

Cavity Wall Construction

Take a historical journey of this building design concept's application in the commercial market from the 1930s to today.

Cavity walls designed and specified for the commercial market in the last 43+ years of my experience in the architectural profession are one of the most misunderstood areas of the design profession. In particular, flashings and weeps are the least understood component by engineers and architects alike in that they believe these systems are so minor to the entire project that no time is really spent on them.

For many years, composite or cavity wall construction consisted of a back-up wall, which was generally masonry with a brick or stone veneer built concurrently (back-up and veneer staged at the same time). The cavity in composite wall construction was filled with mortar or concrete material, usually the same mortar used for the brick, stone, and masonry. There was no differentiation for the mortar used since it was mixed onsite with cement, lime, and aggregate in proportions determined by the mason based on his experience. Reinforcing bars were placed in the cavity at regular intervals just prior to filling the cavity with mortar. Water penetration through the walls ranged from slight to rather profuse.

The introduction of true cavity walls sought to modify the construction to alleviate water penetration and certain other shortcomings. This change was accomplished by placing the reinforcing in the cores of the block rather than in the cavity, which eliminated

the requirement to fill the cavity. Using an air space between the masonry back-up wall and the veneer created a pathway for the movement of water in the cavity.

The air space seems to have been "designed" as 1 inch, where in truth it was the space required by the mason to get the brick in place with his fingers holding it. The back-up masonry wall was coated with an asphaltic material called dampproofing to allow water that reaches the air space from the exterior to ride down the cavity and exit the wall at pre-determined places. The exit areas were located where the through-wall flashings were placed. These flashings were placed at the foundation perimeter just above grade, at the floor lines in multiple floor construction, at heads and sills of windows and doors, and at copings of low-slope roofs.

Flashing details and locations were suggested by technical documents available from several sources, such as the BIA's (Brick Institute of America, now known as Brick Industry Association) *Technical Notes* and Ramsey Sleeper's *Graphic Standards*.

Flashing materials were generally copper or lead, with the former being more prevalent, probably for cost reasons. Copper flashing was generally laminated with asphalt and fiberglass on each side, which allowed the copper thickness to be reduced with no lowering in quality or performance. Laminated copper was patented in 1935 and is still used today by most manufacturers.

The flashing was built into the back-up masonry as the wall was constructed by tucking it into the bed joint one block course above the exterior veneer supporting lintel. Additionally, since water was now allowed in the cavity and would collect at horizontal flashings, there had to be a way to move the moisture to the exterior.

Movement was accomplished by placing a length of cotton rope about 16-inches long in the cavity on top of the flashing material and turning it out from the cavity to the veneer face. These "weep wicks" were generally placed at 4-foot centers.

Masonry reinforcing was placed in the bed joints 2-foot on-center vertically, or every third masonry course. Reinforcing consisted of two pencil rods running along the bed joints continuously, with cross rods in either a truss or ladder pattern.

Different approaches

Times change, philosophies change or are modified, and the manner in which walls are built change. No longer are back-up masonry walls and the veneer built at the same time. The back-up wall is constructed first and some time later (as much as several months) the veneer is staged and built. Many areas of the country have two separate crews building the walls: one laying the block and one laying the veneer. This procedure is used because there may be two pay classes and different expertises required or an express

