Do you own a building with “problem” windows? Consider your options carefully. Do not rush to replace existing windows because they seem “beyond repair,” or a contractor says it is your only course. That choice may prove expensive and can result in compromising your building’s design integrity.

Learn to look at windows. Take a walk through your neighborhood and notice the windows. Even if you take a familiar route, the variety of designs will probably surprise you.

The two most common types of window in San Francisco are the double-hung window and the casement window, but the design variations within those types are numerous. Historically, the casement window, hinged from one side and opening outward (sometimes inward), is the older type, dating to the Middle Ages. The double-hung window appeared at the beginning of the 18th century and won a wide acceptance that has survived through all the changes of architectural taste into the 20th century. Its simplicity and ease of operation, as well as its adaptability to stylistic variation, account for its popularity.

Window types less common in San Francisco than double-hung are those that push out from horizontal pivot points at or toward the top of the frame, tip inward from pivot points at the bottom or open on a vertical pivot. Fixed or stationary windows include transom lights and decorative windows, such as stained glass.

Technical History of Windows

Early double-hung sash were divided-light or multi-pane in character. This use of many small panes of glass was driven by the state of technology but became an expression of style or taste. By the time of the Civil War, manufacture of larger panes of glass of good quality and strength made possible the one-over-one window that is common in San Francisco residences of the Victorian and Edwardian eras. Most of San Francisco’s surviving development is post-Civil War. In most cases where multiple light windows appear, therefore, it is a conscious stylistic decision, as in the case of an architect employing a historic revival design—Tudor, Mission or Mediterranean.

Much of the aesthetic impact of a window comes from the surround or detail that outlines or frames the opening. The window units themselves make a far subtler but no less significant contribution to the overall design of a façade. Function—providing light and ventilation—only partially dictates fenestration (the arrangement and placement of windows in a building). Architectural style and design—and sometimes the state of technology—are strong determinants of a window’s character.

In tracing the technical history of windows in America, Susan Swiatosz notes that design handbooks of the 1830s and 1840s gave detailed window specifications for house builders. By the middle of the 19th century, with the spread of mail order suppliers of building materials, “Mass produced, standardized components became affordable and widely available to the average builder.” At first, the catalogs of these suppliers provided windows
to accommodate certain regional differences, but with increasing competition in ever-widening markets under the impact of rapid urbanization in America, standardization of size and types became general across the nation.

With the diversification of styles in the late Victorian period, catalogs displayed variations of double-hung sash. The most popular was a multi-light ornamental upper sash over a single pane lower sash typical of the Queen Anne style (See top left photo). Curved glass appeared late in the 19th century and with it bowed bays (See middle left photo).

Architectural supply catalogs offered metal windows as early as 1860, but they did not gain wide use until the turn of the century, and they were primarily in industrial and institutional construction. At that time, new technology made it possible to mass produce rolled steel windows at a cost competitive with wood windows. Stricter fire codes, the response to devastating urban fires, encouraged their use in industrial, commercial and office buildings. Steel sash helped make possible large window areas that admitted more light and better ventilation, contributing to a healthier and more attractive workplace.

A cost benefit to use steel casement windows in high rise residential design prior to World War I. Their durability and fire-resistant properties added to their popularity. Also their thin profiles suited the machined, streamlined appearance of the Moderne and International Styles (See bottom left photo). After the Second World War, cheaper aluminum won preference over steel, although the latter continue to be produced.

No Window is Maintenance Free

Windows, more than almost any other element of a building's façade, suffer from lack of proper maintenance. Some property owners, looking for a cheap and quick solution—and preferably one that will be "permanent" and maintenance free—turn to stock aluminum windows. Wood windows may be in need of repair or repainting. They may rattle and admit drafts. They may stick or operate with difficulty. Each of these problems is solvable without resorting to the extreme of tearing them out and replacing them with aluminum or other material.

No window is maintenance-free. Any window requires a certain amount of care over time to keep it in good working order. Wood is the most adaptable of all window materials. It is almost infinite in its capability of renewal and repair, and when you want to change your color scheme, all it takes is a bit of surface preparation and a new coat of paint. A good experienced worker can do routine maintenance of a typical wooden, Victorian-era double-hung window in a couple of hours.

What is the Right Thing?

If the condition of windows is such that replacement is the only alternative, the simple answer to the question, "What is the appropriate window replacement for my building?" is replacement in kind, with respect to type, style and materials. Consistency of type and style is clearly important in order to retain the building's architectural integrity. Material is also important, however. While you can install a vinyl or vinyl-clad window of the correct type and style, the texture of the surface will not be like wood. What is more, you will have to live with the color, since vinyl, although now available in a variety of colors, will not take paint well, if you decide you want a change. Finer details, like the profile of sash and muntins (framing members that hold panes in the sash), may not be available in stock vinyl windows, and the cost of customizing these in vinyl may be prohibitive. All of these are points you should consider, not only when asking how the windows will look from outside but how they will affect your interior design scheme.

Although you can install aluminum double-hung windows, they will not match the look of the original wood windows. Texture and color will be problems, but also the profile, width and thickness of sash, muntins and joiner rails (the two horizontal members that meet when the window is closed) will be wrong. Again, there is the question of whether you want to live with the color and metallic appearance of these windows inside.

Aluminum is not a satisfactory replacement for rolled steel frames. You can replicate the style and the type of window, but not the fine, thin profile that characterizes most steel frames. Because aluminum is a weaker metal, it must be produced in a thicker configuration than steel in order to provide the strength necessary to hold the weight of glass.

Aluminum presents its own set of maintenance problems. It is a soft metal that will pit as a result of even short exposure to San Francisco's marine air. The tight seal, which is one of the selling points of aluminum frames, will lose its grip, and in general aluminum windows are not so easily repaired as wood windows. If a part is damaged, you will usually have to replace the entire unit at a cost greater than you would expect to repair a wood window. Finally, metal is a poor insulator, compared to wood. It conducts heated air outside and cold air inside. The difference between warm interior and cold exterior air can cause condensation on metal frames inside the house that can damage the sill, necessitating more frequent repair and repainting.

"Misguided Improvement" Owners have for years replaced wood windows with aluminum in an attempt to give their building a "modern" look. In this sense, inappropriate window replacement is the aesthetic equivalent of removing gingerbread or other "old fashioned" details and applying stucco, asbestos, vinyl or aluminum siding to Victorian and Edwardian era buildings. Fortunately, today, most people recognize the inappropriateness of the latter, but it is evident from the continuing practice of replacing windows in an older building which otherwise remains intact that many do not understand the importance of windows to a structure's integrity.

This is certainly a "misguided improvement." Inappropriate replacement windows will diminish the value of your property in the eyes of informed buyers looking to acquire an intact older building. They will rightly view aluminum sliders as a feature they will have to remove in order to return the building to its historic appearance. Such buyers are likely to lower their bid for each cost they will have to incur to reverse unsympathetic alterations.

In most instances in San Francisco, inappropriate replacement of windows has not required alteration of the opening itself, so that the façade design and proportions remain intact. In short, misguided installation of aluminum sliders or other incompatible replacement windows is an
There are four distinct categories of work that can be done to a window unit depending on its condition.

1. **Routine Maintenance.** Windows that are structurally sound can usually be restored to working order and an acceptable level of energy efficiency with only minor repairs. Common, inexpensive projects include replacement of broken sash cords or glass, scraping and painting, installing new glazing compound, and replacement of broken sash locks.

2. **Structural Repair.** A lack of routine maintenance over the years can lead to serious deterioration and decay of the window unit. The presence of decay in a window unit does not mean it should be replaced. Modern wood epoxy restoration techniques can economically rejuvenate even severely damaged and decayed window units.

3. **Replacement of Sash Only.** The original moveable sash may be missing or damaged beyond repair, but the frame with its pulleys, counterweights, and exterior moldings may be intact. In this instance, new, wood replacement sash can be installed in the existing frames at a cost that is usually less than total replacement of the entire unit.

4. **Replacement of the Entire Unit.** As a last resort, when damage to the original window unit is too severe to permit consideration of any other alternative, new window units made to exact dimensions of the old one and preferably made of wood to duplicate the look and material of the old units should be installed.


easily reversible condition, especially compared to removing stucco or other siding and restoring ornamentation.

If you have acquired an older building with the idea of rehabilitating it, returning to the original window type and design should be on your project list. If you are lucky enough, a previous owner may have stored the old windows in the garage, attic or crawl space of the building. In that case you can actually restore the originals, effecting any necessary repairs, and reinstall them. All but the most extreme decay can be repaired, with modern methods and materials.

**In sum**

Doing the “right thing” about your windows can also be the economical thing, in the short and the long term. Repair of original windows is generally cheaper than replacing them. When repair is not practical, replacement windows identical with the original, even if at the cost of custom manufacture, represent the wisest investment because it will help preserve the long-term value of your property.

—D. Andreini with assistance from William Beutner; Bruce Bonacker, AIA; and Steve Plath

**Where to get more information**


Sharon C. Park, AIA. *Preservation Briefs: 13, The Repair and Thermal Upgrading of Historic Steel Windows.* National Park Service


