Residential Window Repair and Replacement Guide

Designated Landmarks and Historic/Landmark Districts

The Cleveland Landmarks Commission uses the Secretary of the Interior's Standards for Rehabilitation to review proposed changes to Designated Cleveland Landmark properties.

Original wood windows were constructed to be repaired and can retain usefulness and energy efficiency with general maintenance and appropriate treatment and winterizing methods. Windows are an important part of the building for functionality and aesthetic. A variety of types and styles of windows may be used on a single façade or building and should be repaired to keep the same appearance as originally designed.

Application/Review Process

Window replacement projects include review through the Landmarks Commission office and a permit through the Cleveland Department of Building and Housing.

Windows that are proposed with changes to the style, material, removing or adding muntins, mullions, or grids, changing type of window, or adding or removing windows may require approval through the Landmarks Commission design review process.

Durable and appropriate replacement materials may include aluminum-clad wood, fiberglass, composite, and aluminum/metal replacements. Standard vinyl and vinyl-clad windows are not typically considered an appropriate replacement material for homes and buildings located in Cleveland's designated Historic Districts and on individually designated Cleveland Landmarks.

Windows located on non-primary elevations (not visible from the public right of way) may be reviewed administratively by Landmarks Commission staff for appropriateness of replacement with vinyl or vinyl-clad materials, at the direction of the Landmarks Commission. Replacing unique or decorative windows on non-primary façades is not recommended and may require the Landmarks Commission design review process.

Condominium buildings are recommended to adopt a master plan for windows (and other exterior changes) to ensure consistency in the appearance of the building. A successful master plan should specify the material, color, muntins, and profile of windows on all elevations and be clear to owners and contractors.

Commercial window repair or replacement projects can refer to the *Cleveland Storefront Renovation Program Design Manual: a Practical Guide to Exterior Commercial Rehabilitation.*

Window Types

Windows can be a wide range of sizes, shapes, and configurations depending on the building design and materials available. Some windows are specific to an architectural style and would not be typically found in other styles while other windows are common throughout all building types.

Knowing the appropriate window style for a building is important in repairing and replacing a window or researching the appropriate replacement when the original window has been lost.


Arched


Awning


Bay/Bow


Slider


Palladian


Double/Single Hung


Casement


Picture/Fixed


Cottage


Leaded/Stained Glass


Sidelight


Transom/ Fanlight

Window Materials

The use of a building or structure generally determined the frame or materials used for the window. The lifespan of a window can depend on the materials, direction they are facing, use, and maintenance.

Residential window materials mainly include aluminum, aluminum/vinyl-clad wood, composite, fiberglass, glass block, leaded, wood, and vinyl. While some original window materials may not be as common or recommended in modern construction or renovations, materials for a window frame impact the appearance of a window similar to changing the window type or style. When a window is being installed, awareness of the differences in window materials is important to retaining the aesthetic of a building.

The lifespan of a window varies based on the window and the resources that are available. The variation in information can be based on what the source of the information is and the variability in materials available today versus historically. Some examples of the difference in historic versus modern window materials can be seen in the difference between new and old wood and metal materials. Historic wood windows were constructed with old growth wood that was more durable than new growth wood windows found today while historic metal windows may not be as high quality as current metal window options today.

Old growth wood windows still in place and functional can continue to last (depending on the age of the house 100+ years) with repairs, proper maintenance, and weatherization. New wood windows are constructed with different wood that most likely is not locally based and was grown quickly. The manufacturing of vinyl has developed and continues to develop creating windows that last longer. Vinyl windows from the 1950s-60s would not have lasted as long as new vinyl windows might. A vinyl window will not have the same worries for water damage as a wood window, but some can warp, have broken seals, and cannot be repaired the same as a wood window. New variations of vinyl windows that are stronger than standard vinyl windows and have added benefits of insulation

are on the market with a wide range of options. The lifespan of a vinyl replacement window varies on the materials, manufacturing process, color, function, and climate. Aluminum windows are similar to vinyl in the variety and improvement of the manufacturing and development of the materials and are susceptible to climate changes and freeze-thaw cycles.

Aluminum, vinyl, and new growth wood windows can last around 20-40 years depending on proper maintenance, amount of use, installation methods, and quality of materials. The lifespan of any window can increase with proper and regular maintenance. The addition of aluminum or vinyl cladding to a wood window or aluminum cladding to a vinyl window increases the lifespan of the window, if installed correctly. The cladding offers extra protection to the outside elements and can reduce the amount of maintenance needed for a wood window and add more color and appearance options for a vinyl window. A non-operable or fixed window will generally last longer than an operable, regardless of the materials.

Alternative window options such as composite or fiberglass offer a longer lifespan of around 30-50 years and generally include the benefits of aluminum, vinyl, and wood windows all-in-one. Composite windows can be made of a mixture of composite wood, polymer plastics, and can be made in a way to provide stability, insulation, and moisture resistance. Fiberglass windows are durable and can be well insulated, providing a good barrier for a home. Composite and fiberglass windows often have more variety in the options available with configuration, sizing, grids or muntins and colors/ability to hold paint. Composite and fiberglass windows still require maintenance and can vary in quality based on the manufacturer.

Decorative windows can include stained glass or leaded glass, which should be preserved and restored if needed. They are a unique element to a home and difficult to replicate once they are removed from a home. The openings are generally non-standard sizes and materials and should be properly maintained and repaired as needed. Unique geometric shaped windows or openings and windows with detailed grids or muntins should also be retained and repaired as they are character defining elements to a building's façade.

Less common, or at least, less visible, are skylights and glass block/brick windows. Skylights can be appropriate for more modern styles of homes and were a popular option to bring light into a space for residential uses in the mid-20th century. They are installed into roofing systems and, depending on the material, climate, and proper maintenance can last between 10-20 years. Debris can build up on them and they have a lot more wear and tear than windows on the vertical elevations of a home. Skylights can be appropriate on older buildings when located on rear additions or not in areas visible to from the public right-of-way. Glass block windows or glass brick windows were developed in the late

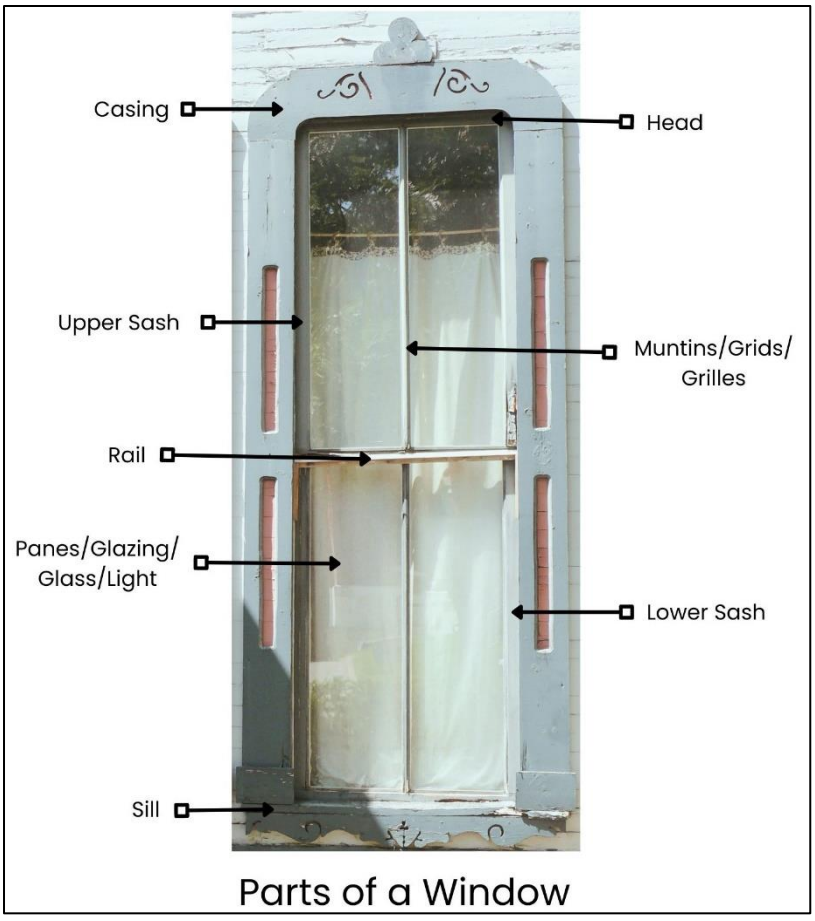
1800s/early 1900s and was popular in the 1930s-50s and made a comeback in the 1980s-90s with interest in their flexibility, uniformity, and durability. For residential uses, they have been most commonly found as replacement basement windows and used for bathroom windows to allow for light, ventilation, and privacy. In historic homes and districts, the most appropriate use is as a replacement basement window, not visible on the home above the foundation unless existing as significant architectural features to the home. They can last around 15-30 years with proper installation and maintenance.

Not all windows are the same and no item in a home is ever "maintenance free." The lifespan of a window can be determined by the materials, climate, environment, installation, craftsmanship, frequency of use, and condition of the surrounding framing and structure. Original wood windows and all of their parts can last longer than average with proper maintenance. It is important be aware of a window's condition to know if a window can be repaired as parts wear out or would need a replacement if the parts are not able to be repaired. A window with limited or a lack of functionality should not be immediately written off as unable to be repaired. Depending on the materials and reason for the limitation, repairs may improve the use and lifespan of the window.

Window Features

Windows have a variety of parts that create the full effect of the window when combined. Some window features are significant parts of the architectural style of the entire structure and should be retained, repaired, or replicated instead of removed entirely.

Sashes are the panels holding the glass of the window; some are fixed while others are the operable parts of a window. They are held in place by a **jamb**, which is the main vertical element on the interior of the window frame. Jambs can house the moving mechanisms for movable windows. Modern window technology allows for a wide variety of movements with window sashes able to be fully removed or replaced without impacting the window frame. Historically, sashes were operated with weights and pulleys hidden in the window frame to allow for balance to open the window without trouble. The sash function should be repaired and retained but can be replaced in the case of severe damage. The size of the sash should be replicated in the replacement even if the function of the window has changed; the configuration of the window is an important visual feature of a building and should be retained whenever possible.



Parts of a Window

Panes/Glazing/Glass/Lights are the glass elements of the window. They can be a variety of sizes and shapes. Glazing could also refer to the putty keeping the glass in place. Historic window glass was blown and can still be seen in some windows that have the imperfections not found in manufactured glass today. Modern energy efficient windows may be double glazed or even triple glazed, and can be appropriate updates to single pane windows if the other elements of a window are retained. A significant portion of energy loss in a home is not through windows or doors but through walls and poorly insulated attics/roofs; but having secure window panes can assist with air flow and noise reduction.

Muntins/Grids/Grilles are called a variety of things but are integral parts of a window. They are the dividers in the window within the sash and create grids and patterns in the window glazing. Historically they would hold each smaller piece of glass in place and would be either wood or metal. Modern muntins can be structural or be purely aesthetic. The historic or original muntins pattern of a window should be retained or replicated if damaged. Modern windows come with options for internal or external muntins but external muntins are an appropriate choice for older buildings to retain the dimensionality of the window. The number of muntins can be used to describe the window. For example a window with a pattern of six panes on the top sash and one large pane on the bottom sash can be described as six-over-one. Another term sometimes used is mullion, but **mullions** are specific to the vertical bars separating window elements and are generally a thicker material. Muntins were once important structural elements of windows but modern window and home construction technology led to their decline and use today as decorative elements.

Casing can be seen on many older buildings as the decorative framing of a window. They were popular for a time and can still be found on structures with their original siding. In masonry structures, the frames or casing would be stone or decorative masonry surrounding the window opening. When wood-sided buildings were resided with aluminum or vinyl siding, most window casings were removed and lost, creating no barrier between the window sash or frame and the siding. The reintroduction of casing where it may have been removed should be completed with documentation to avoid adding inappropriate design elements to the building.

Sills are the exterior bottom of the window. They support the window and also function to protect the window system. They should be angled slightly to allow for rainwater to move away from the base of the window or window opening. Sills are commonly found as stone or wood, depending on the building exterior, and should be documented and retained. Every window sill should be surveyed for correct functionality to avoid damage to the window system and building below the window opening.

Window screens are important parts of a window today, and many times are required by code to be included on a residential window. Mesh screens for windows were patented in the late 1800s and became more popular as they developed and could ensure insects could not enter the home. They were developed as a separate unit from the window and installed (and removed) similar to storm windows today. Screens impact the appearance of a window with grids or muntins and,

depending on the window, can be appropriate as a half screen to allow for functionality and code compliance.

Mechanisms and hardware can include internal mechanisms within the frame to allow a hung window to raise and lower, handles, sash locks and latches, or window operators. It is important to have appropriate hardware for the function of a window, and window hardware can be replaced as needed. Options for finding original window hardware, vintage hardware, or new plastic or metal pieces are available at many hardware stores and online. Properly installed sash locks and latches create a seal for the window that can also help with drafts. Internal weights and pulleys, window balances and jamb liners are less visible, but still important to have in good condition for the operation of a window. They can also be replaced and repaired as needed.

Weatherproofing and Energy Efficiency

Energy efficiency is an important element of a home and, in many cases, a determining factor for looking at changing existing windows. Energy conservation should not be the only determining factor when considering replacing windows and should not lead to the wholesale replacement of windows. Pre-air conditioning and modern HVAC installations, windows were an important part of keeping a home warm or cool. They worked with the building and the climate and their functionality was an important part of keeping a comfortable home. Many windows were painted over or not maintained once the need for the operation of the window was lessened. A key item of energy efficiency in a home is proper insulation. While windows (and doors) are easy culprits to look at for heat loss, many homes can increase their energy efficiency with properly insulated walls and attics.

Historic windows can be made more efficient through a variety of methods. The addition of a high quality storm window and inclusion of weatherization methods can increase the efficiency of a window and allow for the window to continue to add to the character of the home or building. Weatherization options can be completed DIY or by qualified contractors, depending on the work required. It is highly suggested to research options that would best fit a building to ensure the work is done completely and properly to keep the home energy efficient and functioning for years to come.

Storm Windows are a popular and historically appropriate way to improve the performance and longevity of single-pane windows. Double (and now triple) glazed/pane windows became common in the 1970s and storm windows were not as necessary, however, storm windows can be a lower-cost option to protect a window and improve the energy efficiency of a home with a better return on investment than wholesale window replacement. Storm windows can compromise the character of a window by obscuring the depth and shadow lines, but can protect the original windows and extend their lifespan. Quality storm windows can last around 30 years with proper maintenance and can be installed year-round or removed, depending on the season. They are available in double-track or triple-track options in aluminum, most commonly, but wood storm windows and even interior storm windows are options on the market; many options are available. It is important for a storm window to match the shape of the window to help retain the character of the home; an example would be arched windows with arched storm windows installed.

Weatherstripping, temporary caulking, and adding draft stoppers are options to help increase the energy efficiency of a drafty or older window without damaging the frame. They can be completed as an easy fix to secure the window from drafts. Weatherstripping and temporary caulk can be removed from the window if it needs to be opened and should be part of a yearly maintenance plan to keep the windows secure and the home warm over the winter. Draft stoppers or physical barriers are more commonly thought of for doors, but can also be used for windows! Window insulation kits or window film installed to the window interior can also be used as a removable option to protect a window and keep the interior of a home.

Awnings and Shutters were once seen as important and functional elements of a home. Now, their use is more aesthetic. Awnings, when placed on the elevations of a home that faced direct sunlight, would help keep a home cool by keeping the direct overhead light and heat from entering the home. Shutters were installed to the frame of a window and could be opened and closed to provide shade to the interior of the home and even provide protection to the window. Functional shutters are not as common today, but installations of energy efficient blinds or curtains can provide a similar level of shade to a home.

Repair

Original windows should be maintained when possible – Complete replacement should only be considered when a window is not existing, has failed, or is damaged beyond repair.

Routine maintenance should be completed to historic wood windows as needed and can be determined by yearly or seasonal evaluations of the windows. An evaluation should include looking at the window location, paint condition, frame and sill condition, sash condition, glazing issues, and hardware. The functionality of the window should be reviewed as well to determine if there are any issues arising from operational limitations. Each feature and part of original wood windows are able to be individually repaired versus vinyl, aluminum, fiberglass, and composite which are constructed as a unit or frame and sash units. With a unit, the entire section or window would need to be replaced if there is a failure with the glazing, hardware, or materials. Damage sills can be repaired or replaced without impacting the entire jamb or sash, and glass can be removed and replaced without needing the entire structure redone.

Cords, Weights, and Pulleys are internal mechanisms that allow for the ease of operating a single or double hung window. It is easy to tell when they are in need of repair, as the window sash will not have the counter balance to stay open or be easily maneuvered. They can sometimes be seen as an insurmountable problem and require a window replacement, but step-by-step instructions on how to access and repair them are available through a variety of sources. Replacement pieces can also be found. With the modern fixes found today, there are also options to have them removed, the space insulated, and jamb liners or alternative balances installed in their place without making changes to the sash and frame.

Glazing or putty on older windows can crack or break over time. Thankfully, it is fixable and windows can be reglazed to fill in gaps and secure loose window panes. Using proper techniques

and appropriate glazing putty can extend the life of a wood window and last about 25-35 years. Reglazing a window can also mean replacing the glass portion as well. Leaded or stained glass windows generally have a different process used for securing their glass pieces and can be more easily damaged and harder to replace if damaged. When in doubt, a window repair specialist should be consulted to determine the level of damage and proper procedures to repair.

Lead paint is a concern for buildings and structures built prior to 1978 and should be kept in mind when any repair (or replacement) is being done on painted windows and doors. Lead dust and flaking lead paint can be a hazard and can be found under layers of paint, if not on the top layer. Lead dust can be kicked up into the air with general wear and tear and commonly found on windows and window sills. Proper interior maintenance includes keeping painted surfaces in good shape and cleaning dust with a wet cloth regularly and fixing areas with flaking or chipping paint. A certified assessor can determine if there are lead hazards present at a property and identify if windows with lead concerns can be repaired or should be replaced due to health and safety concerns.

Peeling or cracking paint on a window is not a sign that the window underneath has been compromised. In many cases, the wood underneath is in good condition and can be restored with proper paint removal and paint application processes. Paint is the first line of defense for a window and poor paint condition is an issue that can be resolved with minimal or no damage to the window structure or elements. As noted, take care with loose paint on a window, but do not take damaged paint as a sign of window failure.

Window Repair techniques and Energy Efficiency information can be found through National Park Service resources:
National Park Service Preservation Briefs
- Improving Energy Efficiency in Historic Buildings
- The Repair of Historic Wooden Windows
- The Use of Substitute Materials on Historic Building Exteriors
- Maintaining the Exterior of Small and Medium Size Historic Buildings

Replacement

If original windows are no longer existing, appropriate windows can be ascertained based on the architectural style of the building, neighborhood context, and historic images. Wholesale replacement of original features should only be undertaken if there is evidence provided to show complete window failure. Installing higher quality windows initially will be helpful in the long term and provide a higher return on investment than lower quality windows that may need to be replaced within 20 years.

Recommended treatment if repair is not an option:

- Original window openings should not be eliminated or altered
- Existing dimensions and profiles should be matched for the glass and sash
- Framing and trim should be replicated or retained as much as possible
- The existing window style should be matched or an acceptable option provided to replicate the appearance of the original window style

- Divided light sashes and mullions should be matched with same configuration, appearance, and depth on the exterior of the window
- Ornamental and unique windows should be retained and not removed from their existing locations
- Glass block windows should have gray mortar, not white
- Storm windows can be installed as an appropriate weatherization method and should be unobtrusive and removable with no damage
- Replacement storm windows should fit with or reflect the pattern of the window behind.

Window openings on a building may have changed over time, depending on material changes to the building or changes of use. One of the tenants of Rehabilitation is that changes once done can be undone or changes that are undertaken should be done in such a way that they could be reversed in the future. Changes to the size and shape of window openings should be taken with care to ensure that the original or existing window opening is retained or able to be restored in the future.

The operation or movement of a window can change without any or with minimal visual change to the appearance of a window, even if the window type is technically changed. A common change for some residential windows is a sash replacement or insert windows over a full window replacement. A sash replacement updates the moving parts of the window without the full removal of the frame. Insert windows are an option to retain the framing but update the mechanism. They generally do not impact the structural aspects of a window or exterior siding and trim. Depending on the window materials or installation, the appearance of the window may change with a sash replacement or insert window. They may reduce the amount of glazing of the window and increase the size of the sash or visible framing, but are a less costly option for some.

Further Information

Information on best practices for repair and replacement are available through a variety of sources.

- Cleveland Aging and Disability Resource Center (ADRC); City of Cleveland
- Lead Hazard Control; City of Cleveland
- Secretary of the Interior's Standards for Rehabilitation
- United States Environmental Protection Agency