

Window Solutions for Historic Buildings

EL603a

6/21/2018

1 LU (HSW)

This presentation is protected by U.S. and international copyright laws.

Reproduction, distribution, display and use of the presentation without written permission of the speaker is prohibited.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to constitute approval, sponsorship or endorsement by AIA of any method, product, service, enterprise or organization.

The statements expressed by speakers, panelists, and other participants reflect their own views and do not necessarily reflect the views or positions of The American Institute of Architects, or of AIA components, or those of their respective officers, directors, members, employees, or other organizations, groups or individuals associated with them.

Questions related to specific products and services may be addressed at the conclusion of this presentation.

Learning Objectives

- Discuss historic significance
- Describe historic standards & guidelines for window rehabilitation
- Design a window rehabilitation plan
- Evaluate window replacement options

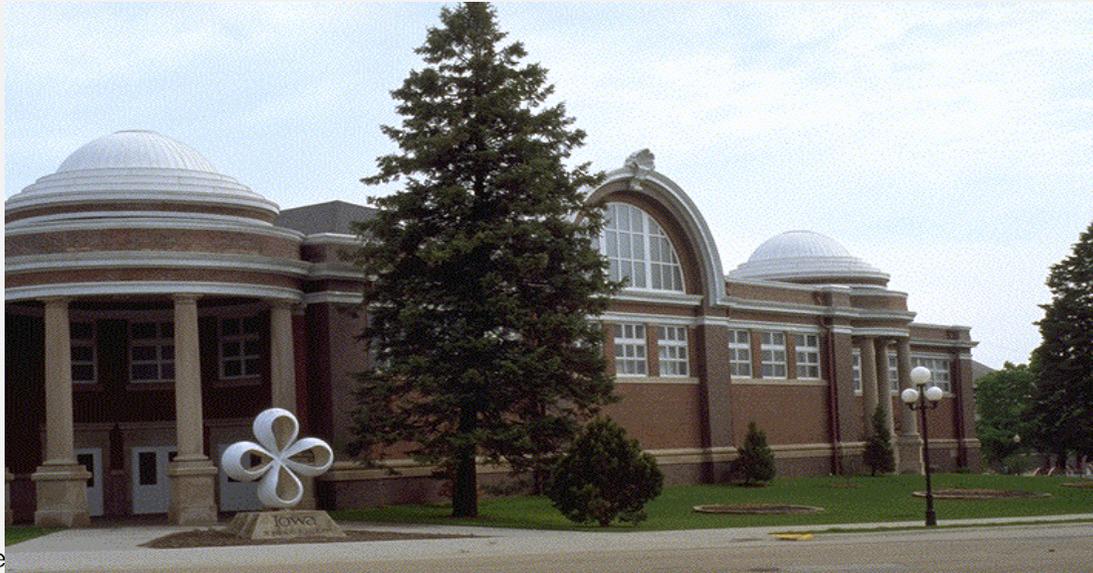


Waksman Institute of Microbiology

Rutgers University

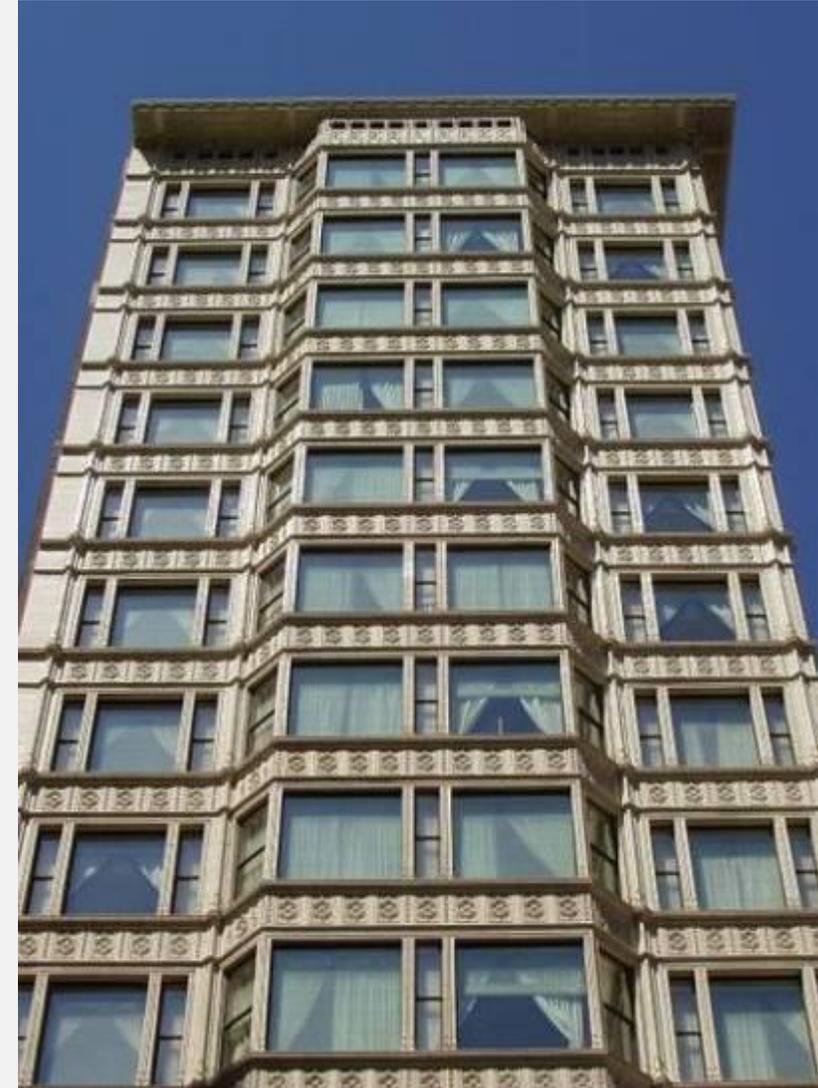
Historic Significance

- What determines the historic significance of buildings?
- Which of these buildings is more historically significant? Why?



A'18 AIA Confe
June 21-23, New York City

Ag Building Iowa State Fairgrounds, Des Moines, IA



Reliance Building

Chicago, IL

Historic Significance

Can be defined in terms of preservation tax incentives:

- Certified historic structure
 - 20% tax credit
- Non-historic, non-residential buildings
 - 10% tax credit
- Non-certified renovations
 - No tax credits



Reliance Building

Chicago, IL

Certified Historic Structure

- A building listed individually on the National Register of Historic Places
- Example: Willard Hotel, Washington DC

Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED
461	DC	District of Columbia	White--Meyer House	1624 Crescent Pl., NW	Washington	1988-01-20
462	DC	District of Columbia	Whittemore House	1526 New Hampshire Ave., NW.	Washington	1973-07-16
463	DC	District of Columbia	Wiley, Emily, House	902 3rd St., NW	Washington	2006-05-26
464	DC	District of Columbia	Willard Hotel	1401--1409 Pennsylvania Ave., NW.	Washington	1974-02-15
465	DC	District of Columbia	Wilson, Woodrow, House	2340 S St., NW	Washington	1966-10-15
466	DC	District of Columbia	Winder Building	604 17th St., NW.	Washington	1969-03-24
467	DC	District of Columbia	Windsor Lodge	2139--2141 Wyoming Ave., NW	Washington	1976-12-08
468	DC	District of Columbia	Woodhull, Maxwell, House	2033 G St., NW.	Washington	1991-04-12
469	DC	District of Columbia	Woodlawn Cemetery	4611 Benning Rd., SE	Washington	1996-12-20
470	DC	District of Columbia	Woodson, Carter G., House	1538 9th St., NW	Washington	1976-05-11



Certified Historic Structure

- A building located in a *registered historic district* & certified by the National Park Service (NPS) as contributing to the historic significance of the district
- Example: University of Notre Dame Main and South Quadrangle
- 20% tax credit available for NPS “certified” rehabilitation

Queries Login Logout Save As Save Options Admin Stop Help

Index By State County
National Register Information System 01/09/2009 14:26:59

No filter Include filter in navigation

State: IN
County: St. Joseph

Row	Resource Name	Address	City	Listed	Multiple
81	Tower Building	216 W. Washington	South Bend	1985-06-05	Downtown South Bend Historic MRA
82	University of Notre Dame: Main and South Quadrangles	Off I-80/90	Notre Dame	1978-05-23	
83	Walker Field Shelterhouse	1305 Ewing Ave.	South Bend	2006-09-27	New Deal Work-Relief Projects in St. Joseph County, Indiana MPS
84	Water Street/Darden Road Bridge	Over St. Joseph River at Darden Rd.	South Bend	1985-03-21	
85	Wenger, Martin, Farmhouse	701 E. Pennsylvania	South Bend	2000-06-22	
86	Wertz--Bestle Farm	51387 Portage Rd.	South Bend	2001-04-12	
87	West Washington Historic District	Irregular pattern roughly bounded by Main St., Western Ave., W. LaSalle Ave., and McPherson St.	South Bend	1975-01-17	

Page 9

First Page Next Page Refresh Export



Historic Significance of Windows

Windows are considered significant when:

- Original
or
- Changed within the period of significance
- Show exceptional craftsmanship or design
- Contribute to the historic character of the property



Learning Objectives

- Discuss historic significance
- Describe historic standards & guidelines for window rehabilitation
- Design a window rehabilitation plan
- Evaluate window replacement options



Waksman Institute of Microbiology

Rutgers University

Standards for Rehabilitation

- Developed by the Secretary of the Interior to guide work undertaken on historic buildings
- Used by the National Park Service to determine if a rehabilitation qualifies for federal tax credits
- Guide preservation of historic federal & private properties not seeking tax credits

The Secretary of the Interior's Standards for Rehabilitation

Rehabilitation projects must meet the following Standards, as interpreted by the National Park Service, to qualify as "certified rehabilitations" eligible for the 20% rehabilitation tax credit. The Standards are applied to projects in a reasonable manner, taking into consideration economic and technical feasibility.

The Standards (36 CFR Part 67) apply to historic buildings of all periods, styles, types, materials, and sizes. They apply to both the exterior and the interior of historic buildings. The Standards also encompass related landscape features and the building's site and environment as well as attached, adjacent, or related new construction.

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.
2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.
4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.
6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.
7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.
8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.
9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.
10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

Rehabilitation

- Defined as:

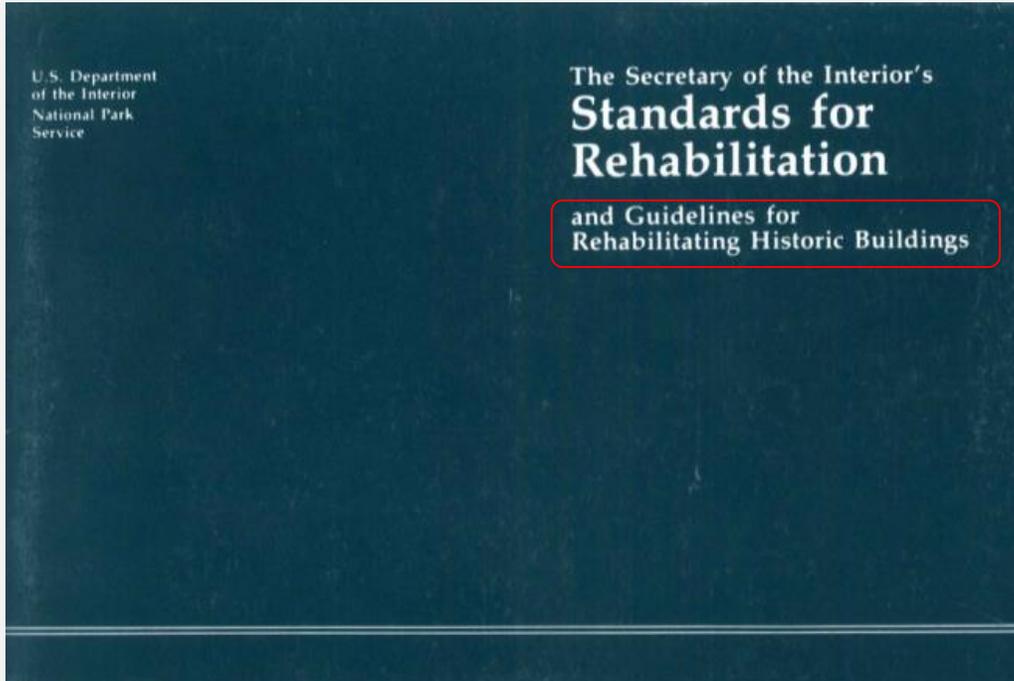
the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

- An approach guided by *The Secretary of the Interior's Standards for Rehabilitation*:

Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature **shall match the old in design, color, texture**, and other **visual qualities** and, where possible, **materials**.

Guidelines for Rehabilitation

- Developed in 1977
- Helps property owners, developers, & Federal managers apply the Secretary of the Interior's "Standards for Rehabilitation"
- Includes guidelines for windows, entrances, and storefronts
- Recommended vs. Not Recommended



Windows	
A highly decorative window with an unusual shape, or glazing pattern, or color is most likely identified immediately as a character-defining feature of the building. It is far more difficult, however, to assess the importance of repeated windows on a facade, particularly if they are individually simple in design and material, such as the large, multi-paned sash of many industrial buildings. Because rehabilitation projects frequently include proposals to replace window sash or even entire windows to improve thermal efficiency or to create a new appearance, it is essential that their contribution to the overall historic character of the building be assessed together with their physical condition before specific repair or replacement work is undertaken.	
<i>Recommended</i>	<i>Not Recommended</i>
Identifying, retaining, and preserving windows—and their functional and decorative features—that are important in defining the overall historic character of the building. Such features can include frames, sash, muntins, glazing, sills, heads, hoodmolds, panelled or decorated jambs and moldings, and interior and exterior shutters and blinds.	Removing or radically changing windows which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
Protecting and maintaining the wood and architectural metal which comprise the window frame, sash, muntins, and surrounds through appropriate surface treatments such as cleaning, rust removal, limited paint removal, and re-application of protective coating systems.	Changing the number, location, size or glazing pattern of windows, through cutting new openings, blocking-in windows, and installing replacement sash which does not fit the historic window opening.
	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.
	Obscuring historic window trim with metal or other material.
	Stripping windows of historic material such as wood, iron, cast iron, and bronze.
	Failing to provide adequate protection of materials on a cyclical basis so that deterioration of the windows results.

Guidelines for Rehabilitation

- Identify – Retain - Preserve
- Protect - Maintain
- Repair
- Replace
- Design for Missing Historic Features
- Alterations/Additions to Historic Buildings
- Energy Retrofitting

Windows

A highly decorative window with an unusual shape, or glazing pattern, or color is most likely identified immediately as a character-defining feature of the building. It is far more difficult, however, to assess the importance of repeated windows on a facade, particularly if they are individually simple in design and material, such as the large, multi-paned sash of many industrial buildings. Because rehabilitation projects frequently include proposals to replace window sash or even entire windows to improve thermal efficiency or to create a new appearance, it is essential that their contribution to the overall historic character of the building be assessed together with their physical condition before specific repair or replacement work is undertaken.

Recommended

Identifying, retaining, and preserving windows—and their functional and decorative features—that are important in defining the overall historic character of the building. Such features can include frames, sash, muntins, glazing, sills, heads, hoodmolds, panelled or decorated jambs and moldings, and interior and exterior shutters and blinds.

Protecting and maintaining the wood and architectural metal which comprise the window frame, sash, muntins, and surrounds through appropriate surface treatments such as cleaning, rust removal, limited paint removal, and re-application of protective coating systems.

Not Recommended

Removing or radically changing windows which are important in defining the overall historic character of the building so that, as a result, the character is diminished.

Changing the number, location, size or glazing pattern of windows, through cutting new openings, blocking-in windows, and installing replacement sash which does not fit the historic window opening.

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.

Obscuring historic window trim with metal or other material.

Stripping windows of historic material such as wood, iron, cast iron, and bronze.

Failing to provide adequate protection of materials on a cyclical basis so that deterioration of the windows results.

Identify – Retain - Preserve

Recommended

- Identifying, retaining, and preserving windows--and their functional & decorative features--that are important in defining the overall historic character of the building
 - Frames, sash, muntins, glazing, sills, heads, hoodmolds, moldings
- **In depth survey of existing conditions**



Window condition assessment preceding repair work

Not Recommended

- Removing or radically changing windows
- Changing the number, location, size or glazing pattern of windows
- **Changing the historic appearance of windows**
- Stripping windows of historic material
- Replacing windows solely because of peeling paint, broken glass, stuck sash, and high air infiltration.



New window is radically different from historic window

Protect - Maintain

Recommended

- **Protecting and maintaining the materials which comprise the window frame, sash, muntins, and surrounds through appropriate surface treatments**
 - cleaning, rust removal, limited paint removal, and re-application of protective coating systems
- Making windows weathertight by re-caulking and replacing weatherstripping
- Evaluating the overall condition of materials



Re-application of protective coating systems

Not Recommended

- Failing to provide adequate protection of materials on a cyclical basis
- Retrofitting or replacing windows rather than maintaining them
- **Failing to undertake adequate measures to assure the protection of historic windows**



Failing to provide adequate protection of materials

Repair

Recommended

- **Repairing window frames & sash by patching, splicing, consolidating or otherwise reinforcing**
 - May include replacement in kind of those parts that are either deteriorated or missing

Not Recommended

- Replacing an entire window when repair of materials and limited replacement of deteriorated or missing parts are appropriate.
- Failing to reuse serviceable window hardware
- Using substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the window



Repairing window frames by patching

Replace

Recommended

- **Replacing in kind an entire window that is too deteriorated to repair using the same sash and pane configuration and other design details**
- If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered

Not Recommended

- Removing a character-defining window that is unrepairable and blocking it in; or replacing it with a new window that does not convey the same visual appearance



Deteriorated historic wood windows



New replacement wood windows

Criteria for Replacement

- Deterioration is too severe to repair
- Windows are not significant to the historic character of the building
- Less important elevations or interior spaces
- Replacing a few windows on a large elevation
- Distance from the ground
- Code requirements
- Energy Performance
- Ease of operation
- Hazard abatement
- Cost

A'18 AIA Conference on Architecture 2018
June 21-23, New York City

Simple window design is not significant to the historic character of the building



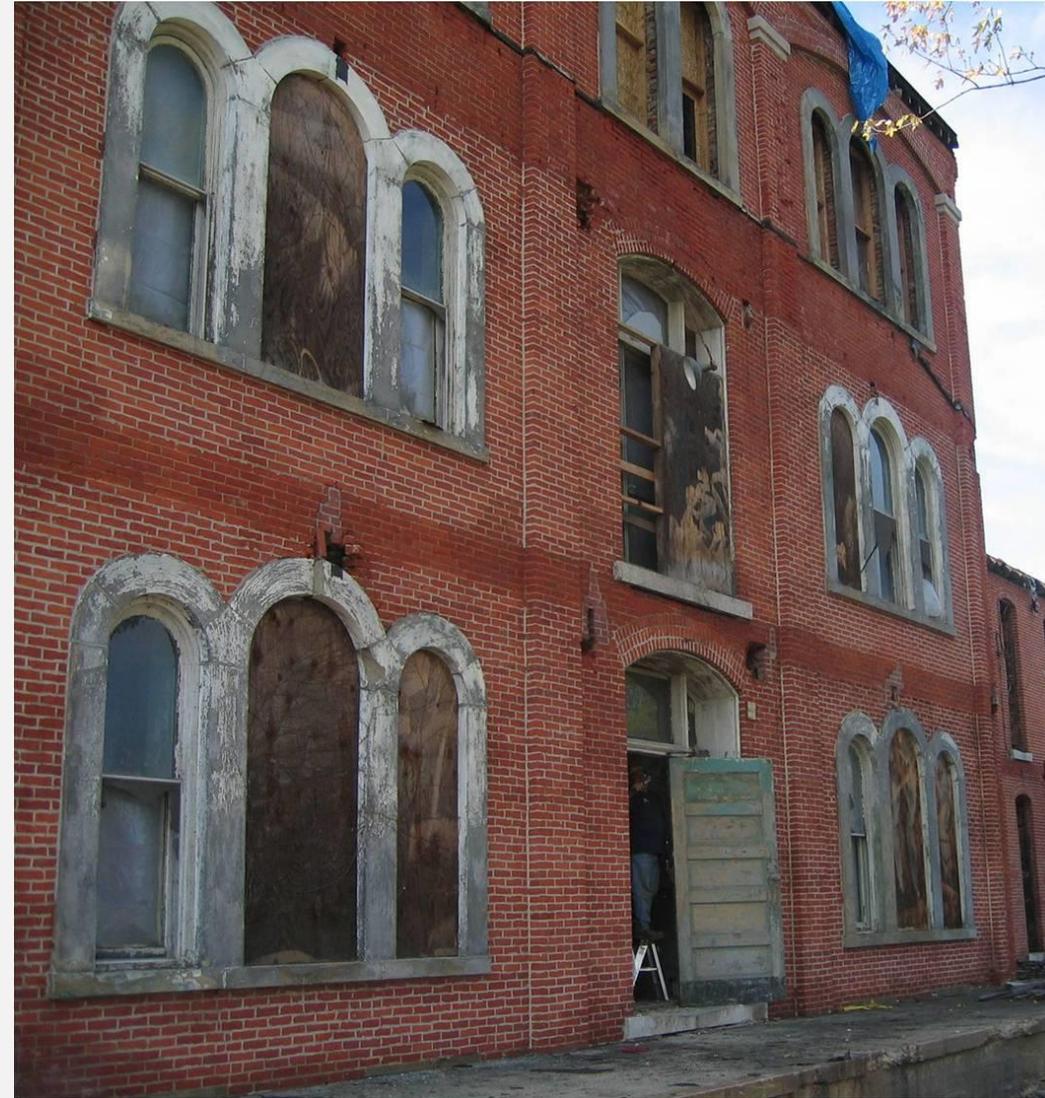
Design for Missing Historic Features

Recommended

- Designing and installing new windows when the historic windows are completely missing
- **Replacement windows may be:**
 - **an accurate restoration**
 - **a new design that is compatible with the window openings and the historic character of the building**

Not Recommended

- Creating a false historical appearance because the replaced window is based on insufficient historical, pictorial, and physical documentation
- Introducing a new design that is incompatible with the historic character of the building



Install new windows when historic windows are missing

Alterations/Additions

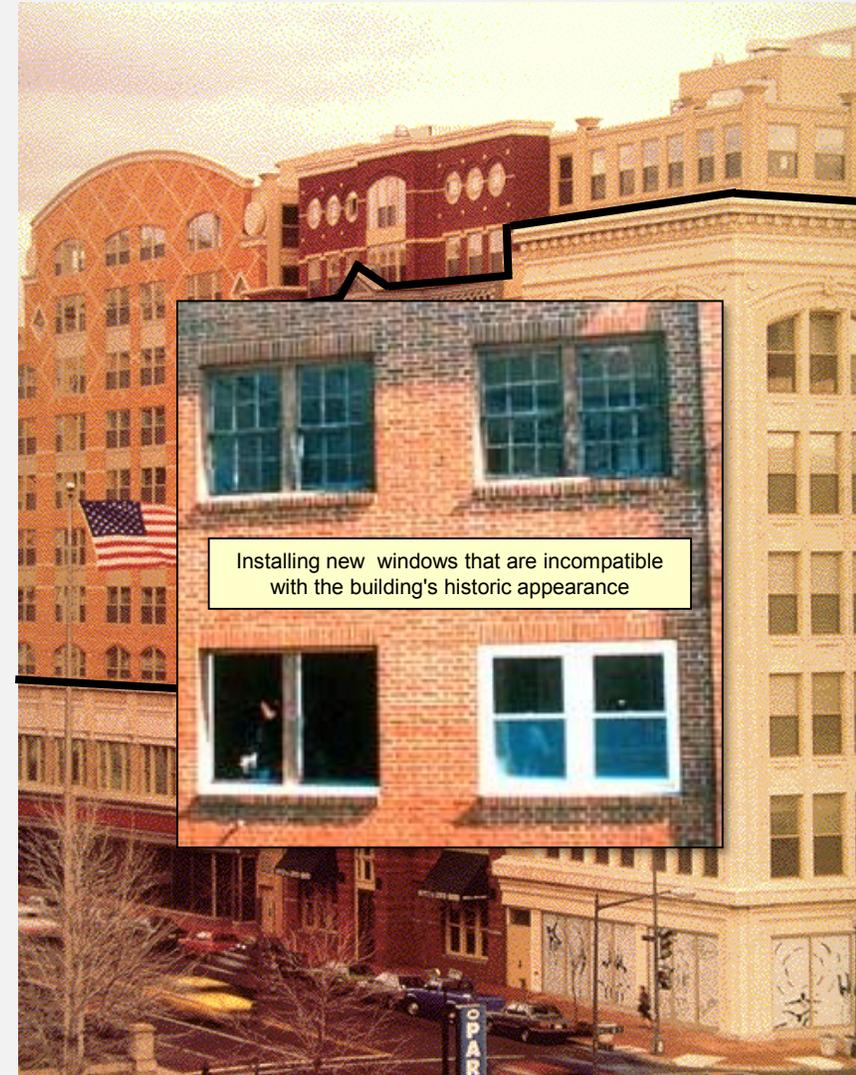
Recommended

- Designing and installing additional windows if required by the new use
- **New window openings**
 - **compatible with the overall design of the building**
 - **don't duplicate the fenestration pattern and detailing of a character-defining elevation**
- Providing a setback in the design of dropped ceilings to allow for the full height of the window openings

Not Recommended

- **Installing new windows that are incompatible with the building's historic appearance**
- Inserting new floors or furred-down ceilings which cut across the glazed areas of windows

A'18 AIA Conference on Architecture 2018
June 21-23, New York City



Designing and installing additional windows

Energy Retrofitting

Recommended

- **Utilizing inherent energy conserving features**
- Improving thermal efficiency
- **Installing interior storm windows**
- **Installing exterior storm windows which do not damage or obscure the windows and frames**
- Considering the use of lightly tinted glazing on non-character-defining elevations

Not Recommended

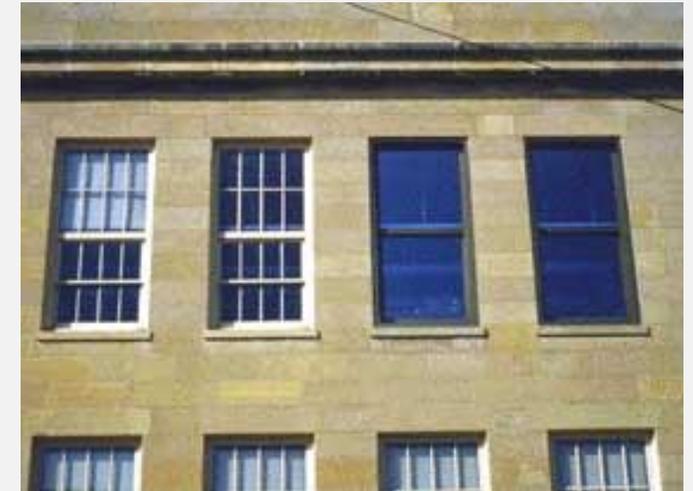
- Removing historic shading devices
- **Replacing historic multi-paned sash with new thermal sash utilizing false muntins or no muntins**
- Installing interior storm windows that damage the historic window
- Installing inappropriate exterior storm windows
- Replacing operable windows with fixed glass or inoperable sash
- **Using tinted or reflective glazing on character-defining or other conspicuous elevations**



Energy conserving shutters



Interior storm windows



Heavily tinted glass – no muntins – on replacement windows

Learning Objectives

- Discuss historic significance
- Describe historic standards & guidelines for window rehabilitation
- Design a window rehabilitation plan
- **Evaluate window replacement options**

A'18 AIA Conference on Architecture 2018
June 21-23, New York City



Waksman Institute of Microbiology

Rutgers University

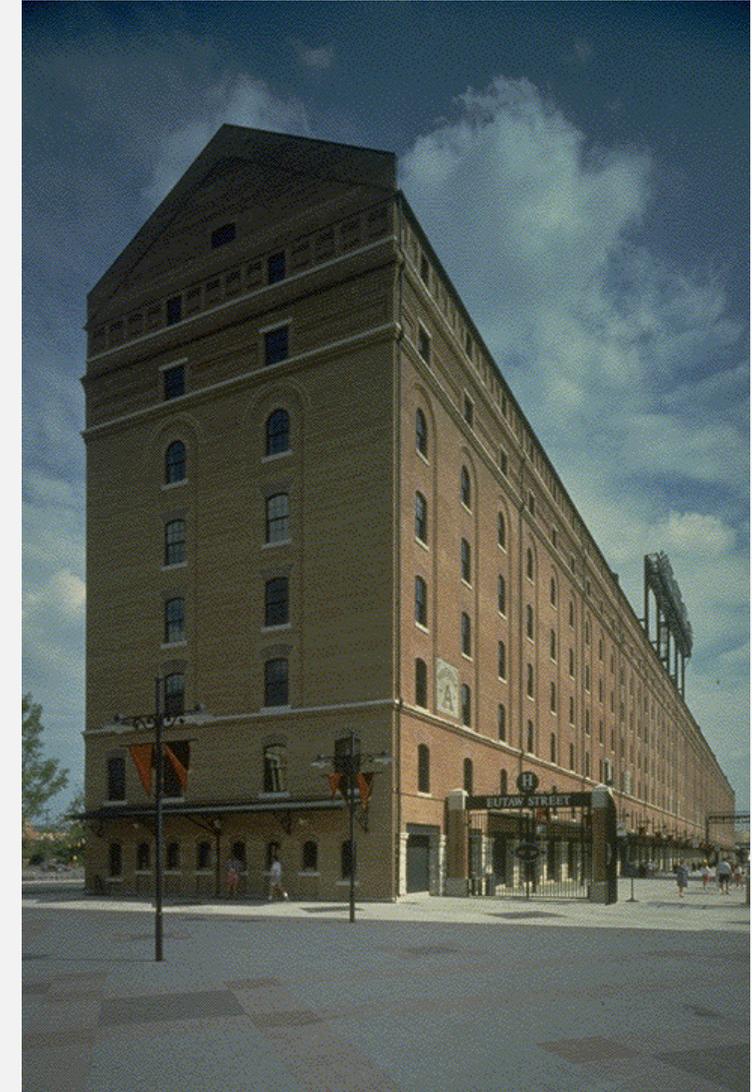
Window Replacement Considerations

- **Pattern/size of openings**
- **Window materials & types**
- **Window design**
- **Muntin patterns & profiles**
- **Exterior & interior trim**
- Glass type
- Structural performance
- Ease of operation
- Noise control
- Energy efficiency
- Cost
- Code requirements
- Hazard abatement

A'18 AIA Conference on Architecture 2018
June 21-23, New York City



Baltimore Orioles Stadium at Camden Yards



Baltimore, MD

Window Materials & Types

- Match existing?

- Wood, metal
- Double/single-hung, casement, awning, fixed

- New material choices

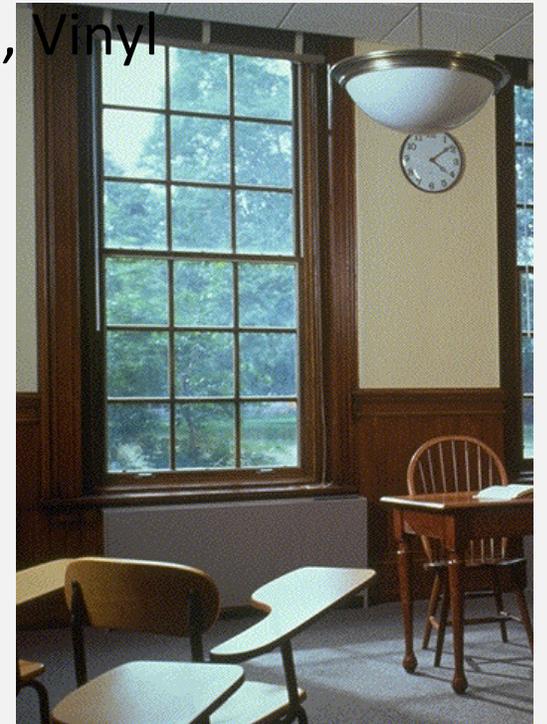
- Wood, Clad wood
- Aluminum
- Fiberglass, Vinyl



Double-hung



Simulated Double-hung



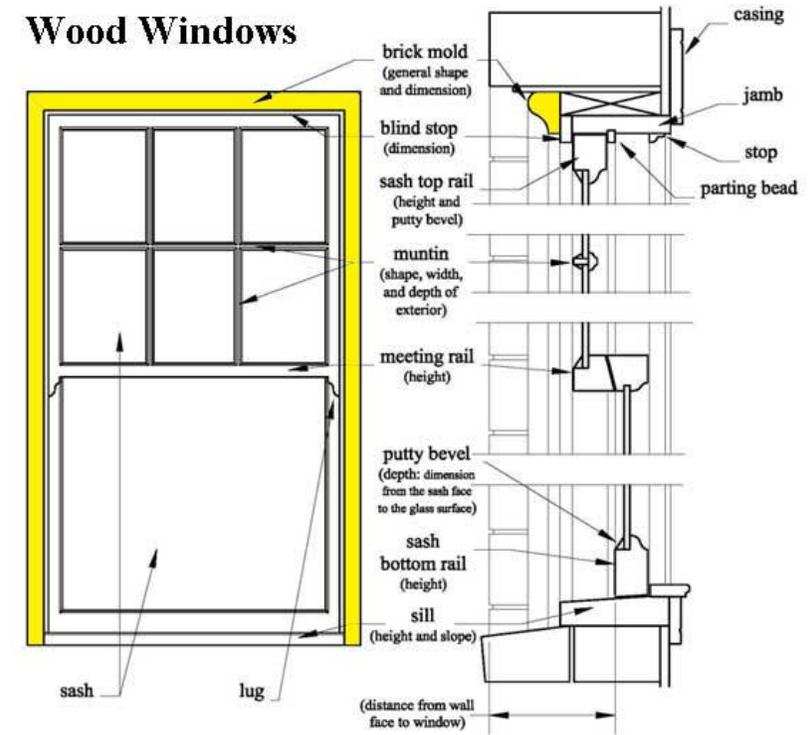
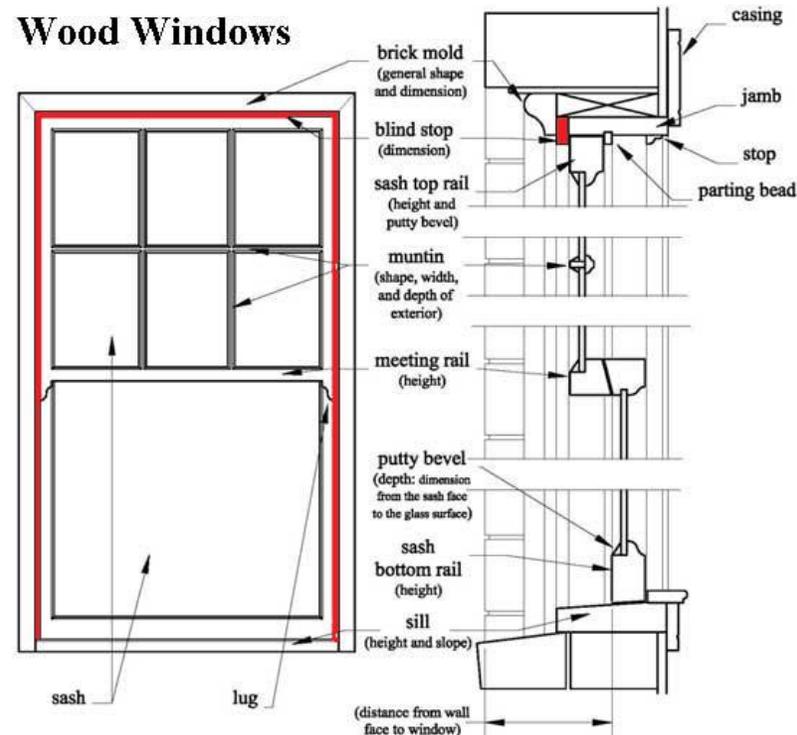
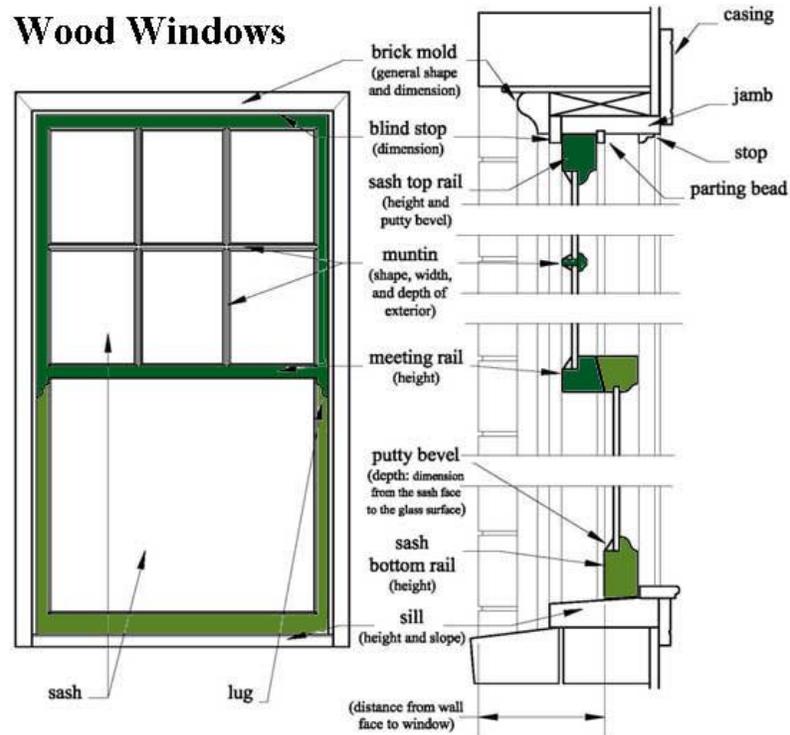
Single-hung

Historic Window Design

1. SASH

2. STOP

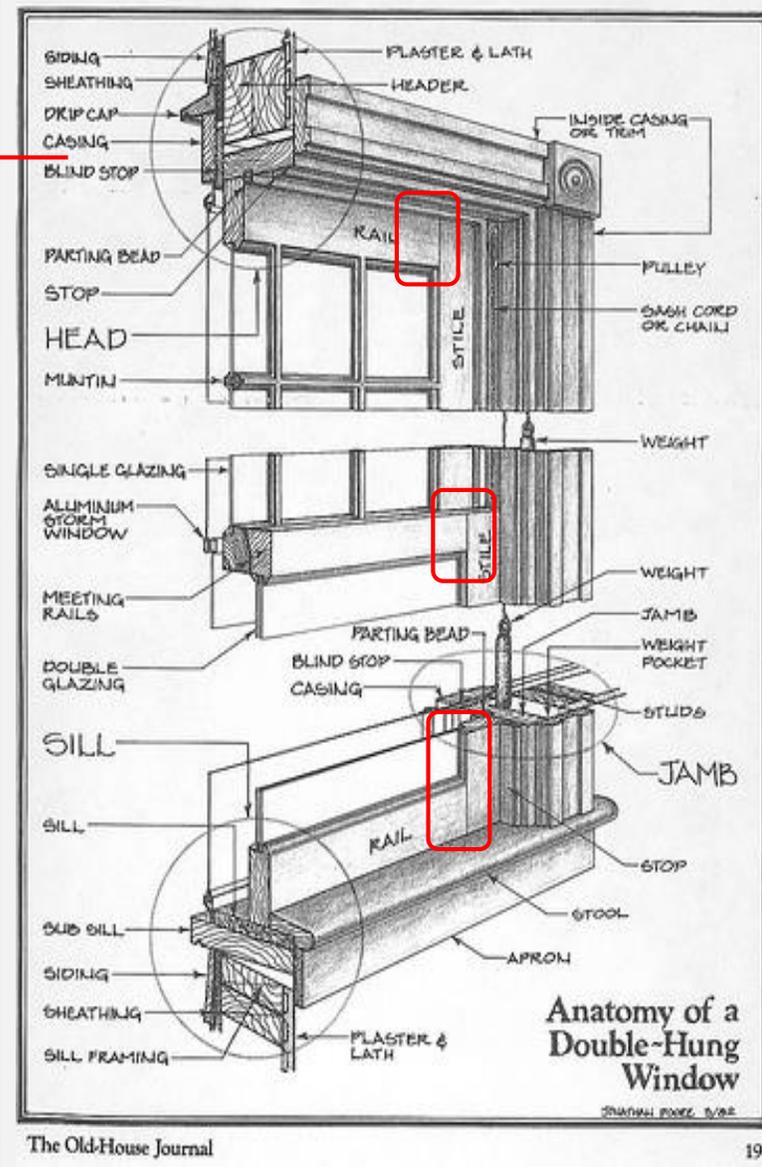
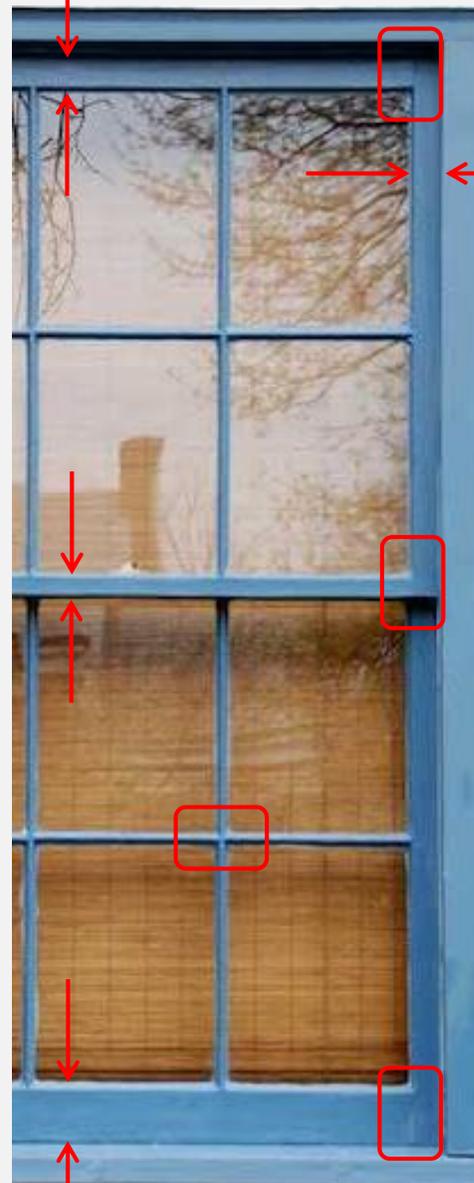
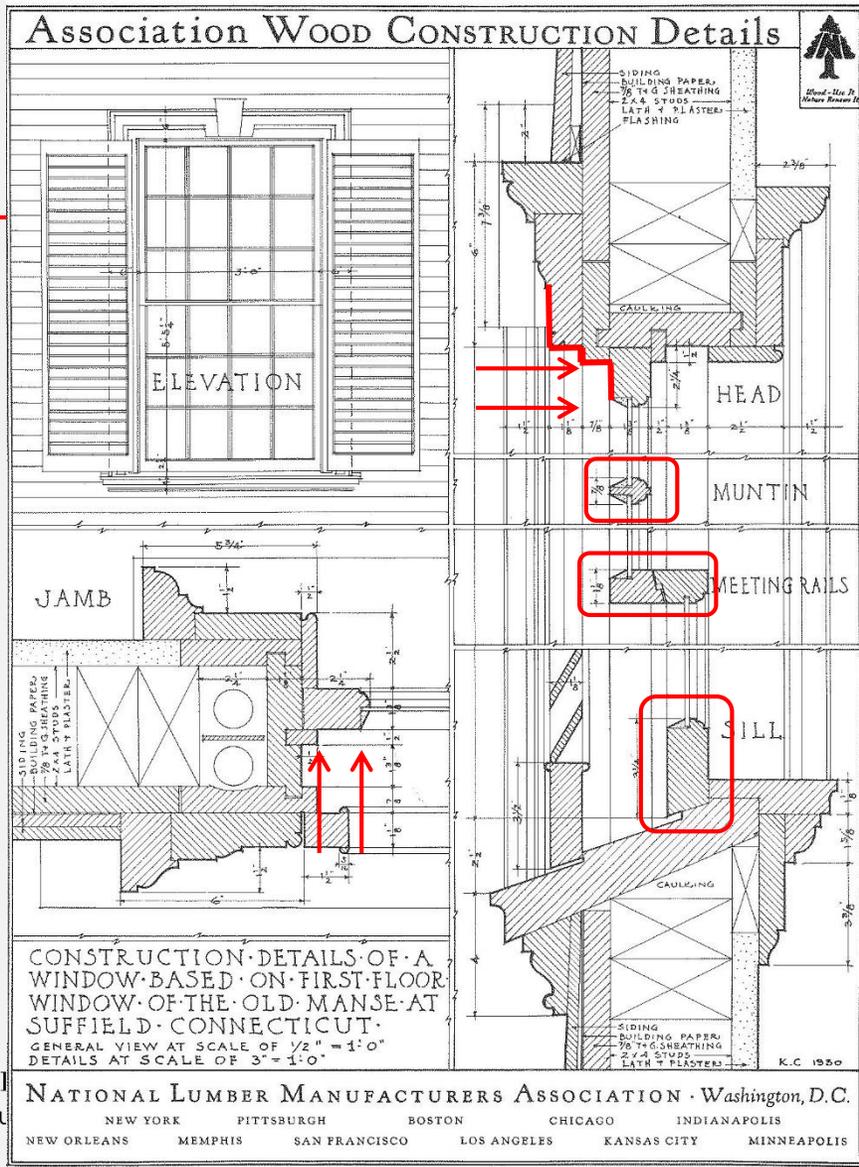
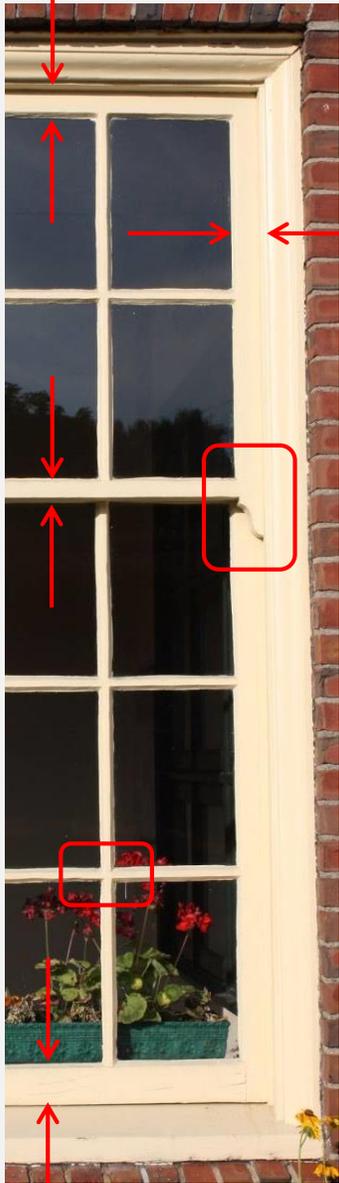
3. MOLD



A'18 AIA Conference on Architecture 2018 June 21-23, New York City

Do all historic windows look like this?

Historic Window Design



New Window Design



Equal Sight Lines



Putty Glazed Profiles



Butt Joinery



Authentic Muntin Depths

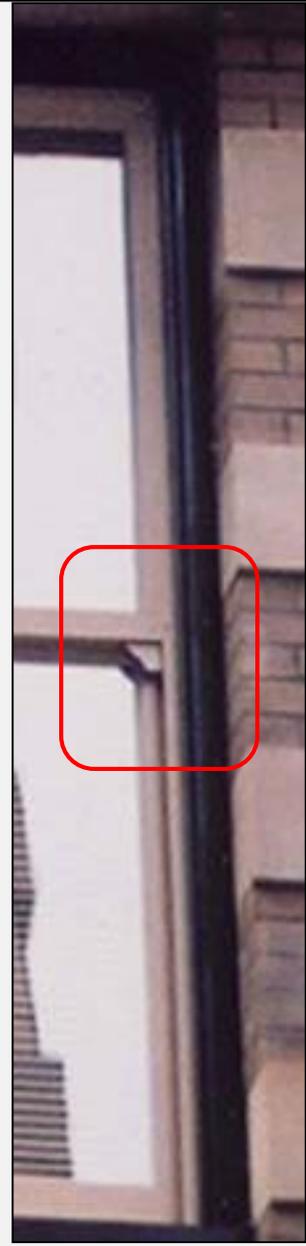
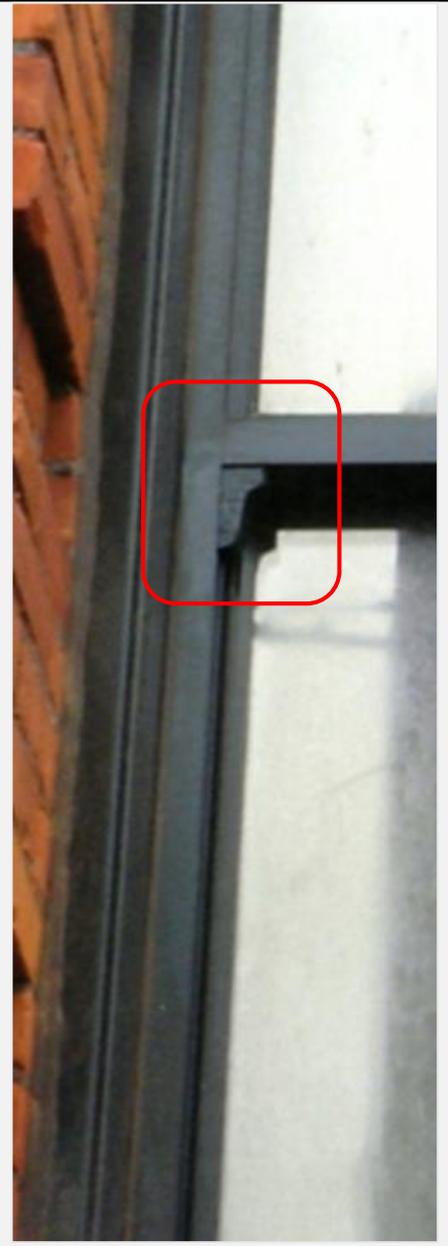


Through Stile Construction

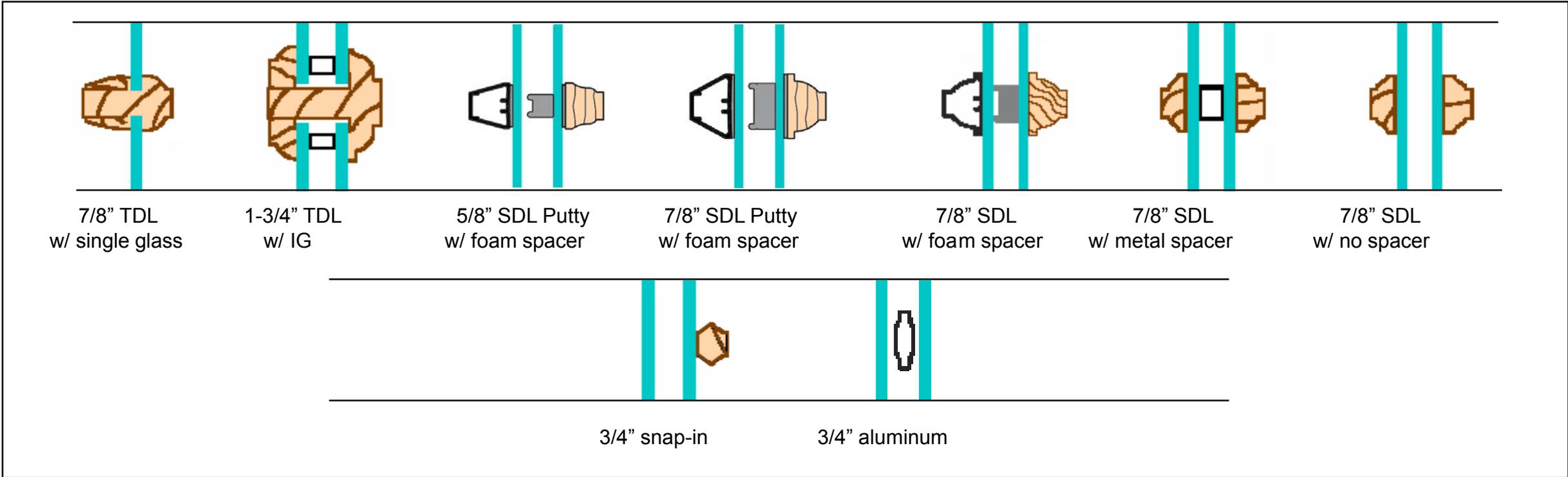
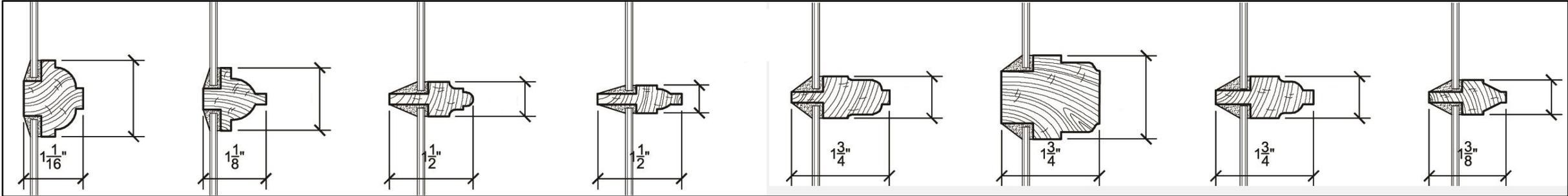


Flush Sash Lugs

Variation in New Window Design



Muntin Bar Profiles

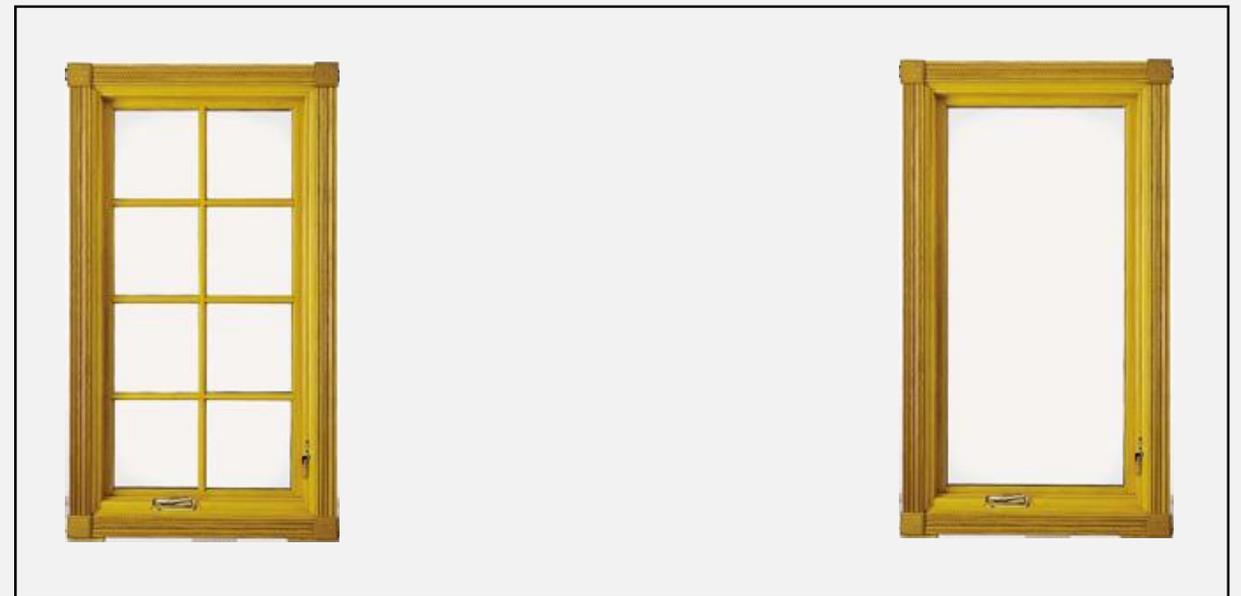
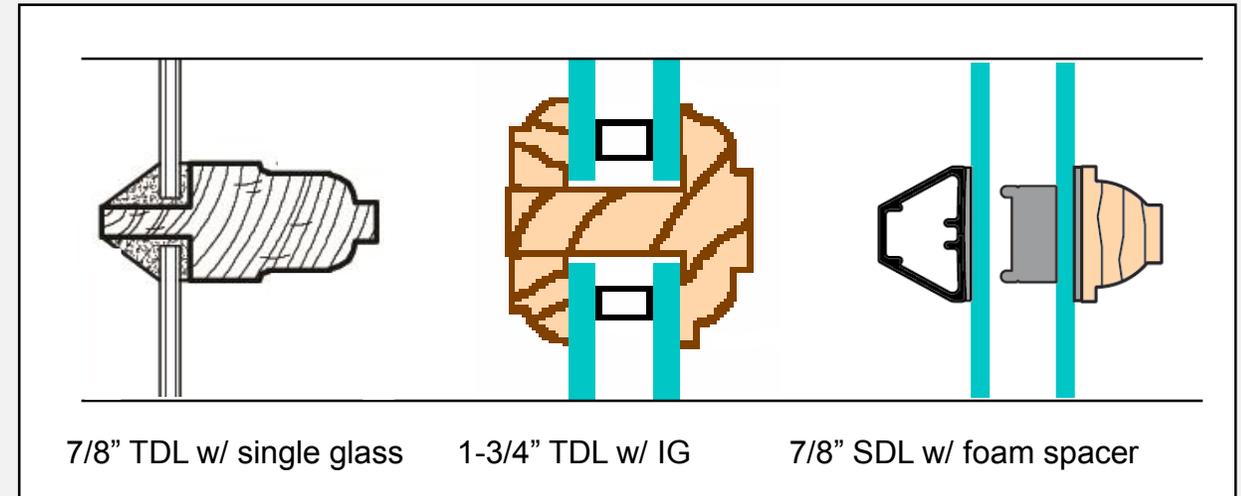


Muntin Bar Details



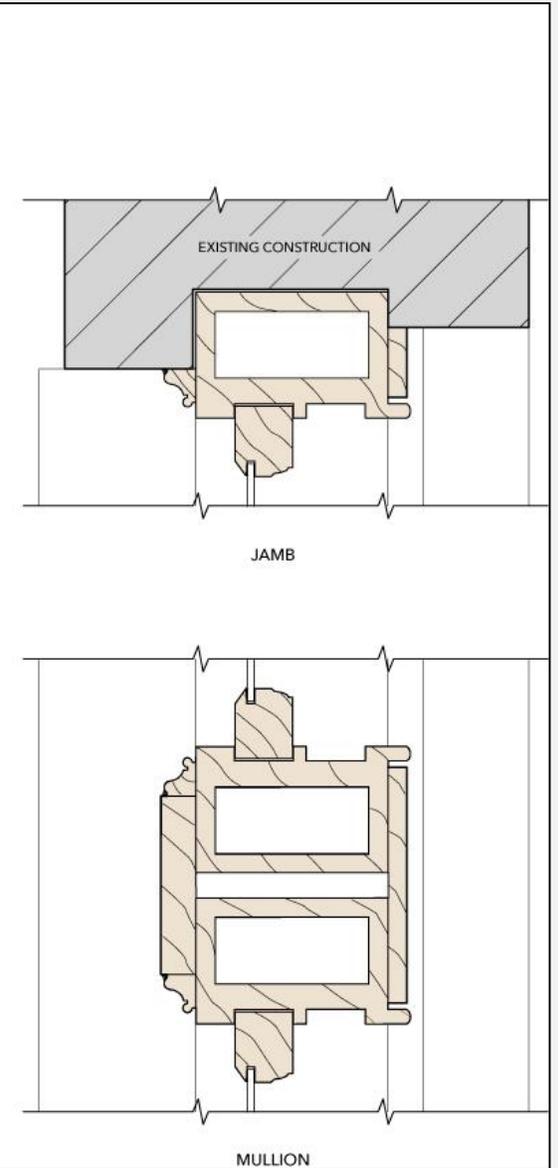
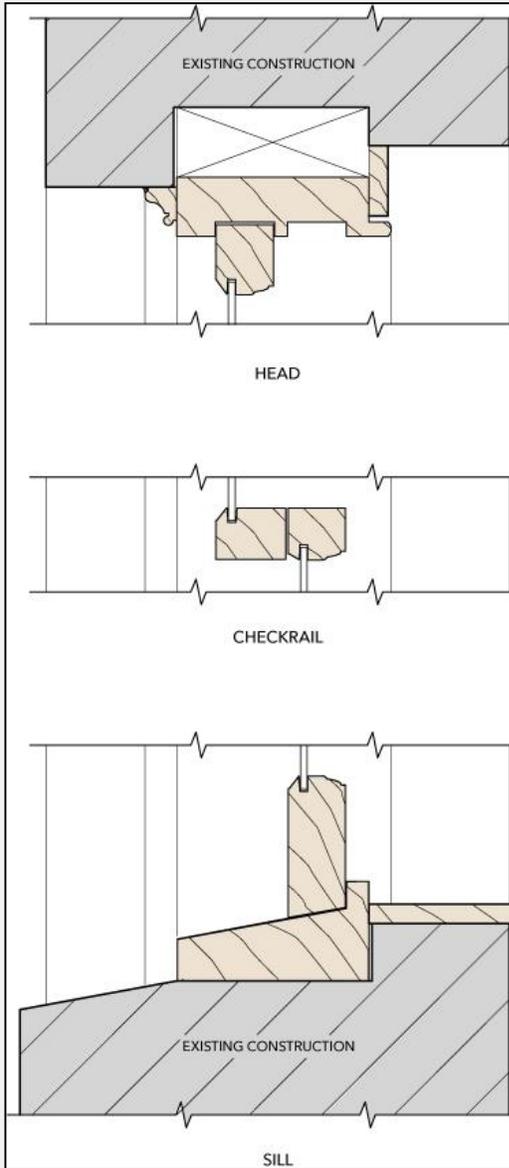
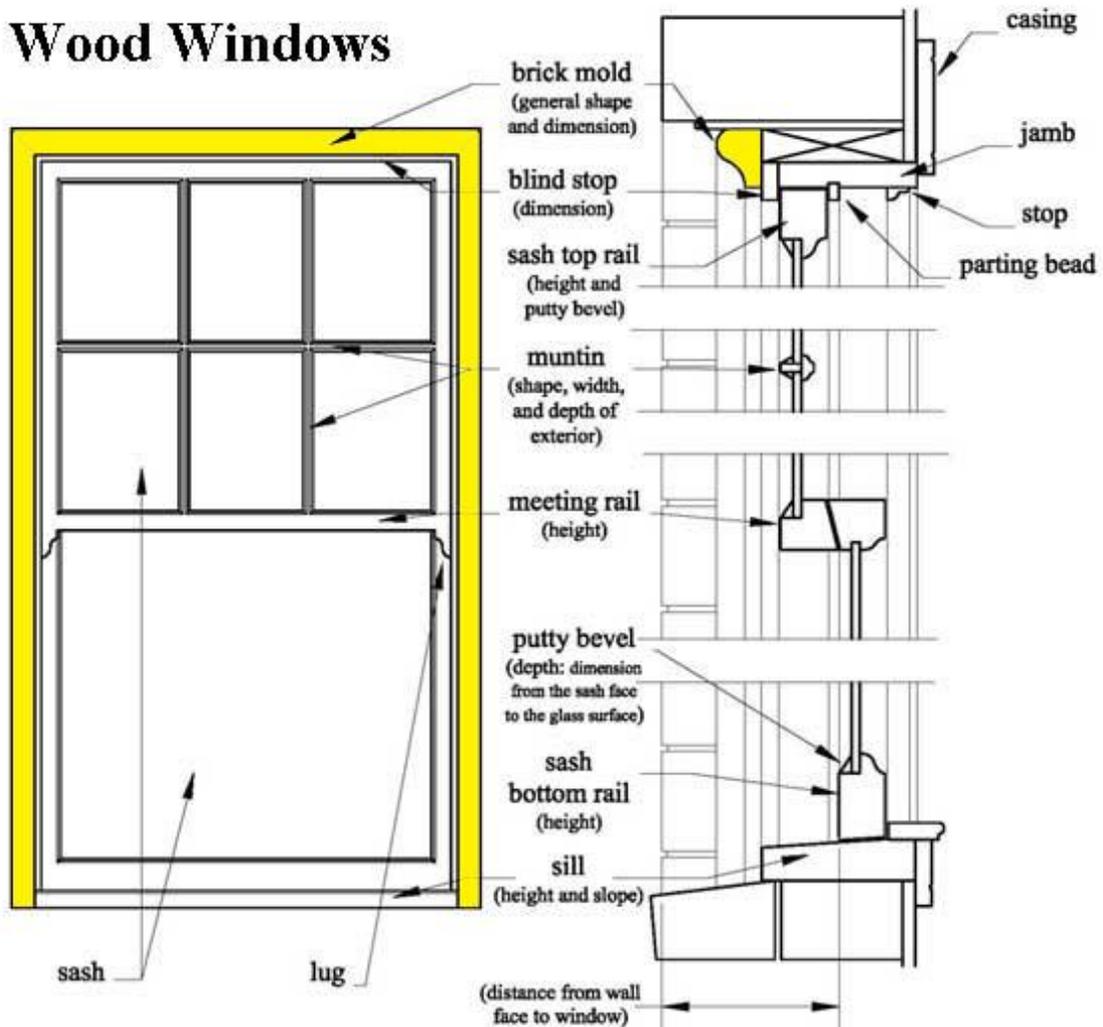
Muntin Bar Comparison

- Better water performance, fewer joints
- Improved structural performance
- Superior thermal performance
- Accepted by National Park Service

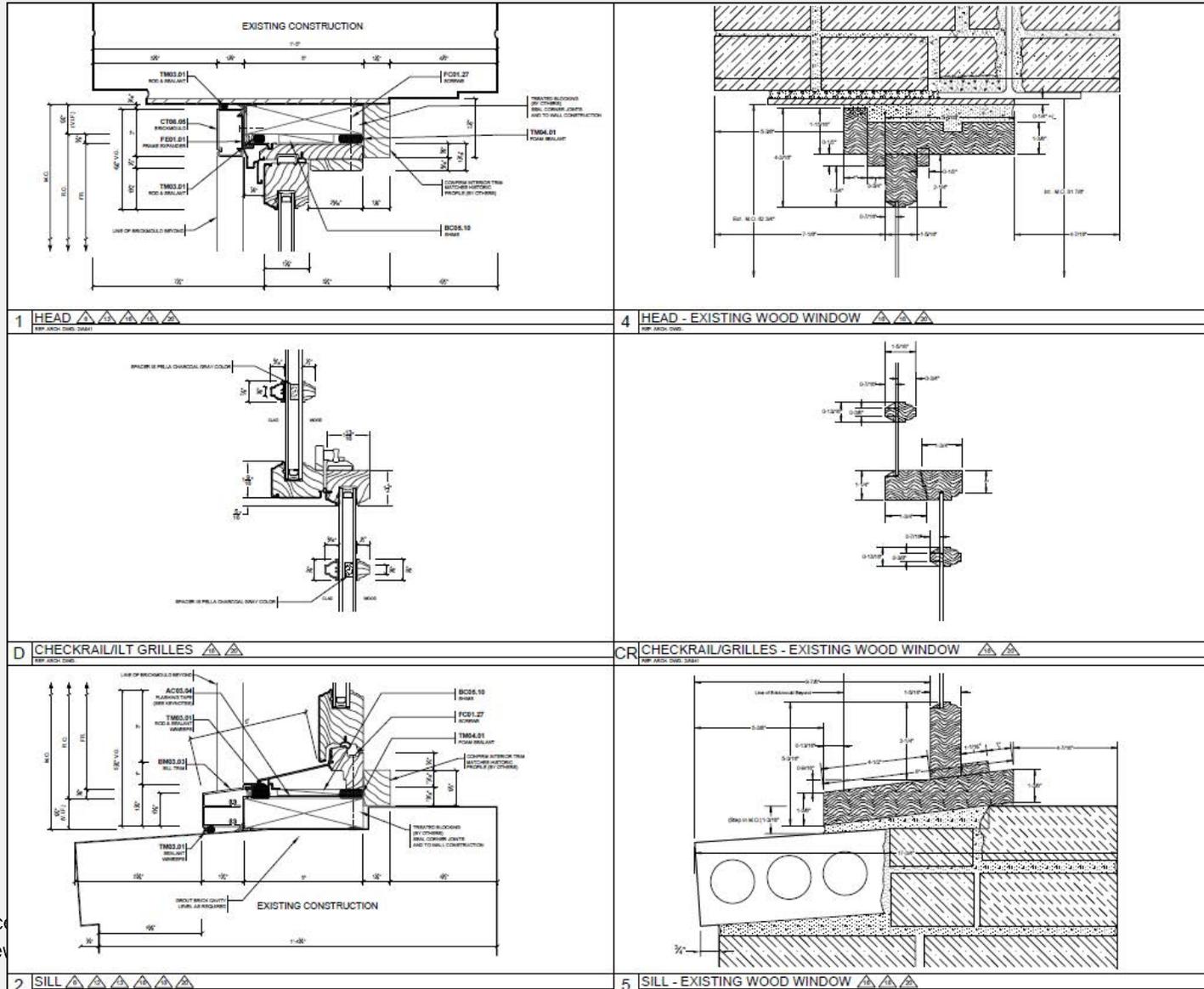


Exterior Trim

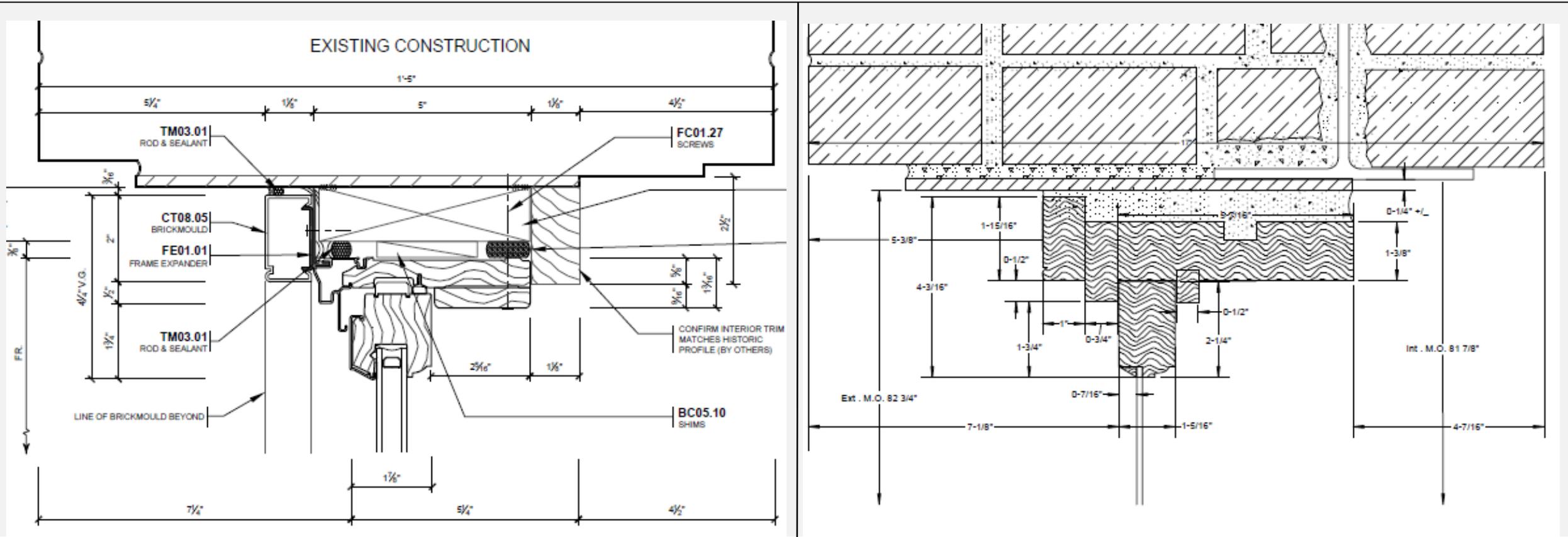
Wood Windows



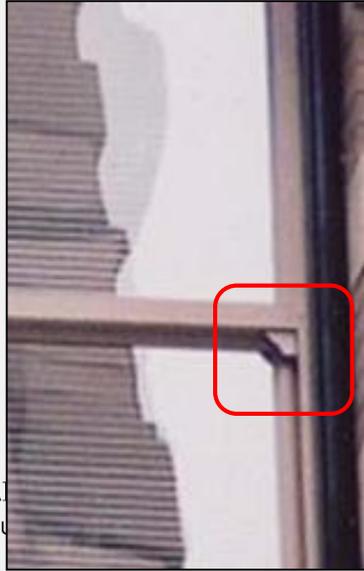
Verifying the Design - Drawings



Verifying the Design - Drawings



What the 2D Drawings don't show us



Verifying the Design – Mock-ups



Mock-up 1

Existing

Mock-up 2

Verifying the Design – Mock-ups



Verifying the Design – Mock-ups



Verifying the Design – Mock-ups



Window Replacement Solutions



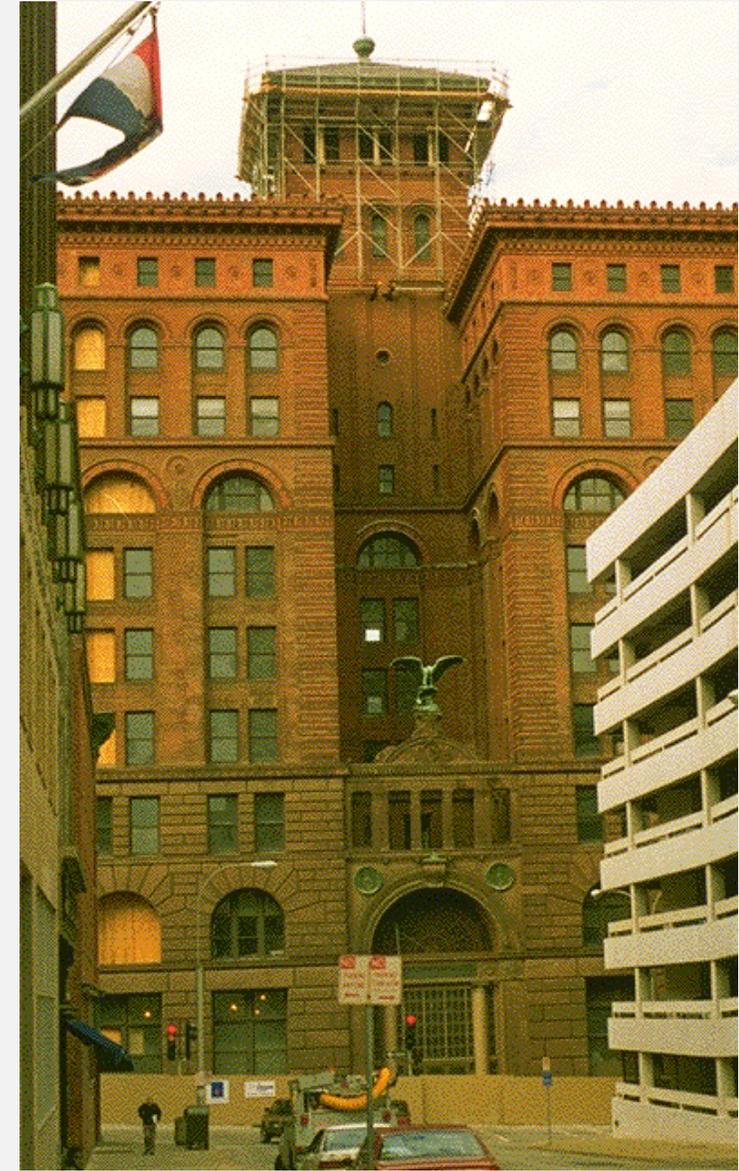
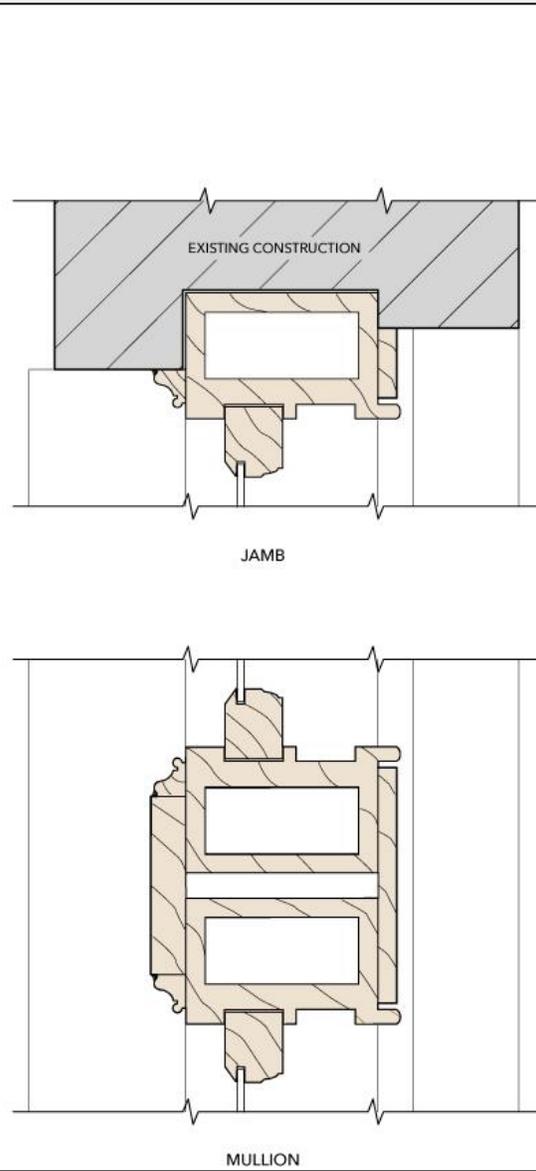
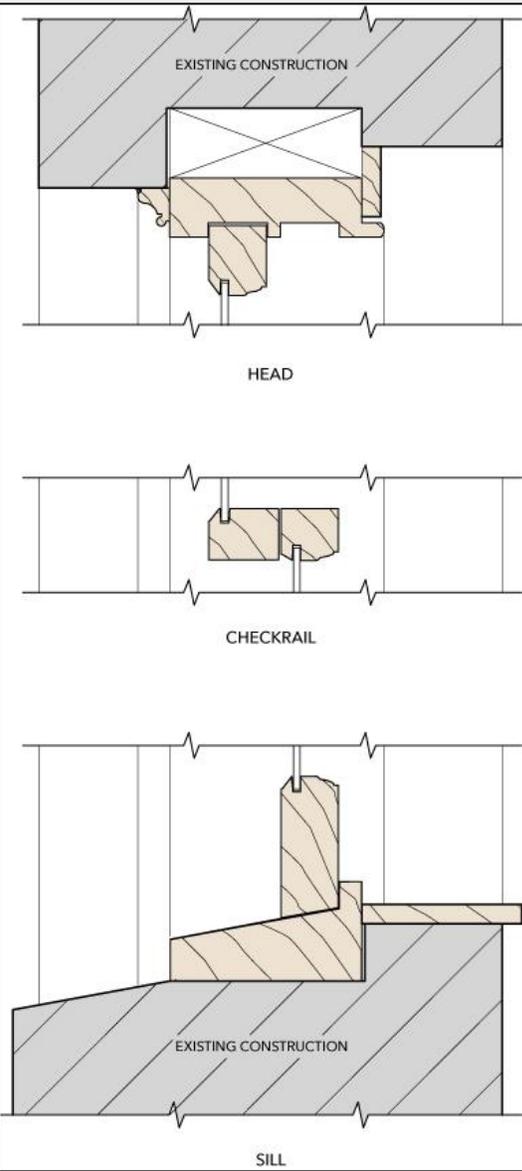
New York Life Building - Kansas City

- National Register of Historic Places
- Certified Historic Structure
- 20% federal tax credit
- Replacement with wood windows

Project Number	7,215
Project	NEW YORK LIFE BUILDING 20 WEST 9TH STREET KANSAS CITY, MO 64105
Part 1: <i>Received:</i> <i>Status:</i>	
Part 2: <i>Received:</i> <i>Status:</i>	
Part 3: <i>Received:</i> <i>Status:</i>	02/20/01 04/30/01 (Approve)

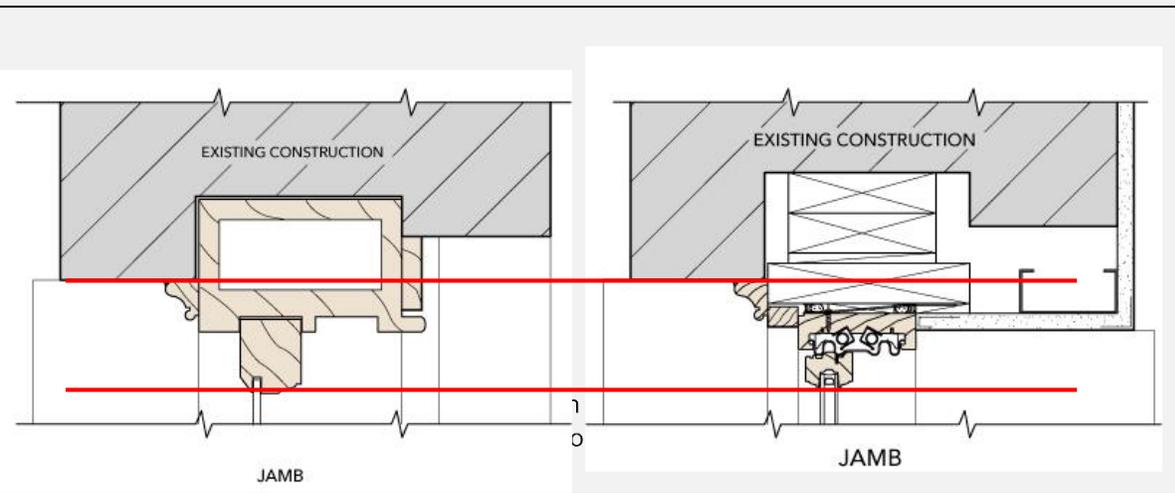
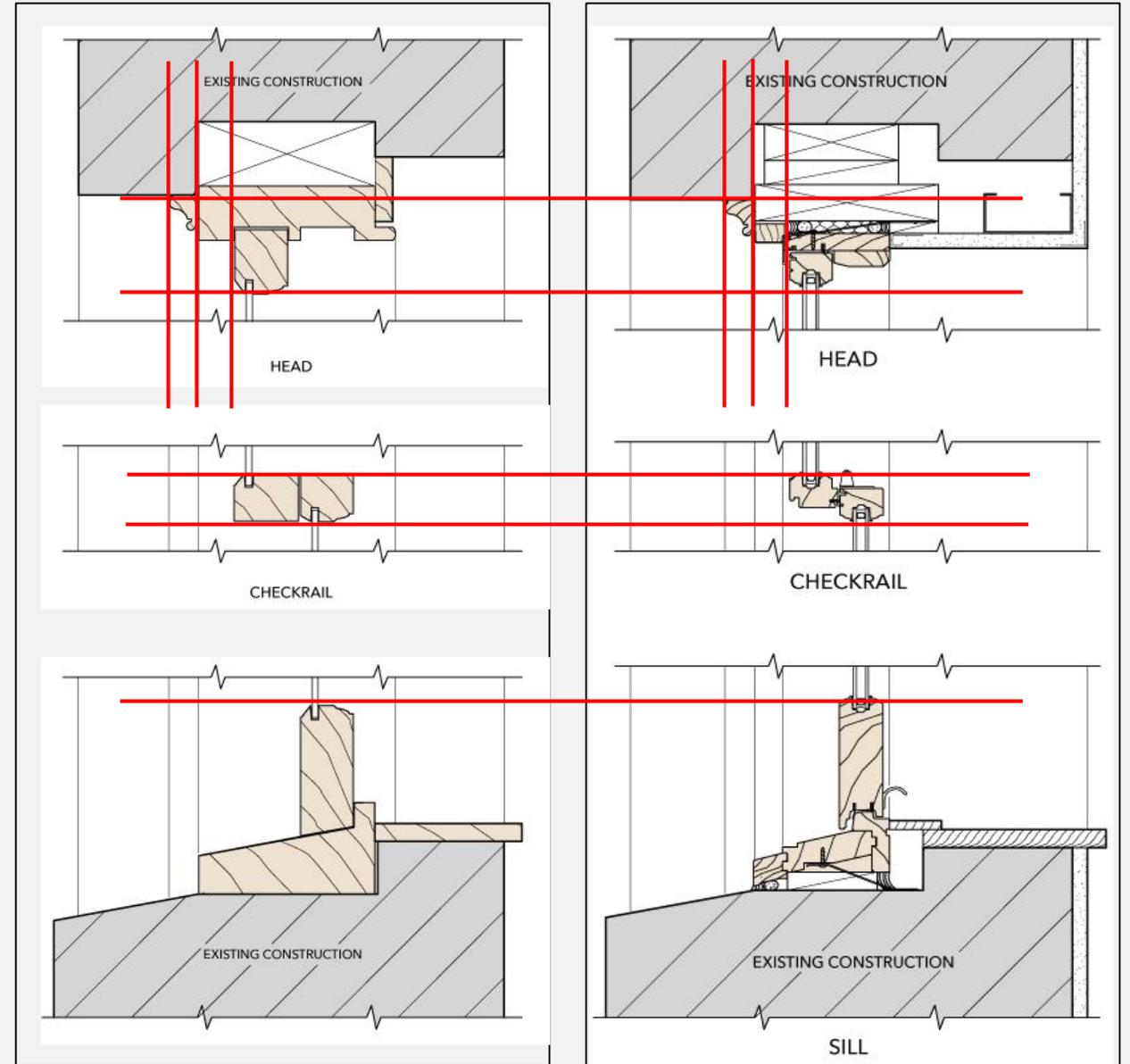


Existing Details



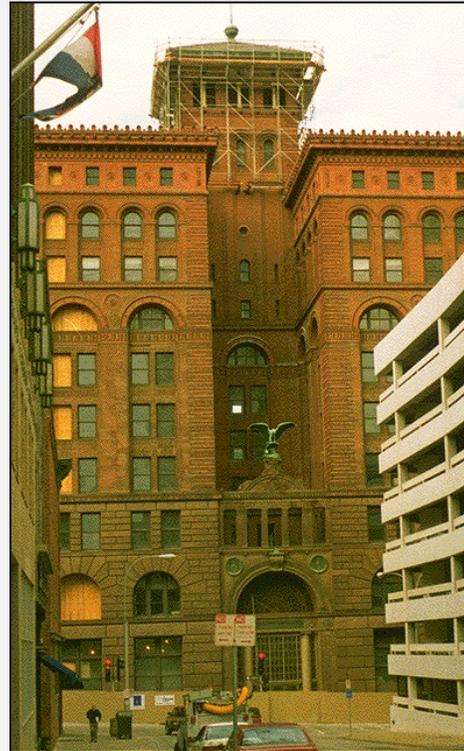
Existing vs. New Details

- Exact match
 - Sightlines
 - Set-backs
 - Brickmould profile
- Acceptable match
 - New product profiles



New York Life Building - Kansas City

- Replace historic wood windows with new wood windows
- Complete tear-out
- Match sightlines but not profiles
- Replace clear single glass with low-E double glazing
- Owner emphasis on energy efficiency & sustainability



Main Building – University of Notre Dame

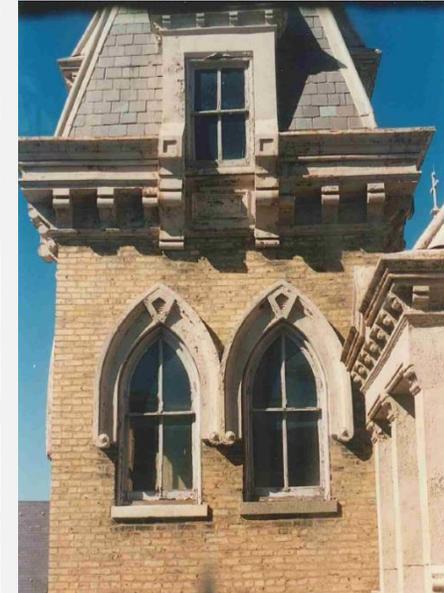
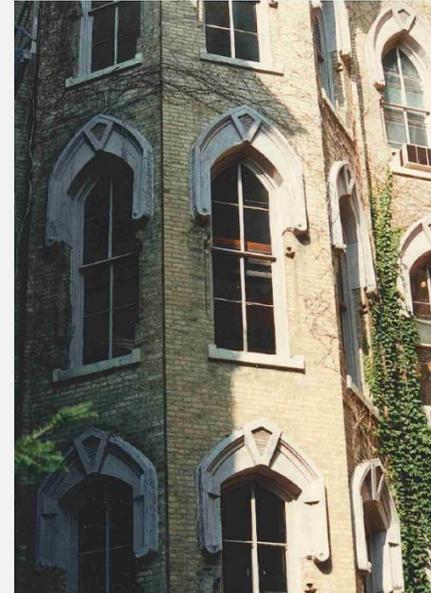
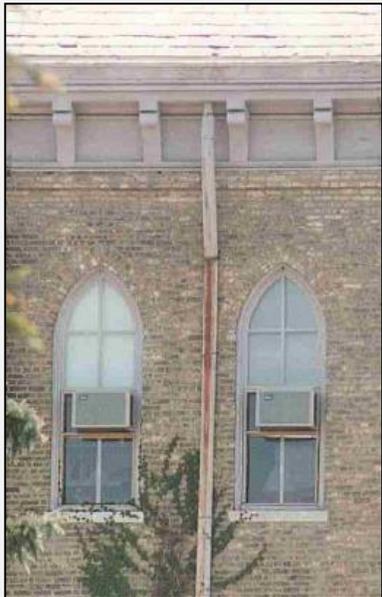
- National Register of Historic Places
- Certified Historic Structure
- Didn't pursue 20% federal tax credit
- Clad wood window replacement

Index By State County				
National Register Information System				
No filter				
State: IN				
County: St. Joseph				
Row	Resource Name	Address	City	Listed
81	Tower Building	216 W. Washington	South Bend	1985-06-05
82	University of Notre Dame: Main and South Quadrangles	Off I-80/90	Notre Dame	1978-05-23
83	Walker Field Shelterhouse	1305 Ewing Ave.	South Bend	2006-09-27
84	Water Street/Darden Road Bridge	Over St. Joseph River at Darden Rd.	South Bend	1985-03-21
85	Wenger, Martin, Farmhouse	701 E. Pennsylvania	South Bend	2000-06-22
86	Wertz--Bestle Farm	51387 Portage Rd.	South Bend	2001-04-12
87	West Washington Historic District	Irregular pattern roughly bounded by Main St., Western Ave., W. LaSalle Ave., and McPherson St.	South Bend	1975-01-17



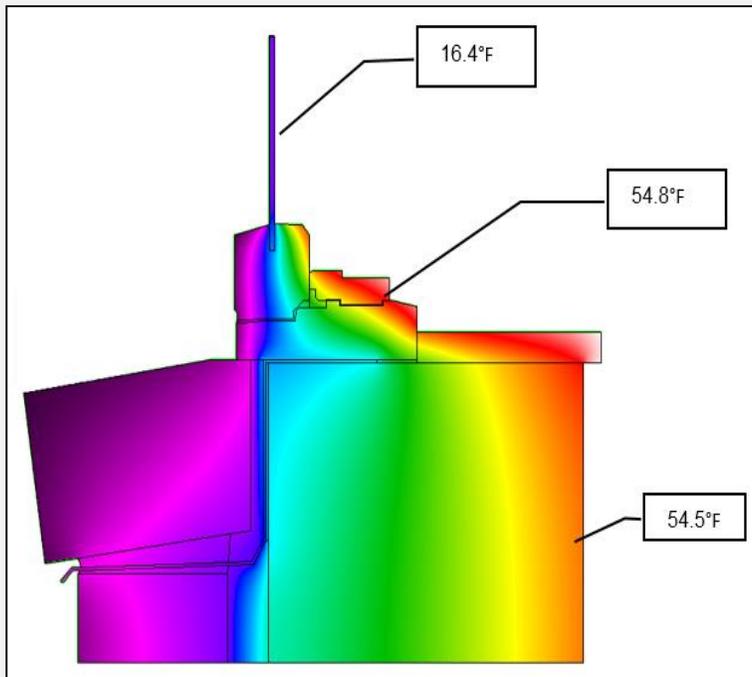
Existing Windows – Floors 1-5

- Wood, Single-glazed
- Double-hung (4' w x 11' h)
- Curve-top exteriors & rectangle-top interiors
- Flat arch-tops to gothic-tops
- 100+ different radii
- Some window air conditioners

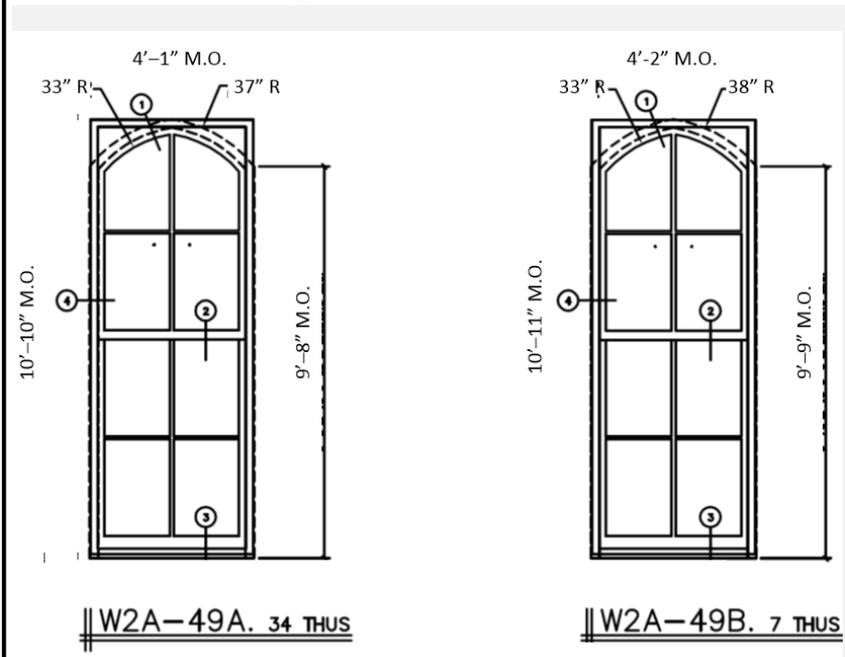
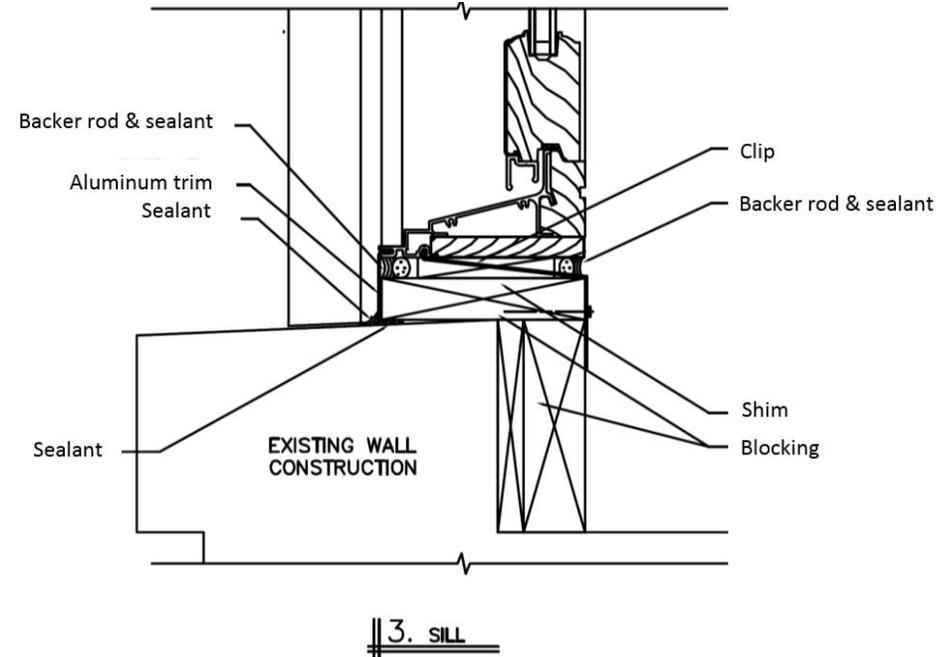
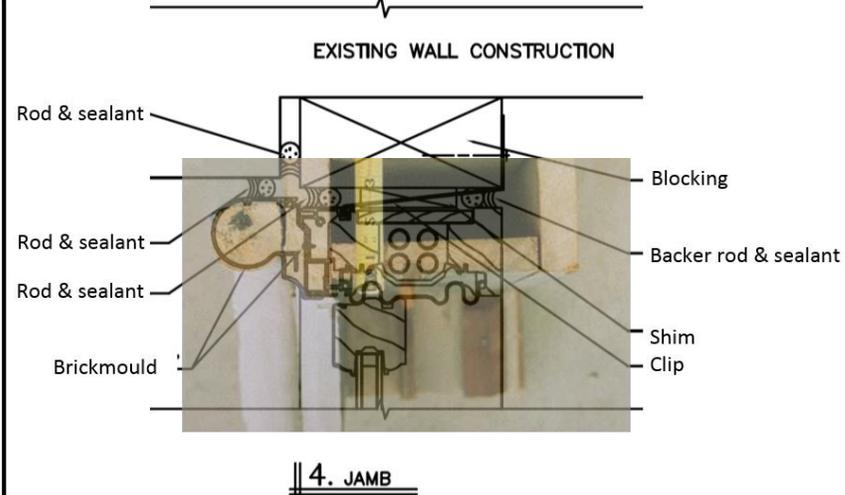
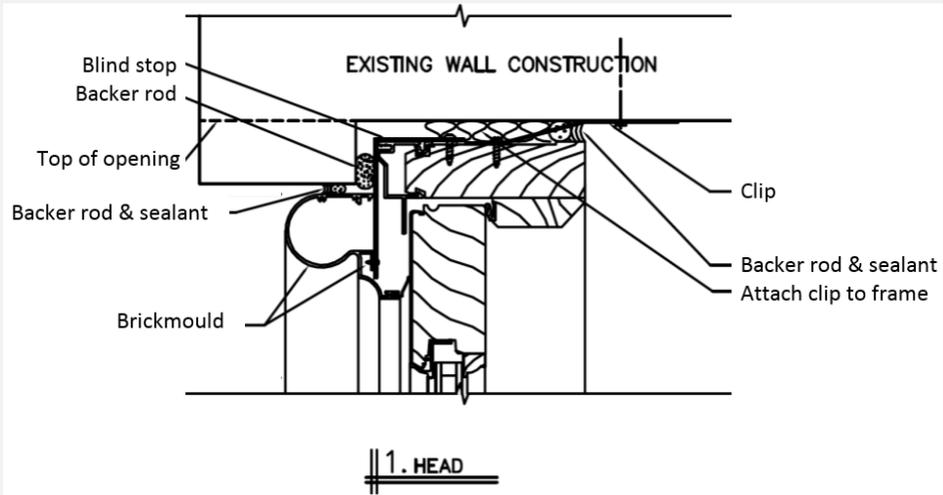


Existing Windows – Floors 1-5

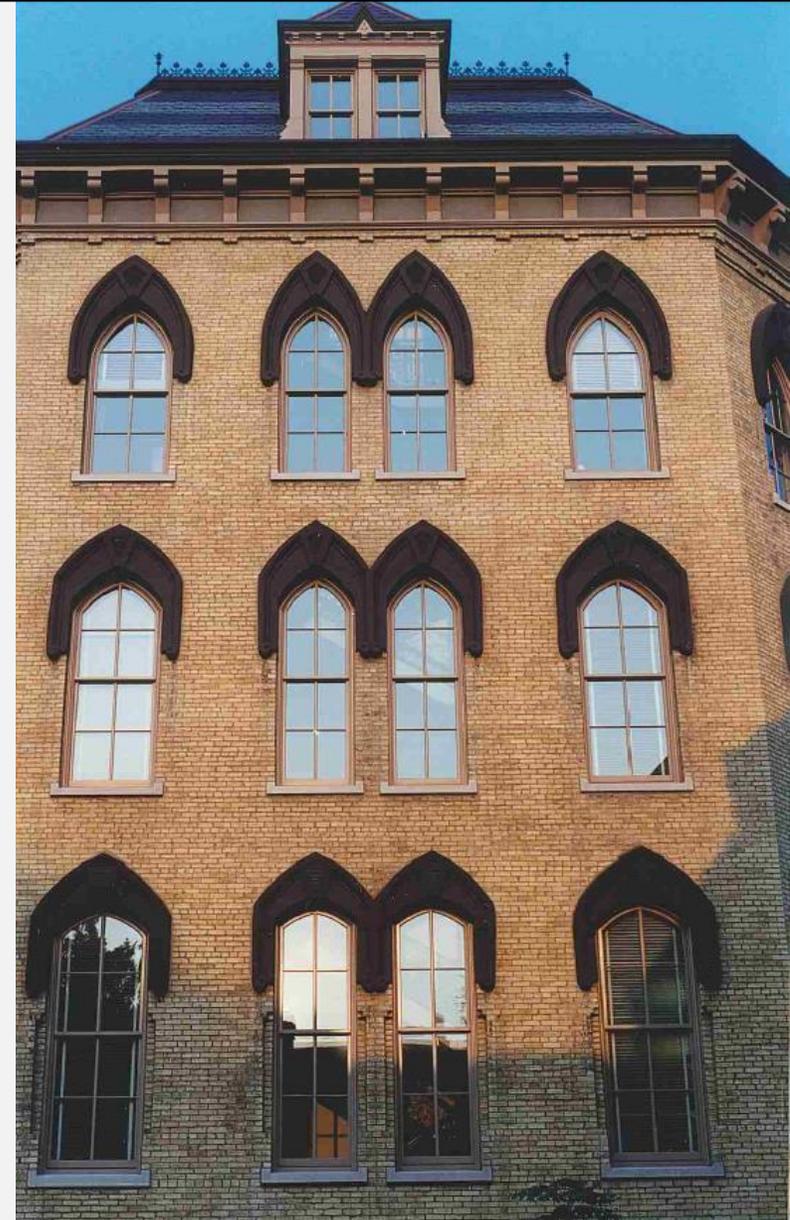
- Divided lights, some failures, inconsistent widths
- Varying levels of deterioration
- Air & water leakage
- Condensation/Frost



Existing vs. New Details



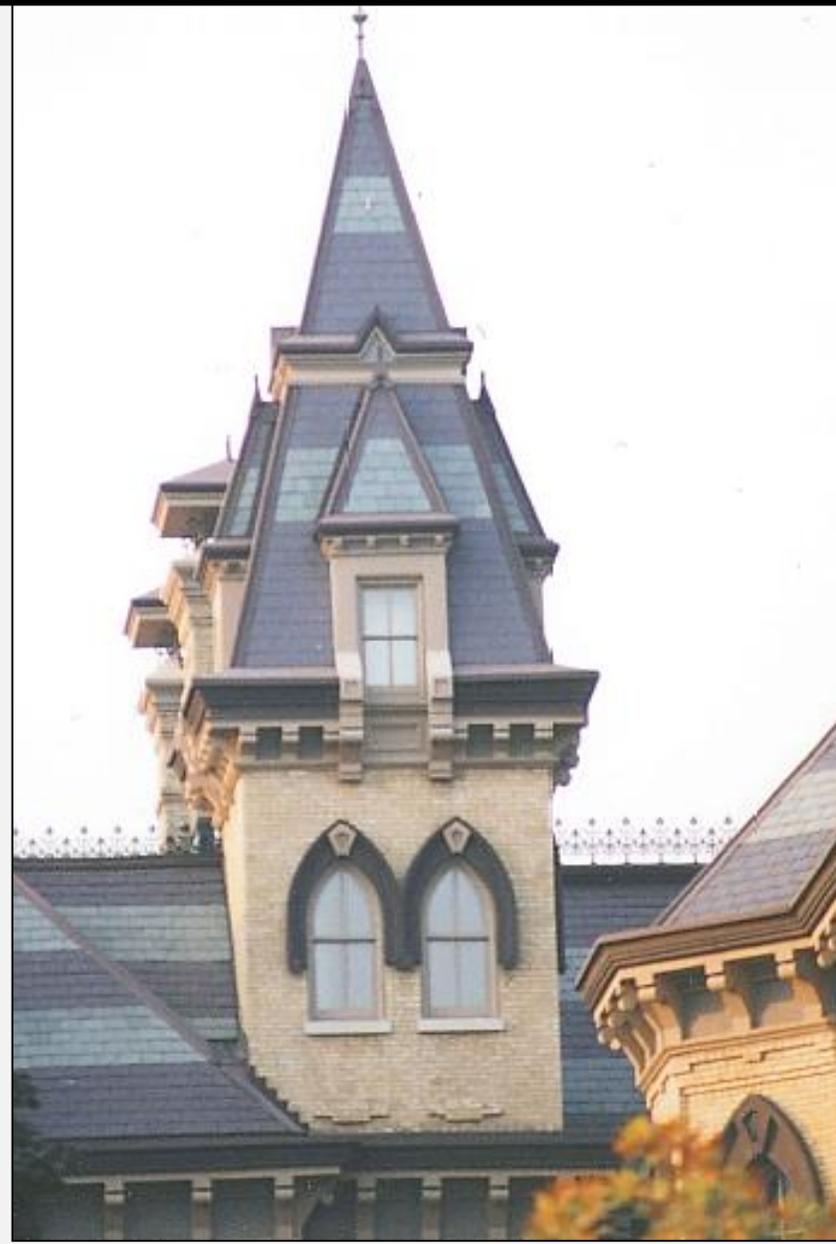
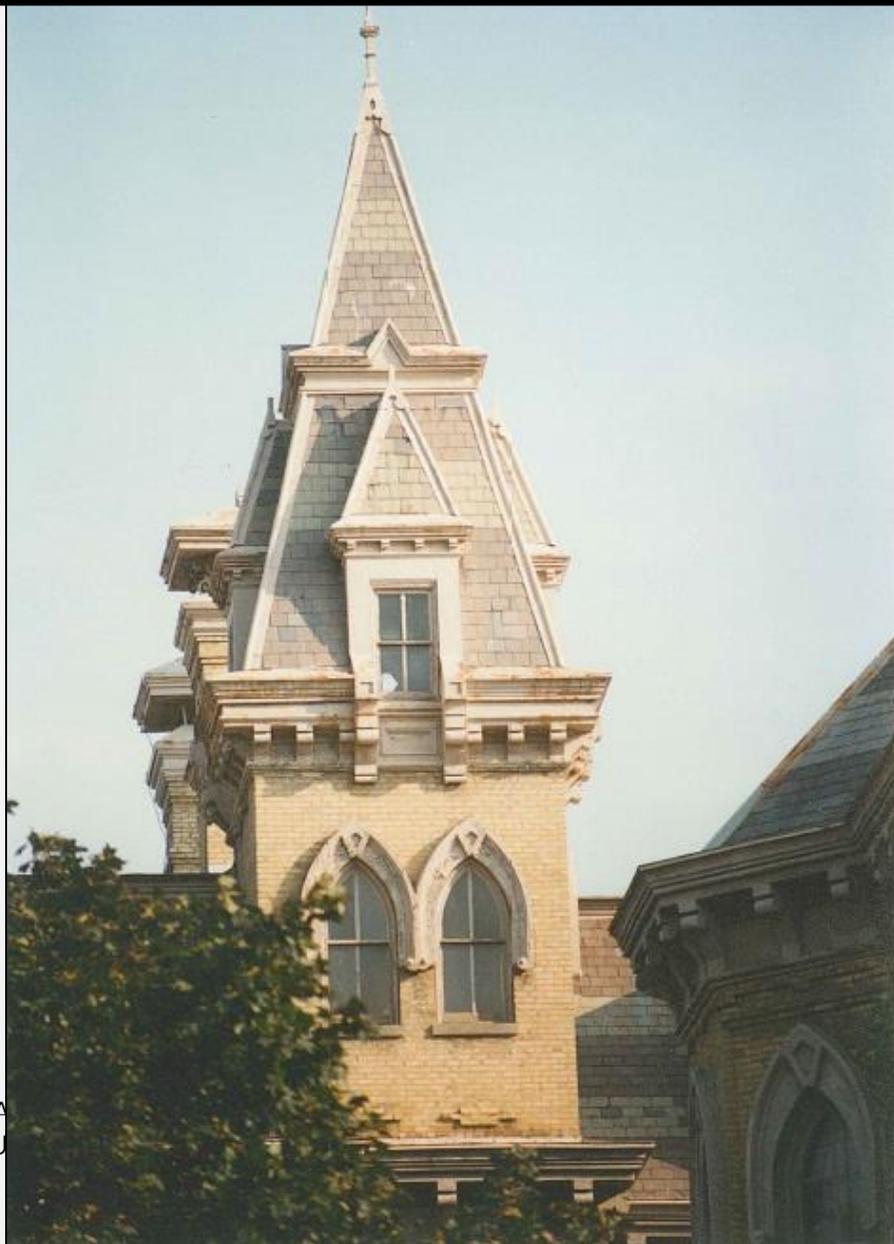
Before & After



Before & After



Before & After



A'18

Holden Block - Chicago

- National Register of Historic Places
- Certified Historic Structure
- 20% federal tax credit
- Chicago landmark & local tax credits
- Aluminum-clad wood windows, storefront, & entrances
- Existing windows were gone

Project Number	27,604
Project	Holden Block 1027 West Madison Street Chicago, IL 60607
Part 1:	
<i>Received:</i>	07/13/12
<i>Status:</i>	10/15/12 (Approve)
Part 2:	
<i>Received:</i>	10/16/12
<i>Fee(1) Received:</i>	
<i>Fee(2) Received:</i>	10/24/12
<i>Status:</i>	11/21/12 (Conditional Approval)
Part 3:	
<i>Received:</i>	
<i>Fee(1) Received:</i>	
<i>Fee(2) Received:</i>	
<i>Status:</i>	

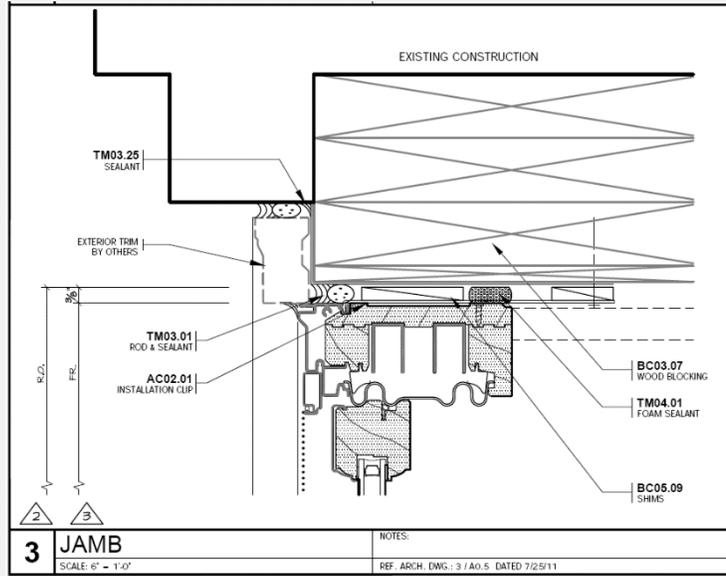


Before

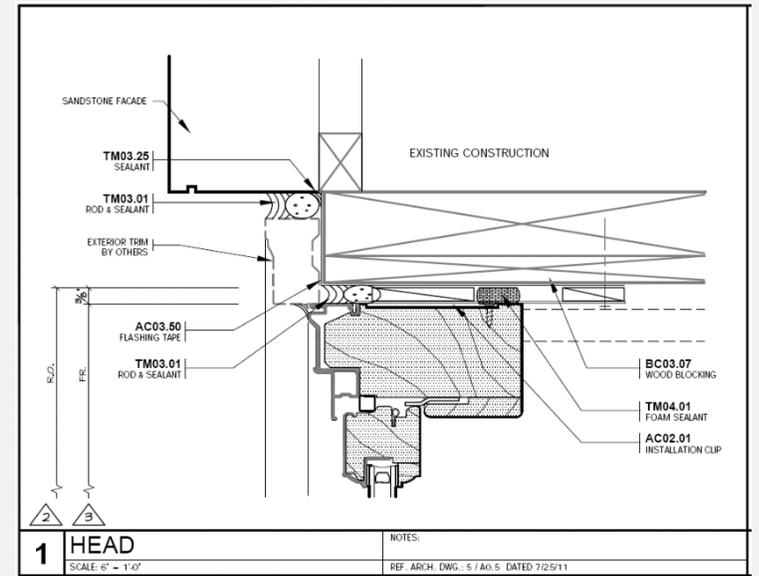


After

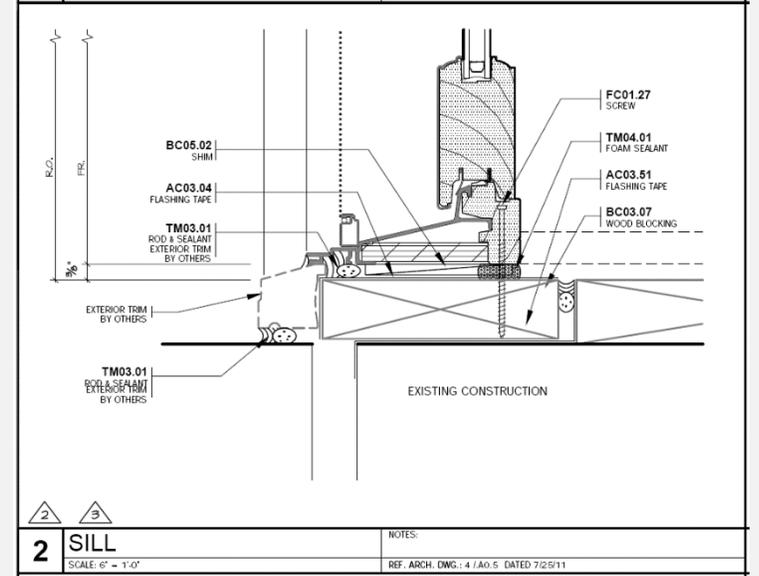
Window Details - Aluminum-clad Wood



Before

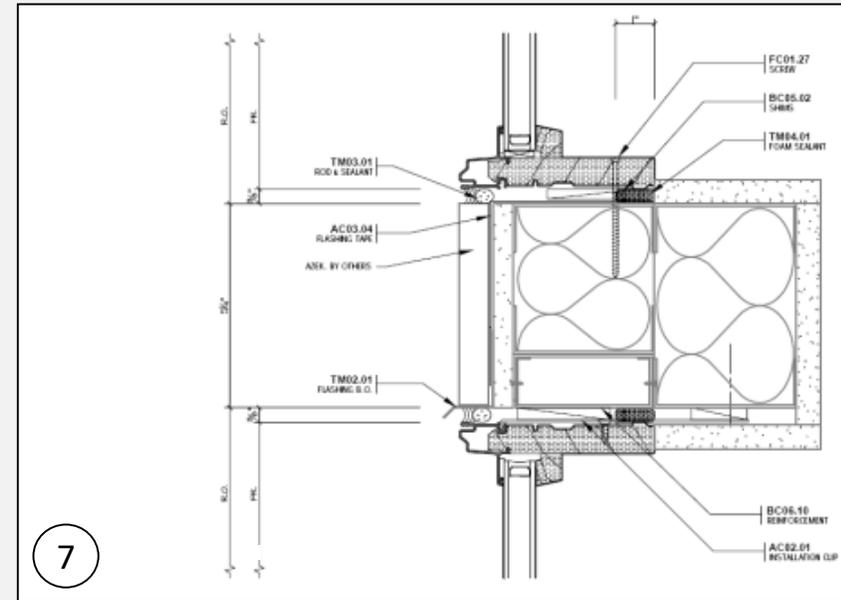
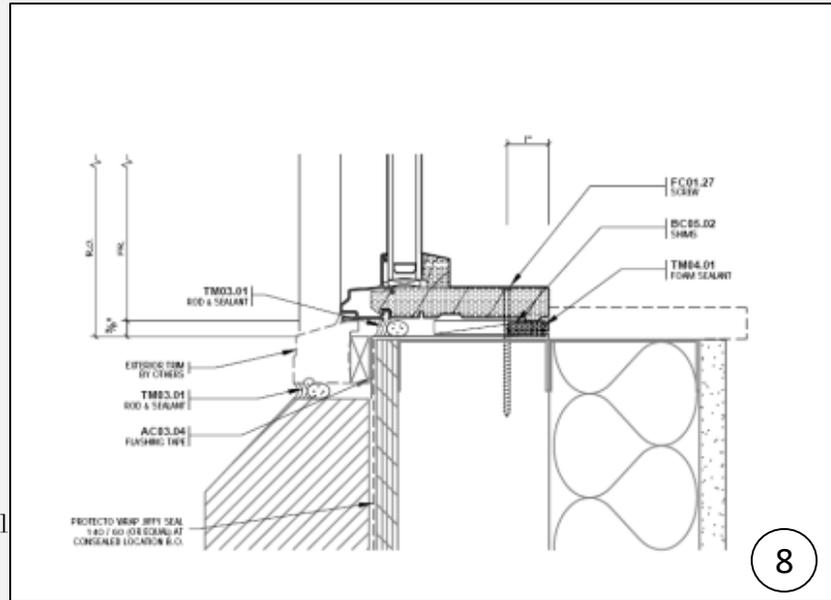
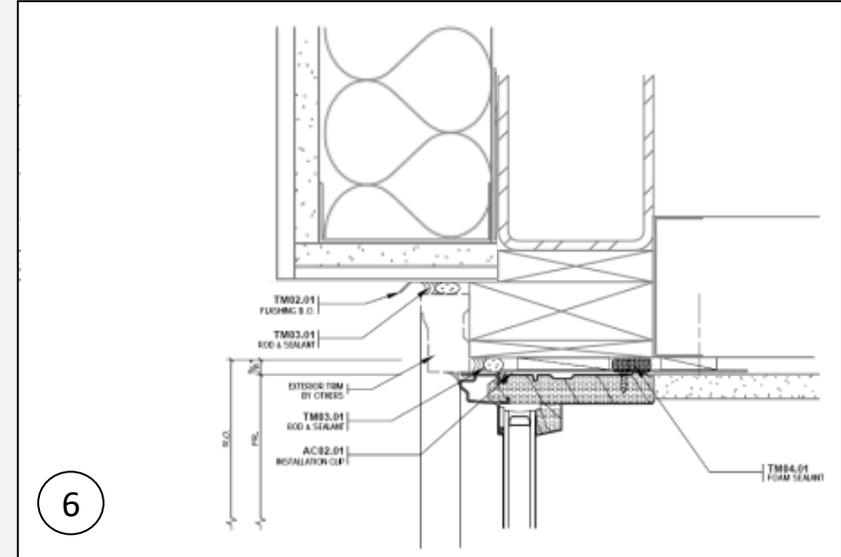
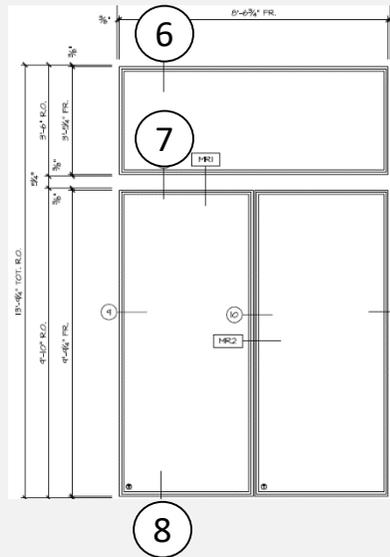


After

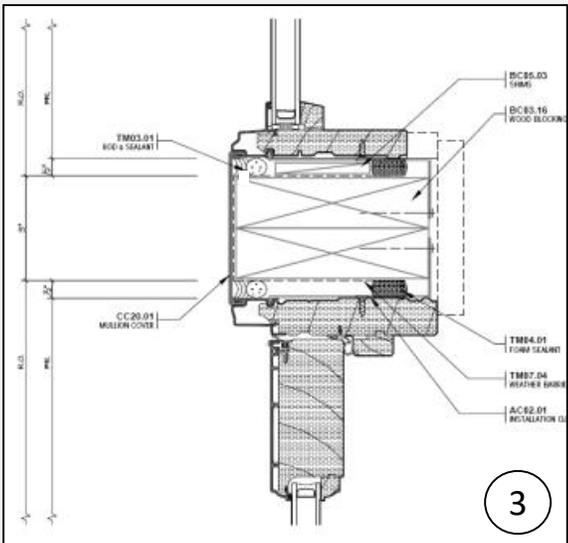
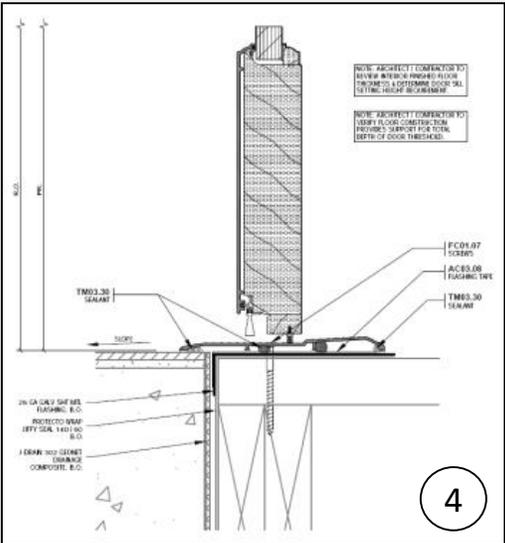
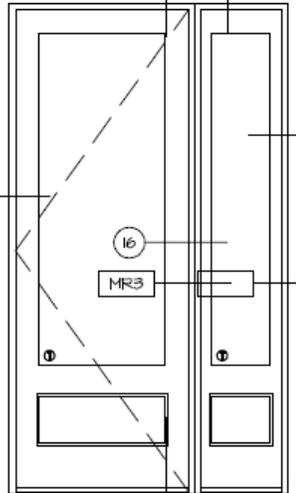
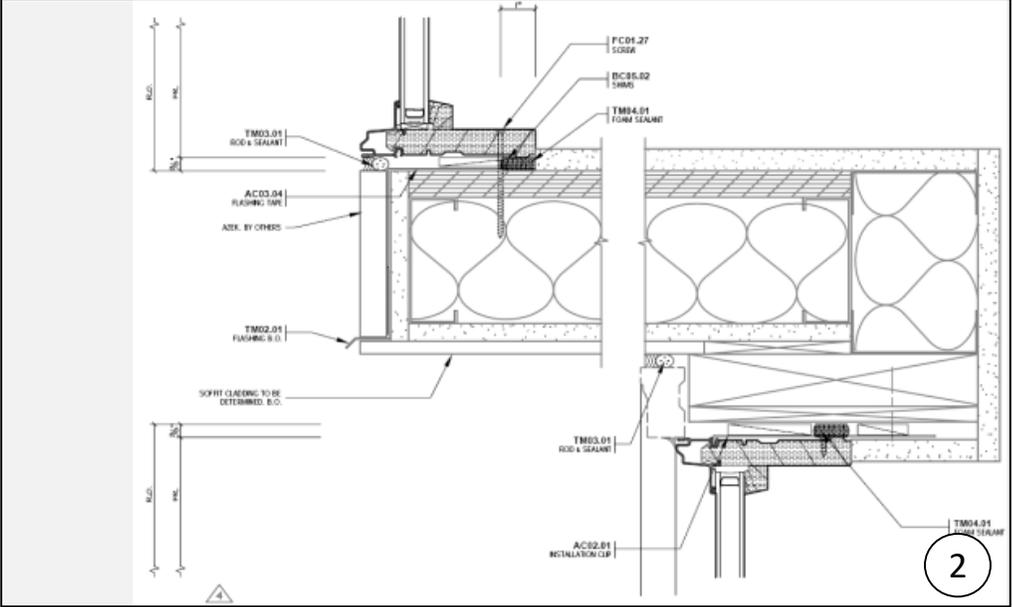
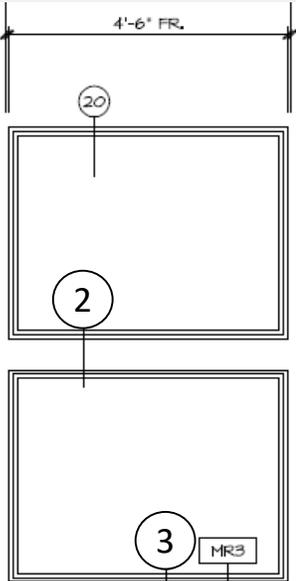


nce
New

Storefront Details - Windows



Storefront Details - Entrance



Review Learning Objectives

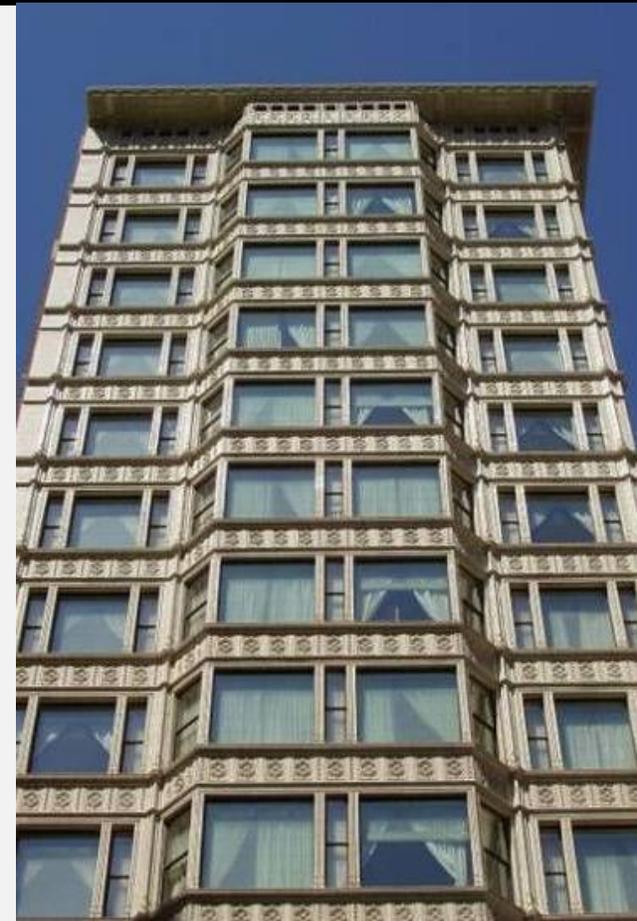
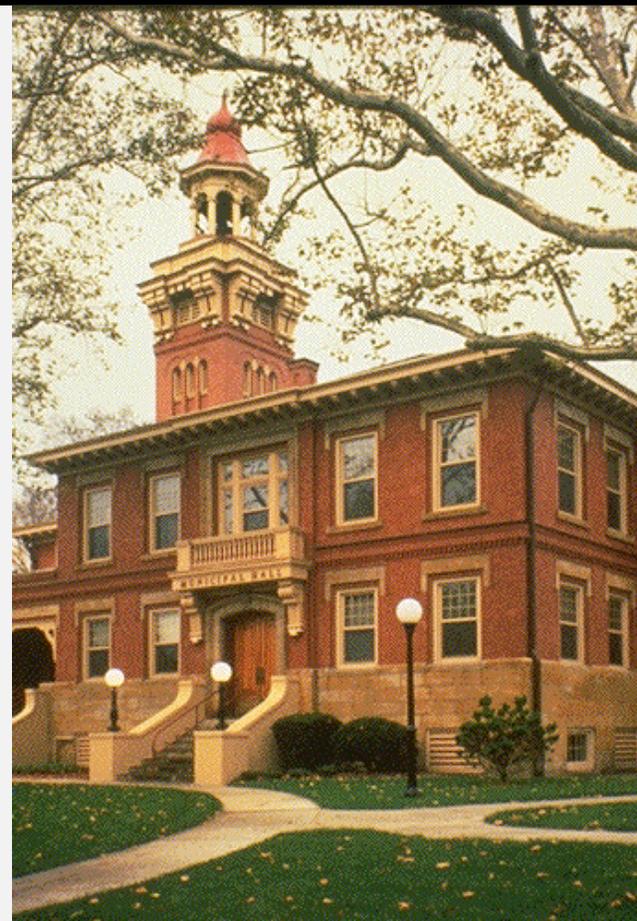
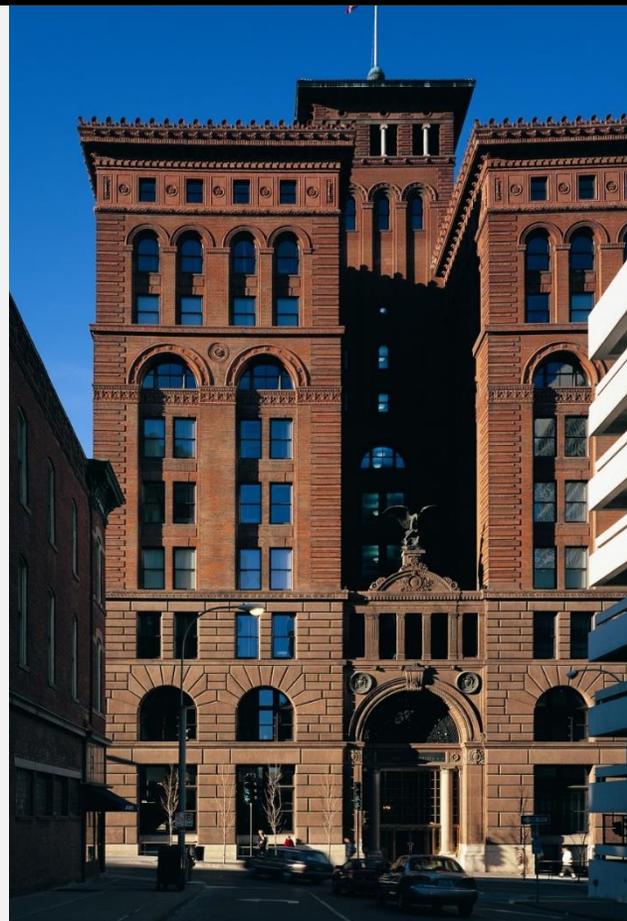
- Discuss historic significance
- Describe historic standards & guidelines for window rehabilitation
- Design a window rehabilitation plan
- Evaluate window replacement options



Waksman Institute of Microbiology

Rutgers University

Questions



Contact Information

Pella Architectural Support Services

ArchitecturalSolutions@Pella.com

www.pro.pella.com