

SECTION 08 50 00

RESTORATION OF HISTORIC WOOD WINDOWS, DOORS AND SHUTTERS

PART I GENERAL

1.1 SUMMARY

- A. Section includes restoration of existing historic wood windows, doors and shutters.
- B. Repair strategies are designed to maximize the retention of historic fabric while making the windows weather resistant for long-term use and serviceable for cyclical maintenance. The key principle is to minimize water infiltration, the cause of cracking, checking and deterioration of wooden sash and door elements.
- C. Work of this section to follow procedures in the National Park Service Preservation Brief 9: The Repair of Historic Wood Windows.
- C. Related Sections:
  - 1. Section 04 05 31 - Masonry Tuckpointing
  - 2. Section 07 92 00 - Joint Sealers
  - 3. Section 09 91 00 - Paints and Coatings

1.2 SUBMITTALS

- A. **Qualifications:** Submit documentation which verifies qualifications of subcontractors, their site supervisors and craftsmen per part 1.3 of this section.
- B. **Shop Drawings:** Submit shop drawings indicating profiles of new components to be fabricated.
- C. **Product Data:** Submit component dimensions, anchorage and fasteners, replacement glass, and accessories.

1.3 QUALIFICATIONS

- A. **Restoration Subcontractor:** Company and designated

personnel specializing in the restoration of historic wood windows and doors, with minimum five years documented experience. Refer to submittal requirements.

- B. Shop Drawings: Submit shop drawings indicating profiles of new components to be fabricated.
- C. Restoration Subcontractor: Company and designated personnel specializing in the restoration of historic wood windows and doors, with minimum five years documented experience. Refer to submittal requirements.
- D. Ultra violet film stripping and reinstallation: Company and designated personnel specializing in the removal and installation of protective film on glass with minimum experience of five years working on historic structures. Refer to submittal requirements.

1.4 PRE-INSTALLATION MEETING

- A. Convene minimum one week before starting Work of this section.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Product Requirements: Product storage and handling requirements, and as detailed in this section.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Section 01600 - Product Requirements.
- B. Maintain this minimum temperature during and after installation of sealants.

PART 2 PRODUCTS

2.1 As specified in Part 3 sections.

PART 3 EXECUTION

3.1 SHUTTER SALVAGE

- A. Remove all shutters. Salvage historic shutters for repair and reinstallation, dispose of non-historic shutters.
- B. At historic shutters, remove and restore hardware for reinstallation on same leaf.

3.2 SASH AND DOOR REMOVAL

- A. Remove interior window casing, parting beads, and stops as necessary to free the existing sash. Tag and label components with window/door opening designator and location in jamb.
- B. Remove existing weather-strip and discard.
- C. Remove sash or door slab from the jambs and stamp the unit with a window/door opening designator. Double-hung windows will be stamped on the side of one stile. Doors will be stamped on the edge of the latch-side stile.
- D. Install temporary acrylic or plywood panels in each window opening, using non-destructive anchoring systems. Door openings shall only be filled with solid core flush doors, fitted to opening, and shall have temporary hinges, handles, surface applied locks and compressible weather-stripping to prevent weather infiltration.
- E. Label (key to the window schedule, bid set drawings) and maintain all associated elements from each window opening together. See window and door schedules on drawings for hardware organization and reuse.
- F. Do not use permanent markers on painted surfaces.

- G. Use dividers and store the windows vertically on edge, as they sit in the jamb, not lying down. Loose panes must be removed or secured.
- H. To minimize breakage, pain lines at the edges of window stops and parting strips must be cut/scribed first with a sharp knife before the moldings are removed.
- I. Moldings must be pried loose patiently and carefully.
- J. All nails will be removed by pulling them through the back of the moldings only. Representative nails will be tagged and archived.
- K. Any breakage of wooden elements will be repaired immediately, small pieces are difficult to store and are often lost on site. Franklin International Titebond II, product #5002 - #5008 (crosslink polyvinyl acetate); weatherproof construction adhesive or equal, will be used for these repairs.

### 3.3 GLASS REMOVAL

- A. Label each pane of glass with location and orientation within the sash so that the historic glass can be returned to its original location and orientation.
- B. Remove all face glazing compound from each window sash using a steam stripper or other approved method.
- C. Free each pane of glass and store until later use.
- D. Remove bed glazing from each putty-bar and putty-bed using putty knives or appropriate scrapers.
- E. Retain broken glass for possible re-use in smaller panes of other units.
- F. Use painters tape, blue 3M Scotch Long-Mask Masting Tape 2090, to label the panes for proper orientation when re-installed. All panes will be marked on the exterior of the glass. The following information will be indicated on the tape:
  - 1. Location designation

2. "Up" arrows for determining orientation

3.4 PAINT REMOVAL

- A. All OSHA, EPA, and other federal, state, and local standards should be complied with.
- B. Remove all paint from the sash so that new paint can be successfully applied at the end of this project. A steam stripper and heat guns (or other approved methods) will be carefully used to remove the paint while limiting damage to the wood substrate. Note that a two-inch band of undisturbed paint will be left on the interior and exterior of each pair of sash. Lightly feather the edges of each paint band. These paint bands will be available in the future if a chromo-chronology is ever executed.
- C. Prepare substrates for repairs by hand sanding with 100 grit paper. The sides of stiles of double-hung windows do not need to be sanded.
- D. After substrate is sanded, vacuum all surfaces and wash wood surfaces with a solution of water and tri-sodium phosphate. Rinse surfaces with clean water.0

3.5 HARDWARE REMOVAL AND TREATMENT

- A. Remove paint from all sash/door hardware so that screws can be loosed.
- B. Scribe paint around hardware so that removal of hardware does not splinter adjacent wood.
- C. After removing all screws, hardware should be taken from each sash/door.
- D. Tag and retain all hardware and screws separately for each opening.
- E. Allow project Owner and Architect to review all hardware so that a determination can be made as to whether hardware will be re-installed.
- F. Hardware not re-installed should be tagged and turned over to the Owner in its existing condition.
- G. Chemically strip remaining paint from all hardware.
- H. Buff or brush clean all metal components with abrasive appropriate to original finish.

- I. Polish all brass and iron components with jewelers' rouge on a cotton buffing wheel.
- J. Clear-coat all interior ferrous hardware with an acrylic lacquer coating and brass or iron hardware with a urethane coating.
- K. Shutter hardware and strap hinges to be powder coated.
- L. Re-install hardware when preserved sash/doors are being re-hung.

3.6 EXECUTING WOOD DUTCHMAN REPAIRS:

- A. See Criteria for Wood Repairs below, which defines when wood repairs will be executed.
- B. Replicate the different component profiles. Sample stock run from the cutter knives will be submitted to the Architect for approval.
- C. Carefully disassemble sash/door as necessary. Take care to mark components with pencil for re-assembly.
- D. Remove unsound wood and extend at least 1/4" into sound wood. Whenever possible, create voids that will provide mechanical attachments, e.g., dovetails. Retain discarded materials indicated by Owner. Tag and submit to Owner.
- E. Cut Dutchman oversized for repair area. Cut from stock that matches historic profile.
- F. Dry-fit joints to ensure that joints are tight. Clean glue surfaces with acetone or denatured alcohol. Apply water-resistant exterior carpenter's glue and clamp until glue has set.
- G. Fashion Dutchman to replicate historic jointery.
- H. Plane Dutchman repair to match adjoining flat surfaces or feather Dutchman to meet irregular or eroded surfaces.
- I. Back-prime any mortises and tenons that become exposed during disassembly.
- J. Reassemble sash/door using historic and new components and draw bore with wood pins.

- K. The damage and deterioration is mostly limited to the lower 1/3 of the sash stiles and rails. Dutchman repairs will be made at the lower joints where structural integrity has suffered from deterioration in lieu of epoxy repairs and fillers.
- L. Slip tenons will be let into the lower rails where deterioration necessitates the removal of the original tenon.
- M. A putty bar that is cracked or deteriorated will be removed and replaced with the new bar glued into a dado, cut into the muntin.
- N. For better adhesion, the length of glue joints is maximized wherever possible.
- O. Fill all fastener and screw holes solid, such that new fasteners can be reset and achieve full strength equal to that of fasteners set in solid wood.
- P. Fill all fastener and screw holes solid, such that new fasteners can be reset and achieve full strength equal to that of fasteners set in solid wood.

3.7 EXECUTING COMPONENT REPLACEMENT:

- A. See Criteria for Wood Repairs below, which defines when wood repairs will be executed.
- B. Replicate the different component profiles. Sample stock run from the cutter knives will be submitted to the Architect for approval.
- C. Carefully disassemble sash or door as necessary. Take care to mark components with pencil for re-assembly.
- D. Remove unsound component. Retain discarded material meeting Owner's criteria for material to be archived, tag, and submit to Owner.
- E. Run new component from stock that matches historic profile.
- F. Fashion replacement component to replicate historic joinery.
- G. Back-prime any joints that become exposed during disassembly.

- H. Reassemble sash/door using historic and new components and draw bore with wood pins.

### 3.8 EXECUTING EPOXY REPAIRS

- A. Remove any deteriorated wood regardless of shape of void.
- B. Clean area of void and apply epoxy primers and fillers according to manufacturer's specifications.
- C. Apply epoxy filler to the void and sand flush.
- D. Shape or tool epoxy filler as necessary.
- E. All deterioration will be removed at minimum 1/4" past the apparent area of deterioration to prevent the fungus hyphae from penetrating further into the piece.
- F. Small areas, 4 cubic inches and less, can be primed with thinned epoxy for penetration, and filled with flexible epoxy filler putty (material/products to be determined or approved by submittal).

### 3.9 APPLYING WATER REPELLANT WOOD PRESERVATIVE, PRIMER AND PAINT:

- A. Prepare surfaces or substrates for painting by lightly sanding.
- B. Apply a water-repellant wood preservative to all surfaces of the sash/door.
- C. Apply one coat of primer to all surfaces of the sash/door including putty beds and putty bars.
- D. Lightly sand the surfaces after the primer has dried, and clean off all dust.
- E. Finish paint exterior surfaces to specified colors. Shop finish paint interior portions to restore existing interior color at time of removal.

- F. Apply two topcoats of specified latex paint to all surfaces other than the putty beds and putty bars. Refer to section 09 91 00 Painting, for specified paint and primer products.
- G. Primer and paint should cover the glass adjacent to the face glazing approximately 1/32".
- H. Prime and paint the sash/door in a controlled environment rather than in the field. Touch-up the paint on site immediately after installation.

3.10 GLAZING WINDOW SASH:

- A. Clean glass prior to glazing.
- B. Re-glaze all window lites using pure linseed oil bed and face glazing. Glazing points shall be used to set the glass.
- C. Broken panes will be replaced with historic glass or reproduction glass. All replacement reproduction glass panes are to be documented in record drawing materials provided by the Contractor.
- D. Broken, Historic panes of glass can be re-used in other locations requiring smaller panes.
- E. After approximately 30 days of cure time, the glass can be cleaned again. Razor edges should not touch the edge of the putty on the glass surface.

3.11 RE-INSTALLING WINDOW SASH AND DOORS:

- A. Remove temporary panels.
- B. Reinstall window sash in restored channels for smooth operation.
- C. Re-string sash weights using Samson cotton sash cord (Samson Technologies Aetna Sash Cord product code 002, cotton braid sash cord with a nylon inner core, all white).
- D. Re-install existing pulleys.
- E. Install new weather-strip as specified.

- F. Re-install existing sash doors into historic jambs to operate smoothly and fully engage new weather-stripping.
- G. Re-install hardware.

3.13 TYPICAL WOOD REPAIRS:

- A. Wood repairs will not be made for aesthetic purposes only.
- B. Wood repairs will be made if *any* of the following three conditions exist.
  - 1. If the joinery of the shutter, sash or door is compromised.
  - 2. If the shutter, sash or door cannot be made to resist weather, or
  - 3. If defects left in place would reduce the serviceability of the shutter, sash or door.
- C. When wood repairs are necessary, the amount of wood removed should be minimized but the amount removed should allow for
  - 1. The removal of all damaged wood
  - 2. The provision of ample glue surface, and
  - 3. The reconstruction of historic joinery and the structural integrity of the historic component.
- E. All deteriorated wood fibers will be removed. Small areas, 4 cubic inches, can be primed and filled with epoxy (material/products to be determined or approved by submittal), large areas, larger than 4 cubic inches, will be repaired with Dutchmen.
- F. All deterioration will be removed at minimum 1/4" past the apparent area of deterioration to prevent the fungus hyphae from penetrating further into the piece.
- G. Slip tenons will be let into the lower rails where deterioration necessitates the removal of the original tenon.
- H. A putty bar that is cracked or deteriorated will be removed and replaced with the new bar glued into a dado, cut into the muntin.

- I. For better adhesion, the length of glue joints is maximized wherever possible.
- J. Putty Bar Replacement (Total or Partial): Remove broken putty bar flush with putty bed and kerf the muntin at least 1/4" deep and as wide as original putty bar. Glue new putty bar into dado. Shave muntin to appropriate height above putty bar.
- K. Repair of Deteriorated or Damaged Material: Remove deteriorated wood and square void to a simple shape that provides a mechanical bond if possible. Fabricate slightly oversized Dutchman and glue into void. Ensure that joints are tight. Shave Dutchman to match contiguous surfaces.
- L. Joint Repair: Disassemble sash as necessary. Remove deteriorated end of stile or rail. Form new joint that allows for maximum glue surface and possible mechanical bond. Fabricate slightly oversized Dutchman and glue to component. Shave Dutchman to match contiguous surfaces. Fashion Dutchman to accommodate historic joint.
- M. Repair of Tenon: Disassemble sash as necessary. Cut off broken or deteriorated tenon. Mortise component approximately 3" deep to receive new tenon. Fabricate new slip tenon and glue into place. Shave exposed tenon end to fit existing mortise.
- N. Check Repairs: Kerf through-checks with saw blade or dado set so as to capture the check. Fabricate wood Dutchman and glue in place. Shave Dutchman to match contiguous surfaces.

### 3.14 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

### 3.15 CLEANING

- A. Remove protective material from sharp finished surfaces.

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