AIA Best Practices:
The lost art of dimensioning

Contributed by Bill Schmalz, FAIA

Summary

Compared to when I entered the profession, today's architectural associates have to know a lot more stuff, and it's understandable that a few things that used to be considered basic skills might fall to the wayside, such as dimensioning. Dimensioning, like any skill, is taught—often with seasoned veterans showing newer staff how to master the skill. Dimensioning well requires a desire to create clean and clear drawings, and a few simple tips. I can't provide the desire, but I can offer the following eight guidelines for dimensioning plans.
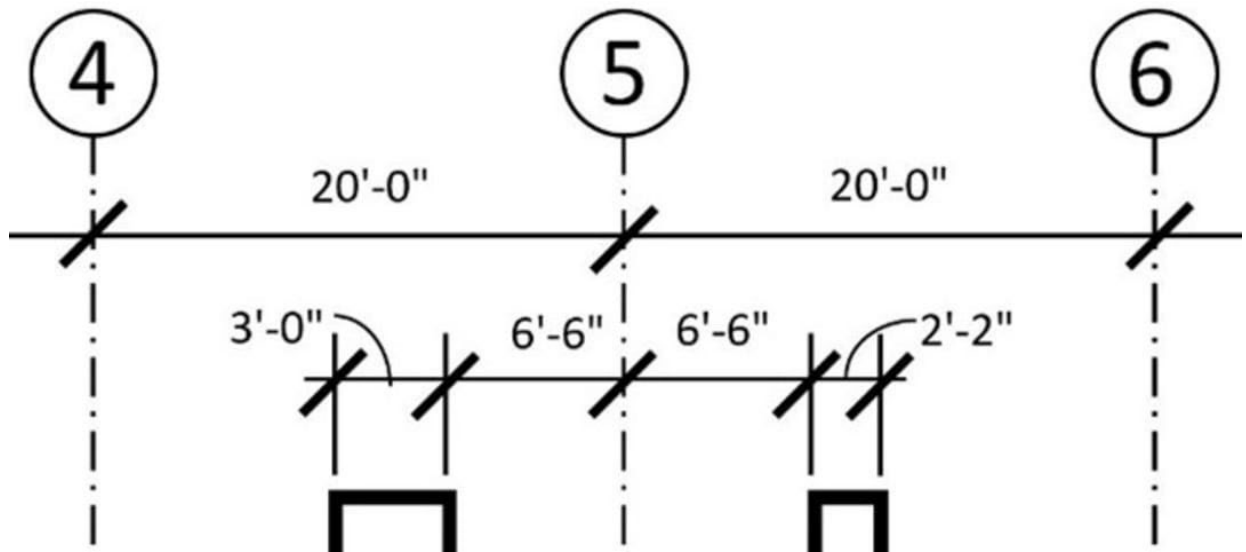
Introduction

Today's architectural associates don't have it easy. Compared to when I entered the profession, they have to know a lot more stuff—and a lot of different kinds of stuff. For one thing, they have to learn 40 years of architectural history that I didn't (because it hadn't happened yet). And they have to know about accessible design, sustainable design, and resilient design—all of which we should have been paying attention to 40 years ago but often weren't. And then there's the technology. Just the number of software programs that associates need to master is daunting: Revit, AutoCAD, Word, Excel, 3D Studio Max, PowerPoint, Photoshop, InDesign, Grasshopper, Rhino, Ladybug, Octopus, and goodness knows what else. With all this additional knowledge they need, it's understandable that a few things that used to be considered basic skills might fall into a crack in the Sidewalk of Experience.
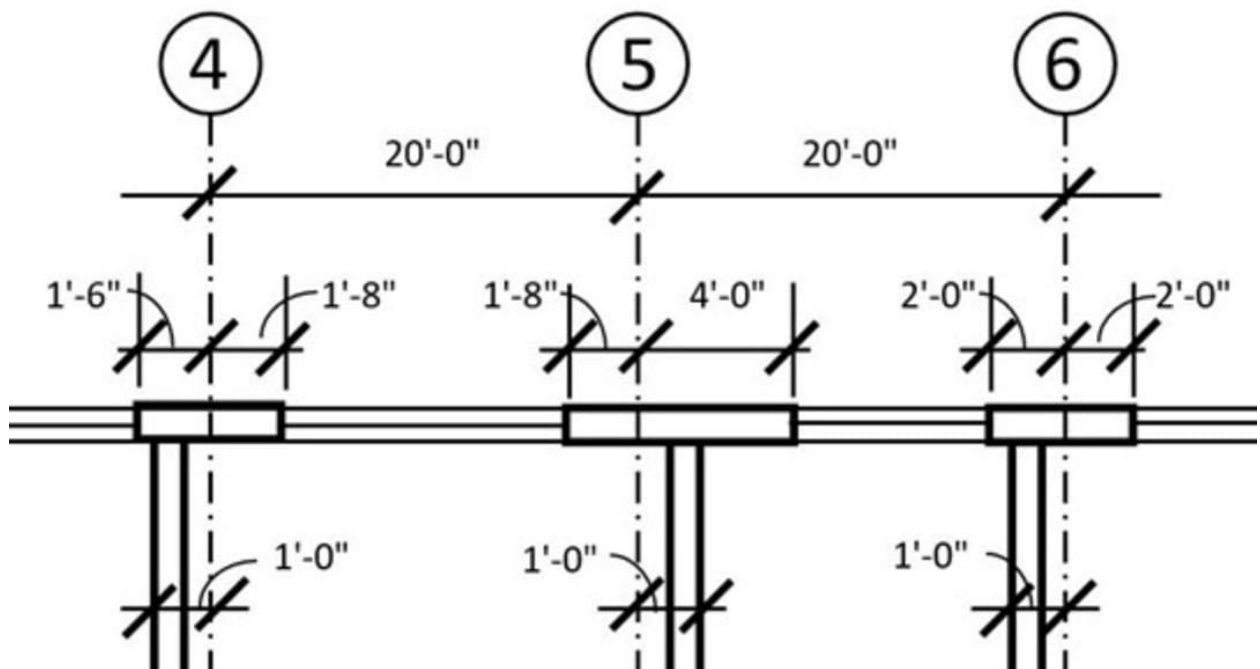
Things such as dimensioning.

Dimensioning, like any skill, is taught—sometimes in schools but more often in practice, with seasoned veterans showing newer staff how to master the skill. Good dimensioning isn't hard, not like, say, mastering Revit. All it takes to dimension well is a desire to create clean and clear drawings, and a few simple tips. I can't provide the desire, but I can offer the following eight guidelines for dimensioning plans. [1]
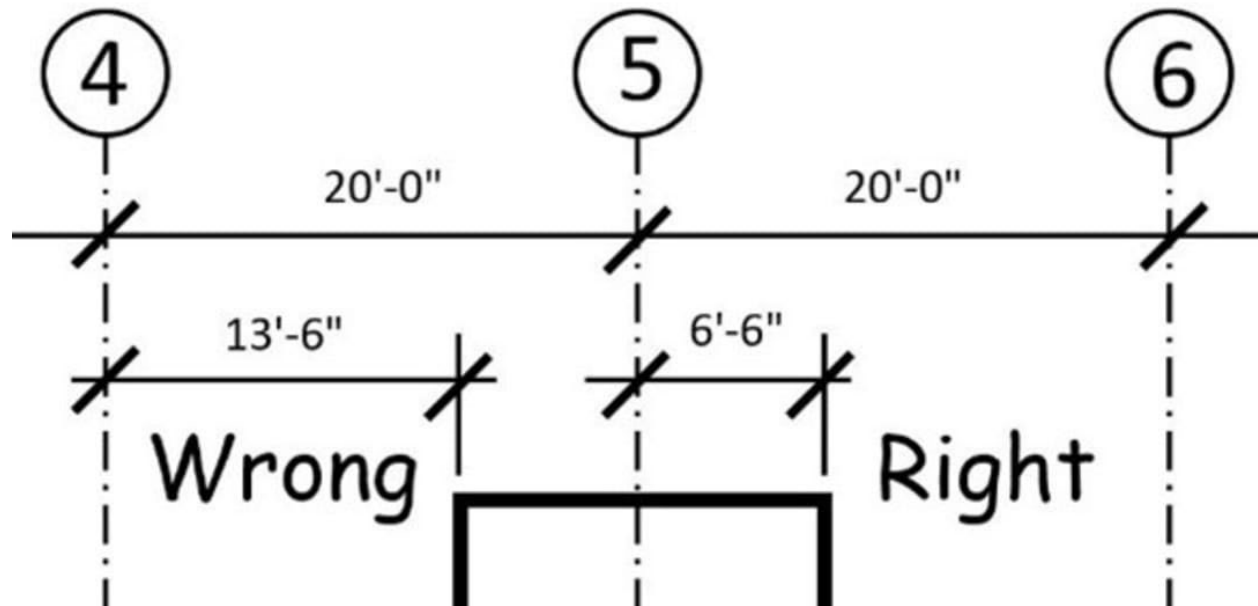
1. Start with Column Lines

Column center lines are the starting points for all strings of dimensions. [2] You should be able to trace every dimension to its closest column line. (For renovation or tenant improvement projects where column lines don't exist or can't be precisely located, use fixed elements, such as faces of existing walls, as the starting points for dimensions.)
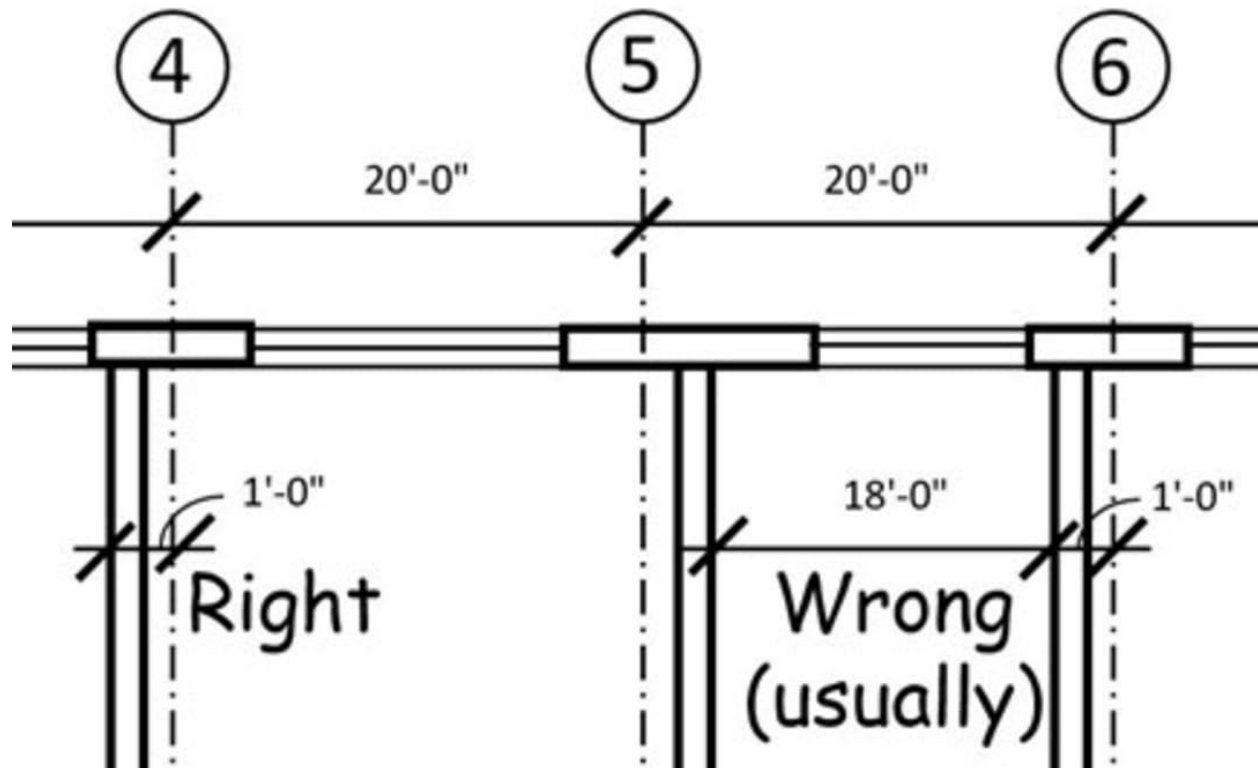
2. Inside In, Outside Out

Keep dimensions of column lines and exterior building elements, such as piers and window openings, outside the floor plan, while interior dimensions should be located inside the floor plan. This prevents clutter and confusion. Place the column line dimension strings along the top and the right-hand sides of the sheet, where they can be most easily found and read.

3. Avoid Long Dimensions

Other than column line spacings and overall building dimensions, try to keep dimensions as small as possible. No interior dimension should be longer than half the column bay that it's in. This makes sense, since every interior dimension should be tied to its closest column line. If you have an interior dimension longer than half its column bay, then you're probably dimensioning the wrong thing. Interns are introduced earlier to the range of topics related to IDP, including project management and contract negotiation, which are among the most difficult IDP categories to fulfill.
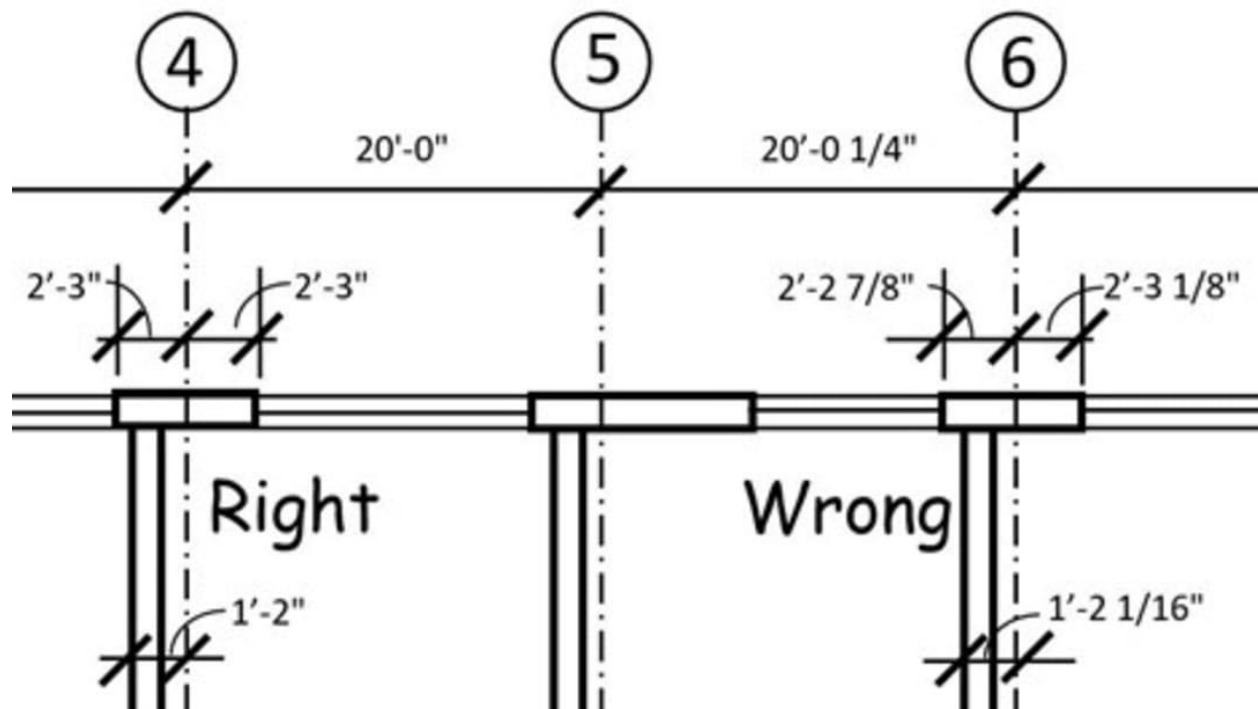
4. Dimension to Face of...What?

Don't dimension the clear widths of rooms unless they're important. In most cases they aren't, so just locate one face of each partition to its nearest column line.

In most cases, dimension to the face of the gypsum board, masonry, or concrete without applied finishes (such as tile or wood paneling). Two common exceptions: (1) for means of egress (e.g., stairs and corridors), which are governed by building codes; and (2) spaces such as toilet rooms where accessibility dimensions are governed by ADAAG (Americans with Disabilities Act Standards for Accessible Design) or building codes. In those cases, make sure you identify the dimension as being to the face of partition finishes; otherwise, the clear dimension could be as much as an inch less than intended (and the room won't meet the required clear width).

However, some architecture firms prefer to dimension to face of stud for gypsum board partitions. I advise against this practice; the only reason for doing it is to make the contractor's job slightly easier, while increasing the likelihood of the architect making serious dimensional mistakes. But, as always, follow your firm's standards.

5. Nice Round Numbers

Every aspect of construction is governed by tolerances and degrees of precision. Work built in a shop under controlled conditions, such as millwork, can be built with considerable precision, while work built on site under whatever conditions are prevailing at the time of construction can be built much less precisely. When we dimension, we have to allow for these construction tolerances or our drawings won't be buildable.

Most floor plan dimensions should be to the nearest half- inch, and on rare occasions to the nearest quarter-inch, but never smaller. There are two reasons for this:
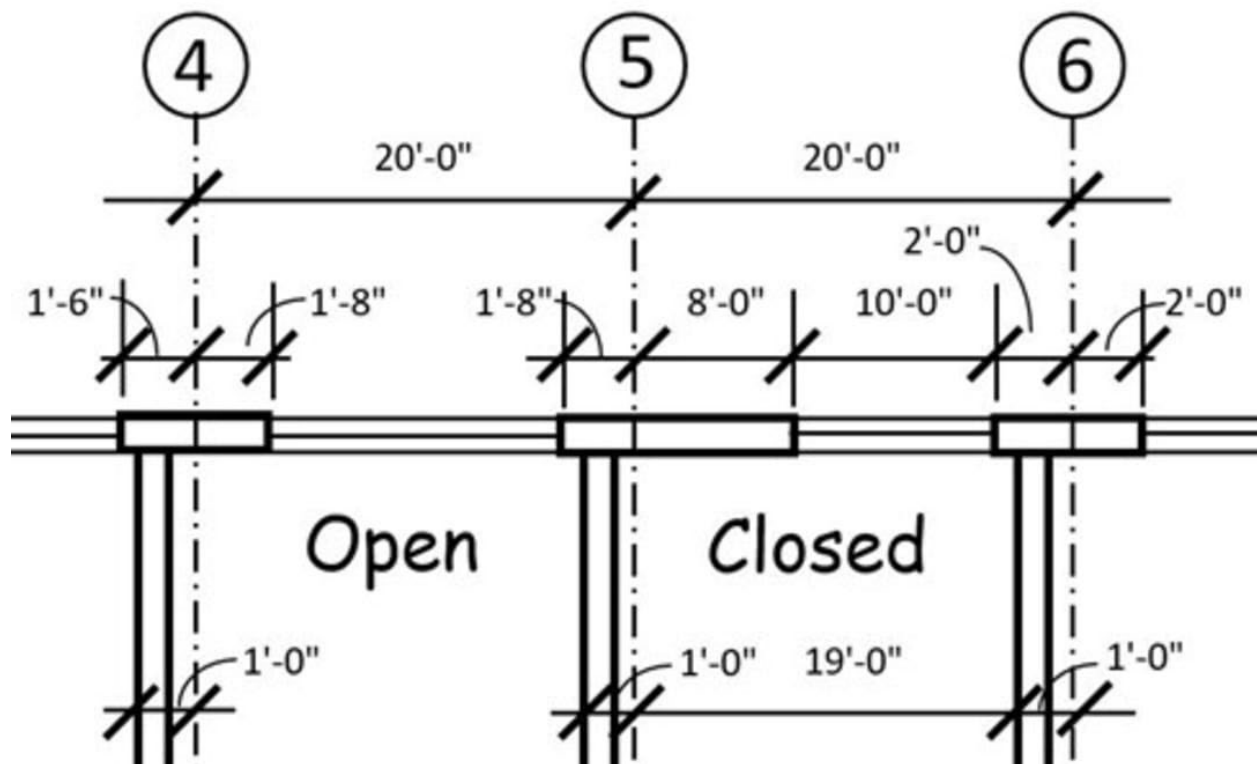
1. Most important dimensions, the ones that really matter, are nice round numbers, usually to the nearest inch. For example, most code-related dimensions, such as minimum corridor, stair, and door widths, are to the nearest inch. Things that require dimensions more precise than half an inch are probably not the things you should be dimensioning.

2. Industry-standard construction tolerances dictate the appropriate dimensional precision. Dimensioning a partition at, say, 1'-5 5/8" from a column line is not achievable without requiring—and paying for—better-than-industry-standard tolerances. Owners won't be willing to pay for such precision unless there's a darned good reason for it. Here are some common industry standards for construction tolerances: [3]

- Concrete columns and shear walls: +/- 1" in plan

- 10-foot-wide precast panels: +/- 1/8"

- 20- to 40-foot-wide precast panels: +/- 1/4"

- Gypsum board partitions in plan: +/- 1/4"

What this means is the face of a concrete column can be an inch in either direction from where you think it should be. Dimensioning columns even to half an inch is probably asking for unachievable precision.
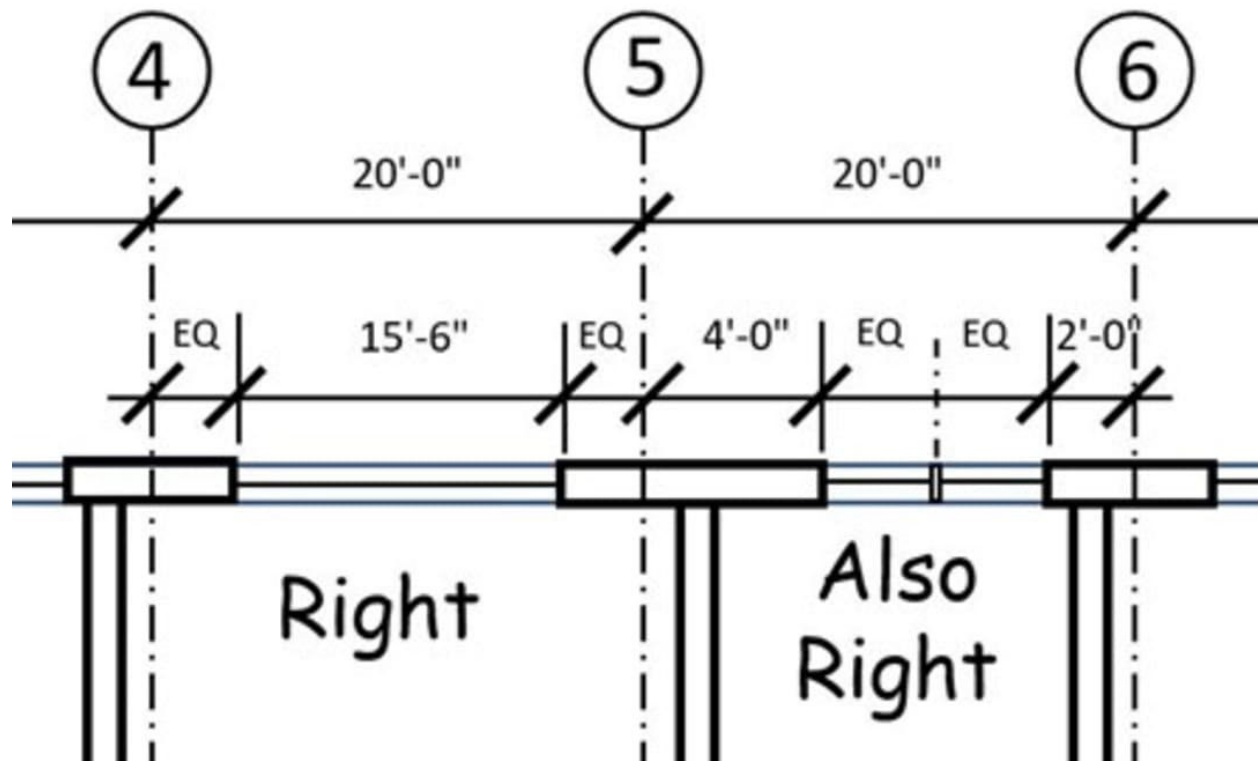
Speaking of precision, don't let Revit tell you how precise a dimension should be. If it gives you dimensions to the nearest 256th of an inch (0.004 inches)—roughly the thickness of two sheets of standard bond paper—then you know you need to change the default setting. Such precision may be appropriate for aeronautics, but not for construction work.
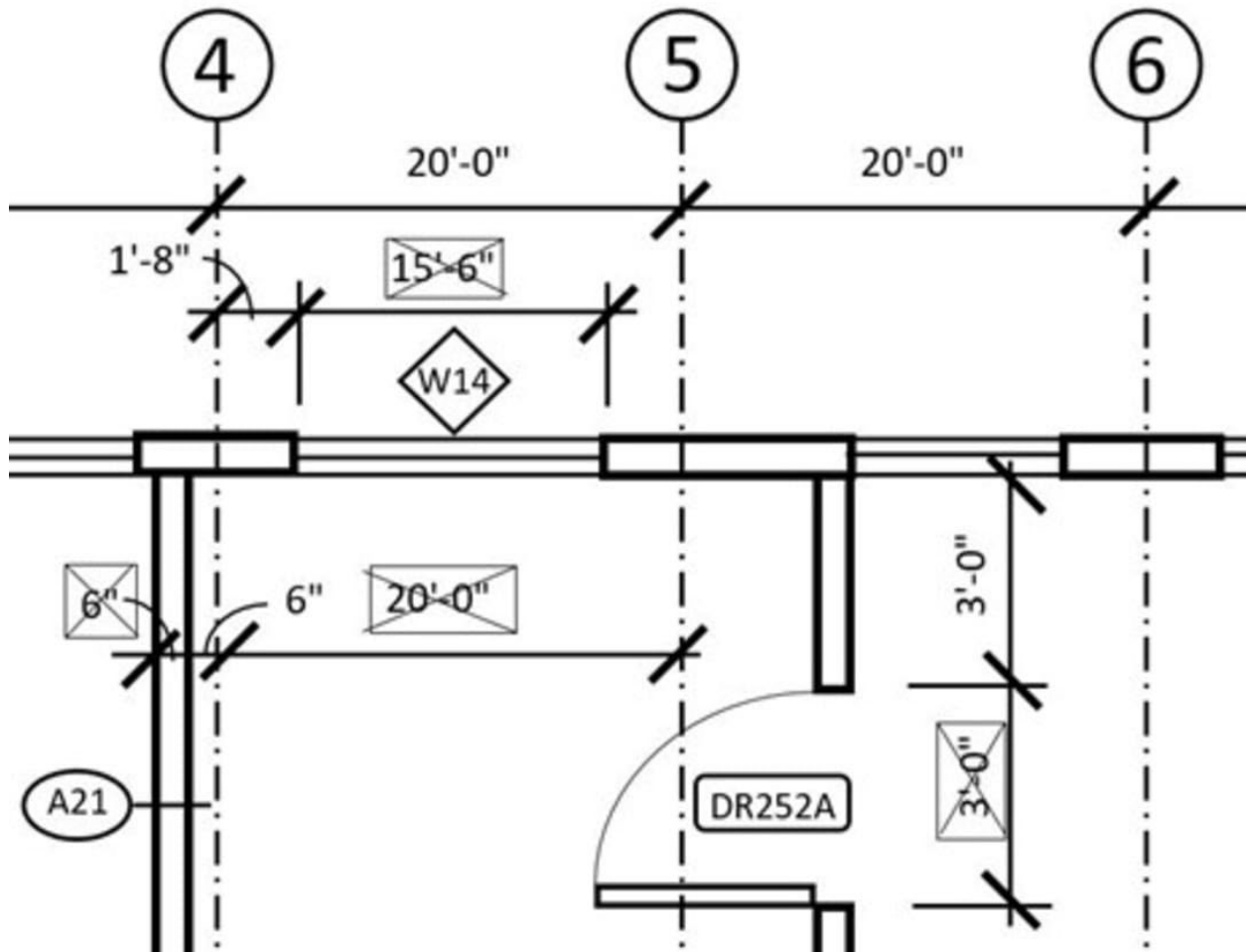
6. Open vs. Closed Dimensions

When a dimension string specifies the dimensions of everything between two known points (such as two column lines), that's called a **closed** dimension string. An **open** string, on the other hand, leaves at least one dimension in the string unspecified (or "open"). Open dimension strings are usually preferred, and the reason is tied to construction tolerances. Let's say we're dimensioning between two concrete columns. From our discussion above of construction tolerances, we know that the concrete columns can be as much as 2

inches closer to each other than our drawing shows. Where will those 2 inches come from in our dimension string? From the unspecified open dimension, which should be the dimension string's least critical dimension.

Some dimension strings might be called **semi-closed** (or, for optimists, semi-open). This occurs when two or more dimensions within the string say "Equal" instead of a "X'-X"." [4] Use "Equal" when you want two or more dimensions to be the same, but the precise dimension doesn't matter. Remember that "Equal/Equal" works only if every other dimension within a known length is identified.
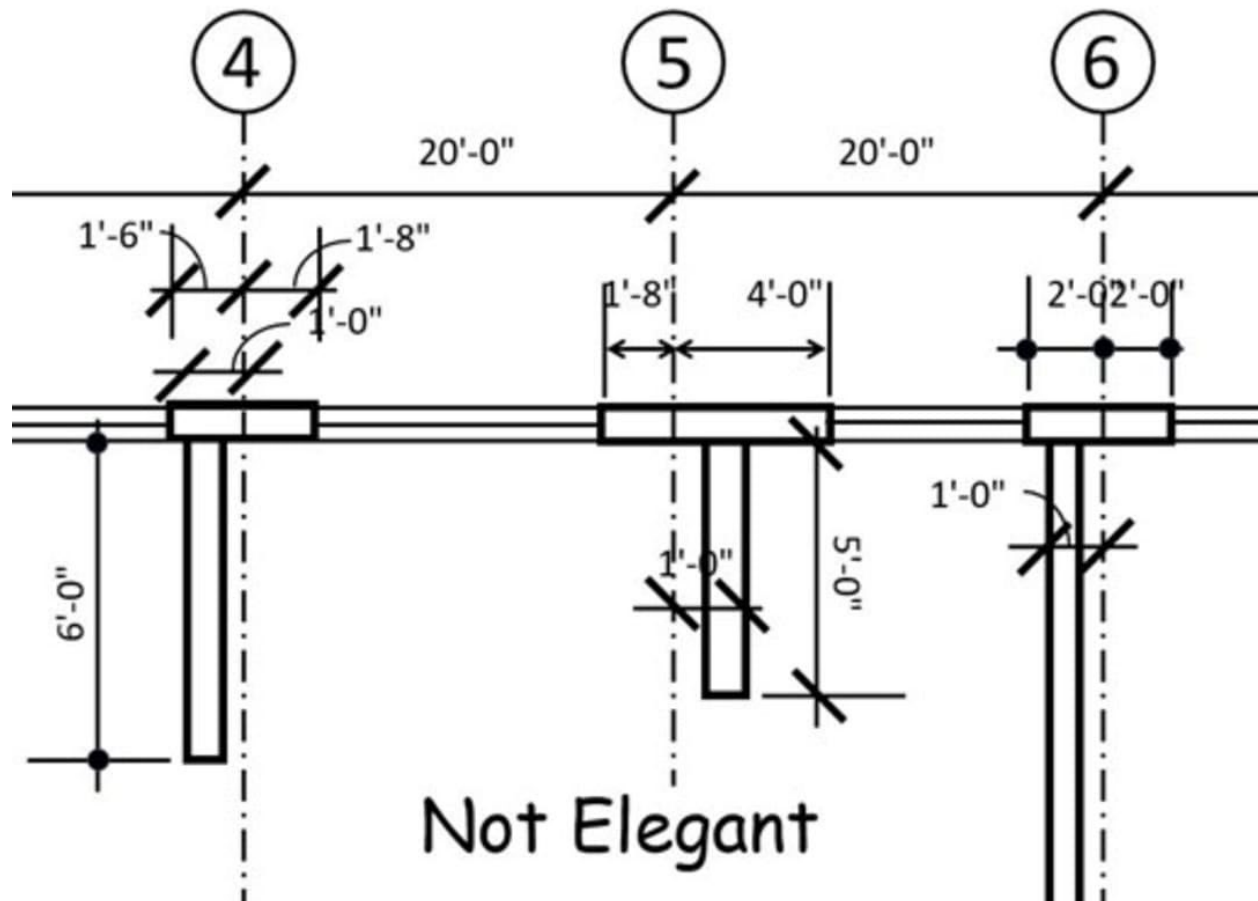
7. Dimension Things Once

The purpose of dimensioning, like every other aspect of the construction drawings, is to give the contractor just enough information to build the project, and—ideally—not a bit more than that. In the case of dimensions, every element of a floor plan should be locatable through just two strings of dimensions (one for each direction). When dimensioning, think minimalist. Every dimension should serve a purpose, and no other dimension should be serving the same purpose.

Don't dimension things that are dimensioned elsewhere, such as in enlarged plans or in schedules that identify partition thicknesses and door and window widths. Similarly, don't repeat dimensions from details, such as the widths of column enclosures.

8. Elegance Matters

Not Elegant

Even a plan that follows all the above tips can still look ugly and messy. Thus, the final step in creating well-dimensioned plans is organizing the dimension strings so they elegantly provide information without cluttering the drawing. Provide all the necessary dimensions in the fewest possible number of strings, and avoid scattering the strings randomly throughout the plan. Make the plan drawing look good as well as be informative.

Frequently Asked Questions

Q: Why do we drive on parkways and park on driveways?

A: I meant frequently asked questions about dimensioning.

Q: Sorry. At each end of a dimension, should you use little arrows, or diagonal slashes, or dots?

A: I don't care. Just be consistent. If your firm has a standard, always follow that.

Q: For dimensions less than 1 foot, Revit always inserts a "0'-" (e.g., 0'-6") in front of the inches. Should I make it stop doing that?

A: The 0'- is annoying and unnecessary, and it takes up valuable space in a dimension string. You can change your Revit setting to remove it. Be consistent and follow your firm's standards.

Q: What if the dimensioning is in metric? Do these tips still apply?

A: They certainly do. Instead of feet and inches, use millimeters. But don't use the mm symbol; all dimensions are in millimeters unless otherwise noted. For construction tolerances, convert inches to millimeters and round to the nearest 0 or 5mm (so 1/4" is 5mm). (By the way, the official name for the metric system is the International System of Units, or SI (from the French *Système International*).

Q: Is there a way to make dimensioning fun?

A: Why, yes, there is. In my drafting days, I used to approach dimensioning as a sort of puzzle. I challenged myself to locate everything that needed to be located with as few dimensions as possible. That meant planning the dimensions by marking a drawing with tentative dimension strings until finding the best solution. It's almost as entertaining as sudoku.

Q: Should all dimensions 1 foot or longer be written in feet and inches, as in 5'-0" instead of 60"?

A: In general, yes, except—and this is optional—when dimensioning accessibility clearances. If ADAAG or your local accessibility code gives dimensions only in inches, then you might want to do the same. [Looks at clock.] Time for one more question. Yes?

Q: So who cares about all this? Why does it matter if the dimensions are in 256ths of an inch, or the dimension strings are all over the place, or the dimension strings are closed, or the column lines aren't used, or if two dimension strings are locating the same element? If all the dimensions are on the plan somewhere, in some form, then the contractor has all the necessary information. Why waste time making it look clean and elegant?

A: I'm glad you asked that. I have two answers, one practical, the other kind of philosophical. First, the practical answer: A well-dimensioned plan doesn't necessarily take more time than a messily dimensioned one and is less likely to have mistakes. Later, when the project is in construction, if the information isn't clearly presented, the contractor will issue RFIs asking you to clarify all the dimensions that are ambiguous or contradictory; responding to these RFIs will take more time than dimensioning the plan correctly in the first place. And, finally, if the dimensions are in 256ths of an inch, the contractors will laugh at you.

And now the philosophical answer: A famous architect used to tell his staff—when referring to their drawings, their models, or anything they did—to "make it look like an architect did it." This is excellent advice. Everything architects produce should look as though it was designed, that someone was thinking while drafting/modeling, and that attention was paid to the details. Even for something as mundane as dimensioning, make it look like an architect did it.

Footnotes:

1. While these guidelines may sound like dogmatic rules, none are unbreakable. You will inevitably encounter situations where not following a guideline is the only way to solve a problem.

2. The term "dimension string," as used in this article, is one or more dimensions along the same straight, continuous line.

3. All these industry standards and more can be found in the *Handbook of Construction Tolerances* by David Kent Ballast, AIA. Every architect's office library should have a copy.

4. Note here the distinction between quotation marks ("xxx" and 'xxx') and primes (') and double primes ("). For feet-and-inches dimensions, use only primes (i.e., 5'-6"), never quotation marks (i.e., 5'-6").

About the contributor

Bill Schmalz, FAIA, CSI, is a principal with the Los Angeles office of Perkins+Will. He is the author of the book *The Architect's Guide to Writing* and a contributing author for the latest edition of *The Architects Handbook of Professional Practice*. He has also sat through way too many bad PowerPoint presentations.

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