7.0 WINDOWS AND HARDWARE ARTICLES

NOTES

WOOD WINDOWS 7.1

7.1.0 INTRODUCTION

Windows are highly important elements contributing to the historical architectural character of a building. Altering the windows by removing elements or refitting with inappropriate elements can destroy the significance and value of the historic building. With attentive and proper maintenance and repair, original wood windows will provide energy efficient service for the life of the building without compromise to the architectural significance of the building.

7.1.1 EVALUATION

Prepare a schedule for evaluating each individual window noting location and the condition of each of its various parts (sills, frame, sash, putty, glass, paint, trim, hardware).

If window glass has been "painted out" on the exterior face, this paint needs to be removed.

Inspect for water penetration around edges, joints or seams.

Inspect putty for cracked, loose or missing sections. Inspect interior back putty for effective seal against condensation.

Inspect for proper slope of sill: down & away from sash.

Inspect for peeling or chipped paint which allows moisture to enter wood possibly leading to decay. Paint failure does not necessarily mean the wood is in poor condition.

Inspect wood for soundness, particularly at areas where paint has failed.

Using awl or knife point gently probe wood for softness.

Pry up a small piece. Sound wood will separate in long splinters, decayed wood will separate in short irregular pieces.

Begin at the sill and work your way up. Pay particular attention to the sill, joints between sill and jamb, corners of bottom rails, top edge of bottom and meeting rails and muntin joints - all areas where water can tend to collect either from rain or condensation.

Inspect all joints for tightness. Open, loose joints are susceptible to water absorption.

Inspect for proper operation of hardware.

7.1.2 TYPICAL REPAIRS

7.1.2.1 GENERAL

Exercise care when removing elements or dismantling windows. Old wood is very brittle and will crack and break easily.

7.1.2.2 PAINT REMOVAL

Remove paint when it loses its bond with the wood or excessive build up impedes the operation of the window or obscures detail.

Have historical color analysis done before any paint removal.

Methods: Water soluble chemical stripping, hot air gun, or heat plate. Do not use a flame, sharp putty knives, or chisels.

Use appropriate safety precautions such as gloves, goggles, and respirators. Old paint layers likely contain lead; guard against breathing paint dust or chemical fumes during removal.

Remove sash from frame to facilitate paint removal. Remove glass from sash to prevent breakage of historical glass from heat processes, and number panes to ensure reinstallation in same location.

Remove all paint from exterior surfaces of glazing. If "blacked-out" window is desired, paint the interior surface of glass only.

7.1.2.3 Painted shut, or excessive paint build-up.

REPAIR

Don't use a screwdriver or chisel to break the paint film or pry on the sash.

Cut paint film between sash and stops or parting strips on inside and outside with a razor knife.

Gently work a wide blade putty knife between stops and sash all around window. Repeat outside if necessary.

Paint build-up may cause binding and will have to be removed and repainted for smooth operation.

7.1.2.4 Sticking/Binding.

REPAIR

If due to excessive paint build-up remove all paint layers and re-paint.

If due to warpage or swelling of wood sash:

Allow wood to dry thoroughly - some binding can be expected in moist weather and will disappear in dry weather.

When dry, plane the bowed area after removing the paint. Severe warping may require replacement of part of sash.

After repainting, wax the mating surfaces with a bar of paraffin.

7.1.2.5 Broken Glass.

REPAIR

Remove putty by hand. Hard putty may be softened by heating with soldering iron or coating with paint stripper.

Protect other panes from damage.

With all broken glass removed clean out remainder of putty from rabbet and prime with a preservative primer.

Preferably use glass salvaged from another building of same period.

Before glass is installed a bead of linseed oil putty should be laid around the rabbet to cushion and seal the glass. Press the pane into place and secure with glazing points pressed into the wood. Complete application of putty.

Refinish after putty hardens (2-3 days) (See "Routine Maintenance" above).

7.1.2.6 Broken or Missing Sash Cords.

REPAIR

Sash weights are accessible through removable panels in jambs down close to sill or by removing interior casing.

Remove sash. Stop and parting strip need only be removed from one side.

Remove remnants of cord from sash and weight. Old cord may be used to cut new cord to proper length.

Feed new cord over pulley and down weight pocket by using weighted string. Tie off to weight and knot other end for insertion in sash.

7.1.2.7 Frozen Pulley.

REPAIR

Tie off sash cord and remove pulley.

Strip off all paint in chemical stripper bath.

Straighten any dents, oil, and reinstall. Do not repaint.

7.1.2.8 Separated Joints.

REPAIR

Remove sash and remove all loose or built-up paint and dirt.

Reglue mortise and tenon joint and drive a small wedge at top and bottom of tenon.

Drill and glue dowels through half-lap joints. Trim and sand ends of dowels flush with surface. Repaint. (Be sure to drive joint closed before drilling and doweling.)

7.1.2.9 Decayed Wood, Small Holes, Splitting.

Patches of decayed area do not mean the window, or even that particular piece, needs to be replaced. Rotted area can be repaired.

REPAIR

First determine cause of rot (source of moisture) and eliminate.

Standard wood fillers are good for very small areas, small cracks, nailholes.

Dry wood and treat with fungicide. Waterproof bare wood with 2 or 3 applications of boiled linseed oil at 24 hour intervals. Oil and fillers should be allowed to dry 2-3 days before painting.

Stabilize decayed areas with penetrating epoxy consolidant. Then fill to surface with a semi-rigid epoxy filler. Use of epoxies requires a specialist familiar with the procedure. One type of consolidant is Abatron's Abocast 8101-4. Epoxy filler: Abatron's Woodepox-1. Wear dust mask when sanding fillers.

Larger area may be patched by removing decayed portion, consolidating surrounding wood and using a carpenter's "dutchman" matching original wood's species, grain pattern and grain direction. Glue or epoxy in place. Fill joints after glue dries, sand smooth.

Parts more than 40% decayed should be reproduced in a mill and replaced.

7.1.3 MAINTENANCE RECOMMENDATIONS

7.1.3.1 GENERAL

A. Caulk around edges and sill if water entry into the assembly is evident.

B. Replace missing, cracked, or loose glazing putty. Use linseed oil putty, do not use glazing compound. Align edge of putty on glass with inside edge of sash. Paint as soon as "skin" has formed on putty (2 or 3 days).

7.1.3.2 REPAINTING

A. Remove loose paint and/or excessive build-up of paint with sharp scraper, hot air gun or chemical stripper. Do not use a flame and take care not to gouge wood when scraping.

B. Repaint only sound wood.

C. Treat bare wood with paintable preservative and 2 or 3 brush-on applications of a 50:50 mix of boiled linseed oil and paint thinner. Allow 24 hours between coats and three days for the oil to dry before sanding and priming.

D. Wet glass and scrape windows with a single edge razor blade before painting to remove previous painting errors.

E. Prime with alkyd primer. Paint 2 coats of compatible latex or oil paint. Run the paint slightly onto the glass to seal where the glass meets the wood.

F. Do not paint the exterior surface of glass. If a "black-out" window is needed paint the interior surface with black paint.

7.1.4 WEATHERIZATION

Felt weatherstripping retains moisture and should be avoided.

Spring metal weatherstrips can be applied at the head and sill, between meeting rails and, if space permits, in the channels between sash and jamb.

Existing weatherstripping should be cleared of all paint.

Properly operating sash locks will also aid in keeping the sash tightly closed.

Caulk around edges of frame and sill.

Install caulking and weatherstripping to be non-intrusive.

7.1.5 SCREENS, STORM WINDOWS

Existing original screen should be repaired, and repainted as needed.

New screens should replicate historic examples.

Unfinished or clear anodized aluminum frames should not be used.

Interior storm windows are preferred as long as they are tightly sealed to prevent condensation on the colder prime window.

NOTES

STEEL WINDOWS 7.2

7.2.0 INTRODUCTION

Steel windows are common in the historic buildings at Fort Lewis. They occur at many of the utilitarian and service type buildings, as well as at some multi-unit quarters. They are in relatively good condition with only some rust and heavy paint build-up evident.

7.2.1 TYPICAL REPAIRS

7.2.1.1 EVALUATION

Prepare a schedule for evaluating each individual window noting location and the condition of each of its various parts (sill, frame, sash, putty, paint, hardware).

Inspect for:
- Water penetration
- Cracked, loose, or missing putty
- Proper slope of sill
- Peeling, chipped paint
- Rust
- Proper operation of hardware

Excessive paint build-up may impede the proper opening and closing operations. Remove all paint and refinish.

Replace broken panes with glass matching original as close as possible in thickness and optical clarity.

7.2.1.2 REPLACEMENT

Replace steel frame and sash only when metal is severely rusted or otherwise damaged beyond repair. Replaced elements should match the original. Some steel window manufacturers will produce single bars for repair work (See Sources).

The metal shop at Fort Lewis is able to repair and replace elements of steel windows.

7.2.2 MAINTENANCE RECOMMENDATIONS

A. Replace cracked or brittle caulk between window frame and building with new urethane sealant.

B. Replace loose, cracked, or missing glazing compound. Repaint when putty has dried (2 - 3 days).

C. Remove loose paint and rust by scraping, wire brushing, or sandblasting with powder or expanded beads.

D. Prime and repaint.

E. Oil hinges and other operating hardware.

NOTES

CONCRETE SILLS 7.3

7.3.0 INTRODUCTION

Concrete is composed of cement, water and aggregate. The aggregate may be sand, gravel or crushed stone. The most common cement is gray Portland cement.

Concrete strength is increased with more cement and less water.

Concrete is usually reinforced with steel reinforcing rods or wire mesh.

Reinforced concrete was used for window sills on most of the buildings at For Lewis. They were probably precast in standard forms and installed during the masonry work.

Concrete window sills at this base vary slightly in size and configuration. The thinner sills used in several of the N.C.O. housing units are spalling and some have cracked transversely. Reinforcing bar is exposed in many cases, is rusting and causing further spalling.

Other sills, especially at Shop buildings are suffering from damage due to impact and soil and moss build-up.

Concrete is not inherently waterproof.

7.3.1 TYPICAL REPAIRS

7.3.1.1 Concrete is generally soiled.

REPAIR
Scrub with bristle brush and spray with garden hose.

7.3.1.2 Concrete is stained.

REPAIR
Scrub with trisodium phosphate solution and rinse.

REPAIR
Sprinkle dishwasher detergent on stain, rinse after 5 minutes with boiling water.

7.3.1.3 Concrete is clad with moss.

REPAIR
Scrub with bleach solution and rinse or with zinc diluted with 40 parts water or with magnesium silica fluoride diluted with 40 parts water.

7.3.1.4 Concrete is soiled by bird droppings.

REPAIR
Scrub with water and mild detergent. Do not use bleach due to toxic gas formation.

7.3.1.5 Concrete is retaining water.

REPAIR
Clean concrete.
Apply siloxane water repellent in late summer when dry.
Comply with manufacturer's recommendations.
Divert source of water if possible.

7.3.1.6 Loss of Concrete (spalling). Cracks or impact damage are evident.

CAUSE
Entry of moisture into concrete at face.
Moisture freezes, expands and pushes away pieces of concrete.

REPAIR
Clean concrete with medium pressure water wash and bristle brush.
Remove all loose concrete. Remove rust from steel.
Fill cracks with grout forcing mix deep into cracks.
Apply primer or bonding agent as recommended by patching compound manufacturer.
Mix and apply patching compound. See "Sources".
Finish and cure. Do not feather over existing concrete.
Apply siloxane type water repellent.

7.3.1.7 Loss of Concrete (spalling). Rust may be evident.

CAUSE
Entry of moisture due to air pollution. Air pollution reduces concrete's alkalinity and increases its porosity.
Moisture freezes, expands and pushes away pieces of concrete.

REPAIR
Clean concrete with medium pressure water wash and bristle brush.
Remove all loose concrete.
Remove rust from steel and apply primer.
Apply primer or bonding agent to concrete as recommended by patching compound manufacturer.
Mix and apply patching compound. See "Sources".
Finish and cure. Do not feather over existing concrete.
Apply siloxane type water repellent.

7.3.1.8 Loss of Concrete (spalling). Rust may be evident.

CAUSE
Entry of moisture due to use of de-icing salts. De-icing salts create chloride ions which create an electron flow at the steel. This is similar to electrolysis and results in localized corrosion of reinforcing steel.
As the steel corrodes the rust expands and pushes away concrete.

REPAIR

Clean concrete with medium pressure water wash and bristle brush.
Remove all loose concrete and concrete behind reinforcing steel.
Clean steel completely to bright metal, removing all rust.
Prime exposed steel with a high zinc primer all around.
Apply primer or bonding agent to concrete as recommended by patching compound manufacturer.
Mix and apply patching compound behind steel, then in front of steel. See "Sources".
Finish and cure. Do not feather over existing concrete.
Apply siloxane type water repellent.

7.3.2 MAINTENANCE RECOMMENDATIONS

A. Keep concrete clean.

B. Remove moss frequently with natural bristle brush and bleach solution.

C. Avoid impact to concrete.

D. Avoid the use of de-icing salts.

E. Clean concrete is less susceptible to loss of alkalinity which leads to an increase in porosity.

F. Prevention of moss build up also helps in preventing the absorption of moisture.

G. Replace brittle or cracked caulk or expansion joint material between sills and masonry or wood.

7.3.3 COMMENTS ON PATCHING COMPOUNDS

For small areas, patching compounds will perform better than a small batch mix of regular concrete. They are formulated for many conditions including:

Thin applications
Thick applications
Congested or narrow conditions
Extreme climate
Subject to movement (grouting of handrails)
Overhead application
Short setting time
Self-curing
Subject to vibration
Resistance to chemicals
Reaction to vehicular traffic
Adhesion to stone

Select patching compounds to suit actual situation. Read label and manufacturer's literature carefully.

Ask for color samples or make test batches. Many turn pinkish. Try to match color of existing concrete as closely as possible.

See "Sources" for manufacturers.

NOTES