

MASONRY INSIGHTS



Masonry Fire Walls

A fire wall is a structure whose purpose is keep fire from spreading to adjacent areas. They are typically located at a lot line or where different occupancies need to be isolated within a single building. Based on NCMA TEK 5-8B, one of the primary options for fire walls are free-standing walls that permit the collapse of the structure on either side of the wall without collapsing themselves. That is the focus of this paper.

Fire Wall Design Options

We will look at a few options for cantilevered masonry fire walls and show what can be accomplished. The walls will be designed for the minimum lateral load of 10psf (minimum IBC lateral load) and constructed using $f'm = 2500$ psi.

Option 1 - cantilevered wall

The first example is a 20-foot tall single story wall. It is fixed at the base and is not supported anywhere along its height. This wall can be a 6 inch block with #5 bars centered at 8 inches. If an 8 inch block is used, #5 bars at 16" are sufficient.

Taking the design a step further to a 30-foot tall wall for a tall single story or multi-story design, this wall can be 12 inch block with #7 bars centered at 24 inches.

Table 1 - Cantilever Fire Wall Guide
 $f'm=2500$ psi, 10psf loading, MSJC 2011

Wall Height	15 foot	20 foot	30 foot
6 inch thick	#5@16 PG	#5@8 SG	-
8 inch thick	#5@40 PG	#5@16 PG	-
12 inch thick	#5@72 PG	#6@48 PG	#7@24 SG
notes	PG=partial grout, SG=solid grout		

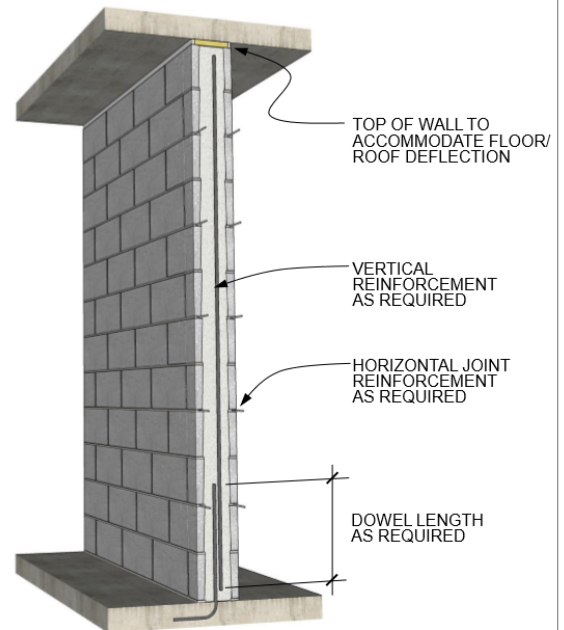


Figure 1: Cantilevered Wall Detail from IMI Masonry Detail Series, <http://imiweb.org/masonry-detailing-series/>

Option 2 - diaphragm wall

Another choice for wall construction is to use a diaphragm wall. This type involves two wythes that are joined by cross walls, or diaphragm walls, that make the two walls behave compositely. This allows walls to be built very high.

Looking, for example, at a diaphragm wall using 8" blocks with an overall nominal wall width of 2'-0", with #5 centered at 24" in each wythe, the wall can be cantilevered 48'-0" tall when designed using ASD provisions. As this example shows, this system can allow walls to stretch very tall. The issue, of course, is that the wall is now quite a bit thicker than a standard single-wythe wall.

In addition to being able to build a taller wall, other advantages are that both faces of the wall are flush (in contrast to a wall with pilasters) and the cavities can be used to locate utilities.

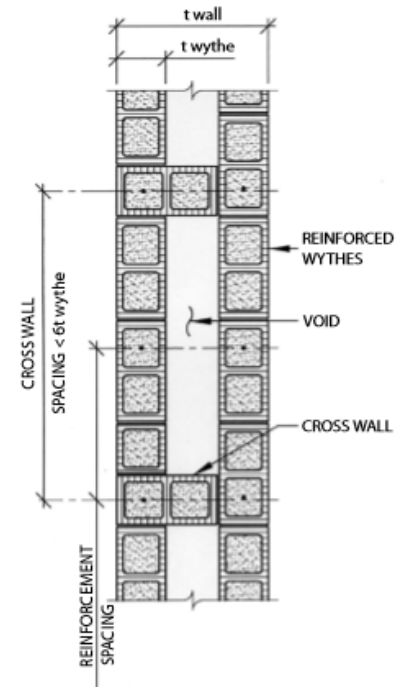


Figure 2: Illustration from STRUCTURE magazine article (May 2008), Designing Tall Masonry Walls

Architectural Insight

Fire Walls

Fire walls are subject to quite a few restrictions and criteria. They are required to extend from exterior wall to exterior wall. If the exterior walls themselves are not fire rated for a certain distance on each side of the fire wall, or if the structure on each side is not protected by an automatic sprinkler system, the wall is required to extend beyond the exterior wall. Fire walls also need to run from the foundation to the roof. The wall must extend above the building roof if certain demands are not met. Penetrations through fire walls are also restricted—they must contain fire dampers, use sleeves, or adhere to other constraints. When concrete masonry firewalls require control joints, designers may consider using fire-rated caulk, or make use of structural design strategies to eliminate control joints as discussed in NCMA TEK 10-3.