

## Keeping water out of federal court.

*(Building problems are not always what they seem.)*



The Federal Courthouse built in 1965 in Hannibal, Missouri had a serious water problem that began several years ago. On a regular basis, rain water ran into the tops of most of the building's windows and onto ceilings, partitions and window sills.

### **What the architect saw.**

The water was said to be, and appeared to be coming in through the aluminum window tops, called heads. However, caulking had been applied to the outside of the window heads without making a difference.



Sealant applied to window heads that did not work.

In buildings like this, there is an inch-wide cavity between the brick exterior and the building's concrete structure.

Looking up into this cavity was difficult because of the steel angles supporting the brick. However, it was possible to trace the water source to this cavity, not the window heads.



Water dripping from the wall cavity.

### **The search for how the water entered.**

Reviewing the building drawings, deductive reasoning and testing indicated that the water was coming through the brick itself. How was this possible?

Brick can be a porous material, and this brick was absorbing a lot of water. This was confirmed by attaching a small vertical tube to the brick and sealing the connection with putty. The rate at which water in the tube drops determines permeability. In this case it was very high.



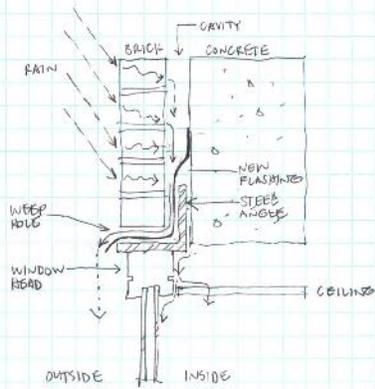
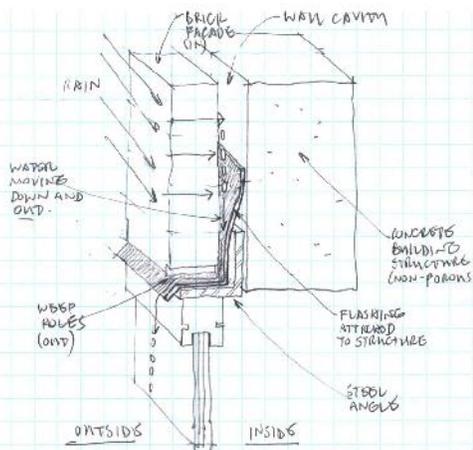
Typical brick and mortar in apparently good condition.

**But water entry is not the real problem...it's the lack of an exit.**

Most building designs recognize that some water will enter the exterior wall assembly. This is inevitable due to a variety of factors. It may not sound right, but this should not cause problems for the building. Problems occur when that water is not given a path to drain harmlessly out of the assembly without entering the interior.

**How the system should work.**

The way to deal with water inside the cavity of a wall, as we had here, is to install flashing and weep holes in the original construction. Flashing is a flexible metal or rubber sheet attached to the inside of the wall cavity and then extending out under the lowest row of brick resting on the steel angle. Weep holes are openings left in the mortar between every few bricks. They allow the water diverted by the flashing to weep harmlessly back out of the wall cavity.



Sketch – Water entering the wall is directed out by the flashing through the weep holes.

This building had flashing installed originally, but that it had deteriorated, due primarily to age.

### Fixing the problem...not the windows.

Installing new flashing was difficult. Holes were drilled through the brick three rows above the window heads. Steel rods were set into the concrete frame of the building every few feet allowing for the removal of the three rows of brick.



The wall opened to reveal the deteriorated flashing.

Laminated copper and fabric flashing was installed against the concrete frame and laped over the steel angles to the outside.



The cleaned and painted steel angle with new flashing being installed.

New brick was installed, with weep holes every 24 inches, where the old brick had been removed.



The new brick with weep holes in place of every third mortar joint.

The porous brick on the building was treated with breathable water repellent to reduce the amount of water entering the wall. The flashing and weep holes, however, are the real line of defense against water damage.

#### **Maxim**

The leaking windows were actually porous brick. The solution involved reducing the amount of water in the wall. More importantly, a harmless path for the water to find its way back out of the wall was provided.

**Diligent architects spend time finding the source of a problem before rushing off to solve it.**

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