

## A Preservation Perspective on Coatings

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In the context of historic preservation, the use of coatings presents unique and interesting challenges. For example, existing coatings on historic structures may be inherently significant — e.g., murals, stencils, historic color schemes — or non-original and not appropriate to the historic character of the structure. They may be remarkably intact, or they may be deteriorated and fragile.



**At this 1870s historic masonry building, the brickwork at the basement level and string course had historically been painted, and were restored and recoated during a recent renovation. The brickwork on the upper portion of the wall had not been painted historically; existing coatings were removed and the brick cleaned and repointed as part of the renovation. ALL PHOTOS COURTESY OF WISS, JANNEY, ELSTNER ASSOCIATES INC.**

As a result, numerous considerations often arise when working with coatings on historic structures, such as:

- Are the existing coatings historically or artistically significant?
- Do the existing coatings need to be conserved? If so, what conservation measures are appropriate?
- If not historically or artistically significant, are the existing coatings needed to protect historic elements or materials?
- Was the surface originally coated? If not, why was a coating added later in the life of the structure?
- What coatings are present, and how are those coatings performing?
- Should the existing coatings be removed? If so, why? Do they need to be removed to reveal the historic substrate, or to preserve the historic substrate?

These are just some of the questions that come up when considering how to treat coatings on historic structures. What follows is a framework for addressing coatings on historic structures, primarily on the exterior of buildings and structures.

Many of the questions related to building exteriors also apply to interiors, although coatings on building interiors may more be decorative in nature or significant from an artistic perspective. Especially where coatings are of artistic interest, the American Institute for Conservation of Historic and Artistic Works (AIC) offers helpful guidance.<sup>1</sup>

## **PRESERVATION STANDARDS AND GUIDELINES**

Within the broad context of historic preservation, the U.S. National Park Service has identified four treatment approaches, which provide a useful guideline for discussion of coatings on historic structures. The four treatment categories are preservation, rehabilitation, restoration and reconstruction, defined as follows:

- Preservation focuses on the maintenance and repair of existing historic materials and retention of a property's form as it has evolved over time.
- Rehabilitation acknowledges the need to alter or add to a historic property to meet continuing or changing uses, while retaining the property's historic character.
- Restoration depicts a property at a particular period of time in its history, while removing evidence of other periods.
- Reconstruction recreates vanished or non-surviving portions of a property for interpretive purposes.

The National Park Service publishes the [Secretary of the Interior's Standards for the Treatment of Historic Properties](#), precepts developed to guide work on historic structures for each of the four treatment approaches outlined above.<sup>2</sup>

The rehabilitation treatment approach is often relevant to architectural and engineering projects, as it addresses changes needed to permit a historic structure to continue in use. The Standards for Rehabilitation are listed below as an example of how these standards specifically pertain to historic structures and coatings (see highlights in italics):

### **Standards for Rehabilitation**

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.

10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.<sup>3</sup>

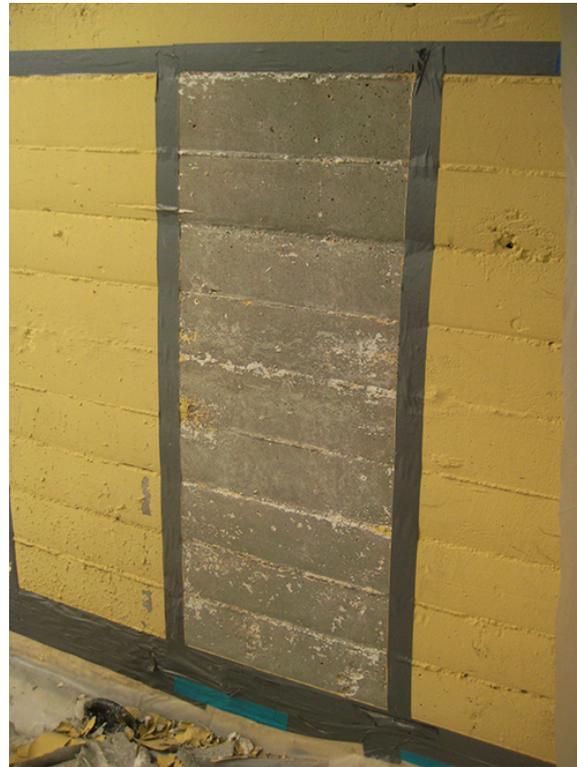
How do these standards pertain to coatings on historic structures? Standard 2 notes, “The historic character of a property will be retained and preserved.” Coatings from the period of significance of a property contribute to its historic character, and can in fact be a character-defining feature.<sup>4</sup> Thus such coatings should be retained and preserved.

Standard 5 notes, “Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.” Coatings may constitute distinctive materials and finishes, and may also be examples of craftsmanship that characterize a property. They may be unique in character or representative of a particular period or type of work that merits preservation.

Standard 6 notes, “Deteriorated historic features will be repaired rather than replaced,” further indicating that where deterioration is severe enough to warrant replacement, the new feature should match the old and that documentary and physical evidence is necessary to support replacement. This guidance is applicable to coatings on a historic building, as well as to the features or substrates to which they are applied.

Standard 7 notes, “Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.” This standard is often referenced in evaluating cleaning treatments, where the use of systems or materials that are overly aggressive can result in damage to the substrate. For coatings, special care is needed if the coating is to be retained; if the coating is to be removed, the treatment needs to avoid damage to the substrate.

Each set of Standards is accompanied by guidelines that help inform their application and use. The guidelines include recommendations for or against specific treatment measures.



**The exposed concrete surface and form board pattern and texture were part of the original character of the facade of this historic concrete structure. Trials were conducted to evaluate removal of the coating that had been applied later in the life of the building.**

For example, with respect to coatings for historic structures, the guidelines for exterior masonry that accompany the Standards for Rehabilitation recommend *for* proper preparation and application of coatings where appropriate for use. In contrast, the Standards recommend *against* the applying paint or other coatings to masonry that has been historically unpainted or uncoated, removing paint from historically painted masonry, or radically changing the type of paint or coating or its color.

## **AN APPROACH**

### **Retaining Historic Coatings**

In order to determine appropriate treatments for coatings on historic structures, the primary questions to be addressed are typically whether the coating should remain and, if so, whether it should be conserved.

If the coating constitutes an artistic feature or is historically significant, it may need to be retained in place and protected. If the coating is intact but not historically significant, it may be suitable for overcoating, or for removal and replacement (see further discussion below).

However, what happens if the coating itself is inherently problematic? For example, although no longer in use, in the past many primers and some finish coatings contained lead or other heavy metals, which are now considered to present health hazards.

Depending on the significance of the coating, its condition, and the current or intended use of the building, these coatings may need to be retained in place and coated over/encapsulated or removed. If removal is necessary, the historic coating should be carefully documented with notes and photographs, with samples retained for archival purposes.

When existing coatings are not identified in available documentation, analysis may need to be performed to understand the composition of the coating and determine whether it can be retained, and how it can be replicated if needed. Analysis of existing coatings, including binders and pigments, can identify the composition of the existing coatings (whether unique or simply unidentified), to evaluate causes of deterioration, to help determine appropriate coatings to match the original materials, to develop methods to conserve existing coatings, or even to determine what techniques can be used to remove the coating.

Historic finishes analysis can be performed to identify the number, type and physical characteristics of coating layers present; the distribution of colors and decorative effects; and the approximate date or period of each coating campaign.



**The concrete masonry on these historic rowhouses was originally visible. Depending on the owner's preference, the concrete in some portions of the building has been coated, while other areas remain exposed.**

intended to be coated; for example, historic brick, stone or concrete were often intentionally left exposed as part of the aesthetic character of the exterior facades. Although it is preferable to keep such materials uncoated, application of coatings to masonry is sometimes necessary to reduce water penetration, preserve a damaged substrate, or protect against graffiti.

Other substrates and features such as metal and wood window frames and sashes, doors, trim, and other components were typically painted for protective or decorative purposes. These features need to be recoated as a cyclical maintenance measure.

Prior to removing existing coatings from a historic structure, it is important to document existing coatings and to retain samples for archival purposes. In some cases, existing coatings must be entirely removed to expose an originally uncoated surface or to provide a sound substrate for recoating. In other cases only certain overcoating layers must be removed to reveal historically or artistically significant finishes such as a murals.

Various methods can be used to remove existing coatings. The method must be selected based on the nature of the existing coatings, the nature and condition of the substrate, and other factors such as environmental and safety considerations.

For example, abrasive surface treatments generally are not appropriate for removing coatings from masonry surfaces; chemical paint removers are usually more appropriate. Steam can be used to remove paint from elements such as a wood window sash. Also, if

The process of identifying the chronology of the colors present involves a detailed field survey to locate representative samples and patterns of color, removal and preparation of samples, and laboratory examination of cross-sections of samples using reflected-light microscopy to identify the stratigraphy of original historic finishes and subsequent recoating layers.<sup>5</sup>

The goal of the finishes analysis may be to document the original color scheme or an entire chronology of finishes. Analysis of the existing coatings can help date specific building elements or alterations, and provide information to more accurately understand the history of the building.

### **Removal and Application of Coatings on Historic Structures**

Many substrates on historic buildings were not originally coated and were not

lead or other heavy metals are present in the existing coatings to be removed, special removal, containment and disposal methods are required.

The gentlest effective method should be selected for coating removal from historic as well as contemporary buildings, and the methods used should not result in damage to the substrate.

New coating application may be designed to match the historic coating material, or it may employ a different coating technology. A barrier or conservation coat may be needed to protect an underlying historic finish prior to application of a new topcoat; the barrier coat may be removed in the future to permit restoration of the original finish layer.

Selection of coatings for historic structures needs to consider the purpose of the coating application (to restore the historic appearance, to protect the substrate, etc.); the nature of existing coatings, if present and necessary or appropriate to retain; and whether the new coatings need to match the original in appearance; as well as the nature and condition of the substrate.

The extent to which the new application will alter the appearance of the historic structure should be considered, as well as history of use, ease of application, environmental constraints, maintenance requirements and cost.

For some substrates (e.g., masonry) the selected coating must be highly breathable (vapor permeable) to allow moisture in the substrate to escape and evaporate, preventing damage to or deterioration of the substrate and/or degradation of the coating in the form of blisters or loss of adhesion. If the masonry coating is not sufficiently permeable to water vapor, water can be trapped within the masonry, leading to accelerated deterioration, especially in cold climates. For other materials (e.g., metals), breathability is not necessary and the coating is intended to be a barrier to moisture.

(As can be seen from this brief review of considerations in selecting coating systems for historic structures, many issues are similar to those involved in selecting coatings for non-historic structures.)

Film-forming coatings are applied for a number of reasons: to protect the underlying material; to reduce water penetration into the substrate; to improve, maintain or change the aesthetic of the building component being painted; or to conceal unsuccessful repairs or graffiti. Pigmented coatings can hide color and texture differences but will not cover changes in surface profile; in fact, surface defects may become even more visually apparent after a coating is applied. Pigmented, film-forming coatings can also obscure the original color and finish of a substrate and may not be appropriate for historic masonry structures, especially when a structure was not originally coated. In general, sound masonry, whether old or new, should not require application of a coating to enhance its performance.

Silanes and other clear penetrating sealers react chemically with surfaces of pores and fine cracks in masonry or concrete to make them water repellent or hydrophobic, while allowing moisture that does enter the material to escape. These sealers generally do not alter the appearance of the historic structure and are highly breathable.

However, preservation standards generally advise against implementation of treatments that cannot be reversed without damage to the material. Unlike film-forming coatings, which can usually be removed, clear, penetrating sealers are not removable once applied. For this reason they are often avoided on historic structures, unless the use of such treatments is essential to the preservation of the building materials in question.

Coatings may also be required to protect an already damaged substrate or to protect a surface against graffiti. Graffiti-mitigation coatings are designed to allow for the easy removal of graffiti using only warm water or mild cleaners, rather than requiring paint strippers. However, these types of coatings may require cyclical reapplication, as well as prompt cleaning of graffiti when it does occur. Also, in some cases, the graffiti itself may be considered historically significant or of artistic interest, in which case it may require protection to conserve it.

## GETTING IT RIGHT

When addressing coatings in the context of historic structures, primary considerations include whether the existing coatings are significant and merit conservation and, if so, what measures are appropriate to achieve this goal.

If the existing coatings are not in themselves significant, then consideration needs to be given to whether the coatings are needed to protect the substrate; what coatings are present and how are they performing; whether existing coatings need to be replaced and, if so, whether they can be overcoated or need to be removed.

Further, if the existing coatings are to be removed, the investigation and design process needs to address what methods should be used for removal and, if coatings are to be replaced, what new coating system should be applied.



**This early twentieth-century historic concrete building had originally been coated; the existing deteriorated coating was removed and a new coating system applied to match the historic appearance.**

With historic structures, it is also very important to consider whether the surface was originally coated. If it was not intended to be coated, then consideration needs to be given to why the coating was applied, whether it can be removed without damaging the substrate, whether the surface requires protection or can be exposed, and what repairs will be required once the existing coating is removed.

Whether the goal of a coating project is to retain and conserve an existing coating, remove an existing coating to expose and restore a substrate, or provide a new coating system to match the historic appearance of a coated substrate, preservation standards and guidelines provide a framework for evaluating treatments.

In addition, many of the standards for historic structures also provide useful guidance for work on non-historic structures. Whether the structure is historic or non-historic, best practices for retaining, removing, or replacing coatings provide the basis for appropriate and serviceable applications. D+D

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## Notes

1. American Institute for Conservation of Historic and Artistic Works (AIC), <http://www.conservation-us.org/>.
2. Kay D. Weeks and Anne E. Grimmer, [The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings](#) (Washington, D.C.: U.S. Department of the Interior, National Park Service, 1995); [The Secretary of the Interior's Standards for the Treatment of Historic Properties](#).
3. Ibid.
4. The "period of significance" is the time during which important events associated with the property occurred; for a building or structure of architectural or engineering design significance, the period of significance is often the period of original construction. "Character-defining features" are visual and physical features that give a building its identity and distinctive character. See also National Park Service Preservation Brief 17: [Architectural Character — Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving Their Character](#), by Lee H. Nelson.
5. Compositional analysis of coatings is often performed by a chemist specializing in paints and coatings, while historic finishes analysis is performed by a specially trained conservator. Standard color identification systems, such as Munsell or the *Commission Internationale de l'Eclairage/International Commission on Illumination* (CIE), are used as a reference to identify specific colors. Special techniques such as X-ray diffraction (XRD), scanning electron microscopy/energy dispersive X-ray spectroscopy (SEM/EDS), and Fourier Transform Infrared Spectroscopy (FTIR) may also be used for analysis of finishes.

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## About the Author



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