WHY SHOULDN'T I REPLACE MY WINDOWS?

People constantly tell to me they need new windows because they fear lead paint, want better soundproofing, energy efficiency and easy cleaning. Then the answer is to restore original windows, not replace them.

Restoration costs less and the windows will be lead free, soundproof, energy efficient and easily cleaned. I've trained many small contractors and homeowners how to perform this task efficiently and cost effectively. For those who insist they want tilt-ins for easier cleaning, this system gives them an easy cleaning solution as well.

All of this and a new combination wood storm/screen or interior storm cost less than a wood tilt-in with vinyl jamb liners and no storm. This system keeps the sash weights, cuts nothing off the window sash and removes all old paint and glazing. My friend John Seekircher always says, "The reason they call them replacement windows is that you have to replace them over and over again,"

EPA & HUD lead paint regulations are out of control. The facts however fly in the face of this anti-preservation intrusion into our lives. Lead poisoning in children has been depicted by HUD and the EPA as an epidemic. The facts do not support this notion. Children today have less lead poisoning than ever before in history and it has little to do with lead paint regulations. Taking lead out of gasoline and better factory emissions are responsible for much of this.

In essence we should be teaching the uneducated, educated, poor and well-off families to clean their houses. Common sense education is all that's needed with lead paint. Lead paint is only a hazard if it's unstable. Removing lead paint from window jambs and sashes is a safe, quick and easy process if the homeowner or contractor knows how to do it. We must start immediately training small contractors & homeowners how to do this. Right now the contractors that are getting lead certified are gouging homeowner's pocketbooks because they can.

The reason homeowner's think they need to replace their windows is that the window industry spends tens of millions of dollars a year to convince them to buy their inferior products. It will take a consumer about 40+ years to get any payback from replacement windows with insulated glass and considering the following statements in the window industries trade periodical, Glass Magazine, the industry makes the case for restoration.

July 2001 Glass Magazine, By Editor, Charles Cumpstom, "The consumer's perception of glass is significantly different from the industry's. While some in the industry think a 15-year life is adequate, it is the rare homeowner who envisions replacing all his windows in 15 years."

Another article in 1995 in Glass Magazine by Ted Hart states, "Remember our industry, with rare exception, has chosen to hide the fact that insulating glass does have a life expectancy. It is a crime that with full knowledge and total capability to build a superior unit, most of the industry chooses to manufacture an inferior single-seal unit." **NOTE:** Single seal units are still the norm with an average seal life of 2 to 6 years.

As a side note to this, I am not a general contractor. I believe it is a conflict to teach people how to do these things out of one side of my mouth and then try to get their business out of the other. I do however buy endangered, residential historic properties and rehab them. This keeps me in the fray with the least conflict of interest. Outside of my own rehabs, my only professional purpose is to teach cost effective preservation methodology and neighborhood planning.

RESTORE & MAINTAIN WINDOWS
*****
DON'T REPLACE THEM

- New wood windows are made with new growth lumber that is not as strong or rot resistant as the old growth lumber in windows made before the 1950s.
- Insulated glass seals tend to fail in 2 to 6 years allowing condensation between the panes.
- Most insulated glass panels cannot be replaced once they fail. The entire window must be replaced.
- Primary window sashes were never intended to take a direct hit from the weather. In early years they had shutters then storms to protect them.
- Air infiltration is the biggest energy issue with windows. Vinyl windows, by their nature, have weep holes in their bottom rail to let the moisture seep out which allows massive air infiltration.
- PVC or vinyl is the most toxic consumer substance manufactured today. It can't be recycled, off gasses toxic fumes and has excessive contraction and expansion issues. It fades, cracks and has a maximum lifespan of 16 to 18 years.
- Metal clad windows are designed to allow water to seep behind the cladding. This causes early rot of the often finger jointed, new growth lumber underneath.
- The vinyl jamb liners that are needed for tilt-in windows have cheap spring balances and cheesy foam backing that have a lifespan of about 6 to 10 years.
- Double hung windows were invented in the 1400s as an air conditioning system. Lower the top sash and raise the lower sash. This lets the hot air and humidity out the top and brings the breezes in through the bottom. Most replacement units don't have a full screen to allow for this process.
- Aluminum, self-storing storm windows are not even a good windbreak. Metal conducts heat and cold while wood insulated against heat and cold.
- Sash weight pockets are only a problem if a house has not been caulked and painted properly.
- Quarter inch thick, laminated glass has better UV protection than all the low-e coatings. It also approaches the same thermal capabilities as insulated glass, is more soundproof, is safer and cost less than insulated glass. If retrofitting glass into an old sash is something you feel must be done, install laminated glass.
- Original window sash is a part of the footprint of your old house or building. Replacements often have different dimensions and sometimes the window contractor wants to reduce the size of your openings. This has a negative effect on the overall texture and look of the original footprint of your building.
- If you don't want to lift a finger to maintain or rehab your home then hire a contractor to restore your windows. Your restored windows will cost less, have a better payback, be easily cleaned, have a nice track system, and stop air infiltration, which means greater energy efficiency.

- Restored wood windows have another 100-year economic life before total restoration is needed again. Replacement windows can never be restored effectively.

Bob Yapp – Preservation Resources, Inc.

PRESERVATION DOESN'T COST, IT PAYS!

- ***Preservation*** is about maintaining or preserving our built environment. It's as much about community & positive economics as it is about saving our architectural heritage.

- ***Preservation*** is an outstanding economic tool for rehabbing houses and buildings.

- ***Preservation*** is a strategic ingredient in the revitalization of historic neighborhoods and downtown's.

- ***Preservation*** **usua**lly costs less than new construction.

- ***Preservation*** keeps more money in your community than new construction.

- ***Preservation*** techniques tend to retain original materials while saving you money.

- ***Preservation*** takes advantage of existing infrastructure like streets, sewers etc.

- ***Preservation*** increases property values.

- ***Preservation*** increases a community's property tax base.

- ***Preservation*** brings new businesses & people to communities.

- ***Preservation*** has been at the forefront of the "green movement" for 50 years

PRESERVATION RESOURCES, INC

Bob Yapp-217-474-6052

REHABILITATION VS NEW CONSTRUCTION

Rehabilitation keeps more money in the community than new construction. The U.S. Department of Commerce tracts the impact of production within a given industry three ways:

1) The number of jobs that are created.
2) Increase in local household income.
3) Impact on other industries.

The growing statistics in state-after-state, show that rehabilitation of existing structures outperforms new construction in all three of these measurements.

If you take a $1,000,000 renovation of a historic building and compare that investment to a $1,000,000 new construction project what would the differences in economic impact be?

A) $120,000 more dollars will initially stay in the community with rehab than with new construction

B) Five to nine more construction jobs will be created with rehab than with new construction.

C) 4.7 more new jobs will be created elsewhere in the community with rehab than with new construction.

D) Household incomes in the community will increase $107,000 more with rehab than with new construction.

E) Retail sales in the community will increase $142,000 with the $1,000,000 in rehab ---- $34,000 more than with the $1,000,000 in new construction.

F) Realtors, bankers, personal service vendors as well as restaurants and drinking establishments will receive more direct monetary benefit from the $1,000,000 in rehab that from $1,000,000 in new construction.

G) According to the Historic Preservation Services Division of the National Park Service, since 1978 federal historic tax credits have stimulated over 35 billion dollars in historic preservation spending nationwide. In 2004/05 over 6.5 billion was invested and the trend is only getting better.

Some of this information is from, "The Economics of Historic Preservation" by Donovan Ripkema

PRESERVATION RESOURCES

OLD HOUSE STUFF BOB YAPP USES

SASH-METAL WEATHER STRIPPING
Dorbin Metal Strip Manufacturer, Inc.
2404-10 S. Cicero Ave.
Cicero, IL. 60804-3492
1-773-242-2333

PULLEY COVERS
Blaine Window Hardware Co.
I7319 Blaine Drive
Hagerstown, MD 21740, Ph- 800-678-1919

SCREEN-STORM WINDOW COMBO
Adams Architectural Eldridge, IA
319-285-8000
1-888-285-8120

Acker Millwork Co.
3300 W. Pabst
Milwaukee, WI 53215

BEVEL CEDAR SIDING (Pre-painted)
Cabot Stains (only make the stain)
800-877-8246
Also: Olympic Stains

Westside Forest Products
RR # 3, Box 303
Bloomington, IL. 61704, Ph.- 309-827-4717
(factory painted 6 sides, cedar clapboard smooth & factory stained fiber cement siding)

CLAY TILE ROOF MFG.
Ludowici Roof Tile, Inc.
Box 69
New Lexington, OH 43764

MORTAR TESTING
The Collaborative, Inc.
1002 Walnut, Suite 201
Boulder, CO 80302, Ph- 303-442-3601

David Arbogast
Architectural Conservator
Mortar, Stucco, Paint & Plaster Analysis
Iowa City, Iowa 52247 Ph- 319-351-4601

MORTAR TESTING (Continued)
US Heritage Group
1-773-286-2100
Contact: John Speweik
(mortar analysis - will match mortar for color & original mix & supply it to you pre-mixed and ready to go - supplier of lime putty mortar)

PAINT SHAVER MFG
American International Tool
1140 Reservoir Ave., Suite L01
Cranston, RI 02920, Ph- 800-932-5872

HALF-ROUND GUTTERS
Historic Gutter Systems
5621 East "DE" Ave.
Kalamazoo, MI 49004, Ph- 616-382-2700

PULLMAN MFG. CORP.
(Counterbalances for windows)
77 Commerce Drive
Rochester, NY 14623
Office 716-334-1350, Fax 716-359-4460

STEEL WINDOW REPAIR
Seekircher Steel Window Repair
Scarsdale, NY
John Seekircher, 914-725-1904

NU WALL & RECYCLED RUBBER
Specification Chemicals
Boone, IA, Ph- 800-247-3932
Also: Glid-Wall by Glidden Paints

PLASTER WASHERS
Charles Street Supply Co.
54-56 Charles Street, Dept. OH
Boston, MA 02114, Ph- 800-382-4360

ARCHITECTURAL EPOXIES
Abatron, Inc.
LiquidWood & WoodEpox
Kenosha, Wisconsin
1-262-653-2000

THE SPEED HEATER
Safe, infrared paint removal tool
703-476-622

NOTICE
The attached list of names should be used as a guide for selecting products and services. While many of the companies and products named in this list have been successfully used on/with historic properties, their listing in no way constitutes a recommendation or endorsement by Bob Yapp. You are encouraged to check references as well as review the work, products and services prior to making any selection for your projects.

The Vinyl Lie

By Gary Kleier

Every day unsuspecting owners of historic homes, believing they are actually making an investment in their home, succumb to the vicious lies of an unscrupulous industry. Unfortunately, most will never know it. Most will never see the immediate undermining of their property value or the long term destruction of the structure of their house. And what is this vicious lie? Vinyl siding. Vinyl siding installed over wood siding. And the most vicious lie is that it will improve the property value of an historic house.

Debunking the lies

Lie number one: Vinyl siding will increase the value of your home.
As an architect involved in numerous historic restorations, I am frequently asked to evaluate an historic house prior to purchase. In virtually every case where vinyl siding has been used to cover original wood, the buyer wants to know the cost of having the vinyl removed and the original siding restored. In every case the same question comes up; "Why would they desecrate an historic house in this manner?"

Increasingly people across America are understanding the value of our historic properties. Like antiques, the closer it is to original the higher is its value. Frequently, the buyer not only sees vinyl siding as decreasing the value of the house, but wants the seller to pay for its removal. This removal and repair of the original wood siding is normally as expensive as the original installation of the vinyl siding.

Lie number two: Vinyl siding will make your house maintenance free.
There is no such product! Every material, every installation requires maintenance!
Vinyl siding installations require significant caulking, around windows, at corners, around doors, anywhere a "J" channel is used to terminate a run of siding. I have never seen a vinyl siding installation where caulking is installed in accordance with the manufacturer's instructions. Even the very best caulking, when improperly installed, will fail within a few years. And when it does, water will enter. Time to do some maintenance.

Vinyl siding is secured to the house by a nail or staple driven through a tab. This tab is designed not only to hold the siding to the house, but to allow it to move as it expands and contracts with temperature. If the fastener is too tight, the siding may buckle in the heat or break in the cold. This will usually result in the siding coming off the house in a windstorm. This rarely happens immediately. Usually it occurs a year or two after the installation, and after the warranty has expired. In addition, since the higher areas of the house are subjected to more wind, that is where the damage is most likely to occur. More maintenance, and maintenance the average homeowner cannot do.

Vinyl siding commercials will show you how the siding can withstand a blow from an object like a hammer. What they do not tell you is that the longer siding is on the house the more brittle it will become. Ten years later, that same piece of siding, exposed to the elements, may crack or even shatter under the same blow. A blow from a tree limb or from a ball and you have more maintenance.
In short, vinyl siding is not maintenance free.

Lie number three: You will never have to paint again.
Maybe we shouldn't call this a lie. The truth is, you never can paint again. Even the best vinyl siding will fade. The deeper the color, the faster it will happen and the more noticeable it will be. In 10 to 15 years vinyl siding will show a significant change in color.

Vinyl siding will also become dingy through an accumulation of dirt. Contrary to what the commercials would have you believe, we are talking about dirt that spraying with a garden hose will not remove. In ten to fifteen

years many home owners are dissatisfied with the dingy look of their siding and want to do something to restore it. (Sounds like maintenance, doesn't it?)

Sorry folks, not a lot you can do. Scrubbing the siding with soap and water (not just spraying it) will help a little. While that is faster than painting, it is far less satisfactory. Painting, however, is totally out of the question. At this time there are no paint manufacturer's I am aware of that will guarantee their paint over vinyl siding. Within a few years the paint will begin to peal.

By the way, if you do decide to wash your vinyl siding, never use a high pressure sprayer. The high water pressure may force water around the siding and through bad caulk joints into your house. Further, the high pressure may loosen the siding, or even remove whole sections that are already loose.

Lie number four: Vinyl siding will save you money.

In spite of what the manufacturers would have you believe, the life expectancy of a high-quality vinyl siding installation is approximately 20 to 30 years. The life expectancy of a high-quality, professional paint job is approximately 10 to 15 years. Since the vinyl siding installation will cost approximately twice that of painting, there is virtually no savings.

Should you choose to remove the old vinyl siding at the end of its life, you now incur the cost of removal as well as the cost of the new installation. At this point painting has become far less expensive.
Now that we've discussed what they do tell you, let's talk about what they don't tell you, and hope you will never discover.

Destruction of details

When you look at an historic frame house, you will notice a significant amount of detail. This may include moldings and brackets at the eaves, details in the siding such as fish scales or beaded edges, headers over windows and doors, and shadow lines at window and door trim. Virtually all of this is covered up when vinyl siding and vinyl eaves are added to a house. In addition, eave details such as brackets and moldings are frequently removed to facilitate the installation of the vinyl material. In short the installation of vinyl siding and eaves significantly reduces the character of the house.

To the individuals seeking to purchase an historic home, the installation of vinyl siding and eaves has not improved the value of the house but rather has destroyed the character for which he/she is looking. Therefore, the value of the house has been significantly reduced.

Destruction of Walls.

In a typical historic house of wood frame construction a wall would normally be composed of the following: plaster on wood lath, the wood studs, exterior sheathing, and wood siding. While these materials may seem solid to us, water vapor easily moves through these materials and escapes from the house during the winter months.

During the installation of vinyl siding a layer of styrene insulation board is applied over the wood siding, and the vinyl siding is applied to that. This insulation board forms an effective barrier to the passage of water vapor, thereby trapping it within the wall. During the winter months this water vapor will condense to liquid water and began rotting the wood materials. Over a period of years the structural integrity of the exterior walls can be completely destroyed. Further, the presence of deteriorating wood has been shown to attract termites and other wood attacking insects.

In summary, it is my opinion based on my experience as an architect that vinyl siding is not maintenance free, and it is not less expensive than painting. It is also my opinion that vinyl siding destroys the aesthetic quality of an historic house, and decreases its value, and can, over time, destroy the structural integrity of the house.

Like many products, vinyl siding has a place. It works adequately in inexpensive new construction where proper precautions are taken to prevent water damage. However, when the industry tries to sell this product as a maintenance free improvement to older homes, they are doing the public a great disservice. And when it comes to historic homes, they are costing you money.

Gary Kleier is the resident Old Louisville Architectural Conservator. He lives on Floral Terrace and is one of those folks who was instrumental in the landscaping and beautification of that little jewel of a walking court between Sixth and Seventh Streets. Gary specializes in restoration architecture and architectural forensic services and has a wide range of talents which are described on his own web site at http://www.kleierassociates.com/. This is reprinted with his permission.

Let the Numbers Convince You: Do the Math

U-Value = A measure of air-to-air heat transmission (loss or gain) due to thermal conductance and the difference in indoor and outdoor temperatures

TUNE-UP STRATEGIES

Storm window over single-pane original window

ANNUAL ENERGY SAVINGS

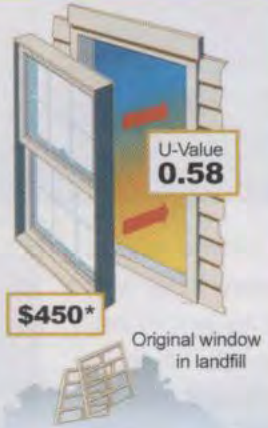
722,218 Btu

ANNUAL SAVINGS PER WINDOW**

$13.20

SIMPLE PAYBACK

$50/$13.20 = **4.5 Years**

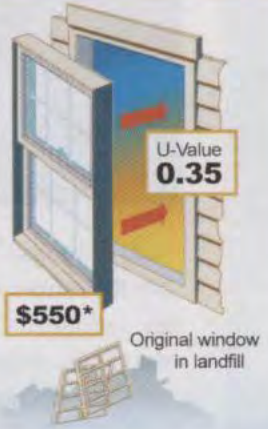


Double-pane thermal replacement of single-pane window

625,922 Btu

$11.07

$450/$11.07 = **40.5 Years**

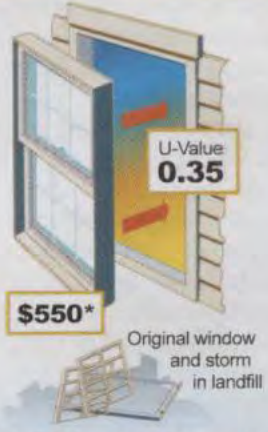


Low-e glass double-pane thermal replacement of single-pane window

902,772 Btu

$16.10

$550/$16.10 = **34 Years**



Low-e glass double-pane thermal replacement of single-pane window with storm window

132,407 Btu

$2.29

$550/$2.29 = **240 Years**

JOHN VAN PELT

*Cost of 3' x 5' window, installed
**Assuming gas heat at $1.09/therm

U-Value = A measure of air-to-air heat transmission (loss or gain) due to thermal conductance and the difference in indoor and outdoor temperatures

Source: Keith Haberern P.E., R.A.
Collingswood Historic District Commission

WHY HISTORIC DISTRICTS ARE A GOOD THING FOR RESIDENTS AND COMMUNITIES

Independent Studies on Positive Historic District Values

- Des Moines – Property assessments rose higher than the city rate in both Local Historic Districts
- In the Quad Cities, Rock Island has shown increase higher than the rest of the city in the Broadway National Historic District.
- Indiana study shows that values either mirrored or exceeded values in surrounding community in 5 Local Historic Districts.
- Chicago, Alexandria VA, Baltimore Maryland, Galveston TX, Savannah GA, Seattle, Multnomah County OR, State of New Jersey, Staunton VA

Siding

Other than brick and stone, wood is the longest lasting siding material.

If painted properly, exterior paint jobs should last 12 to 15 years with yearly maintenance.

Two of the largest residential, class action lawsuits were with synthetic stucco and fiber-board siding. Vinyl is the next big lawsuit.

Parts of Eastern Texas have outlawed vinyl siding for the rot it causes.

Vinyl siding cannot be made to protect from water penetration from the elements. As such, the factory flashing systems don't meet IBC, BOCA or the IBC codes.

Vinyl siding is even worse with original, vertical wood trim.

Backer board acts as a vapor barrier on the wrong side of the wall. Termite damage is the worst with replacement siding.

Virtually all vinyl siding companies are fly by night and won't be around when you have problems.

Vinyl is unstable over 160 degrees. It starts to deteriorate, fade, warp and distort in the first five years.

It is not maintenance free. It must be washed thoroughly on a yearly basis or it stains permanently with mildew, bird dropping, sap, and spores. This is a large job and it must be hand scrubbed as power washing can break the siding.

It is not possible to replace pieces to match in color after the first three months.

Most warrantees only cover manufacturing defects, not warping & fading, and they only cover materials, not installation costs.

Fire experts- it is not unusual for people to be killed by toxic PVC fumes before the fire ever gets to them.

FTC 1985- Replacement siding has no insulation value.

PVC is the single most environmentally damaging of all plastics.

PVC is the least recyclable of all plastics due to excessive number of chemical additives

Windows

In an article written by Ted Hart in 1992 in U.S. Glass Magazine he states the following, "Remember that our industry, with rare exception, has chosen to hide the fact that an insulating glass unit does have a life expectancy. It is crime that with full knowledge and total capability to build a superior unit, most of the industry chooses not to." That same article goes on to site accelerated testing of insulated glass by Cardinal IG that gives the standard single sealed insulated glass a 1 to 4 year life span. Insulated glass has always been a scam.

A new study that 1/4" laminated safety glass with an .006 laminate,

- Approaches the same thermal capabilities of a 5/8" air gap in an insulated unit
- It has better UV protection than low-e coatings 99.7%
- Is more sound resistant
- Safer
- Costs less.

What about Marvin Windows?

Small window companies that reproduce sash are just as economical as Marvin and generally give a far better product that matches.

Marvin Tilt-Packs have foam backed, vinyl jamb liners with spring balances that have, in my experience, a life span of 5 to 10 years max.

No primary double hung was designed to take a direct hit from the weather.

Shutters.
Screens & Storms.

Keeping Original Materials is Sustainable & Economic Rehab

1. The vast majority of heat loss in homes & buildings is through the attic/roof not windows.

2. Adding just three and one-half inches of fiberglass insulation in the attic has three times the R factor impact as replacing a single pane window with no storm window with the most energy efficient window.

3. Properly repaired historic windows have an R factor nearly indistinguishable from new, so-called “weatherized” windows.

4. Regardless of the manufacturers’ “lifetime warranties,” 30 percent of the windows being replaced each year are less than 10 years old.

5. One Indiana study showed that the payback period through energy savings by replacing historic wood windows is 400 years. While this is the high end, you can expect paybacks from 40 to 400 years. In the construction industry this is considered no payback.

6. Many old homes and buildings were built more than a hundred years ago, meaning their windows were built from hardwood timber from old growth forests.

Environmentalists go nuts about cutting down trees in old growth forests, but what’s the difference? Destroying those windows represents the destruction of the same scarce resource.

7. Finally, the diesel fuel to power the bulldozer consumed more fossil fuel than would be saved over the lifetime of the replacement windows.

The point is this: Sustainable development is about, but not only about, environmental sustainability.

• Repairing and rebuilding the historic windows would have meant the dollars were spent locally instead of at a distant manufacturing plant. That’s economic sustainability, also part of sustainable development.

• Maintaining the original fabric is maintaining the character of the historic neighborhood or institutional environment. That’s cultural sustainability, also part of sustainable development.

Note: This is a portion of a speech given by - *Donovan D. Ripkema a principal partner with Place Economics, a Washington, D.C.–based real estate consulting firm.*

PRESERVATION RESOURCES, INC
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Updated 4-25-2011

A COST BREAKDOWN FOR WINDOW RESTORATION V.S. WINDOW REPLACEMENT

The following is a break down of the costs to **completely** restore & weather- strip two original wood sashes in a double-hung window opening, including a new wooden storm window. It is important to note that often, total paint removal, epoxy repair, all new glass, new interior stop-molding, etc. isn't needed.

Window sash and jambs that are **completely** restored have a life of another 100 years with painting every 12 to 20 years depending on conditions. With the wooden storm they also exceed the u-value of a comparable replacement as described in the next paragraphs.

Replacement with two new wooden sashes in an original 33" X 67" double hung jamb unit with four, true divided lights on the top and one light on the bottom will run $800 to $1,200 for single pane with no storm window. Double paned/insulated glass in the new wood sash would raise the cost to $1,000 to $1,400 per unit installed with no storm.

Commercial grade, double paned aluminum sashes with fake divided light muntins and spring balances in the same size opening will run $1,200 to $2,000 with no storm.

The restoration labor time estimates below are based on a worker who is highly experienced in this type of window restoration process. They are also listed as accumulated time, not consecutive time. In other words, if you apply primer and two topcoats, there is dry time in between when other work is performed.

(A) is a traditional wood storm with putty glazed, fixed glass. (B) is a traditionally constructed wood storm with removable glass and screen from inside the house or building.

NOTE: These numbers do not include overhead, profit or travel time.

(A)

Material & Labor to Restore & Weatherize a Double Hung Window Unit with a 33" X 67" Opening. The Top Sash is 4, True Divided Lights & the Bottom Sash is 1 Light. Includes 1 New Traditional Wood Storm Window

Materials (Actual cost with no markup)

What	Description	Cost
Storm Window	Factory primed traditional wood storm 33" x 67"	$200.00
Glazing Putty	Linseed oil based glazing compound	$1.03
Weather Stripping	Rigid metal with EPDM rubber tube for storm & #199S-"Santoprene" T-slot rubber tube for bottom rail of lower sash, meeting/check rail & top rail of upper sash	$20.50
Weather Stripping	Dorbin ribbed/slotted strip metal double hung track system four-1-3/8"x 34", #4C	$14.17
Glass	Double strength glass, 4 lights per upper sash & 1 light on lower @ $2.00 per square foot	$36.00
Storm Hardware	Traditional storm hangers and 2 hook & eyes	$4.50
Sandpaper	100 grit 5" sanding disc- 2 pieces	$.30
Epoxy	Architectural epoxy wood filler-liquid & putty	$4.50
Tack Cloths	For cleaning bare wood surface	$.29
Glazing Points	For setting glass	$.20
Caulk	1 tube, Acrylic Latex caulk with silicone for bedding glass	$1.00
Sash Cord	24'-1/4" cotton sash cord with nylon core	$2.50
Moldings	New interior finish stop & parting stop	$8.50
Primer	Alkyd oil based primer with linseed oil-sash only	$2.25
Paint	Acrylic latex semi-gloss, 2 top coats-sash & storm	$3.50
Total Material Costs with Traditional Wood Storm		**$299.24**

Labor @ $35 Per Hour ($25 p/h plus employment overhead)

Task	What	Time	Cost
Sash removal	Remove sash from jamb, take off all hardware	.50 hrs	$12.50
Paint & Glazing Removal	Infrared paint removal from jamb. Infra red paint removal from glazing from sash	2.00 hrs	$50.00
Repair Sash	Re-pin and repair with wood or epoxy	1 00 hrs	$25.00
Clean & Prime all	Tack-off, clean & oil prime	.75 hrs	$18.75
Glaze	Set glass in caulk with points & install linseed based glazing putty	.75 hrs	$18.75
Paint Sash, Storm & Jamb	Apply and cleanup two top coats	1.00 hrs	$25.00
Hardware	Buff or wire wheel & lacquer or spray paint.	.25 hrs	$6.25
Weather-Stripping	Cut sash slots & install weather-stripping-sash & storm	1.00 hrs	$25.00
Hang Storm & Sash	Re-hang two sashes & one storm with hardware	2.00 hrs	$50.00
Total Labor Costs with Traditional Storm		**9.25 hrs**	**$323.75**
Total Material Costs with Traditional Storm			**+$299.24**
Total Window Restoration Costs with Traditional Storm			**$622.99**

NOTE: This is absolute worst-case/total restoration & weatherizing scenario

(B)

Material & Labor to Restore & Weatherize a Double Hung Window Unit with a 33” X 67” Opening. The Top Sash is 4, True Divided Lights & the Bottom Sash is 1 Light. Includes 1 New Screen/Storm Combo Wooden Storm Window

Materials (Actual cost with no markup)

What	Description	Cost
Storm Window	Factory primed combination storm/ screen wood storm 33” x 67”	$250.00
Glazing Putty	Linseed oil based glazing compound	$1.03
Weather Stripping	Rigid metal with EPDM rubber tube for storm & #199S-"Santoprene" T-slot rubber tube for bottom rail of lower sash, meeting/check rail & top rail of upper sash	$20.50
Weather Stripping	Dorbin ribbed/slotted strip metal double hung track system four-1-3/8"x 34", #4C	$14.17
Glass	Double strength glass, 4 lights per upper sash & 1 light on lower @ $2.00 per square foot	$36.00
Storm Hardware	Traditional storm hangers and 2 hook & eyes	$4.50
Sandpaper	100 grit 5” sanding disc- 2 pieces	$.30
Epoxy	Architectural epoxy wood filler-liquid & putty	$4.50
Tack Cloths	For cleaning bare wood surface	$.29
Glazing Points	For setting glass	$.20
Caulk	1 tube, Acrylic Latex caulk with silicone for bedding glass	$1.00
Sash Cord	24'-1/4" cotton sash cord with nylon core	$2.50
Moldings	New interior finish stop & parting stop	$8.50
Primer	Alkyd oil based primer with linseed oil-sash only	$2.25
Paint	Acrylic latex semi-gloss, 2 top coats-sash & storm	$3.50
Total Material Costs with Screen/Storm Wooden Combo Storm Window		**$299.24**

Labor @ $35 Per Hour ($25 p/h plus employment overhead)

Task	What	Time	Cost
Sash removal	Remove sash from jamb, take off all hardware	.50 hrs	$12.50
Paint & Glazing Removal	Infrared paint removal from jamb. Infra red paint removal from glazing from sash	2.00 hrs	$50.00
Repair Sash	Re-pin and repair with wood or epoxy	1 00 hrs	$25.00
Clean & Prime all	Tack-off, clean & oil prime	.75 hrs	$18.75
Glaze	Set glass in caulk with points & install linseed based glazing putty	.75 hrs	$18.75
Paint Sash, Storm & Jamb	Apply and cleanup two top coats	1.00 hrs	$25.00
Hardware	Buff or wire wheel & lacquer or spray paint.	.25 hrs	$6.25
Weather-Stripping	Cut sash slots & install weather-stripping-sash & storm	1.00 hrs	$25.00
Hang Storm & Sash	Re-hang two sashes & one storm with hardware	2.00 hrs	$50.00
Total Labor Costs with Storm/Screen Wood Combo Storm Window		**9.25 hrs**	**$323.75**
Total Material Costs with Storm/Screen Wood Combo Storm Window			**+$349.24**
Total Window Restoration Costs with Storm/Screen Wood Combo Storm Window			**$672.99**

NOTE: This is absolute worst-case/total restoration & weatherizing scenario

Retrofitting Main Street Buildings for Energy Efficiency

MAIN STREET IOWA
25
QUARTER CENTURY OF CHANGE

IOWA economic DEVELOPMENT

Introduction

Preservation Resources, Inc. (PRI) have been restoring and rehabilitating historic structures for 37 years. As historic property developers we have developed a finely honed understanding of what works for historic buildings based on our experience. Our views don't necessarily represent the views of IDED and Main Street Iowa, but offer a unique and experienced perspective on the topic of energy efficient retrofits for historic buildings.

Why Retrofit Historic Building for Energy Efficiency?

Retrofitting Main Street buildings for energy efficiency is critical to sustain the cultural and economic health of any Main Street community. As the energy sources for generating heat, air conditioning and lighting continue to deplete, we will continue to see ever increasing costs. It is important owners or potential owners of our historic downtown buildings understand there are ways to increase efficiency without spending a fortune. The good news is that this can be done while retaining important architectural integrity of the building and its historic elements.

So, there is a balance to be achieved. The balance between economic return and investment. The balance between comfort and culture. The balance between government and the private sector. The balance between modern systems and historic integrity.

The art to achieving this balance is understanding how to achieve cost effective energy efficiency retrofits, while respecting the architecture. Historic Main Street buildings were constructed before modern HVAC systems and insulation products. As such, many of these retrofits must be thought through so situations aren't created that can actually harm the structural elements of a building or the historic and valuable fabric.

Since financing is so critical to quality rehabilitation of any historic structure, it's important to understand what the purpose and intent of the National Park Service, (through the State Historical Society of Iowa), is when the Federal 20% or state 25% Historic Tax Credits are used. Yet, even if these tax credits are not utilized, preservation based, energy retrofits are the right and most cost effective approach for Main Street buildings.

The Secretary of the Interior's Standards for Rehabilitation is a helpful guide to understanding this balance between preservation and energy efficiency. These standards must also be followed when receiving federal/state grants or tax credits.

Secretary of the Interiors Standards for Rehabilitation

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.

Decoded: This simply means that if you are going to put a building and its site into an "adaptive re-use", the new use should not be so extreme that it diminishes the historic integrity of the property.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

Decoded: Don't remove historic materials or character defining features of the historic structure. For instance, plaster over brick should be kept and not removed. This detrimental practice to achieve a warehouse look in a retail Main Street structure is needlessly removing historic materials and reduces energy efficiency.

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 features or architectural elements from other buildings, shall not be undertaken.

Decoded: Don't create a lie. Adding salvaged columns where there were none is a good example of this.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

Decoded: Early changes or additions that were done well show the progression of the architecture and create a sense of community values. Covering the entire facade of a historic building with insulation and corrugated metal in the 1950's is both structurally detrimental as well as an element that hides the significant, historic exterior. Removing this would be a good thing. However, an Art Deco facade installed in the late 1920's that was done well, would be a significant change that could be kept depending on what historical period for the property is most important.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.

Decoded: Simply don't cover, damage or remove architectural features. A good example of this would be replacing repairable, original windows. These are one of the most character defining features of any historic building and can be made energy efficient in a very cost effective way.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

Decoded: Keep as much of the original materials as possible. When they are deteriorated beyond repair, don't use shiny new materials that don't match. Patch and repair with materials that match well. It will cost less and keep the authenticity. If a wood or stone element needs replacement or patching, use wood or stone, not plastic trim or concrete blocks. Authentic materials are all available to us today either new or salvaged.

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.

Decoded: Do no harm! That is what preservation is specifically and theoretically. For instance, power washing above 900 psi can ruin historic wood, brick and stone. The test of time has revealed that acid washing re-pointed brick or stone is detrimental to these masonry units as well.

8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

Decoded: Don't mess with archeological sites. For instance, if you are drilling wells outside a building for a geothermal HVAC system, it's best to contact your SHPO to be sure there are no potential archeological sites involved. One of the worst offenders are these so-called "Outhouse Archeologists". They try to find old outhouses and rob the artifacts. Stop if you find anything that even resembles an archeological site and call your SHPO.

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 historic integrity of the property and its environment.

Decoded: Once again, don't create a lie. It's perfectly acceptable to build an addition to a historic structure if the zoning, land use and placement don't harm the architecture of the original structure. Trying to make an addition look like it has always been there is creating a lie. However, It shouldn't look like the alien mother ship landed on the back of the structure. It should flow and pick up some muted detailing, while being offset or clearly delineated as an addition.

Another example would be wind turbines sticking up above the roof line or solar panels visible from a public right of way. These additions would not be ok.

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.

Decoded: Don't attach anything to a historic structure that cannot be removed at a later time. Cope around drip ledges and other features so that if your addition is declared "Inappropriate" in 100 years, it can be removed without harming the original structure.

Recently, in the beginning of 2011, the National Park Service published a new document that addresses energy efficient retrofits and integrating other sustainable practices with historic structures titled, "The Secretary of the Interiors Standards for Rehabilitation & Illustrated Guide on Sustainability for Rehabilitating Historic Structures". This can be found at http://www.nps.gov/history/hps/tps/download/guidelines-sustainability.pdf

Where to Start

When considering energy retrofits it is critical to first have the structure analyzed for its current energy footprint.

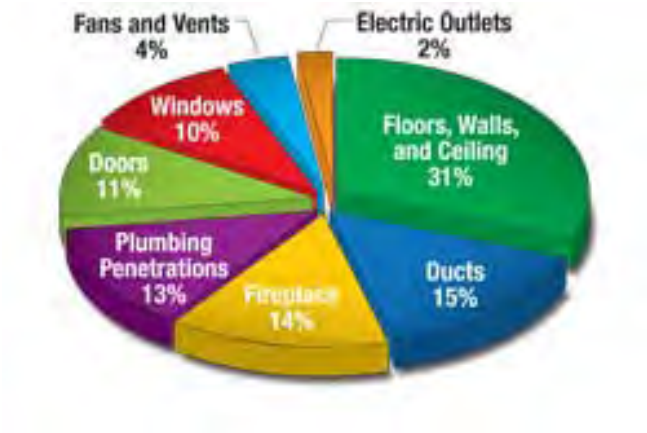
To start with, have an energy audit which includes blower door testing and infrared testing. Be sure to have an analysis of the existing HVAC system as well. Examine the entire structure to determine what positives exist in the original design. Historic buildings were generally designed for air flow. This air flow was achieved using transom windows above doors, operable windows and light wells with operable windows. Energy savings can be realized by keeping these elements while also retaining original features like enclosed entryways and glass walls between offices.

Once this process is completed, you will know exactly where the energy losses are occurring. Without this information, unnecessary dollars could be spent where retrofits are not needed.

Air Infiltration

Excessive air infiltration is one of the primary energy loss aspects of any historic building. Tightening up a building to stop this is cost effective and as such, will deliver one of the biggest paybacks achievable. Historic buildings by their nature are leaky. Again, the key is stopping ***excessive*** air infiltration. You certainly don't want to seal the structure to the point where there is no transfer of air from the

exterior to the interior and the reverse. Doing this can create an environment with stale air, too much moisture and potential mold issues. It's also important to understand where typical energy loss occurs through air infiltration.



Provided by The U.S. Department of Energy,
http://www.energysavers.gov/tips/air_leaks.cfm

All of these penetrations as well as electrical conduit, wiring and roof penetrations should be caulked or insulated prior to installing regular insulation systems. Windows and doors should be weather stripped as well.

Basements are huge air infiltration source. Often these foundations are brick, cut stone or most likely rubble stone in earlier buildings. All box sills (the area between the floor joists that rest on the foundation), sill plates and penetrations should be caulked.

Foundations should be inspected for mortar issues and cracks. Bad mortar should be re-pointed with like mortar and cracks should be filled. Exterior entry doors should be weather stripped and if there are basement windows, they should have weather stripped storm windows. It's a really bad idea to take an operable basement window and replace it with masonry or glass block. Basements need a way to ventilate and operable windows were installed primarily for this purpose.

Windows Realities

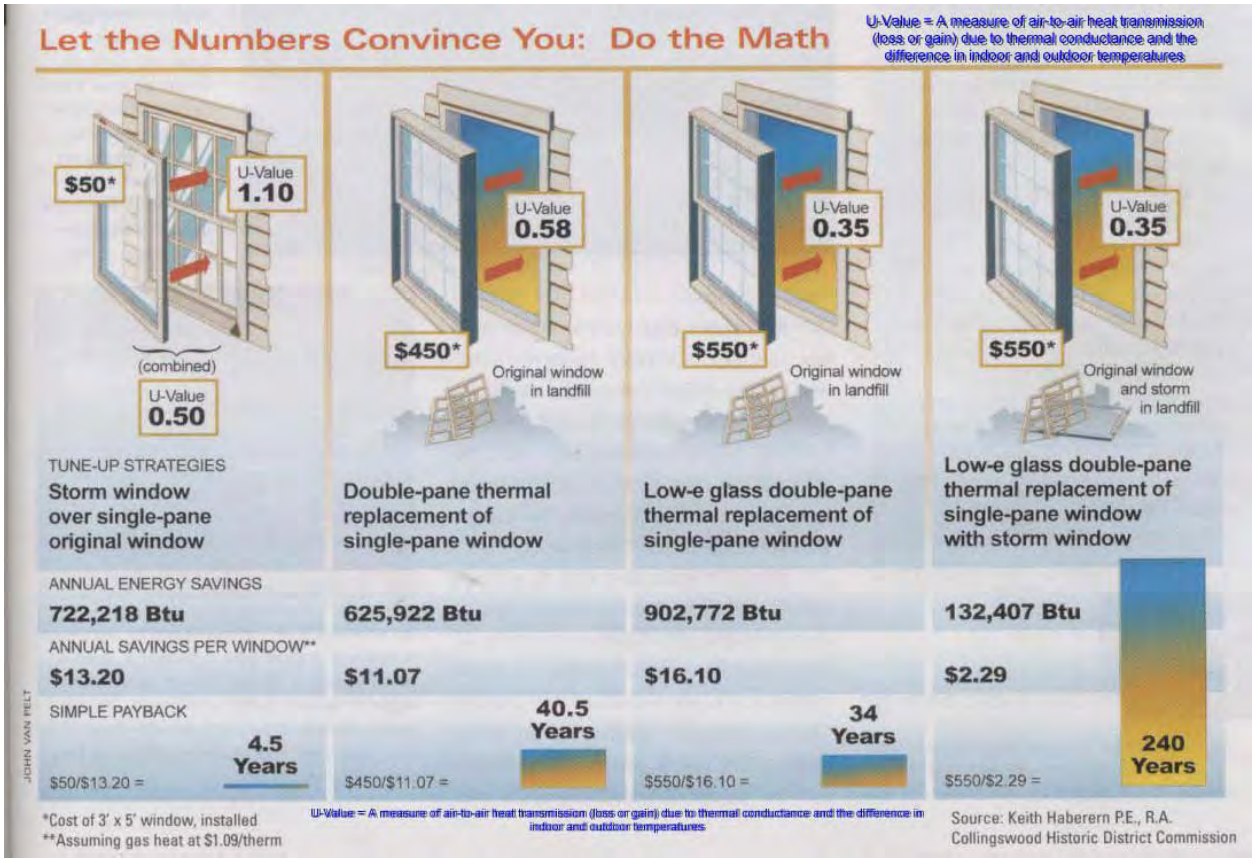
Typically windows comprise only 10% to 15% of the energy footprint of any historic building. This surprises many building owners. If you listen to the massive marketing done by the window replacement industry, you'd think it was 80%. Don't be fooled.

Historic windows are one of the most important architectural features of any Main Street building. They have usually been in service for over 100 years and can be cost effectively repaired, made more energy efficient than a replacement and will last another 100 to 200 years. Yet, many people somehow believe if they don't replace them, their buildings couldn't possibly be energy efficient.

The two primary questions with any window are, what is the U-value and air infiltration? Any window company that uses the insulation industries energy efficiency calculator, R-value, as the primary selling point has a fundamental disconnect with the science.

U-values, simply stated, are a calculation of how much energy passes through a one square foot area of a window in one hour. Most, if not all, window companies calculate U-values at the center of the glass instead of all over the window. This makes most of their claims inaccurate. Just the opposite of R-values, U-values are better the lower the number.

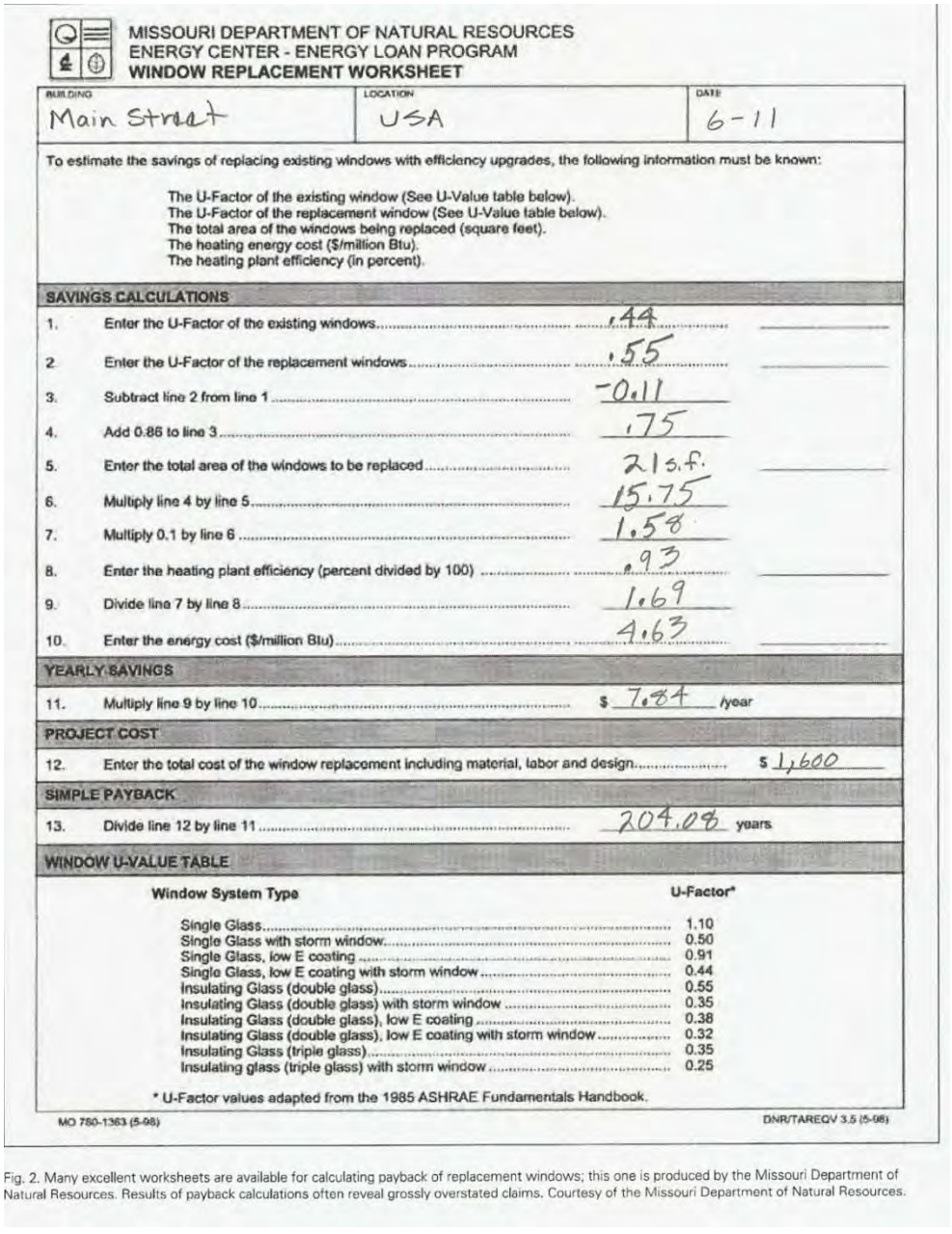
Here's a graphic that demonstrates this:



Used with permission from The Old House Journal

The historic window and storm have absolutely no weather stripping to stop air infiltration and together they still have a better U-value than a double paned (insulated glass) replacement window.

Here's another form called "The *Window Replacement Worksheet*" used by the Missouri Department of Natural Resources to calculate the payback for replacement windows. This form is filled in assuming an un-weather stripped, historic window and wooden storm fitted with low-e glass is in place and proposed to be replaced with a new double paned (insulated glass), high tech, aluminum replacement window.



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

BUILDING	LOCATION	DATE
Main Street	USA	6-11

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	.44
2.	Enter the U-Factor of the replacement windows	.55
3.	Subtract line 2 from line 1	-0.11
4.	Add 0.86 to line 3	.75
5.	Enter the total area of the windows to be replaced	21 s.f.
6.	Multiply line 4 by line 5	15.75
7.	Multiply 0.1 by line 6	1.58
8.	Enter the heating plant efficiency (percent divided by 100)	.93
9.	Divide line 7 by line 8	1.69
10.	Enter the energy cost ($/million Btu)	4.63

YEARLY SAVINGS

11.	Multiply line 9 by line 10	$ 7.84 /year

PROJECT COST

12.	Enter the total cost of the window replacement including material, labor and design	$ 1,600

SIMPLE PAYBACK

13.	Divide line 12 by line 11	204.08 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 780-1363 (5-98) DNR/TAREQV 3.5 (5-98)

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.

As you can see, replacing that historic wood, double hung window (with a total opening of 7 feet x 3 feet = 21 square feet) with a high end, aluminum extruded, double paned window has a payback of 204 years. Even after installing this new window with no functional payback, it's still not as energy efficient as the un-weather stripped wood window, with a wooden exterior storm, it replaced.

With between $20 and $60 worth of weather stripping and a $400 wooden, exterior storm window, with low-e glass, you can expect the U-value to go from the stated 0.44 down to a 0.34 to 0.40. Even if you want total restoration to safely remove old lead paint and putty as well as adding new weather stripping, the total costs should run between $750 to $1,200 depending on the contractor, their level of skill and local wage rates.

So, by keeping the original window you save between $400 and $850 on the window work, per opening, and have a more efficient window. These windows can operate with one finger and have wooden exterior storms with removable glass and screen panels from inside the building so the primary wood storm always stays in place. As a bonus the exterior side of the double hung windows can be cleaned from inside the building by removing a few screws and swinging the sash into the room sideways.

The National Park Service has really come around over the last few years in regard to installing exterior storm windows. For too long they only allowed interior storms. This practice on historic Main Street buildings has been a disaster.

Window sashes were never intended to take a direct hit from the weather. Exterior storms replaced shutters sometime in the mid-Victorian Era as a way to protect window sashes. It's now known they are a good source of energy efficiency as well.

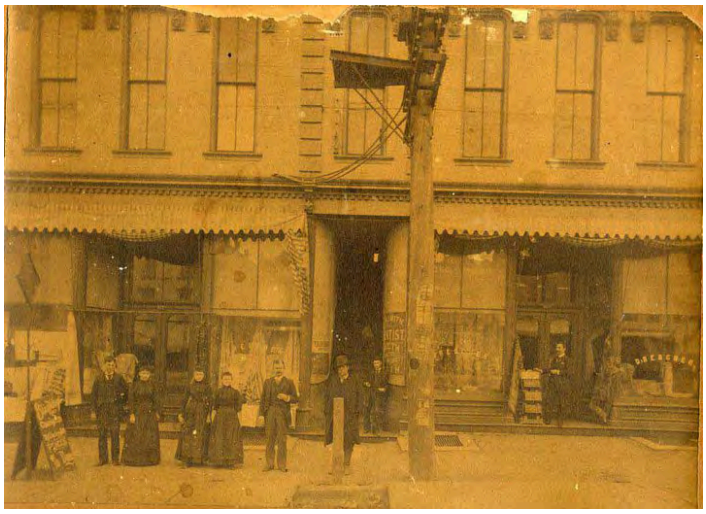
Interior storms make it so the windows cannot be accessed in order to operate them. Having operable windows saves on air conditioning costs and fresh air is a basic human need. The biggest problem with interior storms is that they generate about double the normal condensation you see with exterior storms. This has rotted tens of thousands of historic windows and should not be done unless there is no other alternative.

Awnings for Controlling Solar Gain

Awnings have a great track record for historic Main Street buildings. According to the US Department of Energy, "Window awnings can reduce solar gain in the summer up to 65% on south-facing windows and 77% on west-facing window."

While every building is different and orientation to the sun varies, awnings can potentially save 10% to 25% on energy costs per year.

Awnings have been a part of Main Streets since they were developed.



1894 Main Street building with retractable awnings

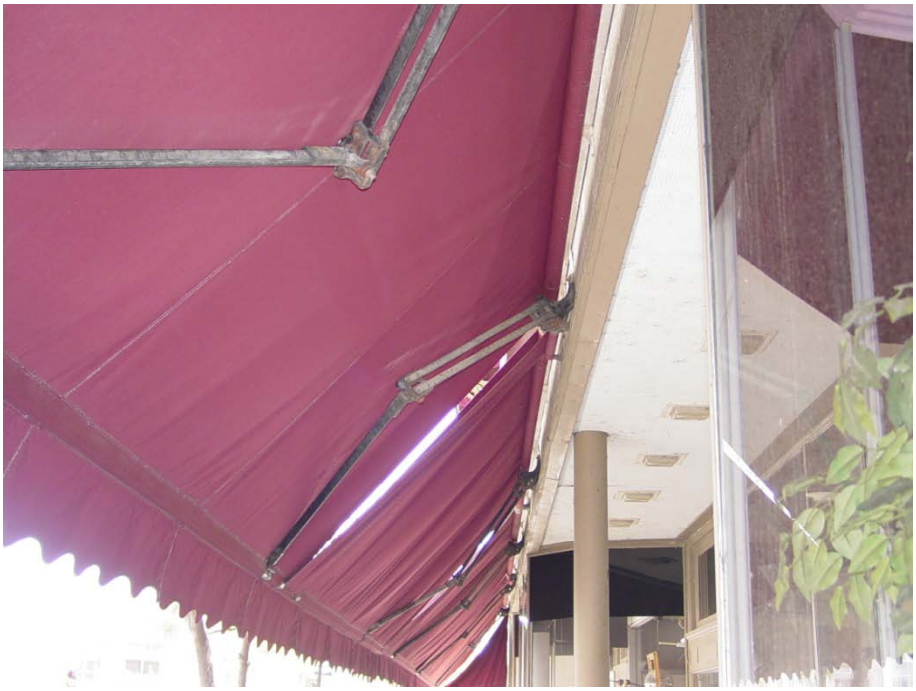
1904 Main Street building with retractable awnings

1910 Main Street building with retractable awnings

2011 Main Street retractable awnings

2011 Main Street retractable awnings

Awnings should not be fixed and stationary. Retractable awnings can be moved in or out depending on the season and time of day. This can be done manually or by remote control.



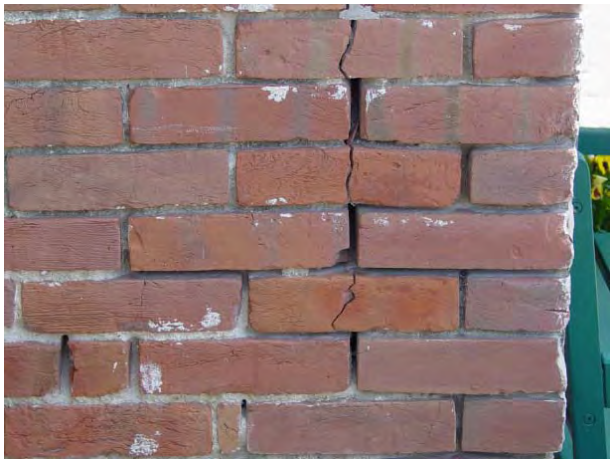
Historic retractable awning frame with newer canvas

Manually retractable awning with pole-hook devise

Masonry

Most Main Street buildings are constructed with masonry. By far, the largest percentage were built with brick and had stone or metal details like lintels, sills and cornices. When mortar has deteriorated or caulking between the wood and stone elements is failed, we see excessive air infiltration into the building. This can be eliminated by re-pointing the brick/stone and adding new caulking/paint.

1840's Main Street building with deteriorated brick & failed caulking



Mortar & brick deterioration due to hard, Portland cement based mortar repairs

Insulating Your Building

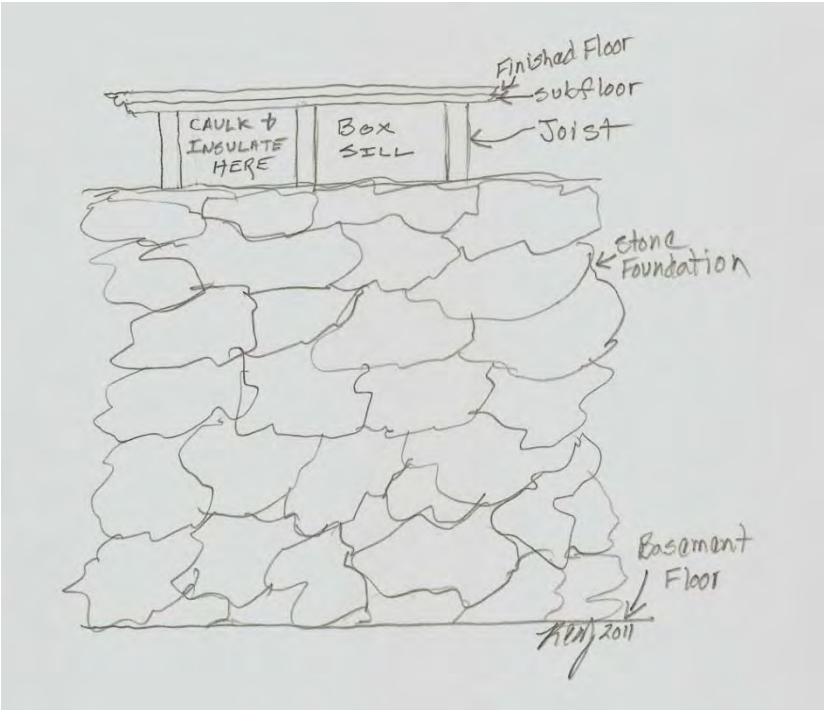
There's a lot of debate about insulating historic structures. The recommendations here are based on science and the 37 years of experience that Preservation Resources, Inc.'s President, Bob Yapp, has as a historic property developer. The idea is to make the building as energy efficient as possible while doing no harm to the structural and architectural elements.

First, a basic understanding of how heated and cooled air moves through a building. You have to imagine a building is like a chimney. The heated air rises up through the building as if it were heat rising up through a chimney. This is also true for residential, stand-alone houses.

On its way up through the building, some of this heated air can be sucked out by holes and gaps in the building that create excessive air infiltration.

The opposite happens when a building is air conditioned in the spring, summer and fall. Cold air falls through the structure and again, some of this cooled air can be sucked out by holes and gaps in the building that create excessive air infiltration.

So, the very best place to insulate, after addressing air infiltration, is in the floor joist cavities between floors and the roof deck. Also in the basement where the wood beams or what we call floor joists rest on the foundation. We call these areas the box sills.



Box sills are a critical place to caulk and insulate

Again, it is essential that before any insulating is done the excessive air infiltration, as discussed earlier, must be addressed first.

Most, if not all, Main Street building were built with some type of masonry. Brick, stone, concrete block and clay tile block represent most. Since there are so few wood frame structures, the following section will address insulation in masonry.

These construction techniques vary in height from one story to two story but typically not more than three stories.

There are three basic structure types:

1) Full party wall

These are structures sharing side walls with the buildings on either side.

2) Partial party wall

These are structures typically on corners or where a former party wall building was demolished. They typically share one wall in common with another building.

3) Stand alone

These literally stand alone and have no connection to any other building.

Where to insulate & with what

Floors & ceilings

In masonry building types, it's important to understand that each heated and air conditioned floor of a building is essentially a standalone space. Most have heated and air conditioned basements that tended to be used for storage and utility equipment. First floor retail, office space, restaurants, galleries or studio space function independently from upper floor apartments, lofts or office space. These spaces, other than basements, generally have separate tenants.

Because of these conditions, insulating the joist structures between floors is very important. By doing so we are keeping the heat and cool air in the space it was intended to be.

First, you need to assess the historic fabric of the ceiling space and the flooring material above it.

On the underside (ceiling), often you will have a three coat plaster ceiling installed over wood lath. Other variants are decorative pressed tin ceilings installed over three coat plaster (rarely over open joists) on furring strips and occasionally decorative plaster or wood treatments. These elements are critical to the historic integrity of the property and should not be removed, covered or damaged.

If at all possible insulation should be installed from the flooring side on top of the joist system. Most upper floors have tongue and grooved wood flooring and occasionally ceramic tile in selected areas.

Wood flooring installed directly over the floor joists, with no subfloor, is always laid perpendicular over the joists. Several rows of the flooring at the wall on opposite sides of the room can be carefully removed so that insulation can be blown into the floor joist cavities. If there is a subfloor under the finished tongue and grooved flooring, holes can be drilled into the subfloor to accomplish the same thing.

It is very important to note that you should never install dense pack cellulose or any foam based insulation into a floor space with a historic ceiling attached below. Foam is installed wet and as such, can harm the ceiling below. Both foam and dense pack cellulose can and usually do cause "pillowing".

Pillowing occurs when dense materials are pressurized into wall or ceiling cavities causing the lath and plaster to bow or pillow out. This causes catastrophic failure of the lath and plaster systems by loosening the lath nails as well as causing the plaster keys holding the plaster to the ceiling or wall, to break off. Not good.

It is best to blow loose fill cellulose, cotton or fiberglass insulation into these floor joist cavities. Once this is done, the tongue and grooved flooring at the edges can be replaced.

Attic & Roof

Unfinished and unheated attic or crawl spaces directly below roof structures need to be insulated and ventilated properly.

Either cellulose, cotton or fiberglass insulation in loose fill or batting should be installed in the Iowa climate to no more than an R-40. Some energy codes are now requiring an R-49 in residential attics. In Preservation Resources, Inc.'s experience, anything over an R-40 in a historic building, with an unheated attic space, has shown signs of abnormal condensation build-up.

Adequate ventilation for roof health and to prevent ice damming should equal 1 square foot of net free ventilation for every 300 square feet of attic floor space (1 in 300). Most codes call for ventilation in these spaces to be 1 in 150 but we feel this is excessive for an old or historic building. Historic buildings by their nature have more air flow and unintended air infiltration.

If there is an unheated attic or crawl space blow the roof structure, there is no need to insulate the roof. However, if the ceiling of the top floor of the building is the roof structure, it will need to be insulated to R-40.

Roof structure insulation starts on the roof deck by applying membrane over insulation board. The underside of the roof is the only place we recommend using open cell, spray foam insulation. Open cell foam is effective because if the roof deck leaks, the water will not sit between the wood deck and the foam which rots the wooden deck. In order to do this, generally the ceiling must be removed and plaster or gypsum board installed after installation of the foam insulation.

Again, if there are decorative finishes on this upper floor ceiling, we recommend against removing it and blowing-in loose fill cellulose, cotton or fiberglass insulation.

Basements

After basement air infiltration issues have been taken care of, we recommend installing the thickest foam insulation board you can afford into the box sill areas around all exterior perimeter sides of the structure. This should be friction fit snugly.

We do not recommend insulating the basement floor joist system unless the basement is to become living or working space that is heated independently of the floor/s above.

Exterior Walls

We do not recommend insulating the exterior walls of historic masonry structures. While this may seem odd to many, there are good reasons not to do so.

By far the majority of historic Main Street buildings have plaster installed directly over the brick walls. In later structures, 1880's forward, we occasionally see 2" x 2" furring strips attached to the brick with lath and plaster over it.

Historically and practically it makes no sense to frame over historic plaster on brick in order to install insulation. The plaster and brick together create a thermal mass that absorbs and retains heat and cooling during each respective season.

Nor should plaster installed on brick or furring strips be removed to create the 1980's exposed brick warehouse look. Interior bricks were lower quality and the mortar was not done as a finished look. Removing this plaster takes away from the thermal mass effect and you're removing important historic materials needlessly.

Insulating theses walls creates a minimal R-value and can potentially cause moisture damage to the masonry. When insulated, the thermal mass of the multi-layered brick walls on all four side of a building is denied the ability to do its job.

The amount of energy saved by insulating the exterior walls of a masonry building with historic materials in place is so minimal that there is no effective payback.

So what about blowing insulation into the 2" x 2" cavity over some brick walls?

In an article titled, "Don't Be Dense—Cellulose and Dense-Pack Insulation" written by Joseph Lstiburek in 2010, he says, "Paint problems are not uncommon as a result of dense packing walls in older buildings." He goes on to say, "Even so, I still think dense packing of walls is a good idea, but it is not risk-free."

Mr. Lstiburek loves dense pack cellulose but fully admits it causes paint failure from excess moisture. It also negatively affects brick and mortar joints for the very same reasons. We contend that the payback is too low and risk is too high.

One of the top reasons for masonry failures, mold, paint failure, termites and structural damage to old buildings is insulation installed in new exterior frame walls or blown into the existing exterior plastered walls. Doing this stops the natural flow of water vapor through the masonry wall and traps moisture.

Again, the primary issue for energy efficiency is stopping air infiltration. There is no reasonable payback to adding insulation into or onto your exterior masonry walls.

HVAC (heating, ventilation and air conditioning)

It is essential that you have the existing heating and air conditioning systems thoroughly inspected by a mechanical engineer before you make any decisions about replacing these systems.

To many building owners it may seem over the top to have a mechanical engineer inspect or design a new system for your little two story, party wall building, but it's worth it.

There are a lot of well meaning HVAC contractors out there who do great work. Many of them can engineer a good system or give you an objective opinion about your existing system. However, regardless of whether you or the HVAC contractor thinks he can do both, there is the serious potential for a conflict of interest. HVAC contractors make their money selling you systems.

A mechanical engineer is an independent third party who only represents your best interest. They may charge you between $500 and $2,000 to analyze your existing system (depending on the size of the building and complexity of the existing system). Be sure the engineer has experience with historic building and forget about hiring a home inspector to do this.

What's astonishing is that in about 30% of the inspections Preservation Resources Inc. has had completed, the recommendation was to keep the current system and tweak it. If this is the case, it could save you tens of thousands of dollars.

If the system is found to be too inefficient or dangerous, the mechanical engineer will study how your building functions and design a system that will be the most efficient and actually work. The payback will be better and you'll be money ahead.

Additional Energy Savings

Lighting

Installing energy efficient lighting and bulbs can have a significant impact on electrical use. Motion sensors that turn hallway lights on and off as people actually use them is an idea that's been used in Europe for decades. Timer devises are also helpful to assure lighting is only on when people need it.

Preservation Resources Inc. has always used lighting that goes with the period of the building. We consider lighting a major part of the architectural integrity of any historic structure. Whether you use reproductions or restored antique lighting, it's important to use lighting devises (bulbs) in these fixtures that are as energy efficient as possible.

Go to the U.S. Department of Energy for more info on the best lighting devises for your energy retrofit, http://www.eere.energy.gov/buildings/documents/pdfs/26467.pdf

Ceiling fans

Ceiling fans have a long history in Main Street buildings. Tall ceilings are part of the charm of any historic building. Ceiling fans help keep the warm and cool air more evenly distributed throughout each space. Period reproductions that are more energy efficient are readily available.

Public Relations Strategies for Smart Energy & Preservation Choices

As leaders in your Main Street program it's good to understand all the reasons to retrofit Main Street buildings for energy efficiency utilizing historic preservation as a foundation. However, unless you get the word out in a simple, understandable way, you'll have difficulties engaging your Main Street building owners and stakeholders.

Every community is different, yet there are many factors that remain the same across the state.

1) Be an educated energy consumer

Be sure you understand and agree that "Smart Energy & Preservation Choices" is the right direction for your community. Take a bit of your valuable time to thoroughly read and understand these materials. Go to some of the links provided to gain an even better understanding.

2) Know who you are trying convince. Understand their sensibilities and motivations.

Building owners

Most often owners of historic Main Street building are driven by economics. There are always a few who also understand the value of preservation, but most will be motivated by the positive economics of preservation and energy retrofitting.

Times are tough and in the Midwest, business people tend to be very "property rights" oriented. You're not going to change this but you must understand it. Full frontal assaults will not work. It's best to come in through the "back door" with the economic argument.

Business owners

Some businesses own their buildings, while many are leasing spaces. Energy retrofits, as described in this campaign, should be a bit easier with business owners once they see that energy retrofits will lower the cost of doing business.

They'll want to know that business interruptions are generally not needed for the preservation approach to these upgrades.

City officials

Mayors, City Managers, Council Members and City staff need to be full partners is this campaign.

Realtors

Realtors can be one of your best allies or not. It is very important to coop Realtors into this campaign. Energy efficient historic buildings that also preserve the character of the architecture, lease or sell either more quickly or for more money. This puts more money in Realtors coffers in each scenario.

Invite key Realtors to an annual tour exclusively for them. Show them what great things your Main Street property owners have done to preserve and weatherize their buildings. Be sure to feed them.

Media

Work with the local media outlets. Newspapers, radio and television can help you win the day. You must understand they want stories with a human interest side to them. If the story is too complicated they cannot turn around and make it understandable, you must do that for them.

Whether or not it's easy to accept, news is about who has the tightest and most concise message or what media calls "sound bites". Like business, good media coverage is about creating relationships.

Contractors

Identify local contractors who either do preservation/energy work or could do it. They will be critical to the success of this campaign since they will be doing the work.

Bankers

Bankers will be a critical partner in your efforts. They hold the key to private financing and have the ability to create programs with you.

Utility companies

The two largest energy suppliers in Iowa are MidAmerican Energy and Alliant Energy. There are also small utility companies, like municipal utilities, as well as cooperatives here and there. Meet with them. Let them know what you're doing so they can also be a partner in smart energy choices.

Downtown neighborhood groups

Historic neighborhoods surrounding Main Streets are usually the most energetic about preservation. They are the troops who also have a vested interest in seeing the Main Street thrive.

There's an old planning adage that is more true today than ever. Main Street development cannot be done in a sustainable way without equal effort being put into the surrounding historic neighborhoods.

Meet with these folks. Most of the citizens in your community feel a sense of ownership in their downtown/Main Street. Engage them and they will want to be involved.

3) Face to face communications

Get the word out

This is best done by committee. Break down the constituents you need to work with as described earlier. Each member of the committee should be tasked with coordinating face to face, one-on-one conversations with the key players within the group they've agreed to work with.

The people picked to work with each group must have credibility with the folks they'll be talking to. For instance, it's best to have a building owner talk to other building owners. Each member should study and memorize the talking points as they relate to their constituent group.

These one-on-one meetings will give you a better idea of what the positives and objections are to the message you're creating. It is sort of like a whisper campaign to test the waters.

After everyone has had their one-on-one visits, meet to go over what was learned. This is the point where the committee tightens up the message and then takes it to the next level.

Local newspaper

Meet with the local newspapers editorial board. Be sure you have your message tightened up and have a response for any anticipated objections. They must be your ally in order to get the message out that, energy efficiency through preservation doesn't cost, it pays.

Fill them in on your basic plans to promote this idea as an economic development tool.

Coordinate a good letter-to-the-editor with an in-house editorial.

Service clubs

Have key committee members speak at the various service club meetings. These are the business leaders in your community and they can get the word out. Be sure whoever is speaking has credibility with these folks and speaks well.

Financial incentives

A) Meet with the decision makers from the local banks as a group. Bankers are almost always interested in community based efforts that create economic development as well as profits for their banks.

Get their ideas on a financing package they could put together as a team. These types of Energy Retrofit loans are best done when the risk can be spread out amongst multiple bankers.

These types of small business loans are advantageous to the property owners and the banks. With existing incentives and tax credits, preservation oriented energy retrofits are cost effective with quick paybacks. This means less money on energy costs and more money staying in the local economy.

B) Find a key contractor or architect who is willing to give free technical advice. Too often it's suggest folks should do this or that but resources aren't provided to help them figure out how to do the work properly and cost effectively.

C) Create a one-page flyer with all the financial incentives relevant to your community.

Seminars & workshops

A) Plan and conduct a seminar for Energy Retrofits. Utilize these materials as well as others. Bring out the financial incentives and the local banker loan program.

Personally invite each building owner. Create a simple, small card flyer announcing the event and hand it to each building owner in person. Use email as well to re-enforce the importance to their pocketbooks and the date.

Write a short and to the point press release. Send it to all the media outlets in the community.

Be sure to personally invite all the local media. Feed people and have a local, dynamic speaker who is concise and to the point. This should not be longer than an hour. Plan it for a time building owners will most likely be able to attend.

B) In the spirit of old time barn raisings, conduct "Rehab-a-thons". This is where folks get together and knock out an energy retrofit for a property owner in a day. It may be caulking, insulating or weather stripping a door or window. In any case it helps people with their buildings and creates a sense of community.

The media loves these types of events because there are lots of people helping people and it gives them visuals. TV stations especially love these types of events.

C) For communities who are Certified Local Governments (CLG), work with your Historic Preservation Commission and city staff to write a grant for a hands-on workshop for building owners and local contractors. This will train both and create a positive environment that shows you are not just telling people what they ought to do, you're creating solutions.

So far, CLG funds have missed the axe in Washington and are a source of training funds that are grossly underutilized.

One day hands-on workshops like window restoration, insulating, caulking and brick re-pointing are all possible.

If finding the right contractor is a problem, you could also use CLG funding to do a three to five day hands-on training workshop just for contractors. Be sure there is a business element to the training as well as the hands-on.

Smart Energy & Preservation Choices Campaign Talking Points

- ***Retrofitting*** Main Street buildings for energy efficiency makes it more affordable for building and business owners to operate.
- ***Historic*** buildings can be made energy efficient, cost effectively.
- ***Energy*** retrofits around preservation are cost effective with fast paybacks.
- ***Preserving*** original windows costs less and is more energy efficient than replacement windows.
- ***Paybacks*** for window preservation run between 2 and 10 years.
- ***Paybacks*** for replacement windows run between 34 & 240 years.
- ***Air Infiltration*** is the number one issue for energy efficiency.
- ***Replacement*** products are just that, products you have to replace over and over again.

- ***Exterior*** wall insulation is expensive and usually damaging to historic buildings.
- ***Historic*** masonry buildings have a thermal mass that retains heat in the winter and cooling in the summer.
- ***Exposed Brick***, unless it was a warehouse, is not a good energy choice.
- ***Sustainability*** simply means doing good work that lasts.
- ***Preservation*** is about maintaining or preserving our built environment. It's as much about community & positive economics as it is about saving our architectural heritage.
- ***Preservation*** is an outstanding economic tool for rehabbing Main Street buildings.
- ***Preservation*** is a strategic ingredient in the revitalization of historic downtown's & neighborhoods.
- ***Preservation*** almost always costs less than new construction.
- ***Preservation*** keeps more money in the community than new construction.
- ***Preservation*** techniques retain original materials while saving you money.
- ***Preservation*** takes advantage of existing infrastructure like streets, sewers etc.
- ***Preservation*** increases property values.
- ***Preservation*** increases a community's property & sales tax base.
- ***Preservation*** brings new businesses & people to communities.
- ***Preservation*** has been at the forefront of the "green movement" for 50 years.
- ***Nothing*** is more green or environmentally sound than an existing building.

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Windows Are Opportunity for Main Street Communities

MAIN STREET IOWA 25 QUARTER CENTURY OF CHANGE

IOWA economic DEVELOPMENT

Introduction

Preservation Resources, Inc. have been restoring and rehabilitating historic structures for 37 years. As historic property developers we have developed a finely honed understanding of what works for historic buildings based on our experience. Our views don't necessarily represent the views of IDED and Main Street Iowa, but offer a unique and experienced perspective on the topic of historic windows.

Why save historic windows?

Historic windows are one of the most important architectural features of any Main Street building. They have usually been in service for over 100 years and can be cost effectively repaired, made more or as energy efficient as a comparable replacement and will last another 100 to 200 years.

A recent window and facade "Upgrade".

Building in the same block with original 150 year old windows & wooden storms.

The photos on the left shows how devastating a bad window and facade job can be. The property on the right is two doors down and under rehabilitation. Which one looks better to you?

Here's another example (below) of how important windows and doors are to the overall architecture. This is a historic movie theater built in the 1920s in Hannibal, Missouri

2011

1930's

Yet, most people somehow believe that if they don't replace windows, their buildings couldn't possibly be energy efficient. Based on the replacement window industry's claim

in Glass Magazine that 8 billion dollars is spent every year on replacement windows, it seems fair to say that if each replacement window opening costs an average of $500, we could be seeing as many as 32 million classic, old growth, upper and lower wood window sashes end up in our landfills yearly.

If it's assumed these numbers are inflated by the industry, say only 2 billion dollars per year, that would still be 8 million wood sashes in the dump every year. Obviously there is nothing green or environmentally sound about this tragedy. The scariest part of this landfill issue is that it's estimated, 15% to 25% of the sashes ending up in the landfill today are less than 15 years old.

The primary reason historic building owners think they need to replace their windows is that the window industry spends tens of millions of dollars a year to convince them to buy their inferior products. While it seems hard to believe, it literally will take a consumer between 34 and 230 years to get any payback from replacement windows with insulated glass and considering the following statements in the window industries trade periodical, Glass Magazine, the replacement industry makes the case for restoration.

In an editorial in the July 2001 issue of Glass Magazine, Editor, Charles Cumpstom said, "The consumer's perception of glass is significantly different from the industry's. While some in the industry think a 15-year life is adequate, it is the rare homeowner who envisions replacing all his windows in 15 years."

Wow, that's quite a statement coming from the editor of a window trade magazine! Nothing has changed since he wrote this editorial and this applies equally to commercial replacement windows.

Another article in 1995 in Glass Magazine by Ted Hart states, "Remember our industry, with rare exception, has chosen to hide the fact that insulating glass does have a life expectancy. It is a crime that with full knowledge and total capability to build a superior unit, most of the industry chooses to manufacture an inferior single-seal unit."

Single seal units are still the norm in the majority of replacement windows with an average seal life of 2 to 6 years. Even dual and triple sealed insulated glass cannot be expected to last more than the 15 years alluded to by Glass magazines former editor, Charles Cumpstom.

As a result of the window replacement industry's dominance in marketing and pursuing relationships with architects, specifiers, consultants, contractors and property developers, they have hijacked the narrative. Just because they claim their products are superior does not make it true and in most cases, their comparative claims are not based on facts or independent research.

The comments made all the time about un-restored, historic windows include:

- We need new windows because the old windows have lead paint.
- The ropes or chains are broken and I can't lift my windows without a prop.
- These old windows are rotted and couldn't possibly be restored.
- The glass rattles around, is broken or missing.
- The old putty is falling out.
- They're so inefficient and air pours right through them.
- I can't tilt them in to clean them.
- I have steel casement windows with rust I know can't be fixed.

These are the same arguments the window replacement industry uses every day. Not only are they using these arguments, they're backed up by millions of dollars in marketing through the window companies and trade organizations.

The only problem with their argument is that it's not credible. None of these "problems" have anything to do with cost effective, lead free and energy efficient window restoration. Not one of these reasons prevents small contractors or building owners from doing safe and energy efficient window restoration and weatherization.

In most cases restored windows will be as or more energy efficient, tilt-in for cleaning, operate with one finger, cost less and provide a payback much faster than a replacement window.

Bob Yapp, President of Preservation Resources, Inc, has been a Midwestern, historic property developer for 37 years. According to Mr. Yapp, "In 37 years and involvement in over 160 historic rehabilitations, I have never replaced a window that wasn't missing in the first place. The reason is simple, if I did, my buildings and houses would lose their historic appeal, wouldn't be as energy efficient and I would spend way too much money. I've restored and weather stripped over 6,000 windows over the years because they're a better window than I can buy and it makes financial sense."

Lead Paint

In regard to lead paint, it's been known for centuries that lead is a poison and as such, lead paint must be respected. However, in Preservation Resources, Inc.'s opinion the EPA and HUD lead paint regulations have been overreaching. The mere presence of lead paint in a historic structure is no reason for panic or the wholesale removal of historic fabric when there are safe and cost effective ways to remove or work around it. The facts fly in the face of this anti-preservation intrusion into our communities. Lead poisoning in children, while terrible when it happens, has been depicted by HUD and the EPA as an epidemic. There is not one study that shows this to be true. There are a

multitude of studies that show lead poising in children is much less today than even 40 years ago.

One such study proving this point is a research paper titled, "*Economic gains resulting from the reduction in children's exposure to lead in the United States*." and written by Scott D Grosse, Thomas D Matte, Joel Schwartz, and Richard J Jackson in June 2002 for the National Center for Environmental Health, Centers for Disease Control and Prevention, (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240871/pdf/ehp0110-000563.pdf).

This study compiles data showing that the decline in blood lead levels (BLLs) from 1976 to 1999 in 1-to-5 year old children was 27.4 microg/dL. In fact, as a result of less lead in children, the study indicates that I.Q. levels in this group of young children have risen an average of 2.2% to 4.7% between 1976 and 1999.

This decline in lead paint poisoning is the result of many factors such as lead education, taking lead out of gasoline and better factory emission. Little of the decreases can be attributed to lead paint regulations.

In essence we should be teaching anyone who lives in a building built before 1978 how to clean and maintain their properties better. Common sense education is all that's needed with lead paint. Lead paint is only a hazard if it's unstable and dust is the biggest issue. Removing lead paint from window jambs and sashes is a safe, quick and easy process if the property owner or contractor knows how to do it.

The EPAs new *Renovation, Repair and Painting* (RRP) lead paint rules require that all contractors (not property owners) working on properties built before 1978 be federally licensed to manage lead dust on the job site. The entire law is currently in disarray because the very contractors who disturb lead paint the most, window replacement contractors and vinyl siding contractor, are fighting the new rules along with many other remodeling industry groups.

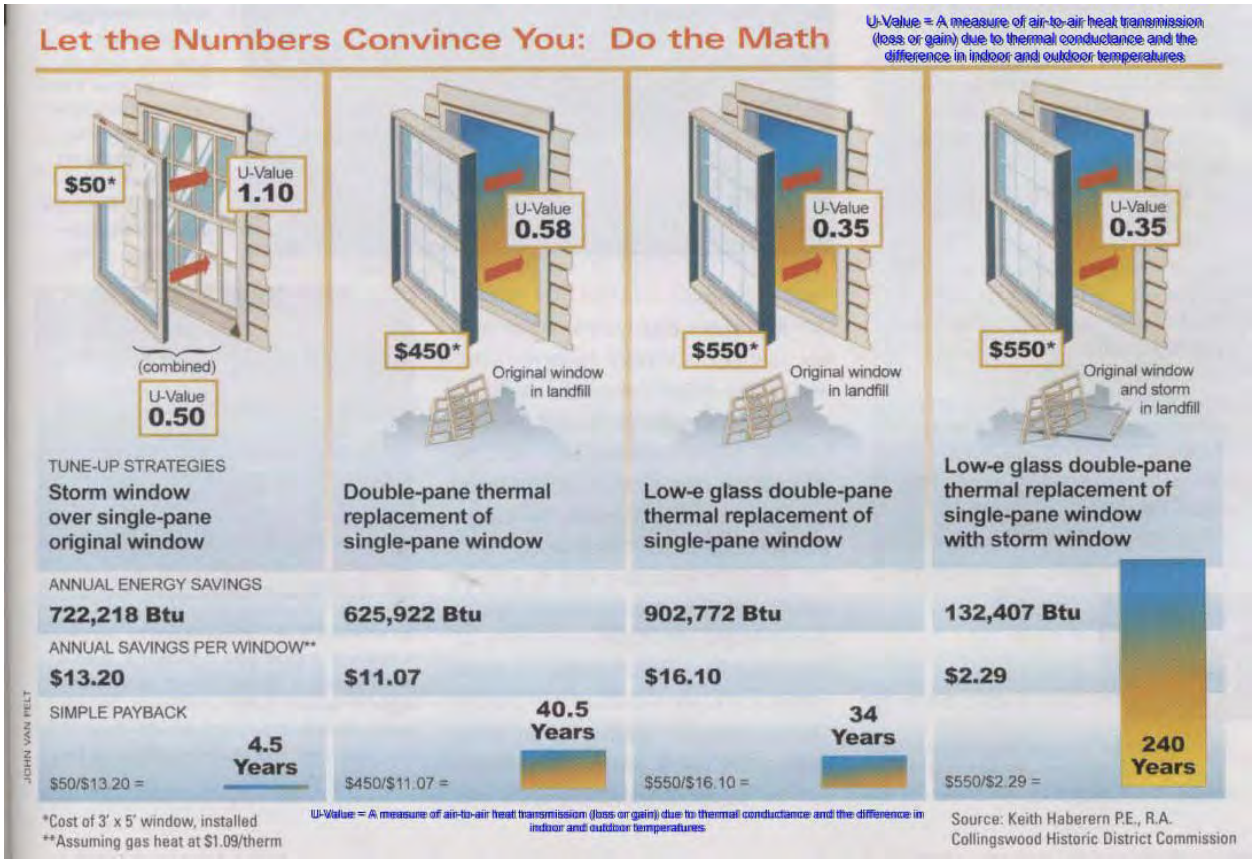
The one day class required to become licensed is far less comprehensive than the lead paint and dust management quality rehab contractors have been practicing for decades.

Window Reality

Typically windows comprise only 10% to 15% of the energy footprint of any historic building. This surprises many building owners. If you listen to the massive marketing done by the window replacement industry, you'd think it was 80%. Don't be fooled.
The two primary issues with any window are the U-value and air infiltration. Any window company that uses the insulation industries energy efficiency calculator, R-value, as the primary selling point has a fundamental disconnect with the science.

U-values, simply stated, are a calculation of how much energy passes through a one square foot area of a window in one hour. Most, if not all, window companies calculate U-values at the center of the glass instead of all over the window. This makes many of their claims inaccurate. Just the opposite of R-values, U-values are better the lower the number.

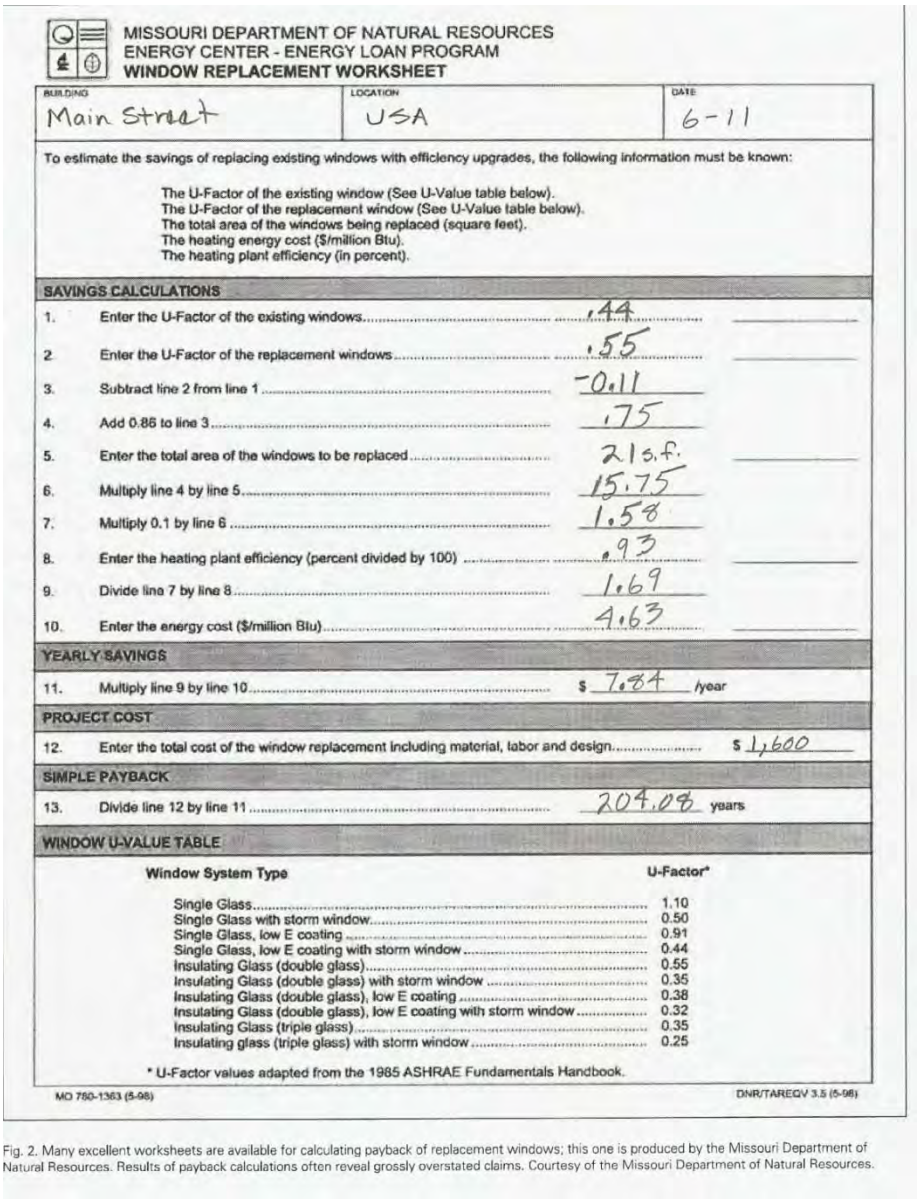
Here's a graphic that demonstrates this:



Used with permission from The Old House Journal

The historic window and storm shown in the graphic have absolutely no weather stripping to stop air infiltration and together they still have a better U-value than a double paned (insulated glass) replacement window.

Here's another form called "The *Window Replacement Worksheet*" used by the Missouri Department of Natural Resources to calculate the payback for replacement windows. This form is filled in assuming an un-weather stripped, historic window and wooden storm fitted with low-e glass is in place and proposed to be replaced with a new double paned (insulated glass), high tech, aluminum replacement window.



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

BUILDING	LOCATION	DATE
Main Street	USA	6-11

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	.44
2.	Enter the U-Factor of the replacement windows	.55
3.	Subtract line 2 from line 1	-0.11
4.	Add 0.86 to line 3	.75
5.	Enter the total area of the windows to be replaced	21 s.f.
6.	Multiply line 4 by line 5	15.75
7.	Multiply 0.1 by line 6	1.58
8.	Enter the heating plant efficiency (percent divided by 100)	.93
9.	Divide line 7 by line 8	1.69
10.	Enter the energy cost ($/million Btu)	4.63

YEARLY SAVINGS

11.	Multiply line 9 by line 10	$ 7.84 /year

PROJECT COST

12.	Enter the total cost of the window replacement including material, labor and design	$ 1,600

SIMPLE PAYBACK

13.	Divide line 12 by line 11	204.08 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 780-1363 (5-98) DNR/TAREQV 3.5 (5-98)

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.

As you can see, replacing that historic wood, double hung window (with a total opening of 7 feet x 3 feet = 21 square feet) with a high end, aluminum extruded, double paned window has a payback of 204 years. Even after installing this new window with no functional payback, it's still not as energy efficient as the un-weather stripped wood window, with a wooden exterior storm, it replaced.

With between $20 and $60 worth of weather stripping and a $400 wooden, exterior storm window, (fitted with 1/4" laminated or low-e glass), you can expect the U-value to go from the stated 0.44 down to a 0.34 to 0.40. Even if you want total restoration to safely remove old lead paint and putty as well as adding new weather stripping, the total costs should run between $750 to $1,200 depending on the contractor, their level of skill and local wage rates.

So, by keeping the original window you save between $400 and $850 on the window work, per opening, and have a more efficient window. These windows can operate with one finger and have wooden exterior storms with removable glass and screen panels from inside the building so the primary wood storm always stays in place. As a bonus the exterior side of the double hung windows can be cleaned from inside the building by removing a few screws and swinging the sash into the room sideways.

The National Park Service has really come around over the last few years in regard to installing exterior storm windows. For too long they only allowed interior storms. This practice on historic Main Street buildings has been a disaster.

Window sashes were never intended to take a direct hit from the weather. Exterior storms replaced shutters sometime in the mid-Victorian Era as a way to protect window sashes.

It's now known that wooden or even commercial grade, aluminum exterior storms are a good source of energy efficiency as well. Even with divided light (multiple panes) sashes, a storm allows you to see the old glass and the wood muntins (muntins are the wooden bars separating panes of glass).

Interior storms make it so the windows cannot be accessed in order to operate them. Having operable windows saves on air conditioning costs and fresh air is a basic human need. The biggest problem with interior storms is that they generate about double the normal condensation you see with exterior storms. This has rotted tens of thousands of historic windows and should not be done unless there is no other alternative.

The bottom line is that for a fraction of the cost, a historic wood or steel window can be made energy efficient and safe. What building owner armed with this information would needlessly spend four times the money for a new window that will not have a functional payback and lasts for 15 years?

A well restored window sash opens with one finger

1859, six over six, true divided light historic window with a wood storm. The storm does not obstruct the view of the window

Metal track, rubber gasket & removable storm panel. Less air infiltration than a replacement window

The same window from inside the building.

Upper & lower sashes both operate

Restore, weatherize & maintain windows, don't replace them!

- Replacement wood windows are made with new growth lumber that is not as strong or rot resistant as the old growth lumber in windows made before the 1950s.
- Insulated glass seals tend to fail in 2 to 6 years allowing condensation between the panes.
- Most insulated glass panels cannot be replaced once they fail. The entire window must be replaced.
- Primary window sashes were never intended to take a direct hit from the weather. In early years they had shutters then storms to protect them.
- Air infiltration is the biggest energy issue with windows. Vinyl windows, by their nature, have weep holes in their bottom rail to let the moisture seep out which allows massive air infiltration.
- PVC or vinyl is the most toxic consumer substance manufactured today. It can't be functionally recycled, off gasses toxic fumes and has excessive contraction and expansion issues. It fades, cracks, can't be painted and has a maximum lifespan of 16 to 18 years.
- Metal clad windows are designed to allow water to seep behind the cladding. This causes early rot of the often finger jointed, new growth lumber underneath.
- The vinyl jamb liners that are needed for tilt-in windows have cheap spring balances and cheesy foam backing that have a lifespan of about 6 to 10 years.
- Double hung windows were invented in the 1400s as an air conditioning system. Lower the top sash and raise the lower sash. This lets the hot air and humidity out the top and brings the breezes in through the bottom. Most replacement units don't have a full screen to allow for this process.
- Aluminum, self-storing storm windows are not even a good windbreak. Metal conducts heat and cold while wood insulated against heat and cold.
- Sash weight pockets are only a problem if a building has not been caulked, painted, or re-pointed properly.
- Quarter inch thick, laminated glass has better UV protection than low-e coatings. It also more soundproof, safer and cost less than insulated glass. If retrofitting glass into an old sash is something you feel must be done, install laminated glass. better yet, install it in the storm window instead of the historic sashes.
- Original window sash is a part of the footprint of your historic building. Replacements often have different dimensions and sometimes the window contractor wants to reduce the size of your openings. This has a negative effect on the overall texture and look of the original footprint of your building.
- If you don't want to lift a finger to maintain or rehab your windows then hire a contractor to restore them. Your restored windows will cost less, have a better payback, be easily cleaned, have a nice track system, and stop air infiltration, which means greater energy efficiency.
- Restored wood & steel windows have another 100-year economic life before total restoration is needed again. Replacement windows can rarely be restored.
- Over 90% of original window opening on historic, commercial buildings have a recess on the outside specifically designed to accept a wooden storm window.

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