Frame Walls Plumb and Straight

Following these steps will make the rest of the build easier

BY BRIAN McCARTHY

Before becoming a full-time framing contractor, I spent some time in the Marine Corps, so it shouldn't be surprising that I value becoming an expert through repetition. When my crew and I plumb and straighten the walls on one of our projects, we always follow the same steps and in the same order for two important reasons. First, when you do something the same way every time, it's harder to forget a step. Second, knowing the steps makes a process more efficient by eliminating unnecessary and redundant movements. Straight walls are important. They make a house look better, and getting them right makes the construction process easier for everyone down the line. If you don't get the walls plumb and straight, everyone from plumbers and drywallers to finish carpenters and flooring installers has a harder time making their respective parts of the house fit together and look good.

The right time

Although timing is not always something we can control, in general it's easier to straighten the walls on frames that go together quickly in good weather. Walls exposed to multiple cycles of wetting and drying are the hardest to straighten.

There are two schools of thought among framers about the right time to straighten the walls. Some framers wait to straighten until

all the interior bearing and nonbearing walls are in place, but I think the better way is to frame and straighten only the walls that are needed to get the next deck installed. This includes all exterior walls, interior bearing walls, walls with point loads, and any walls that might make framing the stairs easier. If you frame just what you need at this point, not only will you have less bracing in your way, but you will have more room to work when installing the floor joists or ceiling joists above. The remaining interior walls can be framed when the next deck is on and the ceiling is strapped. Plus, I find that the nonbearing walls go up faster and straighter when framed later because it's so easy to transfer the layout to the ceiling with lasers and skip the straightening and bracing part altogether.

Where to start?

Making a house's walls straight starts at the lumber pile. We use the longest, straightest stock for plates, and we pull our stud layout from an outside corner, almost always on the longest wall. We square and sheathe the exterior walls while they're lying on the floor. We then stand the walls, plumb them, and tack the corners. Lightly nailing the corners allows us to straighten them later if things move, as they always do. When we install interior beams with multiple layers (either dimensional or engineered lumber), we tack the plies together with a framing nailer, but we don't fully nail the plies tight. This means that they're easier to push and pull when it's time to straighten them. Once all the structural elements are in place, we install the second top plate.

Rim joist before string

With the second top plate in place, we install the rim joist by toenailing it to the top of the wall. Installing the rim at this point is much easier than when there are multiple braces holding up the exterior walls, which make it harder to move material and to position stepladders, and easier to knock something out of alignment.

Once the rim joist is in place, we can straighten the walls. We start with exterior walls by stretching string along their interior. (If we're plumbing and straightening the top floor, as in the photos, there is no rim joist. Instead, the rafters, not floor joists, bear on the top plate.) Often we stretch string on several exterior walls to save time. One carpenter on a three-person crew can be putting

MOUNT THE BRACING

Steel braces are better. *Attach adjustable steel wall bracing to the top plate with 2-in. screws. The 10½-ft.-long braces are made from 1-in. square tubing, so you can adjust them from anywhere along their length with a 1-in. wrench. They have 12 in. of adjustment and are strong enough to straighten even the waviest walls. Again using 2-in. screws, attach the bracing to the subfloor.*

PLUMB THE CORNERS

Mount string blocks first. *To space the string from the wall, screw small 2x4 pieces to the top plate at both ends of the wall. Drive a pair of nails into the blocks for fastening the stringlines used for straightening. Install the blocks on all the corners before plumbing the corners; otherwise, driving the nails knocks the corners out of plumb.*

Plumb with a long level. *Using a plate level, plumb the corners starting with the longest wall. Once the wall is plumb, fully nail the end of the wall to the intersecting wall that forms the corner. Plumb all the corners on the exterior walls of each floor, and fully nail them before straightening anything.*

STRAIGHTEN THE OUTSIDE ...

Stretch a string. *Each corner gets a block with two nails. The upper nail—sunk just shy of the surface—sets the nail about 1 9⁄16 in. from the plate. After pulling tight across this nail, wrap the string around the second nail to keep it taut.*

Gauge the gap. *Starting with the longest wall, check the distance from the string near the center brace first, and then check the distance to the string close to the braces on either side, working toward the corners.*

Move to the next wall. *Once the first wall is straight along its length, move to the next-longest exterior wall that shares a corner with the first straightened wall. Before moving to each new wall, check the center to ensure that straightening the intermediate parts of the wall hasn't moved the center from its straightened position. If you can't completely straighten the wall, average the difference among the braces. It's usually no more than 1⁄8 in. over 12 ft. if you've used straight plate stock that's free of weird grain.*

up the strings while the others are procuring the bracing from the tool trailer or the floor below. Using scraps of 2x lumber, we space the string 1 9/16 in. from the wall, which is just enough room to slip a 2x gauge block between the wall and the string.

Install the bracing

Once the string is in place, we start fastening the adjustable wall braces (qualcraft.com) to the top plate, spacing them about every 8 ft., starting with one at the center of the wall. We make sure the threaded part of the brace is near the middle of its adjustment, and we fasten the top and bottom with 2-in. screws. These braces, which cost about $55 each, are a good investment for anyone who does even occasional framing. The brace's large screw is adjusted with a 1-in. wrench from 10½ ft. to 11½ ft., so even the most resistant wall can be pushed or pulled easily and precisely. The wrench fits on the brace's square tubing, so you can adjust it anywhere along its length. Unlike when using wooden spring boards for straightening, the steel braces allow one carpenter working alone to straighten and plumb a wall. I have bought 20 of these braces over several years. In the early days, I got by with fewer of them by swapping the adjustable steel braces for wood braces as the walls were straightened. But now I have enough to frame a 5000-sq.-ft. house.

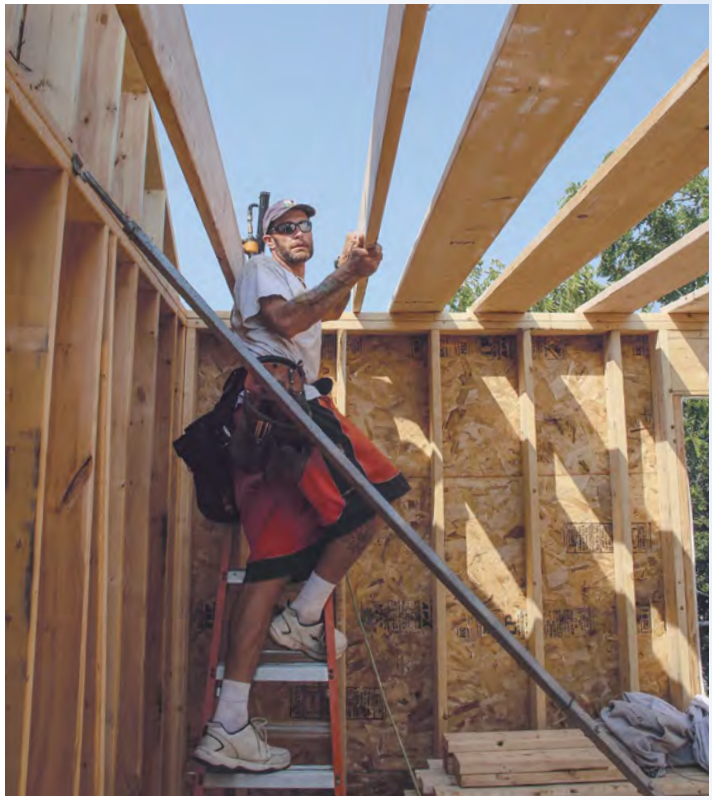
If you're on a tight budget, concrete-form turnbuckles (ellismanufacturing.com) attach to 2x lumber and adjust in length similar to the Qualcraft braces and work nearly as well for $25 each.

Plumb corners, then straighten walls

Once all of the braces are in place, we plumb the exterior corners using a plate level. The height-adjustable plate level only touches the wall at the top and bottom plates, keeping any warp in the studs from transferring to the level. When a corner is plumb in both directions, we fully fasten it together before moving on to the next corner.

After we have confirmed that all the corners are plumb, we move on to straightening the walls, generally starting with the longest exterior wall. Once that wall is straight, we proceed to the next-longest adjacent exterior wall until we've made it the whole way around the house. Then we plumb and straighten any interior bearing walls and any interior walls with point loads. Finally, we straighten any structural beams.

... THEN MOVE INSIDE



Structural interior walls come next. *Once all of the exterior walls are braced, move to bearing walls and any walls with point loads (such as those with a perpendicular beam). Then straighten and brace any beams. It's important to wait until all walls are braced before marking joist layouts.*

Build the next deck. *Getting joists on as quickly as possible is the best way to ensure that the walls are held straight and plumb and are less likely to be knocked or pushed out of alignment. It also means you can take down the braces, which get in the way of building nonbearing partitions.*

With all the structural elements on the floor plumbed and straightened, we frame and sheathe the floor above. This locks everything in place, so we can remove the bracing—which is in the way immediately after we're done with it—and stand the partitions.

In our region, it's common to install perpendicular strapping to the ceiling joists. This allows us to stand partition walls with the floor system above already in place. After we install the strapping on the ceiling, we snap lines on the floor to locate the remaining partition walls. We frame the partitions lying down on the subfloor and then raise them on the snapped lines. We plumb them with a level and make a few checks with a laser measure to ensure that everything is square. Then we slip in a second piece of strapping between the top plate and the strapping on the ceiling and nail through the top plate into the strapping above. □

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