I live in a townhouse with gypsum wallboard and concrete masonry walls between neighboring units. The noise created by the neighbors is unbearable. What can we do to reduce the noise levels? —F.A., Virginia

Several things can be done to help reduce the effects of noisy neighbors. But first there are several things to know about the nature of noise and the nature of building materials to help figure out the best mix of remedial measures.

Sound travels through different materials at different intensities. Materials that have both density and elasticity (like wood and steel) transfer sound very efficiently. This works sort of like whacking a couple of croquet balls; the energy introduced into the first croquet ball (which is held captive by your foot) is passed through to the next ball, which, if not similarly held captive, is projected away. Loud noises or impact cause the molecules in these materials to bang into each other and pass the sound along. Harder, denser surfaces also reflect sound energy, causing the sound to reverberate. Materials that are not so dense or not so elastic, like gypsum board or various types of “fiber board,” contain more airspace and are poorer conductors of sound energy. Such materials tend to absorb or diffuse much of that energy.

Sound travels easily through air, but because air is not dense at all, it doesn’t convey enough sound energy to excite denser elastic materials. So, just like the air gap in double-pane windows helps keep heat from passing through the window, an air gap between two surfaces helps prevent noise from passing into unwanted areas. The greater the gap, the better the noise reduction.

So how does this all add up? The first step to reducing unwanted sound transfer, or noise, is to fill any gaps or openings that air can pass through, because if air can get through, so can the noise. This means caulking any holes, joints or penetrations in the shared wall between you and your neighbors. Typical spots are where pipes or conduit pass through the wall. Also caulk around electrical boxes, because sound can seep through those openings as well.

The next step is to use sound absorptive materials, such as carpet, carpet padding, heavy drapes, acoustical wallcoverings, acoustical ceiling tiles and the like to cut down on the reflection or reverberation of the sound that does come through. Replacing hollow doors with solid doors will help too.

Your biggest obstacle may be the concrete masonry block wall itself. Lower grade block is not particularly sound resistant, and it may in fact be transferring much of the sound since some air may be passing through it. The quickest fix there is another layer or two of gypsum wallboard. If you really want to take advantage of the air-gap idea, you can use what are known as resilient channels, which are special furring strips that attach to the existing surface and create a half-inch gap between the existing surface and the new layer(s) of gypsum board. Make sure that the edges and all openings of the new layer are sealed up tightly to ensure that no sound can go around the new barrier.

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