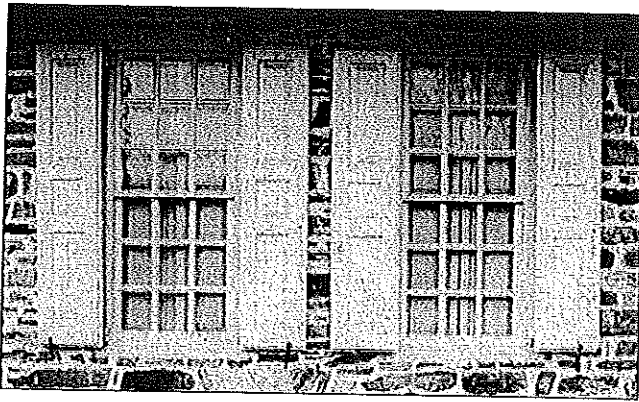


6: GUIDELINES FOR WOOD WINDOWS

PURPOSE

These guidelines were prepared to assist property owners with information when considering the repair, replacement or installation of wood windows. They are not intended to replace consultation with qualified architects, contractors and the HARB.



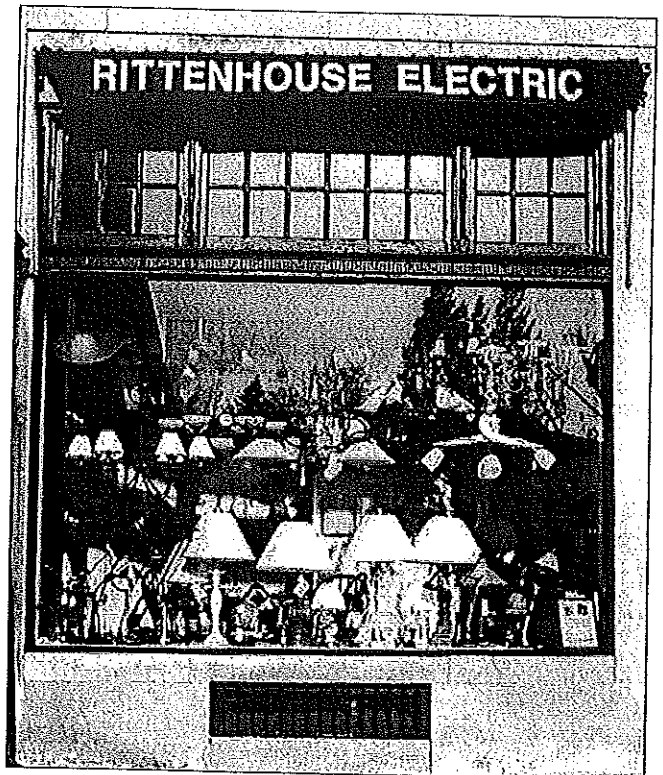
Many older residences include wood windows such as these nine-over-nine double-hung sash with paneled wood shutters.

These guidelines were developed in conjunction with Lower Merion's Historical Architectural Review Board (HARB). The HARB reviews Certificate of Appropriateness (COA) applications for proposed exterior alterations to properties within the historic districts visible from a public way. The applicant is responsible for complying with the provisions of the Zoning and Building Codes at the time of application. The applicant must obtain a Certificate of Appropriateness (COA) as well as all necessary permits prior to proceeding with any work. For more information, call the Department of Building Regulations and Zoning at (610) 645 - 6200.

Please review this information during the early stages of planning your project. Familiarity with this material can assist in moving a project quickly through the approval process, saving applicants both time and money.

WINDOWS

- Define the character of a building and streetscape
- Act as interior and exterior building features
- Typically comprise approximately one quarter of the surface area of exterior walls
- Can identify architectural style
- Can retain connections to the past
- Help define the architectural building period
- Can display craftsmanship and durable construction

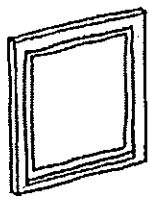


A multi-light wood transom enhances the storefront's character.

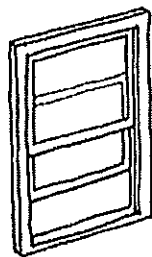
COMMON WINDOW TYPES

All of the identified window types can have different muntin patterns or configurations. Muntin patterns are defined in terms of the number of panes or lights. For example, a 6/1 double-hung window indicates there are 6 panes in the upper sash and 1 pane in the lower sash.

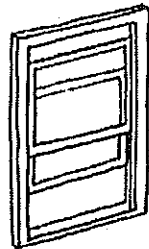
- a. **Fixed:** Non-operable framed glazing
- b. **Single-hung:** Fixed upper sash above a vertically rising lower sash
- c. **Double-hung:** Two sashes that can be raised and lowered vertically
- d. **Sliding:** Either a fixed panel with a horizontally sliding sash or overlapping horizontally sliding sash
- e. **Casement:** Hinged on one side and swinging in or out
- f. **Awning:** Hinged at the top and projecting out at an angle
- g. **Hopper:** Hinged at the bottom and projecting in at an angle
- h. **Vertical pivot:** Pivots vertically along a central axis
- i. **Horizontal pivot:** Pivots horizontally along a central axis



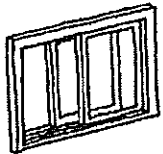
a. Fixed



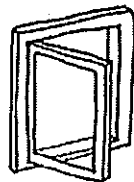
b. Single-hung



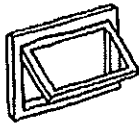
c. Double-hung



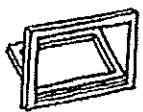
d. Sliding



e. Casement



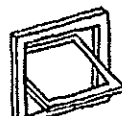
f. Awning



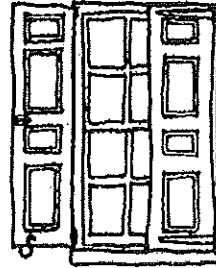
g. Hopper



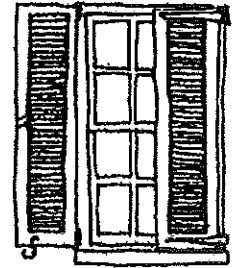
h. Vertical pivot



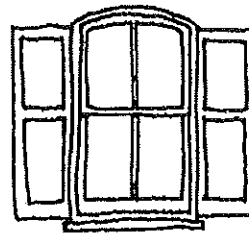
i. Horizontal pivot



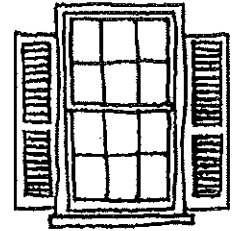
Six-over-six double-hung window with 4-panel shutters



Six-over-six double-hung window with lowered shutters



*The 2-panel shutters do not fit the arched opening
Not Recommended*



*The lowered shutters are the incorrect size for the window
Not Recommended*

SHUTTERS

Historically, exterior shutters were utilized as shielding devices. Paneled shutters were typically located on the ground floor to provide protection and lowered shutters at upper floors to regulate light and air. Shutters were not used on all historic buildings or in all locations.

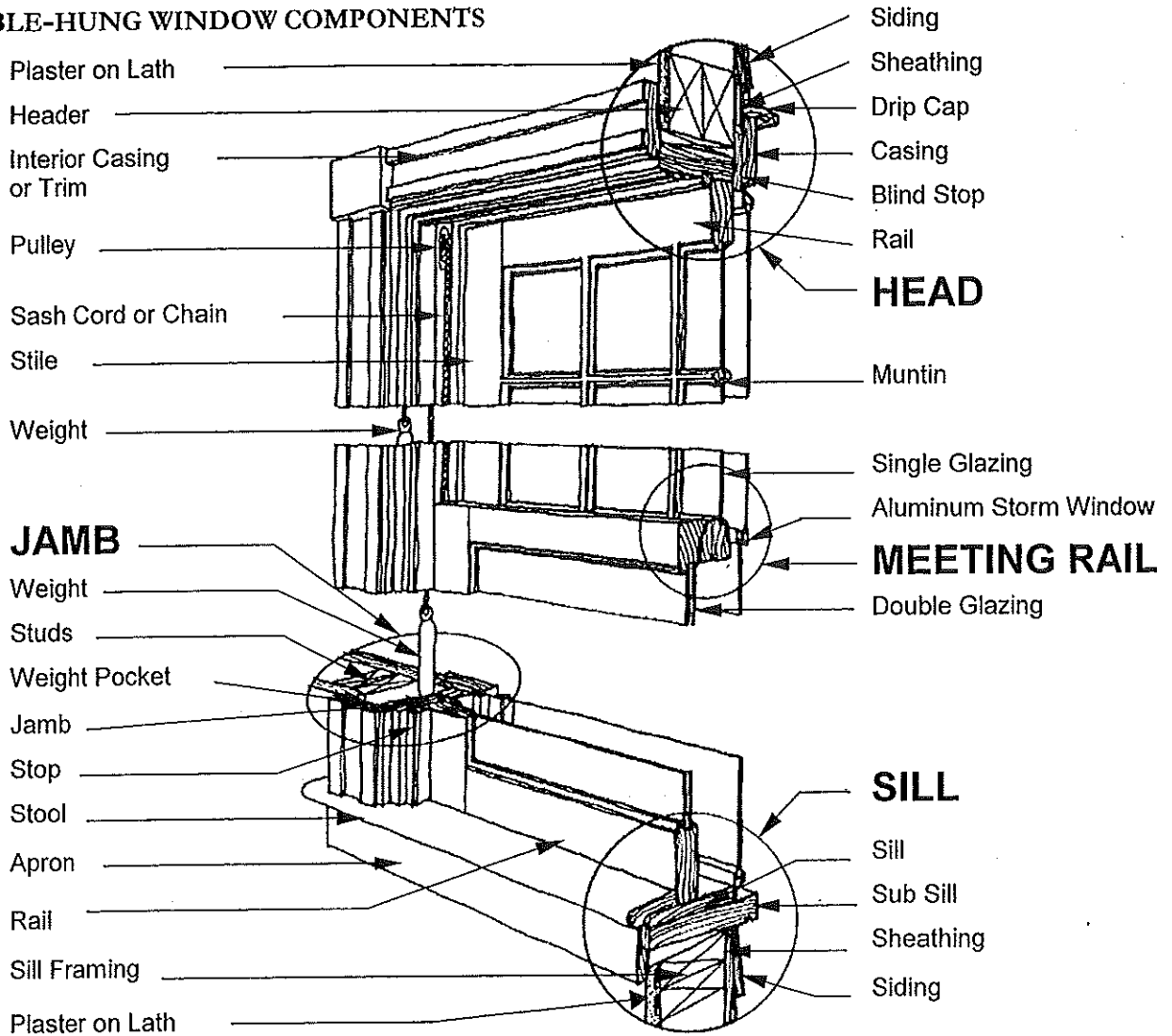
The HARB encourages:

- Shutters where they existed historically
- Operable wood shutters with appropriate hardware
- Shutters of the appropriate style for the house and location
- Appropriately sized and shaped shutters for the window opening, fitted to cover the window when closed
- Refurbished historic shutter hardware

The HARB discourages:

- Installing shutters where they did not exist historically
- Screwing shutters to the face of the building
- Installing vinyl or aluminum shutters
- Inappropriately sized or shaped shutters

DOUBLE-HUNG WINDOW COMPONENTS



WINDOW CONFIGURATIONS

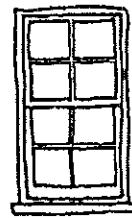
Different window configurations are appropriate for each architectural period or style. Altering the window type, style, shape, material, size, component dimension, muntin pattern or location can dramatically alter the appearance of the building.

The HARB encourages:

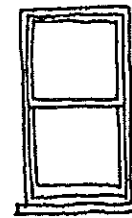
- Utilizing the historically appropriate window configuration
- Utilizing the exterior muntin pattern, profile and size appropriate for the historic period
- Installing true divided-light windows rather than snap-in muntin grids

The HARB discourages:

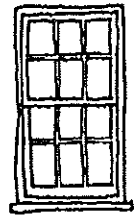
- Use of internal muntins between glazing layers
- Use of interior muntins



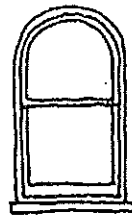
4/4 Window



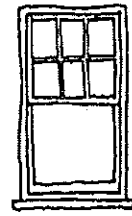
1/1 Window



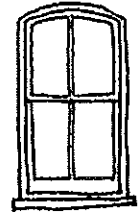
6/6 Window



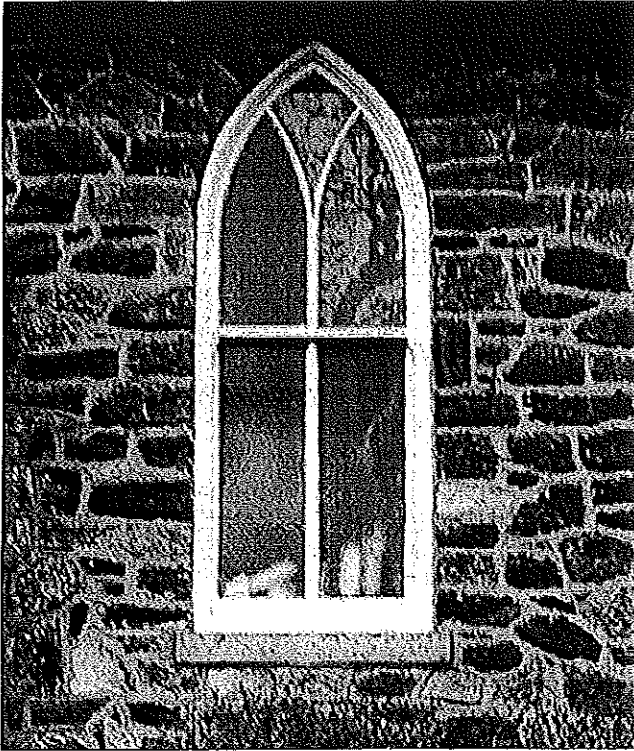
1/1 Window
with round head



6/1 Window



2/2 Window
with arched head



Lancet windows, with a sharply pointed heads, can be found in many historic churches and some Victorian buildings.

HISTORIC WINDOW PROBLEM SOLVING

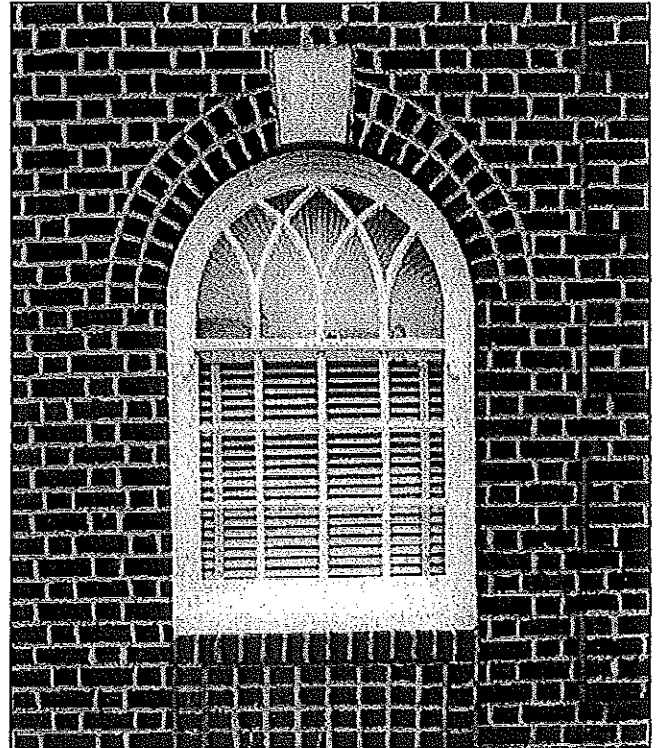
Property owners generally do not notice their windows until a problem occurs. Typical concerns include operation, reducing air infiltration, maintenance and improving the appearance.

Generally, the appearance of a window that has not been properly maintained can seem significantly worse than its actual condition. There is no need to replace an entire window or all windows because of a deteriorated component, typically the sill or bottom rail.

In many instances, selective repair or replacement of damaged parts, and the implementation of a regular maintenance program is all that is required. It is generally possible to upgrade windows in fair or good condition relatively economically. Full window replacement is rarely necessary and should be avoided when possible.

To improve operation

- Verify that sash cords and weights are operational
- Remove built-up paint at jambs
- Repair or replace deteriorated components such as parting beads



Windows with unusual shapes, proportions or detailing are more difficult to replace and should be maintained whenever possible.

To reduce air infiltration

- Install snug weather-stripping between all moving parts (quality metal weather-stripping can last 20 years)
- Replace broken glass (glazing)
- Re-caulk perimeter joints
- Remove and replace missing glazing putty
- Add sash locks to tighten windows
- Add an interior or exterior storm sash (installing a secondary glazing system can achieve similar R-values to a new thermal window)
- Insulate sash pockets

To reduce solar heat gain or heat loss

- Install interior or exterior shutters
- Install interior blinds or curtains
- Plant deciduous trees at south and west elevations to block summer sun and not winter sun
- Install UV filters on glazing

Maintenance

- Regular review and repair
- Re-paint, particularly horizontal elements

STORM WINDOWS

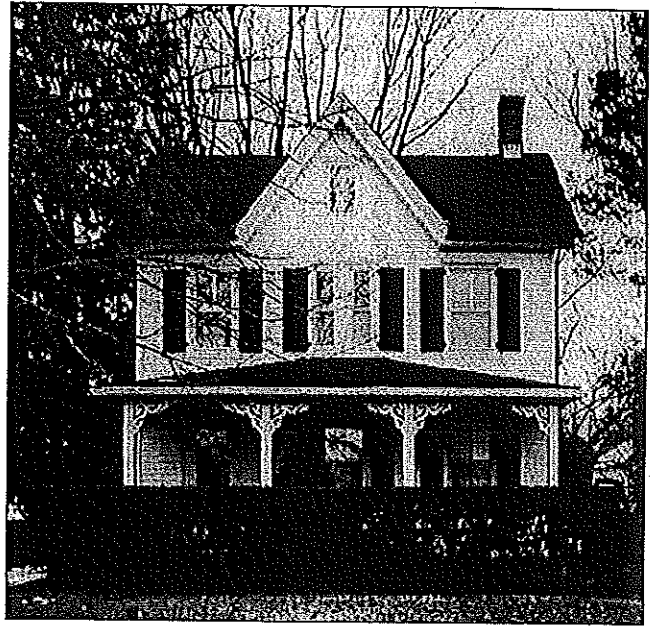
There are several types of storm windows available for both interior and exterior installation, some of which include screen inserts. Storm sash should conceal as little of the historic window as possible and should be selected to complement each window type.

The HARB encourages:

- Interior storms to minimize the change to the exterior appearance
- Retaining wood storm frames rather than replacement with aluminum or vinyl. Wood storm windows can be custom made to fit any size or shaped opening, and lose less heat through the frame than aluminum.
- Utilizing glass rather than Plexiglas, which can discolor and alligator
- Matching the shape of the opening
- Aligning the divisions of the storm window with the divisions of the window, revealing as much of the historic window as possible
- Painting the storm window frame to match the window trim
- Minimizing damage to historic windows and frames during the installation of storm windows
- Caulking and weather-stripping the storm window in accordance with manufacturer's instructions allowing for exterior drainage at the sill
- Removable storm sash to facilitate maintenance of historic window

The HARB discourages:

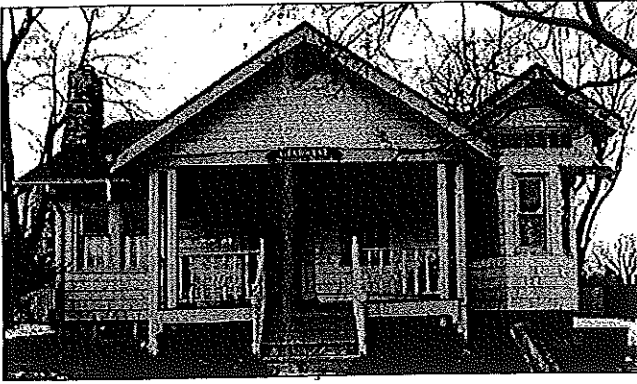
- Stock storm units that require in-fill panels within an existing window opening
- Triple track exterior aluminum storm sash at visible street elevations
- Fixed storm sash



The lowered shutters at the second floor windows and paneled shutters at the first floor windows help define the rhythm of the window openings across the façade. The storm windows match the color of the window trim and the meeting rails align, minimizing the visual impact.



The variety of window sizes and patterns increases the visual interest of this apartment building, however the dark colored storm windows with non-aligning components are too visually prominent.



The variety of windows, sizes and patterns adds visual interest to this façade.

COMPARING WINDOW REPAIR AND REPLACEMENT

When considering repair and retention of existing windows versus installation of replacement windows, HARB generally encourages applicants to retain their existing wood windows. However, HARB does recognize that it is sometimes necessary to replace window components or an entire window because of extensive deterioration.

The HARB discourages:

- Replacing a window component or unit if repair and maintenance will improve its performance and preserve historic elements

It is important to remember that because a portion of the window is deteriorated, replacement of the entire component or unit might not be necessary. A simple means of testing wood window deterioration is to stab the element with an awl or ice pick. Stab the element perpendicularly and measure the penetration depth and damp wood at an angle for the type of splintering.

- If the penetration is less than ¼ inch, the component does not need replacement
- If the penetration is more than ½ inch, the component might need replacement
- If long splinters are produced, the component does not need replacement
- If short sections broken across the grain are produced, the component might need replacement

When evaluating window repair or replacement, the following guidelines can be helpful:

1. **Perform routine maintenance:** Replace broken or missing components such as glazing or sash cords. Verify that caulking, glazing putty and weatherstripping is securely applied, and repaint.
2. **Treat or repair deteriorated components:** At the earlier stages of wood deterioration, it is possible to complete in-place treatments that do not necessitate component replacement. This includes treating wood for insects or fungus, epoxy consolidation, applying putty at holes and cracks, and painting.
3. **Replace Deteriorated Components:** Replace either the deteriorated portion of the component with a "Dutchman" or the entire component if the majority is deteriorated. A Dutchman is a repair with a piece of the same material in a sharp-edged mortise. The replacement pieces should match the original in design, shape, profile, size, material and texture. New sills are usually easily installed while complete sash replacement might solve problems of broken muntins and deteriorated rails.
4. **Replace Window:** If the majority of the window components is deteriorated or missing and in need of replacement, replacement of the window unit might be warranted.

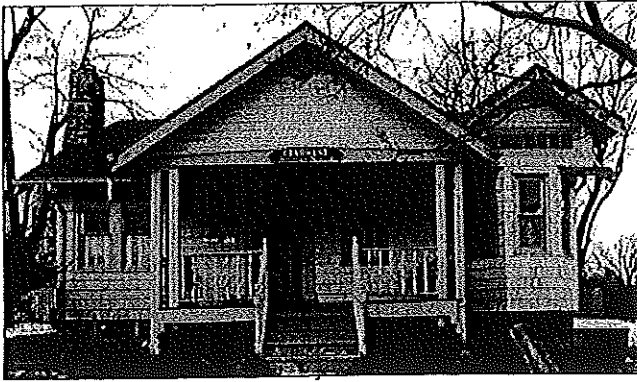
IF REPLACEMENTS ARE NECESSARY

The HARB encourages:

- Replacing only components or windows that are deteriorated beyond repair
- Relocating historic windows to the publicly visible elevations and installing replacement windows at less visible areas
- Matching the original size, shape, operation, muntin pattern, profiles and detailing to the greatest extent possible
- Selecting true divided-light windows
- Re-using serviceable historic hardware or components
- Choosing window style or configuration based upon historical or physical documentation

The HARB discourages:

- Decreasing window size or shape with in-fill to allow for installation of stock window size
- Increasing window sizes or altering the shape to allow for picture or bay windows
- New window openings at publicly visible elevations



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WINDOW MATERIALS PAST AND PRESENT

Wood windows were historically manufactured from durable, close, straight-grain hardwood of a quality uncommon in today's market. The quality of the historic materials and relative ease for repairs allows many well-maintained old windows to survive from the nineteenth century or earlier.

Replacement windows and their components tend to have significantly shorter life spans than historic wood windows. Selecting replacement windows is further complicated by manufacturers who tend to offer various grades of windows, with varying types and qualities of materials and warranties.

Today, lower cost wood windows are typically made from new growth timber, which is much softer and more susceptible to deterioration than hardwoods of the past. Vinyl and PVC materials, now common for replacement windows, breakdown in ultraviolet light, and have a life expectancy of approximately twenty-five years. Because of the great variety of finishes for aluminum windows, they continue to be tested to determine projected life spans.

A greater problem with replacement windows than the construction materials utilized in the frame and sash is the types and quality of the glazing, seals, fabrication and installation.

Double glazing or insulated glass, utilized in most new window systems, is made up of an inner and outer pane of glass with a sealed air space in between. The air space is typically filled with argon gas with a perimeter seal. This perimeter seal can fail in as few as ten years, resulting in condensation between the glass layers, necessitating replacement. Many of the gaskets and seals that hold the glass in place also have a limited life span and deteriorate in ultraviolet light.

Significant problems with replacement windows also result from poor manufacturing or installation. Twisted or crooked frames can make windows difficult to operate. Open joints allow air and water infiltration into the wall cavity or building interior.

The HARB encourages:

- Installing quality wood windows when replacement is deemed necessary
- Review of various grades of windows offered by manufacturers
- Utilizing quality materials throughout the installation process

- Understanding the limits of the warranties for all components and associated labor
- Selecting a reputable manufacturer and installer who is likely to be in business and respond if there is a future problem

MAINTAINING REPLACEMENT WINDOWS

One of the selling points of replacement windows is that they do not require maintenance. With the relatively short life expectancy of many of the materials and components, this is usually an optimistic viewpoint.

As joints or seals in replacement windows deteriorate, openings can be formed that allow air and water to enter into the window frame, wall cavity, and/or building interior, causing additional damage. Repair of these openings typically requires replacement of the deteriorated parts. This can present a problem if the manufacturer has modified their designs or is no longer in business, necessitating custom fabrication of deteriorated elements or replacement of the window.

As previously described, the double-glazing has similar problems over time with the deterioration of the perimeter seal. In addition, if the glazing unit is cracked or broken, it will require full replacement. This is further complicated when the double-glazing includes an internal muntin grid.

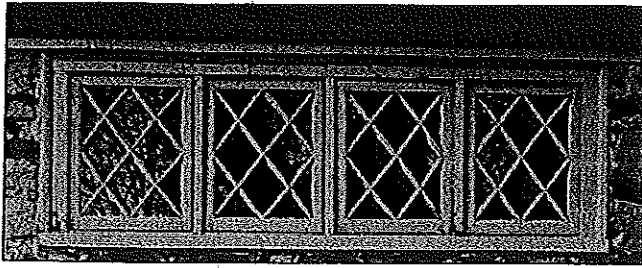
By contrast, a good carpenter can generally repair a historic wood window with single pane glazing.

REPLACEMENT WINDOW COSTS

- Labor to remove and disposal fee for old windows
- Purchase price and delivery of new windows
- Labor and materials to modify existing frames for new windows
- Labor to install new windows
- Life-cycle costs associated with more frequent replacement of deteriorated components

QUALITY REPLACEMENT WINDOWS

Reputable lumberyards typically provide a better selection and higher quality replacement window options than discounted home center stores. Each manufacturer also provides various grades of replacement window options. Manufacturer's information can be found on the Internet.



WINDOW REPAIR AND REPLACEMENT OPTIONS

Repair or replacement of existing components: Deteriorated sills, sash and muntins are repairable by craftsmen with wood consolidant or replacement parts, retaining original fabric and function. In-kind replacement sash and sills can be custom-made to replace deteriorated sections if necessary.

Tilt-sash package: Some manufacturers offer replacement jamb liners and sash for installation within existing window frames. The system allows installation of new thermal sash of various muntin patterns within existing frames that can tilt to facilitate cleaning.

The benefits of the tilt-sash package:

- Original muntin pattern can be duplicated
- Maintains the original surround and opening
- Thermal glazing provides greater energy efficiency

The negatives of the tilt-sash package:

- Historic sash is removed
- Modification of the jambs is necessary
- Out-of-plumb openings can be difficult to fit
- Perimeter seals might not be tight

Frame and sash replacement unit: A complete frame with pre-installed sash of various muntin patterns for installation within an existing window frame opening.

The benefits of the frame and sash replacement unit:

- Manufactured as a unit to be weather tight
- Original muntin pattern can be duplicated
- Thermal glazing provides greater energy efficiency

The negatives of the frame and sash replacement unit:

- Historic sash is removed and frame modified
- The size of the window sash and glass openings are reduced due to the frame within a frame
- In-fill might be required for non-standard sizes
- Alteration of built-in surrounds might be required
- Both frames and sills typically visible at exterior

Locating matching pre-manufactured replacements for unusual windows such as these diamond-patterned wood casements would be unlikely. Maintenance of existing windows is encouraged whenever possible.

HARB WINDOW REVIEW

The HARB reviews all replacement windows that are visible from a public way. In its review of replacement windows, the HARB utilizes *The Secretary of the Interior's Standards for the Treatment of Historic Properties*; the same national standards utilized in all HARB reviews. When reviewing applications, the HARB considers the appropriateness of the replacement window installation and design in relationship to the building and streetscape for which it is proposed. What might be appropriate at one location might not be appropriate at another.

All applicants are encouraged to contact the HARB at the earliest stage of their window project. If you would like to discuss your project informally with the HARB to obtain an initial review and feedback about potential concerns prior to finalizing your plans, please contact the Department of Building Regulations and Zoning at (610) 645-6200.

This publication was initiated and overseen by the Township of Lower Merion and made possible through a grant provided by the Pennsylvania Historical and Museum Commission.

This project has been financed in part with Federal funds from the National Park Service, U.S. Department of the Interior. However, the contents and opinions do not necessarily reflect the views or policies of the Department of the Interior, nor does the mention of trade names or commercial products constitute endorsement or recommendation by the Department of the Interior.

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Dominique M. Hawkins, AIA, of Preservation Design Partnership in Philadelphia, PA, prepared this publication.