Soundproofing A Band Room

Using simple techniques and specialized products, you can block out even live rock'n'roll

by Fernando Pagés Ruiz

I became interested in soundproofing at about the same time that my two teenage sons got into rock'n' roll. Heavy-metal music blasted from their bedrooms, and whenever their rock band rehearsed in the basement we could hear drums reverberate throughout the house. To turn the volume down, I included a basement practice room when we built our new house. Now when the band rehearses, we can still hear them — but it's not loud enough to bother us.

To build the practice room, I used many of the same sound-attenuation products and construction techniques used to build professional recording studios. Since then, I've adopted these methods to silence laundry rooms, isolate attic furnaces, and make bedrooms quieter in the homes my company builds.

Understanding Sound

To build a quiet house, you have to understand how sound travels and how to stop it. Sound-absorbing materials — like carpet or acoustical tile — can help control resonance and make a room seem quieter, but they don't necessarily stop sound from traveling to adjacent areas. To do that, you need to prevent sound transmission through both the air and the building's structure. Noise from a television travels through air, while the knocking of hot-water pipes travels through the structure. Controlling each type of sound transmission requires its own set of products and methods.

Framing Strategies

Sound travels directly through studs and drywall by vibrating the entire wall assembly — much like a speaker — so that sounds hitting one side of the wall are reproduced on the other. Adding mass, more air space, and vibration-dampening materials to a wall assembly makes it quieter.

As a first step, we framed the partitions as double walls. Rather than staggering the studs and using common 2x6 plates — which would transmit sound — we used two separate 2x4 walls, floor to ceiling (**see Figure 1**). To further isolate the wall from the slab and the ceiling joists, I installed Integrity Gasket (Shadwell Co., 800/494-4148, integritygasket.com), a 1/8-inch-thick closed-cell self-adhesive PVC tape, under the sill plates and on top of the top plates.

Ceiling. Framed floors, with their open joist bays, can transmit sounds throughout a structure; I-joist floors can make matters worse because the lightweight members don't dampen sound as well as denser solid lumber joists.

The first floor of the house was framed with I-joists. Over the band room, I added separate 2x10 ceiling joists in the middle of every bay, notching them at the top plate to drop the ceiling plane below the bottom of the I-joists — which effectively isolated the band-room ceiling from the floor structure above (**Figure 2, page 3**). Again, I used gaskets between the joists and the top plates. The ceiling joists aren't fastened to the plates, but are held in place by gravity; flat 2x4 blocks nailed between the joists keep them from tipping and eliminate a mechanical connection between the band room's ceiling and the living room floor.

For good measure, I also ran gasket material along the top edge of the first-floor I-joists instead of using construction adhesive; this created a permanently pliable cushion that eliminates squeaks and dampens noise transmission through the floor sheathing to the joists.

Dealing with airborne sound. To reduce airborne sound transmission, I kept penetrations for electrical boxes to a minimum, and avoided back-to-back receptacles in the double walls. I also avoided placing ductwork in the ceiling, where it could transmit sound through the joist bays. I carefully caulked all the wire penetrations through the studs and plates, then filled the stud and joist bays with 4-inch-thick mineral wool (Thermafiber, 888/834-2371, thermafiber.com), which is denser than standard fiberglass batt insulation.

Figure 1. Parallel 2x4 partition walls (left) provide acoustic separation between rooms. To reduce sound transmission to the living space above, the author dropped separate 2x10 ceiling joists below the plane of the I-joist floor system. Note the green PVC gaskets separating the joists from the plates. Before drywall, the crew sealed potential airborne sound paths with caulk and spray foam (below left), then filled the cavities with mineral-wool insulation to further dampen air vibration (below).

Double Drywall

We first installed a layer of 1/2-inch drywall on the walls and ceiling of the band room, carefully taping and mudding every joint and making a special effort to seal every crack or penetration with compound or caulk. On top of the drywall, I

Soundproofing Details

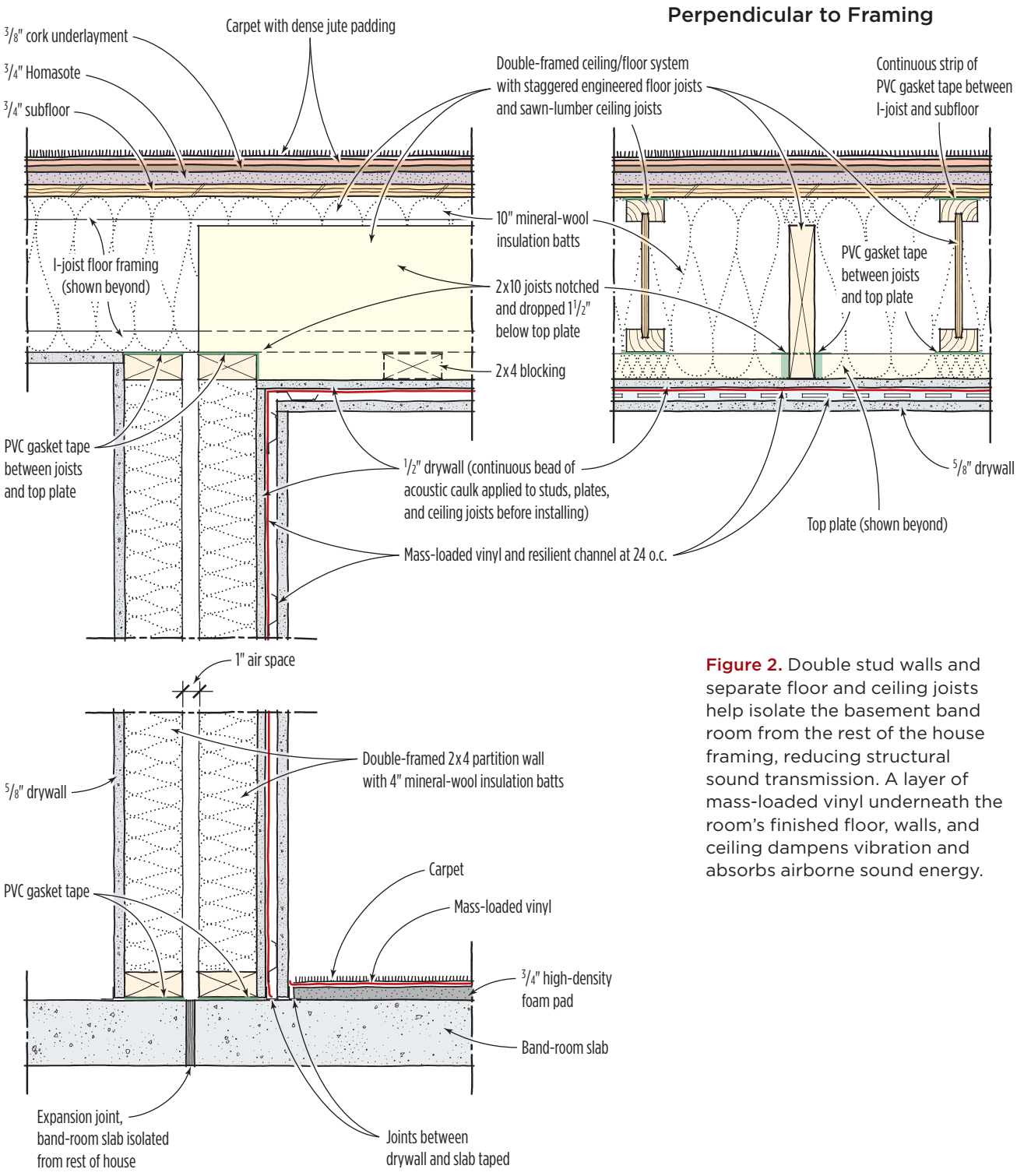

Figure 2. Double stud walls and separate floor and ceiling joists help isolate the basement band room from the rest of the house framing, reducing structural sound transmission. A layer of mass-loaded vinyl underneath the room's finished floor, walls, and ceiling dampens vibration and absorbs airborne sound energy.

Figure 3. Mass-loaded vinyl fastened to the first layer of drywall deadens sound transmission through the walls and ceiling. On top, resilient channel is installed to receive the finish drywall layer.

Figure 4. A pair of 1 3/4-inch solid-core doors — air-sealed as carefully as exterior doors — create a sound-defeating air lock between the practice room and the rest of the basement.

installed a layer of Barricade mass-loaded vinyl (All Noise Control, 561/585-4703, allnoisecontrol.com; **Figure 3**).

This material is extremely dense: Even though it's only 1/8 inch thick, it weighs a pound per square foot. But it's also flexible — it comes in a 54-inch wide roll and can be pneumatically stapled in place. The combination of density and flexibility is ideal in a soundproofing material. The mass absorbs sound energy, while the flexibility dampens vibration in much the same way that a shock absorber dampens motion. Mass-loaded vinyl isn't cheap — I paid a little less than $2 per square foot — but it's very effective in an otherwise well-sealed acoustical wall assembly.

On top of the vinyl we installed standard resilient channel, then a finish layer of 5/8-inch drywall.

Doors and Windows

An effective way to reduce sound transmission around doors (and windows) is to seal gaps between the frames and the rough openings with either acoustic caulk or low-expansion polyurethane foam. The double walls allowed me to install a two-door entry into the band room (**Figure 4**).

I used solid-core 1 3/4-inch-thick door slabs for their extra mass and installed air-sealing thresholds, caulked to the floor, under both doors. I also sealed the gap between the jamb and framing with QuietSeal butyl acoustic caulk (Quiet Solution, 800/797-8159, quietsolution.com) and caulked the stops to the jambs and the casing to the drywall. Finally, I added self-adhesive compressible EPDM weatherstripping around the stops.

The Results

Framing and soundproofing the 11-foot-by-17-foot room cost nearly $15,000, but this was a small price to pay for the luxury of shutting the door and going to bed even when the band jams 'til dawn.

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