

## *BuchNotes for June 2010*

If you purchased a copy of “Building Pathology, Deterioration, Diagnostics, and Intervention”, expecting to quickly find a solution to a problem you might have on a project, you will be disappointed. At least you will be disappointed initially. The book is much more than a cookbook of solutions to building deterioration problems. Yes, there are handy matrices included for evaluating different interventions, but the real strength of the book is in the explanation of the underlying science of materials and its connection to the problem. The result is an in depth understanding of both the problems and their potential remedies.

For any type of deterioration to occur, there must be, “necessary and sufficient conditions” present. For example, water in one form or another, the most common source of problems in buildings, can create deterioration if there’s enough of it in the wrong places. Just a little rain hitting a well built stucco wall should not a problem. The same amount of rain landing on a surface full of cracks may be another matter depending on the amount of rain and the quantity and size of the cracks.

Deterioration is also a function of time. Deterioration is normal for all building materials, it’s called aging, or “entropy in action”. The Brownstone used very commonly in New York, Boston, and other eastern cities in the 19<sup>th</sup> and early 20<sup>th</sup> centuries is a weakly consolidated sandstone. Is the fact that these buildings are now suffering serious deterioration a problem? It is if you’re the owner faced with significant repair costs. But, was the material ever expected to last as long as it has in the first place? The key to a successful building is to understand the properties of materials, selecting materials to suit the application, making sure they are carefully detailed, and finally, paying attention to their long term maintenance. This will control the rate of deterioration to an acceptable level.

The author, Samuel Y. Harris, is an engineer, an architect, and an attorney. But in addition, he must have a strong background in chemistry. This is evident throughout the book in his presentation of such topics as the crystalline nature of metals, the galvanic scale, cathodic and anadotic protection, absorption vs. adsorption of water, cohesion & viscosity, and evaporation and its relation to the energy of surface tension, to name only a few.

As you would expect from an author who is also a structural engineer, the book includes lengthy and interesting explanations of various structural elements and how deterioration can affect them. He makes the point that just because many historic structures have, “stood the test of time”, this is really meaningless unless we know something about the materials used, the design loads, and the resulting factors of safety. The justification for many older building not having to comply with current building code requirements has less to do with having stood the test of time than it does with the economic impact to society of having to upgrade a building each time there is a codes change.

Deterioration is the result of complex interactions between materials and their environments. It is discussed in terms of four categories of stress: structural, thermal, hygroscopic, and chemical. Interventions can range from doing nothing, (often times the best approach), to mitigating the environment that’s creating the problem, to rebuilding the damaged material, and to substituting a new material as a replacement. In a related section, the advantages and drawbacks of various cleaning

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methods for soiled surfaces are considered. The hazards of each method, including washing with clean water, are discussed.

The chapters that will be of most interest to architects are the ones on exterior walls and roofing. Of these, the one on walls is by far the longest and most comprehensive. It covers topics such as moisture movement through walls in both liquid and vapor forms, single layer walls vs. multi-layer construction, air barriers, and the benefits of pressure equalized walls.

“Building Pathology” was published in 2001 by John Wiley & Sons, Inc. It has 654 pages and includes some helpful photographs and drawings. Strangely, it doesn’t include a bibliography but it does have a glossary of terms. The book reads like a text book and, as a result, takes some energy to get through reading cover to cover. It would be an essential reference for anyone working on historic restoration projects and useful for the rest of us trying to keep our projects out of the restoration mode.

*Submitted By*

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