



The existing home, built in 1797, had a full-height basement (its attic was difficult to access and would be a project for another day) **(1)**. A combination of sealant and spray foam air-sealed the gaps between framing members **(2)**. Layers of Roxul insulation were easy to cut and snug into tight joist bays **(3)** and around the irregular fieldstone and hand-hewn framing **(4)**.

Photos by Tim Healey

Air-Sealing the Box Sill of an Old House

BY JIM BRADLEY

In 2013, my company, Caleb Contracting, performed an energy audit on an old (circa 1797) Cape-style home in Northern Vermont.

The homeowner contacted us because she wanted to live a more sustainable, greener lifestyle—starting with her home. During our walk through, she complained of cold floors along the exterior walls and, tangentially, problems with mice. In the basement, we could see gaps in the fieldstone foundation where cold air (and mice) entered at grade. Also visible were past attempts to air-seal the crumbly stone wall with spray foam.

After our initial meeting, I sent her an audit report with my recommendations (covering air-sealing strategies, photovoltaic panels, heat-pump DHW heaters, and mini-split equipment) and checked in with her from time to time to see if she wanted to proceed with the energy upgrades.

Since that time, the client had a PV panel array installed (it's tied to the grid and powers her electric car), but she held off on implementing our air-sealing and HVAC suggestions until last summer. On reconvening, we agreed to tackle air-sealing the troublesome foundation first (holding off on the more troublesome attic, for now). On the HVAC front, she agreed to install a new heat-pump DHW heater in the basement and mini-split HVAC equipment, which would run, in part, off her PV panel array. A mason was hired to rebuild the fieldstone wall.

AIR-SEALING THE BOX SILL

Using foam to air-seal the box sill would have been easiest, from a labor standpoint. However, the homeowner wanted to avoid using foam products, for environmental reasons. To be honest, I was more concerned about introducing an impermeable material to an old, time-tested building assembly. I didn't want to close off the drying potential to the interior of the home's wood-framed box sill (which was close to grade and prone to long periods of dampness). That had the potential to damage a 220-year-old gem of a house.

So with my Siga rep, Marc Coviello, we came up with a vapor-open solution. We would air-seal the framing

with sealant; install 4 to 6 inches of Roxul ComfortBoard insulation into the joist bays; and then cover the foundation-to-floor-framing transition with an air-barrier membrane, sealing it as well as possible to the stone and framing with an assortment of Siga tapes.

Our project manager, Matt Burstein, and my son, Daniel, did the installation work. They first sealed the gaps between the hand-hewn framing members around the basement's perimeter. On gaps less than 1/4 inch wide, they applied DAP Dynaflex 230 sealant, tooling it with their fingers as needed. On wider gaps, we compromised and used Touch 'n Seal All Season spray foam. Gaps between the existing sill beam and the repaired stone wall were sealed with sealant and spray foam as needed.

Insulation. Next, we packed out the box sills with layers of Roxul ComfortBoard to the face of the stone wall. The Roxul, as opposed to rigid foam board or even fiberglass batts, worked great in this application. The ComfortBoard is more malleable than rigid foam—an asset when insulating tight spots—and unlike fiberglass, it can be firmly compressed into place without a loss in R-value. In addition, it's water repellent and doesn't promote mold growth, and mice do not like it. Working around the irregular stone and hand-hewn framing shapes, we easily scribed and cut the Roxul into place. We filled in small voids with strips of the material.

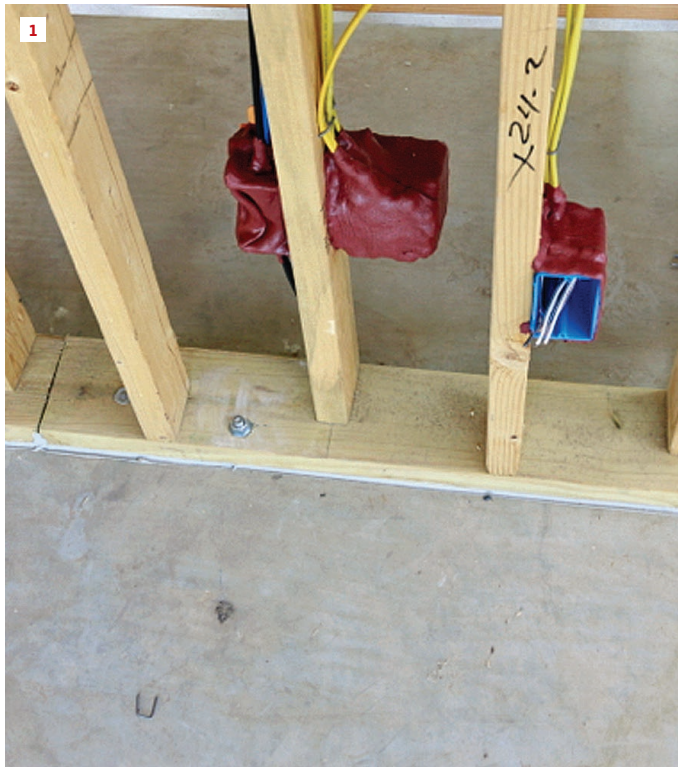
Tapes. To seal the air-barrier membrane to the existing framing and stone, we used a few different tapes from Siga. We applied double-sided Siga Twinet tape for most of the air-sealing of membrane to wood, while using Siga Rissan 60 tape to seal tricky spots, such as at wiring and mechanical penetrations. For the trickier stone connection, we used Siga Primur Roll, which is a fairly new product. It's basically a thick, uniform caulking bead on a roll. We applied it along the top of the wall, rolling it out and pressing it into place before pulling the release paper and applying the air barrier.

Air-barrier membrane. For the air barrier, we chose Siga's Majrex membrane. It's a sturdy, airtight membrane that's vapor-open in one direction only. In this case, it would allow moisture to travel from the insulated joist bays into the basement space while preventing moisture intake from the interior. We installed the membrane with its vapor-open side facing against the stone and folded the membrane up, tailoring it around the floor framing and mechanicals and sealing it with the double-sided tape and Rissan 60 tape, as needed.

Jim Bradley is a BPI-certified home-performance contractor, builder, and remodeler based in Vermont.



Siga Primur Roll tape bonded the new air-barrier membrane to the repaired fieldstone wall. First, the tape was pressed firmly to the stone (5). Removing the release tape exposed the tape's outer, sticky side (6). The air-barrier membrane was then pressed firmly to the tape (7). Next, the membrane was folded up and tailored to fit around framing and mechanicals (8). Using long lengths of membrane reduced the number of seams (9).



When trying to limit sound transfer between rooms, build a 2x4 wall with 2x6 plates and stagger the stud layout (1). All the holes in electrical boxes in the wall must be sealed. Putty pads (1, 2) provide an easy way to do this quickly and effectively.

Practical Sound Control

BY MATT RISINGER

I've renovated professional sound studios and worked on a fair number of condos in which the party wall needed lots of attention to keep neighbors neighborly. But even in a single-family detached home, there are some relatively easy ways to control sound that will make life much more pleasant for the occupants. Whether it's a media room, home office, master bedroom, meditation room, or home theater—on almost every home I build or remodel, my clients ask me to soundproof at least one room.

When you're trying to limit sound transfer through a building assembly, the goal is to do two things: Limit vibration of building materials and limit air movement. Sound moves as waves through air. When the waves hit a wall, they vibrate the wall materials. The sound waves will also move through any cracks and gaps. So the two basic approaches to stopping sound are to isolate materials so vibrations can't transfer from one to the other and to seal up air gaps to limit air movement.

To achieve these goals, here are the usual methods I employ—for example, between a master bedroom and an adjacent bedroom, or between a child's room and the master bath.

Staggered studs. This is a common method of building a quiet wall. We use 2x6 top and bottom plates, and then fill in the studs with 2x4s on a 16-inch-on-center layout, offsetting the layout by 8 inches. You essentially get most of the benefits of two walls, but it is a lot easier to build. When sound hits one side of this double wall and starts vibrating the drywall and 2x4s, that vibration does not transfer to the other side. Sound can transfer only at the plates, an area that's not very significant compared with the entire surface area of the wall.

Sealing electrical boxes. With codes typically requiring outlets every 6 feet, it's hard to have a bedroom wall without an outlet. But electrical boxes have a lot of holes in them for all the wires to poke through. You also end up with a hole in the drywall around the outlet. All those holes need to be sealed to prevent sound from freely passing through them.

For sealing outlet boxes, we use putty pads. These are made for fire stopping in commercial applications, but they work well for soundproofing electrical outlets. I like the thick red pads from Hilti (CP 617) the best. We get them at commercial supply houses or the Hilti store; they are much better than the thin ones sold at big box stores. The Hilti pads are 6 inches by 7 inches;

we center them over the back of the boxes and fold the edges over the sides of the box. The material has a consistency like Silly Putty and effectively shuts down the air flowing through all those holes that might otherwise carry sound.

Once the drywall has been installed, you also have to go back and use an acoustical sealant to seal between the drywall and the box to complete the installation. We have had good luck with the Noiseproofing Sealant in St. Gobain's Green Glue line or QuietSeal Pro, which is part of the QuietRock line. Acoustical sealant stays flexible; it won't set up and get hard. This flexible seal not only stops airflow, but it also isolates the electrical box from sound vibration coming through the drywall.

Soundproofing batts. Before the wall is enclosed, we insulate the wall cavity. Fiberglass batts will work; wet-spray cellulose works better, but it's not that common. We've had the best results with Rockwool (formerly Roxul) soundproofing batts, which are denser and specifically designed to absorb sound.

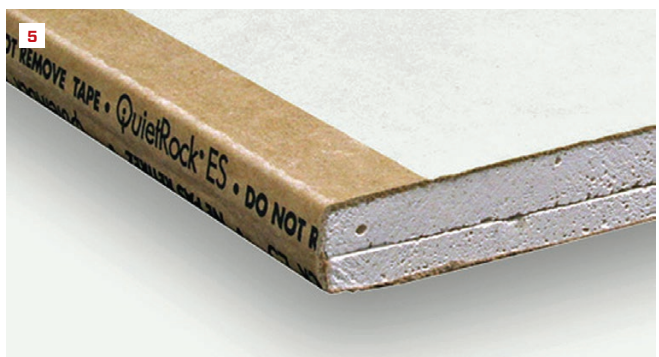
The three steps outlined above will do a lot to limit sound transfer through a wall assembly and can be done with minimal investment. To take sound control a step further—for that condo party wall or a home theater, for example—we will add a second layer of drywall that is acoustically separated from the first layer.

Double drywall. The most cost-effective way to add a second layer is with Green Glue (greengluecompany.com), a compound you squeeze out of a caulk gun in a zigzag pattern onto the back of the drywall. This material stays flexible over time and helps dissipate sound energy from one sheet of drywall to the next.

Green Glue can be effective, but you have to get the details right. You need to use two full tubes for each 4x8 sheet of drywall. You can't skimp on the amount. You also need to do a careful job of sealing the edges of the first layer of drywall with an acoustical sealant. When applying the acoustical sealant, apply lots of pressure as you squeeze it out, pushing the sealant into the crack between adjacent sheets or between the first sheet and the subfloor. Here again, don't skimp on material.

I have also used QuietRock (quietrock.com) effectively. This system essentially uses double sheets that have been pre-bonded together, so you cut down on the installation time. Each sheet is installed with acoustical sealant around the perimeter, so it's not as fast as installing one layer of conventional drywall, but it's a little faster than bonding two layers with Green Glue.

Matt Risinger owns Risinger & Company in Austin, Texas. Follow him on YouTube and on Instagram at @risingerbuild.



Electrical outlets need to be sealed to the drywall with a flexible acoustical sealant (3). This stops air movement and limits vibrations transferring from the drywall to the box. Insulation also helps absorb sound; Rockwool Safe'n'Sound batts work well (4). QuietRock panels (5) provide one way to further decrease sound transmission