

Bringing Back Balloon-Frame Construction

This retro framing technique is a good fit for today's superinsulated walls

BY PAUL BIEBEL

I grew up in a large, vintage New England house with a high-ceiling attic that was every kid's dream clubhouse. There was a 2-ft.-high kneewall around the perimeter of the attic, and studs protruded through the flooring. I didn't know then that this type of framing, balloon-frame construction, meant that the wall studs ran uninterrupted from the top of the foundation to the bottom of the roof rafters. But I learned that if I got close to the 4-in.-wide chasm around the perimeter of the attic, I could feel a breeze blowing up from below (my first experience with the stack effect) and that if I dropped a marble in that chasm, I could hear it rattling all the way down through the wall and later find it waiting on the basement floor.

Balloon framing was a dying practice back then and is essentially extinct today. That's because in the 1920s, builders began framing houses using a method called platform framing, by which the first floor is built and then used as a platform to erect the walls, which support the next floor, and so on. The reasons for the switch were

many: easier framing without scaffolding, better resistance against fire jumping floors, and a general decline in the availability of tall, straight, quality framing lumber.

Nowadays, the challenge we face in building custom homes is in finding the most cost-effective way to build the highest-performing shell with the smallest renewable system necessary to provide 100% of the heat, cooling, and domestic hot water for our clients. Ironically, I've discovered that balloon-framed walls fit this need nicely, as long as the design is updated with a few modern construction details and allows enough depth for adequate insulation. In short, I prefer to build balloon-framed double-stud walls, which represent an excellent balance of cost, familiarity, and performance.

Old meets new to create an ideal thermal assembly

Although double-stud walls are certainly not the norm in modern building, they are far from groundbreaking and have been used by progressive builders for decades. As with any



WHY?

- 1 Attaching the floor system to the wall studs (either eave or gable) with a ledger eliminates the difficult-to-insulate rim-joint area that's common to platform-framed walls.



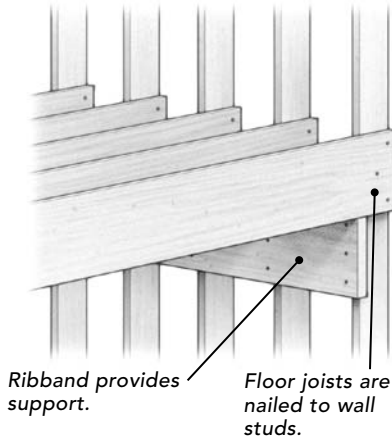
2 Continuous eave-wall studs eliminate the structural hinge point of short upper-story stud walls, offering better resistance against the outward force of the roof rafters above.

3 Uninterrupted double-stud wall cavities provide ample room for faster and easier routing of all mechanicals, and they allow for lots of dense-pack insulation, creating a high-performance, low-cost wall.

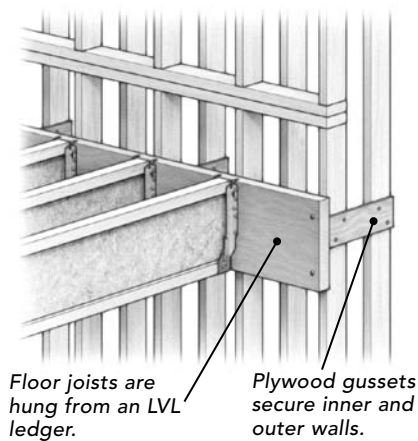
building system, methods for their construction vary; in addition, your code official may require an engineer's stamp.

Our process starts with two independently framed 2x4 stud walls set with about a 4¼-in. space between. When we're able to frame all the walls on-site, we build and stand each one separately. If the framing happens in the dead of winter, as on this project, then we frame many of the walls off-site and truck them in for faster on-site

TRADITIONAL BALLOON FRAME



DOUBLE-STUD BALLOON FRAME



assembly. In those cases, we frame the inner and outer faces of the walls at the same time, using 2x12 plates at the top and bottom. On gable walls, we do some of the infill framing after the walls have been raised and the roof trusses installed, making it easier to air-seal the connection between wall and roof.

The thing that pushes the envelope, though, is the integration of the balloon-frame concept. Rather than framing the double-stud walls in the platform fashion, we build the walls tall enough to run from the first-floor bottom plates to the second-floor top plates in a single push, with the floor system hung

UNDERSTAND THE

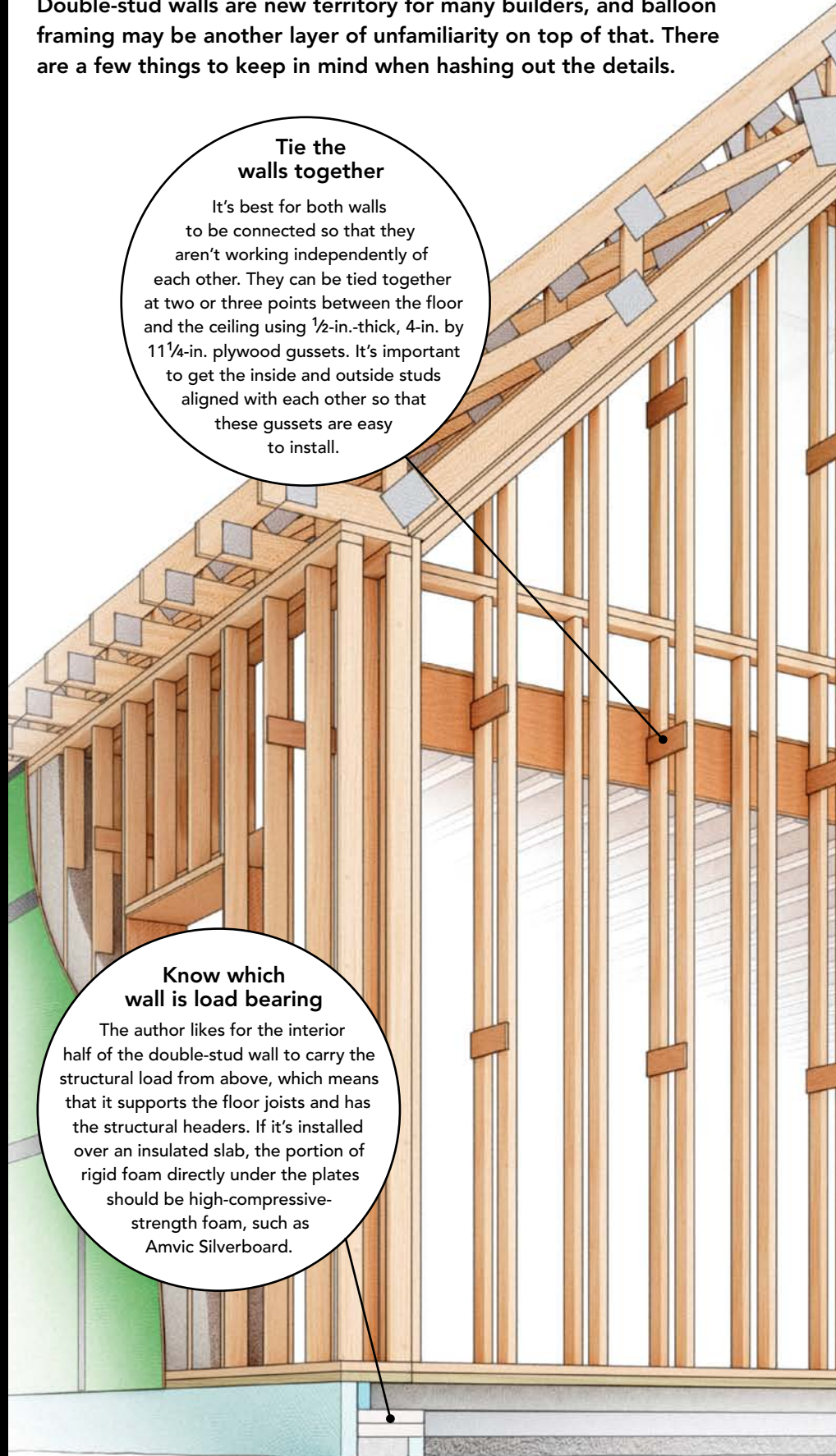
Double-stud walls are new territory for many builders, and balloon framing may be another layer of unfamiliarity on top of that. There are a few things to keep in mind when hashing out the details.

Tie the walls together

It's best for both walls to be connected so that they aren't working independently of each other. They can be tied together at two or three points between the floor and the ceiling using ½-in.-thick, 4-in. by 11¼-in. plywood gussets. It's important to get the inside and outside studs aligned with each other so that these gussets are easy to install.

Know which wall is load bearing

The author likes for the interior half of the double-stud wall to carry the structural load from above, which means that it supports the floor joists and has the structural headers. If it's installed over an insulated slab, the portion of rigid foam directly under the plates should be high-compressive-strength foam, such as Amvic Silverboard.



DESIGN DETAILS



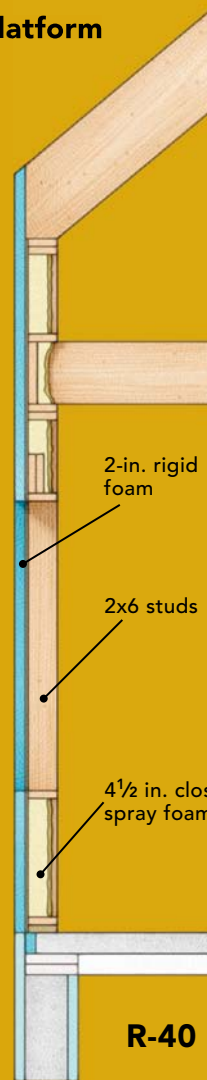
Fire blocking is built in

The building inspector has the final word, but GreenFiber's Cocoon cellulose insulation has an ICC Evaluation Service Report stating that the product is a code-compliant alternative to conventional means of fire blocking, so there shouldn't be a need for solid blocking. Netting between pairs of studs guides cellulose installation.

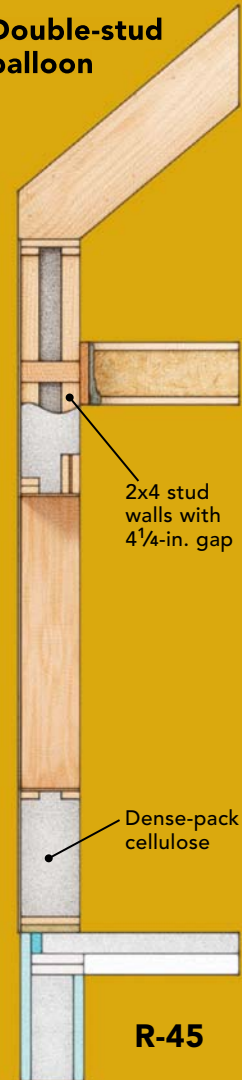
DOES IT PAY?

We ran the numbers to see how the balloon-framed double-stud wall compares to a wall assembly of 2x6s with closed-cell spray foam in the cavities and 2 in. of rigid foam on the exterior. Factoring in materials and labor, we found that the 2x6 wall cost about 14% more than the double-stud wall, despite offering a lower R-value.

Platform



Double-stud balloon

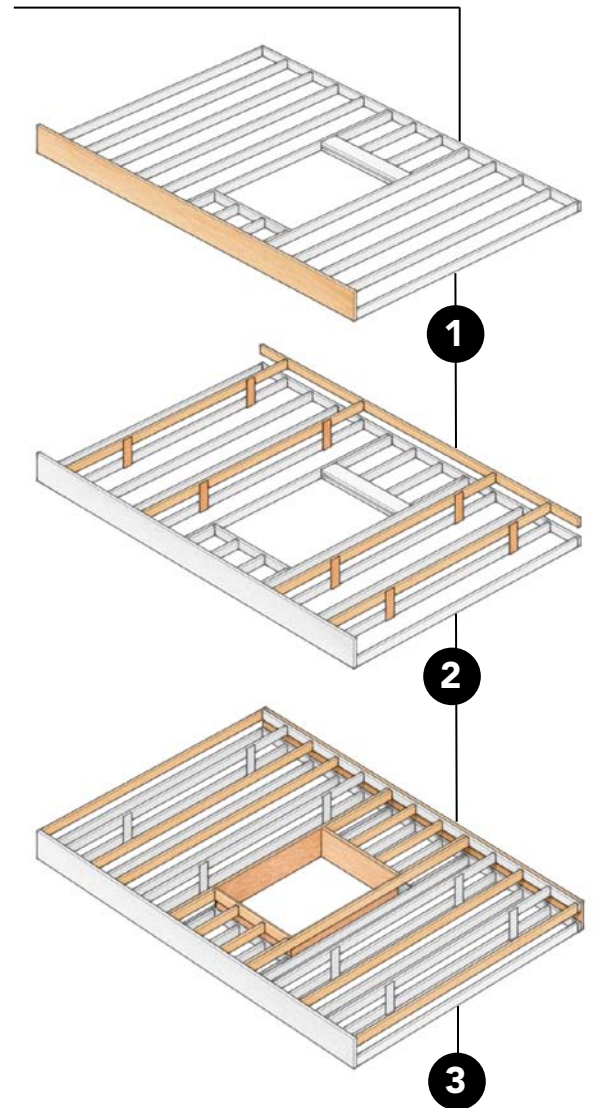




JOB-SITE WORKFLOW:

Although the techniques used in balloon framing aren't wildly different from those

EAVES ARE BUILT ON THE DECK



1. An inner load-bearing wall is framed conventionally except for having a 2x12 bottom plate. **2.** Plywood gussets are added to a handful of studs, allowing their paired outer studs and top plate to be attached. **3.** The remaining exterior studs are attached—including a 2x12 top plate and plywood bucks for windows and doors—before sheathing, taping, and standing the wall.

from a ledger. Now, other than the plywood gussets between studs (and 2x12 plates at the top and bottom, if included), thermal bridging between the exterior wall and interior wall is negligible. This approach also eliminates the weak hinge point of short-stud walls in the upstairs of a 1½-story house.

Caveats to consider

When working with double-stud walls of any kind, you must know which wall is bear-

ing the weight of the house. I prefer to have the interior wall be load bearing, but an exterior bearing wall is possible if you change the way the floor system attaches. This approach could also affect foundation details when using insulated concrete forms (ICFs).

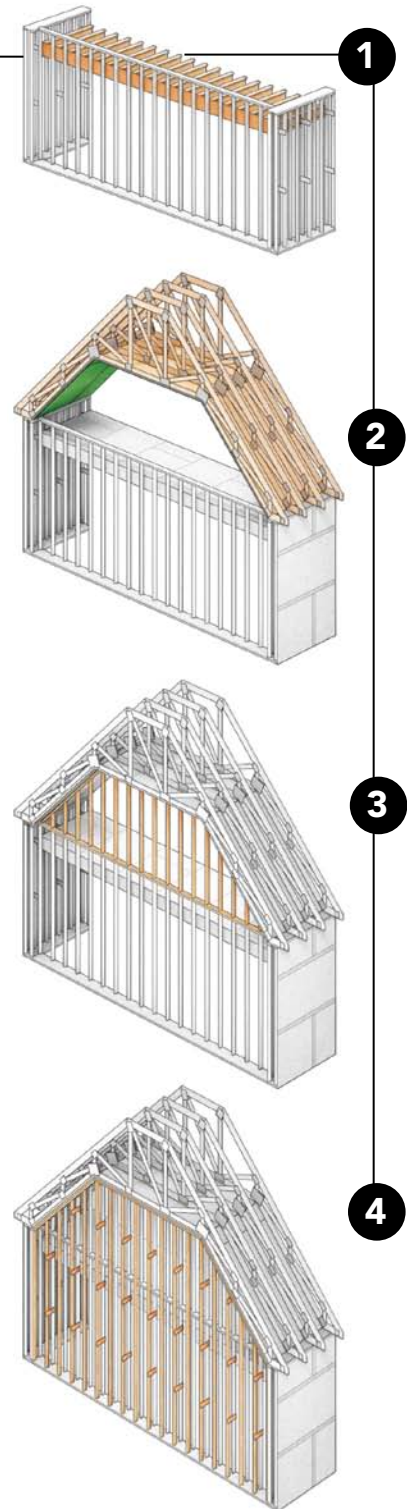
You may also find that engineers get nervous when asked to approve a plan in which the floor joists are hung from a structural ledger attached to the wall studs. I always thought that engineers relied solely on math

(and when done properly, the math works fine here), but I'm learning that intuition plays a role as well. In some cases, I have been asked to beef up the carrying studs to 4x4s instead of 2x4s. When I asked why, the engineer simply replied, "Because it makes me feel better." Since the engineers are the ones who have to sign off in order for me to get a building permit, I just do what they tell me. For interior-design reasons, the floor joists on this project run the length of the

PUT THE PIECES TOGETHER

used in platform framing, the details and sequencing will be new to most builders.

GABLES ARE FINISHED IN PLACE



1. A gable wall begins with the same inner wall on a 2x12 plate, but then it is tipped into place to allow the floor-joist ledger to be attached. **2.** Next come the roof trusses, which are sheathed and taped on their underside for air-sealing purposes. **3.** The top half of the inner wall is then infilled. **4.** Full-height exterior wall studs are added, and the outside of the wall is sheathed and taped.

building, but this unconventional floor-joist direction isn't related to the double-stud or balloon-frame methods.

Wherever a double-frame wall encounters a window or door opening, I prefer to install 3/4-in. by 11 1/4-in. plywood bucks around the inside of the rough opening. The plywood serves as a solid connection between both walls for installing the door or the window, thus providing a stable subplane for attaching the trim. Without it, the walls could

move slightly over several years of drying, which would wreak havoc with jambs and casings. A word of caution: when framing door and window bucks using this system, you've got to tweak the size of each rough opening to allow for the additional thickness of the plywood. □

Paul Biebel is president of Biebel Builders, a design/build company in Windsor, Vt. Photos by the author.