assembly?

Given dimension is 12'-8". Subtract the 2 × 6 wall thickness from both sides ($5\frac{1}{2}"+5\frac{1}{2}" = 11"$). Subtract the gypsum board and OSB from both sides ($1/2"+1/2" = 1" \times 2 \text{ sides} = 2"$). Final answer: $12'-8"-11"-2" = 11'-7"$ maximum cabinet assembly width.

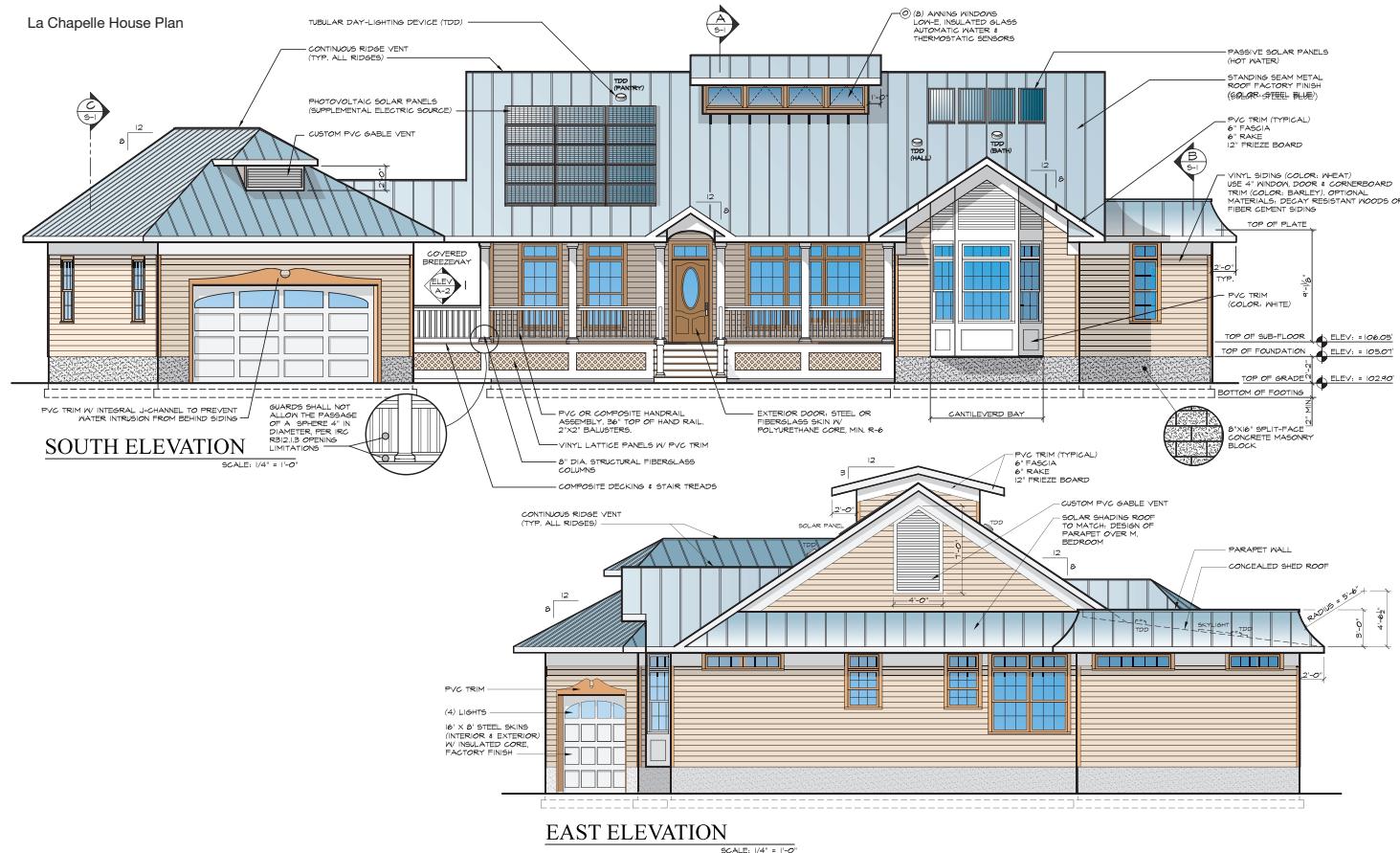


Figure 8.11 Elevation drawings may identify important framing and finish design requirements, such as roof slope.

Framing Plans for Ceilings and Roofs

Ceiling or roof framing plans provide details for all structural components and the layout, spacing, and arrangement of the system. For example, in Figure 8.18, spacing and framing details for all ceiling joists are noted on the ceiling framing plan (sheet A-6). In addition, the size and type of all materials is defined in the framing plan.

A ceiling or roof framing plan (Figure 8.18) will show details of framing for green features such as I-joists, raised-heel trusses, engineered lumber, or recycled steel. These green and sustainable design options must be detailed for carpenters to follow the design specifics. Estimators also need this information for bidding. Some of the green features on framing plans may be included on the specifications sheets.

Without a framing plan, carpenters will design a ceiling or roof system based on the IRC code requirements to provide a code-minimum system that meets all standards for safety. However, using the green features noted above will improve on the minimum design requirements of the International Residential Code and may reduce materials consumption.

Detail and Section Views

The **detail and section views** provide very specific information about a particular construction or design feature. These views provide enlarged drawings to show specific details. To assure compliance with design and efficiency standards for the home, carpenters need detail sheets to define materials, techniques, and special applications.

Detail and section views are often combined several to a sheet. When a particular area of a plan sheet has a corresponding alphabetical or numerical indicator, refer to the detail sheets. This indicator directs the carpenter to a particular enlarged view on the detail sheet. For example, note the window flashing details from plan sheet D-1 in Figure 8.19.

One of the most common detail views is a wall section. See Figure 8.20 for the wall detail from plan sheet D-1. Common practice is to include one typical wall section and any details unique to the home's design or special features. A wall section may include green features and framing requirements above code minimums as shown in Figure 8.20. Study detail sheets carefully before construction begins to assure compliance with structural, materials, and energy-efficiency requirements.

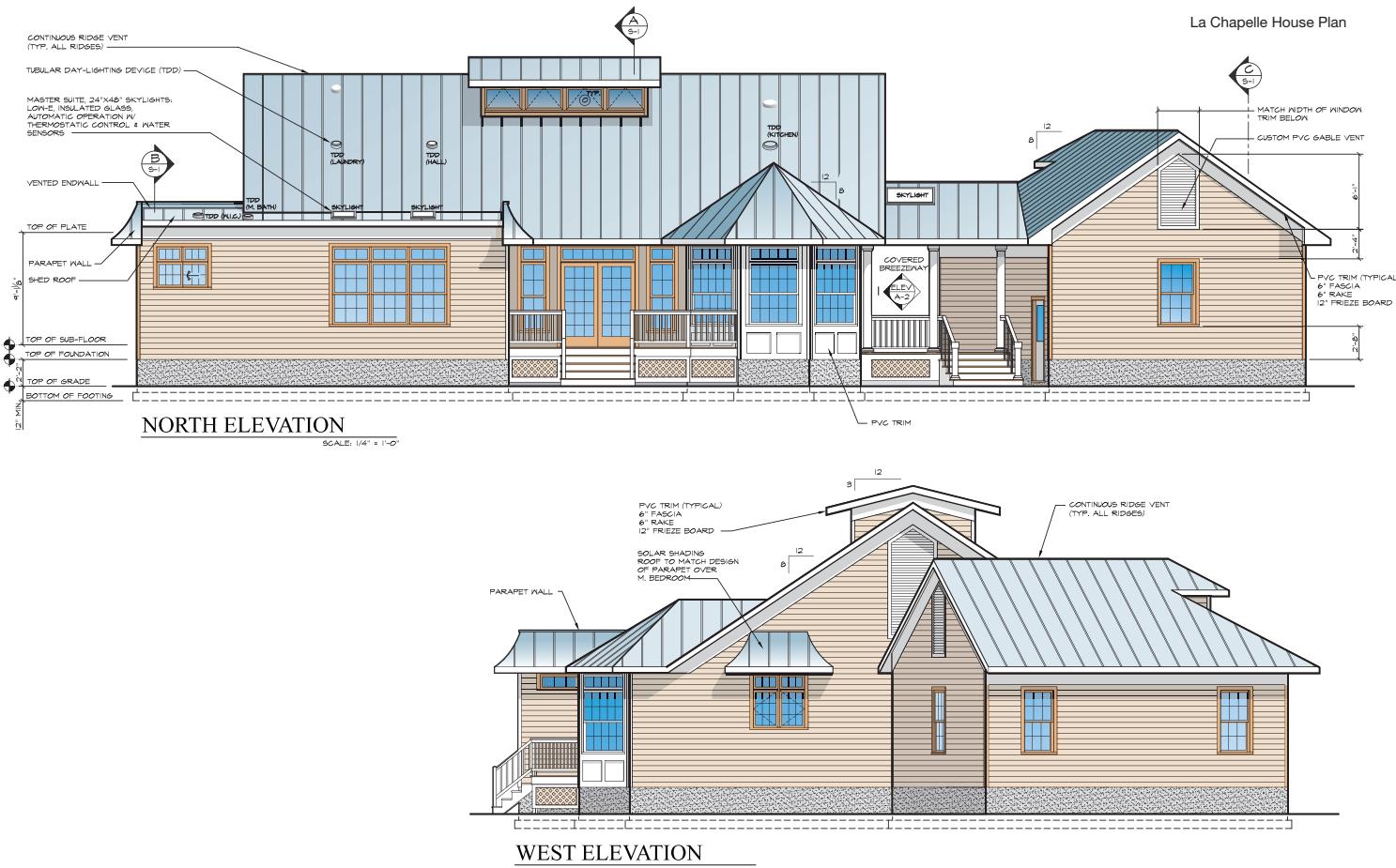


Figure 8.11 (Continued)

Schedules and Specifications

With a set of architectural drawings, the most common schedule or specification sheet is for windows and doors. Throughout a plan set, windows, doors, and other components have a numerical or alphabetical designator corresponding to an entry on the schedule sheet. Information on the **schedule sheet** will provide specifications, model numbers, material type, size, rough openings, manufacturer, and may include a notation of the product's efficiency. See the window schedule from plan sheet C-1 in Figure 8.21. Chapter 43, Windows, Skylights, and Tubular Day-Lighting Devices, covers the efficiency standards noted on the C-1 plan sheet.

CAD PROGRAMS FOR DESIGN AND ENERGY EFFICIENCY

CAD (Computer-Aided Design) software has been available for building design and estimating for years. Options range from simple to very sophisticated software and hardware packages for residential and commercial construction. The most advanced

PROFESSIONAL TIP

CAD (Computer-Aided Design) or CADD (Computer-Aided Design and Drafting) are very similar. Both are available as freestanding programs or as part of a total BIM package.

programs provide materials lists and 3D real-world walkthroughs and at the same time calculate the impact of materials and construction techniques on building operating efficiency. Stand-alone estimating and accounting programs are available as part of fully integrated modeling software called **Building Information Modeling (BIM)**. BIM is sophisticated software that models many aspects of a building, including air quality, energy consumption, and operational efficiency.

3D Design and Estimating Software

Today's estimating and 3D modeling software programs (residential and commercial) range from entry-level programs to highly sophisticated custom programs. A basic example of what



Figure 8.12 Elevations for interior work help carpenters meet layout and installation requirements.

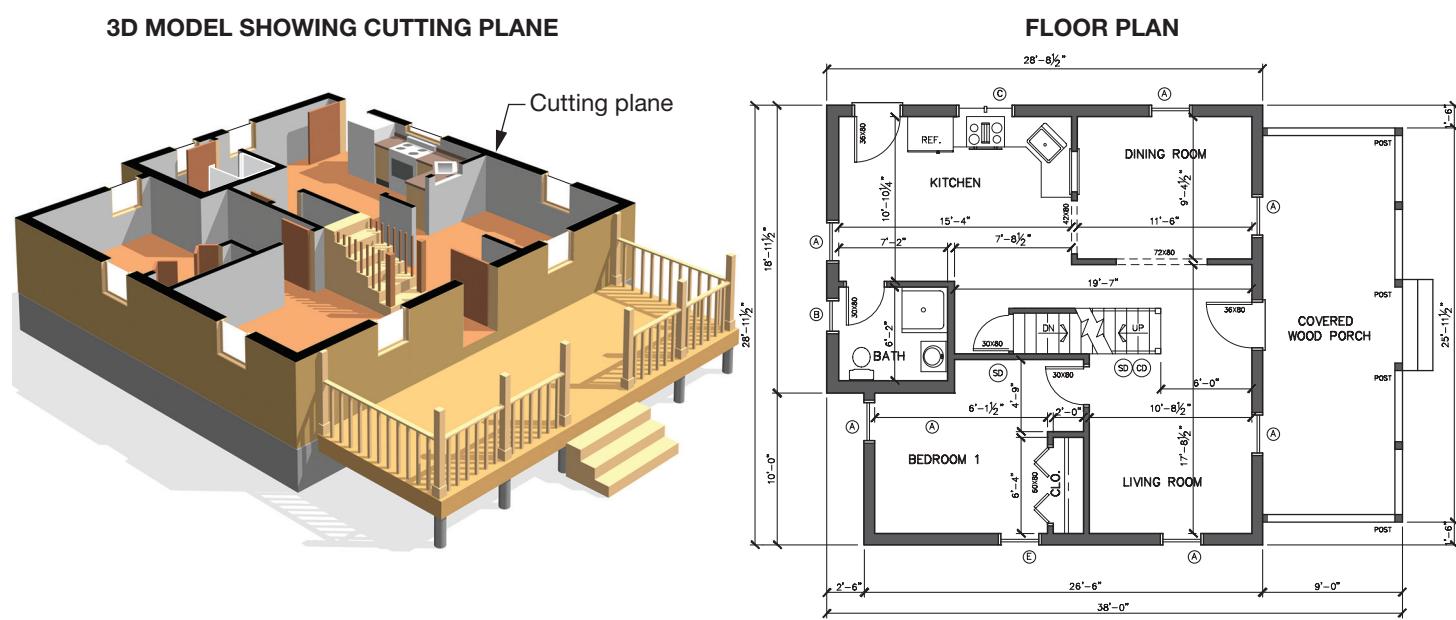


Figure 8.13 Floor plans are horizontal section views and become part of a set of working drawings.

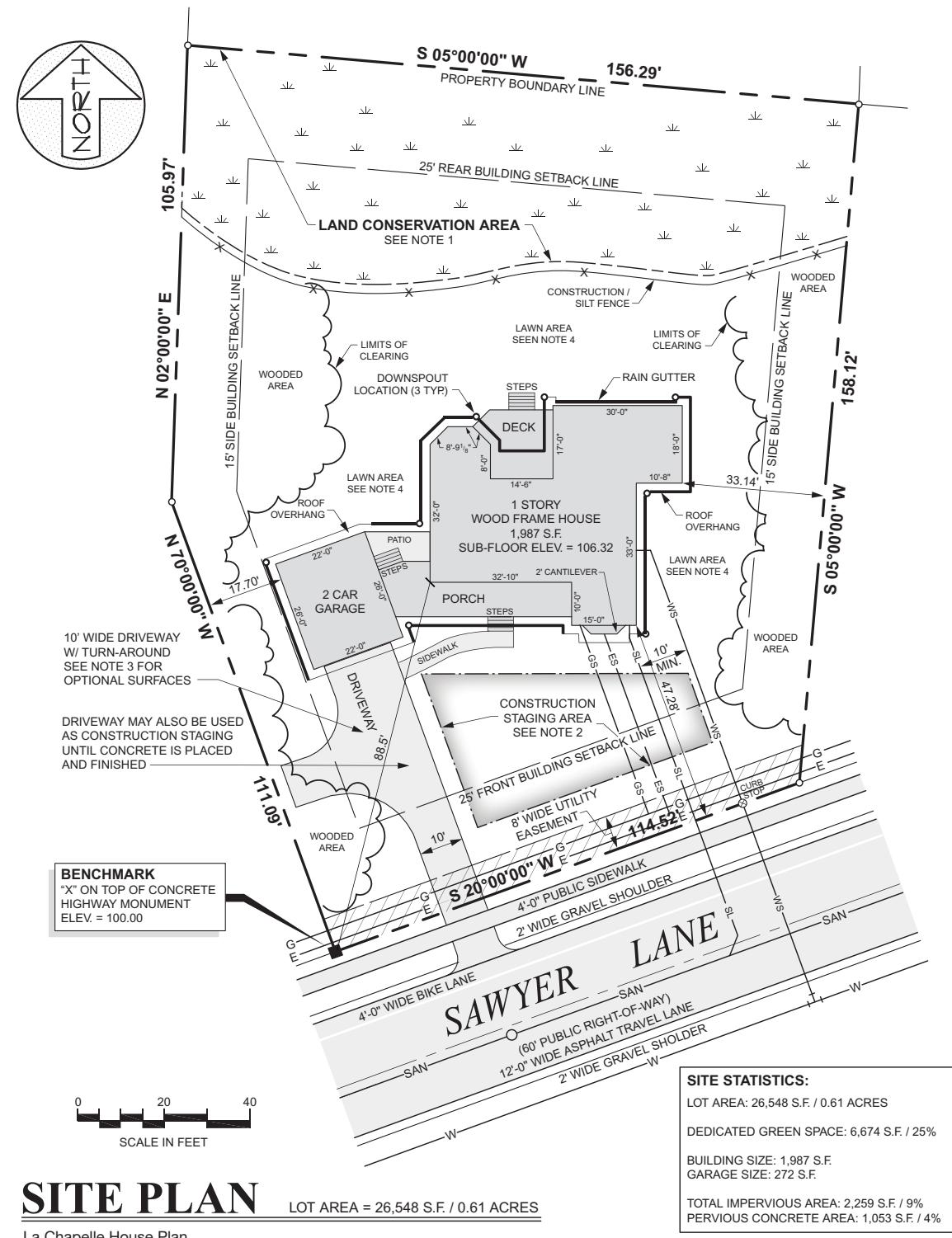


Figure 8.14 A site plan contains important information for positioning the home on the building lot. When builders have the option, solar orientation of the home can significantly improve a home's energy efficiency.

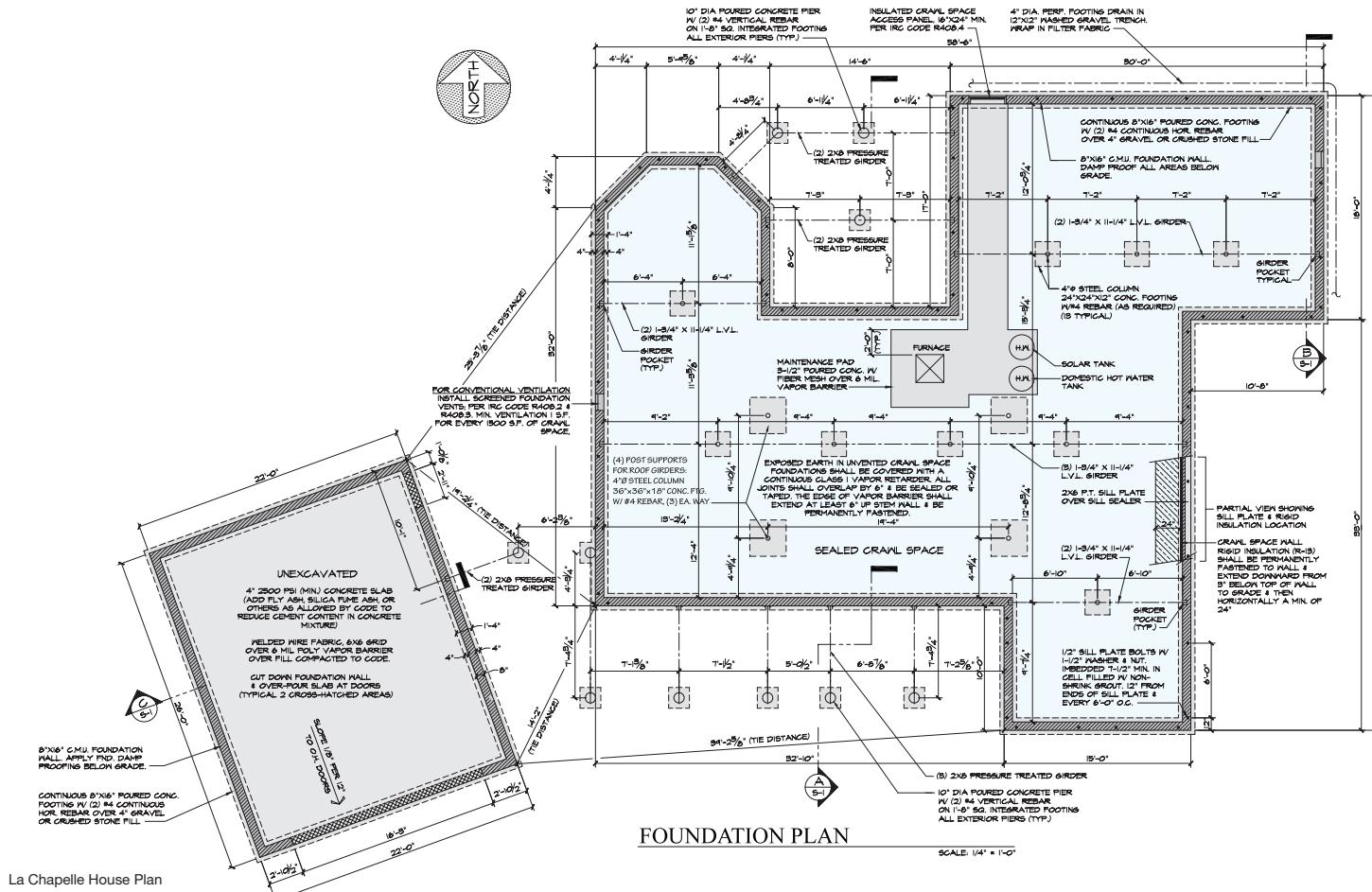


Figure 8.15 Foundation plans detail all footings, piers, foundation walls, and basement walls.

these programs can do is shown in Figure 8.22. Most can produce a complete set of working drawings for any residential design. Some engineers, architects, and builders in residential construction use AutoCAD®. However, AutoCAD requires training and is primarily a commercial design product. Programs tailored for residential construction are easy to use and provide many levels of detail. Some 3D design programs can integrate with accounting programs for detailed cost reports and estimating functions.

Modern builders and subcontractors take advantage of technological advances in communications and software that integrate design, accounting, and scheduling software. These modern tools save time, reduce errors, and help builders become more efficient and profitable. Learning to work with these programs is a prerequisite to management positions in the construction industry.

Building Information Modeling (BIM)

An example of BIM software is the REM/Rate™ software used by Energy Star HERS raters. This software package provides energy modeling based on criteria input by the rater, such as

blower door and duct blaster testing, insulation *quantity* and *quality* of installation, energy-efficient lighting, appliances, and heating and cooling equipment. Using BIM software, a rater can provide a detailed analysis to the builder or homeowner of the operating costs and operating efficiencies of the building.

One of the many functions of BIM software is to compare products for efficiency and cost. For example, windows of different efficiency levels can be compared to calculate the annual energy cost differences. BIM programs make calculations based on building orientation and latitude to determine solar heat gain for windows and doors. The software will calculate these numbers as part of operating efficiency and energy costs on an annual basis. Green remodelers and builders use the reports generated by BIM software programs to help customers see the advantages of green and efficient components and materials.

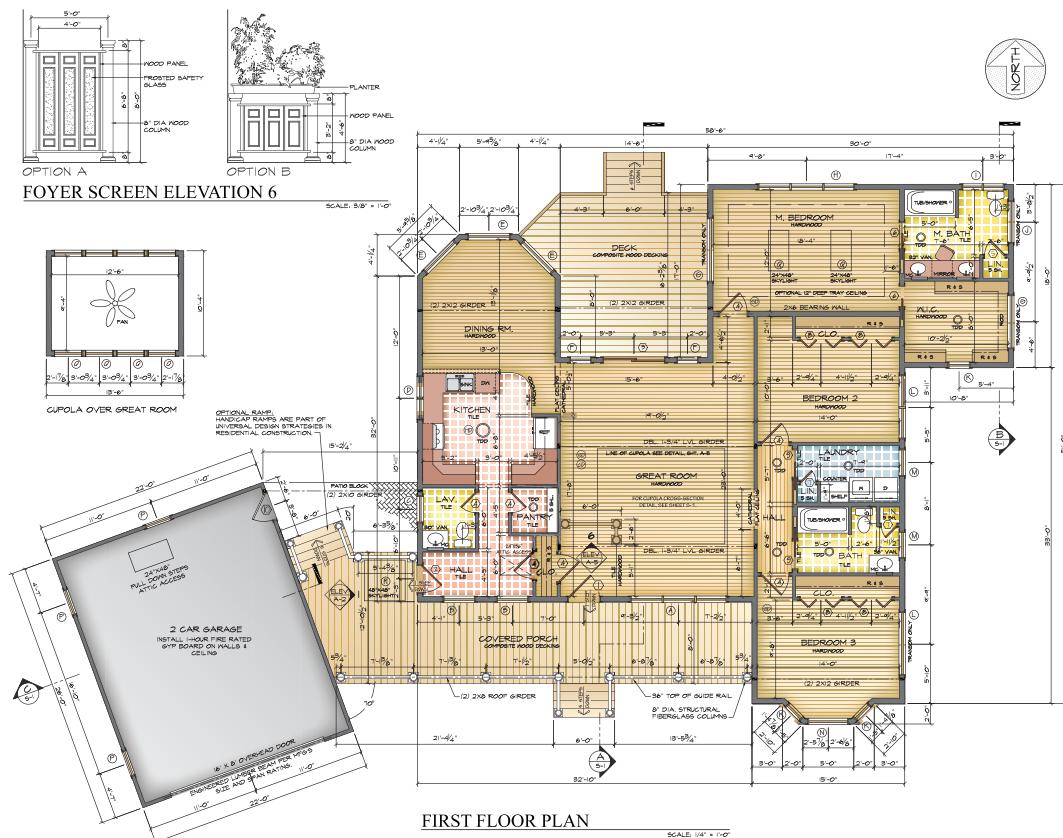


Figure 8.16 Floor plans contain abundant information for carpenters and other workers. Sometimes HVAC, plumbing, and electrical crafts have their own floor plan sheets to help increase detail and readability.

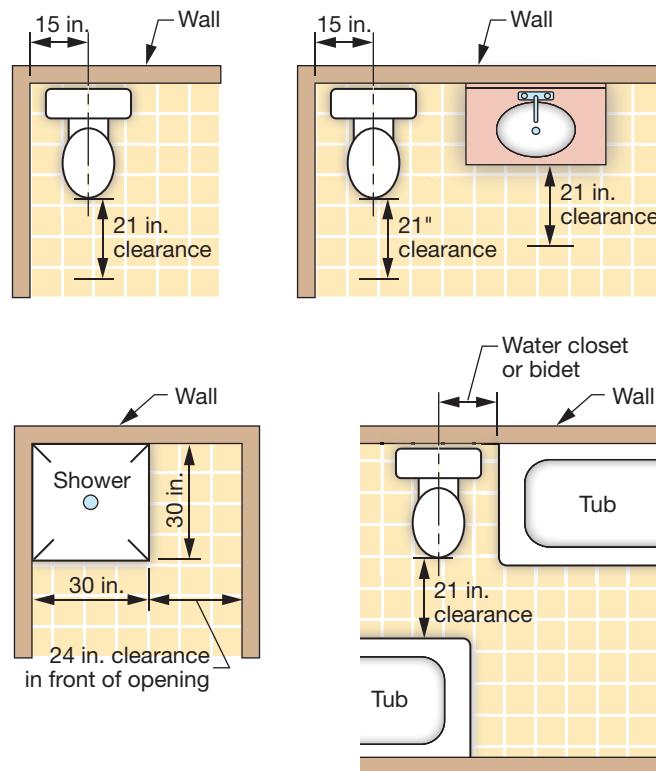


Figure 8.17 Reading floor plans to lay out walls is critical to assure code compliance in areas like bathrooms. Many jurisdictions will adapt (change) the model code to meet local requirements and concerns.

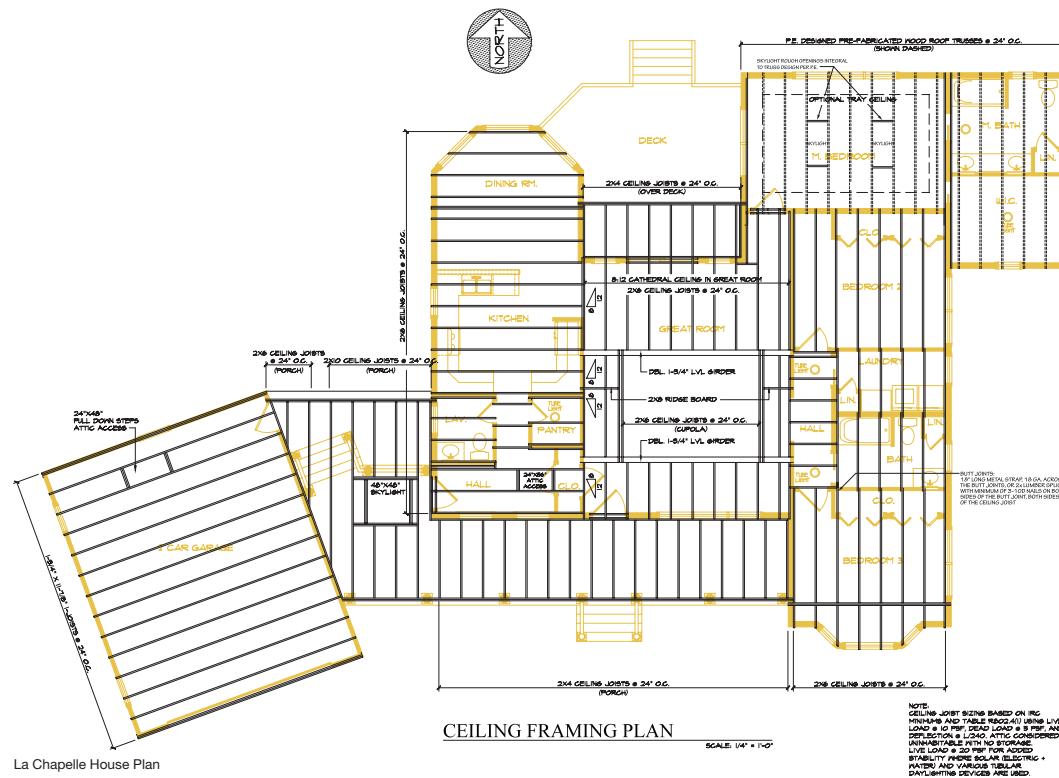


Figure 8.18 A framing plan helps eliminate errors in design and makes carpentry more efficient and cost effective.

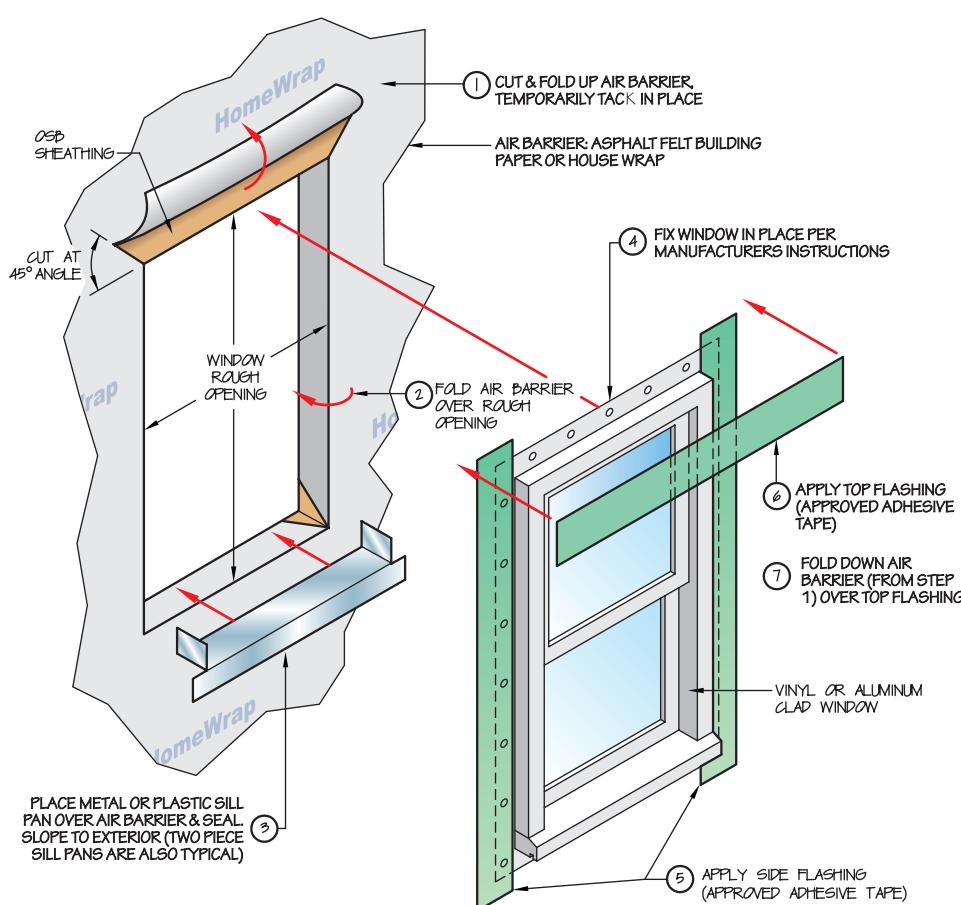


Figure 8.19 Plan detail sheets help assure the building envelope construction meets design standards.

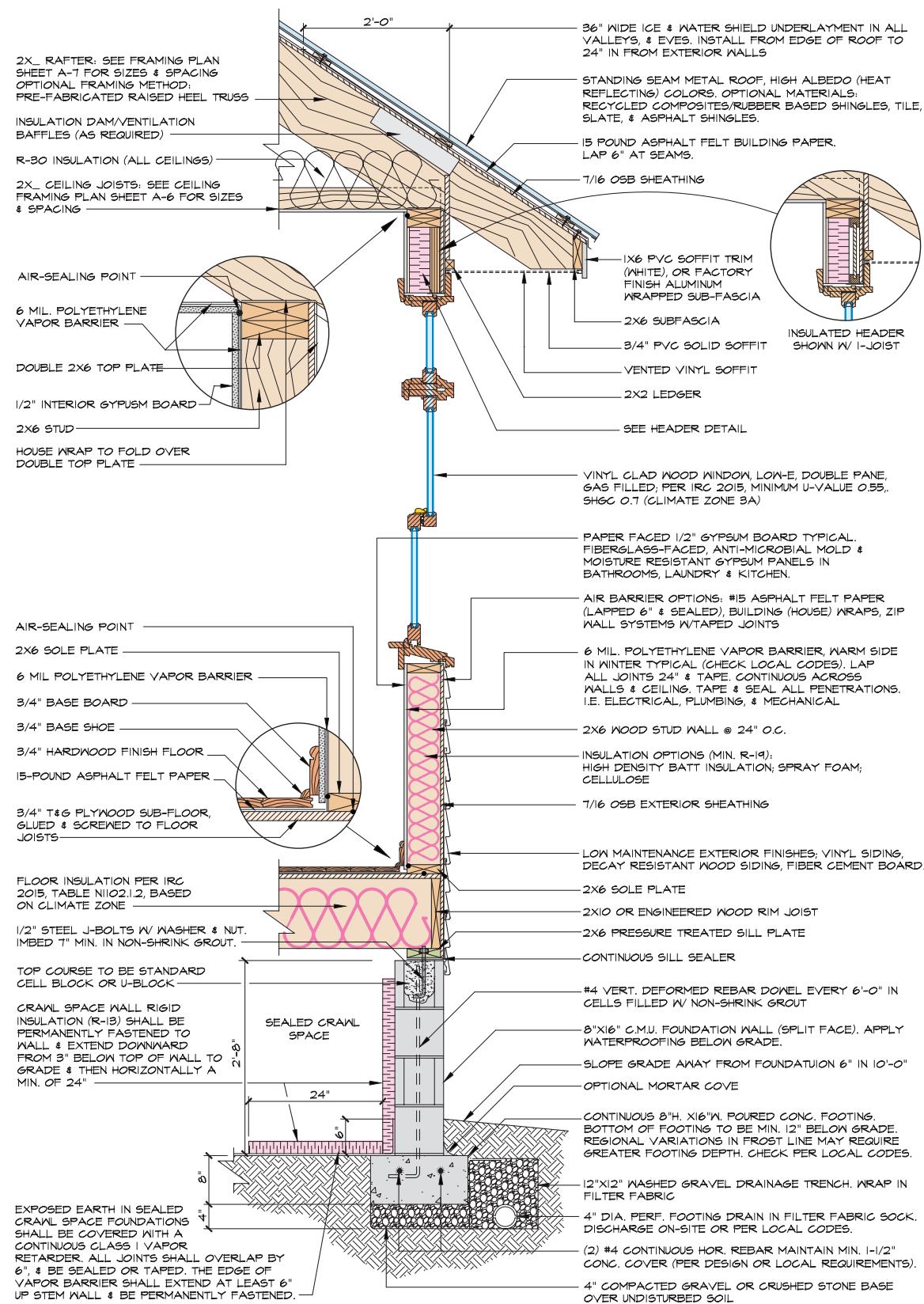


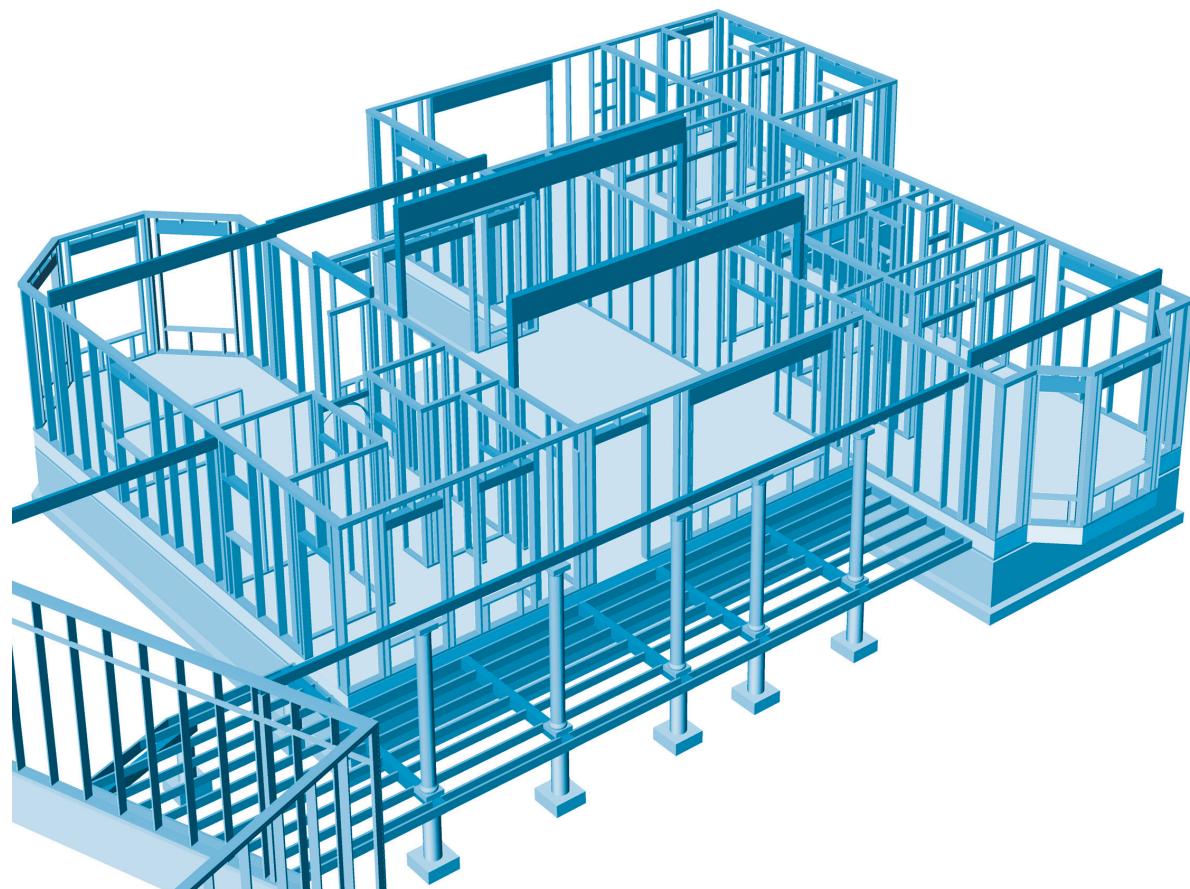
Figure 8.20 Wall sections provide information about all materials needed to construct the system in a way that meets design and efficiency requirements.

A SYMBOL		WINDOW SCHEDULE				
MARK	MODEL	ROUGH OPENING WIDTH × HEIGHT	LIGHT S.F.	VENT. S.F.	EGRESS W. × H. (S.F.)	ENERGY SPECIFICATIONS
A	(3) 3056DH/TR	9'-0 1/2" × 6'-6 1/2"	42.75	19.44		
B	3060DH/TR	3'-0 1/2" × 7'-0 1/2"	14.25	6.04		
C	2630DH	2'-6 1/2" × 3'-0 1/2"	5.62	3.50		
D	(2) 2030DH/TR	4'-0 1/2" × 4'-0 1/2"	13.5	8.43		
E	(3) 4050DH/TR	4'-0 1/2" × 6'-0 1/2"	17.25	8.10		
F	(2) 2056DH/TR	2'-0 1/2" × 6'-6 1/2"	10.5	4.55		
G	6010TR	6'-0 1/2" × 1'-0 1/2"	4.20	-		
H	(3) 3050DH/TR	9'-0 1/2" × 6'-0 1/2"	40.5	18.22	32 1/2" × 27" (6.04) M. BDR.	R310.1.1 MINIMUM OPENING AREA. ALL EMERGENCY ESCAPE AND RESCUE OPENINGS SHALL HAVE A MINIMUM NET CLEAR OPENING OF 5.7 SQUARE FEET. (EXCEPTION: GRADE FLOOR OPENINGS SHALL HAVE A MINIMUM NET CLEAR OPENING OF 5 SQUARE FEET).
I	2040GL/TR	2'-0 1/2" × 5'-0 1/2"	8.25	3.24		R310.1.2 MINIMUM OPENING HEIGHT. THE MINIMUM NET CLEAR OPENING HEIGHT SHALL BE 24 INCHES.
J	4010TR	4'-0 1/2" × 1'-0 1/2"	3.00	-		R310.1.3 MINIMUM OPENING WIDTH. THE MINIMUM NET CLEAR OPENING WIDTH SHALL BE 20 INCHES.
K	2050DH/TR	6'-0 1/2" × 6'-0 1/2"	9.75	4.05		
L	(2) 3050DH/TR	6'-0 1/2" × 6'-0 1/2"	27.0	12.15	32 1/2" × 27" (6.04) BDR. 2	R310.1.4 OPERATIONAL CONSTRAINTS. EMERGENCY ESCAPE AND RESCUE OPENINGS SHALL BE OPERATIONAL FROM THE INSIDE OF THE ROOM WITHOUT THE USE OF KEYS, TOOLS OR SPECIAL KNOWLEDGE.
M	2630DH/TR	2'-6 1/2" × 4'-0 1/2"	7.87	3.5		
N	4050DH/TR	4'-0 1/2" × 6'-0 1/2"	17.12	7.11	41 7/8" × 28" (7.63) BDR. 3	
O	28110AW	2'-8 1/2" × 1'-10 1/2"	3.73	3.49		
P	2650DH	2'-6 1/2" × 5'-0 1/2"	9.37	6.75		
Q	CUSTOM SK	2'-0" × 4'-0" Per P.E.	8.00	2.00		
R	CUSTOM SK	4'-0" × 4'-0" Per P.E.	16.00	NA		

DH = DOUBLE HUNG, TR = TRANSOM, CS = CASEMENT, GL = GLIDER, AW = AWNING, SK = SKYLIGHT

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Figure 8.21 The schedule sheet provides details on specific components to assure compliance with certification programs like the ICC 700 National Green Building Standard, Energy Star, or LEED for Homes.



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Figure 8.22 CADD-type programs can generate a wide range of detailed drawings and perspectives.

KEYTERMS

architectural plans	presentation view	plot plan	detail and section views
title sheet	elevation view	benchmark	schedule sheet
orthographic projection	cutting plane	foundation plan	Building Information Modeling (BIM)
isometric view	bird's-eye view	floor plan	
architect's scale	site plan	ceiling or roof framing plans	

REVIEW QUESTIONS

1. Describe how BIM software is important to building and verifying energy-efficient home construction.
2. What is the purpose of the benchmark on site plans? What important elements of construction reference the benchmark as a starting point?
3. How many scales does a triangular architectural ruler have? What is the most common scale used for residential plan sets? What are the advantages of a scaled drawing?
4. What accessory materials are available for scaling and estimating? What advantages do these accessories offer estimators and builders?
5. Describe and explain at least three advantages available when using design, estimating, and drawing software.
6. Which plan sheet usually has the most building information? What types of information are available from this plan sheet?
7. What plan sheets provide information about required types of windows and doors and their correct placement?
8. When locating the building on the site, which working drawing would verify information on setbacks, easements, orientation, and other factors?
9. What is the purpose of section and detail views?
10. Where in the plan set would you find information about the parties involved in the construction process?