4. Windows

Context & Character

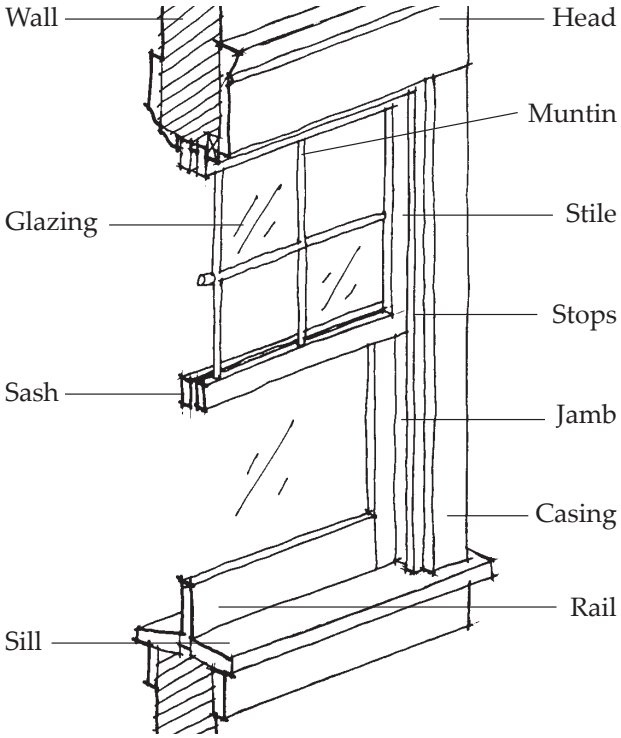
Windows are some of the most significant architectural features and visual components of a historic building. Window design, placement and arrangement ("fenestration") all help to convey the early character of a building. Just as windows define the character of a building, they also contribute to the unique visual and historic qualities and character of a neighborhood or downtown.

Windows provide scale and visual interest, and they often have unique ornamental trim, hoods or surrounds that help to define a building's style. Features important to the character of a window include its frame, sash, muntins, mullions, glazing, sill, head, jambs, moldings, and operation. See diagram to follow. The pattern or grouping of the windows in relationship to other windows or building features is also important. Because historic windows are so significant to the character of a building, their retention and treatment is very important. A loss of historic integrity results when original windows or window features are lost.

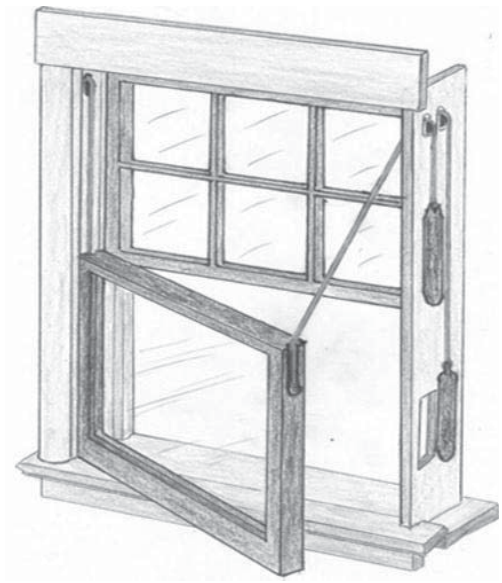
The old-growth lumber that was used to construct historic wood windows can last indefinitely when maintained, unlike modern replacement windows, even wood ones. For example, vinyl elements of modern windows expand more than twice as much as wood and seven times more than glass due to temperature changes. This often results in failed seals between the frame and glass and a significant reduction in performance. Once modern windows fail, there are few ways they can be repaired or recycled, instead ending up in landfills. This begins a cycle of removal and replacement that could be avoided if the original windows were preserved and maintained.

Window configuration and detailing can be important to the composition of a facade.

This window design is significant to the character of the building at 702 N. 'K' Street.



Double-hung window components



Profile of typical sash weights and cords.

Energy efficiency is a common concern when considering window alterations, and is frequently cited as a reason to install modern replacement windows. Most historic windows are inherently energy efficient and durable. They can be made more energy efficient with proper maintenance and by installing weather-stripping. Adding internal or external storm windows will also improve the thermal efficiency of a window. These treatments can match or exceed the performance of replacement windows. They also have distinct cost advantages over the replacement of original windows.

Design Objective

Preserve, maintain and repair original windows. Concealing, enclosing or covering historic windows should be avoided. If replacement windows are necessary due to deterioration, match the historic windows in size, design and material.

General

4.1 The position, number, pattern and arrangement of original windows in a building facade should be maintained and preserved.

- Window openings, window details, and the size and shape of these elements help establish the rhythm, scale and proportion of buildings and reflect architectural style and character.
- Altering the composition of windows in a key facade by adding new window openings is inappropriate.
- Enclosing a historic window opening is also inappropriate.
- Greater flexibility in the placement of new windows may be considered on rear walls.

4.2 The traditional ratio of window opening to solid wall ("solid to void") should be maintained on a primary facade.

- Changing the amount of glass on a character-defining facade will adversely affect the integrity of the building.

4.3 The size, shape and proportions of original window openings should be retained.

- Changes to original window openings in a key character-defining facade should be avoided.
- The proportions of the original window should be respected and retained in any alterations or repair.

4.4 The functional and decorative features of early or original wood windows should be retained and repaired if necessary.

- Retaining as much of the historic window material and detail as possible will help protect the historic integrity of a building.
- Repair frames and sashes rather than replace them wherever possible.
- Match the original detail and materials in any repair as closely as possible.
- Consolidants or epoxies may be used to strengthen deteriorated wood.
- Only those elements of an original window which are beyond repair should be replaced.
- The deteriorated parts should be replaced with new matching pieces, or by splicing new wood into existing members.

The pattern and alignment of windows is essential to the facade composition.

Steel frame windows are characteristic of many historic buildings of the 20th century.

4.5 Upgrade historic steel windows through routine maintenance, repair and weatherization.

- Remedial work will restore the profiles of the opening and fixed sections of the frame and the precise fit of the original frame.
- Caulk around the masonry openings and apply weather striping to reduce air infiltration, and enhance energy and acoustic efficiency.

The number and position of glass panes in a window are important character-defining features of a building.

Regular maintenance is essential and will markedly improve the longevity of a historic window.

Maintenance Tips for Windows

- *Maintain a good coat of paint on all exposed surfaces.*
- *Replace old cracked glazing compound.*
- *Install new weather-stripping to reduce air leaks.*

4.6 Replace windows only if they are beyond repair and the new windows match the original in size, materials, and number and arrangement of lights.

- The acceptability of any replacement window is based upon matching the appearance of a historic window through appropriate dimensions, profile, finish, depth of frame, and the appearance of true divided lights.
- Using the same material as the original is preferred.
- When replacing a historic window, it is important to retain original window casings and trim when possible.
- Match the replacement window to the original in the number, position and size of glass panes. True divided lights are preferred.
- In some cases exterior applied muntins may be appropriate if the appearance of the muntins will match that of the original in dimension, profile and detail.
- Alternative materials may be appropriate in secondary locations if the appearance of the window will match that of the original in design, dimension, profile and finish.

4.7 Missing original windows should be replicated to match the original.

- Consult historical, pictorial and physical documentation to help determine the original design.
- Match the original window in style, frame, sash, glazing and muntin configuration.
- Use materials that match the original.
- A new design may be appropriate if it is compatible with the window opening and historic character of the building.

4.8 A new window opening may be appropriate in a less public location if the design of the window is compatible with the historic character of the building.

Storm Windows

The installation of storm windows can help in lowering energy costs and improve acoustic efficiency. Storm windows also provide additional protection from the weather and can be an effective tool in retaining historic windows. They should, however, be carefully integrated with historic framing and details.

4.9 Storm windows should be installed when possible to enhance energy efficiency rather than replacing a historic window.

- The installation of a storm window, combined with weather-stripping, will notably enhance energy conservation.
- Consider installing a storm window on the interior if feasible. This will allow the external character and profile of the original window to be seen.
- If a storm window is to be installed on the exterior, match the design of the original windows and keep it as simple as possible.
- A storm window should fit tightly within the window opening without the need for subframes, and be set back from the plane of the wall surface as far as possible.
- Select painted wood, anodized aluminum or baked enamel storm windows, preferably matching the materials of the original or historic windows.

Security Doors & Windows

Security can be an important issue to commercial businesses, with many owners choosing to install security doors and windows to protect their properties. There are increasingly broader options for security including the addition of alarms and video surveillance.

4.10 Keep security doors and windows to rear and side facades wherever possible.

- Entrance doors and windows on a character-defining facade are key visual elements of historic building. Security doors and windows can detract from the building's historic appearance.

4.11 Where security doors or windows are installed, they should not detract from a building's historic character and appearance.

- When metal window bars are to be used, they should be installed on the interior side of the window.

Security bars are more appropriate on side or rear facades.

Installing security bars on the inside of windows is a solution that accommodates both design and security considerations.

Lower level windows may be protected by unobtrusive security measures.

4.12 Match security doors and windows to the historic door.

- Security doors and windows with ornate or decorative grillwork can obscure historic features and if so should be avoided.

4.13 The use of solid, roll down security shutters is strongly discouraged.

- When closed, solid shutters diminish the visual interest of individual buildings and the street scene.
- If it is necessary to install a physical barrier within the storefront, the most appropriate option is an external lattice or brick bond grille.

Additional Information

Maintenance, Repair, Weatherization & Energy Efficiency

"How to Restore Sash Windows", "Window Repair Tips", & "Glass Replacement" *Old House Journal*
www.oldhouseonline.com/how-to-restore-sash-windows/
www.oldhouseonline.com/window-repair-tips-from-john-leeke/
www.oldhousejournal.com/magazine/1506

National Park Service. Technical Preservation Services.
www.nps.gov/tps/sustainability/energy-efficiency/weatherization/windows-doors.htm
www.nps.gov/tps/sustainability/research.htm
www.nps.gov/tps/sustainability/resources.htm

National Trust for Historic Preservation. **Weatherization**
www.preservationnation.org/information-center/sustainable-communities/weatherization/windows/

Historic Scotland. *Managing Change in the Historic Environment - Windows.* 2010
www.historic-scotland.gov.uk/index/heritage/policy/managingchange.htm

English Heritage. *Thermal Performance of Traditional Windows.* 2009
www.english-heritage.org.uk/professional/research/buildings/energy-efficiency/thermal-performance-of-traditional-windows/

Northen Ireland Environment Agency. *Windows. A Guidance Booklet on Openings.* Technical Note 4A. 2010
www.doeni.gov.uk/niea/windows_a_guidance_booklet_on_openings_tn_4a.pdf

Department of Arts, Heritage and the Gaeltacht. Ireland. *Windows. A Guide to the Repair of Historic Windows.* 2007
www.ahg.gov.ie/en/Publications/HeritagePublications/BuiltHeritagePolicyPublications/Windows%20-%20A%20Guide%20to%20the%20Repair%20of%20Historic%20Windows%20(2007).pdf

Myers, John H. *Preservation Briefs 9: The Repair of Historic Wooden Windows*. Washington, DC: Technical Preservation Services Division, National Park Service, US Department of the Interior. 1981
www.nps.gov/history/hps/tps/briefs/brief09.htm

Park, Sharon C., AIA, *Preservation Briefs 13: The Repair and Thermal Upgrading of Historic Steel Windows*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 1984
www.nps.gov/hps/tps/briefs/brief13.htm

Park, Sharon C., AIA, and Douglas C. Hicks. *Preservation Briefs 37: Appropriate Methods of Reducing Lead-Paint Hazards in Historic Housing*. Washington, DC: Technical Preservation Services Division, National Park Service, US Department of the Interior. 2006
www.nps.gov/history/hps/tps/briefs/brief37.htm

Randl, Chad. *Windows 19: Repairing Steel Casement Windows*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 2002
www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Windows19.pdf

Staveteig, Kaaren R. *Windows 22: Maintenance and Repair of Historic Aluminum Windows*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 2008
www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Windows22.pdf

Vogel, Neal A. and Rolf Achilles. *Preservation Briefs 33: The Preservation and Repair of Historic Stained and Leaded Glass*. Washington, DC: Technical Preservation Services Division, National Park Service, US Department of the Interior. 2007
www.nps.gov/history/hps/tps/briefs/brief33.htm

New York Landmarks Conservancy. *Repairing Old and Historic Windows: A Manual for Architects and Homeowners*. Washington, DC: National Trust for Historic Preservation, 1992
www.barnesandnoble.com/w/repairing-old-and-historic-windows-new-york-landmarks-conservancy/1022158945?ean=9780471144182&itm=8&usri=windows+repair

Fisher, Charles E. *Windows 2: Installing Insulating Glass in Existing Steel Window*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 1984.
www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Windows02.pdf

Fisher, Charles E. *Windows 11: Installing Insulating Glass In Existing Wooden Sash Incorporating the Historic Glass*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 1984.
www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Windows11.pdf

Storm Windows

Trissler, W. & Fisher, C.E. *Windows 3: External Storm Windows: Casement Design Wooden Storm Sash*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 1984
www.nps.gov/tps/how-to-preserve/Tech-Notes-Windows03.pdf

Fisher, Charles E. & Muckenfuss, Laura A. *Windows 5: Interior Metal Storm Windows*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 1984
www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Windows05.pdf

Park, Sharon C. *Windows 8: Thermal Retrofit of Historic Wooden Sash Using Interior Piggyback Storm Panels*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 1984
www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Windows08.pdf

Fisher, Charles E. *Windows 9: Interior Storm Windows: Magnetic Seal*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 1984
www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Windows09.pdf

Fisher, Charles E. *Windows 15: Interior Storms for Steel Casement Windows*. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior. 1986
www.nps.gov/tps/how-to-preserve/tech-notes/Tech-Notes-Windows15.pdf

Replacement Windows

Replacement Windows That Meet the Standards. Preservation Technical Notes. Washington, DC: Technical Preservation Services, National Park Service, US Department of the Interior
www.nps.gov/tps/standards/applying-rehabilitation/successful-rehab/windows-replacement.htm