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Repair or Replace Old Windows

A Visual Look at the Impacts

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A Visual Look at the Impacts

Windows are a big part of older and historic buildings, from Main Street commercial structures to modernist mid-century residences. Original windows comprise about one quarter of the surface area of exterior walls. Windows often help identify the architectural style, design and give scale to a building. Just as windows define the character of a building, they also contribute to the larger context of neighborhoods and downtowns and their character. The visual impact and appearance of new, replacement windows that do not match or replicate features can be dramatic. Even minor changes to the appearance of windows can alter the way a building looks. Original material is lost and thrown away. And some buildings may no longer be considered 'historic' in terms of integrity and eligibility for historic designation. When choosing between repairing or replacing old windows, a lot needs to be factored in, including the visual impacts. This resource, divided into the following sections, is intended to help you look at your old windows, building and think about all options before making a decision.

Should I Repair My Old Windows?

When are Replacement Windows Necessary?

Do the Benefits Outweigh the Costs?

When Replacing My Windows, What Not To Do?

Do Window Details Matter?

Case Studies:

- A Material Issue
- In-Kind Replacement
- Size Matters
- Close, But Not Enough
- A Blurry View
- Impersonating the Original
- A Modern Dilemma
- Authenticity Counts
- One Window, Multiple Replacements
- Putting Windows in Context

For more information...

Go to **www.PreservationNation.org/Weatherization** to find additional resources on windows and much more for your older and historic building.

19th century Italianate style house
Replacement windows do not match size, type or material

Historic Landmarks Foundation of Indiana

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Should I Repair My Old Windows?

Whenever possible, repair an original window, rather than replace it. Any window over time will deteriorate with the exposure to the elements. Most older windows, especially wood windows, can be easily repaired by a DIY-er or by hiring a qualified contractor. It also will be far more economical than purchasing all new replacement windows. Older windows perform well when maintained. Problems arise from a lack of maintenance, water and condensation damage, and ultra violet light degradation. Layers of paint buildup may also make windows difficult to operate and unattractive. Most older windows can be made more energy efficient by sealing gaps with caulk, replacing glazing compound, fixing broken glass, repairing loose wood parts and installing weather stripping. An appropriate storm window may also help reduce heat loss while retaining original windows.

Ask Yourself Two Questions

1. How important are windows in terms of architectural significance and the character of my building? Usually windows play an important role, especially those at the front and on sides that are highly visible from the street.
2. Are the windows really beyond repair? Often windows in disrepair look worse than they actually are and can be easily repaired and retrofitted for greater energy efficiency at a significantly lower cost than replacements.

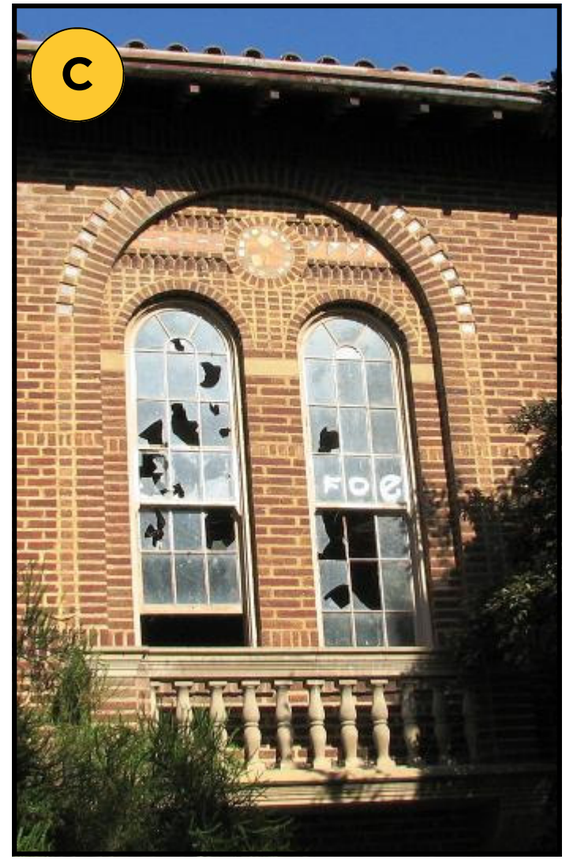
A, B Two eight-over-eight double-hung sash dormer windows. Both are in disrepair; window A will need to be rebuilt or replaced to match window B.

C Broken glass on these architecturally distinctive windows can be easily replaced and windows repaired.

D A coat of paint and routine and preventive maintenance can restore windows to their original appearance.

E Unique roof monitor with well-maintained and character defining six-over-six double-hung sash windows.

F Group of six-over-six double-hung sash windows with transoms, only needing paint.



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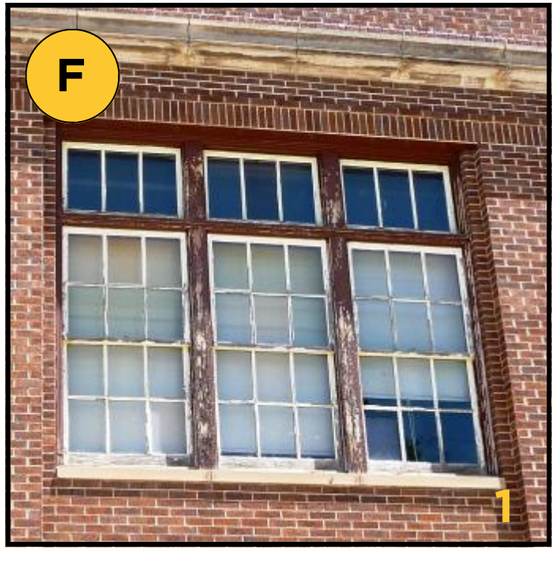

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When Are Replacement Windows Necessary?

A selling point of replacement windows is that they are maintenance free. In truth, based on their materials, components and relatively short life expectancy, you, and subsequent owners, will probably be looking at replacing your replacement windows in less than 20 years. However, the selling point of old windows is most have been on the job for 50 to 100 years or more, and can continue to do so.

Not every old window should be saved. Sometimes it is necessary to replace a window due to extensive deterioration or missing components. An entire window may need to be replaced or sometimes selectively just components, such as retaining the frame while installing new sashes. When replacing windows, remember to match the originals as closely as possible. New windows should replicate originals, in terms of size, glazing (tint), proportions, width, dimension of components (muntins, frame), profile of sash, depth and materials.

A Six-over-six double-hung sash with loose meeting rail, missing glass — can be repaired.

B Queen Anne windows needing paint, re-glazing — can be repaired.

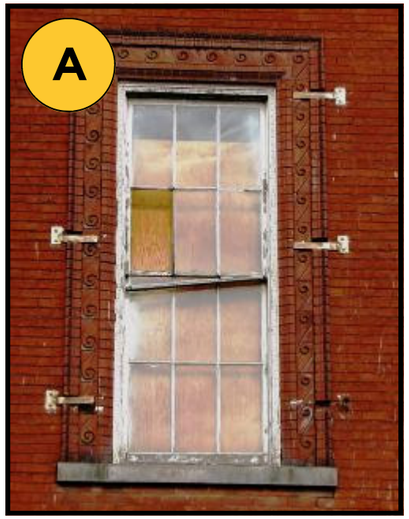
C Two-over-two double-hung sash with loose bottom rail, needing paint, re-glazing — can be repaired.

D Arched double-hung sash windows missing glass and frames — replacement likely.

E One-over-one double-hung sash windows and fixed transoms with detached meeting rail, needing paint and re-glazing — can be repaired.

F Queen Anne window in poor condition, detached from frame and missing glass — borderline, requiring extensive repairs.

G Queen Anne window missing glass and subject to structural settling of the building — borderline, requiring extensive repairs.



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Do the Benefits Outweigh the Costs?

As a homeowner you have to assess the cost-benefit analysis or 'payback' that comes with repairing or replacing your windows. Does replacing windows make economic sense? Can I achieve similar energy savings by repairing windows?

Although data varies, somewhere between 10 and 25% of heat loss is actually attributed to windows. Most heat is typically lost through your roof and un-insulated walls. Given that an average house has between 24 and 30 windows, and a typical replacement window unit costs between $500-1,000 each, does an investment of $12,000 or more make sense? On the flipside, the cost to restore an existing window and add storm windows (where appropriate) will generally be much less (depending on if you do it yourself or hire a contractor), approximately between $125 to 800 each.

Many window replacement manufacturers claim greater savings than actually occur. Since windows account for at most 25% of heat loss, the payback and time to recoup your investment in terms of energy savings could take between 40 and as much as 200 years, based on various studies. A study from Vermont shows the savings gained from replacement windows as opposed to a restored wooden window with a storm is only $.60. The added problem is most replacement windows will not last as long as 40 years, much less over a hundred years. And some are being replaced only after 10 years of service.

Do The Math

- 13 windows on the front of the house (in total 35)
- $500-1,000 for each replacement window unit
- Total costs for new windows: $17,500—35,000
- Average savings gained from replacement windows (in comparison to similar, restored windows with storms): $25.00—50.00 per month
- The payback will take about 60 years

1890s Queen Anne style house
Original one-over-one double-hung sash windows with storm windows

Adrian Scott Fine/NTHP

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When Replacing My Windows, What Not To Do?

Original windows were custom designed to fit your older and historic building. You cannot say the same for replacement windows. Often, off-the-shelf replacement window units do not match originals closely enough in design, overall appearance or fit. As original windows play an important role in defining the character of a building, installing windows that do not match — especially in terms of size and shape, type and color of frame, tint of glazing — can make a significant difference in how the building looks.

Changing the Size

Reducing or enlarging the window opening to accommodate a new replacement window is particularly harmful. It completely changes the entire proportions of a building, not to mention reducing daylight and potential air circulation. If you do choose to replace your original windows, do not eliminate window openings, in-fill or alter them to accommodate smaller or larger windows. These examples illustrate the dramatic change in appearance.

A Italianate style row houses, side by side. Building to the right retains original arched one-over-one double-hung sash windows. Building to the left has smaller replacement windows and in-fill panels installed in the original opening.

B Industrial building converted for housing with reduced windows and in-fill openings.

C Main Street commercial building with upper floor windows removed, openings reduced down and much smaller replacement windows that do not match.

D A stock, smaller window unit was used to replace a larger double-hung sash window.

E Brick was used to in-fill the original opening of the round-arched window.

F Two round arched windows were removed and replaced by one larger picture window, completely different in design and period to the historic Main Street building.

G Three vertically-oriented Gothic style windows were reduced and replaced by horizontally-oriented hopper type windows.

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Do Window Details Matter?

Yes. Even when maintaining the original opening and general size of the old windows, replacement windows can sometimes miss the mark when details and overall design are off. To the greatest extent possible, new windows should match originals as closely as possible. These examples of replacement windows show how even subtle differences, even minor changes in design, can have an impact on the overall character of an older and historic building.

A Replacing an original double-hung sash window with a casement and fixed transom dramatically changes the look and architectural character of this historic building.

B Modern interpretation of an arched window alters the pattern and overall design on this monumental civic building. If original windows are no longer intact, this approach may be acceptable as windows clearly reflect their own era.

C Replacing a round arched double-hung sash window is a one-over-one double-hung sash with fixed transom. This illustrates using stock windows to fit an opening that often requires a custom or more costly replacement window.

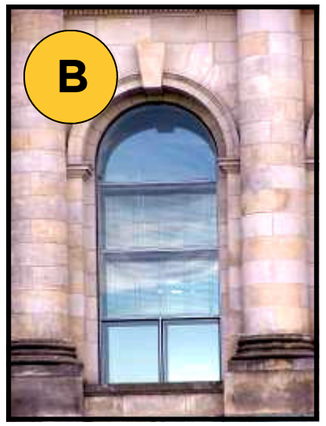
D The thickness of muntins as well as their profile can make a difference. This window is not a true divided-light design, instead featuring applied, flat muntins.

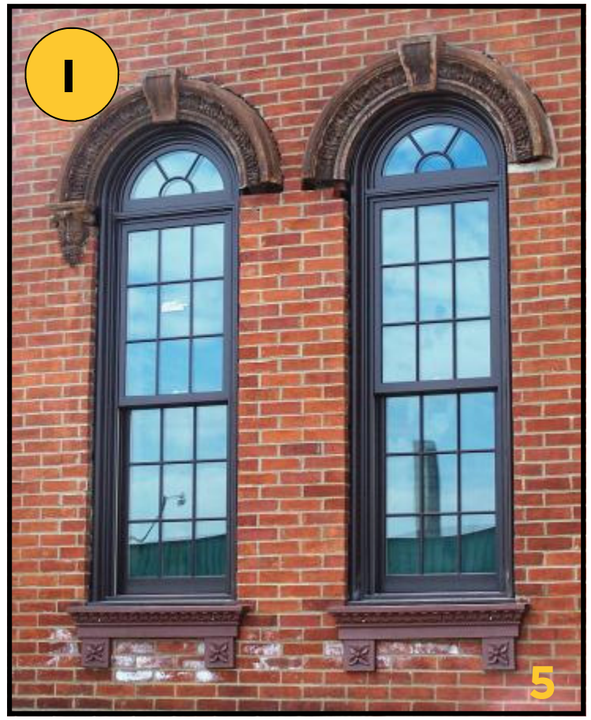
E New windows will often require 'building out' and enlarging the casing and surround to accommodate a stock replacement unit, effectively reducing the size of the window in comparison to the originals.

F The introduction of a hopper window completely alters the look of this window.

G, H Window G features the original twenty-over-twenty double-hung sash window. The replacement, window H, is a fixed one-over-one unit. The design, profile and depth are altered in the process.

I New windows attempt to replicate originals, though the casing and surround is wider and the fixed fanlight does not match originals.





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CASE STUDY: A Material Issue

A series of 1930s duplexes in this neighborhood were designed in the Tudor Revival architectural style. Each features large window openings, prominent bays as a central focus, and original steel casement windows. Original windows are a primary character defining feature.

A, B Both sides of this duplex feature original rolled steel casement windows with interior storm window inserts.

C, D Both sides of this duplex have replacement windows. The one to the left more closely mimics the lines and details of the original steel casements, though the new windows are a mixture of fixed and double-hung sash units and the proportions are not an exact match. The unit to the right also features fixed and double-hung sash replacement windows. In this case, the result is less successful with white vinyl casing and a central picture window missing any muntin pattern.

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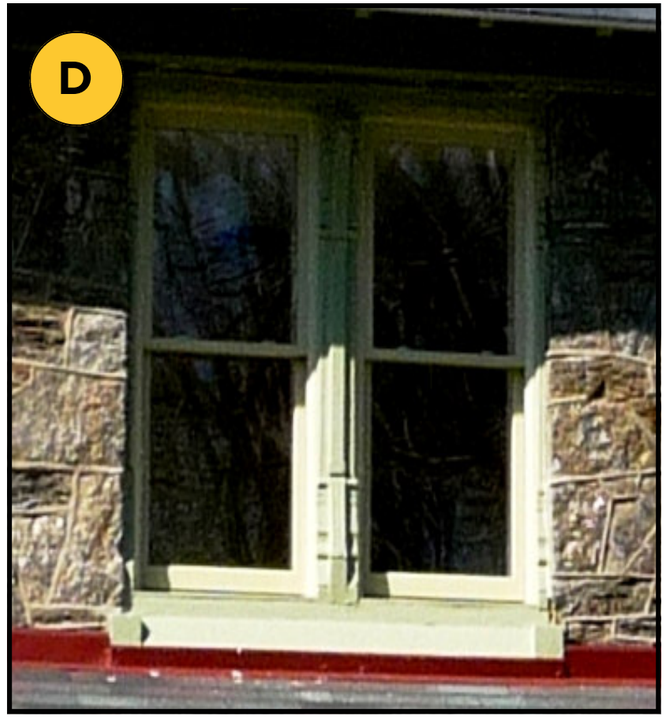
CASE STUDY: In-Kind Replacement

In this dramatic before and after transformation, a severely deteriorated and abandoned duplex was recently rehabilitated. The project preserved important character-defining features, including replicating original windows with new replacement units. The original windows — simple wood one-over-one double-hung sashes — had long disappeared as the building fell into decline and years of vacancy. When replacing a historic window, it is important to retain original window casings and trim when possible. These details often have stylistic features associated with the building's architectural style. In this example, the decorative carved wood casings were intact even though the windows were not.

A, B Original windows are missing but decorative casings and openings remain.

C, D As part of the rehabilitation project, new wood double-hung sash windows were chosen to fit the original openings and the decorative casings were repaired and retained. New windows replicate the originals in terms of size, type, proportion and materials.



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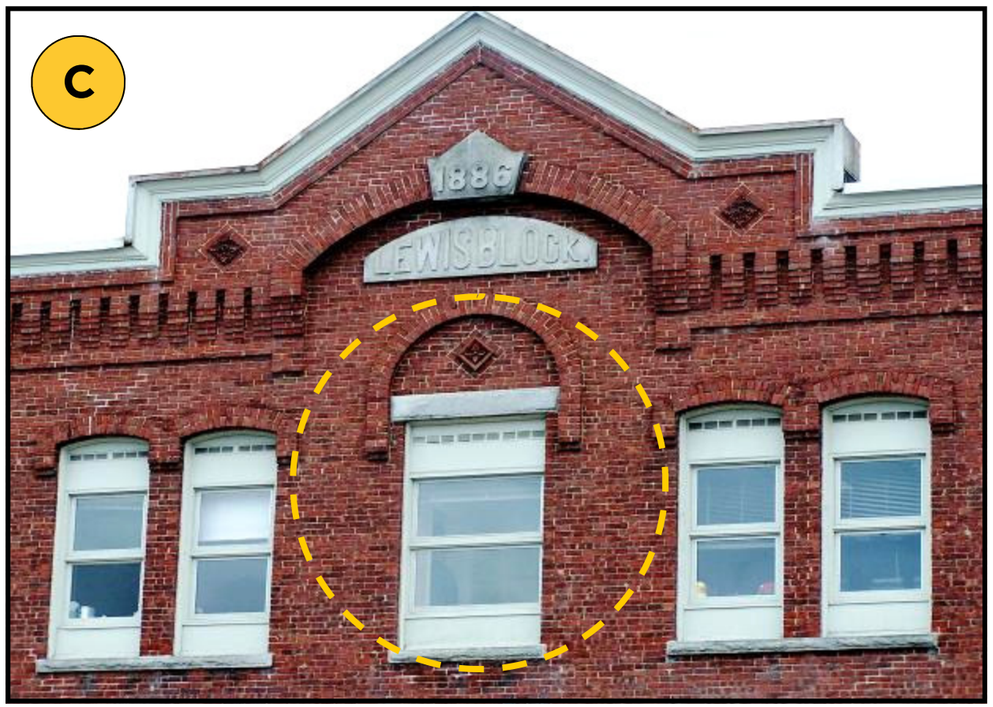
CASE STUDY: Size Matters
In these two examples, original windows were replaced and the openings were reduced to accommodate a much smaller replacement window.

A Two, arched nine-over-one double-hung sash windows are in disrepair with loose meeting rails and paint build up. They can be easily repaired and still maintain the character of the building.

B An identical building with replacement windows. Stock units were used with aluminum in-fill around the opening. The difference in character between A and B is dramatic.

C The upper story windows of this Main Street commercial structure were replaced with stock units with in-fill at the top and bottom.



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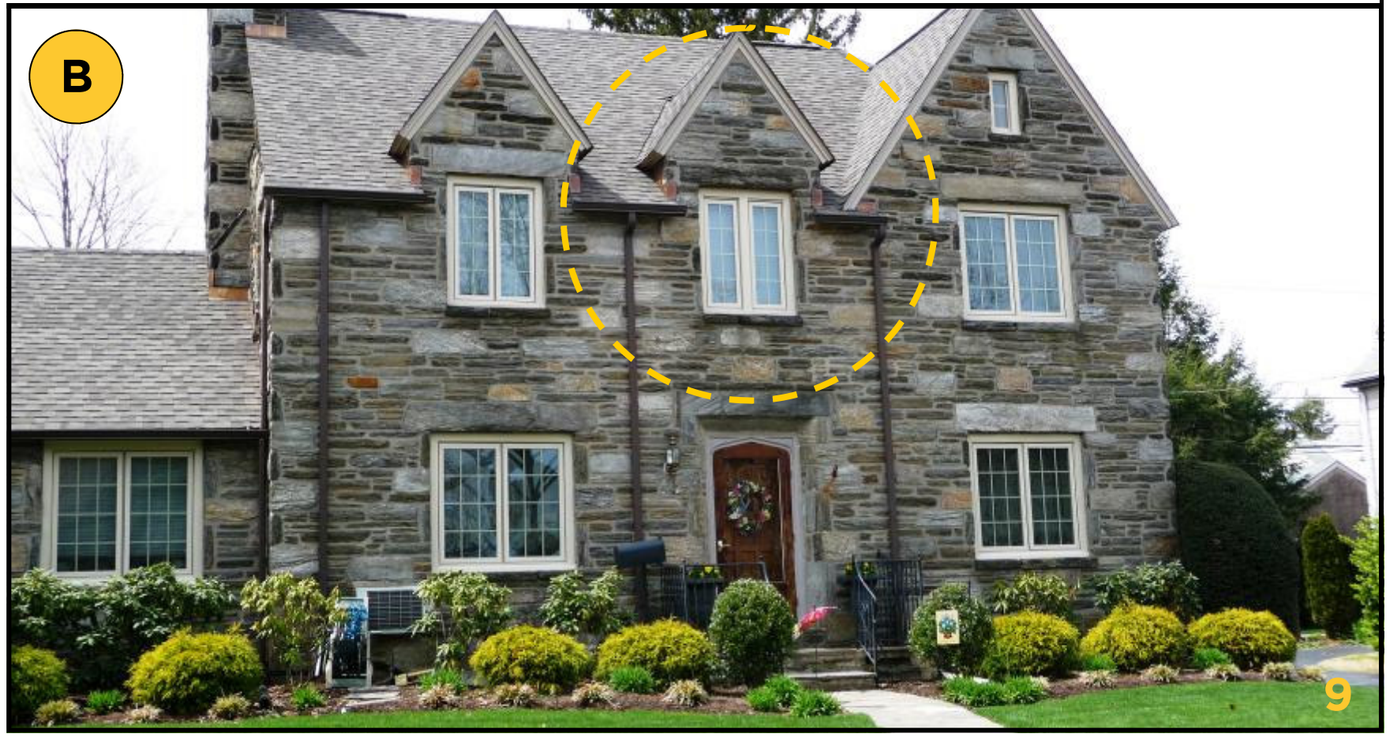
CASE STUDY: Close, But Not Enough

Two similar houses, both Tudor Revival style and dating to the 1920s or early 30s. Both featured steel casement windows, whereas only one retains the original windows today.

A Steel casement windows with fixed transoms and side-lights, featuring interior storm windows. These windows are a character defining feature of the house.

B Replacement windows attempt to match with casement style units yet the proportion, pattern, width and lack of a true divided-light miss the mark.

C, D The differences between the original and replacement are readily seen, where the wider casing and surround are much prominent on the replacement windows.



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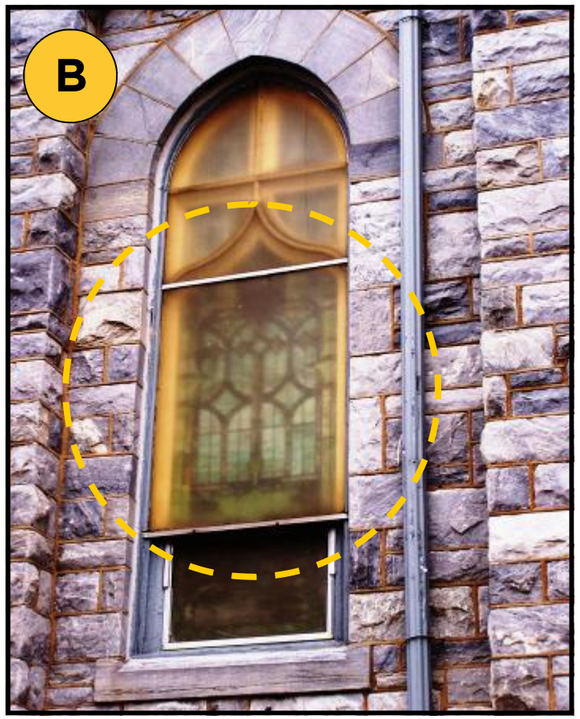
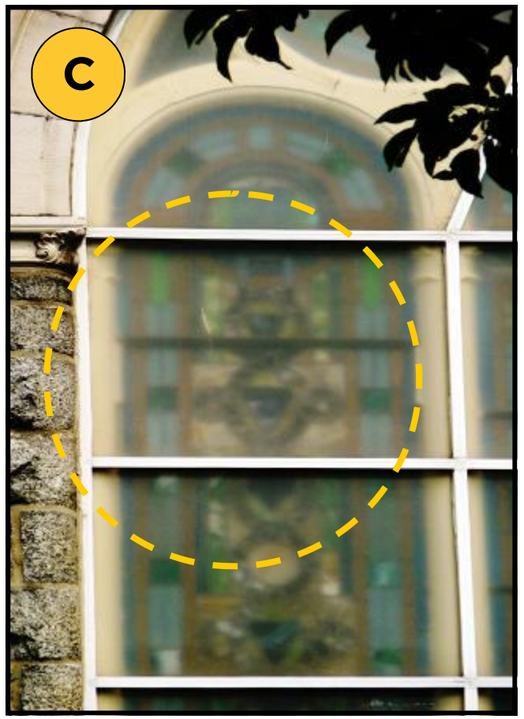
CASE STUDY: A Blurry View

Stained, leaded, slag and other types of decorative glass were meant to be seen from the inside and out-of-doors. In efforts to protect the fragile glass from vandalism and exposure to the elements, protective glazing systems are sometimes used, especially on religious properties. When improperly installed and inappropriate materials used, these systems can not only distort and obscure the look of the windows but also cause more damage than if left exposed. When unvented, moisture from condensation is trapped leading to wood rot and often severe deterioration of the window frames.

A Exposed original one-over-one double-hung slag glass window .
B Plastics (Lexan or Plexiglass) are impact-resistant and nearly shatterproof but tend to yellow and get hazy over time.
C Windows are obscured and the pattern is dramatically altered with new aluminum rails as part of this protective glazing system.





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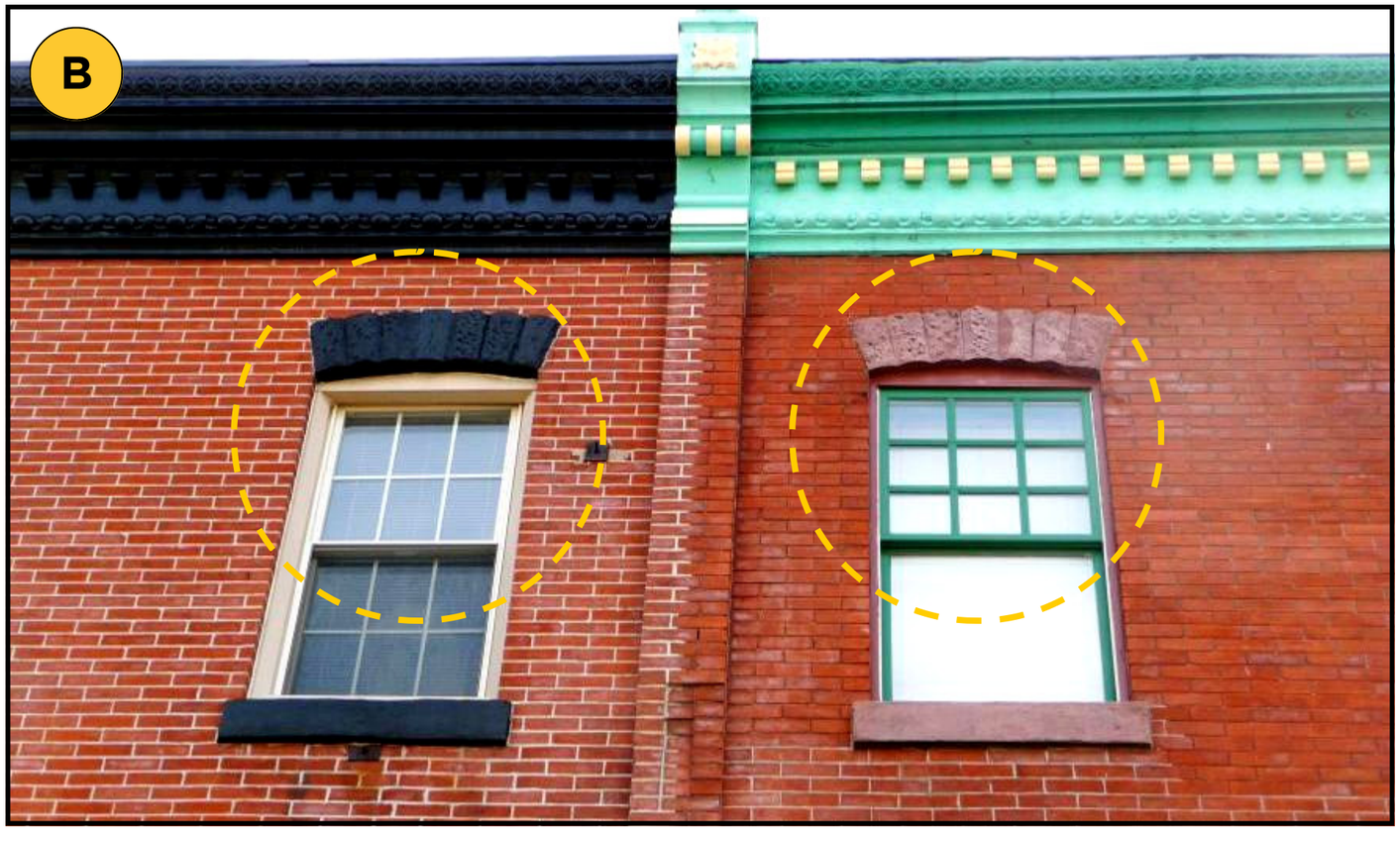
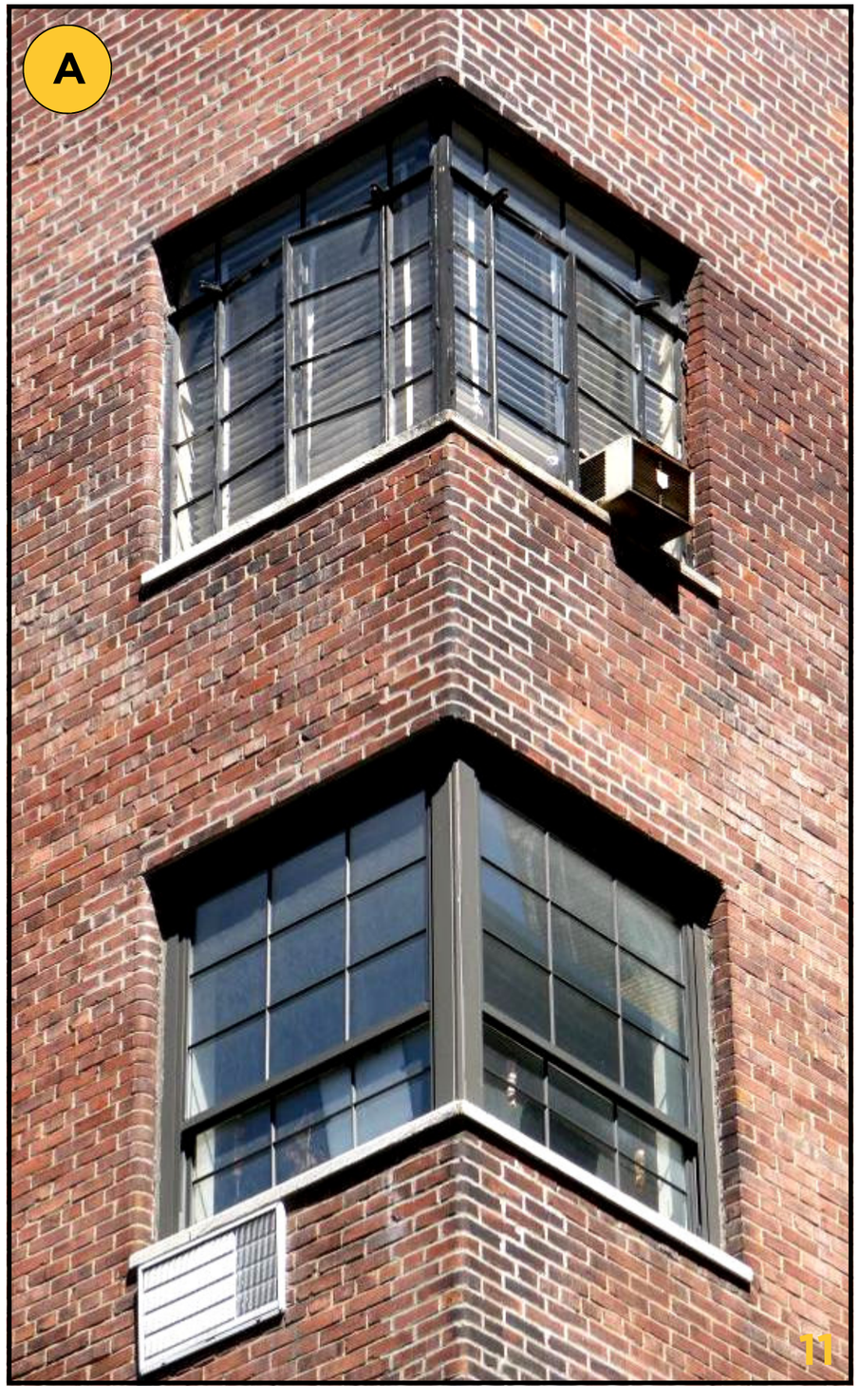
CASE STUDY: Impersonating the Original

Some window manufacturers claim they can replicate and closely match the details of original windows. Most often, replacement windows fall short of duplicating the look and rich detailing of original windows. These examples clearly illustrate this problem.

A An early 1940s apartment building designed in the Art Deco style features corner, steel casement windows. The slender profile of the muntins and casing is a character defining feature. The replacement double-hung sash window, at the bottom, attempts to match the lines of the original, yet the muntin pattern and width of casing are much different.

B Two double-hung sash replacement windows on side-by-side row houses demonstrate the subtle, but noticeable differences in design. While original windows were identical, these are different in terms of depth, muntin size and pattern and width of casing.





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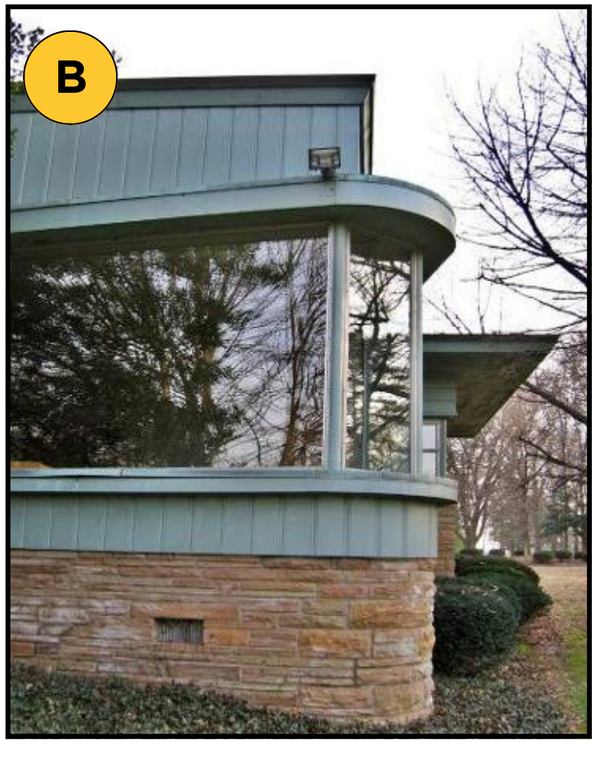
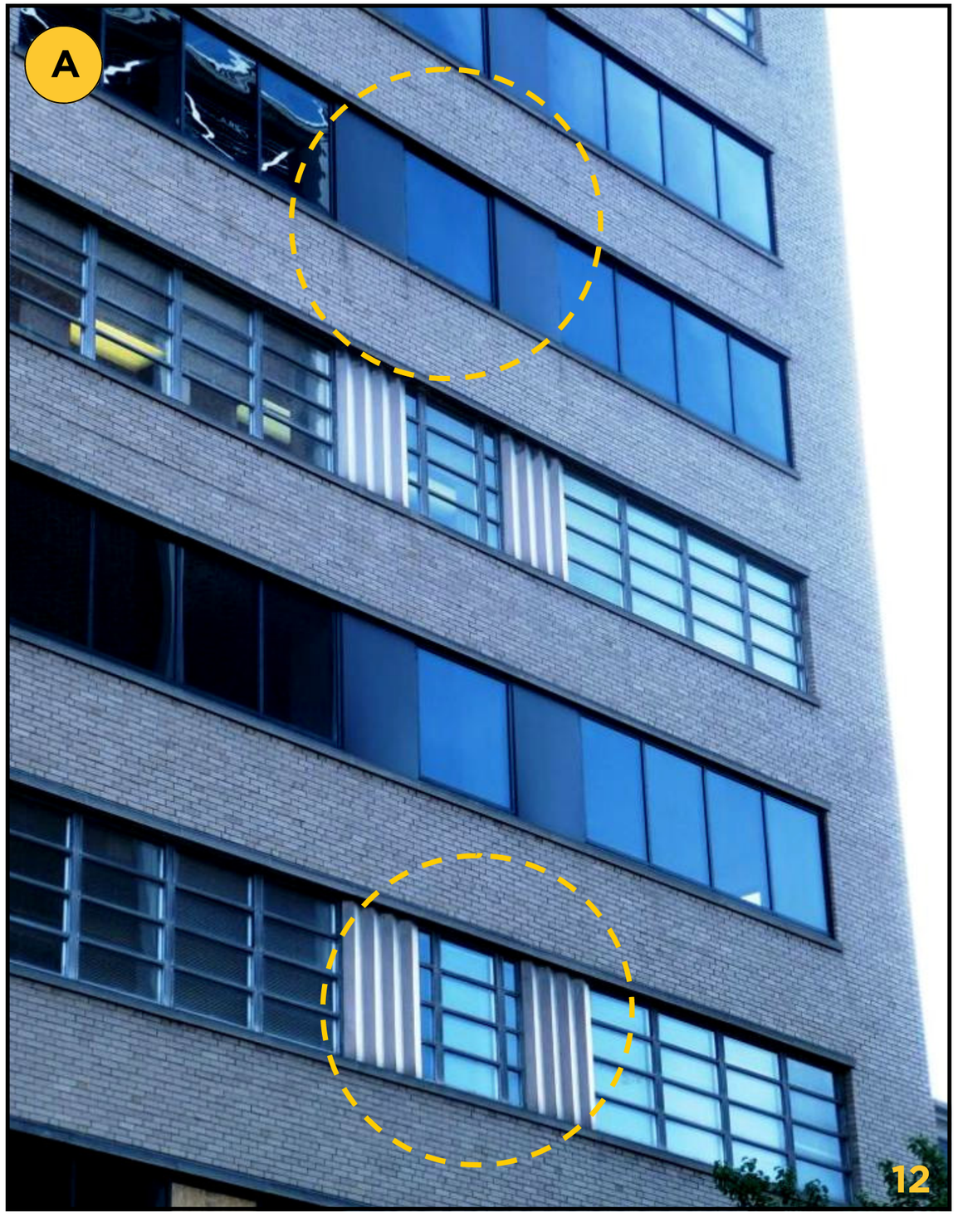
CASE STUDY: A Modern Dilemma

Buildings dating to the second half of the 20th century challenged earlier architectural practices and design, featuring experimental materials and introducing new concepts, such as the 'picture window.' Today, some of these materials are failing, difficult to maintain, and may fall short of optimal energy efficiency goals. As important character-defining features, repair is optimal as finding replacements that match will be difficult. These examples illustrate the challenges.

A Original, character defining windows and corrugated stainless steel detail are being removed on this 1950s office building, replaced by dark tinted fixed windows that do not match.

B, C Large spans of single pane and plate glass require innovative solutions, such as custom designed storm windows.





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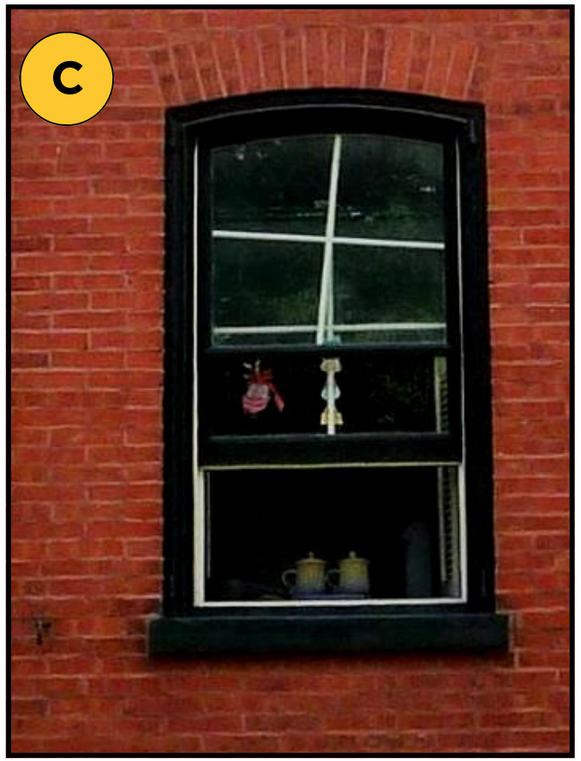
CASE STUDY: Authenticity Counts

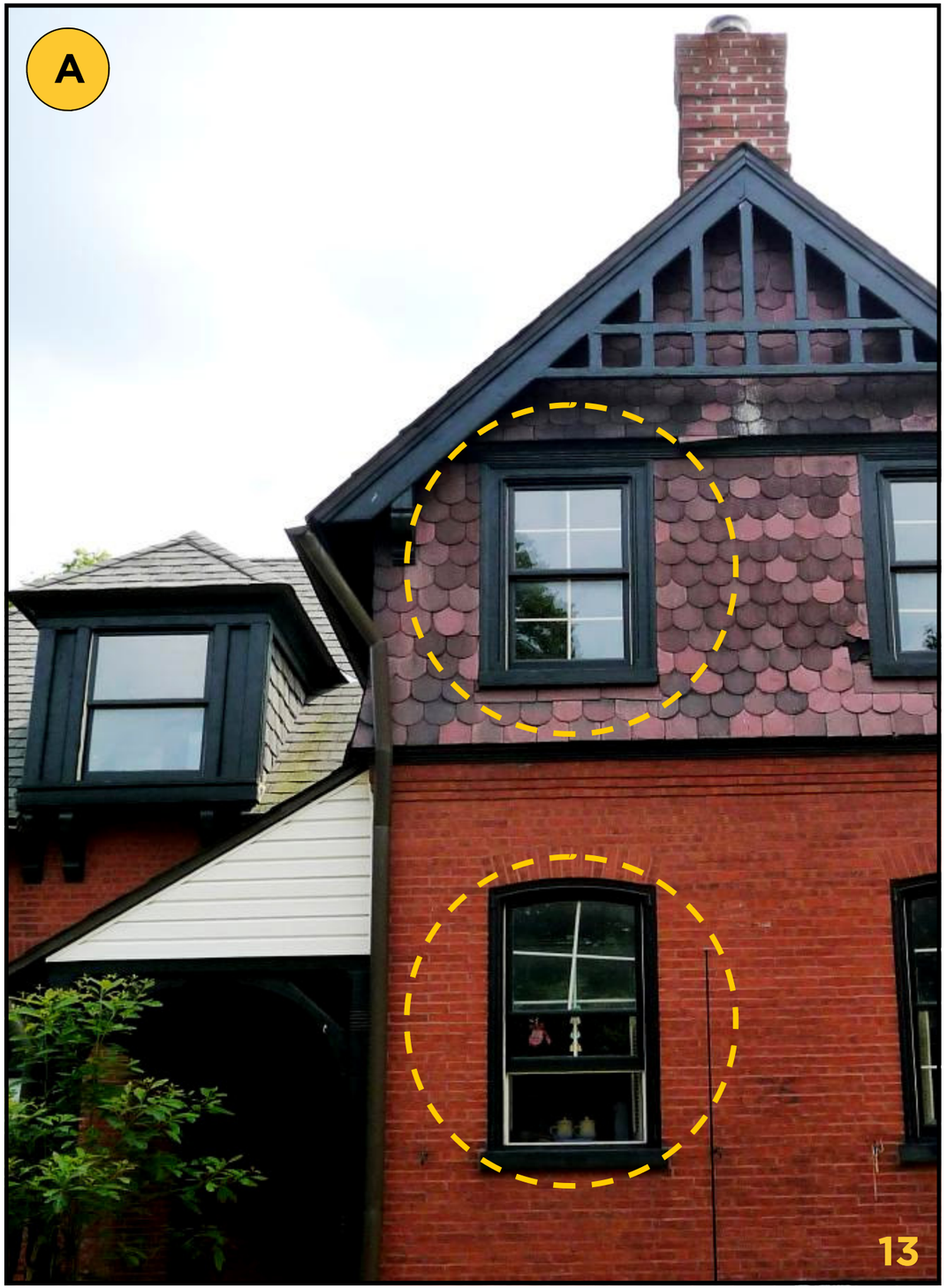
Most older windows are true divided-light, with muntins that are solid, dividing the individual panes of glass. As opposed to a solid piece of glass, a true divided-light window is much more rich in detail and architectural character. Many replacement windows, however, are not true divided light and instead feature muntins that are applied, 'sandwiched' in between glass or clipped on from the inside. This example illustrates.

A A former carriage house, rehabilitated and preserved for a new use, features replacement windows that attempt to look like true divided-light windows.

B This four-over-four double-hung sash still has its original wood casing with a replacement window with clipped on interior muntins. There is little dimension or depth with this design and instead looks like a one-over-one sash.

C This shows how clipped on interior muntins can loosen or fall off.





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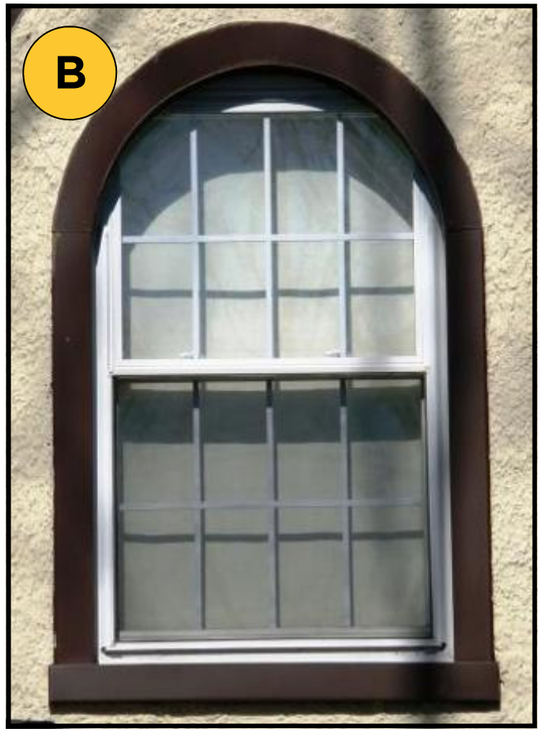
CASE STUDY: One Window, Multiple Replacements

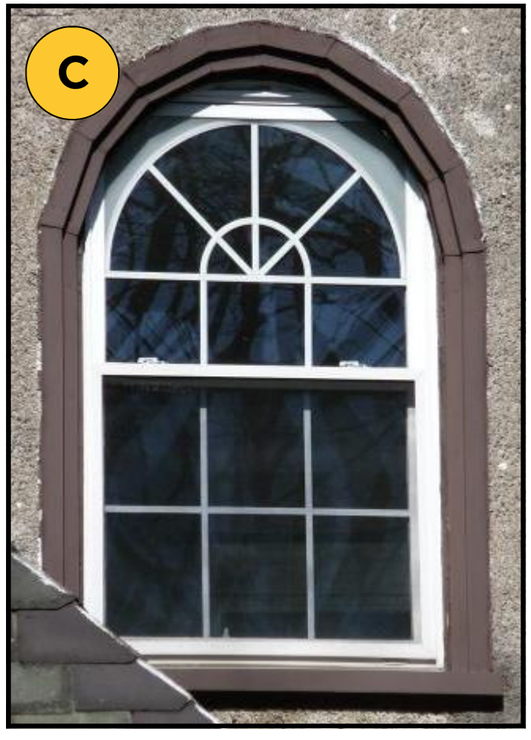
Most older and historic neighborhoods were built, at least in part, by a few developers often employing similar architectural designs and features, such as windows. This example of a simple round arched, wood window clearly shows how different replacement windows can be from one another.

A This eight-over-eight double-hung sash window with wood casing and sill is a common feature on houses in this neighborhood.

B This replacement window attempts to replicate details of the original. However, it is not a true divided-light, the casing is wrapped in aluminum and the upper sash is flat and not round arched.

C. This replacement tries to look like a round arched window but is instead flat, features a completely different muntin pattern, has casing wrapped in aluminum and is not a true divided-light.





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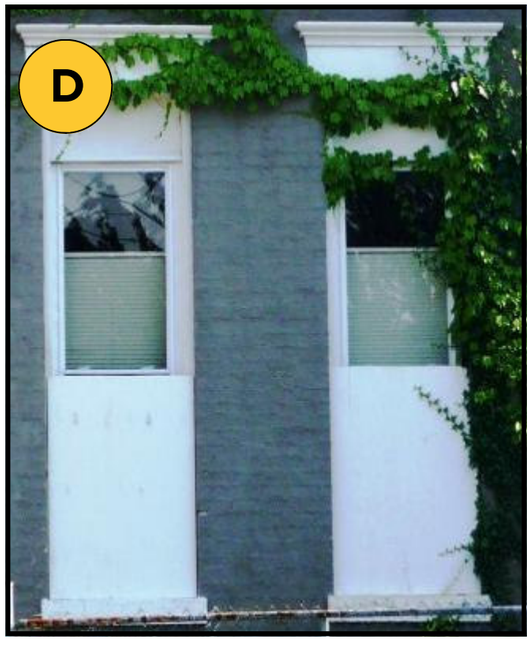
CASE STUDY: Putting Windows in Context

When a homeowner chooses to alter features, such as replacing windows, this may inadvertently also change the character of the larger neighborhood and context, especially when it happens in a domino pattern. Over time, as changes take place house-by-house, the distinctive character of the neighborhood can be diminished.

A, B Two simple Shotgun style homes that were once nearly identical, to each other, and throughout the neighborhood.

C Original two-over-two double-hung windows are a very prominent feature of these homes, directly relating to the size of the main entrance.

D. The original windows were replaced, the openings reduced, and stock windows installed that are no longer in scale to the proportions of the house.



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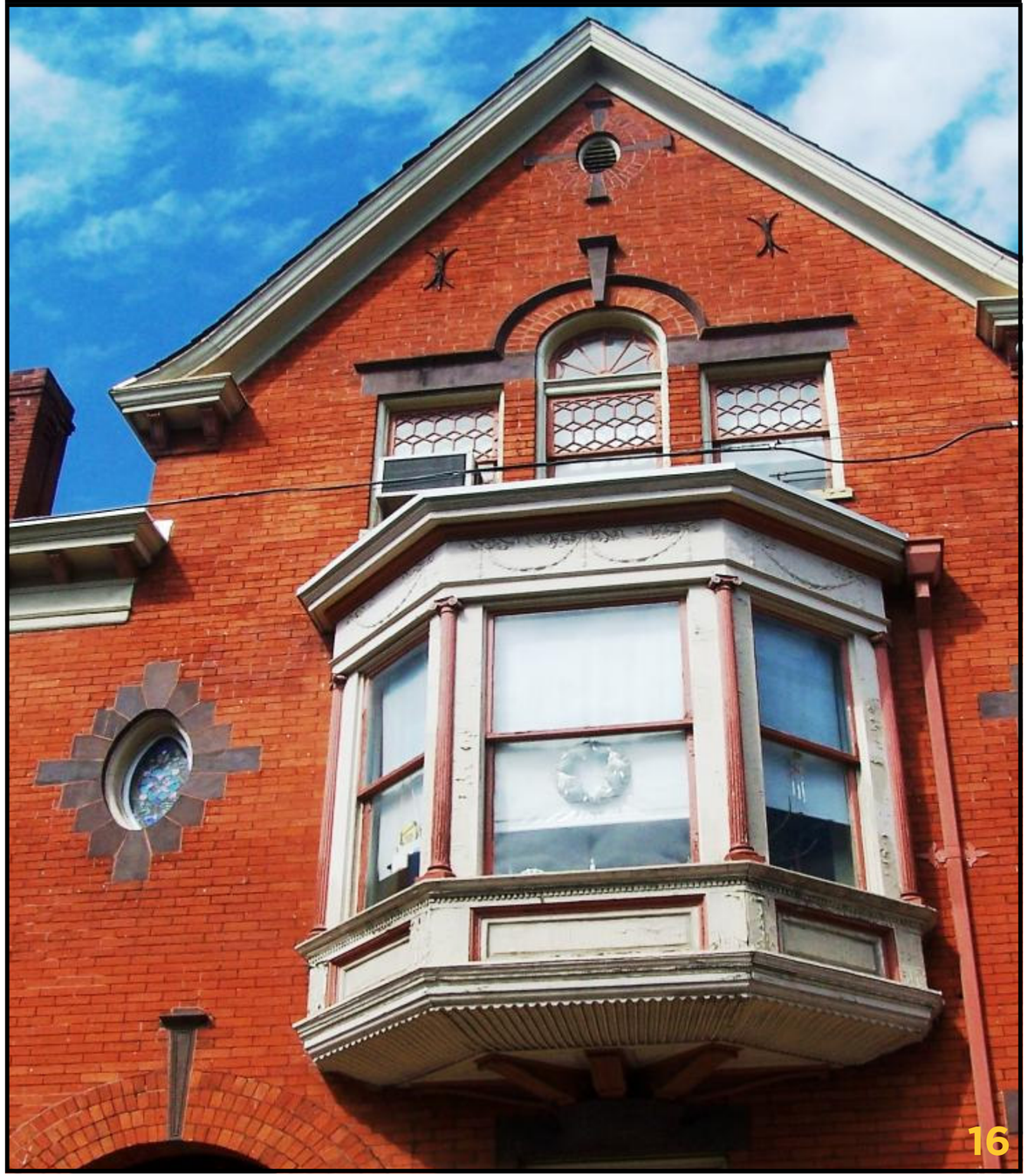
Early 20th century Queen Anne style house
Original windows help define the character of older buildings



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