

LOOKING AT HISTORIC WINDOWS

Windows are frequently the most vexing part of any renovation project. Everyone acknowledges their importance — yet all too often the wrong course is taken. There is often tremendous pressure to adopt the “easiest and cheapest” pre-packaged solution: Tear out the old original windows and replace them with “modern efficient units.” This is certainly what most contractors would prefer to do. And it certainly simplifies specification. Yet this is not necessarily the cheapest alternative — and even more frequently is not the best alternative for the appearance and operation of the building. In this, our annual review of the historic window market, the editors have assembled a range of alternatives that go beyond those offered by “the big three” suppliers.

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WOOD WINDOWS: REPAIR OR REPLACE?

Sound familiar? The issue of what to do with wood windows in older buildings is a question that frequently confronts owners, developers, facility managers, tenant boards, and design professionals who are charged with making decisions relative to historic properties. Here, a seasoned window consultant discusses the repair-vs.-replace conundrum — illustrated by a real-world case study.

by Michael P. Fishman, *President, Historic Window Resources, Inc.*

We want to retain the character of this great building, but the wood windows are falling apart, they're drafty, and they're difficult to operate — if they operate at all." Sound familiar? In the not-too-distant past, the answer was to remove the windows and replace them with aluminum windows, regardless of how the new windows might change the architectural character of the building. One only has to drive down Park and Fifth Avenues in New York, Lake Shore Drive in Chicago, or Wisconsin or Connecticut Avenues in Washington, D.C., to see magnificent pre-World War I buildings with their fenestration altered to the point where it bears no resemblance to the design intent of the architects.

Fortunately, the last 15 years have seen a heightened awareness and public acceptance that America's architectural heritage should be preserved. Landmark preservation groups and agencies have gained the political strength and financial resources necessary to ensure that the architectural character of our cities and towns will be preserved for future generations. Some trade publications have gained a wide readership and reinforce this trend; groups like The National Trust For Historic Preservation and The New York Landmarks Conservancy have made it socially acceptable to support preservation causes.

"Wanting to keep the wood windows while balancing the costs involved in repairing or replacing them is another issue. What should we do?"

The first step in addressing the window issues of a historic property is to

compile as much information as possible about the building, including the architectural significance of the property; its written and photographic history; its usage; and the present condition of its windows. This work is best accomplished by hiring a historic-window consultant to research the property, investigate typical conditions, and report back with a master plan for consideration by the interested parties.

What should a comprehensive window survey entail?

A comprehensive window survey should examine every opening in a building for the purposes of identifying window types, sizes, lite patterns, operation, profiles, and individual condition. It should also note existing conditions that would have an impact on the window work. See sidebar below for specific items to include in the survey.

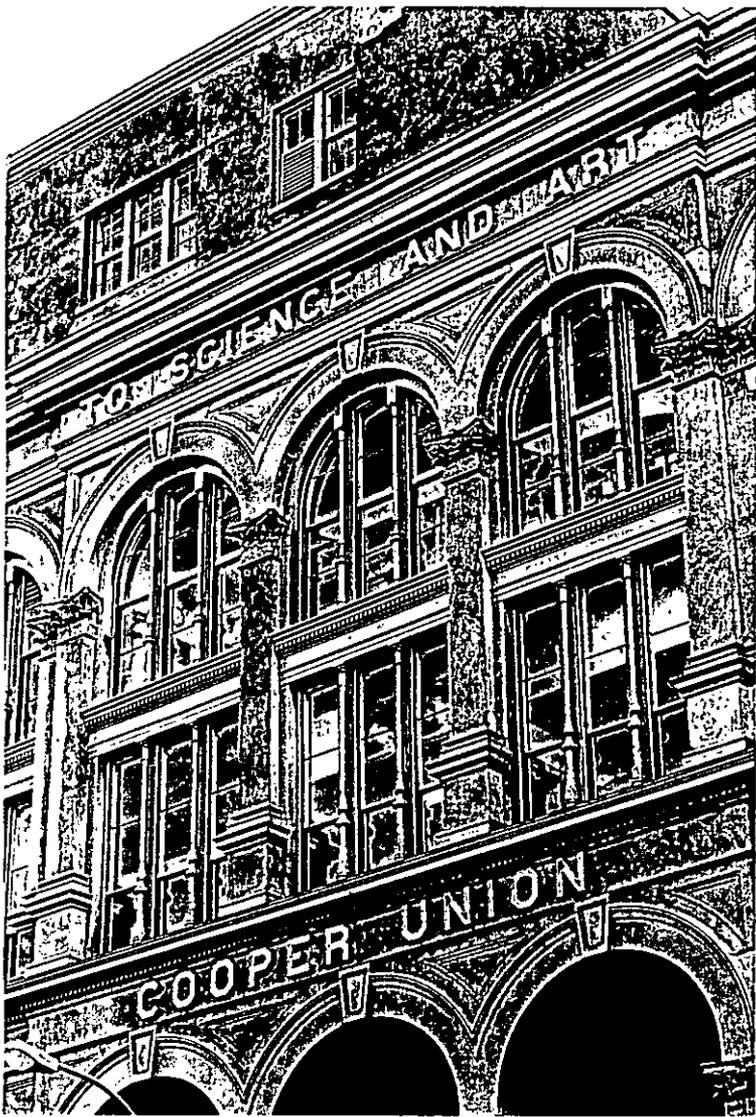
Repair vs. restoration: Which is the better solution?

Before addressing this issue, I think it is important to define what is meant by window repair and window restoration. For the purposes of this discussion, repair can be defined as a series of procedures that correct window deficiencies without replacing entire elements of the window, e.g., the sashes. Repair includes

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A comprehensive window survey should include:

- Identifying the wood species
- Sash thickness
- Sash-profile dimensions
- Muntin profiles
- Brickmould profiles
- Position of brickmould relative to sill
- Is there a build-up of paint and caulking at the brick?
- Sill pitch
- Sill dimensions
- Glass thickness
- Glass texture and transparency
- Frame-component dimensions
- Operational sash hardware and balancing systems
- Weatherstripping
- Sash-locking hardware
- Hardware finish
- Feasibility of reusing hardware
- If hardware is to be reused, should it be cleaned or replated?
- Condition of window-washer anchors
- Interior sash stop profiles
- Interior trim conditions
- Height of opening above floor: Is tempered glass required under today's codes?
- Accessibility to specific openings: Are there suspended ceilings, furniture, built-ins?
- Occupancy: Are the windows located in spaces that are difficult to service, such as classrooms, factory work areas, mechanical rooms, secure spaces?
- Are there non-removable exterior bars that would impede window work?
- Are there interior grilles that would prevent easy access?
- Do window air conditioners have to be removed and re-installed? Are the air-conditioner support brackets up to code?
- Are child window guards in place? Should they be?
- Are there any special conditions relative to the tenant?



The North elevation of a restored Cooper Union shows the restored windows with fixed pivot sashes; replaced exterior casings, sills, and double hung windows; and a copper spandrel panel between floors.

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life, provided reasonable maintenance is instituted. Additional benefits to the owner include the following: The windows will look and operate as they did when new; modern technology can be incorporated; energy efficiency and sound reduction can be improved; and the property may be eligible for historic tax credits.

Things to think about

Notwithstanding the fact that all of us in the landmark community would like to restore buildings to what they were originally, it should be recognized that architects and building-component manufacturers made mistakes a century ago, just as they do today. Because a window was built a particular way 120 years ago should not be the guiding force when we repair or replicate it today.

A case in point is New York City's Cooper Union For The Advancement of Science and Art, one of the nation's foremost institutions of higher learning dedicated to the art, architecture, and engineering professions.

Established in 1859, Cooper Union is listed on The National Register of Historic Places and is a New York City Historic Landmark. Its Great Hall has been witness to the speeches of presidential aspirants Lincoln, Grant, Cleveland, Theodore Roosevelt, Wilson, and Clinton. It is fair to say that few buildings in the United States have more historic credentials. Yet despite its heritage, Cooper Union was an aging building and its envelope was seriously deteriorating (see July/August 1999 *Traditional Building*). The roof was leaking, and its monumental windows had reached a state where they were not operable.

The issue of what to do with the windows became a centerpiece for a major capital improvement project by The Cooper Union. Working as consultants to Platt Byard Dovell Architects, we surveyed the building and identified the accurate condition of the windows and a number of different sash and frame profiles. It was interesting to note that while Cooper Union has seen many alterations throughout its 142-year history, many of these profiles seemed to be part of the original fabric. Subsequent research yielded the information that Peter Cooper had a penchant for thrift, accumulating materials and using them in his building as the work progressed. An account written in 1919 by James L. Ford notes, "He bought the land lot by lot, and it seems surprising that nobody

attempted to hold up his project by an extortionate demand for a single corner. Availing himself of a favorable opportunity when prices were low, he secured a quantity of building material and stored it on the ground ready for use." (Historic American Engineering Record - HAWR NY 20 pg. 42) The possibility that Peter Cooper accumulated his materials, along with the numerous alterations the building sustained, may account for the variance in window profiles. So here we had a building with a prestigious historic background, and conditions that required immediate and comprehensive action.

Actions considered included the following:

- Repair of the window sashes and frames
- Frame restoration with sash and sill replacement
- Complete replacement of all windows to the brownstone
- Repair and restoration of the decorative elements with complete replacement of the building's primary windows.

The most distinctive feature of Frederick A. Peterson's original Italianate design was Cooper Union's monumental Romanesque Revival windows. These openings consist of weights-and-chains double-hung windows, assembled in mullions, with horizontal-pivot windows that are centered at the head of each mullion and flanked by fixed trefoil sash. These units form the upper portion of the building's predominant window openings, and are mullied over a pair of mullioned double hungs to create a 30-ft.-tall bay. A copper spandrel panel separates the double-hung windows between floors. (See photograph at left.)

After much discussion with the design team, it was agreed to recommend to The Cooper Union a course of action where the decorative window heads would be repaired; the pivot sashes would be made fixed; and all exterior casings, sills, and double-hung windows would be replaced. Other small horizontal-pivot windows were also to be restored.

This decision was based on the realization that there was significant sash deterioration; attempts had been made to repair the double-hung sashes on other occasions with unsuccessful results, profiles were inconsistent, and the institution wanted a lasting solution to the window issue. Honduras mahogany was designated as the approved species, and Dahlgrens, Inc., of Oglesby, Ill., manufacturers of Replica Windows, was selected to build the new units. The design team selected one of the original sticking profiles to act as the standard for the new windows. Dahlgrens successfully engineered slip-in windows that were installed within the original weight boxes, thus eliminating the need to perform major interior demolition to set the windows. Upper sashes were made fixed to reduce costs, but were engineered to be moveable for future painting or other maintenance.

The end result is that Cooper Union's windows have been restored to their original appearance, non-conforming alterations have been removed, and this building will continue to please the eye for generations to come.

A few final points that deserve consideration

Sills: Exterior window sills should have a minimum of a 5-degree slope to shed water away from the window opening. Setting this component perfectly flat without slope lets water and snow accumulate, which causes damage and deterioration to the sill itself.

Exterior Brickmould Casings: The exterior brickmould provides two main functions: It is decorative, and it provides a point of closure against air and water infiltration around the perimeter of the window frame. Some buildings have the casing terminate on the masonry sill or brick on which the wood sill rests. This detail can allow water to wick up through the casing, eventually causing it to rot. A preferred detail is to allow the casing to terminate on top of the wood exterior sill, letting the sill project past the face of the brickmould.

Sash Profiles: The stiles and rails of a window sash should be adequate to support the weight of the glass, while providing the stability to resist forces that would cause the sash to warp, twist, or rack. A case in point is the meeting rail on monumental double-hung windows. The overall top-to-bottom height of this member is sometimes seriously undersized by today's standards; an increase of as little as 1/2 in. can make a significant difference in the structural stability of the window. When working with monumental openings, the eye will not pick up this small difference.

Changes in occupancy

A loft building that was built as a factory but has been converted for residential use brings other issues into play. The fire laws that were enacted after the Triangle Shirtwaist Fire of 1911 in New York City mandated that workspaces have alternate means of egress from the area. Fire-escape access doors and kalamein (clad) windows were added to buildings that originally had regular window openings.

It is important for those involved in window restoration to realize that these elements can and should be removed when restoring a building back to the original design. ■

Michael P. Fishman is the president of Historic Window Resources, Inc. His company specializes in new windows and the restoration of old windows in landmark and other properties. Run by Historic Window Resources, Inc., by phone (516) 975-0648; fax (516) 975-0698; or e-mail bwrf3@optonline.com

What's included in a restoration-vs.-replacement feasibility study

- What is the property's landmark status, if any? Has the building been designated as an individual landmark, or is it located within a historic district?
- Is the building known as a local landmark?
- Is the building architecturally significant? Does the property have some special standing in that a noted architect designed it?
- What was the quality of the original construction?
- Are there obvious design flaws that one would not want to replicate today?
- Are the majority of the windows original?
- If there have been alterations, are remnants of the original elements existing for replication?
- Does the present or proposed usage conflict with the original design (e.g., monumental windows split up by floors or partition walls at mullions)?
- What is the client trying to achieve (e.g., energy efficiency, noise abatement)?
- Can the present sashes accommodate insulated glazing?
- Can new sashes be fabricated with insulated glass without compromising the muntin profiles?
- Can window operation be changed to reduce costs (e.g., making double-hung windows single-hung or transoms fixed)?
- Are window air conditioners a factor?
- Are alterations present (e.g., louvers, penetrations, bricked-in openings)?
- Is lead or asbestos abatement an issue?
- Should the building be washed?
- With funds appropriated, can windows be brought back to a satisfactory state of repair?
- What is the expected longevity of the repair, restoration, or replacement work?

epoxy consolidation of the frame and sash parts, and could include replacement or consolidation of the exterior window sill. Repair also includes limited replacement of frame and sash parts that cannot be consolidated: Broken or cracked glass is replaced and putty glazed; window elements are scraped, primed, and repainted; hardware can be repaired or replaced.

Window restoration takes this process to the next level. Restoration can be defined as a series of procedures that involve the consolidation and repair of the window frame with replacement of the expendable components, i.e. the sashes, exterior brickmould casing, and possibly the exterior sill.

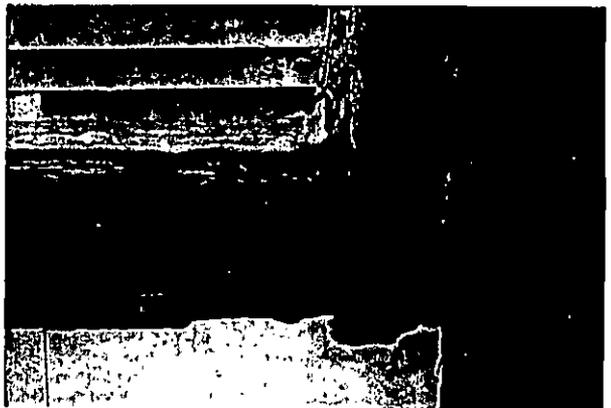
The distinction between these two definitions causes consternation in the landmark community. There are those who would say one should always repair windows when restoring them. While this may be the correct approach when restoring small buildings with a handful of windows, the opposite is true when faced with hundreds or thousands of windows in large apartment houses or commercial buildings. The case can be made that even with the most diligent repair work, it's practical only to bring the sashes back to some degree of their original condition. With few exceptions, glazing must remain the same unless sash depth and muntin width permit routing for thicker insulated glass, otherwise thermal efficiency of the sashes is not improved. More important, it is not practical to achieve the crisp lines the sash and muntin profiles once exhibited when new.

There is another important factor that must be considered when undertaking a full-scale window-replacement project. Namely, *what is the future life of the repair or restoration work?*



This photo illustrates the condition of sashes at The Belnord Apartments in New York City, before sash replacement. This project was slated as a sash-repair project before N.Y.C. Landmarks approved full replacement of the sashes with new mahogany sashes.)

The reality is, had the windows in most pre-war buildings been maintained over the years, window replacement would not be necessary at all. The case can be made that a window-repair or -restoration project should bring the building back to a state where the windows can be maintained from that point forward. If the window program is limited to repairing the sashes and only allowing limited replacement, the building will eventually suffer what I call "the check-board syndrome," i.e. there will be a difference in the function and appearance of some of the windows as they continue to age and fail.



This deteriorated sash was typical of the condition of the wood windows at Cooper Union.



The restored South elevation of Cooper Union after the installation of the new windows.



During the Cooper Union window restoration, horizontal pivots were made fixed and trefoils were repaired.

Think of the discussion that would take place in the boardroom if five years after making a major expenditure to upgrade the windows, more money was required to correct new deficiencies! A much more prudent approach is to replace the expendable components. When one has brake work done on a vehicle, the thought process isn't to repair the brake linings; it's to replace them while restoring the drums or rotors. The same analogy can be applied here: The primary concern for any landmark building is that its appearance remains the same as when the building was new.

If a building's windows are restored to a point where they are all the same, they can then be expected to last its foreseeable

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