



State of West Virginia  
 Department of Administration  
 Purchasing Division  
 2019 Washington Street East  
 Post Office Box 50130  
 Charleston, WV 25305-0130

# Request for Quotation

RFQ NUMBER
DNR209014

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF
FRANK WHITTAKER 304-558-2316

VENDOR

RFQ COPY  
 TYPE NAME/ADDRESS HERE

SHIP TO

DIVISION OF NATURAL RESOURCES  
 ELKINS OFFICE  
 RANDOLPH CENTER - SUITE 222  
 1200 HARRISON AVENUE  
 ELKINS, WV  
 26241

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
09/29/2008				

BID OPENING DATE: 10/30/2008      BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	LS	968-42	ADDENDUM NO. 1		
<p>***** THIS IS THE END OF RFQ DNR209014 ***** TOTAL:</p>						

\*\*\*\*\* ADDENDUM NO. 1 \*\*\*\*\*

THIS ADDENDUM IS ISSUED TO ADD THE ATTACHED CORRECTIONS/ADDITIONS TO THE PROJECT MANUAL & DRAWINGS, MANDATORY PRE-BID MEETING NOTES, QUESTIONS & ANSWERS, AND VENDOR SIGN IN SHEET.

THE BID OPENING DATE IS CHANGED TO 10/30/2008 @ 1:30PM

DEADLINE FOR QUESTIONS IS 10/09/2008 AT 3:00 PM, ALL QUESTIONS MUST BE RECEIVED IN WRITING ON OR BEFORE THE DEADLINE TO BE CONSIDERED.

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
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TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE
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WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

**GENERAL TERMS & CONDITIONS**  
**REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)**

1. Awards will be made in the best interest of the State of West Virginia.
2. The State may accept or reject in part, or in whole, any bid
3. All quotations are governed by the *West Virginia Code* and the *Legislative Rules* of the Purchasing Division
4. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
5. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.
6. Payment may only be made after the delivery and acceptance of goods or services.
7. Interest may be paid for late payment in accordance with the *West Virginia Code*.
8. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*
9. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
10. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
11. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.
12. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
13. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, this Contract may be deemed null and void, and terminated without further order.
14. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, and available online at the Purchasing Division's web site (<http://www.state.wv.us/admin/purchase/vrc/hipaa.htm>) is hereby made part of the agreement. Provided that, the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
15. **WEST VIRGINIA ALCOHOL & DRUG-FREE WORKPLACE ACT:** If this Contract constitutes a public improvement construction contract as set forth in Article 1D, Chapter 21 of the West Virginia Code ("The West Virginia Alcohol and Drug-Free Workplace Act"), then the following language shall hereby become part of this Contract: "The contractor and its subcontractors shall implement and maintain a written drug-free workplace policy in compliance with the West Virginia Alcohol and Drug-Free Workplace Act, as set forth in Article 1D, Chapter 21 of the West Virginia Code. The contractor and its subcontractors shall provide a sworn statement in writing, under the penalties of perjury, that they maintain a valid drug-free work place policy in compliance with the West Virginia and Drug-Free Workplace Act. It is understood and agreed that this Contract shall be cancelled by the awarding authority if the Contractor: 1) Fails to implement its drug-free workplace policy; 2) Fails to provide information regarding implementation of the contractor's drug-free workplace policy at the request of the public authority; or 3) Provides to the public authority false information regarding the contractor's drug-free workplace policy."

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**INSTRUCTIONS TO BIDDERS**

1. Use the quotation forms provided by the Purchasing Division.
2. **SPECIFICATIONS:** Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Complete all sections of the quotation form
4. Unit prices shall prevail in case of discrepancy.
5. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
6. **BID SUBMISSION:** All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130



Cass Clubhouse Museum  
RFQ No.: DNR 209014  
Addendum Bulletin No. 1

**DEPT. of Natural Resources**  
**Cass Scenic Railroad**  
**Clubhouse Renovation**

**AAI PROJECT NO.: 0404039.01**  
**DNR-209014**

September 26, 2008

TO ALL BIDDERS:

**1.0 GENERAL NOTES:**

- .01 This Addendum is part of the Contract Documents for the Project.
- .02 Acknowledge receipt of this Addendum on the Form of Proposal in the space provided. Failure to do so may be cause for rejection of bid.
- .03 A Mandatory Pre-Bid Conference was held on September 23, 2008. Copies of the Pre-Bid Conference Minutes and Attendance List are appended to this Addendum.
- .04 The bid opening time and date shall be changed to **Thursday, October 30<sup>th</sup>, 2008, 1:30 PM.**

**2.0 CORRECTIONS/ADDITIONS TO THE PROJECT MANUAL:**

- .01 **DIVISION 08710 Door Hardware**  
**OMIT:** Division 08710 as delivered in Project Manual  
**ADD:** Division 08710 Door Hardware as Revised 09-25-08 and attached to this addendum.



Addendum No. 1  
September 26, 2008

### 3.0 CORRECTIONS/ADDITIONS TO THE PROJECT DRAWINGS:

- .01 **Sheet G-0.01 Sheet General Notes: 2)**  
 OMIT: "... Substitutions requests ..." 5 business days prior to the date of the bid."  
 ADD: "October 9<sup>th</sup>, 3 PM to the attention of Frank Whittaker either by fax or e-mail. E-mail: [frank.m.whittaker@wv.gov](mailto:frank.m.whittaker@wv.gov) Fax: 304-558-4115."
- .02 **Sheet A-3.02, Detail 2:**  
**Clarification:** When matching tongue and groove porch decking, emphasis is on size and shape of wood and not species of wood, as decking will be painted. Division of Culture and History suggest using 2-1/4" T & G yellow pine. (This information was handed out at the Pre-Bid meeting)
- .03 **Sheet A-3.01-Sheet A-3.05, General Notes:**  
 ADD: "When discussing the appropriate method of "re-glazing" of the windows, follow the instructions for Repair Class I: Routine Maintenance, and if needed Repair Class II: Stabilization from the Technical Preservation Services of the National Park Service, U.S. Dept. of the Interior; Preservation Brief No. 9: *The Repair of Historic Wooden Windows.*" Copy attached and hand delivered at the Mandatory Pre-Bid.
- .04 **Sheet A-5.01, Dtl. 9/A-1.09 Section at Roof Ridge Vent**  
**Add:** Note as shown on the attached Addenda Drawing AD-001. This was also a hand out at the Pre-Bid Meeting.
- .05 **Sheet E-6.01, Electrical Schedules**  
 OMIT: Panel Board A and Panel Board B Schedule.  
 ADD: Panel Board A- Addendum Drawing AD-002, dated 9-25-08  
 ADD: Panel Board B- Addendum Drawing AD-003, dated 9-25-08  
 These are attached at the end of this addendum.

Issued: September 26, 2008  
 Alpha Associates, Incorporated

*Rebecca Jean Key, AIA*  
 Rebecca Jean Key, AIA



Pre-Bid Meeting Minutes

**DEPT. of Natural Resources**  
**Cass Scenic Railroad**  
**Clubhouse Renovation**

**AAI PROJECT NO.: 0404039.01**  
**DNR-209014**

**MANDATORY PRE-BID MEETING**

**DATE:** September 24, 2008  
**FROM:** Rebecca Key *R. Key*  
**LOCATION:** Cass State Park  
 September 23, 2008 Approximately 11 AM

**ATTENDEES:** (See sign-in sheet attached)

**DISTRIBUTION:** To All Attendees of Record  
 Don Smith, DNR  
 Frank Whittaker, State Purchasing  
 ZDS, Consulting Engineer



Pre-Bid Meeting  
September 23, 2008

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1. A Sign-In Sheet was identified and all attendees (bidders) were required to sign-in as evidence of attendance. The pre-bid is mandatory, only attendees that signed in will be considered at the bid opening.
2. Introduction of Parties: Don Smith, Project Engineer for DNR opened the meeting. He introduced Rebecca Key as Project architect from Alpha Associates, Inc., Andy Bennet, Asst. Park Superintendent and Tom Krause also with the Cass State Park.
3. Contractual Responsibilities of Vendor (Bidder) and the State of West Virginia, was presented by Don Smith. The RFQ, Request for Quotation, Number is DNR 209014. The Purchasing Agent is Frank Whittaker; his phone number is 304-558-2316. Copies of the RFQ are available from Frank Whittaker or the State Purchasing web site: <http://www.state.wv.us/admin/purchase>
4. The RFQ has a section for acknowledgement of the addenda; it must be filled out when presenting the bid proposal back to the State.
5. Successful bidders must be registered with the State. That may also be accomplished by contacting Frank Whittaker or the State Purchasing web site.
6. Bid Date: Has changed to October 30, 2008, 1:30PM. Addenda will be issued stating the same.
7. Bid Location: WV State Purchasing Division, Building 15, 2019 Washington Street East, Capitol Complex, Charleston, WV 25305
8. Last day for Questions: Submit in Writing, Thursday, October 9th, 3PM. Fax: 304-558-4115 to Frank Whittaker or e-mail to [frank.m.whittaker@wv.gov](mailto:frank.m.whittaker@wv.gov)
9. Payment: Once a contract is issued, and the job is started, payment requests shall be made monthly, and on approved AIA forms. Those payments will be approved first by the Architect of Record, which is Alpha Associates. They will in-turn be processed by DNR and then sent to the State for payment. Usually those payments take 30 days.
10. Rebecca Key proceeded with other specific information about the project
11. Summary of Project: Approx. 5200 sq. ft. building, this addresses the complete exterior renovation and first floor, plus basement. Installation of 1 toilet room, new services, renovation of flooring, siding, new porch, etc. HVAC, electrical, interior finishes.



Pre-Bid Meeting  
September 23, 2008

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12. Re-Bid of Project: Project was bid previously in 2007. Those companies that may still have the previously bid documents, cannot rely upon those documents for accuracy. The project has changed drastically in size and scope. New drawings, dated June 30 2008 must be obtained.
13. Prevailing Wage: Use the published 2008 Prevailing Wage rates.
14. Contract completion: All work must be completed in the space within 180 consecutive calendar days, following receipt of owner's written Notice to Proceed. The time and date of the Notice to Proceed will be a mutually agreed upon date between the successful bidder and the Park's representatives, after the purchase agreement is developed by the State Purchasing Department.
15. Substitution Requests: Substitution Requests must be in by October 9th, 3 PM, if not, no substitutions will be reviewed during construction. Those substitution requests must also be sent in writing to Frank Whittaker.
16. Temporary Facilities: Water and Power on site is available for Contractor's use without metering or separate charge. Field Offices, General: Owner may make available space with in building for meetings, and as field office.
- Storage Trailer: General Contractor shall provide facilities needed to store tools and materials. Review Division Section 01500 for complete information.
17. Permits: None required.
18. Work Restrictions:
- On-Site Work Hours: Work shall be generally performed inside the Park during normal business working hours of 7:00 a.m. to 5 p.m., Monday through Friday, except otherwise indicated.
- Weekend Hours: as required with prior written approval from DNR
- Early Morning Hours: as required with prior written approval from DNR
- Hours for Utility Shutdowns: Consult with Project Manager.
- Hours for Core Drilling or other noisy activity: No restrictions.
- Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only



Pre-Bid Meeting  
September 23, 2008

after arranging to provide temporary utility services according to requirements indicated:

Notify Owner not less than three 3 days in advance of proposed utility interruptions.

Do not proceed with utility interruptions without Owner's written permission.

19. B & O Tax: Not required.

20. Hand-outs: Several handouts were distributed at the meeting.

- a. Copy of the Agenda
- b. List of Questions and answers that were developed prior to the meeting.
- c. AD-001 Addenda Drawing 001
- d. Preservation Brief No. 9 and No.31

21. Questions from the floor:

Q1: What is the budget?

A1: The bonding amount should be between \$500K and \$600K.

Q2: What type of Quality Control Testing and Balancing is to be done?

A2: There is no third party testing for concrete. (See addenda no. 1 for additional information)

Q3: How much abatement is there for asbestos?

A3: There is a report contained within the project manual (specifications) that in conjunction with the drawings shows where the asbestos is located.

Q4: What is to be done with the existing floors in the building?

A4: They are to be sanded, stained and finished. Information is in the Finish Schedule and the specifications.

Q5: Can all of the plaster be removed and gypsum board be replaced?

A5: If that method is chosen, than it must be done in accordance with the Dept. of Interior guidelines. The existing walls are insulated with a blown-in cellulose fiber. The existing ceiling on the first floor is gypsum board, it may be removed ("dropped" as in eliminate) completely, and new replacement gypsum board may be installed, should the contractor elect to choose that method of repair. No exposed conduit, wire mold, etc. is to be visible, and is to be concealed in walls, baseboards, and above the ceiling.





Pre-Bid Meeting  
September 23, 2008

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- Q6: How far is the electrical run?
- A6: Thought to be either from the train shop or train depot. Please see updated panel schedules attached in Addenda.

### Tour of Existing Facility

The above is considered to be an accurate account of my understanding of the discussions and/or events that took place at the Meeting. Participants are requested to advise this office, in writing, within ten (10) days of the issued date of these Minutes, of any errors or omissions. Otherwise, these Minutes are understood to be accepted by all parties receiving a copy of these Minutes and shall be considered as the Official Minutes of the Meeting.

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The Formal Meeting adjourned at approx. Noon.



ARCHITECTS • ENGINEERS • SURVEYORS

**CASS SCENIC RAILROAD STATE PARK**

AAI PROJECT NO. 0404039.01

**PRE-BID**

RFQ NO.: DNR209014

Date: September 23, 2008

**SIGN-IN SHEET**

NAME	COMPANY/ ADDRESS	E-MAIL	PHONE/ FAX
John Mathena	Proven Const Management PO Box 171 Shenandoah WV	JEMathena@ Gmail.com	304 661 8122 304 536 2051
Amy Moloney	"	amoloney@ gmail.com	304 661 8122
Mary Ann Kiser	Multiplex, Inc. PO Box 505 Summersville, WV 26651	multiplexap@ yahoo.com	304-872-6648 304-872-1445
Vince Mullenax	Dval Construction management P.O. Box 401 Charleston WV 25322		304 847 8820
HARRY FARNACK	GUARDIAN Electric	GUARDIANElectric @HotMail.com	602-727-8102 304-793-6301
Tom ANDERSON	ALLEGHENY Restoration	tom@ allegheny Restoration, L	304-594-2570 304-594-2810
Ches Dwyer	Dankill Construction Co. P.O. Box 685 Care by Bridge, at 11/25/05	cdwyer35 @yahoo.com	304-632-1501 Fax. 304-632-1000 Tel.
Bud Henderson	City Window & Construction P.O. Box 285 Clarksburg, WV 26301	npallock@wvdsi.net	304-623-2573 phs 304-623-5179 fax
Jeery BNS	Lombardi Development & Co. 820 Dunbar Dr East 26037	plombardi@lombardi. development.com	304-748-5720 304-748-8488
Bob Smalleidge	Smalleidge Electric 318 S. Florida St Buckhannon WV 26001	selectric@ cebridge.net	304-472-6247 304-472-8736



ARCHITECTS • ENGINEERS • SURVEYORS

**CASS SCENIC RAILROAD STATE PARK**

AAI PROJECT NO. 0404039.01

**PRE-BID**

RFQ NO.: DNR209014

Date: September 23, 2008

Questions and Answers:

Clarification:

Sheet A-3.02, Detail 2:

When matching tongue and groove porch decking, emphasis is on size and shape of wood and not species of wood, as decking will be painted.

Sheet A-3.01-Sheet A-3.05, General Notes:

When discussing the appropriate method of "re-glazing" of the windows, follow the instructions for Repair Class I: Routine Maintenance, and if needed Repair Class II: Stabilization from the Technical Preservation Services of the National Park Service, U.S. Dept. of the Interior; Preservation Brief No. 9: *The Repair of Historic Wooden Windows*. Copy attached and hand delivered at the Mandatory Pre-Bid

Addendum Drawing No.-001

Sheet A-5.01 Detail 9/A-1.09

Add: Note: "Extend ridge vent to end of gables for finished look. Do not cut vent slot beyond building envelope."

See attached.

**CASS SCENIC RAILROAD STATE PARK  
The Clubhouse Museum  
CASS, WEST VIRGINIA**

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Division 8**

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Commercial door hardware for the following:
  - a. Swinging doors.
  - b. Other doors to the extent indicated.
2. Cylinders for doors specified in other Sections.
3. Electrified door hardware.

- B. Related Sections include the following:

1. Division 08 Section "Hollow Metal Doors and Frames"
2. Division 08 Section "Flush Wood Doors" for provided as part of fire-rated labeled assemblies.
3. Division 08 Section "Stile and Rail Wood Doors" for provided as part of fire-rated labeled assemblies.

1.3 SUBMITTALS

- A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Initial Selection: For each finish, color, and texture required for each type of door hardware indicated.
1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- C. Qualification Data: For Architectural Hardware Consultant.
- D. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final keying schedule.

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- E. Warranty: Special warranty specified in this Section.
- F. Other Action Submittals:
1. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
    - a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
    - b. Content: Include the following information:
      - 1) Identification number, location, hand, fire rating, and material of each door and frame.
      - 2) Type, style, function, size, quantity, and finish of each door hardware item.
      - 3) Complete designations of every item required for each door or opening including name and manufacturer.
      - 4) Fastenings and other pertinent information.
      - 5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
      - 7) Mounting locations for door hardware.
      - 8) Door and frame sizes and materials.
      - 9) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
        - a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
    - 10) List of related door devices specified in other Sections for each door and frame.
  - c. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.
2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

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1.4 QUALITY ASSURANCE

- A. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
- B. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- C. Keying Conference: Obtain keying instructions from Architect and/or Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver permanent keys to Owner by registered mail or overnight package service.

1.6 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of operators and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

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2. Warranty Period: Manufacturer's standard warranties

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section.
1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, using named manufacturers listed in the following paragraphs of this section and hardware sets.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:
1. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 HINGES

- A. Butts and Hinges: As specified in hardware sets
- B. Manufacturers:
1. Bommer Industries, Inc. (BI).
  2. Hager Companies (HAG).
  3. Lawrence Brothers, Inc. (LB).
  4. **McKinney Products Company; an ASSA ABLOY Group company (MC).**
  5. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
  6. Ives Manufacturing, an Ingersoll Rand Company (IVE)

2.3 SPRING HINGES

- A. Self-Closing Hinges: As specified in hardware sets.
- B. Manufacturers:

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1. Bommer Industries, Inc. (BI).
2. Hager Companies (HAG).
3. Lawrence Brothers, Inc. (LB).
4. **McKinney Products Company; an ASSA ABLOY Group company (MC).**
5. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
6. Ives Manufacturing, an Ingersoll Rand Company (IVE)

2.4 LOCKS AND LATCHES

- A. Rim and Bored (cylindrical) Lockset and Latchsets: As specified in hardware sets.
- B. Manufacturers:
- a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
  - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
  - c. **Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YA).**
  - d. **Yale Residential (YR).**
  - e. Falcon Lock Manufacturing Company, an Ingersoll Rand Company (FAL)
  - f. Best Lock Manufacturing Company, a Stanley Hardware Company (BES)

2.5 AUXILIARY LOCKS AND LATCHES

- A. Auxiliary Locks: As specified in hardware sets
1. Manufacturers:
    - a. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
    - b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
    - c. **Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YA).**
    - d. Falcon Lock Manufacturing Company, an Ingersoll Rand Company (FAL)
    - e. Best Lock Manufacturing Company, a Stanley Hardware Company (BES)

2.6 DOOR BOLTS

- A. Surface Bolts: As specified in hardware sets
1. Manufacturers:
    - a. Hager Companies (HAG).
    - b. IVES Hardware; an Ingersoll-Rand Company (IVS).
    - c. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
    - d. Trimco (TBM).



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- e. **Rockwood Manufacturing. (RO).**
- B Manual Flush Bolts: As specified in hardware sets.
1. Manufacturers:
- a Hager Companies (HAG).
  - b IVES Hardware; an Ingersoll-Rand Company (IVS).
  - c Stanley Commercial Hardware; Div. of The Stanley Works (STH).
  - d Trimco (TBM).
  - e **Rockwood Manufacturing. (RO).**
- 2.7 LOCK CYLINDERS
- A. Standard Lock Cylinders: As specified in hardware sets.
- B Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
1. Number of Pins: 6.
  2. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam
  3. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  4. Bored-Lock Type: Cylinders with tailpieces to suit locks.
- C. Construction Keying: Comply with the following:
1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 5 construction master keys.
- D. Manufacturer: Same manufacturer as for locks and latches.
- E. Manufacturers:
1. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
  2. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
  3. **Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YA).**
  4. Falcon Lock Manufacturing Company, an Ingersoll Rand Company (FAL)
  5. Best Lock Manufacturing Company, a Stanley Hardware Company (BES)
- 2.8 KEYING
- A. Keying System: Factory registered. Incorporate decisions made in keying conference
1. Master Key System: Cylinders are operated by a change key and a master key.
  2. Provide construction Master Keyed Cylinders.

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**The Clubhouse Museum**  
**CASS, WEST VIRGINIA**

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2.9 CLOSERS

- A. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
- B. Surface Closers: As specified in hardware sets.
1. Manufacturers:
- a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
  - b. **Norton Door Controls; an ASSA ABLOY Group company (NO).**
  - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
  - d. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).
  - e. Dor-o-matic , an Ingersoll Rand Company (DOR)
  - f. Ryobi Closer, a Stanley Hardware Company (RY)

2.10 STOPS AND HOLDERS

- A. Stops and Bumpers: As specified in hardware sets.
1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic.
- B. Electromagnetic Door Holders: As specified in hardware sets.
- a. **Rixson Specialty Door Controls: An ASSA ABLOY Group Company (RX).**
  2. Coordinate with fire detectors and interface with fire alarm system for labeled fire door assemblies.
- C. Silencers for Wood Door Frames: Neoprene or rubber, minimum 5/8 by 3/4 inch; fabricated for drilled-in application to frame. As specified in hardware sets.
- D. Silencers for Metal Door Frames: Neoprene or rubber, minimum diameter 1/2 inch; fabricated for drilled-in application to frame.
- E. Manufacturers:
1. Hager Companies (HAG).
  2. IVES Hardware; an Ingersoll-Rand Company (IVS).
  3. **Rockwood Manufacturing Company (RO).**

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4. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
5. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
6. Trimco (TBM).

2.11 THRESHOLDS

A. Standard: Wood Threshold as specified in hardware sets.

1. Hager Companies (HAG).
2. **McKinney Products Company; an ASSA ABLOY Group company (MC).**
3. National Guard Products (NGP).
4. Pemko Manufacturing Co. (PEM)
5. Reese Enterprises (RE).
6. Zero International (ZRO).

2.12 MISCELLANEOUS DOOR HARDWARE

A. Auxiliary Hardware: As specified in hardware sets.

1. Manufacturers:

- a. Hager Companies (HAG).
- b. Lawrence Brothers, Inc. (LB).
- c. Rockwood Manufacturing Company (RM).
- d. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
- e. Trimco (TBM).
- f. Ives Manufacturing, an Ingersoll Rand Company

2.13 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

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**CASS, WEST VIRGINIA**

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**Division 8**

- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  2. Steel Machine or Wood Screws: For the following fire-rated applications:
    - a. Mortise hinges to doors.
    - b. Strike plates to frames.
    - c. Closers to doors and frames.
  3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS 2, "Recommended Fasteners for Wood Doors."

2.14 FINISHES

- A. Standard: BHMA A156.18, as indicated in door hardware sets.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 Series.
  1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

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- B. Wood Doors: Comply with DHI A115-W Series.

**3.3 INSTALLATION**

- A. Mounting Heights: Mount door hardware units at heights indicated on drawings or required to comply with governing regulations.

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS 3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

**3.4 ADJUSTING**

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

**3.5 CLEANING AND PROTECTION**

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

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The Clubhouse Museum  
CASS, WEST VIRGINIA**

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Division 8**

3.6 DOOR HARDWARE SETS

SET #1.0

Doors: 001

2 Surface Bolt	580-8 WS	US10B	RO
Balance of hardware is existing			

SET #2.0 (Not Used)

SET #3.0 (Not Used)

SET #4.0

Doors: 002A

3 Hinges	TA2714 4 1/2 X 4 1/2	P	MC
1 Surface Bolt	580-8	US10B	RO

SET #5.0

Doors: 100

NOTE: Cylinder configuration as required.

SET #6.0 (Not Used)

SET #7.0

Doors: 102, 102A, 101, 106

4 Dummy Pulls	Prairie 161	AB	YR
2 Roller Latch	590	US10B	RO

NOTE: Existing hinges to remain.  
Remove existing lockset/trim, patch resulting opening/holes.  
Mount Roller Latches in top rail of both leaves.  
Mount 2 dummy pulls back-to-back each leaf.

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SET #8.0

Doors: 103, 104

1 Rim Lock	80 x 1109E 5 pin	612	YA
1 Door Bolt	630-4	US10B	RO

NOTE: Existing hinges to remain.  
 Retain existing lockset and make latchbolt inoperable so as not to engage strike.

SET #9.0

Doors: 105, 109, S11

1 Rim Lock	80 x 1109E 5 pin	612	YA
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NOTE: Balance of all existing hardware to remain.

SET #10.0

Doors: 106A, 108, 110A

NOTE: All existing hardware to remain.

SET #11.0

Doors: 111

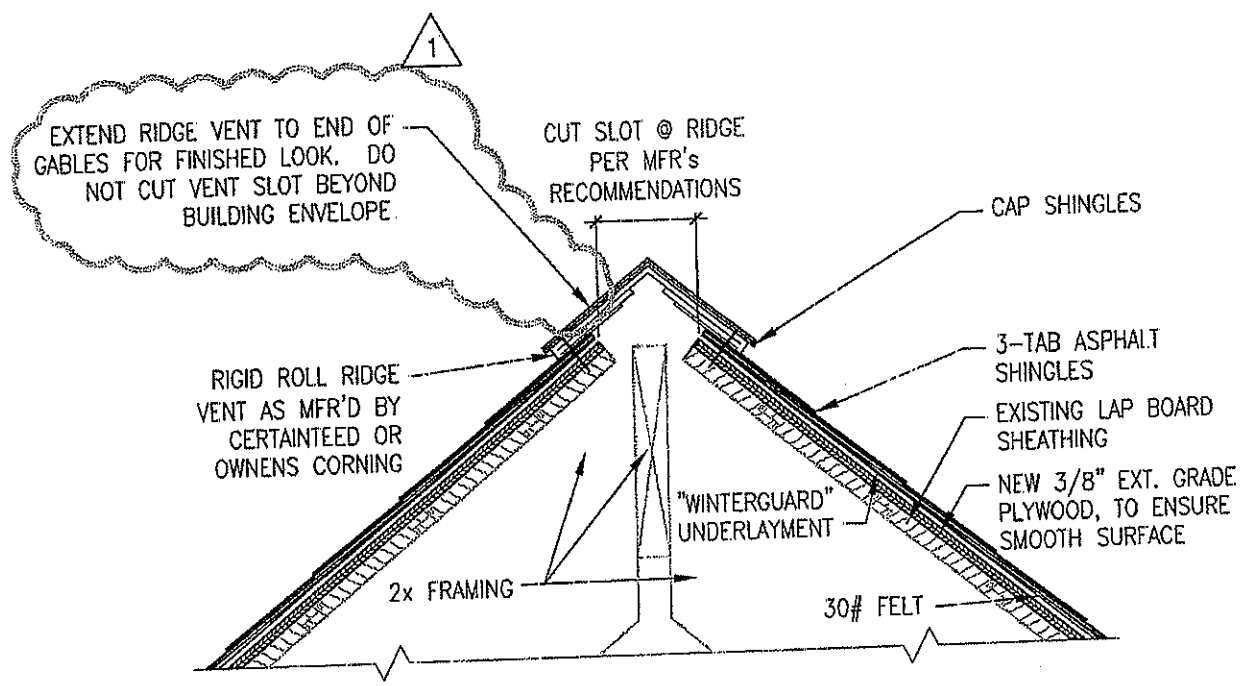
3 Hinges	TA2714 4 1/2 X 4 1/2	P	MC
1 Latchset (Privacy)	AU 5302LN	613	YA
3 Silencers	609	GREY	RO

SET #12.0 (Not Used)

SET #13.0 (Not Used)

SET #14.0 (Not Used)

END OF SECTION 08700



**SECTION @ ROOF RIDGE VENT (TYPICAL)**

SCALE : 1 1/2" = 1'-0"

9  
A-1.09

ADDENDUM DRAWING

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MORGANTOWN, WV 26501  
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TOLL FREE: 800-640-8216  
EMAIL: alpha@alphaaec.com  
HTTP: www.alphaaec.com


REV BY: RJK	DWG. DESCRIPTION: RIDGE VENT CLARIFICATION	DWG. NO: AD-001
DWG. BY: KCB		PBI NO: --
DATE: 9-22-08		SHEET REF: A-5.01
PROJECT NAME: CASS MUSEUM		PROJECT NO: 0404039.01



**Panel Board: "A"** Manufacturer: Square D Style: I-LINE  
 600 Amp Main Lugs 600A Main Breaker  
 240/120V 1Phase 3 Wire, S/N Surface Mounting

Breaker	A	P	Description	Circuit			Phase Load			Circuit	Watts	Description	Breaker
				Watts	No.		No.	A	B				
20	1	RM 002,001 REC	1,200	1	6,000				2	4,800	AH-1	2	60
20	1	RM002,003 REC	960	3		5,760			4	4,800			
20	1	SPARE	1,500	5	6,300				6	4,800	AH-2	2	60
20	1	RM 005 REC	720	7		5,520			8	4,800			
20	1	RM 001,005 LTS	400	9	2,618				10	2,218	AC-1	2	60
20	1	RM 002,003 LTS	400	11		2,618			12	2,218			
60	2	HW HTR, SS-1	5,750	13	7,690				14	1,940	AC-2	2	50
-	-	-	5,750	15		7,690			16	1,940			
20	1	SPARE	1,500	17	12,849				18	11,349	PANEL B	2	150
20	1	SPARE	1,500	19		14,660			20	13,160			
20	1	SPARE	1,500	21	3,000				22	1,500	SPARE	1	20
20	1	SPARE	1,500	23		3,000			24	1,500	SPARE	1	20
35	2	UH-1	2,500	25	4,000				26	1,500	SPARE	1	20
-	-	-	2,500	27		4,000			28	1,500	SPARE	1	20
35	2	UH-1	2,500	29	2,500				30		SPACE		
-	-	-	2,500	31		2,500			32		SPACE		
35	2	UH-1	2,500	33	2,500				34		SPACE		
-	-	-	2,500	35		2,500			36		SPACE		
				37	0	0			38		SPACE		
				39		0			40		SPACE		
				41		0			42		SPACE		
Sub Total:										47,457	48,248	95,705	Total Watts
												399	Amps

Remarks: 1. All Busses, Bars And Lugs Shall Be Copper  
 2. Bracing 40,000 RMS



**ALPHA**  
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ADDENDUM DRAWING


REV. BY: JW	DWS. DESCRIPTION:	DWS. NO: AD-002
DWS. BY: MC		PEN NO:
DATE: 9-25-08		SHEET REF:
PROJECT NAME: CASS MUSEUM		PROJECT NO: CCH071C

Panel Board: "B"  
 150 Amp Main Lugs 150A Main Breaker  
 240/120V 1 Phase 3 Wire, S/N

Manufacturer: Square D Style: NQDD  
 Surface Mounting

Breaker	A	P	Description	Circuit		Phase Load		Circuit	Watts	No.	Description	Breaker	
				Watts	No.	A	B						P
20	1	1	EF-1	129	1	1,089		2	960	2	RM 100,102,103 REC	1	20
20	1	1	SPARE	1,500	3		2,460	4	960	4	RM 102,103,105 REC	1	20
20	1	1	SPARE	1,500	5	2,220		6	720	6	RM 101,102 REC	1	20
20	1	1	SPARE	1,500	7		2,460	8	960	8	RM 106 REC	1	20
20	1	1	SPARE	1,500	9	2,190		10	690	10	RM 106,110,111 REC	1	20
20	1	1	STAIR LTS	800	11		1,490	12	690	12	RM 101,112 REC	1	20
20	1	1	PORCH LTS	400	13	1,090		14	690	14	RM 112,100 REC	1	20
20	1	1	RM 002, 003 LTS	1,400	15		2,090	16	690	16	RM 112 REC	1	20
20	1	1	RM 110, 112 LTS	800	17	1,760		18	960	18	RM 107,108,109 REC	1	20
20	1	1	RM 106, 109 LTS	1,200	19		1,660	20	460	20	RM 110 REC	1	20
20	2	1	HW HTR, LAV-1	1,500	21	3,000		22	1,500	22	SPARE	1	20
-	-	-	-	1,500	23		3,000	24	1,500	24	SPARE	1	20
-	-	-	SPACE		25	0		26		26	SPACE		
-	-	-	SPACE		27		0	28		28	SPACE		
-	-	-	SPACE		29	0		30		30	SPACE		
-	-	-	SPACE		31		0	32		32	SPACE		
-	-	-	SPACE		33	0		34		34	SPACE		
-	-	-	SPACE		35		0	36		36	SPACE		
-	-	-	SPACE		37	0		38		38	SPACE		
-	-	-	SPACE		39		0	40		40	SPACE		
-	-	-	SPACE		41		0	42		42	SPACE		
Sub Total:				11,349		13,160						24,509 Total Watts	102 Amps

Remarks: 1. All Busses, Bars And Lugs Shall Be Copper  
 2. Bracing 22,000 RMS



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ADDENDUM DRAWING

REV. BY: JW	DWS. DESCRIPTION:	DWG. NO: AD-003
DWG. BY: MC		PER NO:
DATE: 9-25-08		SHEET REF:
PROJECT NAME: CASS MUSEUM		PROJECT NO: CCH071C

## 9 Preservation Briefs

Technical Preservation Services

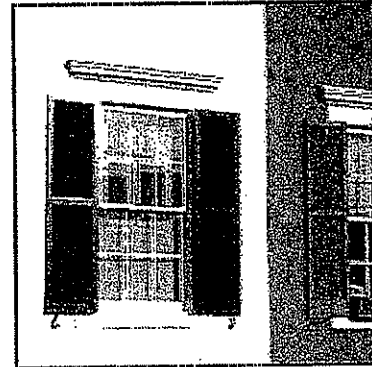
National Park Service  
U.S. Department of the Interior



### The Repair of Historic Wooden Windows

John H. Myers

- » [Architectural or Historical Significance](#)
- » [Physical Evaluation](#)
- » [Repair Class I: Routine Maintenance](#)
- » [Repair Class II: Stabilization](#)
- » [Repair Class III: Splices and Parts Replacement](#)
- » [Weatherization](#)
- » [Window Replacement](#)
- » [Conclusion](#)
- » [Additional Reading](#)



**A NOTE TO OUR USERS:** The web versions of the **Preservation Briefs** differ somewhat from the printed versions. Many illustrations are new, captions are simplified, illustrations are typically in color rather than black and white, and some complex charts have been omitted.

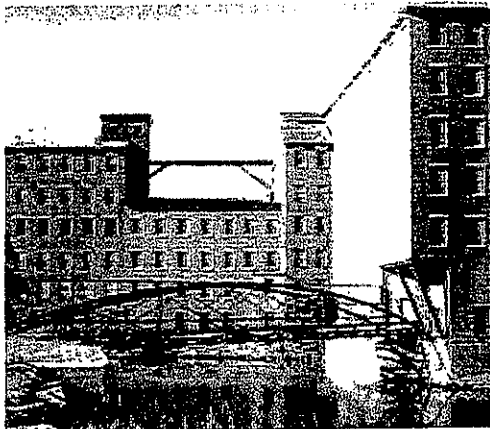
**The windows on many historic buildings are an important aspect of the architectural character of those buildings.** Their design, craftsmanship, or other qualities may make them worthy of preservation. This is self-evident for ornamental windows, but it can be equally true for warehouses or factories where the windows may be the most dominant visual element of an otherwise plain building. Evaluating the significance of these windows and planning for their repair or replacement can be a complex process involving both objective and subjective considerations. *The Secretary of the Interior's Standards for Rehabilitation* and the accompanying guidelines, call for respecting the significance of original materials and features, repairing and retaining them wherever possible, and when necessary, replacing them in kind. This Brief is based on the issues of significance and repair which are implicit in the standards, but the primary emphasis is on the technical issues of planning for the repair of windows including evaluation of their physical condition, techniques of repair, and design considerations when replacement is necessary.

Much of the technical section presents repair techniques as an instructional guide for the do-it-yourselfer. The information will be useful, however, for the architect, contractor, or developer on large-scale projects. It presents a methodology for approaching the evaluation and repair of existing windows, and considerations for replacement, from which the professional can develop alternatives and specify appropriate materials and procedures.

### Architectural or Historical Significance

## Preservation Brief 9: The Repair of Historic Wooden Windows

Evaluating the architectural or historical significance of windows is the first step in planning for window treatments, and a general understanding of the function and history of windows is vital to making a proper evaluation. As a part of this evaluation, one must consider four basic window functions: admitting light to the interior spaces, providing fresh air and ventilation to the interior, providing a visual link to the outside world, and enhancing the appearance of a building. No single factor can be disregarded when planning window treatments; for example, attempting to conserve energy by closing up or reducing the size of window openings may result in the use of *more* energy by increasing electric lighting loads and decreasing passive solar heat gains.



Windows are frequently important visual focal points, especially on simple facades such as this mill building. Replacement of the multi-pane windows with larger panes could dramatically alter the appearance of the building. Photo: NPS files.

Historically, the first windows in early American houses were casement windows; that is, they were hinged at the side and opened outward. In the beginning of the eighteenth century single- and double-hung windows were introduced. Subsequently many styles of these vertical sliding sash windows have come to be associated with specific building periods or architectural styles, and this is an important consideration in determining the significance of windows, especially on a local or regional basis. Site-specific, regionally oriented architectural comparisons should be made to determine the significance of windows in question. Although such comparisons may focus on specific window types and their details, the ultimate determination of significance should be made within the context of the whole building, wherein the windows are one architectural element.

After all of the factors have been evaluated, **windows should be considered significant to a building if they:** **1)** are original, **2)** reflect the original design intent for the building, **3)** reflect period or regional styles or building practices, **4)** reflect changes to the building resulting from major periods or events, or **5)** are examples of exceptional craftsmanship or design. Once this evaluation of significance has been completed, it is possible to proceed with planning appropriate treatments, beginning with an investigation of the physical condition of the windows.

---

### Physical Evaluation

The key to successful planning for window treatments is a careful evaluation of existing physical conditions on a unit-by-unit basis. A graphic or photographic system may be devised to record existing conditions and illustrate the scope of any necessary repairs. Another effective tool is a window schedule which lists all of the parts of each window unit. Spaces by each part allow notes on existing conditions and repair instructions. When such a schedule is completed, it indicates the precise tasks to be performed in the repair of each unit and becomes a part of the specifications. In any evaluation, one should note at a minimum:

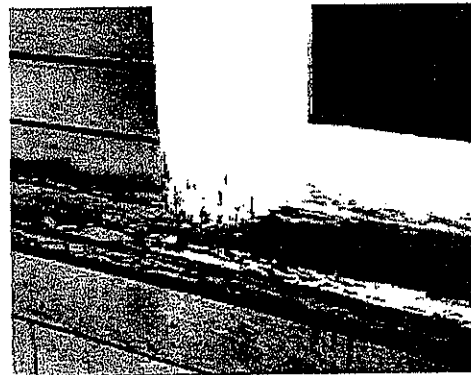
- **1)** window location
- **2)** condition of the paint

## Preservation Brief 9: The Repair of Historic Wooden Windows

- 3) condition of the frame and sill
- 4) condition of the sash (rails, stiles and muntins)
- 5) glazing problems
- 6) hardware, and
- 7) the overall condition of the window (excellent, fair, poor, and so forth)

Many factors such as poor design, moisture, vandalism, insect attack, and lack of maintenance can contribute to window deterioration, but moisture is the primary contributing factor in wooden window decay. All window units should be inspected to see if water is entering around the edges of the frame and, if so, the joints or seams should be caulked to eliminate this danger. The glazing putty should be checked for cracked, loose, or missing sections which allow water to saturate the wood, especially at the joints. The back putty on the interior side of the pane should also be inspected, because it creates a seal which prevents condensation from running down into the joinery. The sill should be examined to insure that it slopes downward away from the building and allows water to drain off. In addition, it may be advisable to cut a dripline along the underside of the sill. This almost invisible treatment will insure proper water runoff, particularly if the bottom of the sill is flat. Any conditions, including poor original design, which permit water to come in contact with the wood or to puddle on the sill must be corrected as they contribute to deterioration of the window.

One clue to the location of areas of excessive moisture is the condition of the paint; therefore, each window should be examined for areas of paint failure. Since excessive moisture is detrimental to the paint bond, areas of paint blistering, cracking, flaking, and peeling usually identify points of water penetration, moisture saturation, and potential deterioration. Failure of the paint should not, however, be mistakenly interpreted as a sign that the wood is in poor condition and hence, irreparable. Wood is frequently in sound physical condition beneath unsightly paint. After noting areas of paint failure, the next step is to inspect the condition of the wood, particularly at the points identified during the paint examination.



Deterioration of poorly maintained windows usually begins on horizontal surfaces and at joints, where water can collect and saturate the wood. Photo: NPS files.

Each window should be examined for operational soundness beginning with the lower portions of the frame and sash. Exterior rainwater and interior condensation can flow downward along the window, entering and collecting at points where the flow is blocked. The sill, joints between the sill and jamb, corners of the bottom rails and muntin joints are typical points where water collects and deterioration begins. The operation of the window (continuous opening and closing over the years and seasonal temperature changes) weakens the joints, causing movement and slight separation. This process makes the joints more vulnerable to water which is readily absorbed into the endgrain of the wood. If severe deterioration exists in these areas, it will usually be apparent on visual inspection, but other less severely deteriorated areas of the wood may be tested by two traditional methods using a small ice pick.

An ice pick or an awl may be used to test wood for soundness. The technique is simply to jab the pick into a wetted wood surface at an angle and pry up a small section of the wood. Sound wood will separate in long fibrous splinters, but decayed wood will lift up in short irregular pieces due to the breakdown of fiber strength.

## Preservation Brief 9: The Repair of Historic Wooden Windows

Another method of testing for soundness consists of pushing a sharp object into the wood, perpendicular to the surface. If deterioration has begun from the hidden side of a member and the core is badly decayed, the visible surface may appear to be sound wood. Pressure on the probe can force it through an apparently sound skin to penetrate deeply into decayed wood. This technique is especially useful for checking sills where visual access to the underside is restricted.

Following the inspection and analysis of the results, the scope of the necessary repairs will be evident and a plan for the rehabilitation can be formulated. Generally the actions necessary to return a window to "like new" condition will fall into three broad categories: **1) routine maintenance procedures, 2) structural stabilization, and 3) parts replacement.** These categories will be discussed in the following sections and will be referred to respectively as **Repair Class I, Repair Class II, and Repair Class III.** Each successive repair class represents an increasing level of difficulty, expense, and work time. Note that most of the points mentioned in Repair Class I are routine maintenance items and should be provided in a regular maintenance program for any building. The neglect of these routine items can contribute to many common window problems.

Before undertaking any of the repairs mentioned in the following sections all sources of moisture penetration should be identified and eliminated, and all existing decay fungi destroyed in order to arrest the deterioration process. Many commercially available fungicides and wood preservatives are toxic, so it is extremely important to follow the manufacturer's recommendations for application, and store all chemical materials away from children and animals. After fungicidal and preservative treatment the windows may be stabilized, retained, and restored with every expectation for a long service life.

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### Repair Class I: Routine Maintenance

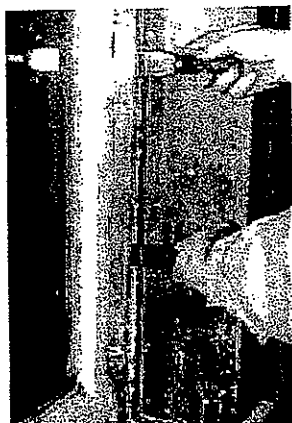
Repairs to wooden windows are usually labor intensive and relatively uncomplicated. On small scale projects this allows the do-it-yourselfer to save money by repairing all or part of the windows. On larger projects it presents the opportunity for time and money which might otherwise be spent on the removal and replacement of existing windows, to be spent on repairs, subsequently saving all or part of the material cost of new window units. Regardless of the actual costs, or who performs the work, the evaluation process described earlier will provide the knowledge from which to specify an appropriate work program, establish the work element priorities, and identify the level of skill needed by the labor force.

The routine maintenance required to upgrade a window to "like new" condition normally includes the following steps: 1) some degree of interior and exterior paint removal, 2) removal and repair of sash (including reglazing where necessary), 3) repairs to the frame, 4) weatherstripping and reinstallation of the sash, and 5) repainting. These operations are illustrated for a typical



This historic double-hung window has many layers of paint, some cracked and missing putty, slight separation at the joints, broken sash cords, and one cracked pane. Photo: NPS files.

## Preservation Brief 9: The Repair of Historic Wooden Windows



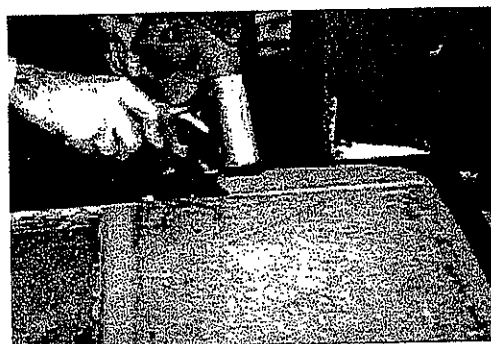
After removing paint from the seam between the interior stop and the jamb, the stop can be pried out and gradually worked loose using a pair of putty knives as shown. Photo: NPS files.

double-hung wooden window, but they may be adapted to other window types and styles as applicable.

Historic windows have usually acquired many layers of paint over time. Removal of excess layers or peeling and flaking paint will facilitate operation of the window and restore the clarity of the original detailing. Some degree of paint removal is also necessary as a first step in the proper surface preparation for subsequent refinishing (if paint color analysis is desired, it should be conducted prior to the onset of the paint removal). There are several safe and effective techniques for removing paint from wood, depending on the amount of paint to be removed.

Paint removal should begin on the interior frames, being careful to remove the paint from the interior stop and the parting bead, particularly along the

seam where these stops meet the jamb. This can be accomplished by running a utility knife along the length of the seam, breaking the paint bond. It will then be much easier to remove the stop, the parting bead and the sash. The interior stop may be initially loosened from the sash side to avoid visible scarring of the wood and then gradually pried loose using a pair of putty knives, working up and down the stop in small increments. With the stop removed, the lower or interior sash may be withdrawn. The sash cords should be detached from the sides of the sash and their ends may be pinned with a nail or tied in a knot to prevent them from falling into the weight pocket.



Sash can be removed and repaired in a convenient work area. Paint is being removed from this sash with a hot air gun. Photo: NPS files.

Removal of the upper sash on double-hung units is similar but the parting bead which holds it in place is set into a groove in the center of the stile and is thinner and more delicate than the interior stop. After removing any paint along the seam, the parting bead should be carefully pried out and worked free in the same manner as the interior stop. The upper sash can be removed in the same manner as the lower one and both sash taken to a convenient work area (in order to remove the sash the interior stop and parting bead need only be removed from one side of the window). Window openings can be covered with polyethylene sheets or plywood sheathing while the sash are out for repair.

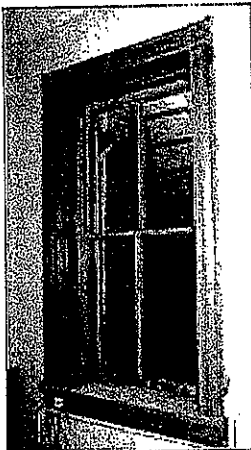
The sash can be stripped of paint using appropriate techniques, but if any heat treatment is used, the glass should be removed or protected from the sudden temperature change which can cause breakage. An overlay of aluminum foil on gypsum board or asbestos can protect the glass from such rapid temperature change. It is important to protect the glass because it may be historic and often adds character to the window. Deteriorated putty should be removed manually, taking care not to damage the wood along the rabbet. If the glass is to be removed, the glazing points which hold the glass in place can be extracted and the panes numbered and removed for cleaning and reuse in the same openings. With the glass panes out, the remaining putty can be removed and the sash can be sanded, patched, and primed with a preservative primer. Hardened putty in the rabbets may be softened by heating with a soldering iron at the

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point of removal. Putty remaining on the glass may be softened by soaking the panes in linseed oil, and then removed with less risk of breaking the glass. Before reinstalling the glass, a bead of glazing compound or linseed oil putty should be laid around the rabbet to cushion and seal the glass. Glazing compound should only be used on wood which has been brushed with linseed oil and primed with an oil based primer or paint. The pane is then pressed into place and the glazing points are pushed into the wood around the perimeter of the pane.

The final glazing compound or putty is applied and beveled to complete the seal. The sash can be refinished as desired on the inside and painted on the outside as soon as a "skin" has formed on the putty, usually in 2 or 3 days. Exterior paint should cover the beveled glazing compound or putty and lap over onto the glass slightly to complete a weather-tight seal. After the proper curing times have elapsed for paint and putty, the sash will be ready for reinstallation.

While the sash are out of the frame, the condition of the wood in the jamb and sill can be evaluated. Repair and refinishing of the frame may proceed concurrently with repairs to the sash, taking advantage of the curing times for the paints and putty used on the sash. One of the most common work items is the replacement of the sash cords with new rope cords or with chains. The weight pocket is frequently accessible through a door on the face of the frame near the sill, but if no door exists, the trim on the interior face may be removed for access. Sash weights may be increased for easier window operation by elderly or handicapped persons. Additional repairs to the frame and sash may include consolidation or replacement of deteriorated wood. Techniques for these repairs are discussed in the following sections.



Following the relatively simple repairs, the window is weather-tight, like new in appearance, and serviceable for many years to come. Photo: NPS files.

The operations just discussed summarize the efforts necessary to restore a window with minor deterioration to "like new" condition. The techniques can be applied by an unskilled person with minimal training and experience. To demonstrate the practicality of this approach, and photograph it, a Technical Preservation Services staff member repaired a wooden double-hung, two over two window which had been in service over ninety years. The wood was structurally sound but the window had one broken pane, many layers of paint, broken sash cords and inadequate, worn-out weatherstripping. The staff member found that the frame could be stripped of paint and the sash removed quite easily. Paint, putty and glass removal required about one hour for each sash, and the reglazing of both sash was accomplished in about one hour. Weatherstripping of the sash and frame, replacement of the sash cords and reinstallation of the sash, parting bead, and stop required an hour and a half. These times refer only to individual operations; the entire process took several days due to the drying and curing times for putty, primer, and paint, however, work on other window units could have been in progress during these lag times.

## Repair Class II: Stabilization

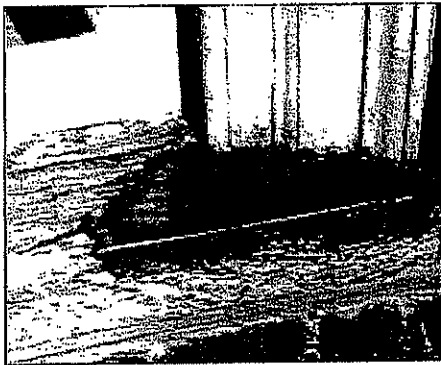
The preceding description of a window repair job focused on a unit which was operationally sound. Many windows will show some additional degree of physical deterioration, especially in the vulnerable areas mentioned earlier, but even badly



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damaged windows can be repaired using simple processes. Partially decayed wood can be waterproofed, patched, built-up, or consolidated and then painted to achieve a sound condition, good appearance, and greatly extended life. Three techniques for repairing partially decayed or weathered wood are discussed in this section, and all three can be accomplished using products available at most hardware stores.

One established technique for repairing wood which is split, checked or shows signs of rot, is to: **1)** dry the wood, **2)** treat decayed areas with a fungicide, **3)** waterproof with two or three applications of boiled linseed oil (applications every 24 hours), **4)** fill cracks and holes with putty, and **5)** after a "skin" forms on the putty, paint the surface. Care should be taken with the use of fungicide which is toxic. Follow the manufacturers' directions and use only on areas which will be painted. When using any technique of building up or patching a flat surface, the finished surface should be sloped slightly to carry water away from the window and not allow it to puddle. Caulking of the joints between the sill and the jamb will help reduce further water penetration.



This illustrates a two-part epoxy patching compound used to fill the surface of a weathered sill and rebuild the missing edge. When the epoxy cures, it can be sanded smooth and painted to achieve a durable and waterproof repair. Photo: NPS files.

When sills or other members exhibit surface weathering they may also be built-up using wood putties or homemade mixtures such as sawdust and resorcinol glue, or whiting and varnish. These mixtures can be built up in successive layers, then sanded, primed, and painted. The same caution about proper slope for flat surfaces applies to this technique.

Wood may also be strengthened and stabilized by consolidation, using semirigid epoxies which saturate the porous decayed wood and then harden. The surface of the consolidated wood can then be filled with a semirigid epoxy patching compound, sanded and painted. Epoxy patching compounds can be used to build up missing sections or decayed ends of members. Profiles can

be duplicated using hand molds, which are created by pressing a ball of patching compound over a sound section of the profile which has been rubbed with butcher's wax. This can be a very efficient technique where there are many typical repairs to be done. The process has been widely used and proven in marine applications; and proprietary products are available at hardware and marine supply stores. Although epoxy materials may be comparatively expensive, they hold the promise of being among the most durable and long lasting materials available for wood repair. More information on epoxies can be found in the publication "Epoxies for Wood Repairs in Historic Buildings," cited in the bibliography.

Any of the three techniques discussed can stabilize and restore the appearance of the window unit. There are times, however, when the degree of deterioration is so advanced that stabilization is impractical, and the only way to retain some of the original fabric is to replace damaged parts.

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### Repair Class III: Splices and Parts Replacement

When parts of the frame or sash are so badly deteriorated that they cannot be stabilized there are methods which permit the retention of some of the existing or original fabric.

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These methods involve replacing the deteriorated parts with new matching pieces, or splicing new wood into existing members. The techniques require more skill and are more expensive than any of the previously discussed alternatives. It is necessary to remove the sash and/or the affected parts of the frame and have a carpenter or woodworking mill reproduce the damaged or missing parts. Most millwork firms can duplicate parts, such as muntins, bottom rails, or sills, which can then be incorporated into the existing window, but it may be necessary to shop around because there are several factors controlling the practicality of this approach. Some woodworking mills do not like to repair old sash because nails or other foreign objects in the sash can damage expensive knives (which cost far more than their profits on small repair jobs); others do not have cutting knives to duplicate muntin profiles. Some firms prefer to concentrate on larger jobs with more profit potential, and some may not have a craftsman who can duplicate the parts. A little searching should locate a firm which will do the job, and at a reasonable price. If such a firm does not exist locally, there are firms which undertake this kind of repair and ship nationwide. It is possible, however, for the advanced do-it-yourselfer or craftsman with a table saw to duplicate moulding profiles using techniques discussed by Gordie Whittington in "Simplified Methods for Reproducing Wood Mouldings," *Bulletin of the Association for Preservation Technology*, Vol. III, No. 4, 1971, or illustrated more recently in *The Old House*, Time-Life Books, Alexandria, Virginia, 1979.

The repairs discussed in this section involve window frames which may be in very deteriorated condition, possibly requiring removal; therefore, caution is in order. The actual construction of wooden window frames and sash is not complicated. Pegged mortise and tenon units can be disassembled easily, if the units are out of the building. The installation or connection of some frames to the surrounding structure, especially masonry walls, can complicate the work immeasurably, and may even require dismantling of the wall. It may be useful, therefore, to take the following approach to frame repair: **1)** conduct regular maintenance of sound frames to achieve the longest life possible, **2)** make necessary repairs in place, wherever possible, using stabilization and splicing techniques, and **3)** if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.

Another alternative may be considered if parts replacement is required, and that is sash replacement. If extensive replacement of parts is necessary and the job becomes prohibitively expensive it may be more practical to purchase new sash which can be installed into the existing frames. Such sash are available as exact custom reproductions, reasonable facsimiles (custom windows with similar profiles), and contemporary wooden sash which are similar in appearance. There are companies which still manufacture high quality wooden sash which would duplicate most historic sash. A few calls to local building suppliers may provide a source of appropriate replacement sash, but if not, check with local historical associations, the state historic preservation office, or preservation related magazines and supply catalogs for information.

If a rehabilitation project has a large number of windows such as a commercial building or an industrial complex, there may be less of a problem arriving at a solution. Once the evaluation of the windows is completed and the scope of the work is known, there may be a potential economy of scale. Woodworking mills may be interested in the work from a large project; new sash in volume may be considerably less expensive per unit; crews can be assembled and trained on site to perform all of the window repairs; and a few extensive repairs can be absorbed (without undue burden) into the total budget for a large number of sound windows. While it may be expensive for the average historic home owner to pay seventy dollars or more for a mill to grind a custom knife to duplicate four or five bad muntins, that cost becomes negligible on large commercial projects which may have several hundred windows.

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Most windows should not require the extensive repairs discussed in this section. The ones which do are usually in buildings which have been abandoned for long periods or have totally lacked maintenance for years. It is necessary to thoroughly investigate the alternatives for windows which do require extensive repairs to arrive at a solution which retains historic significance and is also economically feasible. Even for projects requiring repairs identified in this section, if the percentage of parts replacement per window is low, or the number of windows requiring repair is small, repair can still be a cost effective solution.

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### Weatherization

A window which is repaired should be made as energy efficient as possible by the use of appropriate weatherstripping to reduce air infiltration. A wide variety of products are available to assist in this task. Felt may be fastened to the top, bottom, and meeting rails, but may have the disadvantage of absorbing and holding moisture, particularly at the bottom rail. Rolled vinyl strips may also be tacked into place in appropriate locations to reduce infiltration. Metal strips or new plastic spring strips may be used on the rails and, if space permits, in the channels between the sash and jamb. Weatherstripping is a historic treatment, but old weatherstripping (felt) is not likely to perform very satisfactorily. Appropriate contemporary weatherstripping should be considered an integral part of the repair process for windows. The use of sash locks installed on the meeting rail will insure that the sash are kept tightly closed so that the weatherstripping will function more effectively to reduce infiltration. Although such locks will not always be historically accurate, they will usually be viewed as an acceptable contemporary modification in the interest of improved thermal performance.

Many styles of storm windows are available to improve the thermal performance of existing windows. The use of exterior storm windows should be investigated whenever feasible because they are thermally efficient, cost-effective, reversible, and allow the retention of original windows (see "Preservation Briefs: 3"). Storm window frames may be made of wood, aluminum, vinyl, or plastic; however, the use of unfinished aluminum storms should be avoided. The visual impact of storms may be minimized by selecting colors which match existing trim color. Arched top storms are available for windows with special shapes. Although interior storm windows appear to offer an attractive option for achieving double glazing with minimal visual impact, the potential for damaging condensation problems must be addressed. Moisture which becomes trapped between the layers of glazing can condense on the colder, outer prime window, potentially leading to deterioration. The correct approach to using interior storms is to create a seal on the interior storm while allowing some ventilation around the prime window. In actual practice, the creation of such a durable, airtight seal is difficult.

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### Window Replacement

Although the retention of original or existing windows is always desirable and this Brief is intended to encourage that goal, there is a point when the condition of a window may clearly indicate replacement. The decision process for selecting replacement windows should not begin with a survey of contemporary window products which are available as replacements, but should begin with a look at the windows which are being replaced. Attempt to understand the contribution of the window(s) to the appearance of the facade including: **1)** the pattern of the openings and their size; **2)** proportions of the

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frame and sash; **3)** configuration of window panes; **4)** muntin profiles; **5)** type of wood; **6)** paint color; **7)** characteristics of the glass; and **8)** associated details such as arched tops, hoods, or other decorative elements. Develop an understanding of how the window reflects the period, style, or regional characteristics of the building, or represents technological development.

Armed with an awareness of the significance of the existing window, begin to search for a replacement which retains as much of the character of the historic window as possible. There are many sources of suitable new windows. Continue looking until an acceptable replacement can be found. Check building supply firms, local woodworking mills, carpenters, preservation oriented magazines, or catalogs or suppliers of old building materials, for product information. Local historical associations and state historic preservation offices may be good sources of information on products which have been used successfully in preservation projects.

Consider energy efficiency as one of the factors for replacements, but do not let it dominate the issue. Energy conservation is no excuse for the wholesale destruction of historic windows which can be made thermally efficient by historically and aesthetically acceptable means. In fact, a historic wooden window with a high quality storm window added should thermally outperform a new double-glazed metal window which does not have thermal breaks (insulation between the inner and outer frames intended to break the path of heat flow). This occurs because the wood has far better insulating value than the metal, and in addition many historic windows have high ratios of wood to glass, thus reducing the area of highest heat transfer. One measure of heat transfer is the U-value, the number of Btu's per hour transferred through a square foot of material. When comparing thermal performance, the lower the U-value the better the performance. According to ASHRAE 1977 Fundamentals, the U-values for single glazed wooden windows range from 0.88 to 0.99. The addition of a storm window should reduce these figures to a range of 0.44 to 0.49. A non-thermal break, double-glazed metal window has a U-value of about 0.6.

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## Conclusion

Technical Preservation Services recommends the retention and repair of original windows whenever possible. We believe that the repair and weatherization of existing wooden windows is more practical than most people realize, and that many windows are unfortunately replaced because of a lack of awareness of techniques for evaluation, repair, and weatherization. Wooden windows which are repaired and properly maintained will have greatly extended service lives while contributing to the historic character of the building. Thus, an important element of a building's significance will have been preserved for the future.

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## Additional Reading

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### **Washington, D.C. 1981**

Home page logo: Historic six-over-six windows- -preserved. Photo: NPS files.

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*This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Technical Preservation Services (TPS), Heritage Preservation Services Division, National Park Service prepares standards, guidelines, and other educational materials on responsible historic preservation treatments for a broad public.*

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