

STAFF REPORT August 21, 2024
Historic Preservation Commission

PROJECT NAME

201 LINDEN STREET (LINDEN HOTEL) – DESIGN REVIEW (CONTINUED FROM JULY 17, 2024)

STAFF

Jim Bertolini, Senior Historic Preservation Planner
Maren Bzdek, Historic Preservation Manager

PROJECT DESCRIPTION: Alterations to the Linden Hotel at 201 Linden Street to include complete replacement of the historic windows on the second and third floors of the building.

APPLICANT/OWNER: Linden Street Treehouse, LLC v/ OneSeven Advisors, LLC
148 Remington Street, Ste 100
Fort Collins, CO 80524

RECOMMENDATION: Based on the window study produced by Deep Roots Craftsmen for all of the historic windows on the second and third floors staff recommends approval of repair of the existing upper sashes, in-kind replacement of the lower sashes, and installation of wood storm windows, based on the recommended approach in the window study. This approach appears to meet all the standard considerations of a preservation window study related to performance, retention of historic materials and character, and safety, and is the combination of options that meet the code requirements in Municipal Code Chapter 14 and the adopted Old Town Design Standards.

COMMISSION'S ROLE:

Design review is governed by Municipal Code Chapter 14, Article IV, and is the process by which the Historic Preservation Commission (HPC) reviews proposed exterior alterations to a designated historic property for consistency with the *U.S. Secretary of the Interior's Standards for the Treatment of Historic Properties* (the SOI Standards). The HPC should discuss and consider the presented materials and staff analysis. For City Landmarks and properties in City Landmark Districts, the Commission is a decision-maker and can choose to issue, or not issue, a Certificate of Appropriateness (CoA) describing approved alterations. Issuing a CoA allows the approved work to proceed.

EXECUTIVE SUMMARY:

The HPC continued this item from its July 17, 2024 regular meeting. The report below reflects updated analysis and information based on the Applicant's requests to add material to the record, additional staff analysis based on information added to the record at the July 17 meeting, and the results of an August 6, 2024 window study completed by Deep Roots Craftsmen.

This is a request to replace the exterior windows (between 38 and 41 windows) of the Linden Hotel at 201 Linden Street. City Council individually Landmarked the Linden Hotel in 1974 (Ordinance 1974-44), but the property was also later included as a contributing building in the Old Town Landmark District, designated by City Council in 1979 (Ordinance 1979-170, and subsequent 1998-102 and 1998-124). The hotel was additionally listed in the National Register of Historic Places in 1978 as part of the Old Town Historic District – the Hotel is listed as “the central anchor for the district” (see page 7-4).

The proposal before the HPC is to replace the exterior windows of the property. The materials provided by the Applicant’s contractor provide replacement information including standardized dimensions and material details on the proposed product. Typically the specific details are confirmed via a window study, which was not included with the Applicant’s submission.

Staff engaged an expert to perform a window study, which was delivered the first week in August 2024. That report included several options, with comparative scoring, that addressed the key concerns for historic windows, both from the federal *Standards for Rehabilitation*/Old Town Design Standards, and from the applicant, regarding safety, operability, energy performance, and retention of historic material (see page 15 of the Assessment). Of those, the three options that met all requirements, *including* retention of historic material, were either the repair of the lower sashes, the reproduction of replacement lower sashes, or full replacement in-kind with wood replacements. The consultant, Deep Roots Craftsmen, specified that all of those possible treatments would benefit greatly from the installation of exterior storm windows. Staff is recommending the HPC deny the applicant’s request, and instead approve Deep Roots’ recommended Option C and F, the complete replacement of all lower sashes in-kind, and installation of wood storm windows on the exterior of the property. However, staff would note that full in-kind replacement (Option D) would also receive staff support.

Alterations to City Landmarks are subject to the approval process in Municipal Code Chapter 14, Article IV. Contributing properties to the Old Town Landmark District are subject to the same approval process, with more specific approval standards adopted by City Council in the Old Town Design Standards (OTDS).

ARCHITECTURAL DESCRIPTION:

Nomination documents may describe character-defining features, or those features critical to maintain when approving projects in order to retain an historic property’s essential character and reasons for being designated historic. The National Register nomination approved in 1979 includes the following description of the Hotel (page 7-4):

“[The Linden Hotel]...is a three-story brick structure and is one of the more architecturally significant buildings in the area. The structure has a mansard roof at the cornice, aureole windows at the corner, and a tower with a mansard roof above the aureole windows at the corner. Both the Walnut and Linden Street facades of this building have been treated architecturally with a series of protruding ornamental brick pilasters and recessed window bays. The façade is not symmetrical for the number of windows in each bay varies. The first story has been altered considerably, in places the original window openings can still be seen. The window openings have segmental arch lintels of stone. The second story windows are treated differently architecturally. These windows have half-arch stone lintels. The third story windows have flat stone lintels. The cornice below the mansard roof is quite elaborate and is of pressed tin. The building has a flat roof and is rectangular in plan, except for the diagonal at the corner. The diagonal is the most significant part of the building as it responds quite favorably to the corner and is the location for the rather ornamental aureole windows and the tower.”

Based on this description, and the 1974 individual Landmark ordinance for the property, this property would be considered historic for both its historic (Standard 1) and architectural (Standard 3) importance. The three-story red brick and native sandstone structure has several notable architectural details, including the prominent corner entry with its double oriel windows. According to previous surveys, there are a total of 51 windows on the second and third floors. Each oriel contains three double-hung wood sash windows, in wood surrounds, with ornate carved decorative wood details. Other than the oriel, the second-floor windows are surrounded with pointed half-arch stone lintels and stone sills. Third floor windows have flat stone lintels and stone sills. Windows on the second and

third floors are historic double hung wood windows. Four windows on the west wall of the second floor are non-historic replacement windows; the original windows were lost during the collapse of the west wall associated with the 1994 rehabilitation.

Several features of the building's exterior would be considered "character-defining," including:

- The sandstone and brick exterior, including door and window sills and lintels of varying shapes (arched and segmented arch);
- Metal (historically wood) decorative trim features, including brackets, mullions, and pilasters;
- Wood, inset storefront assemblies on the ground floor;
- Mansard roof at the cornice, now comprised of standing-seam metal
- The prominent aureole windows on the 2nd and 3rd floor at the corner of Linden and Walnut Streets;
- 1-over-1 wood windows on the 2nd and 3rd floor

ALTERATION HISTORY:

Building History

The historic 1882 "Linden Hotel" building at the northwest corner of Walnut and Linden Streets, originally owned by Fort Collins pioneers' Abner Loomis and Charles B. Andrews, was designed by prominent Denver architect William Quayle and constructed by John F. Colpitts just nine years after Fort Collins was incorporated as a town. Until 1917, its first floor housed the Poudre Valley Bank, the oldest banking institution in Larimer County. Other primary uses in its early years included the post office, the Masonic Lodge, a tavern, and the Linden Hotel.

Known alterations of the property to date include:

- 1917 – Remodel and repair (Permit 87)
- 1923 – install 5x14 coal platform
- 1936 – after-the-fact permit for a new 5ft door cut in north wall; 1 30" door in south wall for entrances to 201 and 207 Linden St.
- 1937 – roof of boiler room reinforced with concrete
- 1945 – Remodeling (Permit 8169 and 8361)
- 1945 – Asphalt roof
- 1946 – Remodeling (Permit 9267)
- 1952 – hang neon sign over 12' above sidewalk (200lbs)
- 1994-1995 – Rehabilitation
 - o Comprehensive, including restoration of storefronts, interior remodel, elevator addition, stair tower addition, roof replacement, new fire suppression system
- 1999 – Remodel of 3rd floor (interior?); lighting and mechanical modifications
- 2016 – Interior rehabilitation w/ rooftop patios
- 2018 – Stone pilaster repair
- 2018-2019 – Windows
 - o CoA not issued by interpretation of CDNS Director; project shifted to repair/modification
- 2021 – Corner stone repair (from Linden Alley accidental damage)
- 2023 – Wood trim and storefront window repair and temporary safety measures (plexiglass covering) for 2nd and 3rd floor exterior windows

HISTORY OF DESIGN REVIEW:

- 1993 – Preservation Leadership Training Institute Assessment

- the Linden Hotel was selected as the study site for the week-long Preservation Leadership Training Institute sponsored by the National Trust for Historic Preservation and the National Park Service, which brought experts from around the country to examine the structure's rehabilitation needs and its relationship to the revitalization of the historic downtown towards the river beyond Old Town Square.
- 1994-1995 – Major Rehabilitation
 - Comprehensive, including restoration of storefronts, interior remodel, elevator addition, stair tower addition, roof replacement, new fire suppression system
 - Public-private effort, which included a State Historical Fund grant, Downtown Development Authority funding and City Historic Preservation Fund monies totaling \$450,000. The National Park Service approved the project's full compliance with the SOI Standards for Rehabilitation and praised the extensive effort, noting that "local support by the community and the City of Fort Collins make this project unique among the many rehabilitation projects we review within a 16-state region."
 - In 1995, the City of Fort Collins recognized building owners Dave Veldman and Mitch Morgan of Veldman Morgan Commercial with a "Friend of Preservation" Award for their "courageous effort" to rehabilitate the building.
- 2005 – Window Assessment (Edge Architecture)
 - Owner proposed replacing some of the wood windows. In response to that request, a window survey and assessment of 51 windows was conducted by Angie Aguilera, Edge Architecture. The report noted that windows were in relatively good condition for their age and provided three repair and performance improvement options along with two comparative estimates for replacement.
 - Subsequently, the owner neither repaired nor replaced any of the windows.
- 2018 – Interior rehabilitation w/ rooftop patios
- 2018 – Stone pilaster repair on ground floor facade
- 2018-2019 – Windows
 - Change of use from offices to residential on the second and third floors.
 - At that time, the owner indicated an intention to clean and re-glaze the historic windows. As there were no plans for additional work to the windows at that time, the cleaning and re-glazing would comply with the definition of normal maintenance and repair (Ch. 14, Sec. 14-52).
 - The information did not include a request to change the lift system and add extra panes to the windows, which required channeling out significant portions of wood from the sash. This was completed without approval and Preservation staff was made aware on August 22, 2018, by the windows contractor. This included a request to review options for next steps including replacement of the historic windows with a product that the contractor had shared with the architect and owner's representative.
 - Staff accompanied an LPC Design Review Subcommittee to a site visit at the building on September 4, 2018 to examine the condition and operability of the reinstalled historic windows and to examine four windows on the second floor of the west alley elevation. These four windows were installed in association with the reconstruction of the west wall, which collapsed during the 1994 rehabilitation project. Three of the four windows were modern replacements, and the fourth was a historic window with details, sections, shape, and cut lites that indicated it was moved to this location. On October 21, 2018, the Applicant received administrative approval to replace those four windows
 - The subcommittee provided a recommendation of approval for the administrative design review regarding replacement of the four windows on the west wall due to their lack of significance, but the subcommittee members directed the matter of the building's historic windows to the full Landmark Preservation Commission for a design review hearing. In referring the matter to the full Commission, the subcommittee members noted that the prior work on the windows had resulted in operability issues and each had concerns about the suitability of the rehabilitation approach that the Applicant's contractor had used and

the fact that the work had been performed without prior review and approval. They also noted that the historic windows could be further adjusted to improve operability and performance. At the request of the Commission to provide independent analysis of these comments, staff ordered a third-party analysis of the current condition and repairability of the historic windows from Barlow Cultural Resource Consulting, LLC, using Design Assistance Program funds. That report was dated November 29, 2018, and is an attachment. *Note: This study indicated that the removal of the weight-and-pulley system that was done without approval had damaged them, specifically cutting a groove on the vertical sides of each window sash (the stiles) to house a new spiral balance system, making weatherstripping impossible. It was also indicated that a groove was cut in each sash to install a second pane of glass. Ultimately, the finding of this report was that the window sashes could be brought back into function with a full restoration program.*

- On February 6, 2020, the CDNS Director classified the modification that had been done to the windows as “normal maintenance” (Municipal Code 14-56) and not subject to a CoA approval; noting that if “owners of the residential units want to replace the windows in the future, review by the Landmark Preservation Commission and a Certificate of Appropriateness will be required.”
- 2021 – Corner stone repair (from Linden Alley accidental damage)
- 2023 – Wood trim and storefront window repair on ground level

HISTORY OF FUNDED WORK/USE OF INCENTIVES:

Since 1978, the property has received significant public investment of approximately \$ (\$ in City and \$ in State) to preserve its historic features, including:

- 1994-1995 – Federal Historic Tax Credit
 - 20% of total rehabilitation costs;
- 1994-1995 – Multiple funding sources for comprehensive rehabilitation
 - State Historical Fund, \$100,000
 - Downtown Development Authority and City of Fort Collins Historic Preservation Fund, \$250,000
- 2011 – DDA Façade Restoration Program, \$68,555
 - column and stone base repair
- 2017 – Design Assistance Grant for rooftop modifications
- 2018 – Design Assistance Grant for window study (Barlow) – approx. \$1500
- 2024 – Design Assistance Grant for updated window study (Deep Roots Craftsmen) – \$3300

DESCRIPTION OF PROPOSED WORK:

The Applicant is seeking a Certificate of Appropriateness under Municipal Code 14, Article IV for the following items:

The Applicant is seeking replacement of the second and third story windows on the building. The Applicant provided details about dimensions and details of replacement product that would generally match dimensions with some minor modifications, but would be a wood-clad product rather than in-kind wood replacements.

REQUESTS FOR ADDITIONAL INFORMATION:

Upon review of the original application, staff asked the Applicant to provide more detail on the following items:

- At a meeting on November 9, 2023, the Applicant requested to revisit the question of window replacement based on an updated, independent assessment of their current condition. This assessment was intended to be filled by a new 3rd party contractor without prior involvement in the previous design review process (initiated in 2018). The Applicant ultimately chose to provide a brief overview from the contractor who worked on the windows in 2018 instead; therefore staff engaged a 3rd party contractor,

Deep Roots Craftsmen, using Design Assistance Program funds to perform the study following the *U.S. Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties*, including specific window guidance attached to this packet. The draft report was completed on August 6 (addenda followed August 7) and used to revise this report.

The following changes were made to the Applicant's proposed work since the last HPC meeting:

- Additions including rebuttal of staff's interpretations and the Deep Roots' report, as well as more specific details on the proposed replacement product.

ADDITIONAL MATERIAL ADDED TO THE RECORD AFTER JULY 17, 2024 PORTION OF HEARING

At the request of the Applicant, several new items were added to the record for the August 21 hearing to provide a complete accounting of the administrative process to date. These include:

- the Applicant's July 17, 2024 presentation
- photographs of the windows that the Applicant brought to Council Chambers at the July meeting
- previous HPC records related to a September 4, 2018 site visit, December 2018 hearing (full packet included), and June 2019 hearing (full original item packet included; this item was pulled from the LPC docket prior to the meeting date).

Staff has provided some commentary in the staff presentation related to the statements made by the Applicant on July 17, 2024. Those are elaborated upon here:

Regarding How SOI Standards and Guidelines apply to Window Replacement

Repair is typically the default requirement on most historic buildings subject to the federal preservation SOI Standards, since windows are so often a character-defining feature, and this includes not just their design, but their material, form, and function (i.e., 1-over-1, 3-over-1, etc., and single-hung, double-hung, casement, etc.). Preservation, repair, and rehabilitation of historic windows is the primary treatment approach on historic buildings because:

- In many cases, they are a character-defining feature of a building such as with the Linden Hotel, the subject of this case.
- Preservation/repair of historic building features conserves durable original building materials
 - Avoids landfill waste
 - Avoids environmental cost of new windows, which have an environmental cost to extract raw materials, process raw materials, warehouse the finished product, and transport the raw materials and finished product between stages of manufacturing and installation. This is often referred to as the "embodied energy" of any manufactured good. Avoiding the expenditure of new "embodied energy" has been noted as a critical need in reducing the environmental footprint of the construction industry. Additionally, the manufacture of modern window units usually requires hazardous chemicals in the product components, such as polyvinyl chloride (PVC), adhesives, solvents, formaldehyde (binder in composite window products), and phthalates. Certain window products may achieve third-party certifications to confirm they were made without these harmful chemicals.
- Usually, historic windows, especially wood windows, can be retrofitted for modern operability desires. It is important to note that in most cases, historic wood windows like this *had* full functionality as building systems for ventilation and daylighting, and lost that due to modifications over time (removal of weight and pulley systems, being painted or nailed/screwed shut, etc.). In most cases, simple repairs and retrofit solutions can reverse this damage or loss of functionality.
- Usually, historic windows, especially wood windows, can be retrofitted to meet modern energy performance requirements. Replacement is typically not necessary, and functional windows are often modified for current International Energy Conservation Code (IECC) standards by adding storm windows (exterior, interior, interior inserts, or piggy-back, depending on what is best for the situation), and ensuring good insulation around the window frame. It is most important to understand that windows do not account for the majority of a building's energy performance and potential heating/cooling loss,

typically on the order of 10% or less. Historic preservation specialists (federal, state, and local) and the federal guidelines always advise to complete an energy audit first, and fix documented energy loss points in a building instead of assuming the windows are the culprit (See NPS [Preservation Brief #3](#) on Energy Efficiency in Historic Buildings). This is standard practice across the nation, as well as in the City of Fort Collins, and City funding is available to offset the cost of this analysis. The emphasis on windows largely comes from an effective campaign from window replacement manufacturers, not documented evidence on the importance of window replacements to a building's energy performance.

- All building systems and materials, whether historic or replacement, require maintenance. As a result, care and attention to ongoing, periodic maintenance is often the best approach to reduce costs and ensure the preservation of character-defining materials and features of a particular building.

Replacement

Replacement of historic windows is usually only approved when repair is not possible due to deterioration, and relates directly to the application of Rehabilitation Standard 6 requiring repair first, replacement only if the original material or feature is too deteriorated, and typically requires replacement in-kind. The federal guidelines are more specific about how this standard is applied to windows:

- The guidelines outline a tiered approach in which more visible/character-defining windows receive more scrutiny and are highlighted for repair in more cases, or strict in-kind replacements. Less visible/character-defining windows often receive less attention, and can be replaced in more circumstances.
- The guidelines recommend a window-by-window assessment. This doesn't mean that each window must remain in its original location until it is too deteriorated to repair. It means that in general, historic material should be retained. A standard approach on larger buildings like this when some windows are beyond repair but others are in good condition is to consolidate historic windows (when matching in design and size) into a particular location, and install replacements in the remaining areas. For example, for a 3-story building like the Linden Hotel, in a case where roughly half the windows were beyond repair, the repairable windows could be concentrated on the second story, with replacements on the third story that has reduced visibility from the sidewalk, or historic windows could be concentrated on the Linden Street elevation that is arguably the "front" of the corner building, and replacements concentrated on the Walnut elevation. Both are typical approaches taken on rehabilitation projects in cases where some, but not all, historic windows can be repaired.
- Replacements typically need to be in-kind to meet Rehabilitation Standard 6 and its supporting guidance related to windows, and more specifically, the Old Town Design Standards that interpret those federal Standards for use in the Old Town Landmark District. There are some exceptions to this, specifically regarding dimensions and material, when:
 - Building or other safety code requirements apply, although International Existing Building Code includes variances for character-defining historic features (at the discretion of the chief building official for the regulating body).
 - Replacements are being made on a less-visible/character-defining elevation of the building. Side and rear elevations are often good candidates for concentrating replacement windows, if warranted.
 - If the historic material is no longer available. This happens less often with windows, but may occur with certain historic materials that are either hazardous or out of production, such as unique clay tile roofing, asbestos roof shingles or siding, etc.
 - In general, the SOI Standards and Guidelines call to avoid wholesale replacement if possible, as noted above.

Applicant's concerns raised on July 17, 2024:

- 2018 Barlow report and "flaws":
 - 2018 report did not consider private owner rights
 - Staff response:
 - This is not a task assigned to 3rd party contractors – the City hires them for their expertise in building materials to help inform the City's decision relative to code requirements to which all Landmark owners are subject.

- Staff has additional information responsive to this concern and the application of local and federal codes and standards should the HPC request elaboration.
- 2018 report did not give weight to City Climate Action or Sustainability goals
 - Staff response:
 - Again, these specific concerns are not the responsibility of 3rd party contractors but of City staff and appointed commissioners, although the federal SOI Standards do include consideration of sustainability and energy performance concerns.
 - City Council adopted the Our Climate Future plan in 2023 – this could not have been referenced in 2018 even if it were the responsibility of a 3rd party contractor, which it is not. The City has had climate action plans before 2023, but nothing as comprehensive with such a broad community focus.
 - Staff has additional information responsive to this concern should the HPC request elaboration.
- Existing windows have a “fundamental design flaw.”
 - Staff response:
 - The 2018 Barlow report, w/ 2019 addition, debunked this assumption, and staff has no reason to refute Mr. Barlow’s expertise based on the windows’ successful performance for approximately 140 years. Both Mr. Barlow’s 2018-2019 reports, and the August 2024 report from Deep Roots Craftsmen, indicate that the bulk of performance and safety concerns are a result of damage done to the window units by modifications completed in 2018 without approval.
- Significant deterioration warrants replacement
 - Staff response:
 - Based on the updated 2024 findings from Deep Roots Craftsmen, damage and deterioration warrants serious repair and reconstruction or partial or full replacement in-kind.
 - Staff has additional information responsive to this concern should the HPC request elaboration.
- SOI Standards themselves cannot “be used to make essential decisions about which features of the historic building should be saved and which can be changed...”
 - Staff response:
 - This ignores other guidance from the National Park Service on how to identify key features for which the SOI Standards can be used to make essential decisions. The federal SOI Standards and their guidelines call for identification and careful management of “character-defining features,” or those features essential to conveying the significance of the property. In many cases, windows are a character-defining feature – this is why the NPS offers such an extensive array of guidance to help inform decisions about window treatment.

PUBLIC COMMENTS SUMMARY

No public comment about this project has been received at this time. City staff has informed the Downtown Development Authority of this project, which holds a conservation easement on the property’s exterior.

STAFF EVALUATION OF APPLICABLE REVIEW CRITERIA:

Staff notes that Rehabilitation Standard 6, regarding repair before replacement, is of key concern when replacement of character-defining historic material is concerned.

Old Town Design Standards

The [Old Town Design Standards](#) (OTDS) have been adopted by the City of Fort Collins (via City Council) as the basis for exterior project review on buildings within the Old Town Landmark District, which includes the Linden Hotel at 201 Linden Street. These OTDS are not a substitute for the City’s adopted general standards, the *U.S.*

Secretary of the Interior's Standards for the Treatment of Historic Properties, but rather provide more specific guidance on what can be approved on historic buildings based on the district's and building's specific, defining historic features. Windows are covered on pages 50-54 of the OTDS.

Below is an analysis of the current application based on each of the window-related standards in the OTDS:

Relevant Standards in OTDS

3.8 – Maintain and Repair Historic Windows

- Preserve historic window features including the frame, sash, muntins, mullions, glazing, sills, heads, jambs, moldings, operation, and groupings.
- Repair and maintain windows regularly, including trim, glazing putty, and glass panes.
- Repair, rather than replace, frames and sashes.
- *Staff Analysis: The 2024 Deep Roots Craftsmen study notes that the window units are in a state of disrepair and either need extensive repair and reconstruction, or partial (bottom sash) or full replacement in-kind. and In this case, the HPC has several recommended options (Options B, C, or D in the window study in Attachment #2) that the consultant considers to meet these Standards. These options involve either the extensive repair of the bottom sashes along with other repair work, the replacement in-kind of the bottom sashes along with other repair work, or full replacement of the windows in-kind (i.e., wood), all coupled with the installation of operable storm windows. As a result, staff does not consider the Applicant's total replacement proposal to meet Standard 3.8 based on the information in the Aug. 2024 window study. Staff recommends approval of Option C outlined in the window study (repair and replacement in-kind of the bottom sashes) along with installation of wood storm windows to meet this Standard.*

3.9 – Replace a Historic Window with a Matching Design if Repair is not Possible

- Replace with the same material.
- Match the appearance of the historic window design (i.e., if the historic is double-hung, use a double-hung replacement window).
- Maintain the historic size, shape and number of panes.
- Match the profile of the sash, muntin, and its components to the historic window, including the depth of the sash, which may step back to the plane of the glass in several increments.
- Use clear window glazing that conveys the visual appearance of historic glazing (transparent low-e glass is preferred).
- Do not use vinyl and unfinished metals as window replacement materials.
- Do not use metallic or reflective window glazing.
- Do not reduce a historic opening to accommodate a smaller window or increase it to accommodate a larger window.
- *Staff Analysis: The 2024 Deep Roots Craftsmen study notes that the window units are in a state of disrepair and either need extensive repair and reconstruction, or partial (bottom sash) or full replacement in-kind. In this case, the HPC has several recommended options (Options B, C, or D in the window study in Attachment #2) that the consultant considers to meet the Standards. These options involve either the extensive repair of the bottom sashes along with other repair work, the replacement in-kind of the bottom sashes along with other repair work, or full replacement of the windows in-kind (i.e., wood), all coupled with the installation of operable storm windows. Since the study notes that replacement is a reasonable approach in this case, considering the damage done, and deterioration suffered, on the existing windows, an in-kind (i.e., wood) replacement would meet this Standard.*

3.10 – Use Special Care when Replacing a Window on a Primary Façade

- Give special attention to matching the historic design and materials of windows located on the façade.
- Also, match the historic design when replacing a window located on a secondary wall.

- *Staff Analysis: Based on the findings in the August 2024 window study, shop drawings would be necessary to confirm replacements would match the existing dimensions sufficiently to qualify as an in-kind replacement. It is important to note that in most cases, larger dimensions for replacements do meet the SOI Standards to allow for the use of dual-glazing for improved energy performance. The HPC may consider conditional approval of replacement subject to staff review of shop drawings/specifications upon application for a building permit for window replacement. However, since partial repair is also a recommended option, staff is not recommending approval of a complete replacement.*

3.14 – Enhance the Energy Efficiency of Historic Windows and Doors

- Make the best of historic windows: keep them in good repair and seal all the leaks.
- Maintain the glazing compound regularly. Remove old putty with care.
- Place a storm window internally to avoid the impact upon external appearance.
- Use storm windows designed to match the historic window frame if placed externally.

- *Staff Analysis: With energy performance being cited as a reason for replacement, staff would note that wood windows (sashes and frames) provide higher insulation, when kept in good repair, than most replacement products. With large panes such as these, energy efficiency improvement meeting current International Energy Conservation Code requirements, is possible but can be, and has often been, successfully achieved without wholesale replacement. More common treatments are interior or exterior storms, and ensuring good insulation around the window frame inside the wall. However, with the August 2024 window study considered, replacement with dual-glaze wood windows would likely meet this Standard. However, since partial repair is also a recommended option, staff is not recommending replacement.*

Call-out Box: Alternate Window Material (OTDS, p52)

- If it is not possible to match the historic design and materials of a window, then an alternative design may be considered in the following locations:
 - o On a non-primary façade, accessory building or addition
 - o On a primary façade if no other option is available
- Alternative window designs shall:
 - o Match the general profile and details of the historic window.
 - o Use materials that match the historic appearance in dimension, profile and finish.

- *Staff Analysis: From review on July 17, the proposed aluminum-clad wood windows would match the profile and dimensions, but not finish of the existing windows. While aluminum-clad wood windows are a common replacement type, the Old Town Design Standards lay out a more restrictive pathway for historic property management in the Old Town Landmark District, and in this case, there are other options available for either window repair/partial in-kind replacement on these windows. A substitute is not the only viable approach for this building, and therefore, the requirements in these Standards for use of substitute materials is not met.*

SOI Standards

Applicable Code Standard	Summary of Secretary of the Interior Standards Required under City Code 14-54 and Analysis	Standard Met (Y/N)
SOI #1	<p><i>A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships;</i></p> <p>The upper floors are currently residential units. Residential use for historic hotel space is generally a compatible new use.</p>	Y

<p>SOI #2</p>	<p><i>The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.</i></p> <p>As noted above, the windows on the Linden hotel, including the upper floor, 1-over-1 wood sash windows, are a character defining feature and must be retained or replaced in-kind to meet this standard. The proposed replacement product does not appear to meet this Standard because the existing windows can be repaired, at least in part, and wood windows are a defining characteristic of this property. Since the Old Town Design Standards are the City's interpretation of this Standard for this area of the city, this Standard is not met.</p> <p>Extensive repair, or in-kind replacement, was recommended by the August 2024 window study from Deep Roots Craftsmen. Based on this, either an in-kind wood replacement with modified dimensions for dual glazing (Option D), or the repairs cited in options B or C, could meet the SOI Standards. Staff is recommending the approval of Option C (repair of upper sash, replacement in-kind of lower sash), along with installation of wood storm windows.</p>	<p>N</p>
<p>SOI #3</p>	<p><i>Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.</i></p> <p>Based on the proposed work description, it does not appear that Standard 3 applies to this project.</p>	<p>N/A</p>
<p>SOI #4</p>	<p><i>Changes to a property that have acquired historic significance in their own right will be retained and preserved.</i></p> <p>The proposed scope, relating to window replacement, does not appear to be affecting any historic alterations to the property.</p>	<p>N/A</p>

<p>SOI #5</p>	<p><i>Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.</i></p> <p>As noted above, the one-over-one wood sash windows are a character-defining feature. The proposed clad replacement would not meet this Standard based on the evaluation completed in Aug. 2024 by Deep Roots Craftsmen. The wood craftsmanship, and its future repairability, is an important feature of this building and a metal-clad replacement would not sufficiently replicate that, from staff's observation. The August 2024 study concluded that the windows have deteriorated to a point where they require extensive repairs, or replacement in-kind. The replacement product proposed at the July hearing lacks specific dimensions and details, but as the Deep Roots report notes under discussion of Option E, replacement with a modern manufactured replacement window product does not preserve the distinctive historic integrity of the existing window design or the overall property. Since the Old Town Design Standards are the City's interpretation of this Standard for this area of the city, this Standard is not met.</p> <p>This standard would likely be met by one of options B, C, or D from the window study. The HPC may wish to conditionally approve in-kind replacements for Option C or D, subject to staff review of shop drawings submitted with a Building Permit application. Staff is recommending the approval of Option C (repair of upper sash, replacement in-kind of lower sash), along with installation of wood storm windows.</p>	<p>N</p>
<p>SOI #6</p>	<p><i>Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.</i></p> <p>The Aug. 2024 Window Study from Deep Roots Craftsmen indicates that the windows have deteriorated to a point where they require extensive repairs, or replacement in-kind. The Deep Roots study indicates that the preferred replacement option is to match the old in design, color, texture, and materials through an in-kind reproduction. Since the Old Town Design Standards are the City's interpretation of this Standard for this area of the city, this Standard is not met.</p> <p>This standard would likely be met by one of options B, C, or D from the window study. The HPC may wish to conditionally approve in-kind replacements subject to staff review of shop drawings submitted with a Building Permit application. Staff is recommending the approval of Option C (repair of upper sash, in-kind replacement in-kind of lower sash), along with installation of wood storm windows.</p>	<p>N</p>
<p>SOI #7</p>	<p><i>Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.</i></p> <p>It does not appear that chemical or physical treatments are proposed. In cases where wood windows are retained and repaired, gentle surface preparation (light sanding) and repainting with hydrating, breathable paint is recommended.</p>	<p>N/A</p>

<p>SOI #8</p>	<p><i>Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.</i></p> <p>No excavation is proposed as part of this project.</p>	<p>N/A</p>
<p>SOI #9</p>	<p><i>New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.</i></p> <p>As noted above, the one-over-one wood windows are a character-defining feature of this property. The Aug. 2024 Window Study from Deep Roots Craftsmen indicates that the windows have deteriorated to a point where they require extensive repairs, or replacement in-kind. The Applicant has provided specific dimensions and details on the proposed replacement product in comparison to the historic. The Deep Roots report indicates that Option E, replacement with a modern manufactured replacement window, does not support an appropriate treatment solution that maintains protects the historic integrity of the property compared to a replacement solution that is an in-kind reproduction of the existing window. Since the Old Town Design Standards are the City’s interpretation of this Standard for this area of the city, this Standard is not met.</p> <p>This standard would likely be met by one of options B, C, or D from the window study. The HPC may wish to conditionally approve replacements subject to staff review of shop drawings submitted with a Building Permit application. Staff is recommending the approval of Option C (repair of upper sash, replacement in-kind of lower sash), along with installation of wood storm windows.</p>	<p>N</p>
<p>SOI #10</p>	<p><i>New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.</i></p>	<p>N/A</p>

Additional Guidance used by Staff

Staff regularly uses available guidance from the National Park Service that helps interpret the SOI Standards, including guidance on sustainability the National Park Service provides (<https://www.nps.gov/crps/tps/sustainability-guidelines/windows.htm>).

Regarding window repair vs. replacement related to Rehab Standard 6 and documentation requirements, the following guidance is relevant (by staff’s judgement), with annotations regarding relevancy in this matter. Each has also been included as an attachment:

- NPS Preservation Brief #9, *The Repair of Historic Wooden Windows*, <https://www.nps.gov/orgs/1739/upload/preservation-brief-09-wood-windows.pdf>
 - o *Includes call for “...careful evaluation of existing physical conditions on a unit-by-unit basis.” This is the reason the City typically requires a window study (frequently funded in whole or in part by the Design Assistance Program), prior to approving replacement.*
 - o *Develops classification system for window condition:*
 - *Repair Class I: Routine Maintenance; often light sanding and repaint*
 - *Repair Class II: Stabilization; some decay in wood, treated with waterproofing and wood putty*
 - *Repair Class III: Splices and Parts Replacement; some replacement of rotted window parts, etc. involved.*
 - *Anything beyond Repair Class III would be a candidate for replacement.*

- NPS "Evaluating Historic Windows for Repair or Replacement,"
<https://www.nps.gov/subjects/taxincentives/windows-evaluating.htm>
 - o *This item lays out a requirement to document deterioration, and consider each window in context of how important it is to the historic character of the building (i.e., not every window is necessarily a character-defining feature, such as windows on a secondary elevation, etc.).*
- NPS "Documentation Requirements for Proposed Window Replacement,"
<https://www.nps.gov/subjects/taxincentives/windows-documentation-for-replacement.htm>
 - o *This item lays out a requirement of clearly photographing existing windows (to show condition), and providing drawings showing existing and proposed windows.*
- NPS "Replacement Windows that Meet the Standards,"
<https://nps.gov/subjects/taxincentives/windows-replacement-meet-standards.htm>
 - o *Includes guidance for measuring historic significance of windows in context, and notes on how close of a match a replacement needs to be depending on where it is located on a building and how important it is to the character of the building.*

HPC REQUESTS FOR INFORMATION FROM JULY 10, 2024 WORK SESSION

1. FOR STAFF: Does the City consider cost of repair vs. replacement?
 - o As the driver of what will be approved, the City does not consider economic hardship when considering compliance with most land use/municipal code requirements. City staff does provide information to Applicants about how to calculate cost comparisons of repair versus replacement, since that is a common concern for property owners. While a Waiver of Conditions for Landmark Design Review is possible, it is limited to cases in which there is exceptional physical hardship not of the Applicant's making, or cases in which the proposed work is a nominal and inconsequential deviation from standard compliance with Code requirements.
 - o Window repair and maintenance on original/historic wood sash windows has been proven over time to be more cost-effective, long-term, than replacement, due to long-term repairability, and cost of new window units, including with modest energy upgrades (storm windows, weatherstripping, caulking around the frame, etc.). Significant energy performance upgrades can be more expensive than replacement, but is also usually not necessary/not a good return on investment in the long run since heat/cooling loss through windows only accounts for roughly 15% of a building's potential energy loss, and is usually lost through or around the frame, not through the glazing (although that may be less true in this case since the windows are fairly large).
 - o Financial incentives are available at the local and state level to help offset any additional costs related to labor, custom materials, etc. The City offers 0% interest matching loans up to \$7,500 (on \$15,000 of project costs), and the State of Colorado offers a commercial 20-35%, transferable, state income tax credit on projects over \$20,000. In both cases, projects must meet the federal SOI Standards to qualify.
2. FOR STAFF: Is it typical to specify window treatments on an elevation plan or similar?
 - o Generally yes, although something as detailed as elevation drawings are usually not necessary; a clear plan (via a table, marked up photo, etc.) is usually sufficient, provided information on condition is clear and justifies the treatment proposed, for each window (i.e., Class I – Routine Maintenance, Class II – Stabilization, Class III – Splices and Parts Replacement, or full replacement)
3. FOR STAFF – Provide summary on how window treatments were handled on first floor during 1994-1995 rehab for comparison to current request (research needed)
 - o Upper floor windows were not modified in the same way the street level was, so a greater degree of reconstruction was needed in 1995; upper floor windows were serviced at that time to bring them into working order.

- Lower floor windows in the same configuration (1/1 wood sash) were a mix of in-place and repairable units, or missing units that required infill with new units. The missing 1/1 windows were replaced in-kind using the surviving windows as a template.
4. FOR STAFF and APPLICANT: Please address information on window quote from June in packet; Is this the proposed replacement? (on the assumption that the window quote included in the Applicant packet is the proposed replacement material, staff will provide some comments on appropriateness relative to the federal SOI Standards and Guidelines).
- Existing Windows: From previous documentation, the existing window sashes are generally of 38"x98" rough opening (according to 1994 rehab drawings), with window parts of 1.375" width/thickness for stiles and rails.
 - Assumed Replacement Proposal: In the Applicant's materials, they do refer to a new window unit, the Ultra Clad Sterling XL 1.75" Sash. This product is a double hung window, dual glazed with low-E glass, and pine wood materials clad in aluminum with a fluoropolymer finish (similar to Teflon). The window unit would fit a rough opening of 36.5"x95 9/16". Specific unit dimensions relative to existing historic windows appear to be close. As noted in the Applicant's window assessment, the existing windows have a 1 and 3/8 inch part width, while the proposed replacement uses 1.5" parts.
 - Staff Assessment: As noted by the Applicant, staff would agree that aluminum clad wood windows are in common use in the historic preservation community, and have been approved on projects across the country and in the region as a reasonably in-kind replacement for upper floor windows. This includes projects approved by the National Park Service for receiving the Federal Historic Tax Credit. From staff's experience, the aluminum-clad units have been approved by local, state, and/or federal historic preservation specialists for the following reasons:
 - Qualified Preservation specialists have first determined that none, or most of, the historic windows are not in a condition to be repaired so a wholesale replacement, or at least a wholesale replacement on a certain building level or elevation, is warranted; and
 - Replaced windows are on upper floors and/or on non-primary elevations away from close view by the public, and the design of the aluminum cladding replicates the historic closely, including any special design features such as beading (not applicable in the Linden Hotel case); and
 - The combination of metal cladding and wood cores combines the thermal performance of wood with the durability and weather performance of the aluminum. However, staff would note that moisture trapping under the aluminum cladding is a known issue with this replacement product. While less of a concern in a dry climate like northern Colorado, and in a multi-story masonry building like the Linden Hotel, it is possible that aluminum clad wood may deteriorate faster than a well-maintained all-wood or all-metal window. Considering the prominence of the building in question, and the roughly forty years of more conservative application of the SOI Standards within the Old Town Landmark District, wood replacements, potentially of a harder wood species than the original windows (due to loss of density with newer-growth lumber harvests), might be more advisable. Staff does not know the specific wood species in this case, but it is likely that it is pine or fir, since that is what was readily available for lumber harvesting in the region at the time of the building's construction.

Based on the current information including the August 2024 window study from Deep Roots Craftsmen, Staff concludes that the windows require either extensive repair and reconstruction, or replacement, due to damage and deterioration of critical system components. Based on the OTDS, and the precedent in the Old Town Landmark District since the beginning of restoration and rehabilitation work in the 1980s, staff could support the extensive repairs (Option B), partial bottom sash replacement (Option C), or in-kind replacement with wood units (Option D).

Staff recommends approval of Option C (repair of upper sash, replacement in-kind of lower sash), along with installation of wood storm windows.

Noting that the proposed replacement product is in common use in the U.S. preservation community, including projects approved as meeting the federal SOI Standards by the National Park Service, staff advises of the following qualifications on the proposed approach:

1. The property in question, 201 Linden Street, is within the Old Town Historic District, and the City Council-approved OTDS apply. As with most local jurisdictions, the City has interpreted and applied the federal SOI Standards in a way that best achieves local goals related to historic preservation, such as promoting tourism, adaptive reuse, and celebration of history. The SOI Standards do not provide much room for interpretation on window replacement on street-facing (i.e., highly visible) elevations. These windows are on prominent, street-facing elevations and based on the OTDS, should be repaired or replaced in-kind.
2. The property in question, 201 Linden Street, is the centerpiece of the Landmark District, and a highly significant resource within the historic district.
3. Staff does not feel the requirements for a Waiver of Conditions has been met.

Analysis below:

- a. Hardship not of the Applicant's own making – In this case, it is apparent from two separate qualified professionals that the Applicant (via their contractor) did create this hardship and cause damage to the windows, requiring extensive repair.
 - b. Nominal and Inconsequential – As noted above, the OTDS have been in place in their current form since 2014 and generally prohibit alternative materials on prominent street elevations. The City developed the OTDS in cooperation with many stakeholders, including this commission, the City Council, the Planning and Zoning Commission, and the Downtown Development Authority, and they represent a community-based expectation for how this district will be managed. Furthermore, the roughly forty years of preservation work in the historic district has prioritized more faithful restoration of pre-1940 buildings with pre-1940 materials. Changing forty years of policy, setting aside the Old Town Design Standard requirements, all of which would occur on one of the most prominent historic buildings in the city, is not nominal or inconsequential and would represent a significant shift in standards, policy, and practice within the city.
5. FOR APPLICANT: Any more specific information on proposed replacements (dimensions in comparison to historic, material, etc.) and why those are being selected would be appreciated.
 6. FOR APPLICANT: What do residential units sell for?
 - Staff would caution the HPC against using any information about unit cost/list price in decision-making; even if a request for a Waiver of Conditions is made, MC 14-5 restricts how staff/the HPC can issue those to:
 - “exceptional physical conditions or other extraordinary and exceptional situations...not caused by the act or omission of the Applicant”; and/or
 - “will not diverge from the [Chapter 14] except in nominal and inconsequential ways...”
 7. GENERAL DISCUSSION: Consideration of, if the HPC determines there insufficient information and decides to continue the item, what the procedure is for that. Response: The HPC did continue the hearing on this item to the current August 21 meeting.

HPC REQUESTS FOR INFORMATION FROM AUGUST 14, 2024 WORK SESSION

At the Work Session, the HPC requested additional information be added to the packet on these topics:

1. More specific environmental trade-offs data between repair vs. replacement
 - a. Staff noted at the meeting, this information will still be generalized, not property-specific. Much of the information below is taken from the 2012 National Trust for Historic Preservation report, *Saving Windows, Saving Money*: https://cdn.savingplaces.org/2023/05/18/16/12/26/783/120919_NTHP_windows-analysis_v3lowres.pdf as well as NPS Brief 3, *Improving Energy Efficiency in Historic Buildings*, <https://www.nps.gov/orgs/1739/upload/preservation-brief-03-energy-efficiency.pdf>. However, staff would note that this remains an understudied component of LEED/
 - b. Various studies have attempted to quantify the “embodied energy” of various building materials, including in relation to the conservation/preservation of older buildings, measured in Btu’s (British thermal units, or the amount of energy needed to heat a pound of water by 1 degree Fahrenheit).
 - i. One of the more recent estimates from Keith Haberarn, (engineer engaged by the Collingswood Historic District Commission in New Jersey) puts the average embodied energy of a new manufactured window at about 2.3 million Btu’s, and this only accounted for the manufacturing, not extraction of raw materials, packaging, contractor resources, and all of the transportation in between steps. In most cases, this means it takes about 4 years of energy savings to make up for the environmental cost of manufacturing the window, again not accounting for related costs and ignoring the fact that historic windows in good repair already provide most, though not all, of the energy performance of a new window.¹
 - c. The Advisory Council for Historic Preservation completed a study on embodied energy in historic buildings in 1979 which attempted to quantify the energy values behind typical historic building components. Available here: https://www.achp.gov/sites/default/files/documents/2023-04/1979%20-%20Energy%20Conserv%20and%20Hist%20Pres_0.pdf
 - i. That study estimates the cost of new windows at 9000 Btu’s per board foot of lumber, and 15,000 Btu’s per square foot of glass. That study also made estimates for the per-square-foot MBtu’s of embodied energy for new construction of certain building types (i.e., the cost of actually assembling the materials), putting hotels/motels at 250 MBtu’s per square foot.
2. Specify, from the recommendations in the Deep Roots report, which windows would receive what treatment (via a matrix)
 - a. *Upon review, staff confirmed that the proposed Option C for which staff is recommending approval, based on Deep Roots’ recommendation found on report pp19-21, would apply to all windows.*
3. Request to specify the mechanics of the Deep Roots-recommended installation of combined storm and screen window units
 - a. *Please see PDF page 111 of the Deep Roots report. Wood screens would have an interior-faced aluminum insert on the lower sash that is affixed with rotating stays so that the screen vs. storm insert can be easily replaced depending on the season (presumably storm for cold weather, and screen for warm weather).*

¹ Noelle Lord, “Embracing Energy Efficiency,” *Old House Journal*, (Sept./Oct. 2007): p43, accessed online via the Washington State Historic Preservation Office, https://dahp.wa.gov/sites/default/files/Embracing_Energy_Efficiency.pdf, accessed August 16, 2024.

INDEPENDENT EVALUATION SUMMARY

Staff sought an independent opinion from a qualified historic window repair specialist, Deep Roots Craftsmen. That evaluation is Attachment #2 to this report. In general, the report concluded that the existing historic windows are not beyond repair, but do need extensive repair and modification to achieve all necessary goals. The report includes top recommendations for the installation of exterior storm windows, and either the partial in-kind replacement (of the bottom sashes) with a wood reproduction solution or full replacement in-kind of the existing windows with a wood reproduction solution.

STAFF FINDINGS OF FACT:

In evaluating the request for the 201 Linden Street window replacement, staff makes the following findings of fact:

- The property at 201 Linden Street, known as the Linden Hotel, is a City Landmark, designated individually in 1974 and included in the Old Town Landmark District in 1979.
- Exterior alterations to the Linden Hotel are subject to Preservation approval under the City's Municipal Code, Chapter 14, Article IV, and the OTDS, adopted by City Council on July 15, 2014 (replacing the 1981 Standards for the same).
- All current reports, from the applicant and the third-party Deep Roots Craftsmen report, conclude that the window sashes are compromised and significant intervention, including potentially replacement, are warranted. The primary disagreement between the third-party report (that staff has relied on) and the applicant is in how to address the condition.
- The report provided by Deep Roots Craftsmen meets the professional criteria and scope of work requirements necessary for all landmark design review applications that involve extensive proposed work on existing windows (either repair or replacement), thus providing the level of detailed analysis and full range of options necessary to prioritize the historic integrity of the property per the requirements of Chapter 14 of the municipal code.
- Staff finds that Options B, C, or D would meet the Chapter 14 code requirements as solutions for the existing window condition that needs to be addressed, and Options B, C, and D also address the other important concerns (safety, operability, energy efficiency) relevant to this request. Additionally, staff concurs that the addition of Option F (addition of exterior wood storms) as recommended by the Deep Roots Craftsmen expert analysis would make the window system higher performing than many of the dual pane replacement windows on the market today, without deterioration of that performance over time due to weakening seals between the dual panes.

STAFF RECOMMENDATION:

Staff recommends the approval of the consultant's (Deep Roots Craftsmen's) recommendation summarized on pages 19-21 of their report. This specifically includes the approval of their proposed Option C (repair of upper sash, replacement in-kind of lower sash), along with installation of wood storm windows (Option F).

While it is not staff's top recommendation, a full replacement of the upper story windows mostly in-kind (Option D) could also be supported by staff, provided the replacement windows were in-kind (i.e., wood), with allowances in dimensions made to adequately support a dual glaze system.

SAMPLE MOTIONS

Sample Motion For Final Review Approval: I move that the Historic Preservation Commission approve the plans and specifications for the window amelioration on the second and third floors of the Linden Hotel at 201 Linden Street as described in [Applicant's proposal; Deep Woods Craftsmen Option A, B, or C; or other _____], finding that the proposed work meets the *U.S. Secretary of the Interior's Standards for Rehabilitation* based on the information in the staff report and attachments and the presentations and information received during the July and this continued hearing.

Sample Motion For Final Review Approval W/ Conditions: I move that the Historic Preservation Commission approve the plans and specifications for the window amelioration on the second and third floors of the Linden Hotel at 201 Linden Street as described in [Applicant's proposal; Deep Woods Craftsmen Option A, B, or C; or other _____], subject to the following conditions:

- [list conditions]

finding that the proposed work, subject to these conditions, meets the meets the *U.S. Secretary of the Interior's Standards for Rehabilitation* based on the information in the staff report and attachments and the presentations and information received during this hearing.

Sample Motion For Final Review Denial: I move that the Historic Preservation Commission deny the request for approval of the plans and specifications for the window replacement on the second and third floors of the Linden Hotel at 201 Linden Street as presented, finding that the proposed work does not meet the *U.S. Secretary of the Interior's Standards for Rehabilitation* based on the information in the staff report and attachments and the presentations and information received during this hearing

Sample Motion For Continuance: I move that the Historic Preservation Commission continue this item to the next meeting scheduled September 18, 2024 in order to seek additional information regarding whether the proposed work meets the *U.S. Secretary of the Interior's Standards for Rehabilitation*.

ATTACHMENTS:

1. Application for Design Review (including all attachments)
2. Deep Roots Craftsmen window study, dated August 6, 2024
3. Applicant's additions to packet 8-17-2024
4. Ordinance 1974-44 and subsequent, designating the Linden Hotel as a City Landmark
5. Excerpt from the Old Town Design Standards (pages 50-53)
6. *U.S. Secretary of the Interior's Standards for Rehabilitation*
7. 2018 Barlow Window Study
8. National Park Service Preservation Brief #9, *The Repair of Historic Wooden Windows*, <https://www.nps.gov/orgs/1739/upload/preservation-brief-09-wood-windows.pdf>
9. National Park Service "Evaluating Historic Windows for Repair or Replacement," <https://www.nps.gov/subjects/taxincentives/windows-evaluating.htm>
10. National Park Service "Documentation Requirements for Proposed Window Replacement," <https://www.nps.gov/subjects/taxincentives/windows-documentation-for-replacement.htm>
11. National Park Service "Replacement Windows that Meet the Standards," <https://nps.gov/subjects/taxincentives/windows-replacement-meet-standards.htm>
12. Nov. 11, 2023 "Next Steps" memorandum to Applicant from City Attorney
13. Photos of proposed replacement product (from July 17, 2024 HPC meeting)
14. Applicant presentation from July 17, 2024 HPC meeting
15. Sept. 4, 2018 Design Review Subcommittee Site Visit notes and photos
16. Dec. 19, 2018 LPC packet, window replacement for 201 Linden (denied)
17. June 19, 2019 LPC packet, window modification approval (pulled from LPC docket)

Design Review Application Historic Preservation Division

Fill this form out for all applications regarding designated historic buildings within the city limits of the City of Fort Collins. Review is required for these properties under Chapter 14, [Article IV](#) of the Fort Collins Municipal Code.

Applicant Information

Linden Street Treehouse, LLC vy OneSeven Advisors, LLC	970.420.8897	
Applicant's Name	Daytime Phone	Evening Phone
148 Remington Street, Ste 100, Fort Collins, CO 80524		CO 80524
Mailing Address (for receiving application-related correspondence)	State	Zip Code
david@onesevenadvisors.com		
Email		

Property Information (put N/A if owner is applicant)

201 Linden Avenue, Fort Collins, CO 80524		
Owner's Name	Daytime Phone	Evening Phone
201 Linden Avenue, Fort Collins, CO 80524		
Mailing Address (for receiving application-related correspondence)	State	Zip Code
Email		

Project Description

Provide an overview of your project. Summarize work elements, schedule of completion, and other information as necessary to explain your project.

201 Linden Avenue is a Fort Collins designated landmark property. The Owners request permission to replace the buildings windows which are one-hundred and forty-two years old, and have begun to fail, sending glass planes crashing to the sidewalk below. The Owners have taken great care to hire an expert who has authored a report (the Wernimont Report) who will replace the windows with materials and in a manner so that the replacements appear virtually identical to the original windows. Please see more details in the attached letter and report.

The following attachments are REQUIRED:

- Complete Application for Design Review
- Detailed Scope of Work (and project plans, if available)
- Color photos of existing conditions

Reminders:

Complete application would need all of checklist items as well as both pages of this document.

Detailed scope of work should include measurements of existing and proposed.

Please note: if the proposal includes partial or full demolition of an existing building or structure, a separate demolition application may need to be approved.

Additional documentation may be required to adequately depict the project, such as plans, elevations, window study, or mortar analysis. If there is insufficient documentation on the property, the applicant may be required to submit an intensive-level survey form (at the applicant's expense).

Detail of Proposed Rehabilitation Work (*Required)

If your project includes multiple features (e.g. roof repair and foundation repair), you must describe each feature separately and provide photographs and other information on each feature.

Feature A Name:	
Describe property feature and its condition: Please see attached Wernimont Report	Describe proposed work on feature: Please see attached Wernimont Report.
Feature B Name:	
Describe property feature and its condition:	Describe proposed work on feature:

Use Additional Worksheets as needed.

Required Additional information

The following items must be submitted with this completed application. Digital submittals preferred for photographs, and for other items where possible.

- At least one current photo for each side of the house. Photo files or prints shall be named/labeled with applicant name and elevation. For example, smitheast.jpg, smithwest.jpg, etc. If submitted as prints, photos shall be labeled
- Photos for each feature as described in the section "Detail of Proposed Rehabilitation Work." Photo files or prints shall be named or labeled with applicant name and feature letter. For example, smitha1.jpg, smitha2.jpg, smithb.jpg, smithc.jpg, etc.

Depending on the nature of the project, one or more of the following items shall be submitted. Your contractor should provide these items to you for attachment to this application.

- Drawing with dimensions.
- Product specification sheet(s).
- Description of materials included in the proposed work.
- Color sample(s) or chip(s) of all proposed paint colors.

Partial or full demolition is a part of this project.

Partial demolition could include scopes such as taking off existing rear porches to create space for a new addition or removing an existing wall or demolishing a roof. If you are taking away pieces of the existing residence, you are likely undergoing some partial demolition.

David Diehl

boxSIGN 4P7N87X1-4V78V1D1

Signature of Owner

Jun 24, 2024

Date



June 24, 2024

Claire N. Havelda
Attorney at Law
303.223.1194 direct
chavelda@bhfs.com

SENT VIA EMAIL

201 LINDEN AVENUE: WINDOW REPLACEMENT

Ms. Maren Bzdek
Historic Preservation Manager
City of Fort Collins
281 N. College Avenue
Fort Collins, CO 80524
mbzdek@fcgov.com

Ms. Heather N. Jarvis
Assistant City Attorney
City of Fort Collins
300 Laporte Avenue
PO Box 580
Fort Collins, CO 80522
hjarvis@fcgov.com

Dear Ms. Bzdek & Ms. Jarvis:

I am contacting you on behalf of my Client, the owner of the Linden Hotel located at 201 Linden Avenue, Fort Collins, Colorado 80524 ("Linden Hotel Owners" or "Owners") to request approval of their proposed window replacement plan and the issuance of a Certificate of Appropriateness. As one of the windows has now failed and a portion fell from the second story to the sidewalk below, the Owners seek this review of their proposed window replacement strategy.

Given the long and complex history of this project, the purpose of this letter is to: 1) provide a clear background of the window replacement request to date; 2) more fully respond to the City's November 27, 2023 "Legal Memorandum," which contained several factual errors; and 3) supplement the Owner's application request to replace the windows of the building in conformance with the Secretary of Interior's Standards as further described in the attached Colorado Sash and Door, Inc.'s ("Wernimont Report") expert report.

Bottom Line: The recommendations of the Barlow Report were not sufficient to overcome the fundamental flaws in the windows' original design that the size of the components are too small and thus, never appropriate for the size of the window openings.¹ As such, window failure, inferior

¹ Wernimont Expert Report p. 6.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 2

weatherization and energy performance, inoperability and unsustainably expensive maintenance issues have now resulted. At this time, the only solution that meets the goals of safety, operability, energy performance, preservation of historic aesthetics and manageable maintenance costs is replacement with products discussed in the Wernimont Report attached hereto. The replacement product is designed to be virtually visually identical to the original windows, and have the added benefit of safety, operability, robust thermal performance, energy efficiency and sustainable maintenance costs. The proposed changes result in only a one-half inch (or less) difference in the checkrail as the only visible change from the original windows; a modification that would be visually undetectable on second and third story windows.

1. Background.

The Owners of the Linden Hotel have been in conversation with the City of Fort Collins (the “City”) for many years seeking to appropriately replace what are windows that do not appropriately function and do not provide the level of safe operability and weatherization performance their residence needs. To date, they have not been able to resolve the matter with the City.

On October 21, 2023, part of a second story window dislodged from the second-floor window of the Linden Hotel and crashed to the sidewalk below. The Poudre Fire Authority was called to respond and aid in securing the windows as they now constituted a safety hazard for all foot traffic below.² The City was also immediately contacted to attempt to reach a resolution.

A meeting was held with the City’s Historic Preservation Staff (“HPC Staff”) on November 9, 2023, to attempt to determine a path forward to replace the windows as soon as possible.

HPC Staff toured the building in late 2023. HPC Staff provided the name of a number of contractors for Owners to contact. After months of attempting contact, those who returned Owner’s contact advised that they could not timely inspect the windows or provide a report including considerations of safety, operability, and acceptable performance for the windows.

2. Historical Context.

The Linden Hotel was established in 1882. The majority of windows in the Linden Hotel are believed to be original, and thus, over one-hundred and forty-two years old (142). These windows have not functioned in an acceptable manner since at least 2005 (or almost 20 years). It bears mentioning, that prior to its Landmark designation, the Linden Hotel was in a state of complete and utter disrepair. Tens of thousands of dollars in combined private money has been spent by the owners to rehabilitate

² See Poudre Fire Authority Incident Report October 21, 2023.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 3

the building. Rehabilitating the building was such a monumental feat that the then owners of the building were awarded the City's "Friend of Preservation" Award for "courageous effort" to restore it.

The Linden Hotel was in such disrepair that in 1994, four of the Linden Hotel windows were replaced when the west wall collapsed during the rehabilitation project.³ In 2005, (19 years ago) a window assessment was completed in 2005 which documented the inoperability of the windows and noted that repairs such as adding inner glass storm windows would make all windows inoperable. That same year, the former building owners proposed replacing some of the then one-hundred- and twenty-three-year-old (123) windows. However, this was never approved by the City.

In 2018, the Linden Hotel was remodeled to change from office use to residential use, on the second and third floors. During that approval process, the current Owners informed the City that they intended to clean and re-glaze the windows.⁴ In August of 2018, Mr. Wernimont of Colorado Sash and Door, Inc. (the Owner's Window Expert), contacted the then director of the City's Historic Preservation Department (the "Director"). In his August 22, 2018, email correspondence to the Director, he notes multiple areas in which he had concerns regarding the design of the windows and the ability of the balance system to accommodate their weight.⁵ He also specifically requests time to meet with the City to discuss these matters. In September of 2018, the Landmark Preservation Commission's Design Review Subcommittee provided a recommendation of approval for the administrative design review regarding replacement of the four windows on the west wall "due to their lack of significance."⁶

In November of 2018, City Staff ordered a historic windows report from Barlow Cultural Resources Consulting, LLC (the "Barlow Report"). However, the entire focus of this report was focused on restoring the appearance of the windows, not on the combined objectives of safety, performance, sustainability and operability of the windows.

The closest the Barlow Report comes to addressing functionality and safety of the windows is to say:

The existing windows do not perform up to the energy efficiency or noise reduction standards desired. The fact that historic windows do not meet modern standards is not a valid argument for replacement. There are acceptable treatments that can be applied to meet the desired goals while still adhering to historic preservation guidelines.⁷

³ See December 2018 Staff Report, Items 3. P.3.

⁴ See December 2018 Staff Report, Item 3 p.3

⁵ See Email Correspondence from M. Wernimont to Karen McWilliams, August 22, 2018.

⁶ See December 2018 Staff Report, Items 3. P.3.

⁷ *Barlow Report*, p. 21.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 4

However, the solution proposed is to add storm windows on the inside of the building. Nowhere in that Barlow Report is the issue of operability of the windows, sustainability or the safety ramifications such inoperability satisfactorily addressed.

The Owners expressed grave concerns and objected that the Barlow Report was inaccurate and did not address their very real safety, operability and performance issues. The Owner's expert's opinion that its proposed plan to replace the windows met the Standards for Rehabilitation in 36 Code of Federal Register Section 68.3 because the "existing window frames and sills are severely deteriorated," was rejected. Instead, City Staff recommended denial of the request to replace the Linden Hotel windows, citing the Barlow Report.

3. Correcting the Facts: "Onset" of Window Failure Disputed.

On November 27, 2023, Assistant City Attorney Heather Jarvis issued a legal memorandum ("Legal Memorandum") that contained a number of factual errors and accusations of misconduct on the part of the Owners. The City's Legal Memorandum's claim that the "third-party professional historic window expert the City hired in the autumn of 2018's" observation of the deteriorated condition attributing the "the onset" of the deterioration to repair work done in early 2018, which wholly ignores the fact that the windows were then 136 years old and had not functioned appropriately for at least 20 years prior.

Next, the damage and destabilization to the 142-year-old windows the Legal Memorandum references was not the result of work performed in the Spring of 2018. This is an erroneous statement that essentially makes a legal conclusion as to a violation of City Code Section 14-51 without the due process protections of a full hearing on the matter as required by the Fort Collins' Municipal Code ("Code"). It also disregards the fact that the windows were then 136 years old. In all fairness, there was 136 years' worth of weather damage done and design inefficiencies in place before the current maintenance efforts ever began. To discount this is wildly inappropriate, and any "expert opinion" that says otherwise stretches the bounds of common sense.

The Barlow Report states vaguely that it reviewed the 2018 corrective measures and "suggested corrective measures that would meet the standards while also meeting the stated goals of easier operation with improved energy efficiency."⁸ But it does not address the heart of the matter, that the windows do not operate at a level of safety, operability and performance appropriate for a residential dwelling.

⁸ July 11, 2019, *Letter from Phillip Barlow to City of Fort Collins*, pg. 1.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 5

3.a. Reliance on the Outdated 2018 Barlow Report.

The Legal Memorandum's claim that the Linden Hotel Owners' failure to follow the recommendations of the 2018 Barlow Report somehow caused the 2023 window failures (where a portion of the second floor window fell to the sidewalk below) misrepresents the facts.

The 2018 Barlow Report states that its entire evaluation consisted for "deconstructing one window to determine the scope of the previous repairs and alterations, and examining all windows visually to determine if conditions were consistent around the building."⁹ The Barlow Report further misidentifies the goals of the repairs as being to "meet the goals of energy efficiency and sound reduction,"¹⁰ while completely ignoring goals of operability, sustainability and safety. The Barlow Report then goes on to state that its recommendations are meant to further to Secretary of the Interior's Goals for Rehabilitation.¹¹ Yet, in many instances, the Barlow Report found that the Secretary of Interior Standards were not met because the proposed window rehabilitation measures did not "address retention of historic materials." What is concerning about this statement is that the "historic materials" that fail to function acceptably are largely located on the interior of the building and replacement of both interior and exterior "historic materials" would have no impact on the appearance of the windows from the outside. The Barlow Report also fails to address the fact that the design of the windows was fundamentally flawed from the beginning.¹²

Subsequently, Mr. Barlow was asked to review mitigation work completed after the 2018 Hearing. Again, the focus of the 2019 Barlow Review of the 2018 work was never to address safety, operability, sustainability and performance issues. Rather, it focused its commentary on prior work completed on the windows and how that work impacted the interior aesthetics of the windows and removing glass panes that were used to improve insulation.

Since the time of the 2018 Barlow Report, six additional years of heavy snow, moisture, extreme cold and a global pandemic (making maintenance extremely difficult) have occurred. Further, additional window restoration was completed in October of 2018 and September of 2019.

⁹ *Barlow Report*, dated November 29, 2018, Summary of Findings. (No page numbers identified – Agenda Packet Item 3 Attachment 13 p. 132).

¹⁰ *Id.* and page. 152.

¹¹ *Id.*

¹² *Barlow Report*, at packet pg. 137-140

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 6

3.b. City's Mischaracterization of the 2019 Certificate of Appropriateness Procedures and Review.

The Legal Memorandum then leaps ahead to February of 2020 wherein it claims a Certificate of Appropriateness for window repair was issued by the City based on recommendations of the 2018 Barlow Report.

In reality, the Linden Hotel Owners had been in ongoing communication with the City regarding requested repairs to/replacement of the windows since 2018. There appears to be some confusion as to whether the general contractor (Dohn Construction) obtained appropriate permissions from the Landmark Preservation Department before engaging Colorado Sash and Door to complete window restoration work in October of 2018. However, in May of 2019, the former Historic Preservation Manager, Ms. Karen McWilliams, was contacted in an effort to get approval for "sample window" work to be performed which needed the Landmark Preservation Commission's approval as a condition precedent to receipt of a Certificate of Occupancy. In July of 2019 she was contacted again.¹³

Ms. McWilliams notified the Owners that the request would need to be approved by the Landmark Preservation Commission (the "LPC") at their next meeting in June. However, Ms. McWilliams never scheduled the matter for June of 2019 and the meeting was cancelled for lack of quorum. In his follow-up email to her to check on the status of approval on July 2, 2019, Mark Wernimont (Owner's Window Expert) resent the proposed scope of work outlined for the windows based on feedback from the City and its experts. In her email apologizing for the confusion Ms. McWilliams stated that "it appeared that the work likely meets the Standards and is straightforward enough that it could be revised at the staff level, rather than at an LPC meeting. I'll be able to confirm this later this week."¹⁴

On July 12, 2019, Ms. McWilliams completed the review and approves the work via email.¹⁵ For its part, the Barlow group, upon review of this work stated, "Following its review, BCRC ("Barlow") believes that all the scope items either comply with the Secretary of Interior's Standards or had previously been recommended as a reasonable compromise."¹⁶

On July 15, 2019, the HPM issues a Certificate of Appropriateness ("COA") for "Approval of Plans dated July 1, 2019, to Restore and Rehabilitate 2nd and 3rd Floor Historic Windows, Linden Hotel, 201 Linden Street" and Issuance of a Certificate of Appropriateness. The entirety of the COA is quoted

¹³ Letter from Mark Wernimont to Karen McWilliams dated 7/1/2019.

¹⁴ 7/10/2019 email from Karen McWilliams to Mark Wernimont.

¹⁵ 7/12/2019 email from K. McWilliams.

¹⁶ 7/12/2019 Staff Report re: 201 Linden Street, Linden Hotel Windows – Design Review.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 7

below. Nowhere, does it reference the COA as being conditioned upon further modifications outlined in the Barlow Report. Rather, it states in its entirety:

Dear Mr. Wernimont,

This Certificate of Appropriateness provides you with confirmation that the proposed work to restore and rehabilitate the 2nd and 3rd floor historic windows in the Linden Hotel, 201 Linden Street, has been reviewed and approved by the City's Historic Preservation Division staff. Staff finds that the proposed work meets the criteria and standards in Chapter 14, Article IV of the Fort Collins Municipal Code, including the Secretary of the Interior's Standards for Rehabilitation and the Old Town Historic District Design Standards.

Please note that all ensuring work must conform to the approved plans. Any non-conforming alterations or changes to the plans are subject to stop-work orders, denial of Certificate of Occupancy, and restoration requirements and penalties.

If the approved work is not completed prior to the expiration date noted above, you may apply for an extension by contacting staff at least 30 days prior to the expiration. Extensions may be granted for up to 12 additional months, based on a satisfactory staff review of the extension request.

If you have any questions regarding this approval, or if I may be of any assistance, please do not hesitate to contact me. I may be reached at kmcwilliams@fcgov.com or 970-224-6078.

Sincerely,

Karen McWilliams

Historic Preservation Division Manager

Subsequently, the Owners engaged in rehabilitation and maintenance work to ensure the windows safety. In an abundance of caution, the City and the Owner's representative met to discuss the repairs that were undertaken.

The former Community and Neighborhood Services Director for the City of Fort Collins, Mr. Tom Leeson, clarified to the manager of 201 Linden Street that a Certificate of Appropriateness **was not required** for the repair work the Owners had engaged in. His exact words were:

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 8

I interpret this to mean that if you are not proposing to “replace” the windows, that a Certificate of Appropriateness is not required. Therefore, a Certificate of Appropriateness is not required, and you may proceed with the alterations to the windows as proposed.¹⁷

Thus, for the City to insinuate that the Owners failed to comply with minimum maintenance requirements and thereby violated City Code section 14-7 and 14-51(d) is inaccurate and unnecessarily hostile.

3.c. Early 2020 to Early 2023.

It is worth pointing out that from early 2020 until early 2023, the City of Fort Collins, (along with the rest of society), was largely shutdown or had greatly reduced productivity due to the COVID-19 Pandemic. (It bears mentioning that the City itself had approximately thirty-percent staff turn-over during this time and development projects and historic reviews were backlogged for extensive periods.) Even if the Linden Hotel Owners had wanted to move forward with additional repair to the windows, it would have been virtually impossible to do so in that time frame.

3.d. Correcting the City’s Inaccurate Statements.

The City’s Legal Memorandum engages in an inaccurate recitation of the facts and blames the Linden Hotel Owners for the failure of the windows is inappropriate and prejudicial. To argue in the Legal Memorandum that there was “no change in circumstance” because the Linden Hotel Owners did not undertake action in exact conformance with an outdated 2018 Barlow Report is nonsensical. The Barlow Report never addressed the fundamental design flaw that has caused the majority of the resulting safety, operability, and performance issues the one-hundred and forty-two-year-old windows are now exhibiting. For the Legal Memorandum to take that claim a step further and argue that the Linden Hotel Owners failed to comply with the International Property Maintenance Code and use this as a pretense to deny their request to move forward with addressing very real safety, operability and performance claims in their building is a clear violation of the Linden Hotel Owners’ due process rights.

4. The Wernimont Expert Report: Moving Forward.

The Linden Hotel Owners received a list of proposed City experts to provide the City with guidance as to how the matter should best proceed with repair or replacement of the dangerous condition the

¹⁷ Email communication from Tom Leeson, Community Development and Neighborhood Services Director of February 26, 2020.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 9

current windows may present if not addressed. After months of attempting to reach these experts, none of these proposed experts could take on the project in a timely fashion and none would sufficiently consider the operability, performance and resident safety needs of the windows in their analysis. The Linden Hotel Owners and the residents of the building simply cannot wait any longer to have this matter resolved. Therefore, they reengaged Mark Wernimont to provide a study and assessment in the hopes of finally resolving this matter. The Owners attempted to have the matter heard in June, but the Historic Preservation Commissions schedule could not accommodate this hearing until July 2024.

Mr. Wernimont's expert report takes into account historical relevant Secretary of Interior Standards as well as operability, environmental and safety concerns, which the Barlow Report failed to do.

It is also important to note that the Secretary of the Interior Standards ("SOIS") put forth guidelines intended to promote responsible preservation practices. However, the SOIS website notes that its standards "cannot, in and of themselves, be used to make essential decisions about which features of the historic building should be saved and which can be changed. But, once a treatment is selected, the Standards and Guidelines provide a consistent philosophical approach to the work."¹⁸ Due to the fundamental design flaws of the windows and the very real safety, operability and performance risks they present, as outlined in the Wernimont Report, replacement of the Linden Hotel windows is the appropriate course of action.

5. Secretary of the Interior Standards.

According to the SOIS website, when replacement of portions of historic buildings is necessary, "replacement material must match the old . . . with the exception of hidden structural reinforcement."¹⁹ The Wernimont Report meets this objective by selecting materials and replacement that are visually indistinguishable from the originals. All told, the only visual change to the windows would be a one-half (or less) increase to the chair rail of the windows, which will be visually undetectable on these second and third story windows from the street below.

Even the SOIS "Restoration" standards and the Barlow Report acknowledge that "when the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and where possible, materials."²⁰ This is exactly what the Owners are attempting to achieve.

¹⁸ <https://www.nps.gov/orgs/1739/secretary-standards-treatment-historic-properties.htm>

¹⁹ <https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part1-preservation-rehabilitation.pdf>. Introduction P. 28.

²⁰ *Id.* and *Barlow Report*, at packet pg. 133. See Exhibit 1

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 10

With regards to window specific rehabilitation, the SOIS Treatment Guidelines²¹ provides that:

- “Replacing in kind an entire window that is too deteriorated to repair using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. If using the same kind of material is not feasible, then a compatible substitute material may be considered.”

Additionally, the SOIS recommends replacing all components of the glazing system if they have failed because of faulty design or materials that have deteriorated with new mater that will improve the window performance without noticeably changing the historic appearance.

Finally, where replacement is necessary for the entire window, the SOIS recommends using the physical evidence as a model to reproduce the feature. It acknowledges that if using the same kind of material is not feasible, then a compatible substitute material may be considered. The new work may be unobtrusively dated to guide future research and treatment.”²²

6. City Goals and Policies.

6.a. Historic Preservation.

The replacement windows meet the City’s stated Historic Preservation goals of building safety, environmental, sustainability, performance, operability and long-term sustainability of historic resources. The City’s stated policy declaration for the Historic Preservation Committee states:

(a) It is hereby declared as a matter of public policy that the protection, enhancement and perpetuation of sites, structures, objects and districts of historic, architectural, archeological, or geographic significance, located within the City, are a public necessity and are required in the interest of the prosperity, civic pride and general welfare of the people.

(b) It is the opinion of the City Council that the economic, cultural and aesthetic standing of this City cannot be maintained or enhanced by disregarding the historical, architectural, archeological and geographical heritage of the City and by ignoring the destruction or defacement of such cultural assets.²³

²¹ <https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part2-reconstruction-restoration.pdf>. See Exhibit 2.

²² *Id.* See Exhibit 3.

²³ Fort Collins Municipal Code Section 14-1.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 11

Fort Collins Municipal Code Section 14-2 outlines purpose of Historic Preservation governance as being to:

- stabilize or improve aesthetic and economic vitality and values of such sites, structures objects and districts;
- promote the use of important historical structures;
- promote the use of architectural sites and structures for the education, stimulation and welfare of the people of the City;
- promote and encourage continued private ownership and utilization of such sites, structures, objects or districts now so owned and used; and
- Promote economic, social and environmental sustainability through ongoing “use” of existing buildings.²⁴

Further, replacement of the windows has only a minimal exterior visual impact on the historic character of the building. A less than one-half inch deviation in the chair rail, not visible from the street in the second and third floor windows cannot be credibly claimed to negatively impact the historic architectural character of the building. The same can be said of replacement materials that are visually indistinguishable from original materials. The architectural style, arrangement and perceptible texture of the street facing materials in maintained. The replacement windows would in no way change or destroy the exterior characteristics of the building, but rather would serve to retain the visual integrity and prevent further exterior deterioration. The proposed work, as discussed above meets the SOIS for warranted replacement of historic materials.

Approving the replacement windows meets all of the listed Historic Preservation purposes. To require repair of windows with fundamentally flawed design undermines these policies and ignores other equally important City policies related to life/safety concern, sustainability, private property owner control and maintenance of property, and long-term preservation of historic buildings. A narrow interpretation of the SOIS regarding the priority of replacement of historic materials without consideration of the City’s (and property owners’) other equally important goals serves only to undermine the longevity of the City’s goal to “promote economic, social and environmental sustainability through use of historic buildings.”

Simply put, if the City refuses to view needed replacement work to landmarked properties in the appropriate context of serving multiple City and property owner goals, it will continue to

²⁴ Fort Collins Municipal Code Section 14-2

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 12

have a chilling effect on private property owners stepping forward to take on the colossal task of preserving these buildings.

6.b. Safety and Sustainability Goals.

It is critical to recognize that the Historic Preservation Goals do not exist in a vacuum and other, equally important City goals and policies must also be considered in making decisions that impact other City priorities. Specifically, safety and building code compliance, support of private property rights, and climate goals must be taken into account. Common sense building safety would prioritize residential buildings with operable and functioning windows. Requiring repair of the Linden Hotel windows over replacement does not account for this.

The International Code Council section 403.1 that provides guidance on the International Property Maintenance Standards requires that every Habitable Space has at least one operable window. The total operable area of the window in every room shall be equal to at least 45 percent of the minim glazed area.²⁵ When a private property owner wishes to provide operable windows in its residential buildings to support the buildings long-term utilization, this is a factor that the City should weigh heavily as a recognition of private property owner rights. The same can be said of factoring in the City and private property owners' sustainability goals.

Turning to larger scale sustainability goals, the City of Fort Collins Our Climate Future adopted policy documents recognize that “[a]cting on climate change is urgent and we recognize it will take our community actively working together to address the challenge. . . Our Climate Future expresses our unwavering commitment to mitigating climate change with a systematic approach that is centered in people and community priorities.”²⁶ One of the clearly stated objectives of the Climate Future policy document is to have “Efficient, Emissions Free Buildings.”²⁷ The City espouses similar goals in the creation of a Fort Collins “Our Climate Future Action Guide” of reducing home and business carbon emissions and improving energy efficiency.²⁸ The buildings in Fort Collins compromise over two-thirds of its carbon emissions to provide for heating, cooling, lighting etc.²⁹ Demanding strict adherence to the SOIS

²⁵ International Code Council’s International Property Maintenance Standards of the International Property Maintenance Code p. 4. The City has largely adopted the International Residential Building Codes, but only minor edits to the body of that document are available within the Code or on the City’s website. Thus, such regulations specifications are inaccessible to average residents.

²⁶ City of Fort Collins, Our Climate Future Plan p. 4.

²⁷ *Id.* at p. 25, 42-43.

²⁸ City of Fort Collins, Our Climate Action Guide p. 7

²⁹ Our Climate Future Plan p. 42.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 13

Rehabilitation over Replacement standards defeats these goals. The Owners support the City's commitment to these climate action goals and seek to further them through replacing windows at 201 Linden with those that have far superior energy efficiency but are visually virtually indistinguishable from the originals.

Additionally, the replacement windows meet the City's 2024 adopted International Building Codes:

- Item 1015.8 for Window Opening operability for windows 72" from exterior grade;
- Item 1609.3 Wind Loading. This standard established a required wind loading capability of 140 mph ultimate for sural performance of all exterior items;
- Item 3603.2 Sound Control. This requires the exterior wall assembly meet an STC 39 when within 1,000 feet of an active train line – which the Linden Hotel is; and
- the Dessing Pressure rating for the windows.

The replacement windows serve to protect, enhance and perpetuate the use of the 201 Linden Street property as a residential building. The investment in quality replacement also significantly decreases the ongoing maintenance needs required by the current windows, which, frankly, are unsustainable.

The Owners posit that if the City carefully weighed all applicable City policy goals and objectives and private property owners' rights together, it would conclude that replacement of the 201 Linden Hotel windows is appropriate and far more supportive of the City's long-term goals than never-ending piecemeal rehabilitation efforts.

7. Conclusion.

The Linden Hotel Owners request that this letter be made part of the packet for the Historic Preservation Commission's review and further request a combined Conceptual and Final Review pursuant to Section 14-54³⁰ of the City Code, the approval of their proposed window replacement and the issuance of a new Certificate of Appropriateness.

At this time, for reasons of safety, operability, and performance, the one-hundred- and forty-six-year-old windows in at 201 Linden Street must be replaced. The Owners are committed to the

³⁰ The Owners will leave it to Staff's discretion whether HPC review or Staff review is appropriate under Section 14-53.

SENT VIA EMAIL

Ms. Maren Bzdek
Ms. Heather N. Jarvis
June 24, 2024
Page 14

preservation and maintenance of the entire 201 Linden Street property and the proposed window replacements meet the purpose and policies of the Landmark Preservation and the City as a whole.

To require conformance with the SOIS on rehabilitation for windows that have fundamentally flawed design, when replacement meets the City goals of historic preservation, safety and environmental performance, is poor public policy. The Historic Preservation Commission is encouraged to review the situation wholistically taking into account the City's building standards for safety, operability of windows, weatherization and environmental performance standards and the feasibility of maintaining 201 Linden Street for the next one-hundred years.

Sincerely,



Claire N. Havelda

cc: David Diehl

29722449.1



NFIRS Full Report

Basic-Details

Incident Number: PFA232940 039 **NFIRS Number:** 2328711 **Exposure:** 0 **Incident Date:** 10/21/2023
Call Dispatched as: SRVICE **Incident Type:** 460-Accident, potential accident, other
Primary Action Taken: 86-Investigate
Aid Given or Received: None
Fire Service Deaths: 0 **Fire Service Injuries:** 0
Civilian Deaths: 0 **Civilian Injuries:** 0

Basic-Location and Property Info

Incident Street Number: 201 **Incident Street Name:** Linden **Incident Street Type:** ST-Street
Incident City: FORT COLLINS **Incident Postal Code:** 80524
Incident Location Type: 1-Street address **Property Use:** 400-Residential, other
Mixed Use Property: 58-Business and residential use **Incident GPS Location:** 40.588386,-105.075422

Person/Owner Involved

Business Name	Phone Number	Person or Entity Involved Type	Person Involved Title	Person Involved First Name	Person Involved Last Name
Natures Own	(970) 484-9701	5101012-Employee		Brady	Geraghty
Linden Street Treehouse LLC	(970) 420-8897	5101017-Property Manager	MR-Mr.	David	Diehl
Lochland Management Company	(970) 215-1794	5101017-Property Manager	MR-Mr.	Mark	Wimmer

Basic-Times and Apparatus

PSAP Date Time: 10/21/2023 14:16:01 **Alarm Date Time:** 10/21/2023 14:16:51 **Arrival Date Time:** 10/21/2023 14:21:26 **Last Unit Cleared Date Time:** 10/21/2023 15:26:42
Shifts or Platoon: B 4896
Suppression Apparatus: 2 **Suppression Personnel:** 7
EMS Apparatus: 0 **EMS Personnel:** 0
Other Apparatus: 0 **Other Personnel:** 0

Apparatus

Apparatus or Resource ID	Apparatus or Resource Dispatch Date Time	Apparatus or Resource Enroute Date Time	Apparatus or Resource Arrival Date Time	Apparatus or Resource Clear Date Time	Apparatus or Resource Response Mode to Scene

Any fields that are blank in this report did not pertain to this incident

Apparatus or Resource ID	Apparatus or Resource Dispatch Date Time	Apparatus or Resource Enroute Date Time	Apparatus or Resource Arrival Date Time	Apparatus or Resource Clear Date Time	Apparatus or Resource Response Mode to Scene
E01	14:16:51	14:18:14	14:21:26	15:26:42	Non-Emergent

Apparatus Personnel

Personnel Name/ID

Meza, Carlos
 Bourdon, Robert
 Tete, Caleb

TW01	14:25:16	14:26:31	14:33:06	15:23:11	Non-Emergent
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Apparatus Personnel

Personnel Name/ID

Moinester, Justin
 Hubbard, Gregory
 Newby, Dawson
 Russell, Steven

Basic-Resources Utilized

Was this address accessible by type 1 and support apparatus?: Yes-Both

Was an on-call bureau called for on this incident: No

Did you consult with the hazmat team via phone, radio, etc.: No

Basic-Internal Data Collection

Did this call involve known or suspected weapons: No

Was this call related to the homeless population: No

Was a monitor used: No

Fire-Details

Exposure Report: N-No

Hazmat Ops Level Report

Did you consult with the hazmat team via phone, radio, etc.: No

Any fields that are blank in this report did not pertain to this incident

Narratives

Primary Narrative: Dispatched to a report of a service call regarding windows that were falling from the 2nd and 3rd floors at the stated address. Upon arrival, command was established and contact was made with the RP.

RP reported he needed assistance as the windows were beginning to fail and that one pane of glass was about to fall. He stated one window pane had fallen along the east side from the 2nd floor earlier in the day. He also pointed out along the Southside of the building on the 3rd floor a window had already fallen out previously and was missing and another window that had a pane of glass that was not secure and could fall at any moment. The sidewalk was immediately shut down in front of the building. Due to the height of the un-secure window, TWR1 was requested to gain access to remove the pane of glass from the exterior.

TWR1 then arrived on scene and accessed the pane of glass that was un-secure via the aerial. They also checked multiple windows to see their current status and multiple windows showed signs of the exterior frame rotting. E1 crew made access interior and checked the windows from the inside on floor three. No other windows had glass that was insecure though windows showed signs of frame rot.

These findings were passed on to the RP. The RP advised they had been working to get the windows replaced but were having issues dealing with the city as they were considered "historic" windows.

E1 officer then requested a building inspector to respond out through dispatch. Dispatch then advised the building inspector would not be responding out as all they would do was advise the owners to board up and secure the windows and then hire a contractor to fix them. E1 officer advised how the windows were historic windows and dispatch advised the building inspector was not concerned and they just need to hire a contractor.

This information was passed on to the property manager and the manager of the building LLC. They advised they would work on getting the windows secured and replaced. The sidewalk on both the Walnut and Linden sides of the road were taped off in an attempt to secure the area from any other hazards for foot traffic. E1 officer contact info was left for any further communication the RP's needed in replacing the windows. The RP's were advised the PFA crews were not able to check all windows, but that the issue presented a safety hazard and needed to get addressed immediately. If some had already failed, then it was likely that more would soon fail. RP's understood and advised no other assistance was needed. E1 officer also advised the RP's that a Bureau reference would get sent in to see if the Bureau of the PFA could assist in anyway to help them deal with the city in getting these windows replaced as it now presented a safety hazard for the public and the historic criteria was now irrelevant.

With no other needs from the RP's on scene, E1 and TWR1 crews cleared and became available.

Narratives

Additional Narratives

PFA23-20507 | 10/21/2023 14:16:47FCC270 [1] panes of glass from 2nd and 3rd floor windows falling out - staff requesting fire dept assist for public safety | 10/21/2023 14:17:11FCC270 [2] on site employee/Wimmer,Mark ph/9702151794 | 10/21/2023 14:17:59FCC270 [3] they are old historic windows that started falling out today unexpectedly - a couple have already fallen and staff is trying to keep ppl off the sidewalk | 10/21/2023 14:21:26E01 [4] E01 OS at 10/21/2023 2:21:26 PM, Latitude: 40.5879628, Longitude: -105.0752043 | 10/21/2023 14:25:17FCC271 [5] Backed up E01 with TW01 | 10/21/2023 14:31:04FCC271 [6] E01 MAY NEED CITY BLDG INSPECTOR - 2 WINDOWS HAVE FALLED OUT, DOUBLE PANED WINDOWS | 10/21/2023 14:31:17FCC271 [7] E01 WINDOWS ARE HISTORIC | 10/21/2023 14:33:06TW01 [8] TW01 OS at 10/21/2023 2:33:06 PM, Latitude: 40.5882908, Longitude: -105.0758298 | 10/21/2023 14:40:37FCC271 [9] SPOKE WITH BLDG INSPECTOR DAMIAN 970-218-1073 AND HE SAID HE WOULD ONLY GO OUT AND TELL THEM TO BOARD UP THEIR WINDOWS - THEY NEED TO FIND A CONTRACTOR

Apparatus

There are no apparatus narratives

CRR/Outreach

CRR Referral-Please Other
select the

Any fields that are blank in this report did not pertain to this incident

appropriate choices
below:

Provide information explaining your referral above: RP's on scene may need help dealing with the city getting these windows replaced. RP's report they have been trying to get the windows replaced prior to this occurrence but were running into issues dealing with the City as the windows were considered "Historic". With the windows now presenting a safety hazard for all foot traffic below, repairs are now needed and a push from Community Risk Reduction to help make this happen may be needed. Perhaps a follow up with the involved parties may be helpful to see if any roadblocks are still being encountered in their process of addressing the issue.

Attachments

Addendums

Authorization

Member Making Report: 1239

Member Making Report - Signature: Meza, Carlos

Member Making Report - Position or Rank: Lieutenant

Officer in Charge: 1239

Officer in Charge - Signature: Meza, Carlos

Officer in Charge - Position or Rank: Lieutenant

Any fields that are blank in this report did not pertain to this incident

Colorado Sash & Door, Inc,
4521 Endeavor Drive, Unit C
Johnstown, Colorado 80534

Window Assessment
For:

2nd and 3rd Floor Windows At
201 Lindon Street
For Collins, Colorado
80521

Wood Window Restorations
1993/1994
2019/2020



alamy

Image ID: FCA4XF
www.alamy.com

201 Linden Building Window Information, Past Repairs and Proposed Replacement

201 Linden was built in 1882, and the windows have been worked on many times over the years. Prior work that we are aware of was in 1997/1998 where it is not clear if more work was done on them other than scrape or paint. In 2018/2019 a full restoration of the window sashes was completed. At this time the intent was to replace any damaged window parts, make the windows more energy efficient, better sound control and better able to keep air, dirt and insects out of the building. At that point roughly 30% of the upper sash check rails had to be replaced due to sagging and deterioration.

What was making these parts fail were the 1 3/8" thickness and very narrow check rail size.. All of the components used in this building were the same as windows in modest homes of the same time. However the openings in this building are larger than doors in those same structures. The majority of the windows in this project have a 39" x 98" masonry opening. If the components would have been done with 1 3/4" thickness and of larger size, which we have found in similar sized commercial building, the failure of the check rail most likely would have not happened.

After the assessment of the current window conditions, I will provide a drawing that shows what the component sizes used in this building are along the size components in other similar structures as well as the sizing for the replacement window requesting to be used to replace the existing windows.

201 Linden Window Conditions May 2024

We were asked to go in and review the current conditions of the windows. Since the renovation work was completed, the windows on both floors had an acrylic panel installed to the inside that did not fill the opening to the top as 8' sheets were used. I was told that this was to help control air infiltration and keep dust down. To facilitate this, the metal recessed sash lifts had been removed and a wood stop installed on the sills.



Sill Stop with New Acrylic Panel



Acrylic Panel Removed



Sash Screwed Together

Just prior to our site visit the interior sections of acrylic were removed, believing that we would be able to operate the windows. However, we found that there were no windows that we could operate. In some locations both sash had been screwed together. All of the windows on the 2nd floor were caulked shut and the windows on the 3rd floor were at least painted shut if not caulked shut as well. A few Openings on the 3rd floor had hinged interior Storm Windows installed.

We found that 30% plus of the upper window sash were not fully up in the frame. The meeting of the upper and lower sash did not happen. There were a few gaps between the upper sash and the window frame.

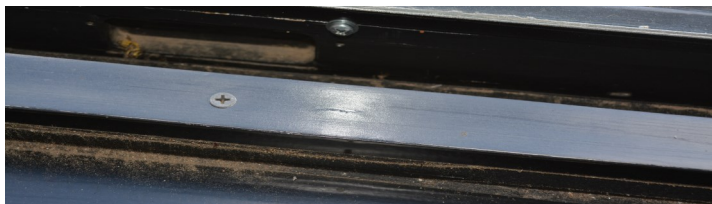


Upper Sash Sitting Below the Lower Sash at the Check Rail



Correct Fitment of Upper Sash

On around 10% of the window sash the RDG panel was not attached to the lower sash. It was Leaning against the acrylic panel or sitting on the sill. The tabs and screws that held them in place were not engaged. In a few spots an additional screw were added in the center of the bottom which seemed like a good solution.



Added Screw for RDG,



Tab Not Engaged, RDG is Loose

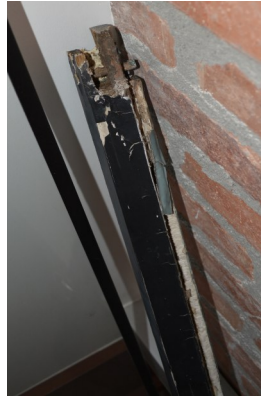
The interior of all the window were painted black and this was mostly in good condition. There was some paint removed with taking down the acrylic panels but did not show much issue. However on the exterior the sills in a lot of locations the sills did show paint failure down and including the primer on the frames. A few locations showed failure of the paint on the sash. We were not able to do a full assessment on the exterior with the exterior acrylic in place and needing to close the sidewalk for a lift to get to these windows. However we were able to photos of most of the surfaces prone to failure.



Exterior sill paint failing on all these.
Note the exterior acrylic panel in place
and in the photo below the interior
acrylic panel is still in place.



The one section we did key in on was the upper sash check rail. The check rail is the bottom of the upper sash and top of the lower sash where the two sash meet. We were told that one of the window parts came off and hit the sidewalk. We have photo of this sash and the missing part. With the restoration in 2019/2020 roughly 35% of these parts were replaced.



Part That Fell



Sash With The Missing Check Rail



Replaced Check Rail



Failing Check Rail

These sections are very thin for a window of this size. You can see the parts that were replaced in the photos. In the photos attached you will see that there are 1 or 2 rails that show some signs of failing. We are not sure how similar these are to the one that failed but we are almost a year later. These are on the same side and just a few windows away from the one that failed.

Around these sash where the check rail is failing are several that had been replaced with the restoration. These still look in good condition today. If the sash are to be left in place, a wood support block running from the sill up to the bottom of the upper sash could be installed. They would sit in the pocket where the upper sash would have moved down. At the same time the upper sash should be moved fully up in the frame so that the check rails may meet and provide the seal as they were designed.

Along with this work, the exterior needs to be cleaned scraped primed and painted again. This process will most likely need to be done every 5 or so years based on the dark color and amount of sun light these windows are exposed to. I had believed and stated with the window survey done in 2016 prior to the last work, that the component sizes on these windows were sized for use in windows of much smaller openings. I still believe this today. These openings are larger than windows just restored in the Carnegie Building here in Fort Collins for the City, but all of the components are thicker and wider than what is in the 201 Linden Building.

A replacement window system that was used on the alley windows had been proposed. This replicated the window dimensions including the daylight openings with in a 1/4" except at the check rail, which is the part that is failing. Along with this all wood option with a factory paint that carries a 10 year warranty, we can replicate the sash, frame and trim in aluminum clad wood. These windows have the same profiles as the all wood units.. The gloss of paint is also the same as painted wood but it provides the owner with a 30 year warranty on the finish. Examples of these are in buildings following. This is a small sample of Historic Approved Buildings with replaced windows.



Sample Replacement Window in Storage

Insert Window Replacement Information

Pro Quote on Window Options

Information on Ultra Clad Windows

Specifics for Ultra Clad Sterling XL Double Hung Windows

Sections and Special Trim for Windows

Wind Facts Information for Wind Loading

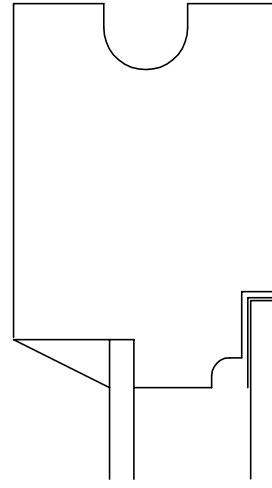
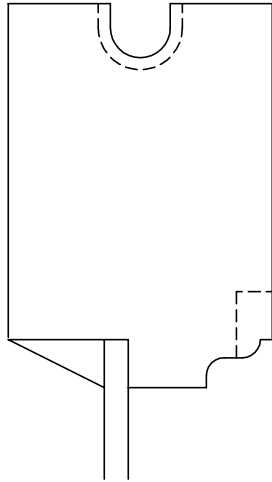


The Tivoli Building was replicated with an all metal exterior so painting was not needed. This including the exterior of the sash, frame, brickmould, sills, mull covers and decorative trim blocks. All of this matched the original profiles. Simulated divide lights were done to match the original. This included some sash that had none.



The Windsor Mill was replaced with aluminum clad wood windows. Similar brickmould as this project. The heavy timber sill was replicated as well as the radius trim. The different color top was done to note the section removed by the tornado but the window details are the same. This project has simulated divided lights to match the true divided lights of the original building





Existing Sash
Set for Rope and
Weight

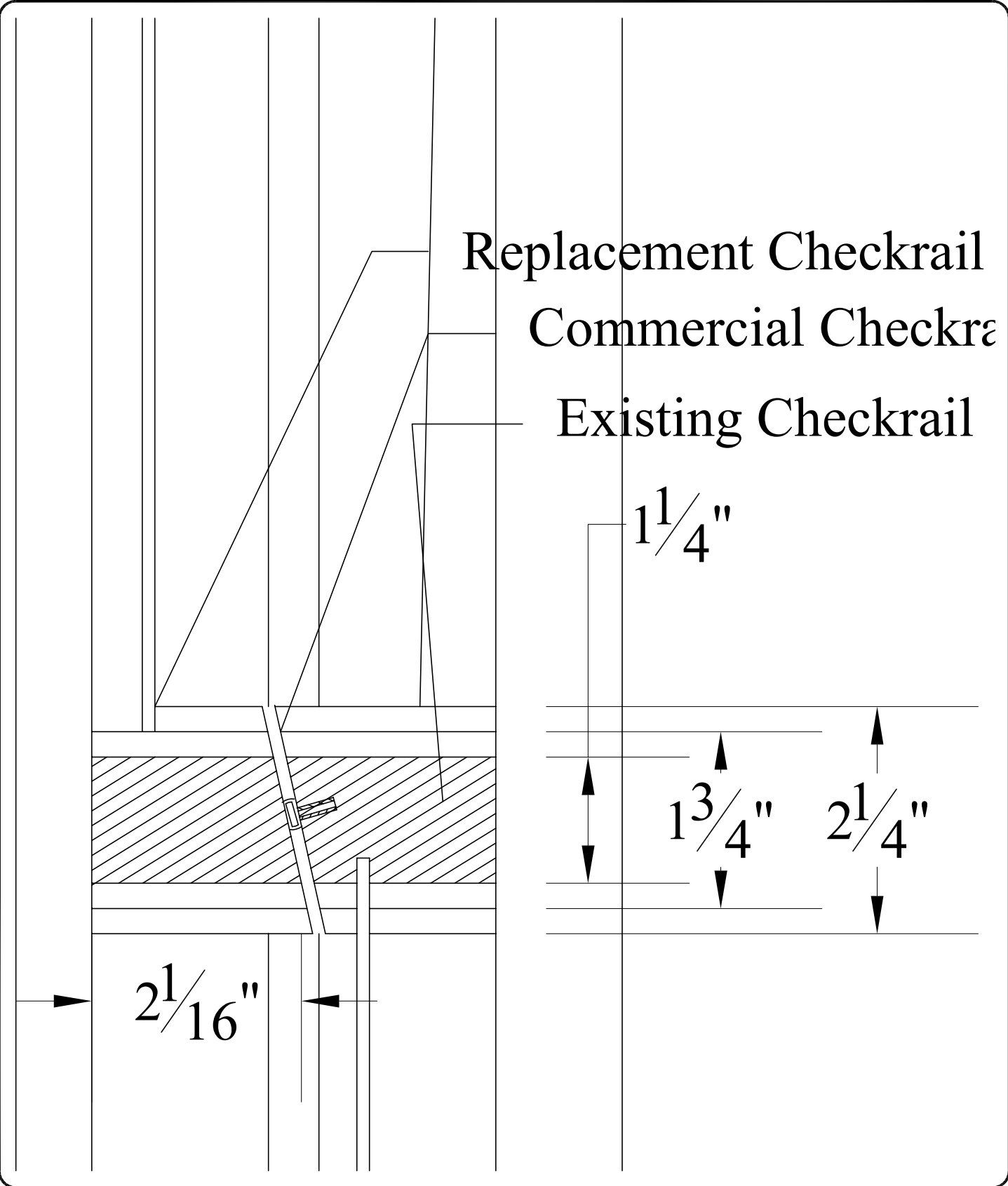
Dash Line Represents
Wood Removed

Sash With Prep
For Spiral Balance
and Interior RDG

Note That All Work is On The Interior
Nothing Shows on the Exterior

DRAWN BY MJW SCALE Full Size FIRST ISSUE DATE 06/15/2024	ARCHITECT . CONTRACTOR 201 Linden Street Fort Collins, Colorado	Colorado Sash & Door, Inc. 4521 Endeavor Drive, Unit C Johnstown, Colorado 80534 ph (970) 226-1460, Cell (970) 402-2623 office@colosash.com	PROJECT 201 Linden	PROJECT NO. 24008 DRAWING NO. 3 of 3
REVISION: △ . △ . △ .			TITLE OF DRAWING Prep for RDG and Spiral Balance	

Replacement Checkrail
 Commercial Checkrail
 Existing Checkrail



DRAWN BY
MJW
 SCALE
9" = 1'-0"
 FIRST ISSUE DATE
06/15/2024

ARCHITECT
 CONTRACTOR

Colorado Sash & Door, Inc.
 4521 Endeavor Drive, Unit C
 Johnstown, Colorado 80534
 ph (970) 226-1460, Cell (970) 402-2623
 office@colosash.com

PROJECT
201 Linden

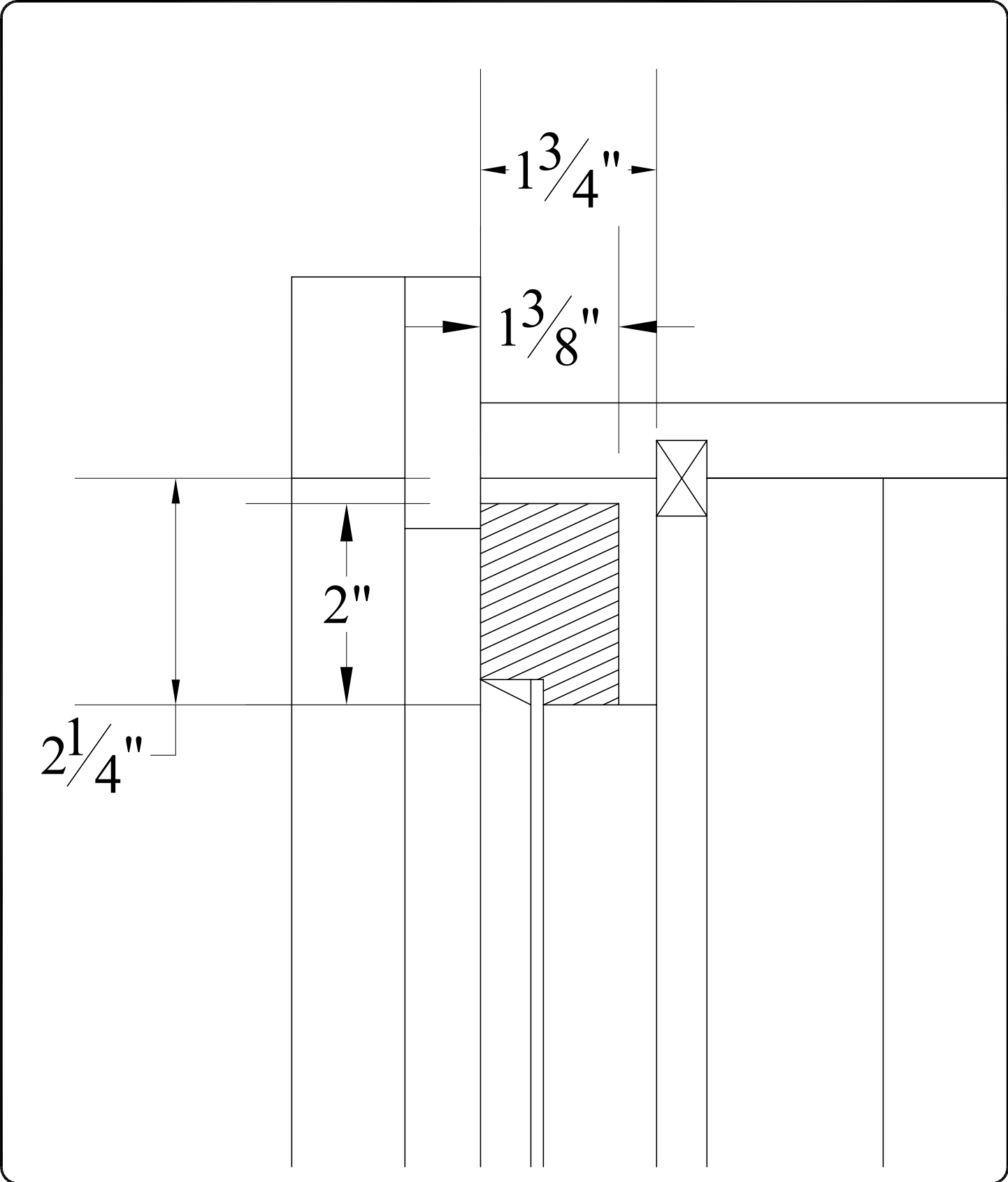
PROJECT NO.
24008
 DRAWING NO.

REVISION:
 △ .
 △ .
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201 Linden Street
 Fort Collins, Colorado

TITLE OF DRAWING
Check Rail at Upper and Lower Sash

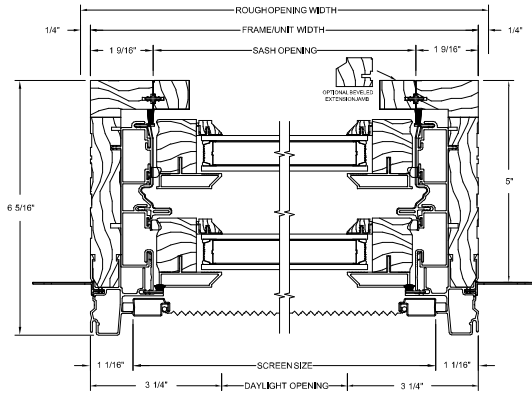
2 of 3



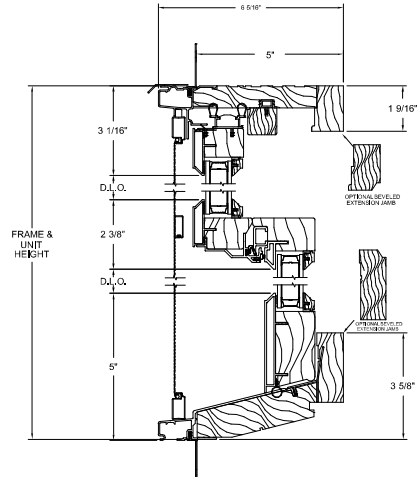
DRAWN BY MJW FIRST ISSUE DATE 06/15/2024	SCALE 9" = 1'-0"	ARCHITECT CONTRACTOR 201 Linden Street Fort Collins, Colorado	PROJECT 201 Linden	PROJECT NO. 24008 DRAWING NO. 1 of 3
REVISION: △ . △ . △ .		COLORADO SASH & DOOR, INC. 4521 Endeavor Drive, Unit C Johnstown, Colorado 80534 ph (970) 226-1460, Cell (970) 402-2623 office@colosash.com	TITLE OF DRAWING Sash Side and Head	

XL Sterling Double Hungs | Operating

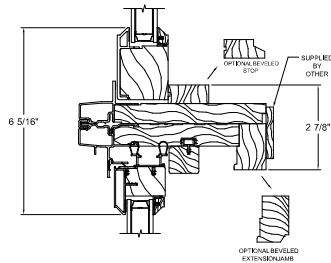
Horizontal Section



Vertical Section

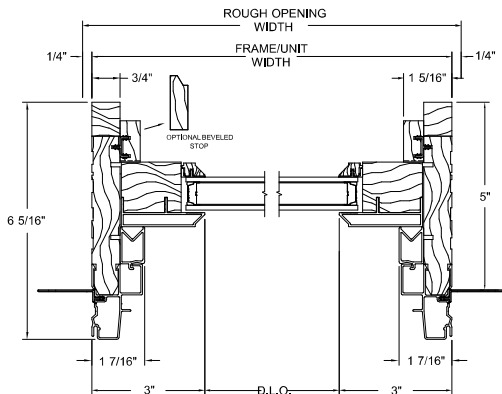


Transom Stacked Above

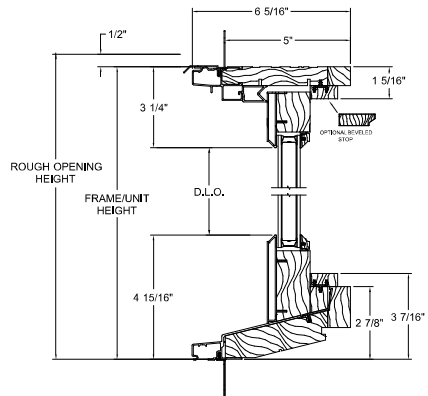


XL Sterling Studio Units

Horizontal Section



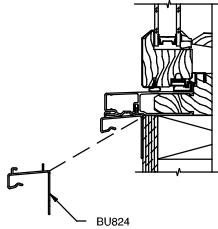
Vertical Section



NOTE: Drawings are not to scale. Brickmould is shown factory-applied. Brickmould may be shipped loose for field application. Some units are shown with optional drip cap or nailing fin. For Ultra accessory or application drawings, see pgs. 206-212. Additional and the most current drawings are available at www.kolbewindows.com.

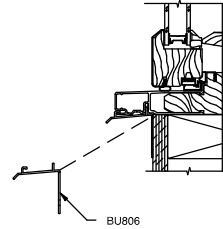
Application Details

Traditional Sill Nosing *(standard)*



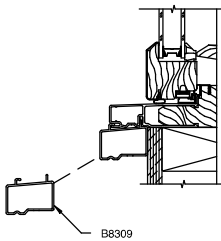
Profile BU824 may be applied to units with 1-15/16" brickmould, 3-1/2" brickmould or 3-1/2" flat casing. Colored to match the unit.

Sill Drip



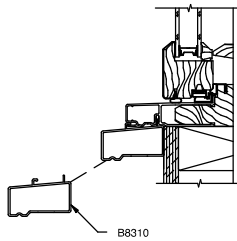
Optional Profile BU806 may be applied to units with 1-15/16" brickmould, 3-1/2" brickmould or 3-1/2" flat casing. Colored to match the unit.

1-5/8" Sill Nosing



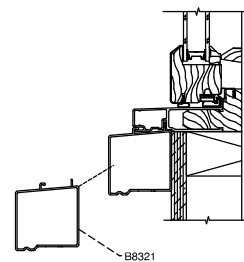
Optional Profile B8309 may be applied to units with 1-15/16" brickmould, 3-1/2" brickmould and 3-1/2" flat casing. Colored to match the unit.

2-1/8" Sill Nosing



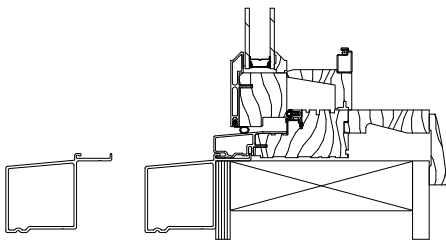
Profile B8310 is a standard application to units with backband, ogee casing and bullnose brickmould. Colored to match the unit.

2-1/8" Historic Nosing



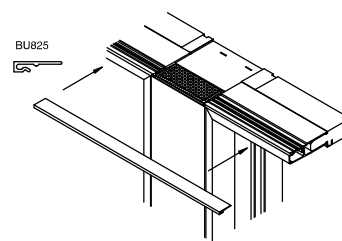
Profile B8321 is a standard application to units with historic brickmould. Colored to match the unit.

Stucco Sill Nosing



Profile B8330 is factory applied as standard and used for Stucco finish applications. Colored to match the unit.

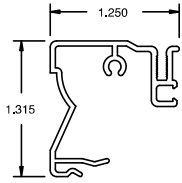
Head & Sill Trim



Profile BU825 may be used on spread mulls and stacked units without brickmould. Colored to match the unit.

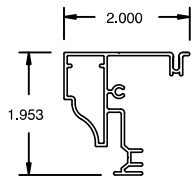
Accessories

Casing



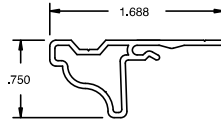
B802

2" brickmould without leg



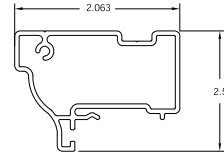
BU834

Receiver trim backband profile



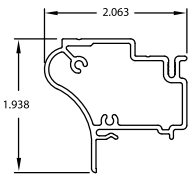
B842

Ogee trim



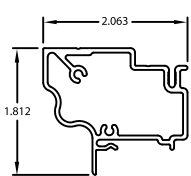
BU864

Pavilion casing



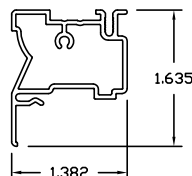
BU865

Bull nose casing



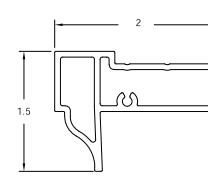
BU866

Historic trim



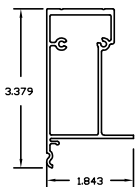
BU900

1-5/8" brickmould



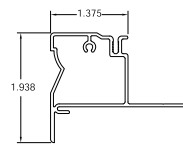
BU905

Backband



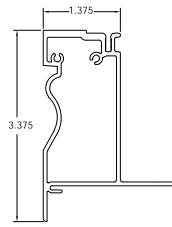
BU917

3-1/2" beaded casing



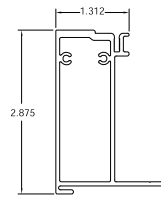
BU919

1-15/16" brickmould with leg



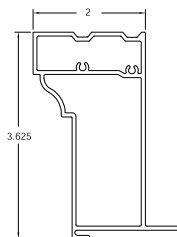
BU920

3-1/2" Brickmould with leg



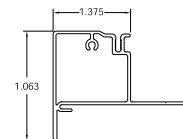
BU921

3-1/2" flat casing



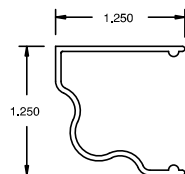
BU922

3-1/2" flat casing with backband



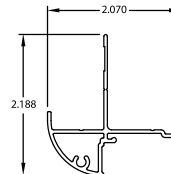
BU924

2" flat casing



B8304

Chicago brickmould

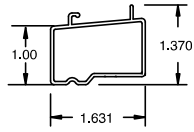


B8329

Stucco casing

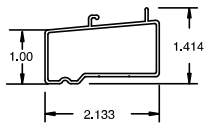
NOTE: Drawings are not to scale. Additional and the most current drawings are available at www.kolbewindows.com.

Sill Nosing/Sill Extenders



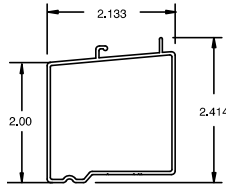
B8309

1-5/8" projected
sill nosing



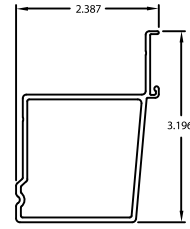
B8310

2-1/8" projected
sill nosing



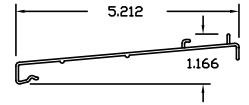
B8321

2-1/8" historic
sill nosing



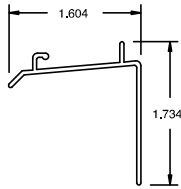
B8330

Stucco trim
sill nosing



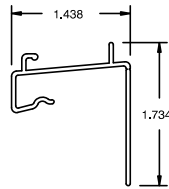
B8332

5-3/16" extended
sill nosing



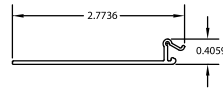
BU806

Sill drip



BU824

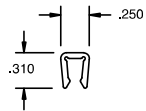
Traditional sill nosing



BU839

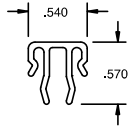
2-1/2" sill extender

Mull Covers



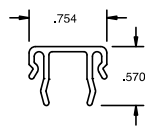
BU805

Mullion & transom
splice



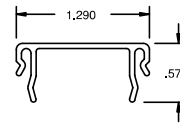
BU817

1/4" mull cover



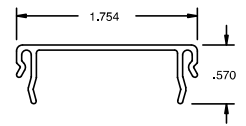
BU813

1/2" mull cover



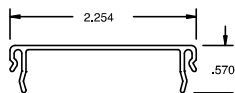
BU818

1" mull cover



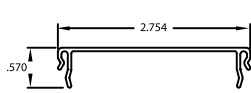
BU814

1-1/2" mull cover



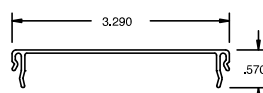
BU815

2" mull cover



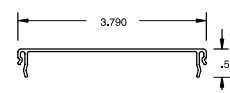
BU875

2 1/2" mull cover



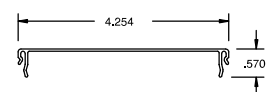
BU819

3" mull cover



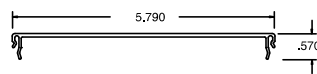
BU829

3-1/2" mull cover



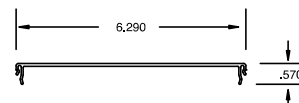
BU816

4" mull cover



BU861

5-1/2" mull cover



BU852

6" mull cover

NOTE: Drawings are not to scale. Additional and the most current drawings are available at www.kolbewindows.com.

On Behalf Of: Colorado Sash & Door Inc

Address: 4521 Endeavor Drive, Unit C
Johnstown, CO 80534

Phone: 970-226-1460

Fax: (970) 797-6392

Contact: Mark Wernimont

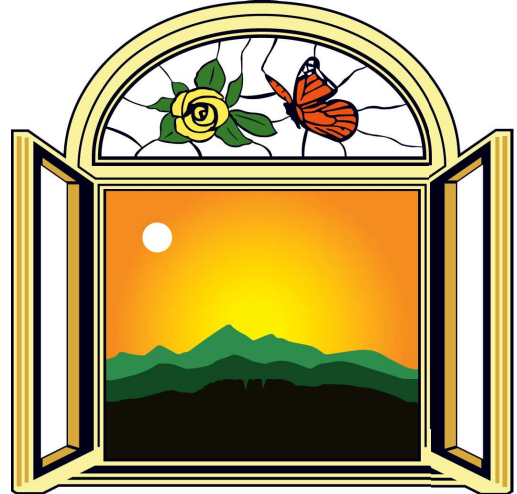
Email: mwernimont@colosash.com

Address: 4521 Endeavor Drive
Unit C

Johnstown, Colorado 80534

Phone: 970-226-1460

Mobile: 970-402-2623



COLORADO
SASH & DOOR, INC

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WINDOWS & DOORS

We're for the visionaries.™

**Quote 1297838C: 201 Linden - Window Replacement
Project: Commercial
Printed: 6/24/2024 5:21:18 AM**



Printed By: Mark Wernimont
Created: 6/24/2024

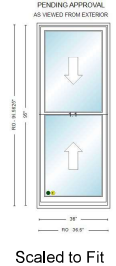
2024 Pricing

For warranty information please click this link or visit <https://www.kolbewindows.com/resources/warranties>

Line	Label	UOM	Quantity	Unit Price	Extended Price
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001	Traditional Double Hung	EA	(1)	\$3,255.12	\$3,255.12
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PERFORMANCE: Standard Performance, Display Current PG Rating Info., Current Calculated PG Rating: -1, Current Calculated Positive DP Rating: -1, Current Calculated Negative DP Rating: -1, Current Calculated Overall PG Rating: N/A, R&D Test No.: N/A, AAMA/WDMA/CSA 101/I.S.2/A440-22: N/A, AAMA/WDMA/CSA 101/I.S.2/A440-17: N/A, AAMA/WDMA/CSA 101/I.S.2/A440-11: N/A, CSA A440 S1-19: N/A, CSA A440 S1-17: N/A, CSA A440 S1-09: N/A, ASTM E 1886/1996: N/A, TAS 201-94: N/A, TAS 202-94: N/A, TAS 203-94: N/A, Test Report No.: N/A, Hallmark No.: N/A, Texas Dept. of Insurance No.: N/A, Water Penetration Resistance Pressure: N/A, Display Current NFRC Rating Info., U-Value: -, Solar Heat Gain Coefficient (SHGC): -, Visible Transmittance (VT): -, Condensation Resistance (CR): -, NFRC CPD #: -, Energy Star Southern Zone: -, Energy Star South/Central Zone: -, Energy Star North/Central Zone: -, Energy Star Northern Zone: -, Energy Star Door Northern & North/Central Zones: -, Energy Star Door South/Central & Southern Zones: -, Energy Star Door All 50 States: -, Canada Energy Rating (ER): -, Canada Energy Star: -, Metric U-Value: -



UNIT - Heritage Rectang Even Split

Traditional Sash Does not Meet Structural Performance for this size.

Sash, Basic Jamb Profile: Square,

Rough Opening: 36 1/2" X 95 9/16"

Frame Size: 36" X 95"

Unit Dimension: 38 3/8" X 97 51/64"

GLASS: Glass Make Up: Double Glazed, Solar Low E, Multi-Function Spacer, Glass Preserve / Neat+ Coating: Glass Preserve without Neat+ Coating, Ovolo Glazing Bead

HARDWARE-ACCESSORIES: Clay (Rustic) Hardware, Amount of Check Rail Locks: 1, No Sash Plough, Bottom Sash Lift Handle(s): Traditional Style, Sash Lift Handle Color: Matte Black, Sash Lift Handle Quantity: 2 Per Bottom Sash, Jambliner: Beige, Window Opening Control Device: Black

CASING-JAMBS-TRIM: 2" Beaded Casing, 2" x 2" Sill Nosing, Apply Exterior Casing/Accessories, 4 9/16" Jambs

SPECIES-FINISH-COLOR: Leave All Pine, Exterior Frame Finish: K-Kron2, Exterior Sash Finish: K-Kron2, Match All Exterior Colors, 1st Custom Color Exterior, Colored Prefinish Interior Frame, Colored Prefinish Interior Sash, Match All Interior Colors, Coal Black Interior, 1st Custom Exterior Color: Match Existing, Standard Fingerjoints

MANUFACTURER NOTES:

Calculated Design Pressure values of individual units will be verified upon order to Kolbe. Overall Performance Grade of mulls/assemblies may/will be less than computed values of individual units and will also be determined upon order to Kolbe.,

Opening(s) designated by a circled 'E' meet most national building codes for emergency escape and rescue requirements. Check local codes for product compliance for desired application.



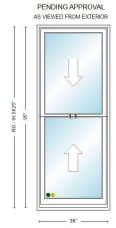
002 Sterling 1 3/4" Sash

EA (1)

\$2,851.36

\$2,851.36

PERFORMANCE: Standard Performance, Display Current PG Rating Info., Current Calculated PG Rating: -1, Current Calculated Positive DP Rating: -1, Current Calculated Negative DP Rating: -1, Current Calculated Overall PG Rating: N/A, R&D Test No.: N/A, AAMA/WDMA/CSA 101/I.S.2/A440-22: N/A, AAMA/WDMA/CSA 101/I.S.2/A440-17: N/A, AAMA/WDMA/CSA 101/I.S.2/A440-11: N/A, CSA A440 S1-19: N/A, CSA A440 S1-17: N/A, CSA A440 S1-09: N/A, ASTM E 1886/1996: N/A, TAS 201-94: N/A, TAS 202-94: N/A, TAS 203-94: N/A, Test Report No.: N/A, Hallmark No.: N/A, Texas Dept. of Insurance No.: N/A, Water Penetration Resistance Pressure: N/A, Display Current NFRC Rating Info., U-Value: -, Solar Heat Gain Coefficient (SHGC): -, Visible Transmittance (VT): -, Condensation Resistance (CR): -, NFRC CPD #: -, Energy Star Southern Zone: -, Energy Star South/Central Zone: -, Energy Star North/Central Zone: -, Energy Star Northern Zone: -, Energy Star Door Northern & North/Central Zones: -, Energy Star Door South/Central & Southern Zones: -, Energy Star Door All 50 States: -, Canada Energy Rating (ER): -, Canada Energy Star: -, Metric U-Value: -



Scaled to Fit

UNIT - Heritage Rectangle Door, Unit Does Not Meet Structural Requirements based on Size, Basic Jamb Profile: Square, Even Split

Rough Opening: 36 1/2" X 95 9/16"
Frame Size: 36" X 95"
Unit Dimension: 38 3/8" X 97 51/64"

GLASS: Glass Make Up: Double Glazed, Solar Low-E, Mill Finish Spacer, Glass Preserve / Neat+ Coating: Glass Preserve without Neat+ Coating, Ovolo Glazing Bead

HARDWARE-ACCESSORIES: Lock Style: Signature, Clay (Rustic) Hardware, Bottom Sash Lift Handle(s): Traditional Style, Sash Lift Handle Color: Matte Black, Sash Lift Handle Quantity: 2 Per Bottom Sash, Jambliner: Black, Window Opening Control Device: Black

CASING-JAMBS-TRIM: 2" Beaded Casing, 2" x 2" Sill Nosing, Apply Exterior Casing/Accessories, 4 9/16" Jamb

SPECIES-FINISH-COLOR: Leave All Pine, Exterior Frame Finish: K-Kron2, Exterior Sash Finish: K-Kron2, Match All Exterior Colors, 1st Custom Color Exterior, Colored Prefinish Interior Frame, Colored Prefinish Interior Sash, Match All Interior Colors, Coal Black Interior, 1st Custom Exterior Color: Match Existing, Jambliner Cover: Wood Wrapped, Vertical Weatherstrip Color: Black, Standard Fingerjoints

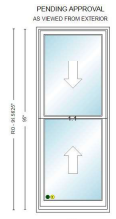
MANUFACTURER NOTES:

Please be aware Retractable Screens and Sash Lifts (supplied by Kolbe or by others) when used together will interfere with unit/screen operation., Calculated Design Pressure values of individual units will be verified upon order to Kolbe. Overall Performance Grade of mulls/assemblies may/will be less than computed values of individual units and will also be determined upon order to Kolbe., Opening(s) designated by a circled 'E' meet most national building codes for emergency escape and rescue requirements. Check local codes for product compliance for desired application.



003 Sterling XL 1 3/4" Sash EA (1) \$3,189.24 \$3,189.24

PERFORMANCE: Standard Performance, Display Current PG Rating Info., Current Calculated PG Rating: 60, Current Calculated Positive DP Rating: 60.15, Current Calculated Negative DP Rating: 60.15, Current Calculated Overall PG Rating: +60/-60, R&D Test No.: 15132, AAMA/WDMA/CSA 101/I.S.2/A440-22: -1, AAMA/WDMA/CSA 101/I.S.2/A440-17: -1, AAMA/WDMA/CSA 101/I.S.2/A440-11: LC-PG60 1219x3061 (~48x121)-H, CSA A440 S1-19: -1, CSA A440 S1-17: -1, CSA A440 S1-09: -1, ASTM E 1886/1996: -1, TAS 201-94: -1, TAS 202-94: -1, TAS 203-94: -1, Test Report No.: QCT16-3890.01, Hallmark No.: 413-H-1176, Texas Dept. of Insurance No.: In Process, Water Penetration Resistance Pressure: 470 Pa (9.82 psf), Display Current NFRC Rating Info., U-Value: -, Solar Heat Gain Coefficient (SHGC): -, Visible Transmittance (VT): -, Condensation Resistance (CR): -, NFRC CPD #: -, Energy Star Southern Zone: -, Energy Star South/Central Zone: -, Energy Star North/Central Zone: -, Energy Star Northern Zone: -, Energy Star Door Northern & North/Central Zones: -, Energy Star Door South/Central & Southern Zones: -, Energy Star Door All 50 States: -, Canada Energy Rating (ER): -, Canada Energy Star: -, Metric U-Value: -



Scaled to Fit

Rough Opening: 36 1/2" X 95 9/16"
Frame Size: 36" X 95"
Unit Dimension: 38 3/8" X 97 51/64"

UNIT - Heritage Rectangle Double Hung Ship Sash Loose, Even Split, Basic Jamb Profile: Square,

Energy Performance Not Tested

GLASS: Glass Make Up: Double Glaze, Preserve / Neat+ Coating: Glass Preserve without Neat+ Coating, Ovolo Glazing Bead

HARDWARE-ACCESSORIES: Lock Style: Signature, Clay (Rustic) Hardware, Jambliner: Black, Window Opening Control Device: Black, Class 5 Balance

CASING-JAMBS-TRIM: 2" Beaded Casing, 2" x 2" Sill Nosing, Apply Exterior Casing/Accessories, 5" Jambs

SPECIES-FINISH-COLOR: Leave All Pine, Exterior Frame Finish: K-Kron2, Exterior Sash Finish: K-Kron2, Match All Exterior Colors, 1st Custom Color Exterior, Colored Prefinish Interior Frame, Colored Prefinish Interior Sash, Match All Interior Colors, Coal Black Interior, 1st Custom Exterior Color: Match Existing, Jambliner Cover: Wood Wrapped, Vertical Weatherstrip Color: Black, Standard Fingerjoints

MANUFACTURER NOTES:

Calculated Design Pressure values of individual units will be verified upon order to Kolbe. Overall Performance Grade of mulls/assemblies may/will be less than computed values of individual units and will also be determined upon order to Kolbe.

Per Product Bulletin #682 dated 6/8/2015, XL Sterling have non-tiltable sash and interior visual differences from Sterling.

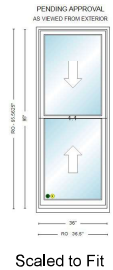
As standard sash will be shipped loose.

Opening(s) designated by a circled 'E' meet most national building codes for emergency escape and rescue requirements. Check local codes for product compliance for desired application.



004 Ultra Clad Sterling XL 1 3/4" Sash EA (1) \$3,518.01 \$3,518.01

PERFORMANCE: Standard Performance, Display Current PG Rating Info., Current Calculated PG Rating: 60, Current Calculated Positive DP Rating: 65.16, Current Calculated Negative DP Rating: 65.16, Current Calculated Overall PG Rating: +60/-65, R&D Test No.: 14104, AAMA/WDMA/CSA 101/I.S.2/A440-22: -1, AAMA/WDMA/CSA 101/I.S.2/A440-17: -1, AAMA/WDMA/CSA 101/I.S.2/A440-11: LC-PG60 1219x3048 (48x120)-H, CSA A440 S1-19: -1, CSA A440 S1-17: -1, CSA A440 S1-09: -1, ASTM E 1886/1996: -1, TAS 201-94: -1, TAS 202-94: -1, TAS 203-94: -1, Test Report No.: ESP018721P-1665, Hallmark No.: 413-H-1129, Texas Dept. of Insurance No.: WIN-2184, Water Penetration Resistance Pressure: 440 Pa (9.19 psf), Display Current NFRC Rating Info., U-Value: 0.32, Solar Heat Gain Coefficient (SHGC): 0.27, Visible Transmittance (VT): 0.50, Condensation Resistance (CR): 53, NFRC CPD #: KKM-K-23-01519-00001, Energy Star Door Northern & North/Central Zones: N/A, Energy Star Door South/Central & Southern Zones: N/A, Energy Star Door All 50 States: N/A, Canada Energy Rating (ER): +15, Metric U-Value: 1.82



UNIT - Ultra Rectangle Double Hung - Complete Unit, XL Sterling, Vintage: #1117, Extruded Sash, Basic Jamb Profile: Square, Ship Sash Loose, Even Split

GLASS: Glass Make Up: Double Glazed, Solar Low-E, Mill Finish Spacer, Glass Preserve / Neat+ Coating: Glass Preserve without Neat+ Coating, Ovolo Glazing Bead

HARDWARE-ACCESSORIES: Lock Style: Signature, Clay (Rustic) Hardware, Jambliner: Black, Window Opening Control Device: Black, Class 5 Balance

CASING-JAMBS-TRIM: 2" Beaded Casing (BU947) , Casing Placement: Head and Sides, Historic 2" x 2" Sill Nosing (B8321) , Apply Exterior Casing/Accessories, Nailing Fin, 5" Jambs

SPECIES-FINISH-COLOR: Leave All Pine, Exterior Frame Finish: 70% Fluoropolymer, Exterior Sash Finish: 70% Fluoropolymer, Exterior Casing Finish: 70% Fluoropolymer, Match All Exterior Colors, 1st Custom Color Exterior, Colored Prefinish Interior Frame, Colored Prefinish Interior Sash, Match All Interior Colors, Coal Black Interior, 1st Custom Exterior Color: Match Existing, Jambliner Cover: Wood Wrapped, Vertical Weatherstrip Color: Black, Standard Fingerjoints

MANUFACTURER NOTES:

Calculated Design Pressure values of individual units will be verified upon order to Kolbe. Overall Performance Grade of mulls/assemblies may/will be less than computed values of individual units and will also be determined upon order to Kolbe.,

Per Product Bulletin #682 dated 6/8/2015, XL Sterling have non-tiltable sash and interior visual differences from Sterling.,

As standard sash will be shipped loose.,

Opening(s) designated by a circled 'E' meet most national building codes for emergency escape and rescue requirements. Check local codes for product compliance for desired application.

Rough Opening: 36 1/2" X 95 9/16"
Frame Size: 36" X 95"
Unit Dimension: 38 5/8" X 98 1/2"

Structural Performance and Energy Testing Done.





Be Inspired ▶

[Click to view more: kolbewindows.com/gallery](https://kolbewindows.com/gallery)

Double Hungs

Quality details adorn the classic design of Ultra Series double hung windows. Sterling double hung sash can be removed from the inside of the home for easy cleaning. Replace older windows with unique cottage-style, radius-top, or XL Sterling units, choosing options like divided lites, hardware, screens, or triple pane glass, to enhance style or performance.

*Sterling Double Hungs | XL Sterling Double Hungs | Cottage Style & Reverse Cottage Style Units
Studio & Transom Units | Picture Combination Units | Segment Head & Half-Circle Top Units | Single Units*



Photo © Anice Hoachlander

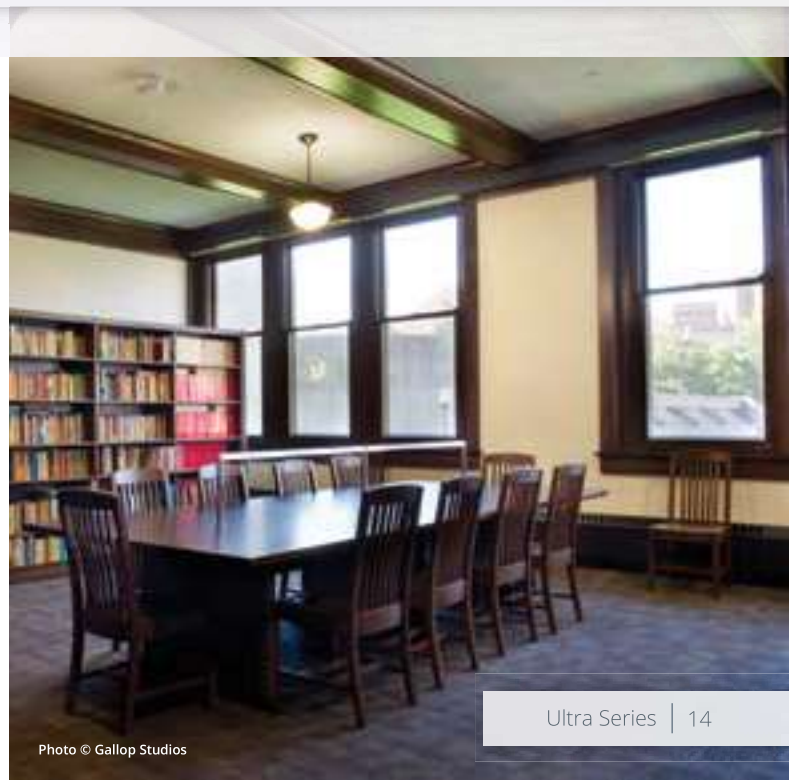


Photo © Gallop Studios

Sterling Double Hungs

Sterling double hungs are made to blend seamlessly with the grandest décor. A patented interior wood cover conceals the jambliner, giving the windows a rich, all-wood appearance. The award-winning XL Sterling double hung expands the architecturally-correct design and high performance of a Sterling double hung. Quality components combined with thoughtful product design allow the XL Sterling double hung to be the perfect fit for any oversized commercial or residential opening. *Patents: 7,296,381 | 7,448,164 | 8,196,355 | 8,429,856*



© Longviews Studio

Standard Features – Sterling Double Hung

- ▶ 1-3/4" thick sash
- ▶ Overall jamb depth is 4-9/16" (*basic box depth is 4-9/16"*)
- ▶ Frame thickness is 3/4" at side jambs and head
- ▶ Sill thickness is 1-3/16"; slope is 14°
- ▶ Constructed of pine, with pine interior stops and wood mull casings on mull units
- ▶ Exterior wood parts are treated
- ▶ Extruded aluminum exterior finished with a 70% PVDF fluoropolymer coating (*meets performance requirements of AAMA 2605*)
- ▶ Energy efficient, insulating Solar Low-E glass
- ▶ Glazed to the interior with beveled wood glazing beads
- ▶ Wood interior head parting stop
- ▶ Clay-colored heavy duty Signature sash lock
- ▶ Spring-loaded block-and-tackle mechanical balances to carry the sash weight
- ▶ Concealed balance system
- ▶ Patented wood wrapped jambliner closure on the interior (*unless interior is prefinished white or primed, then jambliner will be white*) and extruded aluminum jambliner closure on the exterior hides the balance system
- ▶ Nailing fins with head drip caps*

Standard Features – XL Sterling Double Hung (*includes sterling double hung standard features, with the exception of the following substitutions:*)

- ▶ Overall jamb depth is 5" (*basic box depth is 5"*)
- ▶ Class 5 balances capable of carrying heavier loads

Options – Sterling Double Hung/XL Sterling Double Hung (*custom options are also available*)

- ▶ Class 5 balances** available for commercial specifications or larger units
- ▶ Extension jambs (*up to 12" applied, over 12" shipped loose for field application*)
- ▶ Segment head, cottage style segment head, half-circle top, and cottage style half-circle top units†
- ▶ Sash limiters for safety
- ▶ Galvanized steel installation clips
- ▶ Full or half aluminum insect screen with aluminum, BetterVue® or UltraVue® fiberglass mesh; retractable insect screen kit with beveled or square cover
- ▶ Factory-installed Window Opening Control Device (WOCD)
- ▶ High performance or impact performance modifications

[View Style Options & Technical Data ▶](#)

(Click to view hardware, glass, divided lites, finishes, and more, as well as performance and specification details.)

NOTE: All measurements are nominal.

* Standard only on units without brickmould.

** Not available on XL Sterling double hung.

† Units may not carry certification. See Kolbe dealer for details.

BetterVue® and UltraVue® are registered trademarks of PHIFER INCORPORATED.

Finish Options

Interior Wood Species

In addition to the standard pine, Ultra Series windows and doors can be constructed of other optional wood species that enhance their look. Pine and other wood species are sourced from managed forests. The Forest Stewardship Council® (FSC®)-certified wood species are also available for green building projects (FSC® license code FSC®-C019541).

Ask about the availability of additional wood species.



Interior Finishes

For units that are ready to install upon delivery, Kolbe's Ultra Series windows and doors can be prefinished on the interior with one of the water-based stains or paints shown. Stained units are given two coats of satin clear finish. Because our interior finishes are water-based, low-VOC stains and paints, you can rest assured you've made an environmentally conscious decision. Custom colors may be requested as well.



*Applied as a single coat of paint, with some visible wood grain.

Some options for our products may have limited color offerings or may incur a nominal charge. Check with your Kolbe dealer for further details on pricing and availability. Stain colors are shown on pine. Since no two trees are identical, wood can be expected to differ both in color and graining. These factors will influence the stain's final color. Printed images of wood species and stain options will vary from actual product colors. Selections should be made based on color samples available from your Kolbe dealer. Stain colors are shown on pine. A double coat clear finish is also offered. Since no two trees are identical, wood can be expected to differ both in color and graining. These factors will influence the stain's final color.

Color-matched interior paint is available through any Sherwin-Williams retail store in the United States and Canada. The color formula for Kolbe's interior paint finishes is in their National Account System.

Exterior Colors

Kolbe's Ultra Series products are finished with a 70% PVDF fluoropolymer coating, an ideal choice for durability and resistance to chemicals, abrasion, corrosion, and weathering. In addition to the standard palette, custom colors can be specified, as well as Anodized aluminum and Mica* fluoropolymer finishes.

					White	Cloud	Ultra Pure White	
					Abalone	Alabaster	Camel	
Mudpie	Nutmeg	Khaki	Sahara	Beige	Natural Cotton	Spiced Vinegar		
Gingersnap	Truffle	Bronze	Rustic	Shadow	Shale	Smokestack		
Corbeau	Eclipse	Tungsten	Steel Gray	Slate	Castlerock	Timberwolf		
Coal Black	Onyx	Midnight	Sapphire	Coastal Storm	Lunar	Emerald Isle		
Cider	Copper Canyon	Basil	Mystic Ivy	Mediterranean	Green Tea Leaf	Hartford Green		
Chutney	Roma	Maize	Custom Colors Available					
Galaxy Silver Mica*	Silverstorm Mica*	Cosmic Gray Mica*	Night Sky Mica*	Mica*	Anodized	Clear Anodized	Champagne Anodized	
						Black Anodized	Dark Bronze Anodized	

* Mica finishes are 70% PVDF fluoropolymer as standard. Fluoropolymer coatings meet performance requirements of AAMA-2605 and are recommended for coastal applications. Please see your Kolbe dealer for details.

Some options for our products may have limited color offerings or may incur a nominal charge. Check with your Kolbe dealer for further details on pricing and availability. Printed images of exterior finishes may vary slightly from actual colors. Selections should be made based on actual color samples available from your Kolbe dealer.

There is a "color range" with anodized colors. That is, there is an acceptable "light" to "dark" color range that can be experienced on any job. According to AAMA 611-98 specifications, Section 8.3, the range may be up to 5 Delta E's. We can provide from our anodized vendor color samples of this color range if requested. The color range is due to numerous variables which include (but are not limited to) the shape of the parts, alloy variations and time in the anodizing process. This could mean that a sash part may appear slightly different in color than a frame part. This is/will be acceptable. Even the samples that may be provided may vary from the final product due to the variables. You must be aware of this as this will be considered acceptable.

KOLBE
WINDOWS & DOORS

Ultra Series



We're for the visionaries.®

**We're for people
who take building
to new levels.**



We're for people who are passionate about design, who care about the big picture and the smallest detail. We're for people who aren't satisfied with mainstream choices... who push the limits of what's possible with the options and innovations that can only be found in Kolbe windows and doors.



© Dean J. Birinyi

We're for quality craftsmanship.

We're for a tradition of excellence that outlasts the latest design trend. The Kolbe story began with a family and a vision. More than 75 years after the Kolbe brothers began their commitment to producing premium quality windows and doors, products bearing their family name can be found in some of North America's most impressive homes and businesses.

We're for expertise.

We're for people who dream of a personalized design experience. That's why you can't find Kolbe windows and doors in the aisles of a home center. Our products are only available through a Kolbe dealer, because they are as passionate about windows and doors as you are about bringing your vision to life. And they will work with you to make your dream a concrete reality.



© Ema Peter Photography

We're for possibilities.

We're for people who won't settle for "standard." We're for limitless options and custom solutions that can only be found in Kolbe's made-to-order products. Our team members are craftspeople who focus on building one window or door at a time, to create distinctive products that fulfill your unique vision.

We're for innovation.

We're for people who want to take building to new levels, with advancements in not only extraordinary sizes and shapes, but also ground-breaking products. We're for creative thinking that redefines what's possible, constantly reimagining our windows and doors to elevate style, performance and functionality.



© Ema Peter Photography

**Let us bring
your vision
to life.**



Table of Contents

The Ultra Series	1	Direct Sets	19-21
Capabilities	2-7	Direct Sets	20
Style & Design Options	5-7	Corner Direct Sets	21
Casements	8-10	Specialty Windows	22-24
Crank-Out Casements	9	Radius Windows	23
Push-Out Casements	10	Geometric Windows	24
Awnings	11-13	Doors: Entrance to Expansive	25-31
Crank-Out Awnings	12	Swinging Doors	26
Push-Out Awnings	13	Pivot Doors	27
Double Hungs	14-15	Sliding Doors	28
Sterling Double Hungs	15	Multi-Slide Doors	29
Folding & Sliding Windows	16-18	TerraSpan® Lift & Slide Doors	30
Folding Windows	17	Folding Doors	31
Sliding Windows	18	Professional Tools	32





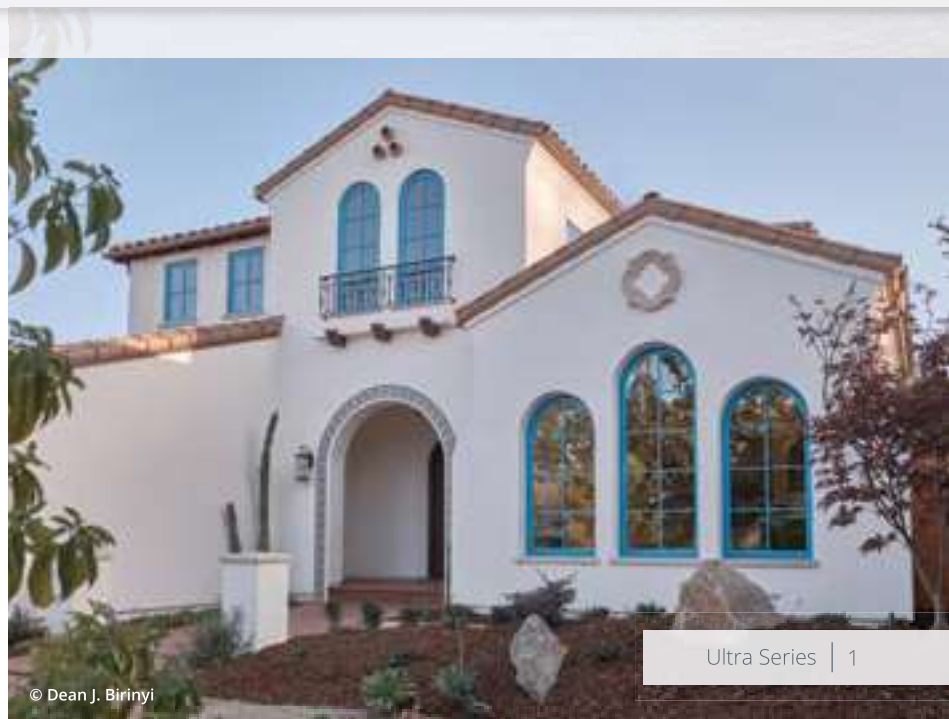
The Ultra Series

Designed for versatility, durability & performance – with an array of options.

Kolbe's Ultra Series windows and doors can mimic the traditional style of wood windows and doors with a warm wood interior and intricate exterior trim details, or it can accommodate modern design needs. Choose from an extensive palette of exterior colors, interior wood species, finishes, divided lite profiles, and more.

The Ultra Series provides:

- Durable extruded aluminum exterior in 50+ standard colors & finishes, plus custom hues
- Warm wood interior in familiar to exotic species, with 20+ standard pre-finishes, plus custom finishes
- Versatile styling, from traditional to modern architectural details
- Enhanced energy efficiency & impact performance options to meet climate demands
- Divided lite profiles & patterns
- Low-E, performance, & specialty glass
- Hardware options & finishes to match any décor
- Automation options for ease of operation





Capabilities

Craftsmanship and artistry are hallmarks of Kolbe products. We build innovative windows and doors with a wide array of options. But don't let the standard options limit your imagination.

At Kolbe, we love a good challenge. We welcome projects that require special wood species, custom divided lite patterns, unique shapes, custom finish colors, unusual mulling configurations – you dream it, we'll build it. Our windows and doors are built to order, so you can choose the options that best suit your design and vision. We offer multiple product lines with distinct characteristics and a full breadth of capabilities for customization and personalization.



Capabilities

Energy Efficiency

In addition to superior craftsmanship, Kolbe windows and doors offer superior performance. Our products undergo independent testing to ensure the highest quality available. Participation in the Window & Door Manufacturers Association (WDMA) Hallmark Certification and ENERGY STAR® programs ensures that our products are tested to industry standards, allowing them to meet and exceed today's stricter building codes and standards for energy efficiency.

Many of the Ultra Series products can also meet California's Title 24 Building Energy Efficiency Standards, as well as Passive House Institute US (PHIUS) verification. Kolbe's numerous products and glass options help meet these stringent energy efficiency requirements.



Sustainability

Whether building a new house or updating an existing one, thoughtful choices create enduring homes that are beautiful, comfortable and instill peace of mind. We prioritize resilient design, supported with durable materials and high-performance products.

Our wood species are renewable resources sourced from managed forests, and our standard glass contains 25-30% recycled content. We can also provide The Forest Stewardship Council® (FSC®)-certified wood species for many products (FSC® license code FSC®-C019541).



Kolbe demonstrates a commitment to providing accurate energy data by having products independently simulated, tested, inspected and listed in the NFRC certification program, and making that data available at kolbewindows.com and on window labels.

Energy performance data and air, water, structural data is updated on a continuous basis. For the most current information, contact your local Kolbe dealer.

International Code Council's International Property Maintenance Standards

I. Overview

The nation's model housing or property maintenance code is the [International Property Maintenance Code \(IPMC\)](#). The IPMC is managed by the International Code Council (ICC). Two states – New York and Virginia – and more than 600 local jurisdictions have adopted the IPMC with modifications.

The [International Code Council \(ICC\)](#) published the first edition of the *International Property Maintenance Code* in 1998. ICC's three charter members of the International Code Council – Building Officials and Code Administrators International, Inc. (BOCA), International Conference of Building Officials (ICBO) and Southern Building Code Congress International (SBCCI) – developed the IPMC as a comprehensive set of regulations for existing buildings that was consistent with the existing model property maintenance codes at the time.. A new edition is promulgated every three years.

The *International Property Maintenance Code* is founded on principles that the IPMC must:

1. Adequately protect public health, safety and welfare;
2. Not unnecessarily increase construction costs;
3. Not restrict the use of new materials, productions or methods of construction; and
4. Not give preferential treatment to particular types or classes of materials, products or methods of construction.

Adoption

The *International Property Maintenance Code* is available for adoption and use by jurisdictions internationally. Its use within a governmental jurisdiction is intended to be accomplished through adoption by reference. At the time of adoption, jurisdictions should insert the appropriate information in provisions requiring specific local information, such as the name of the adopting jurisdiction. These locations are shown in bracketed words in small capital letters in the code and in the sample ordinance.

To find out whether the *International Property Maintenance Code* or any of the other ICC Codes have been adopted in your community, go to www.iccsafe.org/government/adoption.html.

Maintenance

The *International Property Maintenance Code* is kept up to date through the review of proposed changes submitted by code enforcing officials, industry representatives, design professionals and other interested parties. Proposed changes are carefully considered through an open code development process in which all interested and affected parties may participate. The contents of the code are subject to change both through the Code Development Cycles and the governmental body that enacts the code into law. For more information regarding the code development process, contact the Code and Standard Development Department of the International Code Council.

While the development procedure of the *International Property Maintenance Code* assures the highest degree of care, ICC and the founding members of ICC—BOCA, ICBO, SBCCI—their members and those participating in the development of the code do not accept any liability resulting from compliance or noncompliance with the provisions because ICC and its founding members do not have the power or authority to police or enforce compliance with the contents of the code. Only the governmental body that enacts the code into law has such authority.

One advantage of the IPMC is this process of ongoing improvement. Communities that adopt the IPMC often simply update their code to incorporate the latest version of the IPMC. In contrast, most local codes do not have a regular process for improvement and refinement. These communities often lack the

resources to undergo a careful review and political factors lock in the existing code unless serious problems arise.

Relationship to Other ICC Codes

The *International Property Maintenance Code* complements and is fully compatible with all the *International Codes* ("I-Codes") published by the International Code Council (ICC), including the:

1. International Building Code;
2. ICC Electrical Code;
3. International Energy Conservation Code;
4. International Existing Building Code;
5. International Fire Code;
6. International Fuel Gas Code;
7. International Mechanical Code;
8. ICC Performance Code;
9. International Plumbing Code;
10. International Private Sewage Disposal Code;
11. International Residential Code;
12. International Urban-Wildland Interface Code; and
13. International Zoning Code.

All but three other states have adopted one or more of these model codes – most likely the International Building Code.

II. IPMC's Provisions Related to Healthy Homes

EXTERMINATION. The control and elimination of insects, rats or other pests by eliminating their harborage places; by removing or making inaccessible materials that serve as their food; by poison spraying, fumigating, trapping or by any other approved pest elimination methods.

HABITABLE SPACE. Space in a structure for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces, and similar areas are not considered habitable spaces.

INFESTATION. The presence, within or contiguous to, a structure or premises of insects, rats, vermin or other pests.

302.1 Sanitation. All exterior property and premises shall be maintained in a clean, safe and sanitary condition. The occupant shall keep that part of the exterior property which such occupant occupies or controls in a clean and sanitary condition.

302.2 Grading and drainage. All premises shall be graded and maintained to prevent the erosion of soil and to prevent the accumulation of stagnant water thereon, or within any structure located thereon.

302.5 Rodent harborage. All structures and exterior property shall be kept free from rodent harborage and infestation. Where rodents are found, they shall be promptly exterminated by approved processes which will not be injurious to human health. After extermination, proper precautions shall be taken to eliminate rodent harborage and prevent reinfestation.

304.2 Protective treatment. All exterior surfaces, including but not limited to, doors, door and window frames, cornices, porches, trim, balconies, decks and fences shall be maintained in good condition. Exterior wood surfaces, other than decay-resistant woods, shall be protected from the elements and decay by painting or other protective covering or treatment. Peeling, flaking and chipped paint shall be eliminated and surfaces repainted. All siding and masonry joints as well as those between the building envelope and the perimeter of windows, doors, and skylights shall be maintained weather resistant and water tight. All metal surfaces subject to rust or corrosion shall be coated to inhibit such rust and corrosion and all surfaces with rust or corrosion shall be stabilized and coated to inhibit future rust and

corrosion. Oxidation stains shall be removed from exterior surfaces. Surfaces designed for stabilization by oxidation are exempt from this requirement.

304.5 Foundation walls. All foundation walls shall be maintained plumb and free from open cracks and breaks and shall be kept in such condition so as to prevent the entry of rodents and other pests.

304.6 Exterior walls. All exterior walls shall be free from holes, breaks, and loose or rotting materials; and maintained weatherproof and properly surface coated where required to prevent deterioration.

304.7 Roofs and drainage. The roof and flashing shall be sound, tight and not have defects that admit rain. Roof drainage shall be adequate to prevent dampness or deterioration in the walls or interior portion of the structure. Roof drains, gutters and downspouts shall be maintained in good repair and free from obstructions. Roofwater shall not be discharged in a manner that creates a public nuisance.

304.14 Insect screens. During the period from [DATE] to [DATE], every door, window and other outside opening required for ventilation of habitable rooms, food preparation areas, food service areas or any areas where products to be included or utilized in food for human consumption are processed, manufactured, packaged or stored, shall be supplied with approved tightly fitting screens of not less than 16 mesh per inch (16 mesh per 25 mm) and every swinging door shall have a self-closing device in good working condition.

Exception: Screens shall not be required where other approved means, such as air curtains or insect repellent fans, are employed.

304.17 Guards for basement windows. Every basement window that is openable shall be supplied with rodent shields, storm windows or other approved protection against the entry of rodents.

305.1 General. The interior of a structure and equipment therein shall be maintained in good repair, structurally sound and in a sanitary condition. Occupants shall keep that part of the structure which they occupy or control in a clean and sanitary condition. Every owner of a structure containing a rooming house, housekeeping units, a hotel, a dormitory, two or more dwelling units or two or more nonresidential occupancies, shall maintain, in a clean and sanitary condition, the shared or public areas of the structure and exterior property.

305.3 Interior surfaces. All interior surfaces, including windows and doors, shall be maintained in good, clean and sanitary condition. Peeling, chipping, flaking or abraded paint shall be repaired, removed or covered. Cracked or loose plaster, decayed wood and other defective surface conditions shall be corrected.

307.1 Accumulation of rubbish or garbage. All exterior property and premises, and the interior of every structure, shall be free from any accumulation of rubbish or garbage.

308.1 Infestation. All structures shall be kept free from insect and rodent infestation. All structures in which insects or rodents are found shall be promptly exterminated by approved processes that will not be injurious to human health. After extermination, proper precautions shall be taken to prevent reinfestation.

308.2 Owner. The owner of any structure shall be responsible for extermination within the structure prior to renting or leasing the structure.

308.3 Single occupant. The occupant of a one-family dwelling or of a single-tenant nonresidential structure shall be responsible for extermination on the premises.

308.4 Multiple occupancy. The owner of a structure containing two or more dwelling units, a multiple occupancy, a rooming house or a nonresidential structure shall be responsible for extermination in the public or shared areas of the structure and exterior property. If infestation is caused by failure of an occupant to prevent such infestation in the area occupied, the occupant shall be responsible for extermination.

308.5 Occupant. The occupant of any structure shall be responsible for the continued rodent and pest-free condition of the structure.

Exception: Where the infestations are caused by defects in the structure, the owner shall be responsible for extermination.

403.1 Habitable spaces. Every habitable space shall have at least one openable window. The total openable area of the window in every room shall be equal to at least 45 percent of the minimum glazed area required in Section 402.1.

Exception: Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the unobstructed opening to the adjoining room shall be at least 8 percent of the floor area of the interior room or space, but not less than 25 square feet (2.33m²). The ventilation openings to the outdoors shall be based on a total floor area being ventilated.

403.2 Bathrooms and toilet rooms. Every bathroom and toilet room shall comply with the ventilation requirements for habitable spaces as required by Section 403.1, except that a window shall not be required in such spaces equipped with a mechanical ventilation system. Air exhausted by a mechanical ventilation system from a bathroom or toilet room shall discharge to the outdoors and shall not be recirculated.

403.4 Process ventilation. Where injurious, toxic, irritating or noxious fumes, gases, dusts or mists are generated, a local exhaust ventilation system shall be provided to remove the contaminating agent at the source. Air shall be exhausted to the exterior and not be recirculated to any space.

403.5 Clothes dryer exhaust. Clothes dryer exhaust systems shall be independent of all other systems and shall be exhausted in accordance with the manufacturer's instructions.

503.4 Floor surface. In other than dwelling units, every toilet room floor shall be maintained to be a smooth, hard, nonabsorbent surface to permit such floor to be easily kept in a clean and sanitary condition.

505.4 Water heating facilities. Water heating facilities shall be properly installed, maintained and capable of providing an adequate amount of water to be drawn at every required sink, lavatory, bathtub, shower and laundry facility at a temperature of not less than 110°F (43°C). A gas-burning water heater shall not be located in any bathroom, toilet room, bedroom or other occupied room normally kept closed, unless adequate combustion air is provided. An approved combination temperature and pressure-relief valve and relief valve discharge pipe shall be properly installed and maintained on water heaters.

602.2 Residential occupancies. Dwellings shall be provided with heating facilities capable of maintaining a room temperature of 68°F (20°C) in all habitable rooms, bathrooms and toilet rooms based on the winter outdoor design temperature for the locality indicated in Appendix D of the *International Plumbing Code*. Cooking appliances shall not be used to provide space heating to meet the requirements of this section.

Exception: In areas where the average monthly temperature is above 30°F (-1°C), a minimum temperature of 65°F (18°C) shall be maintained.

602.3 Heat supply. Every owner and operator of any building who rents, leases or lets one or more dwelling unit, rooming unit, dormitory or guestroom on terms, either expressed or implied, to furnish heat to the occupants thereof shall supply heat during the period from [DATE] to [DATE] to maintain a temperature of not less than 68°F (20°C) in all habitable rooms, bathrooms, and toilet rooms.

Exceptions:

1. When the outdoor temperature is below the winter outdoor design temperature for the locality, maintenance of the minimum room temperature shall not be required provided that the heating system is operating at its full design capacity. The winter outdoor design temperature for the locality shall be as indicated in Appendix D of the *International Plumbing Code*.

2. In areas where the average monthly temperature is above 30°F (-1°C) a minimum temperature of 65°F (18°C) shall be maintained.

603.2 Removal of combustion products. All fuel-burning equipment and appliances shall be connected to an approved chimney or vent.

Exception: Fuel-burning equipment and appliances which are labeled for unvented operation.

603.5 Combustion air. A supply of air for complete combustion of the fuel and for ventilation of the space containing the fuel-burning equipment shall be provided for the fuel-burning equipment.

603.6 Energy conservation devices. Devices intended to reduce fuel consumption by attachment to a fuel-burning appliance, to the fuel supply line thereto, or to the vent outlet or vent piping therefrom, shall not be installed unless labeled for such purpose and the installation is specifically approved.

607.1 General. Duct systems shall be maintained free of obstructions and shall be capable of performing the required function.

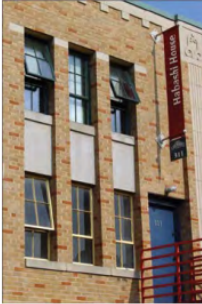
Standards for Preservation

1. A property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.
2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place and use. Work needed to stabilize, consolidate and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection and properly documented for future research.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color and texture.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

WINDOWS

RECOMMENDED	NOT RECOMMENDED
Installing sash locks, window guards, removable storm windows, and other reversible treatments to meet safety, security, or energy conservation requirements.	
Evaluating the overall condition of the windows to determine whether more than protection and maintenance, such as repairs to windows and window features, will be necessary.	Failing to undertake adequate measures to ensure the protection of window features.
Repairing window frames and sash by patching, splicing, consolidating, or otherwise reinforcing them using recognized preservation methods. Repair may include the limited replacement in kind or with a compatible substitute material of those extensively deteriorated, broken, or missing components of features when there are surviving prototypes, such as sash, sills, hardware, or shutters.	Removing window features that could be stabilized, repaired, or conserved using untested consolidants, improper repair techniques, or unskilled personnel, potentially causing further damage to the historic materials. Replacing an entire window when repair of the window and limited replacement of deteriorated or missing components are feasible.
Removing glazing putty that has failed and applying new putty; or, if glass is broken, carefully removing all putty, replacing the glass, and reputtying.	
Installing new glass to replace broken glass which has the same visual characteristics as the historic glass.	
Replacing in kind an entire window that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. If using the same kind of material is not feasible, then a compatible substitute material may be considered.	Removing a character-defining window that is unrepairable or is not needed for the new use and blocking up the opening, or replacing it with a new window that does not match. Using substitute material for the replacement that does not convey the same appearance of the surviving components of the window or that is physically incompatible.

WINDOWS



[21] The windows on the lower floor, which were too deteriorated to repair, were replaced with new steel windows matching the upper-floor historic windows that were retained.

WINDOWS	
RECOMMENDED	NOT RECOMMENDED
Modifying a historic single-glazed sash to accommodate insulated glass when it will not jeopardize the soundness of the sash or significantly alter its appearance.	Modifying a historic single-glazed sash to accommodate insulated glass when it will jeopardize the soundness of the sash or significantly alter its appearance.
Using low-e glass with the least visible tint in new or replacement windows.	Using low-e glass with a dark tint in new or replacement windows, thereby negatively impacting the historic character of the building.
Using window grids rather than true divided lights on windows on the upper floors of high-rise buildings if they will not be noticeable.	Using window grids rather than true divided lights on windows in low-rise buildings or on lower floors of high-rise buildings where they will be noticeable, resulting in a change to the historic character of the building.
Ensuring that spacer bars in between double panes of glass are the same color as the window sash.	Using spacer bars in between double panes of glass that are not the same color as the window sash.
Replacing all of the components in a glazing system if they have failed because of faulty design or materials that have deteriorated with new material that will improve the window performance without noticeably changing the historic appearance.	Replacing all of the components in a glazing system with new material that will noticeably change the historic appearance.
Replacing incompatible, non-historic windows with new windows that are compatible with the historic character of the building; or reinstating windows in openings that have been filled in.	
<i>The following work is highlighted to indicate that it is specific to Rehabilitation projects and should only be considered after the preservation concerns have been addressed.</i>	
Designing the Replacement for Missing Historic Features	
Designing and installing a new window or its components, such as frames, sash, and glazing, when the historic feature is completely missing. It may be an accurate restoration based on documentary and physical evidence, but only when the historic feature to be replaced coexisted with the features currently on the building. Or, it may be a new design that is compatible with the size, scale, material, and color of the historic building.	<p>Creating an inaccurate appearance because the replacement for the missing window is based upon insufficient physical or historic documentation, is not a compatible design, or because the feature to be replaced did not coexist with the features currently on the building.</p> <p>Installing replacement windows made from other materials that are not the same as the material of the original windows if they would have a noticeably different appearance from the remaining historic windows.</p>

WINDOWS

RECOMMENDED	NOT RECOMMENDED
<p>Replacing in kind an entire window from the restoration period that is too deteriorated to repair (if the overall form and detailing are still evident) using the physical evidence as a model to reproduce the feature or when the replacement can be based on historic documentation. If using the same kind of material is not feasible, then a compatible substitute material may be considered. The new work may be unobtrusively dated to guide future research and treatment.</p>	<p>Removing a window from the restoration period that is unrepairable and not replacing it, or replacing it with a new window that does not match.</p> <p>Using substitute material for the replacement that does not convey the same appearance of the surviving components of the window from the restoration period or that is physically incompatible.</p>
<p><i>The following Restoration work is highlighted to indicate that it involves the removal or alteration of existing historic masonry features that would be retained in Preservation and Rehabilitation treatments; and the replacement of missing window features from the restoration period using all new materials.</i></p>	
Removing Existing Features from Other Historic Periods	
<p>Removing windows or window features from other historic period, such as the glazing pattern or inappropriate shutters.</p>	<p>Failing to remove a window or window feature from another period, thereby confusing the depiction of the building's appearance from the restoration period.</p>
<p>Documenting window features dating from other periods prior to their alteration or removal. If possible, selected examples of these features or materials should be stored for future research.</p>	<p>Failing to document window features from other historic periods that are removed from the building so that a valuable portion of the historic record is lost.</p>
Recreating Missing Features from the Restoration Period	
<p>Recreating a missing window or window feature that existed during the restoration period based on documentary and physical evidence; for example, duplicating a hoodmold or shutter.</p>	<p>Constructing a window feature that was part of the original design for the building but was never actually built, or constructing a feature which was thought to have existed during the restoration period but cannot be documented.</p>

From: Mark Wernimont <mwernimont@colosash.com>
Sent: Wednesday, August 22, 2018 6:49 AM
To: Karen McWilliams <KMCWILLIAMS@fcgov.com>
Cc: Dawn Oglesby <dawn@oglesby-design.com>; Stephani Unfug <sunfug@dohnconstruction.com>
Subject: Windows at 201 Linden

Karren,

As you may have noticed we have put back the sash in the 2nd and 3rd floor of the Linden Hotel. The owners wanted to have the building, at least from the exterior, looking not under construction but more complete for all the functions going on downtown this summer. This is good as it has given everyone a chance to see and operate the restored windows early on in the process. One of the area's that is of concern is the three windows that are in the prominent corner of the building on both floors. As it looks, the window jambs seem to be supplying most of the structural support to this area. The framing is a little suspect, but we just replaced the broken jambs as needed. For all the other windows we have done the work as outlined in our write up that I believe you had seen. This is similar to what we had done for the Northern Hotel years back. This work included removing the sash, taking to our shop and adding a second pane of glass to the inside to help with thermal issues and sound control. We also have added weather stripping on the lower operable sash at the check rail, bottom rail and to the sides. The remaining frames, since they were worked on in the late 90's got just a scrape, prime and paint. The conditions of the sill, brickmould and frame remained other than a few jambs as noted in the corner units.

Based on the weight of the sash now being doubled by the extra glass, we needed to change the balance system from the ropes and weights to something else. We were limited due to the thickness of the sash being only 1 3/8", and the original windows were hung off 1/4" rope with pulleys. This is the thickness of a normal house sash and not what we find for windows in commercial buildings or openings of this size even in some homes. With this we did not have the room for the larger weights, or the correct pulleys to use chain. Our option was to use a spiral balance. This allowed us to insulate the weight pockets which has helped with both air infiltration, thermal performance and sound control. However, based on the size the sash with the second layer of glass, the sash now weigh almost 60#'s on the 3rd floor and 55#'s on the 2nd floor. We have installed balances that can be adjusted to take up to 35# each (a pair per sash) however with this, when they are adjusted so the sash lifts easily they are almost impossible for the owners to close. If we adjust the other way they close easily but are almost impossible to open. I had felt that we could make this option perform ok for the application, however this is not the case.

So after several weeks of adjusting and talking we would like to sit down and have a conversation with you as to what our options could be. I have taken the architect and owners rep to the windows we installed at the Empire Grange that are similar sized to these. We have recently used this same system for the new windows at Ginger and Baker, the original structure of the Washington's Music Building as well as the double hung windows in the Music District Building. As we have demonstrated in the past, we can match the details of the windows and can get the sight lines down to match the original windows. We can provide the units as all wood windows, factory prefinished in the correct color. The balance system is fully hidden and based on this there is a double balance system on each side so the operation is something that can work. With this we can also re-frame the corner units to support everything from the roof down to the covering below the floor and not rely on the window jambs to do this work.

I have been asked to set up a meeting later this week or early next week so that we can sit down and talk through our options. We do have a short window as the owners rep is leaving next Thursday and I as well as the architect are out from September 3rd thru the 11th. So if you can check your schedule and find 30/60 min of time for us, I would appreciate it. As usual, cell phone and e-mails get to me the quickest so let me know when we could meet.

Thanks

Mark Wernimont



Colorado Sash & Door, Inc.
4521 Endeavor Drive, Unit C
Johnstown, Colorado 80534
(970)226-1460 office
(970)402-2623 cell



July 1, 2019

City of Fort Collins
Landmark Preservation Office
201 North College Avenue
Fort Collins, Colorado 80521

Attn: Karen McWilliams
Re: 201 Linden – Historic Windows

Karen,

After talk with the owners, contractor and design staff they have asked Colorado Sash & Door, Inc. to propose the following work on the historic windows on the Linden and Walnut Street side of 201 Linden. We are proposing that we remove the sash from the openings, probably in groups of 3 to 6 openings at a time and install temporary protection, material to be determined. Take the sash to our shop and remove the RDG panel installed prior. Remove the interior finish to expose the raw wood and install a replica wood part to rebuild the sash profile. Fill in the groove in the lower sash for the spiral balance. Once the sash has been repaired, we will review any exterior putty glazing or finish that needs attention and replace and paint as needed. The interior will be primed and painted the same black to match the work done to the frames.

The existing metal sill covers will be replaced where removed. No other real work would be done on the frame other than re-installing the parting stop and interior stops. The weight pocket will be left insulated and we will install tape balances in the pocket of the original pulleys. The wood stop to limit operation will be again installed so that sash opens 16" +/- . All pockets for pulls will be filled in the shop and finger lifts similar to the photo would be installed to clear the new wood sills being installed. We will use the brush and leaf weather stripping as in the current mock up and install sash locks and receivers using what originals we have and similar reproduction as needed.

Page Two

Attached with this letter are sections of the upper and lower sash, as well as photographs that point out all the changes to be made to the sash. If you have any questions or need some additional information please let us know.

Respectfully

Mark J. Wernimont
President
Colorado Sash & Door, Inc.

Mark Wernimont

From: Karen McWilliams <KMCWILLIAMS@fcgov.com>
Sent: Wednesday, July 10, 2019 3:43 PM
To: Stephani Unfug; Maren Bzdek
Cc: Jeff Johnson; Mark Wernimont
Subject: RE: 201 Linden - LPC Cancelled Meeting
Attachments: Re: Window Sash Work - 201 Linden (10.2 KB)

Hi, Stephani – I apologize, I did not realize that there was an expectation on your part that the window repairs would be on the July meeting or I would have informed you of the cancellation when it occurred. I received the submittal from Mark on July 2, after the meeting deadline. However, upon my quick scan of the proposed work at that time, it appeared that the work likely meets the Standards and is straightforward enough that it could be reviewed at the staff level, rather than at an LPC meeting. I'll be able to confirm this later this week, once I get a few other reviews completed and can turn my attention to this.

If the proposed work does need to proceed to the LPC for review, either because of the nature of the work or if there is an appeal of the staff decision, the submittal deadline for the August LPC meeting is Monday, July 29. The August LPC work session would be on August 14, and the meeting itself on August 21. - Karen

Karen McWilliams
Historic Preservation Manager | City of Fort Collins
kmcwilliams@fcgov.com | 970.224.6078

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From: Stephani Unfug <sunfug@dohnconstruction.com>
Sent: Wednesday, July 10, 2019 2:46 PM
To: Karen McWilliams <KMCWILLIAMS@fcgov.com>; Maren Bzdek <mbzdek@fcgov.com>
Cc: Jeff Johnson <jjohnson@dohnconstruction.com>
Subject: 201 Linden - LPC Cancelled Meeting

Karen –
Following up on my voicemail.
I was made aware the LPC meeting for this month has been cancelled.
I am concerned as to what this means for the review of our submission for the windows at 201 Linden.

Thank you,



Stephani Evans | Project Manager
Dohn Construction, Inc.
o 970.490.1855 | f 970.490.6093 | m 970.305.0914
2642 Midpoint Drive | Fort Collins, CO | 80525
sunfug@dohnconstruction.com

www.dohnconstruction.com



Mark Wernimont

From: Karen McWilliams <KMCWILLIAMS@fcgov.com>
Sent: Friday, July 12, 2019 5:39 PM
To: Mark Wernimont; 'Stephani Unfug'; Maren Bzdek
Cc: 'Jeff Johnson'
Subject: RE: 201 Linden - LPC Cancelled Meeting

Hi, all – Just to let you know that I've completed my review of Mark's proposed work to repair and restore the windows, and find that the work meets the Standards in Chapter 14, Article IV of the Municipal Code, including the Secretary of the Interior's Standards and the Old Town Design Standards, and that the work will substantially restore the windows to their prior condition without causing further damage. I'll send you an electronic copy of my report on Monday, and mail the official copy with the Certificate of Appropriateness.

Unless appealed, this is a final decision, and the application does not need to go to the LPC. However, because of the controversy surrounding the original work, I think it would be good public relations to report back to the LPC on staff's decision, and have Mark present (and other team members if desired). This would likely occur at the LPC's August 21 regular meeting. Do you wish to do this?

Have a good weekend. - Karen

Karen McWilliams
Historic Preservation Manager | City of Fort Collins
kmcwilliams@fcgov.com | 970.224.6078

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From: Mark Wernimont <mwernimont@colosash.com>
Sent: Friday, July 12, 2019 7:33 AM
To: Karen McWilliams <KMCWILLIAMS@fcgov.com>; 'Stephani Unfug' <sunfug@dohnconstruction.com>; Maren Bzdek <mbzdek@fcgov.com>
Cc: 'Jeff Johnson' <jjohnson@dohnconstruction.com>
Subject: RE: 201 Linden - LPC Cancelled Meeting

Karen,

I am back in town, so if you have some questions just let me know.

Thanks
Mark Wernimont

From: Karen McWilliams [<mailto:KMCWILLIAMS@fcgov.com>]
Sent: Wednesday, July 10, 2019 3:43 PM
To: Stephani Unfug; Maren Bzdek
Cc: Jeff Johnson; Mark Wernimont
Subject: RE: 201 Linden - LPC Cancelled Meeting

Hi, Stephani – I apologize, I did not realize that there was an expectation on your part that the window repairs would be on the July meeting or I would have informed you of the cancellation when it occurred. I received the submittal from

Mark on July 2, after the meeting deadline. However, upon my quick scan of the proposed work at that time, it appeared that the work likely meets the Standards and is straightforward enough that it could be reviewed at the staff level, rather than at an LPC meeting. I'll be able to confirm this later this week, once I get a few other reviews completed and can turn my attention to this.

If the proposed work does need to proceed to the LPC for review, either because of the nature of the work or if there is an appeal of the staff decision, the submittal deadline for the August LPC meeting is Monday, July 29. The August LPC work session would be on August 14, and the meeting itself on August 21. - Karen

Karen McWilliams
Historic Preservation Manager | City of Fort Collins
kmcwilliams@fcgov.com | 970.224.6078

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From: Stephani Unfug <sunfug@dohnconstruction.com>
Sent: Wednesday, July 10, 2019 2:46 PM
To: Karen McWilliams <KMCWILLIAMS@fcgov.com>; Maren Bzdek <mbzdek@fcgov.com>
Cc: Jeff Johnson <jjohnson@dohnconstruction.com>
Subject: 201 Linden - LPC Cancelled Meeting

Karen –
Following up on my voicemail.
I was made aware the LPC meeting for this month has been cancelled.
I am concerned as to what this means for the review of our submission for the windows at 201 Linden.

Thank you,



Stephani Evans | Project Manager
Dohn Construction, Inc.
o 970.490.1855 | f 970.490.6093 | m 970.305.0914
2642 Midpoint Drive | Fort Collins, CO | 80525
sunfug@dohnconstruction.com

www.dohnconstruction.com



From: David Diehl <david@onesevenadvisors.com>

Sent: Friday, June 21, 2024 9:25 AM

To: Havelda, Claire NL. <chavelda@bhfs.com>; Mark Wernimont <MWernimont@colosash.com>; Mark Wimmer (markwwimmer@msn.com) <markwwimmer@msn.com>

Subject: FW: 201 Linden

David Diehl

OneSeven Advisors, LLC | 148 Remington Street, Suite 100, Fort Collins, CO 80524 | 970.416.1222 office
| 970.420.8897 cell

From: Tom Leeson <tleeson@fcgov.com>

Sent: Wednesday, February 26, 2020 4:58 PM

To: David Diehl <david@onesevenadvisors.com>

Cc: sevans@dohnconstruction.com; jjohnson@dohnconstruction.com; markwwimmer@msn.com; Darin Atteberry <DATTEBERRY@fcgov.com>; Jeff Mihelich <jmihelich@fcgov.com>; Caryn M. Champine <cchampine@fcgov.com>

Subject: 201 Linden

Dear David – thank you for taking the time to meet with Darin and me at the 201 Linden building. I enjoyed meeting you and Mark, and I appreciate having the opportunity to see the window issue first hand.

I wanted to let you know that I had the opportunity meet with Karen McWilliams to look closely at the code language that regulates proposed alterations to designated historic resources. The code language states that a Certificate of Appropriateness is required for “exterior alterations, including windows and siding replacement...” I interpret this to mean that if you are not proposing to “replace” the windows, that a Certificate of Appropriateness is not required. Therefore, a Certificate of Appropriateness is not required and you may proceed with the alterations to the windows as proposed.

The initial interpretation that a Certificate of Appropriateness was needed was based upon the request for replacement and the concern that the work that was done to the windows may have resulted in weakening their structural integrity. To address this request, the City hired a windows expert who developed a workable solution for repairs meeting the Secretary of Interior Standards. That solution remains available to you for future implementation.

Also, it should be noted that if individual owners of the residential units want to replace the windows in the future, review by the Landmark Preservation Commission and a Certificate of Appropriateness will be required.

Good luck with the project and please let me know if you have any questions.

Cheers,

Tom Leeson, AICP

Community Development and Neighborhood Services Director

City of Fort Collins

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Table of Contents:

1. Project Introduction
2. Window Construction, Composition, and History
3. Window Condition Summary
4. Window Inventory
5. Treatment Recommendations
 - a. Prioritized and according to Standards
 - b. Balancing systems
 - c. Interior panes
 - d. Interior storms
 - e. Paint
 - f. Structural condition
 - g. Weatherstripping
 - h. Storm Windows
6. Cost Estimates
7. Summary
8. Photos



1. PROJECT INTRODUCTION

Summary of Report

The following report is intended to provide a comprehensive assessment of the existing historic wood windows at the 2nd and 3rd stories of the building at 201 Linden Street in Fort Collins. Numerous studies have been performed in the past, and this report is intended to respond to the cumulative work that has been done to the windows over time with the goal of providing recommendations for future work. In this report will be found current information on condition (including photos) as well as recommendations for ways that the window systems could become more operable and energy efficient while pertaining to the Secretary of the Interior's Standards. Finally, cost estimates associated with the recommended work are included.

Past Window Studies and Documents

The following previous reports have been reviewed as part of the process, and information from these reports integrated into the overall understanding of the window systems:

- 2005 Window Study performed by Edge Architecture
- 2018 Window Evaluation by Barlow Cultural Resource Consulting LLC (BCRC)
- 2024 Window Assessment performed by Colorado Sash and Door, Inc.

The 2018 study by Barlow Cultural Resource Consulting is particularly well written and very accurately documents most of the concerns that are present today. We recommend referencing this earlier report for specific window terminology and additional detail on some of the items noted in this report.

It is understood that the recent interest in further assessing the windows is partly due to an incident on 10/21/23 in which a pane of glass fell from one of the historic units to the sidewalk below. The incident report from Poudre Fire Authority from that date has also been reviewed.

Goals of Window Assessment

The following factors have been factored in as items that are understood to be top priorities with any future work on the windows. The report will dive into all of these factors:

- Maintain and solidify safety for users and passersby
- Adhere to local historic district guidelines and the Secretary of the Interior's Standards
- Maintain and improve upon aesthetics of the windows
- Improve upon the operability of the windows
- Improve upon energy efficiency
- Limit future costs, both related to initial work and ongoing operations costs

2. WINDOW CONSTRUCTION, COMPOSITION AND HISTORY

Original Window Construction

All of the windows involved with this study are traditionally built historic wood windows. As such, they entail pegged joinery between the stiles and rails and feature single pane glass. The original windows featured weight pulleys and weight pockets in the walls. Whereas most historic wooden commercial windows tend to be 1 3/4" thick, the windows are thinner at 1 3/8" thick, more consistent with residential windows from that era. The window openings are unusually large in their size when it comes to the surface area of the glazing. Glass would have been originally glazed in with traditional window glazing putty. It is unclear whether the original window featured any form of weatherstripping at the window jambs, due to the significant alterations that have been carried out since that time.

Current Window Construction

Although the overall construction of the window sashes themselves has not been modified greatly towards their overall construction, significant changes were made to the overall window systems during the previous work. Details of the current window system can be found below:

Window Construction – The original construction of the sashes remains unchanged with pegged joinery between stiles and rails. However, two major changes were made in the 2018 renovation work to remove material from the sashes. One of these alterations is the routing of the interior profile of the window sashes to receive interior glass panels, inset and clipped to the interior faces of the window sashes. The second change is removal of fairly significant amounts of material along the sides of the window to allow for the installation of the spiral balances.

Glazing – As originally constructed, the windows still have single pane glazing glazed in with putty. The most recent restoration work features more modern petroleum-based glazing putty. The secondary interior glass panes (noted above) have been added to create a dual pane concept (See page 12 of the 2018 BCRC report). Throughout the remainder of the report, you will find these panels noted as “RDG panels” as they have been in the 2024 window study by Colorado Sash and Door, Inc.

Balancing Systems – The original pulley and counterweight system was removed in the 2018 renovation work and all balancing systems were replaced with spiral balances along the window jambs. An additional trim piece has been added at most jambs to hide the locations of the mortises for the pulleys. Accounts from the site management have indicated that the weight pockets for the original balancing system have been filled with insulation.

Weatherstripping – As part of the 2018 work, modern weatherstripping was added along the jambs, meeting rail, and at the bottom of the lower sash. This weatherstripping is routed into the sashes. In addition, weatherstripping was routed into new interior stop, making contact with the lower sash.

3. WINDOW CONDITION SUMMARY

Window Condition

There are some significant concerns with the condition of the windows. A wide range of deficiencies appear to have contributed to a system that has very limited operability and has energy efficiency concerns due to heavy air infiltration and due to the lack of a storm window system at most openings. In Addendum B, there are photos showing the common areas of deficiency.

As a general commentary, the areas of concern and areas of deficit flagged in the 2018 report by Barlow Cultural Resource Consulting remain consistent with what is seen on site today. This report should be referenced for additional close-up photos when some windows were removed from their openings, as well as close-up photos that are still very much indicative of current conditions. Since the time of the BCRC study, it is evident that paint, and wood areas where paint has partially or fully failed, have continued to deteriorate. The positioning of the RDG panels appears to have gotten worse over time as well. We agree with all of the findings related to the window condition found in that report, and also recognize the role of the 2018 work in weakening the current window sashes.

The primary deficiencies visible and evident at this time include the following:

- Heavy air infiltration mostly due to large gaps where parting stop and meeting rails meet
- Loose, missing, mis-sized and damaged interior RDG panels
- Decreased operability partly due to addition of weight of interior RDG panels
- Compromised structural integrity to sashes due to removal of material for spiral balances and weatherstripping
- Structural failures focused primarily at meeting rails
- Limited energy efficiency due to large single pane glass with no storm window units
- Paint failure associated with necessary routine maintenance and/or product failure

Window Condition – Sashes

As has been very accurately documented in the 2018 BCRC report, much of the deficiencies on the sashes themselves were introduced during the work in 2018. Most of this lends itself to the large amount of material required to be removed in going to the spiral balance system and well as introducing grooves for the modern brush pile weatherstripping. With such limited thickness on the sash to work with (1 3/8”), many sashes have only a slight amount of wood left, and if these areas of limited material have not already failed through use, they would be expected to do so in time. Other elements of deficiency owe themselves to workmanship as well.



Window Condition – Balancing System

It is unknown how much use the windows have gotten with the spiral balance system but there are several openings where these balances have either failed or been removed. In our window restoration experience, we have seen numerous instances where these systems are being removed, being less than 30 years old due to concerns of operability and due to the concerns above where they have weakened window sashes and created areas for heavier air infiltration. With so many openings at 201 Linden Street having been caulked and painted shut, it is challenging to gauge the true condition at each opening. In general, however, these balances do not have a strong track record or reputation within the window restoration community.

Window Condition – Window Frames

For the most part, the window frames (jambs/ sills/ trim etc.) are in relatively good condition and just suffer a bit from lack of maintenance in the last few years. The exteriors are due for revisiting the exterior painting with paint flaking and failure along the bottom sections of the frames as is typical, as well as at some of the sills. Although some epoxy repair may be required at sills and a few jambs, the condition is relatively consistent with what we see with application of modern latex paint.

Window Condition - Broader Analysis

In assessing any window system, we recognize that there are a series of factors which contribute to the usability, efficiency, and integrity of the windows. In addition to aesthetics and maintaining the structural integrity of windows, it is typically quite important for the systems to be both operable and as energy efficient as they can be. The categories noted below are all factors in this assessment. As with most projects, these factors appear to remain of high importance to the various stakeholders involved with this project. To paint an initial broad picture, we have rated each category as it relates to the current windows, according to the following scale: Great, Good, Fair, Poor, Extremely Poor. In addition, it is noted whether it would require minor or major adjustments to make substantial improvements to each category. Notes on the efforts to improve upon each item will be found in the “Treatment Recommendations” section of this report.

<u>Category</u>	<u>Rating</u>	<u>Adjustments Needed</u>
Safety	Poor as long as RDG panels remain in place	Minor
Structural Integrity	Fair	Major
Exterior Aesthetics	Good to Fair	Minor
Historic Integrity	Fair to Poor	Major
Operability	Fair	Major
Energy Efficiency	Poor	Major
Projected Future Costs	Fair	Major



Safety

Any window system must have safety as the primary factor. In our opinion, the presence of the interior RDG panels pose the greatest risk. With many of these panels loose and misplaced, these panels pose a significant hazard to passersby. The clips retaining them appear to be undersized for the weight of the panels and without an exterior storm window system, these will always have the possibility of coming loose, potentially shattering and finding their way to the sidewalk below. In addition, structural deficiencies evidenced in many of the meeting rails of the window sashes could lead to complete failure and the single pane glass to fall. The addition of the RDG panels has added substantial weight to the existing sashes, with materials removed so that they could be installed, putting further stresses on all window components especially the upper meeting rails.

Structural Integrity

A number of items have decreased the structural integrity of the window sashes. When the 2018 work was done, significant material was removed from the sides of the windows to shift to the spiral balance system. As documented in the report from Barlow Cultural Resource Consulting and through observations on site, this has reduced many areas to a very small amount of material remaining along the edges of the windows. The same routing for this system also extended to the bottom of the lower sash, further weakening the joinery of the window. Lastly, routing of the profiled area of the windows has further removed material from already thin sashes compared to most commercial sashes from their era.

With glass appearing not to have been fully pulled and re-set into a new bed of putty in the 2018 round of restoration work, it also casts some doubt over the ongoing structural integrity over time. Under typical Class III restoration, this glass would be removed and joints restored. Additionally, the re-establishment of a new putty bed to set the glass into helps to firm up all joints and prevent movement of the glass. We cannot say for sure that this work did not occur previously, but based on site conditions, it does appear that the existing sashes will continue to deteriorate faster structurally compared to others that have undergone a true Class III restoration.

Exterior Aesthetics

The current windows leave some to be desired for aesthetics but overall are in relatively good condition. The three main deficiencies would be related to deterioration of glazing putty, paint, and aesthetics of glazing putty repairs. The most serious item would be deteriorated glazing putty, as this will continue to allow moisture to get back to the window sashes in areas where failure is occurring. In that sense, the aesthetic issue can quickly turn into a structural issue as water leads to future rot. The painting maintenance required is relatively consistent with what would be expected knowing that it was last painted 8 years ago, with different openings and elevations featuring greater degradation than others. The larger aesthetic item would be the varying aesthetics of glazing putty. As documented in Barlow's report as well, many areas have poorly applied glazing with ragged edges.

It is unknown what quality of paint was used on the windows but some of the degradation may lend itself to product selection. The glazing repairs were done with a readily available petroleum-based glazing putty whereas we would always recommend a traditional linseed oil-based putty for greater longevity.

Historic Integrity

Although the historic window sashes were maintained in the 2018 work, damage was done in that round of work towards the historic integrity of the system as a whole. The major damage done to the sashes themselves was the alteration to the interior profile to accommodate the RDG panels, as well as the removal of material for the spiral balances and weatherstripping. Looking at the system as a whole, the shift from a pulley weight system to spiral balances was also a significant shift, and one that compromises the historic integrity of the system as it stands now.

Operability

For window operability, it is assumed that all windows were operable via spring balances when the 2018 phase of work was completed. Some of the spring balances have been removed since that time or were observed as having failed. Other sashes have been caulked and painted shut making them inoperable. Some of the interior plexiglass panels were removed to do the window inspection but not all windows were checked for operation. Instead, some assumptions have been made based on the visual inspections of the spring balances and whether or not sashes have been caulked and painted in. In observing the status of the RDG panels, many of which are either loose, missing or jarred loose, site conditions appear consistent with the feedback that has been received that operability of most (if not all) windows has been challenging.

Energy Efficiency

Further studies and research would need to be conducted to truly gauge the energy efficiency of the current windows, but the air infiltration issue is a glaring problem. It is clear that the large gaps between the parting stop and meeting rails are allowing for an unusually large amount of air to enter the building. We believe this issue sparks from the original parting stop having been oversized from what was reinstalled in 2018 resulting in the opening of these gaps. Settling of window opening, particularly at the turret area of the building have also been contributors.

It is unclear and undetermined how much value the interior RDG panels are contributing towards energy efficiency. Operating under the storm window premise where more air space left between storm windows and the window sashes can lead to higher efficiency levels, this would indicate that these panels may be doing a relatively small amount towards increased efficiency.

The number one deficiency that we can identify in the system as a whole is the lack of storm windows at most window openings. Addition of storm windows remains the most effective and most dramatic way to increase the efficiency of historic windows.



Projected Future Costs

As always, we encourage stakeholders in any project to look at costs over time, rather than initial costs of any work to windows. Ongoing operating costs, or future replacement costs can be huge factors and must be considered. In assessing the financial “condition” of the current windows, we would encourage the group to think of that as projected costs over time. We have noted this category as “fair” since there may be some fairly economical ways to create some improvements to the system, but there is higher likelihood of substantial cost being required over time to get to a truly lasting product.

4. WINDOW INVENTORY

Addendum A of this report features inventory sheets for each relevant historic window at the 2nd and 3rd stories. The numbering system used aligns with that used in the 2018 study by Barlow Cultural Resource Consulting LLC, and their elevation graphic has been included below as an initial guide prior to the inventory sheets.



Image 23: Linden Street Elevation

Numbering system for window inventory, credit: 2018 report by Barlow Cultural Resource Consulting LLC



Image 24: Walnut Street Elevation

Numbering system for window inventory, credit: 2018 report by Barlow Cultural Resource Consulting LLC



Image 25: Corner of Linden and Walnut

Numbering system for window inventory, credit: 2018 report by Barlow Cultural Resource Consulting LLC

5. TREATMENT RECOMMENDATIONS

This section will lay out particular routes that the client may take to improve upon the current windows. In relation to the same categories highlighted in Section 3 of this report, each of those categories have been factored into the equation towards recommendations. You will find a brief synopsis below on how those categories will be embodied in proposed solutions:

Safety

To make safe the windows, our recommendation would be to remove the RDG panels or secure in a more substantial fashion. Additionally, any and all concerns on the structural integrity of window joints, particularly those are at the upper meeting rails, should be fully addressed through rail and/or stile replacement.

Structural Integrity

As noted above, any areas demonstrating failure or potential imminent failure should have the window components replaced at a minimum to prevent any failure and subsequent falling of glass.

Exterior Aesthetics

The primary area of focus for exterior aesthetics would be addressing both the glazing compound and paint. Glazing repairs can be accomplished through “spot glazing” in which only select areas are removed and glazed back in with a compatible and appropriate putty.

Historic Integrity

To re-establish the historic integrity of the windows, we will lay out a few scenarios that will work towards that aim. One would be to substantially strengthen the windows through dutchmen repair and the introduction of a different balancing system such as a tape balance system. Alternatively, we would recommend the reproduction of the windows in a historically appropriate fashion, to be detailed below.

Operability

We believe the restoration and/or reproduction strategies proposed below will improve greatly upon operability. We also believe that removal of the RDG panels to lighten the window sashes once again will aid in this effort.

Energy Efficiency

Addressing the gaps at the meeting rail and parting stop, as well as the addition of storm windows are proposed solutions to create improvements in this area.

Projected Future Costs

We are looking at the window on this building through the “best value” lens, over a period of time. Solutions that provide a 50 year plus product are what the collective team should be shooting for to limit the costs over time. When looking at it in this way, there are very few routes to ensure that, with true authentic reproduction, and full Class III restoration work being two such ways.



Potential Treatment Scenarios:

There are several routes that could be taken to improve the existing window systems, listed below. In Addendum C, one can also find further information regarding the storm windows that are proposed.

The proposed strategies would be:

- Option A Make safe the windows and increase measures against air infiltration
- Option B Substantially rebuild existing sashes and shift system to a tape balance balancing system
- Option C Fix current upper sashes and reproduce operable lower sashes utilizing tape balance system
- Option D Full window reproduction
- Option E Replace with manufactured modern product
- Option F Add exterior wood storm/ screen combination units to any of the proposed treatments
- Option G Add exterior aluminum storm/ screen combination units to any of the proposed treatments

The following scope of work would be involved with each scenario:

Option A: Make safe windows and increase measures against air infiltration

- Either remove RDG panels (Preferred)
 - o OR install more substantial retaining clips that would successfully prevent any of the panels from slipping out and falling over time
- If panels are to be removed, change lower sashes to tape balance balancing system for much longer longevity vs. spiral balances
 - o OR changing of spiral balances to accommodate lighter window sashes
- Address any of the windows demonstrating failure of joints (primarily upper meeting rail joints) through replacement of these window components and restoration of those sashes
- Replace all parting stop with properly sized stop that will close air infiltration gaps at meeting rails
- Perform any other dutchmen or repair work at the meeting rails as noted in Window Inventory to help limit air infiltration as well
- Repaint of the exterior and address any exterior deterioration and necessary epoxy repairs



Option B: Substantially rebuild existing sashes and shift system to a tape balance balancing system

- Substantially rebuild the lower operable window sashes through the following process
 - o Removal of window sashes
 - o Extensive dutchmen to sides of windows to replace material lost when sashes were modified for spiral balances
 - o Change over of the window system to a tape balance system
 - o Removal of the RDG panels and leave window interiors untouched where they were routed for panels
 - o Reinstall weatherstripping along sides of windows and/or jambs and meeting rails.

Option C: Affix current upper sashes and reproduce operable lower sashes utilizing tape balance system

- Caulk and paint in upper windows and leave as existing
- Likely removal of RDG panels from upper sashes
- Reproduce all lower sashes as traditional wood sashes, ideally making thicker than the existing 1 3/8" thickness. Sashes to be glazed with single pane glass. If sashes reproduced at thicker dimension (1 1/2" or 1 3/4"), then shifting to dual pane glass could be an option while replicating historic interior profiles.
- Change over the window system to a tape balance system
- Install weatherstripping along sides of lower window sashes and/or jambs and meeting rails.

Option D: Full window reproduction

- Remove sashes in their entirety
- Reproduce all sashes (both upper and lower) as traditional wood sashes, ideally making them thicker than the existing 1 3/8" thickness. Sashes to be glazed with single pane glass or increase of sash thickness to 1 3/4" and sashes potentially glazed with dual pane insulated glass.
- Change the window balancing system to a single-hung tape balance system with fixed upper sashes and operable lower sashes.
- Install weatherstripping along sides of lower window sashes and/or jambs and meeting rails.

Option E: Replace with manufactured modern product

- Remove sashes in their entirety
- Replace all windows with modern manufactured dual pane windows.

Option F: Add wood storm/screen combination units to any of the proposed treatments

- Provide and install custom exterior wood storm windows with removable lower panels with seasonal screen inserts.

Option G: Add aluminum storm/ screen combination units to any of the proposed treatments

- Provide and install exterior operable aluminum storm windows with storm and screen panels.



Below is a look at how each one of the proposed treatments would perform on the performance criteria used in this report.

	Safety	Structural Integrity	Exterior Aesthetics	Historic Integrity/ Appropriateness	Operability	Energy Efficiency
Option A – Make safe and limit air infiltration	X		X			X
Option B – Repaired lower sashes	X	X	X	X	X	X
Option C – Reproduction lower sashes	X	X	X	X	X	X
Option D – Wood reproduction windows	X	X	X	X	X	X
Option E – Modern manufactured replacement windows	X	X			X	X
Option F – Exterior wood storms	X					X
Option G – Exterior aluminum storms	X					X

“Restore vs. Replace”

As is all too often the case, we anticipate that the question of “Repair vs. Replace” will continue to be the predominant question at this building. Although much has been noted in this report regarding the deficiencies with the sashes due to the introduction of the spiral balances and modern weatherstripping, we strongly agree with the assessment found in the BCRC report that the existing windows are salvageable and could be re-worked and retained. We have yet to encounter too many windows that are not able to be restored, in large part because they were built of materials that are able and intended to be maintained with easily acquired materials and easily replicated details. Despite the significant changes to the sashes on this building, the properly performed dutchmen work can bring these back to their original structural integrity. However, the damages to the interior profile in introducing the RDG panel system would be extremely challenging to remedy if the goal and/or requirement is to reconstitute the original window profiles.

Full replacement with most manufactured window options will not be a route that we would recommend. As is shown in the following sections, such replacement would likely be one of the more costly routes to take financially over the long-term as the vast majority of manufactured replacement windows have a fairly limited lifespan and would have a faster replacement timeline compared to true traditional wood windows. From an environmental standpoint, this route would create dramatically more waste with subsequent necessary replacements, and may even be a downgrade in efficiency, should exterior storm windows be an option to be added atop single pane historic units. Additionally, from a usability perspective, modern manufactured windows should not be seen as the magic bullet as they too can carry their own challenges for operability with such tight jamb assemblies. Assuming that the replacement windows would be required to be all wood veneers, they would also not be immune to maintenance cycles, as they would see the same re-painting cycles as a traditional window.

Section 7 of this report will provide our recommendation which provides a proposed hybrid solution.



6. COST ESTIMATES

Below are cost estimates for the proposed window treatments. Costs can vary based on items such as selection of glazing, but the hope is that the pricing below provides a fairly accurate picture. It should also be noted that there can be a very large range of costs when it comes to replacement windows, and this report operates under the premise that should manufactured replacement window be an option, a fairly high end product would be needed to satisfy regulations, both related to historic review and energy efficiency.

Option A:	Make Safe and Limit Air Infiltration	\$ 15,000 – 20,000
Option B:	Repair Lower Sashes	\$ 60,000- 65,000
Option C:	Lower Sash Reproduction Windows	\$ 75,000 – 85,000
Option D:	Traditional Wood Reproduction Windows (Upper/Lower)	\$ 135,000 – 155,000
Option E:	Modern Manufactured Replacement Windows	\$ 10,000 – 120,000
Option F:	Exterior Wood Storms	\$ 65,000 – 75,000
Option G:	Exterior Aluminum Storms	\$ 50,000 – 60,000



Ongoing Maintenance and Future Costs

Immediate cost is one factor, but any window system will require ongoing maintenance, and potential replacement. This is a vital factor that is all too often overlooked in our culture today. Below is a projection of the required maintenance and approximated cost over time for each scenario (calculations included at end of report at Addendum D).

	Routine Maintenance Schedule	Maint. Schedule Costs (Per Cycle)	Projected Next Significant Work and Cost*
Option A	2 years (Paint/ caulk/ safety check)	\$ 750 – 1,500	10-15 years / \$ 75,000 (Significant Restoration) 60 years / \$ 100,000 (Restore)
Option B	10 years (paint/ spot glaze)	\$ 15,000 – 20,000	30 years/ \$ 60,000 (restore uppers/ repair lowers) 80 years / \$100,000 (full restore)
Option C	10 years (paint/ spot glaze)	\$ 15,000 – 20,000	30 years/ \$ 60,000 (restore uppers/ repair lowers) 80 years / \$100,000 (full restore)
Option D	10 years (paint)	\$ 15,000 – 20,000	50 years / \$ 100,000 (full restore)
Option E	5 years (dual pane maintenance) 10 years (paint)	\$ 1,000 – 2,000 \$ 15,000 – 20,000	30 years/ \$ 120,000 (full replace) 60 years / \$120,000 (full replace)
Option F	6 months (swap storm/ screens) 10 years (paint)	\$ 300 – 500 \$ 6,000 – 8,000	15 years/ \$ 10,000 (screen replace) 60 years/ \$ 75,000 (replace units)
Option G	5 years (screen maintenance)	\$ 1,000 – 1,500	15 years/ \$ 15,000 (screen replace) 60 years/ \$ 60,000 (replace units)

Approximate 80 Year Cost Projection* - Factors in Initial Cost, Maintenance and Restore/ Replace Cycles

Option A	\$ 318,000	* Cost represented in 2024 values; inflation of costs will change this number significantly. All costs are highly approximate and entirely dependent on performance of window systems. Longevity of replacement windows will be partially correlated with quality of product.
Option B	\$ 305,000	
Option C	\$ 325,000	
Option D	\$ 395,000	
Option E	\$ 510,000	
Option F	\$ 319,000	
Option G	\$ 212,000	



7. SUMMARY

It is evident that some form of action is needed with the windows at 201 Linden Street. Maintaining a safe environment around the building is paramount. For the user, the windows require improvements to improve upon, or in some cases allow, for operability. From an energy efficiency and livability standpoint, steps must be taken to cut down on air infiltration. Some of the proposed solutions address all of these concerns, whereas others provide partial compromises.

From the historical perspective, it's evident that the previous work was not completed according to the Secretary of the Interior's Standards. To reconstitute the historic integrity that the windows once had will take a good amount of effort, but it is quite feasible. There will inevitably entail some level of compromise when it comes to the historic elements of the windows as a solution is sought.

On such items as energy efficiency, we also strongly encourage all to look at the research on the energy performance of different window systems, and also to look at things through the broader lens of sustainability. There is substantial embodied carbon in the existing historic windows, significant energy consumption associated with replacement windows, and realities that most modern replacement windows will require full replacement on a faster timeline than a properly restored historic window. As communities like Fort Collins push for more sustainable practices and policies, we encourage the City and other municipalities to continue to include room for compromise when it comes to historic windows and allowing these systems to meet the energy efficiency goals that are needed in today's world.

Overlaid upon the overall picture is the issue of cost. As noted in this report, one cannot simply look at initial costs but must look at the ongoing picture of what the windows will require over time. Replacement windows are an option in this building, but one must closely examine the lifespan of these windows and factor in the costs, both financial, environmental etc., over a longer period of time. One must consider that pursuing window restoration (and perhaps window reproduction) may leave the door open for very generous financial incentives available in the State of Colorado such as historic tax credit programs. Additionally, energy efficiency programs may provide financial incentives that could still be pursued without performing full replacement of the windows with manufactured units.

As all parties weigh their options, we strongly recommend a long-term picture be kept clearly in focus, across all factors and priorities. In our opinion, some of the previous window work was completed through a shorter-term lens with a product that would not last as long as it was originally designed to last. As an iconic structure in the heart of Old Town, the building deserves a long-term solution that will provide the best value to all involved in the long term. Coming to that solution may involve compromises on all fronts and will most definitely involve gathering the right parties to the table that can work collaboratively to be sure that all voices are heard and represented in an end solution.



As for the specifics, the following would be our recommendations in order of their importance:

1. Addition of Exterior Storm Windows (Options E or F)

The installation of high-quality wood or aluminum exterior storm windows would have the greatest collective impact versus any other proposed treatment covered in this report. The addition of storm windows would make a monumental difference in efficiency to the existing windows and could immediately take the windows which likely possess U-values of 1.04 or higher and provide a U-value closer to .40 or lower. This is without question the single most impactful action that could be taken when it comes to energy efficiency, livability (in stopping air infiltration), and long-term investment (in providing exterior protection for the historic windows). From a safety standpoint, the RDG panels currently in place could remain, and the windows largely untouched should that be of interest, and a much safer condition would be created in providing an outer layer of defense for anything falling from a window sash. As one can see on costs, the addition of storm windows would sit below most other repair options for overall cost.

2. Reproduction of Lower Sashes at a Minimum (Options C or D)

As we look at the balance of usability, costs, and historic integrity, we are of the opinion that it will be more efficient and result in a longer lasting product to reproduce the lower sashes, at a minimum. As a single-hung assembly wherein the upper sashes are inoperable, we see the restoration and/or replacement of the upper sashes to be far less critical. With the proper design, we believe a replicated lower sash operating on a tape balance would not sacrifice any of the current aesthetics. From a historic standpoint, it would replicate the original interior aesthetic of the windows.

Historic windows are typically built to have an unlimited lifespan when maintained properly. Quite simply, the same cannot be said for any replacement window that is built with modern materials and systems that have shorter lifespans and more complex mechanisms. That being said, the historic sashes as they stand today would only have an unlimited lifespan if they received intensive repair work, and even then, it is debatable. As a result, starting with a clean slate on the lower sashes, which are intended to receive daily use, is seen as potentially the balance between providing a “lifetime” window but not adding significant more cost to do with both upper and lower sashes.

Conclusion

We believe strongly that a fully re-thought system consisting of an altered balancing system (tape balances), reproduced but historically appropriate lower sashes, inoperable upper sashes, and fully functional storm/ screen combination units will provide the longest lasting product that checks as many of the boxes as possible. This solution protects passersby, guarantees full operability of the lower sashes, greatly increases energy efficiency and long-term sustainability goals, while limiting costs on a more intensive full reproduction or full replacement. In such a scenario, the only outlying factor would be the longevity of the historic upper sashes, but otherwise it should represent a 50-year minimum product if properly maintained. In addition, the fabrication of new lower sashes would potentially leave the door open for dual pane glass, which although not recommended, could further increase energy efficiency and value.

Due to the unusual circumstances of this building where previous work was not conducted according to historic standards, there are many elements that would be atypical to most projects in order to bring them back to life. The tape balance system is one that dates back 100 years but it is relatively rare to be used due to the prevalence of window pulleys. With the weight pockets for the window pulleys having been filled with insulation, we have proposed the tape balances as what is seen as the longest-lasting alternative. Another atypical element would be the proposal to introduce a thicker sash for the lower sash, and to leave the upper sashes in with limited work. We have proposed the thicker lower sash again to try and extend the life of the windows as much as possible knowing that the subtle difference could add quite a bit of strength. As noted, this detail also makes it possible to pursue dual pane glass should that be something that would be recommended. As for the upper sashes, doing any and all work in place would help cut costs and allow resources to be focused on the key operable element of the system: the lower sash.

The value of an exterior storm window should not be understated. The energy efficiency achieved through the addition of an exterior storm unit would immediately make the window system higher performing than many of the dual pane replacement windows on the market today. Whereas the energy efficiency of any dual pane glass decreases over time as the seal weakens between the panes, the exterior storm system would remain consistent. In addition, the protection a storm window provides towards the glazing and exposure to window sashes is extremely substantial and should extend the life of the windows by quite a bit.

Finally, all too often discussions surrounding historic windows give the impression of opposing parties, standing either in the “Repair” corner or that for “Replace.” We challenge all involved in this project to think outside the box and think about the long-term impact of the decisions before the group. Thanks in large part to the renovation work done previously at 201 Linden as a whole, this building will remain as one of the iconic structures in Fort Collins for decades to come. The building deserves a long-term solution with its windows and that decision is not nearly as black and white as the major window corporations would lead one to believe. Some forward thinking and creativity could land on a solution for a window system that would outlive even the existing one. As we all look to the environmental challenges that face our buildings, and our culture as a whole, this building provides a great opportunity to make educated and responsible long-term decisions towards more sustainable systems.



8. PHOTOS

Photos of each opening have been provided as Addendum B at the tail end of this report.

201 Linden Street, Fort Collins
Window Inventory



Window # 002-1

Window Type Double Hung
Material Wood

Condition:

Sash: Interior Flaking paint, especially between glass and RDG panel

Exterior Flaking paint, degraded glazing putty

Frame: Interior Good condition (presumed restored in 2018)

Exterior Some flaking paint

Sill: Interior Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail

Exterior Flaking paint

Glazing: Non-original single glazing and RDG panel. Gaps around RDG panel (not fitting properly)

Balancing System: Existing spiral balance (operable)

Weatherstripping: Modern brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: No rot visible. Primary deficiencies are difficult operability, flaking paint, and gaps at RDG panel

201 Linden Street, Fort Collins
Window Inventory



Window # 002-2

Window Type Double Hung
Material Wood

Condition:

Sash: Interior Flaking paint, especially between glass and RDG panel

Exterior Flaking paint, degraded glazing putty

Frame: Interior Good condition (presumed restored in 2018)

Exterior Some flaking paint

Sill: Interior Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail

Exterior Flaking paint

Glazing: Non-original single glazing and RDG panel. Lacking putty seal between sash and single pane glass

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: No rot visible. Operability not tested.

201 Linden Street, Fort Collins
Window Inventory



Window # 002-3

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint, especially between glass and RDG panel. Dutchmen needed at meeting rail of lower sash due to material having chipped out

Exterior Flaking paint, degraded glazing putty

Frame: **Interior** Good condition (presumed restored in 2018)

Exterior Some flaking paint

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail

Exterior Flaking paint

Glazing: Non-original single glazing. RDG panel has come out and is missing. All putty missing at upper sash meeting rail

Balancing System: Failed spiral balance

Weatherstripping: Modern brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: No rot visible. Operability not tested.

201 Linden Street, Fort Collins
Window Inventory



Window # 002-4

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint, especially between glass and RDG panel. Misalignment with meeting rails on upper and lower sashes.

Exterior Flaking paint, degraded glazing putty

Frame: **Interior** Good condition (presumed restored in 2018)

Exterior Some flaking paint

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail

Exterior Flaking paint

Glazing: Non-original single glazing and RDG panel. Lacking putty seal between sash and single pane glass

Balancing System: No spiral balances present (have been removed)

Weatherstripping: Modern brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: No rot visible. Operability not tested.

201 Linden Street, Fort Collins
Window Inventory



Window # 002-5

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint, especially between glass and RDG panel. Misalignment with meeting rails on upper and lower sashes.

Exterior Flaking paint, degraded glazing putty and peeling paint at glazing. Caulked and painted shut (non operable)

Frame: **Interior** Good condition (presumed restored in 2018)

Exterior Some flaking paint

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail that have been caulked in

Exterior Flaking paint

Glazing: Non-original single glazing and RDG panel. Lacking putty seal between sash and single pane glass

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: No rot visible.

201 Linden Street, Fort Collins
Window Inventory



Window # 002-6

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint, especially between glass and RDG panel. Crack in lower rail of lower sash

Exterior Flaking paint, degraded glazing putty and peeling paint at glazing. Caulked and painted shut (non operable)

Frame: **Interior** Good condition (presumed restored in 2018)

Exterior Some flaking paint

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail that have been caulked in

Exterior Flaking paint

Glazing: Non-original single glazing and RDG panel. Lacking putty seal between sash and single pane glass

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: No rot visible.

201 Linden Street, Fort Collins
Window Inventory



Window # 002-7

Window Type Double Hung
Material Wood

Condition:

Sash:	Interior	Flaking paint, especially between glass and RDG panel. Misalignment of meeting rails.
	Exterior	Flaking paint, degraded glazing putty and peeling paint at glazing. Caulked and painted shut (non operable). Loose joinery at upper meeting rail.
Frame:	Interior	Good condition (presumed restored in 2018)
	Exterior	Flaking paint. Some rot and wood degradation requiring epoxy repair at jamb
Sill:	Interior	Fine condition (presumed to be restored in 2018)
	Exterior	Fine condition (presumed to be restored in 2018) but may have negative slope
Trim/ Stop:	Interior	Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail that have been caulked in
	Exterior	Flaking paint
Glazing:		Non-original single glazing and RDG panel. Lacking putty seal between sash and single pane glass
Balancing System:		Existing spiral balance (operation unknown)
Weatherstripping:		Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

Epoxy repair needed at jamb

201 Linden Street, Fort Collins
Window Inventory



Window # 002-8

Window Type Double Hung
Material Wood

Condition:

Sash:	Interior	Flaking paint, especially between glass and RDG panel. Misalignment of meeting rails. Interior of sash routed too wide for RDG panel
	Exterior	Flaking paint, degraded glazing putty and peeling paint at glazing. Caulked and painted shut (non operable).
Frame:	Interior	Good condition (presumed restored in 2018)
	Exterior	Flaking paint.
Sill:	Interior	Fine condition (presumed to be restored in 2018)
	Exterior	Fine condition (presumed to be restored in 2018) but may have negative slope
Trim/ Stop:	Interior	Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail that have been caulked in
	Exterior	Flaking paint
Glazing:		Non-original single glazing and RDG panel. Lacking putty seal between sash and single pane glass. RDG panel not fitting correctly.
Balancing System:		Existing spiral balance (operation unknown)
Weatherstripping:		Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-9

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint, especially between glass and RDG panel. Misalignment of meeting rails. Left stile cracked (lower sash). Routed slot for RDG panel too wide.

Exterior Flaking paint, degraded glazing putty and peeling paint at glazing. Caulked and painted shut (non operable).

Frame: **Interior** Good condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail that have been caulked in

Exterior Flaking paint

Glazing: Non-original single glazing and RDG panel. Lacking putty seal between sash and single pane glass. RDG panel not fitting correctly.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-10

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint, especially between glass and RDG panel. Misalignment of meeting rails. Failure at joint of upper meeting rail. Lifts removed for interior stop.

Exterior Flaking paint, degraded glazing putty and peeling paint at glazing. Failure at joint of upper meeting rail.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Deteriorated condition needing epoxy or dutchmen repair

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint. Heavily deteriorated exterior trim

Glazing: Non-original single glazing and RDG panel. Glazing not sitting properly due to potential settling sash. Needs air sealing around perimeter of glazing.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-11

Window Type Double Hung
Material Wood

Condition:

Sash:	Interior	Flaking paint, especially between glass and RDG panel. Misalignment of meeting rails. Lifts removed for interior stop.
	Exterior	Flaking paint, degraded glazing putty and peeling paint at glazing. Dutchmen needed at meeting rail on lower sash
Frame:	Interior	Decent condition (presumed restored in 2018)
	Exterior	Flaking paint.
Sill:	Interior	Fine condition (presumed to be restored in 2018)
	Exterior	Deteriorated condition needing epoxy or dutchmen repair
Trim/ Stop:	Interior	Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.
	Exterior	Flaking paint. Heavily deteriorated exterior trim
Glazing:		Non-original single glazing and RDG panel. Glazing not sitting properly due to potential settling sash. Needs air sealing around perimeter of glazing.
Balancing System:		Existing spiral balance (operation unknown)
Weatherstripping:		Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-12

Window Type Double Hung
Material Wood

Condition:

Sash:	Interior	Flaking paint, especially between glass and RDG panel. Misalignment of meeting rails. Lifts removed for interior stop.
	Exterior	Flaking paint, degraded glazing putty and peeling paint at glazing. Caulked and painted shut (non operable).
Frame:	Interior	Decent condition (presumed restored in 2018)
	Exterior	Flaking paint.
Sill:	Interior	Fine condition (presumed to be restored in 2018)
	Exterior	Deteriorated condition needing epoxy or dutchmen repair
Trim/ Stop:	Interior	Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail (caulked in)
	Exterior	Flaking paint. Heavily deteriorated exterior trim
Glazing:		Non-original single glazing and RDG panel. Glazing not sitting properly due to potential settling sash. Needs air sealing around perimeter of glazing.
Balancing System:		Existing spiral balance (operation unknown)
Weatherstripping:		Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-13

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint, especially between glass and RDG panel. Misalignment of meeting rails.

Exterior Flaking paint, degraded glazing putty and peeling paint at glazing.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail (caulked in)

Exterior Flaking paint. Heavily deteriorated exterior trim

Glazing: Non-original single glazing and RDG panel. Incorrect RDG panel installed and does not fit opening properly.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-14

Window Type Double Hung
Material Wood

Condition:

Sash:	Interior	Misalignment of meeting rails.
	Exterior	Flaking paint, degraded glazing putty and peeling paint at glazing. Partial failure at joint at meeting rail, upper sash.
Frame:	Interior	Decent condition (presumed restored in 2018)
	Exterior	Flaking paint.
Sill:	Interior	Fine condition (presumed to be restored in 2018)
	Exterior	Fine condition (presumed to be restored in 2018) but may have negative slope
Trim/ Stop:	Interior	Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.
	Exterior	Flaking paint.
Glazing:		Non-original single glazing and RDG panel.
Balancing System:		Existing spiral balance (operation unknown)
Weatherstripping:		Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-15

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Misalignment of meeting rails.

Exterior Flaking paint, degraded glazing putty and peeling paint at glazing.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Fine condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation
leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone
bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-16

Window Type Double Hung
Material Wood

Condition:

Sash:	Interior	Significant misalignment of meeting rails. Sashes caulked and painted in (inoperable)
	Exterior	Flaking paint, degraded glazing putty and paint failure at glazing.
Frame:	Interior	Decent condition (presumed restored in 2018)
	Exterior	Flaking paint.
Sill:	Interior	Fine condition (presumed to be restored in 2018)
	Exterior	Decent condition (presumed to be restored in 2018) but may have negative slope Some gaps requiring caulking/ paint.
Trim/ Stop:	Interior	Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.
	Exterior	Flaking paint.
Glazing:		Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). Paint failure at glazing.
Balancing System:		Existing spiral balance (operation unknown)
Weatherstripping:		Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-17

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Misalignment of meeting rails. Sashes caulked and painted in (inoperable). Paint failure at lower rail of bottom sash.

Exterior Flaking paint, degraded glazing putty and paint failure at glazing.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint. Some rot at brick mould requiring epoxy or dutchman repair.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). RDG pane slipping out of place.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-18

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Misalignment of meeting rails. Sashes caulked and painted in (inoperable). Flaking paint.

Exterior Flaking paint, degraded glazing putty and flaking paint at glazing. Epoxy or dutchman repair needed at lower rail where degraded. Upper meeting rail stabilized with fasteners and requiring repair to joint.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail. Interior stop has been removed

Exterior Flaking paint. Some rot at brick mould requiring epoxy or dutchman repair.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes).

Balancing System: Spiral balances removed

Weatherstripping: Presumed modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-19

Window Type Double Hung

Material Wood

Condition:

Sash: Interior Flaking paint.

Exterior Heavily flaking paint, degraded glazing putty and flaking paint at glazing.

Frame: Interior Decent condition (presumed restored in 2018)

Exterior Flaking paint. Damage to wood requiring epoxy repair.

Sill: Interior Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail (caulked in).

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). Broken glass at upper pane.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 002-20

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Slight bow at upper meeting rail. Lower meeting rail bows into room and may be candidate for replacement

Exterior Flaking paint, more intensive repair required on lower rail of bottom sash that likely necessitates replacement of the rail

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail (caulked in).

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). Paint failure at glazing.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: Interior storm present

201 Linden Street, Fort Collins
Window Inventory



Window # 002-21

Window Type Double Hung

Material Wood

Condition:

Sash: Interior Flaking paint. Wood piece missing at meeting rail that will require dutchman

Exterior Flaking paint.

Frame: Interior Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: Interior Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). RGB panel popping out. Glazing pulling away at lower sash at lower rail.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: Interior storm present

201 Linden Street, Fort Collins
Window Inventory



Window # 002-22

Window Type Double Hung

Material Wood

Condition:

Sash: Interior Flaking paint.

Exterior Flaking paint.

Frame: Interior Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: Interior Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). RGB panel slipping out.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: Interior storm present

201 Linden Street, Fort Collins
Window Inventory



Window # 002-23

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Misalignment of meeting rails.

Exterior Flaking paint and failure at glazing.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). RGB panel slipping out.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: Interior storm present

201 Linden Street, Fort Collins
Window Inventory



Window # 002-24

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Misalignment of meeting rails.

Exterior Flaking paint. Sloped meeting rail indicating likely settling of jamb (sash may require modification to straighten out). Fasteners present in meeting rail to stabilize, may require more traditional repair to joinery.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). RGB panel slipping out.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: Interior storm present. Storm not engaging fully (would benefit from clasp at bottom to pull stile into contact).

201 Linden Street, Fort Collins
Window Inventory



Window # 002-25

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Misalignment of meeting rails.

Exterior Flaking paint. Deterioration at lower rail of bottom sash that may justify full replacement of rail.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). Visual distinction between glazing used in 2018 work vs. older glazing indicating partial re-glazing (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments: Interior storm present. Storm not engaging fully (would benefit from clasp at bottom to pull stile into contact).

201 Linden Street, Fort Collins
Window Inventory



Window # 003-01

Window Type Double Hung
Material Wood

Condition:

Sash: Interior Flaking paint, heavily at lower rail. Typical overpaint onto glazing with paint.

Exterior Flaking paint.

Frame: Interior Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: Interior Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). Visual distinction between glazing used in 2018 work vs. older glazing indicating partial re-glazing (typical at most sashes). RDG panel loose.

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-02

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Possible epoxy repair at interior profile area on lower sash.

Exterior Flaking paint.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Decent condition (presumed to be restored in 2018) but may have negative slope

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. Gaps between glass and sash (typical at most sashes). Visual distinction between glazing used in 2018 work vs. older glazing indicating partial re-glazing (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-03

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Possible epoxy repair at interior profile area on lower sash.

Exterior Flaking paint.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Paint deterioration at sill and potential underlying wood repair needed.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Wavy original single glazing (only original glass observed) and RDG panel. Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:



Window # 003-04

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint.
Misalignment of meeting rails.

Exterior Heavily flaking paint. Damage and deterioration to lower rail of lower sash that
may require full replacement of rail.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Some paint deterioration at sill and potential epoxy repair needed.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation
leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. RDG panel sitting out of grooves in
sash. Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone
bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-05

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint.
Misalignment of meeting rails.

Exterior Flaking paint.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Fine condition (presumed to be restored in 2018)

Exterior Some paint deterioration at sill and potential epoxy repair needed.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. RDG panel sitting outside of grooves in sash. Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-06

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint.

Exterior Flaking paint. Opening is out of square and sashes require modification to align with window opening. This settlement has caused significant gaps around sashes.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Heavy paint and wood deterioration at sill and epoxy repair needed.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel.
Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-07

Window Type Double Hung
Material Wood

Condition:

Sash: Interior Flaking paint. Typical overpaint onto glazing with paint.

Exterior Flaking paint.

Frame: Interior Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: Interior Decent condition (presumed to be restored in 2018)

Exterior Heavy paint and wood deterioration at sill and epoxy repair needed or sill replacement.

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel.
Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-08

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Large gaps at side of sash requiring modifications to sash to close up gaps. Misaligned meeting rails.

Exterior Flaking paint. Evidence of settling of opening and sashes needing to be modified accordingly (note above).

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Heavy paint and wood deterioration at sill and epoxy repair needed or sill replacement.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel.
Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-09

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Bowed upper meeting rail that may require full replacement.

Exterior Flaking paint.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Some paint failure and wood repair may be required.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel.
Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-10

Window Type Double Hung
Material Wood

Condition:

Sash: Interior Flaking paint. Typical overpaint onto glazing with paint.

Exterior Flaking paint.

Frame: Interior Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: Interior Decent condition (presumed to be restored in 2018)

Exterior Some paint failure and wood repair may be required.

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. RDG panel has slipped out of place. Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-11

Window Type Double Hung
Material Wood

Condition:

Sash: Interior Flaking paint. Typical overpaint onto glazing with paint.

Exterior Flaking paint.

Frame: Interior Decent condition (presumed restored in 2018)

Exterior Flaking paint.

Sill: Interior Decent condition (presumed to be restored in 2018)

Exterior Some paint failure and wood repair may be required.

Trim/ Stop: Interior Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. RDG panel has slipped out of place. Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-12

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Sash tucked behind wet bar in current apartment and access limited for inspection

Exterior Flaking paint.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Some flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Some paint failure and wood repair may be required.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. RDG panel has slipped out of place. Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-13

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Significantly misaligned meeting rails.

Exterior Flaking paint. Meeting rail has failed and requires rebuilding of joint.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Some flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Some paint failure and wood repair may be required.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel.
Gaps between glass and sash (typical at most sashes).

Balancing System: Existing spiral balance (operation unknown)

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-14

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint. Misaligned meeting rails. Deterioration to lower rail at lower sash may require replacement.

Exterior Flaking paint. Material needed to be added to lower rail of lower sash to align meeting rails and close gaps further.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Some flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Some paint failure and wood repair may be required.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel.
Gaps between glass and sash (typical at most sashes).

Balancing System: Spiral balances have been removed.

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-15

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint.

Exterior Heavily flaking paint and in very rough condition. Meeting rail has failed and requires replacement. Lower rail of bottom sash features deterioration and may require full replacement.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Some flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Heavier paint failure and wood repair likely to be required.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel.
Gaps between glass and sash (typical at most sashes).

Balancing System: Spiral balances have been removed.

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

201 Linden Street, Fort Collins
Window Inventory



Window # 003-16

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint.

Exterior Heavily flaking paint and in very rough condition. Misaligned meeting rails.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Some flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Some paint failure and wood repair may be required.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation
leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. RDG panels displaced from locations.
Gaps between glass and sash (typical at most sashes).

Balancing System: Spiral balances in place but sleeves have been removed (possibly operational).

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone
bulb at bottom of lower sash

Comments: _____

201 Linden Street, Fort Collins
Window Inventory



Window # 003-17

Window Type Double Hung
Material Wood

Condition:

Sash: **Interior** Flaking paint. Typical overpaint onto glazing with paint.

Exterior Heavily flaking paint and in very rough condition. Upper meeting rail missing entirely.

Frame: **Interior** Decent condition (presumed restored in 2018)

Exterior Some flaking paint.

Sill: **Interior** Decent condition (presumed to be restored in 2018)

Exterior Heavier paint failure and wood repair likely to be required.

Trim/ Stop: **Interior** Replaced in 2018 renovation. Undersized parting stop used in renovation leading to large gaps between stop and meeting rail.

Exterior Flaking paint.

Glazing: Non-original single glazing and RDG panel. RDG panels displaced from locations. Gaps between glass and sash (typical at most sashes).

Balancing System: Spiral balances in place but sleeves have been removed (possibly operational).

Weatherstripping: Modern 'brush pile weatherstripping at side of window and silicone bulb at bottom of lower sash

Comments:

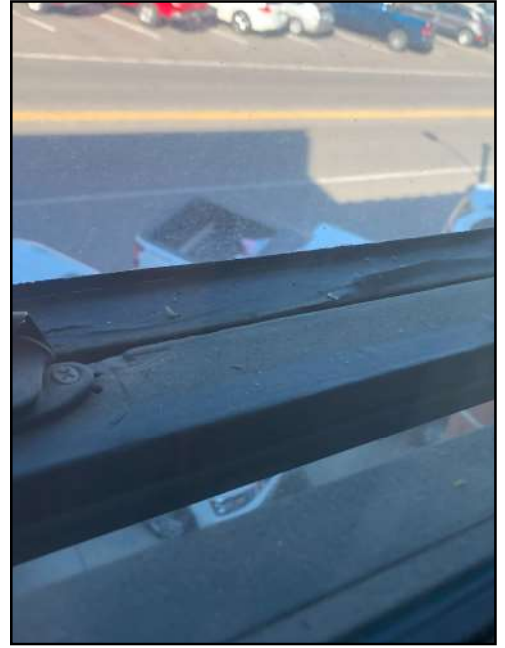
LARGE GAPS BETWEEN PARTING STOP AND MEETING RAILS



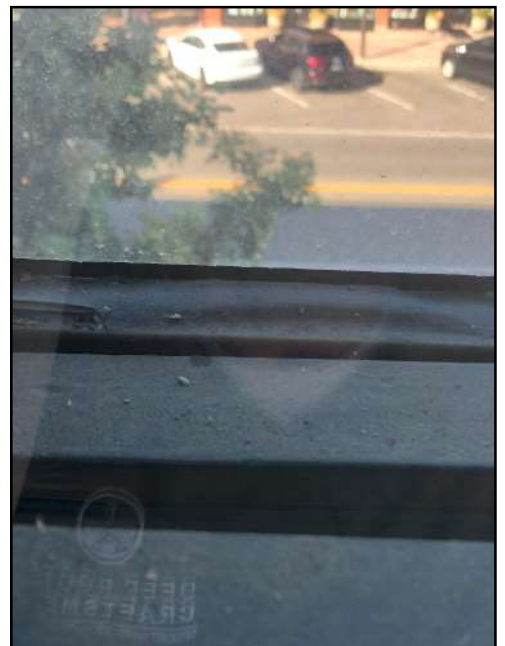
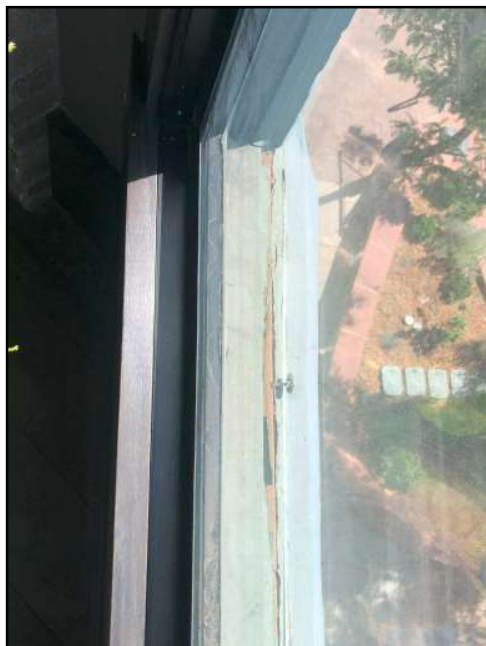
SASHES HEAVILY MODIFIED FOR SPRING BALANCES



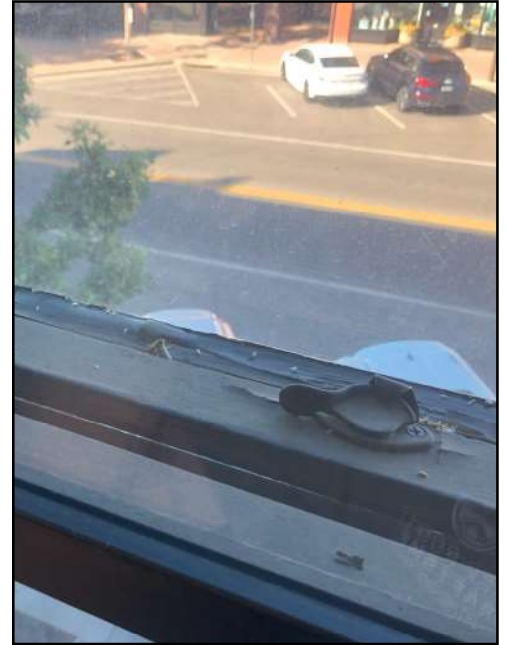
CHIPPING AT MEETING RAIL WHERE ROUTED FOR WEATHERSTRIPPING



PAINT FAILURE



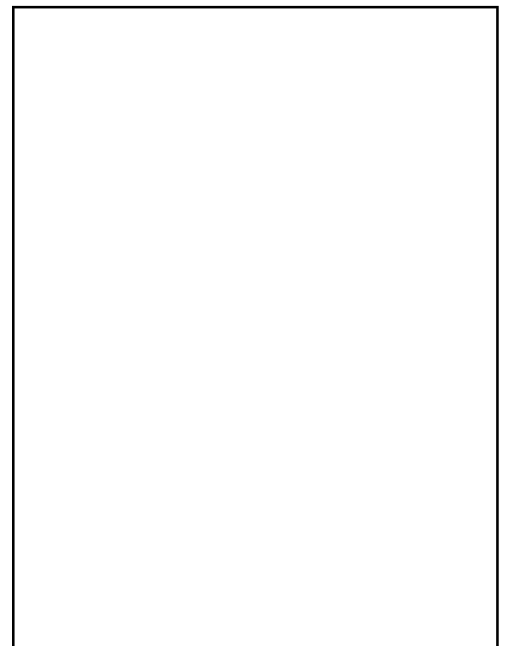
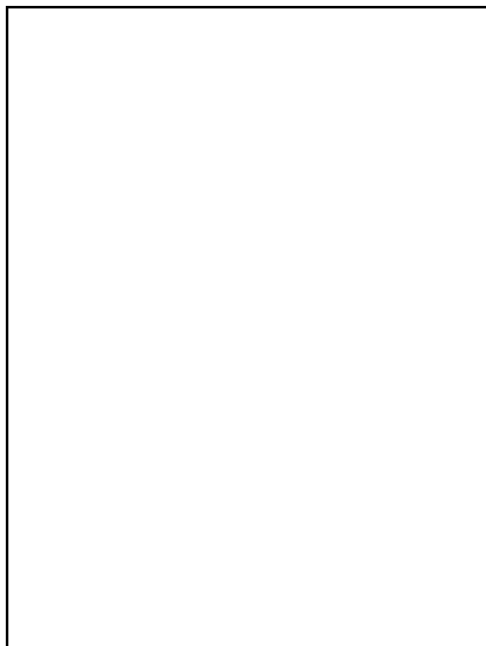
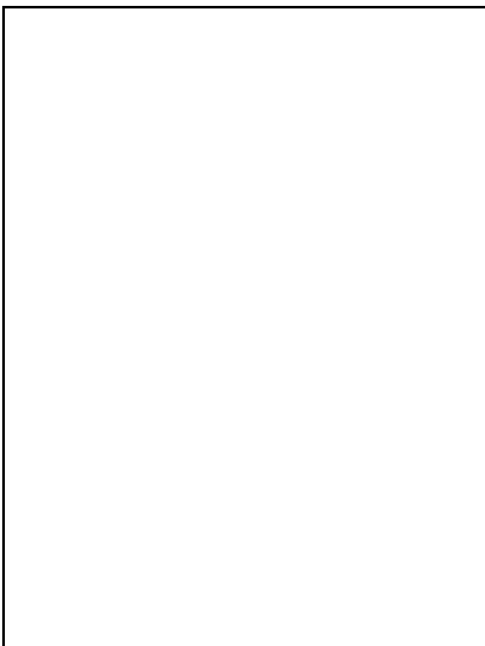
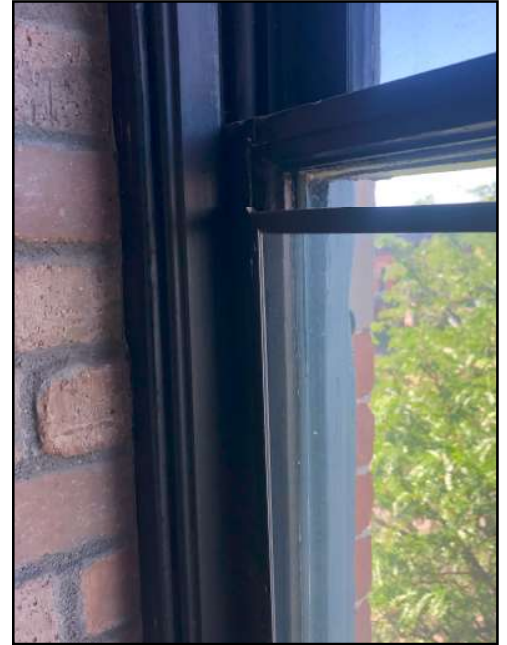
MISALIGNMENT AT MEETING RAILS



STRUCTURAL FAILURE AT MEETING RAIL



DISPLACED AND MISSING RDG PANELS



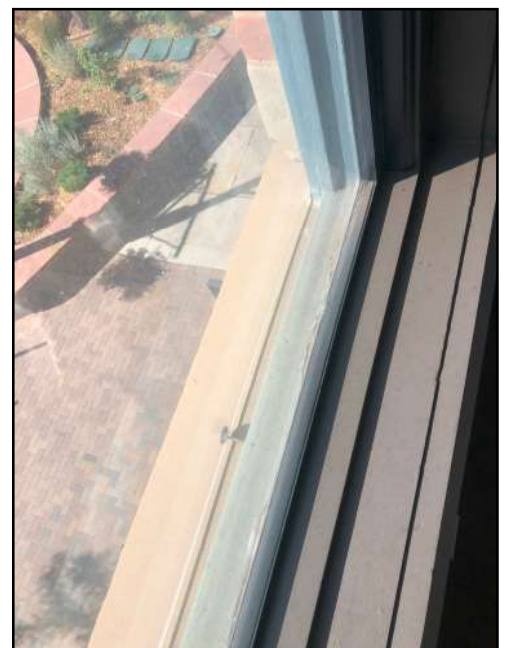




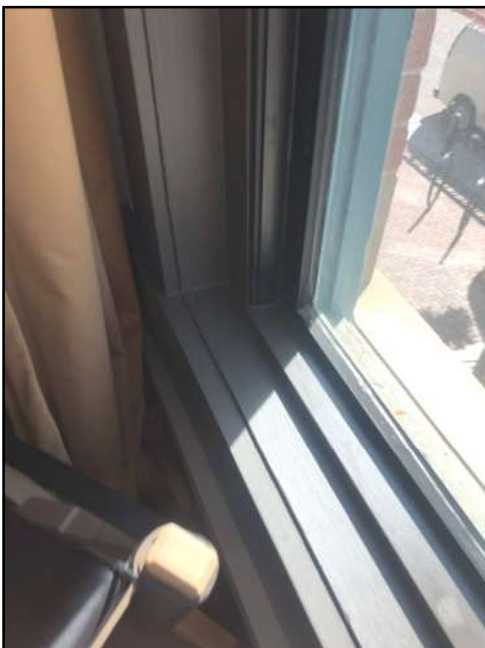


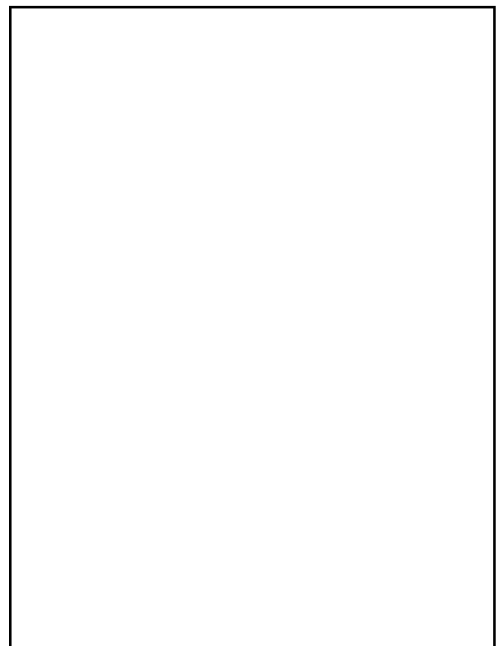
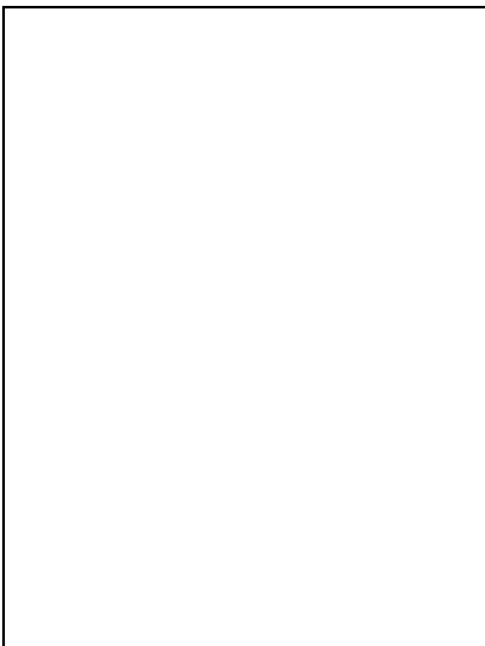
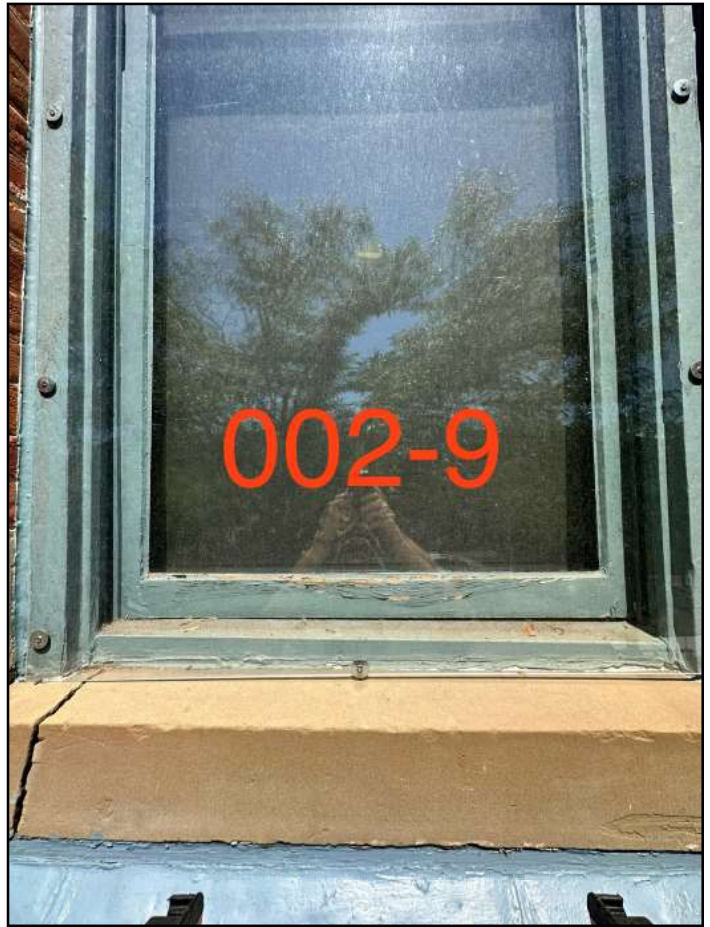
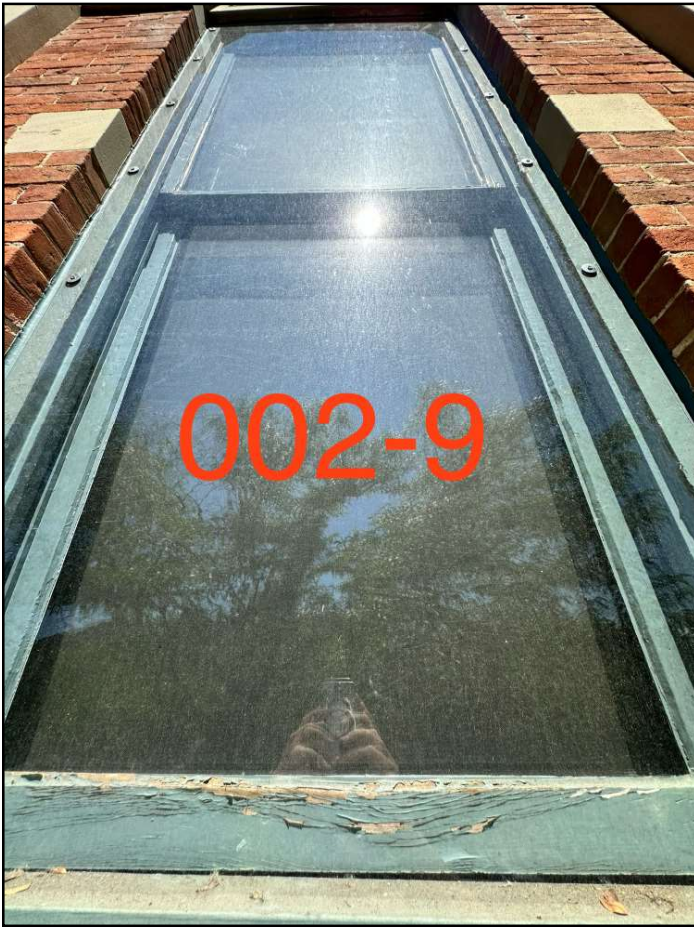


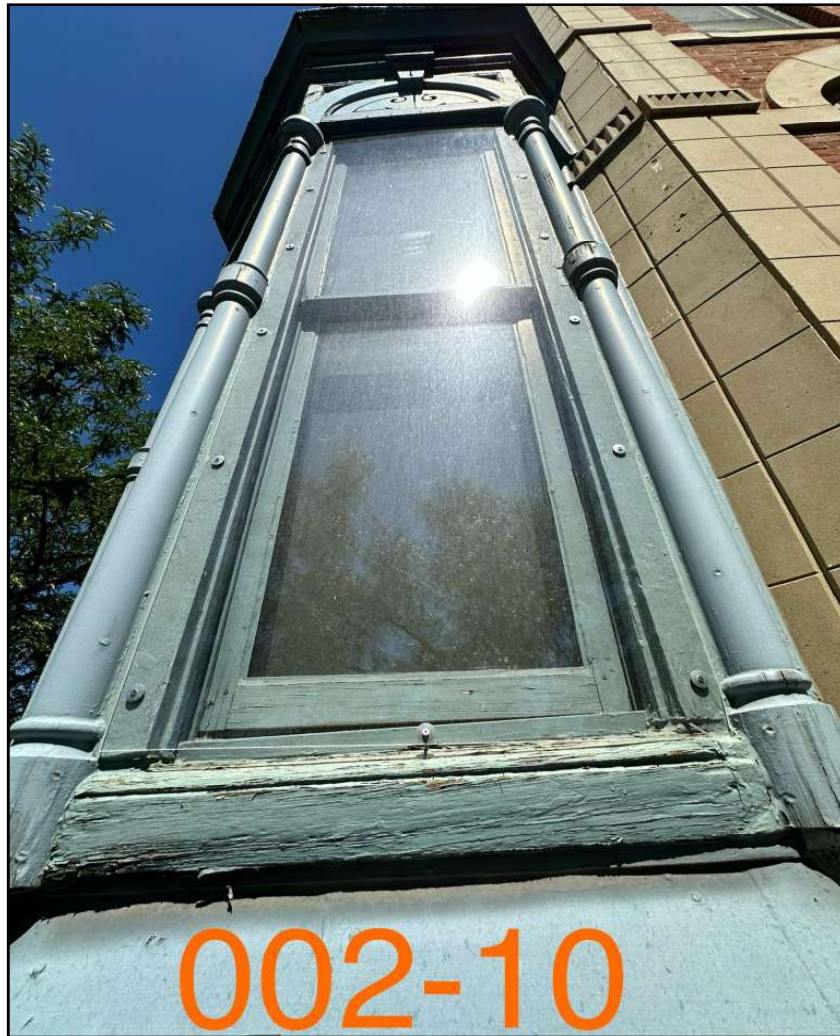




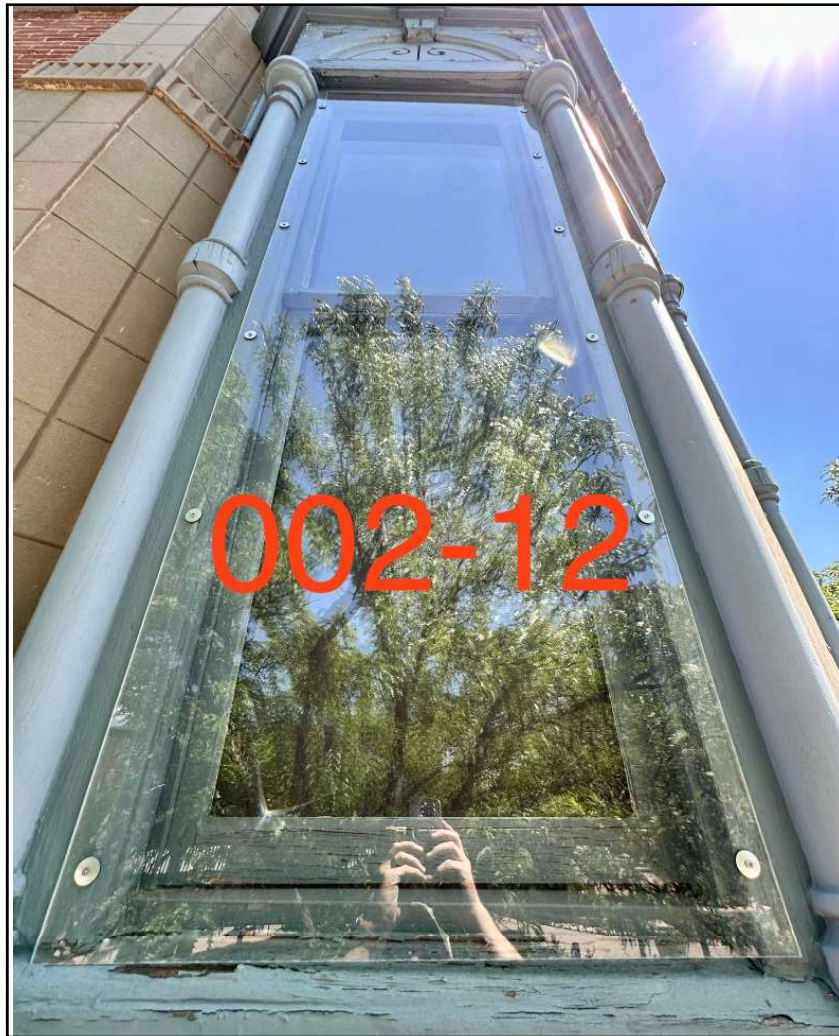


















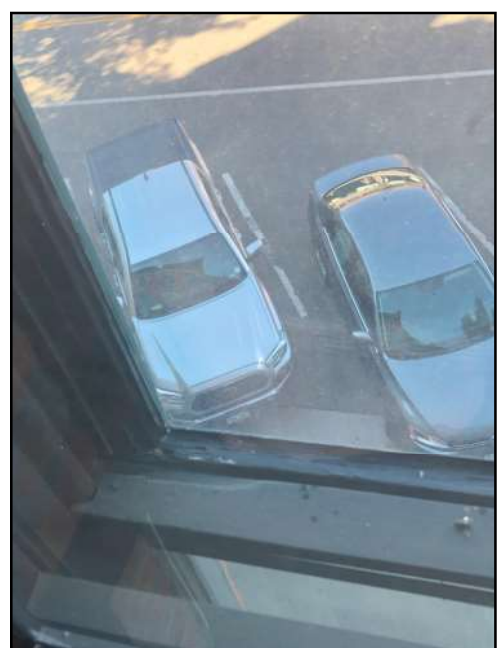


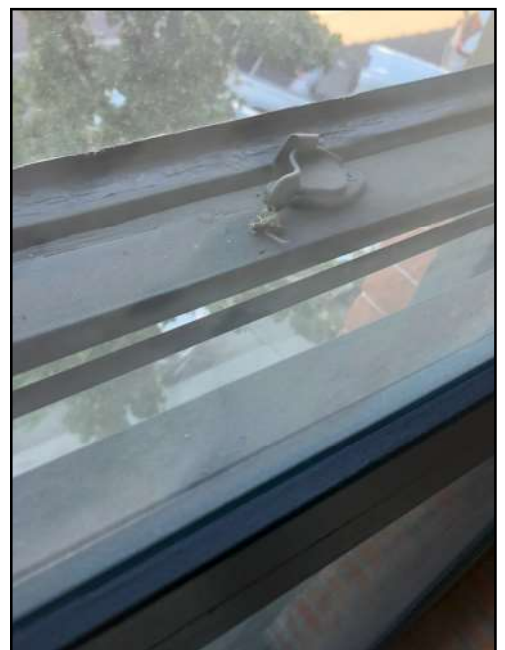




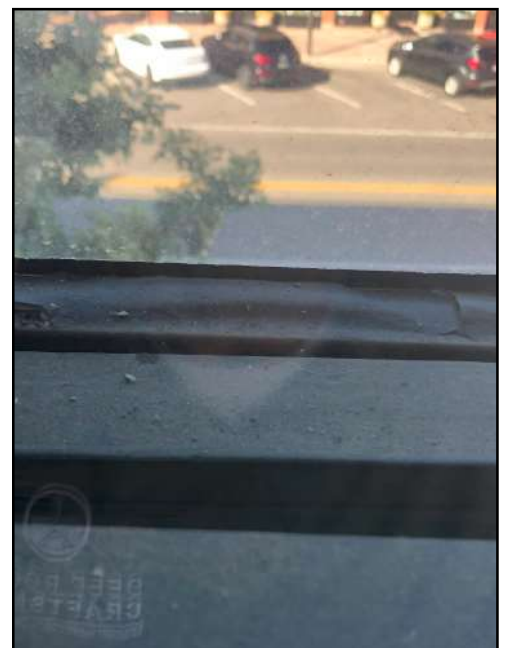
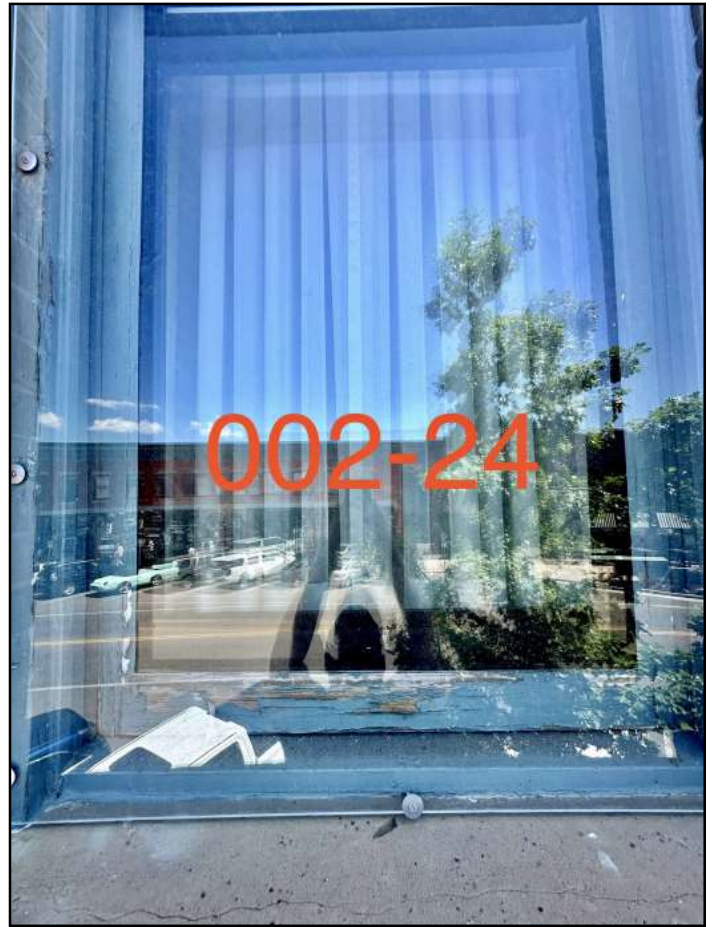


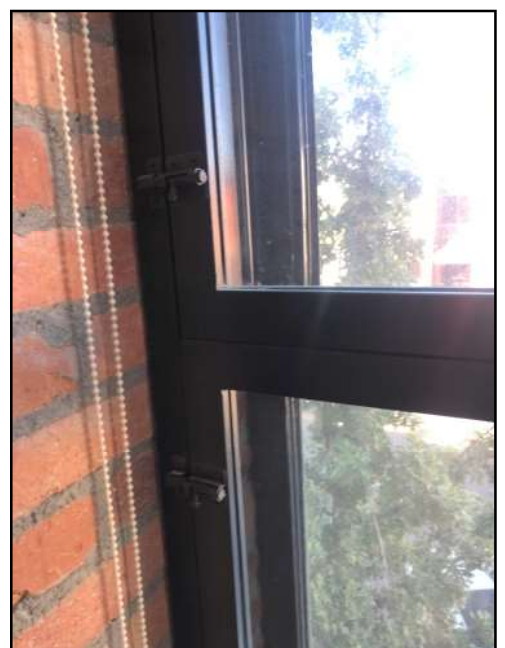












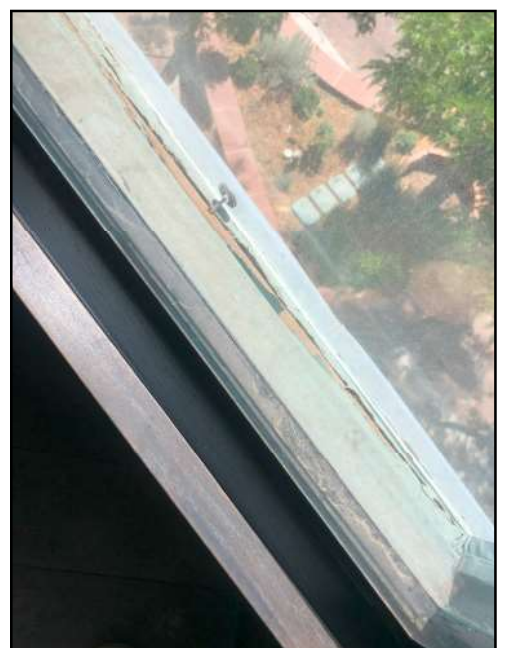




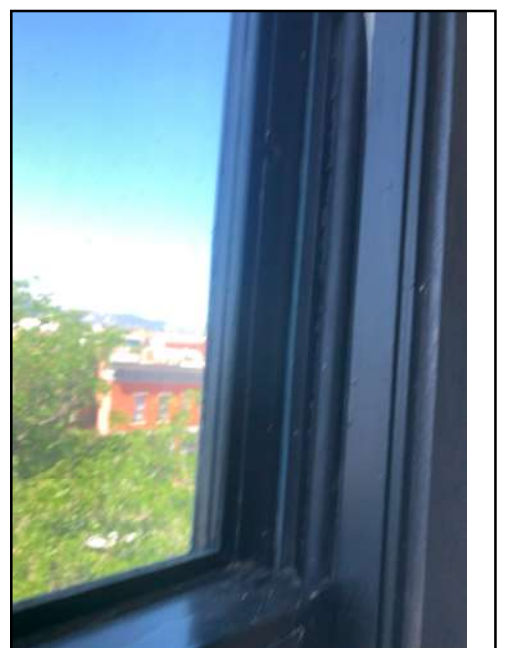


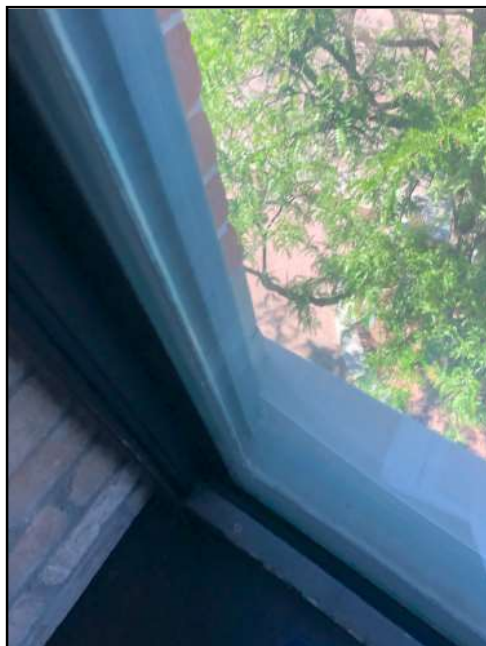














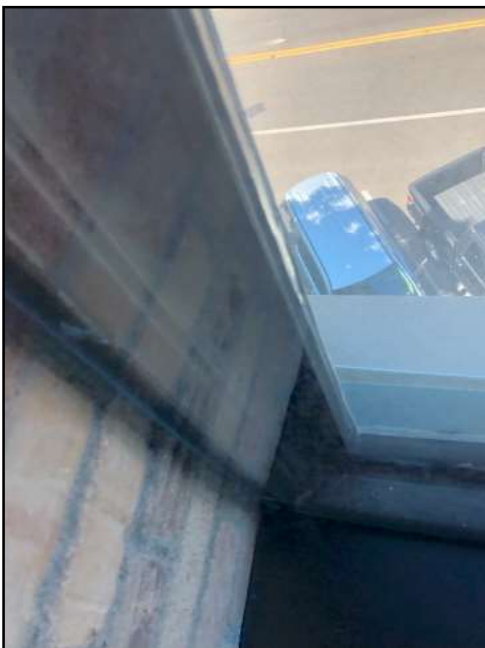
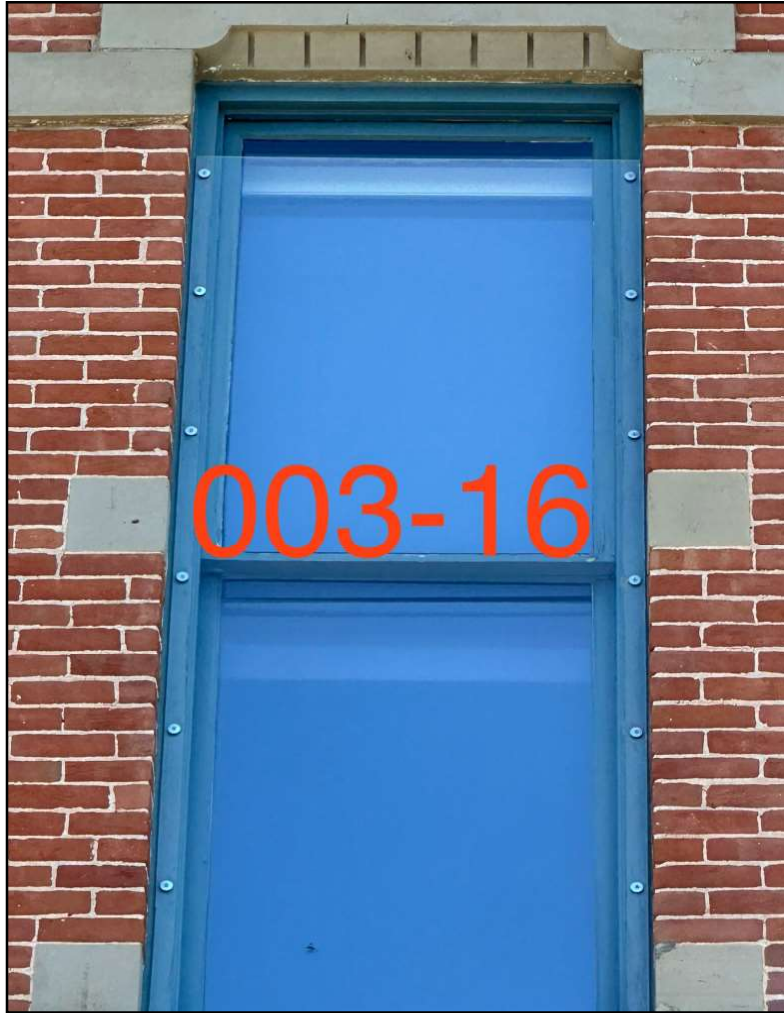














**201 Linden Street
Storm Window Options**

Addendum C

For exterior storm window options, there are several that may be acceptable. We understand that the Old Town District does not currently allow exterior storm windows. Should a waiver be provided for this property, the wood options shown below with removable storm and screen panels could be an option, as well as proven aluminum units such as those offered by Allied Window. Allied Window is a staple in the window industry and their windows have been installed on numerous historic properties nationwide. On the attached pages you will find a list of some of the locations where they've been used. In addition, our team has recently installed them on the Historic Chaffee County Courthouse in Buena Vista, CO and the Valley View School in Salida, CO.

Wood Storm/ Screen Combination Units:

For a number of historic properties, we have fabricated combination storm/ screen units so that the lower panels may be changed out seasonally without removal of the frames themselves. The wood construction allows for a more traditional aesthetic and the aluminum framed storm/ screen panels are not only easily repaired but also nearly devoid of any visible aluminum from the exterior.





Exterior Aluminum Storm Windows:

Example of recent installation of Allied Window's exterior storm/ screen combination unit at a State Historic Fund project in Colorado.



Restored windows with Allied Window Exterior Storm Windows
(before storm windows installed below, and after featured above)



ALLIED WINDOW, INC
EXTERIOR STORM/SCREEN LOCATIONS

<u>CUSTOMER/PROJECT</u>	<u>CITY</u>	<u>ST</u>	<u>MODEL</u>
“Old Main” – Univ. of Arkansas	Fayetteville	AR	HOL-OP
Governors Mansion – State of AR	Little Rock	AR	AOL-C
Museum of NW Colorado	Craig	CO	AOL
Norwich City Hall	Norwich	CT	HOL-B
St. Luke Community Services	Stamford	CT	HOL-B
St. Patrick’s Church	Washington	DC	D-42
Dumbarton Oaks	Washington	DC	AOL
Ft. McPherson (US Army)	Atlanta	GA	HOL-OP
Whiteway Building	Iowa City	IA	AOL-C
The Chimneys	Winnetka	IL	AOL-C
Knightown U.M. Church	Knightstown	IN	AOL
Bierhaus Building	Vincennes	IN	AOL-C
YMCA	Ft. Wayne	IN	AOL
Showers Building	Bloomington	IN	AOL-C
Audubon House	Indianapolis	IN	HOL
Christ Church	Louisville	KY	HOL-OP
Sanford Mansion	Covington	KY	AOL-C
Gratz House	Lexington	KY	AOL-C
Covington Station	Covington	KY	AOL
Adsmore Museum	Princeton, KY	KY	AOL-C
Harvard University – Warren & Kirkland	Cambridge	MA	HOL-OP
Taunton Community Development	Taunton	MA	HOL-B
Harvard University	Cambridge	MA	SCREENS
Flint Memorial Library	N. Reading	MA	HOL-B
Ruggles Church	Boston	MA	AOL
Church of the Covenant	Boston	MA	AOL
Millicent Library	Fairhaven	MA	AOL/HOL-OP
Barrington Town Hall	Barrington	MA	AOL
Higgins Armory Museum	Worcester	MA	AOL-CV
Old State House	Boston	MA	AOL-C
Faneuil Hall	Boston	MA	AOL-C
Heartland House	St. Joseph	MA	AOL-C
Banneker-Douglass Museum	Annapolis	MD	HOL/AOL
Patton Free Library	Bath	ME	AOL
“The Rock”	Bar Harbor	ME	AOL
Rosewood Inn	Hastings	MN	HOL-B
Moss Mansion	Billings	MT	HOL-B
Davidson County Courthouse	Lexington	NC	AOL-C
Leonard Hall – Shaw University	Raleigh	NC	D-45
NC Governors Mansion	Raleigh	NC	D-45
Nash County Courthouse	Nashville	NC	AOL
Clarke County Courthouse	Flemington	NJ	HOL-B
Montclair Inn	Montclair	NJ	HOL-OP
Ft. Hancock	Sandy Hook	NJ	HOL-OP
Noah Hunt House	Lawrenceville	NJ	HOL-OP

The Queen Victoria B&B	Cape May	NJ	HOL-C
Kingsford House	Oswego	NY	HOL-A
Loerzel Brewery	Saugerties	NY	HOL-B
Thrall Library	Middletown	NY	HOL-B
Hancock County Courthouse	Findlay	OH	AOL
Cleveland Heights Public Library	Cleveland Heights	OH	AOL
First Presbyterian Church	Eaton	OH	D-42
Chi Phi Fraternity	Delaware	OH	AOL-C
Historic Fourth & Plum	Cincinnati	OH	HOL-B
Carrousel District Restoration	Mansfield	OH	HOL-B
Armstrong School	Cincinnati	OH	HOL-OP
St. William's Church	Cincinnati	OH	AOL-A
Heritage Museum	Springfield	OH	AOL-A
Post Office Plaza	Cleveland	OH	HOL-E
Waldo Apartments	Cincinnati	OH	HOL-B
Honeybrook Elementary School	Honeybrook	PA	HOL-OP
Centre County Courthouse	Bellefonte	PA	HOL-B
Vaux Hill	Phoenixville	PA	HOL-B
Kane Memorial Chapel	Kane	PA	HOL-B
Firehouse District Renovation	Reading	PA	AOL-C
Clinton County Courthouse	Lock Haven	PA	D-45
St. Matthews Lutheran Church	Bedminster	PA	AOL-C
Bald Eagle U.M. Church	Mill Hall	PA	AOL
Urban Outfitters Corp Offices – Naval Base Cntr	Philadelphia	PA	D-42
Brown University – Wriston Quad	Providence	RI	SCREENS
St. Stephen's Church (Brown University)	Providence	RI	D-42
U.S. Coast Guard Boathouse	Newport	RI	HOL-C
Apponaug USPS	Apponaug	RI	HOL-OP
Brown University – Corliss Brackett House	Providence	RI	HOL-OP
Brown University – Student Affairs Bldg	Providence	RI	HOL-OP
Bank of Cleveland	Cleveland	TN	AOL-C
Pennsylvania House – US Navy	Norfolk	VA	AOL
Van Wyck Library	Norfolk	VA	AOL-C
Monticello – President Jefferson's Home	Charlottesville	VA	AOL-A
Craftsbury Academy	Craftsbury	VT	HOL-OP TOR
Middlebury College - Forrest Hall	Middlebury	VT	AOL-C BIR
Kimball House	Hardwick	VT	HOL-OP
Orange County Courthouse	Chelsea	VT	HOL-B/AOL-A
116 State Street	Montpelier	VT	HOL-OP
University of Vermont - Benedict House	Burlington	VT	HOL-OP
St. Paul's Church	Watt	VT	HOL-OP
Vergennes Train Station	Ferrisburgh	VT	AOL-D/AOL-A
University of Vermont - Pomeroy Hall	Burlington	VT	BOL-ST
Abel Decker Rowhouses	Burlington	VT	HOL-B
North Shore Presbyterian	Milwaukee	WI	HOL-B
Trail End State Historical Site	Shorewood	WI	HOL-B
St. Joseph Church	Sheridan	WY	AOL-C
	Rawlins	WY	AOL
		WY	AOL-B

10/10/20

ALLIED WINDOW, INC.

National Park Service (NPS) Historic Storm Window Projects

Project Name

Location

Abraham Lincoln Home

Springfield, IL

Adams National Historic Park – Old House

Quincy, MA

Dobbs Overseer’s House

Dobbs Ferry, NY

Eisenhower’s House

Newport, RI

Faneuil Hall

Boston, MA

Friendship Hall

Point Marion, PA

Ft. Hancock (at least (10) projects)

Sandy Hook, NJ

James A. Garfield House

Mentor, OH

Nicodemus Town Hall

Nicodemus, KS

4/11/13

ALLIED WINDOW, INC.

Other Significant Interior Storm Window Projects (Among many)

<u>Project Name</u>	<u>Location</u>
U.S. Dept. of Agriculture-South Bldg.	Washington, DC
U.S. Bankruptcy Courthouse	Columbia, SC
Tennessee Governor's Mansion	Nashville, TN
Historic U.S. Customs House & USPO	St. Louis, MO
Dumbarton Oaks Museum	Washington, DC (Georgetown)
51 Louisiana Avenue	Washington, DC
President's Homes:	
Monticello (Jefferson)	Charlottesville, VA
Montpelier (Madison)	Montpelier Station, VA
Belle Grove (Madison)	Port Royal, VA
Rutherford B. Hayes	Fremont, OH
Warren G. Harding	Marion, OH
James A. Garfield	Mentor, OH
Andrew Johnson	Greenville, TN
Dwight D. Eisenhower	Newport, RI
Ulysses S. Grant	Georgetown, OH
State Capitol Building-SC	Columbia, SC
Universities/Colleges: (Among many)	
Princeton University	Princeton, NJ
Harvard University	Cambridge, MA
Yale University	New Haven, CT
Brown University	Providence, RI
Virginia Tech-Higher Education	Roanoke, VA
Virginia Military Institute-VMI	Lexington, VA
Columbia University	New York, NY
University of Pennsylvania	Philadelphia, PA
Northwestern University	Evanston, IL

201 LINDEN STREET - WINDOWS
LONG-TERM COST ANALYSIS
ADDENDUM D

YEAR	Option A	Option B	Option C	Option D	Option E	Option F	Option G
1	\$ 20,000	\$ 65,000	\$ 85,000	\$ 155,000	\$ 120,000	\$ 75,000	\$ 60,000
2						\$ 1,000	
3	\$ 1,500					\$ 1,000	
4						\$ 1,000	
5	\$ 1,500				\$ 2,000	\$ 1,000	\$ 1,500
6						\$ 1,000	
7						\$ 1,000	
8						\$ 1,000	
9						\$ 1,000	
10	\$ 75,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 9,000	\$ 1,500
11						\$ 1,000	
12						\$ 1,000	
13						\$ 1,000	
14						\$ 1,000	
15					\$ 4,000	\$ 11,000	\$ 15,000
16						\$ 1,000	
17						\$ 1,000	
18						\$ 1,000	
19						\$ 1,000	
20	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 9,000	\$ 1,500
21						\$ 1,000	
22						\$ 1,000	
23						\$ 1,000	
24						\$ 1,000	
25					\$ 6,000	\$ 9,000	\$ 1,500
26						\$ 1,000	
27						\$ 1,000	
28						\$ 1,000	
29						\$ 1,000	
30	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 120,000	\$ 11,000	\$ 15,000
31						\$ 1,000	
32						\$ 1,000	
33						\$ 1,000	
34						\$ 1,000	
35					\$ 2,000	\$ 1,000	\$ 1,500
36						\$ 1,000	
37						\$ 1,000	
38						\$ 1,000	
39						\$ 1,000	
40	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 9,000	\$ 1,500
41						\$ 1,000	
42						\$ 1,000	
43						\$ 1,000	
44						\$ 1,000	
45					\$ 4,000	\$ 11,000	\$ 15,000
46						\$ 1,000	
47						\$ 1,000	
48						\$ 1,000	
49						\$ 1,000	
50	\$ 20,000	\$ 20,000	\$ 20,000	\$ 100,000	\$ 20,000	\$ 9,000	\$ 1,500
51						\$ 1,000	
52						\$ 1,000	
53						\$ 1,000	
54						\$ 1,000	
55					\$ 6,000	\$ 1,000	\$ 1,500
56						\$ 1,000	
57						\$ 1,000	
58						\$ 1,000	
59						\$ 1,000	
60	\$ 100,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 120,000	\$ 70,000	\$ 75,000
61						\$ 1,000	
62						\$ 1,000	
63						\$ 1,000	
64						\$ 1,000	
65					\$ 2,000	\$ 1,000	\$ 1,500
66						\$ 1,000	
67						\$ 1,000	
68						\$ 1,000	
69						\$ 1,000	
70	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 20,000	\$ 9,000	\$ 1,500
71						\$ 1,000	
72						\$ 1,000	
73						\$ 1,000	
74						\$ 1,000	
75					\$ 4,000	\$ 11,000	\$ 15,000
76						\$ 1,000	
77						\$ 1,000	
78						\$ 1,000	
79						\$ 1,000	
80	\$ 20,000	\$ 100,000	\$ 100,000	\$ 20,000	\$ 20,000	\$ 9,000	\$ 1,500
SUBTOTALS	\$ 318,000	\$ 305,000	\$ 325,000	\$ 395,000	\$ 510,000	\$ 319,000	\$ 211,500

201 LINDEN STREET - WINDOWS
LONG-TERM COST ANALYSIS

* Utilizes same projected costs in 2024 dollar values and then projection factors in 2% increase in cost for each year

YEAR	Option A	Option B	Option C	Option D	Option E	Option F	Option G
1	\$ 20,000	\$ 65,000	\$ 85,000	\$ 155,000	\$ 120,000	\$ 75,000	\$ 60,000
2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,020	\$ -
3	\$ 1,560	\$ -	\$ -	\$ -	\$ -	\$ 1,040	\$ -
4	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,060	\$ -
5	\$ 1,620	\$ -	\$ -	\$ -	\$ 2,160	\$ 1,080	\$ 1,620
6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,100	\$ -
7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,120	\$ -
8	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,140	\$ -
9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,160	\$ -
10	\$ 88,500	\$ 23,600	\$ 23,600	\$ 23,600	\$ 23,600	\$ 10,620	\$ 1,770
11	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,200	\$ -
12	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,220	\$ -
13	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,240	\$ -
14	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,260	\$ -
15	\$ -	\$ -	\$ -	\$ -	\$ 5,120	\$ 14,080	\$ 19,200
16	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,300	\$ -
17	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,320	\$ -
18	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,340	\$ -
19	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,360	\$ -
20	\$ 27,600	\$ 27,600	\$ 27,600	\$ 27,600	\$ 27,600	\$ 12,420	\$ 2,070
21	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,400	\$ -
22	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,420	\$ -
23	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,440	\$ -
24	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,460	\$ -
25	\$ -	\$ -	\$ -	\$ -	\$ 8,880	\$ 13,320	\$ 2,220
26	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,500	\$ -
27	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,520	\$ -
28	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,540	\$ -
29	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,560	\$ -
30	\$ 31,600	\$ 31,600	\$ 31,600	\$ 31,600	\$ 189,600	\$ 17,380	\$ 23,700
31	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,600	\$ -
32	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,620	\$ -
33	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,640	\$ -
34	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,660	\$ -
35	\$ -	\$ -	\$ -	\$ -	\$ 3,360	\$ 1,680	\$ 2,520
36	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,700	\$ -
37	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,720	\$ -
38	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,740	\$ -
39	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,760	\$ -
40	\$ 35,600	\$ 35,600	\$ 35,600	\$ 35,600	\$ 35,600	\$ 16,020	\$ 2,670
41	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,800	\$ -
42	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,820	\$ -
43	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,840	\$ -
44	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,860	\$ -
45	\$ -	\$ -	\$ -	\$ -	\$ 7,520	\$ 20,680	\$ 28,200
46	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,900	\$ -
47	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,920	\$ -
48	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,940	\$ -
49	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,960	\$ -
50	\$ 39,600	\$ 39,600	\$ 39,600	\$ 198,000	\$ 39,600	\$ 17,820	\$ 2,970
51	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,000	\$ -
52	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,020	\$ -
53	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,040	\$ -
54	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,060	\$ -
55	\$ -	\$ -	\$ -	\$ -	\$ 12,480	\$ 2,080	\$ 3,120
56	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,100	\$ -
57	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,120	\$ -
58	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,140	\$ -
59	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,160	\$ -
60	\$ 218,000	\$ 43,600	\$ 43,600	\$ 43,600	\$ 261,600	\$ 152,600	\$ 163,500
61	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,200	\$ -
62	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,220	\$ -
63	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,240	\$ -
64	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,260	\$ -
65	\$ -	\$ -	\$ -	\$ -	\$ 4,560	\$ 2,280	\$ 3,420
66	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,300	\$ -
67	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,320	\$ -
68	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,340	\$ -
69	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,360	\$ -
70	\$ 47,600	\$ 47,600	\$ 47,600	\$ 47,600	\$ 47,600	\$ 21,420	\$ 3,570
71	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,400	\$ -
72	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,420	\$ -
73	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,440	\$ -
74	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,460	\$ -
75	\$ -	\$ -	\$ -	\$ -	\$ 9,920	\$ 27,280	\$ 37,200
76	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,500	\$ -
77	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,520	\$ -
78	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,540	\$ -
79	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,560	\$ -
80	\$ 51,600	\$ 258,000	\$ 258,000	\$ 51,600	\$ 51,600	\$ 23,220	\$ 3,870
SUBTOTALS	\$ 563,280	\$ 572,200	\$ 592,200	\$ 614,200	\$ 850,800	\$ 541,900	\$ 361,620

August 17, 2024

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REBUTTAL REPORT

Mr. Jim Bertolini
Senior Historic Preservation Planner
City of Fort Collins
281 N. College Avenue
Fort Collins, CO 80524

Historic Preservation Commission
City of Fort Collins
281 N. College Avenue
Fort Collins, Colorado 80524

Ms. Heather Jarvis
Assistant City Attorney
City of Fort Collins
300 Laporte Avenue
Fort Collins, Colorado 80524

Dear Historic Preservation Commission, Mr. Bertolini and Ms. Jarvis:

Please accept this letter and attachments submitted on behalf of the Applicant Team from 201 Linden Avenue as submission of a Rebuttal Expert Report filed in response to the City's expert report from Deep Roots Craftsman dated August 5, 2024 (the "Craftsman Report").

Errors Contained in the Craftsman Report.

The Craftsman Report contains many errors. We have chosen the most significant to highlight here and in Mr. Wernimont's attached Rebuttal Report.

1. Assumption/Meritless Accusations of Code Violations by Owners.

Most inappropriate is the City's continued false narrative parroted in the Craftsman Report and 2018 Barlow Reports that accuses the Owners of the building of negligence and failure to engage in necessary upkeep and restoration of the 201 Linden Hotel. It bears repeating that this building was in ruins, at risk of collapse and at risk of demolition before the current Owners spent hundreds of thousands of

INCLUDE DELIVERY PHRASES IN HEADER

Mr. Jim Bertolini
Historic Preservation Commission
Ms. Heather Jarvis
August 17, 2024
Page 2

dollars carefully restoring this building and bringing it back to life. Further, up until 2007 when the current Owners purchased the second floor of the building, it was used for commercial purposes. At that time, there were virtually no pulleys left in the windows, the ropes were gone and the majority of the weights were also missing. The counterweights were not removed in the 2018 repair work. Further, the current Owners did not purchase the third floor (which was also used for commercial purposes) until 2018. It defies logic that all the damage and degradation of these 142-year-old windows came into effect during the maintenance work of 2018.

That the City so callously dismisses this history with its thinly veiled threats of prosecution towards the Owners is wholly unacceptable,¹ and documents a clear bias against the Owners that has infected the Historic Preservation Commission's ability to serve as neutral decision-makers. This was evidenced during the first night of hearing and reemphasized again during the August 13, 2024, Work Session.²

The Craftsman Report, as the 2018 Barlow Report before it, makes wildly inaccurate speculative conclusions about the impact of the 2018 restoration work on the state of the windows. Had either the author of the Barlow Report or the Craftsman Report bothered to contact the Owners to discuss this prior to issuing their reports, they would have been informed as to the actual state of the windows prior to the 2018 repairs as noted above. As far back as 2005, the Edge Architecture Report noted that 24 of the windows were inoperable and 5 were operable for less than half of the sash.³ The Dohn Construction/Oglesby Design of 2018 ("2018 Dohn Report") submitted to the Historic Preservation Commission ("HPC") in 2018 shows the incredibly degraded state of the windows. Tellingly, the Craftsman Report did not review the Dohn Report.

Further, the assertions about the "significant changes" in 2018 which included the "removal of a fairly significant amount of material along the sides of the window to allow for the installation of spiral balances," is patently inaccurate. This inaccuracy is addressed further in Mr. Wernimont's attached Rebuttal Report and a picture of what, in actuality, was a de minimis removal of historic material, is included therewith.

¹ See Letter from Heather Jarvis, City Attorney dated November 27, 2023, page 1-2 ("Does failure to comply with minimum maintenance requirements under City Code Section 14-8 (to meet the International Property Maintenance Code of the International Existing Building Code) allow the owners to claim changed circumstances?")

² On the first night of the Historic Preservation Commission Hearing, a Commissioner referenced the 2018 Repair work as the reason for the windows degraded condition despite the Applicant Team's objection to this characterization. This narrative continued during the August 14, 2024, Work Session at which the Applicant, notably had no opportunity to rebut these false statements. This continued baseless narrative indicates not only bias but clear prejudgment of the case at hand.

³ 2006 Edge Architect Report, Project Summary.

INCLUDE DELIVERY PHRASES IN HEADER

Mr. Jim Bertolini
Historic Preservation Commission
Ms. Heather Jarvis
August 17, 2024
Page 3

Additionally, that the Craftsman Report recommends the replacement of the original rope opening system with the Tape Balance system shows a lack of experience with industry standards for windows of this size.

But perhaps the most glaring error in the entire Craftsman Report is the recommendation to repair/replace the lower sash to ensure safety when it was the upper sash of a window that failed. The Craftsman Report says initially that the upper windows should be “fully addressed through rail/or stile replacement.”⁴ Yet, its Option C (which City Staff recommend following) recommends only to “caulk and paint in upper windows and leave as existing” and “removal of RDG panels from upper sashes.”⁵ This recommendation does not addresses the fundamental safety issue before the HPC.

Other errors are addressed in the attached Wernimont Rebuttal Report.

2. Failure to Consider Relevant Expert Reports.

The Craftsman Report relied heavily on the 2018 Barlow Report despite the fact that the Owners’ expressed serious concerns about the accuracy of it.⁶ Most concerning is the fact that the Craftsman Report completely ignores the 2018 Dohn Report which includes the attached letters from Mark Wernimont that were presented at the same 2018 Historic Preservation Commission Hearing and were critical components of the record respectively. To disregard the Applicant’s 2018 Dohn Report shows a bias by either the Craftsman experts or the City in failing to provide all available expert reports for consideration.

3. Failure to Analyze Fundamental Design Flaw after Acknowledgment of the Same.

The Craftsman Report acknowledges the inherent fundamental design flaw of that the windows are too small for the window openings, but utterly fails to acknowledge it as such.⁷

As discussed in Mr. Wernimont’s Rebuttal report, the Craftsman proposed solution of new Tape Balance system would require far more invasive changes to the windows as they cannot support the current 1- and 3/8-inch sash. Changes that are also likely prohibited by the Old Town Design Standards.⁸ Despite

⁴ *Deep Roots Craftsman Report*, p. 2.

⁵ *Deep Roots Craftsman Report*, p. 14.

⁶ It is not industry standard for Historic Preservation Experts to fail to review relevant documentation related to the project they are hired to analyze.

⁷ *Deep Roots Craftsman Report*, p. 3.

⁸ See Old Town Design Standards 3.9: Maintain the historic size, shape and number of panes, and do not increase historic window opening to accommodate a larger window.

INCLUDE DELIVERY PHRASES IN HEADER

Mr. Jim Bertolini
Historic Preservation Commission
Ms. Heather Jarvis
August 17, 2024
Page 4

acknowledging this, the Craftsman Report goes on to make a host of recommendations that still do not sufficiently take into account, safety, operability, environmental impacts and the owners fundamental property rights.

4. Failure to Analyze Operability Issues and Inappropriate Recommendation of Storm Windows.

The Craftsman Report vaguely alludes to “improved window operability” if some of its recommendations are followed but does not quantify it. The Report does not define what is meant by improved operability. Does this mean being able to open a window two-inches, six-inches? No information is given. Further, the Craftsman Report goes on to make recommendations that contraindicate any ability to open the windows. The weather stripping proposed would prevent operability. Similarly, the addition of exterior storm windows (which would likely be fixed for this size of window on second and third floors) would completely negate any ability to open the windows themselves.

The Craftsman Report, and Historic Preservation Staff recommendations regarding exterior storm windows conveniently ignores the fact that the Old Town Design Standards prohibit the use of exterior storm windows. Section 3.11 of the Standards state, “If a window did not historically have a storm window, place a new storm window internally to avoid exterior visual impacts.” With regards to interior storm windows, how the City believes it has the authority to regulate the interior of a residential building under the Old Town Design Standards is not explained. As the HPC well knows, their jurisdiction extends only so far as the exterior of designated buildings.

And to be clear, the Owners object to the placement of either interior or exterior storm windows. They believe that preservation of the appearance of the 201 Linden hotel would be degraded by this non-historically accurate addition that is not necessary if their replacement windows were to be authorized.

Without the addition of prohibited storm windows, the Craftsman Report is devoid of any realistic recommendation for repair of the windows that meet the operability or environmental goals of the Owners or the City through its Climate Action Plan.

Historic Preservation Staff mention that the 2018 Barlow Report was not flawed because it failed to address the clearly articulated City Climate Policies as the Climate Action Plan was not yet adopted. However, their current expert also failed to address the City’s Climate Action Plan, which was adopted well in advance of the issuance of the Craftsman Report.

Similarly, the Craftsman Report and Historic Preservation Staff recommendations are utterly devoid of any consideration of private property owner rights, how their recommendations align with the City’s

INCLUDE DELIVERY PHRASES IN HEADER

Mr. Jim Bertolini
Historic Preservation Commission
Ms. Heather Jarvis
August 17, 2024
Page 5

Climate Action Plan. The City and their experts also fail to square these recommendations with the plain language of Policy and Purpose of the Historic Preservation Regulations articulated in Fort Collins Municipal Code Section 14 and discussed at the prior hearing by the Applicant Team.

5. Inaccurate and Contradictory Cost Estimates that Lack Inflation Analysis.

As discussed in Mr. Wernimont's Rebuttal Report, the "cost estimates" proffered by the Craftsman Report are so flawed as to render them totally unhelpful to the HPC's analysis. Notably, no cost estimate is given for replacement of the upper sashes and no inflation factor is included.

As to Historic Preservation Staff's anticipated reliance on the National Trust for Historic Preservations' 2012 Report regarding Window Retrofit and Replacement (the "2012 Report") the HPC must consider the following:

- The entirety of the 2012 Report is based on single family Queen Anne style single-hung residential windows for homes approximately 1,579 square feet in their entirety. Such windows are roughly **half** the size of the nine (9) foot 201 Linden Hotel windows and in a completely different structural building context.
- Nowhere does the 2012 Report contemplate window repairs, which is at the heart of the question before the HPC. Rather it states, "While an important consideration in extending the window's useful life, **window repairs were not considered within the scope of this study** (except in the case of high-cost exterior storm window test condition)."⁹
- In addition to comparing a wholly different product (which would at a minimum requiring doubling all of the costs listed) and the 2012 Report's complete failure to consider the cost of repair, the analysis is based on data from 2012 which means it is significantly outdated.

6. Expertise.

It should be noted that Deep Roots Craftsman has been in operation for scarcely six-years, three of those during a global pandemic. Mr. Wernimont, the Applicant's expert has over thirty-years of experience and has completed a great number of historic renovations in Northern Colorado.

⁹ National Trust for Historic Preservation 2012 Report regarding Repair v. Replacement, pg. 24.

INCLUDE DELIVERY PHRASES IN HEADER

Mr. Jim Bertolini
Historic Preservation Commission
Ms. Heather Jarvis
August 17, 2024
Page 6

Conclusion.

The Applicant requests that the Historic Preservation Commission not rely upon the Craftsman Report or the 2018 Barlow Report in reaching its decision regarding the appropriateness of the Applicant's request to replace the 47 windows at the 201 Linden Hotel. The only true point of agreement with the Craftsman Report that can be reached is to crystalize for the HPC how time sensitive the safety need for replacement of these windows is and that the current windows do not fit safely within the openings.

The Applicant renews its request for a Certificate of Appropriateness to replace the forty-seven windows of the 201 Linden Hotel to meet the City and Applicant's environmental, safety, operability goals and retain the historic visual integrity of the building.

Sincerely,

A handwritten signature in cursive script, appearing to read "C. Havelda", followed by a long horizontal line extending to the right.

Claire N.L. Havelda

cc: David Diehl, Mark Wimmer

Landmark Meeting 8/21/2024
Mark Wernimont, Colorado Sash and Door, inc.

I am going to give a brief background on historic preservation, then answer questions in the last meeting, your work session and new documents. I will then go through the new Deep Roots Craftsman Report (the “Craftsman Report”) and highlight inaccuracies, points of concern and finally talk about the pricing of both the new document and how ours was prepared.

As was noted in the last meeting, I have been doing this for 30+ years but I also attended what was called the Windows Conference II in Washington DC in 1998. While at this meeting I meet with 300+ people in the preservation community on multiple paths. One of the items outlined was the Secretary of the Interior standards. I am constantly surprised that these have not been revised and updated since then. New materials continue to become available, old ones have gone away and things as simple as sash cord are not made the same way, with new cords being able to stretch over time. I am also not sure how these guidelines work with 50-year-old projects that are covered by the City of Fort Collins directive. The guidelines were written for all wood windows, traditional putty glazing, single pane windows with lead paint and little or no thought towards air infiltration, energy efficiency or even operation.

Inaccuracies in the Craftsman Report

Materials

Wood – Old wood is stronger than new wood – But not engineered wood which new wood windows are made of.

Metal Clad – Most current products are extruded aluminum not wood wrapped with metal. The new style does not rot or have moisture issues. Also, wood has a preservative treatment to resist rot, decay and insects. Either wood or clad wood product proposed have a sealed exterior which does not require weeps for water as Vinyl, Aluminum and exterior glazed wood windows do.

Weather Stripping – Product used are new formulated silicone bulb weather or brush stripping as well as brush that are being used on current windows.

Glazing – The RDG panel has been tested to increase the thermal performance from and R-1 for just single glass to R-2. Not nearly as good as sealed insulated unit which until recently have gone past R-3 with some going to R-5 (u-Value 0.20)

Storm Windows – Are best installed on the exterior as they block air prior to getting to the window, but really detract from the appearance of the windows, are not historically accurate and restrict opening of windows.

Past Studies

I don't understand why neither the Craftsman Report nor the 2018 Barlow Report analyzed the prior 2018 Dohn Construction Report that I had prepared and was submitted to the Historic Preservation Commission for review. It is best practice to review all information related to a historic project when providing expert analysis. There is no explanation given as to why this was not done in this case. The photographs included in the Dohn Report of the "existing windows" show the incredible amount of window deterioration prior to our restoration work. The 2005 Study noted that the majority of the windows did not operate. The Dohn 2016 Study is not referenced – it noted the amount of Check Rails Failing and the owner noted most of the ropes and weights were missing at the time of the study. The Barlow Report, which the Craftsman Report followed, including things noted incorrectly. Balances are only on the lower windows and the upper sash is fixed shut. The only wood removed from the upper sash would have been for the RDG Panel. Only the remaining counterweights were removed during the 2018 repair work.

The 2024 Window Assessment was looking at the failed windows parts.

Items in Deep Wood Craftsman Report

Original Construction – the Craftsman Report does acknowledge the thickness and size as an issue. Notably, their repair work calls for extensive changes to the window frame to "cure" this defect with any of the options where the sash are replaced, as they recommend going to the 1 3/4" thick sash.

Material Removed in 2018 was not Significant – Just Increase the pocket on the lower sash from rope to spiral balance and minimal wood for RDG panel. See the drawing provided. This shows the small portion of original material removed which demonstrates clear error in both the Barlow Report and Deep Roots Craftsman report that they base the analysis on.

Balance System – Tape balances do not perform sufficiently, or they would be used as the industry standard in all windows and window repairs. In comparison, the spiral balances we recommend are used as the industry standard in the highest rated performing commercial hung windows. The lifetime warranted versions

cannot be installed in the existing wood sash. The new window proposed use balances that can perform in school applications for up to 20 years.

Glazing Repairs were done with a Linseed Oil Based Putty Glazing as Deep Roots Report notes is preferable.

Wood Cover Over the Balance Tube – were installed to limit the movement of the windows. Current codes would now have the window only move 4”.

Paint – As was stated this would need to be done every 5 to 7 years. The Deep Roots Report claim that it would last 10 years on an all-wood product is incorrect as evidenced by the fact that the paint was redone with high quality paint in 2018 and currently needs repainting.

Add Storm Windows – Exterior Storm Windows changes the aesthetics in contravention of the Old Town Design Standard 3.11 and are extremely difficult to operate. We are not sure if the units being proposed are “Self – Storing” where a glass panel slides up to expose the screen, or if it is a process of removing a panel to expose the screen. Again, this is extremely difficult to operate either option at this size. Along with this, look at the costs of the wood option or even the aluminum clad option in Addendum 4 to maintain these items. This report says that work needs to be done every year.

Weather stripping – Interesting that Deep Roots Report says the edge weather stripping is an issue but then put it back in Option B

Rebuild the lower Sash – this is not the part that failed it was the upper sash. The current upper sash was fixed shut in 2018. We recommended the sashes be changed to 1 3/4”. The option thickness of 1 1/2” does not add enough strength, the interior sill will need to be cut back 3/4" so the step in these used to keep water out of the building will be maintained. The exterior sill will need to be replaced as it needs to go under the interior sill to keep water out. We do not see where there was any cost set for working on the frame, which needs to be done if this Craftsman Report recommendation is followed.

Glazing – the Craftsman Report discusses using insulated glass as an option with this work. However, to do this you must replace the sash to install it. You also need to go to the 1 3/4" thick sash to be able to use glass that increases the performance. With this, the Putty Glazing is not an option as the oils in the glazing putty will deteriorate the butyl sealant in the insulated units.

The single glazed windows have an R-Value of 1 / U-Value of 1.0, with the RDG panel added you will get to an approximate R-Value of 2 / U-Value of 0.50. With the new Insulated Glass and low-E coating but no gas in the cavity due to our altitude, you can get to R-3 / U-Value of 0.33. With the new windows you can get to an R-5 / U-Value of 0.20. on the windows. The storm window over single glass will get you about the same R-Value as the RDG panel at R-2 and U-Value of 0.50. What a storm window does do, if installed on the outside, is to cut down the air infiltration, which is no part of the U-Value. This comes down to how well the windows seal.

Costs

In looking at the costs for the work being done, Addendum #4 with price escalation (that was notably missing from Craftsman Report) seemed to be most usable information. But how it was put together does not make sense. These all should be looked at the cost over 30 years to be a comparison to the new windows and assuming the RDG panel is removed, the storm window needs to be added as a cost.

Option A: This base pricing seems to show window repairs and not sure if the RDG panel stays or goes. But assuming it needs to go, the cost for the option for 30 years is \$170,880. However, our pricing in 2024 was \$28,900 and the owner has had pricing up to \$35,000. If we use our number it adds up to \$133,780 and then add \$88,500 at year 10 for restoration needed, you end up with \$222,280 which is more accurate. But you also must add the storm windows and the wood units as they priced amounts to \$163,620 or a total cost of \$385,900.

Option B: This option seems to move restoration from year #10 to Year #1 and even if you ignore the painting cost difference, you get to a cost of \$147,860 but again add the storm at \$163,620 for a total of \$311,420. And would grow by another estimated cost of \$51,400 for the correct finishing costs which makes the total \$362,820.

Option C: Adds \$20, 000 in year one to the cost, so the total grows to \$382,820.

Option D: After looking at the numbers this appears to cover building just the new lower sash (which again, is not the part that failed), but does not look to address the frame and again you need to add the storm windows. We still need to add the additional painting cost. Total is \$237, 000 plus the storm of \$163,620 and the additional paint cost for a total of \$452,020.

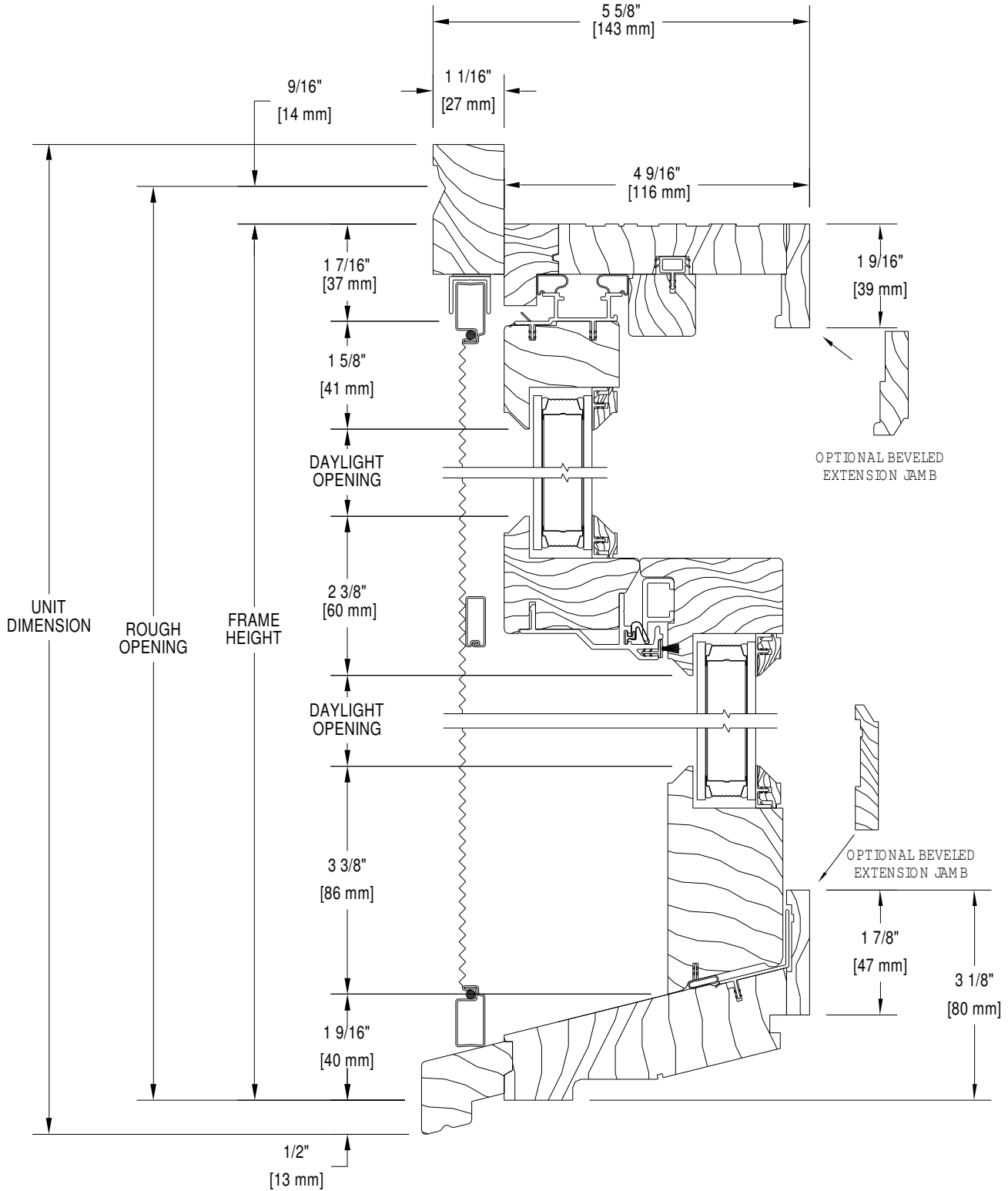
Option E: Craftsman new window pricing is 25% less than what we have priced, (but the 1 3/8" thick sash does not meet the structural performance for the size of the openings.) I am not aware of any product that will hit this budget unless they are using a price for smaller residential house sized windows. They may meet the details but would not provide the custom color with the 4-step paint process in a temperature and humidity controlled environment that we have provided. Their total is \$376,960 and doesn't account for storm windows, which would be an additional cost of \$163,620 for the wood version, for a total of \$540,580. Our price for this is \$284,960 and, critically, would not require storm windows.

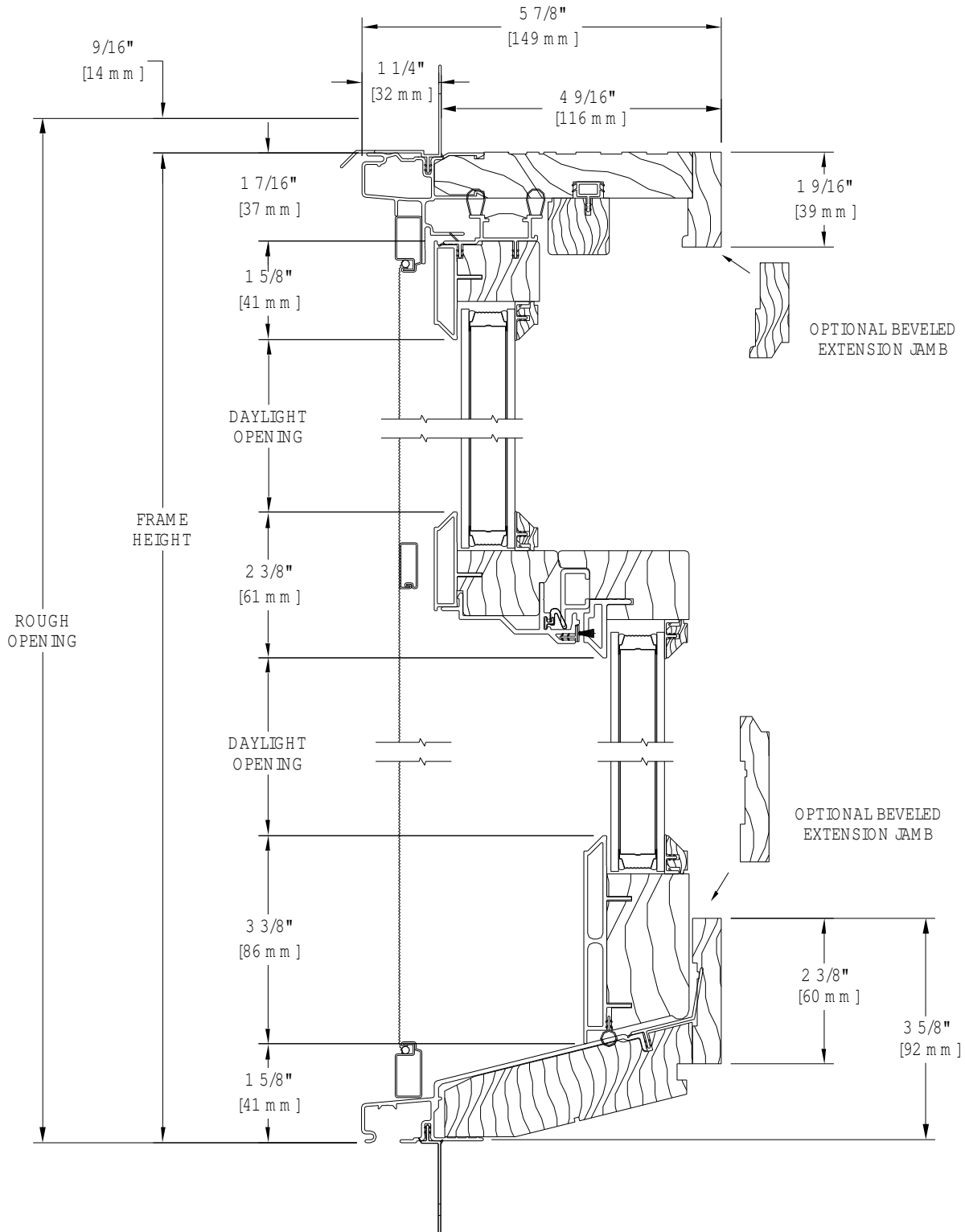
Option F: Wood Storm windows. If you add up the cost for the first 30 years you get \$163,620 which is what I used in the comparisons.

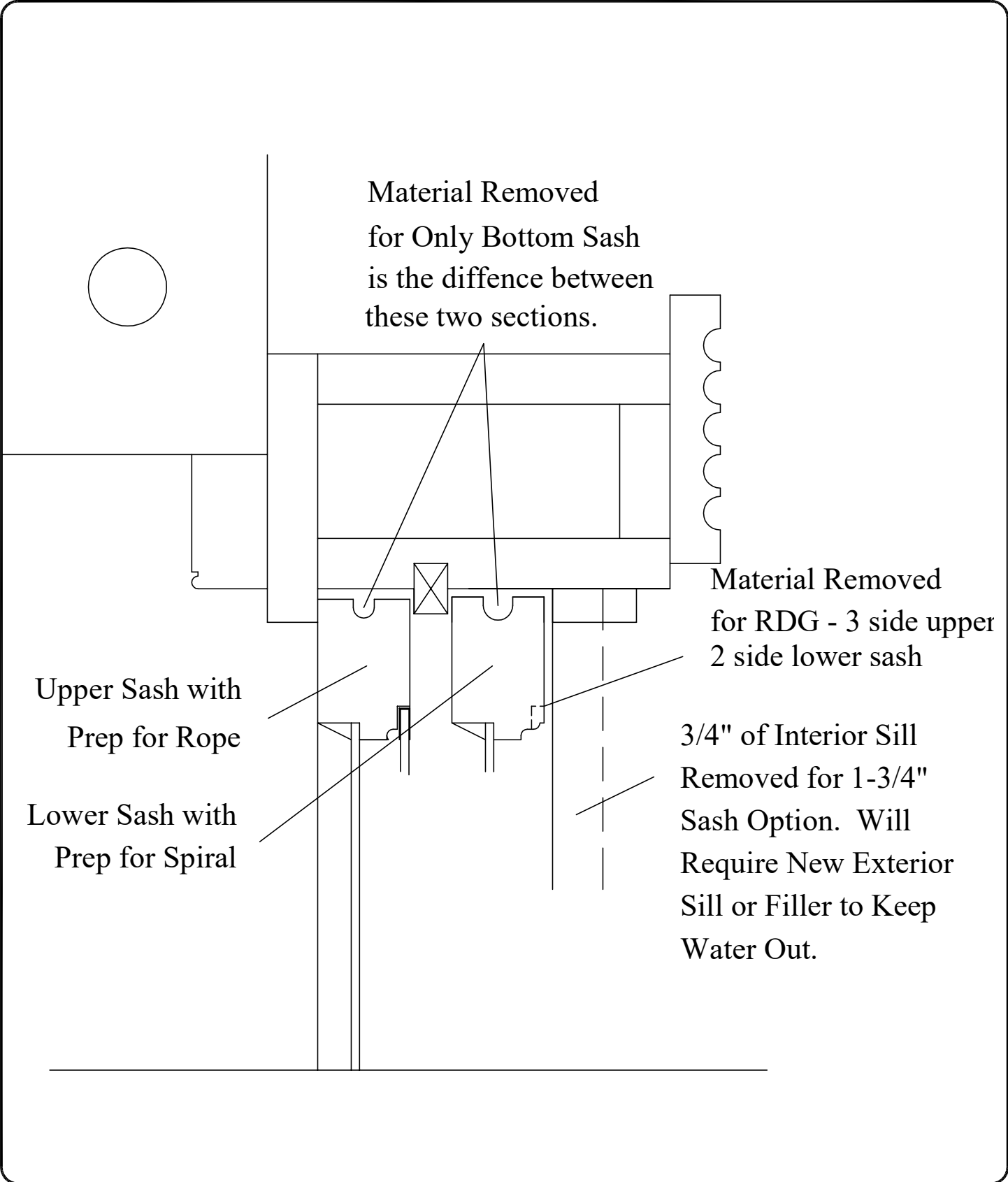
Option G: Aluminum Storms, if clad windows are not an option, aluminum storms should not be an option.

Our option for Aluminum Clad Wood matching the profiles, performance to meet the building codes, is visually indistinguishable from wood and provide better sound control plus being able to maintain going in the future has a base cost of \$218,950 and estimated cost to maintain the weather stripping and maybe glass after 20 years would be less than \$45,000 or a total of \$263,950. This is using a product that has been approved for Historic Replacement locally, regionally and nationally. Meets the owner's desires to make the building look historically accurate, operate as it needs, be safe and provide a better habitable space for comfort in temperature and noise. Critically, this option also comes with energy savings and drastically reduces the affect greenhouse gas emissions.

Mark J. Wernimont
President
Colorado Sash and Door, inc.







DRAWN BY MJW SCALE 9" = 1'-0" FIRST ISSUE DATE 08/15/2024	ARCHITECT CONTRACTOR	Colorado Sash & Door, Inc. 4521 Endeavor Drive, Unit C Johnstown, Colorado 80534 ph (970) 226-1460, Cell (970) 402-2623 office@colosash.com	PROJECT 201 Linden	PROJECT NO. 24008 DRAWING NO. 4 of 4
REVISION: △ . △ . △ .	201 Linden Street Fort Collins, Colorado		TITLE OF DRAWING Jamb Side	

ORDINANCE NO. 170, 1979
OF THE COUNCIL OF THE CITY OF FORT COLLINS
DESIGNATING PROPERTY WITHIN THE CITY OF FORT COLLINS
AS THE OLD TOWN FORT COLLINS HISTORIC DISTRICT PURSUANT
TO CHAPTER 69 OF THE CODE OF THE CITY OF FORT COLLINS

WHEREAS, on September 26, 1979 the Cultural Resources Board of the City of Fort Collins, ex-officio the Fort Collins' Landmark Preservation Commission, held a public hearing concerning the proposed local designation of the Old Town Fort Collins Historical District comprising a portion of the "Triangle" area of the Old Town section of Fort Collins; and

WHEREAS, pursuant to said public hearing, the Cultural Resources Board has affirmatively recommended to the City Council of the City of Fort Collins that the Old Town Fort Collins Historic District be created pursuant to Chapter 69 of the Code of the City of Fort Collins; and

WHEREAS, such a district would be created for the following purposes:

1. To encourage public knowledge and appreciation of the architectural character of Old Town and the history of Fort Collins.
2. To promote the public welfare by strengthening the cultural and educational life of the City, stimulating the enrichment of human life by developing educational and cultural dimension while making Fort Collins a more attractive and desirable place to live.
3. To preserve and protect the beauty and quality of Old Town Fort Collins because it reflects distinctive features of Fort Collins' growth and development by defining and maintaining an appropriate image and atmosphere to enhance Old Town as a cultural resource for this and future generations.
4. To foster economic growth through redevelopment without disrupting the beauty of Historic Old Town by encouraging appropriate use, by restraining environmental influences adverse to such purposes due to pressures resulting from population growth and development, and by encouraging private efforts in support of such purposes.
5. To prevent misguided improvements and to encourage the mitigation of previous incompatible improvements.

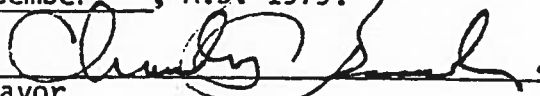
NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF FORT COLLINS AS FOLLOWS:

Section 1. That that certain property whose description appears on Exhibit "A" attached hereto, and by this reference incorporated herein, be, and it hereby is, designated as a Landmark District pursuant to Chapter 69 of the Code of the City of Fort Collins.

Section 2. That said district shall be known as the Old Town Fort Collins Historic Landmark District.

Section 3. That this designation shall take effect at such time as a certified copy of this Ordinance has been recorded in the Office of the Clerk and Recorder of Larimer County.

Introduced, considered favorably on first reading, and ordered published this 4th day of December, A.D. 1979, and to be presented for final passage on the 18th day of December, A.D. 1979.



Mayor

ATTEST:



City Clerk

Passed and adopted on final reading this 18th day of December, A.D. 1979.



Mayor

ATTEST:



City Clerk

NATIONAL Designation
Aug 2, 1978
LOCAL Designation
Dec 16, 1980

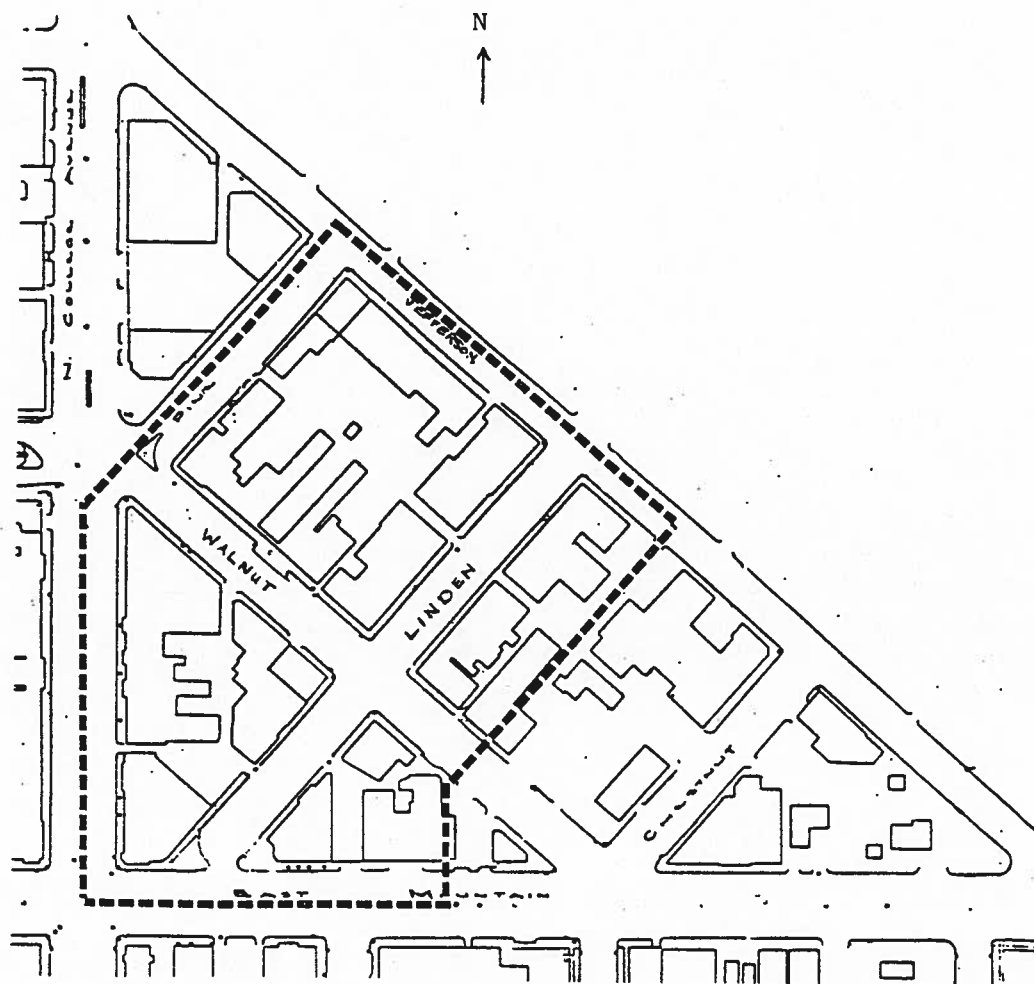
EXHIBIT "A"

LEGAL DESCRIPTION OF HISTORIC OLD TOWN
FORT COLLINS LANDMARK DISTRICT

Lots 11, 12, 13, 14, 15 and 16 of Block 12, Block 13, Block 18, and Lots 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 and 21 of Block 19, in the City of Fort Collins, County of Larimer, State of Colorado.

NOTICE IS HEREBY GIVEN that a hearing will be held before the Cultural Resources Board of the City of Fort Collins at 8:00 O'clock on the 26th day of September, 1979 at City Council Chambers, New Municipal Building, 300 Laporte Avenue, Fort Collins, Colorado for the purpose of considering the designation of the property described below as an hisoric landmark district.

District Boundaries are illustrated on map below.



WINTER-LINDEN SQ
PARTNERSHIP II

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J. ULVANG, RECORDER - LARIMER COUNTY, CO. DOC. FEE- \$0.00

ORDINANCE NO. 44, 1974
BEING AN ORDINANCE DESIGNATING CERTAIN
PROPERTY AS A LANDMARK

WHEREAS, the Landmark Preservation Commission has, by Resolution, recommended to the City Council, the designation of the property hereinafter described as a landmark; and

WHEREAS, the owners of said property have consented to the designation of the same as a landmark; and

WHEREAS, the City Council has reviewed the recommendation of the Landmark Preservation Commission and has heard a report by the members of said Commission and desires to accept such recommendation and designate said property as a landmark.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF FORT COLLINS that the structure known as the Linden Hotel, located on lands described as follows, to-wit:

A portion of Lots 2 and 4, Block 13, City of Fort Collins, also known as 201 Linden Street, Linden Hotel Building;

be and the same hereby is designated as a landmark in accordance with the Ordinances of the City of Fort Collins.

Introduced, considered favorably on first reading and ordered published this 1st day of August, 1974, and to be presented for final passage on the 15th day of August, 1974.

ATTEST:

Verna Lewis
City Clerk

[Signature]
Mayor

Passed and adopted on final reading this 15th day of August, 1974.

ATTEST:

Deputy Lorraine Hoffman
City Clerk

[Signature]
Mayor

CONSENT TO DESIGNATION AS HISTORIC LANDMARK

TO: Fort Collins Landmark Preservation Commission

The undersigned owner(s) hereby consents that the following property be designated by the Fort Collins Landmark Preservation Commission as a historic landmark. The legal description of said property is described as follows:

A PORTION OF LOTS 2 AND 4 BLOCK 13
CITY OF FORT COLLINS ALSO KNOWN AS
201 LINDEN ST. LINDEN HOTEL BUILDING

I understand that should the Commission designate the property as a historic landmark the property will be subject to certain controls. I understand that upon designation I will be requested to notify the Secretary of the Landmark Preservation Commission prior to any of the following:

1. Selling or leasing the property or improvements,
2. Preparation of plans for reconstruction or alteration of the exterior of the improvements, or
3. Preparation of plans for construction of or addition to or demolition of improvements on the property.

I further understand that if I apply for a building permit for any one of the following:

1. Alteration or reconstruction or addition to the exterior of any improvements,
2. Demolition of improvements, or
3. Construction or erection of or additions to improvements,

and if I have not obtained prior consent from the Commission, the building inspector will, within seven days, notify the Commission of my application for a building permit. The Commission will have a period of ninety days after filing of the application for a building permit to develop, with my consent, either alternate plans or appropriate public or private uses of the property. If an agreement cannot be worked out within the ninety day period my application for a building permit will then be processed as if the designation of historic landmark did not exist.

Dated at Fort Collins, Colorado, this 22 day of June, 1973

Veterans of Foreign Wars

Rocky Mountain Post 1781

Bill Learnat Trustee

Wm McNewell Trustmaster

OWNER

CONSENT TO DESIGNATION AS HISTORIC LANDMARK

TO: Fort Collins Landmark Preservation Commission

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I further understand that if I apply for a building permit for any one of the following:

1. Alteration or reconstruction or addition to the exterior of any improvements,
2. Demolition of improvements, or
3. Construction or erection of or additions to improvements,

and if I have not obtained prior consent from the Commission, the Building Inspector will, within seven days, notify the Commission of my application for a building permit. The Commission will have a period of ninety days after filing of the application for a building permit to develop, with my consent, either separate plans or appropriate public works projects which, if approved, will be worked out within the time period for which a building permit will then be processed. If the designation of historic landmark did not exist,

Dated at Fort Collins, Colorado

1978
1871
1871



Historic Window Components

Window components include:

- > Sash
- > Frame
- > Number of lights (panes)
- > Shutters
- > Security Devices (bars and screens)
- > Insect screens
- > Storm windows

WINDOWS

Historic windows help convey the significance of historic structures, and shall be preserved. They can be repaired by re-glazing and patching and splicing elements such as muntins, the frame, sill and casing. Repair and weatherization also is often more energy efficient, and less expensive, than replacement. If a historic window cannot be repaired, a new replacement window shall be in character with the historic building.

3.8 Maintain and repair historic windows.

- > Preserve historic window features including the frame, sash, muntins, mullions, glazing, sills, heads, jambs, moldings, operation and groupings of windows.
- > Repair and maintain windows regularly, including trim, glazing putty and glass panes.
- > Repair, rather than replace, frames and sashes.
- > Restore altered window openings to their historic configuration.



Before rehabilitation: upper story windows in need of repair.



After rehabilitation: repaired windows.

3.9 Replace a historic window with a matching design if repair is not possible.

- > Replace with the same material.
- > Match the appearance of the historic window design (i.e., if the historic is double-hung, use a double-hung replacement window).
- > Maintain the historic size, shape and number of panes.
- > Match the profile of the sash, muntin and its components to the historic window, including the depth of the sash, which may step back to the plane of the glass in several increments.
- > Use clear window glazing that conveys the visual appearance of historic glazing (transparent low-e glass is preferred).
- > Do not use vinyl and unfinished metals as window replacement materials.
- > Do not use metallic or reflective window glazing.
- > Do not reduce a historic opening to accommodate a smaller window or increase it to accommodate a larger window.



Before rehabilitation: historic windows are missing.



After rehabilitation: historic openings are restored.



Match the appearance of a historic window design (i.e., if the historic is double-hung, use a double-hung replacement window).



Replace historic windows (top) with a matching design (bottom), if repair is not possible.



Do not reduce a historic opening to accommodate a smaller window or increase it to accommodate a larger window.

Alternative Window Material

If it is not possible to match the historic design and materials of a window, then an alternative design may be considered in the following locations:

- > On a non-primary façade, accessory building or addition
- > On a primary façade if no other option is available

Alternative window designs shall:

- > Match the general profile and details of the historic window.
- > Use materials that match the historic appearance in dimension, profile and finish.

3.10 Use special care when replacing a window on a primary façade.

- › Give special attention to matching the historic design and materials of windows located on the façade.
- › Also, match the historic design when replacing a window located on a secondary wall.

3.11 Design a storm window to minimize its visual impacts.

- › If a window did not historically have a storm window, place a new storm window internally to avoid exterior visual impacts.
- › Use storm windows designed to match the historic window frame if placed externally.
- › Use insect screens with painted wooden frames where wood windows exist.

3.12 Restore a historic window opening that has been altered.

- › Restore a historic window opening that previously existed.
- › Place a new window to fit within the historic opening.

For More Information

See web link to *Preservation Brief 9: The Repair of Historic Wooden Windows*

<http://www.nps.gov/tps/how-to-preserve/briefs/9-wooden-windows.htm>

See web link to *Preservation Brief 13: The Repair and Thermal Upgrading of Historic Steel Windows*

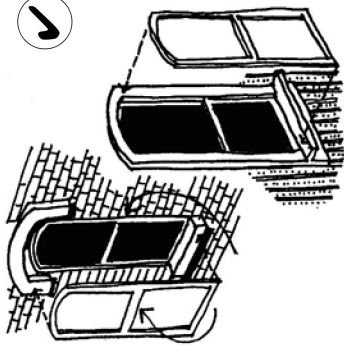
<http://www.nps.gov/tps/how-to-preserve/briefs/13-steel-windows.htm>

See web link to window retrofit article from the National Trust for Historic Preservation web site

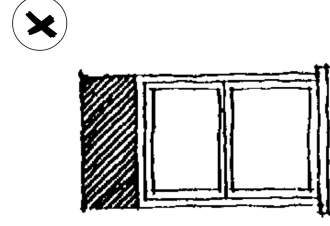
<http://www.preservationnation.org/who-we-are/press-center/press-releases/2012/new-windows-study.html>

Web link to window treatments National Park Service Tech Notes. Scroll down page to window to secure links

<http://www.nps.gov/tps/how-to-preserve/tech-notes.htm>



Place storm windows internally to avoid exterior visual impacts (right). Use storm window inserts designed to match the historic frame if placed externally (left).



Preserve the size and proportion of a historic window opening.

WINDOW EVALUATION

FOR

201 LINDEN STREET

FORT COLLINS, CO 80524



PREPARED FOR:

CITY OF FORT COLLINS
OFFICE OF HISTORIC PRESERVATION
281 NORTH COLLEGE
FORT COLLINS, CO 80524

PREPARED BY:

PHILLIP BARLOW
HISTORIC PRESERVATION SPECIALIST
BARLOW CULTURAL RESOURCE CONSULTING LLC
4576 TANGLEWOOD TRAIL
BOULDER, CO 80301



EVALUATION DATE: NOVEMBER 29, 2018

TABLE OF CONTENTS

SUMMARY OF FINDINGS:.....	1
STANDARDS FOR REHABILITATION	2
DESCRIPTION OF THE TYPICAL WOOD DOUBLE-HUNG WINDOW SYSTEM.....	3
REVIEW OF CONDITIONS	5
APPENDIX.....	25
Example of Full Restoration process for: Wood Double-Hung, Casement, and Fixed Windows.....	25
Preservation Brief 9: The Repair of Historic Wooden Windows	28
Photo Documentation.....	35

SUMMARY OF FINDINGS:

Located in the Old Town Historic District in Fort Collins, the Linden Hotel at 201 Linden Street was constructed in 1883 and designed by William Quayle. Originally housing the Poudre Valley National Bank on the street level with a Masonic Lodge above, the building became the Linden Hotel in 1904.¹ A good example of late 19th century commercial architecture, the Linden Hotel features a clipped corner entry with full-height oriel above, crowned with a pyramidal hood. The building utilizes a tripartite division of the facade, dividing the building into the ground level storefront, a central level characterized by arched stone lintels over the windows, and capped by a third level featuring a metal bracketed cornice.

The City of Fort Collins contracted with BCRC LLC to evaluate the windows in their existing condition to determine if recent alterations rendered them unsalvageable and in need of replacement. The evaluation consisted of deconstructing one window to determine the scope of the previous repairs and alterations, and examining all windows visually to determine if conditions were consistent around the building. Photo documentation of the interior and exterior of each window and a layout of the window numbering system is available in the appendix.

The deconstruction of the test window revealed that the original weight and pulley balance system had been discarded and a modern spiral balance system, which relies on spring tension to balance the sash, had been installed. To install this system a groove was cut on the vertical sides of the window sash (the stiles) to house the mechanism. This groove weakened the stiles and made weatherstripping on the sides of the sash impossible. A pane of glass was installed on the interior face of the upper and lower sash. To install this pane of glass flush with the interior face of the sash a groove was cut into the sash. Repairs made during this restoration phase appear to be minimal and many major repairs remain to be addressed. Paint and glazing putty were not fully removed from the sash. Lead paint remains on a least one sash that was tested.

The final finding is that, despite the destructive nature of the alterations made, these window sash can be brought back to full function by following a full restoration program, the full details of which can be found in the body and appendix of this report. To meet the goals of energy efficiency and sound reduction, preservation appropriate modifications are detailed, including a weatherstripping program and storm windows.

As a historic building, modifications to character defining features like the window system should be compliant with the Secretary of the Interior's Standards for Rehabilitation. To establish a baseline of information, these standards are stated in full in the following section. Throughout the report these standards will be referenced to illustrate how the proposed work will be fully compliant.

Thank you for the opportunity to visit this property. If you have any questions or comments please contact me at 303-746-1602, or barlowpl@gmail.com

Regards,



Phillip Barlow, Owner
BCRC LLC
(303)746-1602

¹ Noel, T. J. (2002). *Buildings of Colorado*. New York: Oxford University Press. Pg. 225

National Park Service
U.S. Department of the Interior
STANDARDS FOR REHABILITATION

"Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

The Standards will be applied taking into consideration the economic and technical feasibility of each project.

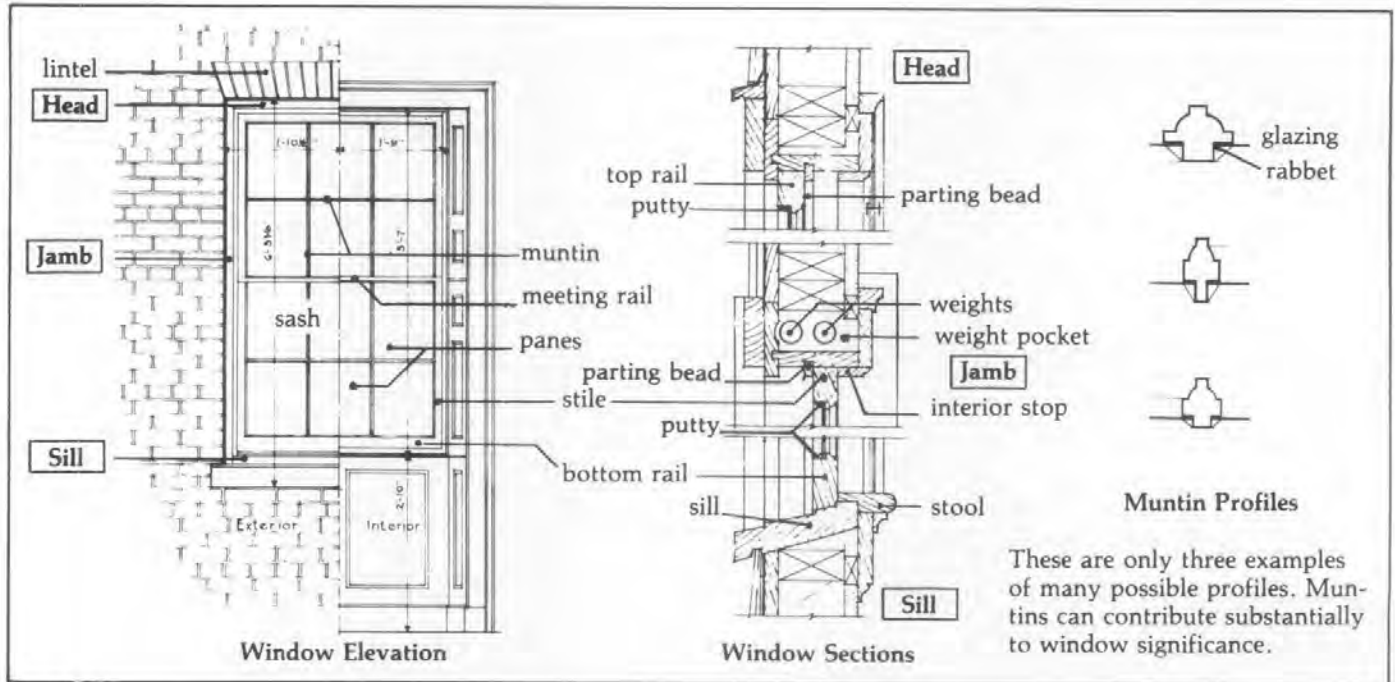
1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations or related new construction will not destroy historic materials, features and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Rehabilitation as a treatment

When repair and replacement of deteriorated features are necessary; when alterations or additions to the property are planned for a new or continued use; and when its depiction at a particular period of time is not appropriate, Rehabilitation may be considered as a treatment." ²

² <https://www.nps.gov/tps/standards/four-treatments/treatment-rehabilitation.htm>

DESCRIPTION OF THE TYPICAL WOOD DOUBLE-HUNG WINDOW SYSTEM



3

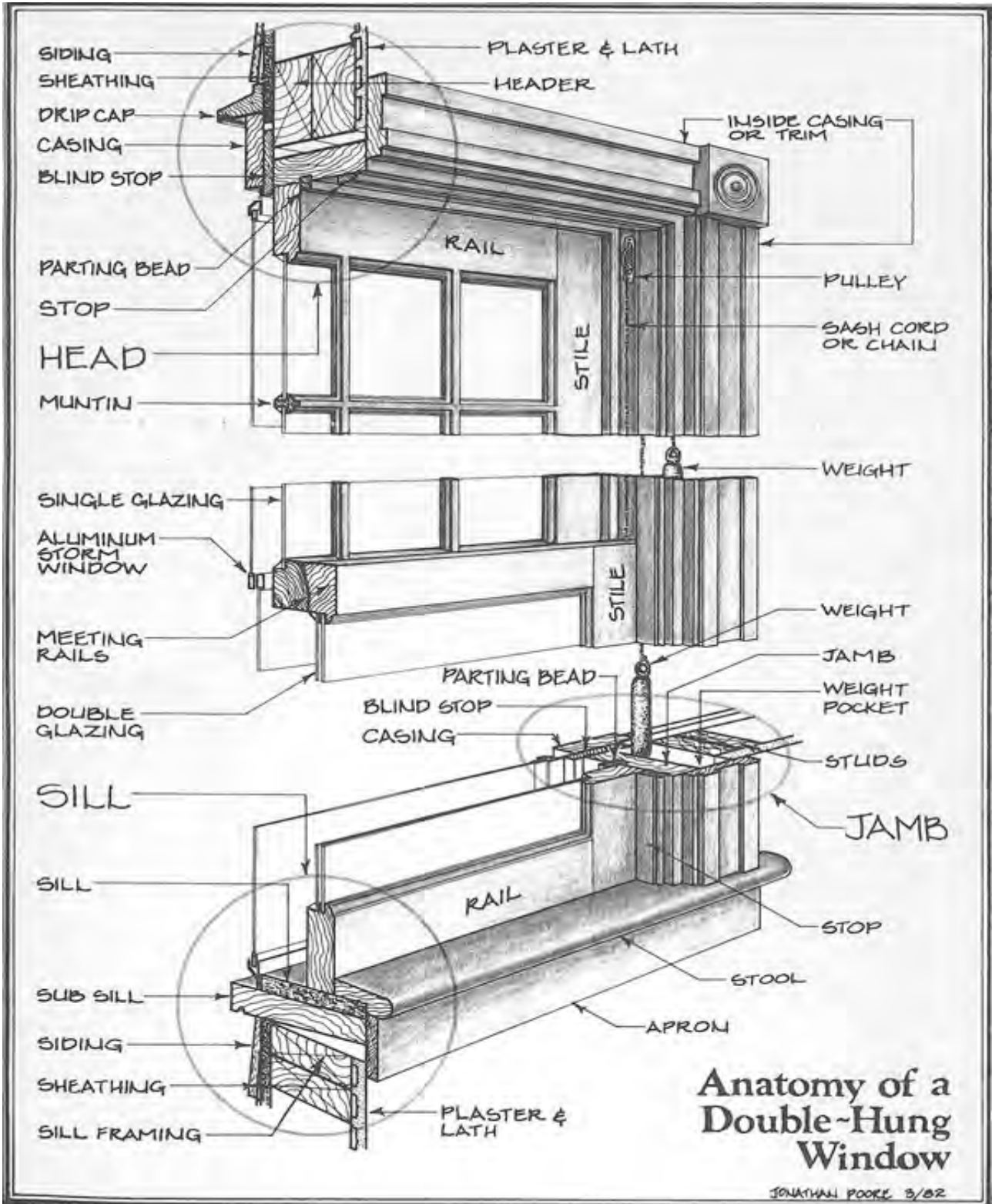
The typical double-hung wood window system consists of the jamb, which are the sides and upper portion of the window that remain static within the wall. At the bottom of the jamb is the sill, which slopes to the exterior of the building to allow for drainage. On the interior, the stool projects into the room and is the flat decorative trim that abuts the lower sash and is typically not sloped.

The illustration above shows the sash, which are the wood frames that hold the window glass and are the only parts of the window that move. The sash of the Linden Hotel are 1/1, which means that there is a single pane of glass in the upper sash and a single pane of glass in the lower sash. The upper sash has four components; the upper rail, which is the top of the sash, the meeting rail, which is the bottom of the sash that "meets" the same rail on the lower sash, and the left and right stiles, which are the vertical members that connect the upper rail and the meeting rail. The lower sash has the meeting rail at the top of the sash, a lower rail at the bottom of the sash which is typically taller than the other sash members, and a left and right stile.

Double-hung operation means that both the upper and the lower sash are designed to move. This is a common configuration because it allows for natural air flow, with the hot air leaving through the top and cooler air coming in through the bottom. The Linden Hotel utilized a rope-and-pulley counterbalance system to allow for ease of operation and to ensure that the windows stay open when desired. This system consists of a rope or chain that is attached to each side of the sash which goes over a pulley which is mortised into the top of each side of the jamb. There is an open space on each side of the jamb that allows room to house the window weights. These weights each weigh half the weight of the sash so that the window can easily open and then stay where ever the occupant desires. The rope or chain that was attached to the sash and brought over the pulley is connected to the weights and the system is balanced.

³ Myers, J. H. (1981) "Preservation Briefs: 9 The Repair of Historic Wooden Windows" U.S. Dept. of Interior, Heritage Preservation Services, Pg. 2

Between the upper and lower sash is a piece of trim called the "parting stop", and on the interior side of the jamb is a strip of trim called the "interior stop" which keeps the lower sash in place and tight to the parting stop.



⁴ Old House Journal "Repairing Hopeless Windows" April 1982, pg. 87

REVIEW OF CONDITIONS

Defect 1:

Window sash do not operate easily. The original balance system would have consisted of window weights, ropes, and pulleys. The windows were altered by adding a second pane of glass on the interior, increasing the weight. A modern spiral balance system was installed with the intention that it would provide the necessary counterbalance for the additional weight. This system has not proven effective. When this system was introduced the weight pockets were filled with blown-in insulation and the window pulleys and weights were presumably discarded.



Image 1: Note missing window pulley. A cover, visible at the bottom of the image, was milled to prevent the window from opening fully, to cover the space left by the removed pulley, and to cover the end of the spiral balance.



Image 2: Cover in place. Black plastic tube houses the spiral balance mechanism.

Proposed Solution:

The best solution would be to return the window pulleys and weights to the window system. This may not be possible if these components have already been discarded. A good solution at this point would be to utilize spring balances. Unlike spiral balances, the spring balance uses the existing pulley mortises and does not require any additional removal of wood from the window sash. Spring balance technology also has a long track record and has proven to be durable.

Note: Specific products and manufacturers are noted in this report as examples of currently available products and are not recommendations. The author has no business or personal relationship with any of the noted companies. It is the responsibility of the contractor and architect to research all options and choose the products that best fit the needs of the project.

One supplier of spring replacement balances that has a good history with historic windows is the Pullman Manufacturing Corporation. <https://www.pullmanmfg.com/window-balances-standard-balances/>

These balances can accommodate sash up to 105 pounds and can be installed with minimal mortise work in the existing openings. The blown-in insulation can stay in place with this recommendation.

These balances are ordered based on the weight of the sash and the length of sash travel. In my experience, it is best to order the tape long to allow for easier operation. If the upper sash are not scheduled for operation, there is no need to install any operating hardware on these sash and they can simply be blocked and caulked in place.



Image 3: Pullman balance installed in place of a window pulley. Photo courtesy of the Pullman website

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:**Previous treatment**

The removal of the traditional balance system and installation of a modern spiral balance does not comply with standards 5 and 6, which address the retention of historic materials and the importance of repair versus replacement. If a treatment, like adding a secondary pane of glass, necessitated the removal of traditional materials then it should not have been considered.

Proposed treatment

If the original weights and pulleys can be located then their reintroduction into the window system is fully in compliance. The introduction of the spring balance is not ideal, as it is not the original design. However, it is an alteration that has been found acceptable when the original balance system has been lost.

Defect 2:

The introduction of a spiral balance system necessitated the cutting of a channel into the left and right stiles of each sash to house the hardware. On the examined window, this channel was 5/8" in width with a rounded bottom with max depth of 1/2". This left approximately 1/4" of material on one side of the groove and 7/16" on the other. The sides of the channel had already split in some places and will continue to fail going forward.



Image 4: Groove cut into one stile. White arrows note the groove.



Image 5: Attachment hardware was added to the bottom of the sash for the spiral balance



Image 6: Note the split that has already developed as a result of the removal of supporting material. In addition, note the thinly filled epoxy repairs that are adjacent

Proposed Solution:

The following are two options for addressing the lost material which has degraded the integrity of the window sash. The Dutchmen solution is likely the most stable and durable, but it does mean that more of the historic window sash is lost. However, it will enhance the structural stability of the remaining material and retain the look and feel of the historic sash. The epoxy solution will retain all of the existing historic material, but it may be more prone to failure and will essentially "glue" many components of the window together.

Dutchmen Solution

- Remove all spiral balance hardware from the sash
- Determine the max depth of the channel as it may vary due to how the cut was made.
- Make notes if the depths vary
- Make notes of where the sash cord knot hole and channel were
- Make notes on the full width of the meeting rail in case any portion of it will be cut
- Cut the sides of the sash down even with the depth of the channel
- Cut new wood slightly thicker than the sash stile and as wide as the previous channel-depth measurement
- Glue the new wood to the sides of the sash and clamp on. Use high quality indoor/outdoor carpenters glue. Allow to dry according to manufacturers specifications
 - Note: If full reversibility is desired, then the new wood should be screwed tightly onto the sash without the use of glue
- If the original weights and pulleys are to be used, route a groove and drill a knot hole according to the previously recorded measurements
- If spring balances are to be used, follow the manufacturer's installation instructions
- If any portion of the meeting rail profile as removed then cut a matching piece per the recorded measurements and attach
- Sand and/or plane the portions of the new wood that are not flush with the original sash to create a smooth appearance

Epoxy Solution

- Remove all spiral balance hardware from the sash
- Make notes of where the sash cord knot hole and channel were
- Select an epoxy system. The following are three epoxy systems that have been used successfully on historic properties
 - <https://www.abatron.com/>
 - <https://www.westsystem.com/>
 - http://www.conservationtechnology.com/building_repair.html
- Prep the wood according to manufacturers recommendations
- Fill the groove with the selected epoxy
- Sand the epoxy back to the smooth finish and down to the original dimensions of the window
- If the original weights and pulleys are to be used, route a groove and drill a knot hole according to the previously recorded measurements
- If spring balances are to be used, follow the manufacturer's installation instructions

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:**Previous treatment**

The installation of a modern spiral balance required the removal of substantial historic material and altered the original design of the window. This does not comply with standards 5 and 6, which address the retention of historic materials and the importance of repair versus replacement. If a treatment, like adding a secondary pane of glass, necessitated the removal of traditional materials then it should not have been considered.

Proposed treatment

Both of the proposed treatments focus on preserving as much of the original material as possible. The Dutchmen repair is more appropriate as it is a replacement in-kind, although it does have the drawbacks noted above. If completed with screws and no glue, then the Dutchmen repair has the added benefit of being reversible.

Defect 3:

Glass panes were added to the interior of the upper and lower sash with the goal of reducing sound transference and improving energy efficiency. A groove was cut into the interior face of the sash to a depth of approximately 3/16" and a width of 3/8" for the glass to fit into. The glass is held in place with four turn button clips. During inspection the panels did not fit tight into this groove and rattled when pressed against. In some locations the glass panels had slipped out of the groove leaving air gaps. The lack of a seal negates significant noise reduction or improved energy efficiency. If a better seal is achieved, then there is a risk that condensation will be exacerbated on the interior face of the primary glazing, which will then be trapped in between the two layers of glass and hasten deterioration of the historic sash. The glass pane on the upper sash covers the historic location of the sash lock.



Image 7: Groove cut to house glass panel. The open space underneath the sash is due to the sill and stool being missing, presumably awaiting restoration.



Image 8: Note that glass panel does not fit tight in groove



Image 9: Glass panel is slipping. Fit is loose

Proposed Solution:

Remove the added glass panes. The benefit they provide is negligible and their presence makes operation of the window difficult. Energy efficiency will be addressed in a separate section. Unfortunately the groove that

was cut for the glass to set in is likely best left alone. If a repair to return the window sash to their original look is desired then strips of wood will need to be glued into the channel and custom router bits manufactured to allow the profile to be recreated on the sash. However, this solution would require complete disassembly of each window sash, and as such may not be practical. The most realistic way forward may be to consider this groove as a part of the windows history.

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

The addition of a glass panel caused the destruction of historic materials and led to other incompatible alterations, which is prohibited by Standard 9.

Proposed treatment

The removal of the glass panel will return the window to its original condition as closely as possible, which is in compliance with the Standards.

Defect 4:

Standard practice for restoring historic wood sash is the removal of, at a minimum, loose and flaking paint so that new paint has a solid surface to adhere to. Better practice is to completely remove all paint layers so that the wood can be fully evaluated for defects that would need to be addressed. During evaluation it was noted that paint was not removed in any significant way from the sash and many needed repairs to the sash were left untreated.

A 3M LeadCheck product was used on the lower sash of window 003-12. The test came back positive for lead paint.



Image 10: Note the condition of the lower rail and the built-up paint



Image 11: Note flaking paint



Image 12: 3M LeadCheck test. Red indicates the presence of lead. Many paint layers were visible when scoring down to bare wood

Proposed Solution:

All of the sash should be stripped of all paint down to bare wood. Each sash should then be evaluated to determine if additional repairs are needed.

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:**Previous treatment**

Leaving the paint on the sash and performing minimal repairs is acceptable per the Standards. However, more maintenance will soon be necessary as the windows continue to degrade.

Proposed treatment

Removing all paint layers is an acceptable practice as part of the restoration process. No historic material is lost via this process. If a record of the historic paint layers is desired, then samples can be collected from a variety of locations before the windows are removed for stripping.

The EPA Renovation, Repair and Painting Program (EPA RRP) likely applies to this project. Please ensure that all activities that disturb paint follow the guidelines specified by the EPA, which are available online at: <https://www.epa.gov/lead/renovation-repair-and-painting-program>

Defect 5:

Standard practice for restoring historic wood sash is the removal of failed glazing compound and replacement with a comparable putty that replicates the look of the original and, to the extent possible, the performance. Some of the sash did not have putty removed, presumably because it was still in good condition. The condition of the old putty cannot be verified due to the paint layer on top. Many sash have a white compound applied which appears to be a DAP window glazing caulk, although this cannot be verified without a submittal from the contractor. This DAP product is acceptable, as are other caulk-tube extruded glazing compounds, however it was applied leaving a concave surface and was applied quite thinly in several areas which will lead to premature failure. Finally, several of the windows were overpainted onto the glass significantly. While this is not a structural or performance concern, it negatively impacts the aesthetic of the window and reduces occupant enjoyment.



Image 13: Note the concave surface of the glazing compound. This is less effective at shedding water and does not replicate the historic appearance



Image 14: Note how the new glazing compound does not come up to the edge of the bed and has a ragged edge

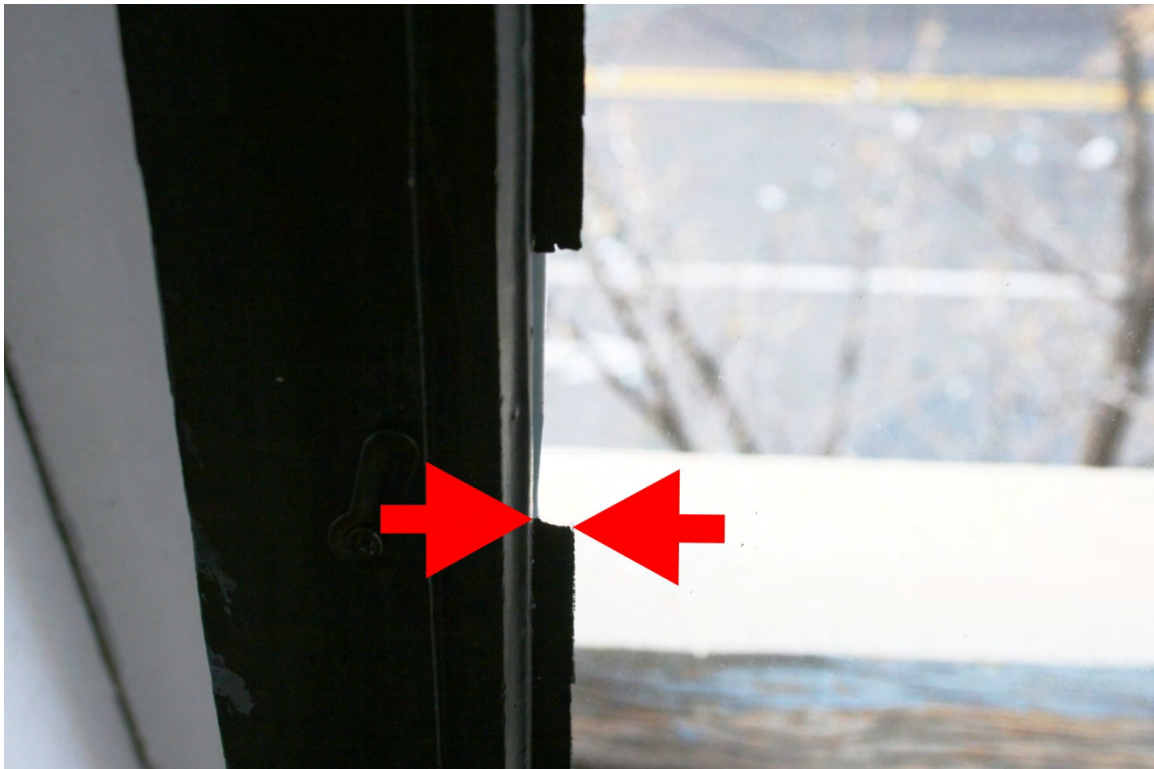


Image 15: Evidence of overpainting. A section of paint was removed to show where the paint should have ended. The area between the arrow points is over painted

Proposed Solution:

As part of the paint removal process, all glazing putty should be removed as well. The glass should be removed from the sash, cleaned, and reset in a new bed of glazing compound with new points. All efforts should be made to save original glass whenever possible. Only one pane of original glass was noted during the evaluation, located on the lower sash of window 003-3.

There are a variety of window putties available that are appropriate for historic windows. Please conduct research to determine the best fit for skill level and application. The following are two examples of glazing putty products that have been successfully used on historic wood windows.

Advanced Repair Technology's Glaze-Ease 601

http://www.advancedrepair.com/glazing_glaze_ease_601.html

Sarco's Multi-Glaze Type M Putty (Available online from a variety of suppliers)

<https://www.srshardware.com/product/sarco-multi-glaze-type-m-putty/>

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

The durability of the current glazing is unknown but suspected to be relatively short. More information about the product used would be necessary to determine if it does not meet the Standards.

Proposed treatment

Reglazing with a product designed for historic wood windows is fully compliant with the Standards.

Defect 6:

The window sash weatherstripping consists of a pile weatherstripping applied to the exterior face of the interior stop so that it seals against the lower sash when the window is closed. There is also bulb weatherstripping applied to the exterior face of the lower-sash meeting rail to seal the upper sash to the lower sash when the window is closed. Finally, there is also bulb-seal applied to the bottom of the lower sash to seal with the sill. The bulb seals are all appropriate and within standard practice for weatherstripping historic wood sash. The pile weatherstripping, while acceptable, isn't sealing the window to the extent desired.

Proposed Solution:

T-rail metal weatherstripping is a traditional system that is still in use today and would have been available at the time of the building's construction. The system consists of metal strips that are affixed to the jamb that have a protrusion that interfaces with a 5/32" x 7/16" groove cut into the side of the sash. For additional sealing and smoother operation, it is recommended that single-sided glazing tape be affixed to the back of the metal strip to seal between it and the jamb. This method of weatherstripping is compatible with the spring balances described earlier. The bulb seals that are currently in place at the meeting rail and the bottom rail should stay as they are, although some of the meeting rail bulb seals may need to be replaced as they were damaged during lock installation.

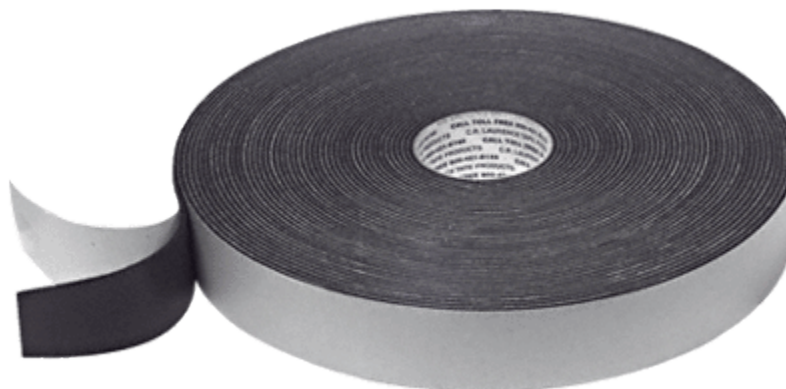


Image 16: Example of single-sided foam glazing tape



Image 17: Damaged seal at meeting rail



Image 18: Image from Accurate Weatherstripping. The sill strip can be omitted in the described application

There are a variety of similar options to the described approach. Please conduct research to determine the best fit for the situation at hand.

As an example, Accurate Metal Weatherstrip Co. Inc. has a variety of products that have successfully been installed in historic buildings. The product closest to what has been described, and installation instructions, can be viewed online at:

<http://metalstrips.accurateweatherstrip.com/product/window-weatherstrips/s-series-no-10-up-1-3-8-or-1-3-4-double-hung-sash->

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

The previous treatment is compatible with the Standards

Proposed treatment

The proposed treatment is adding new material to the window system, but it is reversible without causing damage or loss of historic materials which is compatible with the Standards. The proposed treatment is also a well-established protocol for historic windows with a track record of durability.

Defect 7:

Structural repairs were treated with a skim-coat of epoxy when dutchmen repairs would have been more appropriate. Some meeting rails on the upper sash are slipping, which should have been addressed during the most recent restoration. The following list of items is not comprehensive and consists only of what was noticed during the evaluation. All paint layers should be removed so that the full extent of necessary repairs can be discerned.

Window 2-6: Lower sash, crack in lower rail

Window 2-7: Upper sash, meeting rail is slipping

Window 2-9: Lower sash, left stile is cracked

Window 2-10: Upper sash, meeting rail is slipping

Window 2-14: Upper sash, meeting rail is slipping

Window 2-20: Lower sash, lower rail may need replacement

Window 2-25: Lower sash, lower rail may need replacement

Window 3-4: Lower sash, lower rail may need replacement

Window 3-14: Lower sash, lower rail may need replacement

Window 3-15: Lower sash, lower rail may need replacement

Window 3-18: (Interior window, sealed off on one side) Upper sash, upper pane is broken



Image 19: Window 002-6, note crack in lower rail



Image 20: Window 002-11, note meeting rail slipping down



Image 21: Window 002-21 deterioration at the upper sash stiles and meeting rail left untreated

Proposed Solution:

Following the removal of paint and glazing putty, all of the sash should be evaluated for repairs. If Dutchmen repairs are determined to provide a more durable repair, then that approach should be taken. The use of epoxy is appropriate for filling in checks and cracks, but should not be applied as a skim coat as it would then trap moisture. The use of epoxy to replace rotted mortise and tenon joinery is also not appropriate as these joints were designed to move and the epoxy will eventually crack and fail.

For a full description of the proposed restoration process please refer to appendix items titled:
REPAIR PROCESS FOR: WOOD DOUBLE-HUNG, CASEMENT, AND FIXED WINDOWS
and
PRESERVATION BRIEF 9: THE REPAIR OF HISTORIC WOODEN WINDOWS

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

The previous repair work, aside from the addition of a glass pane and replacement of the balance system, is compatible with the Standards. Additional work is necessary to fully stabilize the window system.

Proposed treatment

The proposed treatments are compliant as they focus on repairs rather than replacement, and utilize products that are compatible with preservation standards.

Defect 8:

The existing windows do not perform up to the energy efficiency or noise reduction standards desired. The fact that historic windows do not meet modern standards is not a valid argument for replacement. There are acceptable treatments that can be applied to meet the desired goals while still adhering to historic preservation guidelines.

Proposed Solution:

In combination with the repairs and installation of additional weatherstripping described above, the installation of an operable interior storm window will greatly improve the energy efficiency and noise reduction of the window system.

There are many storm window manufacturers. As an example, an Allied Window product is detailed in this report to show one of the options available. Coordination with the architect, contractor, manufacturer, and building owner will be necessary to determine the best option to achieve the clients goals.

Allied Window #MOL-OP, operating magnetic one-lite storm window with screen. This storm window mounts on the interior of the window in the ample space available.



Image 22: Red lines indicate plane where a storm window would be installed

The upper panel of the storm window is fixed, and the lower panel is operable. A screen option is also available. These storm windows can be custom colored to match any sample given, and the entire system can be removed for cleaning the window glass. There are several glazing options that address UV reduction, noise reduction, and other considerations. For additional information, including all options available and detailed drawings, please visit:

<https://catalog.alliedwindow.com/item/interior-magnetic-storm-windows/operating-magnetic-one-lite-mol-op-with-screen-2/item-1057?&bc=100|1064>

Many studies have been conducted on the subject of historic windows and energy efficiency. The common take-away is that historic windows, when properly repaired and weatherstripped, with the combination of a storm window, can achieve similar energy efficiency performance as a replacement window and provide a better return on investment than wholesale replacement.

Links below provided via the National Park Service Technical Preservation Services. Please click on the title for access to the full reports

<https://www.nps.gov/tps/sustainability/research.htm>

A Comparative Study of the Cumulative Energy Use of Historical Versus Contemporary Windows—A 2010 study by Boston professionals funded by the Boston Society of Architects. Life cycle costs were calculated and compared for a typical wood double-hung window with an added Low-E storm window and a new vinyl replacement window. Using modeling and adapting previous field studies to a Boston location, it was determined that the thermal performances of the two window systems are similar; and taking all costs into account, the historic window with a storm has a much lower life-cycle cost throughout a 100-year period. It does not seem, however, that the sources used for air leakage numbers take into account the infiltration that can occur between the window unit and the wall assembly and how that may differ between the historic window/storm and the new window.

The Effects of Energy Efficiency Treatments on Historic Windows—Published in January, 2011, by the Center for Resource Conservation in Boulder, Colorado. This study focuses on empirical testing of the energy efficiency and economy of a range of options for upgrading the energy performance of historic windows. It involved retrofitting windows in a test home in a historic district in Boulder, Colorado as well as testing in a laboratory facility developed for the study. Summary tables cover the eleven different preservation treatment options that were investigated and then compared to a new vinyl window. Most of the proposed treatments were able to outperform a new vinyl window. The study has lots of technical information and the results from both field and lab testing. While there is not a great deal of detail about the cost of the various options, there is enough cost information to provide relative payback savings.

Field Evaluation of Low-E Storm Windows— A study conducted in Chicago in 2007 by Lawrence Berkeley National Laboratory. While based on only six homes in the Chicago area, data collected from field monitoring for this study indicates a consistent benefit to using storm windows. Clear glass storm windows reduced the heating load by 13% with a 10-year simple payback. Low-e storm windows also showed an additional improvement on top of the clear glass benefits, amounting to 21% heating savings and an average payback of less than five years. Pointed out as an ancillary benefit of installing storm windows is reduced air infiltration.

Measured Winter Performance of Storm Windows—A 2002 study completed by Lawrence Berkeley National Laboratory. In testing under actual winter weather conditions, the study finds that a north-facing, wood, double-hung, single-glazed (AND intentionally leaky), sash in combination with a low-E storm window, performed very similarly to the standard low-E vinyl replacement window.

Testing the Energy Performance of Wood Windows in Cold Climates—A 1996 study which showed that window replacement will not necessarily reduce energy costs more than an upgrade utilizing the existing sash. It found that effectively sealing between the window frame and rough opening was important in reducing the infiltrative thermal losses associated with any window renovation. Storm windows, either existing or replacements, were found to be effective in reducing both infiltrative and non-infiltrative losses. This study was funded by the State of Vermont Division for Historic Preservation utilizing a grant received from the National Center for Preservation Technology and Training of the National Park Service.

Thermal Performance of Traditional Windows—Published in 2008 by Glasgow Caledonian University for Historic Scotland. This study investigated various options for reducing heat loss through windows. Among the options tested were secondary glazing systems (storm windows), insulating shades, and more traditional window treatments like shutters and curtains. Although secondary glazing was found to be the most effective option (reducing heat loss by 63%), timber shutters were also found to be effective (reducing heat loss by 51%.) Findings indicate that the most effective reductions in heat loss were attained by combining several treatments.

Links below provided via the California State Parks Office of Historic Preservation. Please click on the title for access to the full reports

http://www.ohp.parks.ca.gov/?page_id=25935

A report produced by the National Trust for Historic Preservation Green Lab provides cost guidance for homeowners weighing the financial and energy tradeoffs between replacing or repairing older, less efficient windows. This report, "[Saving Windows, Saving Money: Evaluating the Energy Performance of Window Retrofit and Replacement](#)", builds on previous research by examining multiple window improvement options, comparing them to replacement windows across multiple climate regions.

"Window Repair, Rehabilitation and Replacement", Peter Baker, P.E.

This report was prepared for Building America, Building Technologies Program, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy to evaluate advanced retrofit measures. A balanced approach is presented to guide contractors and homeowners to decide whether to repair or replace considering many factors, one of which is historic preservation. November 2011

"Thermal Assessment of internal Shutters and Window Film Applied to Traditional Single Glazed Sash and Case Windows" by John Currie, Julio Bros Williamson, Jon Stinson & Marie Jonnard, Historic Scotland

Technical Report 23 assesses the effectiveness of two inexpensive and minimally invasive methods for improving the thermal performance of single glazed windows. This technical paper demonstrates that a range of options, including minimally invasive and inexpensive methods, can play a worthwhile role in the overall thermal improvement of buildings.

"Of Paint and Windows - Replace or Repair" by Bob Yapp

"Thermal Performance of Historic Windows" by Chris Wood, www.buildingconservation.com (England)

"An Analysis of the Thermal Performance of Repaired and Replacement Windows", PDF, Robert Score and Bradford Carpenter, APT Bulletin 40:2, 2009

Window Energy Analysis, Keith Haberern, P.E.

“Replacement Windows and Furnaces in the Heartland: Indiana’s Energy Conservation Financial Assistance Program” by William H. Hill. This is the 1990 study that demonstrates a four hundred year payback using replacement windows.

“Building Regulations and Historic Buildings: balancing the needs for energy conservation with those of building conservation” The English Heritage Interim Guidance article touches on all parts of preservation and conservation of power and fuel, and the chapter on windows is very relevant.

“Repair or Replace Windows in Historic Buildings: Arriving at a Sustainable Solution” The Heritage Canada file contains two articles, one from Andrew Powter and Craig Sims discussing how to arrive at a decision to replace or repair original windows, and Susan Turner explains the sustainable nature of window repair rather than replacement.

“Life Cycle Of Window Materials - A Comparative Assessment” by Asif, Davidson and Muneer. A comparative life cycle assessment of the environmental impact of different window materials is included for its interesting materials energy cost analysis.

“Domestic Retrofitting Strategies in the UK: Effectiveness vs. Affordability” is an interesting presentation of the effectiveness of different energy retrofitting strategies, including shutters.

“What Replacement Windows Can’t Replace: The Real Cost of Replacing Historic Windows” Walter Sedovic and Jill Gotthelf provide an excellent discussion of the comparative value of window replacement versus repair. Many aspects of sustainability are considered.

“Lincoln Hall Windows Research Report: A Case Study of Options for Treatment for Windows at Lincoln Hall, University Of Illinois, Urbana Champaign” This report provides empirical data to assess window repair or replacement options for a proposed LEED Gold project, addressing the existing windows in terms of energy consumption.

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

N/A

Proposed treatment

The introduction of a storm window is an approved preservation practice and fully reversible with minimal damage to historic materials. Therefore, the proposed treatment is compatible with the Standards.

APPENDIX

Example of Full Restoration process for: Wood Double-Hung, Casement, and Fixed Windows

On-Site Method of Procedure

Window Sash Removal:

- 1.) When required per [EPA regulations](#), place poly-sheeting on the floor at the work area to collect any dust or debris created during the sash removal process. The sheeting will extend 10 feet from the window opening towards the interior of the room and 6 feet on either side of the opening. If these minimum distances cannot be achieved, the sheeting will extend as far as possible into the room as well as side to side in front of the window opening.
- 2.) Remove the left and right sash from the opening by removing the hinge pins or by unscrewing the hinge from the jamb
- 3.) Number each sash for each opening according to the window schedule using a “Sharpie” to write the corresponding number on the unfinished side of the stile of each sash. Where multiple sashes are present in one opening, a dash (-) followed by a sequential numbering system will be used. For example; a window opening designated 236C has 4 total sashes. There are two upper sashes and two lower sashes. As viewed from the interior, if sash removal will begin in the lower left hand corner of the opening: The lower left hand sash will be labeled 236C-1, the upper left hand sash will be labeled 236C-2, the lower right hand sash will be labeled 236C-3, and the upper right hand sash will be labeled 236C-4. This system will be utilized in the same order where transom windows are present. The interior stop will be labeled with 236C and differentiated by an “L,” “C,” or “R” to designate its original location (Left, Center, or Right). The parting stop is not typically labeled or restored as it is most often time damaged beyond repair during the removal process and new parting stop will be fabricated to match the existing for every opening.
- 4.) When required per EPA regulations, bag or wrap all components; including sash, interior stop, parting stop and trash in heavy duty poly-sheeting or poly-bags to assure containment of any dust or debris during transport.
- 5.) When required per EPA regulations, cleaning verification will be provided following a thorough cleaning of the area using damp wipes and/or HEPA vacuums; including, but not limited to, all sills, stools, floors, weight pockets, poly-bags and poly-sheeting.

Installation of Temporary Enclosures:

- 1.) The material selected for use as the temporary enclosure, “Verolite” or similar, will be cut to fit inside the existing opening whenever possible. If not specified, plywood or OSB will be utilized. When required, the perimeter of the Verolite, plywood, or OSB will be wrapped in foam tape in an effort to create the most effective weather seal possible. The wood backing for this will be screwed to the existing frame where the interior stop and/or parting stop was located. The screw holes created will be hidden by the interior stop or parting stop upon reinstallation of the restored components and causes little to no damage to the frame. The verolite will then be attached to this backing material utilizing screws.

Existing Frame Restoration:

- 1.) Loose and flaking or failed paint is removed following the National Park Service Preservation Brief number 10. A “wet method” utilizing chemical strippers, carbide scrapers, or HEPA approved mechanical sanders (or a combination of all three) will ensure that no lead based paint dust is created. Following the paint stripping process, a thorough visual and tactile examination of the existing wood substrate will be performed.

- 2.) If there are any pieces or components that have shifted or become loose on the frame, counter-sunk coated screws and/or galvanized brad nails will be utilized to restore the integrity of the components.
- 3.) If it is determined that the existing substrate is beyond repair through the use of epoxy, the deteriorated wood will be “cut” out of the existing frame and a replacement piece fabricated to replicate the removed component, commonly referred to as a “Dutchman,” will be installed in its place. After all of the Dutchmen have been installed, epoxy will be utilized to make any other repairs that are deemed necessary.
- 4.) When the epoxy has dried, it will be sanded to shape. A thorough review by our staff will determine if any additional epoxy consolidate is required.
- 5.) All window frame components will then be primed, and an additional review completed to ensure that we have achieved the acceptable criteria set forth by the “Mock-up Review.” If more consolidation is deemed necessary, the primer at that location will be removed and steps 5-7 will be repeated.
- 6.) A modified polyurethane sealant will then be applied to any and all areas that require it. The sealant will either be color matched and/or paintable. It will be a low-modulus elastomeric product.
- 7.) A minimum of two finish coats of paint will then be applied and given ample drying time before the restored sash will be installed.

Sash Installation:

- 1.) The sash will be delivered pre-finished to site and will be installed per the plans and specifications. Depending on the specifications, metal interlocking weather stripping will be utilized in conjunction with compression bulb weatherstripping for casement sash. The sashes are installed in a manner which attempts to balance the ease of operation while still maintaining the best possible seal against air infiltration.
- 2.) The locking hardware will then be installed.
- 3.) All necessary caulking and paint touch up will be preformed after installation to provide a clean and seamless finished product.
- 4.) After the owner and architect have reviewed the finished product, all necessary punch-list items will be corrected.

Off-site Method of Procedure

Receiving Sash:

- 1.) When the sashes and interior stop arrive at the “Shop” the window designation numbers are “stamped” into the sash at the same location. This is to ensure that the number is not inadvertently removed during the restoration process.

Glazing Putty, Glass Removal, and Glass Cleaning:

- 1.) Steam ovens are utilized to soften the historic glazing putty and all existing putty is removed. This ensures a wet method technique that is non-invasive and is the best method to avoid breakage of the glass during this process.
- 2.) When the glass has been removed, the corresponding sash number is written on a piece of tape and applied to the surface of the glass.
- 3.) This number will be removed temporarily when the glass is cleaned, but will be reattached after the cleaning is complete. Typical glass cleaners such as Windex are utilized. All glass that can be reused will be reused. Existing scratches on the glass that were not created during the removal or cleaning process will not dictate replacement of the glass unless directed by the architect and/or owner.
- 4.) When the sash has completed the restoration process in the shop, the original piece of glass will be installed in the same location from which it came.

Sash Restoration:

- 1.) All sashes, after they have been stripped, are re-squared prior to applying epoxy consolidates. This is achieved by clamping the sash and when 90 degree internal angles are achieved, dowels are utilized to maintain the shape.
- 2.) Before the glass is set and bedded, and after the sanding of the epoxy is completed, the glazing rabbit is primed.
- 3.) After sanding the epoxy consolidates, kerfs are cut for future installation of the bulb seal and, when specified, t-rail weather stripping.

Sash Replication:

- 1.) Where window sash are missing the jambs are carefully measured, including the diagonals to allow for adjustments for out-of-square openings and with careful notation of hinge and hardware location.
- 2.) Lumber is selected to match the existing wood, with care being taken regarding grain direction to prevent warping or twisting.
- 3.) Using the existing sash as a template, new sash are constructed mimicking the stile and rail dimensions, joinery details, and profiles
- 4.) Once constructed, the replica sash join the restored sash at the sanding phase and continue through the same steps in the Glazing and Painting and Staining processes.

Interior Stop Restoration:

- 1.) This process is similar to the Existing Frame Restoration section but may include some new fabrication to replace pieces which were damaged beyond repair during the sash removal process.

Parting Stop Fabrication:

- 1.) All parting stop will be fabricated to match existing and will be prefinished in the shop prior to installation on-site.

Glazing Process:

- 1.) Dap Glazing compound is applied to the glazing rabbit and the glass is installed using push points when traditional glazing putty is utilized. Push points are not used when glass stops (wood or other) are utilized.
- 2.) The residual Dap compound that "oozes" out is cleaned from the glass and wood sash surfaces.
- 3.) When the Dap has "set-up" Glazing putty or wood glass stop is applied.
- 4.) The sash is then placed vertically in a drying rack.
- 5.) Depending on the type of glazing compound utilized, dry time can range from a little as a few days to as long as 6 weeks.

Painting and Staining Process:

- 1.) The sashes are masked to protect the glass but still allow the finish paint to extend very slightly beyond the glazing bed to create a seal.
- 2.) They are transferred to painting racks, and the primer and two finish coats are applied with an airless or a HVLP paint sprayer.
- 3.) When the finish coat is dry, the masking is removed, the bulb seal installed, glass cleaned, and the sash delivered to the site for installation.

Preservation Brief 9: The Repair of Historic Wooden Windows



U.S. Department of the Interior
National Park Service
Cultural Resources
Heritage Preservation Services

Preservation Briefs: 9

The Repair of Historic Wooden Windows

John H. Myers

The windows on many historic buildings are an important aspect of the architectural character of those buildings. Their design, craftsmanship, or other qualities may make them worthy of preservation. This is self-evident for ornamental windows, but it can be equally true for warehouses or factories where the windows may be the most dominant visual element of an otherwise plain building (see figure 1). Evaluating the significance of these windows and planning for their repair or replacement can be a complex process involving both objective and subjective considerations. The *Secretary of the Interior's Standards for Rehabilitation*, and the accompanying guidelines, call for respecting the significance of original materials and features, repairing and retaining them wherever possible, and when necessary, replacing them in kind. This Brief is based on the issues of significance and repair which are implicit in the standards, but the primary emphasis is on the technical issues of planning for the repair of windows including evaluation of their physical condition, techniques of repair, and design considerations when replacement is necessary.

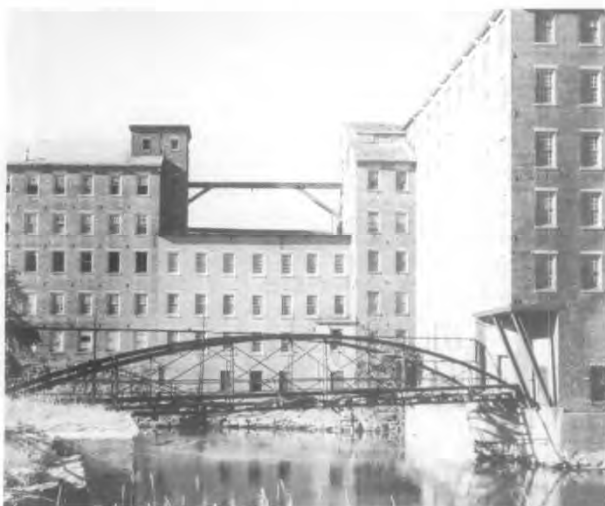


Figure 1. Windows are frequently important visual focal points, especially on simple facades such as this mill building. Replacement of the multi-pane windows here with larger panes could dramatically change the appearance of the building. The areas of missing windows convey the impression of such a change. Photo: John T. Lowe

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

Architectural or Historical Significance

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

Historically, the first windows in early American houses were casement windows; that is, they were hinged at the side and opened outward. In the beginning of the eighteenth century single- and double-hung windows were introduced. Subsequently many styles of these vertical sliding sash windows have come to be associated with specific building periods or architectural styles, and this is an important consideration in determining the significance of windows, especially on a local or regional basis. Site-specific, regionally oriented architectural comparisons should be made to determine the significance of windows in question. Although such comparisons may focus on specific window types and their details, the ultimate determination of significance should be made within the context of the whole building, wherein the windows are one architectural element (see figure 2).

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

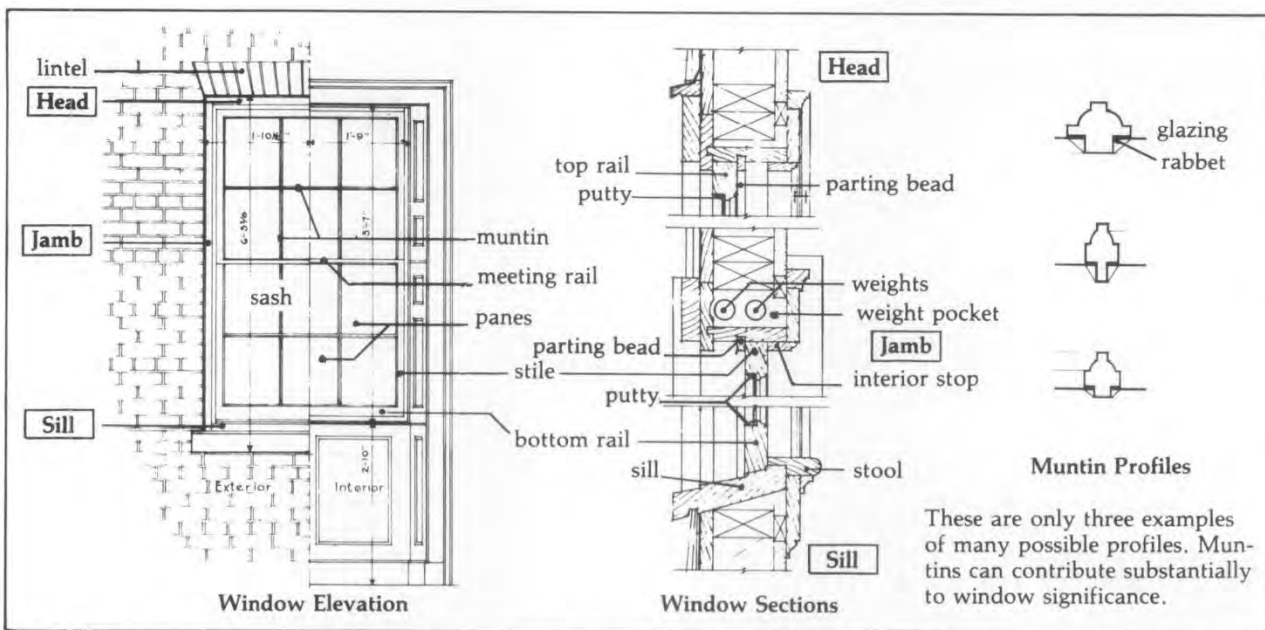


Figure 2. These drawings of window details identify major components, terminology, and installation details for a wooden double-hung window.

ceed with planning appropriate treatments, beginning with an investigation of the physical condition of the windows.

Physical Evaluation

The key to successful planning for window treatments is a careful evaluation of existing physical conditions on a unit-by-unit basis. A graphic or photographic system may be devised to record existing conditions and illustrate the scope of any necessary repairs. Another effective tool is a window schedule which lists all of the parts of each window unit. Spaces by each part allow notes on existing conditions and repair instructions. When such a schedule is completed, it indicates the precise tasks to be performed in the repair of each unit and becomes a part of the specifications. In any evaluation, one should note at a minimum, 1) window location, 2) condition of the paint, 3) condition of the frame and sill, 4) condition of the sash (rails, stiles and muntins), 5) glazing problems, 6) hardware, and 7) the overall condition of the window (excellent, fair, poor, and so forth).

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

larly if the bottom of the sill is flat. Any conditions, including poor original design, which permit water to come in contact with the wood or to puddle on the sill must be corrected as they contribute to deterioration of the window.

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

Each window should be examined for operational soundness beginning with the lower portions of the frame and sash. Exterior rainwater and interior condensation can flow downward along the window, entering and collecting at points where the flow is blocked. The sill, joints between the sill and jamb, corners of the bottom rails and muntin joints are typical points where water collects and deterioration begins (see figure 3). The operation of the window (continuous opening and closing over the years and seasonal temperature changes) weakens the joints, causing movement and slight separation. This process makes the joints more vulnerable to water which is readily absorbed into the end-grain of the wood. If severe deterioration exists in these areas, it will usually be apparent on visual inspection, but other less severely deteriorated areas of the wood may be tested by two traditional methods using a small ice pick.

An ice pick or an awl may be used to test wood for soundness. The technique is simply to jab the pick into a wetted wood surface at an angle and pry up a small sec-



Figure 3. Deterioration of poorly maintained windows usually begins on horizontal surfaces and at joints where water can collect and saturate the wood. The problem areas are clearly indicated by paint failure due to moisture. Photo: Baird M. Smith, AIA

tion of the wood. Sound wood will separate in long fibrous splinters, but decayed wood will lift up in short irregular pieces due to the breakdown of fiber strength.

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

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

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

Repair Class I: Routine Maintenance

Repairs to wooden windows are usually labor intensive and relatively uncomplicated. On small scale projects this

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

The routine maintenance required to upgrade a window to "like new" condition normally includes the following steps: 1) some degree of interior and exterior paint removal, 2) removal and repair of sash (including reglazing where necessary), 3) repairs to the frame, 4) weather-stripping and reinstallation of the sash, and 5) repainting. These operations are illustrated for a typical double-hung wooden window (see figures 4a-f), but they may be adapted to other window types and styles as applicable.

Historic windows have usually acquired many layers of paint over time. Removal of excess layers or peeling and flaking paint will facilitate operation of the window and restore the clarity of the original detailing. Some degree of paint removal is also necessary as a first step in the proper surface preparation for subsequent refinishing (if paint color analysis is desired, it should be conducted prior to the onset of the paint removal). There are several safe and effective techniques for removing paint from wood, depending on the amount of paint to be removed. Several techniques such as scraping, chemical stripping, and the use of a hot air gun are discussed in "Preservation Briefs: 10 Paint Removal from Historic Woodwork" (see Additional Reading section at end).

Paint removal should begin on the interior frames, being careful to remove the paint from the interior stop and the parting bead, particularly along the seam where these stops meet the jamb. This can be accomplished by running a utility knife along the length of the seam, breaking the paint bond. It will then be much easier to remove the stop, the parting bead and the sash. The interior stop may be initially loosened from the sash side to avoid visible scarring of the wood and then gradually pried loose using a pair of putty knives, working up and down the stop in small increments (see figure 4b). With the stop removed, the lower or interior sash may be withdrawn. The sash cords should be detached from the sides of the sash and their ends may be pinned with a nail or tied in a knot to prevent them from falling into the weight pocket.

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

The sash can be stripped of paint using appropriate techniques, but if any heat treatment is used (see figure 4c), the glass should be removed or protected from the sudden temperature change which can cause breakage. An



Figure 4a. The following series of photographs of the repair of a historic double-hung window use a unit which is structurally sound but has many layers of paint, some cracked and missing putty, slight separation at the joints, broken sash cords, and one cracked pane. Photo: John H. Myers



Figure 4b. After removing paint from the seam between the interior stop and the jamb, the stop can be pried out and gradually worked loose using a pair of putty knives as shown. To avoid visible scarring of the wood, the sash can be raised and the stop pried loose initially from the outer side. Photo: John H. Myers



Figure 4c. Sash can be removed and repaired in a convenient work area. Paint is being removed from this sash with a hot air gun while an asbestos sheet protects the glass from sudden temperature change. Photo: John H. Myers

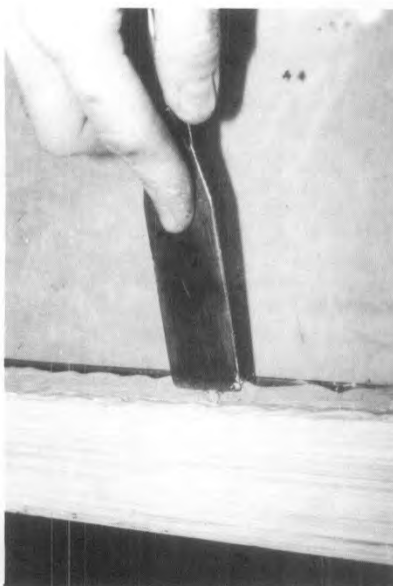


Figure 4d. Reglazing or replacement of the putty requires that the existing putty be removed manually, the glazing points be extracted, the glass removed, and the back putty scraped out. To reglaze, a bed of putty is laid around the perimeter of the rabbet, the pane is pressed into place, glazing points are inserted to hold the pane (shown), and a final seal of putty is beveled around the edge of the glass. Photo: John H. Myers



Figure 4e. A common repair is the replacement of broken sash cords with new cords (shown) or with chains. The weight pocket is often accessible through a removable plate in the jamb, or by removing the interior trim. Photo: John H. Myers



Figure 4f. Following the relatively simple repairs, the window is weathertight, like new in appearance, and serviceable for many years to come. Both the historic material and the detailing and craftsmanship of this original window have been preserved. Photo: John H. Myers

overlay of aluminum foil on gypsum board or asbestos can protect the glass from such rapid temperature change. It is important to protect the glass because it may be historic and often adds character to the window. Deteriorated putty should be removed manually, taking care not to damage the wood along the rabbet. If the glass is to be removed, the glazing points which hold the glass in place can be extracted and the panes numbered and removed for cleaning and reuse in the same openings. With the glass panes out, the remaining putty can be removed and the sash can be sanded, patched, and primed with a preservative primer. Hardened putty in the rabbets may be softened by heating with a soldering iron at the point of removal. Putty remaining on the glass may be softened by soaking the panes in linseed oil, and then removed with less risk of breaking the glass. Before reinstalling the glass, a bead of glazing compound or linseed oil putty should be laid around the rabbet to cushion and seal the glass. Glazing compound should only be used on wood which has been brushed with linseed oil and primed with an oil based primer or paint. The pane is then pressed into place and the glazing points are pushed into the wood around the perimeter of the pane (see figure 4d). The final glazing compound or putty is applied and beveled to complete the seal. The sash can be refinished as desired on the inside and painted on the outside as soon as a "skin" has formed on the putty, usually in 2 or 3 days. Exterior paint should cover the beveled glazing compound or putty and lap over onto the glass slightly to complete a weathertight seal. After the proper curing times have elapsed for paint and putty, the sash will be ready for reinstallation.

While the sash are out of the frame, the condition of the wood in the jamb and sill can be evaluated. Repair and refinishing of the frame may proceed concurrently with repairs to the sash, taking advantage of the curing times for the paints and putty used on the sash. One of the most common work items is the replacement of the sash cords with new rope cords or with chains (see figure 4e). The weight pocket is frequently accessible through a door on the face of the frame near the sill, but if no door exists, the trim on the interior face may be removed for access. Sash weights may be increased for easier window operation by elderly or handicapped persons. Additional repairs to the frame and sash may include consolidation or replacement of deteriorated wood. Techniques for these repairs are discussed in the following sections.

The operations just discussed summarize the efforts necessary to restore a window with minor deterioration to "like new" condition (see figure 4f). The techniques can be applied by an unskilled person with minimal training and experience. To demonstrate the practicality of this approach, and photograph it, a Technical Preservation Services staff member repaired a wooden double-hung, two over two window which had been in service over ninety years. The wood was structurally sound but the window had one broken pane, many layers of paint, broken sash cords and inadequate, worn-out weatherstripping. The staff member found that the frame could be stripped of paint and the sash removed quite easily. Paint, putty and glass removal required about one hour for each sash, and the reglazing of both sash was accomplished in about one hour. Weatherstripping of the sash and frame, replacement of the sash cords and reinstallation of the sash, parting bead, and stop required an hour and a half. These times refer only to individual operations; the entire pro-

cess took several days due to the drying and curing times for putty, primer, and paint, however, work on other window units could have been in progress during these lag times.

Repair Class II: Stabilization

The preceding description of a window repair job focused on a unit which was operationally sound. Many windows will show some additional degree of physical deterioration, especially in the vulnerable areas mentioned earlier, but even badly damaged windows can be repaired using simple processes. Partially decayed wood can be waterproofed, patched, built-up, or consolidated and then painted to achieve a sound condition, good appearance, and greatly extended life. Three techniques for repairing partially decayed or weathered wood are discussed in this section, and all three can be accomplished using products available at most hardware stores.

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

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

Wood may also be strengthened and stabilized by consolidation, using semi-rigid epoxies which saturate the porous decayed wood and then harden. The surface of the consolidated wood can then be filled with a semi-rigid epoxy patching compound, sanded and painted (see figure 5). Epoxy patching compounds can be used to build up



Figure 5. This illustrates a two-part epoxy patching compound used to fill the surface of a weathered sill and rebuild the missing edge. When the epoxy cures, it can be sanded smooth and painted to achieve a durable and waterproof repair. Photo: John H. Myers

missing sections or decayed ends of members. Profiles can be duplicated using hand molds, which are created by pressing a ball of patching compound over a sound section of the profile which has been rubbed with butcher's wax. This can be a very efficient technique where there are many typical repairs to be done. Technical Preservation Services has published *Epoxies for Wood Repairs in Historic Buildings* (see Additional Reading section at end), which discusses the theory and techniques of epoxy repairs. The process has been widely used and proven in marine applications; and proprietary products are available at hardware and marine supply stores. Although epoxy materials may be comparatively expensive, they hold the promise of being among the most durable and long lasting materials available for wood repair.

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

Repair Class III: Splices and Parts Replacement

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

The repairs discussed in this section involve window frames which may be in very deteriorated condition, possibly requiring removal; therefore, caution is in order. The actual construction of wooden window frames and sash is not complicated. Pegged mortise and tenon units can be disassembled easily, if the units are out of the building. The installation or connection of some frames to the surrounding structure, especially masonry walls, can complicate the work immeasurably, and may even require

dismantling of the wall. It may be useful, therefore, to take the following approach to frame repair: 1) conduct regular maintenance of sound frames to achieve the longest life possible, 2) make necessary repairs in place wherever possible, using stabilization and splicing techniques, and 3) if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.

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

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

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

Weatherization

A window which is repaired should be made as energy efficient as possible by the use of appropriate weatherstripping to reduce air infiltration. A wide variety of products are available to assist in this task. Felt may be fastened to the top, bottom, and meeting rails, but may have the disadvantage of absorbing and holding moisture, particularly at the bottom rail. Rolled vinyl strips may also be tacked into place in appropriate locations to reduce infiltration. Metal strips or new plastic spring strips may be used on the rails and, if space permits, in

the channels between the sash and jamb. Weatherstripping is a historic treatment, but old weatherstripping (felt) is not likely to perform very satisfactorily. Appropriate contemporary weatherstripping should be considered an integral part of the repair process for windows. The use of sash locks installed on the meeting rail will insure that the sash are kept tightly closed so that the weatherstripping will function more effectively to reduce infiltration. Although such locks will not always be historically accurate, they will usually be viewed as an acceptable contemporary modification in the interest of improved thermal performance.

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

Window Replacement

Although the retention of original or existing windows is always desirable and this Brief is intended to encourage that goal, there is a point when the condition of a window may clearly indicate replacement. The decision process for selecting replacement windows should *not* begin with a survey of contemporary window products which are available as replacements, but should begin with a look at the windows which are being replaced. Attempt to understand the contribution of the window(s) to the appearance of the facade including: 1) the pattern of the openings and their size; 2) proportions of the frame and sash; 3) configuration of window panes; 4) muntin profiles; 5) type of wood; 6) paint color; 7) characteristics of the glass; and 8) associated details such as arched tops, hoods, or other decorative elements. Develop an understanding of how the window reflects the period, style, or regional characteristics of the building, or represents technological development.

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

information on products which have been used successfully in preservation projects.

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

Conclusion

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

Additional Reading

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1981

Photo Documentation



Image 23: Linden Street Elevation



Image 24: Walnut Street Elevation



Image 25: Corner of Linden and Walnut



002-1-Exterior



002-1-Interior



002-1-Interior Detail 1



002-2-Exterior



002-2-Interior



002-2-Interior Detail 1



002-2-Interior Detail 2



002-3-Exterior



002-3-Interior



002-3-Interior Detail 1



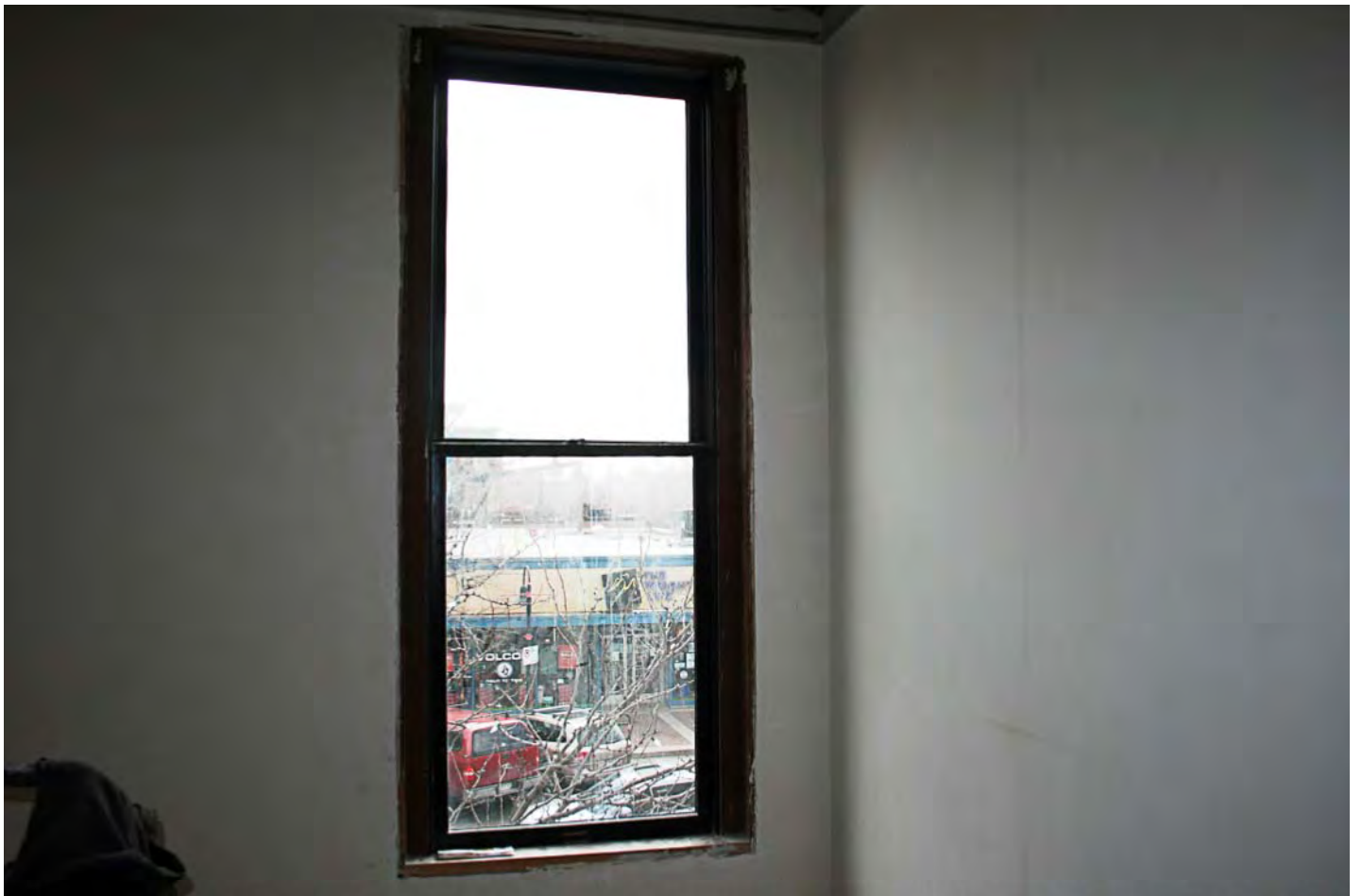
002-3-Interior Detail 2



002-3-Interior Detail 3



002-4-Exterior



002-4-Interior



002-4-Interior Detail 1



002-4-Interior Detail 2



002-4-Interior Detail 3



002-5-Exterior



002-5-Interior



002-5-Interior Detail 1



002-6-Exterior



002-6-Interior



002-6-Interior Detail 1



002-7-Exterior



002-7-Interior



002-7-Interior Detail 1



002-7-Interior Detail 2



002-7-Interior Detail 3



002-8-Exterior



002-8-Interior



002-8-Interior Detail 1



002-8-Interior Detail 2



002-9-Exterior



002-9-Interior



002-9-Interior Detail 1



002-9-Interior Detail 2



002-10-Exterior



002-10-Interior



002-10-Interior Detail 1



002-10-Interior Detail 2



002-10-Interior Detail 3



002-11-Exterior



002-11-Interior



002-11-Interior Detail 1



002-11-Interior Detail 2



002-12-Exterior



002-12-Interior



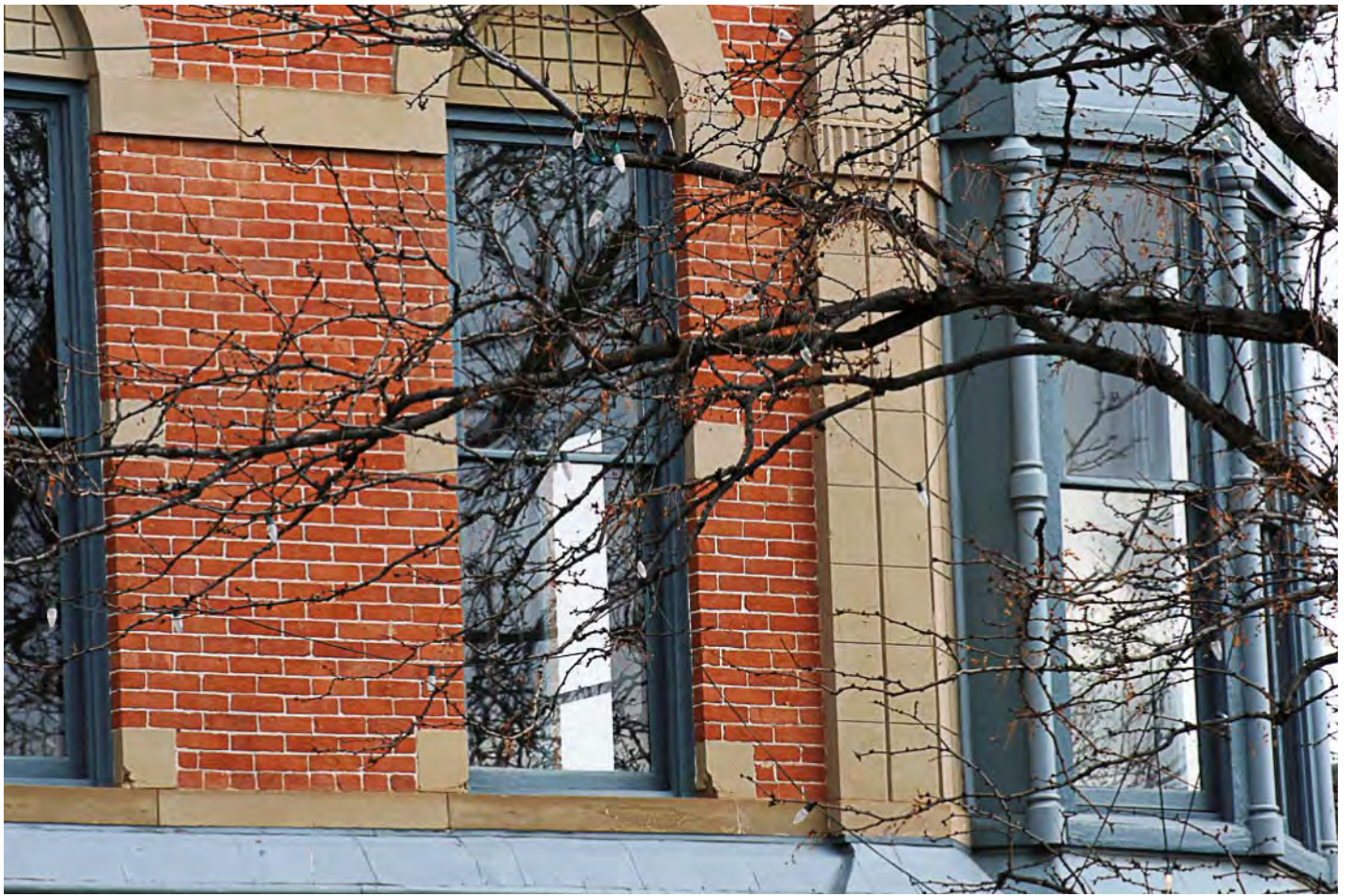
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002-12-Interior Detail 2



002-12-Interior Detail 3



002-13-Exterior



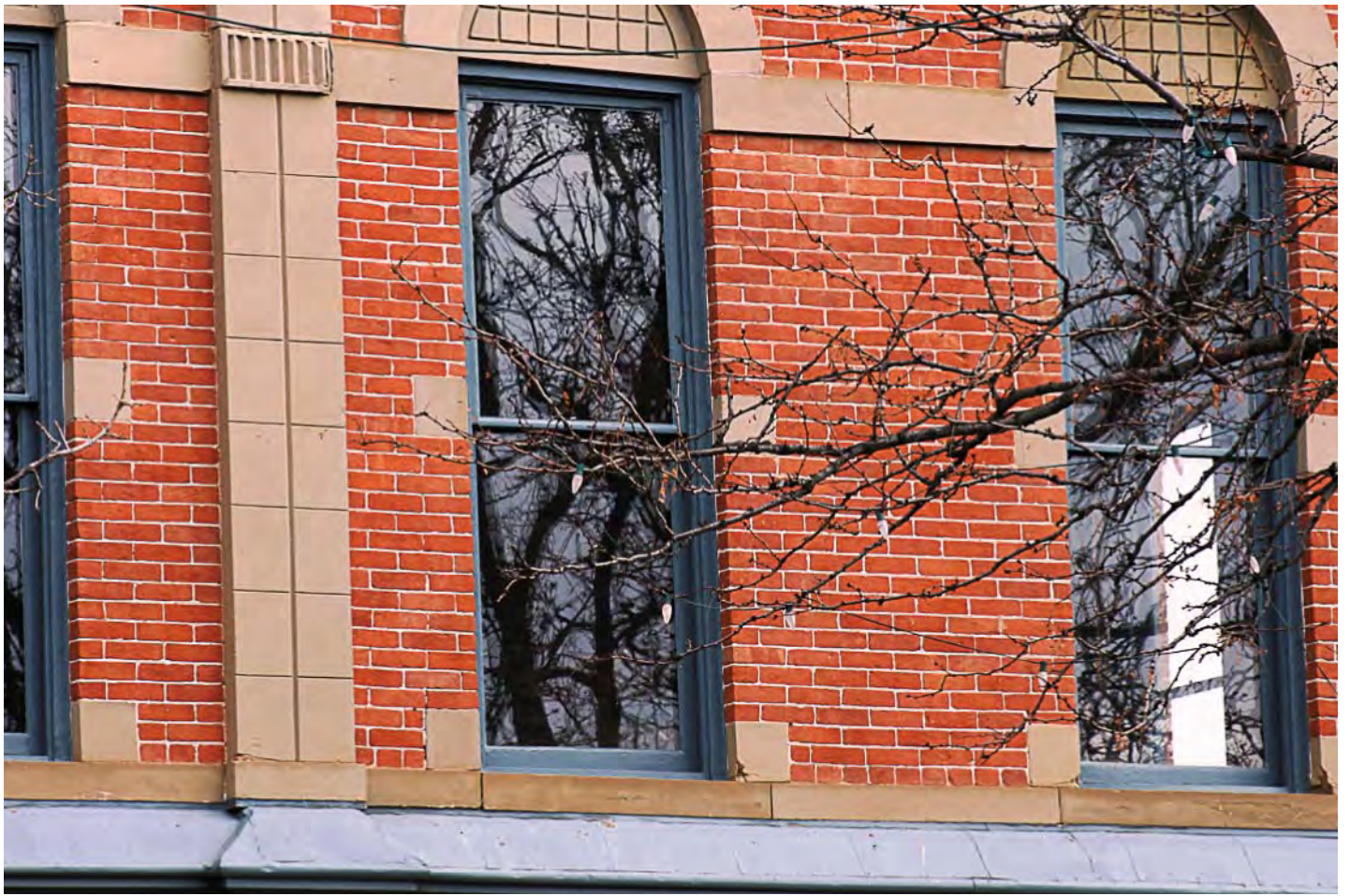
002-13-Interior



002-13-Interior Detail 1



002-13-Interior Detail 2



002-14-Exterior



002-14-Interior



002-14-Interior Detail 1



002-14-Interior Detail 2



002-15-Exterior



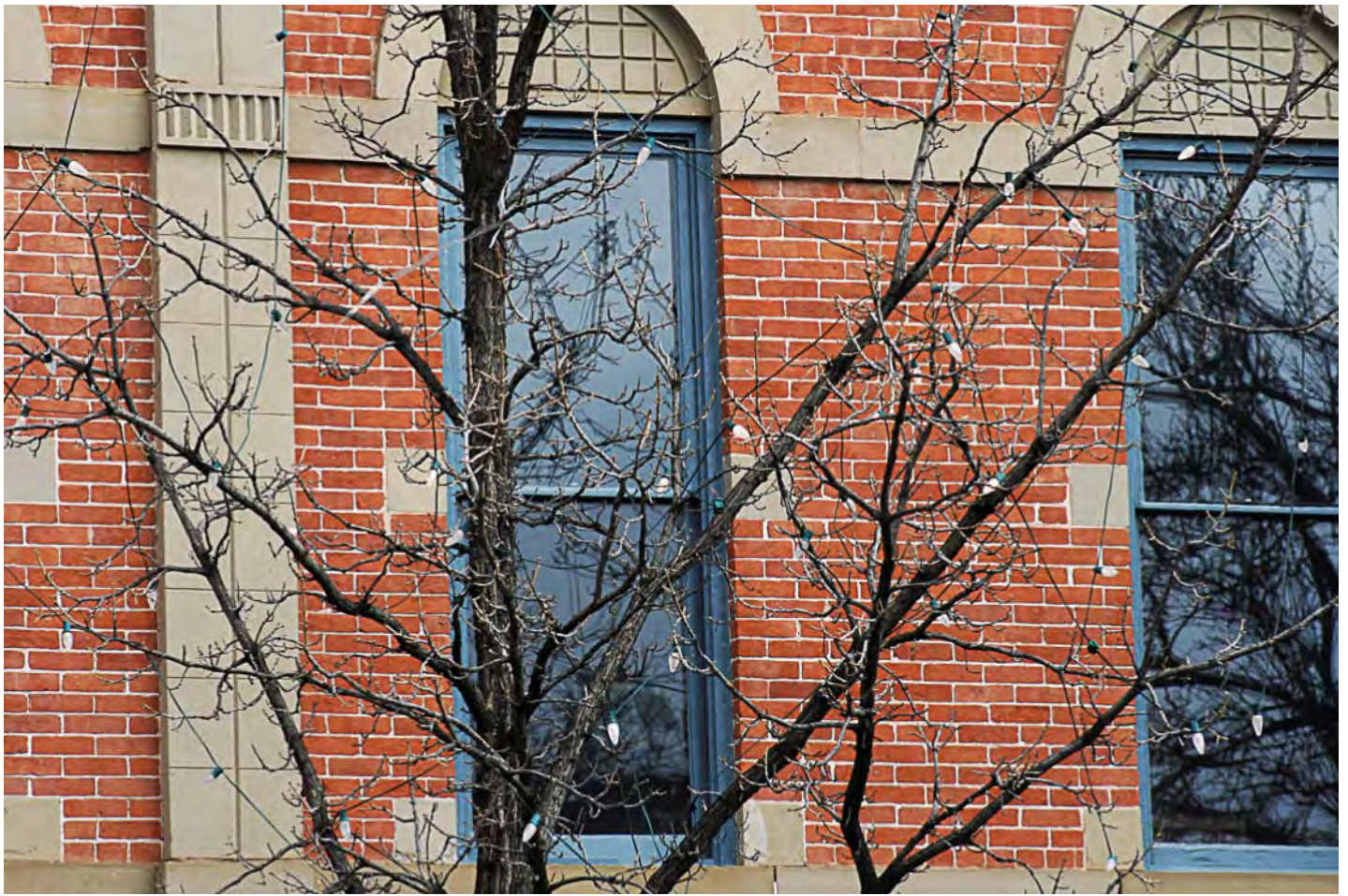
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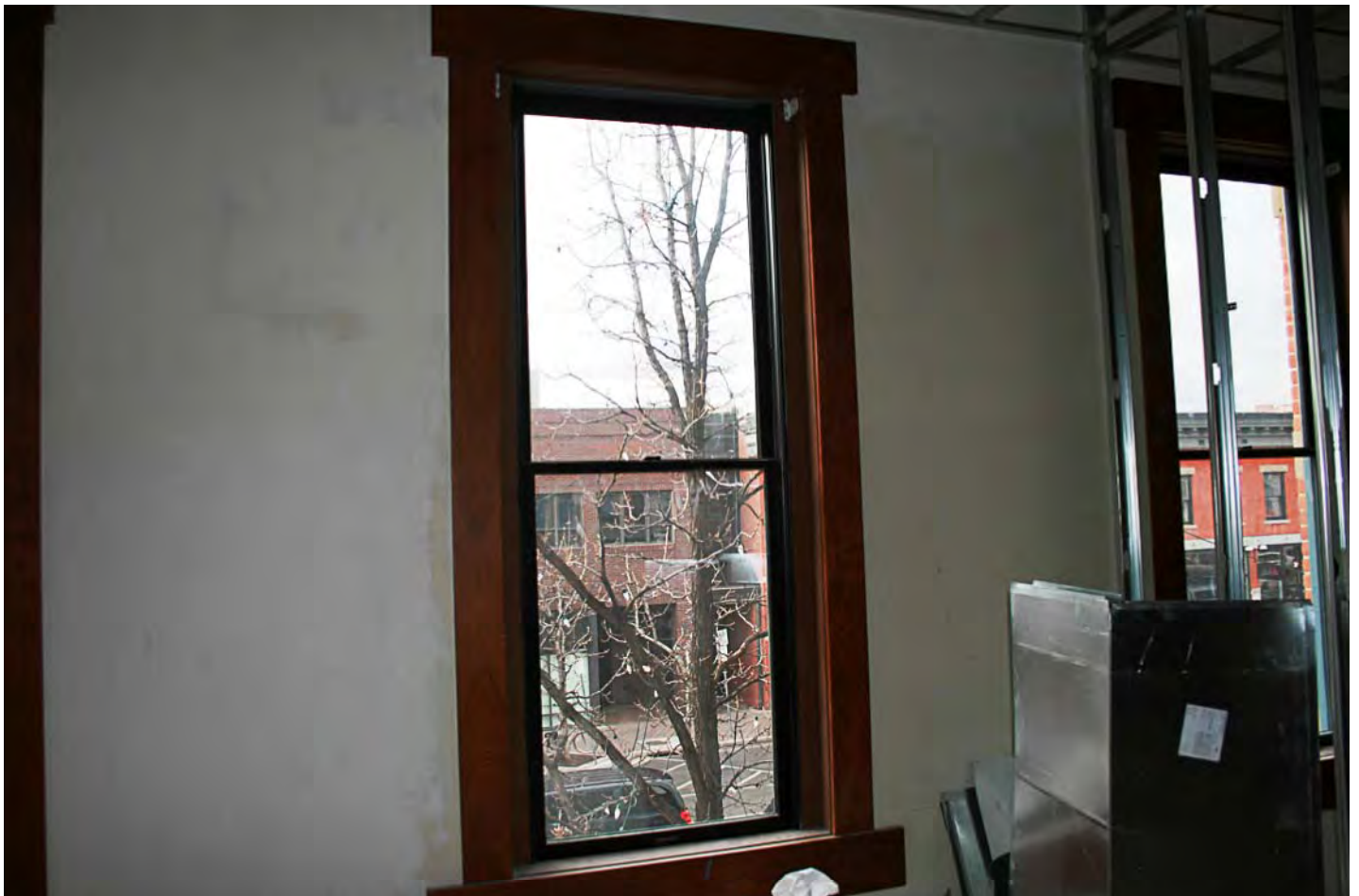
002-15-Interior Detail 1



002-15-Interior Detail 2



002-16-Exterior



002-16-Interior



002-16-Interior Detail 1



002-17-Exterior



002-17-Interior



002-17-Interior Detail 1



002-17-Interior Detail 2



002-18-Exterior



002-18-Interior



002-19-Exterior



002-19-Interior



002-19-Interior Detail 1



002-19-Interior Detail 2



002-20-Exterior



002-20-Interior



002-20-Interior Detail 1



002-20-Interior Detail 2



002-21-Exterior



002-21-Exterior Detail 1



002-21-Interior



002-21-Interior Detail 1



002-21-Interior Detail 2



002-21-Interior Detail 3



002-22-Exterior



002-22-Interior



002-22-Interior Detail 1



002-22-Interior Detail 2



002-22-Interior Detail 3



002-22-Interior Detail 4



02-23-Exterior



002-23-Interior



002-23-Interior Detail 1



002-23-Interior Detail 2



002-24-Exterior



002-24-Interior



002-24-Interior Detail 1



002-24-Interior Detail 2



002-25-Exterior



002-25-Interior



002-25-Interior Detail 1



002-25-Interior Detail 2



003-1-Exterior



003-1-Interior



003-1-Interior Detail 1



003-2-Exterior



003-2-Interior



003-2-Interior Detail 1



003-2-Interior Detail 2



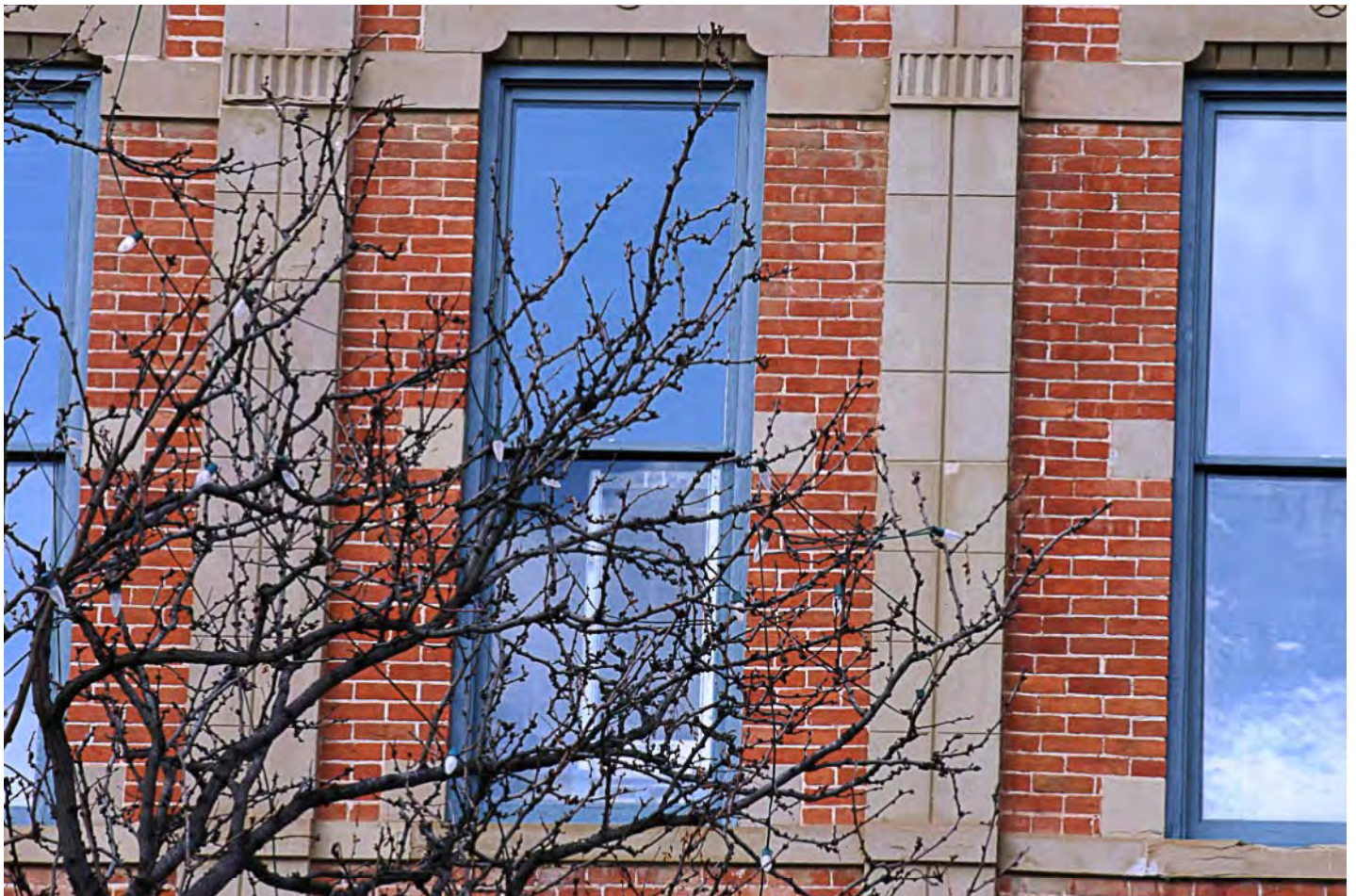
003-3-Exterior



003-3-Interior



003-3-Interior Detail 1



003-4-Exterior



003-4-Interior



003-5-Exterior



003-5-Interior



003-5-Interior Detail 1



003-5-Interior Detail 2



003-6-Exterior



003-6-Interior



003-6-Interior Detail 1



003-6-Interior Detail 2



003-7-Exterior



003-7-Interior



003-7-Interior Detail 1



003-7-Interior Detail 2



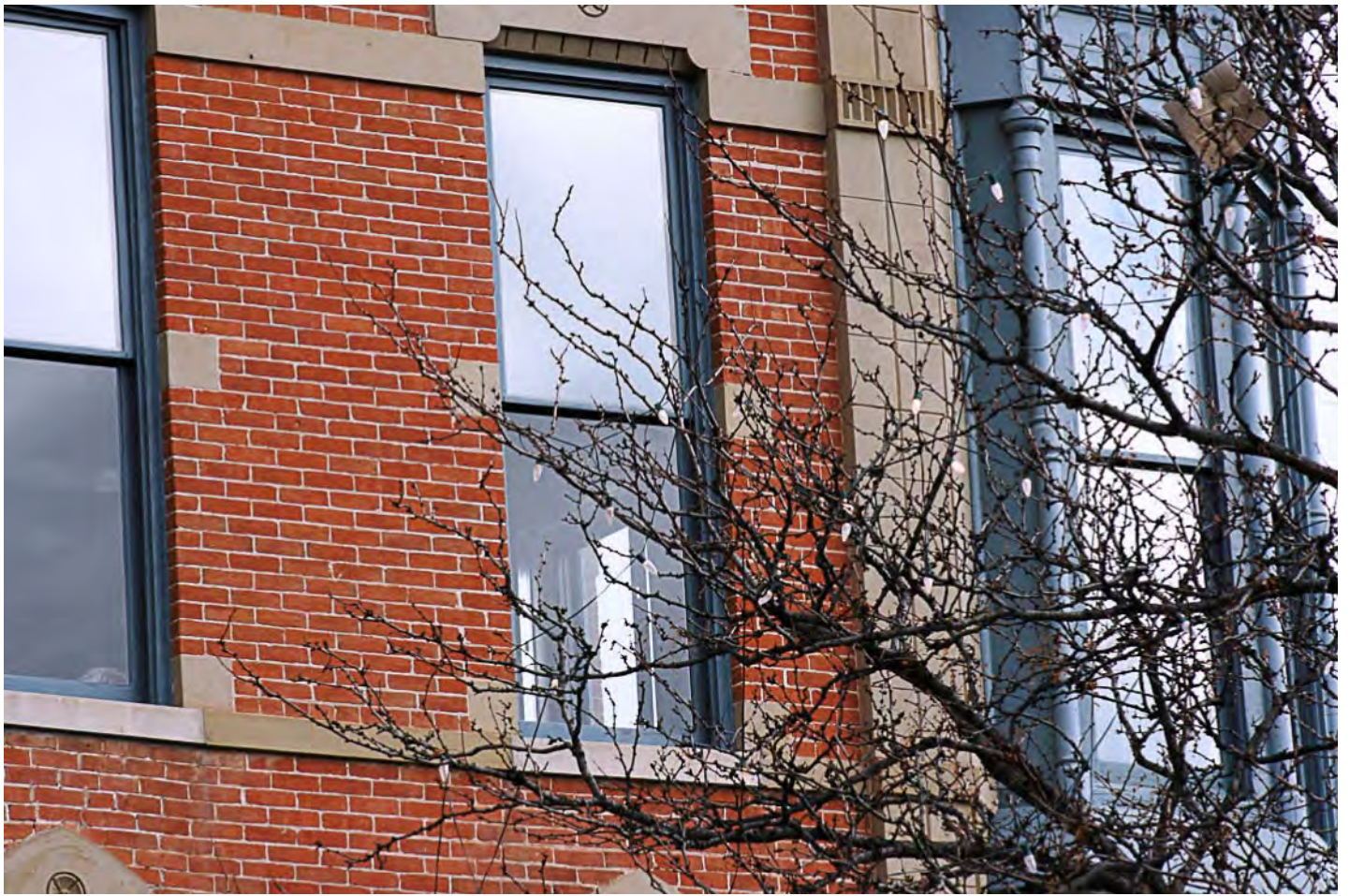
003-8-Exterior



003-8-Interior



003-8-Interior Detail 1



003-9-Exterior



003-9-Interior



003-9-Interior Detail 1



003-9-Interior Detail 2



003-9-Interior Detail 3



003-10-Exterior



003-10-Interior



003-10-Interior Detail 1



003-10-Interior Detail 2



003-11-Exterior



003-11-Interior



003-11-Interior Detail 1



003-12-Exterior



003-12-Interior



003-12-Interior Detail 1



003-13-Exterior



003-13-Interior



003-13-Interior Detail 1



003-13-Interior Detail 2



003-14-Exterior



003-14-Interior



003-14-Interior Detail 1



003-14-Interior Detail 2



003-14-Interior Detail 3



003-14-Interior Detail 4



003-14-Interior Detail 5



003-14-Interior Detail 6



003-14-Interior Detail 7



003-15-Exterior



003-15-Interior



003-16-Exterior



003-16-Interior



003-17-Exterior



003-17-Interior



003-18-Interior



003-18-Interior Detail 1



Corner of Linden and Walnut



Linden Street Elevation_Faces Southeast



Walnut Street Elevation, Faces Southwest



Replacement windows_Northwest elevation_Alley 2



Replacement windows_Northwest elevation_Alley



ARTICLE

The Secretary of the Interior's Standards for the Treatment of Historic Properties: Rehabilitation as a Treatment and Standards for Rehabilitation

Rehabilitation as a Treatment

Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

Standards for Rehabilitation

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings

- [Introduction, Historical Overview, Preservation Standards & Guidelines, Rehabilitation Standards & Guidelines \(pp.1-162, PDF\)](https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part1-preservation-rehabilitation.pdf)
(<https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part1-preservation-rehabilitation.pdf>)
- [Restoration Standards & Guidelines and Reconstruction Standards & Guidelines \(pp.163-241, PDF\)](https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part2-reconstruction-restoration.pdf)
(<https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part2-reconstruction-restoration.pdf>)

☑ Important Note about the Standards for Rehabilitation

The **Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68, 1995)** consists of four treatment standards—[Preservation \(https://www.nps.gov/articles/000/treatment-standards-preservation.htm\)](https://www.nps.gov/articles/000/treatment-standards-preservation.htm), [Rehabilitation \(https://www.nps.gov/articles/000/treatment-standards-rehabilitation.htm\)](https://www.nps.gov/articles/000/treatment-standards-rehabilitation.htm), [Restoration \(https://www.nps.gov/articles/000/treatment-standards-restoration.htm\)](https://www.nps.gov/articles/000/treatment-standards-restoration.htm), and [Reconstruction \(https://www.nps.gov/articles/000/treatment-standards-reconstruction.htm\)](https://www.nps.gov/articles/000/treatment-standards-reconstruction.htm)—and are regulatory for NPS Grants-in-Aid programs. The [Secretary of the Interior's Standards for Rehabilitation \(https://www.nps.gov/subjects/taxincentives/secretarys-standards-rehabilitation.htm\)](https://www.nps.gov/subjects/taxincentives/secretarys-standards-rehabilitation.htm) (**36 CFR Part 67, 1990**), which are included in the Treatment Standards, are regulatory for the

[Federal Historic Preservation Tax Incentives program \(https://www.nps.gov/subjects/taxincentives/index.htm\)](https://www.nps.gov/subjects/taxincentives/index.htm) and are the criteria used to determine if a project qualifies as “a certified rehabilitation.” The 1990 and the 1995 versions of the Rehabilitation Standards convey the same intent and provide the same guidance, although they are worded slightly differently, and “shall” replaces “will” in the 1995 version. **The Secretary of the Interior's Standards for the Treatment of Historic Properties**, in particular the Standards for Rehabilitation, are intended as general guidance for work on all historic properties, are widely used, and have been adopted at the Federal, State, and local levels.

Choosing Rehabilitation as a Treatment

In **Rehabilitation**, historic building materials and character-defining features are protected and maintained as they are in the treatment Preservation. However, greater latitude is given in the [Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings \(https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part1-preservation-rehabilitation.pdf\)](https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part1-preservation-rehabilitation.pdf) to replace extensively deteriorated, damaged, or missing features using either the same material or compatible substitute materials. Of the four treatments, only Rehabilitation allows alterations and the construction of a new addition, if necessary for a continuing or new use for the historic building.

When repair and replacement of deteriorated features are necessary; when alterations or additions to the property are planned for a new or continued use; and when its depiction at a particular time is not appropriate, Rehabilitation may be considered as a treatment. Prior to undertaking work, a documentation plan for Rehabilitation should be developed.

The [Guidelines for the Treatment of Historic Properties \(https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part1-preservation-rehabilitation.pdf\)](https://www.nps.gov/orgs/1739/upload/treatment-guidelines-2017-part1-preservation-rehabilitation.pdf) illustrate the practical application of the Standards for Rehabilitation to historic properties.

History of the Standards

Read a [History of The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings. \(https://www.nps.gov/articles/000/treatment-standards-history.htm\)](https://www.nps.gov/articles/000/treatment-standards-history.htm)



secretary's standards

technical preservation services

Last updated: February 1, 2024

Was this page helpful?

Yes

No



Preservation Briefs: 9

The Repair of Historic Wooden Windows

John H. Myers

The windows on many historic buildings are an important aspect of the architectural character of those buildings. Their design, craftsmanship, or other qualities may make them worthy of preservation. This is self-evident for ornamental windows, but it can be equally true for warehouses or factories where the windows may be the most dominant visual element of an otherwise plain building (see figure 1). Evaluating the significance of these windows and planning for their repair or replacement can be a complex process involving both objective and subjective considerations. The *Secretary of the Interior's Standards for Rehabilitation*, and the accompanying guidelines, call for respecting the significance of original materials and features, repairing and retaining them wherever possible, and when necessary, replacing them in kind. This Brief is based on the issues of significance and repair which are implicit in the standards, but the primary emphasis is on the technical issues of planning for the repair of windows including evaluation of their physical condition, techniques of repair, and design considerations when replacement is necessary.



Figure 1. Windows are frequently important visual focal points, especially on simple facades such as this mill building. Replacement of the multi-pane windows here with larger panes could dramatically change the appearance of the building. The areas of missing windows convey the impression of such a change. Photo: John T. Lowe

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

Architectural or Historical Significance

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

Historically, the first windows in early American houses were casement windows; that is, they were hinged at the side and opened outward. In the beginning of the eighteenth century single- and double-hung windows were introduced. Subsequently many styles of these vertical sliding sash windows have come to be associated with specific building periods or architectural styles, and this is an important consideration in determining the significance of windows, especially on a local or regional basis. Site-specific, regionally oriented architectural comparisons should be made to determine the significance of windows in question. Although such comparisons may focus on specific window types and their details, the ultimate determination of significance should be made within the context of the whole building, wherein the windows are one architectural element (see figure 2).

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

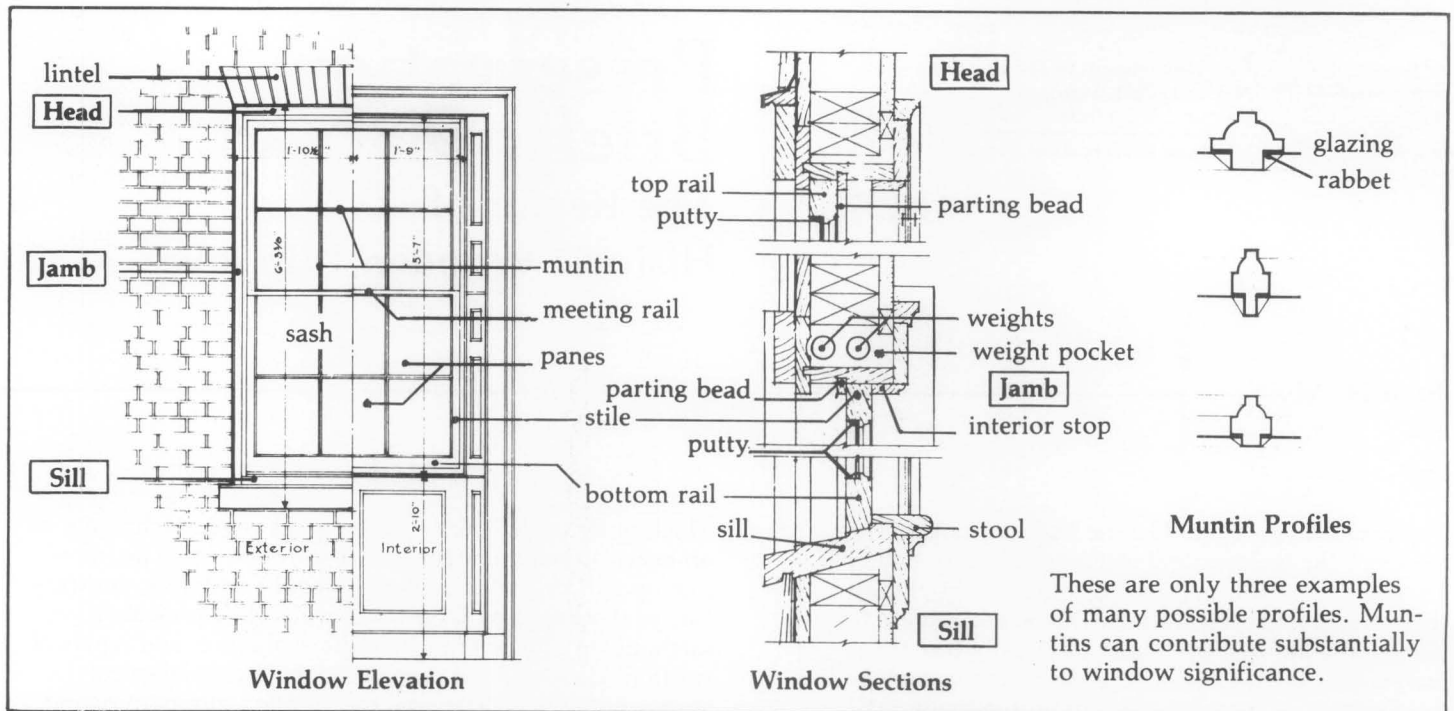


Figure 2. These drawings of window details identify major components, terminology, and installation details for a wooden double-hung window.

ceed with planning appropriate treatments, beginning with an investigation of the physical condition of the windows.

Physical Evaluation

The key to successful planning for window treatments is a careful evaluation of existing physical conditions on a unit-by-unit basis. A graphic or photographic system may be devised to record existing conditions and illustrate the scope of any necessary repairs. Another effective tool is a window schedule which lists all of the parts of each window unit. Spaces by each part allow notes on existing conditions and repair instructions. When such a schedule is completed, it indicates the precise tasks to be performed in the repair of each unit and becomes a part of the specifications. In any evaluation, one should note at a minimum, 1) window location, 2) condition of the paint, 3) condition of the frame and sill, 4) condition of the sash (rails, stiles and muntins), 5) glazing problems, 6) hardware, and 7) the overall condition of the window (excellent, fair, poor, and so forth).

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

larly if the bottom of the sill is flat. Any conditions, including poor original design, which permit water to come in contact with the wood or to puddle on the sill must be corrected as they contribute to deterioration of the window.

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

Each window should be examined for operational soundness beginning with the lower portions of the frame and sash. Exterior rainwater and interior condensation can flow downward along the window, entering and collecting at points where the flow is blocked. The sill, joints between the sill and jamb, corners of the bottom rails and muntin joints are typical points where water collects and deterioration begins (see figure 3). The operation of the window (continuous opening and closing over the years and seasonal temperature changes) weakens the joints, causing movement and slight separation. This process makes the joints more vulnerable to water which is readily absorbed into the end-grain of the wood. If severe deterioration exists in these areas, it will usually be apparent on visual inspection, but other less severely deteriorated areas of the wood may be tested by two traditional methods using a small ice pick.

An ice pick or an awl may be used to test wood for soundness. The technique is simply to jab the pick into a wetted wood surface at an angle and pry up a small sec-

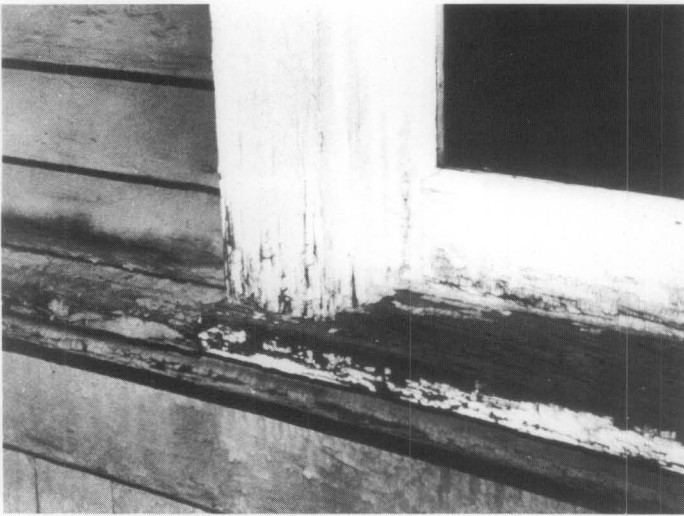


Figure 3. Deterioration of poorly maintained windows usually begins on horizontal surfaces and at joints where water can collect and saturate the wood. The problem areas are clearly indicated by paint failure due to moisture. Photo: Baird M. Smith, AIA

tion of the wood. Sound wood will separate in long fibrous splinters, but decayed wood will lift up in short irregular pieces due to the breakdown of fiber strength.

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

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

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

Repair Class I: Routine Maintenance

Repairs to wooden windows are usually labor intensive and relatively uncomplicated. On small scale projects this

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

The routine maintenance required to upgrade a window to "like new" condition normally includes the following steps: 1) some degree of interior and exterior paint removal, 2) removal and repair of sash (including reglazing where necessary), 3) repairs to the frame, 4) weatherstripping and reinstallation of the sash, and 5) repainting. These operations are illustrated for a typical double-hung wooden window (see figures 4a-f), but they may be adapted to other window types and styles as applicable.

Historic windows have usually acquired many layers of paint over time. Removal of excess layers or peeling and flaking paint will facilitate operation of the window and restore the clarity of the original detailing. Some degree of paint removal is also necessary as a first step in the proper surface preparation for subsequent refinishing (if paint color analysis is desired, it should be conducted prior to the onset of the paint removal). There are several safe and effective techniques for removing paint from wood, depending on the amount of paint to be removed. Several techniques such as scraping, chemical stripping, and the use of a hot air gun are discussed in "Preservation Briefs: 10 Paint Removal from Historic Woodwork" (see Additional Reading section at end).

Paint removal should begin on the interior frames, being careful to remove the paint from the interior stop and the parting bead, particularly along the seam where these stops meet the jamb. This can be accomplished by running a utility knife along the length of the seam, breaking the paint bond. It will then be much easier to remove the stop, the parting bead and the sash. The interior stop may be initially loosened from the sash side to avoid visible scarring of the wood and then gradually pried loose using a pair of putty knives, working up and down the stop in small increments (see figure 4b). With the stop removed, the lower or interior sash may be withdrawn. The sash cords should be detached from the sides of the sash and their ends may be pinned with a nail or tied in a knot to prevent them from falling into the weight pocket.

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

The sash can be stripped of paint using appropriate techniques, but if any heat treatment is used (see figure 4c), the glass should be removed or protected from the sudden temperature change which can cause breakage. An



Figure 4a. The following series of photographs of the repair of a historic double-hung window use a unit which is structurally sound but has many layers of paint, some cracked and missing putty, slight separation at the joints, broken sash cords, and one cracked pane. Photo: John H. Myers



Figure 4b. After removing paint from the seam between the interior stop and the jamb, the stop can be pried out and gradually worked loose using a pair of putty knives as shown. To avoid visible scarring of the wood, the sash can be raised and the stop pried loose initially from the outer side. Photo: John H. Myers



Figure 4c. Sash can be removed and repaired in a convenient work area. Paint is being removed from this sash with a hot air gun while an asbestos sheet protects the glass from sudden temperature change. Photo: John H. Myers

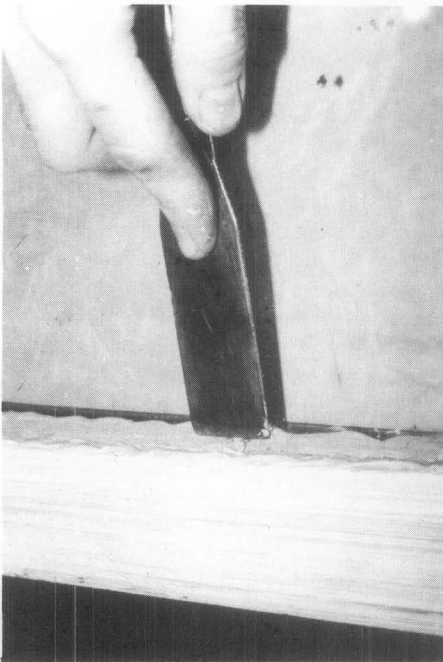


Figure 4d. Reglazing or replacement of the putty requires that the existing putty be removed manually, the glazing points be extracted, the glass removed, and the back putty scraped out. To reglaze, a bed of putty is laid around the perimeter of the rabbet, the pane is pressed into place, glazing points are inserted to hold the pane (shown), and a final seal of putty is beveled around the edge of the glass. Photo: John H. Myers



Figure 4e. A common repair is the replacement of broken sash cords with new cords (shown) or with chains. The weight pocket is often accessible through a removable plate in the jamb, or by removing the interior trim. Photo: John H. Myers



Figure 4f. Following the relatively simple repairs, the window is weathertight, like new in appearance, and serviceable for many years to come. Both the historic material and the detailing and craftsmanship of this original window have been preserved. Photo: John H. Myers

overlay of aluminum foil on gypsum board or asbestos can protect the glass from such rapid temperature change. It is important to protect the glass because it may be historic and often adds character to the window. Deteriorated putty should be removed manually, taking care not to damage the wood along the rabbet. If the glass is to be removed, the glazing points which hold the glass in place can be extracted and the panes numbered and removed for cleaning and reuse in the same openings. With the glass panes out, the remaining putty can be removed and the sash can be sanded, patched, and primed with a preservative primer. Hardened putty in the rabbets may be softened by heating with a soldering iron at the point of removal. Putty remaining on the glass may be softened by soaking the panes in linseed oil, and then removed with less risk of breaking the glass. Before reinstalling the glass, a bead of glazing compound or linseed oil putty should be laid around the rabbet to cushion and seal the glass. Glazing compound should only be used on wood which has been brushed with linseed oil and primed with an oil based primer or paint. The pane is then pressed into place and the glazing points are pushed into the wood around the perimeter of the pane (see figure 4d). The final glazing compound or putty is applied and beveled to complete the seal. The sash can be refinished as desired on the inside and painted on the outside as soon as a "skin" has formed on the putty, usually in 2 or 3 days. Exterior paint should cover the beveled glazing compound or putty and lap over onto the glass slightly to complete a weathertight seal. After the proper curing times have elapsed for paint and putty, the sash will be ready for reinstallation.

While the sash are out of the frame, the condition of the wood in the jamb and sill can be evaluated. Repair and refinishing of the frame may proceed concurrently with repairs to the sash, taking advantage of the curing times for the paints and putty used on the sash. One of the most common work items is the replacement of the sash cords with new rope cords or with chains (see figure 4e). The weight pocket is frequently accessible through a door on the face of the frame near the sill, but if no door exists, the trim on the interior face may be removed for access. Sash weights may be increased for easier window operation by elderly or handicapped persons. Additional repairs to the frame and sash may include consolidation or replacement of deteriorated wood. Techniques for these repairs are discussed in the following sections.

The operations just discussed summarize the efforts necessary to restore a window with minor deterioration to "like new" condition (see figure 4f). The techniques can be applied by an unskilled person with minimal training and experience. To demonstrate the practicality of this approach, and photograph it, a Technical Preservation Services staff member repaired a wooden double-hung, two over two window which had been in service over ninety years. The wood was structurally sound but the window had one broken pane, many layers of paint, broken sash cords and inadequate, worn-out weatherstripping. The staff member found that the frame could be stripped of paint and the sash removed quite easily. Paint, putty and glass removal required about one hour for each sash, and the reglazing of both sash was accomplished in about one hour. Weatherstripping of the sash and frame, replacement of the sash cords and reinstallation of the sash, parting bead, and stop required an hour and a half. These times refer only to individual operations; the entire proc-

ess took several days due to the drying and curing times for putty, primer, and paint, however, work on other window units could have been in progress during these lag times.

Repair Class II: Stabilization

The preceding description of a window repair job focused on a unit which was operationally sound. Many windows will show some additional degree of physical deterioration, especially in the vulnerable areas mentioned earlier, but even badly damaged windows can be repaired using simple processes. Partially decayed wood can be water-proofed, patched, built-up, or consolidated and then painted to achieve a sound condition, good appearance, and greatly extended life. Three techniques for repairing partially decayed or weathered wood are discussed in this section, and all three can be accomplished using products available at most hardware stores.

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

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

Wood may also be strengthened and stabilized by consolidation, using semi-rigid epoxies which saturate the porous decayed wood and then harden. The surface of the consolidated wood can then be filled with a semi-rigid epoxy patching compound, sanded and painted (see figure 5). Epoxy patching compounds can be used to build up



Figure 5. This illustrates a two-part epoxy patching compound used to fill the surface of a weathered sill and rebuild the missing edge. When the epoxy cures, it can be sanded smooth and painted to achieve a durable and waterproof repair. Photo: John H. Myers

missing sections or decayed ends of members. Profiles can be duplicated using hand molds, which are created by pressing a ball of patching compound over a sound section of the profile which has been rubbed with butcher's wax. This can be a very efficient technique where there are many typical repairs to be done. Technical Preservation Services has published *Epoxy for Wood Repairs in Historic Buildings* (see Additional Reading section at end), which discusses the theory and techniques of epoxy repairs. The process has been widely used and proven in marine applications; and proprietary products are available at hardware and marine supply stores. Although epoxy materials may be comparatively expensive, they hold the promise of being among the most durable and long lasting materials available for wood repair.

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

Repair Class III: Splices and Parts Replacement

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

The repairs discussed in this section involve window frames which may be in very deteriorated condition, possibly requiring removal; therefore, caution is in order. The actual construction of wooden window frames and sash is not complicated. Pegged mortise and tenon units can be disassembled easily, if the units are out of the building. The installation or connection of some frames to the surrounding structure, especially masonry walls, can complicate the work immeasurably, and may even require

dismantling of the wall. It may be useful, therefore, to take the following approach to frame repair: 1) conduct regular maintenance of sound frames to achieve the longest life possible, 2) make necessary repairs in place wherever possible, using stabilization and splicing techniques, and 3) if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.

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

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

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

Weatherization

A window which is repaired should be made as energy efficient as possible by the use of appropriate weatherstripping to reduce air infiltration. A wide variety of products are available to assist in this task. Felt may be fastened to the top, bottom, and meeting rails, but may have the disadvantage of absorbing and holding moisture, particularly at the bottom rail. Rolled vinyl strips may also be tacked into place in appropriate locations to reduce infiltration. Metal strips or new plastic spring strips may be used on the rails and, if space permits, in

the channels between the sash and jamb. Weatherstripping is a historic treatment, but old weatherstripping (felt) is not likely to perform very satisfactorily. Appropriate contemporary weatherstripping should be considered an integral part of the repair process for windows. The use of sash locks installed on the meeting rail will insure that the sash are kept tightly closed so that the weatherstripping will function more effectively to reduce infiltration. Although such locks will not always be historically accurate, they will usually be viewed as an acceptable contemporary modification in the interest of improved thermal performance.

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

Window Replacement

Although the retention of original or existing windows is always desirable and this **Brief** is intended to encourage that goal, there is a point when the condition of a window may clearly indicate replacement. The decision process for selecting replacement windows should *not* begin with a survey of contemporary window products which are available as replacements, but should begin with a look at the windows which are being replaced. Attempt to understand the contribution of the window(s) to the appearance of the facade including: 1) the pattern of the openings and their size; 2) proportions of the frame and sash; 3) configuration of window panes; 4) muntin profiles; 5) type of wood; 6) paint color; 7) characteristics of the glass; and 8) associated details such as arched tops, hoods, or other decorative elements. Develop an understanding of how the window reflects the period, style, or regional characteristics of the building, or represents technological development.

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

information on products which have been used successfully in preservation projects.

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

Conclusion

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

Additional Reading

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Historic Preservation Tax Incentives

Evaluating Historic Windows for Repair or Replacement

Determinations concerning the treatment of historic windows begin with Standard 6 of the [Secretary of the Interior's Standards for Rehabilitation](https://www.nps.gov/subjects/taxincentives/secretarys-standards-rehabilitation.htm): (<https://www.nps.gov/subjects/taxincentives/secretarys-standards-rehabilitation.htm>), "Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence."

Repair should be the first option considered. Repair can include renewal of finishes, material repair using epoxies, replacement of component parts and additions such as weather stripping. While it may be possible to repair even severely deteriorated windows, repair of deterioration beyond a certain level is not practical or reasonable and replacement becomes the appropriate treatment.

The Standards also require, "The removal of historic materials or alterations of features and spaces that characterize a property shall be avoided." While most windows are significant to the character of a property, every window on all properties is not, and it is in these cases that considerations beyond deterioration as described below are appropriate.

Documentation of deterioration

Determination as to when deterioration is sufficiently severe to justify replacement must be based on documentation of the condition of the windows. What constitutes effective documentation may vary with the circumstances of the project, but at minimum must include enough good quality photographs to clearly depict the full range of conditions. When a project involves a great many deteriorated windows, general quantification of the specific aspects of the deterioration may substitute for photographs and descriptions of every window. A full window survey should only be needed in limited instances.

Questions about the feasibility of repair or the quality of the repaired window can usually be best answered by doing a sample repair. The appearance, the cost of the repair, and other factors may be considered. Where particular performance levels are critical, testing of the repaired window may provide information useful in evaluating the viability of repair.

Considerations beyond deterioration

While condition is the primary determinant in decisions regarding the treatment of historic windows, the importance of the windows to the historic character of the building can also be taken into account. The design and location of windows and their relationship to the design of the building can affect their role in the character of a building. Windows that are distinctive features or exemplify fine craftsmanship are more critical to retain and repair than those that play a lesser supporting role in the design of the building or are simple manufactured units. The more important the elevation, feature or space of which the windows are a part, the more important it is to retain the historic windows.

While factors including occupant operation, presence of hazardous materials, code requirements, or energy performance, if taken individually, are not reasons to replace windows, they may be issues to consider in conjunction with deterioration in establishing a need for window replacement. In many cases these requirements can be met without losing the historic windows. For example, studies have shown that the energy performance of historic windows can be significantly improved by adding storm windows and weatherstripping or by replacing the glazing or the sash.

The number of windows being replaced is a consideration that may allow for window replacement that does not depend on deterioration. It may be possible that the replacement of a few windows may have only an inconsequential effect on the character of an elevation with many windows. Thus, where a need such as egress can be achieved with little change to the appearance of the building, a few windows may be replaced irrespective of their condition.

Some areas have code requirements in response to severe weather conditions. Mandates such as impact resistance may make it impossible for a building to have any compliant occupancy with the historic windows in place, particularly on taller buildings. In these cases, replacement of the historic windows will not be dependent on documentation of deterioration.

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Historic Preservation Tax Incentives

Replacement Windows that Meet the Standards

The decision-making process for selecting replacement windows divides into two tracks depending on whether historic windows remain in place or no historic windows survive.

Replacement of Existing Historic Windows

When historic windows exist, they should be repaired when possible. When they are too deteriorated to repair, selection of the replacement windows must be guided by Standard 6. Design, visual qualities, and materials are specific criteria provided by the Standard that are pertinent to evaluating the match of a replacement window. Evaluating the adequacy of the match of the replacement window involves the consideration of multiple issues.

How accurate does the match need to be?

The more important a window is in defining the historic character of a building the more critical it is to have a close match for its replacement. Location is a key factor in two ways. It is usually a consideration in determining the relative importance of a building's various parts. For example, the street-facing facade is likely to be more important than an obscured rear elevation. The more important the elevation, feature or space of which the window is a part, the more important the window is likely to be, and thus, the more critical that its replacement be a very accurate match. Secondly, the location of the window can affect how much of the window's features and details are visible. This will affect the nature of an acceptable replacement. For example, windows at or near ground level present a different case from windows in the upper stories of a tall building.

Using the hierarchy of a building's features and taking into account the window's visibility, some general guidance can be drawn.

- Replacement windows on primary, street-facing or any highly visible elevations of buildings of three stories or less must match the historic windows in all their details and in material (wood for wood and metal for metal).
- Replacement windows on the primary, street-facing or any highly visible elevations that are part of the base of high-rise buildings must match the historic windows in all their details and in material (wood for wood and metal for metal). The base may vary in the number of stories, but is generally defined by massing or architectural detailing.
- Replacement windows on the primary, street-facing or highly visible elevations of tall buildings above a distinct base must match the historic windows in size, design and all details that can be perceived from ground level. Substitute materials can be considered to the extent that they do not compromise other important visual qualities.
- Replacement windows on secondary elevations that have limited visibility must match the historic windows in size, configuration and general characteristics, though finer details may not need to be duplicated and substitute materials may be considered
- Replacement windows whose interior components are a significant part of the interior historic finishes must have interior profiles and finishes that are compatible with the surrounding historic materials. However, in most cases, the match of the exterior of a

replacement window will take precedence over the interior appearance.

- Replacement windows in buildings or parts of buildings that do not fit into any of the above categories must generally match the historic windows in all their details and in material (wood for wood and metal for metal). Variations in the details and the use of substitute materials can be considered in individual cases where these differences result in only minimal change to the appearance of the window and in no change to the historic character of the overall building.

How well does the new window need to match the old?

The evaluation of the match of a replacement window depends primarily on its visual qualities. Dimensions, profiles, finish, and placement are all perceived in relative terms. For example, an eighth of an inch variation in the size of an element that measures a few inches across may be imperceptible, yet it could be more noticeable on the appearance of an element that is only half an inch in size. The depth of a muntin or the relative complexity of a brick mold profile are more often made visually apparent through the shadows they create. Thus, while comparable drawings are the typical basis for evaluating a replacement window, a three-dimensional sample or mock-up provides the most definitive test of an effective visual match.

The way a historic window operates is an important factor in its design and appearance. A replacement window, however, need not operate in the same manner as the historic window or need not operate at all as long as the change in operation does not change the form and appearance of the window to the point that it does not match the historic window or otherwise impair the appearance and character of the building.

Factors to consider in evaluating the match of a replacement window

- **Window unit placement in relation to the wall plane;** the degree to which the window is recessed into the wall. The location of the window affects the three-dimensional appearance of the wall.
- **Window frame size and shape.** For example, with a wood window, this would include the brick mold, blind stop, and sill.
 - The specific profile of the brick mold is usually less critical than its overall complexity and general shape, such as stepped or curved.
 - Typical sight lines reduce the importance of the size and profile of the sill on windows high above ground level, especially when the windows are deeply set in the wall.
 - Though a blind stop is a small element of the overall window assembly, it is a noticeable part of the frame profile and it is an important part of the transition between wall and glass.
 - Steel windows that were installed as a building's walls were constructed have so little of their outer frame exposed that any replacement window will necessitate some addition to this dimension, but it must be minimal.
- **Glass size and divisions.** Muntins reproduced as simulated divided lights – consisting of a three-dimensional exterior grid, between-the-glass spacers, and an interior grid – may provide an adequate match when the dimensions and profile of the exterior grid are equivalent to the historic muntin and the grid is permanently affixed tight to the glass.
- **Sash elements width and depth.** For example with a wood window, this would include the rails, stiles and muntins; with a steel window, this would include the operator frame and muntins.
 - The depth of the sash in a double-hung window, or its thickness, affects the depth of the offset at the meeting rail of a hung window. This depth is perceived through the shadow that it creates.
 - Because of its small size, even slight differences in the dimension of a muntin will have a noticeable effect on the overall character of a window. Shape, as well as depth, is important to the visual effect of a muntin.

- The stiles of double-hung historic windows align vertically and are the same width at the upper and lower sashes. The use of single-hung windows as replacements may alter this relationship with varying effects on the appearance of a window. In particular, when the distinction between the frame and the sash is blurred, details such as lugs may be impossible to accurately reproduce.
 - Meeting rails of historic windows were sometimes too narrow to be structurally sound. Reproducing a structurally-inadequate condition is not required.
 - The operating sash of a steel window is usually wider than the overall muntin grid of the window. In addition, the frame of the operating sash often has slight projections or overlaps that vary from the profile of the surrounding muntins. The shadow lines the muntins create add another important layer to the three-dimensional appearance of the window.
- **Materials and finish.**
 - While it may be theoretically possible to match all the significant characteristics of a historic window in a substitute material, in actuality, finish, profiles, dimensions and details are all affected by a change in material.
 - In addition to the surface characteristics, vinyl-clad or enameled aluminum-clad windows may have joints in the cladding that can make them look very different from a painted wood window.
 - Secondary window elements that do not match the finish or color of the window can also diminish the match. Examples include white vinyl tracks on dark-painted wood windows or wide, black, glazing gaskets on white aluminum windows.
 - **Glass characteristics.**
 - Insulated glass is generally acceptable for new windows as long as it does not compromise other important aspects of the match.
 - The clarity and reflectivity of standard clear window glass are significant characteristics of most windows. Because these characteristics are often diminished for old glass, new glass equivalent to the original should be the basis for evaluating the glazing proposed for new windows. Color should only be a noticeable characteristic of the new glass where it was historically, and any coating added must not perceptibly increase the reflectivity of the glass.
 - Where the glazing is predominantly obscure glass, it may be replaced with clear glass, but some evidence of the historic glazing must be retained, either in parts of windows or in selected window units.

Replacement Windows Where No Historic Windows Remain

Replacement windows for missing or non-historic windows must be compatible with the historic appearance and character of the building. Although replacement windows may be based on physical or pictorial documentation, if available, recreation of the missing historic windows is not required to meet the Standards. Replacement of missing or non-historic windows must, however, always fill the original window openings and must be compatible with the overall historic character of the building. The general type of window – industrial steel, wood double-hung, etc. – that is appropriate can usually be determined from the proportions of the openings, and the period and historic function of the building. The appearance of the replacement windows must be consistent with the general characteristics of a historic window of the type and period, but need not replicate the missing historic window. In many cases, this may be accomplished using substitute materials. There may be some additional flexibility with regard to the details of windows on secondary elevations that are not highly visible, consistent with the approach outlined for replacing existing historic windows. Replacing existing incompatible, non-historic windows with similarly incompatible new windows does not meet the Standards.



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LEGAL MEMORANDUM

TO: Claire Havelda, Counsel for 201 Linden

FROM: Heather N. Jarvis, Assistant City Attorney

DATE: November 27, 2023

RE: Fort Collins Landmark at 201 Linden, Windows

Thank you for your patience during this busy time of year. I recognize that your clients feel a sense of urgency to move forward with whatever solution is approved and feasible. This memorandum is to confirm we are on the same page with respect to how to proceed.

By way of a brief background as I understand it, the current condition of the windows at 201 Linden, a designated Fort Collins Landmark since 1974, reflects a damaged and destabilized condition that was observed and documented by a third-party professional historic window expert the City hired in the autumn of 2018. That damage was done by work performed in the spring of 2018 without consultation or approval of Historic Preservation staff or the Historic Preservation Commission as required under City Code Section 14-51. The work also did not comply with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* (SOI Standards). On December 19, 2018, the Historic Preservation Commission denied the property owner's application to replace the windows, because the third-party expert's opinion was that the windows could be repaired. Following a repair mockup on one window to test proposed methodologies, staff issued a Certificate of Appropriateness (COA) based on the third-party expert's recommendations for repair so that applicants could proceed with a rehab plan that would meet City Code requirements and SOI Standards. In February 2020, owners were able to obtain authorization from the City to proceed with an alternative plan, developed by the windows contractor who had performed the work in 2018, to address the damaged windows, a plan that the third-party expert cautioned would not fully restore the stability and structural integrity of the windows or solve the performance problems, but at least would not do further damage. Our understanding is that this alternative plan to address the damaged windows was not completed. The windows were left in their damaged condition.

Recent loss of windowpanes, including one falling two stories to the sidewalk, has led to renewed interest in addressing the damaged windows situation. Owners have applied or plan to apply to the Historic Preservation Commission for design review to replace the windows. The first questions are, since nothing was done to the damaged windows, not the plan for which a COA was issued, and not the alternative plan, whether the passage of time and loss of windowpanes constitute "changed circumstances sufficient to justify the resubmittal" under City Code Section 14-53(b)(2)b. and 14-54(a)(4)b. Does a failure to comply with minimum

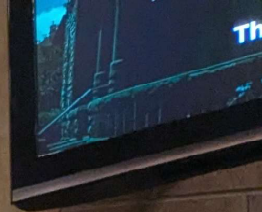
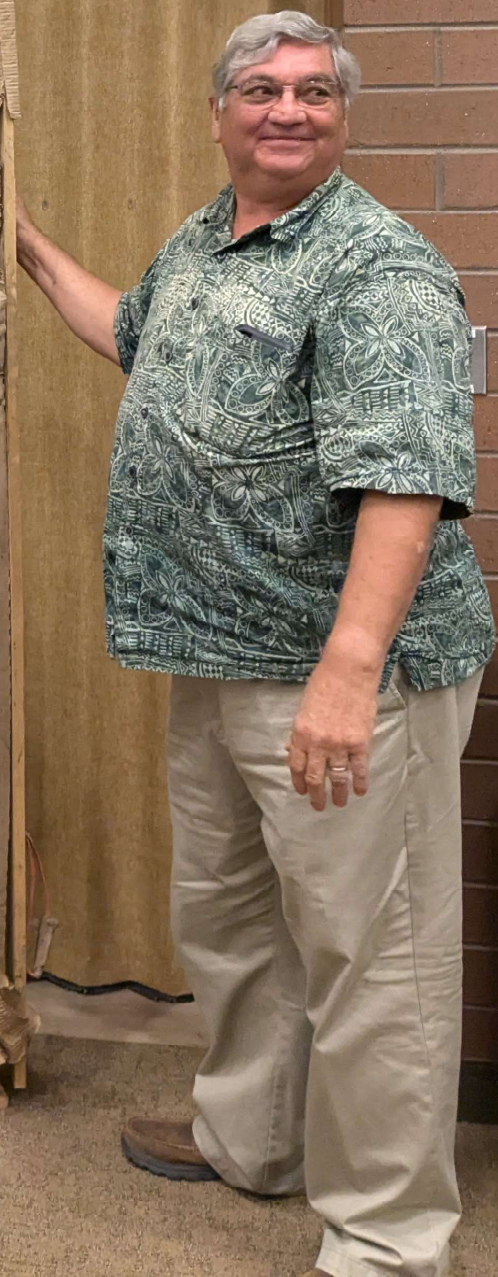
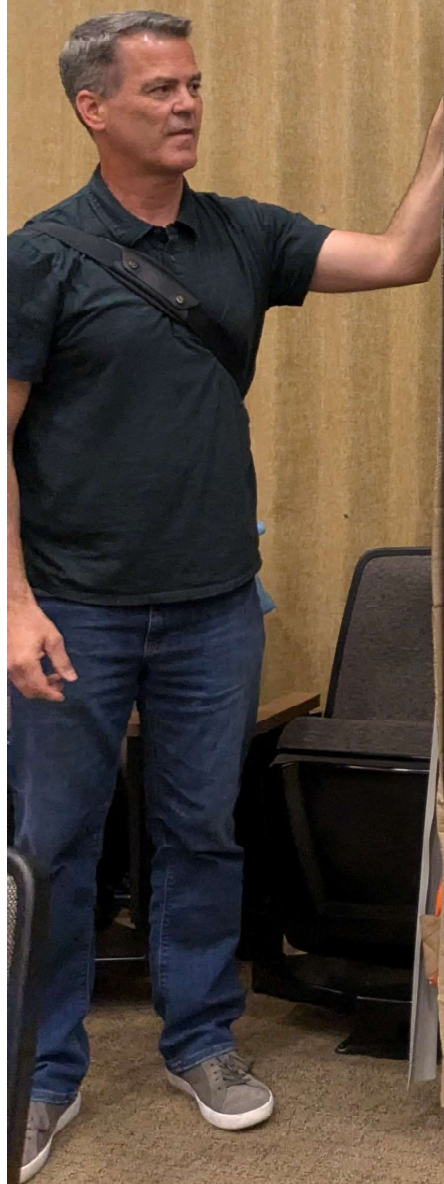
November 22, 2023

Page 2 of 2

maintenance requirements under City Code Section 14-7 (to meet the *International Property Maintenance Code* or the *International Existing Building Code*) allow the owners to claim changed circumstances? Upon consultation with Historic Preservation staff, the CDNS Director, and the City's Chief Building Official, the City is prepared to recognize that the instability of the glazing in at least some of the current window conditions is sufficient to justify the definition of changed circumstances.

The next considerations involve how to ameliorate the situation. Under City Code Section 14-51(d), for alterations not meeting the standards (which the alterations of the Landmark in violation of the City Code constitute), the property owner "shall restore the site, structure, or object to its original condition prior to any alteration occurring." It would seem that perhaps the necessary actions to restore the windows are already outlined in the plan issued with the July 15, 2019, COA. If that is the case, then your clients could proceed immediately to renew the COA and then to pursue that COA course of action. It may be, however, that the current condition of the windows prevents the COA course of action. Expert analysis seems necessary to determine, based on a window-by-window analysis, what needs to be done and to provide a revised assessment for the Historic Preservation Commission to make any determination. Attached is a proposed scope of work for the new expert and a list of professional contractors with sufficient experience and knowledge to complete the work. Given the time that has passed since we last met in order for staff to review a proper course of action and to visit the site, along with the recent holiday break, we have rescheduled consideration of this item to the January 17, 2024, HPC meeting. The deadline for submittal of materials for that meeting is January 2, 2023, which should give the third-party expert adequate time to complete the full scope of work. Please advise as to what you need from me and Historic Preservation staff as you proceed.

CC: Maren Bzdek, Historic Preservation Manager
Paul Sizemore, CDNS Director





201 Linden Hotel

Request for Certificate of Appropriateness:
Window Replacement Request
&
Combined Conceptual & Final Review
FCMC Section 14-54

Brownstein



201 Linden Hotel Team

David Diehl – OneSeven Advisors, LLC – Owner’s Representative

Mark Wernimont – Colorado Sash and Door – Expert

Claire Havelda – Brownstein Hyatt Farber & Schreck, LLP

Introduction

Request.

- Approval of replacement of all 42 of the 147-year-old 2nd and 3rd story windows for the 201 Linden Hotel. **Only visual impact less than ½ inch change to the window check rail.**

Clarification.

- Expert Report Timing.
 - October 21, 2023 – Window Failure.
 - November 9, 2023 – Meeting with the City.
 - Discussed finding a neutral expert to do the window assessment as Owners had grave concerns about the inadequacies of the Barlow Report.
 - Owners Representative contacted all suggested experts.
 - A few never returned calls.
 - 1 Declined. Offered to do a ballistic report. (Heritage Window Restoration)
 - Engaged Mark Wernimont – Colorado Sash and Door – Report provided with application in June 2024.
- City's Expert Report.
 - The City commissioned report – August?
 - We have grave concerns about the limited focus and scope of that report and do not believe it will address the fundamental issue at hand. Design Flaw & Lack of consideration of relevant City and Owner goals.

Record

1. Request that the complete application, including the letter of June 24, 2024, and all attachments submitted therewith.
 1. Record reflect that Mr. Wernimont's Report included reference to the proposed replacement window.
 2. Unclear whether HPC was provided this application prior to Work Session.
 3. Did not see in the packet was the City's "Legal Memorandum" dated November 27, 2023, that was sent to the Applicant Team. Important that this also be included in the record as it gives context to our Application, outlines the limited scope of review the City's Report will cover, and documents the tenor that the City's Legal Team has chosen to engage in.
2. Ask that these slides be included.
3. Ask that the prior information included in the Agenda Packet of Item 3 attachment 1 of the 12/17/18 HPC Agenda Packet from Dohn Construction and Mr. Wernimont's past reports be included.
4. The proposed window replacements be included in the record – in form that makes most sense (photographs or originals).

History of 201 Linden Hotel Replacement Requests

- First request to replace 128-year-old windows first made in 2005.
 - City denies.
- Second request to replace 141-year-old windows made in 2018.
 - Expert Report by Dohn Construction Submitted.
 - City commissions Barlow Report and uses as basis for denial.
 - Flaws in Barlow Report & Newly Commissioned City Report.
 - No weight given to:
 - Private Property Owner Rights – Concerns of window operability, safety, civil liability and sustainability.
 - Onerous Repair Requirements =*Potential Violation of Sheetz v. County of El Dorado CA, 144 S. Ct. 893 (2024). Permit conditions must have rough proportionality to impact on land-use interest – may not require landowner to pay more than is necessary to mitigate harms resulting from development.*
 - City Climate Action/Sustainability Goals OR HPC Goals.
 - October 2024 – 2nd Story Window Fails.
- Third request to replace 147-year-old windows made 2024.
 - Windows contain a **Fundamental Design Flaw** that Rehabilitation does not sufficiently address.
 - Significant deterioration to warrant replacement under Secretary of Interior Standards 36 CFR Section 68.3.

REPAIR v. REPLACEMENT

REPAIR

- Secretary of the Interior Standards:

“[C]annot, in and of themselves, be used to make essential decisions about which features of the historic building should be saved and which can be changed. But, once a treatment is selected, the Standards and Guidelines provide a consistent philosophical approach to the work.”

Rehabilitation is not appropriate in this case where window design is fundamentally flawed, significantly degraded windows, and attempts at rehabilitation have not proven sustainable.

Rehabilitation does not meet:

- Operability standards private property owners have a right to in a residential building.
- Safety standards private property owners have a right to in a residential building nor does it meet the proportionality test of *Sheetz*.
- Historic Preservation Commission Goals.
- City of Fort Collins Sustainability Goals.
 - Either for energy efficiency or maintenance sustainability.

REPAIR v. REPLACEMENT

REPLACEMENT ALIGNS WITH GOALS & STANDARDS

- Proposed Replacement Windows Meet Secretary of Interior Standards.
 - When the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and **where possible** materials.
 - If using the same kind of material is not feasible, then a compatible substitute material may be considered.
- Proposed Windows Meet HPC Goals.
- Proposed Windows Meet Building Safety Standards.
- Proposed Windows Meet City Energy and Maintenance Sustainability Goals.

REPAIR v. REPLACEMENT

Replacement Continued

1. Replacement does not create an adverse affect on the general historical character of the landmark – windows are visually identical from the exterior street view.
2. Replacement holds with the general historical character of the landmarked area.
3. Retention of the faulty materials does not outweigh the safety, operability, environmental and sustainability concerns replacement would address.
4. No visible change to the exterior key characteristic of the landmark.
5. Replacement will encourage the protection, enhancement and perpetuation of use of the landmark by honoring owner concerns related to safety and sustainability.
 1. This is not a first-floor commercial building where interior is open to inspection by public. 2nd & 3rd floor exterior visual impact only.
 2. The current windows also creating water damage on the interior of walls of 201 Linden Hotel.
6. Replacement minimizes ongoing disruption to lives of residents of the 201 Linden Hotel, unlike a piecemeal rehabilitation approach.

SECRETARY OF INTERIOR STANDARDS FOR REPLACEMENT

- ✓ Replacement material should match the old with exception of hidden structural reinforcement.
- ✓ Restoration Standards
 - When the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and where possible materials. It further states that “if using the same kind of material is not feasible, then a compatible substitute material may be considered.”
 - Mr. Wernimont discuss in detail later in presentation.

HISTORIC PRESERVATION COMMISSION'S DEFINED PURPOSES

Fort Collins Municipal Code Section 14-2

- **Stabilize and improve the aesthetic and economic vitality and values of historic sites and structures.**
 - Owners attempting protect building, interior & exterior.
- **Promote the use of historical structures.**
 - Private residences. No public access. However, the Owners are committed to ensuring visual consistency with the original windows.
- **Promote and encourage continued private ownership and utilization of such sites/structures.**
 - Must be a consideration of private property owners' rights in this balance; including operability, safety and exposure to civil liability for failing windows.
 - Visual difference of less than ½ inch check rail – imperceptible from exterior.
 - Repair requires ongoing excessive maintenance and defeats this purpose.
- **Promote economic, social and environmental sustainability through ongoing “use” of existing buildings.**
 - Replacement is the only economically and environmentally sustainable option.

SAFETY AND SUSTAINABILITY

- OWNERS SAFETY AND SUSTAINABILITY GOALS.

- Safety & Operability.
 - Repair = Seal Shut
- Energy Efficiency.
 - Repair = Seal shut.
- Predictable long term maintenance costs; budget. Not yearly reviews by HPC.

- CITY'S SUSTAINABILITY GOALS.

- The Replacement windows meet the City's adopted the International Building Code Standards:
 - Window opening operability 1015.8;
 - Wind Loading in 1609.3;
 - Sound Control 3603.2; and the
 - Dessing Pressure rating for windows.
- City's adopted "Our Climate Future" Plan and the City's published Our Climate Future Action Guide, identify the urgent need to reduce carbon emissions and improve energy efficiency.
 - City documented that 2/3 of Carbon Emissions come from buildings providing heating, cooling and lighting.
 - New Replacement windows are energy efficient and significantly reduce carbon emissions.

OLD TOWN DESIGN STANDARDS

- **Design Standards.** Design standards promote historic preservation best practices. They seek to:
 - Manage change so the historic character of the district is respected while accommodating compatible improvements.
 - They reflect the city’s goals to promote economic and sustainable development, enhance the image of the city and reuse historic resources.
- **When Strict Adherence to the Design Standard is Inappropriate.**
 - In addition, there are many cases in which the standards state that one particular solution is preferred . . . but . . . some alternatives may be considered if the preferred approach is not feasible.
 - In those instances, the HPC should consider:
 - The quality, appearance and character of alternative solutions, such as new materials.

OLD TOWN DESIGN STANDARDS /cont.

Old Town Design Standards claim that does not hold true for this matter:

1. Repair is generally claimed as less expensive than replacement by the Standards (P. 19) and by Staff.
 1. This is not accurate in this case.
 1. **Repair.** Ongoing repair of the current windows is estimated to be **\$352,798** over a thirty-year period.
 2. **Replacement.** 1st Option **\$284,690** / 2nd Option **\$218,950** (Applicant Preferred Option).
 3. **Cost Difference.** 1st Option \$68,108 / 2nd Option \$133,848.
2. OTDS language indicates that cost was a consideration in developing these standards and thus, may be considered in the HPC's analysis.

Repair Costs

Paint 2024	1	42	100	350	18900	10000	\$28,900	
Paint 2031	1	42	126	442	23856	11000	\$34,856	
Paint 2038	1	42	159	560	30198	12000	\$42,198	
Paint 2045	1	42	200	707	38094	13000	\$51,094	
Assume 3.75% per year Same as 2016 thru 2024								
Repair	1	42	225	4150	183750	12000	\$195,750	
							\$352,798	133848

*Note – Repairs do not allow for Operability of Windows or meet Environmental Sustainability Goals.

Replacement Costs (#1 Wood & #2 Clad Options)

			Material	Labor		Set Up		
Option #1								
Wood		42	3300	1500	201600	10000	\$211,600	
Paint	1	42	121	424	22890	12000	\$34,890	
	1	42	133	467	25200	13000	\$38,200	
							\$284,690	65740
Option #2								
Clad		42	3700	1275	208950	10000	\$218,950	Base Line

OLD TOWN DESIGN STANDARDS

Standard	Content	Met
Policy LIV 17.2 Encourage Adaptive Reuse.	In order to capture the resources and energy embodied in existing buildings, <u>support and encourage the reuse, and adaptation of historically significant and architecturally important structures,</u> including but not limited to Downtown buildings, historic homes, etc.	✓
Policy LIV 17.3 Ensure Congruent Energy Efficiency.	Ensure that <u>energy efficient upgrades contribute to or do not lessen the integrity of historic structures.</u>	✓

OLD TOWN DESIGN STANDARDS

Standard	Content	Met
<p>3.9</p> <p>Replace a historic window with a matching design if repair is not possible.</p>	<ul style="list-style-type: none">• Replace with the same material*. Match the appearance of the historic window design (i.e., if the historic is double-hung, use a double-hung replacement window).• Maintain the historic size, shape and number of panes.• Match the profile of the sash, muntin and its components to the historic window, including the depth of the sash, which may step back to the plane of the glass in several increments.• Use clear window glazing that conveys the visual appearance of historic glazing (transparent low-e glass is preferred).• Do not use vinyl and unfinished metals as window replacement materials.• Do not use metallic or reflective window glazing.• Do not reduce a historic opening to accommodate a smaller window or increase it to accommodate a larger window.	<p>✓</p> <p>*One of two options for replacement varies materials but is visually identical to the original materials.</p>

OLD TOWN DESIGN STANDARDS

Standard	Content	Met
3.10 Replace a historic window with a matching design if repair is not possible.	Give special attention to matching the historic design and materials of windows located on the façade.	✓

Expert Analysis

- Fundamental Design Flaw.
- Sustainability/Significant Deterioration.
- Costs in Time & Money of Ongoing Piecemeal Repair.
- Energy Efficiency.
- Operability.
- Safety.
- Acknowledging Bias of “Repair” Experts.
- Recommendation: Replacement.

Consideration of Additional Impacts of Delayed Replacement

1. Impacts of water infiltration on interior walls of 201 Linden Hotel.
2. Impacts to lives of property owners for delay to replacement & requirement for piecemeal approach to repairs.
3. Liability concerns.

REQUEST FOR A BALANCED APPROACH

When interpreting Municipal Code, must give “consistent, harmonious and sensible effect to all of its parts.”*

When review this request holistically and accounting for all policy goals and objectives, **Replacement** of the 201 Linden Hotel Windows far outweighs the benefits of an exorbitantly costly, piecemeal, unsustainable and unnecessary **Repair** approach.

Thus, the applicant team respectfully asks for your approval to replace all 42 of the 147-year-old 2nd and 3rd Floor Windows of the 201 Linden Hotel.

• **R.W. v. People in Interest of E.W.*, 532 P.3 422, 425 (Colo. 2022).

*Thank you for your thoughtful
consideration.*

CONTACT

Claire N.L. Havelda
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303.223.1194



Proposed Window & Door Design

5



Proposed Skylight Design

4



NEW WINDOW HEADERS TO ALIGN WITH ADJACENT BUILDING WINDOW HEADER HEIGHT.



Alley Study

2



NEW SHIP LADDER & MECHANICAL PENTHOUSE ENCLOSURE

NEW PATIO COVER



Walnut Street Study

1



EXISTING WINDOW SIMILAR TO PROPOSED WINDOW DESIGN.

Building Across Alley
SCALE

3



Linden Street Residence

Architecture and Interior Design Services for:

201 Linden Street, Fort Collins, Colorado



123 N. College Ave. Suite 390
Fort Collins, CO 80524
970.476.8829 | 1970.416.9876 F
www.oglesby-design.com

Design Development

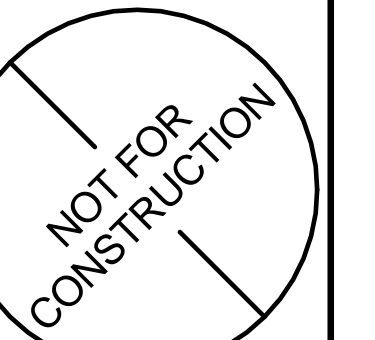
Issue Date	
Description	Date
3 FOR REVIEW	10/21/16
4 FOR REVIEW	11/14/2016

Walnut Street 3D / Sections / Elevations

JOB NO: 16-02

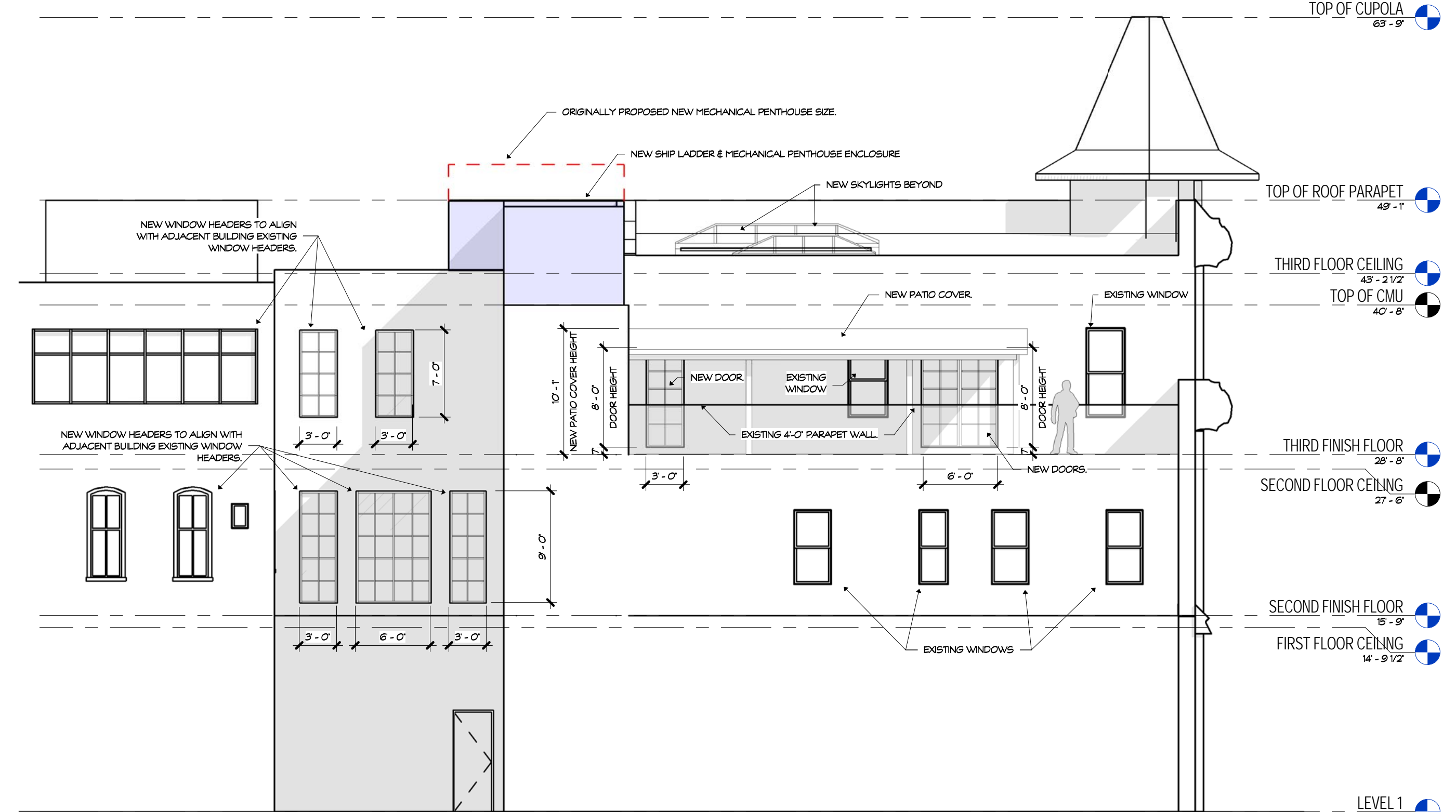
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P1.2



Walnut Street View
EXTERIOR ELEVATION
SCALE: 1/8" = 1'-0"

B



New Patio Cover
EXTERIOR ELEVATION
SCALE: 1/8" = 1'-0"

A

← LOOMIS BUILDING | 201 LINDEN BUILDING →

Site visit September 4, 2018

Work in progress during visit;

Historic window rehabilitation. Window sash removal, restoration and reinstallation.

Observations

1. Rehabilitated windows are reinstalled. Workmanship of restoration is not at an acceptable level according to the window subcontractor. (Colorado Sash and Door)
2. Window subcontractor will remove window units from the historic window jambs and rework units to meet a level of craftsmanship that is acceptable and indicative of Colorado Sash.
3. A large air gap exists between the new Thermopane at the meeting rail on all of the restored windows. This will be corrected in the re-restoration of all of the units.
4. Historic window counter weights have been removed and replaced with a contemporary spiral lift system at each window. This is intended to compensate for the additional weight of the Thermopane windows. This work was not reviewed by the Preservation staff or LPC.
5. Due to the additional weight of the rehabilitated window units the newly installed windows are difficult to raise and lower. There is excessive lateral window movement within the historic jambs causing binding. During the reinstallation of the windows nylon pads/scuffs will be added to help in reducing window racking and binding.
6. One window on the east elevation functions satisfactory. It was agreed by all in attendance that Colorado Sash will use this window as a standard for operation while adjusting the remainder of windows. According to Colorado Sash all windows can be made to function properly.
7. The building ownership is concerned with the poor window operation and air, dust noise infiltration. Colorado Sash is confident that with adjusting the meeting rail thermopane gap and adjusting the spiral lifts the windows will operate smoothly and block air and dust infiltration.
8. There are a few original window pulls that will be reused at the oriel window locations. New window pulls (two per window) will be added elsewhere to help facilitate the window operation. The old pull mortises will be filled with fitted wood pieces and painted.
9. At the building west elevation the non-historic window units will be replaced with contemporary units that will closely resemble the historic window function, rail and stile dimensions. The window opening size will remain unchanged.

10. It was observed and discussed that it appears that the structural framing at the oriel window is absent. The original window jambs are present but have no attachment to structure. The floor has a profound slope toward the exterior in the oriel window space. Racking of the window jambs was also noted. It was discussed that the ownership should contract with a structural engineer for analysis and recommendation.
11. It was observed that the historic window stools (sills) have been irreparably damaged. The stools have been fractured off with what appears to be a large hammer. The damaged sills will be covered with non-historic painted steel plate. The result is an appearance that is historically incorrect and diminishes the entire window unit's ability to convey its significance. The demolition of historic fabric was not reviewed for preservation compliance.

MEETING NOTES

201 Linden Street Meeting (Sept 4th 2018).

I (KMM) showed up a few minutes late.

We were shown an example of a window that does not work smoothly

Window weight pockets were filled and replaced with spiral system.

Mark Wernimont (MW) of Colorado Sash & Door felt that he would not need permission to remove the weight system.

MW changed the system because he had decided to make the windows thermopane, and he believed that he could not find the right weights to use with the extra pane's weight.

MW felt that the weight systems had to be removed in the Turret because there was not enough structure in the turret, and would fail. He felt that the window pocket area could be used to add structure.

It was stated that thermopane units would be used to help in thermal and sound insulation.

On one sash, there was a thin clear second glazing glued to the inside.

I (KMM) noticed the window one over worked well. It solved the complaints of the Owners: that the window was easy to open and close. **It was suggested that the other windows be set to work like that window.**

On the west wall, there were 3 windows that did not match other windows in the building. These windows were thought to be replacement windows put in after the same wall had collapsed in the 80's, and been rebuilt. **Consensus seemed to be that these windows were not old enough to meet Sec'y of Interior's Standards and could be replaced.**

The Owner's Representative mentioned that the Owners were not happy with all the existing windows and wanted them replaced. He felt that it was not negotiable.

Colorado Sash & Door's Assumptions:

- The turret area was not structurally sound and the window weight pocket area could be used to add structure.
- Thermopane units were needed to help with thermal and sound insulation.
- ½" thermopane units could deliver on these goals.
- The existing weight system could not be adapted to the use of thermopane weight.

- Changing the balance system of the windows and adding thermopane units could be done without consultation from the City.
- The addition of the second glazing is expected.

Observations by KMM:

- We need more information on the system Colorado S&D is now selling the Owner. It seems to be installed in many places around town, but the system is not described anywhere:

“So after several weeks of adjusting and talking we would like to sit down and have a conversation with you as to what our options could be. I have taken the architect and owners rep to the windows we installed at the Empire Grange that are similar sized to these. We have recently used this same system for the new windows at Ginger and Baker, the original structure of the Washington’s Music Building as well as the double hung windows in the Music District Building. As we have demonstrated in the past, we can match the details of the windows and can get the sight lines down to match the original windows. We can provide the units as all wood windows, factory prefinished in the correct color. The balance system is fully hidden and based on this there is a double balance system on each side so the operation is something that can work. With this we can also re-frame the corner units to support everything from the roof down to the covering below the floor and not rely on the window jambs to do this work.” (MW)

- Thin thermopane units give questionable results in sound and thermal performance gain. I can explain further.....
- The letter to Josh Wallace suggests the changes taken on, as an option, but does not mention the weight system change.

“The glazing of the windows is all complete with just a few windows that have had a film applied to the interior to block out some sunlight and heat. The sash could have an interior RDG (removable double glazing) applied to each sash in an opening. This would be not seen from the exterior and could be painted to blend into the sash. This same system was done on all the historic windows in the Northern Hotel Project. We would need to re-weight the sash, install new cords and change the sash locks. Only the sash lock would be seen and there are some that are similar to the existing. If some additional thermal performance and even some solar heat gain reductions requested, a low-e hard coat could be add to the RDG with the coating being located in the cavity. This has been done on several of the Historic Denver Public School Buildings. This option would double the thermal performance of the windows.” (MW)

Kevin Murray



OGID

LINDE

AWERS
to top

3' OULINE











PROJECT NAME

201 LINDEN STREET, LINDEN HOTEL – DESIGN REVIEW

STAFF

Karen McWilliams, Historic Preservation Manager
Maren Bzdek, Senior Historic Preservation Planner

PROJECT INFORMATION

- PROJECT DESCRIPTION:** This is a request for design review of proposed modifications to the historic windows at the Linden Hotel, 201 Linden Street. The property is designated as a Fort Collins Landmark and is listed on the National Register of Historic Places and the Colorado State Register of Historic Properties.
- APPLICANT:** Mark Wernimont, Colorado Sash and Door.
- RECOMMENDATION:** Staff recommends denial of the request for modifications of the window.

EXECUTIVE SUMMARY

The Linden Hotel at 201 Linden Street, constructed in 1882, is a Fort Collins Landmark and a contributing property to the National and State Register Old Town Historic District. The building was rehabilitated through a significant public-private effort in 1994. At its December 19, 2019 meeting, the LPC considered a request to replace the historic windows, which had been modified without approval. The LPC denied the request.

The applicant is now requesting a review of the work that was previously done, with the following changes or enhancements: to determine if this work may be approved.

At the December 19, 2019 meeting, staff provided the following recommended steps to assess the work undertaken and the appropriate next steps:

- The applicant should hire a window rehabilitation contractor, approved by City staff, to test on one representative historic window the efficacy of the rehabilitation treatment methods proposed in the Barlow report, which would salvage the historic windows and mitigate some of the issues created by the work that was done without design review approval. ??
- The contractor should also conduct a revised and detailed window study to provide an individual assessment and plan for each window that considers their existing condition and the methods that prove effective from the test window. ??

- If the original weights and pulleys have not been discarded or if appropriate replacements are available, they should be considered for the revised rehabilitation plan to achieve the greatest level of compliance with the standards. ??
- The applicant should then return to the Landmark Preservation Commission to seek approval for a revised rehabilitation plan based on the above testing and window study. That plan should include a plan for repair and rehabilitation of all historic windows that are repairable and replacement only for windows that are beyond repair (based on expert analysis). The replacement windows must also meet the standards.
- Only after the question of whether or not some or all of the existing windows could be salvaged is definitively answered should the Commission then turn to the question of replacement for some or all of the windows and, if appropriate, whether or not the proposed replacement solution meets the requirements in the standards regarding form, design, scale, materials, and appearance.
 - The applicant is no longer proposing to replace any of the historic windows.

COMMISSION'S ROLE

The LPC reviews exterior changes to a designated property at a Design Review Hearing, in two (2) phases:

- *Conceptual review.* Conceptual review is an opportunity for the applicant to discuss requirements, standards, design issues and policies that apply to designated resources. Conceptual review of any proposed alteration may be limited to certain portions of the work as deemed appropriate by the Commission. *The applicant may waive the conceptual review and proceed directly to a final review.*
- *Final review.* Each application may be finally reviewed and decided upon by the Commission at the same meeting as the Commission's conceptual review of the application, if any, or at a subsequent meeting of the Commission. During final review, the Commission shall consider the application and any changes made by the applicant since conceptual review.

Commission's Action:

- If the Commission determines that a proposed alteration to a Fort Collins landmark or resource(s) within a Fort Collins landmark district meets the Standards, the Commission shall approve the application and issue a certificate of appropriateness.
- If the Commission determines that a proposed alteration to a Fort Collins landmark or resource(s) within a Fort Collins landmark district does not meet the Standards, the Commission shall deny the application.
- Alternatively, if the Commission determines that it does not have the information it requires to make a decision, the Commission may table the item to a future hearing.

BACKGROUND

The Linden Hotel at 201 Linden Street, constructed in 1882, was individually designated as a Fort Collins Landmark in 1974—the third property in to receive this official recognition. It was further designated as a contributing building to the National Register Old Town Historic District in 1978 and the local Old Town Fort Collins Historic District in 1979. The building's history, important location, and distinctive architectural features all combine to make the Linden Hotel, in the words of the National Register nomination, “the central anchor for the district.”

Having fallen into disrepair, in 1994, the building was rehabilitated through a significant public-private effort, which included a State Historical Fund grant, Downtown Development Authority funding and City monies. The National Park Service approved the project's full compliance with the Secretary of the Interior's Standards for Rehabilitation and praised the extensive effort, noting that "local support by the community and the City of Fort Collins make this project unique among the many rehabilitation projects we review within a 16-state region." In 1995, the City of Fort Collins recognized building owners Dave Veldman and Mitch Morgan of Veldman Morgan Commercial with a "Friend of Preservation" Award for their "courageous effort" to rehabilitate the building.

In 2005, a previous building owner proposed replacing some of the wood windows. In response to that request, a window survey and assessment of 51 windows was conducted by Angie Aguilera, Edge Architecture. The report noted that windows were in relatively good condition for their age and provided three repair and performance improvement options along with two comparative cost estimates for replacement. Subsequently, the owner neither repaired nor replaced any of the windows.

The current remodeling project involves a change of use from offices to residential on the second and third floors. As part of this project, the historic windows were to be cleaned and re-glazed. Instead, the applicant moved forward with modifications to the windows, including changing the lift system and adding extra panes to the windows, which required channeling out significant portions of wood from the sash. The results did not meet with the owners' performance expectations and, on August 22, 2018, the applicant contacted staff regarding options for next steps, including the replacement of the historic windows. Following a site visit by staff and the Design Review Subcommittee (Hogestad, Murray) on September 4, 2018, the matter of the building's historic windows was referred to the full Landmark Preservation Commission for a design review hearing. The subcommittee members noted that the prior work on the windows had resulted in operability issues and each had concerns about the suitability of the rehabilitation approach that the Colorado Sash and Door had used, and the fact that the work had been performed without prior review and approval. They also noted that the historic windows could be further adjusted to improve operability and performance. To provide independent analysis of these comments, staff ordered a third-party analysis of the condition and repairability of the historic windows from Barlow Cultural Resource Consulting, LLC. That report, dated November 29, 2018, is attached.

The Commission heard the matter on December 19, 2018 and denied the proposal to replace the windows. The applicant, Mr. Wernimont, was instructed to use one window as a mock-up of the steps he is now proposing for all of the windows.

PROPOSED WORK FOR WHICH THE APPLICANT IS SEEKING A REPORT OF ACCEPTABILITY:

Work done in 2018 for which the applicant is seeking a report of acceptability:

- The original window sashes are and will remain in the same openings as when this project started;
- The original putty glazing and paint was believed to have been removed some time prior to the start of this project; the applicant cleaned up any failing glazing putty.
- Structural defects were addressed and repaired by Dutchmen or epoxy fillers.
- The sash was then routed for the interior Removable Double Glazing (RDG) panel; this doubled the weight of the window
- The sash was also routed where the rope groove was to allow the spiral balance to be installed, replacing the historic weight and pulley system
- The installation of the spiral balance system necessitated cutting a large channel into the left and right stiles of each window sash. This weakened the integrity of each stile and has increased the likelihood that the stiles may split at the thinnest location.
- The existing weight pocket was filled with blown-in insulation

- The upper sash was again fixed in place
- A new sweep sash lock with a correct receiver was added to the sash
- The lower sash has a bulb weather stripping installed at the check rail and bottom rail. This will sit on the metal sill covers done in the prior work.
- A brush weather strip is applied to the edge of the interior stop
- The interior wood sill, apron, jamb extensions and casing were changed base on the change in wall conditions and details. This work has been done by other firms

The following work was performed on the mock-up window, but has not yet occurred on the other windows:

- Add a black leaf weather strip on the jamb at the parting stop.
- Take the recently added heat shrink tubing off the spiral balance assembly; leave assembly exposed but paint black; the heat shrink tubing has rubber characteristics and is creating drag.
- Replace the bracket on bottom of sash that the spiral balance assembly attaches to (see attached sheet on spiral balance) providing more structural stability
- Remove single center finger lift, and add two finger lifts instead; fill hole of center finger lift, and any other holes;
- Repaint sash as well as the metal edge of the Removable Double Glazing (RDG)
- Readjust RDG

INDEPENDENT EVALUATION SUMMARY:

The Landmark Preservation Commission requested that an outside professional consult be hired to evaluate the proposed work. Through recommendations from History Colorado and professional restorations firms, staff selected and contracted with Barlow Cultural Resource Consulting (BCRC) for both the initial detailed review of the unauthorized window work in 2018 and the 2019 work to the mockup window. Both the 2018 report and the 2019 letter are attached.

Staff and Phil Barlow, principal of BCRC, met with the applicant on site on May 28, 2019, to evaluate the window mock-up. BCRC's letter, dated May 29, 2019, is excerpted below:

"The following items were listed in the [2018] BCRC report (pages 5 to 22) as defects with the proposed corrective measure following. The condition of the mock-up as examined on May 28 follows the [applicant's] proposed corrective measure and is in bold.

1. The window sash did not operate easily. The cause was identified as being the addition of a second pane of glass on the interior of the upper and lower sash which increased the weight of each sash and the replacement of the historic weight and pulley counterbalance system with the spiral balance system.
 - The proposed corrective measure was to return the historic weight and pulley system to the window or, if these items had been discarded, to install an in-kind replacement weight and pulley systems (with appropriate sash repairs); alternatively, but less desirable, a spring balance system that was tensioned to the weight of the sash could be installed, recognizing that this approach does not repair the stiles
 - **The mock-up window was able to be opened and closed with a reasonable amount of effort. The restoration contractor stated that the owner tried the window and deemed the operation acceptable. This does not address the concern that the historic counterbalance system has been removed.**

2. The installation of the spiral balance system necessitated cutting a large channel into the left and right stiles of each window sash. This weakened the integrity of each stile and has increased the likelihood that the stiles may split at the thinnest location.
 - The proposed corrective measure was to either cut back the stiles to remove the channel and then glue on new in-kind material to return the sash to its original width, or to fill the channel with epoxy
 - **The spiral balance system remains in place. The original concern that the stiles have been weakened remains**

3. The glass panels that were added to the front face of each sash caused historic material to be lost for a negligible benefit of energy efficiency and increased the weight of each sash which had a negative impact of operability.
 - The proposed corrective measure was to accept the loss of material as part of the history of the window and to remove the second glass pane from the system
 - **The glass panels remain in place. The concern that the window sashes have been heavily weighted remains**

4. All of the original paint was not removed from the sash, potentially hiding additional defects
 - The proposed corrective measure was to strip each sash to bare wood, evaluate the underlying conditions, make repairs as necessary, and repaint.
 - **The sash of the mock-up window appeared to have been stripped and repainted. However, some paint failure was observed on the lip of the glazing bed of the lower sash and on the blind stop. The glazing bed paint failure may be due to abrasion during install, but the blind stop paint failure appears to be related to excessive moisture. Recommendation is to review the caulking around the perimeter to ensure that no moisture is penetrating into the wood.**

5. Glass was glazed with a caulk or caulk like product with gaps and over painting, potentially allowing water to penetrate
 - The proposed corrective measure was to remove all old glazing compound and caulk, and reglaze with a product approved for historic work
 - **The mock-up window appears to have appropriate glazing compound installed. The work is neat with appropriate paint lines**

6. Weathers tripping on the windows consisted of bulb-seal applied to the meeting rail and the lower rail and brush pile weather stripping applied to the exterior face of the interior stop. These alterations are acceptable within the guidelines of the SOTI standards, but the system wasn't creating as tight of a seal as desired
 - The proposed corrective measure was to install a T-rail weather stripping backed with glazing tape on the jambs to create a tighter seal
 - **The mock-up shows a jamb weather stripping that is inserted into a kerf in the parting bead. This is appropriate per SOTI standards, but the stated lifespan of this product is ten years which may be a maintenance concern in the future**

7. Several repairs were identified that were treated with a skim coat of epoxy that needed more in-depth treatment
 - The proposed corrective measure included stripping all paint as previously described and either fully repairing the material with epoxy or performing a dutchmen repair
 - **The workmanship on the mock-up window looked good, with no obvious areas of concern**

8. While not a defect in workmanship, one of the reasons for requesting replacement was the lack of energy efficiency inherent in single pane windows and the desire for noise reduction
- The proposed corrective measure was to install a storm window that could greatly improve energy efficiency and reduce sound infiltration
 - **Storm windows are not of interest to the parties involved with this restoration**

BCRC CONCLUSION:

There are two possible paths to take at this point. On one side there is the consideration that these windows retained considerably more of their historic integrity before this project began and now have been modified significantly in the pursuit of perceived improvements. Those modifications do not meet the Secretary of the Interior Standards. The windows are capable of being repaired and their structural integrity restored. Although the windows look the same from the exterior, the use of materials that may fail prematurely could have the effect of frustrating current and future owners which increases the likelihood that a request to replace these windows will be pursued again in the near future. The best way to ensure that historic windows are saved and used as they were intended is to adhere to methods and materials that have been proven to perform well and have the ability to be repaired as described in the original [2018] BCRC report.

On the other side is the consideration that these windows have already had the damage done. The mock-up as examined does not do additional damage and corrects some of the issues from the initial report. Approving this scope of work for the remainder of the windows will not create additional problems but would likely set up a similar discussion with a new owner not long down the road, and therefore is not the best or most appropriate option.

STAFF EVALUATION OF APPLICABLE REVIEW CRITERIA:

Secretary of the Interior Standards		
Applicable Code Standard	Summary of Code Requirement and Analysis	Does Work Meet Standard?
SOI #1	<p><i>A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships;</i></p> <p>Staff finds that the proposed work meets this standard because the original windows will be retained.</p>	YES
SOI #2	<p><i>The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.</i></p>	?

<p>SOI #3</p>	<p><i>Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.</i></p> <p>Staff finds that the proposed work would meet this standard because repairing the windows would not create a false sense of historical development.</p>	<p>?</p>
<p>SOI #4</p>	<p><i>Changes to a property that have acquired historic significance in their own right will be retained and preserved.</i></p> <p>Staff finds that there are no changes that have acquired historic significance in their own right associated with the proposed work.</p>	<p>N/A</p>
<p>SOI #5</p>	<p><i>Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.</i></p> <p>Staff finds that the proposed work does not meet this standard, which is unambiguous in regard to retention of historic materials, stating that distinctive character-defining features, including their materials and construction techniques, “will be preserved.” The applicant’s work to date on the property resulted in altered historic windows. The applicant is now asking for approval of this work, rather than repairing the windows and strengthening the stiles.</p> <p>The applicant removed the historic weights and pulley system. The weights and pulley system should be reinstalled to achieve the greatest level of compliance with the Standards; if that is no longer feasible, BCRC recommends a spring balance rather than a spiral balance. The spring balance would use the existing or reintroduced pulley mortices and does not require the removal of wood from the window sash. This would also mean that the stiles could be strengthened as described in the BCRC 2018 report.</p>	<p>NO</p>
<p>SOI #6</p>	<p><i>Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.</i></p> <p>Staff finds that the proposal to modify the historic windows rather than repair and restore the windows to their original condition prior to the unauthorized work does not meet this standard. The central and unambiguous idea in Standard 6 is similar to the previous standard, stating that distinctive features “will be repaired rather than replaced.” In addition, it provides requirements for replacement when damage precludes the possibility of repair. In such cases, the burden is on the applicant to demonstrate that severity of deterioration “requires replacement,” which means that there is no option for repair. Staff cannot find a basis for claiming that the Secretary of the Interior’s Standards have been met. The third-party professional assessment provided by Barlow Cultural Resource Consulting recommends repair options that meet the Standards.</p>	<p>NO</p>

SOI #7	<p><i>Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.</i></p> <p>Staff finds that this standard is not relevant for the current application.</p>	?
SOI #8	<p><i>Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.</i></p> <p>Staff finds that this standard is not relevant for the current application.</p>	N/A
SOI #9	<p><i>New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.</i></p> <p>Based on the information provided in the Barlow report, staff finds that the contractor used a physical treatment, without approval, that caused damage to the historic windows. Glass panes were added to the interior of the upper and lower sash. A groove was cut into the interior face of the historic sash to a depth of approximately 3/16" and a width of 3/8" for the glass to fit into, removing historic material and changing the appearance of the windows. Historic weights and pulley systems were removed, and the stiles channeled significantly to accept a spiral balance system.</p>	NO
SOI #10	<p><i>New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.</i></p> <p>Staff finds that this standard is not relevant for the current application.</p>	N/A

Old Town Historic District Design Standards: Windows (page 50) states:

"Historic windows help convey the significance of historic structures, and shall be preserved. They can be repaired by re-glazing and patching and splicing elements such as muntins, the frame, sill and casing. Repair and weatherization also is often more energy efficient, and less expensive, than replacement. If a historic window cannot be repaired, a new replacement window shall be in character with the historic building.

3.8 Maintain and repair historic windows.

- > *Preserve historic window features including the frame, sash, muntins, mullions, glazing, sills, heads, jambs, moldings, operation and groupings of windows.*
 - > *Repair and maintain windows regularly, including trim, glazing putty and glass panes.*
 - > *Repair, rather than replace, frames and sashes.*
 - > *Restore altered window openings to their historic configuration."*
- Staff finds that the proposed work does not meet this standard because it fails to follow the requirements to maintain and repair the historic windows.

FINDINGS OF FACT:

FINDINGS OF FACT SUMMARY AND RECOMMENDATION:

Staff recommends denial of the current application to replace the historic windows at 201 Linden based on the following findings of fact:

- The proposed work is not consistent with or supportive of the previous public and private investments in the historic rehabilitation of the structure.
- The proposed work does not comply with Municipal Code Chapter 14, Article IV, because it fails to satisfy all of the applicable Secretary of the Interior's Standards for Rehabilitation (specifically standards 5, 6, 7 and 9), as required, and further does not comply with section 3.8 of the City's adopted Old Town Design Standards (Ordinance No. 094, 2014).
- Because the proposed work does not meet the requirements of the Municipal Code, there is no basis for approval.

RECOMMENDATION:

E.g. Despite owners efforts to match siding to blah, and to provide, blah, staff feels that this still does not meet SOI #9 because xx and recommends denial at this time.

Municipal Code Chapter 14, Article IV, Sec. 14-51 (d) states: "If any alteration is made without first obtaining a certificate of appropriateness, the City may issue a stop work order for any permits issued for the property upon which the designated resource is located, refuse to finalize any issued permits, refuse to issue a certificate of occupancy, refuse to issue additional City permits, and take any other available action, or any combination of the aforementioned, until the applicant has applied for and received approval for the alteration. **If the alteration is not approved, the property owner shall restore the site, structure, or object to its original condition prior to any alteration occurring.**" (Emphasis added).

SAMPLE MOTIONS

SAMPLE MOTION TO PROCEED TO FINAL REVIEW: I move that the Landmark Preservation Commission move to Final Review of the proposed work at the XXXX Property at XXXX Street.

SAMPLE MOTION FOR APPROVAL: I move that the Landmark Preservation Commission approve the plans and specifications for the XXXXX to the XXXX Property at XXX XXXXX Street as presented, finding that the proposed work XXXXX.

SAMPLE MOTION FOR DENIAL: I move that the Landmark Preservation Commission deny the request for approval for the plans and specifications for the XXXXX to the XXXX Property at XXX XXXXX Street as presented, finding that the proposed work XXXXX.

ATTACHMENTS:

- Nomination form
- Full set of review standards (SOI, OT, etc)
- Full set of photos
- Relevant review history documents, incl. minutes



BARLOW CULTURAL RESOURCE CONSULTING LLC

Phillip Barlow
4576 Tanglewood Trail
Boulder CO 80301

May 29, 2019

City of Fort Collins
Historic Preservation Services
281 North College Avenue
Fort Collins, CO 80524

Re: Field review of window mock-up at 201 Linden Street, Fort Collins

BCRC LLC was contracted to review the window restoration project at 201 Linden Street following a request to replace the windows as the restored windows did not meet the client's expectations and the window restoration contractor did not believe the windows had the structural integrity to complete further work. BCRC submitted a report on December 5th, 2018 detailing several modifications that were made that did not align with the Secretary of the Interior (SOTI) Standards and suggested corrective measures that would meet the standards while also meeting the stated goals of easier operation with improved energy efficiency. Phil Barlow of BCRC also attended a meeting of the Landmark Preservation Commission on December 19th to answer any questions that arose from the contents of this report. The request to replace the windows was denied.

On May 28th, 2019 Phil Barlow attended a field review of the mock-up that was prepared as the new standard of work for the windows. The following items were listed in the BCRC report (pages 5 to 22) as defects with the proposed corrective measure following. The condition of the mock-up as examined on May 28 follows the proposed corrective measure and is in bold.

1. The window sash did not operate easily. The cause was identified as being the addition of a second pane of glass on the interior of the upper and lower sash which increased the weight of each sash and the replacement of the historic weight and pulley counterbalance system with the spiral balance system
 - The proposed corrective measure was to return the historic weight and pulley system to the window or, if these items had been discarded, to install an in-kind replacement weight and pulley systems (with appropriate sash repairs); alternatively, but less desirable, a spring balance system that was tensioned to the weight of the sash could be installed, recognizing that this approach does not repair the stiles
 - **The mock-up window was able to be opened and closed with a reasonable amount of effort. The restoration contractor stated that the owner tried the window and deemed the operation acceptable. This does not address the concern that the historic counterbalance system has been removed.**
2. The installation of the spiral balance system necessitated cutting a large channel into the left and right stiles of each window sash. This weakened the integrity of each stile and has increased the likelihood that the stiles may split at the thinnest location.
 - The proposed corrective measure was to either cut back the stiles to remove the channel and then glue on new in-kind material to return the sash to its original width, or to fill the channel with epoxy
 - **The spiral balance system remains in place. The original concern that the stiles have been weakened remains**



BARLOW CULTURAL RESOURCE CONSULTING LLC

3. The glass panels that were added to the front face of each sash caused historic material to be lost for a negligible benefit of energy efficiency and increased the weight of each sash which had a negative impact of operability.
 - The proposed corrective measure was to accept the loss of material as part of the history of the window and to remove the second glass pane from the system
 - **The glass panels remain in place. The concern that the window sashes have been heavily weighted remains**

4. All of the original paint was not removed from the sash, potentially hiding additional defects
 - The proposed corrective measure was to strip each sash to bare wood, evaluate the underlying conditions, make repairs as necessary, and repaint
 - **The sash of the mock-up window appeared to have been stripped and repainted. However, some paint failure was observed on the lip of the glazing bed of the lower sash and on the blind stop. The glazing bed paint failure may be due to abrasion during install, but the blind stop paint failure appears to be related to excessive moisture. Recommendation is to review the caulking around the perimeter to ensure that no moisture is penetrating into the wood.**

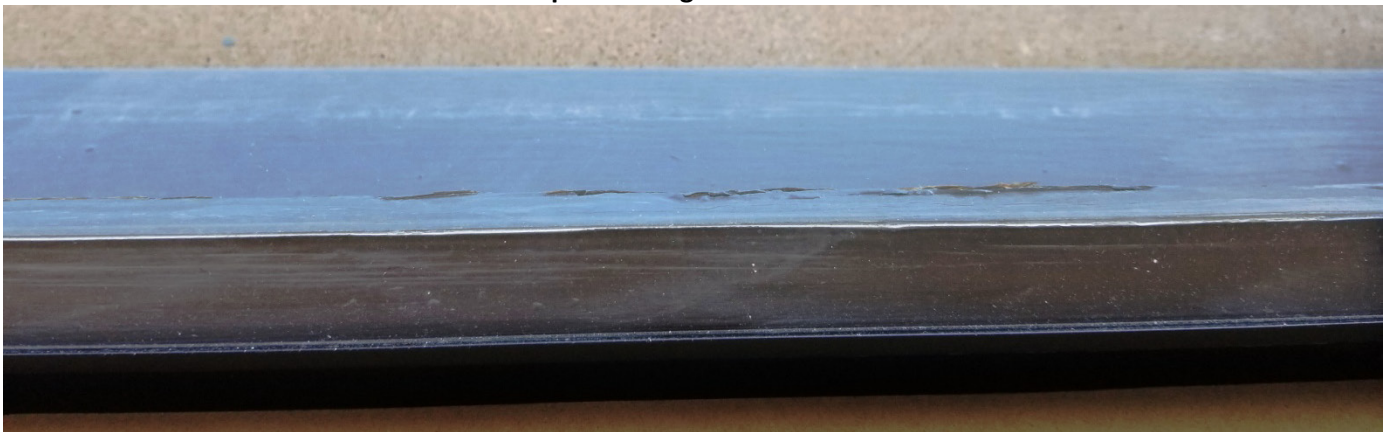


Image 1: Paint failure, lower sash



Image 2: Paint failure, blind stop



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5. Glass was glazed with a caulk or caulk like product with gaps and over painting, potentially allowing water to penetrate
 - The proposed corrective measure was to remove all old glazing compound and caulk, and reglaze with a product approved for historic work
 - **The mock-up window appears to have appropriate glazing compound installed. The work is neat with appropriate paint lines**

6. Weatherstripping on the windows consisted of bulb-seal applied to the meeting rail and the lower rail and brush pile weatherstripping applied to the exterior face of the interior stop. These alterations are acceptable within the guidelines of the SOTI standards, but the system wasn't creating as tight of a seal as desired
 - The proposed corrective measure was to install a T-rail weatherstripping backed with glazing tape on the jambs to create a tighter seal
 - **The mock-up shows a jamb weatherstripping that is inserted into a kerf in the parting bead. This is appropriate per SOTI standards, but the stated lifespan of this product is ten years which may be a maintenance concern in the future**



Image 3: New weatherstripping is the brown strip to the inside of the parting bead



BARLOW CULTURAL RESOURCE CONSULTING LLC

7. Several repairs were identified that were treated with a skim coat of epoxy that needed more in-depth treatment
 - The proposed corrective measure included stripping all paint as previously described and either fully repairing the material with epoxy or performing a dutchmen repair
 - **The workmanship on the mock-up window looked good, with no obvious areas of concern**

8. While not a defect in workmanship, one of the reasons for requesting replacement was the lack of energy efficiency inherent in single pane windows and the desire for noise reduction
 - The proposed corrective measure was to install a storm window that could greatly improve energy efficiency and reduce sound infiltration
 - **Storm windows are not of interest to the parties involved with this restoration**

Conclusion:

There are two possible paths to take at this point. On one side there is the consideration that these windows retained considerably more of their historic integrity before this project began and now have been modified significantly in the pursuit of perceived improvements. Those modifications do not meet the Secretary of the Interior Standards. The windows are capable of being repaired and their structural integrity restored. Although the windows look the same from the exterior, the use of materials that may fail prematurely could have the effect of frustrating current and future owners which increases the likelihood that a request to replace these windows will be pursued again in the near future. The best way to ensure that historic windows are saved and used as they were intended is to adhere to methods and materials that have been proven to perform well and have the ability to be repaired as described in the original BCRC report.

On the other side is the consideration that these windows have already had the damage done. The mock-up as examined does not do additional damage and corrects some of the issues from the initial report. Approving this scope of work for the remainder of the windows will not create additional problems, but would likely set up a similar discussion with a new owner not long down the road, and therefore is not the best or most appropriate option.

Thank you for the opportunity to visit this property. If you have any questions or comments please contact me at 303-746-1602, or barlowpl@gmail.com

Regards,

Phillip Barlow, Owner
BCRC LLC
(303)746-1602

WINDOW EVALUATION

FOR

201 LINDEN STREET

FORT COLLINS, CO 80524



PREPARED FOR:

CITY OF FORT COLLINS
OFFICE OF HISTORIC PRESERVATION
281 NORTH COLLEGE
FORT COLLINS, CO 80524

PREPARED BY:

PHILLIP BARLOW
HISTORIC PRESERVATION SPECIALIST
BARLOW CULTURAL RESOURCE CONSULTING LLC
4576 TANGLEWOOD TRAIL
BOULDER, CO 80301



EVALUATION DATE: NOVEMBER 29, 2018

TABLE OF CONTENTS

SUMMARY OF FINDINGS:.....	1
STANDARDS FOR REHABILITATION	2
DESCRIPTION OF THE TYPICAL WOOD DOUBLE-HUNG WINDOW SYSTEM.....	3
REVIEW OF CONDITIONS	5
APPENDIX.....	25
Example of Full Restoration process for: Wood Double-Hung, Casement, and Fixed Windows.....	25
Preservation Brief 9: The Repair of Historic Wooden Windows	28
Photo Documentation.....	35

SUMMARY OF FINDINGS:

Located in the Old Town Historic District in Fort Collins, the Linden Hotel at 201 Linden Street was constructed in 1883 and designed by William Quayle. Originally housing the Poudre Valley National Bank on the street level with a Masonic Lodge above, the building became the Linden Hotel in 1904.¹ A good example of late 19th century commercial architecture, the Linden Hotel features a clipped corner entry with full-height oriel above, crowned with a pyramidal hood. The building utilizes a tripartite division of the facade, dividing the building into the ground level storefront, a central level characterized by arched stone lintels over the windows, and capped by a third level featuring a metal bracketed cornice.

The City of Fort Collins contracted with BCRC LLC to evaluate the windows in their existing condition to determine if recent alterations rendered them unsalvageable and in need of replacement. The evaluation consisted of deconstructing one window to determine the scope of the previous repairs and alterations, and examining all windows visually to determine if conditions were consistent around the building. Photo documentation of the interior and exterior of each window and a layout of the window numbering system is available in the appendix.

The deconstruction of the test window revealed that the original weight and pulley balance system had been discarded and a modern spiral balance system, which relies on spring tension to balance the sash, had been installed. To install this system a groove was cut on the vertical sides of the window sash (the stiles) to house the mechanism. This groove weakened the stiles and made weatherstripping on the sides of the sash impossible. A pane of glass was installed on the interior face of the upper and lower sash. To install this pane of glass flush with the interior face of the sash a groove was cut into the sash. Repairs made during this restoration phase appear to be minimal and many major repairs remain to be addressed. Paint and glazing putty were not fully removed from the sash. Lead paint remains on a least one sash that was tested.

The final finding is that, despite the destructive nature of the alterations made, these window sash can be brought back to full function by following a full restoration program, the full details of which can be found in the body and appendix of this report. To meet the goals of energy efficiency and sound reduction, preservation appropriate modifications are detailed, including a weatherstripping program and storm windows.

As a historic building, modifications to character defining features like the window system should be compliant with the Secretary of the Interior's Standards for Rehabilitation. To establish a baseline of information, these standards are stated in full in the following section. Throughout the report these standards will be referenced to illustrate how the proposed work will be fully compliant.

Thank you for the opportunity to visit this property. If you have any questions or comments please contact me at 303-746-1602, or barlowpl@gmail.com

Regards,



Phillip Barlow, Owner
BCRC LLC
(303)746-1602

¹ Noel, T. J. (2002). *Buildings of Colorado*. New York: Oxford University Press. Pg. 225

National Park Service
U.S. Department of the Interior
STANDARDS FOR REHABILITATION

"Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

The Standards will be applied taking into consideration the economic and technical feasibility of each project.

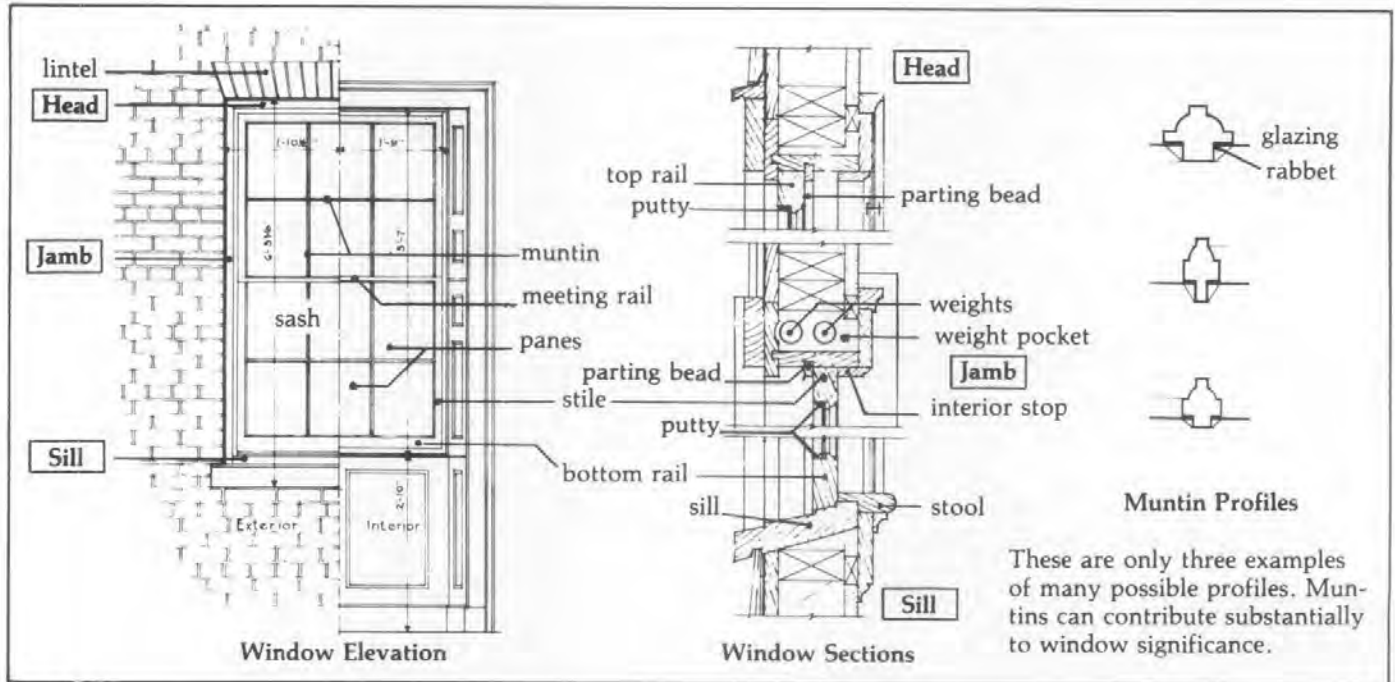
1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations or related new construction will not destroy historic materials, features and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Rehabilitation as a treatment

When repair and replacement of deteriorated features are necessary; when alterations or additions to the property are planned for a new or continued use; and when its depiction at a particular period of time is not appropriate, Rehabilitation may be considered as a treatment." ²

² <https://www.nps.gov/tps/standards/four-treatments/treatment-rehabilitation.htm>

DESCRIPTION OF THE TYPICAL WOOD DOUBLE-HUNG WINDOW SYSTEM



3

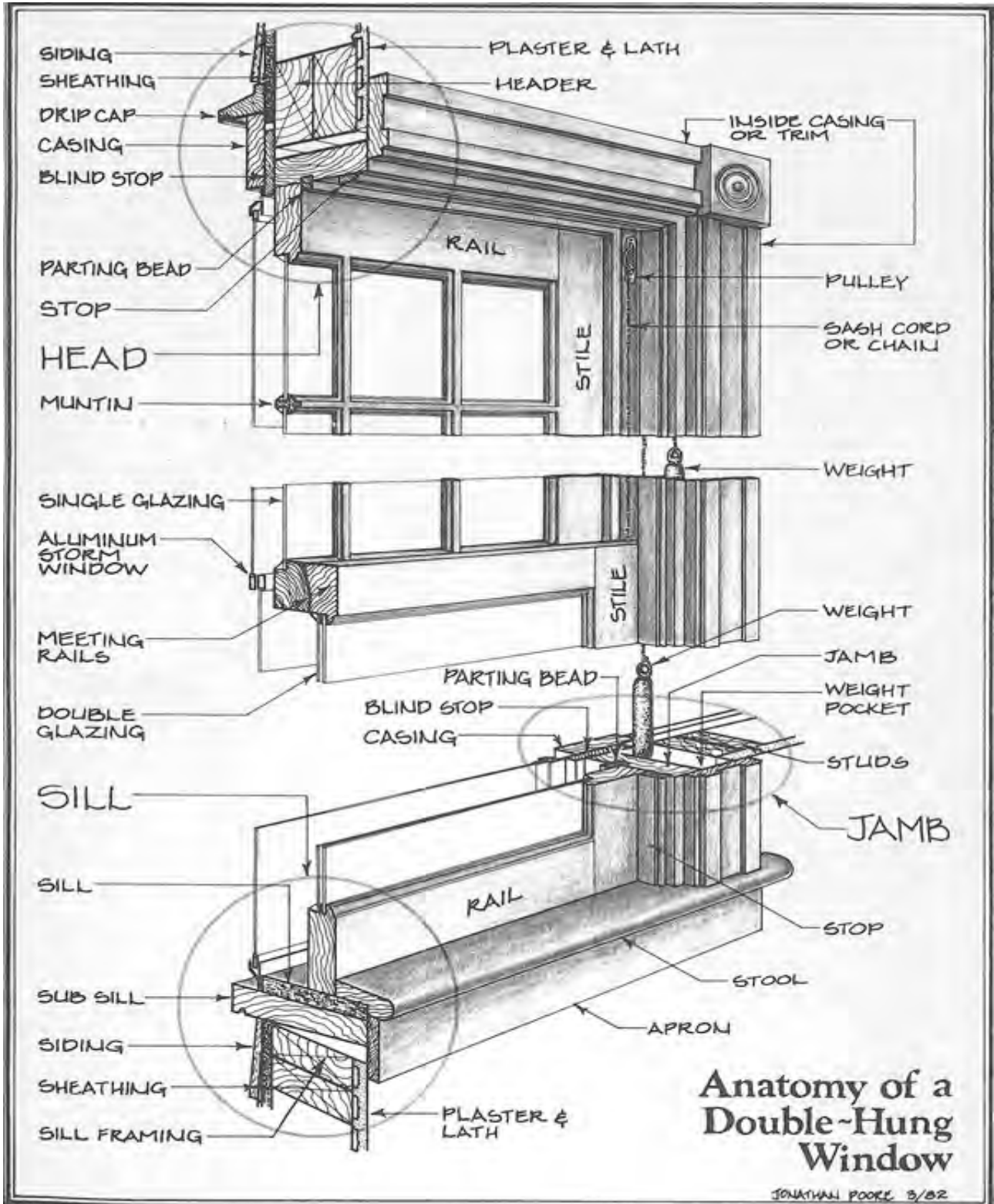
The typical double-hung wood window system consists of the jamb, which are the sides and upper portion of the window that remain static within the wall. At the bottom of the jamb is the sill, which slopes to the exterior of the building to allow for drainage. On the interior, the stool projects into the room and is the flat decorative trim that abuts the lower sash and is typically not sloped.

The illustration above shows the sash, which are the wood frames that hold the window glass and are the only parts of the window that move. The sash of the Linden Hotel are 1/1, which means that there is a single pane of glass in the upper sash and a single pane of glass in the lower sash. The upper sash has four components; the upper rail, which is the top of the sash, the meeting rail, which is the bottom of the sash that "meets" the same rail on the lower sash, and the left and right stiles, which are the vertical members that connect the upper rail and the meeting rail. The lower sash has the meeting rail at the top of the sash, a lower rail at the bottom of the sash which is typically taller than the other sash members, and a left and right stile.

Double-hung operation means that both the upper and the lower sash are designed to move. This is a common configuration because it allows for natural air flow, with the hot air leaving through the top and cooler air coming in through the bottom. The Linden Hotel utilized a rope-and-pulley counterbalance system to allow for ease of operation and to ensure that the windows stay open when desired. This system consists of a rope or chain that is attached to each side of the sash which goes over a pulley which is mortised into the top of each side of the jamb. There is an open space on each side of the jamb that allows room to house the window weights. These weights each weigh half the weight of the sash so that the window can easily open and then stay where ever the occupant desires. The rope or chain that was attached to the sash and brought over the pulley is connected to the weights and the system is balanced.

³ Myers, J. H. (1981) "Preservation Briefs: 9 The Repair of Historic Wooden Windows" U.S. Dept. of Interior, Heritage Preservation Services, Pg. 2

Between the upper and lower sash is a piece of trim called the "parting stop", and on the interior side of the jamb is a strip of trim called the "interior stop" which keeps the lower sash in place and tight to the parting stop.



⁴ Old House Journal "Repairing Hopeless Windows" April 1982, pg. 87

REVIEW OF CONDITIONS

Defect 1:

Window sash do not operate easily. The original balance system would have consisted of window weights, ropes, and pulleys. The windows were altered by adding a second pane of glass on the interior, increasing the weight. A modern spiral balance system was installed with the intention that it would provide the necessary counterbalance for the additional weight. This system has not proven effective. When this system was introduced the weight pockets were filled with blown-in insulation and the window pulleys and weights were presumably discarded.



Image 1: Note missing window pulley. A cover, visible at the bottom of the image, was milled to prevent the window from opening fully, to cover the space left by the removed pulley, and to cover the end of the spiral balance.



Image 2: Cover in place. Black plastic tube houses the spiral balance mechanism.

Proposed Solution:

The best solution would be to return the window pulleys and weights to the window system. This may not be possible if these components have already been discarded. A good solution at this point would be to utilize spring balances. Unlike spiral balances, the spring balance uses the existing pulley mortises and does not require any additional removal of wood from the window sash. Spring balance technology also has a long track record and has proven to be durable.

Note: Specific products and manufacturers are noted in this report as examples of currently available products and are not recommendations. The author has no business or personal relationship with any of the noted companies. It is the responsibility of the contractor and architect to research all options and choose the products that best fit the needs of the project.

One supplier of spring replacement balances that has a good history with historic windows is the Pullman Manufacturing Corporation. <https://www.pullmanmfg.com/window-balances-standard-balances/>

These balances can accommodate sash up to 105 pounds and can be installed with minimal mortise work in the existing openings. The blown-in insulation can stay in place with this recommendation.

These balances are ordered based on the weight of the sash and the length of sash travel. In my experience, it is best to order the tape long to allow for easier operation. If the upper sash are not scheduled for operation, there is no need to install any operating hardware on these sash and they can simply be blocked and caulked in place.



Image 3: Pullman balance installed in place of a window pulley. Photo courtesy of the Pullman website

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:**Previous treatment**

The removal of the traditional balance system and installation of a modern spiral balance does not comply with standards 5 and 6, which address the retention of historic materials and the importance of repair versus replacement. If a treatment, like adding a secondary pane of glass, necessitated the removal of traditional materials then it should not have been considered.

Proposed treatment

If the original weights and pulleys can be located then their reintroduction into the window system is fully in compliance. The introduction of the spring balance is not ideal, as it is not the original design. However, it is an alteration that has been found acceptable when the original balance system has been lost.

Defect 2:

The introduction of a spiral balance system necessitated the cutting of a channel into the left and right stiles of each sash to house the hardware. On the examined window, this channel was 5/8" in width with a rounded bottom with max depth of 1/2". This left approximately 1/4" of material on one side of the groove and 7/16" on the other. The sides of the channel had already split in some places and will continue to fail going forward.



Image 4: Groove cut into one stile. White arrows note the groove.



Image 5: Attachment hardware was added to the bottom of the sash for the spiral balance



Image 6: Note the split that has already developed as a result of the removal of supporting material. In addition, note the thinly filled epoxy repairs that are adjacent

Proposed Solution:

The following are two options for addressing the lost material which has degraded the integrity of the window sash. The Dutchmen solution is likely the most stable and durable, but it does mean that more of the historic window sash is lost. However, it will enhance the structural stability of the remaining material and retain the look and feel of the historic sash. The epoxy solution will retain all of the existing historic material, but it may be more prone to failure and will essentially "glue" many components of the window together.

Dutchmen Solution

- Remove all spiral balance hardware from the sash
- Determine the max depth of the channel as it may vary due to how the cut was made.
- Make notes if the depths vary
- Make notes of where the sash cord knot hole and channel were
- Make notes on the full width of the meeting rail in case any portion of it will be cut
- Cut the sides of the sash down even with the depth of the channel
- Cut new wood slightly thicker than the sash stile and as wide as the previous channel-depth measurement
- Glue the new wood to the sides of the sash and clamp on. Use high quality indoor/outdoor carpenters glue. Allow to dry according to manufacturers specifications
 - Note: If full reversibility is desired, then the new wood should be screwed tightly onto the sash without the use of glue
- If the original weights and pulleys are to be used, route a groove and drill a knot hole according to the previously recorded measurements
- If spring balances are to be used, follow the manufacturer's installation instructions
- If any portion of the meeting rail profile as removed then cut a matching piece per the recorded measurements and attach
- Sand and/or plane the portions of the new wood that are not flush with the original sash to create a smooth appearance

Epoxy Solution

- Remove all spiral balance hardware from the sash
- Make notes of where the sash cord knot hole and channel were
- Select an epoxy system. The following are three epoxy systems that have been used successfully on historic properties
 - <https://www.abatron.com/>
 - <https://www.westsystem.com/>
 - http://www.conservationtechnology.com/building_repair.html
- Prep the wood according to manufacturers recommendations
- Fill the groove with the selected epoxy
- Sand the epoxy back to the smooth finish and down to the original dimensions of the window
- If the original weights and pulleys are to be used, route a groove and drill a knot hole according to the previously recorded measurements
- If spring balances are to be used, follow the manufacturer's installation instructions

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:**Previous treatment**

The installation of a modern spiral balance required the removal of substantial historic material and altered the original design of the window. This does not comply with standards 5 and 6, which address the retention of historic materials and the importance of repair versus replacement. If a treatment, like adding a secondary pane of glass, necessitated the removal of traditional materials then it should not have been considered.

Proposed treatment

Both of the proposed treatments focus on preserving as much of the original material as possible. The Dutchmen repair is more appropriate as it is a replacement in-kind, although it does have the drawbacks noted above. If completed with screws and no glue, then the Dutchmen repair has the added benefit of being reversible.

Defect 3:

Glass panes were added to the interior of the upper and lower sash with the goal of reducing sound transference and improving energy efficiency. A groove was cut into the interior face of the sash to a depth of approximately 3/16" and a width of 3/8" for the glass to fit into. The glass is held in place with four turn button clips. During inspection the panels did not fit tight into this groove and rattled when pressed against. In some locations the glass panels had slipped out of the groove leaving air gaps. The lack of a seal negates significant noise reduction or improved energy efficiency. If a better seal is achieved, then there is a risk that condensation will be exacerbated on the interior face of the primary glazing, which will then be trapped in between the two layers of glass and hasten deterioration of the historic sash. The glass pane on the upper sash covers the historic location of the sash lock.



Image 7: Groove cut to house glass panel. The open space underneath the sash is due to the sill and stool being missing, presumably awaiting restoration.



Image 8: Note that glass panel does not fit tight in groove



Image 9: Glass panel is slipping. Fit is loose

Proposed Solution:

Remove the added glass panes. The benefit they provide is negligible and their presence makes operation of the window difficult. Energy efficiency will be addressed in a separate section. Unfortunately the groove that

was cut for the glass to set in is likely best left alone. If a repair to return the window sash to their original look is desired then strips of wood will need to be glued into the channel and custom router bits manufactured to allow the profile to be recreated on the sash. However, this solution would require complete disassembly of each window sash, and as such may not be practical. The most realistic way forward may be to consider this groove as a part of the windows history.

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

The addition of a glass panel caused the destruction of historic materials and led to other incompatible alterations, which is prohibited by Standard 9.

Proposed treatment

The removal of the glass panel will return the window to its original condition as closely as possible, which is in compliance with the Standards.

Defect 4:

Standard practice for restoring historic wood sash is the removal of, at a minimum, loose and flaking paint so that new paint has a solid surface to adhere to. Better practice is to completely remove all paint layers so that the wood can be fully evaluated for defects that would need to be addressed. During evaluation it was noted that paint was not removed in any significant way from the sash and many needed repairs to the sash were left untreated.

A 3M LeadCheck product was used on the lower sash of window 003-12. The test came back positive for lead paint.



Image 10: Note the condition of the lower rail and the built-up paint



Image 11: Note flaking paint



Image 12: 3M LeadCheck test. Red indicates the presence of lead. Many paint layers were visible when scoring down to bare wood

Proposed Solution:

All of the sash should be stripped of all paint down to bare wood. Each sash should then be evaluated to determine if additional repairs are needed.

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:**Previous treatment**

Leaving the paint on the sash and performing minimal repairs is acceptable per the Standards. However, more maintenance will soon be necessary as the windows continue to degrade.

Proposed treatment

Removing all paint layers is an acceptable practice as part of the restoration process. No historic material is lost via this process. If a record of the historic paint layers is desired, then samples can be collected from a variety of locations before the windows are removed for stripping.

The EPA Renovation, Repair and Painting Program (EPA RRP) likely applies to this project. Please ensure that all activities that disturb paint follow the guidelines specified by the EPA, which are available online at: <https://www.epa.gov/lead/renovation-repair-and-painting-program>

Defect 5:

Standard practice for restoring historic wood sash is the removal of failed glazing compound and replacement with a comparable putty that replicates the look of the original and, to the extent possible, the performance. Some of the sash did not have putty removed, presumably because it was still in good condition. The condition of the old putty cannot be verified due to the paint layer on top. Many sash have a white compound applied which appears to be a DAP window glazing caulk, although this cannot be verified without a submittal from the contractor. This DAP product is acceptable, as are other caulk-tube extruded glazing compounds, however it was applied leaving a concave surface and was applied quite thinly in several areas which will lead to premature failure. Finally, several of the windows were overpainted onto the glass significantly. While this is not a structural or performance concern, it negatively impacts the aesthetic of the window and reduces occupant enjoyment.



Image 13: Note the concave surface of the glazing compound. This is less effective at shedding water and does not replicate the historic appearance



Image 14: Note how the new glazing compound does not come up to the edge of the bed and has a ragged edge

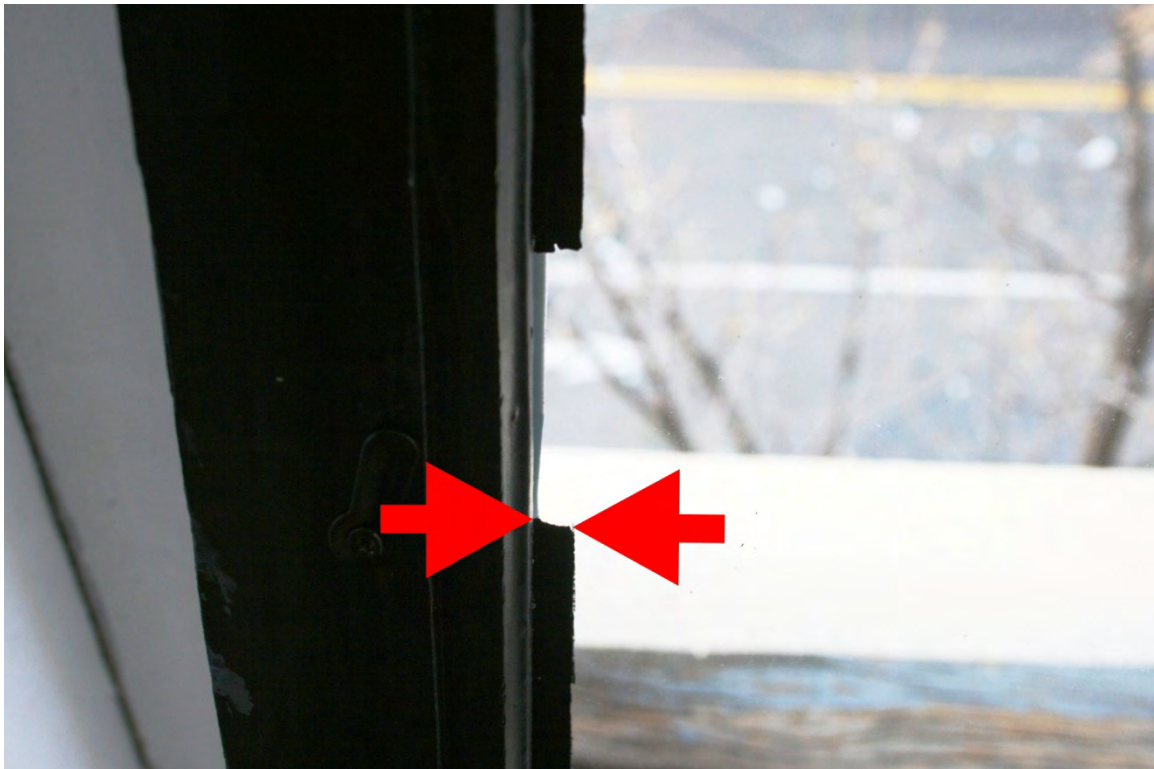


Image 15: Evidence of overpainting. A section of paint was removed to show where the paint should have ended. The area between the arrow points is over painted

Proposed Solution:

As part of the paint removal process, all glazing putty should be removed as well. The glass should be removed from the sash, cleaned, and reset in a new bed of glazing compound with new points. All efforts should be made to save original glass whenever possible. Only one pane of original glass was noted during the evaluation, located on the lower sash of window 003-3.

There are a variety of window putties available that are appropriate for historic windows. Please conduct research to determine the best fit for skill level and application. The following are two examples of glazing putty products that have been successfully used on historic wood windows.

Advanced Repair Technology's Glaze-Ease 601

http://www.advancedrepair.com/glazing_glaze_ease_601.html

Sarco's Multi-Glaze Type M Putty (Available online from a variety of suppliers)

<https://www.srshardware.com/product/sarco-multi-glaze-type-m-putty/>

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

The durability of the current glazing is unknown but suspected to be relatively short. More information about the product used would be necessary to determine if it does not meet the Standards.

Proposed treatment

Reglazing with a product designed for historic wood windows is fully compliant with the Standards.

Defect 6:

The window sash weatherstripping consists of a pile weatherstripping applied to the exterior face of the interior stop so that it seals against the lower sash when the window is closed. There is also bulb weatherstripping applied to the exterior face of the lower-sash meeting rail to seal the upper sash to the lower sash when the window is closed. Finally, there is also bulb-seal applied to the bottom of the lower sash to seal with the sill. The bulb seals are all appropriate and within standard practice for weatherstripping historic wood sash. The pile weatherstripping, while acceptable, isn't sealing the window to the extent desired.

Proposed Solution:

T-rail metal weatherstripping is a traditional system that is still in use today and would have been available at the time of the building's construction. The system consists of metal strips that are affixed to the jamb that have a protrusion that interfaces with a 5/32" x 7/16" groove cut into the side of the sash. For additional sealing and smoother operation, it is recommended that single-sided glazing tape be affixed to the back of the metal strip to seal between it and the jamb. This method of weatherstripping is compatible with the spring balances described earlier. The bulb seals that are currently in place at the meeting rail and the bottom rail should stay as they are, although some of the meeting rail bulb seals may need to be replaced as they were damaged during lock installation.

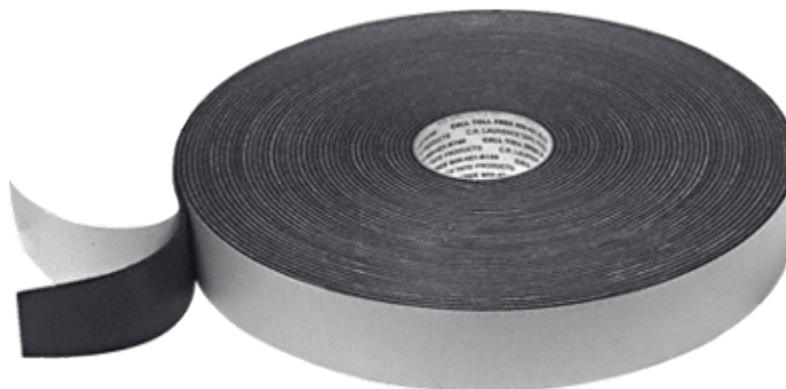


Image 16: Example of single-sided foam glazing tape



Image 17: Damaged seal at meeting rail



Image 18: Image from Accurate Weatherstripping. The sill strip can be omitted in the described application

There are a variety of similar options to the described approach. Please conduct research to determine the best fit for the situation at hand.

As an example, Accurate Metal Weatherstrip Co. Inc. has a variety of products that have successfully been installed in historic buildings. The product closest to what has been described, and installation instructions, can be viewed online at:

<http://metalstrips.accurateweatherstrip.com/product/window-weatherstrips/s-series-no-10-up-1-3-8-or-1-3-4-double-hung-sash->

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

The previous treatment is compatible with the Standards

Proposed treatment

The proposed treatment is adding new material to the window system, but it is reversible without causing damage or loss of historic materials which is compatible with the Standards. The proposed treatment is also a well-established protocol for historic windows with a track record of durability.

Defect 7:

Structural repairs were treated with a skim-coat of epoxy when dutchmen repairs would have been more appropriate. Some meeting rails on the upper sash are slipping, which should have been addressed during the most recent restoration. The following list of items is not comprehensive and consists only of what was noticed during the evaluation. All paint layers should be removed so that the full extent of necessary repairs can be discerned.

Window 2-6: Lower sash, crack in lower rail

Window 2-7: Upper sash, meeting rail is slipping

Window 2-9: Lower sash, left stile is cracked

Window 2-10: Upper sash, meeting rail is slipping

Window 2-14: Upper sash, meeting rail is slipping

Window 2-20: Lower sash, lower rail may need replacement

Window 2-25: Lower sash, lower rail may need replacement

Window 3-4: Lower sash, lower rail may need replacement

Window 3-14: Lower sash, lower rail may need replacement

Window 3-15: Lower sash, lower rail may need replacement

Window 3-18: (Interior window, sealed off on one side) Upper sash, upper pane is broken



Image 19: Window 002-6, note crack in lower rail



Image 20: Window 002-11, note meeting rail slipping down



Image 21: Window 002-21 deterioration at the upper sash stiles and meeting rail left untreated

Proposed Solution:

Following the removal of paint and glazing putty, all of the sash should be evaluated for repairs. If Dutchmen repairs are determined to provide a more durable repair, then that approach should be taken. The use of epoxy is appropriate for filling in checks and cracks, but should not be applied as a skim coat as it would then trap moisture. The use of epoxy to replace rotted mortise and tenon joinery is also not appropriate as these joints were designed to move and the epoxy will eventually crack and fail.

For a full description of the proposed restoration process please refer to appendix items titled:
REPAIR PROCESS FOR: WOOD DOUBLE-HUNG, CASEMENT, AND FIXED WINDOWS
and
PRESERVATION BRIEF 9: THE REPAIR OF HISTORIC WOODEN WINDOWS

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

The previous repair work, aside from the addition of a glass pane and replacement of the balance system, is compatible with the Standards. Additional work is necessary to fully stabilize the window system.

Proposed treatment

The proposed treatments are compliant as they focus on repairs rather than replacement, and utilize products that are compatible with preservation standards.

Defect 8:

The existing windows do not perform up to the energy efficiency or noise reduction standards desired. The fact that historic windows do not meet modern standards is not a valid argument for replacement. There are acceptable treatments that can be applied to meet the desired goals while still adhering to historic preservation guidelines.

Proposed Solution:

In combination with the repairs and installation of additional weatherstripping described above, the installation of an operable interior storm window will greatly improve the energy efficiency and noise reduction of the window system.

There are many storm window manufacturers. As an example, an Allied Window product is detailed in this report to show one of the options available. Coordination with the architect, contractor, manufacturer, and building owner will be necessary to determine the best option to achieve the clients goals.

Allied Window #MOL-OP, operating magnetic one-lite storm window with screen. This storm window mounts on the interior of the window in the ample space available.



Image 22: Red lines indicate plane where a storm window would be installed

The upper panel of the storm window is fixed, and the lower panel is operable. A screen option is also available. These storm windows can be custom colored to match any sample given, and the entire system can be removed for cleaning the window glass. There are several glazing options that address UV reduction, noise reduction, and other considerations. For additional information, including all options available and detailed drawings, please visit:

<https://catalog.alliedwindow.com/item/interior-magnetic-storm-windows/operating-magnetic-one-lite-mol-op-with-screen-2/item-1057?&bc=100|1064>

Many studies have been conducted on the subject of historic windows and energy efficiency. The common take-away is that historic windows, when properly repaired and weatherstripped, with the combination of a storm window, can achieve similar energy efficiency performance as a replacement window and provide a better return on investment than wholesale replacement.

Links below provided via the National Park Service Technical Preservation Services. Please click on the title for access to the full reports

<https://www.nps.gov/tps/sustainability/research.htm>

A Comparative Study of the Cumulative Energy Use of Historical Versus Contemporary Windows—A 2010 study by Boston professionals funded by the Boston Society of Architects. Life cycle costs were calculated and compared for a typical wood double-hung window with an added Low-E storm window and a new vinyl replacement window. Using modeling and adapting previous field studies to a Boston location, it was determined that the thermal performances of the two window systems are similar; and taking all costs into account, the historic window with a storm has a much lower life-cycle cost throughout a 100-year period. It does not seem, however, that the sources used for air leakage numbers take into account the infiltration that can occur between the window unit and the wall assembly and how that may differ between the historic window/storm and the new window.

The Effects of Energy Efficiency Treatments on Historic Windows—Published in January, 2011, by the Center for Resource Conservation in Boulder, Colorado. This study focuses on empirical testing of the energy efficiency and economy of a range of options for upgrading the energy performance of historic windows. It involved retrofitting windows in a test home in a historic district in Boulder, Colorado as well as testing in a laboratory facility developed for the study. Summary tables cover the eleven different preservation treatment options that were investigated and then compared to a new vinyl window. Most of the proposed treatments were able to outperform a new vinyl window. The study has lots of technical information and the results from both field and lab testing. While there is not a great deal of detail about the cost of the various options, there is enough cost information to provide relative payback savings.

Field Evaluation of Low-E Storm Windows— A study conducted in Chicago in 2007 by Lawrence Berkeley National Laboratory. While based on only six homes in the Chicago area, data collected from field monitoring for this study indicates a consistent benefit to using storm windows. Clear glass storm windows reduced the heating load by 13% with a 10-year simple payback. Low-e storm windows also showed an additional improvement on top of the clear glass benefits, amounting to 21% heating savings and an average payback of less than five years. Pointed out as an ancillary benefit of installing storm windows is reduced air infiltration.

Measured Winter Performance of Storm Windows—A 2002 study completed by Lawrence Berkeley National Laboratory. In testing under actual winter weather conditions, the study finds that a north-facing, wood, double-hung, single-glazed (AND intentionally leaky), sash in combination with a low-E storm window, performed very similarly to the standard low-E vinyl replacement window.

Testing the Energy Performance of Wood Windows in Cold Climates—A 1996 study which showed that window replacement will not necessarily reduce energy costs more than an upgrade utilizing the existing sash. It found that effectively sealing between the window frame and rough opening was important in reducing the infiltrative thermal losses associated with any window renovation. Storm windows, either existing or replacements, were found to be effective in reducing both infiltrative and non-infiltrative losses. This study was funded by the State of Vermont Division for Historic Preservation utilizing a grant received from the National Center for Preservation Technology and Training of the National Park Service.

Thermal Performance of Traditional Windows—Published in 2008 by Glasgow Caledonian University for Historic Scotland. This study investigated various options for reducing heat loss through windows. Among the options tested were secondary glazing systems (storm windows), insulating shades, and more traditional window treatments like shutters and curtains. Although secondary glazing was found to be the most effective option (reducing heat loss by 63%), timber shutters were also found to be effective (reducing heat loss by 51%.) Findings indicate that the most effective reductions in heat loss were attained by combining several treatments.

Links below provided via the California State Parks Office of Historic Preservation. Please click on the title for access to the full reports

http://www.ohp.parks.ca.gov/?page_id=25935

A report produced by the National Trust for Historic Preservation Green Lab provides cost guidance for homeowners weighing the financial and energy tradeoffs between replacing or repairing older, less efficient windows. This report, "[Saving Windows, Saving Money: Evaluating the Energy Performance of Window Retrofit and Replacement](#)", builds on previous research by examining multiple window improvement options, comparing them to replacement windows across multiple climate regions.

"Window Repair, Rehabilitation and Replacement", Peter Baker, P.E.

This report was prepared for Building America, Building Technologies Program, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy to evaluate advanced retrofit measures. A balanced approach is presented to guide contractors and homeowners to decide whether to repair or replace considering many factors, one of which is historic preservation. November 2011

"Thermal Assessment of internal Shutters and Window Film Applied to Traditional Single Glazed Sash and Case Windows" by John Currie, Julio Bros Williamson, Jon Stinson & Marie Jonnard, Historic Scotland Technical Report 23 assesses the effectiveness of two inexpensive and minimally invasive methods for improving the thermal performance of single glazed windows. This technical paper demonstrates that a range of options, including minimally invasive and inexpensive methods, can play a worthwhile role in the overall thermal improvement of buildings.

"Of Paint and Windows - Replace or Repair" by Bob Yapp

"Thermal Performance of Historic Windows" by Chris Wood, www.buildingconservation.com (England)

"An Analysis of the Thermal Performance of Repaired and Replacement Windows", PDF, Robert Score and Bradford Carpenter, APT Bulletin 40:2, 2009

Window Energy Analysis, Keith Haberern, P.E.

“Replacement Windows and Furnaces in the Heartland: Indiana’s Energy Conservation Financial Assistance Program” by William H. Hill. This is the 1990 study that demonstrates a four hundred year payback using replacement windows.

“Building Regulations and Historic Buildings: balancing the needs for energy conservation with those of building conservation” The English Heritage Interim Guidance article touches on all parts of preservation and conservation of power and fuel, and the chapter on windows is very relevant.

“Repair or Replace Windows in Historic Buildings: Arriving at a Sustainable Solution” The Heritage Canada file contains two articles, one from Andrew Powter and Craig Sims discussing how to arrive at a decision to replace or repair original windows, and Susan Turner explains the sustainable nature of window repair rather than replacement.

“Life Cycle Of Window Materials - A Comparative Assessment” by Asif, Davidson and Muneer. A comparative life cycle assessment of the environmental impact of different window materials is included for its interesting materials energy cost analysis.

“Domestic Retrofitting Strategies in the UK: Effectiveness vs. Affordability” is an interesting presentation of the effectiveness of different energy retrofitting strategies, including shutters.

“What Replacement Windows Can’t Replace: The Real Cost of Replacing Historic Windows” Walter Sedovic and Jill Gotthelf provide an excellent discussion of the comparative value of window replacement versus repair. Many aspects of sustainability are considered.

“Lincoln Hall Windows Research Report: A Case Study of Options for Treatment for Windows at Lincoln Hall, University Of Illinois, Urbana Champaign” This report provides empirical data to assess window repair or replacement options for a proposed LEED Gold project, addressing the existing windows in terms of energy consumption.

Compatibility with the Secretary of the Interior's Standards for Rehabilitation:

Previous treatment

N/A

Proposed treatment

The introduction of a storm window is an approved preservation practice and fully reversible with minimal damage to historic materials. Therefore, the proposed treatment is compatible with the Standards.

APPENDIX

Example of Full Restoration process for: Wood Double-Hung, Casement, and Fixed Windows

On-Site Method of Procedure

Window Sash Removal:

- 1.) When required per [EPA regulations](#), place poly-sheeting on the floor at the work area to collect any dust or debris created during the sash removal process. The sheeting will extend 10 feet from the window opening towards the interior of the room and 6 feet on either side of the opening. If these minimum distances cannot be achieved, the sheeting will extend as far as possible into the room as well as side to side in front of the window opening.
- 2.) Remove the left and right sash from the opening by removing the hinge pins or by unscrewing the hinge from the jamb
- 3.) Number each sash for each opening according to the window schedule using a “Sharpie” to write the corresponding number on the unfinished side of the stile of each sash. Where multiple sashes are present in one opening, a dash (-) followed by a sequential numbering system will be used. For example; a window opening designated 236C has 4 total sashes. There are two upper sashes and two lower sashes. As viewed from the interior, if sash removal will begin in the lower left hand corner of the opening: The lower left hand sash will be labeled 236C-1, the upper left hand sash will be labeled 236C-2, the lower right hand sash will be labeled 236C-3, and the upper right hand sash will be labeled 236C-4. This system will be utilized in the same order where transom windows are present. The interior stop will be labeled with 236C and differentiated by an “L,” “C,” or “R” to designate its original location (Left, Center, or Right). The parting stop is not typically labeled or restored as it is most often time damaged beyond repair during the removal process and new parting stop will be fabricated to match the existing for every opening.
- 4.) When required per EPA regulations, bag or wrap all components; including sash, interior stop, parting stop and trash in heavy duty poly-sheeting or poly-bags to assure containment of any dust or debris during transport.
- 5.) When required per EPA regulations, cleaning verification will be provided following a thorough cleaning of the area using damp wipes and/or HEPA vacuums; including, but not limited to, all sills, stools, floors, weight pockets, poly-bags and poly-sheeting.

Installation of Temporary Enclosures:

- 1.) The material selected for use as the temporary enclosure, “Verolite” or similar, will be cut to fit inside the existing opening whenever possible. If not specified, plywood or OSB will be utilized. When required, the perimeter of the Verolite, plywood, or OSB will be wrapped in foam tape in an effort to create the most effective weather seal possible. The wood backing for this will be screwed to the existing frame where the interior stop and/or parting stop was located. The screw holes created will be hidden by the interior stop or parting stop upon reinstallation of the restored components and causes little to no damage to the frame. The verolite will then be attached to this backing material utilizing screws.

Existing Frame Restoration:

- 1.) Loose and flaking or failed paint is removed following the National Park Service Preservation Brief number 10. A “wet method” utilizing chemical strippers, carbide scrapers, or HEPA approved mechanical sanders (or a combination of all three) will ensure that no lead based paint dust is created. Following the paint stripping process, a thorough visual and tactile examination of the existing wood substrate will be performed.

- 2.) If there are any pieces or components that have shifted or become loose on the frame, counter-sunk coated screws and/or galvanized brad nails will be utilized to restore the integrity of the components.
- 3.) If it is determined that the existing substrate is beyond repair through the use of epoxy, the deteriorated wood will be “cut” out of the existing frame and a replacement piece fabricated to replicate the removed component, commonly referred to as a “Dutchman,” will be installed in its place. After all of the Dutchmen have been installed, epoxy will be utilized to make any other repairs that are deemed necessary.
- 4.) When the epoxy has dried, it will be sanded to shape. A thorough review by our staff will determine if any additional epoxy consolidate is required.
- 5.) All window frame components will then be primed, and an additional review completed to ensure that we have achieved the acceptable criteria set forth by the “Mock-up Review.” If more consolidation is deemed necessary, the primer at that location will be removed and steps 5-7 will be repeated.
- 6.) A modified polyurethane sealant will then be applied to any and all areas that require it. The sealant will either be color matched and/or paintable. It will be a low-modulus elastomeric product.
- 7.) A minimum of two finish coats of paint will then be applied and given ample drying time before the restored sash will be installed.

Sash Installation:

- 1.) The sash will be delivered pre-finished to site and will be installed per the plans and specifications. Depending on the specifications, metal interlocking weather stripping will be utilized in conjunction with compression bulb weatherstripping for casement sash. The sashes are installed in a manner which attempts to balance the ease of operation while still maintaining the best possible seal against air infiltration.
- 2.) The locking hardware will then be installed.
- 3.) All necessary caulking and paint touch up will be preformed after installation to provide a clean and seamless finished product.
- 4.) After the owner and architect have reviewed the finished product, all necessary punch-list items will be corrected.

Off-site Method of Procedure

Receiving Sash:

- 1.) When the sashes and interior stop arrive at the “Shop” the window designation numbers are “stamped” into the sash at the same location. This is to ensure that the number is not inadvertently removed during the restoration process.

Glazing Putty, Glass Removal, and Glass Cleaning:

- 1.) Steam ovens are utilized to soften the historic glazing putty and all existing putty is removed. This ensures a wet method technique that is non-invasive and is the best method to avoid breakage of the glass during this process.
- 2.) When the glass has been removed, the corresponding sash number is written on a piece of tape and applied to the surface of the glass.
- 3.) This number will be removed temporarily when the glass is cleaned, but will be reattached after the cleaning is complete. Typical glass cleaners such as Windex are utilized. All glass that can be reused will be reused. Existing scratches on the glass that were not created during the removal or cleaning process will not dictate replacement of the glass unless directed by the architect and/or owner.
- 4.) When the sash has completed the restoration process in the shop, the original piece of glass will be installed in the same location from which it came.

Sash Restoration:

- 1.) All sashes, after they have been stripped, are re-squared prior to applying epoxy consolidates. This is achieved by clamping the sash and when 90 degree internal angles are achieved, dowels are utilized to maintain the shape.
- 2.) Before the glass is set and bedded, and after the sanding of the epoxy is completed, the glazing rabbit is primed.
- 3.) After sanding the epoxy consolidates, kerfs are cut for future installation of the bulb seal and, when specified, t-rail weather stripping.

Sash Replication:

- 1.) Where window sash are missing the jambs are carefully measured, including the diagonals to allow for adjustments for out-of-square openings and with careful notation of hinge and hardware location.
- 2.) Lumber is selected to match the existing wood, with care being taken regarding grain direction to prevent warping or twisting.
- 3.) Using the existing sash as a template, new sash are constructed mimicking the stile and rail dimensions, joinery details, and profiles
- 4.) Once constructed, the replica sash join the restored sash at the sanding phase and continue through the same steps in the Glazing and Painting and Staining processes.

Interior Stop Restoration:

- 1.) This process is similar to the Existing Frame Restoration section but may include some new fabrication to replace pieces which were damaged beyond repair during the sash removal process.

Parting Stop Fabrication:

- 1.) All parting stop will be fabricated to match existing and will be prefinished in the shop prior to installation on-site.

Glazing Process:

- 1.) Dap Glazing compound is applied to the glazing rabbit and the glass is installed using push points when traditional glazing putty is utilized. Push points are not used when glass stops (wood or other) are utilized.
- 2.) The residual Dap compound that "oozes" out is cleaned from the glass and wood sash surfaces.
- 3.) When the Dap has "set-up" Glazing putty or wood glass stop is applied.
- 4.) The sash is then placed vertically in a drying rack.
- 5.) Depending on the type of glazing compound utilized, dry time can range from a little as a few days to as long as 6 weeks.

Painting and Staining Process:

- 1.) The sashes are masked to protect the glass but still allow the finish paint to extend very slightly beyond the glazing bed to create a seal.
- 2.) They are transferred to painting racks, and the primer and two finish coats are applied with an airless or a HVLP paint sprayer.
- 3.) When the finish coat is dry, the masking is removed, the bulb seal installed, glass cleaned, and the sash delivered to the site for installation.

Preservation Brief 9: The Repair of Historic Wooden Windows



U.S. Department of the Interior
National Park Service
Cultural Resources
Heritage Preservation Services

Preservation Briefs: 9

The Repair of Historic Wooden Windows

John H. Myers

The windows on many historic buildings are an important aspect of the architectural character of those buildings. Their design, craftsmanship, or other qualities may make them worthy of preservation. This is self-evident for ornamental windows, but it can be equally true for warehouses or factories where the windows may be the most dominant visual element of an otherwise plain building (see figure 1). Evaluating the significance of these windows and planning for their repair or replacement can be a complex process involving both objective and subjective considerations. The *Secretary of the Interior's Standards for Rehabilitation*, and the accompanying guidelines, call for respecting the significance of original materials and features, repairing and retaining them wherever possible, and when necessary, replacing them in kind. This Brief is based on the issues of significance and repair which are implicit in the standards, but the primary emphasis is on the technical issues of planning for the repair of windows including evaluation of their physical condition, techniques of repair, and design considerations when replacement is necessary.

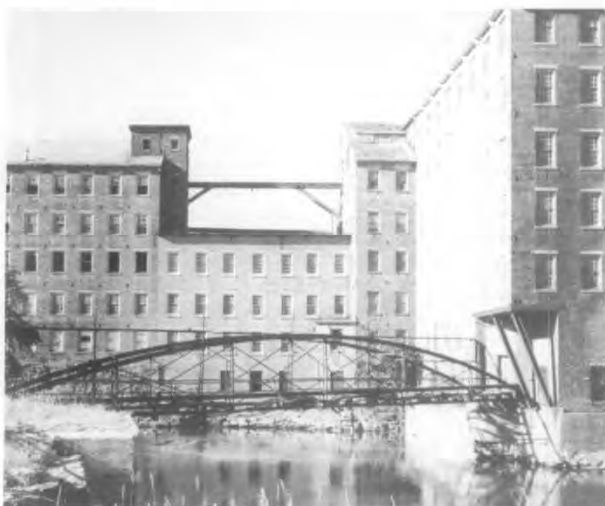


Figure 1. Windows are frequently important visual focal points, especially on simple facades such as this mill building. Replacement of the multi-pane windows here with larger panes could dramatically change the appearance of the building. The areas of missing windows convey the impression of such a change. Photo: John T. Lowe

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

Architectural or Historical Significance

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

Historically, the first windows in early American houses were casement windows; that is, they were hinged at the side and opened outward. In the beginning of the eighteenth century single- and double-hung windows were introduced. Subsequently many styles of these vertical sliding sash windows have come to be associated with specific building periods or architectural styles, and this is an important consideration in determining the significance of windows, especially on a local or regional basis. Site-specific, regionally oriented architectural comparisons should be made to determine the significance of windows in question. Although such comparisons may focus on specific window types and their details, the ultimate determination of significance should be made within the context of the whole building, wherein the windows are one architectural element (see figure 2).

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

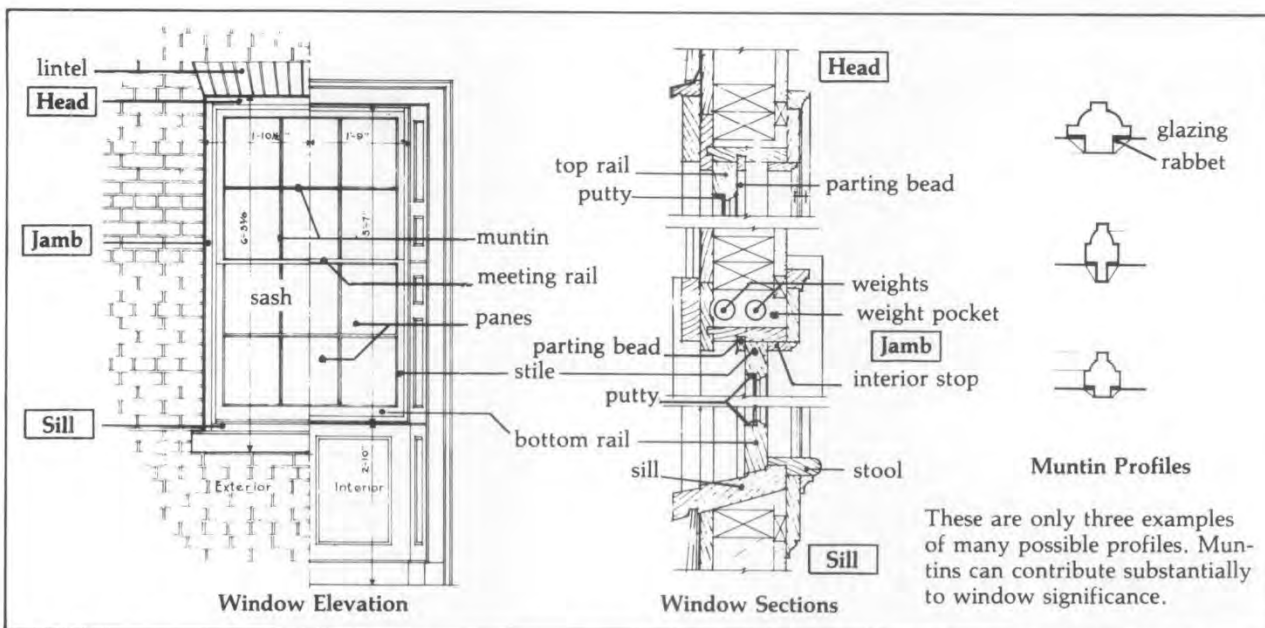


Figure 2. These drawings of window details identify major components, terminology, and installation details for a wooden double-hung window.

ceed with planning appropriate treatments, beginning with an investigation of the physical condition of the windows.

Physical Evaluation

The key to successful planning for window treatments is a careful evaluation of existing physical conditions on a unit-by-unit basis. A graphic or photographic system may be devised to record existing conditions and illustrate the scope of any necessary repairs. Another effective tool is a window schedule which lists all of the parts of each window unit. Spaces by each part allow notes on existing conditions and repair instructions. When such a schedule is completed, it indicates the precise tasks to be performed in the repair of each unit and becomes a part of the specifications. In any evaluation, one should note at a minimum, 1) window location, 2) condition of the paint, 3) condition of the frame and sill, 4) condition of the sash (rails, stiles and muntins), 5) glazing problems, 6) hardware, and 7) the overall condition of the window (excellent, fair, poor, and so forth).

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

larly if the bottom of the sill is flat. Any conditions, including poor original design, which permit water to come in contact with the wood or to puddle on the sill must be corrected as they contribute to deterioration of the window.

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

Each window should be examined for operational soundness beginning with the lower portions of the frame and sash. Exterior rainwater and interior condensation can flow downward along the window, entering and collecting at points where the flow is blocked. The sill, joints between the sill and jamb, corners of the bottom rails and muntin joints are typical points where water collects and deterioration begins (see figure 3). The operation of the window (continuous opening and closing over the years and seasonal temperature changes) weakens the joints, causing movement and slight separation. This process makes the joints more vulnerable to water which is readily absorbed into the end-grain of the wood. If severe deterioration exists in these areas, it will usually be apparent on visual inspection, but other less severely deteriorated areas of the wood may be tested by two traditional methods using a small ice pick.

An ice pick or an awl may be used to test wood for soundness. The technique is simply to jab the pick into a wetted wood surface at an angle and pry up a small sec-



Figure 3. Deterioration of poorly maintained windows usually begins on horizontal surfaces and at joints where water can collect and saturate the wood. The problem areas are clearly indicated by paint failure due to moisture. Photo: Baird M. Smith, AIA

tion of the wood. Sound wood will separate in long fibrous splinters, but decayed wood will lift up in short irregular pieces due to the breakdown of fiber strength.

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

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

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

Repair Class I: Routine Maintenance

Repairs to wooden windows are usually labor intensive and relatively uncomplicated. On small scale projects this

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

The routine maintenance required to upgrade a window to "like new" condition normally includes the following steps: 1) some degree of interior and exterior paint removal, 2) removal and repair of sash (including reglazing where necessary), 3) repairs to the frame, 4) weather-stripping and reinstallation of the sash, and 5) repainting. These operations are illustrated for a typical double-hung wooden window (see figures 4a-f), but they may be adapted to other window types and styles as applicable.

Historic windows have usually acquired many layers of paint over time. Removal of excess layers or peeling and flaking paint will facilitate operation of the window and restore the clarity of the original detailing. Some degree of paint removal is also necessary as a first step in the proper surface preparation for subsequent refinishing (if paint color analysis is desired, it should be conducted prior to the onset of the paint removal). There are several safe and effective techniques for removing paint from wood, depending on the amount of paint to be removed. Several techniques such as scraping, chemical stripping, and the use of a hot air gun are discussed in "Preservation Briefs: 10 Paint Removal from Historic Woodwork" (see Additional Reading section at end).

Paint removal should begin on the interior frames, being careful to remove the paint from the interior stop and the parting bead, particularly along the seam where these stops meet the jamb. This can be accomplished by running a utility knife along the length of the seam, breaking the paint bond. It will then be much easier to remove the stop, the parting bead and the sash. The interior stop may be initially loosened from the sash side to avoid visible scarring of the wood and then gradually pried loose using a pair of putty knives, working up and down the stop in small increments (see figure 4b). With the stop removed, the lower or interior sash may be withdrawn. The sash cords should be detached from the sides of the sash and their ends may be pinned with a nail or tied in a knot to prevent them from falling into the weight pocket.

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

The sash can be stripped of paint using appropriate techniques, but if any heat treatment is used (see figure 4c), the glass should be removed or protected from the sudden temperature change which can cause breakage. An



Figure 4a. The following series of photographs of the repair of a historic double-hung window use a unit which is structurally sound but has many layers of paint, some cracked and missing putty, slight separation at the joints, broken sash cords, and one cracked pane. Photo: John H. Myers



Figure 4b. After removing paint from the seam between the interior stop and the jamb, the stop can be pried out and gradually worked loose using a pair of putty knives as shown. To avoid visible scarring of the wood, the sash can be raised and the stop pried loose initially from the outer side. Photo: John H. Myers



Figure 4c. Sash can be removed and repaired in a convenient work area. Paint is being removed from this sash with a hot air gun while an asbestos sheet protects the glass from sudden temperature change. Photo: John H. Myers

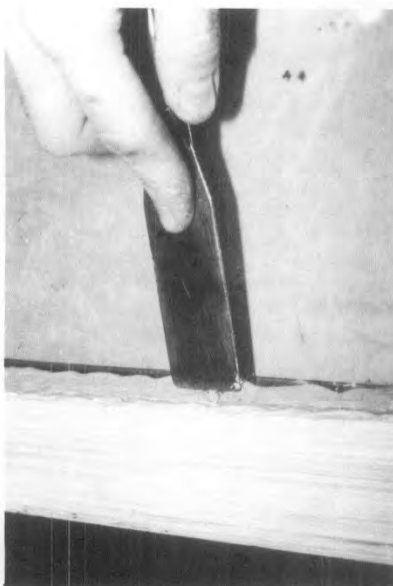


Figure 4d. Reglazing or replacement of the putty requires that the existing putty be removed manually, the glazing points be extracted, the glass removed, and the back putty scraped out. To reglaze, a bed of putty is laid around the perimeter of the rabbet, the pane is pressed into place, glazing points are inserted to hold the pane (shown), and a final seal of putty is beveled around the edge of the glass. Photo: John H. Myers



Figure 4e. A common repair is the replacement of broken sash cords with new cords (shown) or with chains. The weight pocket is often accessible through a removable plate in the jamb, or by removing the interior trim. Photo: John H. Myers



Figure 4f. Following the relatively simple repairs, the window is weathertight, like new in appearance, and serviceable for many years to come. Both the historic material and the detailing and craftsmanship of this original window have been preserved. Photo: John H. Myers

overlay of aluminum foil on gypsum board or asbestos can protect the glass from such rapid temperature change. It is important to protect the glass because it may be historic and often adds character to the window. Deteriorated putty should be removed manually, taking care not to damage the wood along the rabbet. If the glass is to be removed, the glazing points which hold the glass in place can be extracted and the panes numbered and removed for cleaning and reuse in the same openings. With the glass panes out, the remaining putty can be removed and the sash can be sanded, patched, and primed with a preservative primer. Hardened putty in the rabbets may be softened by heating with a soldering iron at the point of removal. Putty remaining on the glass may be softened by soaking the panes in linseed oil, and then removed with less risk of breaking the glass. Before reinstalling the glass, a bead of glazing compound or linseed oil putty should be laid around the rabbet to cushion and seal the glass. Glazing compound should only be used on wood which has been brushed with linseed oil and primed with an oil based primer or paint. The pane is then pressed into place and the glazing points are pushed into the wood around the perimeter of the pane (see figure 4d). The final glazing compound or putty is applied and beveled to complete the seal. The sash can be refinished as desired on the inside and painted on the outside as soon as a "skin" has formed on the putty, usually in 2 or 3 days. Exterior paint should cover the beveled glazing compound or putty and lap over onto the glass slightly to complete a weathertight seal. After the proper curing times have elapsed for paint and putty, the sash will be ready for reinstallation.

While the sash are out of the frame, the condition of the wood in the jamb and sill can be evaluated. Repair and refinishing of the frame may proceed concurrently with repairs to the sash, taking advantage of the curing times for the paints and putty used on the sash. One of the most common work items is the replacement of the sash cords with new rope cords or with chains (see figure 4e). The weight pocket is frequently accessible through a door on the face of the frame near the sill, but if no door exists, the trim on the interior face may be removed for access. Sash weights may be increased for easier window operation by elderly or handicapped persons. Additional repairs to the frame and sash may include consolidation or replacement of deteriorated wood. Techniques for these repairs are discussed in the following sections.

The operations just discussed summarize the efforts necessary to restore a window with minor deterioration to "like new" condition (see figure 4f). The techniques can be applied by an unskilled person with minimal training and experience. To demonstrate the practicality of this approach, and photograph it, a Technical Preservation Services staff member repaired a wooden double-hung, two over two window which had been in service over ninety years. The wood was structurally sound but the window had one broken pane, many layers of paint, broken sash cords and inadequate, worn-out weatherstripping. The staff member found that the frame could be stripped of paint and the sash removed quite easily. Paint, putty and glass removal required about one hour for each sash, and the reglazing of both sash was accomplished in about one hour. Weatherstripping of the sash and frame, replacement of the sash cords and reinstallation of the sash, parting bead, and stop required an hour and a half. These times refer only to individual operations; the entire pro-

cess took several days due to the drying and curing times for putty, primer, and paint, however, work on other window units could have been in progress during these lag times.

Repair Class II: Stabilization

The preceding description of a window repair job focused on a unit which was operationally sound. Many windows will show some additional degree of physical deterioration, especially in the vulnerable areas mentioned earlier, but even badly damaged windows can be repaired using simple processes. Partially decayed wood can be waterproofed, patched, built-up, or consolidated and then painted to achieve a sound condition, good appearance, and greatly extended life. Three techniques for repairing partially decayed or weathered wood are discussed in this section, and all three can be accomplished using products available at most hardware stores.

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

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

Wood may also be strengthened and stabilized by consolidation, using semi-rigid epoxies which saturate the porous decayed wood and then harden. The surface of the consolidated wood can then be filled with a semi-rigid epoxy patching compound, sanded and painted (see figure 5). Epoxy patching compounds can be used to build up



Figure 5. This illustrates a two-part epoxy patching compound used to fill the surface of a weathered sill and rebuild the missing edge. When the epoxy cures, it can be sanded smooth and painted to achieve a durable and waterproof repair. Photo: John H. Myers

missing sections or decayed ends of members. Profiles can be duplicated using hand molds, which are created by pressing a ball of patching compound over a sound section of the profile which has been rubbed with butcher's wax. This can be a very efficient technique where there are many typical repairs to be done. Technical Preservation Services has published *Epoxies for Wood Repairs in Historic Buildings* (see Additional Reading section at end), which discusses the theory and techniques of epoxy repairs. The process has been widely used and proven in marine applications; and proprietary products are available at hardware and marine supply stores. Although epoxy materials may be comparatively expensive, they hold the promise of being among the most durable and long lasting materials available for wood repair.

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

Repair Class III: Splices and Parts Replacement

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

The repairs discussed in this section involve window frames which may be in very deteriorated condition, possibly requiring removal; therefore, caution is in order. The actual construction of wooden window frames and sash is not complicated. Pegged mortise and tenon units can be disassembled easily, if the units are out of the building. The installation or connection of some frames to the surrounding structure, especially masonry walls, can complicate the work immeasurably, and may even require

dismantling of the wall. It may be useful, therefore, to take the following approach to frame repair: 1) conduct regular maintenance of sound frames to achieve the longest life possible, 2) make necessary repairs in place wherever possible, using stabilization and splicing techniques, and 3) if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.

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

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

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

Weatherization

A window which is repaired should be made as energy efficient as possible by the use of appropriate weatherstripping to reduce air infiltration. A wide variety of products are available to assist in this task. Felt may be fastened to the top, bottom, and meeting rails, but may have the disadvantage of absorbing and holding moisture, particularly at the bottom rail. Rolled vinyl strips may also be tacked into place in appropriate locations to reduce infiltration. Metal strips or new plastic spring strips may be used on the rails and, if space permits, in

the channels between the sash and jamb. Weatherstripping is a historic treatment, but old weatherstripping (felt) is not likely to perform very satisfactorily. Appropriate contemporary weatherstripping should be considered an integral part of the repair process for windows. The use of sash locks installed on the meeting rail will insure that the sash are kept tightly closed so that the weatherstripping will function more effectively to reduce infiltration. Although such locks will not always be historically accurate, they will usually be viewed as an acceptable contemporary modification in the interest of improved thermal performance.

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

Window Replacement

Although the retention of original or existing windows is always desirable and this Brief is intended to encourage that goal, there is a point when the condition of a window may clearly indicate replacement. The decision process for selecting replacement windows should *not* begin with a survey of contemporary window products which are available as replacements, but should begin with a look at the windows which are being replaced. Attempt to understand the contribution of the window(s) to the appearance of the facade including: 1) the pattern of the openings and their size; 2) proportions of the frame and sash; 3) configuration of window panes; 4) muntin profiles; 5) type of wood; 6) paint color; 7) characteristics of the glass; and 8) associated details such as arched tops, hoods, or other decorative elements. Develop an understanding of how the window reflects the period, style, or regional characteristics of the building, or represents technological development.

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

information on products which have been used successfully in preservation projects.

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

Conclusion

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

Additional Reading

- ASHRAE Handbook-1977 Fundamentals*. New York: American Society of Heating, Refrigerating and Air-conditioning Engineers, 1978 (chapter 26).
- Ferro, Maximilian. *Preservation: Present Pathway to Fall River's Future*. Fall River, Massachusetts: City of Fall River, 1979 (chapter 7).
- "Fixing Double-Hung Windows." *Old House Journal* (no. 12, 1979): 135.
- Look, David W. "Preservation Briefs: 10 Paint Removal from Historic Woodwork." Washington, DC: Technical Preservation Services, U.S. Department of the Interior, forthcoming.
- Morrison, Hugh. *Early American Architecture*. New York: Oxford University Press, 1952.
- Phillips, Morgan, and Selwyn, Judith. *Epoxies for Wood Repairs in Historic Buildings*. Washington, DC: Technical Preservation Services, U.S. Department of the Interior (Government Printing Office, Stock No. 024-016-00095-1), 1978.
- Rehab Right*. Oakland, California: City of Oakland Planning Department, 1978 (pp. 78-83).
- "Sealing Leaky Windows." *Old House Journal* (no. 1, 1973): 5.
- Smith, Baird M. "Preservation Briefs: 3 Conserving Energy in Historic Buildings." Washington, DC: Technical Preservation Services, U.S. Department of the Interior, 1978.

1981

Photo Documentation



Image 23: Linden Street Elevation



Image 24: Walnut Street Elevation



Image 25: Corner of Linden and Walnut



002-1-Exterior



002-1-Interior



002-1-Interior Detail 1



002-2-Exterior



002-2-Interior



002-2-Interior Detail 1



002-2-Interior Detail 2



002-3-Exterior



002-3-Interior



002-3-Interior Detail 1



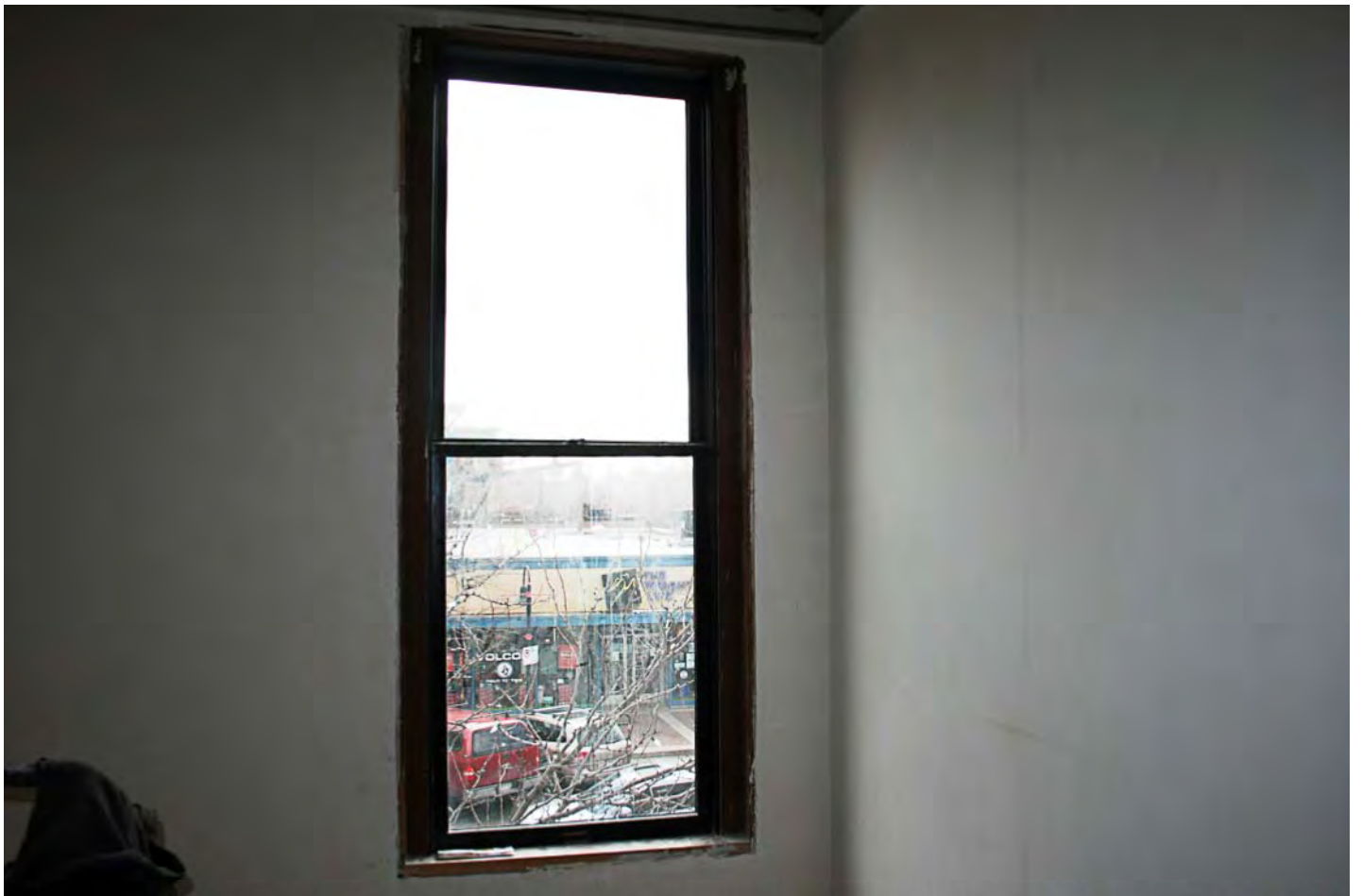
002-3-Interior Detail 2



002-3-Interior Detail 3



002-4-Exterior



002-4-Interior



002-4-Interior Detail 1



002-4-Interior Detail 2



002-4-Interior Detail 3



002-5-Exterior



002-5-Interior



002-5-Interior Detail 1



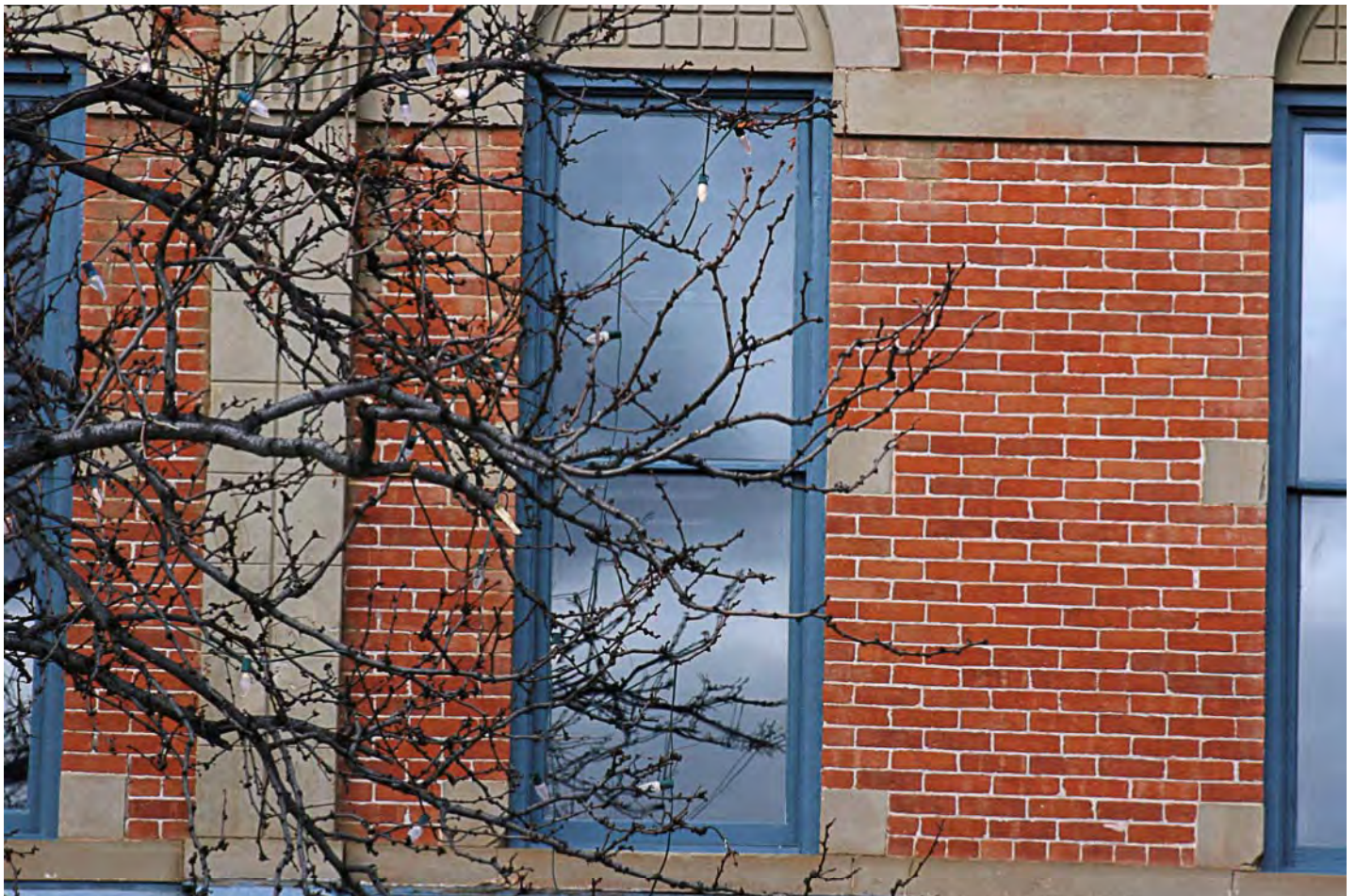
002-6-Exterior



002-6-Interior



002-6-Interior Detail 1



002-7-Exterior



002-7-Interior



002-7-Interior Detail 1



002-7-Interior Detail 2



002-7-Interior Detail 3



002-8-Exterior



002-8-Interior



002-8-Interior Detail 1



002-8-Interior Detail 2



002-9-Exterior



002-9-Interior



002-9-Interior Detail 1



002-9-Interior Detail 2



002-10-Exterior



002-10-Interior



002-10-Interior Detail 1



002-10-Interior Detail 2



002-10-Interior Detail 3



002-11-Exterior



002-11-Interior



002-11-Interior Detail 1



002-11-Interior Detail 2



002-12-Exterior



002-12-Interior



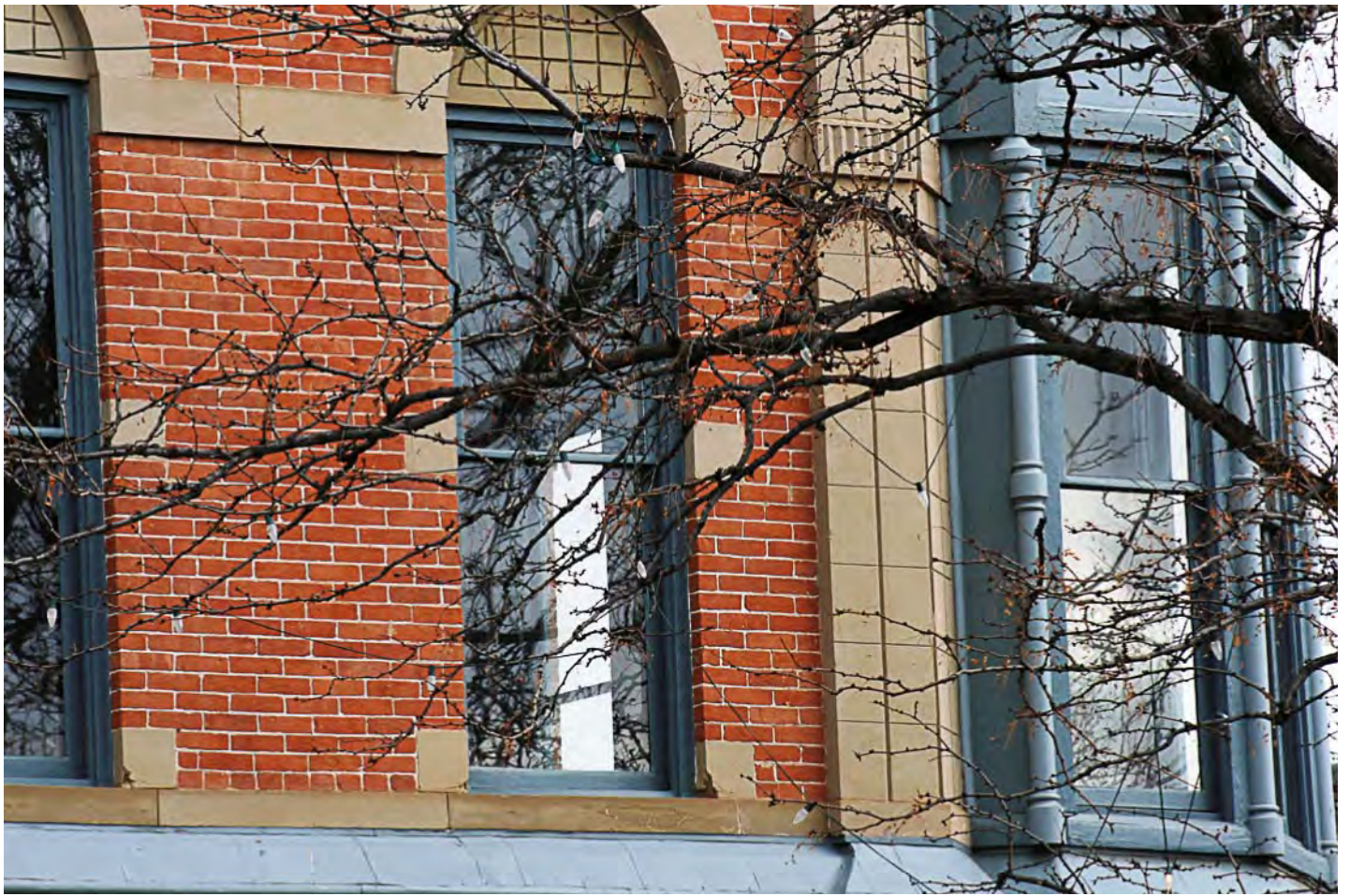
002-12-Interior Detail 1



002-12-Interior Detail 2



002-12-Interior Detail 3



002-13-Exterior



002-13-Interior



002-13-Interior Detail 1



002-13-Interior Detail 2



002-14-Exterior



002-14-Interior



002-14-Interior Detail 1



002-14-Interior Detail 2



002-15-Exterior



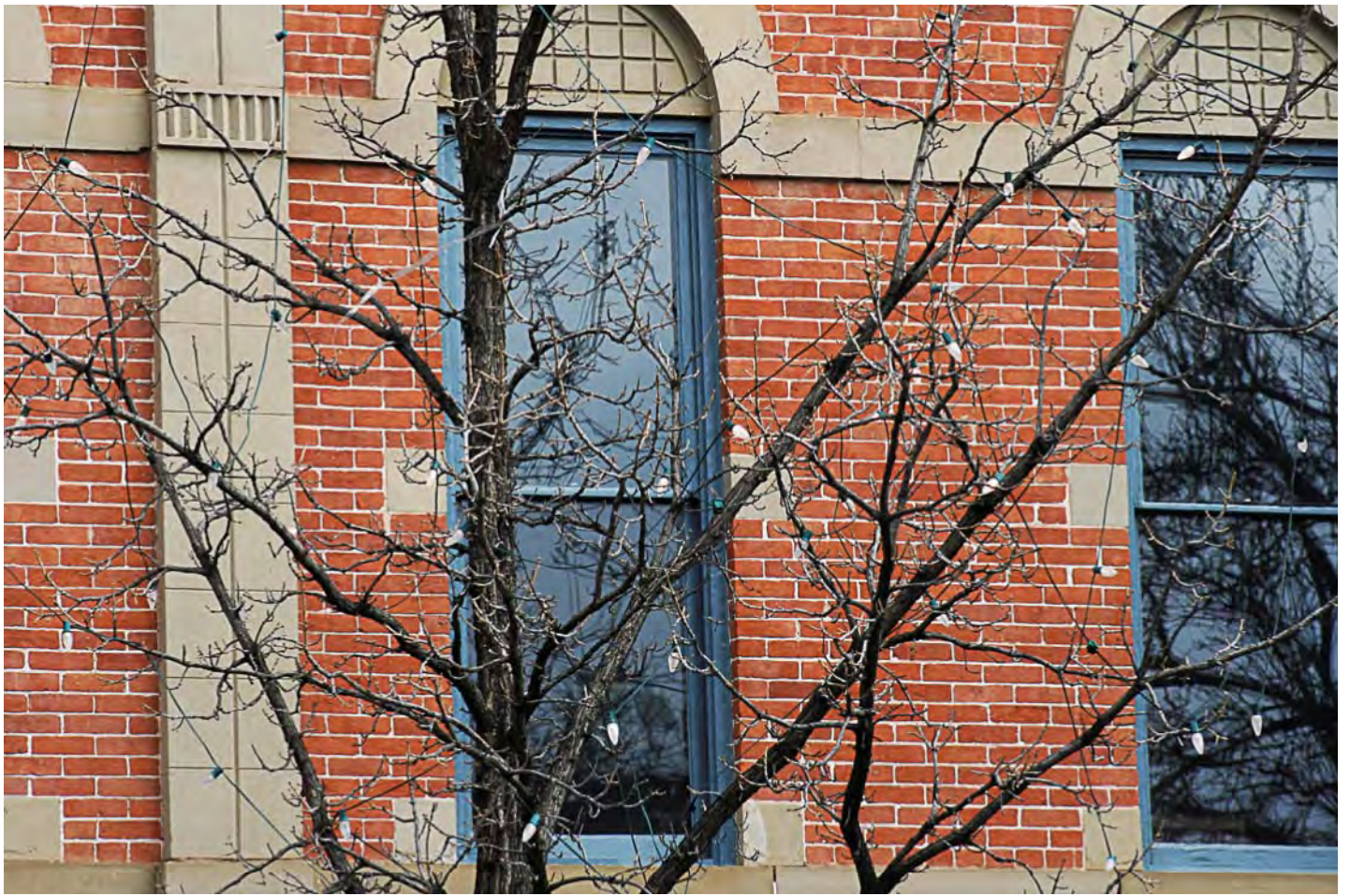
002-15-Interior



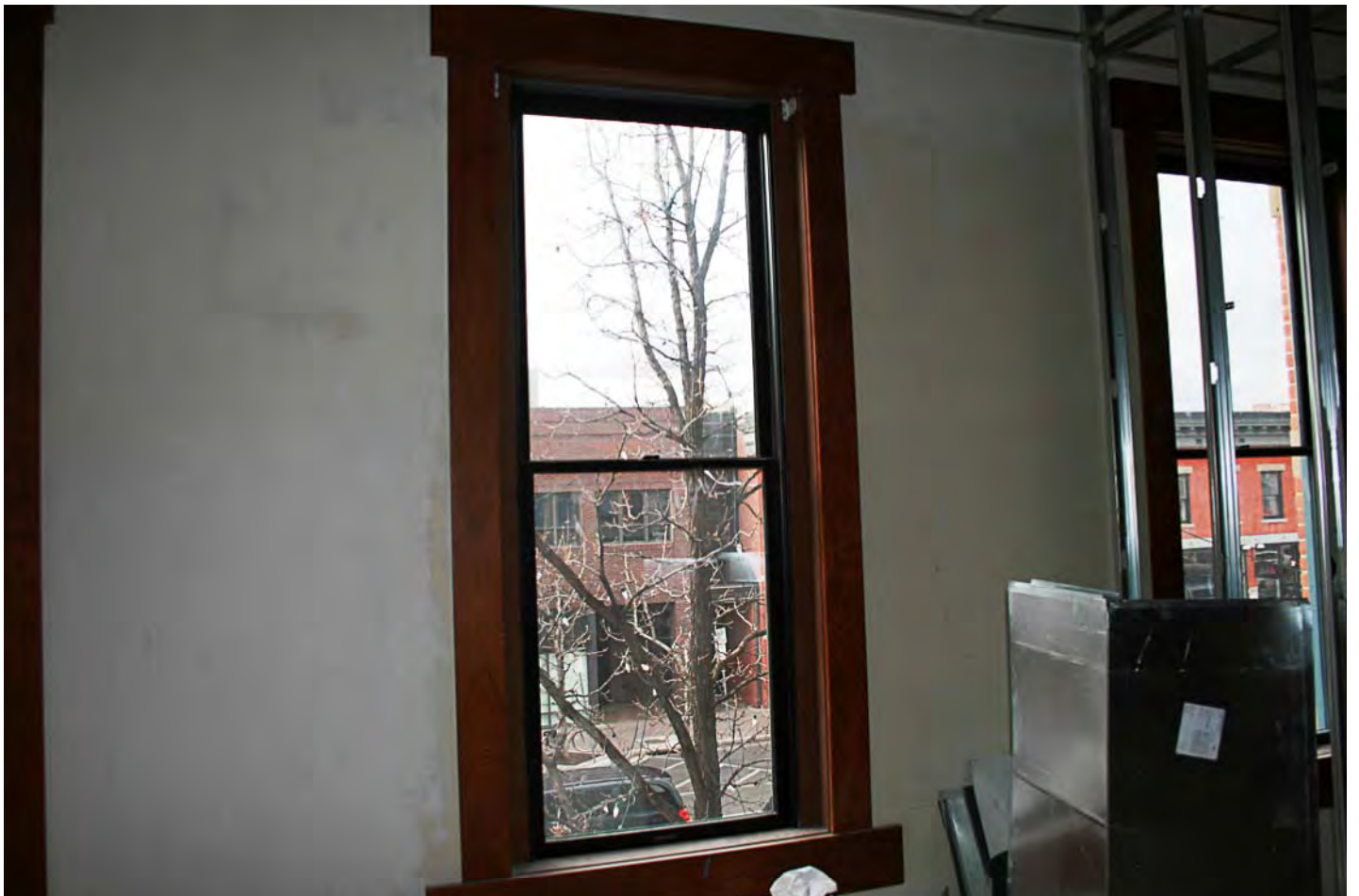
002-15-Interior Detail 1



002-15-Interior Detail 2



002-16-Exterior



002-16-Interior



002-16-Interior Detail 1



002-17-Exterior



Note to
Installer/Gas Fitter/Electrician
1. Please push in tabs at time of in-
stallation.
2. Before performing connections, carefully pull back
cover to replace in tabs.
3. After performing connection, please replace cover
in tabs.

002-17-Interior



002-17-Interior Detail 1



002-17-Interior Detail 2



002-18-Exterior



002-18-Interior



002-19-Exterior



002-19-Interior



002-19-Interior Detail 1



002-19-Interior Detail 2



002-20-Exterior



002-20-Interior



002-20-Interior Detail 1



002-20-Interior Detail 2



002-21-Exterior



002-21-Exterior Detail 1



002-21-Interior



002-21-Interior Detail 1



002-21-Interior Detail 2



002-21-Interior Detail 3



002-22-Exterior



002-22-Interior



002-22-Interior Detail 1



002-22-Interior Detail 2



002-22-Interior Detail 3



002-22-Interior Detail 4



02-23-Exterior



002-23-Interior



002-23-Interior Detail 1



002-23-Interior Detail 2



002-24-Exterior



002-24-Interior



002-24-Interior Detail 1



002-24-Interior Detail 2



002-25-Exterior



002-25-Interior



002-25-Interior Detail 1



002-25-Interior Detail 2



003-1-Exterior



003-1-Interior



003-1-Interior Detail 1



003-2-Exterior



003-2-Interior



003-2-Interior Detail 1



003-2-Interior Detail 2



003-3-Exterior



003-3-Interior



003-3-Interior Detail 1



003-4-Exterior



003-4-Interior



003-5-Exterior



003-5-Interior



003-5-Interior Detail 1



003-5-Interior Detail 2



003-6-Exterior



003-6-Interior



003-6-Interior Detail 1



003-6-Interior Detail 2



003-7-Exterior



003-7-Interior



003-7-Interior Detail 1



003-7-Interior Detail 2



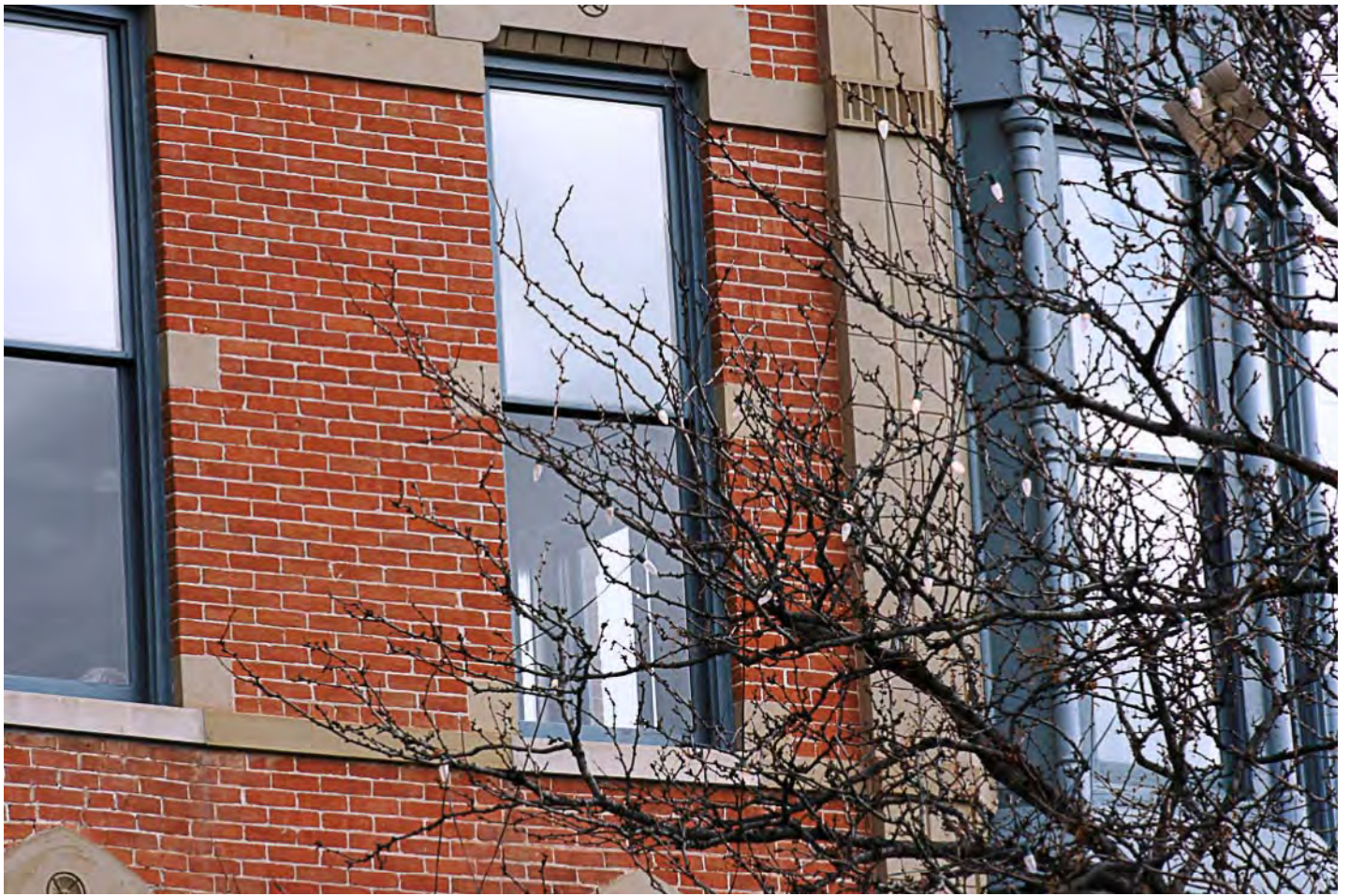
003-8-Exterior



003-8-Interior



003-8-Interior Detail 1



003-9-Exterior



003-9-Interior



003-9-Interior Detail 1



003-9-Interior Detail 2



003-9-Interior Detail 3



003-10-Exterior



003-10-Interior



003-10-Interior Detail 1



003-10-Interior Detail 2



003-11-Exterior



003-11-Interior



003-11-Interior Detail 1



003-12-Exterior



003-12-Interior



003-12-Interior Detail 1



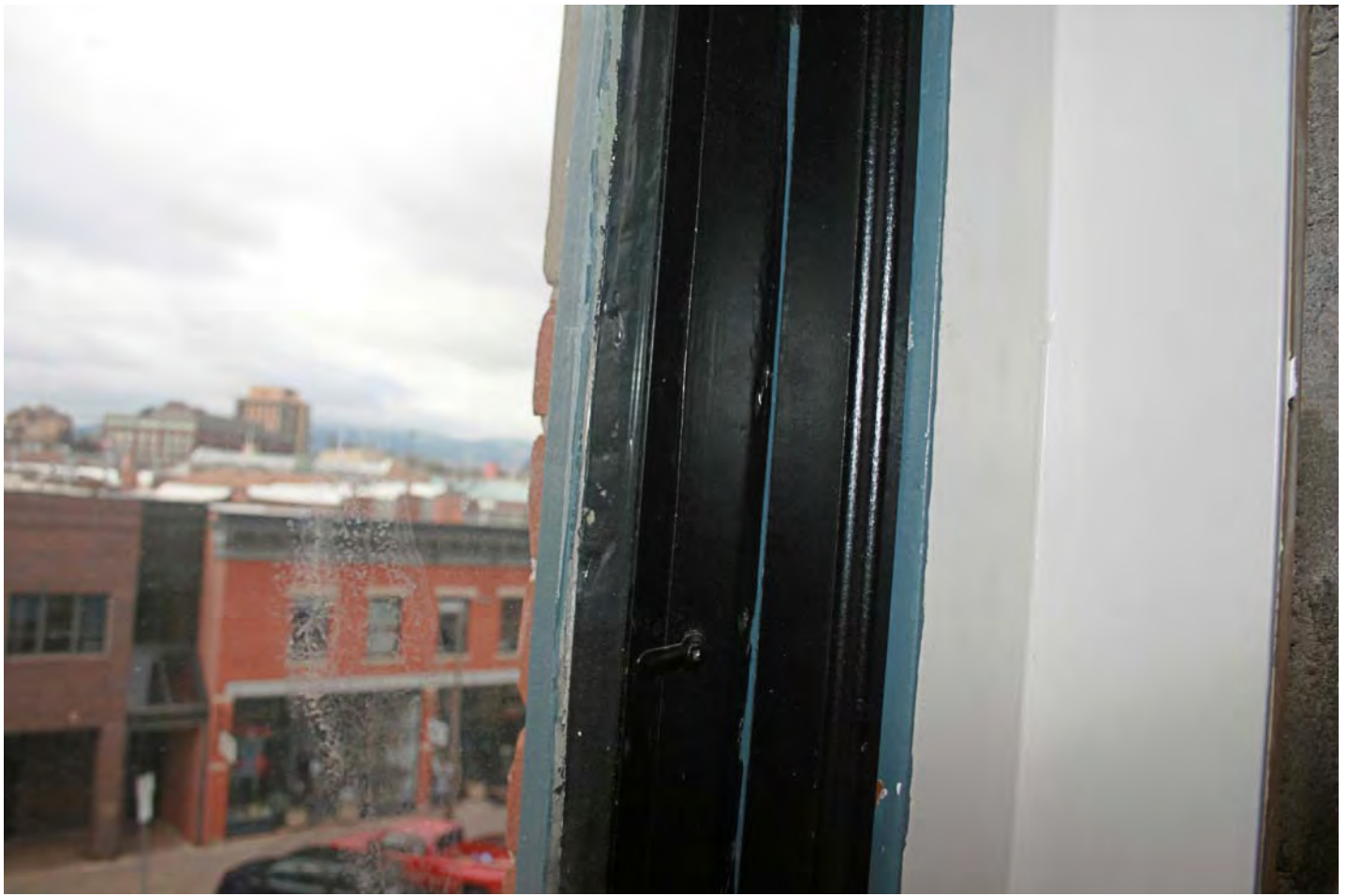
003-13-Exterior



003-13-Interior



003-13-Interior Detail 1



003-13-Interior Detail 2



003-14-Exterior



003-14-Interior



003-14-Interior Detail 1



003-14-Interior Detail 2



003-14-Interior Detail 3



003-14-Interior Detail 4



003-14-Interior Detail 5



003-14-Interior Detail 6



003-14-Interior Detail 7



003-15-Exterior



003-15-Interior



003-16-Exterior



003-16-Interior



003-17-Exterior



003-17-Interior



003-18-Interior



003-18-Interior Detail 1



Corner of Linden and Walnut



Linden Street Elevation_Faces Southeast



Walnut Street Elevation, Faces Southwest



Replacement windows_Northwest elevation_Alley 2



Replacement windows_Northwest elevation_Alley



May 10, 2019

Dohn Construction
2642 Midpoint Drive
Fort Collins, CO 80525

Attn: Stephani Unfug
Re: 201 Linden – Historic Windows

Josh,

Attached with this letter is the window survey that we performed on the Historic Linden Hotel located at 201 Linden. We were looking at the condition of the windows on the 2nd and 3rd floor and did not review or comment on the 1st floor windows and doors. In reviewing the photos in the entry way as well as a little research on the project we believe that the windows were restored or at least repainted in 1994. From what I had found, it appeared that the city of Fort Collins and/or the State of Colorado contributed to the restoration of the exterior façade. But it does not appear that much if any work or maintenance has been done on the windows since then.

After going through all the windows the condition of the majority are fairly similar. The paint on the West sills and lower sash are some of the worst. However I understand that these are to be replaced as they are not original to the building. The bottom rail on the lower sash on the South are a little better and the East side, are the best. However, all of the sash should be pulled upper and lower and repainted. The sills in some locations show a little more deterioration which could be repaired by epoxy fillers and then painted or a metal sill cover done to and match the existing wood. This would provide a longer lasting finish and a better slope for water drainage.

There are a few check rails, bottom rails that should be repaired or replaced, but this affects less than 5% of the project. However something that was not done in the prior restoration would be to add some weather stripping to the lower sash. The sills on the East and South face have been covered by metal. A few of these need to be replaced and re-painted. Most of the

page two

upper sash are fixed in place. I would again fix them in place after taking them out to clean, paint and repair the frame and exterior trim. The lower sash should have a bulb weather stripping at the bottom of the bottom rail to the sill and on the check rail to contact the check rail on the upper sash. The sides could be done with either a metal 'T' rail system or brush weather stripping. I have had better results with the brush, so this would be my recommendation. This will help cut down the air and dirt that is blowing into the building.

The glazing of the windows is all complete with just a few windows that have had a film applied to the interior to block out some sunlight and heat. To help with sound control and thermal performance the sash could have an interior RDG (removable double glazing) applied to each sash in an opening. This would be not seen from the exterior and could be painted black to blend into the sash and trim that is being painted black. Since this will double the weight of the sash, we would use a spiral balance instead of ropes and weights. This will allow us to insulate the weight cavity also helping in sound transmission and thermal performance. This same system was done on all the historic windows in the Northern Hotel Project. We would need to change the sash lock to be changed based on the RDG panel. We would also fill all prior holes for sash lifts and apply to finger lifts that would be in an appropriate finish. Spacing would be worked out once the sashes are set in place. Also we would provide a cover for the spiral balance that would also act as a limiter for sash movement, as the owner has requested.

Along with the survey are a set of photographs that depict the condition of the openings. From this I used a simple rating system for the condition:

- 1) This is the worst condition for this part, needs paint cleaned maybe some epoxy fillers, priming and painting.
- 2) This is normal condition where the part needs to be cleaned would not need epoxy repairs just primed and painted.
- 3) This is for the best conditions. This may just need to be scuff sanded primed and painted.

I have listed all the glass as in #3 conditions, as there is no broken glass. There will be some glazing putty that needs to be repaired but that would be related to the work done on the wood parts noted as #1, maybe #2 after the paint is removed. Also, since these windows were restored in the 90's we would believe that there is no lead paint on the sash. I am not sure without any testing if there is lead paint on the frame or exterior trim.

Respectfully,

Mark Wernimont

PO Box 270682, Fort Collins, Colorado 80527-0682
(970) 226-1460 FAX (970) 797-6392 CELL (970) 402-2623

201 Linden
 Linden Street Residence
 Fort Collins, Colorado 80521

											Existing Condition						
Opening	Opening Sizes						Operation	Cut Light		Special Shape				Sash		Notes	
	Day Light		Sash		Masonry			Upper	Lower		Sill	Frame	Trim	Upper	Lower		Glass
201																	???
202																	???
203	32.25	24.75	36.75	57.50	42.00	62.50	Double Hung				1	2	2	2	2	3	
204	25.25	23.75	27.75	57.50	33.00	62.25	Double Hung	2w2h	2w2h		1	2	2	2	2	3	
205	32.75	25.63	36.75	57.50	42.00	62.00	Double Hung	2w2h	2w2h		1	1	2	2	1	3	3/4" Horz, 1 1/8" Vert Bars
206	32.75	25.63	36.75	57.50	42.00	62.50	Double Hung				1	2	2	2	2	3	
207	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	
208	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	
209	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	
210	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	
211	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	
212	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	
213	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	2	Film on Glass
214	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	2	Film on Glass
215	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	2	Film on Glass
216	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	2	Film on Glass
217	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	
218	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	
219	29.75	43.75	34.25	93.75	39.00	97.75	Double Hung				2	2	2	2	2	3	



May 31, 2019

Dohn Construction
2642 Midpoint Drive
Fort Collins, CO 80525

Attn: Stephani Unfug
Re: 201 Linden – Historic Windows

Stephani,

Based on our meeting on the job site Tuesday June 28th, Karen McWilliams asked for a description of the work that was done to the sash at 201 Linden on the 2nd and 3rd floor. My outline is the work that was completed on the mock up that we reviewed. I am not going to review all the work that was done to the sash back in 1997/1998 but will note a few items that we are leaving in place.

The original window sashes are and will remain in the same openings when this renovation project started. We are also only addressing the windows on the Walnut and Linden Street sides. The original putty glazing and paint was believed to have been removed in the early renovation, so we only cleaned up any failing glazing putty. The sash had any structural defects addressed and repaired by Dutchmen or epoxy fillers. The sash was then routed for the interior RDG (removable double glazing panel) that was attached for more thermal protection and sound control. The sash was also routed where the rope groove was to allow the spiral balance to be installed. This was sized for the weight of the sash. The existing weight pocket was filled with blown in insulation to again help with thermal and sound transmission. The upper sash was again fixed in place and a new sweep sash lock with a correct receiver added to the sash. The sash will have any prior sash lift or handle prep filled and a new pair of finger lifts installed. The lower sash has a bulb weather stripping installed at the check rail and bottom rail. This will sit on the metal sill covers done in the prior work. A brush weather strip is applied to the edge of the interior stop. All the weather stripping is hidden from view except the bottom bulb weather stripping when raised high enough. We also added a black leaf weather strip on the jamb at the parting stop. This helps seal out airflow and aids in the operation of the lower sash.

Once everything has be prepared, the sash is painted black as well as the RDG metal edge. The exterior is paint the matching Blue along with all the other exterior details. The interior wood sill, apron, jamb extensions and casing were changed base on the change in wall conditions and details. This work has been done by other firms.

Respectfully,

Mark Wernimont

201 Linden Street
Fort Collins, Colorado 80521



South East Corner



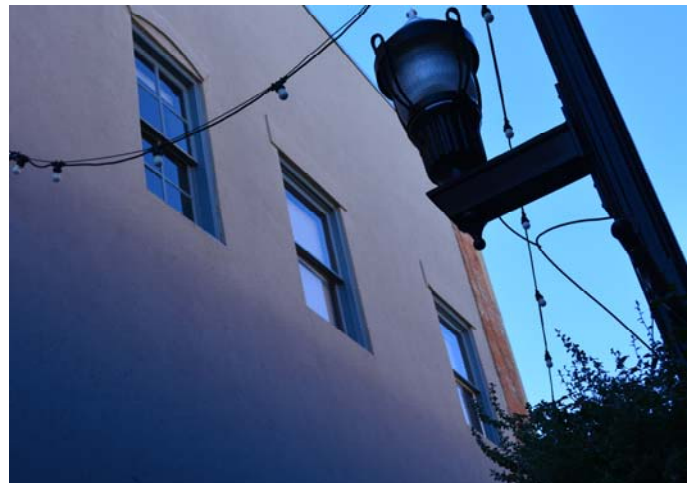
East Elevation



South Elevation



West Alley





2nd Floor Street Side Windows

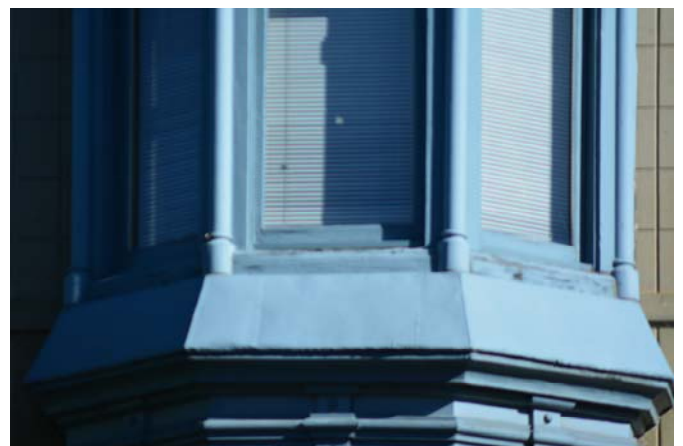


Third Floor West Windows



3rd Floor Corner Sill

3rd Floor Street Side Windows



2nd Floor Corner Sills

2nd Floor Pictures



3rd Floor Windows



Miscellaneous Photos















WB7900 Series

For Double/Single Hung, Non-Tilt/
Non-Take Out Style Windows



Actual Diameter 9/16"
Also Referred to as 5/8"

Order WB0618
Tension Tool:



Most Commonly Used
Accessory: WB0014



Bearing
Cross Pin
Rod → ← Hole

Recommended Sash Weight per Pair:

- White Bearing: Up to 12lbs
- Red (Orange) Bearing: 13-25lbs
- Blue Bearing: 26-35lbs
- Black Bearing: 36-40lbs





Meg Dunn, Chair
Alexandra Wallace, Vice Chair
Michael Bello
Katie Dorn
Kristin Gensmer
Per Hogestad
Kevin Murray
Anne Nelsen
Mollie Simpson

City Council Chambers
City Hall West
300 Laporte Avenue
Fort Collins, Colorado

The City of Fort Collins will make reasonable accommodations for access to City services, programs, and activities and will make special communication arrangements for persons with disabilities. Please call 221-6515 (TDD 224-6001) for assistance.

Video of the meeting will be broadcast at 1:30 p.m. the following day through the Comcast cable system on Channel 14 or 881 (HD). Please visit <http://www.fcgov.com/fctv/> for the daily cable schedule. The video will also be available for later viewing on demand here: <http://www.fcgov.com/fctv/video-archive.php>.

Regular Meeting December 19, 2019 Minutes

- **CALL TO ORDER**

Chair Dunn called the meeting to order at 5:31 p.m.

- **ROLL CALL**

PRESENT: Dunn, Wallace, Hogestad, Dorn, Bello, Nelson, Simpson (late)
ABSENT: Gensmer, Murray
STAFF: Bzdek, Bumgarner, Yatabe, Schiager

- **AGENDA REVIEW**

No changes to posted agenda.

- **STAFF REPORTS**

Ms. Bzdek thanked the Commission for this year of service, particularly Per Hogestad who will be moving to the Planning and Zoning Board. She also informed the Commission that Anna Simpkins would be filling that vacancy and Meg Dunn was reappointed.

She announced several upcoming events, including a meeting on Monday, January 14th with the Greeley, Loveland, and Windsor landmark commissions and Historic Larimer County members, the statewide Saving Places Conference in Denver from February 4th-7th, and the LPC annual training retreat at Primrose Studio on February 22nd.

● **PUBLIC COMMENT ON ITEMS NOT ON THE AGENDA**

None

● **DISCUSSION AGENDA**

1. CONSIDERATION AND APPROVAL OF THE MINUTES OF THE NOVEMBER 14, 2018 REGULAR MEETING.

The purpose of this item is to approve the minutes from the November 14, 2018 regular meeting of the Landmark Preservation Commission.

Ms. Wallace moved that the Landmark Preservation Commission approve the minutes of the November 14, 2018 regular meeting as presented. Ms. Nelsen seconded. The motion passed unanimously.

2. FARRINGTON PROPERTY 322 EDWARDS STREET - APPLICATION FOR FORT COLLINS LANDMARK DESIGNATION

PROJECT DESCRIPTION: This item is to consider the request for a recommendation to City Council regarding landmark designation for the Farrington Property, a great example of a late-Victorian Classic Cottage built circa 1900.

APPLICANT: Adrian, Alan, and Elizabeth MacDonald, Owners

Staff Report

Ms. Bumgarner presented the staff report noting the property owners have consented to the proposed landmark designation. She showed photos of the home and its outbuildings. She stated the property is being nominated for designation under Standard C for Design Construction and Staff agrees with the application that the property meets all seven aspects of integrity.

Ms. Bumgarner outlined the role of the Commission in this proceeding.

Applicant Presentation

None

Public Input

None

Commission Questions & Discussion

None

Commission Deliberation

Ms. Dorn moved that the Landmark Preservation Commission pass a resolution recommending that City Council designate the Farrington Property as a Fort Collins Landmark in accordance with Municipal Code Chapter 14, based on the property's significance under Standard C for its design as a Classic Cottage style residence, and its preponderance of exterior integrity.

Ms. Nelsen seconded.

Chair Dunn stated she agrees with the property's significance under Standard C, but also believes it could possibly be significant under Standard A, Events, citing the machine shop on the property and lack of zoning at the time.

Mr. Hogestad commented that it was unusual to find a home this well intact, with only the minor addition of the porch. He asked if there is a preservation plan for any of the outbuildings. Ms. Bumgarner replied there is currently no plan in place; however, Staff can work with the property owners to assist with maintenance.

Chair Dunn noted this home is a prime example of a working-class home.

The motion passed 6:0.

[Secretary's Note: The Commission took a brief break at 5:48 while awaiting Ms. Simpson's arrival.]

3. 201 LINDEN STREET, LINDEN HOTEL – CONCEPTUAL/FINAL DESIGN REVIEW

PROJECT DESCRIPTION: This is a request for design review of replacement windows at the Linden Hotel, 201 Linden Street. The property is designated as a Fort Collins Landmark and is listed on the National Register of Historic Places and the Colorado State Register of Historic Properties. The proposed work involves replacing historic windows with new windows.

APPLICANT: Stephani Unfug, Project Manager, Dohn Construction.

Ms. Simpson joined the Commission at 5:54 pm.

Mr. Hogestad recused himself from this item due to a conflict of interest.

Staff Report

Ms. Bzdek presented the staff report stating this design review application is associated with the conversion of the second and third stories of 201 Linden Street to condominiums. The item tonight is specifically related to window replacement. The Applicant is seeking to remove and replace the historic windows on the second and third stories. Staff finds that the proposed work does not comply with any of the five requirements for alterations to designated landmarks and therefore has no basis for a recommendation of approval. Some of the window work was completed without the knowledge of Historic Preservation Staff.

Ms. Bzdek provided a history of the property and discussed its 1994 rehabilitation. She noted Staff has a consultant's report about the existing condition of the windows to help determine if the unapproved work rendered them beyond repair. The report concluded the windows can be brought back to full function by following a full restoration program.

Ms. Bzdek discussed the Commission's questions from the work session. Regarding the projected lifespan of historic windows, Ms. Bzdek stated there is no ability to predict when historic windows would fail given proper maintenance and restoration.

Ms. Bzdek discussed Staff findings on this item stating the proposal is not consistent with or supportive of the previous public and private investments and historic rehabilitation of the structure to date. The proposal does not comply with standards because it creates an adverse effect on the general character of the landmark, does not preserve the historic window materials, changes key exterior characteristics of a landmark building, fails to demonstrate necessity for the protection and enhancement of the landmark, and fails to satisfy the applicable Secretary of the Interior Standards for rehabilitation or the City's standards regarding the Old Town Historic District.

Ms. Bzdek outlined the role of the Commission in this decision.

Applicant Presentation

Stephani Unfug, Applicant, introduced consultant Mark Wernimont to discuss the windows. He discussed work done in 1997 to the existing windows and stated he completed a window survey in 2006. He asked if the City has adopted the 2017 Interior Standards and explained the 1997 window work stating it appeared the pulleys and weights for the upper sash were removed. The windows were set from the exterior and caulked into place, necessitating their removal from the exterior which did cause some damage. He stated the sash from the windows were not thick enough to support the large windows and lead-based paint was used to paint the windows; the lead from which remains whether or not the paint has been removed.

Mr. Wernimont discussed the addition of a second pane of glass to keep out road noise and wind and discussed the decision to use a spiral balance in the window that will carry the weight of the sash. He stated he has the weights and a few pulleys left on the site and the storm windows can come off the sash; however, that would result in the building not being conducive to a residential use given insulation issues. He stated the window system is not a new process and exists in other historic structures in the city.

David Deihl, manager of the LLC owners, stated the owners' intent is to return the building to a residential use in a way that will make it last longer than it otherwise would.

Public Input

Ann McCleave, historic preservation specialist with the State Historical Fund, stated the Fund provided a \$100,000 grant toward the 1994 rehabilitation, and replacing windows that could be repaired does not meet the Secretary of the Interior Standards.

Myrne Watrous discussed the original windows in her 90-year-old home and other buildings in the city. She requested the Commission deny the Applicant's request.

Phil Barlow, Barlow Cultural Resource Consulting, stated he was contracted by the City to evaluate the windows and provide an opinion as to whether they could be saved.

Ron Anthony, wood scientist, discussed his credentials in the field and stated old growth wood, if properly maintained, can last indefinitely.

Staff Response

Ms. Bzdek responded to Mr. Wernimont's question about the 2017 Interior Standards stating there was a revision of the interpretive document in 2017 for the Secretary of the Interior Standards; however, the Standards themselves have not been revised. Ms. Bzdek reiterated that the Commission needs to decide if meets Standards.

Applicant Response

Mr. Wernimont asked Mr. Anthony if a member of a wood structure should be replaced if it is improperly designed or undersized. Mr. Anthony replied that is part of the philosophical debate for preservation commissions.

Commission Questions

Mr. Bello asked if the windows are currently single-paned or double-paned. Mr. Wernimont replied the windows are single glazed windows with a second pane of glass applied to the interior. The proposal is to change the glass to be insulated.

Mr. Bello stated the improvements and window replacement are not in character with the original building.

Chair Dunn noted the work that has already been done was completed without permission.

Mr. Bello asked about the absorption of lead-based paint. Mr. Wernimont replied lead in the window sash will remain for as long as the wood is still there.

Chair Dunn asked if the second pane of glass mentioned is on the interior of the historic window. Mr. Wernimont replied in the affirmative and stated sills should be replaced as part of a restoration.

Ms. Simpson asked Mr. Barlow about energy efficiency. Mr. Barlow replied his report recommended storm windows which are not attached to the sash.

Ms. Dorn asked who was involved in performing the rehabilitation work without first bringing it before Staff or the Commission. Ms. Unfug replied she was not aware there were more steps involved as the project received a building permit through the City process.

Ms. Bzdek noted window replacement does not require a permit and therefore falls under Section 14, proposed work to a landmark that does not require a building permit.

Ms. Dorn asked what entity is responsible for the work on the project. Doug Dohn, Dohn Construction, replied he received a building permit that he understood was routed through all departments. He stated he had met with the LPC about other issues and noted the exterior of the windows is not being changed.

Ms. Dorn asked if the scope of work included the window work. Mr. Dohn replied it was in the scope of work for the building permit.

Chair Dunn clarified Mr. Dohn met with design review subcommittees, not the entire Commission.

Ms. Dorn asked Staff if the window work was part of the scope of work. Ms. Bzdek replied her review of the document shows it to include normal repair and maintenance of the windows.

Ms. Dorn stated there should have been a conceptual review on this issue before the entire Commission.

Mr. Bello agreed but stated the work on the windows could fall within the purview of 'repair.'

Chair Dunn disagreed adding glass is considered repair and stated the addition of the glass is causing the windows to operate improperly, therefore the Applicant wants to replace them.

Ms. Dorn suggested this is demolition by neglect as the Applicant did not come forward with a full scope of work.

Ms. Wallace asked if Mr. Dohn would consider this type of work to fall under 'maintenance and repair' for other projects.

Mr. Yatabe suggested the Commission focus more on the application at hand rather than on the previous work completed.

Ms. Simpson asked Mr. Barlow about lead paint absorption. Mr. Barlow replied he did get a positive lead result in his testing and confirmed that lead will soak into wood. Stripping the paint layers and resealing the lead left in the wood by repainting is an acceptable practice.

Ms. Nelsen asked if the lead can be encapsulated with a new coat of paint. Mr. Barlow replied it can be encapsulated with a coat of primer and two paint coats.

Ms. Wallace asked Mr. Barlow if his opinion or recommendation has changed based on the information he has received this evening. Mr. Barlow replied in the negative and stated he believes the windows can be restored to an acceptable level of preservation.

Ms. Simpson asked Ms. Watrous if the single pane windows have affected her way of living. Ms. Watrous replied in the negative but noted she does have storm windows.

Ms. Dorn asked if the Applicant is aware of the financial incentives for properly rehabilitating historic buildings. Mr. Deihl replied in the affirmative but stated the owners would like to do what is best for the longevity of the building. He stated some similar incentives for energy efficiency gains would exist with window replacement.

Mr. Anthony commented residual lead in wood is so low it is inconsequential.

Move to Final Review

Ms. Simpson moved that the Landmark Preservation Commission move to Final Review of the proposed work at the Linden Hotel, 201 Linden Street.

Ms. Nelson seconded.

Ms. Simpson asked about operability and safety concerns and whether there have been issues in other buildings. Ms. Bzdek replied she cannot think of any that have proved to be unresolvable.

The motion passed 7:0.

Final Review Commission Questions and Discussion

Chair Dunn read portions of Chapter 14 to provide a framework for the Commission understanding its purpose.

She stated the first item for the Commission to consider is the effect this application would have upon the character of the landmark. Mr. Bello asked if denying this application would be stating the character of the new windows does not align with the general historic and architectural character of the landmark. Chair Dunn replied in the affirmative.

Mr. Bello stated he is struggling with whether the new windows are vastly different in appearance from the historic windows.

Ms. Nelsen asked if the glass is original. Mr. Wernimont replied there are only 3 pieces of historic glass left after the work done between the 1990's and now.

Mr. Bello stated the new windows do not appear to change the character of the building. Ms. Dorn replied the windows are a character-defining feature of the building and replacing them with a non-historic window adversely affects the structure.

Ms. Wallace stated she is concerned about the removal of the historic fabric of the building.

Ms. Simpson stated she understands Mr. Bello's point, but wonders if changing the proportion of sash to window creates a false sense of history.

Mr. Bello asked if it would be possible to replace the windows with the same proportions. Mr. Wernimont replied in the affirmative.

Chair Dunn noted it is possible to make the windows energy efficient while still using the historic fabric of the building.

Mr. Bello stated the intent of Standard B1 is met if the windows can be replaced by new windows of the same dimensions.

Ms. Nelsen stated it has not been proven necessary for the windows to be replaced.

Chair Dunn stated the Commission needs to address authenticity.

Ms. Dorn stated removing the windows involves destroying an exterior characteristic of the building, which would adversely affect the building.

Chair Dunn outlined Standard 4, the effect of the proposed work upon the protection, enhancement, perpetuation, and use of the landmark or landmark district. Mr. Bello stated replacing the windows would have no effect on the use of the building, would enhance the building from a usability standpoint, and protect its longevity.

Chair Dunn requested input as to whether replacing the windows will increase the lifespan of the building. Ms. Wallace replied repairing the existing windows would do the same thing without adding new materials.

Ms. Nelsen asked about the possibility of damaging the window openings in the process. Mr. Wernimont replied he has never damaged any structure in replacing a window.

Chair Dunn asked about the status of the building's bay windows. Mr. Wernimont replied there is still some structural design that must be done as the window frames are supporting the floor and roof structure.

Chair Dunn outlined Standard 5 which relates to the Secretary of the Interior and Downtown Standards. She noted repair is preferred over replacement.

Ms. Dorn stated mimicking falls under creating a false sense of historic development. Chair Dunn stated damaged materials should be replaced in kind.

Ms. Dorn stated historic windows are good examples of projects wherein deteriorated components can be replaced or repaired. However, modern windows are usually created as units requiring the replacement of the entire thing.

Mr. Bello asked if that is a true statement. Mr. Wernimont replied components of new windows can be replaced, particularly if they are all wood, and they could potentially last for as long as historic windows.

Ms. Dorn asked about the report that some window components need to be repaired or maintained but do not necessarily need to be replaced. Chair Dunn noted the Applicant's plan of protection states any window components that are removed will be protected whenever possible for reuse by the appropriate City organization. She stated that suggests there is quite a bit of reusable material.

Ms. Dorn questioned if the alteration of the windows would destroy historic materials that characterize the property.

Ms. Wallace asked about grooves cut into the face of the historic sash. Mr. Wernimont replied the existing grooves were increased in size to accommodate the balance mechanism. Ms. Wallace stated that has then destroyed historic materials.

Chair Dunn discussed the Old Town Historic Design Standards which prioritize repair and restoration over replacement. Ms. Simpson stated replacing the windows does not meet these Standards. Ms. Nelsen agreed.

Ms. Nelsen stated the possibility for repair versus replacement has not been exhausted.

[Secretary's Note: The Commission took a brief break at this point in the meeting and resumed at 8:48pm.]

Commission Deliberation

Ms. Nelson moved that the Landmark Preservation Commission deny the application for 201 Linden Street as the Commission finds that the proposed work erodes the authenticity, destroys distinctive exterior features or characteristics of the improvements or site and is not compatible with the distinctive characteristics of the landmark or landmark district, or with the spirit and purpose of City Code Chapter 14.

This decision is based upon the Commission's consideration of the five criteria set forth in City Code Section 14-48(b) for which the Commission makes the following findings:

- **The windows are a predominant character of the street-facing façade and by removing them, their historic texture and materials would not be retained and destroying their exterior characteristics has been found to be unnecessary.**
- **Replacing the windows is not required to perpetuate the building's use and is not in line with the Secretary of the Interior Standard for rehabilitation nor the Old Town Historic District Design Standards.**
- **Ms. Nelsen also moved to adopt the Staff findings and explanations of the five criteria.**

Ms. Dorn seconded.

Mr. Bello disagreed that the application does not meet any of the criteria and stated it is myopic thinking not to consider other issues such as the City's Climate Action Plan goals. He stated he would not support the motion.

Ms. Dorn stated she would support the motion as the application does not meet any of the Chapter 14 standards. She stated windows should be repaired if possible and components beyond repair should only be replaced on a case-by-case basis.

Ms. Simpson stated she supports the motion as she has not been convinced replacing the windows accomplishes anything window repair cannot.

Ms. Wallace stated she would support the motion as alternatives have not been fully examined and criteria have not been met to support the application.

Ms. Nelsen stated she does share some of Mr. Bello's concerns; however, the Commission has a specific charge and other viable alternatives have yet to be explored.

Chair Dunn stated she would support the motion and agrees the windows should be dealt with on a case-by-case basis. Additionally, she stated it is important standards are met for this historic building. She stated more discussion should occur and agreed energy conservation is important.

The motion passed 5:1, Bello dissenting.

Ms. Bzdek stated Staff has provided next step recommendations for the Applicants' consideration. A design review process will be required, and any changes will require a conceptual review by the Commission.

Ms. Simpson thanked the Applicant for stating their interest in preserving the building and stated she hopes an agreement on how to do that can be reached.

Mr. Hogestad rejoined the Commission.

4. HISTORIC PRESERVATION LAND USE CODE CHANGES

PROJECT DESCRIPTION: Revisions to Land Use Code Section 3.4.7, Historic and Cultural Resources, as they relate to standards governing the review of developments affecting historic resources.

APPLICANT: City of Fort Collins

Staff Report

Ms. Bzdek presented the staff report and discussed the goals of Section 3.4.7. She detailed the process of identifying the 200-foot area of adjacency, identifying any historic resources within that boundary, surveying potential resources, and identifying the historic influence area. She showed examples of mapping this process. She also discussed the proposed process for addressing historic resources on development sites, as well as the process for addressing eligible properties.

Public Input

None

Commission Questions

Chair Dunn asked if diagrams would be included in the Code. Ms. Bzdek replied one simplified schematic will be included.

Commission Deliberation

Ms. Simpson moved that the Landmark Preservation Commission enthusiastically recommend to City Council the approval of the proposed changes to Land Use Code (LUC) Section 3.4.7.

Ms. Nelsen seconded.

The motion passed 7:0.

● **OTHER BUSINESS**

None

● **ADJOURNMENT**

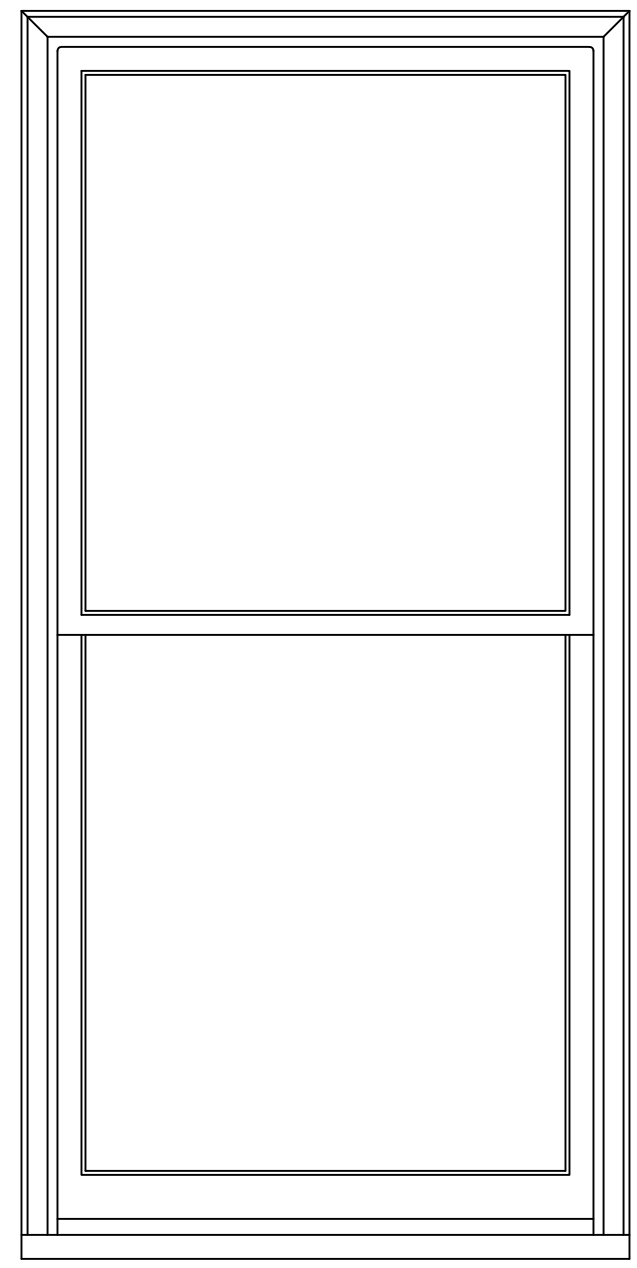
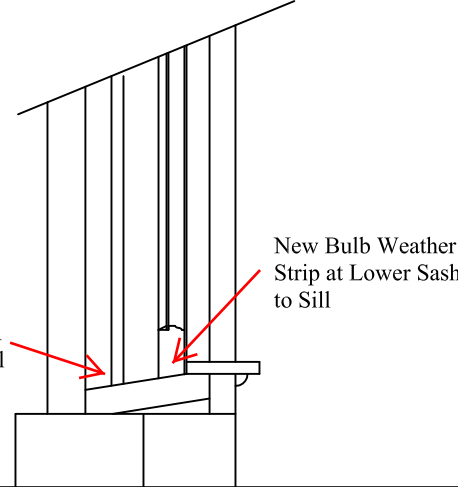
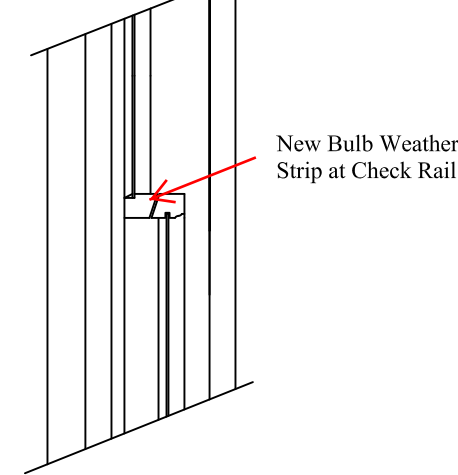
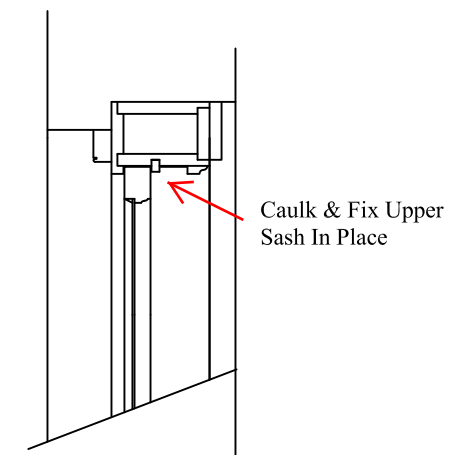
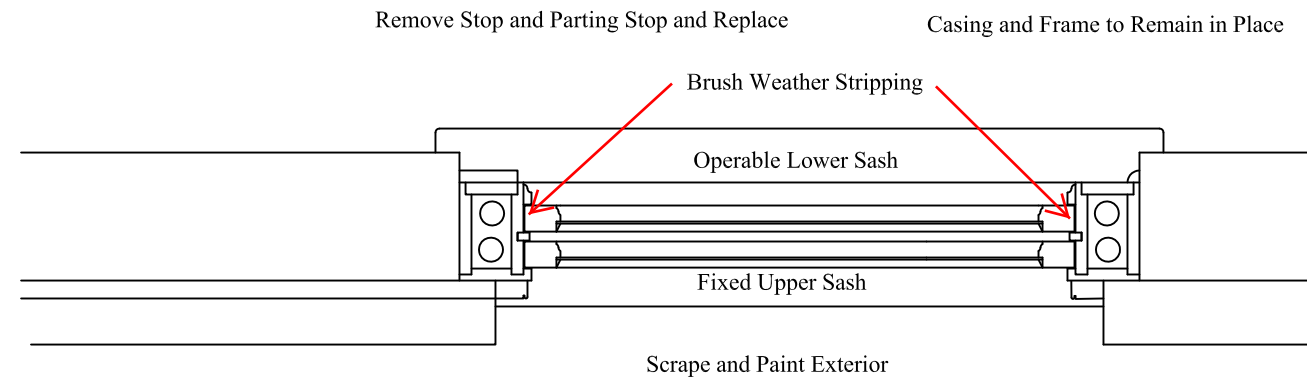
Chair Dunn adjourned the meeting at 9:32 p.m.

Minutes prepared by Tara Leman, Tripoint Data, and respectfully submitted by Gretchen Schiager.

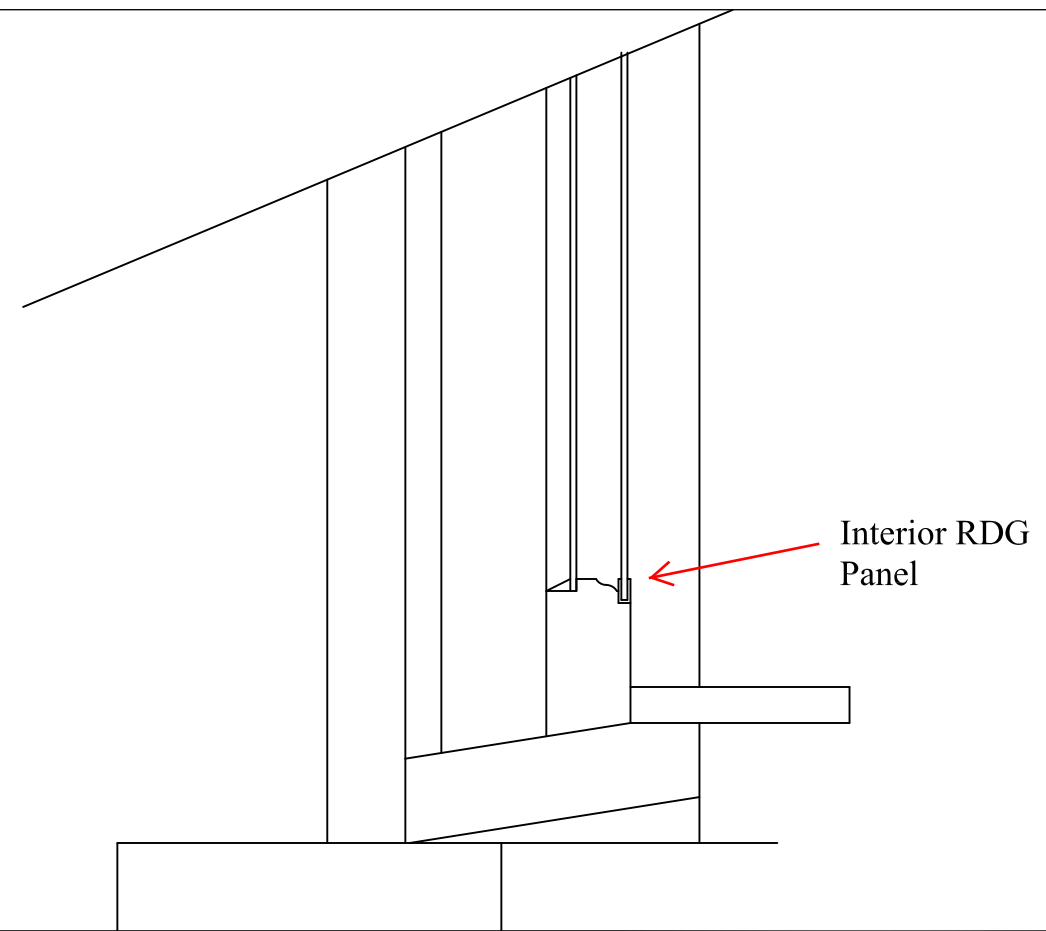
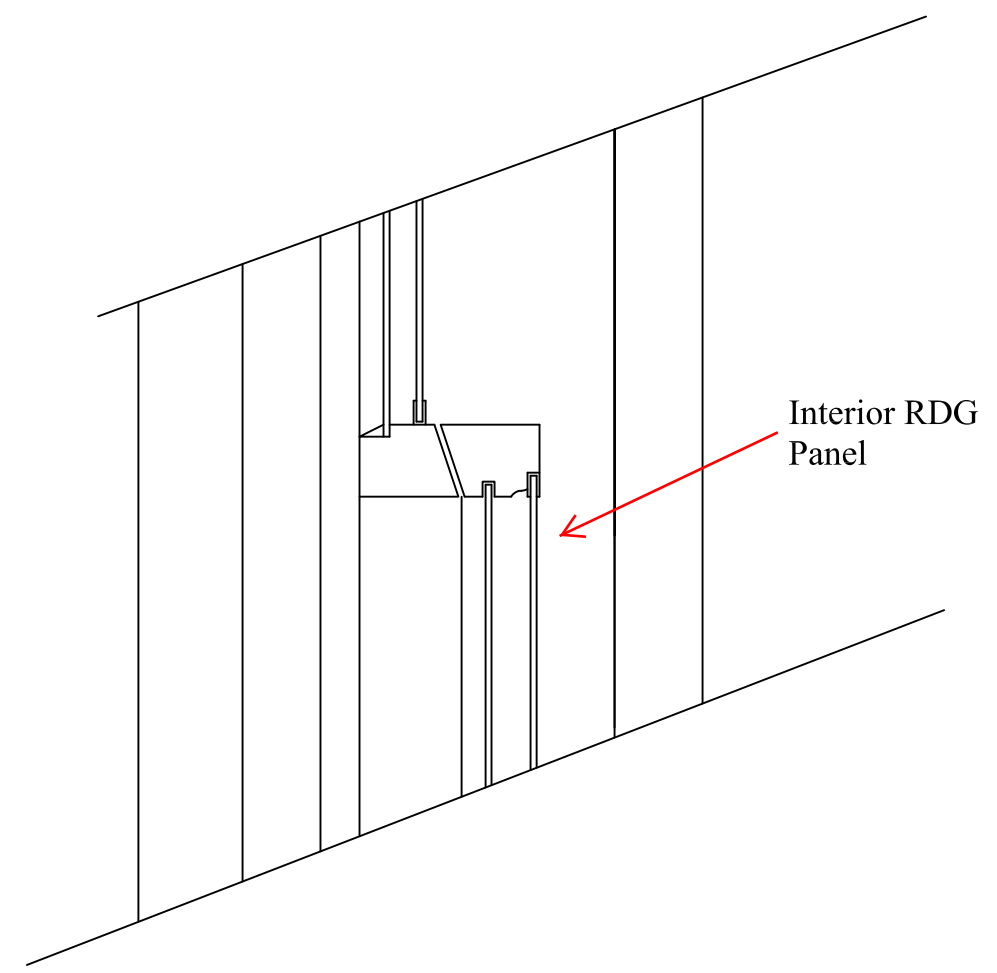
Minutes approved by a vote of the Commission on Jan 16, 2019



Meg Dunn, Chair



Scrape & Paint Sill or Clad With Metal



FIRST ISSUE DATE	DATE
October 6, 2006	
REVISIONS	
▲	
▲	
▲	

ARCHITECT	CONTRACTOR	DRAWN BY	SCALE
Ogelsby Design	John Construction	mw	1/4" = 1'-0"

Colorado Sash & Door, Inc.
 PO Box 270682
 Fort Collins, Colorado 80527
 Ph (970) 226-1460 E-mail mwerimoni@colosash.com

201 Linden Street
 Fort Collins, Colorado

PROJECT
 Linden Hotel

TITLE OF DRAWING
 Window Restoration & Repairs

PROJECT NO.
 16027

SHEET NO.
 1/1