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Building Forensics Can Prevent and Solve Water Damage

by **Wayne Offerman**

Ongoing maintenance and repairs help prolong the overall health of a building's exterior skin or envelop. But its fate is often predicated on what facilities managers aren't typically trained to see or predict—until it's too late.

Such was the case for a major hospital in South Florida. In 2004, hospital leadership decided to build a major addition to accommodate its growing pediatric and acute care services while expanding its patient room and laboratory capacities. Built above an existing hospital structure, the addition was completed using traditional South Florida building materials: metal framing with Densglas sheathing covered with metal lathe and painted cement plaster stucco.

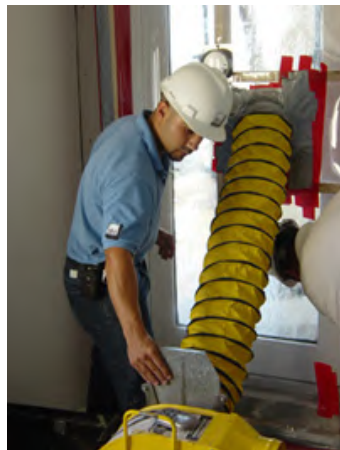


However, within one year of its completion, the majority of the multi-million dollar structure—addition and some of the existing—suffered severe and expensive damage caused by extensive water intrusion. It was no longer a bastion of cleanliness and safety, the addition and the existing structure underneath fell into disrepair. Some parts were evacuated and the structure needed hundreds of thousands of dollars worth of repair. In addition, the disruption and cost of lost revenue were enormous.

The culprit? In Florida, one would probably think it was a big hurricane or storm that did the damage. Rather, when the new windows were being installed, the perimeter sealant applied at the exterior of the window assemblies didn't properly interface with the adjacent exterior wall.

Experts determined that when the window system was being installed, the surfaces of the window frame perimeter and the corresponding window opening substrate contained debris. As a result, the sealant never fully bonded and over time. The window perimeter sealant gradually lost adhesion with the building opening substrate and every time it rained, water intrusion occurred. Silently, water leaked into the facility until the ceilings and walls couldn't hide it anymore.

So how did we solve it? Like in your favorite episode of C.S.I., we used forensic testing and investigation to let the facts of the case show us the way to the truth. Or, in this case, to show us the root problem. We started with the as-built drawings and project documents. Then we conducted an applicable test for water intrusion. Specifically, we used industry recognized water penetration resistance test methods (ASTM & AAMA) and investigation standards (ASCE).



Using what we had learned at that point, we conducted a destructive investigation of the problematic area/condition to expose the layers of construction and assembly. That was how we discovered that the window sealant didn't adhere to the wall due to insufficient cleaning of materials before the work was affected.

Armed with this information, we compared the existing condition with the original design intent. For the hospital, we recommended testing a mock-up of the window system with our solution, which was then tested to establish the effectiveness of the repairs. If that worked, we would be good to go.

Additionally, it is prudent to conduct random water penetration resistance testing of remediated areas as another means of quality control. And, of course, the key is to have all work performed by a trained professional. Facilities managers are the gatekeepers who authorize inspections that can identify and address a problem before it becomes a bigger issue.

What can be done to monitor a structure to prevent this from occurring in the first place?

Here are some tips:

- During the construction process, use a consulting firm to inspect and test the exterior wall components/systems to prevent air and water leakage. This careful oversight will enhance the design and performance of the building envelope and provide a sense of security knowing that the possibility of costly disruptions and damages have been addressed and eliminated, upfront.
- Post-construction, maintain a certified waterproofing or building inspector's name and number in your files. You may wish to keep them on retainer, especially in a hurricane-prone area like Florida, where you need them to assist at a moment's notice.
- Monitor the facility with a scheduled maintenance and inspection program. Inspections can be done by an internal team or, better yet, outsourced. Facilities managers who perform inspections internally would do well to take continuing education classes to review all aspects of the inspection process.
- Keep accurate notes of trouble areas, including the dates, locations, and remedial activities; supplement written notes with photographs of the relevant areas. This tracking will aid facilities management with small jobs but also be a huge timesaver if you need to turn to a professional consultant.
- A maintenance program should involve inspection of the roof system, exterior wall coatings, sealants, glazing systems, waterproofing, and other components. Each of these systems has a useful life expectancy and by monitoring the performance of the systems and performing the recommended maintenance throughout the life expectancy of the products, performance can be maintained.
- Finally don't be afraid to call a consultant for additional insights. Pick someone with experience in performing inspections and, if necessary, repairs.

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