A Short Course in Windows

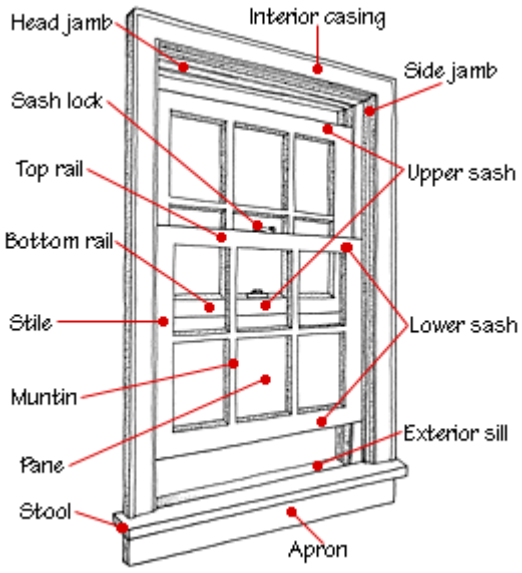
The intent of this write-up is to provide all Glendale residents with information about windows and options for what to do if you have issues with your windows. For older structures the general preference is to preserve original windows and thereby preserve the historic appearance of your home or business building. We also recognize that there are different architectural styles throughout the village, including the historic district, and each structure is somewhat unique. The aim of this document is to help you do what is architecturally appropriate for your home or business building.

It's important to realize that no matter whether your house is old or new, windows are an integral part of the architectural detail of a building and changes made to them can significantly alter a structure's character and appearance. This is true for commercial buildings as well. The integrity and value of a building is impacted by the choices made regarding window repair or replacement. Investing in windows, whether repairing existing, adding storms, replacing or building new is a big decision as it potentially affects your home's value – the result should enhance its appearance, not detract from it.

There is a lot of information available about windows, especially replacement windows, and not all of it is accurate. Information can come from window manufacturers, sales people, contractors, homeowners, preservation organizations, and a myriad of websites.

The sections below cover 1) the parts of a window and define terms, 2) energy ratings, efficiency and potential savings, 3) options for repairing older windows and 4) helpful resources for further information.

1. Basic parts of a Double-Hung Window



Look closely at your old windows. The sash parts – stiles, rails and muntins—are all independent pieces that can be individually replaced or repaired if something is wrong with them. In new manufactured windows, the sashes are complete units and as such are not repairable but must be replaced in their entirety should something go wrong. The most common failure on new windows is loss of the seal between the panes of glass, impacting the window's performance.

Older wooden windows have stile and rail widths and muntin profiles that add depth and architectural detail to the window itself. Replacement windows come in a wide variety of types and materials, many of which are not appropriate for the architectural style of older houses as they don't come close to matching the profile of older windows. The quality of new windows also varies from very good to distinctly substandard. The average vinyl window is designed for a 10-year life.

There are a few terms worth defining in order to understand a discussion about new windows.

Single/double/triple glazed windows – This simply refers to the number of glass layers in each window sash. Most new windows will be double or perhaps triple-glazed, each sash having solid panes of glass sealed together.

Clad windows – The exterior portions of wood or fiberglass windows are covered in low-maintenance material, aluminum is used most often though some do have vinyl cladding. This is done for two reasons, the clad surface shouldn't need painting and it covers up the wood. Newer wood simply rots more easily than old wood from old growth trees. Windows made before 1940 are irreplaceable in that respect.

Simulated-Divided-Light – New windows attempt to mimic the look of old windows that may have two, four, six or more separate panes of glass in each sash, separated by wood muntins. An old window like this is said to be a true divided light window. Producing true divided light in new windows results in a thick muntin on double and triple glazed windows. To work around this, simulated-divided-light windows attempt to match the profile of old windows by having muntins permanently affixed to both the exterior and interior of the glass. If a homeowner must replace a window, simulated-divided-light windows combine the closest possible look of an old window with the sash engineering of a new window. Locally, the Carruthers Pond architectural standards require all homes to have simulated-divided-light windows on the front elevation.

Windows that have the muntins 'sandwiched' between two layers of glass do not provide the architectural detail of old muntins and have a very flat look to them, as do windows with snap-on interior grilles. These are generally not architecturally appropriate for historic structures.

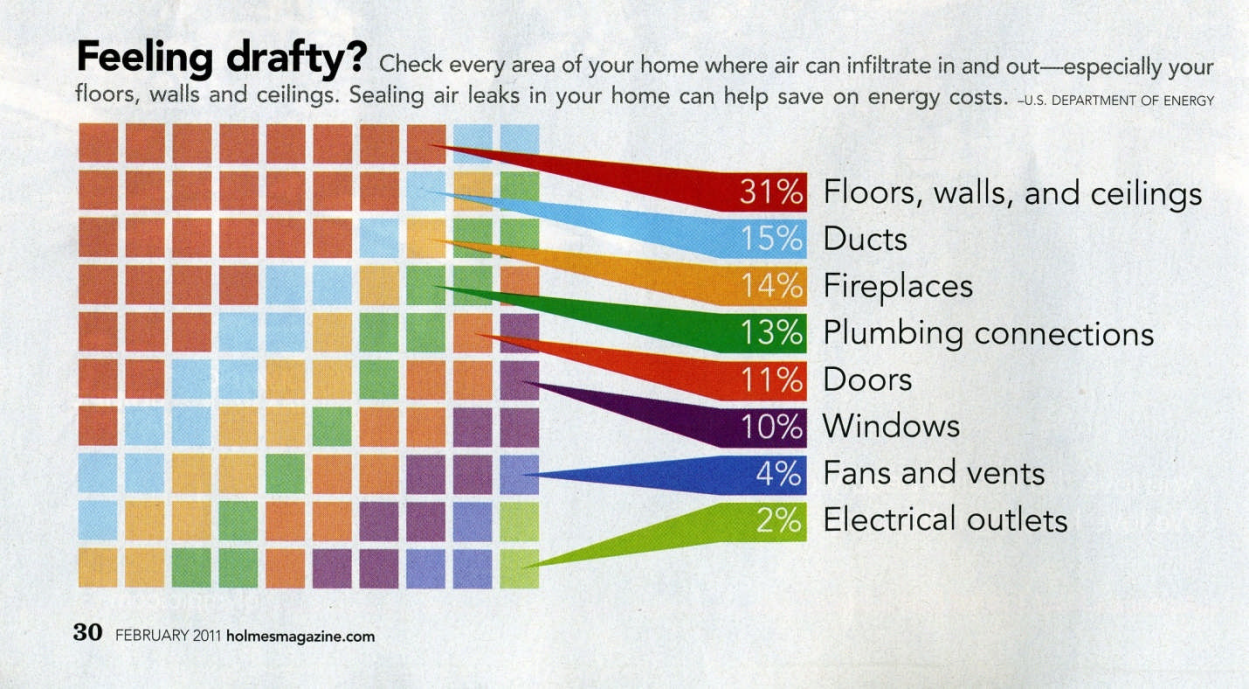
A cross-section of a Simulated-Divided-Light-window.

Pocket fit – a replacement window that fits inside the window opening without removing trim.

2. Energy Ratings and Potential Savings

Wondering if your windows are costing you money on your utility bill?

Our climate has more heating degree days than cooling days so this discussion of energy savings will focus on heating costs. Windows impact your heating costs in two ways. One is air infiltration and the other is cold/heat transmitted through the glass. Air infiltration can come from sashes that don't fit snugly together, sashes that don't close properly, or leaks through pockets holding window weights. Window air infiltration can account for roughly 10-15% of your total heat bill. Heat and cold conducting through the glass can account for a similar amount. There is no window, old or new, that will give you zero air infiltration and zero heat/cold conductivity through the glass. Replacing windows or adding storms will not reduce your heat bills by 30%, a more accurate range would be 10-20%. Check claims for new windows carefully – saving 50% of the energy lost from single pane windows translates into savings of approximately 15% of your heat bill at best. Attic insulation and high-efficiency furnaces will yield greater energy savings than window replacement. As you can see on the following chart from *Holmes Magazine*, air infiltration from other sources far outweighs that from windows.



The National Fenestration Rating Council states, ***" Fifteen percent of the household energy costs can be reduced by replacing the windows."*** Note this says reduced, not eliminated.

Data on Energy Costs

The resistance of a material to heat transfer is measured by a U-factor, the lower the number the better. For a more detailed analysis of potential energy savings, see Attachment I at the end of this article. It has data on energy costs from the website of The Efficient Windows Collaborative (new window manufacturer's group) with the energy data provided by the Lawrence Berkeley National Laboratory. This website is interactive and with a just a bit of work your own data could be entered. A summary of this analysis would show that for a typical 2,150 square foot home, at current gas rates, the annual savings for replacing all of the windows would result in savings of $180. It takes an investment of several thousand dollars to achieve this savings so again, there may be other more cost-effective options for energy savings.

The irony here is that the payback period (the time it takes to recover the cost of investment with resulting energy savings) may be longer than the designed life-span of the new window. Congress was offering tax incentives to buy new windows for a reason – the project is generally not a payout proposition and homeowners needed further incentive.

That said, if your old windows are particularly drafty, have already been replaced with poor-quality windows or have other problems, you will likely want to do something. You may well be able to gain efficiency in a cost-effective manner with strategic repairs to existing older windows and the addition of storm windows. Both of these are less expensive alternatives to good-quality replacement windows.

3. What Options Are There For Improving the Performance of Older Windows?

Some key facts about old windows – they are important to the overall look of your home, it's 'green' to keep them, if they are older than 1940 they are built from more rot-resistant old-growth wood and most things that might be wrong with them can be corrected. Painted shut? That can be fixed. Rotted sills? That's fixable. Won't stay up? That too can be fixed. Need help finding someone to do work? Glendale Heritage Preservation has a list of contractors who work on windows.

Proper caulking can do a lot to decrease air infiltration around older windows. Another key choice for improved energy performance is to add storm windows. New storm windows are not your Grandpa's storm windows – they can be nearly invisible on your home. Glendale is fortunate to be located close to Allied Window in Sharonville, a nationally recognized company providing storm windows appropriate for historic buildings. The Glendale zoning code does not require a Certificate of Appropriateness from the Glendale Planning and Historic Preservation Commission to repair existing windows or to add storms. Replacement windows in the historic district do require a Certificate of Appropriateness.

Check this website for a cost comparison between repair and replacement. The project is for 73 windows in a large older structure in the Cincinnati area. The decision to repair versus replace saved $50,000.
http://cincinnatipreservation.org/advocacy/covington-window-study/

This link is to an article in *Preservation Magazine* entitled, *Saving Green by Going Green* by Lauren Walser.
http://www.preservationnation.org/magazine/2011/march-april/saving-green.html Of particular interest is this young couple's strategy to save their windows.

We encourage Glendale residents to investigate their options when it comes to making a significant decision about windows. The next page provides a list of resources for further education on the subject. Also feel free to call any of us should you have any questions.

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4. List of Resources

Organization	Website	Comments
National Trust for Historic Preservation	http://www.preservationnation.org/ http://www.preservationnation.org/issues/savethewindows/	Window-specific information on the Save the Windows site.
National Park Service Preservation Briefs	http://www.oldhouseweb.com/how-to-advice/the-repair-of-historic-wooden-windows.shtml	See Preservation Brief #9 on Historic Wood Windows.
National Park Service Technical Preservation Services	http://www.cr.nps.gov/hps/tps/	See Weatherizing and Improving Energy Efficiency of Historic Buildings.
Efficient Window Collaborative	http://www.efficientwindows.org/index.cfm	Click on Window Selection, and then existing construction and name of city to see heat and AC cost estimates for various window types.
Allied Window	http://www.invisiblestorms.com/	Exterior and interior storms
Marsh Building Products	www.marshbuild.com. Showroom: 10078 E. Kemper Road, Loveland, 513-697-7600	They sell Marvin and other good-quality windows.
Gilkey Window	http://www.gilkey.com/	They sell Kolbe and Semco aluminum-clad wood and manufacture their own higher quality vinyl window.
Peachtree Windows	www.Lowes.com	Peachtree offers an aluminum-clad simulated-divided-light window.

Energy Cost Data from the Efficient Windows Collaborative Website

The website is http://www.efficientwindows.org/index.cfm
Click on *Window Selection* and then in the box on the right side, click on *Existing Construction* and select a city. Not all cities are available and Dayton is the closest to us.

The cost data is based on weather in Dayton, Ohio for a typical 2,150 sq ft. existing home with window space of 15% of floor area and natural gas costs at $1.219 per therm (CCF). (Ed. Note. Current Glendale gas prices are lower by approximately 34%. The heating cost estimates were verified with records from a Glendale household and this model was found it to be an accurate predictor. The chart below shows data directly from the website with gas at the $1.21 price and also data at current prices of $.80)

The chart below shows the heating costs of common window configurations – a single pane wooden window, a single pane wooden window with a storm window, and a newer double-glazed window. The window numbers refer to the website reference. The key take-away from the website analysis is that heating costs associated with non-metal windows **with the same u-factor** are nearly identical. This makes comparing options somewhat easier as you just need to find the u-factor.

Please note, windows with metal frames and no thermal break are another story altogether; they will substantially drive up heating costs. We did not look at these types of windows.

Average Heating Costs for Common Window Configurations

2,150 sq. ft. home

Type of Window	U-factor	Whole House Heating Cost Est. Gas at $1.219	Whole House Potential Annual Savings	% Difference	Whole House Heating Cost Est. Gas at $ .80 (2)	Whole House Potential Annual Savings
Single pane, Wood (non metal) frame [Window #15]	.71 - .99	$1,275	n/a		$840	n/a
Single pane window with storm (1) [Window #13]	.41 - .55	$1,100	$175	-14%	$725	**$115**
Double glazed, argon gas (non-metal frame) [Window 26]	.26 - .30	$1,000	$275	-21%	$660	**$180**

(1) U-factor for older windows with storms is approx .50, data for double-glazed clear window with the same U-factor is provided here since energy costs for windows with similar U-factors are the same.
(2) The January, 2011 rate for Glendale gas aggregation customers.