M. GAERTNER,
HISTORIC BUILDING CONSULTANT
11 Stevens Avenue
Portland, ME
04102

May 16, 2013

Mike Johnson
Grants & Easements Review / Technical Advisor
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333-0065

Reference: Portland Observatory Window Design and Replacement
138 Congress Street
Portland, Maine

Dear Mike Johnson:

In anticipation of your site visit on May 28, 2013, I am furnishing you with background materials regarding the Observatory Window Replacement. Enclosed please find some preliminary materials to acquaint your with the background of this project. I have included:

1. An illustrated chart showing failures identified in the existing windows.
2. Our proposed specifications for the historically-accurate wood windows, wood shingle siding, and paints and coatings.
3. Plate 18 from Asher Benjamin's *The American Builder's Companion,* 1806 edition.
4. A ca. 1904 photograph of the Observatory.
5. A ca. 1936 photograph of the Observatory taken by HABS.
6. The elevation and section drawings prepared by HABS in 1936. Please note all of the HABS documentation for the Observatory is available online at http://www.loc.gov/pictures/item/me0024/ ; high resolution versions are available there and you may find this helpful should you want to "zoom in" on any of these images.

Historical Background and Interpretation of Site
The following milestones and known repairs were found in the book *Captain Moody and his Observatory* by John K. Moulton and other sources.

1923 -- Observatory was closed to visitors in 1923 (Moulton, p. 69)
1936 -- HABS drawings were made (HABS drawings)

1937 -- Observatory presented to City by Moody descendants (Moulton, p. 69)
1939 – WPA-funded repairs were made, including: re-shingling; center post installed; some floor beams replaced; walls and ceiling under the sixth floor were replaced (p. 69)
1975 -- Further repairs were made including new railings at lantern (Moulton, p. 70)
1983 -- Foundation timbers were replaced; fir was used, almost 15 inches square (Moulton, p. 70)
Base of center post was replaced
Loose or missing shingles replaced; whole structure repainted
27 new windows were installed "Unfortunately, the flashing around these windows was not well placed, so water still leaks in." (Moulton, p. 70)
The drawings for these windows survive at the City of Portland's Public Works archive.
1988 -- Mr. Dubois expressed distress at the leaking around the windows (Moulton, p. 70)
1999 - 6 of the eight posts at the lantern were rotted; these were replaced with oak posts (Moulton, p. 80)
Repairs to the tower framing were executed in eastern white pine (Moulton, p. 107)
The new shingles were 5 inches to the weather; they had been 8 inches to the weather (Moulton, p. 81)
All of the windows were replaced.

Thus, the existing windows are at least the third and possibly the fourth generation: original, likely 1939, 1983, and 1999. No original window fabric is known to have survived.

Greater Portland Landmarks interprets the Observatory to the late-nineteenth/very early - twentieth century. Thus, our intent is to have the windows reflect that interpretive date.

We have reviewed the available historic documentation on the Observatory. The HABS drawings show no useful details for the Tower windows. I have spoken with HABS/Library of Congress in hopes that they might have some additional documentation on the windows but there is nothing else in their files.

I have also reviewed the Moody Papers at the Maine Historical Society and found no more specific information on the Observatory windows. Those documents included invoices for glass that included pane size but nothing helpful about the sash. In the absence of detailed historical information, our proposed design is an "of-the-period" wood, hung sash typical of 1806 as the original windows likely were still in place in the late-nineteenth century.

Project Scope and Approach
The project scope includes replacement of all the window sash, frames and exterior trim in the Tower and Lantern. In addition limited amounts of shingles around each Tower window opening will be removed and replaced in-kind to facilitate removal and installation of the windows. All new work will be painted to match the existing.

Our design team – me, Marc Bagala of Bagala Window Works and Rick Romano of Papi & Romano Builders – have spent extensive time inspecting the building, studying the historic documents, and reviewing the drawings and specifications for the 1998-9 work. We have identified sources of failures and summarized them in an illustrated chart which is included with this letter.

An especially critical issue is the strapping on the Tower. When the Observatory was restored in 1999, it was decided to install the shingles over strapping. This added between 1-1/8" and 1-3/8" to the wall thickness (the thickness of the strapping varies). Also, the shingles were installed with triple coverage, adding at least another 5/8" +/- to the wall thickness. Thus, window components including moldings, blind stop thickness, jamb depth, and sill depth were all adjusted to accommodate the thicker wall assembly.

As we cannot change the wall thickness, most of the dimensions on our proposed Tower windows will differ little from those of the 1999 windows. Instead, we have focused on correcting flashing details and improving the quality of construction and materials so as to provide a more durable window.

One change we propose to make is to use a different muntin profile. The 1999 muntins were based on profile "E" from Plate 18 of Asher Benjamin's 1806 *The American Builder's Companion*. We propose to use another profile (labeled "G" on the same plate) as it is more typical of Maine sash of that era. A similar profile was also shown on Plate 13 of Benjamin's 1797 *The Country Builder's Assistant*.

Mock Up

We look forward to reviewing a full-size mockup of our proposed Tower window with you at the Observatory Tuesday, May 28. The mock up will show, at full scale, all components and flashing details. In the meanwhile, I am happy to provide any additional information you may require.

Sincerely,

Margaret Gaertner

cc. Marc Bagala, Bagala Window Works
Christopher Closs, GPL
Robert Gaudreau, Hardypond
Amy Pulaski, City of Portland
Rick Romano, Papi & Romano
Aaron Shields, City of Portland
Deirdre Wadswoth, Hardypond

Following please find an illustrated list of problems and sources of failures we have identified in the existing windows at the Observatory. We have also identified corrective measures that should improve future performance.

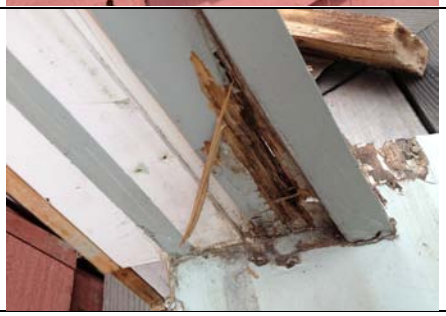
The 1998 drawings do not show the 7.7 degree angle of the Observatory façade and windows. On the drawings, several elements appear to be horizontal but as executed actually slope **towards** the interior of the building and thus channel water **into** assemblies. This has affected the windows in several locations:

Observation	**Photograph of Condition**	**Corrective Measure**
The upper rail of the screen sash channels water back towards the building. This has caused water to collect on the bottom rail of the upper sash and this rail is very deteriorated.		Place screen in a different location within the assembly. Use a more durable material (old growth Eastern White Pine) to fabricate new sash.
The header trim angles back towards the building causing water to flow into the assembly.		Bevel top of header casing to correct pitch. This will not be visible from the ground. Fabricate header flashing to collect and divert water away from face of sash.

The windows were modified in the field to accommodate the strapping for the shingle siding. The strapping was not part of the original design and is not shown on the drawings. This change affected both the design of the window units and required flashing at the sides of the rough opening (not a traditional practice). The following modifications appear to have been made to accommodate this change:

Observation	**Photograph of Condition**	**Corrective Measure**
Driven rain enters at the stiles of the upper sash, is halted at the metal weather strip, and flows down between the jamb and stile, and continues to flow behind the sash jack to the sill.		Shorten sash jacks to provide a gap at the bottom so moisture can exit freely at sill.
The sills are two pieces of wood. The joint is potential failure point.		Provide sills fabricated from a single piece of wood.
A large molding was added under the sills, possibly to support a piece of metal flashing and provide support to the deeper sill. This molding is not visible in historic photograph.		Eliminate molding. Terminate shingles in a groove in the underside of the sill.
The molding applied to the casings is very large and is deeper than was drawn.		Provide a smaller scaled, more period-appropriate molding at casings.

Other observations:

Observation	Photograph of Condition	Corrective Measure
The extent sash are not detailed properly. The bottom rail continues to the jambs.		Provide sash detailed with period-appropriate details in which face of the stiles continue to the bottom of the sash.
Water dripping from the head hits the meeting rail, causing the sash to deteriorate quickly.		Fabricate head flashing to collect water and divert it to sides of windows.
The wood species used was not durable enough and elements have decayed severely as a result.		Use a more durable wood species (old growth Eastern White Pine) to fabricate all elements. Treat all endgrain with low viscosity epoxy to reduce moisture absorption.
The drip edge cut into the sill is not wide enough to force water to drip properly.		Provide a wider drip edge.
The stiles of the screen sash collect water and snow behind them that in turn contributes to decay in the bottoms of the jambs and sash stops.		Place screen in a different location within the assembly. Seal jamb endgrain with low-viscosity epoxy.
The jamb flashings, as detailed, is likely drawing water into the assembly and allowing it to collect on top of the sill flashing.		Cut back furring strips and provide solid nailing surfaces at entire perimeter of opening. Back caulk shingles.

Issues in the Lantern:

Observation	Photograph of Condition	Corrective Measure
The lantern repairs were also executed in a non-durable wood species and the wood has deteriorated quickly.		Fabricate new components using old-growth Eastern White pine.
The sill below the lantern windows lacks a proper overhang and drip edge.		Provide a deeper sill with an appropriate drip edge cut to allow water to shed further away from the lantern.
The joints in the exterior trim at the outside corners between the lantern windows (the mullions) are letting water in.		Wood expands across the grain in the summer. In the winter it shrinks, and the joints open up. We propose to use stainless steel trim screws / puttied out on **one side only** allows it to the wood to move (expand and contract).

SECTION 08 52 00 – HISTORICALLY-ACCURATE WOOD WINDOWS

PART 1 – GENERAL

1.01 Summary

A. This Section includes the following: Provide labor, materials and equipment necessary to fabricate and install historically accurate windows with double-hung sash including all exterior and interior trim, flashings, sealants and hardware as shown on Drawings.

B. Coordination with the General Contractor and Owner for review of proposed design with the City of Portland Historic Review Commission and Maine Historic Preservation Commission.

1.02 Related Documents

A. All work shall be completed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Buildings*.

1.03 Related Sections

A. Section 07 31 29: Wood Shingle Siding

B. Section 09 90 00: Paints and Coatings

1.04 Submittals

A. Product data, storage and handling requirements and recommendations, installation instructions, technical data sheets defining performance properties, and general recommendations from manufacturer for all products and materials to be used.

B. Samples of all products used

C. Full size mock-up of proposed window unit shall include all components including frame, trim, sash, weatherstripping and hardware.

1.05 Quality Assurance

A. The fabricator and installer performing the work of this section must within the last five years prior to the bid opening have successfully completed at least three projects similar in scope and type to the work required by this section.

B. Knowledge of Site: General contractor, fabricator and installer shall visit site prior to bid and carefully examine project scope and conditions that may affect proper execution of work of this Section and determine or verify dimensions and quantities.

C. Warranty: At project closeout, provide to Owner or Owner's Representative an executed copy of the window fabricator and installing contractor's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage for the specified warranty period of two years.

1.06 Delivery, Storage and Handling

A. Deliver all materials in original unopened containers labeled with the manufacturer's name, brand name, item name and installation instructions.

B. Store materials in compliance with the manufacturer's requirements for

temperature, maximum and minimum, and other conditions. Keep all materials under cover and dry. Protect against exposure to the weather.

C. Discard and remove from the job site any materials damaged in handling or storage and any materials that have been subjected to conditions contrary to the manufacturer's recommendations or whose maximum shelf life has expired.

D. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.07 Project Conditions

A. Protection of Building: Protect building elements and finishes from damage or deterioration caused by the work of this Section.

1.08 Environmental Conditions

A. General: Perform work only when temperature of products being used, temperatures of existing and new materials, and air temperature and humidity comply with product manufacturer's requirements and requirements of this Section. In case of conflict, the most stringent requirements shall govern.

PART 2 - PRODUCTS

2.01 Windows, Trim, and Sash

A. All new window components shall be custom fabricated.

B. All new components shall be fabricated of clear, select old-growth eastern white pine, 100% heart wood, minimum of 10 annual growth rings / inch, dried to a moisture content of 6 to 12% at time of fabrication.

C. Wood shall be free of knots and checks, without finger joints or other joints, and free from defects or blemishes on surfaces exposed to view that will show after paints and finishes have been applied.

D. Sash shall be haunch mortise and tenoned, tenons shall be pegged with hardwood pegs. No metal fastener shall be used to fabricate sash.

E. Acceptable manufacturers:
Bagala Window Works
60 Gray Road, 3-4
Falmouth, ME 04105
p. 207-878-6306

2.02 Endgrain Treatment

A. Endgrain treatment shall be a two component, ultra-low viscosity, epoxy-based wetting agent

B. Acceptable products:
Prima-A-Trate
by Advanced Repair Technology
PO Box 510 l
Cherry Valley, NY 13320
p. 607-264-9040

2.03 Fasteners

A. Fasteners shall be stainless steel, galvanized or bon-ferrous brass or bronze.

2.04 Linseed Oil

2.05 Glass

A. Salvage and reuse existing glass panes.

B. If additional glass is required, provide new glass to match existing glass exactly in thickness, appearance, reflectivity, and tint.

C. Possible manufacturers:

1. Bendheim
   61 Willett St.
   Passaic, NJ 07055
   p. 800.221.7379
   p. 973.471.1733
   f. 973.471.1640

2. Hollander
   Hollander Glass East, Inc.
   50 Clearview Road
   Edison, NJ 08837
   p. 732-346-1211
   f. 732-346-1711
   e. east@hollanderglass.com

2.06 Glazing Putty

A. Latex glazing compound

B. Acceptable products: Aqua Glaze

C. Acceptable manufacturer:
   SCL Sterling,
   Savogran Company
   P.O. Box 130
   Norwood, MA
   p. 781-762-5400

2.07 Glazing Points

A. Glazing points shall be stainless steel or galvanized steel.

B. Acceptable products: Galvanized triangle points

C. Fletcher

2.08 Flashing and Drip Caps

A. 16 oz. sheet copper coated both size with a zinc-tin alloy approximately .5 mils thick (for step flashings and drip cap flashings).

1. Metal: ASTM B370.
2. Finish: hot dipped Z-T alloy.
3. Acceptable product: Freedom Gray by Revere Copper Products, Inc.

2.09 Hardware

A. Sash locks shall be cast, solid brass sweep-type locks.

B. Acceptable manufacturers:
The Architectural Resource Center
Northwood, NH

2.10 Weatherstripping

A. Weatherstripping at stiles/jambs:
1. Interlocking type, bronze
2. Acceptable products: Series # 3c
3. Acceptable manufacturers:
Accurate Metal Weatherstrip Co., Inc.
725 S. Fulton Avenue.
Mount Vernon, NY 10550-5086
p. (800) 536-6043
p. (914) 668-6042
f. (914) 668-6062
e. info@accurateweatherstrip.com
w. www.accurateweatherstrip.com

B. Weatherstripping at meeting, rails, top rail and bottom rail/sill:
1. Silicone tube seal
2. Acceptable products: Series ws10, ws11
3. Acceptable manufacturers:
Resource Conservation Technology, Inc.

2.11 Joint sealants

A. Sikaflex - 1a; by the Sika Corporation.

B. NP 1; Sonneborn Building Products Div., by ChemRex Inc

PART 3 – EXECUTION

3.01 Glazing

A. Prepare surfaces to receive glazing as per glazing compound manufacturer's requirements.

3.02 Installation of Weatherstripping

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install in accordance with manufacturer's instructions.

3.03 Site Preparation

A. Do not begin installation until substrates have been properly prepared.

3.04 Temporary Protection

A. Provide temporary weather protection when existing sash and frames are removed.

3.05 Inspection

A. Inspect openings before beginning installation. Verify that the opening is correct and the rough framing is level. Do not proceed with the installation of the window units until unsatisfactory conditions have been corrected.
   1. Wood frame walls and rough openings shall be dry, clean, free from construction debris, sound and well-nailed, free of voids and without offsets at joints.
   2. Nail heads shall be driven flush with frame surfaces in the opening and with 3" of the openings corners.
   3. Coordinate window installation with all wall flashing and other built-in components.
   4. Notify Owner of unacceptable conditions before proceeding with installation.

3.06 Installation

A. Comply with the Window Manufacturer's recommended installation instructions, including but not limited to the following:
   1. Set units plumb to existing facade, level and true to line, without warp or rack of jamb/frame, sash or glazing.
   2. Provide proper support and anchor units securely in place.
   3. Set sill members and exterior trim members in and/or against a bed of sealant.
   4. Head trim/jamb members shall be adequately sealed and/or weatherstripped to the exterior sub-sheathing, exterior shingle siding facade.
   5. All operating sash shall operate smoothly over entire height.
   6. Sash Hardware: Provide sash locks on all windows. Adjust sash locks for smooth easy operation and firm, secure locking.
   7. Wax: Treat unpainted sides of stiles and frame with wax for ease of window operation and wood protection.
   8. At completion of installation, windows shall be complete with all components and with unblemished paint and finish coats.

3.07 Weatherstripping

A. Provide weatherstripping at all jambs, meeting rails, sills and headers. Install weatherstripping following manufacturer's requirements.
B. Rabbet sash as required for proper installation of weatherstripping.
C. Weatherstripping shall be completely sealed and weathertight when sash are closed.
D. Weatherstripped windows shall be fully operable with out binding, scraping or excessive noise and shall close fully without excessive effort.

3.08 Adjusting

A. Adjust all operating sash and hardware to provide a tight fit at contact points and weatherstripping and insure smooth operation.
B. General: Adjust operating sash and hardware to provide a tight fit at contact points and weatherstripping, and to provide smooth operation and a weathertight closure. Lubricate hardware and moving parts.

3.09 Cleaning

A. Clean glass and interior and exterior surfaces promptly after installation and on-site finishing.
B. Do not scratch glass with cleaning tools.
C. Do not damage protective coatings and finishes.
D. Do not use solvents that damage or deteriorate the finish or glazing compounds.
E. Use only cleaners that do not contain ammonia. Products with ammonia are not acceptable as they accelerate paint film deterioration.

3.10 Protection

A. Take necessary precautions to protect window units from damage or deterioration until time of substantial completion.
B. Remove and replace glass that has been broken, chipped, cracked, abraded or damaged until time of substantial completion.

-- END OF SECTION --

Following please find an illustrated list of problems and sources of failures we have identified in the existing windows at the Observatory. We have also identified corrective measures that should improve future performance.

The 1998 drawings do not show the 7.7 degree angle of the Observatory façade and windows. On the drawings, several elements appear to be horizontal but as executed actually slope **towards** the interior of the building and thus channel water **into** assemblies. This has affected the windows in several locations:

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The header trim angles back towards the building causing water to flow into the assembly.		Bevel top of header casing to correct pitch. This will not be visible from the ground. Fabricate header flashing to collect and divert water away from face of sash.

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The sills are two pieces of wood. The joint is potential failure point.		Provide sills fabricated from a single piece of wood.
A large molding was added under the sills, possibly to support a piece of metal flashing and provide support to the deeper sill. This molding is not visible in historic photograph.		Eliminate molding. Terminate shingles in a groove in the underside of the sill.
The molding applied to the casings is very large and is deeper than was drawn.		Provide a smaller scaled, more period-appropriate molding at casings.

Other observations:

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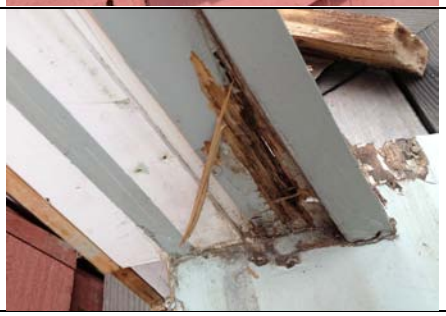
The extent sash are not detailed properly. The bottom rail continues to the jambs.		Provide sash detailed with period-appropriate details in which face of the stiles continue to the bottom of the sash.
Water dripping from the head hits the meeting rail, causing the sash to deteriorate quickly.		Fabricate head flashing to collect water and divert it to sides of windows.
The wood species used was not durable enough and elements have decayed severely as a result.		Use a more durable wood species (old growth Eastern White Pine) to fabricate all elements. Treat all endgrain with low viscosity epoxy to reduce moisture absorption.
The drip edge cut into the sill is not wide enough to force water to drip properly.		Provide a wider drip edge.
The stiles of the screen sash collect water and snow behind them that in turn contributes to decay in the bottoms of the jambs and sash stops.		Place screen in a different location within the assembly. Seal jamb endgrain with low-viscosity epoxy.
The jamb flashings, as detailed, is likely drawing water into the assembly and allowing it to collect on top of the sill flashing.		Cut back furring strips and provide solid nailing surfaces at entire perimeter of opening. Back caulk shingles.

Issues in the Lantern:

Observation	Photograph of Condition	Corrective Measure
The lantern repairs were also executed in a non-durable wood species and the wood has deteriorated quickly.		Fabricate new components using old-growth Eastern White pine.
The sill below the lantern windows lacks a proper overhang and drip edge.		Provide a deeper sill with an appropriate drip edge cut to allow water to shed further away from the lantern.
The joints in the exterior trim at the outside corners between the lantern windows (the mullions) are letting water in.		Wood expands across the grain in the summer. In the winter it shrinks, and the joints open up. We propose to use stainless steel trim screws / puttied out on **one side only** allows it to the wood to move (expand and contract).

Project Design and Installation Summary

Site and Logistics
We will use some staging (tower type) and some of the work will be executed from a lift. We are trying to accomplish the best value for the owner, but also have to balance site constraints, public access, public safety, and worker safety requirements.

Materials
Following, please find our proposed Specifications for wood shingle siding, historically-accurate wood windows, and painting.

For this project, we propose to fabricate the new window components and lantern trim of new, old-growth, Eastern White pine. The wood most likely will be cut from new logs sourced from riverbeds. There are several reasons we prefer this materials over other options such as Douglas Fir or mahogany:

1. It is a very durable wood, dense and naturally resistant to decay.
2. It is the historically appropriate choice. While most of the windows will be painted, the jambs will not and thus the bare wood will be visible to the public.
3. It is an environmentally sound choice. Reclaimed trees have already been harvested and thus their use does not harm existing forests. It is locally produced and available, thus requiring less energy to deliver.

We will reuse the interior trim to the greatest extent possible.

For glazing, we propose to re-use the existing glazing to the greatest extent possible. Our craftsmen have the ability to remove the glass without breakage and reusing the glass will provide value to the Owner. Glazing putty will be the product we have found to be the most durable.

The windows will be painted with an oil-based primer and acrylic top coats. All will be California-brand products, which repeatedly earns top ratings in tests.

Flashings will be zinc-coated copper. We prefer copper for its workability and a coated copper to prevent staining on adjacent materials. Zinc-coated is a more environmentally friendly option than lead coated but is similar in appearance.

Schedule
Following also please find a detailed proposed Project Schedule prepared by Hardypond in consultation with Papi & Romano Builders and Bagala Window Works. Please note we have incorporated the necessary reviews and approvals into our Schedule.

SECTION 07 31 29 – WOOD SHINGLE SIDING

PART 1 – GENERAL

1.01 Summary

A. This Section includes the following: Careful, selective/limited removal of shingles as required to properly install new windows including solid wood blocking and head flashing at perimeter of opening. Furnish and install new, wood shingle siding to match existing, adjacent siding.

B. Coordinate with the General Contractor and Owner for review of proposed design with the City of Portland Historic Review Commission and Maine Historic Preservation Commission.

1.02 Related Documents

A. All work shall be completed in accordance with the standards and guidelines in the manuals of the Cedar Shake and Shingle Bureau.

B. All work shall be completed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Buildings*.

1.03 Related Sections

A. Part 2 – General Conditions, provided by the City of Portland, apply to this Section.

B. Section 08 52 00: Historically Accurate Wood Windows

C. Section 09 90 00: Painting

1.04 Submittals

A. Product data for all products and materials to be used

B. Samples of shingles, fasteners, underlayment. Submit three unfinished shingles and three shingles finished with specified primer and finish for approval by Owner.

1.05 Quality Assurance

A. Warranty: At project closeout, provide to Owner or Owner's Representative an executed copy of the installing contractor's standard limited warranty against defect, outlining its terms, conditions, and exclusions from coverage for the specified warranty period of two years.

1.06 Delivery, Storage and Handling

A. Deliver materials to job-site in new, dry, unopened, and well-marked containers showing product and manufacturer's name.

B. Store all materials on a raised platform covered with secured canvas tarpaulin (not polyethylene), top to bottom. Cover all materials when project is not in progress and maintain the ability at all times to cover the materials when required, such as during an unanticipated rain shower.

PART 2 - PRODUCTS

2.01 Wood Shingles

A. No. 1 Grade Certigrade Blue Label, sawn and kiln-dried western red cedar shingles.
   1. Length and thickness: 18 inches long, .45 inch thick at butt
   2. Dimensions provided for budgeting purposed; Contractor to verify dimensions of existing and provide exact match.
   3. Provide fire-retardant, pressure-treated shingles in packages bearing UL Class "C" label.
   4. Density: shingles shall have no fewer than five growth rings per inch.

2.02 Fasteners

A. Nails for shingles must be ***must be*** stainless steel-Type 316 in due to project location within fifteen (15) miles of salt water.

2.03 Felt Underlayment

A. Asphalt-saturated organic felts, unperforated, conforming to the requirements of ASTM D 226, Type II, No. 30.
B. Felt underlayment conforming to the requirements of ASTM Designation 4869 (ASTM D 4869).
C. Approved equal.

PART 3 – EXECUTION

3.01 Examination

A. Examine substrates for any defects or other conditions that will affect installation of shingles in accordance wit the Specifications.
B. Inspect each shingle for damage or defects.

3.02 Preparation

A. Cut strapping back as required to fit in solid blocking around window openings.
B. Remove all banded nails and other protrusions in exposed strapping.
C. Re-secure felt paper as required; replace as necessary.

3.03 Installation, General

A. Install new shingles with exposure, coursing and spacing between shingles to match existing, adjacent shingles. Shingles shall be spaced apart 1/8" to 1/4".
B. Joints of shingles in any one course shall be offset not less than 1 1/2" from the joints in adjacent courses.
C. Apply each shingle with at least two, hammered nails. Do not use a nail gun or staples. Shingles wider than 10" require 2 additional nails and these two nails are driven approximately 1" apart near center of shingle.
D. Fasteners shall be long enough to penetrate into the sheathing at least 3/4" or all the way through and driven flush with the surface of the shingle. Do not overdrive fasteners.

3.04 Adjusting

A. Remove and replace any shingles that do not meet these Specifications or do not match the existing.

B. Replace any damaged materials installed under this section with new materials.

-- END OF SECTION --

SECTION 08 52 00 – HISTORICALLY-ACCURATE WOOD WINDOWS

PART 1 – GENERAL

1.01 Summary

A. This Section includes the following: Provide labor, materials and equipment necessary to fabricate and install historically accurate windows with double-hung sash including all exterior and interior trim, flashings, sealants and hardware as shown on Drawings.

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A. All work shall be completed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Buildings*.

1.03 Related Sections

A. Section 07 31 29: Wood Shingle Siding

B. Section 09 90 00: Paints and Coatings

1.04 Submittals

A. Product data, storage and handling requirements and recommendations, installation instructions, technical data sheets defining performance properties, and general recommendations from manufacturer for all products and materials to be used.

B. Samples of all products used

C. Full size mock-up of proposed window unit shall include all components including frame, trim, sash, weatherstripping and hardware.

1.05 Quality Assurance

A. The fabricator and installer performing the work of this section must within the last five years prior to the bid opening have successfully completed at least three projects similar in scope and type to the work required by this section.

B. Knowledge of Site: General contractor, fabricator and installer shall visit site prior to bid and carefully examine project scope and conditions that may affect proper execution of work of this Section and determine or verify dimensions and quantities.

C. Warranty: At project closeout, provide to Owner or Owner's Representative an executed copy of the window fabricator and installing contractor's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage for the specified warranty period of two years.

1.06 Delivery, Storage and Handling

A. Deliver all materials in original unopened containers labeled with the manufacturer's name, brand name, item name and installation instructions.

B. Store materials in compliance with the manufacturer's requirements for

temperature, maximum and minimum, and other conditions. Keep all materials under cover and dry. Protect against exposure to the weather.

C. Discard and remove from the job site any materials damaged in handling or storage and any materials that have been subjected to conditions contrary to the manufacturer's recommendations or whose maximum shelf life has expired.

D. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.07 Project Conditions

A. Protection of Building: Protect building elements and finishes from damage or deterioration caused by the work of this Section.

1.08 Environmental Conditions

A. General: Perform work only when temperature of products being used, temperatures of existing and new materials, and air temperature and humidity comply with product manufacturer's requirements and requirements of this Section. In case of conflict, the most stringent requirements shall govern.

PART 2 - PRODUCTS

2.01 Windows, Trim, and Sash

A. All new window components shall be custom fabricated.

B. All new components shall be fabricated of clear, select old-growth eastern white pine, 100% heart wood, minimum of 10 annual growth rings / inch, dried to a moisture content of 6 to 12% at time of fabrication.

C. Wood shall be free of knots and checks, without finger joints or other joints, and free from defects or blemishes on surfaces exposed to view that will show after paints and finishes have been applied.

D. Sash shall be haunch mortise and tenoned, tenons shall be pegged with hardwood pegs. No metal fastener shall be used to fabricate sash.

E. Acceptable manufacturers:
Bagala Window Works
60 Gray Road, 3-4
Falmouth, ME 04105
p. 207-878-6306

2.02 Endgrain Treatment

A. Endgrain treatment shall be a two component, ultra-low viscosity, epoxy-based wetting agent

B. Acceptable products:
Prima-A-Trate
by Advanced Repair Technology
PO Box 510 l
Cherry Valley, NY 13320
p. 607-264-9040

2.03 Fasteners

A. Fasteners shall be stainless steel, galvanized or bon-ferrous brass or bronze.

2.04 Linseed Oil

2.05 Glass

A. Salvage and reuse existing glass panes.

B. If additional glass is required, provide new glass to match existing glass exactly in thickness, appearance, reflectivity, and tint.

C. Possible manufacturers:

1. Bendheim
   61 Willett St.
   Passaic, NJ 07055
   p. 800.221.7379
   p. 973.471.1733
   f. 973.471.1640

2. Hollander
   Hollander Glass East, Inc.
   50 Clearview Road
   Edison, NJ 08837
   p. 732-346-1211
   f. 732-346-1711
   e. east@hollanderglass.com

2.06 Glazing Putty

A. Latex glazing compound

B. Acceptable products: Aqua Glaze

C. Acceptable manufacturer:
   SCL Sterling,
   Savogran Company
   P.O. Box 130
   Norwood, MA
   p. 781-762-5400

2.07 Glazing Points

A. Glazing points shall be stainless steel or galvanized steel.

B. Acceptable products: Galvanized triangle points

C. Fletcher

2.08 Flashing and Drip Caps

A. 16 oz. sheet copper coated both size with a zinc-tin alloy approximately .5 mils thick (for step flashings and drip cap flashings).

1. Metal: ASTM B370.
2. Finish: hot dipped Z-T alloy.
3. Acceptable product: Freedom Gray by Revere Copper Products, Inc.

2.09 Hardware

A. Sash locks shall be cast, solid brass sweep-type locks.

B. Acceptable manufacturers:
The Architectural Resource Center
Northwood, NH

2.10 Weatherstripping

A. Weatherstripping at stiles/jambs:
1. Interlocking type, bronze
2. Acceptable products: Series # 3c
3. Acceptable manufacturers:
Accurate Metal Weatherstrip Co., Inc.
725 S. Fulton Avenue.
Mount Vernon, NY 10550-5086
p. (800) 536-6043
p. (914) 668-6042
f. (914) 668-6062
e. info@accurateweatherstrip.com
w. www.accurateweatherstrip.com

B. Weatherstripping at meeting, rails, top rail and bottom rail/sill:
1. Silicone tube seal
2. Acceptable products: Series ws10, ws11
3. Acceptable manufacturers:
Resource Conservation Technology, Inc.

2.11 Joint sealants

A. Sikaflex - 1a; by the Sika Corporation.

B. NP 1; Sonneborn Building Products Div., by ChemRex Inc

PART 3 – EXECUTION

3.01 Glazing

A. Prepare surfaces to receive glazing as per glazing compound manufacturer's requirements.

3.02 Installation of Weatherstripping

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install in accordance with manufacturer's instructions.

3.03 Site Preparation

A. Do not begin installation until substrates have been properly prepared.

3.04 Temporary Protection

A. Provide temporary weather protection when existing sash and frames are removed.

3.05 Inspection

A. Inspect openings before beginning installation. Verify that the opening is correct and the rough framing is level. Do not proceed with the installation of the window units until unsatisfactory conditions have been corrected.
   1. Wood frame walls and rough openings shall be dry, clean, free from construction debris, sound and well-nailed, free of voids and without offsets at joints.
   2. Nail heads shall be driven flush with frame surfaces in the opening and with 3" of the openings corners.
   3. Coordinate window installation with all wall flashing and other built-in components.
   4. Notify Owner of unacceptable conditions before proceeding with installation.

3.06 Installation

A. Comply with the Window Manufacturer's recommended installation instructions, including but not limited to the following:
   1. Set units plumb to existing facade, level and true to line, without warp or rack of jamb/frame, sash or glazing.
   2. Provide proper support and anchor units securely in place.
   3. Set sill members and exterior trim members in and/or against a bed of sealant.
   4. Head trim/jamb members shall be adequately sealed and/or weatherstripped to the exterior sub-sheathing, exterior shingle siding facade.
   5. All operating sash shall operate smoothly over entire height.
   6. Sash Hardware: Provide sash locks on all windows. Adjust sash locks for smooth easy operation and firm, secure locking.
   7. Wax: Treat unpainted sides of stiles and frame with wax for ease of window operation and wood protection.
   8. At completion of installation, windows shall be complete with all components and with unblemished paint and finish coats.

3.07 Weatherstripping

A. Provide weatherstripping at all jambs, meeting rails, sills and headers. Install weatherstripping following manufacturer's requirements.
B. Rabbet sash as required for proper installation of weatherstripping.
C. Weatherstripping shall be completely sealed and weathertight when sash are closed.
D. Weatherstripped windows shall be fully operable with out binding, scraping or excessive noise and shall close fully without excessive effort.

3.08 Adjusting

A. Adjust all operating sash and hardware to provide a tight fit at contact points and weatherstripping and insure smooth operation.
B. General: Adjust operating sash and hardware to provide a tight fit at contact points and weatherstripping, and to provide smooth operation and a weathertight closure. Lubricate hardware and moving parts.

3.09 Cleaning

A. Clean glass and interior and exterior surfaces promptly after installation and on-site finishing.
B. Do not scratch glass with cleaning tools.
C. Do not damage protective coatings and finishes.
D. Do not use solvents that damage or deteriorate the finish or glazing compounds.
E. Use only cleaners that do not contain ammonia. Products with ammonia are not acceptable as they accelerate paint film deterioration.

3.10 Protection

A. Take necessary precautions to protect window units from damage or deterioration until time of substantial completion.
B. Remove and replace glass that has been broken, chipped, cracked, abraded or damaged until time of substantial completion.

-- END OF SECTION --

SECTION 09 90 00 – PAINTS AND COATINGS

PART 1 – GENERAL

1.01 Summary

A. This Section includes the following: surface preparation, back-priming, priming, and finish painting of all interior and exterior surfaces scheduled to be finished.

B. The work includes preparation and painting with a three (3) coat system (one (1) primer coat and two (2) finish coats) of all **new**, exterior-exposed materials and surfaces of all exterior and interior wooden surfaces and finishes and preparation and painting of all components scheduled to be reused.

1.02 Related Sections

A. Part 2 – General Conditions, provided by the City of Portland, apply to this Section.

B. Section 07 31 29: Wood Shingle Siding

C. Section 08 52 00: Historically Accurate Wood Windows

1.03 Definitions

A. Paint as used herein means all coating systems materials, including primers, emulsions, enamels, sealers, and other applied materials used as a primer or finish coating.

B. General: Standard coating terms defined in ASTM D 16.

1. Flat: Paint or coating whose specular gloss registers less than 15 on an 85-degree meter or less than 5 on a 60-degree meter according to ASTM Method D 523, Standard Test Method for Specular Gloss.
2. Non-flat: Paint or coating whose specular gloss registers 15 or greater on an 85-degree meter or 5 or greater on a 60-degree meter according to ASTM Method D 523, Standard Test Method for Specular Gloss.

1.04 Submittals

A. Product data for all products and materials to be used, including:

1. Material List: List of required coating materials. Identify each material by manufacturer's catalog number and general classification.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Application methods.

B. Samples

1. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and finish.
2. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

3. Closeout Submittals: 1. Provide manufacturer's maintenance instructions that include recommendations for cleaning, touch-up, and repair of painted and coated surfaces.
4. Provide the color mixture name and code to the Owner for accurate future color matching.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.05 Quality Assurance

A. Warranty: At project closeout, provide to Owner or Owner's Representative an executed copy of the installing contractor's standard limited warranty against defect, outlining its terms, conditions, and exclusions from coverage for the specified warranty period of two years.

1.06 Delivery, Storage, and Handling

A. Store products in manufacturer's unopened packaging with labels intact until ready for installation.
B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F (7 degrees C). Maintain storage containers in a clean condition, free of foreign materials and residue.
C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 Project Conditions

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.01 Acceptable manufacturers:

A. For window components:
California Paint
150 Dascomb Road,
Andover, MA 01810
p. (800) 225-1141
p. (978) 623-9980
e. info@californiapaints.com
w. www.californiapaints.com

B. For shingle siding:
Pratt & Lambert
p. 800-289-7728

2.02 Acceptable products:
A. Primer for priming and back priming all new shingles:
1. PRO-HIDE Gold® Exterior Alkyd Primer over knots or heavy pitch staining
B. Finish coat for all shingles:
1. Stainshield® Exterior Solid 100% Acrylic Latex Siding Stain
2. Color: custom as required to match existing color on siding.
C. Primer for exterior window components:
One Coat - Troubleshooter Fast Drying Alkyd/Linseed Oil Wood Exterior Primer #22700.
D. Finish for window components:
1. Fresh Coat Velvet Flat, custom color to match existing, sheen to match existing.

2.03 Materials - General
A. Compatibility: Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
B. Volatile Organic Compound (VOC) Content: Provide coatings that comply with the most stringent requirements of the following
1. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
C. Mixing and Tinting:
1. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.
2. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.
3. Where paint is to be sprayed, thin according to manufacturer's guidelines.

PART 3 – EXECUTION

3.01 Application
A. Paint all exposed surfaces whether or not colors are designated, except where the natural (unpainted) finish of the materials is obviously intended and specifically noted as a surface not to be painted. Where items or surfaces are

not specifically mentioned, paint these areas the same as adjacent areas or material.

3.02 Cleaning

A. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.
B. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
C. Reconnect equipment adjacent to surfaces indicated to receive coatings.
D. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
E. Remove protective materials.

3.03 Protection

A. Protect installed products until completion of project.

-- END OF SECTION --

Following please find an illustrated list of problems and sources of failures we have identified in the existing windows at the Observatory. We have also identified corrective measures that should improve future performance.

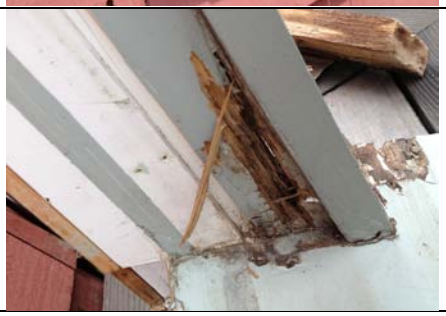
The 1998 drawings do not show the 7.7 degree angle of the Observatory façade and windows. On the drawings, several elements appear to be horizontal but as executed actually slope **towards** the interior of the building and thus channel water **into** assemblies. This has affected the windows in several locations:

Observation	**Photograph of Condition**	**Corrective Measure**
The upper rail of the screen sash channels water back towards the building. This has caused water to collect on the bottom rail of the upper sash and this rail is very deteriorated.		Place screen in a different location within the assembly. Use a more durable material (old growth Eastern White Pine) to fabricate new sash.
The header trim angles back towards the building causing water to flow into the assembly.		Bevel top of header casing to correct pitch. This will not be visible from the ground. Fabricate header flashing to collect and divert water away from face of sash.

The windows were modified in the field to accommodate the strapping for the shingle siding. The strapping was not part of the original design and is not shown on the drawings. This change affected both the design of the window units and required flashing at the sides of the rough opening (not a traditional practice). The following modifications appear to have been made to accommodate this change:

Observation	**Photograph of Condition**	**Corrective Measure**
Driven rain enters at the stiles of the upper sash, is halted at the metal weather strip, and flows down between the jamb and stile, and continues to flow behind the sash jack to the sill.		Shorten sash jacks to provide a gap at the bottom so moisture can exit freely at sill.
The sills are two pieces of wood. The joint is potential failure point.		Provide sills fabricated from a single piece of wood.
A large molding was added under the sills, possibly to support a piece of metal flashing and provide support to the deeper sill. This molding is not visible in historic photograph.		Eliminate molding. Terminate shingles in a groove in the underside of the sill.
The molding applied to the casings is very large and is deeper than was drawn.		Provide a smaller scaled, more period-appropriate molding at casings.

Other observations:

Observation	Photograph of Condition	Corrective Measure
The extent sash are not detailed properly. The bottom rail continues to the jambs.		Provide sash detailed with period-appropriate details in which face of the stiles continue to the bottom of the sash.
Water dripping from the head hits the meeting rail, causing the sash to deteriorate quickly.		Fabricate head flashing to collect water and divert it to sides of windows.
The wood species used was not durable enough and elements have decayed severely as a result.		Use a more durable wood species (old growth Eastern White Pine) to fabricate all elements. Treat all endgrain with low viscosity epoxy to reduce moisture absorption.
The drip edge cut into the sill is not wide enough to force water to drip properly.		Provide a wider drip edge.
The stiles of the screen sash collect water and snow behind them that in turn contributes to decay in the bottoms of the jambs and sash stops.		Place screen in a different location within the assembly. Seal jamb endgrain with low-viscosity epoxy.
The jamb flashings, as detailed, is likely drawing water into the assembly and allowing it to collect on top of the sill flashing.		Cut back furring strips and provide solid nailing surfaces at entire perimeter of opening. Back caulk shingles.

Issues in the Lantern:

Observation	Photograph of Condition	Corrective Measure
The lantern repairs were also executed in a non-durable wood species and the wood has deteriorated quickly.		Fabricate new components using old-growth Eastern White pine.
The sill below the lantern windows lacks a proper overhang and drip edge.		Provide a deeper sill with an appropriate drip edge cut to allow water to shed further away from the lantern.
The joints in the exterior trim at the outside corners between the lantern windows (the mullions) are letting water in.		Wood expands across the grain in the summer. In the winter it shrinks, and the joints open up. We propose to use stainless steel trim screws / puttied out on **one side only** allows it to the wood to move (expand and contract).

Project Design and Installation Summary

Site and Logistics
We will use some staging (tower type) and some of the work will be executed from a lift. We are trying to accomplish the best value for the owner, but also have to balance site constraints, public access, public safety, and worker safety requirements.

Materials
Following, please find our proposed Specifications for wood shingle siding, historically-accurate wood windows, and painting.

For this project, we propose to fabricate the new window components and lantern trim of new, old-growth, Eastern White pine. The wood most likely will be cut from new logs sourced from riverbeds. There are several reasons we prefer this materials over other options such as Douglas Fir or mahogany:

1. It is a very durable wood, dense and naturally resistant to decay.
2. It is the historically appropriate choice. While most of the windows will be painted, the jambs will not and thus the bare wood will be visible to the public.
3. It is an environmentally sound choice. Reclaimed trees have already been harvested and thus their use does not harm existing forests. It is locally produced and available, thus requiring less energy to deliver.

We will reuse the interior trim to the greatest extent possible.

For glazing, we propose to re-use the existing glazing to the greatest extent possible. Our craftsmen have the ability to remove the glass without breakage and reusing the glass will provide value to the Owner. Glazing putty will be the product we have found to be the most durable.

The windows will be painted with an oil-based primer and acrylic top coats. All will be California-brand products, which repeatedly earns top ratings in tests.

Flashings will be zinc-coated copper. We prefer copper for its workability and a coated copper to prevent staining on adjacent materials. Zinc-coated is a more environmentally friendly option than lead coated but is similar in appearance.

Schedule
Following also please find a detailed proposed Project Schedule prepared by Hardypond in consultation with Papi & Romano Builders and Bagala Window Works. Please note we have incorporated the necessary reviews and approvals into our Schedule.

SECTION 07 31 29 – WOOD SHINGLE SIDING

PART 1 – GENERAL

1.01 Summary

A. This Section includes the following: Careful, selective/limited removal of shingles as required to properly install new windows including solid wood blocking and head flashing at perimeter of opening. Furnish and install new, wood shingle siding to match existing, adjacent siding.

B. Coordinate with the General Contractor and Owner for review of proposed design with the City of Portland Historic Review Commission and Maine Historic Preservation Commission.

1.02 Related Documents

A. All work shall be completed in accordance with the standards and guidelines in the manuals of the Cedar Shake and Shingle Bureau.

B. All work shall be completed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Buildings*.

1.03 Related Sections

A. Part 2 – General Conditions, provided by the City of Portland, apply to this Section.

B. Section 08 52 00: Historically Accurate Wood Windows

C. Section 09 90 00: Painting

1.04 Submittals

A. Product data for all products and materials to be used

B. Samples of shingles, fasteners, underlayment. Submit three unfinished shingles and three shingles finished with specified primer and finish for approval by Owner.

1.05 Quality Assurance

A. Warranty: At project closeout, provide to Owner or Owner's Representative an executed copy of the installing contractor's standard limited warranty against defect, outlining its terms, conditions, and exclusions from coverage for the specified warranty period of two years.

1.06 Delivery, Storage and Handling

A. Deliver materials to job-site in new, dry, unopened, and well-marked containers showing product and manufacturer's name.

B. Store all materials on a raised platform covered with secured canvas tarpaulin (not polyethylene), top to bottom. Cover all materials when project is not in progress and maintain the ability at all times to cover the materials when required, such as during an unanticipated rain shower.

PART 2 - PRODUCTS

2.01 Wood Shingles

A. No. 1 Grade Certigrade Blue Label, sawn and kiln-dried western red cedar shingles.
   1. Length and thickness: 18 inches long, .45 inch thick at butt
   2. Dimensions provided for budgeting purposed; Contractor to verify dimensions of existing and provide exact match.
   3. Provide fire-retardant, pressure-treated shingles in packages bearing UL Class "C" label.
   4. Density: shingles shall have no fewer than five growth rings per inch.

2.02 Fasteners

A. Nails for shingles must be ***must be*** stainless steel-Type 316 in due to project location within fifteen (15) miles of salt water.

2.03 Felt Underlayment

A. Asphalt-saturated organic felts, unperforated, conforming to the requirements of ASTM D 226, Type II, No. 30.
B. Felt underlayment conforming to the requirements of ASTM Designation 4869 (ASTM D 4869).
C. Approved equal.

PART 3 – EXECUTION

3.01 Examination

A. Examine substrates for any defects or other conditions that will affect installation of shingles in accordance wit the Specifications.
B. Inspect each shingle for damage or defects.

3.02 Preparation

A. Cut strapping back as required to fit in solid blocking around window openings.
B. Remove all banded nails and other protrusions in exposed strapping.
C. Re-secure felt paper as required; replace as necessary.

3.03 Installation, General

A. Install new shingles with exposure, coursing and spacing between shingles to match existing, adjacent shingles. Shingles shall be spaced apart 1/8" to 1/4".
B. Joints of shingles in any one course shall be offset not less than 1 1/2" from the joints in adjacent courses.
C. Apply each shingle with at least two, hammered nails. Do not use a nail gun or staples. Shingles wider than 10" require 2 additional nails and these two nails are driven approximately 1" apart near center of shingle.
D. Fasteners shall be long enough to penetrate into the sheathing at least 3/4" or all the way through and driven flush with the surface of the shingle. Do not overdrive fasteners.

3.04 Adjusting

A. Remove and replace any shingles that do not meet these Specifications or do not match the existing.

B. Replace any damaged materials installed under this section with new materials.

-- END OF SECTION --

SECTION 08 52 00 – HISTORICALLY-ACCURATE WOOD WINDOWS

PART 1 – GENERAL

1.01 Summary

A. This Section includes the following: Provide labor, materials and equipment necessary to fabricate and install historically accurate windows with double-hung sash including all exterior and interior trim, flashings, sealants and hardware as shown on Drawings.

B. Coordination with the General Contractor and Owner for review of proposed design with the City of Portland Historic Review Commission and Maine Historic Preservation Commission.

1.02 Related Documents

A. All work shall be completed in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Buildings*.

1.03 Related Sections

A. Section 07 31 29: Wood Shingle Siding

B. Section 09 90 00: Paints and Coatings

1.04 Submittals

A. Product data, storage and handling requirements and recommendations, installation instructions, technical data sheets defining performance properties, and general recommendations from manufacturer for all products and materials to be used.

B. Samples of all products used

C. Full size mock-up of proposed window unit shall include all components including frame, trim, sash, weatherstripping and hardware.

1.05 Quality Assurance

A. The fabricator and installer performing the work of this section must within the last five years prior to the bid opening have successfully completed at least three projects similar in scope and type to the work required by this section.

B. Knowledge of Site: General contractor, fabricator and installer shall visit site prior to bid and carefully examine project scope and conditions that may affect proper execution of work of this Section and determine or verify dimensions and quantities.

C. Warranty: At project closeout, provide to Owner or Owner's Representative an executed copy of the window fabricator and installing contractor's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage for the specified warranty period of two years.

1.06 Delivery, Storage and Handling

A. Deliver all materials in original unopened containers labeled with the manufacturer's name, brand name, item name and installation instructions.

B. Store materials in compliance with the manufacturer's requirements for

temperature, maximum and minimum, and other conditions. Keep all materials under cover and dry. Protect against exposure to the weather.

C. Discard and remove from the job site any materials damaged in handling or storage and any materials that have been subjected to conditions contrary to the manufacturer's recommendations or whose maximum shelf life has expired.

D. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.07 Project Conditions

A. Protection of Building: Protect building elements and finishes from damage or deterioration caused by the work of this Section.

1.08 Environmental Conditions

A. General: Perform work only when temperature of products being used, temperatures of existing and new materials, and air temperature and humidity comply with product manufacturer's requirements and requirements of this Section. In case of conflict, the most stringent requirements shall govern.

PART 2 - PRODUCTS

2.01 Windows, Trim, and Sash

A. All new window components shall be custom fabricated.

B. All new components shall be fabricated of clear, select old-growth eastern white pine, 100% heart wood, minimum of 10 annual growth rings / inch, dried to a moisture content of 6 to 12% at time of fabrication.

C. Wood shall be free of knots and checks, without finger joints or other joints, and free from defects or blemishes on surfaces exposed to view that will show after paints and finishes have been applied.

D. Sash shall be haunch mortise and tenoned, tenons shall be pegged with hardwood pegs. No metal fastener shall be used to fabricate sash.

E. Acceptable manufacturers:
Bagala Window Works
60 Gray Road, 3-4
Falmouth, ME 04105
p. 207-878-6306

2.02 Endgrain Treatment

A. Endgrain treatment shall be a two component, ultra-low viscosity, epoxy-based wetting agent

B. Acceptable products:
Prima-A-Trate
by Advanced Repair Technology
PO Box 510 l
Cherry Valley, NY 13320
p. 607-264-9040

2.03 Fasteners

A. Fasteners shall be stainless steel, galvanized or bon-ferrous brass or bronze.

2.04 Linseed Oil

2.05 Glass

A. Salvage and reuse existing glass panes.

B. If additional glass is required, provide new glass to match existing glass exactly in thickness, appearance, reflectivity, and tint.

C. Possible manufacturers:

1. Bendheim
   61 Willett St.
   Passaic, NJ 07055
   p. 800.221.7379
   p. 973.471.1733
   f. 973.471.1640

2. Hollander
   Hollander Glass East, Inc.
   50 Clearview Road
   Edison, NJ 08837
   p. 732-346-1211
   f. 732-346-1711
   e. east@hollanderglass.com

2.06 Glazing Putty

A. Latex glazing compound

B. Acceptable products: Aqua Glaze

C. Acceptable manufacturer:
   SCL Sterling,
   Savogran Company
   P.O. Box 130
   Norwood, MA
   p. 781-762-5400

2.07 Glazing Points

A. Glazing points shall be stainless steel or galvanized steel.

B. Acceptable products: Galvanized triangle points

C. Fletcher

2.08 Flashing and Drip Caps

A. 16 oz. sheet copper coated both size with a zinc-tin alloy approximately .5 mils thick (for step flashings and drip cap flashings).

1. Metal: ASTM B370.
2. Finish: hot dipped Z-T alloy.
3. Acceptable product: Freedom Gray by Revere Copper Products, Inc.

2.09 Hardware

A. Sash locks shall be cast, solid brass sweep-type locks.

B. Acceptable manufacturers:
The Architectural Resource Center
Northwood, NH

2.10 Weatherstripping

A. Weatherstripping at stiles/jambs:
1. Interlocking type, bronze
2. Acceptable products: Series # 3c
3. Acceptable manufacturers:
Accurate Metal Weatherstrip Co., Inc.
725 S. Fulton Avenue.
Mount Vernon, NY 10550-5086
p. (800) 536-6043
p. (914) 668-6042
f. (914) 668-6062
e. info@accurateweatherstrip.com
w. www.accurateweatherstrip.com

B. Weatherstripping at meeting, rails, top rail and bottom rail/sill:
1. Silicone tube seal
2. Acceptable products: Series ws10, ws11
3. Acceptable manufacturers:
Resource Conservation Technology, Inc.

2.11 Joint sealants

A. Sikaflex - 1a; by the Sika Corporation.

B. NP 1; Sonneborn Building Products Div., by ChemRex Inc

PART 3 – EXECUTION

3.01 Glazing

A. Prepare surfaces to receive glazing as per glazing compound manufacturer's requirements.

3.02 Installation of Weatherstripping

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Install in accordance with manufacturer's instructions.

3.03 Site Preparation

A. Do not begin installation until substrates have been properly prepared.

3.04 Temporary Protection

A. Provide temporary weather protection when existing sash and frames are removed.

3.05 Inspection

A. Inspect openings before beginning installation. Verify that the opening is correct and the rough framing is level. Do not proceed with the installation of the window units until unsatisfactory conditions have been corrected.
   1. Wood frame walls and rough openings shall be dry, clean, free from construction debris, sound and well-nailed, free of voids and without offsets at joints.
   2. Nail heads shall be driven flush with frame surfaces in the opening and with 3" of the openings corners.
   3. Coordinate window installation with all wall flashing and other built-in components.
   4. Notify Owner of unacceptable conditions before proceeding with installation.

3.06 Installation

A. Comply with the Window Manufacturer's recommended installation instructions, including but not limited to the following:
   1. Set units plumb to existing facade, level and true to line, without warp or rack of jamb/frame, sash or glazing.
   2. Provide proper support and anchor units securely in place.
   3. Set sill members and exterior trim members in and/or against a bed of sealant.
   4. Head trim/jamb members shall be adequately sealed and/or weatherstripped to the exterior sub-sheathing, exterior shingle siding facade.
   5. All operating sash shall operate smoothly over entire height.
   6. Sash Hardware: Provide sash locks on all windows. Adjust sash locks for smooth easy operation and firm, secure locking.
   7. Wax: Treat unpainted sides of stiles and frame with wax for ease of window operation and wood protection.
   8. At completion of installation, windows shall be complete with all components and with unblemished paint and finish coats.

3.07 Weatherstripping

A. Provide weatherstripping at all jambs, meeting rails, sills and headers. Install weatherstripping following manufacturer's requirements.
B. Rabbet sash as required for proper installation of weatherstripping.
C. Weatherstripping shall be completely sealed and weathertight when sash are closed.
D. Weatherstripped windows shall be fully operable with out binding, scraping or excessive noise and shall close fully without excessive effort.

3.08 Adjusting

A. Adjust all operating sash and hardware to provide a tight fit at contact points and weatherstripping and insure smooth operation.
B. General: Adjust operating sash and hardware to provide a tight fit at contact points and weatherstripping, and to provide smooth operation and a weathertight closure. Lubricate hardware and moving parts.

3.09 Cleaning

A. Clean glass and interior and exterior surfaces promptly after installation and on-site finishing.
B. Do not scratch glass with cleaning tools.
C. Do not damage protective coatings and finishes.
D. Do not use solvents that damage or deteriorate the finish or glazing compounds.
E. Use only cleaners that do not contain ammonia. Products with ammonia are not acceptable as they accelerate paint film deterioration.

3.10 Protection

A. Take necessary precautions to protect window units from damage or deterioration until time of substantial completion.
B. Remove and replace glass that has been broken, chipped, cracked, abraded or damaged until time of substantial completion.

-- END OF SECTION --

SECTION 09 90 00 – PAINTS AND COATINGS

PART 1 – GENERAL

1.01 Summary

A. This Section includes the following: surface preparation, back-priming, priming, and finish painting of all interior and exterior surfaces scheduled to be finished.

B. The work includes preparation and painting with a three (3) coat system (one (1) primer coat and two (2) finish coats) of all **new**, exterior-exposed materials and surfaces of all exterior and interior wooden surfaces and finishes and preparation and painting of all components scheduled to be reused.

1.02 Related Sections

A. Part 2 – General Conditions, provided by the City of Portland, apply to this Section.

B. Section 07 31 29: Wood Shingle Siding

C. Section 08 52 00: Historically Accurate Wood Windows

1.03 Definitions

A. Paint as used herein means all coating systems materials, including primers, emulsions, enamels, sealers, and other applied materials used as a primer or finish coating.

B. General: Standard coating terms defined in ASTM D 16.

1. Flat: Paint or coating whose specular gloss registers less than 15 on an 85-degree meter or less than 5 on a 60-degree meter according to ASTM Method D 523, Standard Test Method for Specular Gloss.
2. Non-flat: Paint or coating whose specular gloss registers 15 or greater on an 85-degree meter or 5 or greater on a 60-degree meter according to ASTM Method D 523, Standard Test Method for Specular Gloss.

1.04 Submittals

A. Product data for all products and materials to be used, including:

1. Material List: List of required coating materials. Identify each material by manufacturer's catalog number and general classification.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Application methods.

B. Samples

1. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and finish.
2. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

3. Closeout Submittals: 1. Provide manufacturer's maintenance instructions that include recommendations for cleaning, touch-up, and repair of painted and coated surfaces.
4. Provide the color mixture name and code to the Owner for accurate future color matching.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.05 Quality Assurance

A. Warranty: At project closeout, provide to Owner or Owner's Representative an executed copy of the installing contractor's standard limited warranty against defect, outlining its terms, conditions, and exclusions from coverage for the specified warranty period of two years.

1.06 Delivery, Storage, and Handling

A. Store products in manufacturer's unopened packaging with labels intact until ready for installation.
B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F (7 degrees C). Maintain storage containers in a clean condition, free of foreign materials and residue.
C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 Project Conditions

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

2.01 Acceptable manufacturers:

A. For window components:
California Paint
150 Dascomb Road,
Andover, MA 01810
p. (800) 225-1141
p. (978) 623-9980
e. info@californiapaints.com
w. www.californiapaints.com

B. For shingle siding:
Pratt & Lambert
p. 800-289-7728

2.02 Acceptable products:
A. Primer for priming and back priming all new shingles:
1. PRO-HIDE Gold® Exterior Alkyd Primer over knots or heavy pitch staining
B. Finish coat for all shingles:
1. Stainshield® Exterior Solid 100% Acrylic Latex Siding Stain
2. Color: custom as required to match existing color on siding.
C. Primer for exterior window components:
One Coat - Troubleshooter Fast Drying Alkyd/Linseed Oil Wood Exterior Primer #22700.
D. Finish for window components:
1. Fresh Coat Velvet Flat, custom color to match existing, sheen to match existing.

2.03 Materials - General
A. Compatibility: Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
B. Volatile Organic Compound (VOC) Content: Provide coatings that comply with the most stringent requirements of the following
1. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
C. Mixing and Tinting:
1. Except where specifically noted in this section, all paint shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.
2. Thinner addition shall not exceed manufacturer's printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.
3. Where paint is to be sprayed, thin according to manufacturer's guidelines.

PART 3 – EXECUTION

3.01 Application
A. Paint all exposed surfaces whether or not colors are designated, except where the natural (unpainted) finish of the materials is obviously intended and specifically noted as a surface not to be painted. Where items or surfaces are

not specifically mentioned, paint these areas the same as adjacent areas or material.

3.02 Cleaning

A. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.
B. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
C. Reconnect equipment adjacent to surfaces indicated to receive coatings.
D. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.
E. Remove protective materials.

3.03 Protection

A. Protect installed products until completion of project.

-- END OF SECTION --