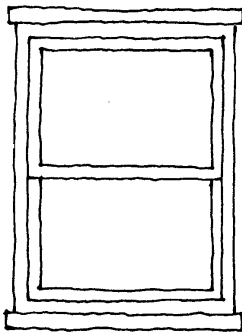


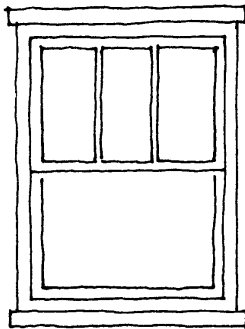
B.1 Windows

The Preservation Board strongly prefers that historic windows be retained, along with their functional and decorative elements such as sash, muntins, glass, sills, heads, hood molds, decorated jambs and shutters. The Board prefers that these windows are repaired rather than replaced.

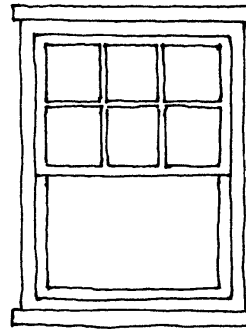
Common Window Types



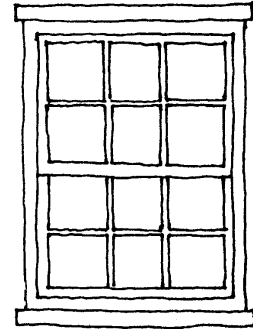
One-over-one



Three-over-one



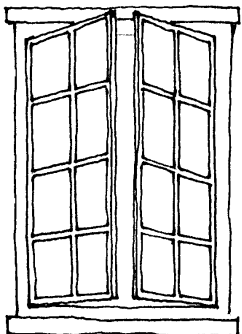
Six-over-one



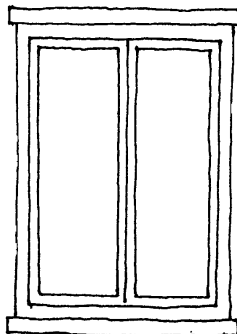
Six-over-six

The windows above are all “hung” windows. In a single-hung window, only one of the sash slides up and down, whereas both sash slide in a double-hung window. There is no difference in outward appearance.

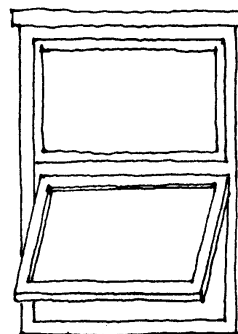
There are several other muntin configurations beside those shown. Multi-lite windows are more traditional than single-lite, the latter being more common in buildings built after the 1930s.



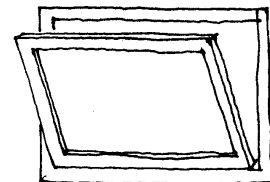
Metal casement



Wood or vinyl casement



Single or double awning

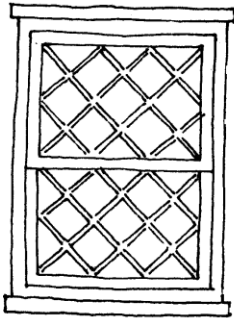


Hopper

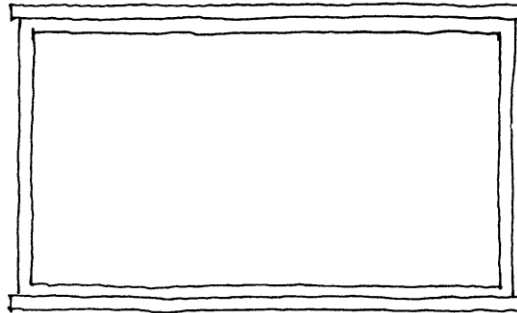
Of the windows directly above, only the metal casement and the hopper are common in historic buildings. Metal casement windows appear in the revival styles such as Tudor, French Eclectic and Renaissance, and in Moderne buildings. The hopper was used in many pre-1930s buildings, mainly in service rooms such as kitchens and baths.

B.2 Windows

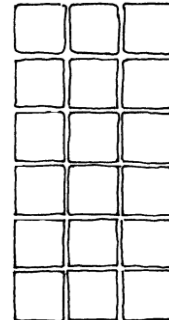
More Common Types



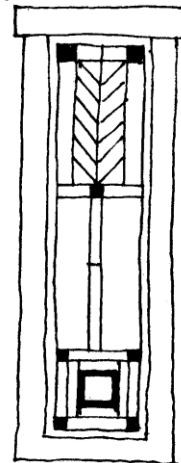
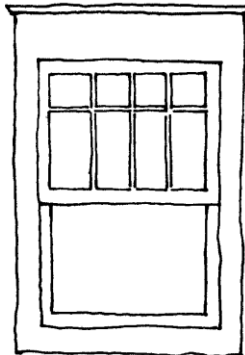
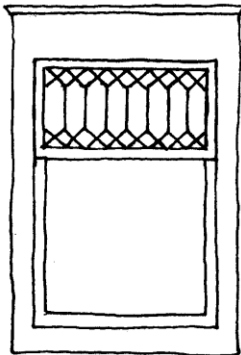
Diamond panes are seen in Tudor Revival and Queen Anne buildings.



Picture windows, with their large panes of glass, became common in the 1950s, and are not traditional.

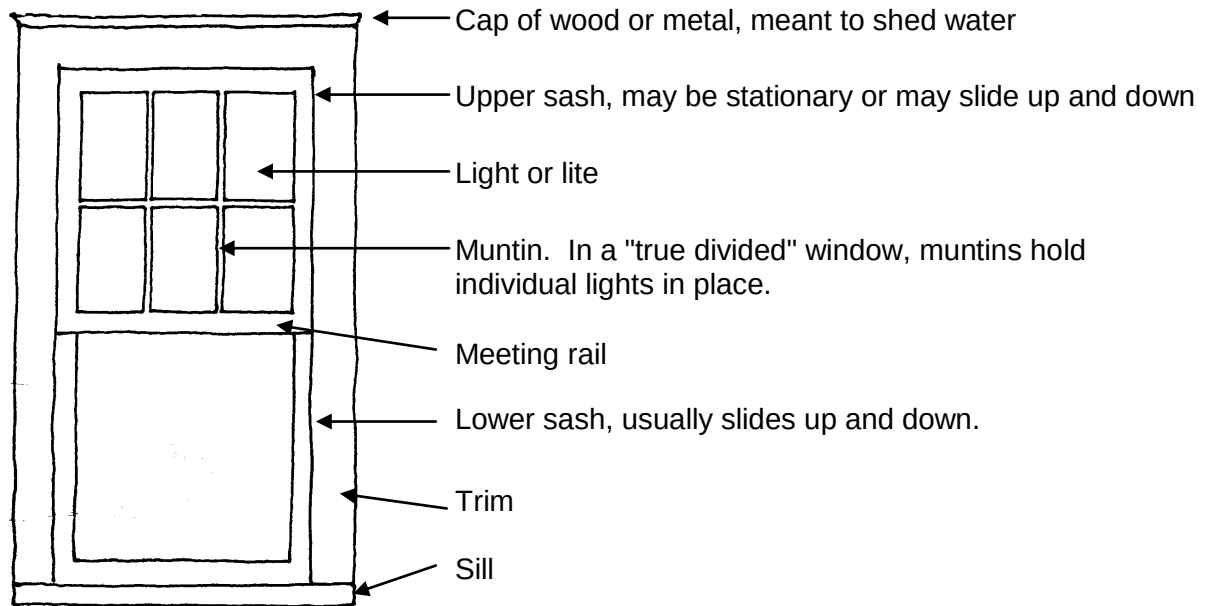


Glass block is seen in Moderne buildings from the 1930s-40s.

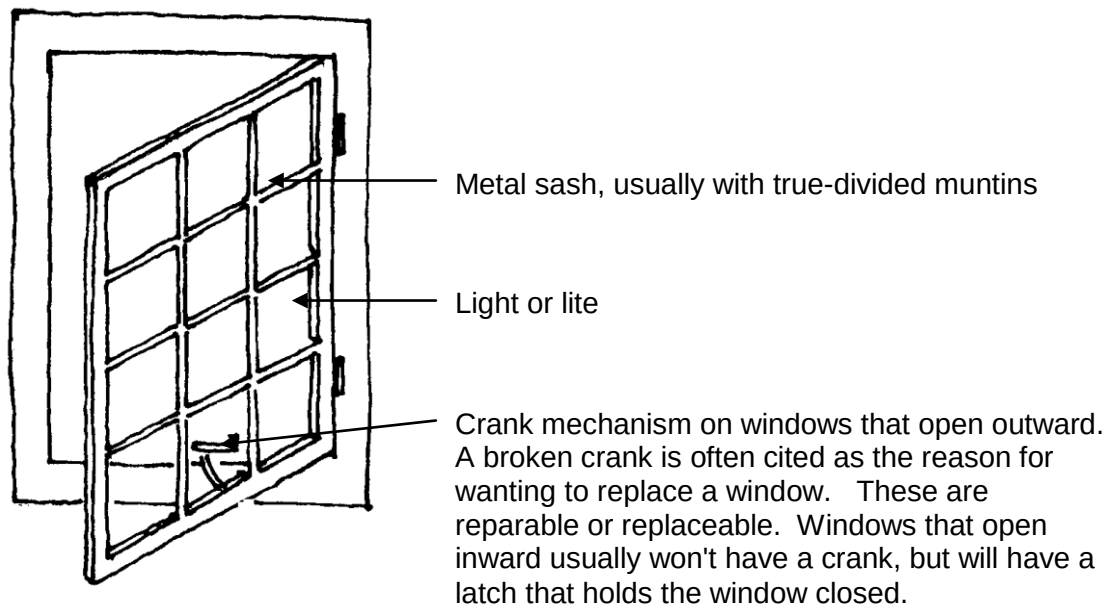


Decorative glass windows appear in buildings of several styles, including the Queen Anne, Tudor, Arts & Crafts and Craftsman styles. They take many forms and have a wide range of complexity. Common to these windows are decorative glass and elaborate muntin patterns. The glass is often high-quality leaded or stained glass, and the muntins are often lead.

B.3 Window Anatomy



Single- or double-hung window



Metal casement window

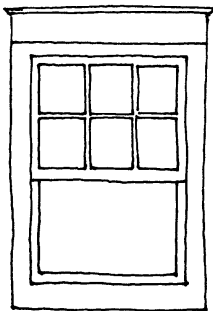
B.4 Replacing a window in an existing opening

An original window may be replaced only if it is beyond reasonable repair. Most of the common problems with windows, such as stuck sash, peeling paint, broken glass or air leakage can be solved with reasonable repair. When repair work does not change the appearance of a window, Board review of the work is not required.

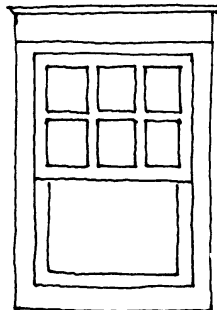
If replacement is absolutely necessary, the new window should match the original window as best possible in size, muntin configuration, and sash dimensions. Though replacement-in-kind is usually appropriate, in cases where an historic window was replaced with an inappropriate type, the new window should fit the style of the building, not repeat the earlier mistake.

If the sash are beyond repair but the frames are useable, replacing the sash may be more appropriate than replacing the entire window.

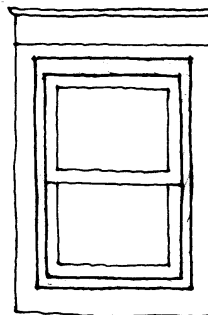
Two good sources of information on window repair are the National Park Service's Preservation Brief #9: *The Repair of Historic Wooden Windows*, and Brief #13: *The Repair and Thermal Upgrading of Historic Steel Windows*.



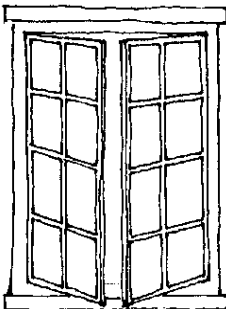
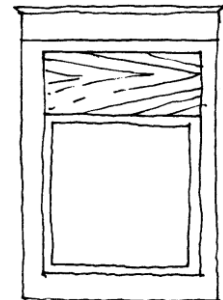
A. Original window



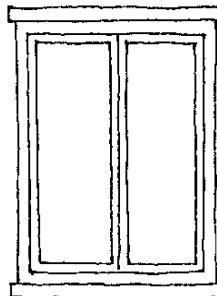
A. 1 Inappropriate:
Replacement sash and muntins are noticeably thicker than originals.



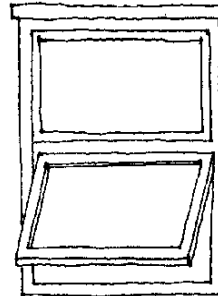
A. 2 Inappropriate:
Neither of these replacement sash fill the original opening, and both lack muntins.



B. Original metal casement window



B. 1 Inappropriate:
Replacement sash is not metal, is too thick, and lacks muntins.



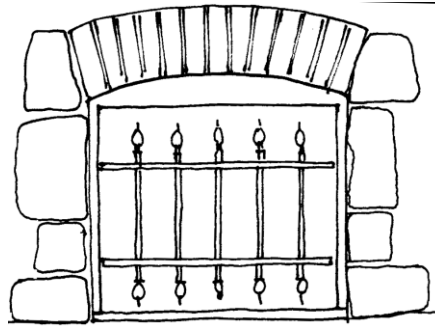
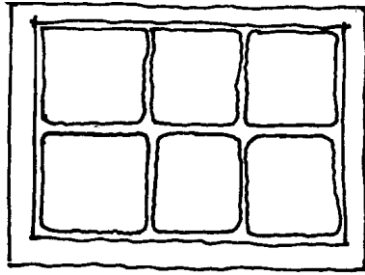
B. 2 Inappropriate:
Replacement sash is a very different type from original.

B.5 Replacing a window in an existing opening

Continued

Basement windows

Glass block, like that on the left below, is appropriate only in buildings of the Moderne or International style. If security is the goal, an appropriate solution is to retain the original windows and use metal security bars or grilles, as shown on the right.



Vinyl and vinyl clad windows

Vinyl windows are made solely of vinyl, which is extruded from a mold like pasta. And like cannelloni, the inside is hollow. A complex cross section makes the sash rigid and, in most cases, strong. The amount of vinyl in the cross section affects the outward appearance and the cost of the windows. The less vinyl, the lower the cost. Minimal vinyl can translate into sash that are too thin in profile for historic buildings, and/or that have a wavy, cheap looking surface from overly pliable vinyl. Some manufacturers counter this with "heavy duty" models that can go too far in the opposite direction, having sash profiles that are too thick for historic buildings. In addition, the depth of some heavier windows is noticeably greater than historic windows, reducing the amount that the windows are recessed into their openings. In a double hung window, this difference can be as much as two inches.

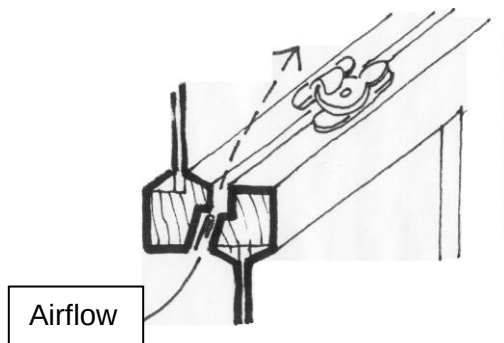
Vinyl *clad* window sash have a solid inside made of wood or a wood/plastic composite, which is then wrapped--or clad--in vinyl. The vinyl cladding can cover just the exterior face or the interior face also. The exterior appearance is similar for both the vinyl and vinyl clad sash, but the interior finish can differ, depending on whether the interior of the latter is wood or vinyl. Costs of windows with wood interiors depend upon whether the wood is paint grade or stain grade. Because of their solid, rigid composition, clad window sash can be stronger than vinyl sash of the same dimensions. For historic buildings, this means that the sash profile and depth can more closely match the dimensions of historic windows. These sash are also heavier than hollow vinyl sash and, when operated, can feel more like historic windows.

A factor which can, more than any other, affect whether a new window looks similar to an historic window is the thickness of the glass. Most new windows are made with dual-pane glazing, i.e. two thin layers of glass with an airspace between. Overall thicknesses range from 3/8 inch to one inch. In contrast, historic windows were made with a single pane of glass about 1/8 inch thick. With today's thicker, heavier glass, sash must be beefier than historic sash, a difference that is visually noticeable. Likewise, true-divided lite muntins must be thicker, if they are available at all.

B.6 Energy Efficiency and Window Replacement

The major reason people give for wanting to replace windows is air leakage in cold weather. These leaks can be stopped, and insulating devices added, to reduce heat loss and to retain the historic windows.

Studies show that more heat loss occurs through air transfer than through a material. Minimal heat energy is lost through the wood and glass. Most loss occurs through gaps around the window sash.

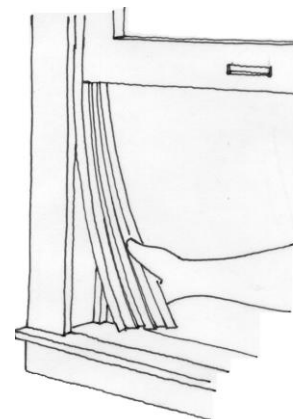
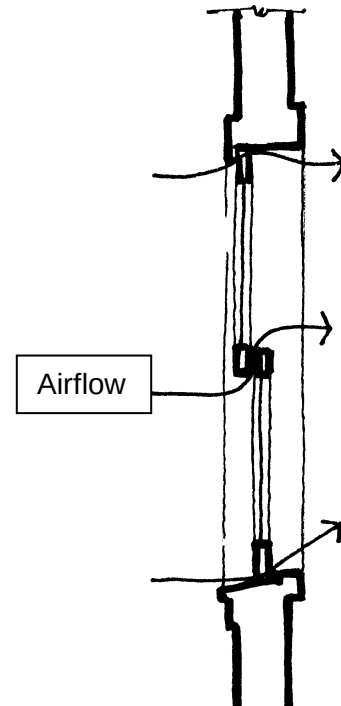


Metal weatherstripping added around sash, or plastic liners added to jambs, will stop most air leakage. Insulating panels can be installed on the inside of window openings. These are typically rigid plastic panels that adhere to the window frames with magnetic or adhesive strips.

A less expensive way to reduce drafts and to prevent frost build-up on glass is to add plastic insulating film on the inside. When properly installed, the film is nearly invisible. Like storm windows or insulating panels, the plastic can be left in place year round on unused or inoperable windows.

All these options are far cheaper than replacement windows.

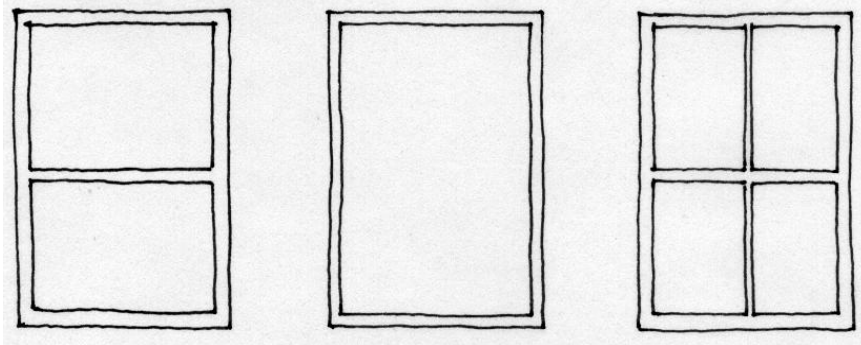
For help, see the National Park Service's Preservation Brief #3: *Conserving Energy in Historic Buildings*.



Jamb Liner

B.7 Energy Efficiency continued

Exterior storm windows are an excellent way to reduce air leakage and heat loss. Wooden storm windows are preferred, with divisions that match those of the window sash. Aluminum triple-track storms are acceptable, and are best when painted to match the window trim. Interior storm windows are an option that won't affect the building's outside appearance



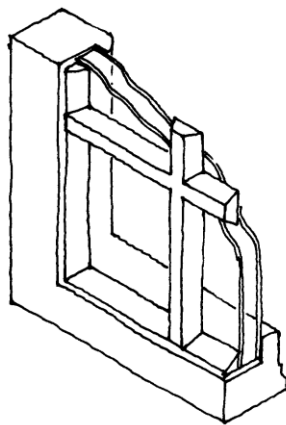
Center rail aligns with meeting rails of sash.

Single pane storm works well, but may look too flat or planar.

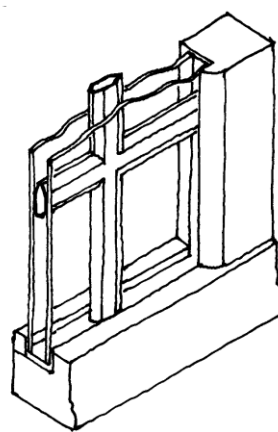
Center rail and vertical muntin appear elegant.

If the Board determines that an historic, true-divided window cannot be repaired, the window may be replaced with an insulated glass window provided:

- The muntins are installed on the outside of the glass, not only on the inside and not only between the glass.
- The muntins are in the same or similar configuration as the original.
- The dimensions of the stiles and rails of the new sash are the same as or similar to the dimensions of the original.

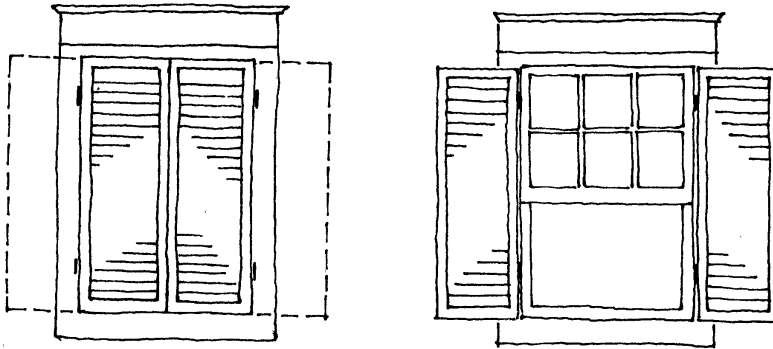


Appropriate: Muntins on the outside of the glass. Better yet are these muntins with a spacer bar between the glass and muntins on the inside face of glass.

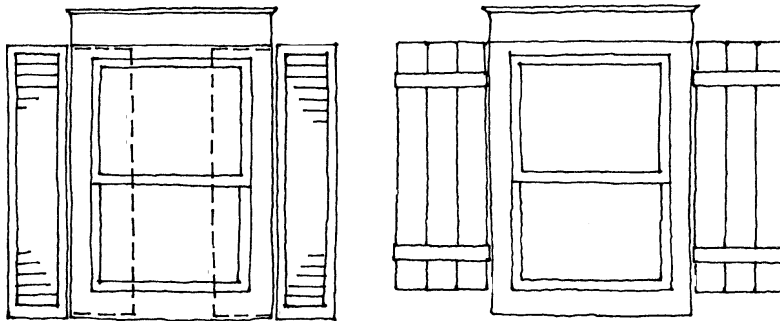


Inappropriate: Muntins in the airspace between the layers of glass. The reflectivity of the glass would hide the muntins.

B.8 Shutters

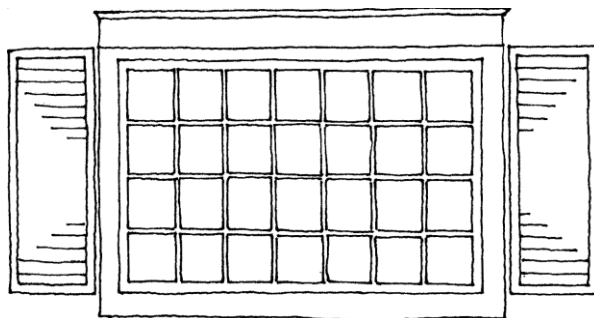


Where shutters are appropriate to the style of the building, they should be built of wood, not of vinyl or metal. The shutters should be of the correct size and in the correct location to cover the window if closed. Note that the shutters shown above, if closed, would fit inside the window trim. They stop at the top and bottom of the sash, and are affixed to the inside edge of the trim.



These shutters are too narrow and tall, and are hung outside the window trim.

This "rustic" style predates the buildings in our districts, and is therefore inappropriate.



These shutters are too narrow, but wider shutters would be equally inappropriate, as a historic window this size would not have had shutters