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1. **Design & Performance Criteria:**

- a. Evaluation of each window unit is required in the project scope in the following circumstances:
 - i. When directed to include renovation of wood windows by UVM.
 - ii. Building is included in one of the lists below:
 1. State Register of Historic Places:
<https://www.burlingtonvt.gov/PZ/State-Register-of-Historic-Places>
 2. National Register of Historic Places:
<https://www.burlingtonvt.gov/PZ/National-Register-of-Historic-Places>
 3. Burlington’s Historic Sites and Structures Surveys:
<https://www.burlingtonvt.gov/PZ/Historic-Sites-and-Structures-Surveys>
 - iii. Building is considered historically significant by UVM or the City of Burlington.
 - iv. Evaluate restoration if original windows are still intact in the building. If windows have been replaced, option to replace new windows to match historic style should be considered.
- b. Window Significance: Windows will be considered significant to the character of the building if they are original, reflect the building’s purpose or use, reflect period or regional styles or building practices, or reflect changes to the building resulting from major periods or events. The significance of the windows will play a part in the determination of the appropriateness of replacement instead of repair.
- c. Restoration of existing windows is preferred over replacement.
 - i. Replacement will be reviewed as a possible priority over restoration in the following circumstances:
 1. Where the planned use of a building requires windows with a higher durability or safety factor (residential, agricultural, industrial, etc)
 2. Where location or height requires reduced maintenance features (difficult to reach, courtyard interior access, inaccessible or secure interior spaces, etc)
- d. Replacement Criteria: UVM’s replacement criteria considers the following:
 - i. Single components of a window:
 1. if more than 50% of the original material is in disrepair the window component may be replaced in kind.

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2. Sills: when checks are 2/3rds of the thickness the sill should be replaced
 - ii. Entire window assembly:
 1. Replacement is the last resort; restoration is always preferred.
 2. Replacement must be explicitly approved by the Owner after review by applicable state agencies.
 3. Replacement units will be in kind with respect to changing as little of the historically contributing factors of the old window as possible. Refer to Preservation Brief #9 (see references) for guidance relating to replacement.
 - e. Vermont Division of Historic Preservation (VDHP) replacement criteria may override UVM replacement criteria. Refer to “Treatment of Historic Properties” Design Standard for guidelines related to VDHP project review.
 - f. Window Evaluation Survey
 - i. Design Consultant shall perform a window evaluation as the first step in a window restoration/replacement project.
 - ii. Survey shall document types and causes of deterioration, their location, and extent for considerations in the decisions made about what repairs are appropriate.
 - iii. Survey shall include the components indicated in the following “List of Components to Evaluate” found later in this document.
 - iv. Design Consultant may reference past UVM Window Evaluation reports from the following projects
 1. 2017 Cohen Hall Exterior Improvements
 2. 2018 475-489 Main Street Cottage Envelope Rehabilitation
 3. 2019 Ira Allen Chapel Window Restoration
 - g. Documentation of proposed repairs
 - i. After the window evaluation is performed, the specific treatments or repairs will be determined for each type of issue noted in the evaluation.
 1. Consultant proposed repairs will be reviewed and confirmed by the UVM project manager.
 2. Such repairs shall be documented in a schedule of repairs. The intent is for the schedule to provide a detailed list to produce

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- accurate bids by qualified window restoration contractors and general contractors.
3. Schedule will include the window location, the standardized repair description (so it is the same across windows as much as possible), and a unit of measurement where appropriate.
 4. The schedule of repairs will be provided in one of the forms listed below.
 - a. a sortable list of standardized repairs formatted to present each window with a sub-list of required repairs and a list of repairs with a sub-list of applicable windows.
 - b. A graphic matrix /grid of windows and repairs
 5. Condition of each component will be noted as “good” if no repairs are required, otherwise the necessary repair will be described in the schedule.
 6. The sortable list format need only to include the necessary repairs if a separate list is provided documenting each of the components whose condition is labeled “good”.
 7. Where components are missing (ie: sash cord/chain, handles, or locks) the need to provide replacements will be noted.
 8. The type/style of components will be noted (ie: weatherstripping, locks, handles)
 9. The period of components will be noted in columns or description as
 - a. “appropriate” (establishes that the component is original or a historically appropriate replacement.)
 - b. “modern”. (establishes that the component is not historically appropriate.) It is possible that depending on the component “modern” items will not need to be replaced according to the Owner’s decision.
 10. Work items will be categorized into one of three repair classes
 - a. Class 1: routine maintenance procedures
 - i. Paint repairs
 - ii. Sash/glazing repairs
 1. Weatherstripping repairs
 - b. Frame repairs

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- c. Class 2: structural stabilization
 - i. Repair of split, checked, punky, or rotten wood
 - d. Class 3: parts replacement.
 - h. Photographs of each window will be taken to support the schedule of repairs.
 - i. Photos are not required to be included in the schedule of repairs but will be available to describe the recommendations for repairs or replacement if needed.
 - ii. Capture and storage and production of photos is the responsibility of the design or engineering consultant.
 - i. Allowances shall be used to account for unseen repairs. The following list is a suggestion for kinds of allowances to include:
 - 1. Parting stop replacement: parting stops may be broken during removal and need to be replaced
 - 2. Sash joint repairs after glazing has been removed
 - 3. Broken glass replacement: lites may break during reputty work
- 2. **Reference Standards:**
 - a. The Secretary of the Interior’s Standards for the Treatment of Historic Properties:
 - i. Published by the National Park Service and available at their website (www.nps.gov/tps/standards.htm)
 - ii. Offers recommendations regarding materials, construction, and use and are the basis for much of state and federal review of projects under their jurisdiction.
 - b. The National Park Service Technical Preservation Services Preservation Briefs #9: “The Repair of Historic Wooden Windows”.
- 3. **Submittals to be reviewed by University:**
 - a. Schedule of Repairs
 - b. Consultant drawings
 - i. Plans and / or elevations indicating window numbers
 - ii. Legend of window types
- 4. **Products, Materials & Equipment:**
 - a. Suitable Sash repair materials

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- i. Wood: cypress, cedar, or mahogany, matching existing in historic contexts where finish is other than paint
- ii. Epoxy consolidants (two-part)
 - 1. Moisture content of substrate must be above 12%
 - 2. Remove seriously decayed wood prior to treatment
- iii. Boiled Linseed oil based consolidant
 - 1. Moisture content of substrate must be above 12%
 - 2. Remove seriously decayed wood prior to treatment
- b. Glazing putty materials
 - i. Oil-based compounds are preferred over alkyd based.
- c. Weatherstripping: the following types of weatherstripping are preferred, strongest to least desired.
 - i. Jamb
 - 1. Double leaf seals (installed into sash kerf – see attached detail)
 - 2. T Flange (Ribbed)
 - 3. Spring metal
 - 4. Brush seals
 - 5. Sash weights may be replaced with springs and cavity insulated for increased energy efficiency with approval.
 - ii. Sill
 - 1. Flexible Bulb seal (installed into sash kerf)
 - 2. Single leaf seal (installed into sash kerf)
 - 3. T Flange (Ribbed)
 - iii. Meeting Rail
 - 1. Double brush
 - 2. Beveled rail type
 - 3. Interlocking metal
 - iv. Head
 - 1. Bulb seal (installed in sash kerf)
- d. Storm Windows
 - i. Basis of Design for new aluminum storm window system:
 - 1. Manufacturer: Allied Windows, 11111 Canal Road - Cincinnati, OH 45241; alliedwindow.com.
 - ii. Exterior casing should remain visible where possible
 - iii. Meeting rail for multiple-pane storms will align with sash meeting rail

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- iv. Frames between glass and screen panels will align with sash meeting rail or at horizontal muntin line if screen is smaller than wood sash.
 - v. Color match wood sash
 - vi. Weep holes must remain open after installation
 - vii. Operable storm windows desired if original window is functional
 - e. Hardware: Original hardware to be removed and restored to original finish. Additional hardware required to match original style as much as possible.
 - f. Restricted materials
 - i. Silicone sealant may not be used at windows. (Difficult to remove and short-lived)
 - ii. Metal fasteners in wood sash.
- 5. **List of attached sketches:**
 - a. Sample of sortable list repair schedule showing repairs grouped by window
 - b. Sample of sortable list repair schedule showing windows grouped by repair
 - c. Sample of matrix repair schedule
 - d. Examples of acceptable replacement seals at wood windows
- 6. **List of components to evaluate**
 - a. Frame and Trim
 - i. Exterior Casing
 - ii. Steel or masonry lintels supporting wall veneer
 - iii. exterior sill
 - iv. Interior casing
 - v. Interior stool
 - vi. Ability of interior stops to be adjusted to improve operability
 - vii. parting stops
 - viii. wood at jamb/head/sill frame
 - ix. weight pocket doors
 - x. paint/stain/coating – moisture related problems
 - xi. Evidence of water collection/freezing in sill
 - xii. Wood species/finish
 - b. Sash
 - i. Stiles and Rails
 - ii. Joints between stiles and rails

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- iii. Wood muntins – profile, damage
- iv. Joints between muntins and stiles or rails
- v. glazing putty – condition, age, type
- vi. Visible racking/bowing
- vii. weatherstripping kerfs
- viii. paint/stain
- ix. Presence of sagging along bottom sash rail
- x. Excessive paint on glass
- xi. Presence of glazing points
- xii. Sash material/finish
- xiii. Presence of past repairs
- xiv. Evidence of non-original glass
- xv. Documentation of original glass
- xvi. Presence of broken glass
- xvii. Presence of non-matching lites in divide lite sash.
- xviii. Fit of sash in jamb channels.
- xix. Operability of sash
- xx. Ability of upper and lower sash to fully close and mate at the meeting rail
- xxi. Ability of sash locks to hold the meeting rail tight
- c. Hardware
 - i. sash locks
 - ii. sash handles
 - iii. sash ropes/chains/other forms of balance
 - iv. sash weights – present/obstructed
 - v. jamb weatherstripping
 - vi. meeting rail weather stripping/bevel/kerf
 - vii. head weatherstripping
- d. Storm Windows
 - i. Presence of weeps in exterior storm assemblies
 - ii. Operation of storm windows
 - iii. Missing screens/panes
- e. Screens
 - i. Damaged or missing screen fabric
 - ii. Operation of hinged or sliding screen frames

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**Attachment A: Sortable List: Showing
Repairs Grouped by Window**

Window #	Repair	Quantity of Repair
B14	Adjust dimension of upper sash to allow meeting rail to accurately align - see notes	1
		2
	Adjust sash weights for balanced and smooth operation	
	Make interior stops adjustable	2
	Provide Bulb weather stripping at sill	1
	Remove aluminum storm assembly and replace sealant with foam gasket	4
B15		2
	Adjust sash weights for balanced and smooth operation	
		1
B16	Provide bulb seal at sill to fill existing over-height rabbet	
	Replace 100% of existing glazing putty	1
		2
B21	Adjust sash weights for balanced and smooth operation	
	Install bulb weatherstripping at sill for lower sash and head of upper sash	2
	Install leaf weatherstripping at jambs for both sash	2
G1	Scrape, prime, and paint existing wood frame and plywood panel at exhaust louver	1
	Treat dry wood at sill and of sill molding, scrape, prime and paint	1
G11	Replace 100% glazing putty	1
	Replace Glazing putty at arch top	1
	Scrape, prime, and paint sill and interior sill trim	1
G12		2
	Add sash lock in kind with other windows - Space evenly	
	Adjust dimension of upper sash to allow meeting rail to accurately align - see notes	1
	Adjust lower sash so bottom rail fully seats on the sill.	1
G13		2
	Add sash lock in kind with other windows - Space evenly	
	Adjust dimensions of upper sash to allow meeting rails to accurately meet - see notes	1
	Adjust lower sash so bottom rail fully seats on the sill.	56
		1
G13	Adjust sash weights for balanced and smooth operation	
	Install locks in kind with other windows	2
	Adjust dimensions of upper sash to allow meeting rails to accurately meet - see notes	1
	Adjust lower sash so bottom rail fully seats on the sill.	1

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	Adjust sash weights for balanced and smooth operation (some removal and reinstallation of jamb frame material may be necessary)	1
G16	Repair crack at lower sash meeting rail - 4 inches long	1
	Adjust dimensions of upper sash to allow meeting rails to accurately meet - see notes	1
	Install sash blocks	2
	Provide weather stripping at upper sash jambs and head in kind with adjacent windows	3
	Provide weatherstripping at interior left of lower sash in kind	4
G17	Repair bow in window frame (may require removal of glass)	1
	Add weather stripping on the right side of the upper sash	1
	Adjust dimension of upper sash to allow meeting rail to accurately align - see notes	1

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**Attachment B: Sortable List: Showing Windows
Grouped by Repair**

Repair	Window #	Quantity of Repair
Add sash lock in kind with other windows - Space evenly	G11	2
	G12	2
Add weather stripping on the right side of the upper sash	G17	1
Adjust dimension of upper sash to allow meeting rail to accurately align - see notes	B14	1
	G11	1
	G17	1
Adjust dimensions of upper sash to allow meeting rails to accurately meet - see notes	G12	1
	G13	1
	G16	1
Adjust lower sash so bottom rail fully seats on the sill.	G11	1
	G12	56
	G13	1
Adjust sash weights for balanced and smooth operation	B14	2
	B15	2
	B16	2
	G12	1
	G13	1
Adjust sash weights for balanced and smooth operation (some removal and reinstallation of jamb frame material may be necessary)	G13	1
Install bulb weatherstripping at sill for lower sash and head of upper sash	B16	2
Install leaf weatherstripping at jambs for both sash	B16	2
Install locks in kind with other windows	G12	2
Install sash blocks	G16	2
Make interior stops adjustable	B14	2
Provide bulb seal at sill to fill existing over-height rabbet	B15	1
Provide Bulb weather stripping at sill	B14	1
Provide weather stripping at upper sash jambs and head in kind with adjacent windows	G16	3
Provide weatherstripping at interior left of lower sash in kind	G16	4
Remove aluminum storm assembly and replace sealant with foam gasket	B14	4
Repair bow in window frame (may require removal of glass)	G16	1

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Repair crack at lower sash meeting rail - 4 inches long	G13	1
Replace 100% glazing putty	G1	1
Replace 100% of existing glazing putty	B15	1
Replace Glazing putty at arch top	G1	1
Scrape, prime, and paint existing wood frame and plywood panel at exhaust louver	B21	1
Scrape, prime, and paint sill and interior sill trim	G1	1
Treat dry wood at sill and of sill molding, scrape, prime and paint	B21	1

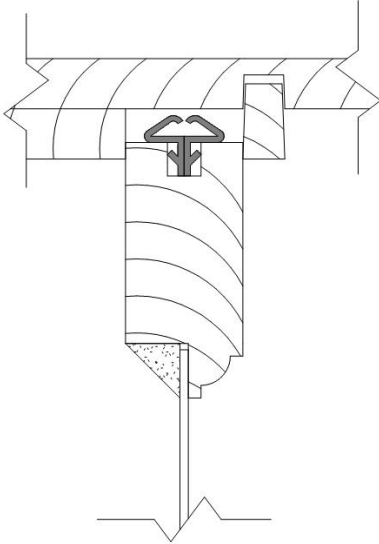
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Attachment C: Matrix of Repairs

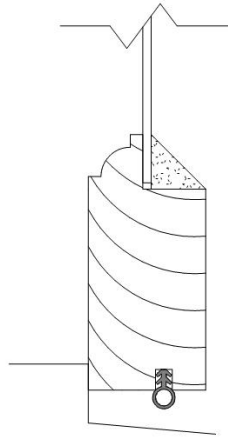
WINDOW TAG	WINDOW TYPE	SCOPE OF WORK														
		WINDOW REPAIR 1	WINDOW REPAIR 2	WINDOW REPAIR 3	WINDOW REPAIR 4	WINDOW REPAIR 5	WINDOW REPAIR 6	WINDOW REPAIR 7	WINDOW REPAIR 8	WINDOW REPAIR 9	WINDOW REPAIR 10	WINDOW REPAIR 11	WINDOW REPAIR 12	WINDOW REPAIR 13	WINDOW REPAIR 14	WINDOW REPAIR 15
1	Q	X	X	X	X	X	X	X				X				
2	S	X	X	X	X		X									
3	Q	X	X	X	X	X	X									
4	K	X	X	X	X	X	X	X	X				X	X	X	X
5	K	X	X	X	X	X	X	X	X				X	X	X	X
6	K	X			X											
7	K	X	X	X	X	X	X									
8	K	X	X	X	X	X	X									
9	N	X	X	X	X	X	X					X				
10	K	X	X	X	X	X	X	X	X			X				
11	O	X	X	X	X	X	X		X	X						
12	M	X	X	X	X	X	X									
13	J	X	X	X	X	X	X									
14	I	X	X	X	X	X	X									
15	D	X	X	X	X	X	X									
16	D	X	X	X	X	X	X									
17	D	X	X	X	X	X	X									
18	D	X	X	X	X	X	X									
19	D	X	X	X	X	X	X									
20	G	X	X	X	X	X	X									
21	G	X	X	X	X	X	X					X				
22	O	X	X	X	X	X	X									
23	O	X	X	X	X	X	X									
24	O	X	X	X	X	X	X					X				
25	O	X	X	X	X	X	X		X		X					
26	O	X	X	X	X	X	X		X	X						
27	O	X	X	X	X	X	X									
28	O	X	X	X	X	X	X									

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Attachment D: Example of replacement seals at wood windows



DOUBLE LEAF SEALS IN KERF AT JAMB



BULB SEAL IN KERF AT SILL