STAFF REPORT: FEBURARY 10, 2021 MEETING PREPARED BY: B. CAGNEY
APPLICATION NUMBER: 21-7053
ADDRESS: 1948 CHICAGO BLVD.
HISTORIC DISTRICT: BOSTON-EDISON
APPLICANT: WIL MARQUEZ, MICHAEL MONDO
PROPERTY OWNER: MAHJA ZEON
SCOPE OF WORK: CONSTRUCT NEW ADDITION AT REAR, WINDOW REPLACEMENT, VARIOUS EXTERIOR MODIFICATIONS AND GENERAL MAINTENANCE
DATE OF PROVISIONALLY COMPLETE APPLICATION: 12/18/2020
DATE OF STAFF VISIT: 2/4/2021

1948 Chicago, from Chicago blvd, staff photo. .

Existing Conditions

1948 Chicago Blvd. is a 2 story, single-family home, erected in 1946, located midblock between 14th street and Rosa Parks Blvd. The home is clad in red brick and displays many character defining features of Art Moderne architecture, making it relatively unique compared to the majority of homes in Boston-Edison that were constructed prior to World War II. Although there have been several alterations to the exterior of the home over the decades, the understated and elegant styling of the home remains intact. The west side of the front (south facing) facade features a prominent, curvilinear bay of windows on the first floor. Just above is a sunroom, which the applicant asserts was likely an open patio. Further, it appears to have been retrofitted prior to Boston-Edison's neighborhood designation, as referenced by the 1974 photothat indicate this area has been enclosed. The windows, with the exception of some glass block, were replaced with vinyl windows at an unknown time, post designation. While the designation photos are obstructed by vegetation in front of the home, it is clear that the original windows were metal casement windows with horizontal muntins, as would befit a house of this style. The front door has been removed and is currently boarded up with plywood.

On the east elevation, a one–story projection features glass block windows that continue around the corner to the north and south side. The roof of the projection also functions as a walk-out terrace for the second story above. Based on the 1974 designation photo, it appears these windows were originally steel casements. On the north elevation, the applicant also provides documentation that the two-story rear projection was once an attached garage with bedroom above. At some point the garage was bricked in to create a flexible entertainment space, with a door and window added during the conversion.

HDC digital archives do not indicate that any COA's have been issued for this address. BSEED records indicate that the home was inspected and sold in 2002 and again in 2010.

Proposed Scope of Work: With the current proposal, the applicant is seeking the Commission's approval to construct additional living space at the rear of the home, replace all of the existing windows and doors, convert existing windows into doorways at the rear elevation, as well as other work items as follows:

South Elevation:

- Window Replacement as follows:
    - Replace (7) vinyl slider windows on second floor sunroom with *Andersen E-Series* aluminum clad, wooden casement windows, in black finish, with non-operational transom.
    - Replace (5) vinyl double-hung windows on first floor with *Andersen E-Series* aluminum clad, wooden casement windows, in black finish, with non-operational transom.
    - Replace existing glass block fenestration with new glass block.
- Raise sill height of existing sunroom (3) brick courses to align with sill height of adjacent window on second story.
- Install new front door with porthole window.
    - Door to feature flush panel steel front and balcony door with pre-hung system, with 24" Dia. Glass / metal frame porthole. The doors will be galvanized to resist rust and be 24-Gauge, high quality steel with 22-Gauge steel stiles and rails for additional strength and security. Door size is 36 in. x 80 in. Unit dimension is 37.5 in. x 81.75 in.
- Remove overhang above front door and repair framing, reroof and clad with metal paneling.
    - Material is a .032 Aluminum exterior skin, smooth texture, in black finish.
- Demolish deteriorated planter, and rebuild to include new footing, restacking with matching brick and stone cap, to match existing footprint.
- Remove mature evergreen tree directly in front of home.
- Repoint masonry as needed; new mortar to match original in color, texture and tooling.
- Clean masonry as needed after conducting tests on small areas not exposed to public view.

North Elevation:

- Construction of new 175 Square Foot addition, directly above the existing 1-story projection at northwest corner of home.
    - New brick to match the existing brick mortar, and tooling of the home.
    - Remove existing corner window, filling with matching brick, mortar and tooling.
    - Install *Andersen E-Series* aluminum clad, wooden casement windows at north and west corners of the proposed addition, to align with sill of window on the northeast corner.
- Window Replacement as follows:
    - Replace vinyl double-hung window on first floor with new *Andersen E-Series* aluminum clad, wooden window, operation not specified.

- Remove (2) existing glass block windows on first floor, expand openings down to grade and install new rear doorways.
    - New French doors to feature transoms above and horizontal muntins, in black finish.
    - Manufacturer not specified.
- Repoint masonry as needed; new mortar to match original in color, texture and tooling.
- Clean masonry as needed after conducting tests on small areas not exposed to public view.

East Elevation:

- Window Replacement as follows:
    - Remove vinyl windows at the second-story, southeast corner and replace them with *Andersen E-Series* aluminum clad, wooden casement windows, in black finish, with Non-operable transom and horizontal muntins.
    - Remove (2) glass block corner window treatments on both north and south corners to be replaced with *Andersen* aluminum clad, wooden casement windows, in black finish, with operable transom and horizontal muntins.
    - Remove and replace existing non-historic door at second story balcony with new wood door featuring dual portholes.
    - Replace (1) vinyl double-hung window on first floor with new *Andersen E-Series* aluminum clad, wooden casement window, in black finish, with non-operational transom.
    - Remove all existing glass block fenestration on second floor and replace in-kind with new glass block.
- Remove existing door opening, infill with brick to match existing.
- Restore existing railing on second story balcony.
- Install new door on north side of east projection (door currently sealed shut).
- Repoint masonry as needed; new mortar to match original in color, texture and tooling.
- Clean masonry as needed after conducting tests on small areas not exposed to public view.

West Elevation:

- Window Replacement as follows:
    - Replace (3) vinyl double-hung windows on first floor with *Andersen E-Series* aluminum clad, wooden casement window, in black finish, with non-operational transom.
    - Replace (1) vinyl slider window on second floor with *Andersen E-Series* aluminum clad, wooden dual operation casement window unit, separated by mullion, in black finish, with non-operational transom.
- Repoint masonry as needed; new mortar to match original in color, texture and tooling.
- Clean masonry as needed after conducting tests on small areas not exposed to public view.

Staff Observations and Research:

- Boston Edison Historic District was designated in 1973.
- Some of the exterior modifications to this home were done prior to designation, as is clear from the designation photos and supplemental information provided in the applicant's submission. The windows were replaced after designation.
- The proposed addition will be partially visible from the right of way.
- The proximity of the mature evergreen tree to the front of the home appears to be too close for a tree of that size, and is in the wrong location with respect to the homes primary elevation, detracting from the site's historic character.

Issues:

- While the proposed doors generally seem appropriate, it is not clear if these will be custom or provided by manufacturer. No cutsheets have been provided.
- The existing windows at 1948 Chicago Blvd. are not appropriate for the style and character of this home. Staff feels that the removal of these windows for more appropriate windows will greatly improve the historic character of the home. Staff understands that the proper replacement of the original steel casement windows may be unreasonably costly. However, staff has questions as to whether the *Andersen E-Series* aluminum clad wood windows are the most appropriate option available for replacement.
- The applicant provided staff with photo documentation of an original window from the house, that is found in a window well. These window frame dimensions measure 2-1/8" and the muttons measure 3/4".
- While it appears that the proposed windows do exhibit some traits of the original windows like casement operation and horizontal muntins, the window frames of the Andersen E-Series appear to be thicker (2-5/16" visible sash width, with simulated divided lights and 5/8" muntins) than the original windows, as steel construction allows for much thinner profiles (*National Park Service Technical Preservation Brief 13*, "The Repair and Thermal Upgrading of Historic Steel Windows"). Wood and synthetic windows are unable to match these profiles and dimensions. It is unclear if the applicant has researched any commercial or specialty window manufacturers as alternative options.
- Per NPS Guidance in applying the Standards, "Replacing existing incompatible, non-historic windows with similarly incompatible new windows does not meet the Standards." I.e., although the proposed product may be less objectionable than the current windows, this does not make them appropriate per the ordinance.
- North elevation modifications: Much of the exterior alterations proposed are on the rear elevation. These alterations will not result in the removal of any character defining features of the home or alter the overall expression of the Art Moderne style home.

Recommendation 1: Windows

- It is staff's opinion that the replacement of the existing non-historic windows is appropriate as the current window situation does detract from the overall historic character of the home. However, staff is not convinced that the Andersen E-Series as proposed is the best possible option for replacement and is not appropriate under the Secretary of the Interior's Standards for Rehabilitation (36 CFR Part 67). Staff therefore recommends that the Commission approve a Certificate of Appropriateness (COA) subject to the conditions below, for this portion of the application.

  "The applicant work with staff to identify an appropriate aluminum or steel window product, well-suited for single family residential use and with reasonable economic and technical feasibility, with such feasibility considered as part of a phased approach to window replacement. Should staff and the applicant be unsuccessful in identifying a product by the deadline for the March meeting, the application may be returned to the Commission at that meeting for reconsideration, accompanied by a staff report outlining the research and investigation results."

Recommendation 2: All Other Items in Proposed Workscope

- It is staff's opinion that the rest of the proposed work is appropriate under the Elements of Design for the Boston-Edison Historic District and the Secretary of the Interior's Standards for

Rehabilitation (36 CFR Part 67). Staff therefore recommends that the Commission issue a Certificate of Appropriateness (COA) for the application with the following conditions:

- The applicant submits final specs for all proposed doors, a sample of brick that will be used prior to signing off on permits.

1948 Chicago Blvd, southeast view, 1974 HDC designation photo.

1948 Chicago Blvd, southwest view, 1980 HDC designation photo.

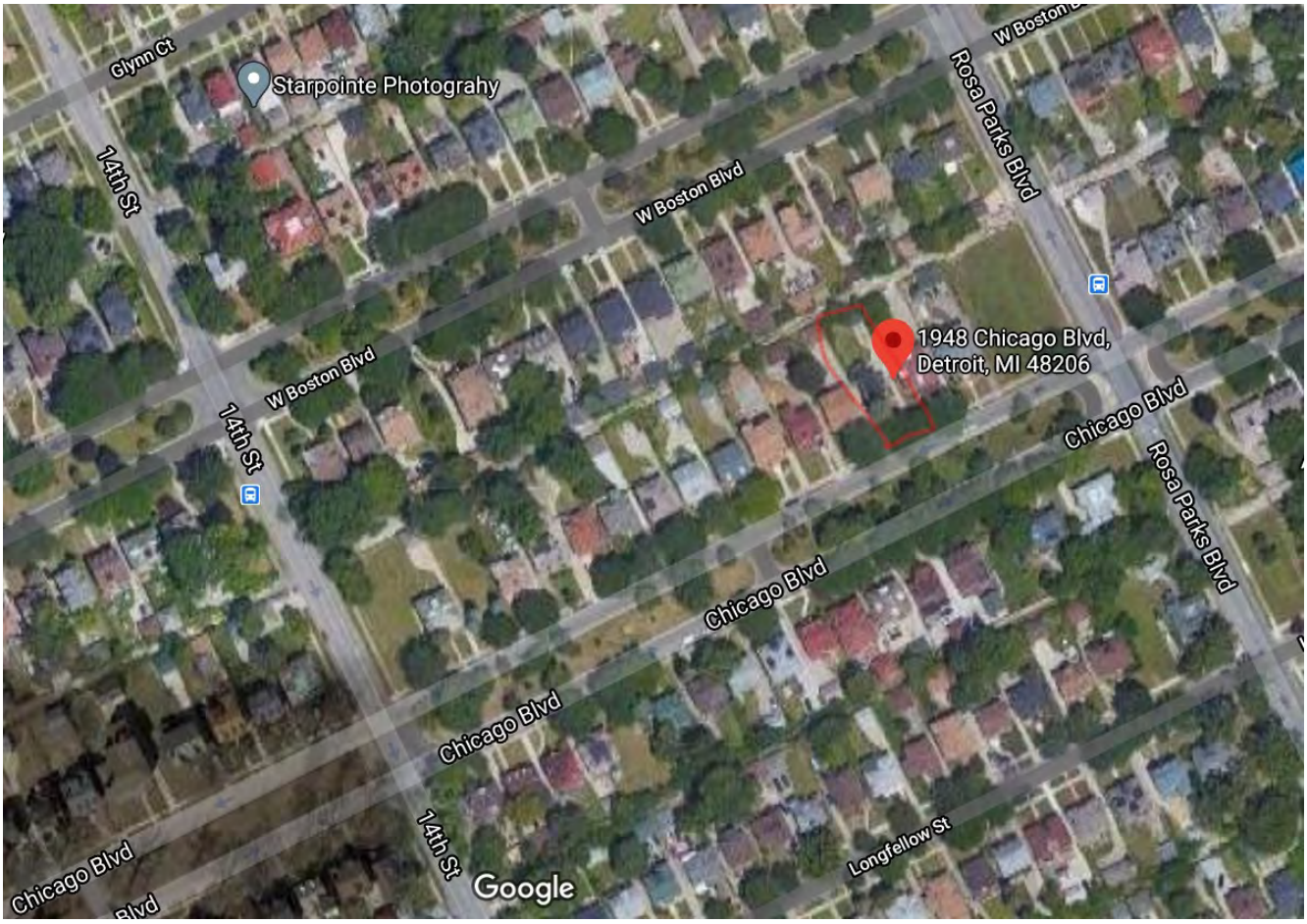
1948 Chicago Blvd, southeast view, staff photo.

1948 Chicago Blvd, southwest view, staff photo.

Figure 1. The only remaining window (Applicant photo)

Figure 2- Mutton is 3/4"

Figure 3- Frame measures 2-1/8"



1948 Chicago Blvd, aerial view, Google.

Marquez Residence
1948 Chicago Blvd
Window and Facade Submission

THE GIVENS FAMILY

1946 | Estelle Gable
1953 | George & Evelyn S Rapp

1946 - Art Moderne home was built and completed. Estelle Gable was original owner

1958 | Donovan H. Givens
1964 | Donovan H. Givens
1968 | Donovan H Givens, Jr.
1972 | Mrs. Lilian Givens
1973 | Donovan H Givens Jr.

1958 - Dr. Donovan H. Givens was married to Lilian Givens. Dr. Givens moved family into 1948 Chicago Blvd in 1958.

Donovan H. Givens was born in 1899 in Indianapolis, Indiana and a graduate of Indiana University. He was a member of the Kappa Alpha Psi Fraternity - Alpha Chapter in 1919.

After leaving Indiana University, Dr. Givens lived in Indianapolis. He practiced in Chicago for four years and eventually settled in Detroit in 1929. Dr. Givens lived and operated his family practice at 3453 Charlevoix Avenue before moving his family to Boston Edison to 1948 Chicago Blvd. as his primary residence in 1958.

Dr. Givens and his wife had two children in Detroit

1. Dr. Donovan Givens Jr.
2. Betty Givens

Fig. A | Dr. Donovan Givens and Lilian Givens. Lilian Givens was from Xenia, Ohio. Photo courtesy of Linda Givens.

Dr. D. H. Givens, Detroit Physician

Dr. Donovan H. Givens, of 1948 Chicago, a physician in Detroit for 37 years, died Sunday. He was 66.

Dr. Givens recieved his bachelor of science and medical degrees from Indiana University and practiced in Chicago four years before coming to Detroit.

He is survived by his wife, Lillian; a son, Dr. Donovan H. Givens Jr.; and daughter, Mrs. William T. Patrick Jr.

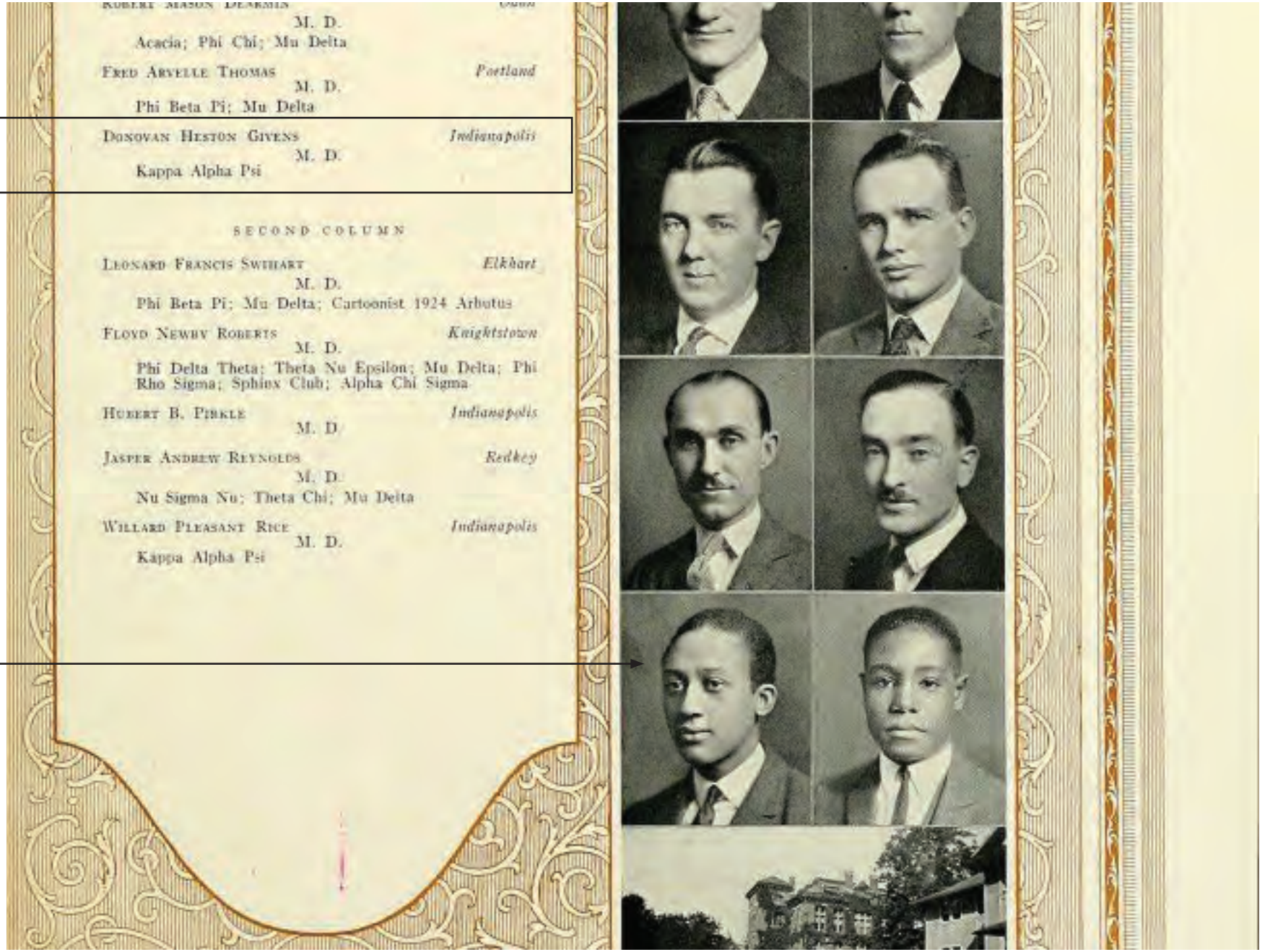
Funeral arrangements are being made by the Charles T. Cole Funeral Home.

Fig. B | Dr. Givens only daughter Betty was married to Detroits first African American City Councelor William T. Patrick Jr.

SECOND YEAR

Ankenbrock, William Simon	Indianapolis
Baeker, Henry George	Indianapolis
Broadbent, Oliver Pickering	Elwood
Carson, Basil Given	Vincennes
Chesser, Arra Bernard	Waldron
Cox, Wilbur Jonathan	Rushville
Cure, Elmer Treat	Martinsville
Dearmin, Robert Mason	Odon
Ellison, Alfred Hancock	Anderson
Emenhiser, John Lesly	Fort Wayne
Erehart, Archie Dean	Huntington
Frasch, Mahlon Godlove	Lafayette
B.S., Purdue University, 1917	
Gillen, Harold William	Wellston, Ohio
A.B., Ohio University, 1917	
Gilman, Marcus Mandle	South Bend
Gitlin, Max Maxwell	Bluffton
Givens, Donovan H.	Indianapolis
Goldner, Roy Edwin	Preble
Harkness, Robert Glenn	Terre Haute
Harrison, Benjamin Lewis	Danville
Havice, Jay Frederick	Fort Wayne
Hicks, Chester Arthur	Centerpoint
Hill, Howard Edwin	Muncie

Fig. C | Indiana University Medical School listing. Donovan Givens was listed as a "Second Year" student.



M. D.
Acacia; Phi Chi; Mu Delta

FRED ARVELLE THOMAS — *Portland*
M. D.
Phi Beta Pi; Mu Delta

DONOVAN HESTON GIVENS — *Indianapolis*
M. D.
Kappa Alpha Psi

SECOND COLUMN

LEONARD FRANCIS SWIHART — *Elkhart*
M. D.
Phi Beta Pi; Mu Delta; Cartoonist 1924 Arbutus

FLOYD NEWBY ROBERTS — *Knightstown*
M. D.
Phi Delta Theta; Theta Nu Epsilon; Mu Delta; Phi Rho Sigma; Sphinx Club; Alpha Chi Sigma

HUBERT B. PIRKLE — *Indianapolis*
M. D

JASPER ANDREW REYNOLDS — *Redkey*
M. D.
Nu Sigma Nu; Theta Chi; Mu Delta

WILLARD PLEASANT RICE — *Indianapolis*
M. D.
Kappa Alpha Psi

Fig. C C | Indiana University Medical School listing. Dr. Donovan H. Givens was listed as member of Kappa Alpha Psi

Fig. C | Dr. Donovan Givens Jr. celebrates his recent nuptuals with his bride. This photo was taken in the backyard of 1948 Chicago Blvd.

On July 26, 1967, I was almost four years old. My family lived at 1948 Chicago Boulevard, four houses west of 12th Street, and four blocks north of Clairmount, the epicenter of the rebellion, which had broken out early in the morning of the 23rd.

Donna L. Givens is president and CEO of the Eastside Community Network in Detroit.

I remember crawling on the floor under windows to avoid stray bullets, tanks rolling down the street, and fear of my father being stopped at gunpoint by soldiers like those patrolling Vietnam. I remember being unable to differentiate the war on the streets from the war taking place on television. But I also remember a Detroit immersed in black pride despite every obstacle, an awareness that some of us had overcome and all of us would overcome some day.

I went to last week's premiere of the "Detroit" movie, which opens nationwide Friday, with high hopes that my Detroit would be celebrated on a world's stage. I left the Fox Theatre wishing the writer and director could see Detroit like I do.

Fig. D | Donna Givens is the Executive Director of the Eastside Community Network describes her experience at 1948 Chicago. Her grandfather was Dr. Donovan Givens and Grandmother Lilian Givens

Linda Givens <lggivensrn@icloud.com>
to me

My name is Linda Givens and I lived at the above address from January 1966 to September 1967. My grandparents bought the home the year I was born so I spent a great deal of my early years there.

Linda Givens <lggivensrn@icloud.com> Tue, Jun 30, 10:21 AM
to me

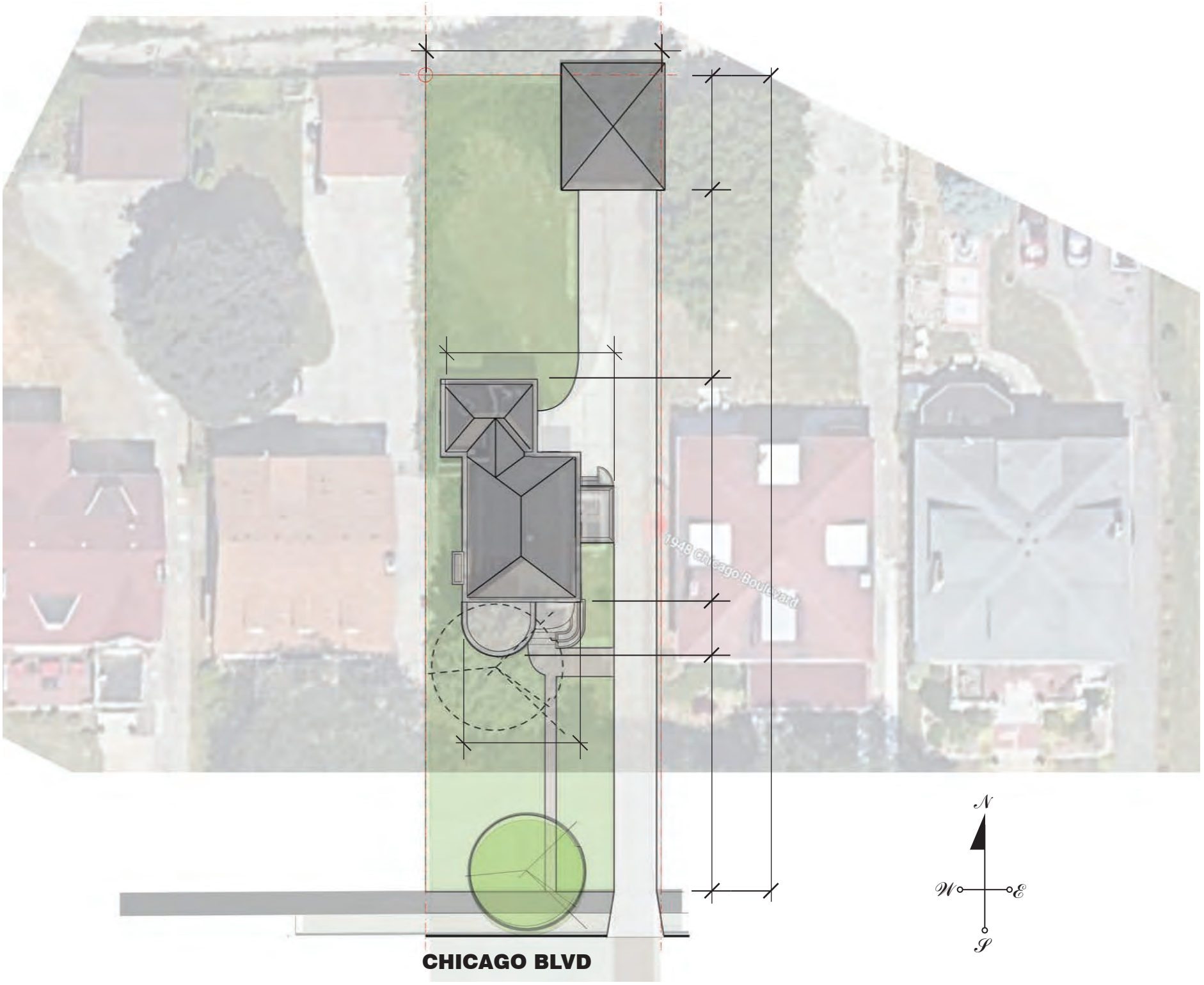
Actually during the riot we were in Idlewild at my grandmothers cottage. We left Sunday afternoon after my father, my uncle William Patrick and my daddy's friend Howard Sims (an architect) walked down to 12th street and saw the fires. We left in my father's car immediately with us lying on th floor without even grabbing diapers for Elizabeth who was about 18 month, Donna was 3, I had just turns 12. When we got to Idlewild my grandmother, Ninnie was waiting with a pot of chili on the stove. My father turned around and returned to Detroit as he was concerned for his patients many of whom he had inherited from his father after he died. My grandfather practiced in Detroit in 1937 until his death in 1965 when he died. He started working in the practice of Ossian Sweet and doing night call in Black bottom for Detroit Receiving hospital. About the house, there was a one way mirror in the front door so you clearly see who was at the door. The the right of the door was a wall of coke bottle class. The rounded windows on the front in the living room wad vertical blinds and the living room was sunken. As you entered the front door there were stairs to the basement. Straight ahead was to the left was the sunken dining room and to the right was the stairs and a door to the kitchen. Off the kitchen was the breakfast room which had a large mirror on the back wall and a door to the yard. The dining room also had a large mirror on the wall opposite the entrance and then a sunken pine paneled rec room with glass covered shelves to th left and it was a huge room with a baby grand piano, an old fashion record player radio set and on the outer wall mirrored shelves and laverd windows. The story my grandmother told me was that the architect who designed and built the house had an attached garage where he committed suicide. After that it was converted to a rec room. In the kitchen there was a countertop dishwasher, and a 2 door fridge with the freezer on the bottom. More to come

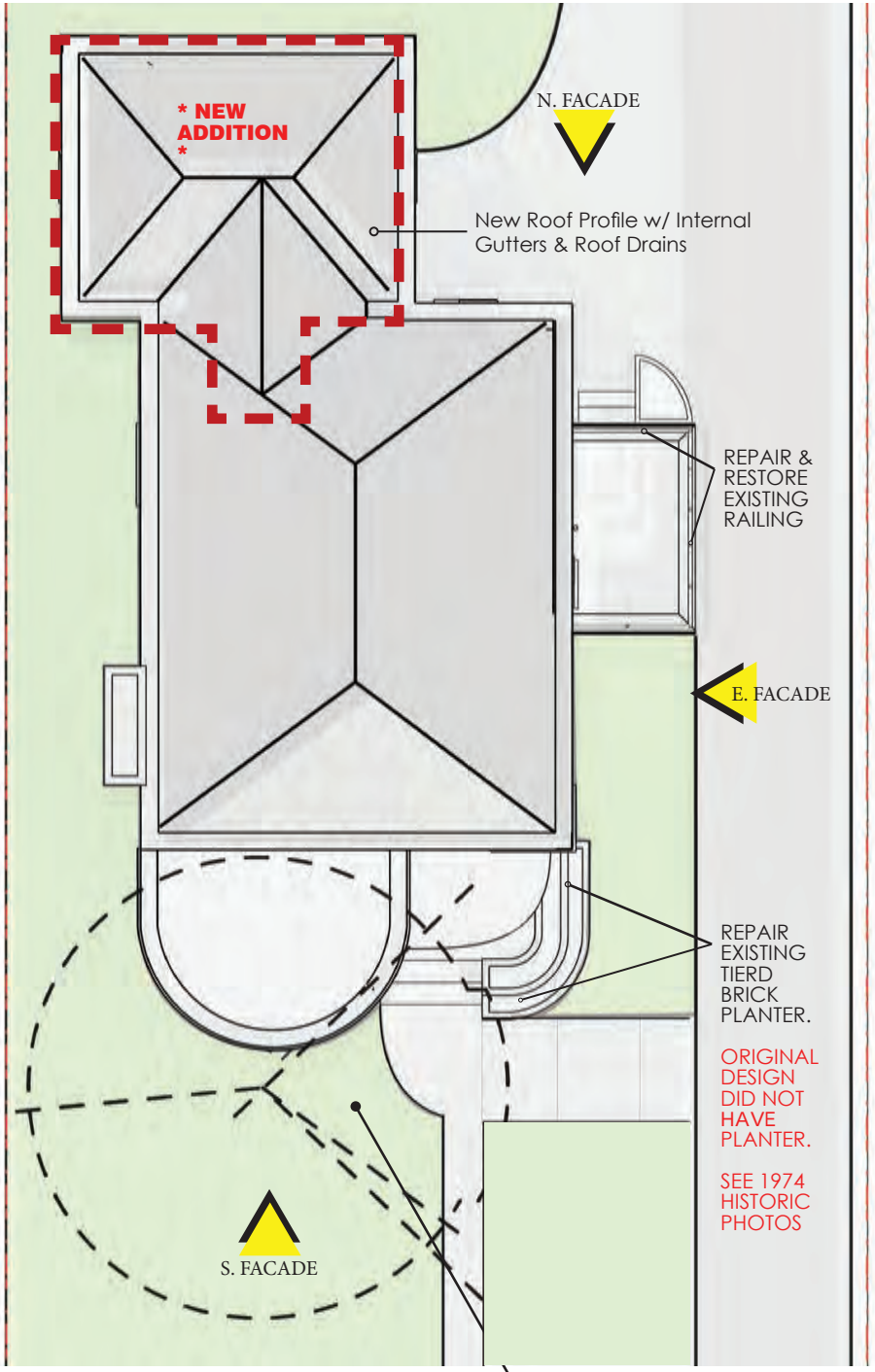
Linda Givens <lggivensrn@icloud.com> Jun 30, 2020, 12:20 PM
to me

I see that the living room and dining room are one space. And the shelves in the rec room bones are there. My grandmother had Cutie Roxbourough's cherry wood dining room set we have the china cabinet in our living room. Cutie was a good friend of my grandmothers and she was married to John Roxborough who managed Joe Louis until he went to jail I think for racketeering. He was well known for developing the numbers racket in Detroit. My grandmother had a decorator from Hudson's to handle the living room.

Fig. E | Conversations w/ Linda Givens

1948 CHICAGO BLVD


1948 Chicago Boulevard
N
W
E
S
CHICAGO BLVD



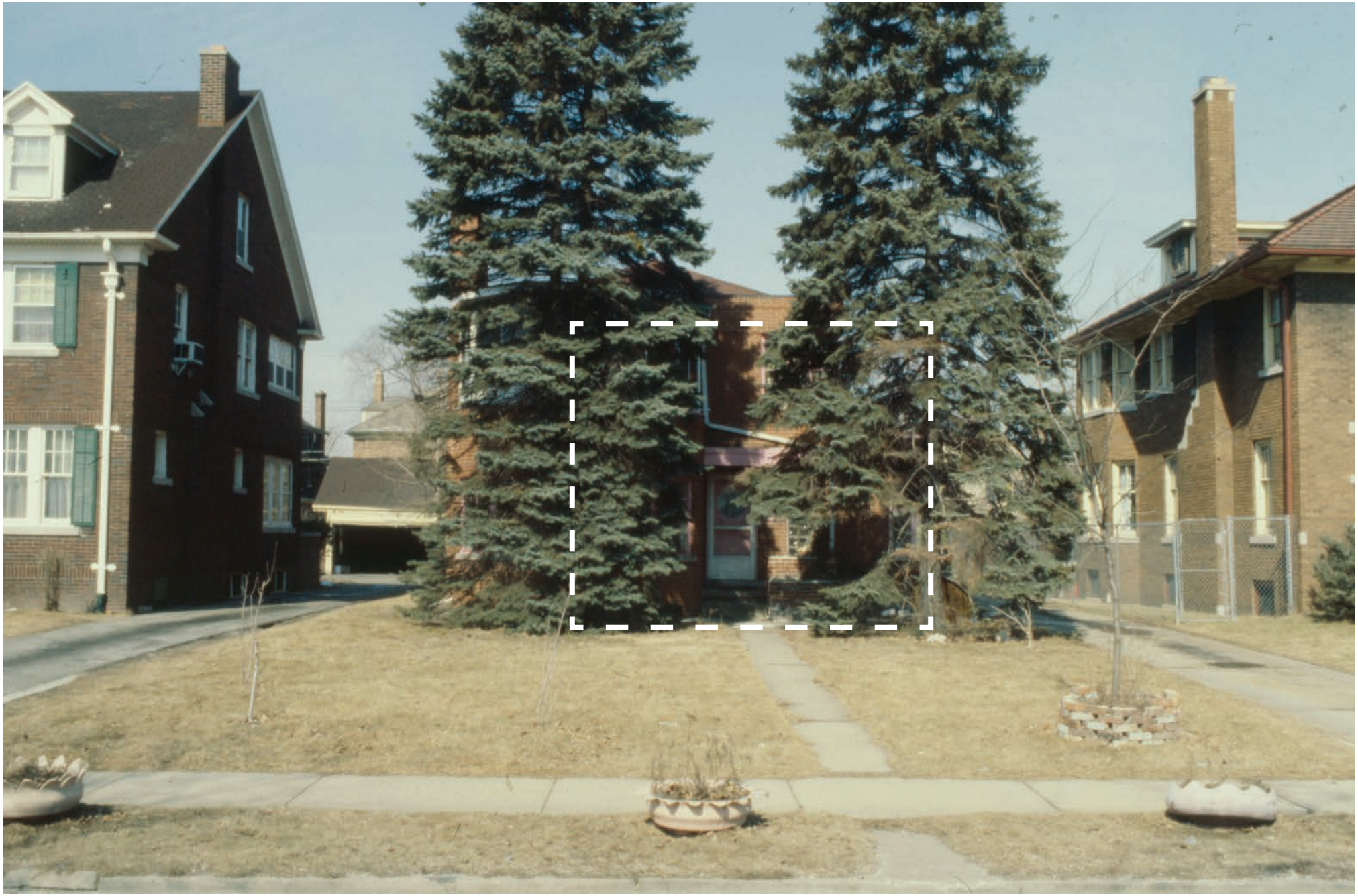
ENLARGED SITE PLAN

EXISTING AERIAL VIEW

HISTORIC PHOTOS

SOUTH ELEVATION - 1974 HISTORIC VIEW FROM CHICAGO BLVD.

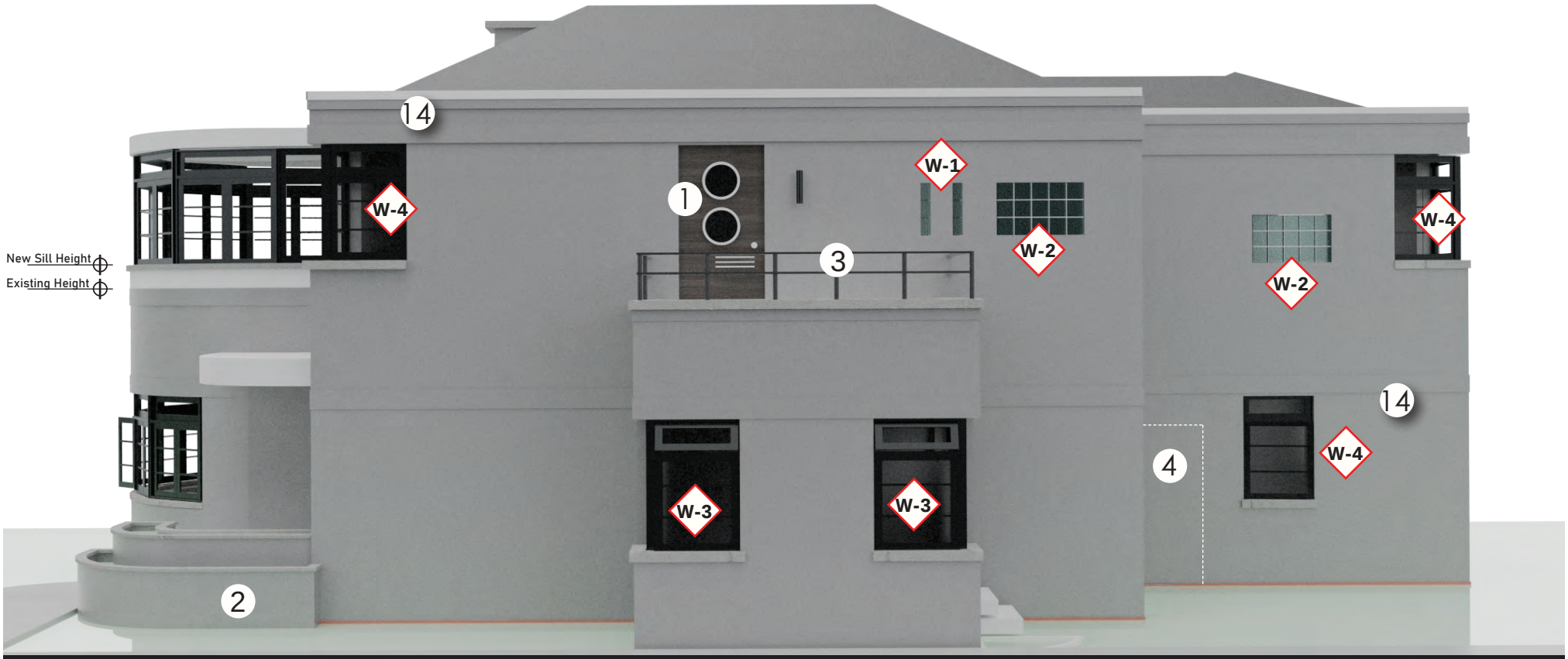
SOUTH ELEVATION - 1974 HISTORIC VIEW FROM CHICAGO BLVD.



SOUTH (STREET VIEW) ELEVATION - 1980 HISTORIC PHOTO

SOUTH (STREET VIEW) ELEVATION ENLARGED - 1980 HISTORIC PHOTO

EAST ELEVATION



▲ Image | Fig. 4 ▲ ▲ Image | Fig. 2,3 ▲ ▲ Image | Fig. 1 ▲

East Elevation will have (9) total windows replaced. Of the nine windows and (1) door, only (3) windows can be verified as original to the home.

W-1 & W-2 are Glass block windows. They will be replaced with new glass block in the same size. (2) W-3 and (2) W-4 are currently double hung windows and will be replced with Aluminum Clad Casement windows from Anderson (E-Series).

1 New exterior wood door w/ dual porthole windows.

2 Demo existing planter, repour concrete footing and restack w/ matching brick.

3 Existing railing is the original railing. It will be restored.

4 Existing door opening will be bricked in and closed.

EAST ELEVATION

1946 | One Car Garage

- Originally a garage constructed w/ concrete block, steel members & joists.

The original home included a bedroom above the garage.

Today, hidden inside a doorway in the basement are the concrete stairs that once led up to the garage. The stair was abandoned and the garage has been transformed into a flexible entertainment space.

According to Elizabeth Givens, granddaugher of Dr. Givens Sr. the “Piano Room”, was home to their grandmothers Baby Grand piano. She described the home as a space decorated by interior consultants from Hudsons department store in downtown Detroit.

The grandchildren of Dr. Givens have wonderful memories about 1948 Chicago and were very specific, including an alleged rumor that the homes original architect committed suicide in the garage shortly after completing the project in the early 40’s. The tradgedy, as expected triggered the immidate renovation from garage to rumpus room.

FIG. 1

FIG. 2

FIG. 3

FIG. 4

Fig. 1 | East Facade (Former Garage)

Original home had one car garage.

The original garage opening left the steel lintel in place.

It will get removed.

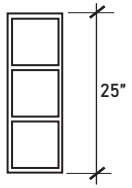
Original Glass Block

Window Symbol	Photo	Diagram	Historical Preservation Retrofit

W-1

SIZE: 8"x 27"
MATERIAL: Glass Block
ORIGINAL ARCH: Yes

SOLUTION:Replace existing Glass Block w/ new (7.75" x 7.75") Clear Pattern Glass Block

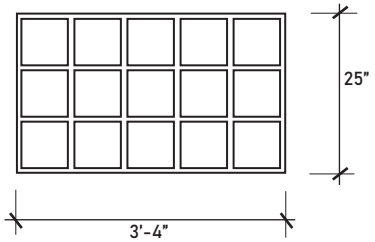


7-3/4" x 7-3/4" x 3.8" Clear Glass Pattern Block or Approved Alternate

W-2

SIZE: 24"x 40"
EXISTING MATERIAL: Glass Block
ORIGINAL ARCH: Yes

SOLUTION: Replace existing Glass Block w/ new (7.75" x 7.75") Clear Pattern Glass Block



7-3/4" x 7-3/4" x 3.8" Clear Glass Pattern Block or Approved Alternate

W-3

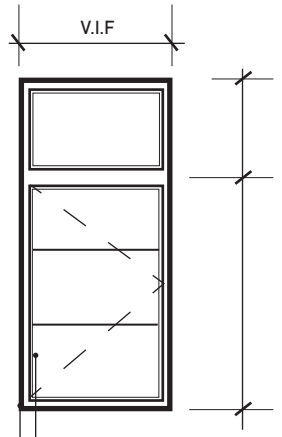
SIZE: Varies
EXISTING MATERIAL: Glass Block
EXISTING WINDOWS: Not Original

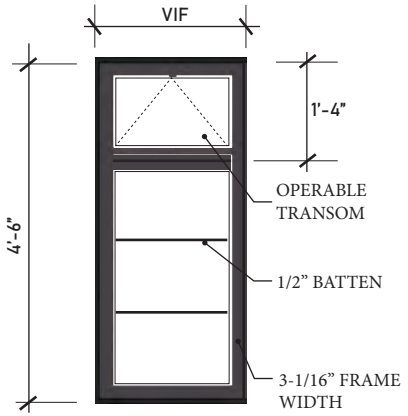
SOLUTION:

The existing glass block currently installed is NOT original to the home according to the 1974 Historic Boston Ediston Photo.

We propose a historic preservation retrofit with Anderson Windows. Anderson's E-Series are advertised as an architectural low-profile solution for this style of home. We will remove exising glass block and spec the original window to casem.ent

See Fig. 3 for existing windows that replaced the original metal casement





Anderson Aluminum Exterior Clad E-Series Casement w/ Latest window technology and energy efficient glass.

The 1974 Boston Edison Historic Photo show these windows with glass block and are original to the home.

Glass Block is not original to home according to historic photos

Fig. 2 | Looking SW at East Facade (Former Rear Entry)

Fig. 3 | Historic 1974 Boston Edison photo references existing glass block windows on 2nd Floor with metal railing and fabric canopy structure.

On the first floor are long rectangular metal windows w/ upper transom and horizontal battens.

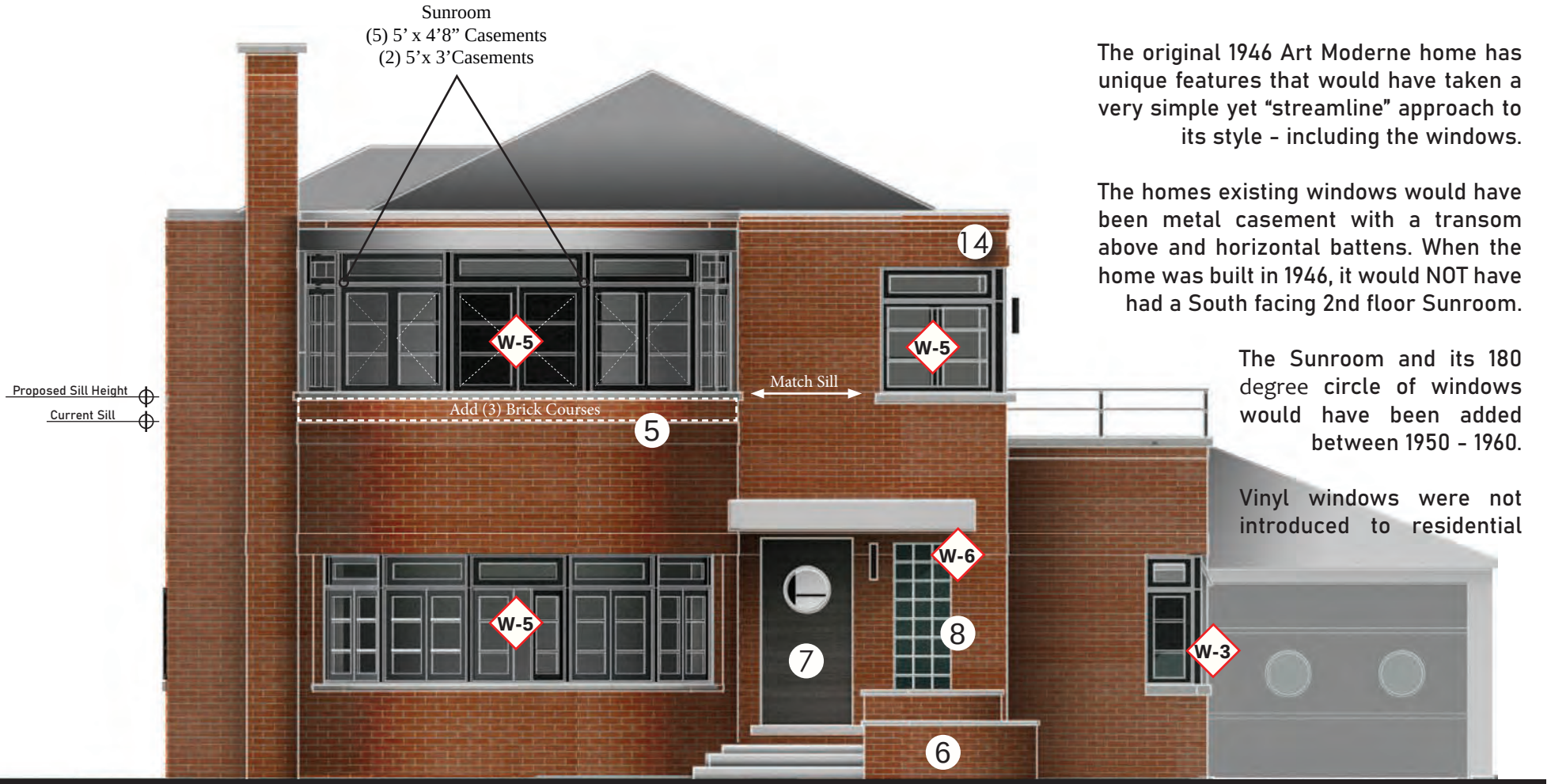
EAST ELEVATION PHOTOS REAR

Fig. 3A | Today, the windows have been replaced with glass block. See window type (W-3) for more informaton

Fig. 5 | Looking west at East facing facade - Front entry area.

EAST ELEVATION EXISTING PHOTOS

STREET “SOUTH” ELEVATION



▲ Image | Fig. 8,10 ▲ ▲ Image | Fig. 7 ▲ ▲ Photo | Fig. 6 ▲

The original 1946 Art Moderne home has unique features that would have taken a very simple yet “streamline” approach to its style - including the windows.

The homes existing windows would have been metal casement with a transom above and horizontal battens. When the home was built in 1946, it would NOT have had a South facing 2nd floor Sunroom.

The Sunroom and its 180 degree circle of windows would have been added between 1950 - 1960.

Vinyl windows were not introduced to residential

5 Existing vinyl windows sit below desk height. We propose to add 3-courses of matching brick to align with top of existing stone sills.

6 Existing planter foundation has deteriorated and will need to be replaced. Existing planter bricks are not original to home. Repair includes new footing, restacking w/ matching brick, and stone cap.

7 Porthole Window front door would have been original to the home. We propose to reintroduce this chic door style back to home

8 This glass block is original to this home. We propose to replace dated glass block with new glass block and mortar

STREET “SOUTH” ELEVATION

Fig. 6 | South Facade (Street View). See 1974 and 1980 Historic Photos

Historic/Existing Style	Original- Diagram	Historical Preservation Retrofit

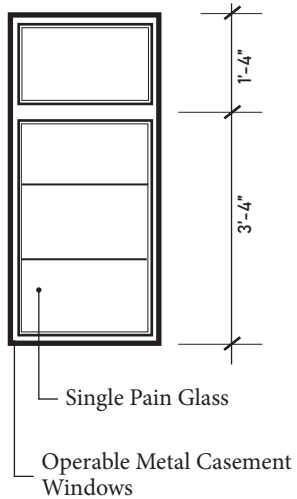
W-4

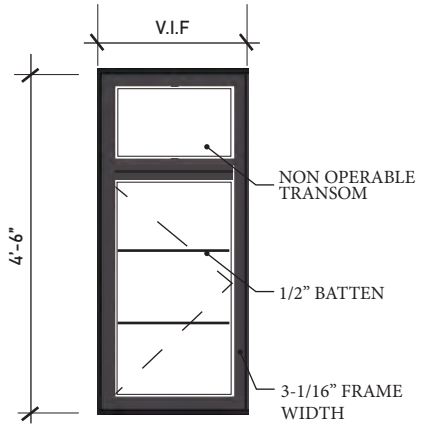
SIZE: Varies
EXISTING MATERIAL: Vinyl - Sliding
EXISTING WINDOWS: Not Original

SOLUTION:

The existing vinyl sliding/casement windows are NOT original to the home. The windows were installed after 1980. Metal windows are shown in the 1974 and 1980 Historic Boston Ediston Photo.

We propose a historic preservation retrofit with Anderson Windows. Anderson's E-Series are advertised as an architectural low-profile solution for this style of home. We will remove exising vinyl and spec the original window to casement





Anderson Aluminum Exterior Clad E-Series Casement w/ Latest window technology and energy efficient glass.

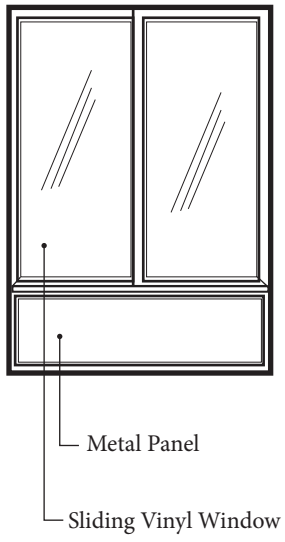
W-5

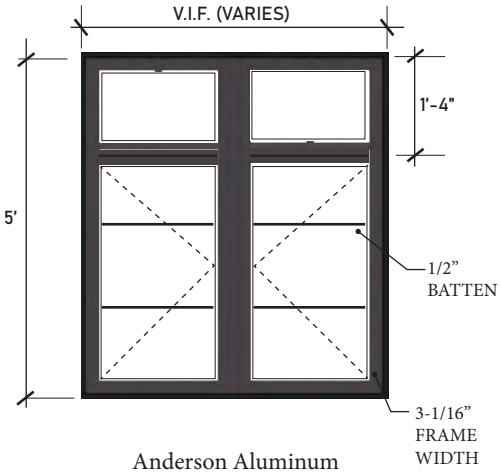
SIZE: Varies
EXISTING MATERIAL: Vinyl Clad Windows
EXISTING WINDOWS: Not Original

SOLUTION:

The existing sunroom vinyl windows are NOT original to home. The 2nd floor sunroom was added before 1974, as the sunroom appears in the 1974 Boston Ediston historic photo. Interior photos of the space provide clear evidence that the sunroom was originally an outdoor porch.

We propose a historic preservation retrofit with Anderson Windows. Their E-Series are Andersons architectural low profile solution for this style of home.





Anderson Aluminum Exterior Clad E-Series Casement w/ Latest window technology and energy efficient glass.

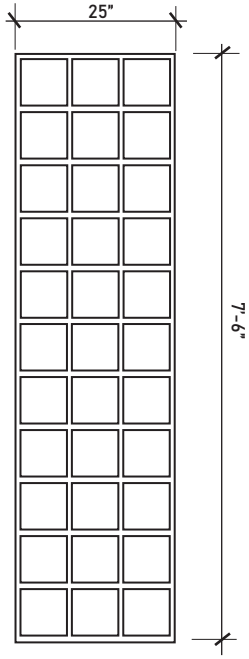
W-6

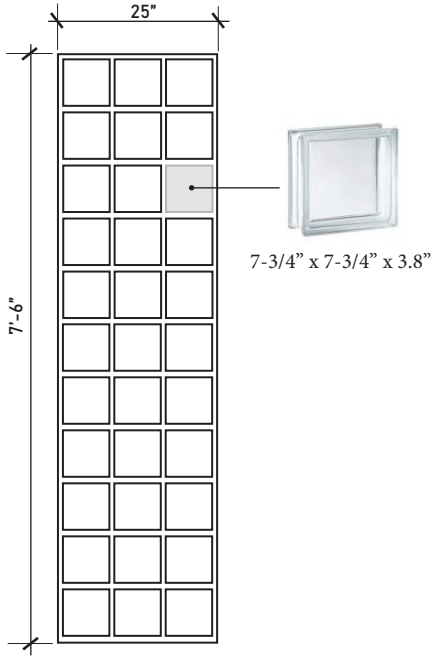
SIZE: 25” x 7’-6”
EXISTING MATERIAL: Glass Block (7
EXISTING WINDOW/S: Original

SOLUTION:

The existing glass block windows are original to the home. The windows mortar has aged and is brittle. The glass block is now 74 years old and has shown signs of fogging and mild deterioration.

We propose a historic preservation retrofit with glass block windows. We want to be good stewards to the homes architecture and will not alter the size or original intent.





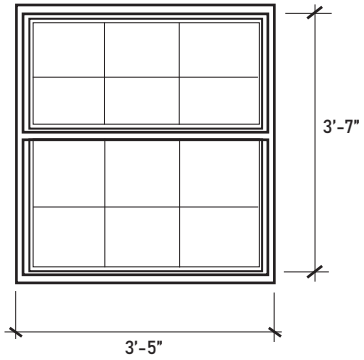
W-7

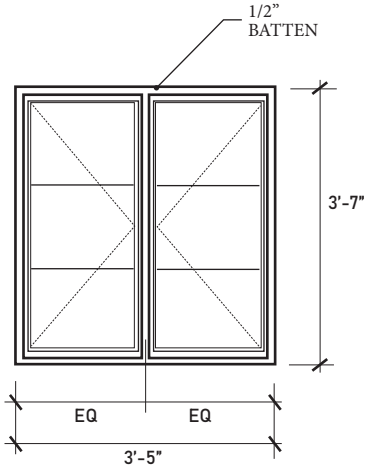
SIZE: 3’7 x 3’5”
EXISTING MATERIAL: Vinyl - Double Hung
EXISTING WINDOWS: Not Original

SOLUTION:

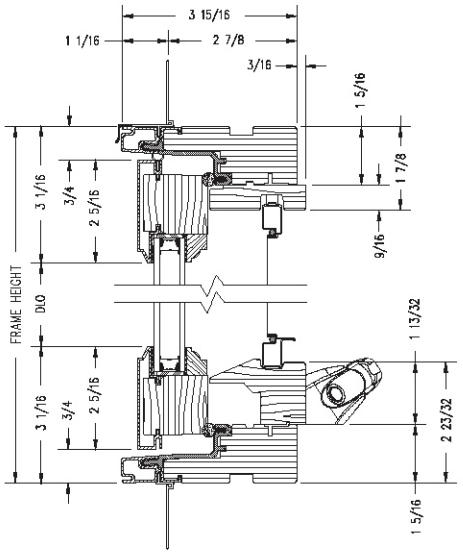
The existing vinyl double hung windows are NOT original to the home. The windows were installed after 1980. Metal windows are shown in the 1974 and 1980 Historic Boston Ediston Photo.

We propose a historic preservation retrofit with Anderson Windows. Anderson’s E-Series are advertised as an architectural low-profile solution for this style of home. We will remove existing vinyl and specify the original style/proportions of window to aluminum casement

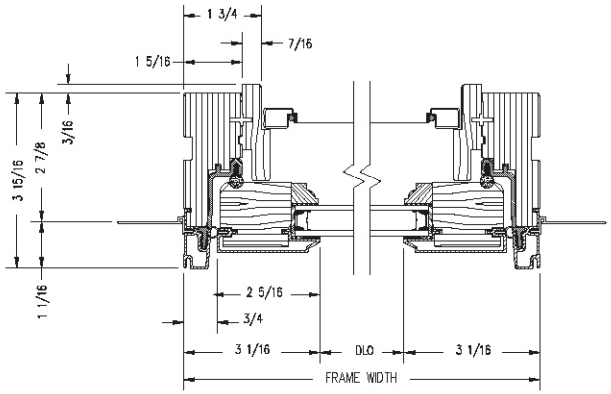




Casement

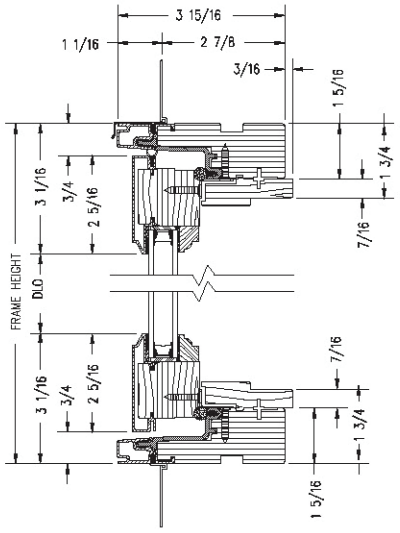


Vertical Section

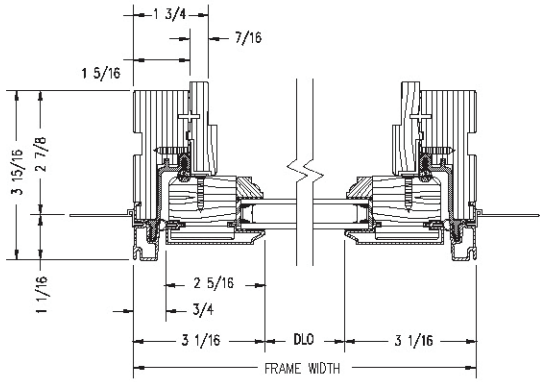


Horizontal Section

Sash-Set (2-Piece) Casement



Vertical Section

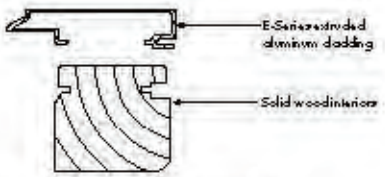


Horizontal Section

WINDOW DETAIL | ANDERSON E-SERIES

EXTERIOR COLORS

Colony White	White	Abalone	Balsa White	Canvas	Maple Syrup
Carmel	Terratone	Hot Chocolate	Bourbon	Acorn	Coffee Bean
Cardinal	Bing Cherry	Fire Engine Red	Cinnamon Toast	Olive	Sage
Aquamarine	Patina	Sky Blue	Country Blue	Blue Denim	Watercolor Blue
Harbor Mist	Yorktown Pewter	Smokey Gray	Mystic Gray	Dark Ash	Black



A solid wood core and extruded aluminum cladding give E-Series windows both strength and flexibility in many design applications.

E-Series casement window with Terratone exterior color.

*Visit andersenwindows.com/warranty for details.

WINDOW DETAIL | ANDERSON E-SERIES

Interior of door shown with 3 11/16" contemporary panel profile.

CONTEMPORARY DESIGNS

Dark colors and narrow profile options on windows, patio doors and even grille options offer a truly contemporary style.

Contemporary grille profile in black with a black spacer bar.

BEAUTY

Durable, stainless steel FSB® hardware features clean lines in a satin finish for a thoroughly modern look. See FSB hardware options on page 29.

SLEEK INTERIORS

High-quality, factory-applied interior finishes offer convenience along with beauty. For a modern

BRING YOUR VISION TO LIFE

Andersen has done extensive research into many architectural styles and how windows and patio doors play a critical role in achieving them. We've compiled it all into our Home Style Library. Whether you're looking for a modern home style or something more traditional, our library shows how easily you can achieve each style with our Andersen® products. To view our complete Home Style Library, visit **andersenwindows.com/stylelibrary**.

Miesian Modern

Industrial Modern

International Modern

FEATURES

CASEMENT WINDOWS

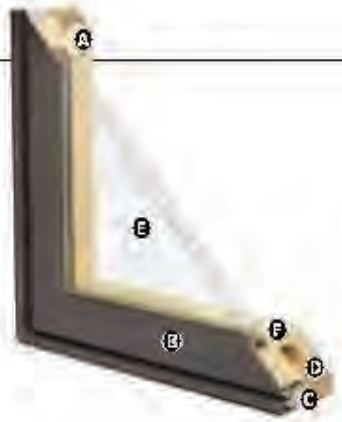
FRAME & SASH

Ⓐ Select wood components are kiln dried and treated with water/insect repellent and preservative. Interior wood surfaces are available in pine, mixed grain Douglas fir, cherry, hickory, mahogany,* maple, oak, walnut, alder or vertical grain Douglas fir. Interior surfaces are available unfinished or factory primed. Factory-applied finishes are available in a variety of stain and paint options.

Ⓑ Wood components are fitted with aluminum extrusions on the exterior. 50 exterior colors that meet AAMA 2604 and 2605 specifications are available, as well as custom colors. Also available is a selection of seven exterior anodized options. Integral, butyl-backed corner keys provide a positive, tight seal.

Vinyl installation flanges are pre-applied into a kerf on the frame exterior to facilitate installation. Optional aluminum flanges and metal installation clips are available.

Ⓒ A Fibrex® material thermal barrier encompasses the interior perimeter of the frame and is a neutral beige color.



Ⓓ A continuous perimeter bulb weatherstrip around the frame is positioned on the Fibrex material thermal barrier and provides solid surface contact with the sash.

A secondary bulb weatherstrip is applied on three sides of the sash into a stand-alone kerf on the aluminum extrusion. Available in white or optional black.

GLASS

Ⓔ High-Performance Low-E4® glass with a low-conductivity spacer. Triple-pane glass, tinted, clear dual-pane, high-altitude glass and other special glazing options are available.

Ⓕ Glass is fixed in place from the interior with wood stops that can be removed for easy reglazing if necessary. Glass stops available in ovolo (colonial) and contemporary profiles.

HARDWARE

Equipped with a stainless steel gear operator, concealed hinges and hinge track. Arch casement units use stainless steel piano hinges.

Locks, handles and operator covers are available in 10 finishes and can be shipped separately closer to job completion.

Sash Locks

Concealed sash locks (multi-point on units taller than 2'-8") provide a positive lock by operating one convenient lever. Stainless steel keepers resist corrosion.** Available in finishes to match operator handles.

HARDWARE OPTIONS

Antique Brass | Black
Bright Chrome | Bronze
Gold | Oil Rubbed Bronze
Pewter | Polished Brass
Satin Chrome | White

Bold name denotes finish shown.

HARDWARE FINISHES

Oil rubbed bronze is a "living" finish that will change with time and use.

Fig. 7 | Above: 1974 Boston Edison Photo shows a front porch with a arched edge, but no raised planters. Right: Diagram shows where original porch location (in dashed).

See Fig. 5,6 for additional images & views of brick planters

FRONT ENTRY PHOTOS

Fig. 8 | (Left) Conceptual Rendering of Original 1946 Outdoor Patio

(Center) 2020 Photo

(Right) Concept w/ Historic Retrofit Windows

As an effort to keep with the homes important defining features we are proposing an alteration to the home. The alteration involves the 2nd floor outdoor patio. Shortly there after, the outdoor space was enclosed. Historic photos from 1974 hightlight the enclosed space.

We propose to add (3) courses of bricks to the 2nd Floor Sunroom.

Our justification for the alteration is that the existing closed in Sunroom is not original and was not completed appropriatly or with consideration to window proportions and original style. Our proposal will stack (3) courses of brick where currently the aluminum panel resides. The transition from seasonal space to temperatured controlled interior room is timely. Our suggested retrofit preserves the homes character and corrects the enclosures original intent with a more thoughtful glazing system, heat gain protection, and finally attention to window proportions.

We feel our design will not diminish, but enhance the character of the historic art moderne architeture. The addition of the courses of brick and new windows will further render the home viable in todays market by transforming a seasonal space into a funcitonal space for today's family and sustainabilty

SOUTH FACADE - 1ST & SECOND FLOOR

Fig. 9| Above: 2020 Interior photo shows existing Sunroom. To the left you can see the brick exterior wall that is now enclosed w/ 180 degree window view from the bow of the "boat". The dashed white lines highlight the proposed new window proportions.

Stack new brick to bottom of existing windows. Frame and insulate interior walls.

***Note: New masonry will match existing brick and mortar should match the original composition in color, texture, and tooling.*

Exsiting Conditons:

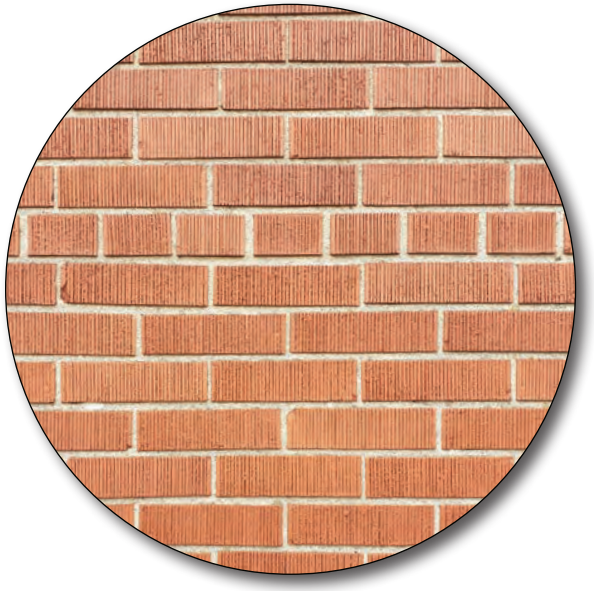
- Single Pane Glazing
- Installed between 1958-1974

- Existing seals have deteriorated. Plastic frames have become brittle.

- Existing interior space is non insulated. Existing glazing system life cycle has expired.

INTERIOR PHOTOS | VIEW LOOKING SOUTH

MASONRY



Reference:

National Park Service Preservation Briefs 1, 2, 6, 7, 15, 16, 22, 42, 47.

Recommended Masonry Treatments:

- Clean masonry only when necessary to halt deterioration or to remove heavy soiling. Use the gentlest means possible. Water and a natural bristle brush may be sufficient.

- Carry out masonry surface cleaning after conducting tests on limited areas not exposed to public view.

- Inspect painted masonry surfaces to determine whether repainting is necessary. Remove damaged paint only to the next sound layer with the gentlest means possible before repainting.

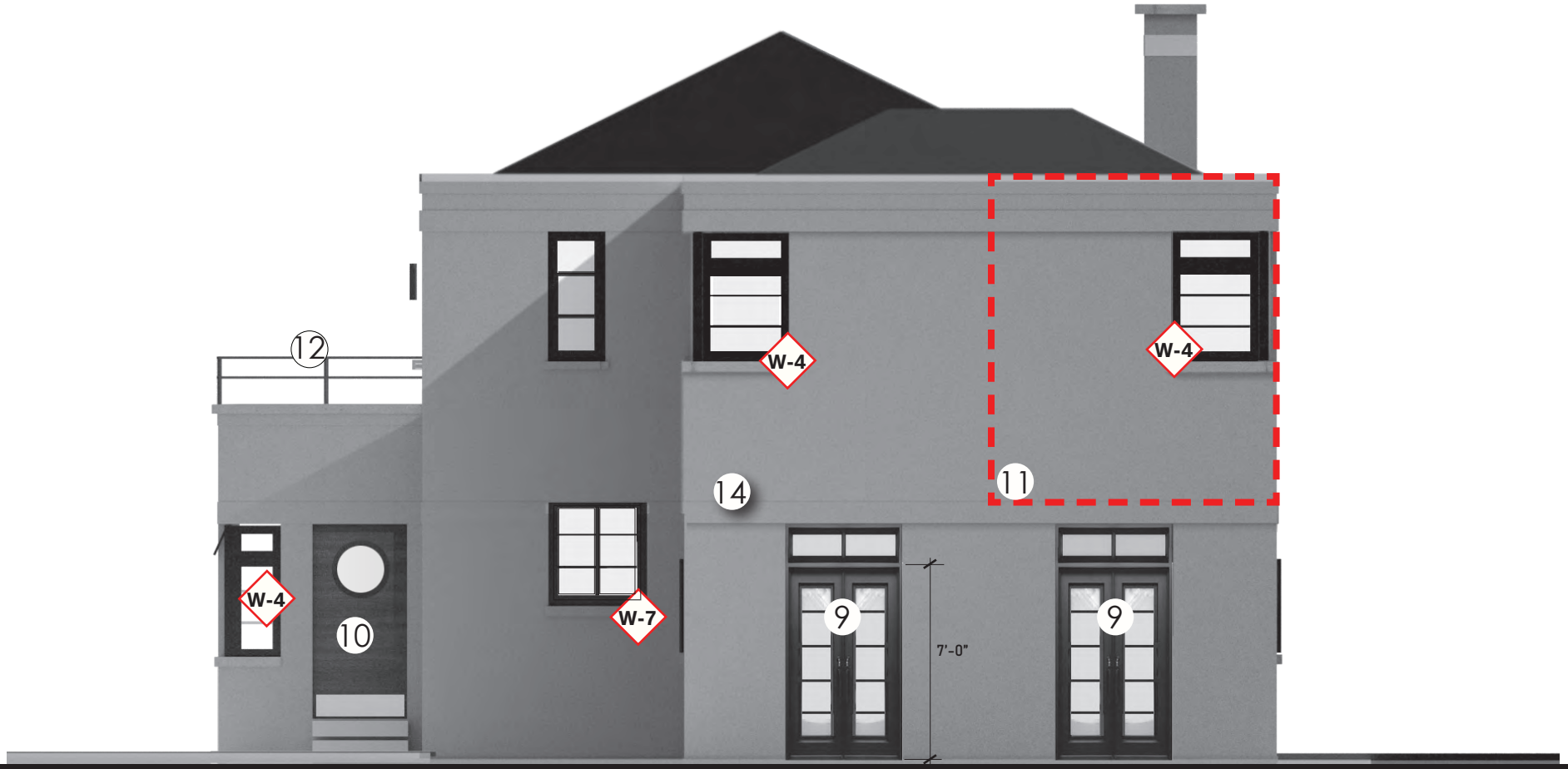
- The use of epoxies, stone consolidants and preservation mortars on spalling stone is acceptable so long as the patch matches the color, surface texture, reflectivity, finish, details, and other qualities of the original stone.

- When repointing masonry, the new mortar should match the original composition in color, texture, and tooling.

Fig. 10 | Before vs. After Photo Comparison

SOUTH FACADE - BEFORE/AFTER RENDERINGS

NORTH “BACKYARD” ELEVATION



▲ Image | Fig. 12 ▲

▲ Image | Fig. 11 ▲

9 New exterior doors w/ upper transom and horizontal battons. Color to match Anderson black windows

10 Porthole window rear door would expand the homes character and reinforce “streamline” story.

11 175 SQFT Brick Addition. See Fig. 11

12 Existing railing is the original railing. It will be restored and painted.

NORTH ELEVATION - REAR ELEVATION

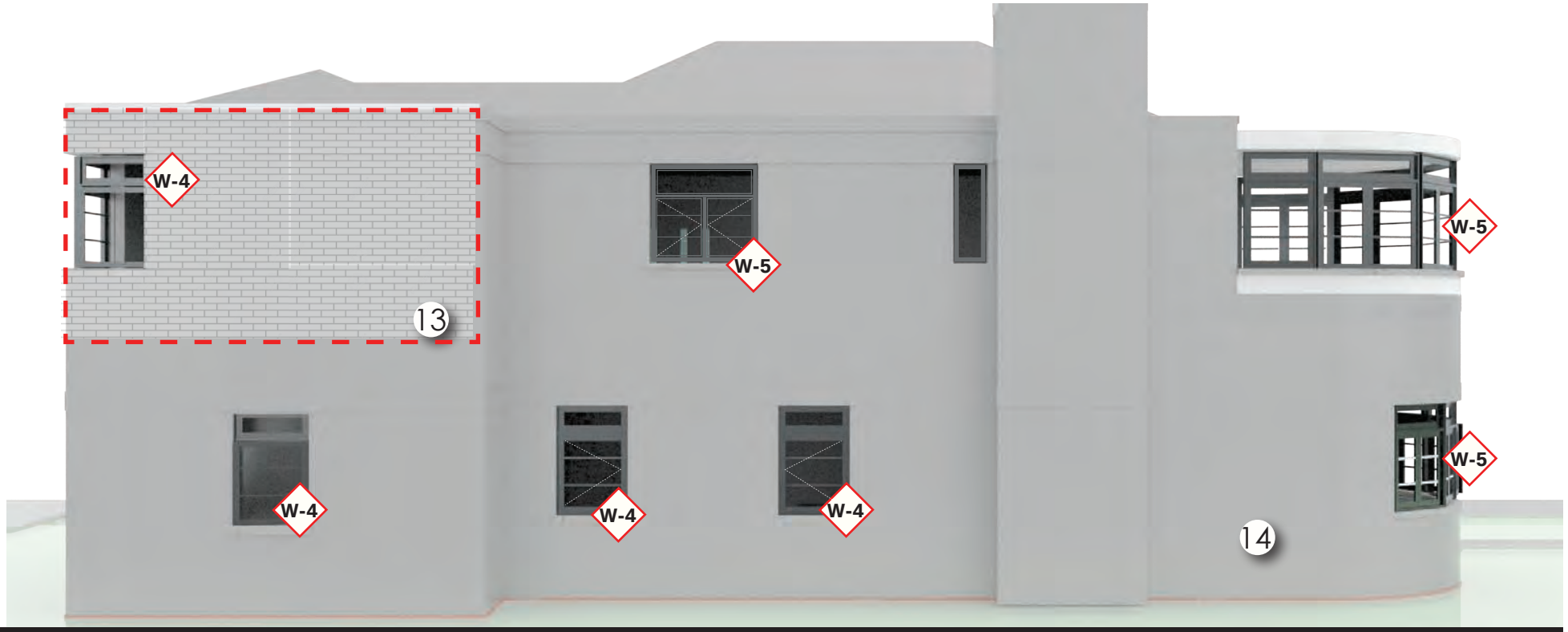
Fig. 11 | The backyard of 1948 Chicago Blvd. - South Elevation

NORTH ELEVATION PHOTO | VIEW LOOKING SOUTH

Fig. 12 | The backyard of 1948 Chicago Blvd. -North Elevation

NORTH ELEVATION PHOTO | VIEW LOOKING SOUTH

WEST ELEVATION



▲ Image | Fig. 14 ▲

▲ Image | Fig. 13 ▲

13 175 SQFT Brick addition.
See Fig. 11

14 Repoint masonry in some areas. New mortar should match the original composition in color, texture, and tooling.

Carry out masonry surface cleaning after conducting tests on limited areas not exposed to public view.

WEST ELEVATION

Fig. 13 | The sideyard of 1948 Chicago Blvd. -West Elevation

Fig. 14 | The sideyard of 1948 Chicago Blvd. -West Elevation

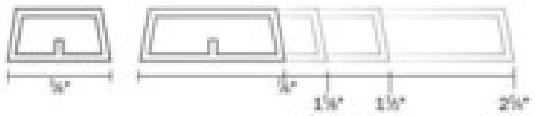
WEST ELEVATION PHOTO

3. Additional details for proposed windows including muntin thickness and state whether they are applied on the exterior or are simulated divided light. ***Note that commission typically does not approve muntins between glass or on the interior.***

**** There is one surviving metal window in the basement. The window belongs to a window well. When the home was built in 1946 the window frame dimensions would have been 2-1/8" and the muttons would have measured 3/4" .**

We will use SDL (Simulated Divided Lights) with a contemporary profile to meet the home's *International Modern Style*. The muntin dimension will be 5/8"

The frames will be 3-1/6"



Simulated Divided Lights - Muntins

HISTORIC DISTRICT COMMISSION
PROJECT REVIEW REQUEST

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

DATE: 12.15.2020

PROPERTY INFORMATION

ADDRESS: 1948 Chicago Blvd **AKA:**

HISTORIC DISTRICT: Boston Edison

SCOPE OF WORK: (Check ALL that apply)

- ☑ Windows/ Doors
- ☑ Roof/Gutters/ Chimney
- ☐ Porch/ Deck
- ☑ Landscape/Fence/ Tree/Park
- ☑ General Rehab
- ☐ New Construction
- ☑ Demolition
- ☐ Addition
- ☑ Other: 175 sqft addition in rear

APPLICANT IDENTIFICATION

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

NAME: Mahja Zeon **COMPANY NAME:**

ADDRESS: 2900 E. Jefferson Avenue **CITY:** Detroit **STATE:** MI **ZIP:** 48207

PHONE: 404.395.5523 **MOBILE:** **EMAIL:** wilandmahja@gmail.com

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 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

P2 - BUILDING PERMIT APPLICATION

Date: 12.15.2020

PROPERTY INFORMATION

Address: 1948 Chicago Blvd Floor: ____ Suite#: ____ Stories: 2

AKA: ____ Lot(s): ____ Subdivision: ____

Parcel ID#(s): 08003034 Total Acres: .192 Lot Width: 50 Lot Depth: 170

Current Legal Use of Property: R1- Residential Proposed Use: R1-Residential

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)

Complete rehab of existing interior of home. Selective rehab of exterior, including appropriate exterior windows, new roof shingles, proper masonry repair and tooling and addition of 175 sqft above the existing "family room" in rear of building.

☐ 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: 3 ☐ 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:

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: ____

Permit #:

IDENTIFICATION (All Fields Required)

Property Owner/Homeowner ☐ Property Owner/Homeowner is Permit Applicant

Name: Mahja Zeon Company Name:

Address: 2900 E. Jefferson Avenue A100 City: Detroit State: MI Zip: 48207

Phone: 404.395.5523 Mobile:

Driver's License #: Email: wilandmahja@gmail.com

Contractor ■ Contractor is Permit Applicant

Representative Name: Michael Mondo Company Name: LIVE Mondo

Address: 8136 W. Nine Mile City: Oak Park State: MI Zip: 48237

Phone: Mobile: 248.933.3942 Email: michael@mondo-holdings.com

City of Detroit License #: LIC2019-01045

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: Mahja Zeon (Homeowner) Signature: Date: 12/18/2020

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

Signature: (Notary Public) My Commission Expires:

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: Mahja Zeon (Permit Applicant) Signature: Date: 12/18/2020

Driver's License #: Expiration:

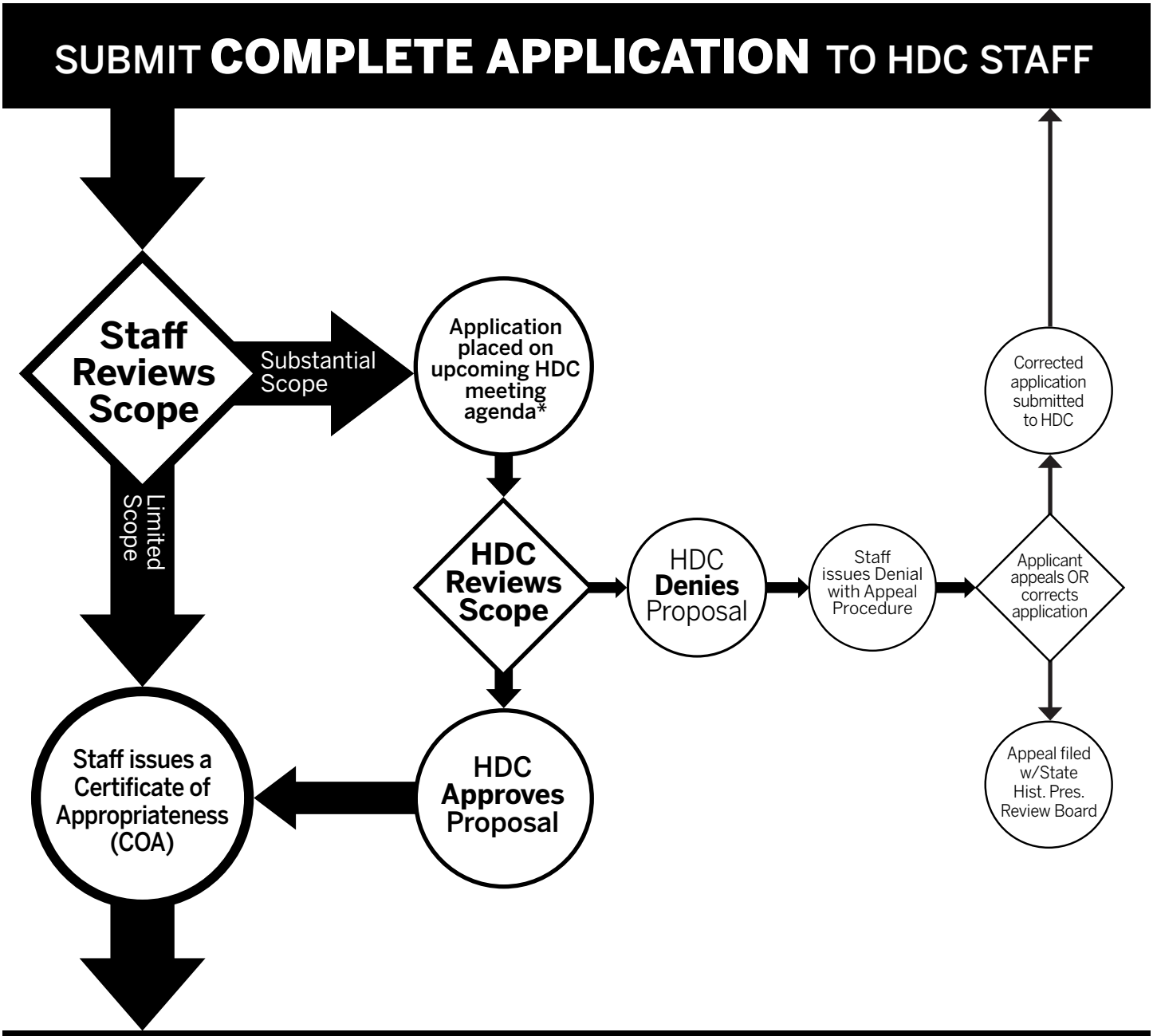
Subscribed and sworn to before me this day of 20 A.D. County, Michigan

Signature: (Notary Public) My Commission Expires:

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 for more information.

HISTORIC DISTRICT COMMISSION
REVIEW & PERMIT PROCESS



* THE **COMMISSION MEETS REGULARY AT LEAST ONCE PER MONTH,** TYPICALLY ON THE SECOND WEDNESDAY OF THE MONTH.
(SEE WEBSITE FOR MEETING SCHEDULE/AGENDAS)

FIND OUT MORE AT www.detroitmi.gov/hdc

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.[1] 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.

[1]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 1/8'' thick and 1'' - 1 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.

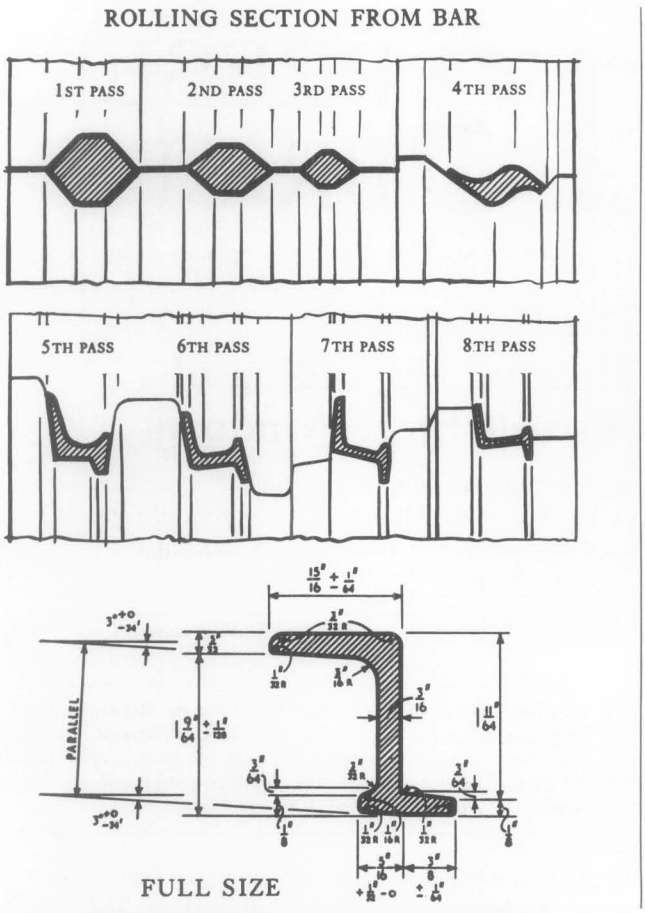


Fig. 2. The process of rolling a steel bar into an angled section is illustrated above. The shape and size of the rolled section will vary slightly depending on the overall strength needed for the window opening and the location of the section in the assembly: subframe, frame, or sash. The 1/8 '' thickness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

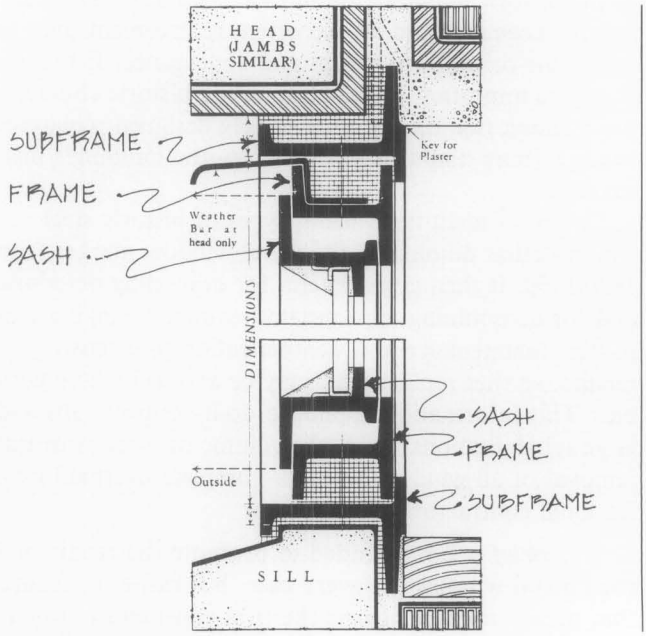


Fig. 3 A typical section through the top and bottom of a metal window shows the three component parts of the window assembly: subframe, frame, and sash. Drawings: Catalogue No. 15, January 1931; International Casement Co, Inc., presently Hope's Architectural Products, Inc., Jamestown, NY. Used with permission.

Cover illustration: from *Hope's Metal Windows and Casements: 1818-1926,* currently Hope's Architectural Products, Inc. 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 subframe—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.

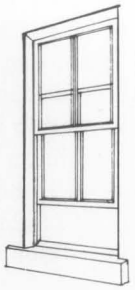
Since moisture is the primary cause of corrosion in steel windows, it is essential that excess moisture be eliminated and that the building be made as weathertight as possible before any other work is undertaken. Moisture can accumulate from cracks in the masonry, from spalling mortar, from leaking gutters,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

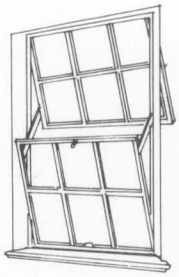
ROUTINE MAINTENANCE

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.

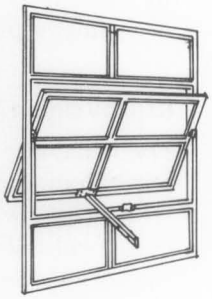
Double-hung industrial windows duplicated the look of traditional wooden windows. Metal double-hung windows were early examples of a building product adapted to meet stringent new fire code requirements for manufacturing and high-rise buildings in urban areas. Soon supplanted in industrial buildings by less expensive pivot windows, double-hung metal windows regained popularity in the 1940s for use in speculative suburban housing.



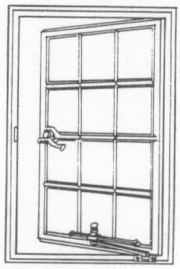
Austral windows were also a product of the 1920s. They combined the appearance of the double-hung window with the increased ventilation and ease of operation of the projected window. (When fully opened, they provided 70% ventilation as compared to 50% ventilation for double-hung windows.) Austral windows were often used in schools, libraries and other public buildings.



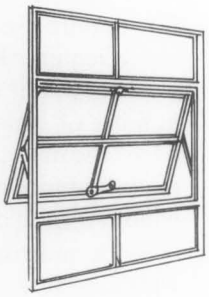
Pivot windows were an early type of industrial window that combined inexpensive first cost and low maintenance. Pivot windows became standard for warehouses and power plants where the lack of screens was not a problem. The window shown here is a horizontal pivot. Windows that turned about a vertical axis were also manufactured (often of iron). Such vertical pivots are rare today.



Casement 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.



Projecting 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.



Continuous 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.

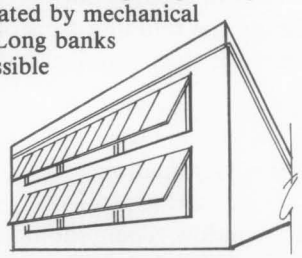


Fig. 4 Typical rolled steel windows available from 1890 to the present. The various operating and ventilating capacities in combination with the aesthetics of the window style were important considerations in the selection of one window type over another. Drawings: Sharon C. Park, AIA.

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.[2] 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.

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[2]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).

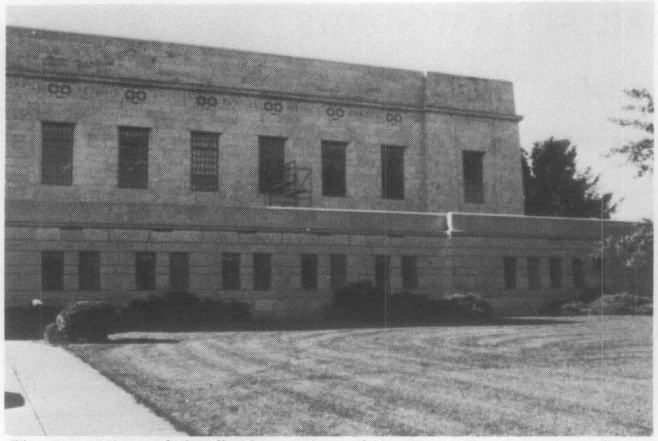

Fig. 6 a. View of the flanking wing of the State Capitol where the rolled steel casement windows are being removed for repair.

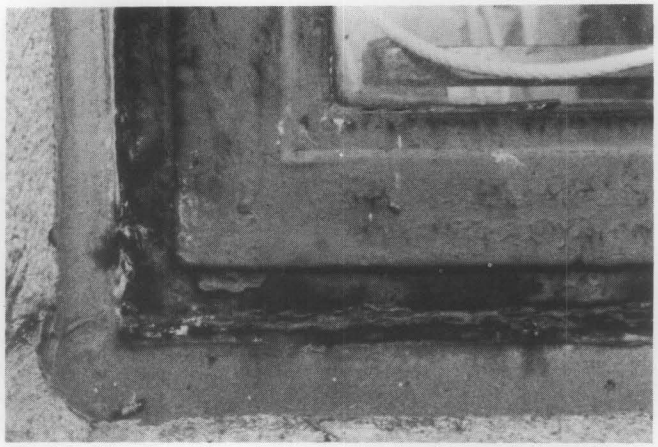

Fig. 6 b. View from the exterior showing the deteriorated condition of the lower corner of a window prior to repair. While the sash was in relatively good condition, the frame behind was rusted to the point of inhibiting operation.

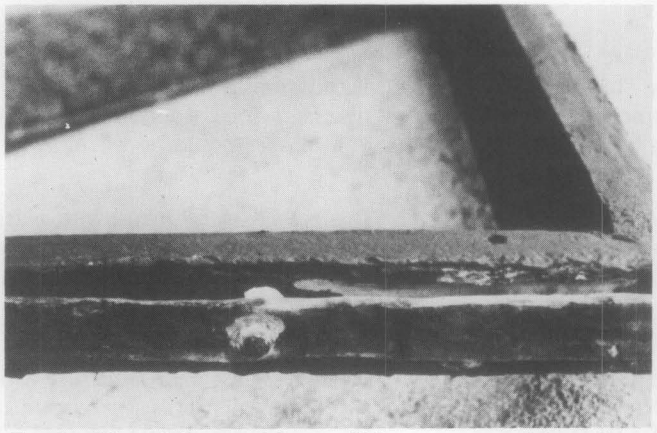

Fig. 6 c. View of the rusted frame which was unscrewed from the subframe and removed from the window opening and taken to a workshop for sandblasting. In some cases, severely deteriorated sections of the frame were replaced with new sections of milled bar steel.

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.

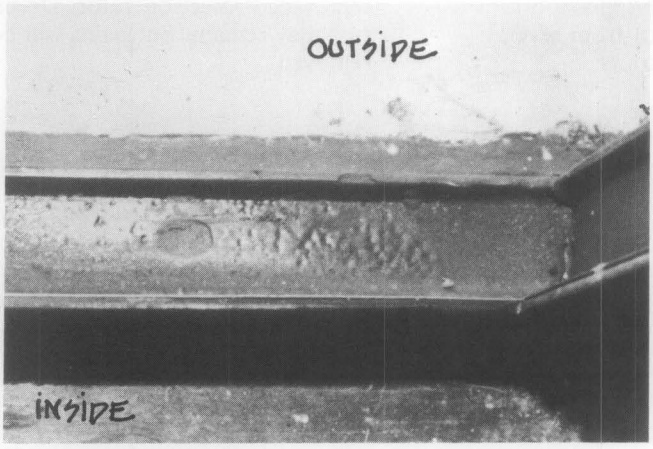

Fig. 6 e. View looking down towards the sill. The cleaned frame was reset in the window opening. The frame was screwed to the refurbished subframe at the jamb and the head only. The screw holes at the sill, which had been the cause of much of the earlier rusting, were infilled. Vinyl weatherstripping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

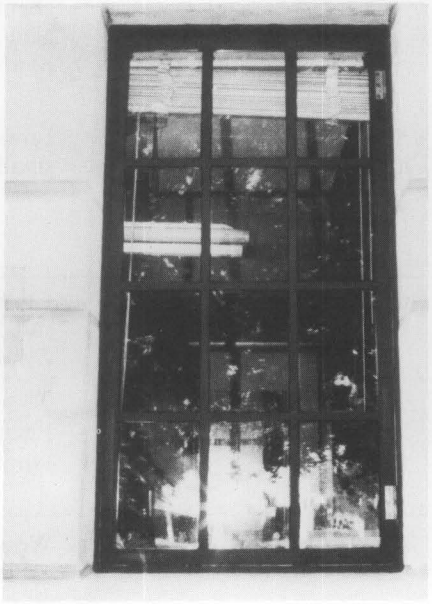

Fig. 6 f. View from the outside of the completely refurbished window. In addition to the steel repair and the installation of vinyl weatherstripping, the exterior was caulked with polyurethane and the single glass was replaced with individual lights of thermal glass. The repaired and upgraded windows 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.	Handsanding 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.[3]

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 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.

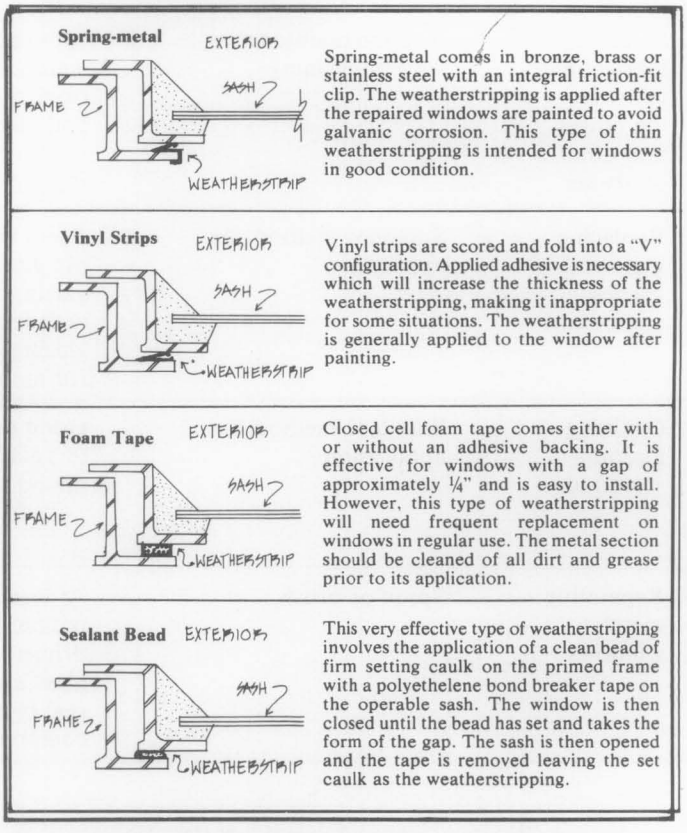

Fig. 8 APPROPRIATE TYPES OF WEATHERSTRIPPING FOR METAL WINDOWS. Weatherstripping is an important part of upgrading the thermal efficiency of historic steel windows. The chart above shows the jamb section of the window with the weatherstripping in place. Drawings: Sharon C. Park, AIA.

[3]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).

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 then 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).

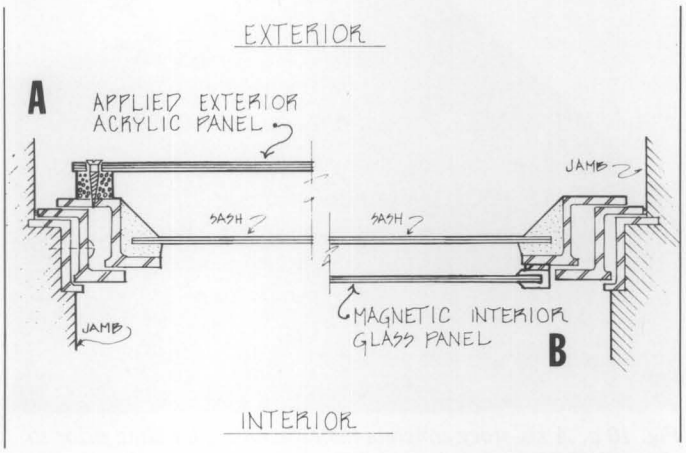

Fig. 9 Two examples of adding a second layer of glazing in order to improve the thermal performance of historic steel windows. Scheme A (showing jamb detail) is of a ¼" acrylic panel with a closed cell foam gasket attached with self-tapping stainless steel screws directly to the exterior of the outwardly 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.

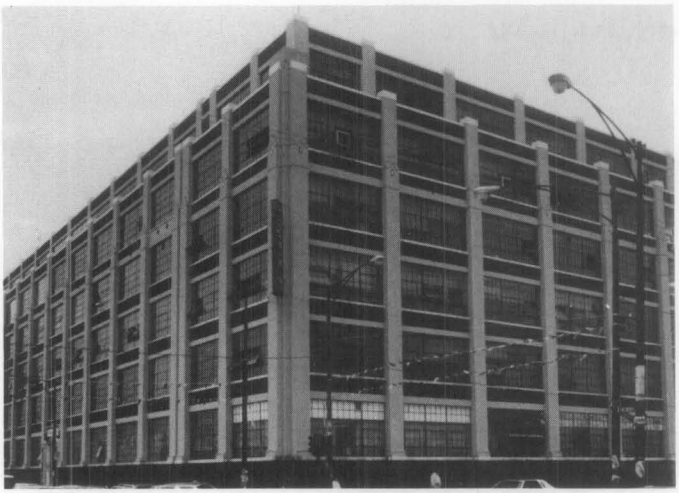

Fig. 10 a. A six-story concrete manufacturing building prior to the replacement of the steel pivot windows. Photo: Charles Parrott.

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.