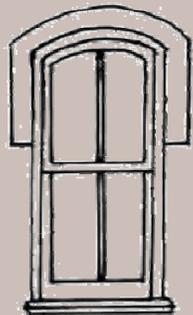
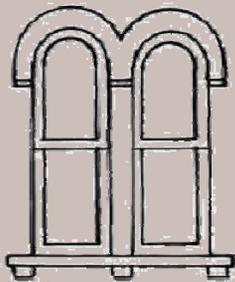
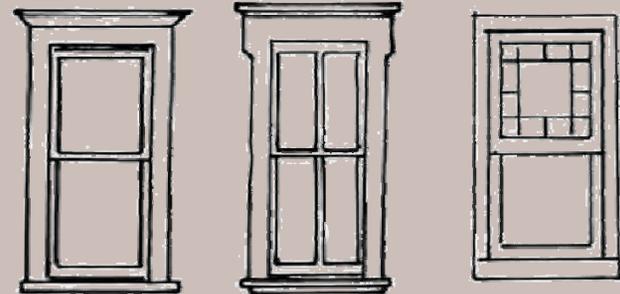


Plainfield Historic Preservation Commission



THE PLAINFIELD HISTORIC
PRESERVATION COMMISSION

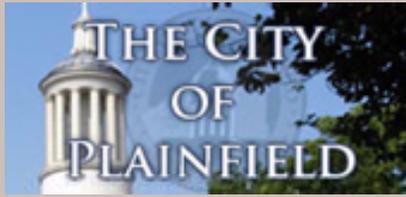
PRESENTS



THE WOOD WINDOW WORKSHOP

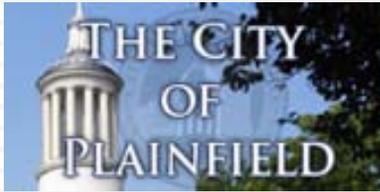
October 15, 2011

At the Plainfield Public Library, 800 Park Avenue, Plainfield, NJ



Workshop Outline

- **I. Introduction**
- **II. Historic Wood Windows or Replacements**
- **III. Inspecting & Repairing Wood Windows**
- **IV. Energy Efficiency of Old and New Windows**
- **V. Resources**
- **VI. Guest Panel Q&A**



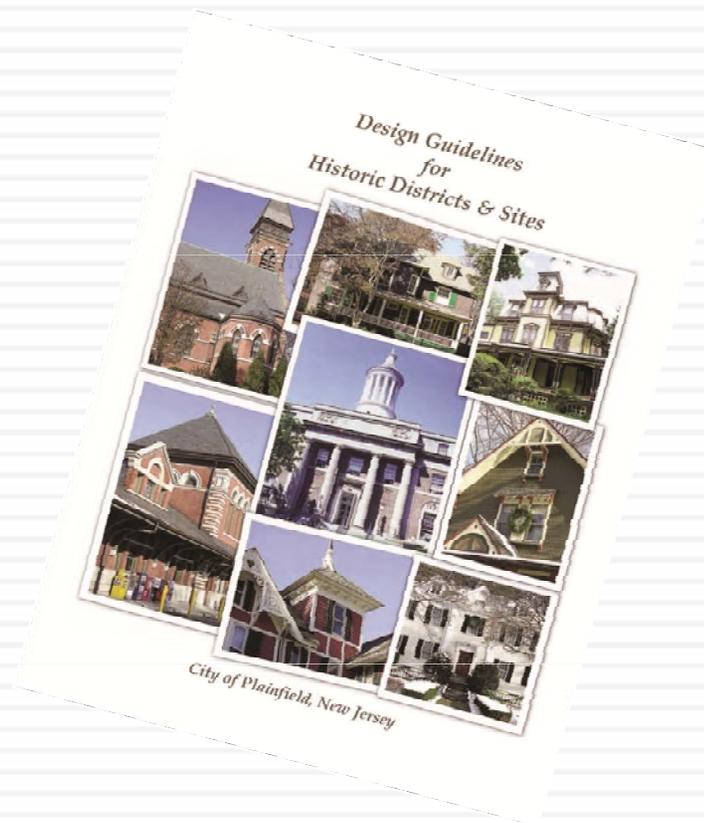
Plainfield Historic Preservation Commission

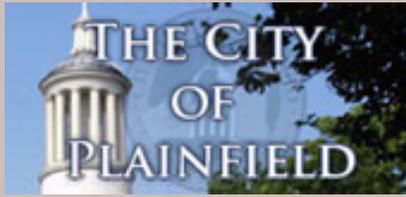
I

Introduction

Resources:

Plainfield's Design Guidelines for
Historic Districts and sites

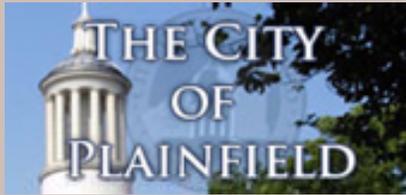




Plainfield Historic Preservation Commission

Mission Statement

- Identify and protect Plainfield's historic sites and districts
- Strengthen the sense of connection to the community's past
- Create a distinctive environment and sense of place
- Foster civic pride in the accomplishments of Plainfield's past
- Promote the use of historic districts and landmarks for the educational, cultural, and recreational welfare of its residents
- Help to insure the harmonious and efficient growth of the City
- Support the local economy by promoting tourism, encouraging investment, and revitalizing neighborhoods



Plainfield Historic Preservation Commission

Design Guidelines

Plainfield's **Design Guidelines** provide essential information to help you plan for repairs, alterations or additions to your building, as well as how to apply and obtain approval for the work you have planned...

City of Plainfield, New Jersey

Design Guidelines for Historic Districts & Sites

More recently, the City has undertaken new historic preservation initiatives, including:

- ▶ Updating and strengthening the historic preservation ordinance, adopted in 2002 and increased...

is appropriate to the historic district and conforms to the Design Guidelines.

The Commission strives to assist applicants with their projects. Applicants are encouraged to schedule an informational meeting with the HPC prior to submitting an application, particularly if the project is a large addition or new construction.

Obtaining HPC Approval for Your Project

A Certificate of Appropriateness issued by the HPC is required if a property is located within a historic district, or is an individual historic site, before any of the following work can begin:

- ▶ Exterior work that requires a building permit. Examples include roof repair or replacement, porch repair or replacement, new siding, decks, and additions.
- ▶ Exterior repairs, replacements, or removal of features including windows, doors, stairs, railings, and any other trim.
- ▶ Adding, replacing, or changing fences, walls, signs, solar panels, sidewalks, driveways and parking lots.
- ▶ Moving a structure.
- ▶ Demolishing a structure.
- ▶ The removal of living trees measuring 18 inches or more in diameter at breast height located in the public right of way.

The following work on historic sites does not require HPC approval:

- ▶ Any work to the interior of buildings.
- ▶ Any work that is not visible from a public street.
- ▶ Ordinary maintenance that does not require replacement of existing materials.
- ▶ Painting your building.

Historic Preservation in Plainfield • 5

Design Guidelines for Repairs, Additions and New Construction

The Design Guidelines are the criteria by which the Historic Preservation Commission will review applications and determine the appropriateness of proposed work on designated historic properties.

The Design Guidelines cover repair and alteration of existing buildings, and construction of additions and new buildings. The underlying principle of these guidelines is respect for the historic built environment. A building design should carefully

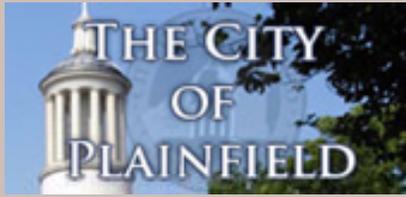
relate to its site, its neighbors and its heritage. Designs should maintain significant existing features, while integrating compatible new features. These should build upon the best of earlier building traditions, but not necessarily imitate them. Siting, scale, proportion, massing and materials are more important than recreating a particular historical style in achieving an appropriate design for Plainfield's historic properties.

Principles of Preservation: The Secretary of the Interior's Standards

The Plainfield Historic Preservation Commission is guided by The Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for Preservation, Rehabilitation, Restoration and Reconstruction. As rehabilitation is the most common treatment approach, the Standards for Rehabilitation are cited below. The Standards are intended to promote responsible preservation practices that help protect our Nation's cultural resources, and are used nationwide for planning and reviewing work on historic properties. The Standards do not offer specific answers for each site or building, but they do provide a philosophical framework for treatment of historic properties, and for the Design Guidelines herein.

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.
2. The historic character of a property will be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural elements or architectural elements from other buildings, shall not be undertaken.
4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.
6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.
7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.
8. Significant archaeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.
9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.



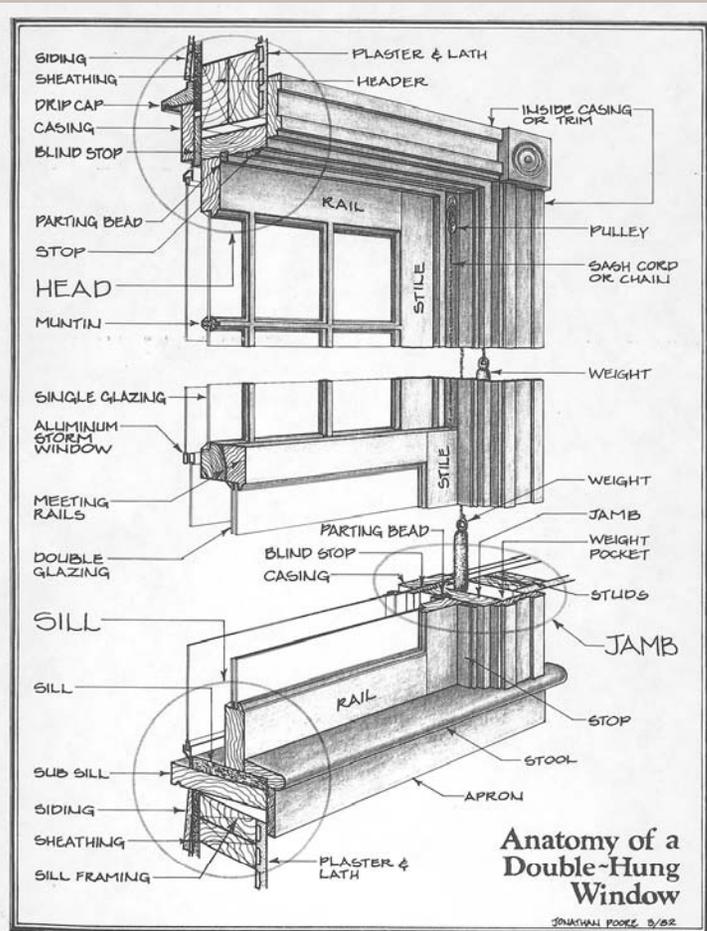
Plainfield Historic Preservation Commission

Goals of this Workshop

- ***Help understand that historic wood windows are a valuable asset***
...and why preserving them may be your best long-term option
- ***Help navigate all the technical information available today***
...and develop a framework for understanding it and where to go to learn more
- ***Teach how to assess window conditions so you can evaluate your options***
...and discuss them with contractors and vendors or do repairs yourself
- ***Provide tips for selecting new windows if restoration is not possible***
...for an aesthetically pleasing, energy efficient, and cost effective purchase
- ***Provide guidance with Design Guidelines and the application process***
...when working on your house

Parts of a Window

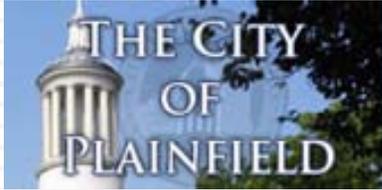
Windows 101



The Old-House Journal

19

- **Frame:** Head, Jamb, Sill, Parting Bead or Strip, Sash Stops
- **Sash:** Rails, Stiles, Muntins, Meeting Rails, & Glazing
- **Hardware:** Weights, Chains or Ropes, Pulleys, Lifts, & Lock
- **Exterior Trim:** Drip Cap, Blind Stop, Casings, Sill, & Sub Sill
- **Interior Trim:** Apron, Stool, Casings or Trim

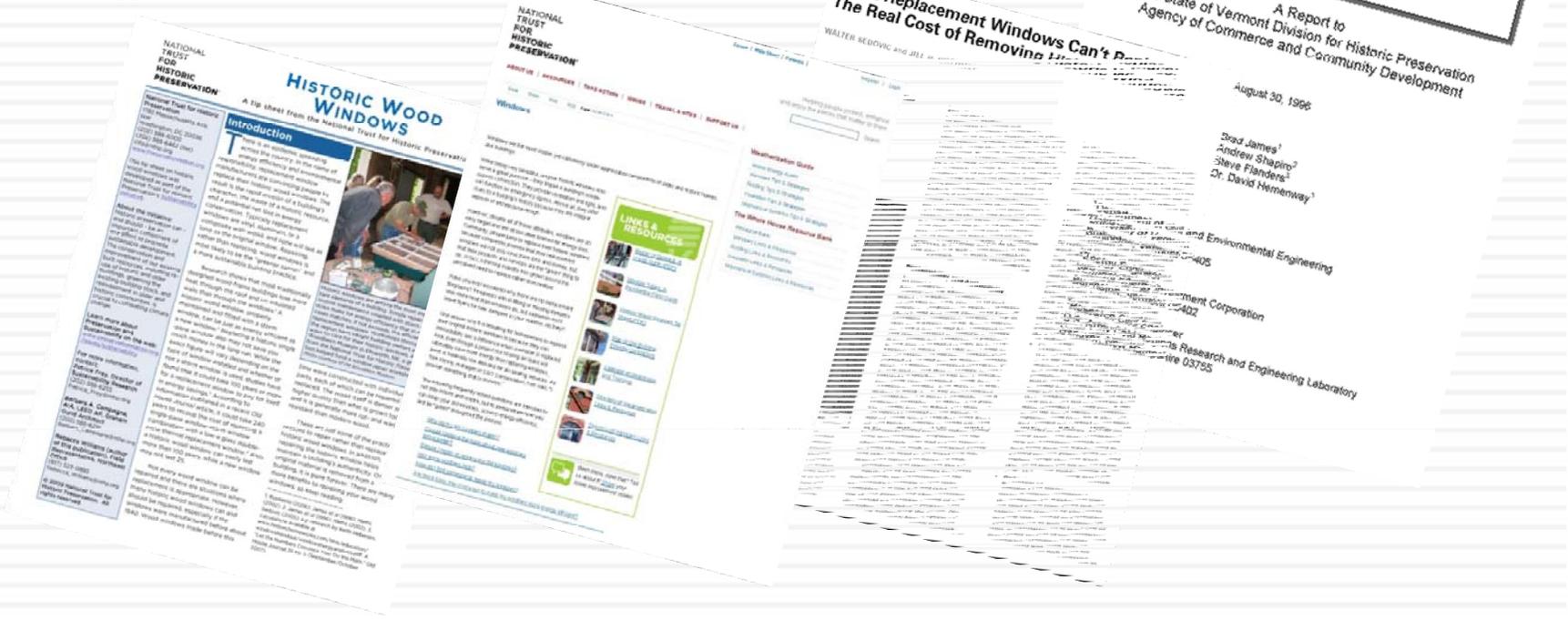


Plainfield Historic Preservation Commission

II

Historic Wood Windows or Replacements

Resources:
 National Trust Wood Window Tip Sheet
 National Trust Web Site
 Articles on Energy Performance



Compare the Wood

Old Growth Wood

Growth rings are closer together with a high percentage of hardwood, which makes it:

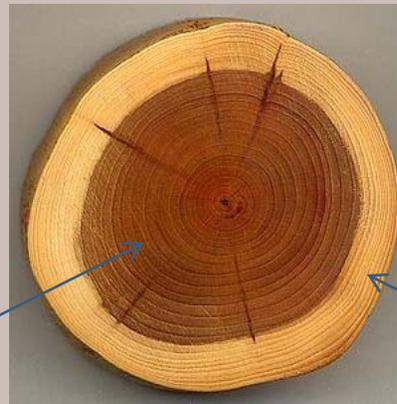
- ❑ More resistant to insects & rot
- ❑ Dimensionally more stable with less expansion and contraction
- ❑ Can hold paint and stain well
- ❑ Better cuts of wood (quarter sawn) & solid pieces

Modern Fast Grown Wood

Growth rings are farther apart with a high percentage of sapwood, which makes it:

- ❑ More attractive to insects and rot
- ❑ Dimensionally less stable and more likely to warp and age unpredictably
- ❑ Must be treated to hold paint
- ❑ Less desirable cuts (rift or flat sawn) & scarfed or tongued sections

Hardwood



Sapwood

Proportion & Installation

Historic Windows

Were designed to fit their openings:

- ❑ Aesthetically the windows are in proportion to the building
- ❑ Over the years have shifted gradually with time and were “eased in” by repairs
- ❑ Each piece can be individually repaired or replaced in kind

Replacement Windows

May not fit the openings:

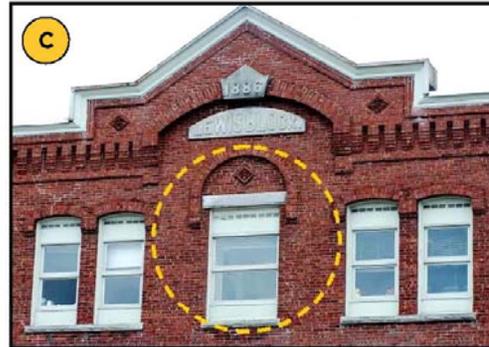
- ❑ Infill may change the proportion of the window and may not “look right”
- ❑ Infill materials create more possible areas for heat to escape through the perimeter of the window
- ❑ Manufactured windows cannot be repaired - when a part fails the entire unit must be replaced

**NATIONAL
TRUST
FOR
HISTORIC
PRESERVATION®**

CASE STUDY: Size Matters

In these two examples, original windows were replaced and the openings were reduced to accommodate a much smaller replacement window.

- A Two, arched nine-over-one double-hung sash windows are in disrepair with loose meeting rails and paint build up. They can be easily repaired and still maintain the character of the building.
- B An identical building with replacement windows. Stock units were used with aluminum in-fill around the opening. The difference in character between A and B is dramatic.
- C The upper story windows of this Main Street commercial structure were replaced with stock units with in-fill at the top and bottom.



Adrian Scott Fine/THP

Replacement Window: Standard Sizes and Infill

In addition to blocking light and looking out of place, these replacements and the ones on the following pages will create too many opportunities for air to infiltrate the building and heat to escape.

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CASE STUDY: One Window, Multiple Replacements

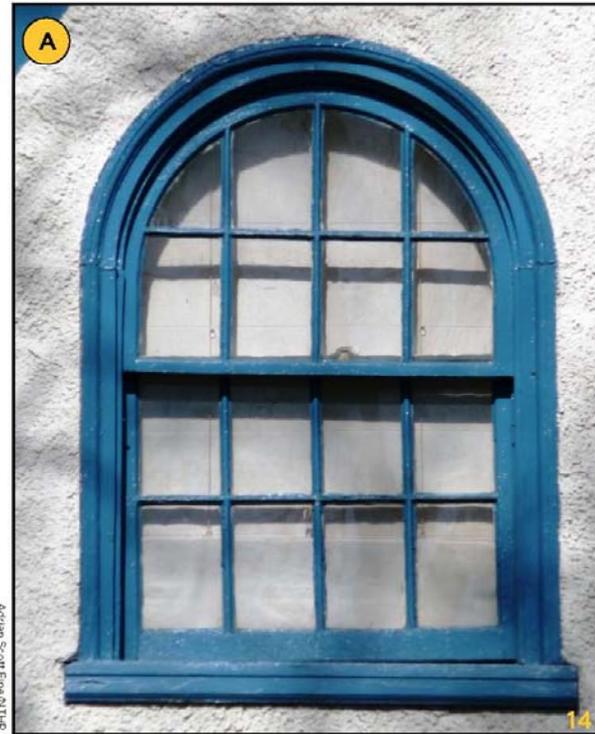
Most older and historic neighborhoods were built, at least in part, by a few developers often employing similar architectural designs and features, such as windows. This example of a simple round arched, wood window clearly shows how different replacement windows can be from one another.

- A This eight-over-eight double-hung sash window with wood casing and sill is a common feature on houses in this neighborhood
- B This replacement window attempts to replicate details of the original. However, it is not a true divided-light, the casing is wrapped in aluminum and the upper sash is flat and not round arched.
- C This replacement tries to look like a round arched window but is instead flat, features a completely different muntin pattern, has casing wrapped in aluminum and is not a true divided-light.



Adrian Scott Fine/NTIP

Repair or Replace Old Windows



Replacement Window: Standard Sizes and Infill

Energy Efficiency: Calculate First!

Historic wood windows can be as or more energy efficient as new windows when properly caulked and weather-stripped and combined with storm window

- **Air-flow** reduction in at the perimeter of the window
- **Heat Radiation** is reduce by an **Air Space** created between the historic window and the storm window

*Caulking & weather-stripping can lower the U value** of your windows, increasing energy efficiency considerably and low costs. Many owners can do this work themselves.*

The effect of adding a storm window - studies* have illustrated:

U value** of a single pane window.....	1.10
U value** of a double pane insulated window	0.58
U value** of a single Pane window with storm.....	0.50

* Study by Keith Haberern, Professional Engineer and Chairman of Collingswood, NJ Historic District Commission

** U value is the measure of the rate of heat loss through a material or assembly.

Energy Efficiency: Calculate First!

Window Replacement Worksheet

Anyone can easily estimate the savings of replacing existing windows using a simple calculation form*:

- ❑ Manufacturers will list the U-value taken at the center of the glass, not for the entire unit. This makes the U value appear to be much higher than it will actually be when installed.
- ❑ Be sure to confirm the U values you are quoted are for windows with the same features of your purchased window

* See Walter Sedovic and Jill H. Gotthelf's *What Replacement Windows Can't Replace: The Real Cost of Removing Historic Windows* in the the Resources slide at the end of presentation for this form.

26 APT BULLETIN: JOURNAL OF PRESERVATION TECHNOLOGY / 36:4, 2005

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER - ENERGY LOAN PROGRAM
WINDOW REPLACEMENT WORKSHEET

BUILDING: _____ LOCATION: _____ DATE: _____

To estimate the savings of replacing existing windows with efficiency upgrades, the following information must be known:

- The U-Factor of the existing window (See U-Value table below).
- The U-Factor of the replacement window (See U-Value table below).
- The total area of the windows being replaced (square feet).
- The heating energy cost (\$/million Btu).
- The heating plant efficiency (in percent).

SAVINGS CALCULATIONS

1. Enter the U-Factor of the existing windows.....
2. Enter the U-Factor of the replacement windows.....
3. Subtract line 2 from line 1.....
4. Add 0.85 to line 3.....
5. Enter the total area of the windows to be replaced.....
6. Multiply line 4 by line 5.....
7. Multiply 0.1 by line 6.....
8. Enter the heating plant efficiency (percent divided by 100).....
9. Divide line 7 by line 8.....
10. Enter the energy cost (\$/million Btu).....

YEARLY SAVINGS

11. Multiply line 9 by line 10..... \$...../year

PROJECT COST

12. Enter the total cost of the window replacement including material, labor and design..... \$.....

SIMPLE PAYBACK

13. Divide line 12 by line 11..... years

WINDOW U-VALUE TABLE

Window System Type	U-Factor*
Single Glass.....	1.10
Single Glass with storm window.....	0.50
Single Glass, low E coating.....	0.91
Single Glass, low E coating with storm window.....	0.44
Insulating Glass (double glass).....	0.55
Insulating Glass (double glass) with storm window.....	0.35
Insulating Glass (double glass), low E coating.....	0.38
Insulating Glass (double glass), low E coating with storm window.....	0.32
Insulating Glass (triple glass).....	0.35
Insulating glass (triple glass) with storm window.....	0.25

* U-Factor values adapted from the 1985 ASHRAE Fundamentals Handbook.

MO 780-1383 (3-98) DNR/ENERGY/3.3 (3-98)

Fig. 2. Many excellent worksheets are available for calculating payback of replacement windows; this one is produced by the Missouri Department of Natural Resources. Results of payback calculations often reveal grossly overstated claims. Courtesy of the Missouri Department of Natural Resources.

Energy Efficiency: Calculate First!

Replacement windows may not be an effective way to lower your heating bill...

Let's say you have a house with 24 windows and it costs \$500 each to replace them, and after you do, the your heating bill goes down by \$40 a month. Did you save money?

24 windows x \$500 = \$12,000

6 winter months x \$40 = \$240 (saved per year)

It would take 50 years to get your money back

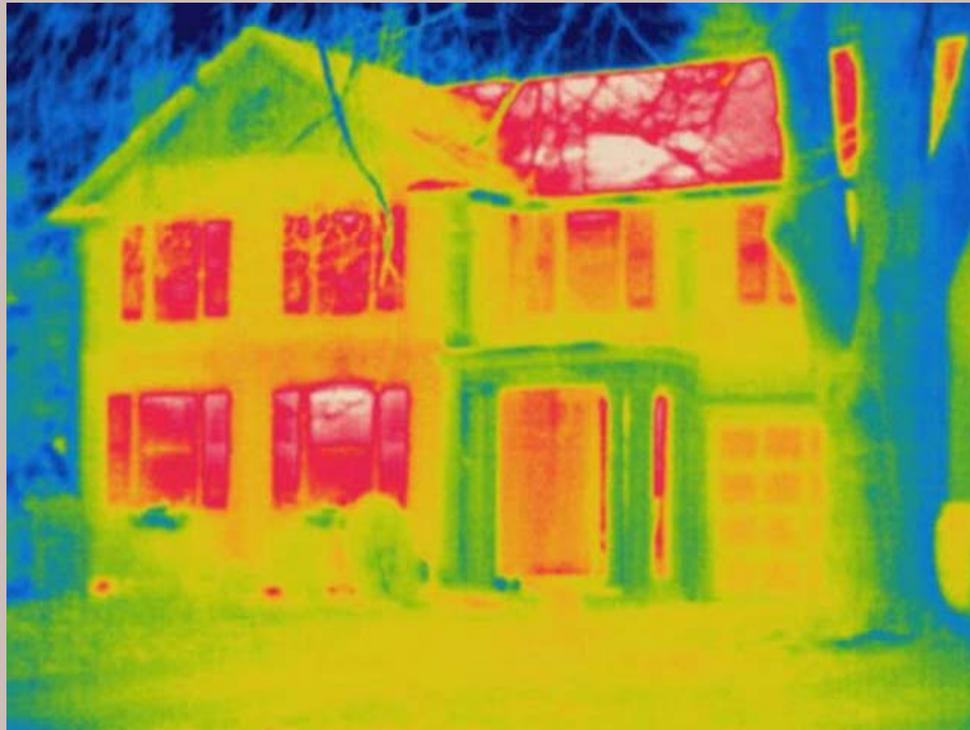
- ❑ If you have central air, it would take less
- ❑ If you financed the work, it would take more

Keep in mind...

- ❑ The average manufactured window only lasts 20 years
- ❑ The average person lives in their house for just 5-7 years
- ❑ There may be better places to put your money if you want to save energy

Energy Efficiency: Calculate First!

There may be higher priorities where you can invest your money to save energy. This infrared photography shows areas of heat loss in red. The owner of this house will save more energy for less cost if they put insulation in their attic first, rather than invest in new windows.



Energy Efficiency: The Guarantee

Read the Guarantee Before You Replace Your Windows...

- ❑ **The guarantee may have a cap** – a guarantee that you will save a minimum percentage on heating or cooling costs usually has a maximum
- ❑ **Guarantees of 20 years have other typical limitations:**
 - ❑ The installation limited to 2 years
 - ❑ Non-glass components limited to 10 years
 - ❑ “Lifetime” guarantees are for the lifetime of the window, not the house or the owner

Keep in mind...

- ❑ The average manufactured window only lasts 20 years
- ❑ The average person lives in their house for just 5-7 years
- ❑ Guarantees are not transferable

Local Economy & The Environment

Historic Windows...



Require much less:

- ❑ Harvesting of new wood & chemically treating wood
- ❑ Manufacture of petroleum based products
- ❑ Shipping and packing materials
- ❑ Garbage sent to the local dump



Replacement Windows...

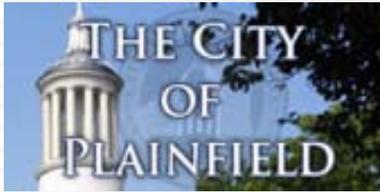


Require much more:



And are more likely to...

- ❑ Support local contractors
- ❑ Can be spot repaired when they break
- ❑ Support remote manufactures
- ❑ Require replacement when they break



Plainfield Historic Preservation Commission

III

Working with Historic Wood Windows

Resources:

NPS Preservation Briefs 9 & 37

National Trust Tip Sheet



Inspecting Wood Windows

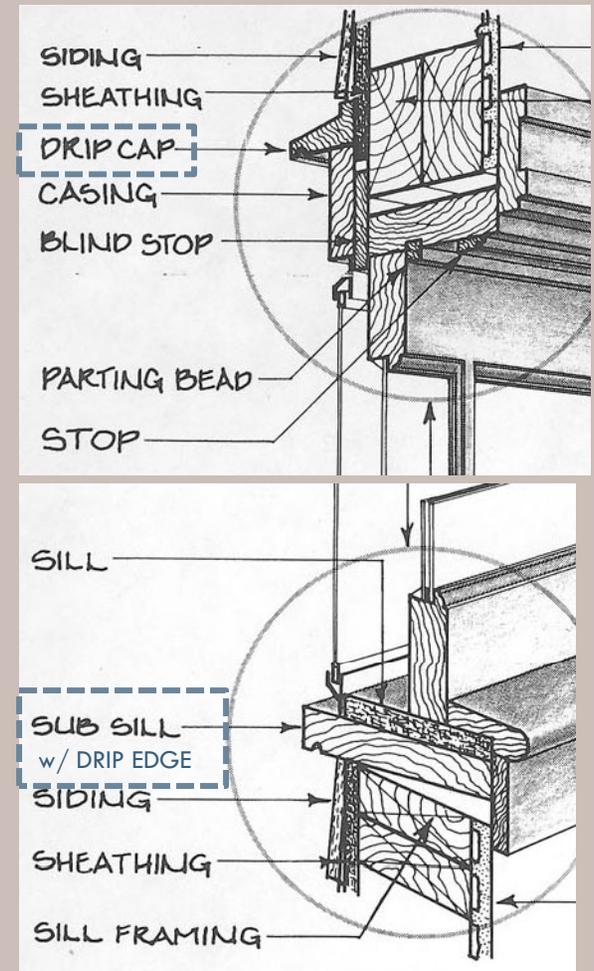
1. Window Location & Design

The window may have an inherent problem that will require a long range design solution such as a sill that is not properly sloped to drain or flashing at the head.



This ornament has rotted exactly where the lintel flashing ends. A drip edge would have prevented this.

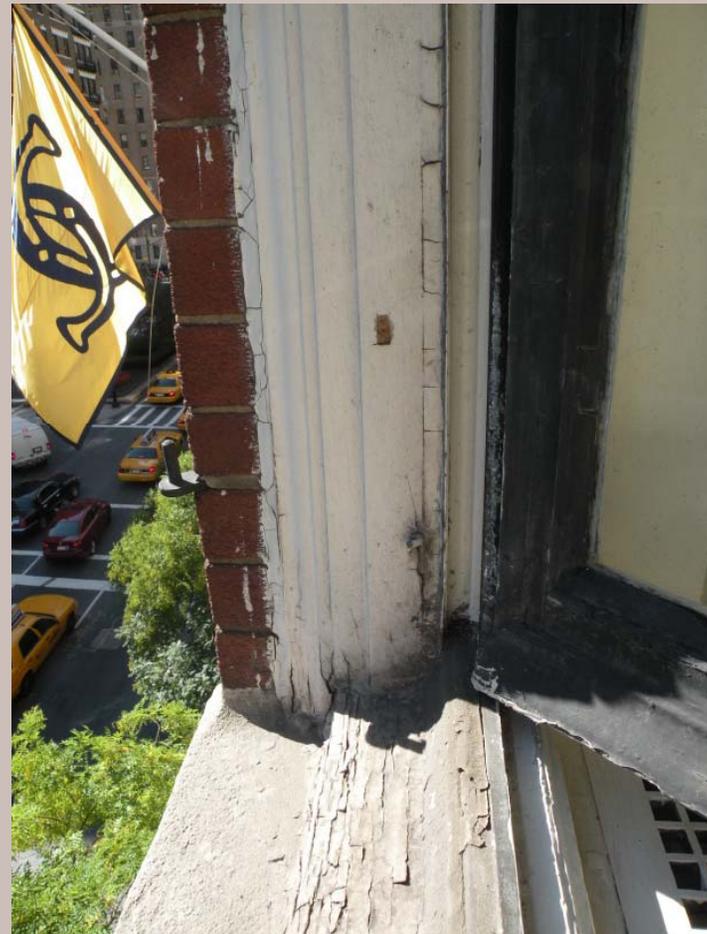
The drip line of this air conditioner is clearly rotting the window sill



Inspecting Wood Windows

2. Condition of the Paint & Caulk

Peeling paint can indicate areas of water infiltration that should be addressed prior to repainting. Deterioration like this is easily restored; these windows do not need to be replaced!



Inspecting Wood Windows

3. Condition of the Frame and Sill

Examine from top to bottom to trace the start of the problem; a small ice pick can be used to test the wood. Rotted sills and other “straight cut” frame components can be easily replaced with new.



Inspecting Wood Windows

4. Condition of the sash

Sometimes a “broken” window has a perfectly good frame and only needs a new or repaired sash; this is an opportunity to have a new sash made with insulated glazing



Inspecting Wood Windows

5. Glazing & Putty or Glazing Stops

Examine glazing putty for cracked, loose, or missing sections which allow water to saturate the wood; the back putty on the interior side of the pane should also be inspected. Replacing the glazing putty is a simple repair that will prolong the life of the window and decrease air infiltration making a window much more energy efficient.



Inspecting Wood Windows

6. Hardware

Keep the sash lock in good working order; it holds the top and bottom sash tightly in place which reduces perimeter air flow. Sash pulls help prevent damage to a window from improperly using the top of the sash to push it open.



Routine Maintenance

The Basics of Window Maintenance

Chances are you can do much of this work yourself, but if not, learn these about these steps so you can discuss them with your contractor...

- 1. Limited areas of paint removal.....** So you can remove the sash stops and remove the sash for repairs and reinstall for proper operation
- 2. Removal and repair of sash.....** Re-glue the joints, replace glazing and glazing putty as required
- 3. Repairs to frame.....** Remove old caulking and reinstall with new, provide lintel flashings and minor wood repairs
- 4. Provide new weatherstripping.....** Replace old weatherstripping as required with new
- 5. Check the hardware.....** Replace broken cord/chains, pulleys and locks
- 6. Recaulk and Repaint.....** Keep all exterior surfaces painted including glazing putty and especially on horizontal surfaces; don't paint surfaces where the window moves such as the inside of the jamb or the pulleys or ropes

Routine Maintenance

Traditional Homebuilding – Restoring Window Sashes

by David Gibney is a great article to help you get started, or just know how to talk to a contractor...

REMOVING THE WINDOW SASH



used, some window panes are rippled like the ocean, and others are bubbled or scattered with bull's-eyes. Each pane, though, is unique. On the rare occasion when I find a window that's not salvagable, I always save the glass.

If you're seeking sources for old glass, check first with salvage contractors in your area or with window-replacement contractors, most of whom will be happy to let you haul away the old sashes that they take out. If those options don't pan out, I know of one supplier (Fairview Glass Co.; www.fairviewglass.com; 801-371-3366) that ships glass nationwide.

Window frames rarely need fixing

I inspect the window frames as well as the sashes. Like a dentist with a pick, I use a scratch awl to poke around rotted areas to determine the extent of damage. Fortunately, unless the house in question has suffered from serious moisture problems, the frames are almost always rock solid, which is why so many manufacturers have come out with replacement window units that fit within existing frames. If I find some frame rot, it's usually confined to the end grain where the side jamb meets the sill or to the top portion of the sill itself. These infestations are cleaned out and repaired easily with epoxy (see *FHB* #107, pp. 60-65, or read this article at www.finehomebuilding.com).

If serious damage has occurred, it's most likely to involve the sashes, particularly the lower sash, because they are used and abused the most. If sash rot is minor and localized, I make the repairs in place. But whenever I discover a serious problem such as a severely rotted bottom rail or side jamb, or a broken or rotted muntin strip, I remove that particular sash and make the repair in the shop. Only if the bottom and both sides are missing do I consider a sash to be beyond repair.

Disassembly requires care, especially with old glass

As I remove each sash, I hold it up to a light source and take note of which panes of glass are original so that I remember to take special care to save them. Removing old glass without breaking it is a tedious process at best. Sometimes I find that the old glazing putty is so loose that it just needs a good nudge with a paint scraper to get it off; sometimes, however, the putty is as hard as rock.

Plenty of tools and techniques are available for removing stubborn old glazing putty, and

none of them is perfect. I've had lots of success using a Fom MshMaster tool along with a small Makita orbital-orbital sander to break up old putty, but this process is not for the squeamish (sidebar p. 85).

If you're trying to remove the glass without success, you might be able to find a local window-repair or paint-removal specialist who can help. Or you might attempt the repair with the glass in place. You also might want to check out a new infrared paint-removal tool that claims to be equally effective for removing glazing putty (see *FHB* #150, p. 114).

Epoxy repairs minor damage

After all the glass has been removed and carefully set aside, the built-up layers of paint are next to go. Old windows almost always have at least one layer of lead paint on them, so it's important to take some safety precautions (see *FHB* #150, pp. 66-75, or read this article at www.finehomebuilding.com). If I have an



REPAIR SASH WITH OLD WOOD AND EPOXY

1 Deep gouges and rot are carved out and squared up with a chisel to make room for a wooden patch (commonly called a dutchman) that's fastened with an epoxy adhesive. 2 After all surfaces have been wetted with liquid epoxy, a thickener is added to the mix, and a generous helping is applied between



the dutchman and the sash. 3 Cut from the same species of wood as the sash, the dutchman should stand slightly proud of the surrounding surfaces. After the epoxy has cured fully, the patch can be planed and sanded to make the repair invisible.



Why not spend a little time, and a lot less money, to help your existing windows last another century?

entire house's worth of windows to repair. I send them to a reputable paint stripper, where the paint can be removed safely. If I have just a few windows to repair, I strip the paint myself using low-temperature heat strippers (photo bottom right, p. 85) or chemicals (Back to Nature Products; 800-423-7733; www.backtonature.com).

If the sashes have any minor cases of rot or simple weather damage, they are repaired with epoxy. First, I gently wire-brush the surface free of all loose wood fibers. Next, I carefully warm the wood surface with a heat gun set on its lowest setting. Using a disposable paintbrush, I apply generous amounts of a liquid epoxy (West System; 989-694-7286;

www.westsystem.com); the heat treatment allows the liquid epoxy to travel deep into the wood's fibers, creating a superior bond. As soon as the wood fibers refuse to absorb any more of the liquid, I spread on a fine skim coat of solid epoxy filler to create a smooth finish surface.

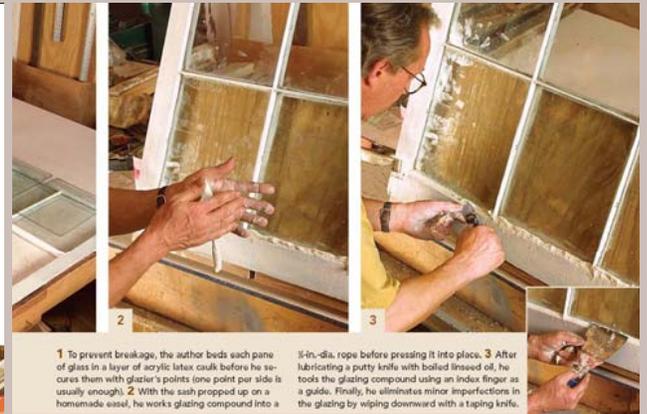
Parts and patches are made from the same wood as the sash

Unlike fixed trim elements, a window sash is subject to a great deal of mechanical stress. To ensure that my repairs last as long as possible, I don't depend on epoxy to fill large gaps; instead, I fashion all but the smallest patches from wood. I rely on a dutchman (a

patch that is made with wood) glued with an epoxy adhesive from West Systems to repair damage that would require more than a skim coat of filler (photos below).

When I have to replace an entire sash part, such as a rail or a muntin strip, I first try to scrounge up a match in a local salvage yard. But if that doesn't pan out, I can replicate the profile using a molding head cutter that fits my table saw. (To find out how to make a custom molding cutter, visit our Web site at www.finehomebuilding.com.) If just a portion of the original piece is damaged, I cut back to sound wood and splice new wood to add.

Whether it's a small dutchman or an entire bottom rail, every replacement part should be



1 To prevent breakage, the author beds each pane of glass in a layer of acrylic latex caulk before he secures them with glazier's points (one point per side is usually enough). 2 With the sash propped up on a homemade stand, he works glazing compound into a

5/8-in.-dia. rope before pressing it into place. 3 After lubricating a utility knife with boiled linseed oil, he tools the glazing compound using an index finger as a guide. Finally, he eliminates minor imperfections in the glazing by wiping downward with a taping knife.

achieve (photos above). Glazing compound does not hold paint well, so it has had a couple of weeks to cure. If time allows, I ace the sashes in my shop, then apply two full coats of paint before I install them. When painting over the glazing compound, I've learned that it's important to let the paint overlap the glass (about 1/8 in.); this overlap prevents water from getting behind the glazing, causing early failure.

Repaired window sashes have a greater life expectancy than new window units, but as with anything that's exposed to nature's wrath, they still have to be maintained. I urge all my clients to open and close each of their windows at least once a year and to examine them thoroughly for signs of rot at least every five years.

David Gibney is a restoration contractor in Smithsburg, Md. Photos by Tom O'Brien, except where noted.

Photo bottom right courtesy of Allied Window Inc.

Storm windows and weatherstripping tighten up old windows



By today's standards, old double-hungs are drafty; but that problem is easy to fix. The most straightforward solution is to add storm windows. Triple-track units are the most common option, but they can be bulky and conspicuous. If you decide to go this route, buy from a high-end manufacturer that offers custom sizing and a wide choice of colors.

For a less conspicuous appearance, I prefer the Historic One-Light (HOL) unit from Allied Window Inc. (800-445-5411; www.alliedwindow.com). This low-profile storm (photo left) is essentially a single-track unit in which upper and lower sashes mount one over the other; screens are available, but they must be stored elsewhere. For restoration purists who'd rather not see any storm window on the outside of a home, this manufacturer also offers a variety of interior storm-window options.

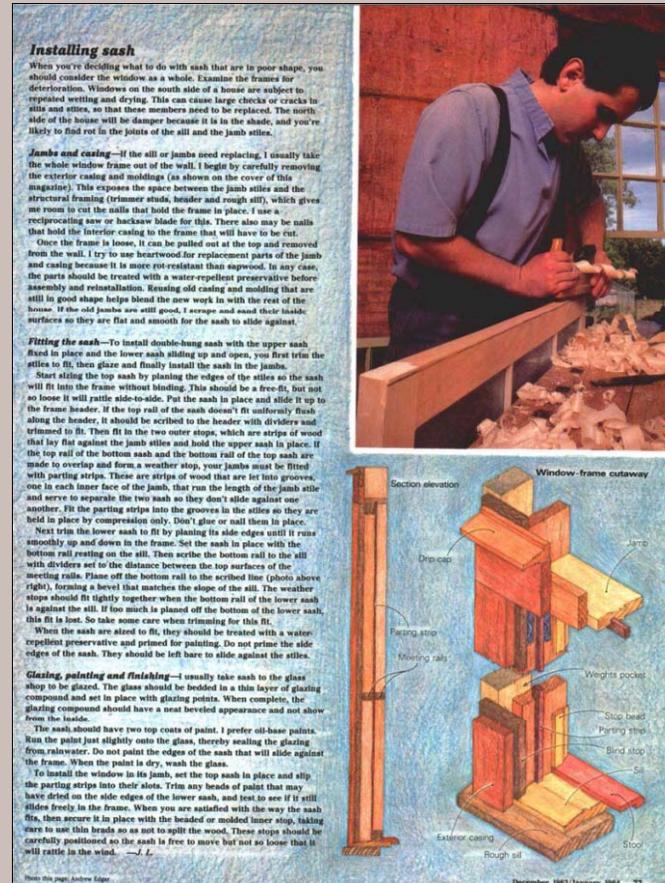
The windows themselves also can be tightened up. The edges of fixed sashes should be caulked, inside and out, to eliminate air infiltration. If you're willing to remove them from their frames, sashes and stops can be routed and resealed with specially designed weatherstripping. Resource Conservation Technology Inc. (410-366-1146; www.conservationaltechnology.com) offers a wide variety of weatherstripping, as well as an excellent catalog that doubles as an installation manual.

Photo courtesy of Allied Window Inc.

Routine Maintenance

Making Window Sash – How to do a Custom Job with Ordinary Tools and a Router

By John Leeke. Even if you are not rebuilding your windows yourself, articles like this are a great way to take the mystery out of window construction and repair. John Leeke's website is a great resource for windows.



Stabilization and Parts Replacement

Options for Deteriorated Windows

Before you assume your window cannot be restored, think about these options. You may have to look a bit harder for a contractor who can do this work, but these are good options for large or unique windows that would be expensive to replace.

- 1. Allow the wood to dry out.....** Allow the unpainted wood to air out; moisture meters can be purchased to test the wood
- 2. Treat decayed areas with a fungicide...** Only use on areas to be painted due to toxicity; use with extreme care
- 3. Waterproof with boiled linseed oil.....** Two to three applications every 24 hours
- 4. Consolidation of weakened wood.....** Wood is strengthened and stabilized by using semi-rigid epoxies which saturate the decayed wood
- 5. Fill cracks and holes with putty.....** Which can be sanded and painted
- 6. Splices and Parts Replacement.....** Replace the deteriorated parts with new matching pieces, or splicing new wood into existing members
- 7. Paint.....** After all other treatments have had time to cured

Stabilization and Parts Replacement



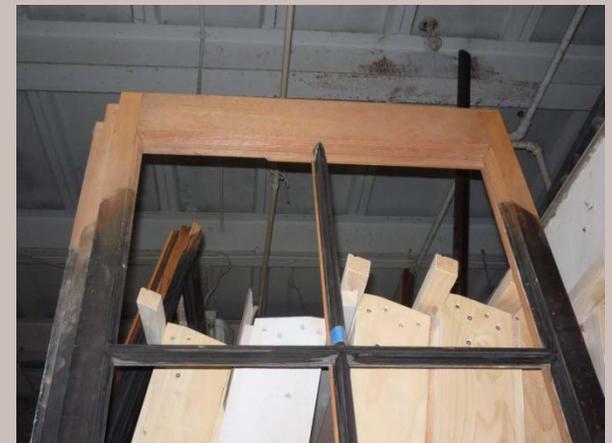
These large wood French doors had rotted bottom rails, but the rest of the door was in good condition. The owner had a carpenter “scarf” in new wood at the bottom for a fraction of the cost of recreating the entire door.



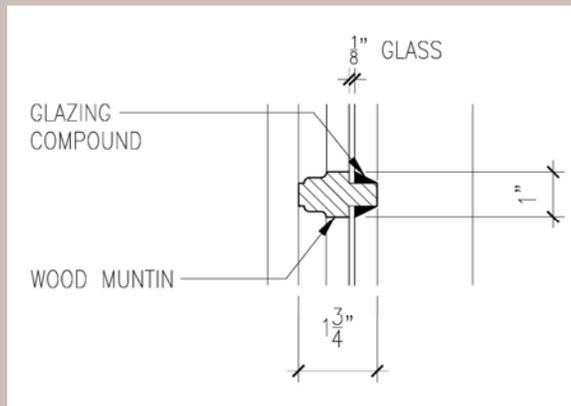
The rotted bottom rail



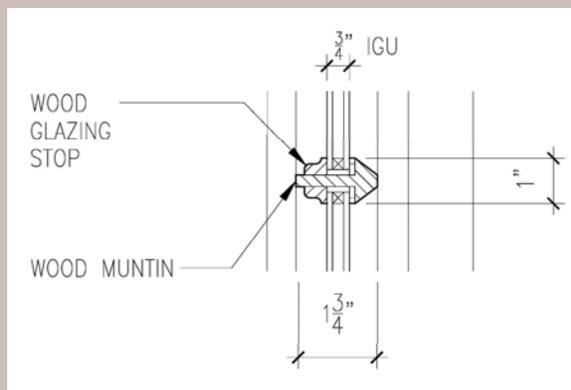
Photos of new wood “scarfed” into the old frame



Stabilization and Parts Replacement



Before



After



These same doors had thick mullions that were able to hold insulated glazing units by altering the wood glazing stop. The owner was able to restore the doors and match their energy efficiency at a fraction of the cost of new doors.

Stabilization and Parts Replacement



These windows, dating from the 1830s, were similarly restored. Note how the deteriorated frames were cleaned and painted with few repairs necessary



Stabilization and Parts Replacement

Similar to the previous example, these windows had mullions that were able to hold insulated glazing units by altering the wood glazing stop. The owner was able to restore their and match their energy efficiency and keep their historic windows



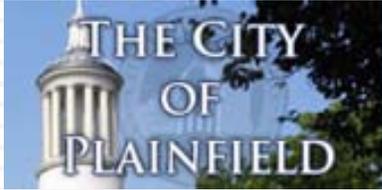
Be Careful about Lead Paint

Consult your local or state ordinance to determine the legal method for handling and disposing of lead paint in your area.

- Children and pregnant women should not be allowed in the work area
- Do not smoke or eat or drink in the area you are working in; wash your hands and face before doing so
- Wear disposable gloves and eye protection
- Use a respirator if there is friable paint, or if you are scraping or sanding paint
- Use a wet sanding technique to minimize dust
- Vacuum using a HEPA filter
- Wash your work clothes separately from your household laundry or use a tyvek suit
- Use tarps to collect loose paint and seal off the work space

Paint that was applied prior to 1978 probably will have lead paint on them.

Just because there may be lead paint on the windows does not mean that they are unsafe or need to be replaced.



Plainfield Historic Preservation Commission

IV

Winterizing Historic Wood Windows

Resources:

National Trust Tip Sheet

Articles on Energy Performance

NATIONAL TRUST FOR HISTORIC PRESERVATION
 National Trust for Historic Preservation
 11 Dupont Circle, N.W.
 Washington, DC 20036
 (202) 638-2000
 (202) 638-2402 (fax)
 www.nthp.org

HISTORIC WOOD WINDOWS
 A tip sheet from the National Trust for Historic Preservation

Introduction
 There are many reasons for wanting to preserve the country in the name of history. One of the most important is energy efficiency and environmental sustainability. Historic wood windows are an important part of our architectural heritage and a valuable resource for energy efficiency. The National Trust for Historic Preservation has developed this tip sheet to help you understand the benefits of historic wood windows and how to care for them.

What Replacement Windows Can't Replace: The Real Cost of Removing Historic Windows
 WALTER SEDGWICK and JILL N. GOTTRELL

Testing the Energy Performance of Wood Windows in Cold Climates
 A Report to
 The State of Vermont Division for Historic Preservation
 Agency of Commerce and Community Development
 August 30, 1996
 Brad James¹
 Andrew Shapiro²
 Steve Flansburg³
 Dr. David Hemenway⁴

Will and Environmental Engineering
 100T
 INT 05405

Investment Corporation
 INT 05402

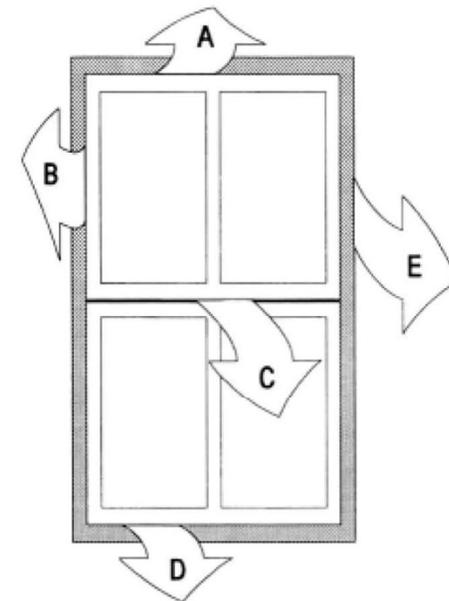
Engineer
 Leigions Research and Engineering Laboratory
 Hampshire 03755

Air Flow – The Main Culprit

Infiltrating air, not heat loss through glass the primary culprit affecting energy loss

- ❑ **Windows only account for about 12.5% of heat loss** in the average house - money is often more wisely spent on insulating attics, walls and foundations
- ❑ **Retrofitting a window with weatherstripping** can improve the performance of the window comparable with that of a new window
- ❑ **Consider converting a double-hung window** to a single hung and filing the unused sash pocket with insulation

Figure 1: Principle air leakage sites for a typical double-hung window



- A - air infiltration through the head junction
- B - air infiltration through the sash/jamb junction
- C - air infiltration through the meeting rail
- D - air infiltration through the sill junction
- E - air infiltration through and around the jamb from the rough opening

Diagram from The State of Vermont Division for Historic Preservation Agency of Commerce and Community Development's *Testing the Energy Performance of Wood Windows in Cold Climates*. See Resources slide at the end of presentation for this form.

Air Flow – The Main Culprit

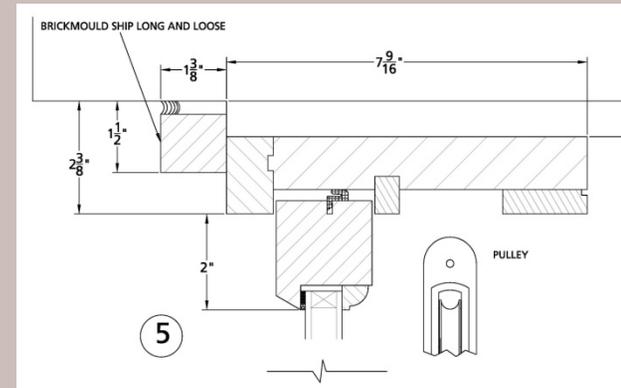
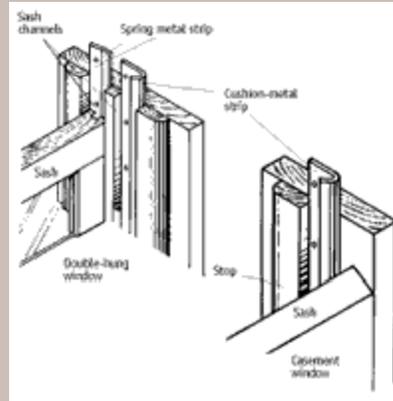
Weatherstripping

There are a variety of weatherstripping options. Most manufacturers have detailed information about installation:

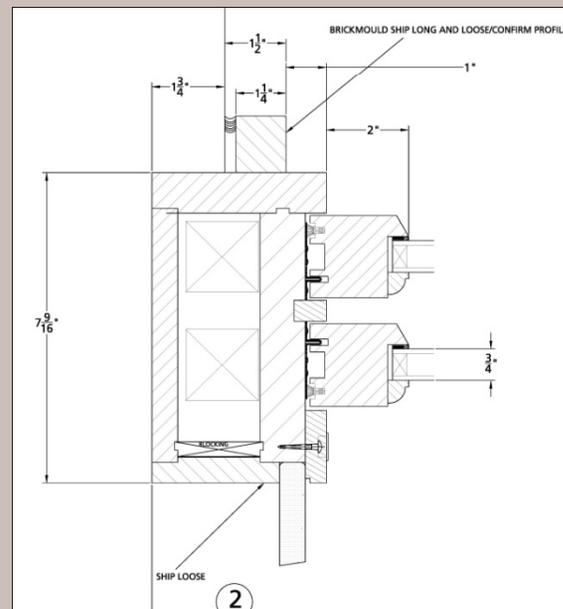
- ❑ Brush/Pile
- ❑ Kerf or Bulb
- ❑ Metal Interlocking

Also consider options such as:

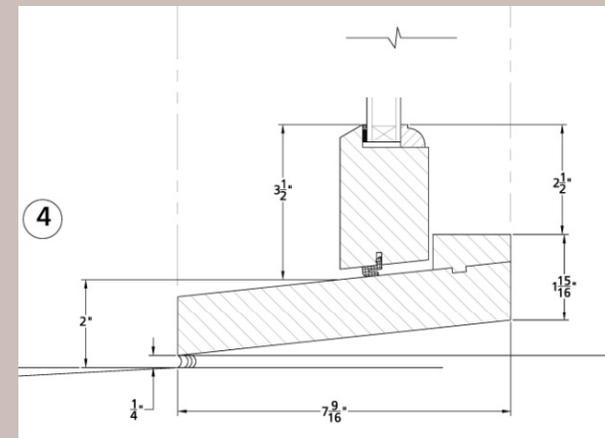
- ❑ Sash Liner at jambs & fill the weight pockets with insulation
- ❑ Draft proof pulley covers



Head



Jamb



Sill

Air Flow – The Main Culprit

The Important Points

- ❑ Understand the U-value you are given: Glass vs. Window Assembly vs. Installation
- ❑ Installation is critical!
- ❑ Have a test before and after the installation
- ❑ Door Blower Test
- ❑ Thermographic / Infrared
- ❑ PFT Air Infiltration

US Dept. of Energy's www.energysavers.gov is an excellent resource for understanding energy audits, both do-it-yourself and professional:

The screenshot shows the 'Energy Savers' website page for 'Home Energy Assessments'. The page features a navigation bar with links for HOME, TIPS, YOUR HOME, RENEWABLE ENERGY, YOUR VEHICLE, YOUR WORKPLACE, REBATES, TAX CREDITS, & FINANCING, PRODUCTS & SERVICES, and INFORMATION RESOURCES. A search bar is located in the top right corner. The main content area includes a video player for 'Energy 101: Home Energy Assessment' and a sidebar with various links and resources.

Home Energy Assessments
A home energy assessment, also known as a home energy audit, is the first step to assess how much energy your home consumes and to evaluate what measures you can take to make your home more energy efficient. An assessment will show you problems that may, when corrected, save you significant amounts of money over time.

Energy 101: Home Energy Assessment

Learn about the steps and benefits of a comprehensive home energy assessment in this video.
[Text Version](#)

During the assessment, you can pinpoint where your house is losing energy. Energy assessments also determine the efficiency of your home's heating and cooling systems. An assessment may also show you ways to conserve hot water and electricity. You can perform a simple energy assessment yourself, or have a professional energy auditor carry out a more thorough assessment.

A professional auditor uses a variety of techniques and equipment to determine the energy efficiency of a structure. Thorough assessments often use equipment such as **blower doors**, which measure the extent of leaks in the building envelope, and **infrared cameras**, which reveal hard-to-detect areas of air infiltration and missing insulation.

Here you'll find the following information:

- [Do-It-Yourself Home Energy Assessments](#)
- [Professional Home Energy Assessments](#)

ENERGY SAVERS BLOG

Videos on Clean Energy That Give You the Basics and More
3 hours ago

What Do You Think About Solar Decathlon?
Oct 07, 2011

Thoughts on a Two-Year Race
Oct 05, 2011

More Entries:
[Subscribe to RSS Feed](#)
[Connect on Facebook](#)

Heat Transmission & Glass

Options for Improving Glass Performance

- ❑ **Storm windows create an air-pocket** between the historic window and the storm window that is an excellent barrier to prevent heat loss
- ❑ **Air-pocket can also be effective in sound proofing**
- ❑ **Replace existing glass with single-pane low-e glass** to improve window performance
- ❑ **Laminated low-glass** can even improve sound-proofing qualities
- ❑ **Replacing existing glass with insulated glass units** may also be possible if the sash depth is large enough



Storm Windows

All Storm Windows...

- ❑ **Can be made to fit virtually any window**
- ❑ **Can significantly increase the energy efficiency the window**
- ❑ **Can improve sound-proofing**
- ❑ **Lower costs than replacements**
- ❑ **Simple construction and less likely to fail**
– no thermal glazing or complex sash mechanisms
- ❑ **Variety of materials** – aluminum, vinyl, fiberglass, composites, and wood
- ❑ **All storm windows should have weep holes** at the sill to let out any moisture that gets in between the windows

Condensation on **inside surface of the storm window** indicates warm air is leaking out of the house into the air space

Condensation on **inside surface of the primary window** indicates cold air leaking in from the outside into the air space

Storm Windows

Exterior storm windows Pros & Cons

Pros

- ❑ Protects the historic window
- ❑ Insect screens easy to operate
- ❑ Do not obscure primary window from the interior

Cons

- ❑ Obscure the primary window from the exterior

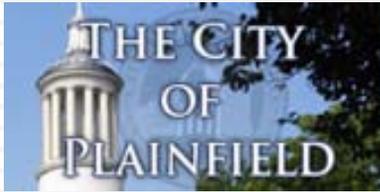
Interior storm windows –Pros & Cons

Pros

- ❑ Easy to install & clean without ladders
- ❑ Tend to be low-profile
- ❑ Do not obscure primary window from the exterior

Cons

- ❑ Obscure the primary window from interior
- ❑ Interior moldings may be shallow - making less room for storms on the inside
- ❑ Insect screens are less convenient



Plainfield Historic Preservation Commission

V

More Information

Here is where you can find all of the information presented here by downloading:

[Wood Window Workshop-More Information.PDF](#)

on the Plainfield HPC website. There are also links to other articles on evaluating the pros and cons of restoration vs. replacement as shown on the final slide...

137 Things Window Companies Won't Tell You About Vinyl

Manufacturers spend millions in propaganda to convince consumers to buy vinyl.

If you are a typical homeowner blessed with a visit from your local vinyl window salesman, you've probably heard things like: "Our vinyl windows will last forever. We have a double lifetime warranty. Nobody beats our prices." Window dealers sell vinyl, not because they are so good, but because the PROFITS are huge.

This article is a compilation of FACTS derived from many sources such as books, magazines, and mostly the internet. Once you have researched vinyl for yourself, you'll think twice before falling for the sales pitch and putting poor quality materials on your home.

My confession:

I made over \$100,000 per year selling plastic windows and siding to unwary homeowners. As an independent contractor selling for one or more dealers, I could make thousands on one job by simply getting a signature on a contract. If I was making that kind of money as a salesman, what do you think the dealer was making? There were many well scripted sales "pitches". I was the Marketing Director or Advertising Manager. If you let us use your home for a model or show home, we'll give you a special deal.

The fact is that if you spend more than about \$250 for most installed vinyl windows, you paid too much!

1



Vinyl framed "replacement" windows being removed after one use. Twisted frames on a southwest exposure.

Conviction Brings Integrity

At first, I believed what my company told me also "Vinyl is final". It would last forever. Homeowners upwards of \$600 to \$1000 for an installed window product was so good. After all, we are giving them warranty".

It wasn't until a couple of years into it that my eye opened. Customers were calling all the time about windows sticking, water or air coming in, or asking why white windows started turning yellow? And because just the "dealer" we deferred all the complaints to the tuner. Unfortunately that vinyl window manufacture of business and so much for the "lifetime warranty".

I decided to do my homework and really find out why behind vinyl. What was found is astonishing! It long before I knew that not only would I never sell but I would never even put the product on my own! any price!

Homeowners Defense L

The Washington Post

CORRECTION TO THIS ARTICLE
This article incorrectly said that homeowner Carol Rosen has vinyl windows. They are made of a composite.

Windows Aren't Always A Clear Path for Savings

In Quest to Boost Energy-Efficiency, Small Changes Might Have Bigger Payoff

By Terri Rugar
Washington Post Staff Writer
Saturday, May 16, 2009

The big appeal of replacing your old windows with new energy-efficient ones is that they might save you money. A federal tax credit of up to \$1,500 adds to the attraction.

But there are other, cheaper ways to reduce energy bills, experts said. Replacing windows last things you want to do," said Pascale Maslin, founder of energy auditor Energy Efficient. "First you want to seal up your house, and that takes more time than it does materials. See want to get your house insulated."

Carol Rosen, who lives in a four-bedroom, 3,200-square-foot house in North Bethesda, spent \$32,000 to get her 26 windows replaced.

Before, she said, "when a wind would come through, you could see the curtains billow."

She said she thinks she's saving money, but with energy costs going up, it's hard to tell. Her longer feels drafts between the windows.

Plus, she replaced wood windows with vinyl, so not having to paint them anymore has a time.

There are many details involved in windows, but if you're interested in replacing yours, here are the basics.

— Before you replace your windows, Nils Petermann of the Alliance to Save Energy recommends a home energy audit to help determine how to make your home, including windows, more efficient. You may be able to get away with just replacing glass, which he says has improved since the 1970s. You might just need weatherstripping or caulking to block holes. You may also interior or exterior storm windows or plastic window films to keep the hot and cold air out.

Jim Conlon of Silver Spring-based Elysian Energy, which does energy audits, said window replacement is one of the least cost-effective ways to make your home more energy-efficient. Take that step if you have single-pane windows with metal frames or your windows are broken or rotting, he said.

Thinking Of New Windows? Save Your Energy

by CHERYL CORLEY

October 11, 2009

text size A A A



Enlarge
A work crew replaces the old window at Nancy Munson's home in Downers Grove, Ill.

Those who choose this route can now get a federal tax credit of up to \$1,500. Nancy Munson, a resident of Downers Grove, Ill., a suburb west of Chicago, is one of many rushing to take advantage before the tax credit expires at the end of next year. Her 1950s-era two-bedroom cottage has its original windows, which have single-glass panes and metal frames.



Enlarge
Nancy Munson shows off one of the new vinyl replacement windows that she had installed in fall.

Windows Resources

— The Energy Star Web site provides information about the federal tax credits for energy efficiency. Click on windows and doors for information specifically about windows.

This story is part of a series called *How Green Is It?* airing on All Things Considered. The series examines some of the things Americans are doing — and buying — to help the environment and whether those steps really are as "green" as they seem.

Windows can provide great views and fresh air, but they also can run up energy bills. That's why many people opt to replace old drafty windows at home with new energy-efficient ones.

Those who choose this route can now get a federal tax credit of up to \$1,500. Nancy Munson, a resident of Downers Grove, Ill., a suburb west of Chicago, is one of many rushing to take advantage before the tax credit expires at the end of next year. Her 1950s-era two-bedroom cottage has its original windows, which have single-glass panes and metal frames.

"I was tired of my heating bills being so high in the winter because the windows were so drafty," Munson says. "I would put up plastic [over the windows], but the plastic would actually blow off because the wind would go right through the window."

After she put energy-efficient vinyl-frame windows in the back of the house last fall, she says, her heating bills dropped by \$25 to \$50 each month. Munson is spending \$9,000 for the front windows and hopes her energy costs will drop further.

Are New Windows The Best Approach?

Energy experts say there are less-expensive ways to reduce energy costs. Brandon Thiele, the founder of Chicago Energy Consultants, says investing in windows is last on his list in terms of building energy efficiency.

"You can't deny that a single-pane window is not going to be outperformed by a new double-pane or triple-pane window," Thiele says. "But the money that you would typically spend on that is typically better spent on sealing air leaks in the home and increasing insulation levels."

More Information

Sample Articles Targeted to Educate the Consumer