Tight Construction Made Easier

If you hated poly and caulk, weren't sure about ADA, but still want to build tight houses, maybe it's time you tried "simplecs."

BY JIM MALONEY

Although I am now a builder and designer, I spent three years with the Oregon Department of Energy trying to encourage builders to build more energy-efficient homes. I learned that going against the grain of conventional practice is not an easy task and does not make you very popular on building sites. But the old way is not always the best way to do things. In fact, my experience in Oregon has shown me that conventional wisdom would often be better described as "prevalent nonsense."

Before I describe any building innovations, I should note some peculiarities in the way we do things here in Oregon.

- About 80 percent of the homes built in the state have crawlspace foundations.
- Half the new homes use electric heat, because electricity only costs 2.6 cents per kilowatt hour. The rest use gas at 63 cents a therm.
- The first-floor structural system over the crawlspace is usually a post-and-deck floor using random length T&G 2x8.
- We build year 'round here, and get 50 to 60 inches of rain a year — making for a lot of damp jobsites.

The regional program I worked for (the Residential Standards Demonstration Program) paid builders a financial incentive to meet a set of standards called the Model Conservation Standards. While most of the standards dealt with insulation levels, window U-values, and heating equipment, the ones that met with the most resistance and caused the most problems had to do with air leakage and moisture movement.

At that time, builders interested in airtight construction used polyethylene, which they wrapped around the entire house and sealed meticulously. Although this system was used successfully in Canada and some Scandinavian countries, a vast majority of the Oregon builders balked at the idea. The most common reasons given were: "A house needs to breathe." "It will trap water in the walls and the house will rot away." "It takes too much time." "It's too tedious." "My building inspector won't allow it." "My drywall contractor can't glue his gyp board." and my favorite, "My framing crew will quit."

It was extremely clear that we had proposed a bitter pill and needed to come up with something more palatable. While searching for solutions, we came upon what is now widely known as the airtight-drywall approach or "advanced" drywall approach or just plain ADA.

This approach, developed by Toronto engineer Joseph Lstiburek, did away with the unpopular poly and used the building's drywall itself as the air barrier. The interior paint served as the vapor retarder. Or you could use 4-mil poly as the vapor retarder, but install it without all the fancy seams, nasty caulks, and general fuss that drove many builders to distraction.

At first, the builders in the program thought that ADA was great, particularly when compared to the trials and tribulations of trying to do a good job with poly. The high praise, however, was soon tempered by a host of complaints from the job site. These often took the form, "Yeah, this is a great system, but..." Some of the common "buts" were:

- But my electrician had fits getting his wires in and out of the walls.
- I had to have the drywaller here twice.
- The gasket held up the rim joist so my framers had to lift each joist when nailing it.
- The gasket kept tearing away when we tried to move the wall to the chalk line.
- There must be a better way.

To make a long story short, we managed to get a number of ADA houses built in Oregon. Along the way, we made a number of modifications aimed at simplifying the system for the framers, drywallers, and mechanical subs. We found that many of the problems could be solved if the air-barrier efforts could be delayed until the building was framed and sheathed. I've combined a number of these modifications and added some new ones to come up with a system I call "Simplecs" for "simple caulk and seal."

The key to the system is to do the air sealing at the latest possible stage in construction. It turned out that it could always be done after the framing and sheathing and usually right before hanging the drywall. In some cases, such as the leak at the baseboard below the drywall, the sealing could even take place after the drywall is up. Most of the details are shown in the accompanying drawings.

One advantage of this system in our climate is that the air-barrier work is done in a more controlled, dryer environment. It means that we can apply caulks, adhesives, or gaskets in a dryer, warmer, perhaps even cleaner building. It also means that a tricky sealing problem will not hold up a three-man framing crew.

To comply with local code, we still use 4-mil poly, but because we don't rely on it to stop air—only to block vapor diffusion—we can slap it up quickly with unsealed seams just before the drywall goes on. A vapor-retarding paint would work just as well.

One house we built last spring using the system tested adequately tight (3 air changes per hour at 50 Pascals), which is what we were after. The house was fairly large (2400 square feet), and quite complex—with five floor levels, curved exterior walls, vaulted ceilings, and the works.

We just started the next "Simplecs" house and plan to refine the system further. We're going to be evaluating how various caulks and sealants perform in the field. And since we now have our own blower door, we'll also be able to find out which materials and details stand up over time. Although few test programs address the issue of long-term durability, it's of the utmost importance to me and my clients. After all, buildings go on long after the builder leaves the job. ■

Jim Maloney is a builder, designer, and researcher of energy-efficient homes in Eugene, Ore.

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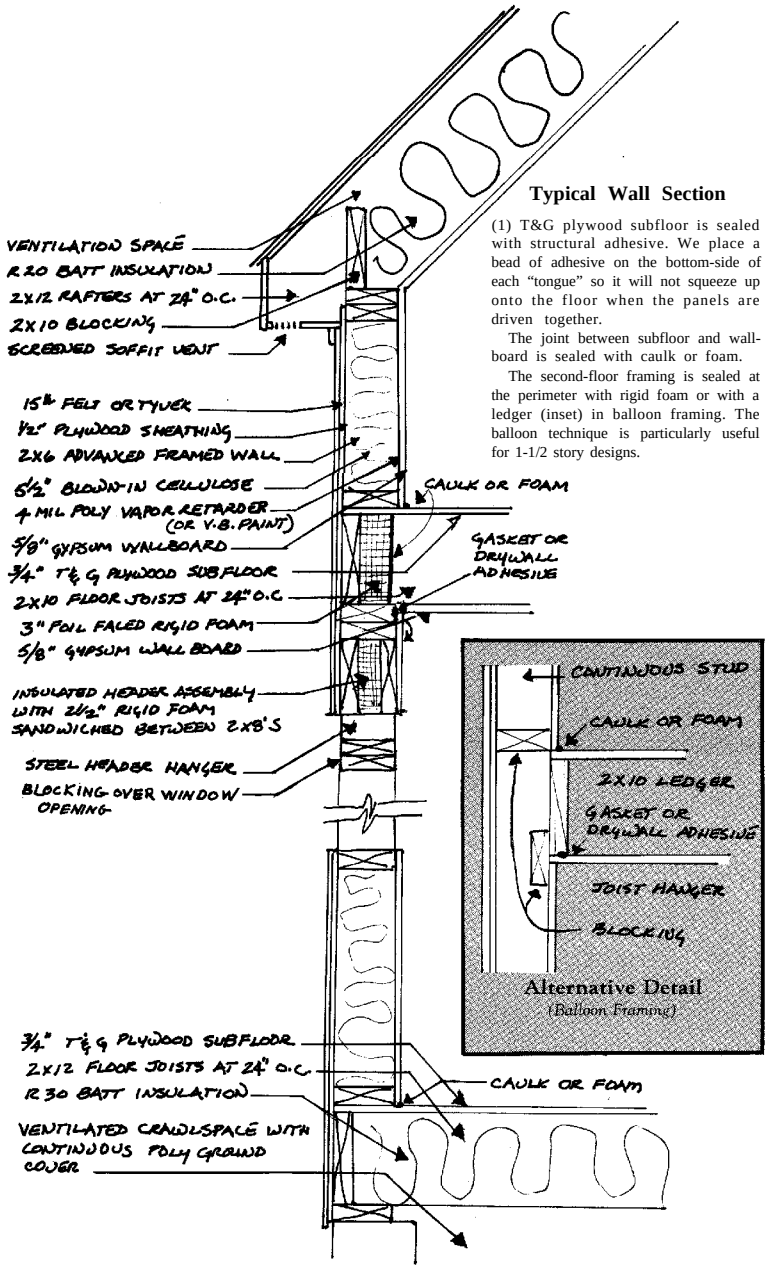
AIR LEAKAGE CONTROL USING "SIMPLECS"

Simplecs stands for "simple caulk and drywall." It's an advancement on the ADA system in that it requires no sealing during the framing process. It is also flexible; it can use caulks, adhesives or gaskets depending on the specific application and the builder's preference. As in the ADA system, most of the air-barrier connections are visible and reparable. The key details are explained below:



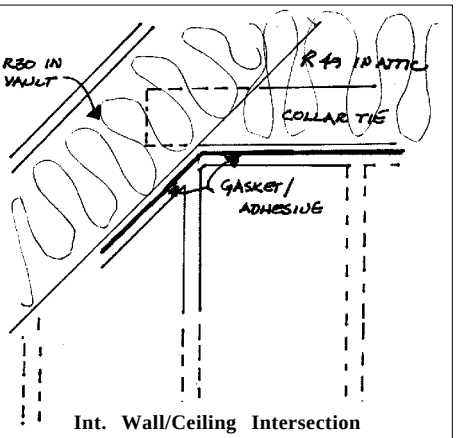
Typical Wall Section

(1) T&G plywood subfloor is sealed with structural adhesive. We place a bead of adhesive on the bottom-side of each "tongue" so it will not squeeze up onto the floor when the panels are driven together.

The joint between subfloor and wallboard is sealed with caulk or foam.

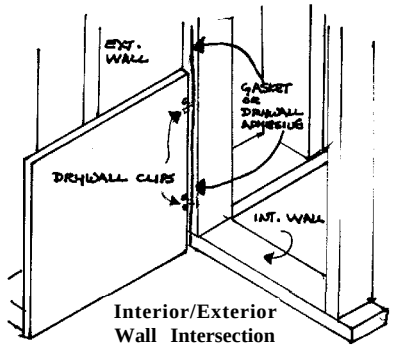
The second-floor framing is sealed at the perimeter with rigid foam or with a ledger (inset) in balloon framing. The balloon technique is particularly useful for 1-1/2 story designs.

Alternative Detail
(Balloon Framing)



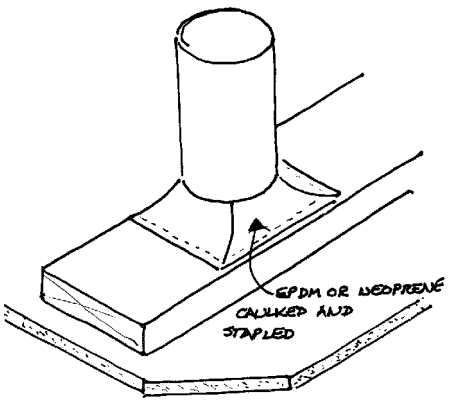
Int. Wall/Ceiling Intersection

(2) At the intersection of an interior partition and exterior ceiling, the top plate of the partition is gasketed, or a continuous bead of adhesive is used for the wallboard.



Interior/Exterior Wall Intersection

(3) At the intersection of an interior partition and an exterior wall, the last interior stud is gasketed, or a continuous bead of adhesive is used for the wallboard.



Typical Plumbing Penetration

(4) Plumbing penetrations of air barriers are typically sealed with long-lasting elastic sheet goods such as neoprene or EPDM. (We've had great luck with swaths cut from old truck inner tubes.) Electrical and other penetrations are sealed with foam or a compatible caulk.