softening points, and the asphalt can flow off the backing film in the hot environment within an exterior wall.

Flexible Composite Flashing

These are combinations of various materials and are relatively new to the market. The compositions are similar to copper fabric flashing in that they exploit the advantages of each material. Many composite flexible flashings are sold in rolls of various widths between 12 and 48 inches. Roll lengths can be up to 300 feet. The variety of dimensions allows the material to be unrolled along the length of shelf angles and other long flashings, avoiding laps and joints in the flashing materials.

One such flexible composite flashing system is a combination of a proprietary ketone ethylene ester (KEE) polymer membrane with a pressure-sensitive adhesive. The 40-mil composite membrane has a release paper and is installed in the same manner as a self-adhered flashing. Another product is a vinyl ethylene film bonded to fiberglass reinforcement. This material is most often used with separate metal drip edges and is typically loose-laid and mechanically fastened to the substrate or set in mortar joints of the backup masonry. Special tapes and mastics are used to seal terminations and penetrations.

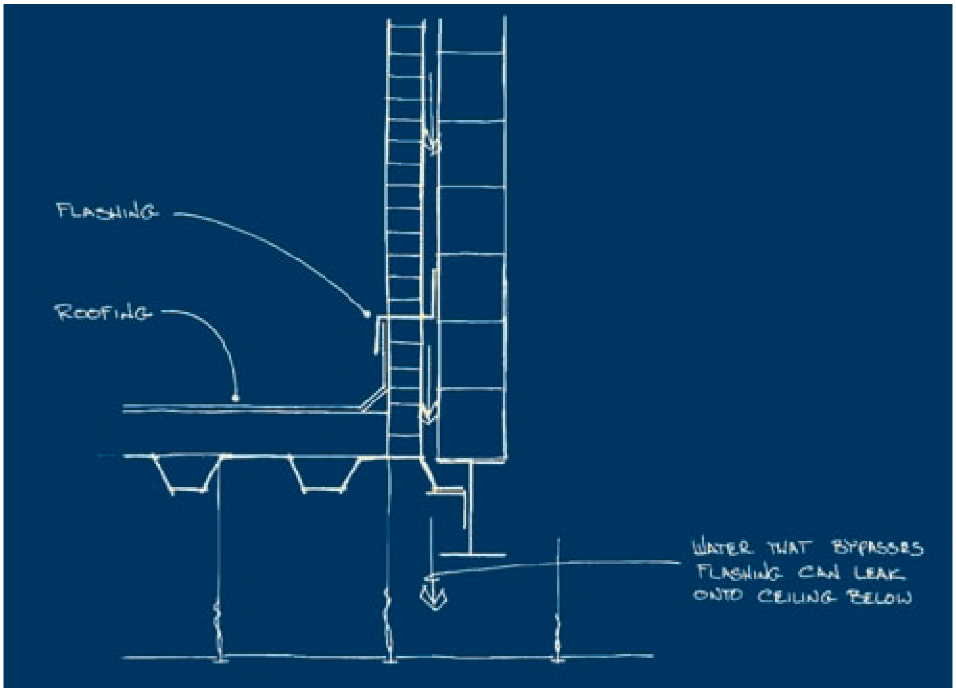

Figure 3

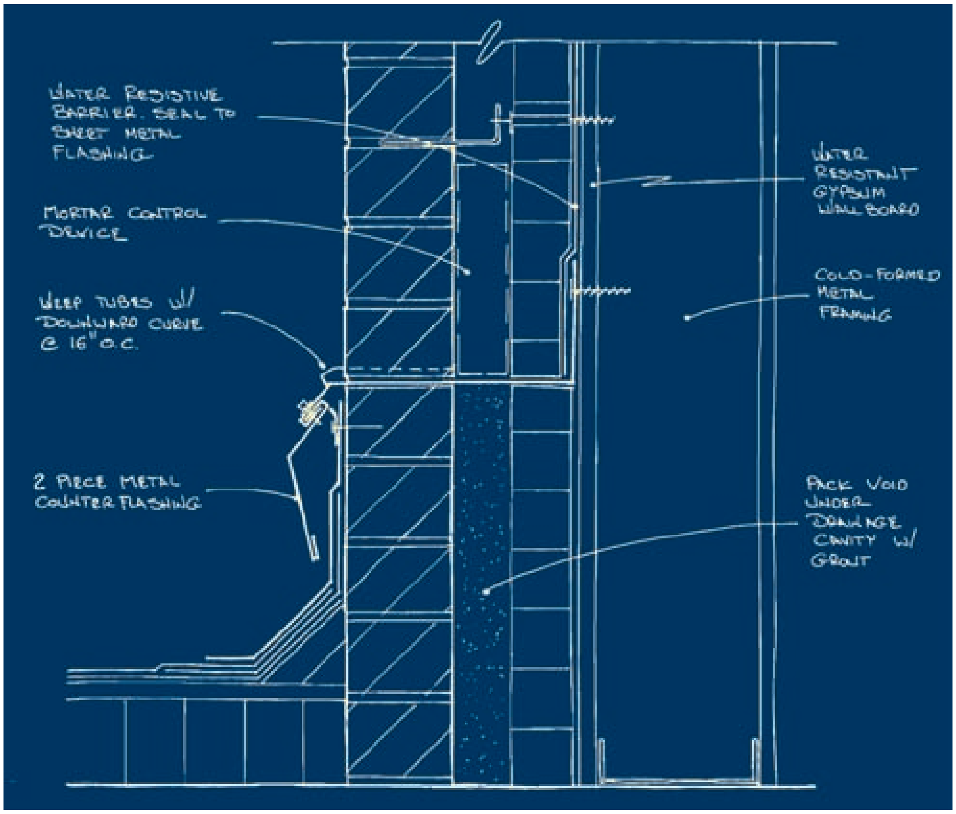

Figure 4

TYPICAL FLASHING LOCATIONS

Flashings are more common in drainage cavity and single-wythe walls. However, in the author's opinion, they can be just as important in thicker walls. The following descriptions and figures are generic in nature and should be modified and adapted for use in each particular building by a qualified design professional.

Base of Walls

This is probably the most common location that blocks the downward flow of water within a masonry wall. Locations where rising walls are constructed directly over occupied portions of a building are particularly vulnerable to water infiltration. Any water that bypasses the flashing will very likely result in an active water leak in the occupied space below (*Figure 3*). The wall cavity must not be blocked with mortar droppings, and the flashings and weeps must be very well constructed at these locations.

At the base of walls, a sheet metal flashing assembly that extends from the face of the backup wall through the masonry should be used to form a drip outside the wall. A sheet waterproofing membrane or water-resistive barrier is utilized to flash over the back leg of the metal flashing (*Figure 4*). Weeps are provided through the masonry veneer. A manufactured, mortar-control device is used to catch droppings at the base of the drainage cavity so that they cannot block the weeps. The open cavity below the flashing should be filled so that there is a solid backing under the flashing at laps. This action helps prevent the bottom piece of flashing from deflecting downward as the lap seam is created.

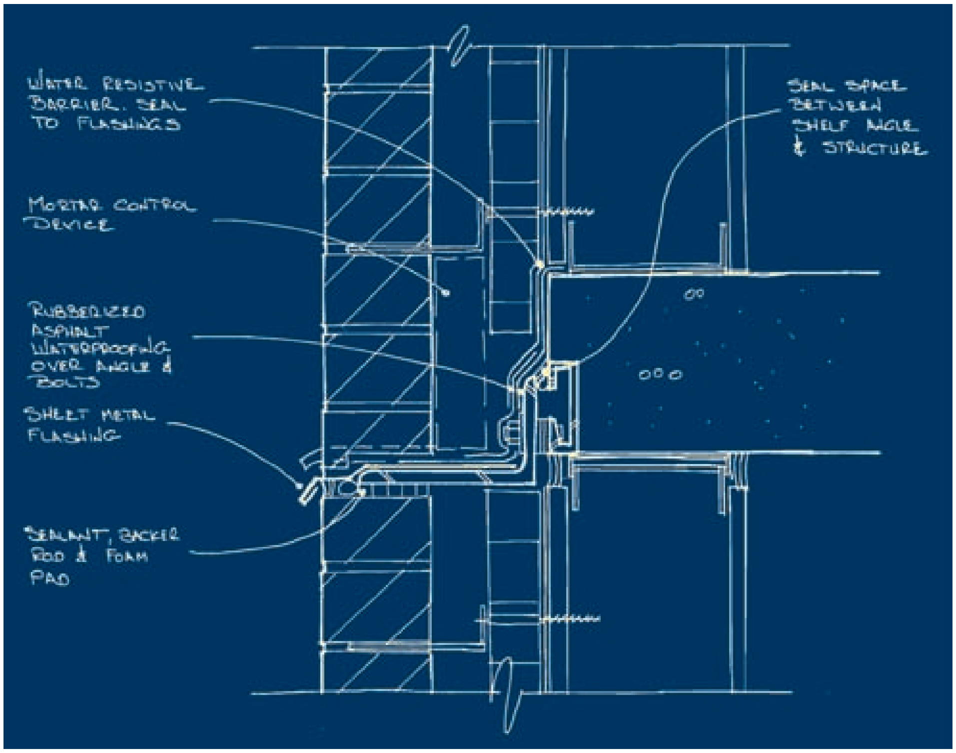

Figure 5

There are critical components of this detail that should not be overlooked, such as lap joints, expansion joints, door thresholds, and inside and outside corners.

Shelf Angles

Sometimes called relieving angles, these are locations where a structural angle is provided to carry the dead load of the masonry veneer. Buildings often incorporate continuous shelf angles that support the masonry veneer at heads of windows. Shelf angles are also found at floor lines of taller buildings. These locations are similar to those at the base of a wall. However, the flashing must form around the toe of the angle. Also, if the angle spans any considerable distance, it will most likely be either welded or bolted back to the structure of the building. A flexible flashing can be formed around the bolt heads (*Figure 5*).

Window and Door Heads

Flashings at window heads are very similar to those at shelf angles. There is usually a lintel or shelf angle that supports the masonry veneer above the window. However, the lintels are not continuous. It is therefore prudent to provide an upturned end dam at the end of the lintel. The intent of this practice is to prevent water from flowing off the end of the lintel, discharging water at the jamb of the window or door.

Window and Door Jambs

These locations, along with other penetrations through the wall such as mechanical louvers, create conditions in which water can potentially flow out of the drainage cavity migrating down the side of the window, door, or both, creating a leak. Sheet metal or flexible adhesive membranes can be used to create a dam to prevent water from flowing out of the drainage cavity and into voids at window and door jambs (*Figure 6*).

Window Sills and Door Thresholds

Locations below windows and doors – particularly at areas directly below the jambs – are vulnerable to water infiltration. These are locations where individual framing members of windows and doors intersect at an opening in the masonry veneer. Flashings at these locations should have an upturned back leg to prevent water from flowing off the back of the flashing. An end dam should also be provided to prevent water from flowing off the side of the flashing. If the window or door is near the base of the wall, the flashing should form a continuous envelope and be connected to the adjacent wall flashing.

Masonry Copings

Copings constructed with stone, precast concrete, or masonry should not be considered watertight. Water can penetrate through transverse joints in the copings or be adsorbed directly through the coping unit. Parapets are subject to increased vulnerability from freeze-thaw distress because they are exposed to the elements on three

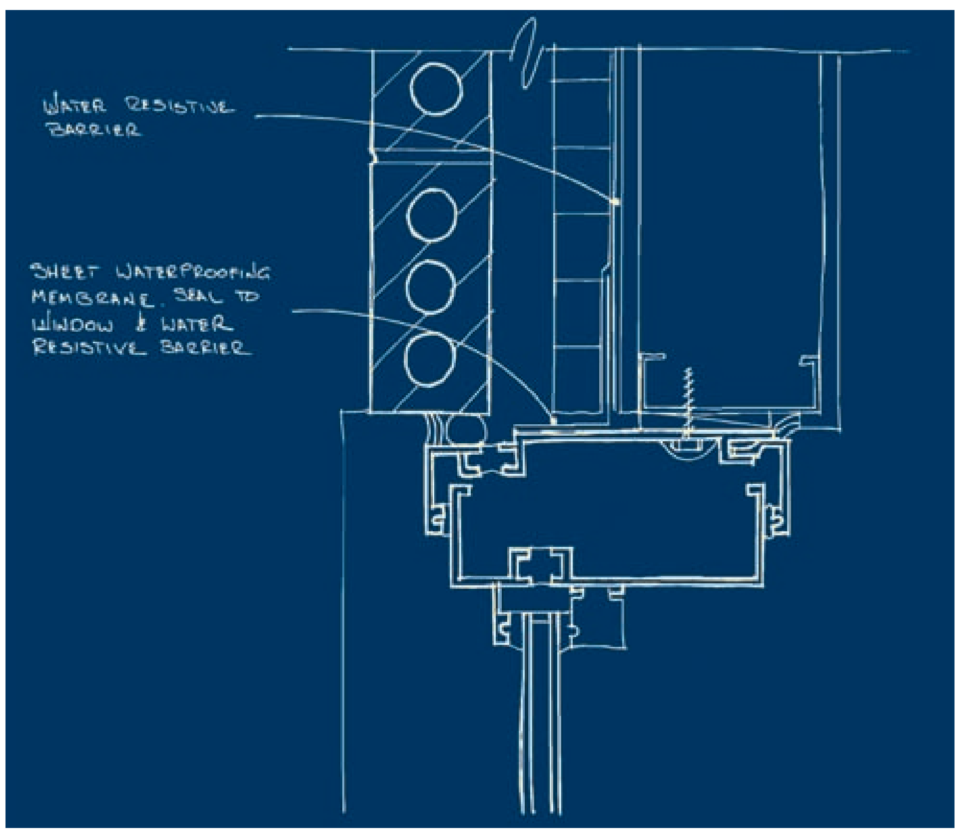

Figure 6

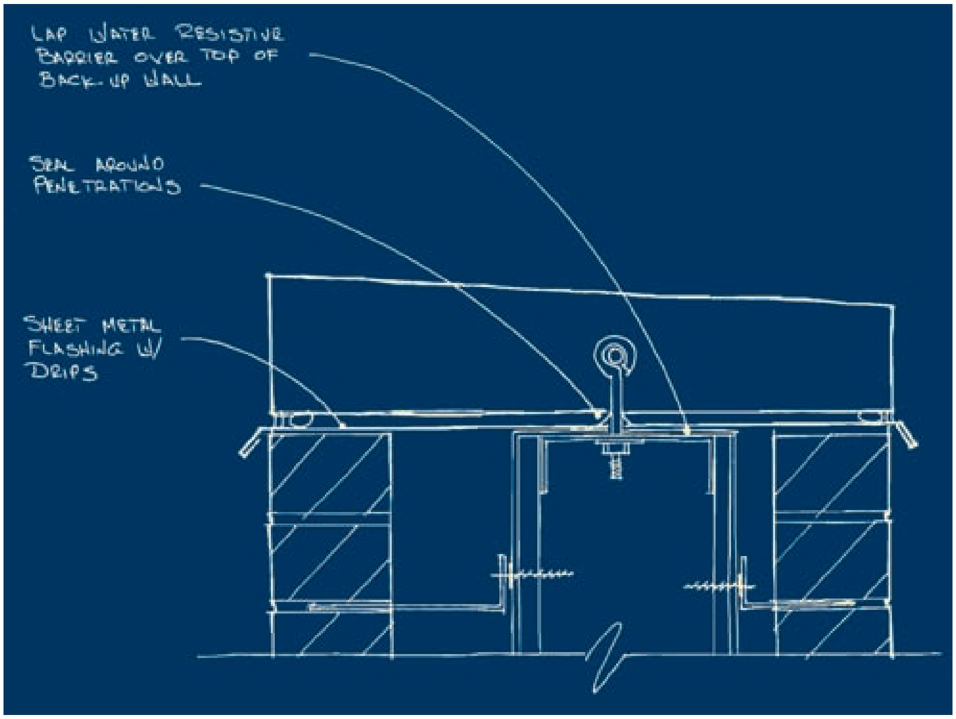

Figure 7

sides. A flashing should be provided directly under the coping to block water from flowing down through the wall. Dowels or other types of coping anchor penetrations through the flashings must be sealed (*Figure 7*).

Workmanship

Although masonry flashings can prevent water infiltration into buildings at certain locations, the overall workmanship of the mason has a large impact. One of the most common workmanship problems is mortar that falls down the inside of the drainage cavity. The mortar can harden and block the flow of water out of the weeps. Mortar droppings can also collect on wall ties and provide locations where water can bridge across the drainage cavity. Drainage composite materials are available. These mesh-like materials are placed at the bottom of the wall cavity and suspend the droppings, allowing water to flow around the hardened mortar. However, the mason still needs to avoid mortar spillage because if enough mortar is spilled into the drainage cavity, it will cover the top of the drainage composite.

Conclusion

Flashings are a critical component to the overall water management performance of masonry wall systems. The masonry industry and numerous consultants understand that water penetration through masonry veneers is unavoidable. This has created an emphasis on the effective management of the water penetration.

All parties, including the owner, designer, general contractor or construction manager, and sub-contractors, must be aware of the critical nature of these flashings. During the inevitable value-engineering process, modifications are often made that can either eliminate some of these flashing components or substitute materials that may not perform as well as originally intended. Designers must be knowledgeable enough to educate the owner as to the advantages and disadvantages of these proposed substitutions. There is also a coordination burden placed on the general contractor and/or construction manager and various subcontractors, as more and more portions of the exterior building envelope are constructed by different entities.

Douglas R. Stieve, RRC, AIA

Douglas R. Stieve, RRC, AIA, is a registered architect in the states of Connecticut, Massachusetts, New Jersey, New York, and Pennsylvania. He earned his BA in architecture from the University of Oklahoma and his RRC registration from RCI. Since joining Wiss Janney Elstner in 1991, he has specialized in building envelope failure diagnosis and repair. Projects in which Stieve has been involved have won awards from the National Trust for Historic Preservation, the New York City Landmarks Preservation Commission, and the Boston Preservation Alliance. He is a member of RCI, AIA, and ASTM and has served on the ASTM C15.02, Brick and Structural Clay Tile Committee; and ASTM C15.04, Research (Masonry) Committee.

Energy Performance Requirements in LEED Rating System to Increase 14%

The U.S. Green Building Council's membership overwhelmingly approved a new requirement for all LEED-certified projects to achieve at least two "Optimize Energy Performance" points within LEED, which will improve the energy performance of all LEED-certified green buildings by 14% for new construction and 7% for existing buildings.

All newly registered commercial LEED projects will be required to achieve the two "Optimize Energy Performance" points within LEED. The new requirement will reduce the environmental and economic impacts associated with excessive energy use and maximize energy performance of buildings through cost-effective, energy-efficient measures. To help projects achieve the new energy reduction requirements, a prescriptive compliance path is currently under development as an alternative to energy modeling. The two mandatory points will count toward a project's LEED certification.

— ENR