Choose a party wall system that provides protection, privacy, and a marketing edge

PARTY WALL OPTIONS

by Rick Maranhas

There's a good reason party walls are also called firewalls. Two-hour gypsum-based firewalls prevented this townhouse fire from spreading; break-away features in the framing allowed the structural framing that burned to collapse and fall away from the adjacent units.

The type of party wall you choose to use in a multi-unit building affects many people. Owners, architects, developers, builders, and occupants all play a role and are likely to have their own opinions about what type of wall is best. Owners may focus on costs, architects on code and structural considerations, while the developer may focus on costs and customer satisfaction. The builder may consider all these issues, as well as the availability of subtrades and the ease with which the wall will fit into the overall structure. And the future occupant will want the privacy and fire protection a good party wall provides.

The best decision, of course, will balance these interests to come up with a design that suits everyone. This is possible. There are many party wall options available. To narrow them, I've found that four areas need review and discussion before selecting a system for a specific project. These are:

- State and local building-code requirements.
- Technical requirements or limitations.
- A practical review of options.
- Marketing considerations.

These are listed not in their order of importance, but in the order in which they must be addressed. While marketing considerations may be extremely important in a high-end project, for instance, it's no use considering options that don't meet code requirements or that are technically impossible.

Code Requirements

Depending on where you are building, you are generally regulated by both state and local building codes that will require a wall separation to have a minimal fire-resistance value. This value, which is expressed in terms of hours, indicates how long a material will withstand fire temperatures. Most projects will need a one- or two-hour wall. The requirements may vary according with the type of building.

In Massachusetts, for instance, all buildings are classified according to their "use group"—that is, how the building will be occupied and used, such as for industrial assembly, office space, or residential. These use groups are further divided into subgroups. Residential buildings, for instance, are divided into five subgroups, such as single-family, multi-family, and attached. Each subgroup has its own particular fire-protection requirements for party walls.

All this can get fairly complicated, depending on what your particular code requirements are. Fortunately, identifying fire-protection requirements is usually the job of the architect. As builders, once we know the requirement, we can begin to focus on the technical and practical aspects of the various wall options available to us.

A number of publications can help us find the wall types that meet our code requirements. The Underwriters Laboratories Fire Resistance Directory (available from their offices at 333 Pfingsten Rd., Northbrook, IL 60062) and the "Fire Resistance Design Manual," (Gypsum Association, 1603 Orrington Ave., Evanston, IL 60201) are both excellent reference books that clearly illustrate various wall configurations and their hourly fire ratings.

Underwriters Laboratories, for example, will show a section of wall in plan view and label each component of the wall with various acceptable manufacturers of the product. The section will also list a design number for reference, a fire-resistance rating for the assembly, the structural capacity of the wall (bearing or nonbearing), and specific details concerning how to construct the wall in the field. The sections listed cover the full range of wall construction materials, from wood frame to steel and masonry. The fire ratings for a given wall section are for the described assembly only, and substitutions for any component may change the rating.

The Gypsum Association manual limits its review to gypsum-based products, but the format is similar. Wall sections are shown in plan view. Fire ratings are listed in table form, as are the overall sound ratings of the assemblies. Again, detailed construction descriptions are included. In addition, the manual also shows overall wall thicknesses and approximate weight in pounds per square foot. I find the Gypsum Association manual easier to use, since the format has all the information you want in one place.

Up to this point, the basis for choosing a wall type is fairly straightforward: First determine the fire rating required, then determine the wall types that will give that rating. Naturally the type of building you are planning (for example, wood frame, masonry, steel, etc.) may further narrow the selection. But you will still have a large number of alternatives.

Sound Ratings

This is a good time to focus on the sound rating, which will further narrow your focus. The ability of a wall to resist the transmission of sound (airborne vibration) is rated in terms of a sound transmission class (STC) number—the higher the STC number, the better the sound resistance. The range of STC numbers you would normally see varies from 30 to 65.

Basically, common walls with STC ratings below 30 allow loud speech to be easily understood. Between 30 to 50, loud conversations become muted. Above 50, loud talking is inaudible.

These numbers refer only to resistance to airborne vibration, which is controlled by mass or wall thickness. Impact vibrations, which should also be considered, are best controlled by separation of surfaces.

Good control of sound transmission is obviously a strong marketing advantage.

Let's Build a Wall

At this point things get a bit more complicated, and it's useful to have a point of reference to track our way through the selection process. I'll use as an example a development I currently have under construction.

The homes are wood framed, one- and two-story single-family attached. There are from three to five homes per building, with attached garages. The floor elevations vary from unit to unit. Conventional dimension lumber framing is used throughout. The homes are in a quiet suburb west of Boston and target the affluent "empty nester." In addition to being the builder, my firm is also the developer, and we will manage the association once the project is complete. In other words, we have a long-term commitment.

In choosing a party-wall construction for this project, we first determined that code required a one-hour fire separation wall between units. We knew from the beginning that a wood stud frame would be used throughout, with drywall finish. From past experience and because of location, we knew we wanted our common walls to have STC ratings above 50—a nice, quiet wall for our privacy-oriented occupants.

With all this information, and using the design manuals mentioned, we reduced our choices to three possible wall types (see Figure 1):

Wall A. Fire rating 1 hour, STC 56. A single wood stud with resilient channel on one side. Double-layer 1/2-inch type "X" gypsum board each side; one layer R-11 fiberglass insulation.

Wall B. Fire rating 1 hour, STC 53. Staggered wood studs 24 inches on-center. Double-layer 1/2-inch type "X" gypsum board each side; one layer R-11 fiberglass insulation.

Wall C. Fire rating 1 hour, STC 59. Double wood stud wall with single-layer 1/2-inch type "X" gypsum board each side; two layers R-11 fiberglass insulation.

Each of the walls above meets our fire and sound requirements. However, each has its own merits and drawbacks which have to be considered before making a final decision.

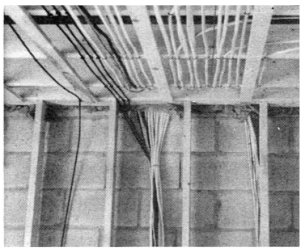
For example, Wall A is simple to build, low in cost, and has few details. As an uninterrupted wall between open spaces it would work well. But for our sample buildings, this wall system will not achieve the results we are looking for. A single wall between living units that have different floor elevations, numerous electrical penetrations, and possibly plumbing and wall cabinets attached is almost impossible to build satisfactorily under field conditions. Also, impact vibrations on a single-stud wall can't be controlled, as adjacent living spaces have a common framing structure allowing these vibrations to be passed from one unit to the other. These objections are enough to eliminate the single-stud wall system from our choices.

Wall B, the staggered-stud wall, is also simple to build, has few details, and has the added virtue of increasing the distance between wall surfaces. However, it has the same impact-transmission problems that Wall A has; so it too can be eliminated.

Wall C, with its excellent sound resistance and increased impact resistance, is the wall of choice here. Although twice the initial material cost, this wall meets very well all our requirements and does not require any expensive follow-up work, such as caulking, patching, etc. It is, however, necessary to seal around any openings made for wiring or plumbing to maintain the fire break between floors (see Figure 2). Horizontal and vertical differences between units are no problem, since each unit is structurally independent of the other. The added time and expense of building the double-wall system is the price we pay to provide the extra privacy we seek in this project.

To assure this privacy, the most important part of the double wall system is the 1-inch separation between units. This separation should extend from the top of the foundation to the underside of the roof, without connections or penetrations of any kind between units. Make sure to verify this before the insulation is installed. We often find that temporary braces or pieces of 2x4 have been nailed between the walls during framing. Sometimes they are even installed to hold the walls apart. These must be removed or they will transmit vibration.

Another area you should pay particular attention to is interior/exterior corners. In Figure 3 you can see that



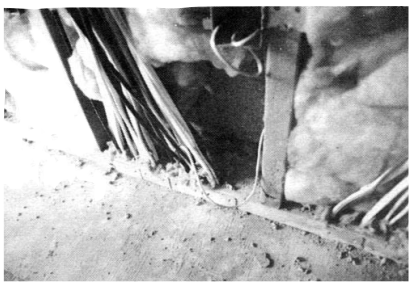


Figure 2. *To maintain the fire-stopping qualities of a party wall, openings in the plates for wires and pipes may be sealed with a "safing insulation." It's available from U.S. gypsum and from Roxul, Inc., of Milton, Ontario.*

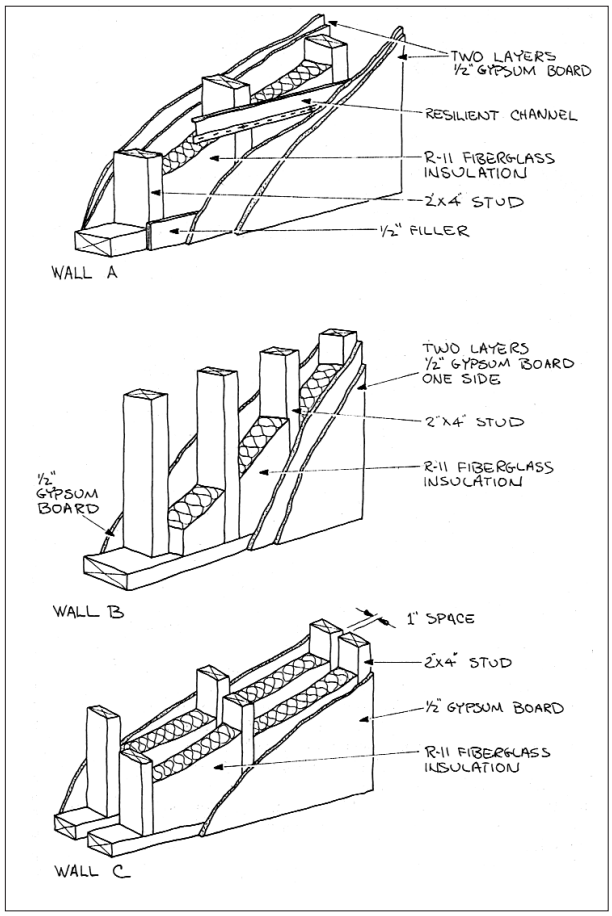


Figure 1. *One-hour-rated party walls. The resilient metal channel in Wall A decreases sound transmission, as does the staggered stud system in Wall B. To reduce impact vibration, however (and sometimes to meet code), a physical separation between walls is needed, as in Wall C.*

Where Firewalls Meet the Roof

Both code and common sense dictate that where firewalls are needed in a multi-unit project, you also need to take steps to keep fire from spreading from the roof of one unit to the roof of the next. The traditional method has been to run the firewall up through the roof to form a parapet 30 or 36 inches high (depending on the model code) between units. When units are of different heights, the distance is measured from the lower roof.

In recent years another solution, one that allows a builder to forego the expensive (and often unsightly) parapet, has also become common. That is to simply run the firewall up against the bottom of the roof sheathing and use fire-retardant-treated plywood roof sheathing for a width of 4 feet on either side of the party wall. This solution is now permitted explicitly by all the modelcodes except the Uniform Building Code; and even in areas covered by the Uniform Building Code, many local officials accept this arrangement as meeting the requirements of code.

The Standard Building Code and the One- and Two-Family Dwelling Code also permit a system using one layer of 5/8-inch Type-X gypsum board installed directly beneath the roof sheathing for a width of 4 feet on each side of the firewall. Since the gypsum board goes on top of the first few rafters or trusses, this method makes it necessary to shim up the rest of the rafters or trusses to create level sheathing.

Code acceptance of these treatments is fairly uniform, though there are some local variations. As with so much else, it pays to check first with your local code official—or to make sure the architect did so.

—David Dobbs

New Gypsum Firewalls Compete with Masonry

Structurally independent firewalls are often required on multi-unit housing projects, whether it be at every partition or, as described in "Party Wall Options," every few partitions. A true firewall, by definition, is a wall that will remain standing even if one of the adjacent units collapses (a fire-separation wall, by comparison, is often a standard framed wall with fire-resistant cladding). Many codes require structurally independent firewalls for all or some of the partitions in a multi-unit project. In the project described in the accompanying article, for instance, such walls were required at every fourth partition.

The firewall of choice in such cases has long been masonry, usually in 8-inch-thick blocks. A properly constructed masonry firewall stands well as an independent unit, is non-combustible, and gives excellent sound insulation. The most common wall of this sort is a free-standing 8-inch-thick masonry wall between independent wood-framed units.

A less common masonry solution, allowed by some codes, is a load-bearing masonry wall in which the floor joists are beveled rather than square-cut where they bear on the wall. The bevel, called a "firecut," allows a collapsing floor joist to fall away from the wall without toppling it. This "breakaway" system produces a load-bearing wall that is common to both adjacent units, but which is structurally independent in a fire. While it saves the time, space, and materials associated with building independent stud walls on either side of the firewall, this solution, being load-bearing, often meets with skepticism from code officials.

Recently, the gypsum industry has developed another solution, one it claims stops noise and fire as well as masonry walls do while simplifying construction and lowering costs. This is a structurally independent, non-load-bearing wall of gypsum between units; the system can be as thin as 3 inches. Metal studs are usually used, with a double layer of 1/2-inch gypsum on each side. The 3-inch version is a solid double layer of gypsum embraced in metal H-studs.

The key to the gypsum firewall's structural independence—and thus its code approval—is a system of aluminum breakaway clips that secure the firewall to the stud walls and/or joists on either side. (The clips are not meant to support joist ends, so the joists must run parallel to the fire wall.) The clips are designed to soften at high temperatures so that in a fire the burning unit can fall away from the firewall, leaving it intact to protect the adjacent unit. The fire rating on such a wall is two hours, the same as the masonry wall. No penetrations of the wall are allowed, so any plumbing or wiring must run along chases or within an independent wall attached to the firewall.

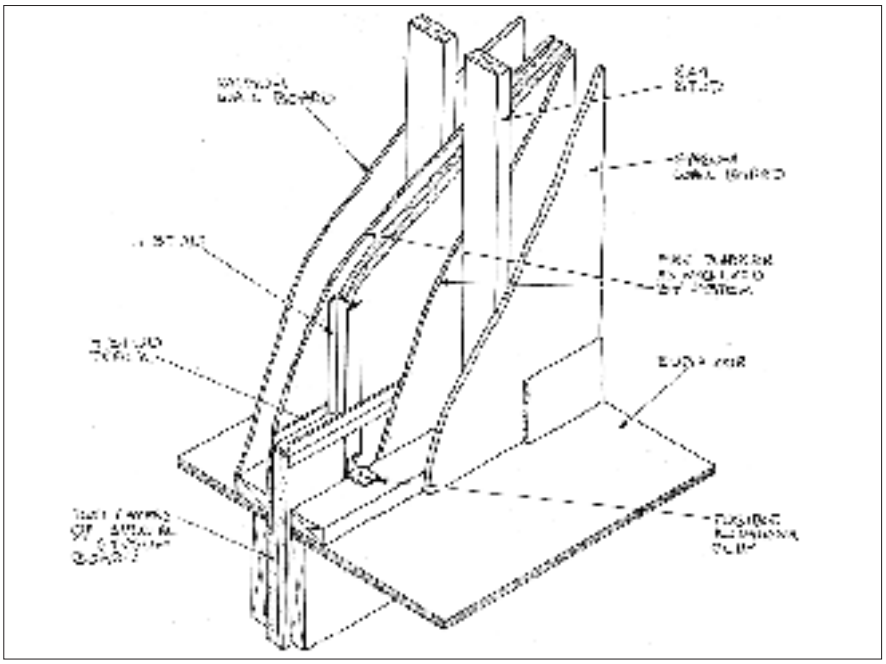
Since code language regarding firewalls is performance based—typically requiring that the wall have a two-hour rating and be structurally independent—the two-hour breakaway gypsum systems should, in theory, make the grade.

In reality, breakaway gypsum firewall systems, perhaps because they are still relatively new, are often more trouble to get code approved than are masonry walls of the same rating. As Rick Maranhas (author of "Party Wall Options") puts it, "With gypsum walls, the inspector wants to see every seam, and you have to leave the adjacent walls open for him so he can take a look. That can be a hassle and cause delays. With a masonry wall, he just sees it going up, and he's done with it." Maranhas has used gypsum walls in a few projects, but prefers masonry for its quicker code approval and flexibility in scheduling.

Ken Huckabee, service representative for the Building Officials and Code Administrators (BOCA), which writes the model code for the Northeast and much of the Midwest, agrees that code approval for gypsum firewalls is presently more troublesome than for masonry, particularly on multi-story projects. He says code officials tend to question what might happen in an upper-story fire when the clips there melt away and the top floors collapse. "They want to know what happens to the clips on the stories below, which might not be hot enough to break away. To me they have legitimate questions."

However, Huckabee feels that with time, and as code officials see more of them, the gypsum systems will be more readily and quickly approved. Until then, builders using the gypsum system will do well to check with local code officials first.

—David Dobbs



Shown above is the general design of the two-hour gypsum firewalls promoted by the major gypsum board manufacturers. Each manufacturer's system uses its own patented products and design, which must be followed precisely. The H-stud version shown here uses two layers of 1-inch-thick gypsum. The stud walls on either side are attached with "fusible" aluminum angle clips that melt at high temperatures, allowing the burning wall to fall away.

one unit forms an outside wall corner, while the adjacent unit continues. We maintain the separation by running the continuous wall's exterior sheathing a couple of inches into the 1-inch space, then stopping the other wall's sheathing flush with the inside edge of its stud wall (just short of the continuous wall's sheathing). This leaves a 1/2-inch space to maintain the separation of units. The gap is easily flashed with vinyl or other roll flashing before the sidewall operations start.

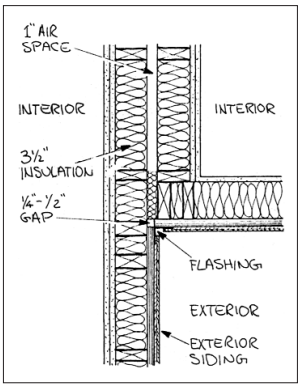
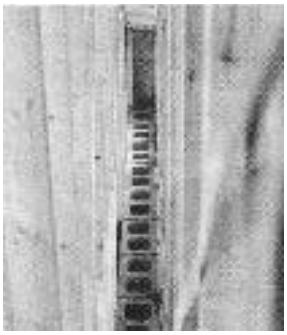


Figure 3. *When building double walls, care must be taken to maintain their separation at interior/exterior corners. One option is stopping the exterior sheathing about 1/2 inch short of the corner and backing the gap with flashing.*

Masonry firewalls. Another system we use quite often is a masonry wall. In this project, we built the first phase using the double wall system as described above for most units. However, code required that every fourth separation have a second layer of gypsum on each surface and a structurally independent two-hour firewall in between. We decided on an 8-inch masonry wall.

Though specially designed gypsum walls can meet the same purpose (see



"New Gypsum Firewalls"), we chose masonry because in our experience masonry walls get code approval in less time and with fewer inspections than do gypsum systems. Another plus was that masonry could be easily installed after the adjacent walls were framed, whereas a gypsum system is unwieldy to install because you have to work between framing; we've found drywall subs aren't crazy about doing such jobs, and their rates reflect it. Finally, the masonry was easier to schedule and plan, since it could be done either before or after the adjacent units were framed. We made one phone call, and in three or four days the walls were up. Figure 4 shows how we opened the 1-inch space between units to 10 inches and put the 8-inch masonry wall between. Installed, the masonry wall cost us approximately $4.25 per block, which translated to $4.75 per square foot of wall surface. But with the masonry wall we could cut our gypsum back to a single layer on each side, saving about $4 per square foot. The final net cost was about $4 per square foot for the masonry wall compared to around $4 per square foot for a gypsum system.

Marketing Makes Its Play

That first masonry wall was required by code for every fourth separation. But as we built the units, the sales and marketing staff saw that the masonry separation walls were much more appealing to potential buyers. Fire safety and noise between units were major concerns to them, and they saw the masonry wall as a structure that would meet their needs. So, we decided to switch to masonry for all party walls in the remaining phases. We also learned to never underestimate the buyer's perception of value and safety in making a decision on the type of party wall to build.

Good party wall decisions start with good planning and design, and should be a priority all through the construction process. Carefully review each detail and option in advance and see if it fits into your construction schedule and building technique. And don't be afraid to upgrade if the process requires it. In general, I believe that party walls should achieve the required fire/safety ratings, have a STC rating of 53 or higher, and should be built without requiring any specialized techniques, sub-trades, or inspections.

Figure 4. *A free-standing masonry wall provides a 2-hour fire rating and excellent sound protection. One-inch spaces on either side of the wall leave the townhouse units structurally independent. The wall can be put up either before (above) or after (left) the adjacent units are framed.*

For More Information

Fire Separation Requirements for Attached Single-Family Homes, from the NAHB (15th & M Streets NW, Washington, DC 20005), summarizes basic code requirements for party walls and provides specifications for a variety of one- and two-hour walls. ■

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