

TRAINING THE TRADES



Reading Blueprints

A primer on how to understand construction drawings

BY JLC STAFF

Blueprints are the complete set of drawings that show what a designer wants a building to look like. These drawings are made to an exact “scale” (a ratio of size; the length of a line on the drawing equals a proportional length on the building) and include dimensions, as well as plenty of detail on material choices and installation directions. Construction drawings were first called blueprints because a 19th century process for reproducing multiple copies of a set of drawings showed the building outline and dimensions in white over a blue background—a process that continued to be used well into the 20th century. These days, blueprints rarely even have blue ink, but the name is still used for the set of drawings that pro-

vides a detailed map for the builder to follow while turning a designer’s vision into reality.

Depending on the complexity of the project and the requirements of the local building department, blueprints can range from a couple of simple sheets that convey code-minimum requirements to a thick sheaf of documents that lays out every construction decision right down to the cabinet pulls.

In this article, we show only a few pages of a complete set of construction drawings. The intent here is to provide a short introduction for carpenters and other tradespeople on how to begin to navigate a set of construction drawings. Our hope is that this will help young workers know how to study and better understand

All drawings adapted from original blueprints by Kaplan Thompson Architects. All errors and omissions are the responsibility of JLC. Intended for illustration purposes only.

Window and door locations are noted with window numbers placed in hexagons and door numbers in circles. These symbols cross-reference with the elevations and window and door schedules.

Some information may be somewhat cryptic: for instance, the note "door in accordance with IRC 2009 (302.6)." This note puts the onus on the builder to know not only how to install the door but also how to properly install adjacent fire-separation materials between the garage and conditioned living space in order to meet code. Highlight and keep track of impactful notes such as this.

Building section symbols indicate where sections are taken from and in which direction. The symbol consists of an "arrow" superimposed on a circle noting the drawing number (top) and the sheet number on which it appears (bottom). See "section 2, sheet A-3.1" on page 33. Exterior (and interior) elevations are referenced as well. See "elevation 1, sheet A-2.1" on page 33.

Wall assembly types are noted and cross-referenced with elevations, sections, and assembly drawings and notes. See "sheet A-9.1", page 35, for sample assembly drawings and notes.

Drawings often have a grid system to help navigate the set of plans and orient the reader.

Title blocks typically note the client, builder, architect, and engineer. If required, they also include an architect's and/or engineer's approval stamp.

Title blocks also help navigate the set of drawings and maintain version control. Check for revised dates (only the most recent version is approved for construction). Also, check for specific revisions on drawings (revised areas enclosed with "clouds"; the clouds numbered and keyed to title block).

PROJECT: RENOVATION/ ADDITION
STRUCTURAL Engineer
BUILDER Builder

Rev.	Date	Description
1	9/27/2017	FOR CONSTRUCTION
2	11/21/2017	FOR CONSTRUCTION

FIRST FLOOR PLAN
A-1.2

The floor plans are typically at the beginning of a set of drawings. In addition to showing the location of walls and dimensioning, floor plans contain information that often references other sheets in the drawing set. A variety of symbols are used to indicate section cuts, interior and exterior elevations, and window and door locations.

their scopes of work, and in a larger sense, foster better communication between the construction trades and designers.

ARCHITECTURAL VS. STRUCTURAL PAGES

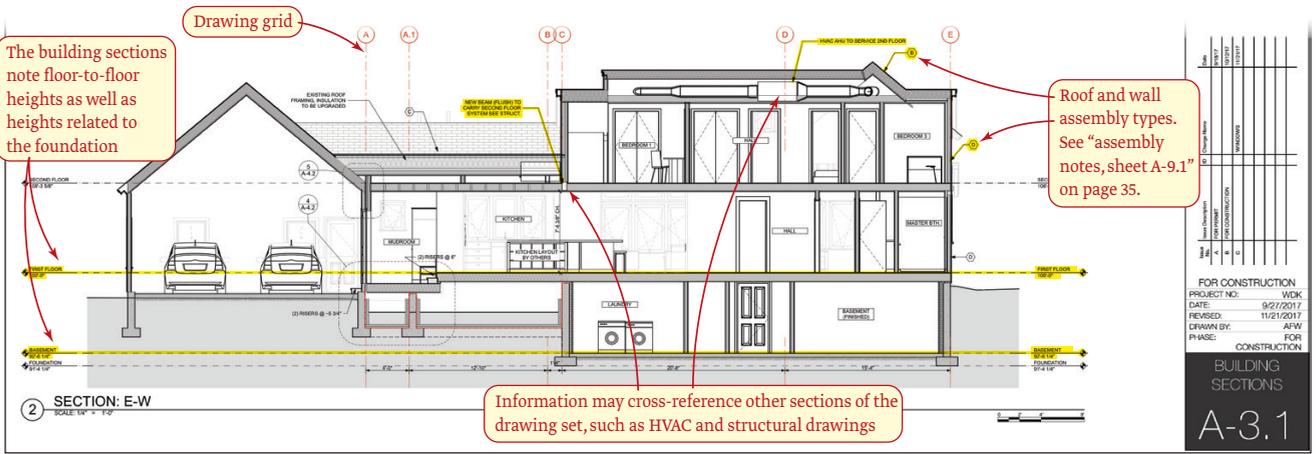
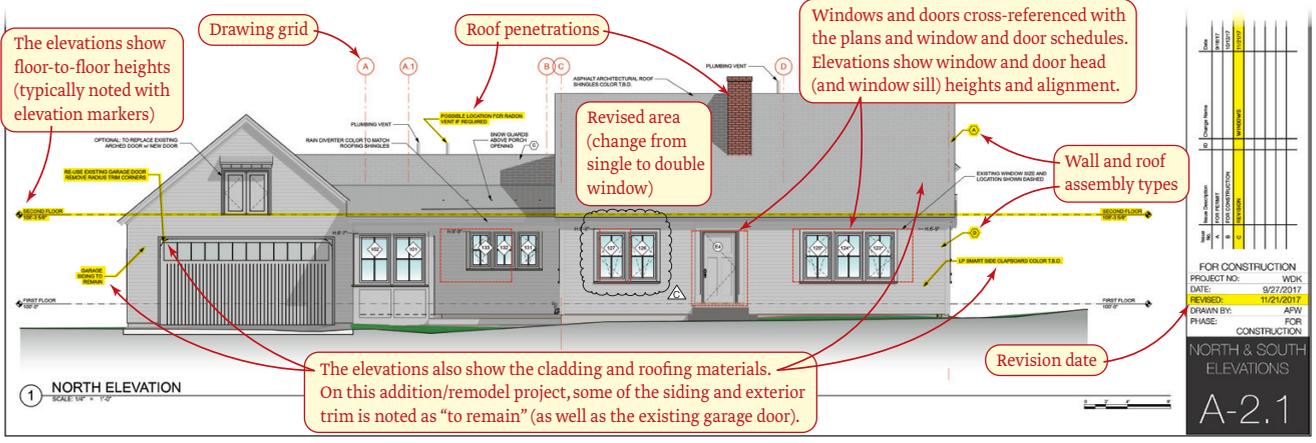
Most plans are broken out in several different ways. One of the most important to carpenters is the distinction between "architectural" and "structural" details. Architectural details show things like room dimensions, fixture locations, window and door locations, and finish materials. Carpenters use the dimensions on the architectural sheets to lay out wall framing and to verify, for example, that a floor joist is not located where a toilet drain has to go. The architectural pages of a plan are usually designated by the letter "A" followed by a page number.

Structural pages show locations and sizes of important details

such as footings, foundation walls, posts, and beams, and these pages are marked with an "S" and a page number. Large projects may have pages for electrical, plumbing, and mechanical contractors as well.

ELEVATIONS AND PLAN MAP THE PROJECT

Usually, the first few pages of a set of drawing show "elevations"—views of the building's vertical planes, as seen from one direction. These show you what a vertical plane looks like when you are looking square on the finished building front, side, or rear. Elevations provide a quick overview of what you're about to build. Most of the time, these are only provided for the exterior, to show siding materials, exterior trim, final grade, the relative heights of floors and eaves, and window and door locations. If the designer intends for window and door heads to align, this is where it would



Partial sheet "A-2.1" shows the north elevation (or "Elevation 1"). The exterior elevations indicate siding, exterior trim, roofing, and roof penetrations as well as the finish grade, relative heights of floors and eaves, and window and door locations (top). Partial sheet "A-3.1" shows the building section (or "Section 2"). A section allows you to see through the building and display critical information to the builder. Note where in the building a section is taken, which way it is "looking," whether it is straight or offset, and what information it is designed to show (bottom).

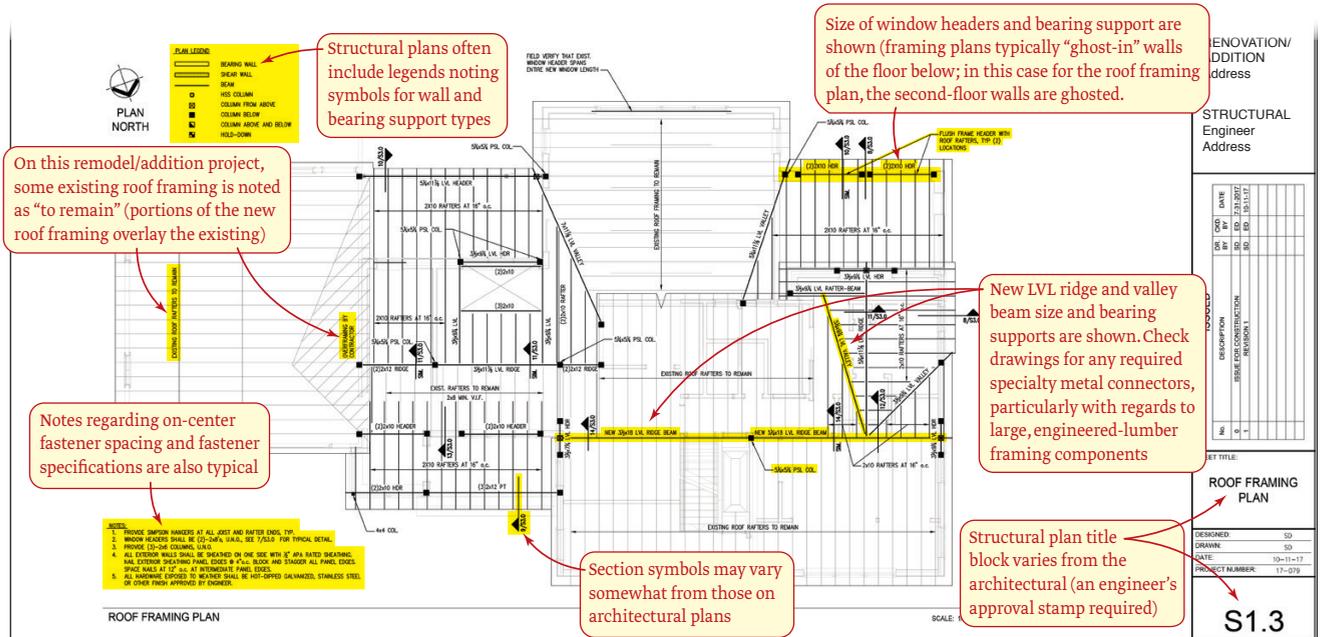
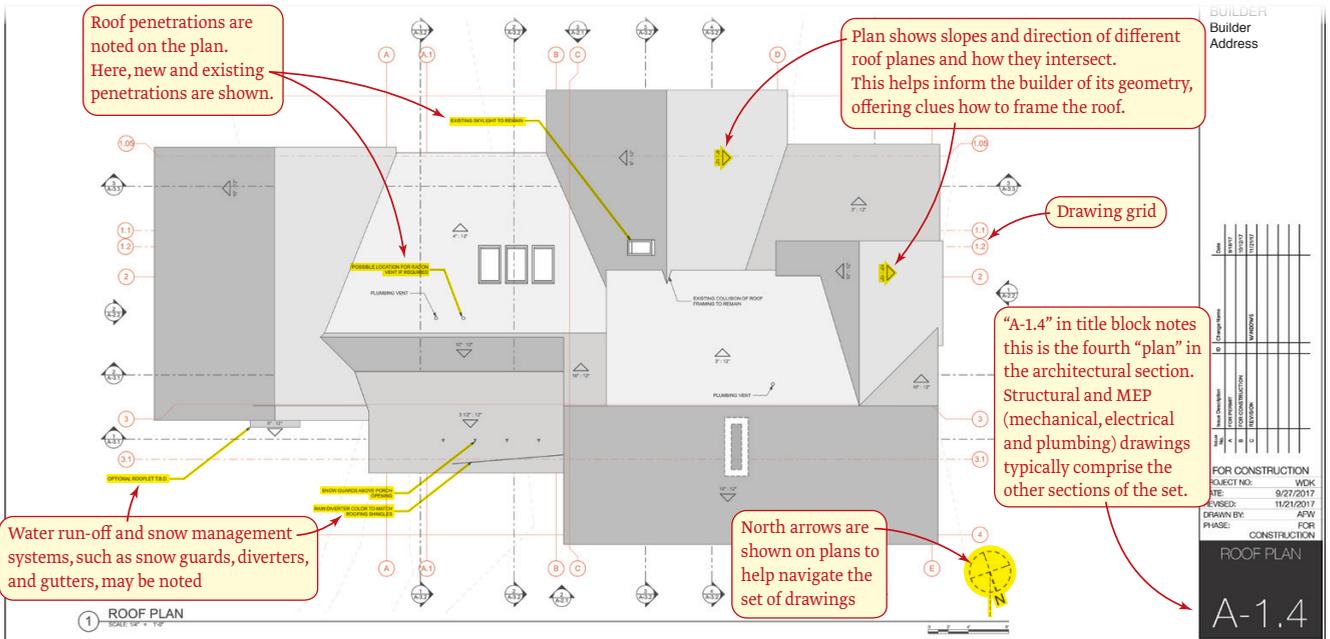
be shown. However, plans for higher-end homes with lots of interior trim may also include interior elevations. Interior elevations are especially useful in areas like kitchens and baths where there is a lot of cabinetry and other built-in casework.

Plan view. Since drawings are two dimensional, elevations don't show how different faces of a building may relate to each other. For example, you can't tell how far a breezeway to the garage is set back from the front of the house. To see these differences requires the "plan" view.

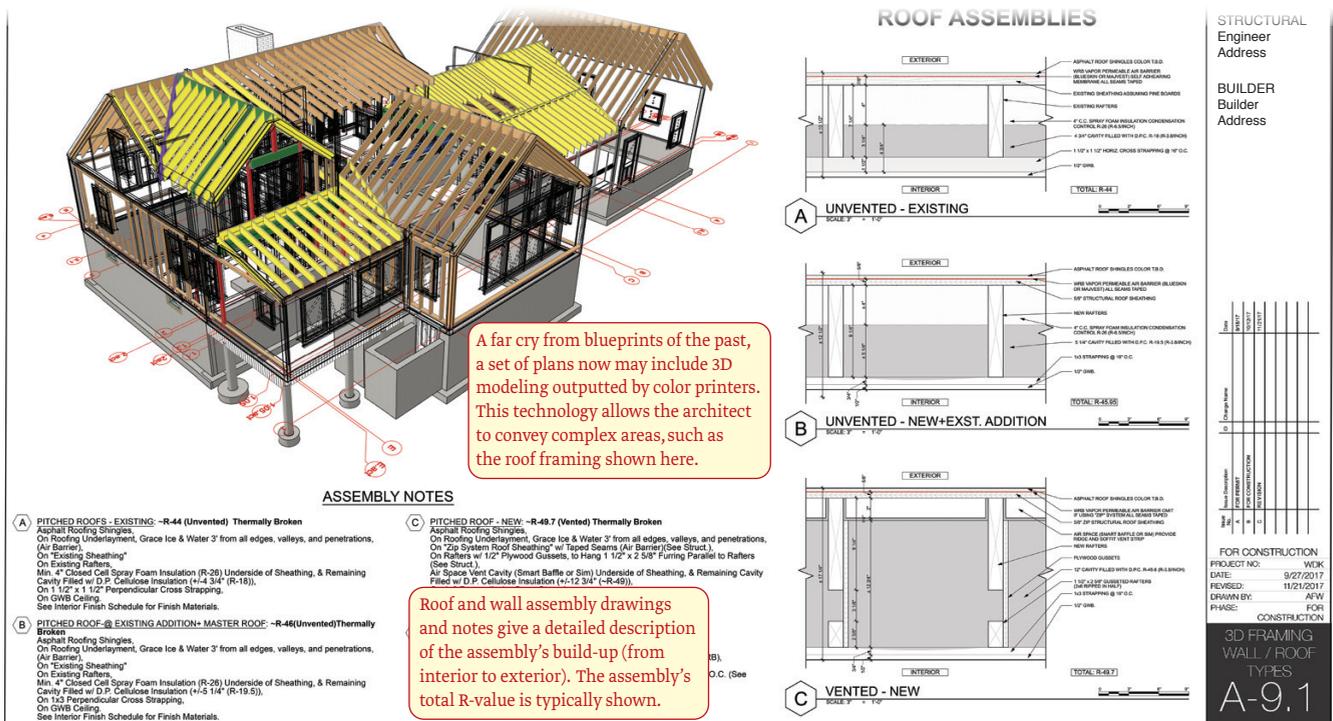
A plan view is like a road map where you look down on the geography of that house. Each level of the house will have at least its own page in plan view showing dimensions for all the walls and

permanent fixtures, such as doors, windows, tubs, and toilets, and a basic kitchen layout. Most plans will provide dimensions for every wall and opening, and the center locations for all those fixtures. Besides illustrating the locations of walls and partitions, plan views reference other sheets in the drawing set, using a variety of symbols to indicate section cuts, interior and exterior elevations, and window and door schedules.

Remodeling plans. For remodeling projects, the plans will specify which parts of the house are part of an addition, which existing areas are to be remodeled, which areas need to be demolished (sometimes called out on a separate demolition plan), and which areas are to be left alone.



Partial sheet “A-1.4” shows the roof plan (top). The roof plan notes all penetrations, such as chimneys, vent pipes, and skylights, as well as the various roof slopes and how they intersect. Partial sheet “S-1.3” shows the structural roof framing plan (bottom). Notes regarding on-center fastener spacing and fastener specifications are typical. For this remodel and addition, the roof framing, ridges, valleys, beams, and headers are superimposed over the “ghosted” second-floor plan.



Partial sheet “A-9.1” shows a 3D model made with BIM (building information modeling) CAD software that helps framers identify the roof framing components needed for this remodel and addition. The roof and wall assemblies, shown in section on the right, give a detailed description of the layers from interior to exterior and include performance details, including total R-value.

Framing plans. Of particular use to carpenters are the framing plans, which, when included, are typically pulled off on separate sheets that are drawn by a structural engineer or licensed architect and show location and size (and on-center spacing) of joists, rafters, beams (ridges and valleys), window and door headers, and columns. Unless otherwise specified, framing dimensions on plans are usually plate to plate, before any sheathing or drywall is applied.

When laying out rough openings, it’s always a good idea to check the dimensions on the plan view against the door or window manufacturer’s published opening sizes. If there’s a discrepancy, the manufacturer is usually right, but you should still make the designer aware of the situation.

A good set of plans goes so far as to include the layout for all joists and rafters, and may include 3D outputs to model complex framing. However, in many cases, the plans only specify the spacing and leave out the rest for the carpenter to figure out. When you’re the one doing that, study all sections and related sheets carefully. You might not think a carpenter needs to know the location of, say, a toilet, until you’re called back to move a joist that’s in the exact place the plumber

needs to run the drain line for that toilet. Identifying discrepancies early can go a long way to ensuring the job runs smoothly.

SECTIONS HELP YOU SEE INSIDE

For a simple project, elevations and plan views may be all an experienced carpenter needs. Few projects are that simple though, and a third way of seeing is usually included. Called a “section,” this view cuts through a wall, floor, or roof to provide details of material size or installation that can’t be gleaned otherwise.

Section views are called out with lines through the plans at the relevant area and are labeled on the elevation view with an alphanumeric reference, such as A1 or S3. More than any other type of drawing, sections are deliberately included in the drawing set to display critical information to the builder. Study them carefully. Note where in the building a section is taken, which way it is “looking,” whether it is straight or offset, and what information it is designed to show.

NOTES AND SCHEDULES PROVIDE DETAILS

Elevations, plan views, and sections are all visual, but they don’t tell the entire story. Sometimes, the entire story doesn’t need

