

**STAFF REPORT: FEBURARY 17, 2021 MEETING**

**PREPARED BY: B. CAGNEY**

**APPLICATION NUMBER: 21-7091**

**ADDRESS: 19365 WARRINGTON**

**HISTORIC DISTRICT: SHERWOOD FOREST**

**APPLICANT: BRETT MAHAFFEY**

**PROPERTY OWNER: JAMES HASKINS**

**SCOPE OF WORK: REPLACE STEEL CASEMENT WINDOWS AS PROPOSED**

**DATE OF PROVISIONALLY COMPLETE APPLICATION: 2/12/2021**

**DATE OF STAFF VISIT: 2/8/2021**



*19365 Warrington, Front (East) elevation, staff photo.*

### **Existing Conditions**

19365 Warrington is a 2 story, single-family home, erected in 1939, on the west side of the street. The home is clad in a multicolor brick and displays many character-defining features of English Revival architecture: articulated brickwork, limestone detailing and the **original steel casement windows**. The majority of the steel casement windows are different sized versions of **a single type**: 16 panes of glass, divided by 5/8” steel muntins with operable mullions in the central section of the window. There

are also slight variations on the casements, like the **double casement** windows, as seen in the bay windows on the first and second floors on the front of the home. The rest of the windows are tall, narrow **casement windows** in both **operable** and **non-operable** versions.

The detailed photos supplied by the applicant show the steel casement windows in **various states of condition**, including peeling paint, broken panes of glass and missing / deteriorating exterior sills. The **applicant states** that most of the windows show signs of “rotting around frames,” “the window is hard to close if opened.”

The applicant was issued a COA on 6/26/2020 by HDC to replace their existing fence with a new wood fence. BSEED records indicate that the home was inspected and in 2013, mechanical and electrical permits were issued in 2017 and a plumbing permit was issued in 2020.

**Proposed Scope of Work:** With the current proposal, the applicant is seeking the Commission’s approval to replace (24) original steel casement windows in the home with Andersen Fibrex windows.

#### Window Replacement:

- Replace all steel casement windows with **Andersen Fibrex casement windows with “grilles between glass,” in black finish, with 2” brick mould.**
- **The proposed windows are a composite material, with a 3-1/4” frame.**
- **The replacement windows for the double casements feature a 4-1/2” Mullion in between.**
- **The proposed operable casement windows swing out with from the side.**

#### Staff Observations and Research:

- The Sherwood Forest Historic District was designated in 2002.
- In staff’s opinion, based on the detailed photos provided, the windows do not appear to be deteriorated beyond repair.

#### Issues:

- The **applicant has stated that they have contacted several repair contractors** but has been unable to get an estimate for repair.
- For staff to recommend approval for the replacement of these character defining historic windows, the applicant must demonstrate that the proposal complies with the Secretary of the Interior Standards for Rehabilitation, in particular Standard 6) *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.*
- The window frames of the **Andersen Fibrex (3-1/4”)** appear to be thicker than the original windows (**2” top, 2-1/4” sides**), as steel construction allows for much thinner profiles. The existing muntins are 3/8” while the proposed “grille between glass” is 3/4”. Wood and synthetic windows are unable to match these profiles and dimensions (*National Park Service Technical Preservation Brief 13, “The Repair and Thermal Upgrading of Historic Steel Windows”*).

- It is staff's opinion that the proposed windows do not match the existing in the physical qualities specified in Standard 6)
  - *Material* – the original windows are steel, the proposed are a synthetic composite;
  - *Operation* – the original window operation, creates a transom effect, as only the central portion of the window opens, whereas in the proposed window, the entire window opens;
  - *Design*- the existing window thinner than the proposed;
  - *Texture and Other Visual Qualities*- The original windows feature true divided-lite panes of glass, where the proposed windows have a grille between the double pain glass.
- It is staff's opinion, based on the detailed photos provided, that the existing windows have not deteriorated beyond repair, and can be restored.

### **Recommendation 1: Window Replacement**

- Staff recommends that the proposed replacement of 24 existing steel casement windows will not be appropriate according to the standards of review set forth in the state and local legislation, and therefore HDC staff recommends that the Commission issues a denial for the proposed work, as the proposed work fails to meet the Secretary of the Interior's Standards, specifically Standard 6) *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.*



*19365 Warrington 2002 HDC designation photo.*



*19365 Warrington, southeast view, staff photo.*



*19365 Warrington, southeast view, staff photo.*



**James Haskins**  
19365 Warrington Dr  
Detroit MI 48221  
**Sherwood Forest** District

# Renewal by Andersen 37720 Amrhein Livonia, MI 48150

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- Homeowner wants to replace all the windows around house except for one stained glass window unit
- Windows are original steel
- Renewal by Andersen windows are Fibrex (wood composite) material
- Total of 24 windows to be replaced
- Windows exterior color will be black if approved
- Most windows matching style except for bay windows – flankers changed to operable and middle window changed to fixed.
- Windows will match existing mutton bar “pattern”
- Homeowner unable to get quotes for repair



Front of house





Right side (from drive)



Left side (from street)



Back of house





## WINDOW OPENING 101

### Living Room - Front of House

#### Existing:

- Fixed window – Steel casement
- Window is in Living room
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

#### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, Tempered Glass, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 2w x 5h, **Misc:** None



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# WINDOW OPENING 102

## Living Room - Front of House

### Existing:

- Double casement
- Window is in Living room
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame
- Missing screen

### New:

**Window:** Casement, Fixed Window, Base Frame, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, Tempered Glass, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 6w x 5h, **Misc:** None







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## WINDOW OPENING 103 Living Room - Front of House

### Existing:

- Fixed window – Steel casement
- Window is in Living room
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame – bottom exterior sill missing

### New:

**Window:** Casement, Single, Right, Base Frame, 2"

Brickmould / Traditional, Exterior Black, Interior Black, **Glass:**

All Sash: High Performance SmartSun Glass, No Pattern,

Tempered Glass, **Hardware:** Black, **Screen:** Fiberglass, Full

Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille**

**Pattern:** All Sash: Colonial 2w x 5h, **Misc:** None









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## WINDOW OPENING 104

### Living Room – Right side of House

#### Existing:

- Single Casement window
- Window is in Living room
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

#### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None





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## WINDOW OPENING 105

### Living Room - Right side of House

#### Existing:

- Single Casement window
- Window is in Living room
- Window doesn't open
- Windowpane cracked
- Missing screen

#### New:

**Window:** Casement, Single, Left Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None



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# WINDOW OPENING 106

## Dining Room - Right side of House

### Existing:

- Single Casement Window
- Window is in Dining room
- Window is hard to close if opened
- Exterior of window is rotting
- Screen missing

### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None











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## WINDOW OPENING 107 Dining Room - Right side of House

### Existing:

- Single Casement Window
- Window is in Dining room
- Window is hard to close if opened
- Windowpane cracked
- Screen missing

### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None







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## WINDOW OPENING 108

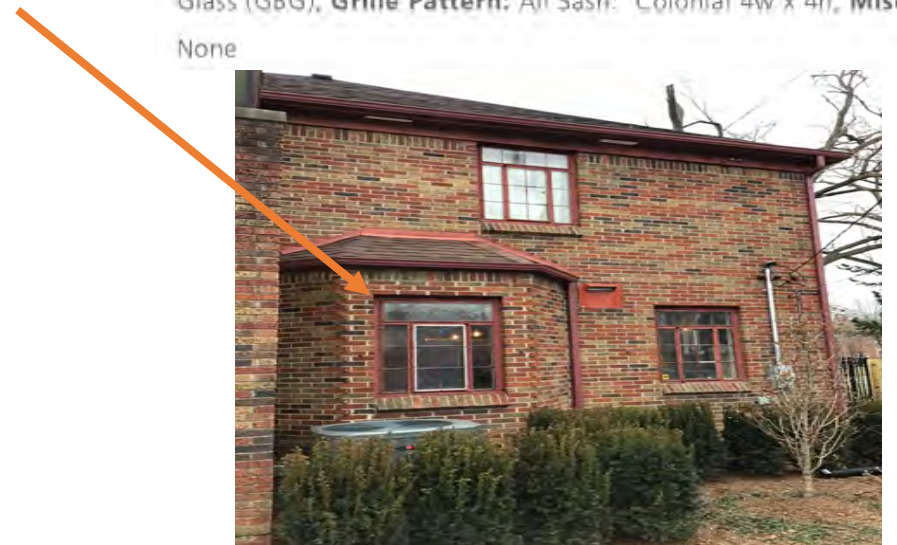
### Kitchen - Back of House

#### Existing:

- Single Casement Window
- Window is in Kitchen
- Window doesn't open
- Exterior sill is rotted, can see through
- Interior sill is cracked
- Windowpane cracked
- Screen missing

#### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** TruScene, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None







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## WINDOW OPENING 109 Kitchen - Back of House

### Existing:

- Single Casement Window
- Window is in Kitchen
- Window won't open
- Broken and cracked windowpanes

### New:

**Window:** Casement, Single, Right, Base Frame, 2"

Brickmould / Traditional, Exterior Black, Interior Black, **Glass:**

All Sash: High Performance SmartSun Glass, No Pattern,

**Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:**

Grilles Between Glass (GBG), **Grille Pattern:** All Sash:

Colonial 4w x 4h, **Misc:** None



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## WINDOW OPENING 110

### Kitchen – Left side of House

#### Existing:

- Single Casement Window
- Window is in Kitchen
- Window won't open
- Exterior of window showing signs of rotting around frame and exterior window shows breakage
- Interior casing is missing/broken

#### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** TruScene, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 3w x 4h, **Misc:** None









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## WINDOW OPENING 111

### Bathroom - Left side of House

#### Existing:

- Single Casement Window
- Window is in Bathroom
- Window doesn't open
- Exterior of window showing signs of rotting around frame

#### New:

**Window:** Casement, Single, Left Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, Obscure, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 2w x 3h, **Misc:** None







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## WINDOW OPENING 112 Office - Left side of House

### Existing:

- Fixed window – Steel casement
- Window is in an office
- Window doesn't open
- Ivy stuck between window and storm
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 2w x 4h, **Misc:** None



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## WINDOW OPENING 113 Office - Left side of House

### Existing:

- Casement Single Window
- Window is in an office
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Fixed Window, Base Frame, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None





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## WINDOW OPENING 114 Office - Left side of House

- Fixed window – Steel casement
- Window is in an office
- Ivy stuck between window and storm
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Right, Base Frame, 2"

Brickmould / Traditional, Exterior Black, Interior Black, **Glass:**

All Sash: High Performance SmartSun Glass, No Pattern,

**Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:**

Grilles Between Glass (GBG), **Grille Pattern:** All Sash:

Colonial 2w x 4h, **Misc:** None











## WINDOW OPENING 115 Office - Front of House

### Existing:

- Casement Single Window
- Window is in an office
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** TruScene, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None





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## WINDOW OPENING 201 Office – Left side of House

### Existing:

- Casement Single Window
- Window is in an office
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None



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## WINDOW OPENING 202 Office – Front of House

### Existing:

- Casement Single Window
- Window is in an office
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None





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## WINDOW OPENING 203 Bathroom - Front of House

### Existing:

- Single Casement Window
- Window is in a bathroom
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, Tempered Glass, **Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 2w x 4h, **Misc:** None



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## WINDOW OPENING 204 Bedroom - Front of House

### Existing:

- Double Casement Window
- Window is in Bedroom
- Window doesn't open
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Double, Vented, Base Frame, 2"

Brickmould / Traditional, Exterior Black, Interior Black, **Glass:**

All Sash: High Performance SmartSun Glass, No Pattern,

**Hardware:** Black, Wide Opening Hinge, **Screen:** TruScene, Full

Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille**

**Pattern:** All Sash: Colonial 3w x 4h, **Misc:** None



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## WINDOW OPENING 205 Bedroom – Right side of House

### Existing:

- Single Casement Window
- Window is in Bedroom
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Right, Base Frame, 2"

Brickmould / Traditional, Exterior Black, Interior Black, **Glass:**

All Sash: High Performance SmartSun Glass, No Pattern,

**Hardware:** Black, **Screen:** Fiberglass, Full Screen, **Grille Style:**

Grilles Between Glass (GBG), **Grille Pattern:** All Sash:

Colonial 4w x 4h, **Misc:** None





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## WINDOW OPENING 206

### Bedroom - Right side of House

#### Existing:

- Single Casement Window
- Window is in Bedroom
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

#### New:

**Window:** Casement, Single, Right, Base Frame, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, Obscure, Tempered Glass, **Hardware:** Black, Wide Opening Hinge, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None









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## WINDOW OPENING 207 Bedroom - Right side of House

### Existing:

- Double Casement Window
- Window is in Bedroom
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Double, Vented, Base Frame, 2"  
Brickmould / Traditional, Exterior Black, Interior Black, **Glass:**  
All Sash; High Performance SmartSun Glass, No Pattern,  
**Hardware:** Black, Wide Opening Hinge, **Screen:** Fiberglass,  
Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille**  
**Pattern:** All Sash; Colonial 3w x 4h, **Misc:** None





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## WINDOW OPENING 208 Bedroom - Back of House

### Existing:

- Single Casement Window
- Window is in Bedroom
- Window is hard to close if opened
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, **Glass:** All Sash: High Performance SmartSun Glass, No Pattern, **Hardware:** Black, Wide Opening Hinge, **Screen:** Fiberglass, Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None



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## WINDOW OPENING 209 Bedroom – Left Side of House

### Existing:

- Single Casement Window
- Window is in Bedroom
- Window doesn't open
- Exterior of window showing signs of rotting around frame

### New:

**Window:** Casement, Single, Right, Base Frame, 2"

Brickmould / Traditional, Exterior Black, Interior Black, **Glass:**

All Sash: High Performance SmartSun Glass, No Pattern,

**Hardware:** Black, Wide Opening Hinge, **Screen:** Fiberglass,

Full Screen, **Grille Style:** Grilles Between Glass (GBG), **Grille**

**Pattern:** All Sash: Colonial 4w x 4h, **Misc:** None

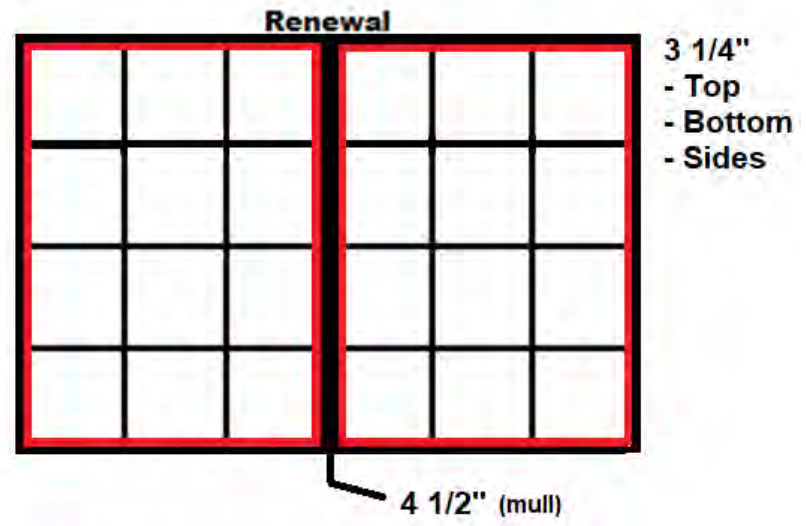
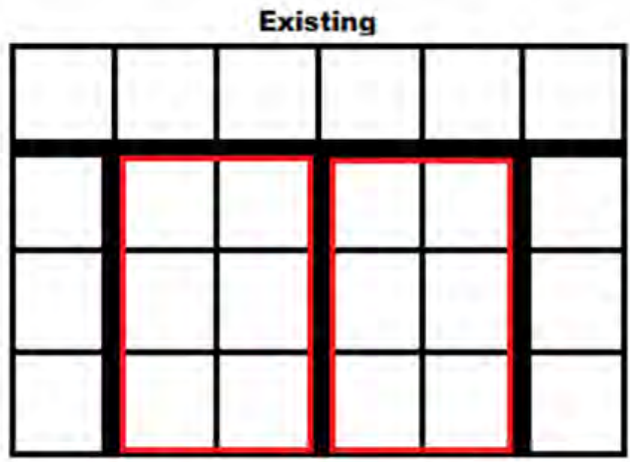
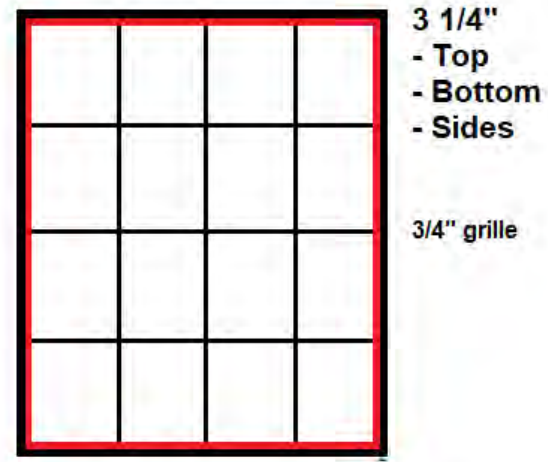
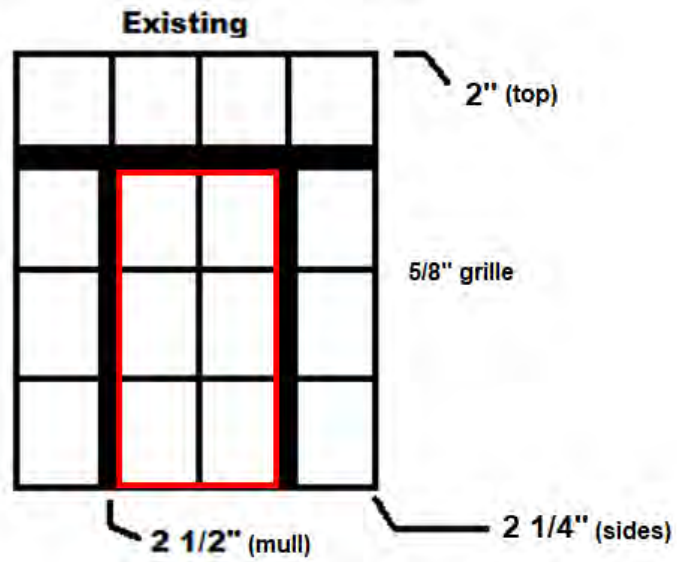








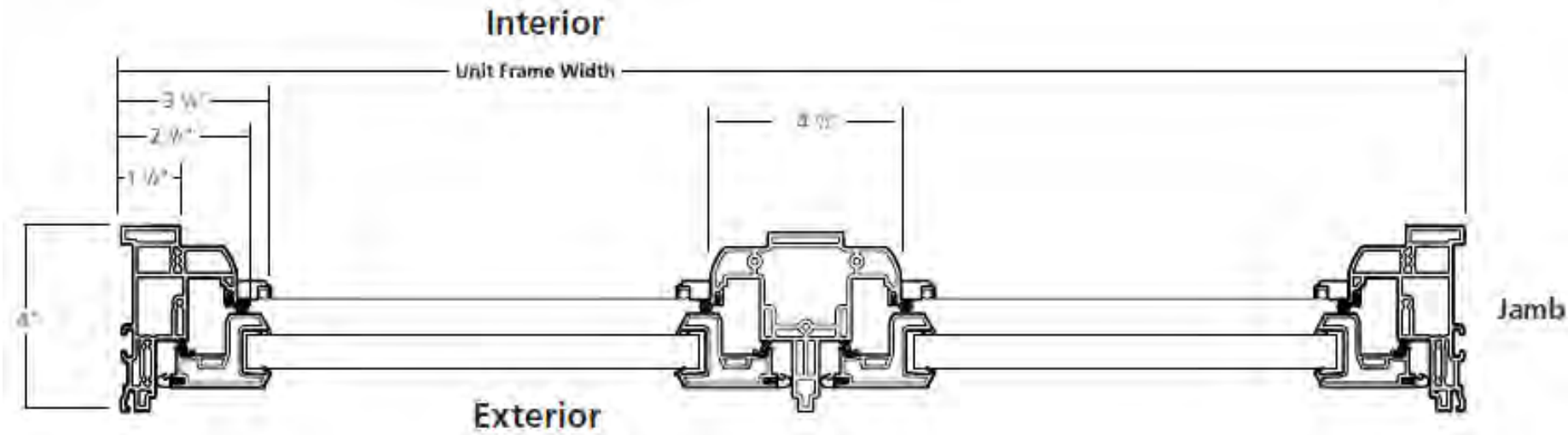
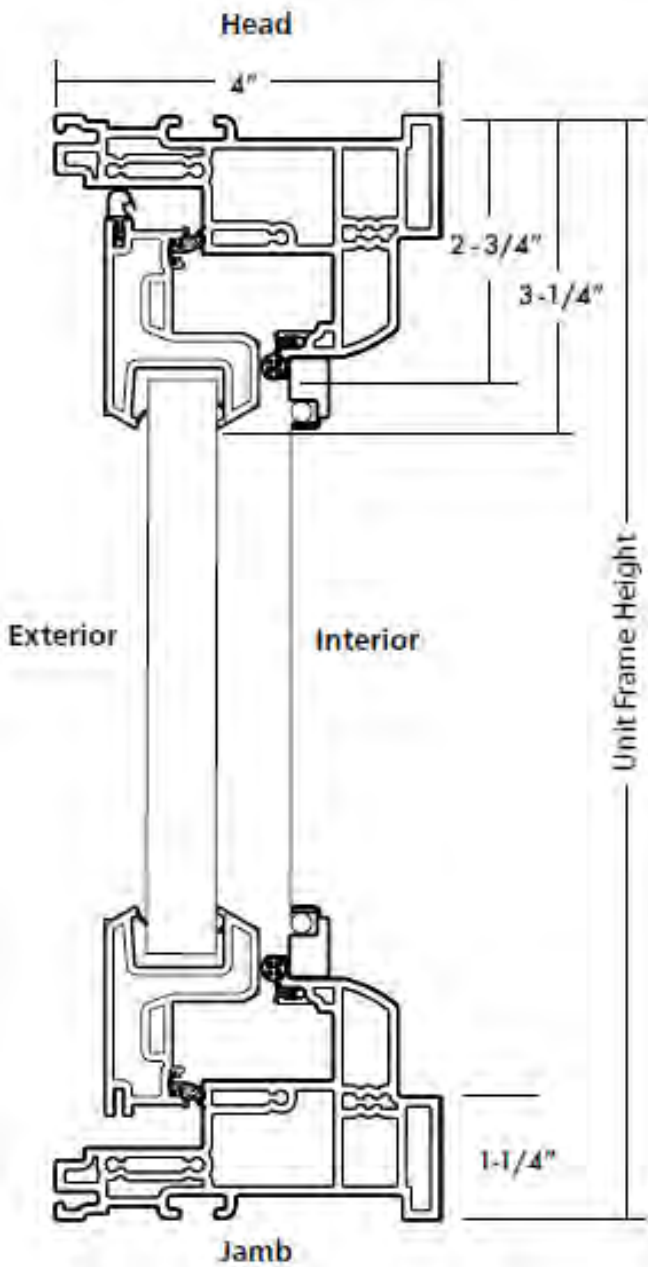
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**RENEWAL**  
by **ANDERSEN**

FULL-SERVICE WINDOW & DOOR REPLACEMENT



Renewal  
by Andersen



WINDOW REPLACEMENT an Andersen Company

## FIBREX<sup>®</sup> MATERIAL:

**A BETTER ALTERNATIVE, A BETTER WINDOW**

### Reinventing the window

Innovation has been a hallmark of Andersen Corporation since its founding in 1903. From implementing “mass production” techniques in 1904 (nine years before Henry Ford), to producing the first completely assembled window unit in the industry (1926), to becoming the world’s largest specialized window frame factory in 1929, our guiding principle has always been to “make a product that is different and better.” Each step of the way we have incorporated the latest technologies, fine precision, and high standards in our quest to be better.

### Introducing Fibrex<sup>®</sup> material

One of our most innovative ideas is Fibrex material. This revolutionary composite combines the strength and stability of wood with the low-maintenance features of vinyl. In fact, you might say it’s an evolutionary product—Andersen scientists developed the first hollow vinyl window in the U.S. in 1959, and engineered composite window materials in the 1960s and 1970s. In 1992, Andersen perfected composite window technology, and patented Fibrex material. Today, Fibrex material is the perfect choice for your new replacement windows.

	<b>Fibrex® Material</b>	<b>Other Materials</b>
<b>Strength</b>	Because Fibrex® material is strong, we can make our sash and frames narrower. Narrower frames mean more glass, more view.	Vinyl frames are known to have a higher expansion/contraction rate and can bow, breaking the glass seal.
<b>Insulation</b>	Fibrex material has superior thermal insulating properties. Combined with Andersen® High-Performance™ Low-E4® glass, this helps your home stay warmer in winter and cooler in summer. You can save money on your energy bills. Your home feels more comfortable.	Aluminum window frames conduct heat and cold. Heat leaks out of your house in the winter and into your house in the summer.
<b>Low Maintenance</b>	Fibrex material never needs scraping or painting. It won't rot, decay or mold*.	Fiberglass frames are painted and may need regular maintenance.
<b>Beauty</b>	<p>Renewal by Andersen replacement windows preserve the architectural beauty of your home. Frame and sash design reflect the shape and lines of your original windows.</p> <p>The unique extruded Fibrex material can be made into any kind of window—including curved specialty windows.</p>	<p>Most replacement windows have square profiles that may look artificial in your home. Vinyl frame material is often thicker, reducing glass area.</p> <p>Fiberglass can only be made into straight lineals.</p>
<b>Environmental Responsibility</b>	40% of the raw material by weight used to make Fibrex material is clean, reclaimed wood fiber. Reclaimed materials in the manufacturing process can also be reground and reused. Renewal by Andersen® windows meet Green Seal's science-based environmental certification standards as well as being ENERGY STAR® qualified for meeting strict energy efficiency criteria set by the U.S. Department of Energy.	<p>Andersen windows are the only windows with Green Seal certification.</p> <p>Fiberglass is a thermoset material and cannot be reformed into new profiles.</p>
<b>Warranty</b>	A window is not just glass and some framing material. It's a precise combination of glass, frame and quality installation. We back it all with a 20/2/10 Limited Warranty* that is one of the best in the business.	More than half of all remodeling firms have been in business less than four years.** Installation is rarely covered in the written warranty.





# Agreement Document and Payment Terms

dba: **Renewal by Andersen of Detroit**  
Legal Name: Renewal by Andersen LLC  
**2102215127**  
37720 Amrhein Road | Livonia, MI 48150  
Phone: 734-237-1052 | Fax: 651-275-6041 | rbasalesdetroit@andersencorp.com

**James Haskins**  
19365 wArrington Dr  
Detroit, MI 48221  
H: 2485634634

Buyer(s) Name: James Haskins Contract Date: 08/24/20

Buyer(s) Street Address: 19365 wArrington Dr, Detroit, MI 48221

Primary Telephone Number: 2485634634 Secondary Telephone Number: \_\_\_\_\_

Primary Email: alchemist.james@gmail.com Secondary Email: \_\_\_\_\_

Buyer(s) hereby jointly and severally agrees to purchase the products and/or services of Renewal by Andersen LLC d/b/a Renewal by Andersen of Detroit ("Contractor"), in accordance with the terms and conditions described in this Agreement Document and Payment Terms, any documents listed in the Table of Contents, and any other document attached to this Agreement Document, the terms of which are all agreed to by the parties and incorporated herein by reference (collectively, this "Agreement"). Buyer(s) hereby agrees to sign a completion certificate after Contractor has completed all work under this Agreement.

Total Job Amount: **\$44,330** By signing this Agreement, you acknowledge that the Balance Due, and the Amount Financed must be made by personal check, bank check, credit card, or cash.

Deposit Received: **\$0**

Balance Due: **\$44,330** Estimated Start: **8-12** Estimated Completion: **2-3**

Amount Financed: **\$44,330**

Method of Payment: **Financing** We schedule installations based on the date of the signed contract and secondarily on the date in which we complete the technical measurements. The installation date that we are providing at this time is only an estimate. We will communicate an official date and time at a later date. Rain and extreme weather are the most common causes for delay.

Notes: \_\_\_\_\_

Buyer(s) agrees and understands that this Agreement constitutes the entire understandings between the parties and that there are no verbal understandings changing or modifying any of the terms of this Agreement. No alterations to or deviations from this Agreement will be valid without the signed, written consent of both the Buyer(s) and Contractor. Buyer(s) hereby acknowledges that Buyer(s) 1) has read this Agreement, understands the terms of this Agreement, and has received a completed, signed, and dated copy of this Agreement, including the two attached Notices of Cancellation, on the date first written above and 2) was orally informed of Buyer's right to cancel this Agreement.

NOTICE TO BUYER: Do not sign this contract if blank. You are entitled to a copy of the contract at the time you sign.

**YOU, THE BUYER, MAY CANCEL THIS TRANSACTION AT ANY TIME NOT LATER THAN MIDNIGHT OF 08/27/2020 OR THE THIRD BUSINESS DAY AFTER THE DATE OF THIS TRANSACTION, WHICHEVER DATE IS LATER. SEE THE ATTACHED NOTICE OF CANCELLATION FORM FOR AN EXPLANATION OF THIS RIGHT.**

Legal Name: **Renewal by Andersen LLC**  
dba: **Renewal by Andersen of Detroit**

  
\_\_\_\_\_  
Signature of Sales Person

**Ronya Berry**

\_\_\_\_\_  
Print Name of Sales Person

Buyer(s)  
  
\_\_\_\_\_  
Signature

**James Haskins**

\_\_\_\_\_  
Print Name

Signature

Print Name



# Itemized Order Receipt

dba: Renewal by Andersen of Detroit

Legal Name: Renewal by Andersen LLC

2102215127

37720 Amrhein Road | Livonia, MI 48150

Phone: 734-237-1052 | Fax: 651-275-6041 | rbasalesdetroit@andersencorp.com

James Haskins

19365 wArrington Dr

Detroit, MI 48221

H: 2485634634

ID#:	ROOM:	SIZE:	DETAILS:
101	living	20 W 63 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, Tempered Glass, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 2w x 5h, <b>Misc:</b> None
102	living	55 W 64 H	<b>Window:</b> Casement, Fixed Window, Base Frame, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, Tempered Glass, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 6w x 5h, <b>Misc:</b> None
103	living	20 W 63 H	<b>Window:</b> Casement, Single, Right, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, Tempered Glass, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 2w x 5h, <b>Misc:</b> None
104	living	35 W 58 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None



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ID#:	ROOM:	SIZE:	DETAILS:
105	living	35 W 58 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
106	dining	35 W 58 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
107	dining	35 W 58 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
108	kitchen	37 W 52 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> TruScene, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None



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 19365 wArrington Dr  
 Detroit, MI 48221  
 H: 2485634634

ID#:	ROOM:	SIZE:	DETAILS:
109	kitchen	38 W 52 H	<b>Window:</b> Casement, Single, Right, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
110	sink	38 W 39 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> TruScene, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 3w x 4h, <b>Misc:</b> None
111	bath	19 W 40 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, Obscure, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 2w x 3h, <b>Misc:</b> None
112	james office	19 W 51 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 2w x 4h, <b>Misc:</b> None



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Detroit, MI 48221

H: 2485634634

ID#:	ROOM:	SIZE:	DETAILS:
113	james office	39 W 51 H	<b>Window:</b> Casement, Fixed Window, Base Frame, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
114	james office	19 W 51 H	<b>Window:</b> Casement, Single, Right, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 2w x 4h, <b>Misc:</b> None
115	james office	39 W 51 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> TruScene, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
201	josh office	38 W 51 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None



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Detroit, MI 48221

H: 2485634634

ID#:	ROOM:	SIZE:	DETAILS:
202	josh office	38 W 51 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
203	mst bath	20 W 51 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, Tempered Glass, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 2w x 4h, <b>Misc:</b> None
204	mst	56 W 52 H	<b>Window:</b> Casement, Double, Vented, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, Wide Opening Hinge, <b>Screen:</b> TruScene, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 3w x 4h, <b>Misc:</b> None
205	mst	38 W 51 H	<b>Window:</b> Casement, Single, Right, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None



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H: 2485634634

ID#:	ROOM:	SIZE:	DETAILS:
206	bath	38 W 38 H	<b>Window:</b> Casement, Single, Right, Base Frame, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, Obscure, Tempered Glass, <b>Hardware:</b> Black, Wide Opening Hinge, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
207	guest bed	60 W 51 H	<b>Window:</b> Casement, Double, Vented, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, Wide Opening Hinge, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 3w x 4h, <b>Misc:</b> None
208	luckys	38 W 51 H	<b>Window:</b> Casement, Single, Left, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, Wide Opening Hinge, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
209	luckys	38 W 51 H	<b>Window:</b> Casement, Single, Right, Base Frame, 2" Brickmould / Traditional, Exterior Black, Interior Black, <b>Glass:</b> All Sash: High Performance SmartSun Glass, No Pattern, <b>Hardware:</b> Black, Wide Opening Hinge, <b>Screen:</b> Fiberglass, Full Screen, <b>Grille Style:</b> Grilles Between Glass (GBG), <b>Grille Pattern:</b> All Sash: Colonial 4w x 4h, <b>Misc:</b> None
<b>WINDOWS: 24    PATIO DOORS: 0    SPECIALTY: 0    MISC: 0</b>			<b>TOTAL    \$44,330</b>



*Renewal by Andersen is committed to our customers' safety by complying with the rules and lead-safe work practices specified by the EPA.*

## [EXTERNAL] RE: 19365 Warrington - Sherwood Forest



You forwarded this message on Thu 10/15/2020 3:50 PM



Mahaffey, Brett

Thu 10/1/2020 4:49 PM

To: Audra Dye; Historic District Commission (Staff)

Cc: Mahaffey, Brett <Brett.Mahaffey@andersencorp.com>



Good Afternoon!

Attached is the list on the companies that the customer reached out to.

Here are the places I have connected and times as best as I can recollect:

**Turner Restoration:** phone call on September 7 and email on September 15

**Sevonty Restoration:** called and left message on August 27. Their website states they are scheduling for 2021

**Place Restoration:** recommended by Michigan Historic Window Company (they don't do work on steel). Called on August 30 and left message

**Jason Creseska:** recommend contractor in Sherwood Forest Group> Called and left voicemail on August 27 and Sept 1 as he was supposed to come review on August 31

**H & R Window Repair:** submitted online request including pictures on August 26, followed up with phone call on September 2

**Allstate Glass Repair:** called and left message on August 27

Were you able to get in touch with them or did you need more contact information?

Thanks,

Brett Mahaffey

P: 734-237-1065



# HISTORIC DISTRICT COMMISSION PROJECT REVIEW REQUEST

CITY OF DETROIT  
PLANNING & DEVELOPMENT DEPARTMENT  
2 WOODWARD AVENUE, ROOM 808, DETROIT, MI 48226

DATE: \_\_\_\_\_

## PROPERTY INFORMATION

ADDRESS: \_\_\_\_\_ AKA: \_\_\_\_\_

HISTORIC DISTRICT: \_\_\_\_\_

SCOPE OF WORK:  Windows/Doors  Roof/Gutters/Chimney  Porch/Deck  Landscape/Fence/Tree/Park  General Rehab  
(Check ALL that apply)  New Construction  Demolition  Addition  Other: \_\_\_\_\_

## APPLICANT IDENTIFICATION

Property Owner/Homeowner  Contractor  Tenant or Business Occupant  Architect/Engineer/Consultant

NAME: \_\_\_\_\_ COMPANY NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_ CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

PHONE: \_\_\_\_\_ MOBILE: \_\_\_\_\_ EMAIL: \_\_\_\_\_

## PROJECT REVIEW REQUEST CHECKLIST

Please attach the following documentation to your request:

**\*PLEASE KEEP FILE SIZE OF ENTIRE SUBMISSION UNDER 30MB\***

- Completed Building Permit Application** (highlighted portions only)
- ePLANS Permit Number** (only applicable if you've already applied for permits through ePLANS)
- Photographs** of ALL sides of existing building or site
- Detailed photographs** of location of proposed work (photographs to show existing condition(s), design, color, & material)
- Description of existing conditions** (including materials and design)
- Description of project** (if replacing any existing material(s), include an explanation as to why replacement--rather than repair--of existing and/or construction of new is required)
- Detailed scope of work** (formatted as bulleted list)
- Brochure/cut sheets** for proposed replacement material(s) and/or product(s), as applicable

### NOTE:

Based on the scope of work, additional documentation may be required.

See [www.detroitmi.gov/hdc](http://www.detroitmi.gov/hdc) for scope-specific requirements.

Upon receipt of this documentation, staff will review and inform you of the next steps toward obtaining your building permit from the Buildings, Safety Engineering and Environmental Department (BSEED) to perform the work.

**SUBMIT COMPLETED REQUESTS TO [HDC@DETROITMI.GOV](mailto:HDC@DETROITMI.GOV)**

# P2 - BUILDING PERMIT APPLICATION

Date: \_\_\_\_\_

## PROPERTY INFORMATION

Address: \_\_\_\_\_ Floor: \_\_\_\_\_ Suite#: \_\_\_\_\_ Stories: \_\_\_\_\_

AKA: \_\_\_\_\_ Lot(s): \_\_\_\_\_ Subdivision: \_\_\_\_\_

Parcel ID#(s): \_\_\_\_\_ Total Acres: \_\_\_\_\_ Lot Width: \_\_\_\_\_ Lot Depth: \_\_\_\_\_

Current Legal Use of Property: \_\_\_\_\_ Proposed Use: \_\_\_\_\_

Are there any existing buildings or structures on this parcel?  Yes  No

## PROJECT INFORMATION

**Permit Type:**  New  Alteration  Addition  Demolition  Correct Violations

Foundation Only  Change of Use  Temporary Use  Other: \_\_\_\_\_

Revision to Original Permit #: \_\_\_\_\_ (Original permit has been issued and is active)

**Description of Work** (Describe in detail proposed work and use of property, attach work list)

MBC use change  No MBC use change

**Included Improvements** (Check all applicable; these trade areas require separate permit applications)

HVAC/Mechanical  Electrical  Plumbing  Fire Sprinkler System  Fire Alarm

### Structure Type

New Building  Existing Structure  Tenant Space  Garage/Accessory Building

Other: \_\_\_\_\_ Size of Structure to be Demolished (LxWxH) \_\_\_\_\_ cubic ft.

Construction involves changes to the floor plan?  Yes  No

(e.g. interior demolition or construction to new walls)

Use Group: \_\_\_\_\_ Type of Construction (per current MI Bldg Code Table 601) \_\_\_\_\_

**Estimated Cost of Construction** \$ \_\_\_\_\_ By Contractor \$ \_\_\_\_\_ By Department

### Structure Use

Residential-Number of Units: \_\_\_\_\_  Office-Gross Floor Area \_\_\_\_\_  Industrial-Gross Floor Area \_\_\_\_\_

Commercial-Gross Floor Area: \_\_\_\_\_  Institutional-Gross Floor Area \_\_\_\_\_  Other-Gross Floor Area \_\_\_\_\_

Proposed No. of Employees: \_\_\_\_\_ List materials to be stored in the building: \_\_\_\_\_

**PLOT PLAN SHALL BE submitted on separate sheets and shall show all easements and measurements (must be correct and in detail). SHOW ALL streets abutting lot, indicate front of lot, show all buildings, existing and proposed distances to lot lines.** (Building Permit Application Continues on Next Page)

### For Building Department Use Only

Intake By: \_\_\_\_\_ Date: \_\_\_\_\_ Fees Due: \_\_\_\_\_ DngBld?  No

Permit Description: \_\_\_\_\_

Permit #: \_\_\_\_\_ Current Legal Land Use: \_\_\_\_\_ Proposed Use: \_\_\_\_\_

Permit#: \_\_\_\_\_ Date Permit Issued: \_\_\_\_\_ Permit Cost: \$ \_\_\_\_\_

Zoning District: \_\_\_\_\_ Zoning Grant(s): \_\_\_\_\_

Lots Combined?  Yes  No (attach zoning clearance)

**Revised Cost** (revised permit applications only) Old \$ \_\_\_\_\_ New \$ \_\_\_\_\_

Structural: \_\_\_\_\_ Date: \_\_\_\_\_ Notes: \_\_\_\_\_

Zoning: \_\_\_\_\_ Date: \_\_\_\_\_ Notes: \_\_\_\_\_

Other: \_\_\_\_\_ Date: \_\_\_\_\_ Notes: \_\_\_\_\_



**IDENTIFICATION** (All Fields Required)

**Property Owner/Homeowner**  Property Owner/Homeowner is Permit Applicant

Name: \_\_\_\_\_ Company Name: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Mobile: \_\_\_\_\_

Driver's License #: \_\_\_\_\_ Email: \_\_\_\_\_

**Contractor**  Contractor is Permit Applicant

Representative Name: \_\_\_\_\_ Company Name: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Mobile: \_\_\_\_\_ Email: \_\_\_\_\_

City of Detroit License #: \_\_\_\_\_

**TENANT OR BUSINESS OCCUPANT**  Tenant is Permit Applicant

Name: \_\_\_\_\_ Phone: \_\_\_\_\_ Email: \_\_\_\_\_

**ARCHITECT/ENGINEER/CONSULTANT**  Architect/Engineer/Consultant is Permit Applicant

Name: \_\_\_\_\_ State Registration#: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Mobile: \_\_\_\_\_ Email: \_\_\_\_\_

**HOMEOWNER AFFIDAVIT** (Only required for residential permits obtained by homeowner.)

I hereby certify that I am the legal owner and occupant of the subject property and the work described on this permit application shall be completed by me. I am familiar with the applicable codes and requirements of the City of Detroit and take full responsibility for all code compliance, fees and inspections related to the installation/work herein described. I shall neither hire nor sub-contract to any other person, firm or corporation any portion of the work covered by this building permit.

Print Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(Homeowner)

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_ A.D. \_\_\_\_\_ County, Michigan

Signature: \_\_\_\_\_ My Commission Expires: \_\_\_\_\_  
(Notary Public)

**PERMIT APPLICANT SIGNATURE**

I hereby certify that the information on this application is true and correct. I have reviewed all deed restrictions that may apply to this construction and am aware of my responsibility thereunder. I certify that the proposed work is authorized by the owner of the record and I have been authorized to make this application as the property owner(s) authorized agent. Further I agree to conform to all applicable laws and ordinances of jurisdiction. **I am aware that a permit will expire when no inspections are requested and conducted within 180 days of the date of issuance or the date of the previous inspection and that expired permits cannot be**

Print Name: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(Permit Applicant)

Driver's License #: \_\_\_\_\_ Expiration: \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_ A.D. \_\_\_\_\_ County, Michigan

Signature: \_\_\_\_\_ My Commission Expires: \_\_\_\_\_  
(Notary Public)

**Section 23a of the state construction code act of 1972, 1972PA230, MCL 125.1523A, prohibits a person from conspiring to circumvent the licensing requirements of this state relating to persons who are to perform work on a residential building or a residential structure. Visitors of Section 23a are subject to civil fines.**

This application can also be completed online. Visit [detroitmi.gov/bseed/elaps](http://detroitmi.gov/bseed/elaps) for more information.



# 13 PRESERVATION BRIEFS

## The Repair and Thermal Upgrading of Historic Steel Windows

Sharon C. Park, AIA



U.S. Department of the Interior  
National Park Service  
Cultural Resources  
Heritage Preservation Services



The Secretary of the Interior's "Standards for Rehabilitation" require that where historic windows are individually significant features, or where they contribute to the character of significant facades, their distinguishing visual qualities must not be destroyed. Further, the rehabilitation guidelines recommend against changing the historic appearance of windows through the use of inappropriate designs, materials, finishes, or colors which radically change the sash, depth of reveal, and muntin configuration; the reflectivity and color of the glazing; or the appearance of the frame.

Windows are among the most vulnerable features of historic buildings undergoing rehabilitation. This is especially the case with rolled steel windows, which are often mistakenly not deemed worthy of preservation in the conversion of old buildings to new uses. The ease with which they can be replaced and the mistaken assumption that they cannot be made energy efficient except at great expense are factors that typically lead to the decision to remove them. In many cases, however, repair and retrofit of the historic windows are more economical than wholesale replacement, and all too often, replacement units are unlike the originals in design and appearance. If the windows are important in establishing the historic character of the building (see fig. 1), insensitively designed replacement windows may diminish—or destroy—the building's historic character.

This *Brief* identifies various types of historic steel windows that dominated the metal window market from 1890-1950. It then gives criteria for evaluating deterioration and for determining appropriate treatment, ranging from routine maintenance and weatherization to extensive repairs, so that replacement may be avoided where possible.<sup>1</sup> This information applies to do-it-yourself jobs and to large rehabilitations where the volume of work warrants the removal of all window units for complete overhaul by professional contractors.

This *Brief* is not intended to promote the repair of ferrous metal windows in every case, but rather to insure that preservation is always the first consideration in a rehabilitation project. Some windows are not important elements in defining a building's historic character; others are highly significant, but so deteriorated that repair is infeasible. In such cases, the *Brief* offers guidance in evaluating appropriate replacement windows.



*Fig. 1 Often highly distinctive in design and craftsmanship, rolled steel windows play an important role in defining the architectural character of many later nineteenth and early twentieth century buildings. Art Deco, Art Moderne, the International Style, and Post World War II Modernism depended on the slim profiles and streamlined appearance of metal windows for much of their impact. Photo: William G. Johnson.*

<sup>1</sup>The technical information given in this brief is intended for most ferrous (or magnetic) metals, particularly rolled steel. While stainless steel is a ferrous metal, the cleaning and repair techniques outlined here must not be used on it as the finish will be damaged. For information on cleaning stainless steel and non-ferrous metals, such as bronze, Monel, or aluminum, refer to *Metals in America's Historic Buildings* (see bibliography).

## HISTORICAL DEVELOPMENT

Although metal windows were available as early as 1860 from catalogues published by architectural supply firms, they did not become popular until after 1890. Two factors combined to account for the shift from wooden to metal windows about that time. Technology borrowed from the rolling industry permitted the mass production of rolled steel windows. This technology made metal windows cost competitive with conventional wooden windows. In addition, a series of devastating urban fires in Boston, Baltimore, Philadelphia, and San Francisco led to the enactment of strict fire codes for industrial and multi-story commercial and office buildings.

As in the process of making rails for railroads, rolled steel windows were made by passing hot bars of steel through progressively smaller, shaped rollers until the appropriate angled configuration was achieved (see fig. 2). The rolled steel sections, generally  $\frac{1}{8}$ " thick and 1" - 1  $\frac{1}{2}$ " wide, were used for all the components of the windows: sash, frame, and subframe (see fig. 3). With the addition of wire glass, a fire-resistant window resulted. These rolled steel windows are almost exclusively found in masonry or concrete buildings.

A byproduct of the fire-resistant window was the strong metal frame that permitted the installation of larger windows and windows in series. The ability to have expansive amounts of glass and increased ventilation dramatically changed the designs of late 19th and early 20th century industrial and commercial buildings.

The newly available, reasonably priced steel windows soon became popular for more than just their fire-resistant qualities. They were standardized, extremely durable, and easily transported. These qualities led to the use of steel windows in every type of construction, from simple industrial and institutional buildings to luxury commercial and apartment buildings. Casement, double-hung, pivot, projecting, austral, and continuous windows differed in operating and ventilating capacities. Figure 4 outlines the kinds and properties of metal windows available then and now. In addition, the thin profiles of metal windows contributed to the streamlined appearance of the Art Deco, Art Moderne, and International Styles, among others.

The extensive use of rolled steel metal windows continued until after World War II when cheaper, non-corroding aluminum windows became increasingly popular. While aluminum windows dominate the market today, steel windows are still fabricated. Should replacement of original windows become necessary, replacement windows may be available from the manufacturers of some of the earliest steel windows. Before an informed decision can be made whether to repair or replace metal windows, however, the significance of the windows must be determined and their physical condition assessed.

### ROLLING SECTION FROM BAR

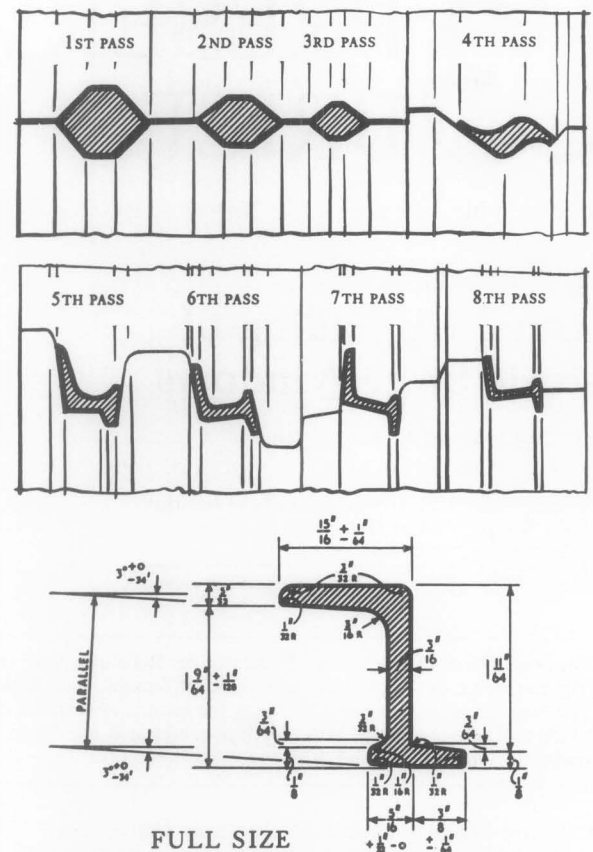


Fig. 2. The process of rolling a steel bar into an angled section is illustrated above. The shape and size of the rolled section will vary slightly depending on the overall strength needed for the window opening and the location of the section in the assembly: subframe, frame, or sash. The  $\frac{1}{8}$ " thickness of the metal section is generally standard. Drawing: *A Metal Window Dictionary*. Used with permission.

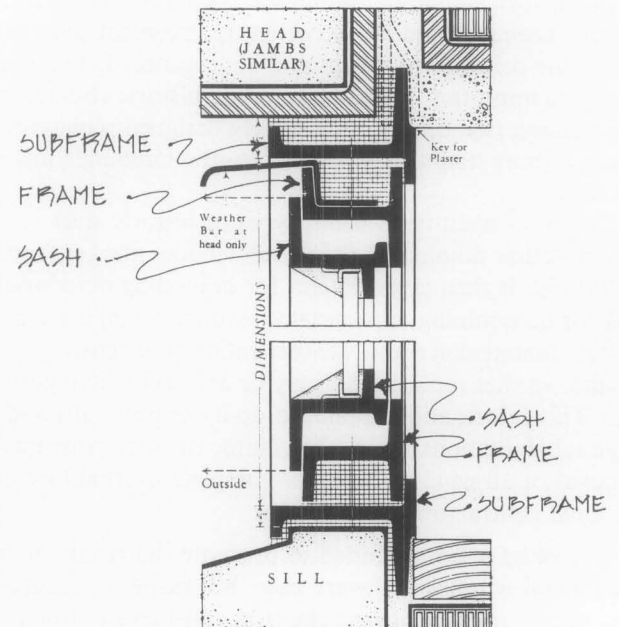


Fig. 3 A typical section through the top and bottom of a metal window shows the three component parts of the window assembly: subframe, frame, and sash. Drawings: Catalogue No. 15, January 1931; International Casement Co, Inc., presently Hope's Architectural Products, Inc., Jamestown, NY. Used with permission.

## EVALUATION

### Historic and Architectural Considerations

An assessment of the significance of the windows should begin with a consideration of their function in relation to the building's historic use and its historic character. Windows that help define the building's historic character should be preserved even if the building is being converted to a new use. For example, projecting steel windows used to introduce light and an effect of spaciousness to a warehouse or industrial plant can be retained in the conversion of such a building to offices or residences.

Other elements in assessing the relative importance of the historic windows include the design of the windows and their relationship to the scale, proportion, detailing and architectural style of the building. While it may be easy to determine the aesthetic value of highly ornamented windows, or to recognize the importance of streamlined windows as an element of a style, less elaborate windows can also provide strong visual interest by their small panes or projecting planes when open, particularly in simple, unadorned industrial buildings (see fig. 5).

One test of the importance of windows to a building is to ask if the overall appearance of the building would be changed noticeably if the windows were to be removed or radically altered. If so, the windows are important in defining the building's historic character, and should be repaired if their physical condition permits.

### Physical Evaluation

Steel window repair should begin with a careful evaluation of the physical condition of each unit. Either drawings or photographs, liberally annotated, may be used to record the location of each window, the type of operability, the condition of all three parts—sash, frame and sub-frame—and the repairs essential to its continued use.

Specifically, the evaluation should include: presence and degree of corrosion; condition of paint; deterioration of the metal sections, including bowing, misalignment of the sash, or bent sections; condition of the glass and glazing compound; presence and condition of all hardware, screws, bolts, and hinges; and condition of the masonry or concrete surrounds, including need for caulking or resetting of improperly sloped sills.

Corrosion, principally rusting in the case of steel windows, is the controlling factor in window repair; therefore, the evaluator should first test for its presence. Corrosion can be light, medium, or heavy, depending on how much the rust has penetrated the metal sections. If the rusting is merely a surface accumulation or flaking, then the corrosion is light. If the rusting has penetrated the metal (indicated by a bubbling texture), but has not caused any structural damage, then the corrosion is medium. If the rust has penetrated deep into the metal, the corrosion is heavy. Heavy corrosion generally results in some form of structural damage, through delamination,

to the metal section, which must then be patched or spliced. A sharp probe or tool, such as an ice pick, can be used to determine the extent of corrosion in the metal. If the probe can penetrate the surface of the metal and brittle strands can be dug out, then a high degree of corrosive deterioration is present.

In addition to corrosion, the condition of the paint, the presence of bowing or misalignment of metal sections, the amount of glass needing replacement, and the condition of the masonry or concrete surrounds must be assessed in the evaluation process. These are key factors in determining whether or not the windows can be repaired in place. The more complete the inventory of existing conditions, the easier it will be to determine whether repair is feasible or whether replacement is warranted.

### Rehabilitation Work Plan

Following inspection and analysis, a plan for the rehabilitation can be formulated. The actions necessary to return windows to an efficient and effective working condition will fall into one or more of the following categories: routine maintenance, repair, and weatherization. The routine maintenance and weatherization measures described here are generally within the range of do-it-yourselfers. Other repairs, both moderate and major, require a professional contractor. Major repairs normally require the removal of the window units to a workshop, but even in the case of moderate repairs, the number of windows involved might warrant the removal of all the deteriorated units to a workshop in order to realize a more economical repair price. Replacement of windows should be considered only as a last resort.

Since moisture is the primary cause of corrosion in steel windows, it is essential that excess moisture be eliminated and that the building be made as weathertight as possible before any other work is undertaken. Moisture can accumulate from cracks in the masonry, from spalling mortar, from leaking gutters, from air conditioning condensation runoff, and from poorly ventilated interior spaces.

Finally, before beginning any work, it is important to be aware of health and safety risks involved. Steel windows have historically been coated with lead paint. The removal of such paint by abrasive methods will produce toxic dust. Therefore, safety goggles, a toxic dust respirator, and protective clothing should be worn. Similar protective measures should be taken when acid compounds are used. Local codes may govern the methods of removing lead paints and proper disposal of toxic residue.

## ROUTINE MAINTENANCE

A preliminary step in the routine maintenance of steel windows is to remove surface dirt and grease in order to ascertain the degree of deterioration, if any. Such minor cleaning can be accomplished using a brush or vacuum followed by wiping with a cloth dampened with mineral spirits or denatured alcohol.

<p><i>Double-hung</i> industrial windows duplicated the look of traditional wooden windows. Metal double-hung windows were early examples of a building product adapted to meet stringent new fire code requirements for manufacturing and high-rise buildings in urban areas. Soon supplanted in industrial buildings by less expensive pivot windows, double-hung metal windows regained popularity in the 1940s for use in speculative suburban housing.</p>	<p><i>Austral</i> windows were also a product of the 1920s. They combined the appearance of the double-hung window with the increased ventilation and ease of operation of the projected window. (When fully opened, they provided 70% ventilation as compared to 50% ventilation for double-hung windows.) Austral windows were often used in schools, libraries and other public buildings.</p>
<p><i>Pivot</i> windows were an early type of industrial window that combined inexpensive first cost and low maintenance. Pivot windows became standard for warehouses and power plants where the lack of screens was not a problem. The window shown here is a horizontal pivot. Windows that turned about a vertical axis were also manufactured (often of iron). Such vertical pivots are rare today.</p>	<p><i>Casement</i> windows adapted the English tradition of using wrought iron casements with leaded cames for residential use. Rolled steel casements (either single, as shown, or paired) were popular in the 1920s for cottage style residences and Gothic style campus architecture. More streamlined casements were popular in the 1930s for institutional and small industrial buildings.</p>
<p><i>Projecting</i> windows, sometimes called awning or hopper windows, were perfected in the 1920s for industrial and institutional buildings. They were often used in "combination" windows, in which upper panels opened out and lower panels opened in. Since each movable panel projected to one side of the frame only, unlike pivot windows, for example, screens could be introduced.</p>	<p><i>Continuous</i> windows were almost exclusively used for industrial buildings requiring high overhead lighting. Long runs of clerestory windows operated by mechanical tension rod gears were typical. Long banks of continuous windows were possible because the frames for such windows were often structural elements of the building.</p>

Fig. 4 Typical rolled steel windows available from 1890 to the present. The various operating and ventilating capacities in combination with the aesthetics of the window style were important considerations in the selection of one window type over another. Drawings: Sharon C. Park, AIA.

If it is determined that the windows are in basically sound condition, the following steps can be taken: 1) removal of light rust, flaking and excessive paint; 2) priming of exposed metal with a rust-inhibiting primer; 3) replacement of cracked or broken glass and glazing compound; 4) replacement of missing screws or fasteners; 5) cleaning and lubrication of hinges; 6) repainting of all steel sections with two coats of finish paint compatible with the primer; and 7) caulking the masonry surrounds with a high quality elastomeric caulk.

Recommended methods for removing light rust include manual and mechanical abrasion or the application of chemicals. Burning off rust with an oxy-acetylene or propane torch, or an inert gas welding gun, should never be attempted because the heat can distort the metal. In addition, such intense heat (often as high as 3800° F) vaporizes the lead in old paint, resulting in highly toxic fumes. Furthermore, such heat will likely result in broken glass. Rust can best be removed using a wire brush, an aluminum oxide sandpaper, or a variety of power tools



Fig. 5 Windows often provide a strong visual element to relatively simple or unadorned industrial or commercial buildings. This design element should be taken into consideration when evaluating the significance of the windows. Photo: Michael Auer.

adapted for abrasive cleaning such as an electric drill with a wire brush or a rotary whip attachment. Adjacent sills and window jambs may need protective shielding.

Rust can also be removed from ferrous metals by using a number of commercially prepared anti-corrosive acid compounds. Effective on light and medium corrosion, these compounds can be purchased either as liquids or gels. Several bases are available, including phosphoric acid, ammonium citrate, oxalic acid and hydrochloric acid. Hydrochloric acid is generally not recommended; it can leave chloride deposits, which cause future corrosion. Phosphoric acid-based compounds do not leave such deposits, and are therefore safer for steel windows. However, any chemical residue should be wiped off with damp cloths, then dried immediately. Industrial blow-dryers work well for thorough drying. The use of running water to remove chemical residue is never recommended because the water may spread the chemicals to adjacent surfaces, and drying of these surfaces may be more difficult. Acid cleaning compounds will stain masonry; therefore plastic sheets should be taped to the edge of the metal sections to protect the masonry surrounds. The same measure should be followed to protect the glazing from etching because of acid contact.

Measures that remove rust will ordinarily remove flaking paint as well. Remaining loose or flaking paint can be removed with a chemical paint remover or with a pneumatic needle scaler or gun, which comes with a series of chisel blades and has proven effective in removing flaking paint from metal windows. Well-bonded paint may serve to protect the metal further from corrosion, and need not be removed unless paint build-up prevents the window from closing tightly. The edges should be feathered by sanding to give a good surface for repainting.

Next, any *bare* metal should be wiped with a cleaning solvent such as denatured alcohol, and dried immediately in preparation for the application of an anti-corrosive primer. Since corrosion can recur very soon after metal has been exposed to the air, the metal should be primed immediately after cleaning. Spot priming may be required periodically as other repairs are undertaken. Anti-corrosive primers generally consist of oil-alkyd based paints rich in zinc or zinc chromate.<sup>2</sup> Red lead is no longer available because of its toxicity. All metal primers, however, are toxic to some degree and should be handled carefully. Two coats of primer are recommended. Manufacturer's recommendations should be followed concerning application of primers.

## REPAIR

### Repair in Place

The maintenance procedures described above will be insufficient when corrosion is extensive, or when metal window sections are misaligned. Medium to heavy corrosion that has not done any structural damage to the metal sections can be removed either by using the chemical cleaning

process described under "Routine Maintenance" or by sandblasting. Since sandblasting can damage the masonry surrounds and crack or cloud the glass, metal or plywood shields should be used to protect these materials. The sandblasting pressure should be low, 80-100 pounds per square inch, and the grit size should be in the range of #10-#45. Glass peening beads (glass pellets) have also been successfully used in cleaning steel sections. While sandblasting equipment comes with various nozzle sizes, pencil-point blasters are most useful because they give the operator more effective control over the direction of the spray. The small aperture of the pencil-point blaster is also useful in removing dried putty from the metal sections that hold the glass. As with any cleaning technique, once the bare metal is exposed to air, it should be primed as soon as possible. This includes the inside rabbeted section of sash where glazing putty has been removed. To reduce the dust, some local codes allow only wet blasting. In this case, the metal must be dried immediately, generally with a blow-drier (a step that the owner should consider when calculating the time and expense involved). Either form of sandblasting metal covered with lead paints produces toxic dust. Proper precautionary measures should be taken against toxic dust and silica particles.

Bent or bowed metal sections may be the result of damage to the window through an impact or corrosive expansion. If the distortion is not too great, it is possible to realign the metal sections without removing the window to a metal fabricator's shop. The glazing is generally removed and pressure is applied to the bent or bowed section. In the case of a muntin, a protective 2 x 4 wooden bracing can be placed behind the bent portion and a wire cable with a winch can apply progressively more pressure over several days until the section is realigned. The 2 x 4 bracing is necessary to distribute the pressure evenly over the damaged section. Sometimes a section, such as the bottom of the frame, will bow out as a result of pressure exerted by corrosion and it is often necessary to cut the metal section to relieve this pressure prior to pressing the section back into shape and making a welded repair.

Once the metal sections have been cleaned of all corrosion and straightened, small holes and uneven areas resulting from rusting should be filled with a patching material and sanded smooth to eliminate pockets where water can accumulate. A patching material of steel fibers and an epoxy binder may be the easiest to apply. This steel-based epoxy is available for industrial steel repair; it can also be found in auto body patching compounds or in plumber's epoxy. As with any product, it is important to follow the manufacturer's instructions for proper use and best results. The traditional patching technique—melting steel welding rods to fill holes in the metal sections—may be difficult to apply in some situations; moreover, the window glass must be removed during the repair process, or it will crack from the expansion of the heated metal sections. After these repairs, glass replacement, hinge lubrication, painting, and other cosmetic repairs can be undertaken as necessary.

<sup>2</sup>Refer to Table IV. Types of Paint Used for Painting Metal in *Metals in America's Historic Buildings*, p. 139. (See bibliography).



To complete the checklist for routine maintenance, cracked glass, deteriorated glazing compound, missing screws, and broken fasteners will have to be replaced; hinges cleaned and lubricated; the metal windows painted, and the masonry surrounds caulked. If the glazing must be replaced, all clips, glazing beads, and other fasteners that hold the glass to the sash should be retained, if possible, although replacements for these parts are still being fabricated. When bedding glass, use only glazing compound formulated for metal windows. To clean the hinges (generally brass or bronze), a cleaning solvent and fine bronze wool should be used. The hinges should then be lubricated with a non-greasy lubricant specially formulated for metals and with an anti-corrosive agent. These lubricants are available in a spray form and should be used periodically on frequently opened windows.

Final painting of the windows with a paint compatible with the anti-corrosive primer should proceed on a dry day. (Paint and primer from the same manufacturer should be used.) Two coats of finish paint are recommended if the sections have been cleaned to bare metal. The paint should overlap the glass slightly to insure weathertightness at that connection. Once the paint dries thoroughly, a flexible exterior caulk can be applied to eliminate air and moisture infiltration where the window and the surrounding masonry meet.

Caulking is generally undertaken after the windows have received at least one coat of finish paint. The perimeter of the masonry surround should be caulked with a flexible elastomeric compound that will adhere well to both metal and masonry. The caulking used should be a type intended for exterior application, have a high tolerance for material movement, be resistant to ultraviolet light, and have a minimum durability of 10 years. Three effective compounds (taking price and other factors into consideration) are polyurethane, vinyl acrylic, and butyl rubber. In selecting a caulking material for a window retrofit, it is important to remember that the caulking compound may be covering other materials in a substrate. In this case, some compounds, such as silicone, may not adhere well. Almost all modern caulking compounds can be painted after curing completely. Many come in a range of colors, which eliminates the need to paint. If colored caulking is used, the windows should have been given two coats of finish paint prior to caulking.

### Repair in Workshop

Damage to windows may be so severe that the window sash and sometimes the frame must be removed for cleaning and extensive rust removal, straightening of bent sections, welding or splicing in of new sections, and reglazing. These major and expensive repairs are reserved for highly significant windows that cannot be replaced; the procedures involved should be carried out only by skilled workmen. (see fig. 6a—6f.)

As part of the orderly removal of windows, each window should be numbered and the parts labelled. The operable metal sash should be dismantled by removing the hinges; the fixed sash and, if necessary, the frame can then be unbolted or unscrewed. (The subframe is usually left in place. Built into the masonry surrounds, it can only be cut out with a torch.) Hardware and hinges should be labelled and stored together.

The two major choices for removing flaking paint and corrosion from severely deteriorated windows are dipping in a chemical bath or sandblasting. Both treatments require removal of the glass. If the windows are to be dipped, a phosphoric acid solution is preferred, as mentioned earlier. While the dip tank method is good for fairly evenly distributed rust, deep set rust may remain after dipping. For that reason, sandblasting is more effective for heavy and uneven corrosion. Both methods leave the metal sections clean of residual paint. As already noted, after cleaning has exposed the metal to the air, it should be primed immediately after drying with an anti-corrosive primer to prevent rust from recurring.

Sections that are seriously bent or bowed must be straightened with heat and applied pressure in a workshop. Structurally weakened sections must be cut out, generally with an oxy-acetylene torch, and replaced with sections welded in place and the welds ground smooth. Finding replacement metal sections, however, may be difficult. While most rolling mills are producing modern sections suitable for total replacement, it may be difficult to find an exact profile match for a splicing repair. The best source of rolled metal sections is from salvaged windows, preferably from the same building. If no salvaged windows are available, two options remain. Either an ornamental metal fabricator can weld flat plates into a built-up section, or a steel plant can mill bar steel into the desired profile.

While the sash and frame are removed for repair, the subframe and masonry surrounds should be inspected. This is also the time to reset sills or to remove corrosion from the subframe, taking care to protect the masonry surrounds from damage.

Missing or broken hardware and hinges should be replaced on all windows that will be operable. Salvaged windows, again, are the best source of replacement parts. If matching parts cannot be found, it may be possible to adapt ready-made items. Such a substitution may require filling existing holes with steel epoxy or with plug welds and tapping in new screw holes. However, if the hardware is a highly significant element of the historic window, it may be worth having reproductions made.

Following are illustrations of the repair and thermal upgrading of the rolled steel windows in a National Historic Landmark (fig. 6). Many of the techniques described above were used during this extensive rehabilitation. The complete range of repair techniques is then summarized in the chart titled *Steps for Cleaning and Repairing Historic Steel Windows* (see fig. 7).

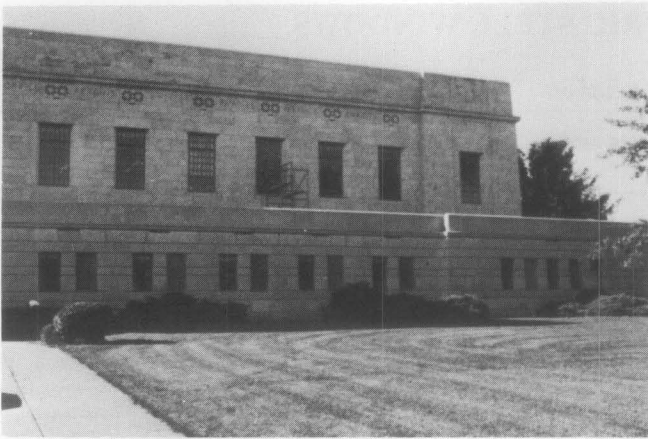


Fig. 6 a. View of the flanking wing of the State Capitol where the rolled steel casement windows are being removed for repair.

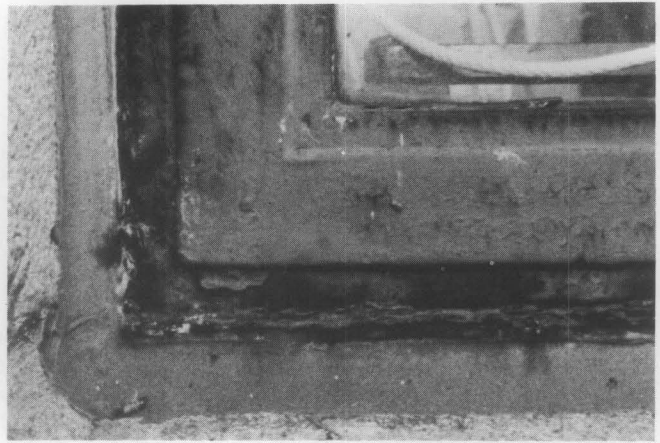


Fig. 6 b. View from the exterior showing the deteriorated condition of the lower corner of a window prior to repair. While the sash was in relatively good condition, the frame behind was rusted to the point of inhibiting operation.

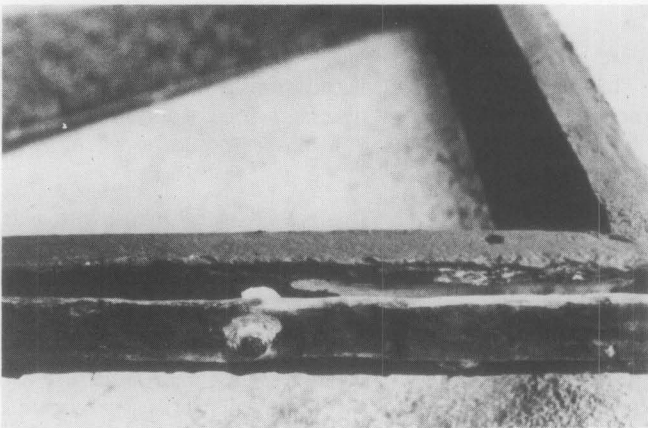


Fig. 6 c. View of the rusted frame which was unscrewed from the subframe and removed from the window opening and taken to a workshop for sandblasting. In some cases, severely deteriorated sections of the frame were replaced with new sections of milled bar steel.



Fig. 6 d. View looking down towards the sill. The subframes appeared very rusted, but were in good condition once debris was vacuumed and surface rust was removed, in place, with chemical compounds. Where necessary, epoxy and steel filler was used to patch depressions in order to make the subframe serviceable again.

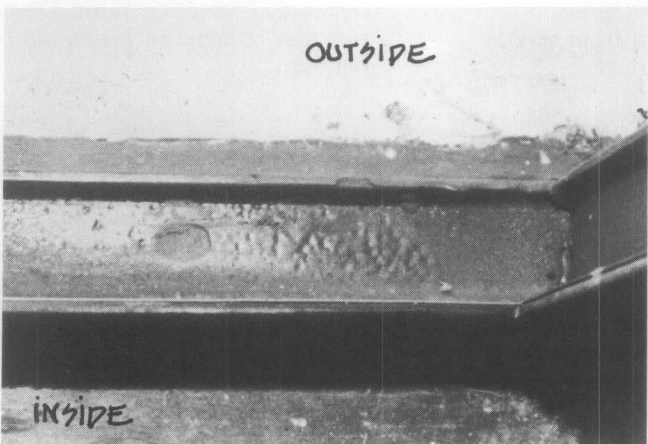


Fig. 6 e. View looking down towards the sill. The cleaned frame was reset in the window opening. The frame was screwed to the refurbished subframe at the jamb and the head only. The screw holes at the sill, which had been the cause of much of the earlier rusting, were infilled. Vinyl weatherstripping was added to the frame.



Fig. 6 f. View from the outside of the completely refurbished window. In addition to the steel repair and the installation of vinyl weatherstripping, the exterior was caulked with polyurethane and the single glass was replaced with individual lights of thermal glass. The repaired and upgraded windows have comparable energy efficiency ratings to new replacement units while retaining the historic steel sash, frames and subframes.

Fig. 6. The repair and thermal upgrading of the historic steel windows at the State Capitol, Lincoln, Nebraska. This early twentieth century building, designed by Bertram Goodhue, is a National Historic Landmark. Photos: All photos in this series were provided by the State Building Division.

## STEPS FOR CLEANING AND REPAIRING HISTORIC STEEL WINDOWS

Work Item	Recommended Techniques	Tools, Products and Procedures	Notes
	*(Must be done in a workshop)		
1. Removing dirt and grease from metal	General maintenance and chemical cleaning	Vacuum and bristle brushes to remove dust and dirt; solvents (denatured alcohol, mineral spirits), and clean cloths to remove grease.	Solvents can cause eye and skin irritation. Operator should wear protective gear and work in ventilated area. Solvents should not contact masonry. Do not flush with water.
2. Removing Rust/Corrosion			
Light	Manual and mechanical abrasion	Wire brushes, steel wool, rotary attachments to electric drill, sanding blocks and disks.	Hand sanding will probably be necessary for corners. Safety goggles and masks should be worn.
	Chemical cleaning	Anti-corrosive jellies and liquids (phosphoric acid preferred); clean damp cloths.	Protect glass and metal with plastic sheets attached with tape. Do not flush with water. Work in ventilated area.
Medium	Sandblasting/abrasive cleaning	Low pressure (80-100 psi) and small grit (#10-#45); glass peening beads. Pencil blaster gives good control.	Removes both paint and rust. Codes should be checked for environmental compliance. Prime exposed metal promptly. Shield glass and masonry. Operator should wear safety gear.
Heavy	*Chemical dip tank	Metal sections dipped into chemical tank (phosphoric acid preferred) from several hours to 24 hours.	Glass and hardware should be removed. Protect operator. Deepset rust may remain, but paint will be removed.
	*Sandblasting/abrasive cleaning	Low pressure (80-100 psi) and small grit (#10-#45).	Excellent for heavy rust. Remove or protect glass. Prime exposed metal promptly. Check codes for environmental compliance. Operator should wear safety gear.
3. Removing flaking paint.	Chemical method	Chemical paint strippers suitable for ferrous metals. Clean cloths.	Protect glass and masonry. Do not flush with water. Have good ventilation and protection for operator.
	Mechanical abrasion	Pneumatic needle gun chisels, sanding disks.	Protect operator; have good ventilation. Well-bonded paint need not be removed if window closes properly.
4. Aligning bent, bowed metal sections	Applied pressure	Wooden frame as a brace for cables and winch mechanism.	Remove glass in affected area. Realignment may take several days.
	*Heat and pressure	Remove to a workshop. Apply heat and pressure to bend back.	Care should be taken that heat does not deform slender sections.

Work Item	Recommended Techniques	Tools, Products and Procedures	Notes
	*(Must be done in a workshop)		
5. Patching depressions	Epoxy and steel filler	Epoxy fillers with high content of steel fibers; plumber's epoxy or autobody patching compound.	Epoxy patches generally are easy to apply, and can be sanded smooth. Patches should be primed.
	Welded patches	Weld in patches using steel rods and oxy-acetylene torch or arc welder.	Prime welded sections after grinding connections smooth.
6. Splicing in new metal sections	*Cut out decayed sections and weld in new or salvaged sections	Torch to cut out bad sections back to 45° joint. Weld in new pieces and grind smooth.	Prime welded sections after grinding connection smooth.
7. Priming metal sections	Brush or spray application	At least one coat of anti-corrosive primer on bare metal. Zinc-rich primers are generally recommended.	Metal should be primed as soon as it is exposed. If cleaned metal will be repaired another day, spot prime to protect exposed metal.
8. Replacing missing screws and bolts	Routine maintenance	Pliers to pull out or shear off rusted heads. Replace screws and bolts with similar ones, readily available.	If new holes have to be tapped into the metal sections, the rusted holes should be cleaned, filled and primed prior to redrilling.
9. Cleaning, lubricating or replacing hinges and other hardware	Routine maintenance, solvent cleaning	Most hinges and closure hardware are bronze. Use solvents (mineral spirits), bronze wool and clean cloths. Spray with non-greasy lubricant containing anti-corrosive agent.	Replacement hinges and fasteners may not match the original exactly. If new holes are necessary, old ones should be filled.
10. Replacing glass and glazing compound	Standard method for application	Pliers and chisels to remove old glass, scrape putty out of glazing rabbet, save all clips and beads for reuse. Use only glazing compound formulated for metal windows.	Heavy gloves and other protective gear needed for the operator. All parts saved should be cleaned prior to reinstallation.
11. Caulking masonry surrounds	Standard method for application	Good quality (10 year or better) elastomeric caulking compound suitable for metal.	The gap between the metal frame and the masonry opening should be caulked; keep weepholes in metal for condensation run-off clear of caulk.
12. Repainting metal windows	Spray or brush	At least 2 coats of paint compatible with the anti-corrosive primer. Paint should lap the glass about 1/8" to form a seal over the glazing compound.	The final coats of paint and the primer should be from the same manufacturer to ensure compatibility. If spraying is used, the glass and masonry should be protected.

Fig. 7. STEPS FOR CLEANING AND REPAIRING HISTORIC STEEL WINDOWS. Compiled by Sharon C. Park, AIA.

## WEATHERIZATION

Historic metal windows are generally not energy efficient; this has often led to their wholesale replacement. Metal windows can, however, be made more energy efficient in several ways, varying in complexity and cost. Caulking around the masonry openings and adding weatherstripping, for example, can be do-it-yourself projects and are important first steps in reducing air infiltration around the windows. They usually have a rapid payback period. Other treatments include applying fixed layers of glazing over the historic windows, adding operable storm windows, or installing thermal glass in place of the existing glass. In combination with caulking and weatherstripping, these treatments can produce energy ratings rivaling those achieved by new units.<sup>3</sup>

### Weatherstripping

The first step in any weatherization program, caulking, has been discussed above under "Routine Maintenance." The second step is the installation of weatherstripping where the operable portion of the sash, often called the ventilator, and the fixed frame come together to reduce perimeter air infiltration (see fig. 8). Four types of weatherstripping appropriate for metal windows are spring-metal, vinyl strips, compressible foam tapes, and sealant beads. The spring-metal, with an integral friction fit mounting clip, is recommended for steel windows in good condition. The clip eliminates the need for an applied glue; the thinness of the material insures a tight closure. The weatherstripping is clipped to the inside channel of the rolled metal section of the fixed frame. To insure against galvanic corrosion between the weatherstripping (often bronze or brass), and the steel window, the window must be painted prior to the installation of the weatherstripping. This weatherstripping is usually applied to the entire perimeter of the window opening, but in some cases, such as casement windows, it may be best to avoid weatherstripping the hinge side. The natural wedging action of the weatherstripping on the three sides of the window often creates an adequate seal.

Vinyl weatherstripping can also be applied to metal windows. Folded into a "V" configuration, the material forms a barrier against the wind. Vinyl weatherstripping is usually glued to the frame, although some brands have an adhesive backing. As the vinyl material and the applied glue are relatively thick, this form of weatherstripping may not be appropriate for all situations.

Compressible foam tape weatherstripping is often best for large windows where there is a slight bending or distortion of the sash. In some very tall windows having closure hardware at the sash mid-point, the thin sections

<sup>3</sup>One measure of energy efficiency is the U-value (the number of BTUs per hour transferred through a square foot of material). The lower the U-value, the better the performance. According to *ASHRAE HANDBOOK-1977 Fundamentals*, the U-value of historic rolled steel sash with single glazing is 1.3. Adding storm windows to the existing units or reglazing with 5/8" insulating glass produces a U-value of .69. These methods of weatherizing historic steel windows compare favorably with rolled steel replacement alternatives: with factory installed 1" insulating glass (.67 U-value); with added thermal-break construction and factory finish coatings (.62 U-value).

of the metal window will bow away from the frame near the top. If the gap is not more than 1/4", foam weatherstripping can normally fill the space. If the gap exceeds this, the window may need to be realigned to close more tightly. The foam weatherstripping comes either with an adhesive or plain back; the latter variety requires application with glue. Compressible foam requires more frequent replacement than either spring-metal or vinyl weatherstripping.

A fourth type of successful weatherstripping involves the use of a caulking or sealant bead and a polyethylene bond breaker tape. After the window frame has been thoroughly cleaned with solvent, permitted to dry, and primed, a neat bead of low modulus (firm setting) caulk, such as silicone, is applied. A bond breaker tape is then applied to the operable sash covering the metal section where contact will occur. The window is then closed until the sealant has set (2-7 days, depending on temperature and humidity). When the window is opened, the bead will have taken the shape of the air infiltration gap and the bond breaker tape can be removed. This weatherstripping method appears to be successful for all types of metal windows with varying degrees of air infiltration.

Since the several types of weatherstripping are appropriate for different circumstances, it may be necessary to use more than one type on any given building. Successful weatherstripping depends upon using the thinnest material adequate to fill the space through which air enters. Weatherstripping that is too thick can spring the hinges, thereby resulting in more gaps.

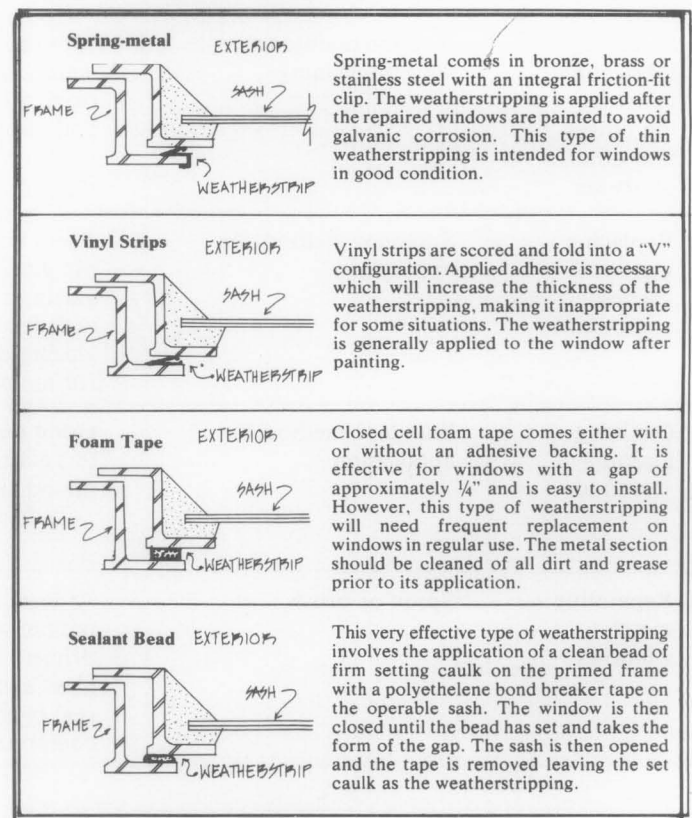


Fig. 8 APPROPRIATE TYPES OF WEATHERSTRIPPING FOR METAL WINDOWS. Weatherstripping is an important part of upgrading the thermal efficiency of historic steel windows. The chart above shows the jamb section of the window with the weatherstripping in place. Drawings: Sharon C. Park, AIA.

## Thermal Glazing

The third weatherization treatment is to install an additional layer of glazing to improve the thermal efficiency of the existing window. The decision to pursue this treatment should proceed from careful analysis. Each of the most common techniques for adding a layer of glazing will effect approximately the same energy savings (approximately double the original insulating value of the windows); therefore, cost and aesthetic considerations usually determine the choice of method. Methods of adding a layer of glazing to improve thermal efficiency include adding a new layer of transparent material to the window; adding a separate storm window; and replacing the single layer of glass in the window with thermal glass.

The least expensive of these options is to install a clear material (usually rigid sheets of acrylic or glass) over the original window. The choice between acrylic and glass is generally based on cost, ability of the window to support the material, and long-term maintenance outlook. If the material is placed over the entire window and secured to the frame, the sash will be inoperable. If the continued use of the window is important (for ventilation or for fire exits), separate panels should be affixed to the sash without obstructing operability (see fig. 9). Glass or acrylic panels set in frames can be attached using magnetized gaskets, interlocking material strips, screws or adhesives. Acrylic panels can be screwed directly to the metal windows, but the holes in the acrylic panels should allow for the expansion and contraction of this material. A compressible gasket between the prime sash and the storm panel can be very effective in establishing a thermal cavity between glazing layers. To avoid condensation, 1/8" cuts in a top corner and diagonally opposite bottom corner of the gasket will provide a vapor bleed, through which moisture can evaporate. (Such cuts, however, reduce thermal performance slightly.) If condensation does occur, however, the panels should be easily removable in order to wipe away moisture before it causes corrosion.

The second method of adding a layer of glazing is to have independent storm windows fabricated. (Pivot and austral windows, however, which project on either side of the window frame when open, cannot easily be fitted with storm windows and remain operational.) The storm window should be compatible with the original sash configuration. For example, in paired casement windows, either specially fabricated storm casement windows or sliding units in which the vertical meeting rail of the slider reflects the configuration of the original window should be installed. The decision to place storm windows on the inside or outside of the window depends on whether the historic window opens in or out, and on the visual impact the addition of storm windows will have on the building. Exterior storm windows, however, can serve another purpose besides saving energy: they add a layer of protection against air pollutants and vandals, although they will partially obscure the prime window. For highly ornamental windows this protection can determine the choice of exterior rather than interior storm windows.

The third method of installing an added layer of glazing is to replace the original single glazing with thermal glass. Except in rare instances in which the original glass is of special interest (as with stained or figured glass), the glass can be replaced if the hinges can tolerate the weight of the additional glass. The rolled metal sections for steel windows are generally from 1" - 1 1/2" thick. Sash of this thickness can normally tolerate thermal glass, which ranges from 3/8" - 5/8". (Metal glazing beads, readily available, are used to reinforce the muntins, which hold the glass.) This treatment leaves the window fully operational while preserving the historic appearance. It is, however, the most expensive of the treatments discussed here. (See fig. 6f).

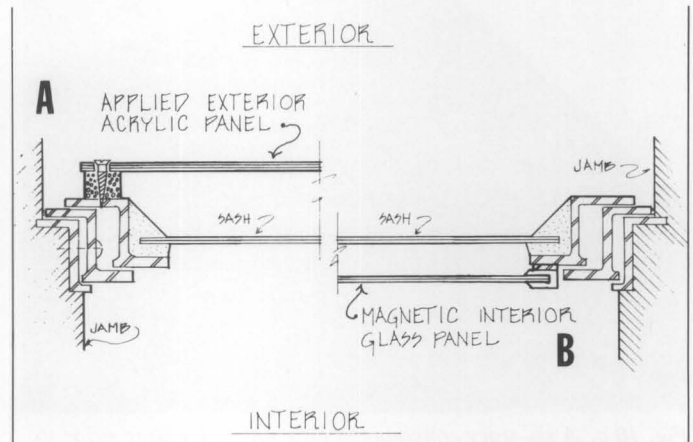


Fig. 9 Two examples of adding a second layer of glazing in order to improve the thermal performance of historic steel windows. Scheme A (showing jamb detail) is of a 1/4" acrylic panel with a closed cell foam gasket attached with self-tapping stainless steel screws directly to the exterior of the outwardly opening sash. Scheme B (showing jamb detail) is of a glass panel in a magnetized frame affixed directly to the interior of the historic steel sash. The choice of using glass or acrylic mounted on the inside or outside will depend on the ability of the window to tolerate additional weight, the location and size of the window, the cost, and the long-term maintenance outlook. Drawing: Sharon C. Park, AIA.

## WINDOW REPLACEMENT

Repair of historic windows is always preferred within a rehabilitation project. Replacement should be considered only as a last resort. However, when the extent of deterioration or the unavailability of replacement sections renders repair impossible, replacement of the entire window may be justified. In the case of significant windows, replacement in kind is essential in order to maintain the historic character of the building. However, for less significant windows, replacement with compatible new windows may be acceptable. In selecting compatible replacement windows, the material, configuration, color, operability, number and size of panes, profile and proportion of metal sections, and reflective quality of the original glass should be duplicated as closely as possible.

A number of metal window manufacturing companies produce rolled steel windows. While stock modern window designs do not share the multi-pane configuration of

historic windows, most of these manufacturers can reproduce the historic configuration if requested, and the cost is not excessive for large orders (see figs. 10a and 10b). Some manufacturers still carry the standard pre-World War II multi-light windows using the traditional 12" x 18" or 14" x 20" glass sizes in industrial, commercial, security, and residential configurations. In addition, many of the modern steel windows have integral weatherstripping, thermal break construction, durable vinyl coatings, insulating glass, and other desirable features.

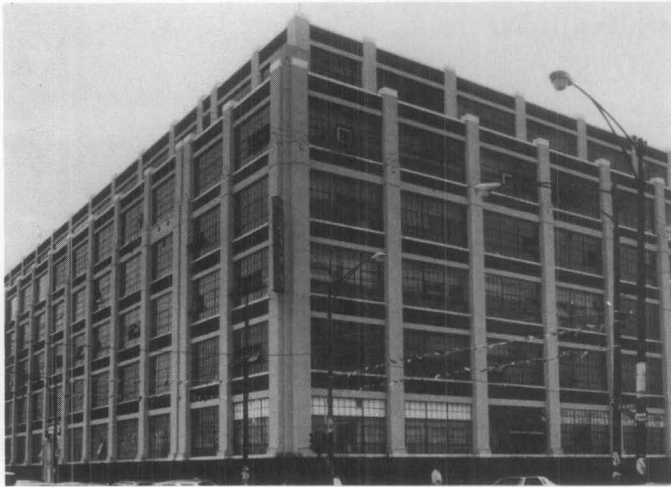


Fig. 10 a. A six-story concrete manufacturing building prior to the replacement of the steel pivot windows. Photo: Charles Parrott.



Fig. 10 b. Close-up view of the new replacement steel windows which matched the multi-lighted originals exactly. Photo: Charles Parrott.

Windows manufactured from other materials generally cannot match the thin profiles of the rolled steel sections. Aluminum, for example, is three times weaker than steel and must be extruded into a box-like configuration that does not reflect the thin historic profiles of most steel windows. Wooden and vinyl replacement windows generally are not fabricated in the industrial style, nor can they reproduce the thin profiles of the rolled steel sections, and consequently are generally not acceptable replacements.

For product information on replacement windows, the owner, architect, or contractor should consult manufacturers' catalogues, building trade journals, or the Steel Window Institute, 1230 Keith Building, Cleveland, Ohio 44115.

## SUMMARY

The National Park Service recommends the retention of significant historic metal windows whenever possible. Such windows, which can be a character-defining feature of a historic building, are too often replaced with inappropriate units that impair rather than complement the overall historic appearance. The repair and thermal upgrading of historic steel windows is more practicable than most people realize. Repaired and properly maintained metal windows have greatly extended service lives. They can be made energy efficient while maintaining their contribution to the historic character of the building.

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This publication has been prepared pursuant to the Economic Recovery Tax Act of 1981, which directs the Secretary of the Interior to certify rehabilitations of historic buildings that are consistent with their historic character; the guidance provided in this brief will assist property owners in complying with the requirements of this law.

*Preservation Briefs: 13* has been developed under the technical editorship of Lee H. Nelson, AIA, Chief, Preservation Assistance Division, National Park Service, U.S. Department of the Interior, Washington, D.C. 20240. Comments on the usefulness of this information are welcomed and can be sent to Mr. Nelson at the above address.