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WHEN IT RAINS, IT STAINS

By Bob Cusumano

Paints and coatings are applied for two reasons; to beautify and to protect the surface to which they were applied. In this article, we'll discuss a failure to beautify where discoloration is the nature of the failure and although the painting contractor is involved, did not cause the problem.

Marina Shores is an upscale residential community on the Intracoastal Waterway. As photo #1 shows, the exterior materials of construction include wood members composed of rough sawn cedar and stucco walls. The exterior wood surfaces are receiving a semi-transparent stain finish. Stucco surfaces are painted with an elastomeric coating system. It was noted that after it rains, a brown discoloration appears on exterior stucco surfaces. These stains seem to lighten over time, but reappear when it rains again. It was theorized that the stains were related to the semi-transparent stain.

Photo 1

A site inspection revealed that there are brown colored stains on many exterior surfaces including painted stucco (photo #2), stonework (photo #3) and unpainted stucco (photo #4). The discoloration is visible in a vertical rundown pattern and is only present on surfaces below wood members.

Photo 2

Photo 3

Photo 4

The amount of moisture present in the cedar members was measured using a moisture meter. The level of moisture was not found to be unusually high, however, the area had been suffering a drought and it had not recently rained.

Samples of discolored paint were removed and examined through a microscope. Photo #5 shows the line of demarcation between stained and unstained areas of painted stucco. By viewing a cross-section of the sample, it was established that the discoloration is a deposit on the surface extending into the coating but does not extend throughout the entire thickness of the coating.

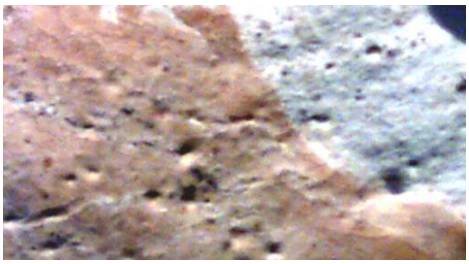

Photo 5

Oxalic acid was swabbed onto the deposit, and slight lightening of the discoloration resulted. When dilute hydrochloric acid was applied, a more aggressive acid, the discoloration was removed.

The discoloration at Marina Shores is due to water soluble extractives in the cedar members. Cedar and several other woods have a high percentage of organic materials, including tannins, that are dissolved and leached when exposed to water. When the water evaporates, a brown colored deposit is left on the surface on which the run down occurred.

The wood members that are totally exposed to the weather, like the components of the wood trellises, are more prone to have water enter the wood and leach extractives than are the more protected components like wood fascia and soffits. The 6 inch by 8 inch trellis beams (the green arrow in photo #6) are particularly prone to staining due to the greater bulk of material. It was noted that a majority of the stains were located beneath these members on the various buildings.

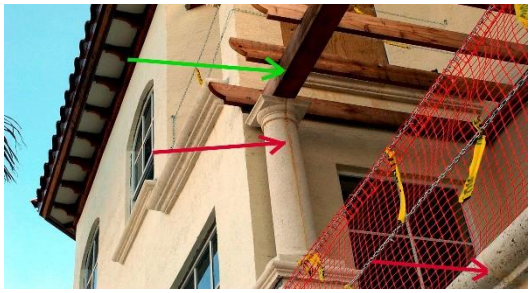

Photo 6

An attempt can be made to remove the existing deposits using a dilute acid solution. Oxalic, muriatic, and citric can be tried to gauge their effectiveness. Care should be taken to avoid

personal injury and damage to substrates and surfaces treated. If removing the deposits is not effectively accomplished, then affected areas will have to be recoated.

It should be known that additional staining can occur. Limiting the amount of water that enters and exits the wood members will reduce the amount of discoloration. The semi-transparent stain applied to the wood is relatively porous and does not keep water from penetrating into the wood. A paint film of approximately 4 to 5 mils with an alkyd based primer would be necessary to eliminate water intrusion. However, this would drastically change the aesthetic appearance of the wood and coating delamination could result in some areas. A more practical measure would be to limit the amount of water than can enter the top face of the exposed wood beams. This could be effectively accomplished by installing a metal cap over these surfaces. A more economical, but probably less effective method, would be to apply a coating system that includes the use of a linseed oil primer to the top face of the exposed cedar members.

In this instance the coating products selected by the architect for the project were related to the failure encountered. The stain applied to the wood allowed water to enter and leach extractives. The elastomeric coating applied to the stucco is a relatively soft paint film that tends to hold the stains and makes them difficult to remove. The staining could have been lessened by applying a more waterproof coating system to the wood and a "harder" paint to the stucco walls. However, this is not a coatings problem, but a design problem. Had the architectural design of the project provided adequate protection of the wood members, then the problem would not have occurred. As often happens, even though the painting contractor was not the direct cause of the failure, that contractor is a vital part of the solution.