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HOW MUCH WATER IS TOO MUCH?

By Bob Cusumano

The Manor at Whispering Pines is a luxurious three-year-old assisted living facility in south Florida. The exterior of the building is panelized stucco construction created by using plastic reveals as shown in photo #1. Water intrusion has occurred within several living units and common areas in the building. The result has been mildewed drywall on the inside of the building that had to be removed and replaced. Attempts at remedial patching and caulking have proved to be unsuccessful.

The water intrusion problem was discussed with the building manager whose belief, based on his observations during periods of water intrusion, was that water is penetrating through the stucco itself due to insufficient or improper paint application. During our inspection of the building exterior, we observed several defects such as cracks (photo #2), holes (photo #3), and voids at the ends and at joints between plastic reveals (photo #4) that could also admit water. The blotchy paint appearance as a result of alkali burn shown in photo #5 and the efflorescence depicted in photo #6 are signs of water intrusion.



Photo 1



Photo 2

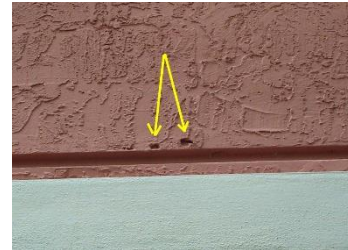


Photo 3



Photo 4



Photo 5



Photo 6

Testing was performed to evaluate the "water repellence" of the stucco itself versus possible water intrusion through defects. Plastic Rilem tubes were attached to the building at selected locations using a putty type adhesive. The Rilem tubes were filled with distilled water containing dye. A piece of plastic wrap was placed over each container so that the water could not evaporate nor could water enter by rainfall or from the sprinkler system. The amount of water that had penetrated from the Rilem tube into the wall was recorded at various time intervals. Absorption rates into the stucco could then be calculated. If absorption is found to be high at any locations, then core samples could be taken and examined to determine the depth of penetration of the water.

If this testing produced results indicating that water is indeed passing through the stucco, then it is clear that total waterproofing is necessary and specifications can be developed for the performance of that work. If it is found that the water is not passing through the stucco itself, then it would be recommended that building envelope defects be carefully identified and repaired.

The maximum water absorption rate at each location was calculated. Small stucco core samples were taken at each sample location and examined to determine if water penetrated into the stucco. The Rilem tests performed indicated that the paint system currently applied to the exterior stucco allowed a slight amount of water penetration into the stucco substrate. However, the tests also showed that the amount of water passing through the coating and entering into the substrate is minuscule compared to the amount that can enter through defects in the stucco such as hairline cracks and small voids. Evaluating the test results showed that where stucco defects exist (location A in photo #7) versus adjacent samples where no defects exist (location B), up to 4,000 times more water can pass through a crack or void. Note that the red dye has traveled through the crack system and exited at locations several inches from the Rilem tube.



Photo 7

We were not convinced however, that stucco defects and voids were the only source of water intrusion. The window units themselves were suspect, since the evidence of water intrusion at the interior of the building was often immediately below windows. In order to test this theory, the drywall was removed on one interior window wall and water testing was performed by systematically applying water from a garden hose to exterior elements of the window in order to produce and detect water intrusion. In this testing, all stucco related defects were isolated as sources of water intrusion. All exterior wall cracks in the vicinity of the window were cut out,

cleaned, primed with a bonding primer, caulked with a moisture cured urethane caulk and then patched with an elastomeric patching compound. Perimeter caulking was removed and replaced with moisture cured urethane sealant. Wall areas were then covered with plastic sheeting and taped to totally isolate them from the window units.

When water was directed at the very top of the frame, where metal to metal and glass to metal joints had not been caulked, a great amount of water intruded into the interior. The water was found to run down the enclosed interior portion of the window frame and drip out the bottom. Water spots appeared on the interior left side of the sill as well as beneath the vertical members that separate the three panes of glass (photo #8). Based on this testing, we were convinced that water is intruding through the window units themselves, not only at the window perimeters and through cracks and voids on the exterior walls.



Photo 8

Remedial work must include repair or replacement of the window units as well as the repair of all stucco defects. Repainting of the building will be necessary due to these repairs, not because of defects in the painting work itself. In this instance, the originally accused painting contractor was exonerated; the window manufacturer and the stucco contractor were not that lucky and will be held responsible for the extensive repairs necessary.