

Laying Out and Detailing Wall Plates

How a seasoned framer quickly and accurately transforms blueprint dimensions into templates for walls

BY LARRY HAUN

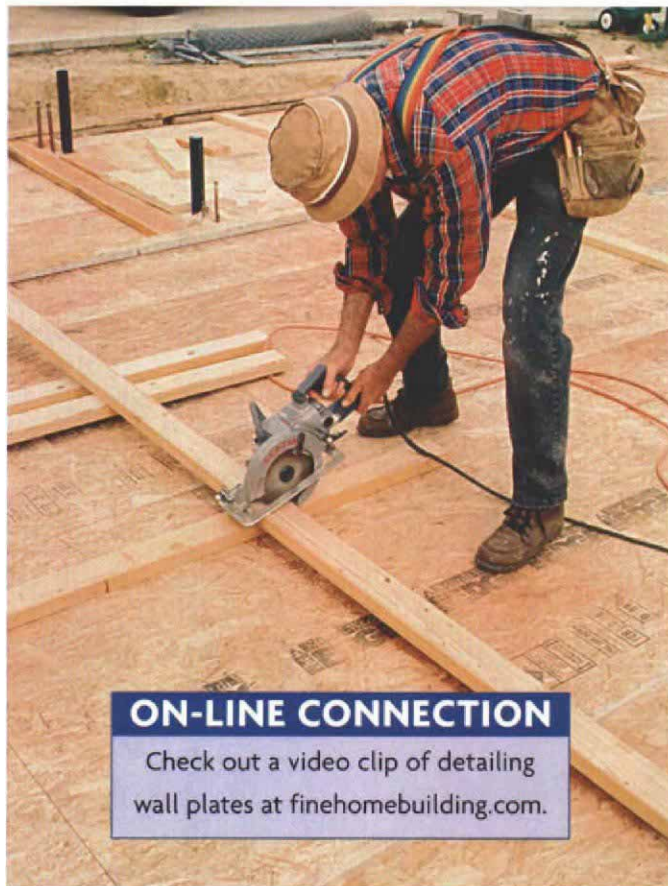
As a beginning carpenter, I was so afraid of making a mistake when laying out walls that the process took me hours. Layout seemed like an exact science, one whose rules I didn't know.

Transferring measurements from blueprints to full-size markings on the floor and then cutting the wall plates to fit these markings set the stage for all of the carpentry that follows (drawing facing page). If the walls are out of parallel or if rooms are not square, roof rafters, cabinets and even floor tiles won't fit properly.

Done correctly, though, wall layout leaves a set of clearly marked plates—templates, in a sense, that can enable relatively inexperienced carpenters to assemble the walls. Well-laid-out walls compensate for errors in the floor, be it slab or frame, and ensure that fixtures such as bathtubs fit between the walls. Once I learned the rules, learned where being off $\frac{1}{4}$ in. matters and where it doesn't, I relaxed and then began to enjoy laying out walls.

The plans may not tell the whole story

Before beginning to frame a house, I study the plans at home. I note what the plans show and what must be inferred. There are often differences between plan dimensions and what is needed on the job. For example, plans may call for 36 in. between walls for a



set of stairs (drawing right, p. 100). So that the stairs themselves will measure a full 36 in., I leave at least $38\frac{1}{2}$ in. from stud wall to stud wall. The extra $2\frac{1}{2}$ in. leaves enough room for $\frac{1}{2}$ -in. drywall and a $\frac{3}{4}$ -in. skirt-board on each wall, enclosing 36-in. treads and risers between them.

To accommodate a bathtub, most bathrooms need to be 60 in. wide. I usually frame bathrooms $\frac{1}{8}$ in. or $\frac{1}{4}$ in. big so that the tub can be installed with ease. Nonstandard-size tubs are becoming more common, and in these cases, the tub supplier may be a more reliable source for the tub's dimensions than the plans.

Plans often call for halls to have 36 in. between finished walls. To achieve this dimension, the studs and plates must be 37 in. apart, allowing for $\frac{1}{2}$ -in. drywall on each wall. For that matter, 36-in. halls, common on older stock plans, don't allow adequate room for code-required $2/8$ (32-in.) doors and their trim.

I lay out halls ending at a $2/8$ door with 40 in. between stud walls, which leaves room for a 37-in. header with a king stud on each side (drawing left, p. 100). Typically, the extra inches are stolen from bedrooms on both sides of the walls, a theft that is hard to notice.

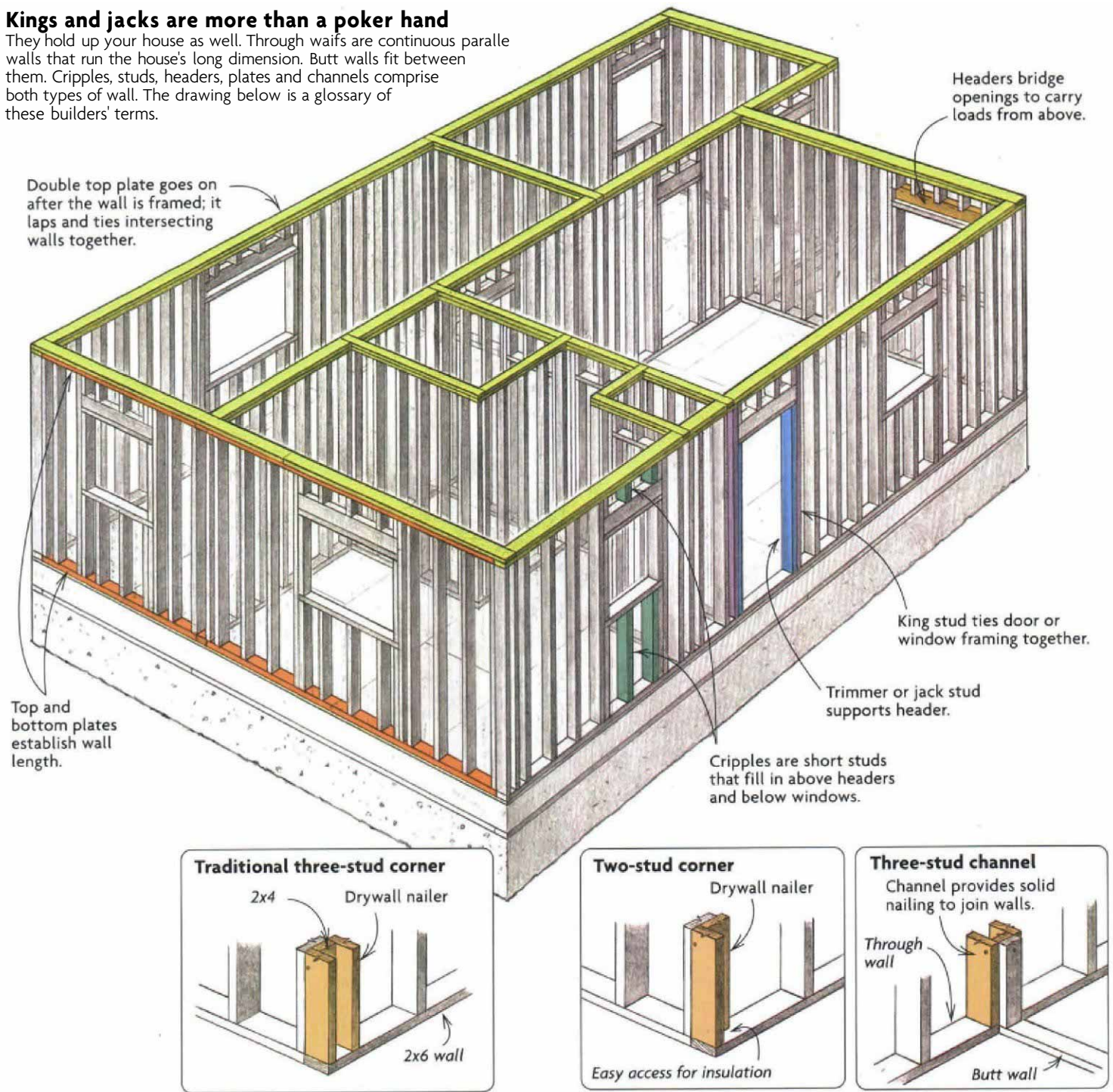
I check that all the plan dimensions are correct. It's not uncommon for the room dimensions and the thicknesses of their walls to add up to a different number than

that called out as the overall size of the house. Figuring out these discrepancies is much easier at my kitchen table than in the field. I note which walls are 2x4 (most interior walls) or 2x6 (most exterior walls and walls with plumbing). I make notes directly on the plans so that all the needed information is in one place, and I discuss any wall-location changes with the owner, builder or architect before snapping the wall lines.

Although following plan dimensions is important, most builders view plans as a guide and not as law written in stone. For example, when working on a concrete slab, you might find that a pipe will be 1 in. or so off layout

Kings and jacks are more than a poker hand

They hold up your house as well. Through waifs are continuous parallel walls that run the house's long dimension. Butt walls fit between them. Cripples, studs, headers, plates and channels comprise both types of wall. The drawing below is a glossary of these builders' terms.



(drawing p. 98). Fixing this error would be a huge job for the plumber, and it would slow the builder's schedule. Rather than snap the wall line to the plan dimension, you can usually move the wall to cover the pipe. Check first, though, that moving this wall doesn't affect adjoining areas where space is crucial.

Check floors for parallel and square

Once you're familiar with the plans, it's time to sweep the floor and to begin laying out walls. The first step always is to check that

the floor is parallel and square (drawing left, p. 98). I measure the floor from outside to outside at both ends of the longest exterior walls. If the measurements are equal, I mark the inside of the walls on the floor using a scrap of 2x4 or 2x6 plate stock as my guide. Pencil shows up well on wood, but I use keel, or lumber crayon, on concrete.

From these marks, I snap chalklines that establish the insides of the long walls (drawing top right, p. 98). An awl driven into a wood floor holds the end of a tape or chalk-

line. I use a weight on concrete slabs; in green concrete, you can drive a nail into the slab.

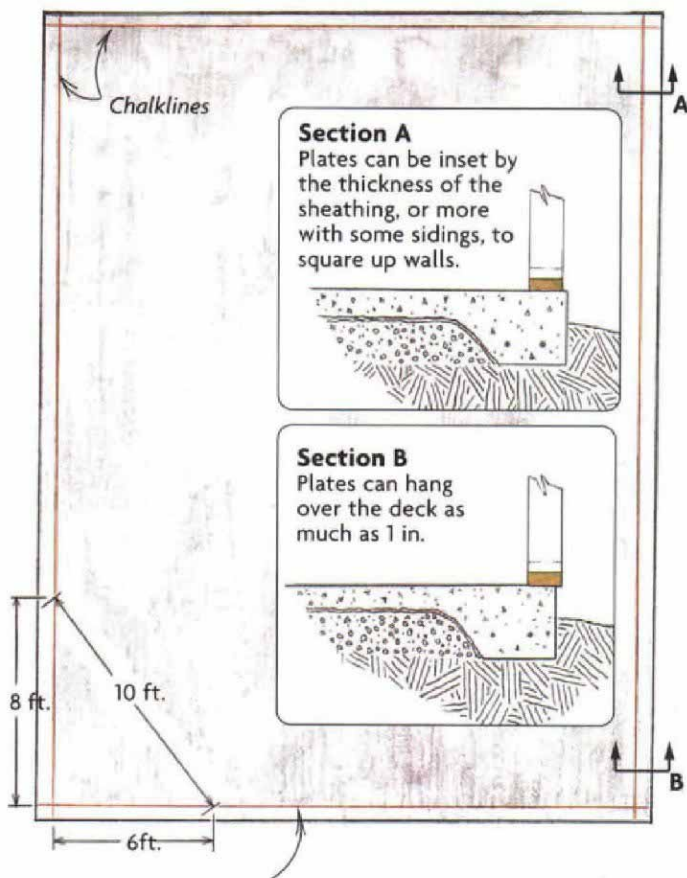
Be sure to stretch chalklines tight and to pull the line straight up when snapping. Chalklines released at an angle can leave a curved line on the floor. Snapping lines in the wind can also leave a curved line.

Tweaking walls square on an out-of-square deck

If the exterior walls are slightly out of parallel, adjustments can be made. The last house

Squaring plates on an out-of-parallel slab

Check first that the two longest sides of the deck or slab are parallel. If they aren't, you'll need to adjust them, and snap the chalklines, marking these plates parallel.



With the long sides parallel, square the perpendicular outside walls. Remember, any triangle whose sides measure 3, 4 and 5, or multiples thereof, is a right triangle.

Lay out the interior walls by measuring from the exterior

A crow's foot marks wall dimensions.

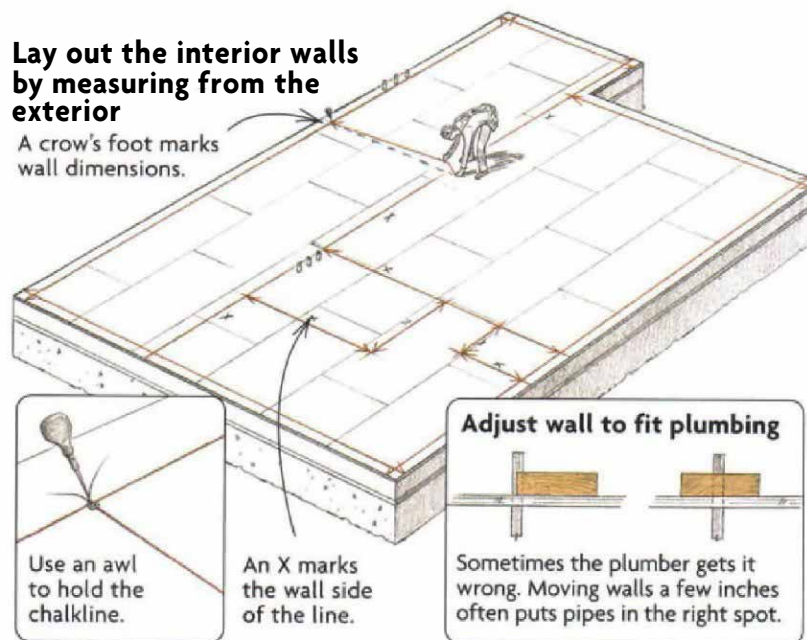
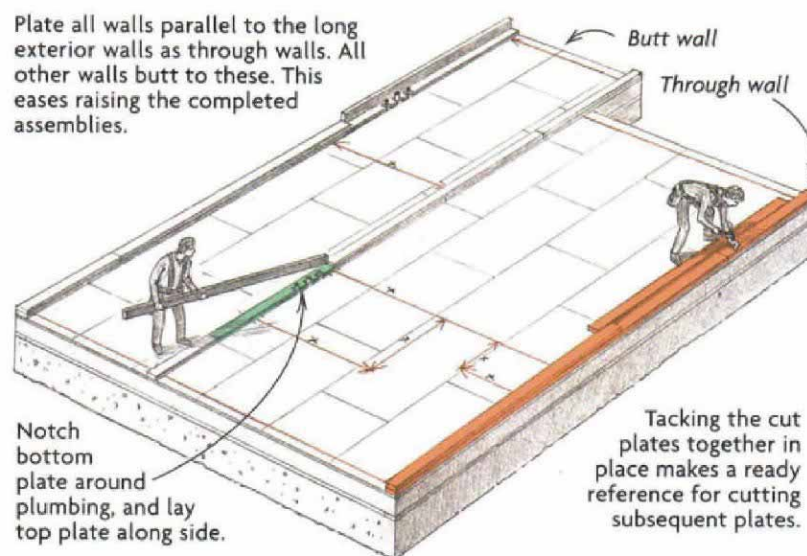


Plate the longest walls through from end to end

Plate all walls parallel to the long exterior walls as through walls. All other walls butt to these. This eases raising the completed assemblies.



I helped to frame was built on a slab whose long sides were 1 in. out of parallel. I moved both walls inward $\frac{1}{4}$ in. at the wide end of the slab, decreasing the width $\frac{1}{2}$ in. At the narrow end, I moved each wall out $\frac{1}{4}$ in., increasing the width $\frac{1}{2}$ in. and making the walls parallel. Sometimes nothing you can do will get the walls perfectly parallel. If I can get them to within $\frac{1}{4}$ in. over 12 ft., that's usually good enough.

Keep in mind what will cover the exterior walls. Wall coverings often extend below the framing onto the slab or foundation by 1 in. or so. If you move a wall in on the foundation too far, the siding may not be able to extend below the sill.

Snapping lines for the perpendicular exterior walls comes next. I mark the wall location on the floor at each end of the first perpendicular wall, again using plate scrap as a

guide. After connecting these marks with a chalkline, I check the corner for square by measuring 3 ft. along one wall and 4 ft. along the other; then I check this triangle's hypotenuse. It will measure 5 ft. if the corner is square. Multiples of 3, 4 and 5 work as well, so a 6-8-10 triangle is also a right triangle.

If a corner is slightly out of square, you can adjust it much as with parallel walls. Move one end of the wall out a bit and the other end in. Take special care to make sure the kitchen and bathrooms are square so that cabinets and tile can be set easily.

Measure from the exterior walls to lay out the interior walls

Measuring from the long exterior walls, I can now mark the parallel walls on the floor. A plan dimension might read 12 ft. 6 in., for example, outside to center of a 2x4 wall. To

locate the edge of a wall, simply move the mark over $1\frac{3}{4}$ in., or half the thickness of a 2x4. I locate both ends of an interior wall by measuring from an exterior wall and marking a V or crow's foot on the floor. Long walls such as those for bedrooms and hallways are laid out before the short walls for closets and bathrooms are located.

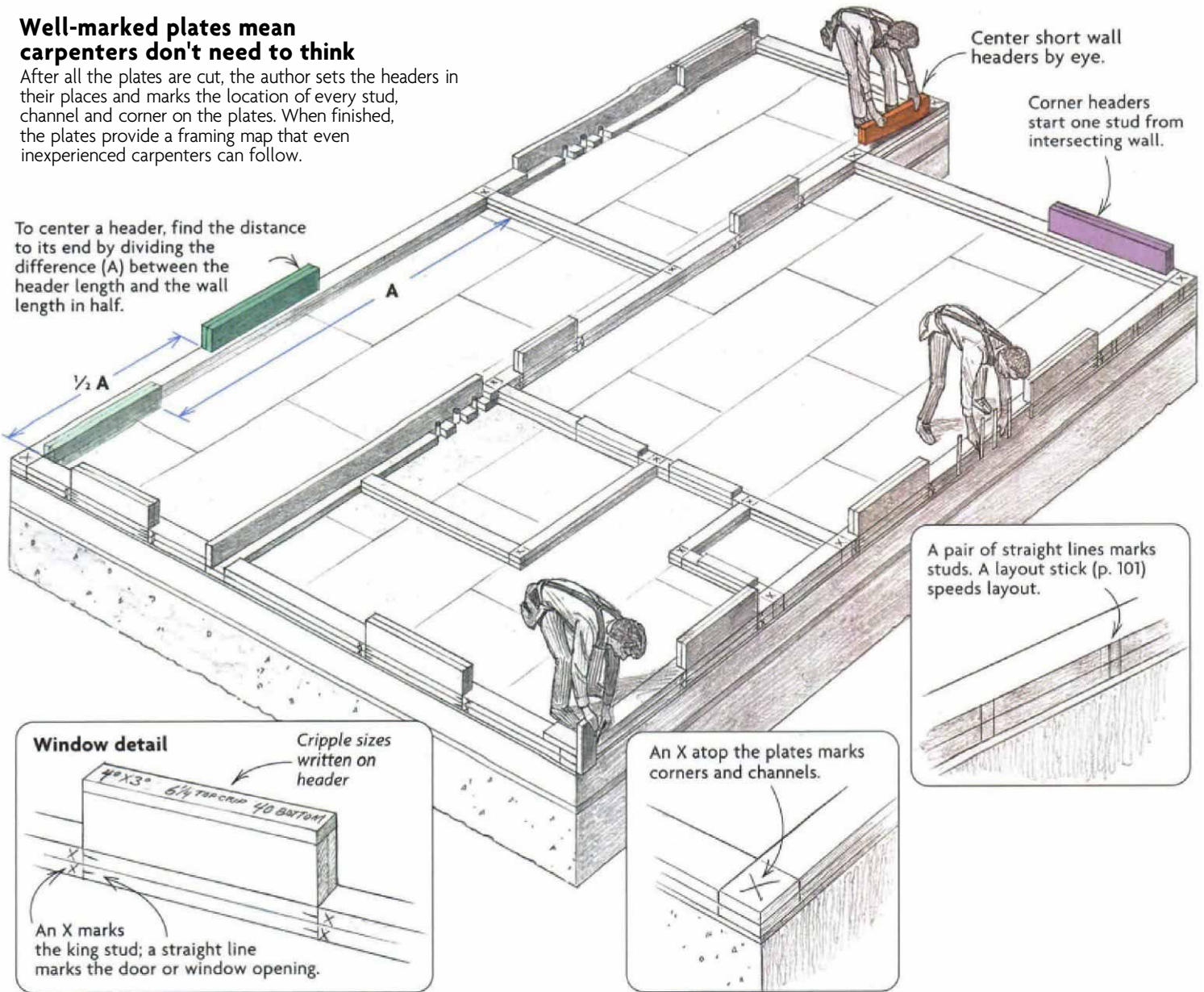
I always make an X with keel alongside the crow's foot to show on which side of the mark the plate will fall. Be careful: An X on the wrong side of a bathroom wall, for example, may mean that the tub won't fit. Some carpenters snap two chalklines to note that the plate will fall between the lines. This seems to be an unnecessary extra step.

All of the chalklines should be snapped straight through wall openings. Pay no attention to door and window openings when snapping chalklines.

Well-marked plates mean carpenters don't need to think

After all the plates are cut, the author sets the headers in their places and marks the location of every stud, channel and corner on the plates. When finished, the plates provide a framing map that even inexperienced carpenters can follow.

To center a header, find the distance to its end by dividing the difference (A) between the header length and the wall length in half.



If you snap a line in error, make a clear correction. Rub out an erroneous chalkline with your foot or draw a wavy line through it before snapping another. To avoid confusion, you can snap a second chalkline using a different color of chalk.

I note anything out of the ordinary on the floor with keel. For example, I indicate the end of a short wall with a mark and write "end" at that point. If a plumbing wall is to be 2x6, I write that on the floor. I try to keep it simple because too many marks can be just as confusing as too few.

Distribute all the plate stock before cutting any to length

After I finish snapping all the lines, the next step is carrying and placing two pieces of plate stock along every wall line (drawing bottom right, facing page). These pieces of

stock will be the top and bottom plates, and their lengths should approximate the wall length. To ensure straight and strong walls, I use long (16 ft., if possible), straight stock for plates. It's a good idea to sight the plate stock and to use the straighter pieces for the top plates. The bottom plates can be easily straightened when they're nailed to the floor, but the top plates must be braced straight after the walls are raised.

Once the plate stock is distributed, I start plating the longest outside walls. These plates run through from corner to corner and are called through walls. Walls that fit between other walls are called butt walls. The chalklines mark the exterior walls' inside edge. Because the chalklines represent the inside of the walls, I locate the exact ends of the first through walls by lining up the end of the plates on a scrap of plate stock held on

the intersecting wall's chalkline and cut the plate to length.

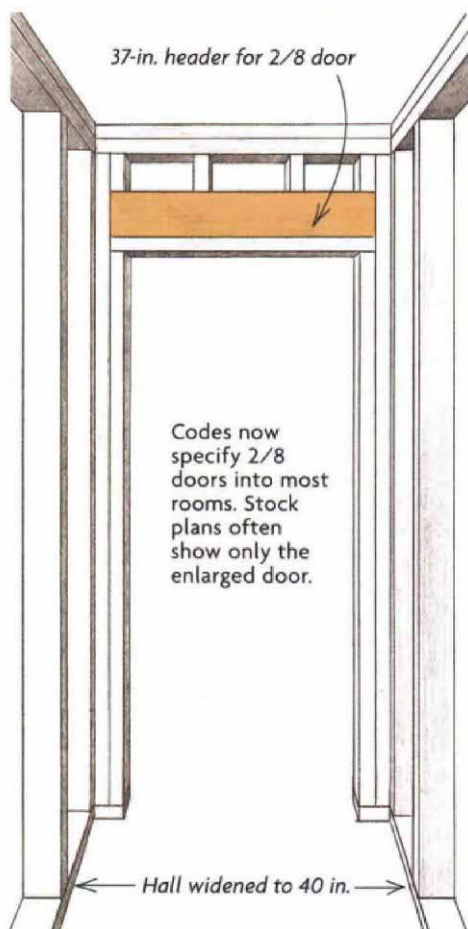
I tack the bottom plate to the floor with two or three 8d nails, stack on the top plate and tack it to the bottom plate. I continue stacking and tacking until I reach the far end of the wall. There, I mark the ends of the plates as I began, with a scrap held to the butt wall's chalkline, and cut the plates to length.

Staggering joints in the top and bottom plates is okay, but not necessary. The bottom plate will be nailed to the floor. After the studs are nailed in, a second, or double, plate will be nailed to the top plate, reinforcing it and tying together the walls. At least 4 ft. must separate joints in these top plates. So that intersecting walls can attach solidly, I keep joints in both top plates 4 ft. from intersections.

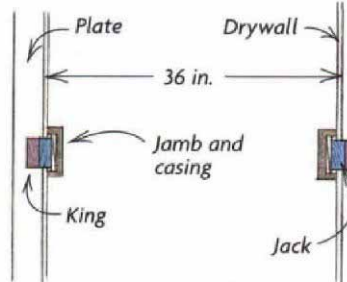
Once the exterior walls are done, I cut, stack and tack (with 8d nails) the plates for

Code specified 2/8 doors don't fit well in 36-in. hallways

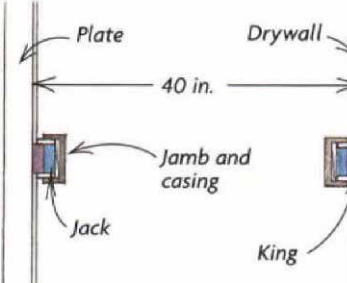
The author often widens halls to 40 in., adding room to trim around the door.



Fitting a 2/8 door in a 36-in. hall requires inseting the kings and jacks in the through walls and ripping the casing.

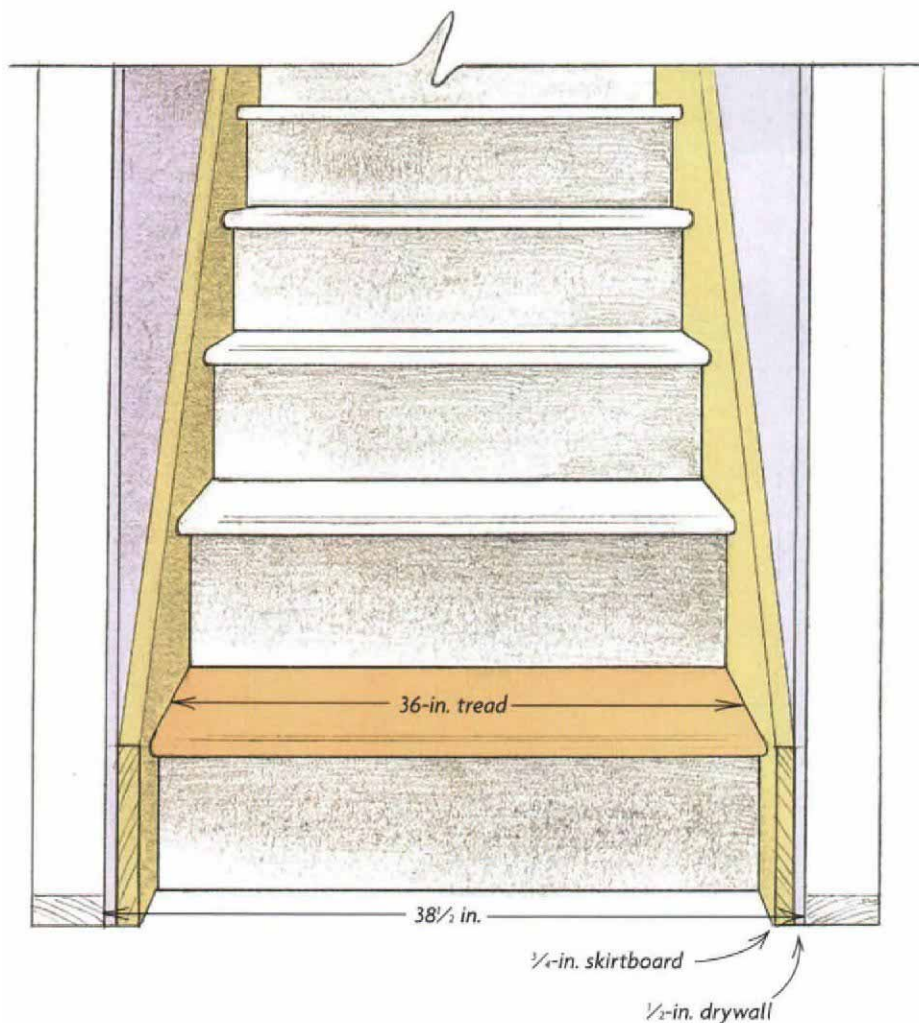


Enlarging the hall to 40 in. provides room for both the framing and full trim.



Plans may call for a 36-in. stairway, but that often means 38½ in. between the studs

Stairs are often site-built, and the framer must leave space for drywall and skirtboards, as well as for 36-in. treads.



the interior walls that parallel the long exterior walls. All perpendicular walls will butt into these through walls. I run all plates continuously, ignoring door and window openings. I cut the bottom plate from door openings later.

Cut the plates to length by eye

The wall lines snapped on the floor show the position and length of each plate. It takes a bit of courage and practice, but you should be able to cut wall plates square and to length without further use of measuring tape or square (*FHB* #118, p. 78). For through walls, sight the circular-saw blade on the chalkline below. Line up cuts on butt-wall plates with the intersecting through walls (photo p. 96). If you have a 10-in. saw, you can tack the plates together and cut them with one pass.

The bottom plates can be cut a bit short. The result will be a harmless gap where two

bottom plates intersect. The top plates, though, must be cut within $\frac{1}{16}$ in. Otherwise they'll push or pull walls out of plumb.

Plating on a concrete slab is much the same as on a wooden deck, but there are a few differences. Remember to use treated wood for the bottom plate. The bottom plate can't be as easily tacked to a slab as it can be to a wood deck. I simply lay the bottom plates on their lines and tack on the top plates. I toenail intersecting plates together so that they don't move until I'm ready to nail together the walls.

Often, the bottom plate of an exterior wall must be bolted fast to a concrete slab. Typically, anchor bolts are cast into the edge of the slab, and holes are drilled in the plate to receive the bolts. I mark the holes with a bolt marker (photo top right, facing page). Set the plate directly on the chalkline, but on the opposite side of where it will finally go, and

mark the hole location. Interior walls on slabs are usually nailed home with powder-driven pins or with concrete nails. Codes are specific about what fasteners can be used, so if in doubt, ask your building department.

When plumbing is roughed in, as it is on a slab, plates can't be stacked. I notch the bottom plate to fit around the pipes, lay it on the line and put the top plate next to the bottom.

Now, mark every stud on the plates

Detailing plates is marking the location of all corners and intersecting walls, headers and studs in every wall on the plates (drawing p. 99). Because hundreds of marks are made on the plates, I keep this marking system simple. Extra marks are confusing.

I start detailing by marking the locations of corners and channels (three-stud assemblies in through walls to which butt walls are nailed). These spots require extra studs so that walls can be nailed together properly. The extra studs also provide backing for dry-wall inside and sheathing outside.

I lay out corners and channels by lining up a channel marker (photo center right) on the edge of the intersecting wall and drawing a line on the top and both sides of the through wall. I mark an X with keel on the top plate to show the framers where the corners and channels will nail in place. Mark corner and channel locations precisely. A repeated small mistake can cause walls to be out of plumb once they are raised. The corner and channel marks also indicate where the double-top plates will intersect, tying together the through walls and butt walls.

Next, I mark the location of each door and window with keel. I will have made all the headers early. I lay them at their place on the plates, and then simply draw a keel line down from the header and across the two plates without using a square. Away from the header and on each plate, I mark an X at the location of the king studs that nail to the header ends. A straight line on each plate under the header indicates this space is a door or window opening (drawing detail right, p. 99). I also mark the lengths of upper and lower cripples on the headers.

At this point, I study the plans again and detail any specials such as medicine cabinets, tub backing, openings for plumbing access, posts for beams, heating ducts, short or tall walls or even ironing boards. Proper layout for these items before framing means you won't have to remodel a wall later.

Use a layout stick to mark the studs

The framing members in most houses are laid out on 16-in. or 24-in. centers because

these measurements divide evenly into the 4x8 dimensions of standard sheathing and drywall. Maintaining a consistent layout along the length of the exterior wall is important so that panel edges always fall in the middle of a stud.

Many carpenters lay out stud locations by stretching out a tape measure, ticking the 16-in. or 24-in. increments on one plate with a pencil and returning with a square to extend the lines to both plates. This process works, but it's slow.

I use a layout stick (photo bottom right) instead. This 4-ft. long aluminum bar has 1½-in. wide tabs on 16-in. and 24-in. centers and serves as a template for spacing studs. To begin a wall, I hang the first short tab on the stick ¾ in. beyond the end of the wall. This placement sets up the layout so that the centers of the studs fall on 16-in. or 24-in. centers, and sheathing edges will land centered on the studs. Then I mark both sides of all the studs for this 4-ft. section of wall, move the layout stick down, line its end up on my last mark and again mark out 4 ft. more of wall.

When I come to a door or window opening, I continue the layout, marking cripple locations on the headers. You can ease the plumber's task by laying out the studs to leave a full bay for shower and bath valves. I like to start butt-wall layout at channels, leaving a full bay's room to swing a hammer when nailing the walls together.

Because of the sheer number of marks that are required, I wander through the plated rooms and check to see whether I have missed marking a corner, a door or even some studs here and there. An error caught at this point can save time and grief during the actual framing.

At this point, all the information necessary to frame the walls is marked on the plates. Even if I have to leave the site, a relatively inexperienced crew can have the walls standing by the end of the day without ever seeing the plans. The final step in plating comes after the studs have been nailed between the top and bottom plates. I nail on the double-top plate before raising the walls. On through walls, I leave out sections of this plate at the corners and channel marks. The double-top plates on the adjoining butt walls are cut one plate width longer to lap the through wall above corners and channels, tying the walls together. D

Larry Haun is a carpenter and author from Coos Bay, OR. His latest book, *Homebuilding Basics: Carpentry*, was published last spring by The Taunton Press. Photos by Andy Engel, except where noted.

TOOLS FOR QUICK LAYOUT

Efficient carpenters have light toolboxes. Only tools that speed the job make the cut. Here are three, available from Pairis Enterprises (909-923-7742).



Anchor-bolt marker. Lay the plate exactly on the opposite side of its chalkline, center the bolt in the marker, and then whack it with a hammer to mark where to drill the plate. The second bolt is for 2x6 plates.



Channel marker. This lightweight ¾-in. wide tool enables carpenters to mark intersecting butt walls on all three sides of through walls with a pencil. A similar tool can be quickly site-built of plate scrap.



Layout stick. With tabs on 16-in. and 24-in. centers, a layout stick locates studs fast. The longer teeth come into play when plates are laid side by side and are marked on their faces rather than edges.