

# GYPSUM-BOARD Firewalls



Gypsum-board area separation walls perform as well as masonry but can be assembled by carpenters

**A**rea separation walls are critical safety features in multifamily housing. If one unit catches on fire, the area separation wall (also known as a firewall or party wall) is designed to prevent the fire from spreading to an adjoining unit or units. Equally important, it must be constructed to allow a burning unit to collapse

without pulling down the firewall or compromising its structural integrity (see Figure 1). A firewall must be continuous from wall to wall and from foundation to roof. In most cases, it continues through the roof sheathing as a parapet and protrudes through the exterior walls, although other terminations are possible where allowed by code.

## Masonry vs. Gypsum Board

Traditionally, residential area separation walls have been made from concrete block or some other form of masonry. Masonry walls do the job, but from my standpoint as the vice president for construction of a company that builds stick-framed multifamily projects in southeastern Pennsylvania and



National Gypsum Co.

**Figure 1.** Although the burned-out unit at center is a total loss, the gypsum-board area separation walls on either side prevented the fire from spreading horizontally and allowed the burning unit to collapse inward without damage to its neighbors.

southern New Jersey, they have a couple of important disadvantages.

Masonry walls require working with mortar, which can make things difficult when winter temperatures fall below freezing. Going with masonry also introduces another trade to the site, which adds to the cost and increases scheduling and coordination problems.

We've found that the best and most cost-effective solution is to use two-hour-rated gypsum-board area separation walls, which are approved by BOCA — the applicable code in our area of operations — and meet the requirements of our insurance underwriters. (Some townships in our area still require masonry walls, however.)

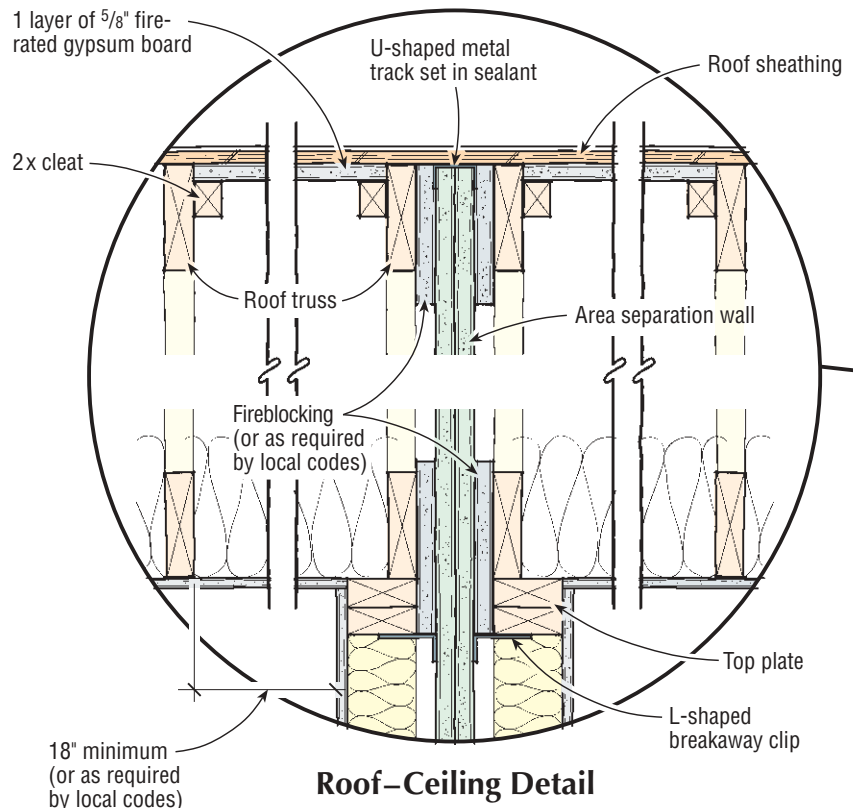
Gypsum-board area separation walls are a little bit cheaper than masonry, in our experience, but their real benefit is that they're easily erected by carpenters. Our current crew of framers, for example, had never installed gypsum-board separation walls, but they mastered the procedure within a few hours. With the required trade already on the site and weather conditions removed from the equation (carpenters can work on gypsum-board walls even in the coldest weather), it becomes much easier to stick to the schedule.

## Area Separation Wall Basics

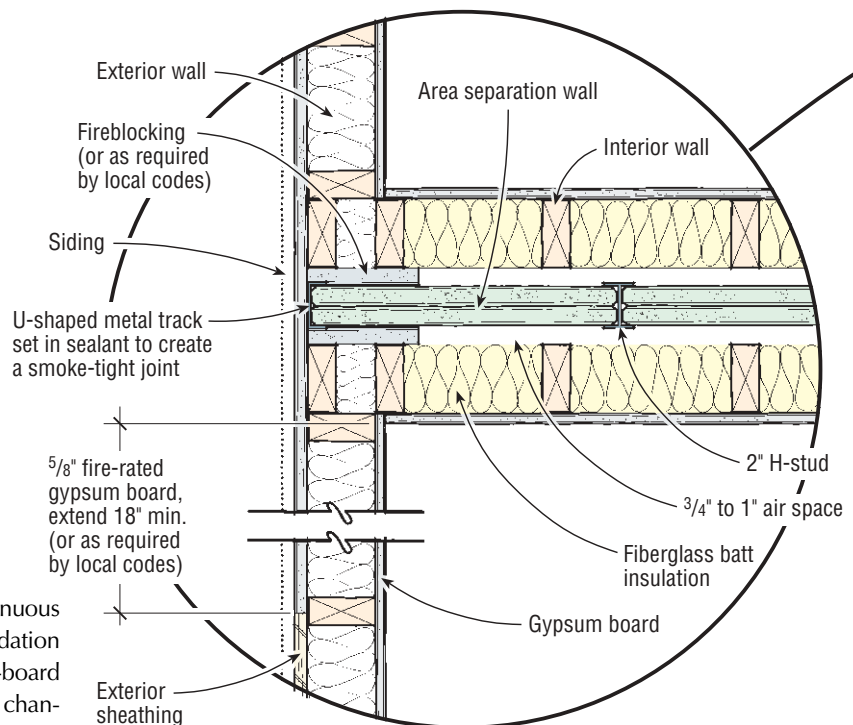
The heart of the system is a double layer of 1-inch-thick gypsum liner panels, which fits between the back-to-back framed walls of two adjacent units (Figure 2). The area separation wall begins at foundation level, where a U-shaped metal track is pinned to the slab. Because the gypsum-board panels are so light, they don't require separate footers.

**Figure 2.** The heart of the area separation wall is a continuous double layer of 1-inch gypsum board that runs from foundation to roof, and from the front to the back wall. The gypsum-board panels are connected where they butt together with steel channel and H-studs; structural support is provided by aluminum "breakaway clips" fastened to wood-framed walls of the adjoining units. Depending on the application and local codes, the firewall may be extended beyond the exterior walls and roof to form a parapet or may terminate flush, as detailed here.

## Area Separation Wall Basics

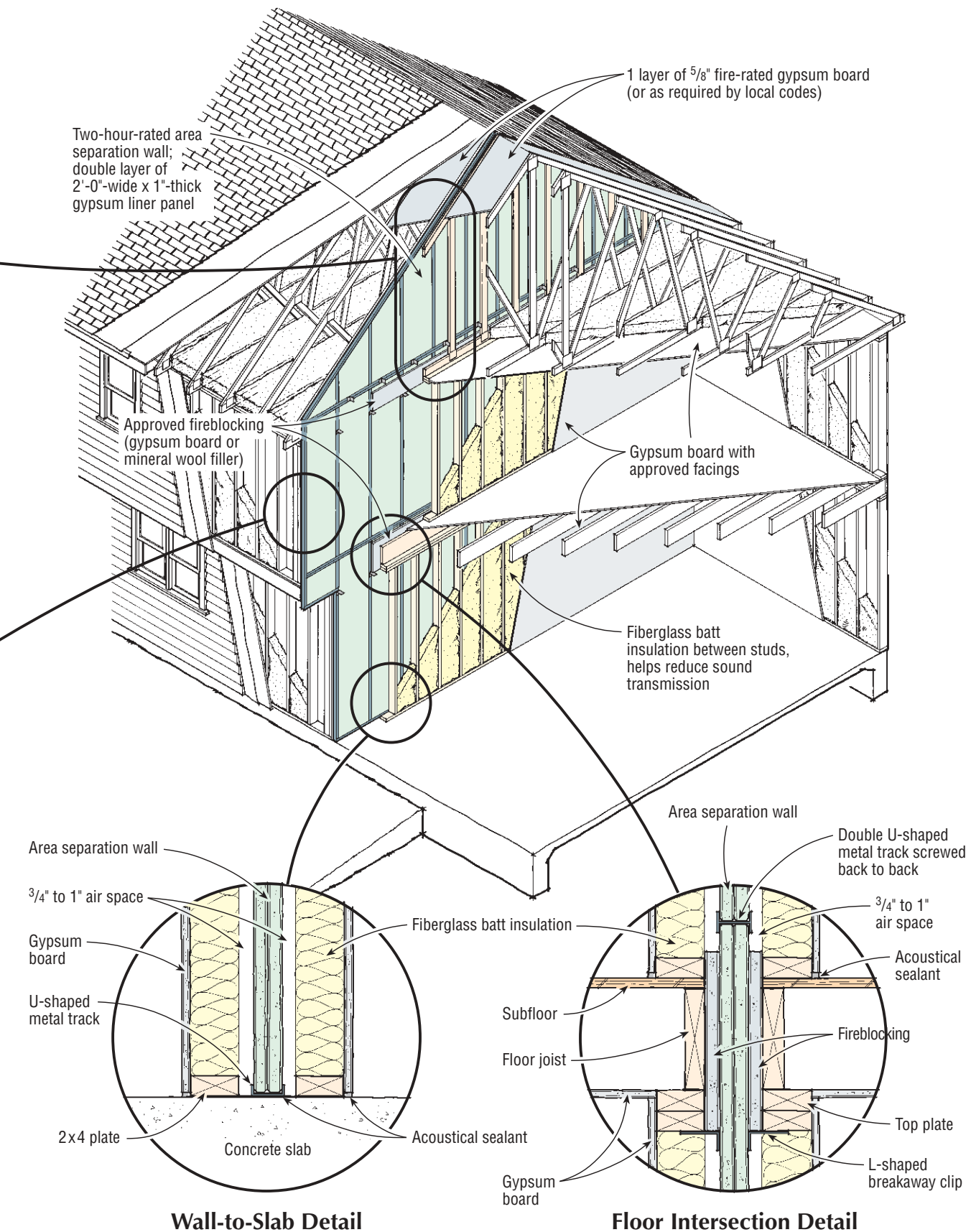


**Roof-Ceiling Detail**



**Exterior Wall Intersection – Plan View**

# Area Separation Wall Basics (continued from previous page)





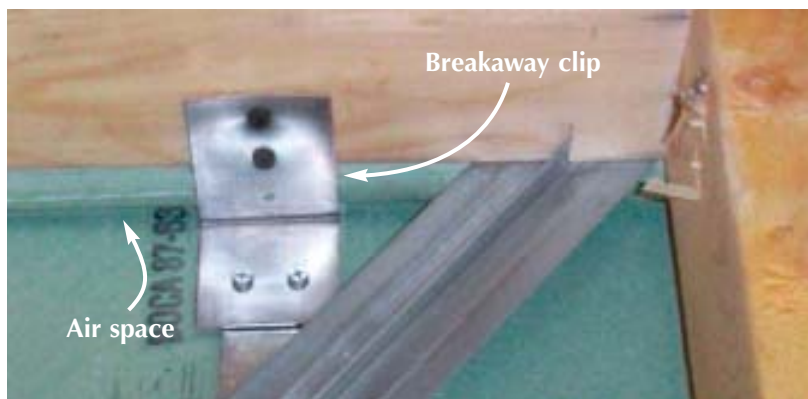
**Figure 3.** After inserting the bottom edges of the gypsum-board panels into a metal track fastened to the foundation, a carpenter installs the steel H-stud that will connect the vertical edges of the panels where they butt together. The base of the H-stud fits into the base channel and will be fastened in place with pan-head screws (right). Two lengths of channel are screwed together back to back atop the panel edges that extend above the second floor, serving as a base for the next course of panels (below).



Once the wood-framed wall that adjoins the firewall on one side is in place, the bottoms of the 2-foot-wide gypsum panels are inserted into the base channel and tilted up to vertical (Figure 3). The edges of successive panels are joined where they butt together with 2-inch metal H-studs. Special L-shaped aluminum clips are screwed to the H-studs where they pass by the top plate or floor plate; the other leg of the clip is screwed or nailed to the plate itself (Figure 4).

It's important to maintain a  $\frac{3}{4}$ -inch to 1-inch air space between the gypsum panels and the wood-framed walls on either side — no direct contact between the gypsum board and surrounding combustibles is permitted.

**Hot clips, cool clips.** At normal temperatures, the aluminum clips hold the gypsum-board core of the area separation wall in an upright position. But in a fire, when one side of the system is exposed to temperatures in excess of 1,100°F, they soften and break away. (On the job site, in fact, the aluminum clips are generally referred to as “breakaway clips.”) This allows the fire-side structure to collapse without pulling down the fire-resistive separation wall. The clips on the opposite side of the area separation wall remain intact, since temperatures on that side will be far below the point



**Figure 4.** The double layer of gypsum board at the center of the area separation wall assembly is fastened to the adjacent framing with aluminum “breakaway clips.” In the heat of a fire, the clips soften and melt, allowing the burning unit to collapse without pulling down the firewall or the neighboring unit on the other side.

**Figure 5.** Where the area separation wall meets the roof, sheets of 5/8-inch type X gypsum board protect the underside of the roof sheathing in the two adjoining rafter bays on each side.



at which the clip will soften.

**Moving up.** The gypsum-board area separation wall is extended upward a floor at a time as the framers continue their work. As each floor is completed, the top edge of the previous course of gypsum panels is capped with an upside-down piece of steel track. A second piece of track is screwed back to back on top of it, and the next row of panels is erected and fastened to the framing with more clips. The area separation walls we build are usually limited to two stories and an attic, but walls up to four stories high are permissible if the first story is a basement.

### Fireblocking and Roof Junctions

To slow the vertical spread of fire between floors on the same side of an area separation wall, the code requires fireblocking of the space between the gypsum panels and the adjacent floor joists. In most cases, the fireblocking consists of strips of the same 1-inch gypsum board used in the firewall itself. The gypsum-board fireblocking is fastened to the H-studs with screws.

The 2-inch gypsum core of the firewall is required to be continuous, with no openings or penetrations that could allow fire to pass through it. But the framing of the walls on either side can accommodate plumbing and wiring just like any other partition.

**Sound control.** The dense, continuous area separation walls also provide an

effective barrier to sound transmission between units of a townhouse or apartment complex. To reduce transmitted sound even more and improve thermal performance, we insulate the adjacent walls with fiberglass batts. When the plumbing, electrical, and insulation subs are done, the walls and ceiling are finished with drywall in the usual way.

**Where roof meets firewall.** Building codes ordinarily require area separation walls to be constructed with a parapet — a vertical segment of the wall that extends through the roof to a specific height, usually 30 to 36 inches above the roofline. But for townhouse construction, the code in our area also accepts a method that doesn't require a parapet (Figure 5). We use this method in applications where we want to avoid the appearance of a roofline interrupted by one or more parapets.


This involves installing a code-approved roofing material and adding a layer of 5/8-inch type X gypsum board for 4 feet on either side of the area separation wall. The gypsum-board underlayment sits directly beneath the sheathing, where it's supported by ledgers nailed to the top chords of the adjoining roof trusses. A similar detail can be used where an area separation wall meets an exterior wall (Figure 6).

### It Works

We're confident that gypsum-board area separation walls perform every bit



**Figure 6.** A carpenter installs a strip of fire-blocking to close the gap where a short section of exterior garage wall will butt against the area separation wall.

as well as masonry. About 12 to 15 years ago, we encountered a local township that had no history of working with gypsum-board area separation walls, and town officials were skeptical of our intention of using them. To show them how reliable the gypsum-board walls are, we built an 8x16-foot building and divided it in half with an 8-foot-high gypsum-board area separation wall. Under the watchful eye of the local fire department, we set the test facility on fire. The gypsum-board wall system performed well beyond expectation, and we were able to sell the project to town authorities as planned. The test wasn't completely scientific, but it confirmed our belief and convinced local fire officials that gypsum-board area separation wall systems work as designed. 

**Robert Brown** is vice president of construction for the Barness Organization in Warrington, Pa.