GUIDELINES FOR MAINTAINING
HAWAI‘I’S HISTORIC WOOD WINDOWS

HISTORIC HAWAI‘I FOUNDATION

These practical suggestions have been prepared to help owners of historic properties that retain their original windows preserve the long-term value of the buildings.

- The purpose of this brochure is to address typical window repairs necessitated by island environmental conditions – rain, humidity, strong sun, salt air, mildew, algae, and many pests – that require window upkeep.
- Recommendations are based on the Secretary of the Interior’s Standards for the Treatment of Historic Properties, which are the foundation for many preservation and repair projects in Hawai‘i.
- The guidelines are not complicated or costly. Rather, these are maintenance-oriented and financially-feasible considerations to help owners and historic property stewards solve normal wear and tear problems.

GENERAL GUIDELINES FOR maintenance, repair and restoration of wood sash windows, which account for the majority of historic residential windows in Hawai‘i.

Vintage wood windows require a few simple treatments to perform as well as, or better than, new windows:

1. Repair and maintain wood windows to prevent rot or other deterioration;
2. Render them weathertight;
3. Upgrade energy efficiency with easy retrofits.

These steps will ensure that your historic wood windows last a lifetime, retain your property’s value, and meet energy-efficiency standards.

- We hope that you find these window maintenance guidelines useful because, as time goes by, Hawai‘i’s historic wood windows, well-built by carpenters, are becoming rarer and increasing in value. If maintained properly, these important historic features can have a useful life for years to come.
- The process of keeping your windows in a state of utility through maintenance, repairs, and upgrades is important. Rehabilitation makes possible efficient continuing use while saving the features of your property that are significant to its original appearance and design.

TOP TEN REASONS TO RESTORE WOOD WINDOWS

1 AUTHENTICITY

They reflect the technology and fashion of the era in which the structure was built. Original windows were custom built to fit their frames and complement the design of the building in a way that no replacement can match.

2 QUALITY

Old-growth lumber is denser, more dimensionally stable, and more resistant to rot and insect damage than materials commercially available today. Wood windows traditionally have mortise and tenon joints, strong and stable joints made by master carpenters.

3 CHARACTER

Wavy glass, true-divided lite sash, decorative casings, and unique shapes please the eye and contribute to the value and historic character of the building.

4 REPAIRABLE

Wood windows are readily repairable. Their parts (hardware, sash and glass lites) are designed to be disassembled and repaired or replaced when they reach the end of their useable life.

5 LONGEVITY

Most non-historic replacement windows have a lifespan of 10-20 years while a well-restored historic window can last generations.

6 OPERABILITY

The weight and pulley system provides decades of use with minimal maintenance. Wood windows operate with greater tolerances to settling or shifting that occurs over time.

7 ENERGY EFFICIENCY

Windows account for 10-20% of energy loss in a typical home (less than energy loss through roofs). Wood windows can be efficient when kept in good repair. With simple retrofits, a single-pane window can be made more energy-efficient and cost–effective over the long run.

8 RESALE VALUE

Buyers of historic properties will pay a premium for buildings with their original features intact. The most desirable features sought by buyers are original floors and windows.

9 LEAD SAFETY

By properly restoring the windows, the project can also assuage lead paint concerns. Once windows have been stripped and refinished, lead paint is typically no longer an issue for historic windows.

10 SUSTAINABILITY

The greenest window is the one that is already installed. By retaining original windows, material is kept out of the landfill!

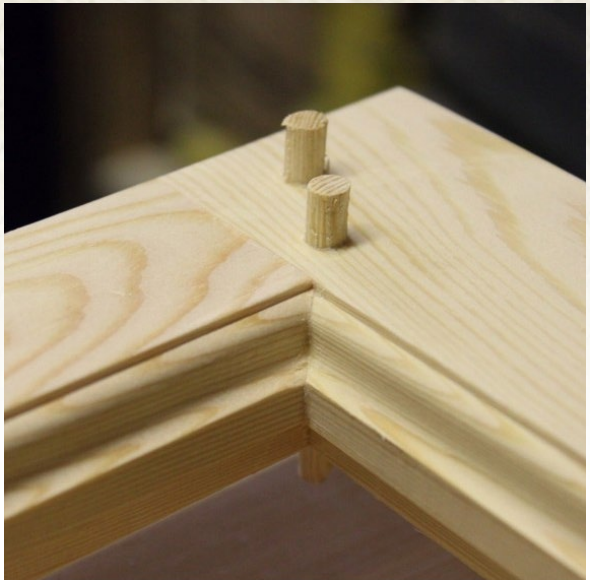
Why Preserve?

Preservation is about the future. It is a potent and democratic planning tool for all communities, and it is the heart and soul of sustainability.

SIGNIFICANCE OF WINDOWS

Windows contribute to the function and character of a historic building by:

- Admitting light to the interior spaces;
- Providing fresh air and ventilation;
- Serving as a visual link to the outside world, and
- Enhancing the appearance of a building.



WINDOW TYPES

HUNG OR SASH WINDOWS

Sash windows are commonly used in Hawai'i's historic buildings. Each sash moves vertically in tracks on the window jamb. Double-hung windows feature two operable sash that hold panes of glass. Each sash is "hung" from pulleys at the top of the jamb with rope or chain connected to counter-weights. Another common type is the single-hung with an operable lower sash and fixed upper sash.

GLASS

Most vintage windows in Hawai'i utilize single pane glass approx. 3/16" thick. Pre-WWII windows may be distinguished by wavy glass resulting from the original manufacturing process. Several vendors – Bendheim, Schott, AGW, and Hollander - still provide this glass under the label "restoration", "antique", or "seedy" in various degrees of distortion.

SPECIALTY WINDOWS

Palladian

Bay

Dormer

Transom

PROJECTING WINDOWS

There are several types of projecting windows, each defined by how they are connected to the frame. These may project (swing) into the room (in-swing) or exterior (out-swing):

- *Casement*: hinges at the side (jamb), commonly in pairs
- *Awning*: hinges at the top and opens facing down
- *Hopper*: hinges at the bottom and swings in and upward

JALOUSIE WINDOWS

Typically, an architectural element of mid-20th century houses, jalousie windows may be "historic" if they are original to the home.

SLIDING

Sliding or gliding windows move horizontally along wood tracks at the sill and head of the window frame. These windows use minimal hardware and were common on Plantation-era buildings.

ANATOMY OF A WINDOW

GLOSSARY

Apron: Interior trim on the wall below the stool.

Casing: Applied trim at the interior or exterior perimeter of a window frame; often decorative.

Fenestration: Design and arrangement of windows.

Frame: Surrounding structure of a window built into the wall and receives the operable sash.

Glazing: Window glass

Head / Jamb: Vertical and horizontal members forming the sides and top of the frame.

Light (lite): Pane of glass used in a window or door. Frequently spelled "lite" in industry literature to avoid confusion with visible light. A 6-over-6 window has six individual lites (pieces of glass) in each sash while a 4-over-4 has four individual lites per sash, etc.

Mullion: Vertical structural support between windows.

Muntin: Bar or rigid supporting strip between panes of glass.

Pane: Piece of sheet glass installed in a sash.

Parting Bead: Vertical spline that creates a channel for the sashes to slide past each other.

Putty: Glazing putty is traditionally made by mixing a base of whiting (finely ground chalk) with linseed oil.

Sash: Operable part of a window that fits within a frame and is designed to accommodate the glazing.

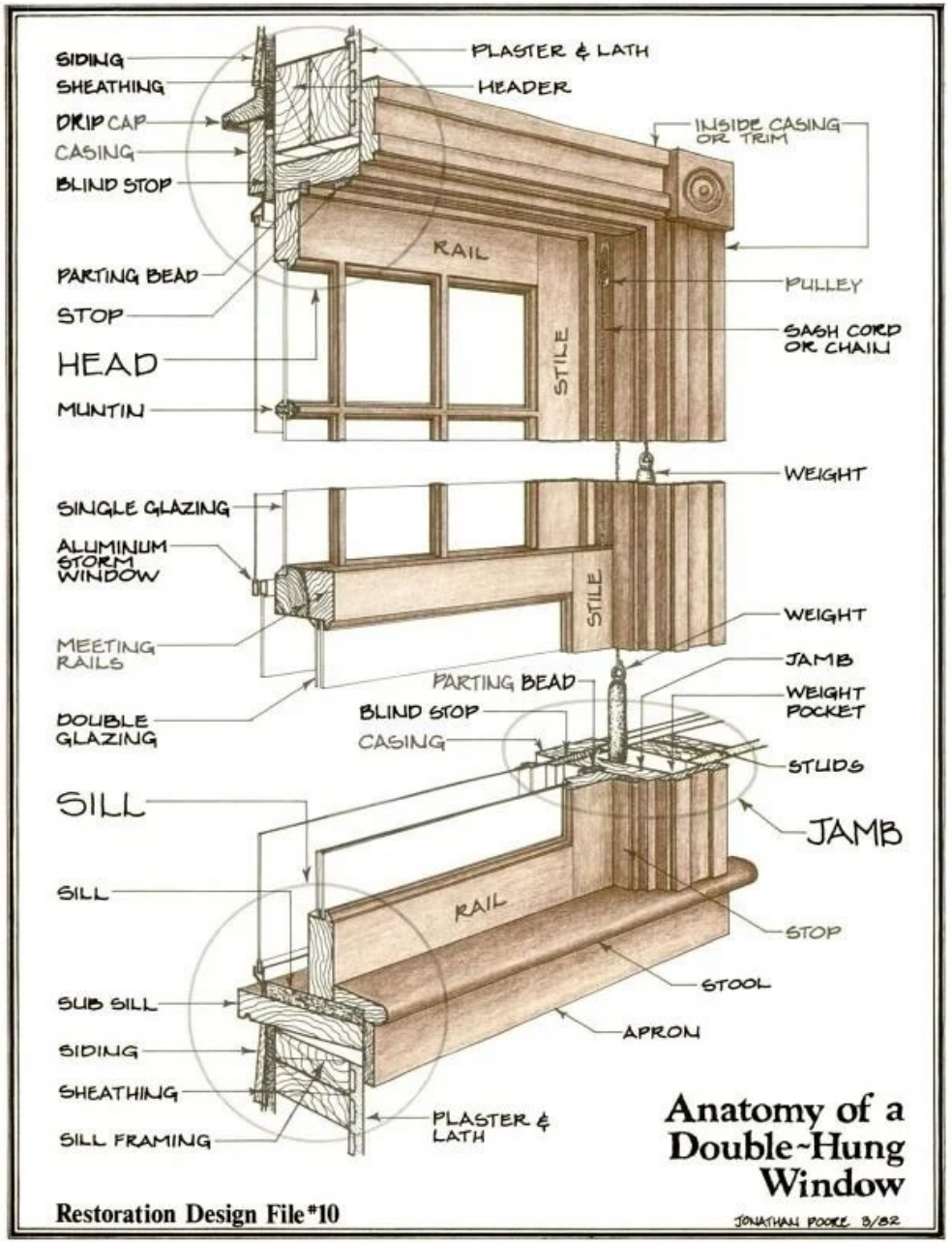
Sill: Exterior horizontal member at the bottom of the frame.

Stile / Rail: Vertical and horizontal members of a sash, leaf, or panel.

Stool: Horizontal member across the bottom of the window frame; corresponds to the exterior sill.

Stop: Narrow trim that holds a sash in position in a frame.

True divided lite (TDL): Lite in which dividers (muntins) separate the glazing into individual smaller panes.



ESSENTIAL REPAIRS FOR WOOD WINDOWS

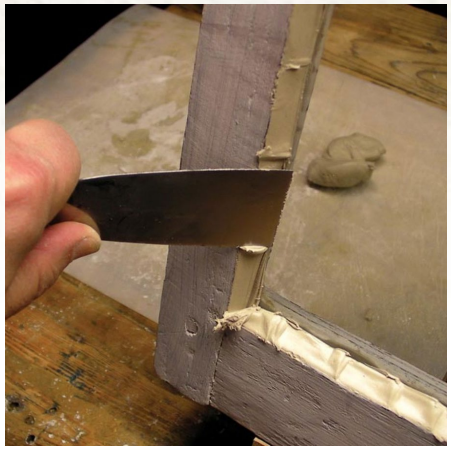
Prior to undertaking repairs, inspect the window and document the extent of damage. Be familiar with the types and origins of wood decay, selective wood repair methods, sash stabilization techniques, glazing, and hardware restoration or replacement to effectively design the rehabilitation of the historic window.

MAINTENANCE

Cleaning – Keep windows and glazing clean. This will prevent the glass from etching. A solution of vinegar and water will remove haze.

Inspection – Inspect for rot, termites or other deterioration annually. Address defects before they affect the function of the window.

Operability – Operate the windows, lubricate hinges or stays, tighten screws. Replace missing or damaged hardware.



WEATHERTIGHTNESS

Repair or refresh:

- Caulking / sealants at the perimeter where the frame meets the wall
- Weatherstripping, if any
- Glazing putty

In Hawai'i's tropical climate, we seal windows to keep the rain out and cool air inside.

HAZARDOUS MATERIALS SAFETY

It is important to test old windows for lead paint and asbestos. If lead is present, have the paint removed or encapsulated by a lead-safe certified contractor. Asbestos, typically found in glazing putty, must also be abated by a certified-professional.

Contact the Hawai'i State Department of Health (Phone: (808) 586-5800) for more information.

PAINTING PRO TIPS

- Strip and repaint windows when the layers are 2 mm thick (about as thick as a nickel)
- Use an oil-based primer and two quality topcoats, either alkyd (oil) or 100% acrylic latex
- Paint the glazing putty after it cures
- Don't paint the friction edges of the jamb or parting bead; paint prevents the sash from sliding

REPAIRS

Dutchman - Wood splice for damaged or missing areas that involves removing a symmetrical, squared area around the defect and replacing it with new wood of the same species, grain pattern and color as the original.

Epoxy Repair – Restoration epoxy is specially formulated for repair of wood, matching the tensile strength and other characteristics of the material. It consists of a consolidant and a paste for repair of minor rot to the complete reconstruction of profiles.

IMPROVING ENERGY EFFICIENCY OF WOOD WINDOWS

WINDOW FILM

Retrofitting with window film results in:

- Energy saving and climate control
- UV-blocking for protection against fading
- Glare reduction
- Enhances safety and security

Install neutral gray films without obvious color or highly-mirrored surfaces in historic buildings .

ENERGY SAVINGS

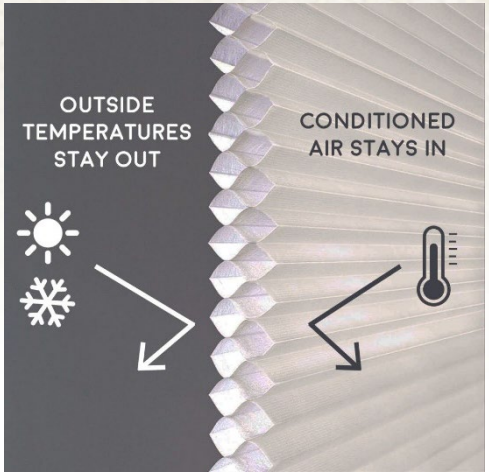
Windows account for 10-20% of energy loss in a typical home (much less than roofs and doors).

When kept in good repair historic windows can be efficient windows. And, with simple retrofits, a single-paned window can approximate a replacement window's efficiency.

EXTERIOR AWNINGS

Awnings, drapes, curtains, shutters, and blinds provided natural climate control in an age before air conditioning and tinted glass.

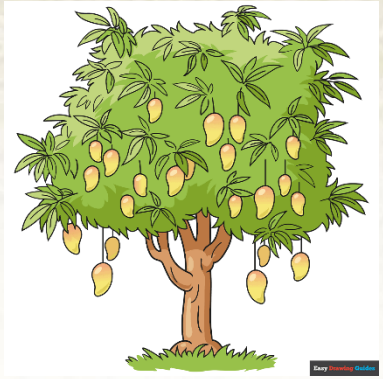
- Easily installed and reversible.
- Relatively inexpensive



CELLULAR SHADES

Cellular or honeycomb shades have horizontal columns of air trapped between two or more connected layers of blind.

- Increases R-value (measure of insulation). Single honeycomb shades have an insulation value around R-2, while double-layer honeycomb shades can reach R-5.
- Inexpensive and readily available at local home improvement stores.



FACT: In tree-shaded neighborhoods, the summer daytime air temperature can be up to six-degrees cooler than in treeless areas (Lawrence Berkeley National Laboratory).

LANDSCAPING FOR SHADE

Shading is the most cost-efficient way to reduce solar heat gain and cut air conditioning costs. To effectively shade the home, determine the size, shape, and location of the shadow that the tree will cast. Plant trees with a stand-off distance so roots and irrigation will not affect the building foundation or walls.

- Maximize summer shade with trees that still allow penetration of low-angle sun.
- Channel breezes toward the home.

SELECTING APPROPRIATE REPLACEMENT WINDOWS

Repair should be the first option considered. While it is possible to rehabilitate severely deteriorated windows, repair of deterioration beyond a certain level may not be practical and replacement becomes an acceptable treatment.

Appropriate replacement windows are generally custom-fabricated to match the historic character-defining features of traditional windows:

Size - Retain the size and shape of the original window. Do not fill, expand or alter window openings to accommodate a standardized unit.

Location - New windows should be installed in the same location in wall plane as the originals. This retains the shadow lines and visual texture of the façade.

Type / Operation - The new window should operate in the same manner as the original. In some cases, changing the operation to address life-safety issues, such as emergency exiting, may be acceptable on the rear or "non-primary" elevations.

Materials - Preservation Standards state that the new window shall match the original in color, texture, and materials as closely as possible. Since "close" may be open to interpretation, consult with the State Historic Preservation Division, Historic Hawai'i Foundation, and/or a historic architect prior to making decisions or purchasing replacement windows for your historic property.

Trim Details - Existing trim should be retained when possible or replaced in-kind with trim that matches the original. Window trim and molding profiles should not be obscured or altered by the new window.

Above: A new, custom-made wood replacement window constructed from a larger salvaged historic window results in a new window out of old growth lumber.

Above: A custom-made wood replacement window (r) prior to painting that is otherwise identical to the original window (l) in operation and materials, including historically–appropriate thin muntins and lugs at the upper sash.

THE REAL MEANING OF "MAINTENANCE FREE"

Historic wood windows are constructed of well-fitted parts that can be individually repaired or even replaced. They are designed to be maintained.

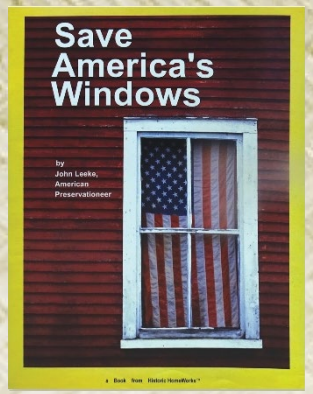
This is an advantage over contemporary commercial windows, which are manufactured as a unit and are generally disposed of when damaged. This is why they are called "replacement windows": because you'll have to keep replacing them.

MODERN REPLACEMENT WINDOWS

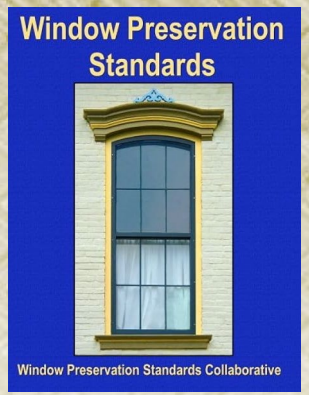
Unlike traditional custom- or carpenter-made wood windows, commercially available "replacement windows" often exhibit the following problems:

- Fogginess, condensation, or haziness between insulated glass lites resulting from a broken seal.
- Loss of function due to warpage and rot as a result of lower quality lumber, or from broken, inexpensive (often plastic) hardware and weatherstripping.
- Typical commercial windows use lower quality softwoods that are not treated to combat Hawaii's insect problems.
- Clad windows (wood with an applied exterior of aluminum or vinyl) have many seams that may fail. Water can penetrate behind the cladding and deteriorate the wood. This damage cannot be readily observed nor easily repaired. This creates a false sense that these units are performing better than painted wood windows, however their lifespan is significantly shorter.

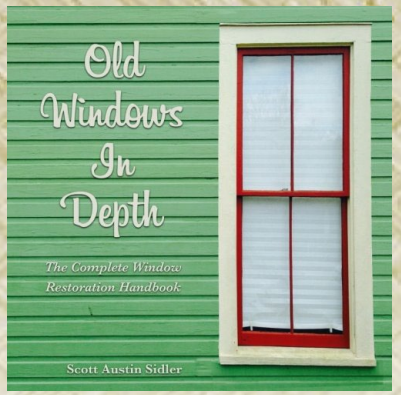
HISTORIC WINDOW RESOURCES



John Leeke (2009)
ISBN: 146628644X



Window Preservation Standards Collaborative (2013) ISBN: 1491015403



Scott Sidler (2018)
ISBN: 1718966222

WPA
WINDOW PRESERVATION ALLIANCE

Window Preservation Alliance
www.windowpreservationalliance.org

Window repair kit
Source: Scott Sidler's The Craftsmen Blog Store

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The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings (2017)

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