

Technical Preservation Guidelines

Upgrading Historic Building Windows

Windows are an important feature of a historic building. When it comes to restoration, the Department of the Interior has strict preservation guidelines designed to preserve the architectural integrity of historic windows as much as possible.

Replace vs. Retrofit

There are two basic approaches to restoring historic windows: 1) replacing the original windows; or 2) retrofitting the existing windows with an interior window. Since the goal is always to preserve the architectural integrity of a historic window, the DOI encourages retrofitting existing windows whenever possible. Removing and replacing the original windows should only be considered if the historic window is damaged beyond repair.

Retaining and retrofitting historic windows offers preservation, environmental and economic advantages. First and foremost, the original materials are preserved. Window retrofits install on the interior of the existing window, leaving the exterior of the building completely intact and unaltered. In doing so, window retrofits reduce waste. Also, by eliminating the labor involved with removing and replacing any glass, window retrofits are more cost-friendly than replacement windows.

DOI Historic Window Restoration Goals

- ✓ preserve historic materials
- ✓ preserve historic design and appearance
- ✓ improve thermal performance
- ✓ preserve window daylight
- ✓ meet security requirements
- ✓ last for the lifetime of the building
- ✓ minimize future maintenance

Additional Thermolite Benefits

- ✓ attaches to interior of the existing window
- ✓ no removal of any existing materials
- ✓ no alteration of sight lines
- ✓ custom finish to match existing paint
- ✓ no scaffolding, permits or special tools
- ✓ quick & easy installation

Thermolite Windows at the Department of the Interior

The Secretary of the Interior is responsible for establishing the standards for all programs under departmental authority and for advising federal agencies on the preservation of historic properties listed in the National Register of Historic Places. In 2017, Thermolite completed the installation of more than 4,000 interior windows at the Department of the Interior Headquarters, exceeding all DOI preservation and security requirements and setting the standard for upgrading windows in historic buildings.



Historic Window Retrofits

Thermolite Window System Overview

Thermolite interior windows are an affordable and effective solution for upgrading the windows of historic buildings. Widely used by the GSA and other federal agencies, the Thermolite windows meet all federal preservation guidelines, improves thermal performance, reduces air infiltration, requires no maintenance, and can be installed for a fraction of the cost of traditional replacement windows. Thermolite windows are also available for security applications including blast mitigation, hurricane protection and signal defense.

Existing Historic Window

The existing historic windows stay in place, preserving the original appearance and design integrity in accordance with federal preservation guidelines

Insulating Air Cavity

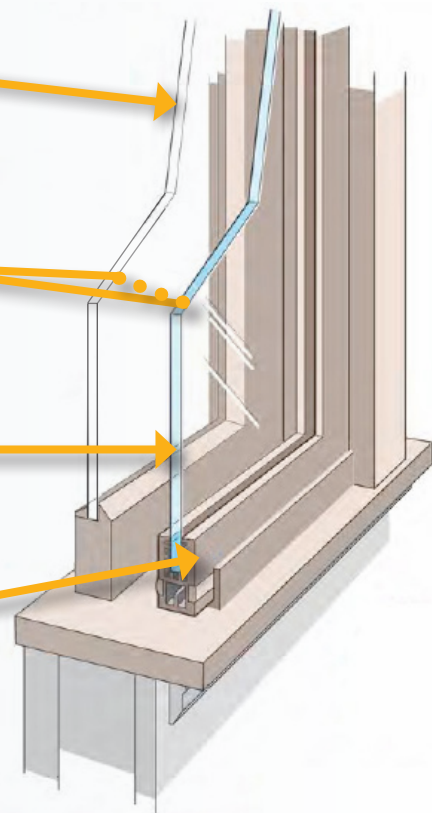
An insulating dead-air space between the existing window and the Thermolite window provides an extra layer of insulation that improves the thermal performance

Thermolite Glass Panel

Thermolite high-performance window panes use laminated, tempered or insulating glass with a low-e coating to keep your building warm during winter months and cool during summer months

Frame with Matching Finish

Thermolite frames attach easily to your window opening and are coated with a custom powder paint to match the color of the existing frame



Thermolite Window Performance

	Existing Historic Window	Existing + 1/4" Tempered	Existing + 3/4" Insulated	Existing + 1/8" Vacuum Insulated
R Value	1	3	5	12
U Value	1.02	.36	.18	.08
SHGC	.83	.70	.44	.35
VT	.89	.77	.61	.65

Center of Glass Value

GSA WINDOW PROJECT MATRIX FOR HISTORIC BUILDINGS

Window Repair/ Replacement Option	Retains Historic Material (1-3)*	Matches Historic Appearance (1-3)	Thermal Performance (1-3)	Meets Security Requirements (1-3)	Ease of Maintenance (1-3)	Maintains Operability (1-3)	Installation Risk - Damage to Interior/ Exterior Finished (1-3)	Expected Lifespan with Maintenance	Initial Cost (1-3)	Life-Cycle Cost (1-3)	TOTAL SCORE
Option 1 Repair Existing Sash + Add Glazing Film / Weatherstripping	1	1	2	2	1	1	1	3	1	3	16
Option 2 Repair Sash + Add Interior Storm	1	1	1	1	1	1	1	1	1	1	10
Option 3 Repair Existing + Add Interior Blast Curtains / Drapes	1	1	3	1	3	1	1	2	1	2	16
Option 4 Repair Existing Sash + Replace Existing Glazing with IGU	2	2	2	3	1	1	1	1	2	2	17
Option 5 New Wood Frame and Sash with IGU	3	2	1	3	1	1	3	1	3	2	20
Option 6 New Aluminum Frame and Sash with IGU	3	2	1	1	1	1	3	1	3	1	17

*See key on next page

GSA Window Matrix Ranking Key

Retains Historic Material: Extent to which original window components (sash & frame) are preserved.

- 1 preserves original sash and frames
- 2 preserves frames only;
- 3 preserves no original window components.

Matches Historic Appearance: How closely the exterior appearance of a window option conforms to the original window.

- 1 matches the appearance of the existing window close and conforms to The Secretary of Interior's Standards;
- 2 has a similar overall appearance, but has been modified to accommodate insulated glass and conform to The Secretary of Interior's Standards;
- 3 has a different appearance due to manufacturer or material limitations and will not meet The Secretary of Interior's Standards.

Thermal Performance: A qualitative comparison based on the relative thermal values of the respective window options.

- 1 maximizes the thermal improvement of the glazing and sash;
- 2 offers a moderate improvement in thermal performance of the glazing;
- 3 offers no improvement in thermal performance.

Meets Security Requirements: A qualitative comparison based on the extent to which GSA glass fragmentation protection requirements are met.

- 1 protects occupants from glass fragments and unit detachment;
- 2 protects occupants from glass fragmentation only;
- 3 offers no blast protection.

Ease of Maintenance: A qualitative comparison based on the relative maintenance required for the respective window options.

- 1 requires little or no routine maintenance;
- 2 requires occasional light maintenance;
- 3 requires routine regular repairs and maintenance.

Maintains Operability: Extent to which each option maintains window operability.

- 1 maintains window operability by occupants;
- 2 maintains window operability by facilities staff only;
- 3 maintains no window operability.

Risk of Damage to Interior Finishes: If an option requires replacement of the window frame, the surrounding finishes are damaged to install the new window. Any option that involves only the sash will cause little or no damage to surrounding finishes.

- 1 does not require removal and replacement of surrounding finishes;
- 2 requires some removal or alteration of surrounding finishes;
- 3 requires significant removal and replacement of surrounding finishes.

Expected Life Span: The anticipated life before requiring replacement.

- 1 estimated lifespan of 25+ years;
- 2 estimated lifespan of 15-25 years;
- 3 estimated lifespan of 15 years.

Initial Cost: (insert project specific cost range -high, medium, low)

- 1 below \$_____;
- 2 between \$_____ and \$_____;
- 3 over \$_____.

Life-Cycle Cost: (insert project specific lifecycle cost range -high, medium, low)

- 1 cost less than \$_____;
- 2 cost between \$_____ and \$_____;
- 3 cost over \$_____.

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