



**GUIDELINES FOR
WINDOWS & DOORS**



Township of Hopewell Historic Preservation Commission

GUIDELINES FOR WOOD WINDOWS & DOORS



Historic residences often have smaller attic windows. This one has an exterior wood storm window and lowered shutters.

PURPOSE

These *Guidelines* were prepared to assist property owners with information when considering the repair, replacement or installation of wood windows and doors. They are not intended to replace consultation with qualified architects, contractors and the Historic Preservation Commission (HPC). The HPC will be happy to provide consultation and assistance with materials, free of charge.

These *Guidelines* were developed in conjunction with Hopewell Township's Historic Preservation Commission (HPC). The HPC reviews Certificate of Appropriateness (COA) applications for proposed exterior alterations to properties locally designated as Historic Landmarks or within a local Historic District. 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, or to obtain permit applications, please call the COA Administrator at (609) 737-0612, ext. 643.

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. Additional *Guidelines* addressing other historic building topics are available at the Township Administration Building and on its web site at www.hopewelltpw.org.

WINDOWS AND DOORS

- 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

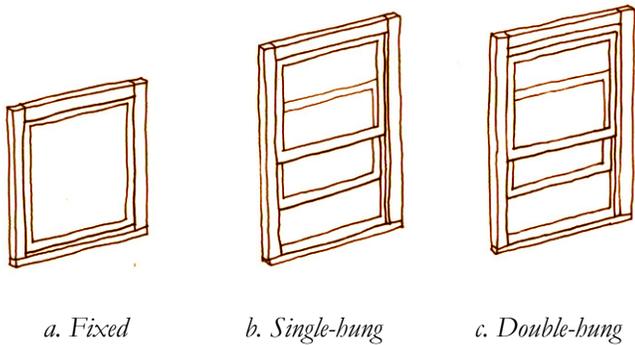


The varying heights of these round-headed tripartite windows help to emphasize the steepness of the roof pitch at the intersecting gable, reinforcing the Italianate style.

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.

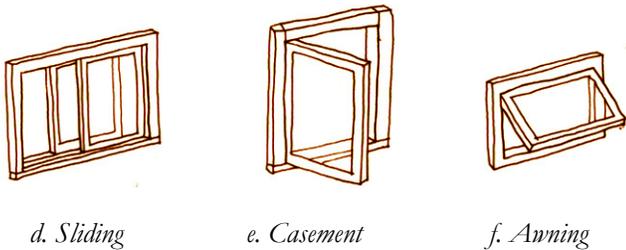
- a. **Fixed:** Non-operable framed glazing
- b. **Single-hung:** Fixed upper sash above a vertically rising lower sash
- c. **Double-hung:** Two sashes that can be raised and lowered vertically
- d. **Sliding:** Either a fixed panel with a horizontally sliding sash or overlapping horizontally sliding 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

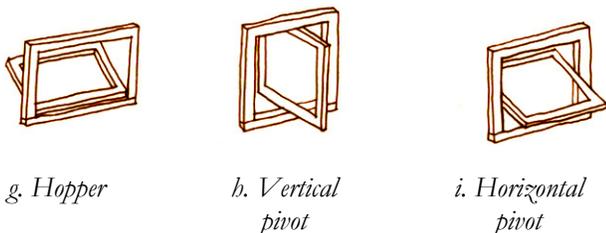
c. Double-hung



d. Sliding

e. Casement

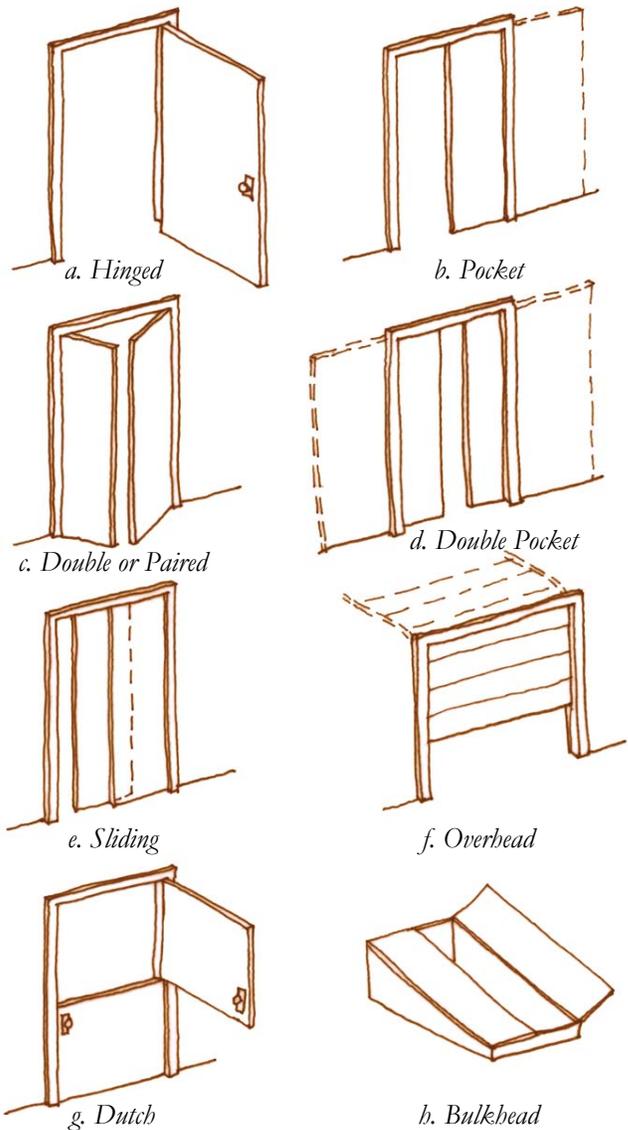
f. Awning



g. Hopper

h. Vertical pivot

i. Horizontal pivot



a. Hinged

b. Pocket

c. Double or Paired

d. Double Pocket

e. Sliding

f. Overhead

g. Dutch

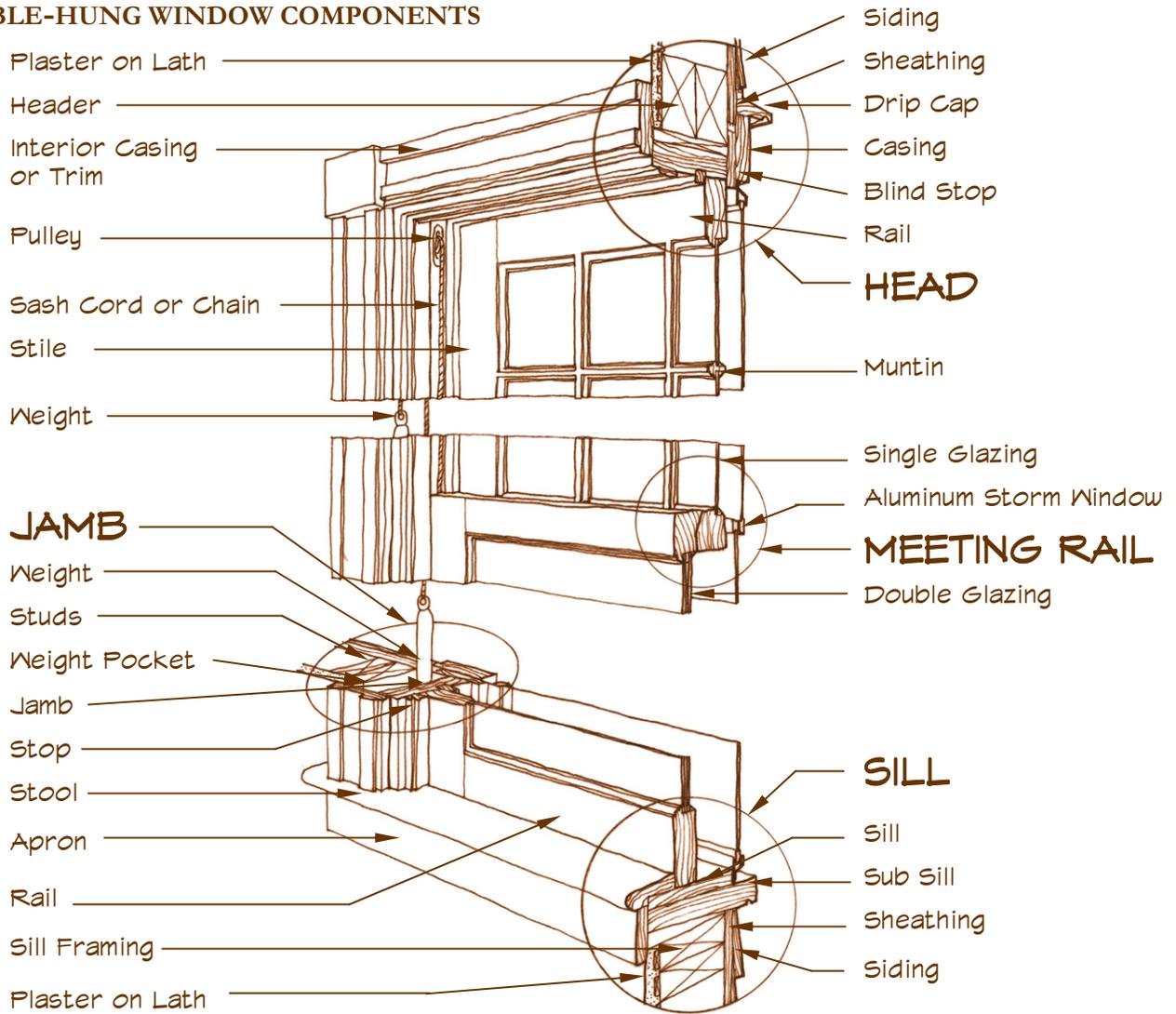
h. Bulkhead

COMMON DOOR TYPES

All of the identified door types can have different patterns or configurations.

- a. **Hinged:** Swings to close at opposite jamb
- b. **Pocket:** Slides into a concealed wall recess
- c. **Double or Paired:** A pair of swinging doors that close an opening by meeting in the middle
- d. **Double Pocket:** A pair of doors that slide into wall recesses at each jamb
- e. **Sliding:** Either two doors or one fixed panel and one sliding
- f. **Overhead:** Horizontal panels that slide on tracks opening upwards
- g. **Dutch:** Upper and lower parts operate separately
- h. **Bulkhead:** Sloped hatchway opening to cellar stair

DOUBLE-HUNG WINDOW COMPONENTS



WINDOW CONFIGURATIONS

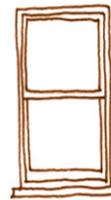
Different window configurations are appropriate for each architectural period or style. Altering the window type, style, shape, material, size, component dimension, muntin pattern or location can dramatically alter the appearance of the building.

The HPC 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 for multi-paned appearance

The HPC discourages:

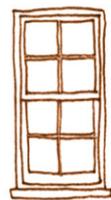
- Use of internal muntins between glazing layers
- Use of interior muntins



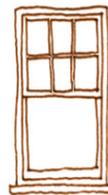
1/1 Window



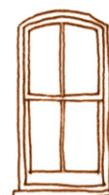
6/6 Window



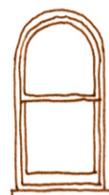
4/4 Window



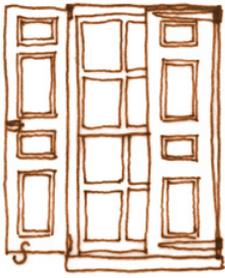
6/1 Window



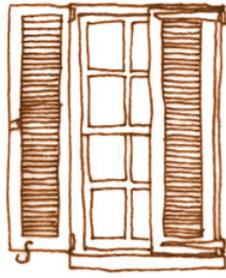
2/2 Window
with arched head



1/1 Window
with round head



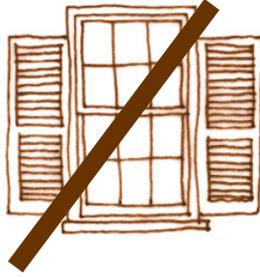
Six-over-six double-hung window with 4-panel shutters



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 used as shielding devices. Paneled shutters were typically located on the ground floor to provide protection and louvered shutters at upper floors to regulate light and air. Shutters were not used on all historic buildings or in all locations. It is often possible to determine if shutters previously existed by looking for hardware such as hinges or tie-backs or evidence of their attachment.

The HPC 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 HPC discourages:

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



Pointed arch windows are, also referred to as lancet windows, are a typical feature of Gothic Revival architecture. This Harbourton Baptist Church example includes wood louvered shutters that are appropriately sized and shaped for the window opening with operable hardware. Since replacement windows and shutters of similar configuration would undoubtedly require costly custom fabrication, regular maintenance and repainting are strongly encouraged.



Despite the tie-backs, these vinyl shutters were screwed directly to the brick wall. The shutters are not proportionately sized to the window and given the close window spacing it is unlikely that there were shutters historically.



The window sill and jamb have peeling paint and some checking or splitting.

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



Regular repainting of these unusual four-over-one windows will extend their life span, postponing costly replacement.

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 allow in winter sun
- Install UV window shades

Maintenance

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



This entrance door features a transom window and is flanked by sidelights. The storm door has simple detailing with a large single light allowing most of the historic door to remain visible.

WOOD DOORS

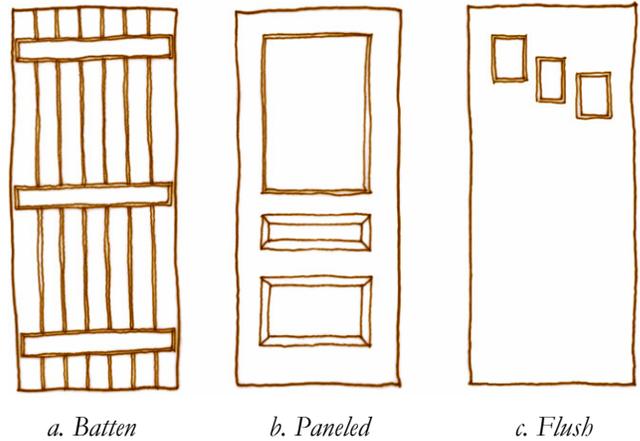
Entrance doors serve an important role in regulating the passage of people, light and air into a building as well as providing a threshold separating the exterior and interior. Historically most doors were wood and varied stylistically based upon the building design, providing a grand formal appearance or one that is more informal and welcoming.

Single pieces of wood are rarely available in large enough sizes to fill an entire opening so doors are typically constructed with smaller elements. In some of the earliest examples doors were constructed of vertical boards nailed to horizontal boards, similar to many doors found at barns and secondary buildings. By the middle of the eighteenth century, more elaborate paneled doors were becoming more common and now represent the most common door type in American houses. Paneled doors could be constructed in a variety of configurations to reflect the style of the building, with many later doors including glazed panels. Flush doors appear to be constructed of a single piece of wood but are in fact of veneered construction and are generally inappropriate for historic buildings.

WOOD DOOR TYPES

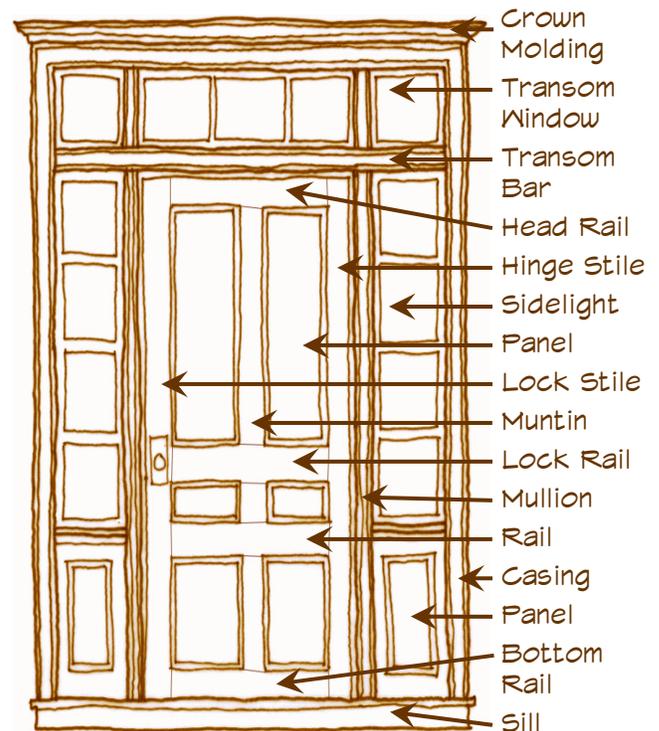
All of the identified door types can have glazing installed in different configurations.

- a. **Batten:** Full height boards attached edge to edge with horizontal boards nailed to the verticals
- b. **Paneled:** A frame of solid wood parts with either glass or wood panels
- c. **Flush:** A single plain surface on its face, typically wood veneer



PANELED WOOD DOOR COMPONENTS

In Hopewell Township paneled wood doors were most common for historic buildings. The diagram below identifies common wood paneled door components.



HISTORIC DOOR PROBLEM SOLVING

Since doors tend to be one of the most utilized elements on the exterior of a building, they are more susceptible to deterioration from wear or damage and generally require more regular maintenance such as painting or varnishing. If deterioration occurs, selective repair or replacement of damaged parts, and the implementation of a regular maintenance program is all that is required to retain a historic door.



Wood checking and peeling paint visible. Minor repair and maintenance can prolong the serviceable life of this historic door.

To improve operation

- Verify that doors fit properly in their frames and joints are tight
- Verify that hardware is operational particularly that hinges are tight and hinge pins not worn
- Remove built-up paint at door and jambs
- Repair or replace deteriorated components such as trim and stops

To reduce air infiltration

- Install weather stripping between door and frame
- Replace broken glass (glazing) and remove and replace missing glazing putty
- Re-caulk perimeter joints around frame
- Install a storm door

Maintenance

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

WEATHER STRIPPING AND CAULK FOR WINDOWS AND DOORS

Proper application of weather stripping and caulk around windows and doors can greatly reduce air infiltration and drafts. When selecting weather stripping or caulk it is important to choose the material appropriate for each location and follow manufacturer's installation recommendations for the best results.

Because weather stripping is used between the moving parts of windows and doors, it is highly susceptible to damage and can become loose, bent or torn. It is important to inspect weather stripping on a regular basis and replace it as needed. For high use installations such as entrance doors, it may be beneficial to install more durable weather stripping such as spring metal or felt.

Recommended locations for weather stripping:

- Behind window sash track
- At perimeter of doors and windows and between window meeting rails

The installation of caulk or other sealants should occur throughout the exterior of the building. Locations include where two dissimilar materials meet; where expansion and contraction occur; or where materials are joined together. In some instances caulks and sealants can be sanded and/or painted to minimize their visual appearance. It is important to select the appropriate type for each location and exercise care when removing old caulk that might contain lead.

Recommended locations for caulk:

- Between window or door frame and adjacent wall
- Between abutting materials such as corner boards and siding, porch and wall surface
- Between dissimilar materials such as masonry and wood, flashing and wall surface

DEFINITIONS:

Weather Stripping: A narrow compressible band used between the edge of a window or door and the jambs, sill, head and meeting rail to seal against air and water infiltration; of various materials including spring metal, felt, plastic foam and wood with rubber edging.

Caulk: Flexible sealant material used to close joints between materials; of various materials including tar, oakum, lead, putty, and modern elastomerics such as silicone and polyurethane.

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 HPC 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
- 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
- Utilizing glass rather than Plexiglas, which can discolor and alligator in appearance
- Painting the storm window frame to match the window trim



This wood storm window complements the original window and provides good insulation from drafts. It is the same size and shape as the window opening and the horizontal divider aligns with the meeting rail.



Operable louvered shutters are historically located at the upper floors and paneled shutters at the first floor. The storm windows match the color of the window trim and the meeting rails align in both the six-over-six and nine-over-six configurations, minimizing the visual impact.

- 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
- Installing removable storm sash to facilitate maintenance of historic window

The HPC 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

STORM AND SCREEN DOORS

There are several types of storm doors available, some of which include screen inserts. Similar to storm windows, storm or screen doors should conceal as little of the historic door as possible and should be selected to complement the door configuration. This generally means selecting a storm or screen door that has horizontal and vertical rails that coincide with the door behind.

The most recommended option for a storm door is a simple wood storm door with a single large glazed opening with as little detail or ornamentation as possible. If more elaborate detailing is desired, the style and level of detailing should complement the style of the house; for example, a storm door with Victorian gingerbread would not be appropriate for a Colonial Revival house.



This wood storm door is simple in construction with minimal detailing and a single large glazed opening. Because the door is wood rather than aluminum, it could be painted to match the historic paneled door, minimizing the visual impact on the historic character.



Bare metal finished doors such as this aluminum example are generally not appropriate for historic buildings. This example includes a thick horizontal division that runs across the center of the lower windows and decorative grillwork that makes the door more visually prominent.

The HPC encourages:

- Wood storm doors rather than aluminum or vinyl – wood storm doors can be custom made to fit any size or shaped opening, and lose less heat through the frame than aluminum
- Matching the shape of the opening
- Aligning the divisions of the storm door with the divisions of the door, revealing as much of the historic door as possible
- Utilizing glass rather than Plexiglas, which can discolor and alligator in appearance
- Painting the storm door frame to match the door
- Minimizing damage to historic doors and frames during the installation of storm door
- Caulking and weather-stripping the storm door in accordance with manufacturer's instructions allowing for exterior drainage at the sill

The HPC discourages:

- Stock storm units that require in-fill panels or applied wood trim within an existing door opening
- Metal finish aluminum storm doors at visible street elevations
- Decorative detailing that does not complement the historic character of the house



Replacement of large or unusually shaped windows can be costly. Maintenance of existing windows is encouraged.

COMPARING WINDOW AND DOOR REPAIR AND REPLACEMENT

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

The HPC discourages:

- Replacing a window or door 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 or door 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 trim, glazing or sash cords. Verify that caulking, glazing putty and weather-stripping 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 or Door:** If the majority of the window or door components are deteriorated or missing and in need of replacement, replacement of the unit might be warranted.

IF REPLACEMENTS ARE NECESSARY

The HPC encourages:

- Replacing only components, windows or doors that are deteriorated beyond repair
- Relocating historic windows or doors to the publicly visible elevations and installing replacement windows or doors 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 or doors
- Re-using serviceable historic hardware or components
- Choosing window or door style or configuration based upon historical or physical documentation

The HPC discourages:

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

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 used in the frame and sash is the types and quality of the glazing, seals, fabrication and installation.

Double glazing or insulated glass, used 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 HPC 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 remain 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

REPLACEMENT WINDOW QUALITY

Reputable lumberyards typically provide a better selection and higher quality replacement window options than companies that advertise with bulk mailings or flyers. Each manufacturer also provides various grades of replacement window options. Manufacturer's information can generally be found on their web sites or in catalogues.

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 new frame within the old 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



This half-round window features a radiating leaded glass pattern



Some windows, such as this Victorian stained glass window, are unique features of residences that would be difficult and costly to duplicate or replace. Proper maintenance is strongly encouraged.



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