

# ***Mid-Century Modern: The Challenges for a CM to Add Value***

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## **Mid-20<sup>th</sup> Century Buildings Workshop**

*Facility Officers Conference/ Columbus, Ga./ 26 October 2011*

# *The Challenges for a CM to Add Value*

## ***Session Outline***

Discussion of Multiple Building Systems

Discussion of Changing Building Technology

Typical System Failures and Limitations on Repair

Case Studies

Best Practices



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# Post WWII saw many changes to building technology

- Reliance on mechanical HVAC systems.
- Manufactured “systems” in lieu of trade based systems.
  - No longer did the carpenter or mason have majority of construction responsibility.



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# *Post WWII Changes*

- Structural systems were now typically all steel or concrete frame. Larger floor plates were more common.
- Building skins changed immensely.
  - Introduction to interstitial dew point issues, pressure balancing/equalization of buildings, vapor transmission, etc.



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# *Post WWII Changes*

- Glass was no longer simply clear
  - Tinted, reflective, insulated, structural, etc.
- Asbestos and lead paint were used for ***everything!***
- Caulk is ***King*** ... it can fix anything!
- Buildings designs were looking for “zero” maintenance systems and funded them accordingly.



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# Executive Summary

- Our experience is that mid-century buildings can be successfully reused for many purposes including new purposes not originally contemplated.
- Like working on any other period building, the structure, systems, and implications of change need to be fully understood by all team members to accurately plan, budget and implement.
- The cost of repurposed buildings is typically less than a complete replacement.
- Repurposed buildings can be as economical to operate as new buildings.
- Keeping existing buildings has less impact on the environment



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**HOWEVER,**

***THE DEVIL IS IN  
THE  
DETAILS .....***



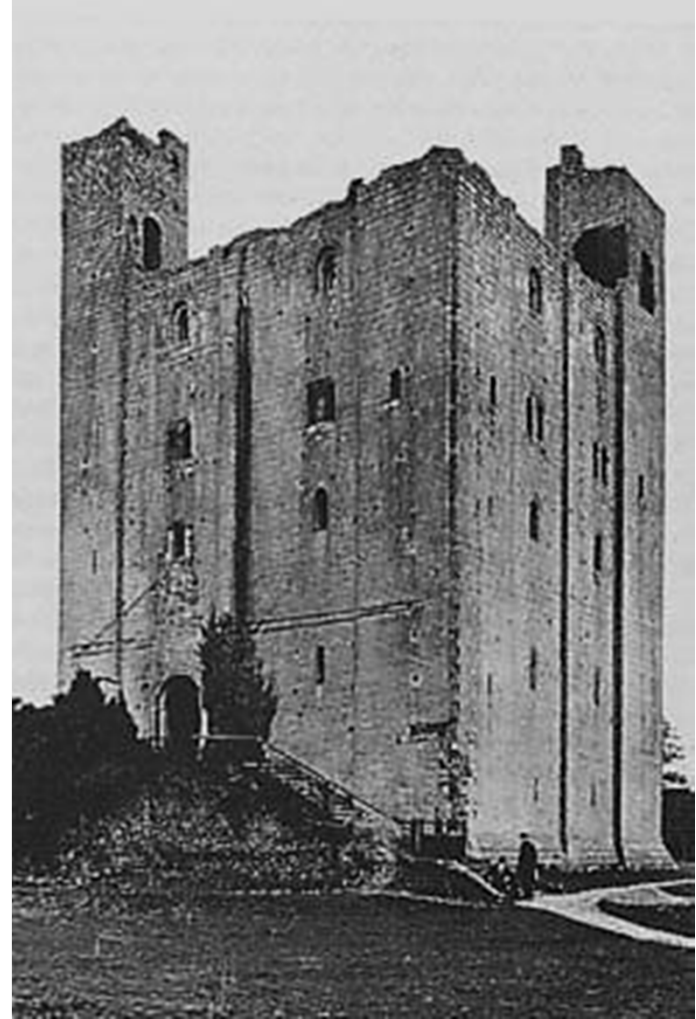
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# *The Challenges for a CM to Add Value*

- Why do some systems last and others do not?
- What does time show us for “traditional” verses “contemporary” building systems?
- What is the culprit for the majority of system failures?
- Results of deferred maintenance on 19<sup>th</sup> century vs. 20<sup>th</sup> century buildings.
- What can't we see?

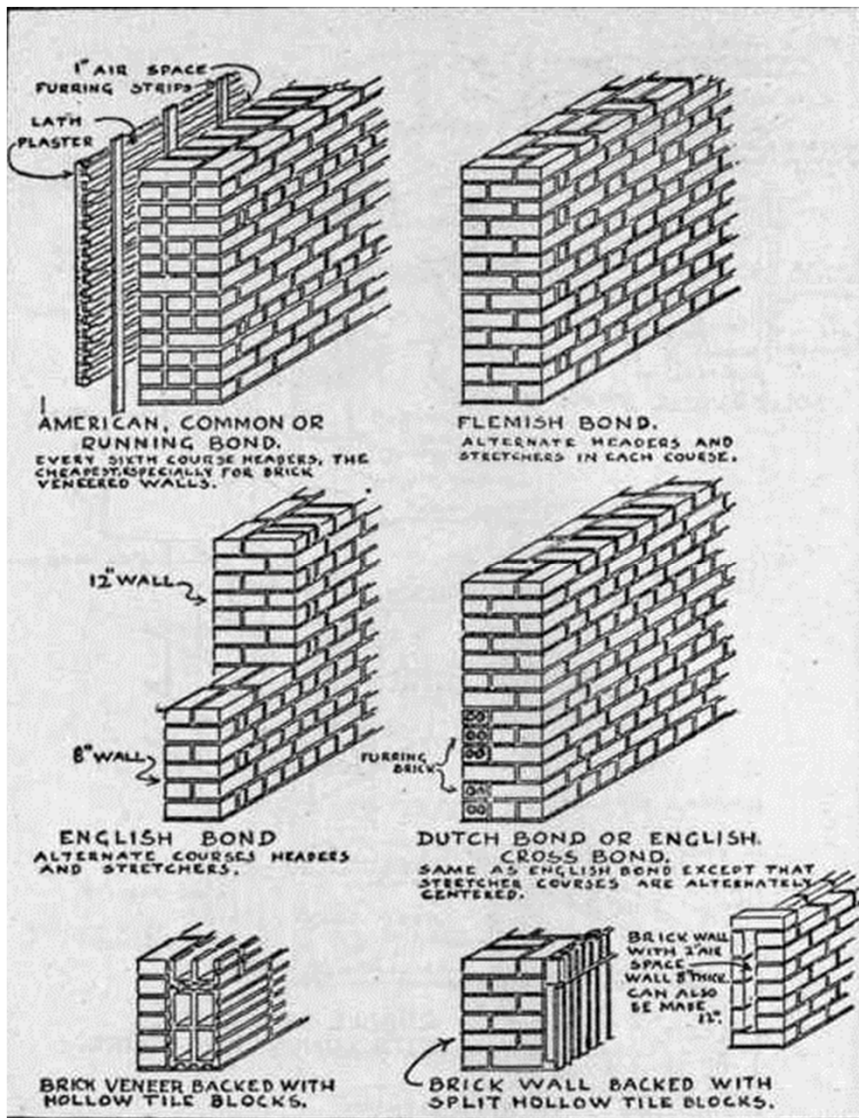
*Let's talk about wall systems ...*



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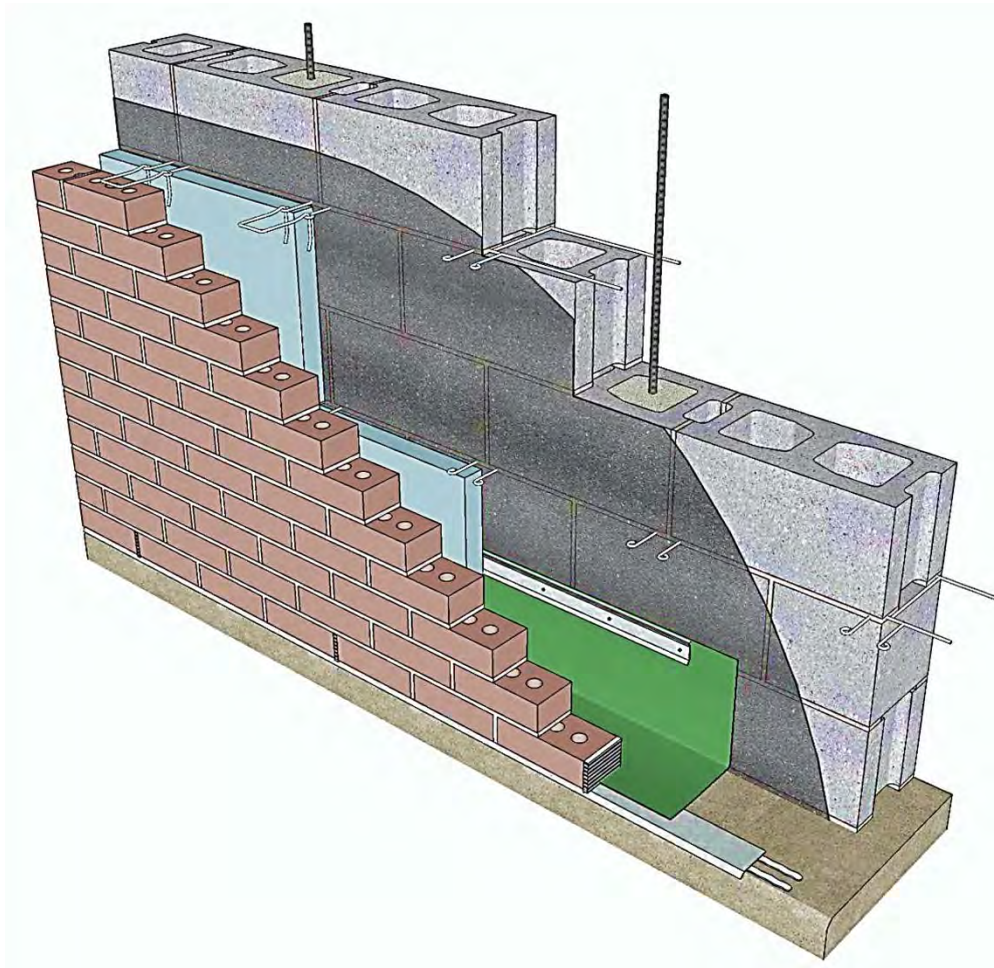
## “Traditional” Wall Design

- Understood allowance for movement and cross connection of wythes of masonry.
- Moisture is separated from inside to outside based upon material volume.
- Flexible mortar is self healing and eliminated the need for expansion joints.
- System is water tolerant.



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## Common Mid-Century Wall Details

- Rain screen masonry or panel system
- Materials with different coefficients of expansion
- Hard mortar that requires expansion joints
- Thin cross section connections subject to corrosion
- Detailed engineered system
- Death by water



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# The Problem With “New” Engineered Systems?

- Give a trade the chance to make a mistake, *and they will*.
- Success depends upon multiple trades all getting it correct.
- Training and education to ***fully understand*** how a system performs *seldom exists*.
- Quality control in the commercial construction process can be less than adequate to oversee the little details.



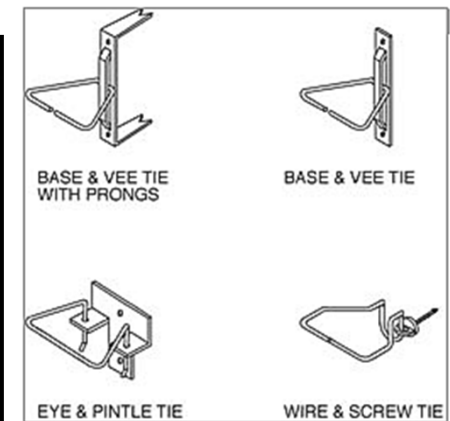
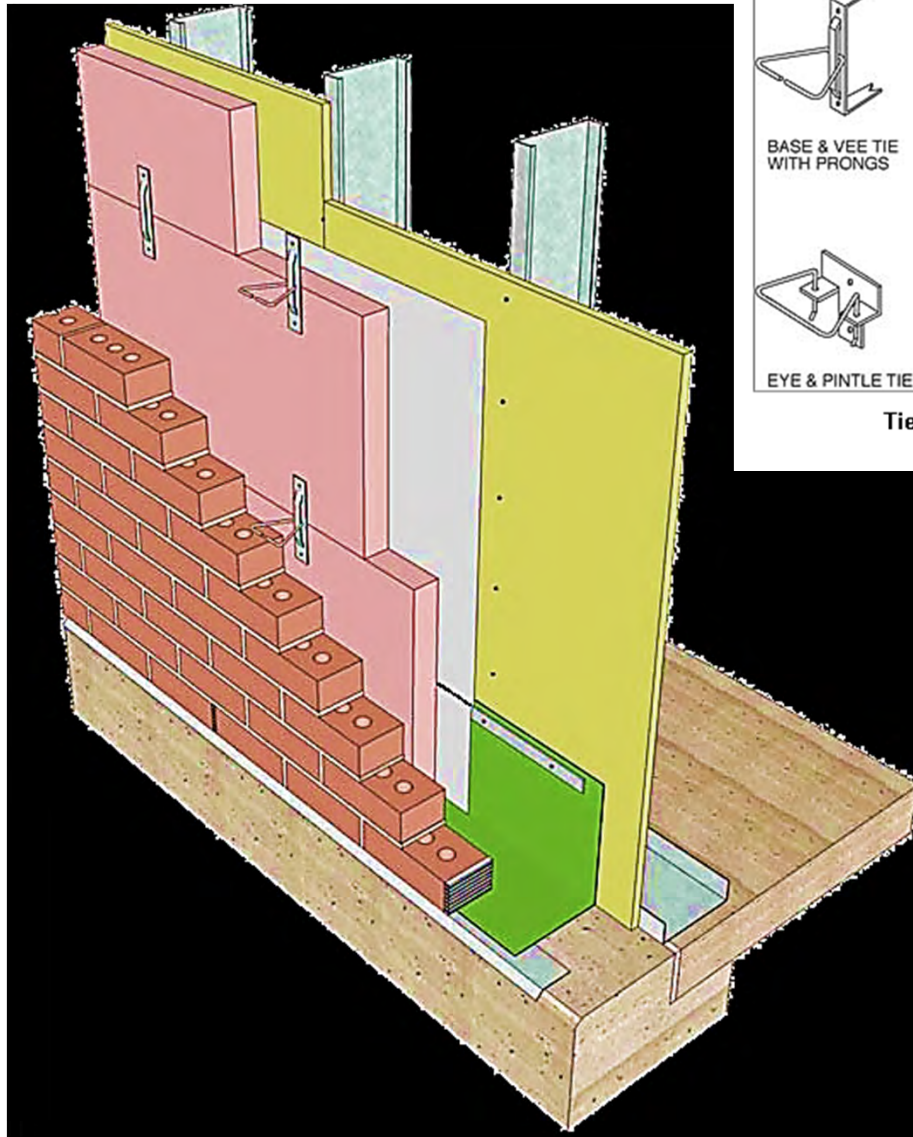
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## Detail Economies

- Over time details have changed and continue to change to lessen cost.
- Modifications to an interior stud wall can now have serious implications to the exterior masonry support.
- A system's performance can now be a success or failure based upon the placement or deterioration of a single screw.



Tie Assemblies  
Fig. 5

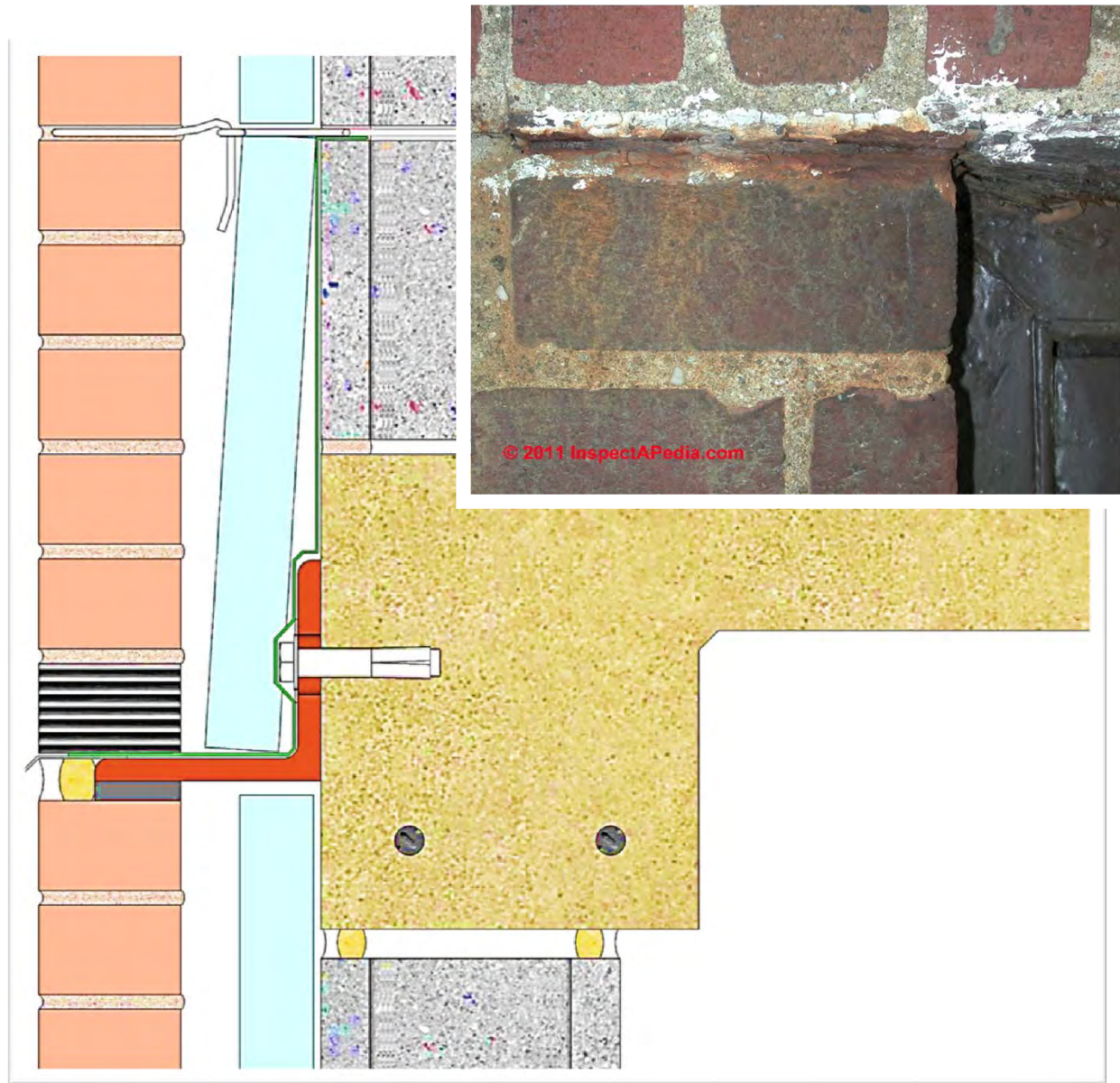


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## The Shelf Angle Weakness

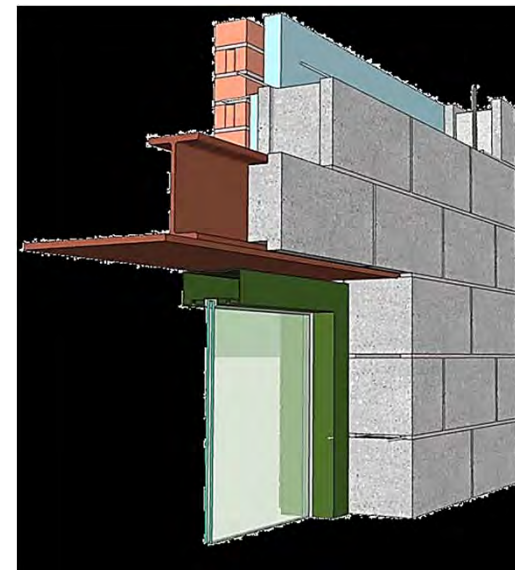
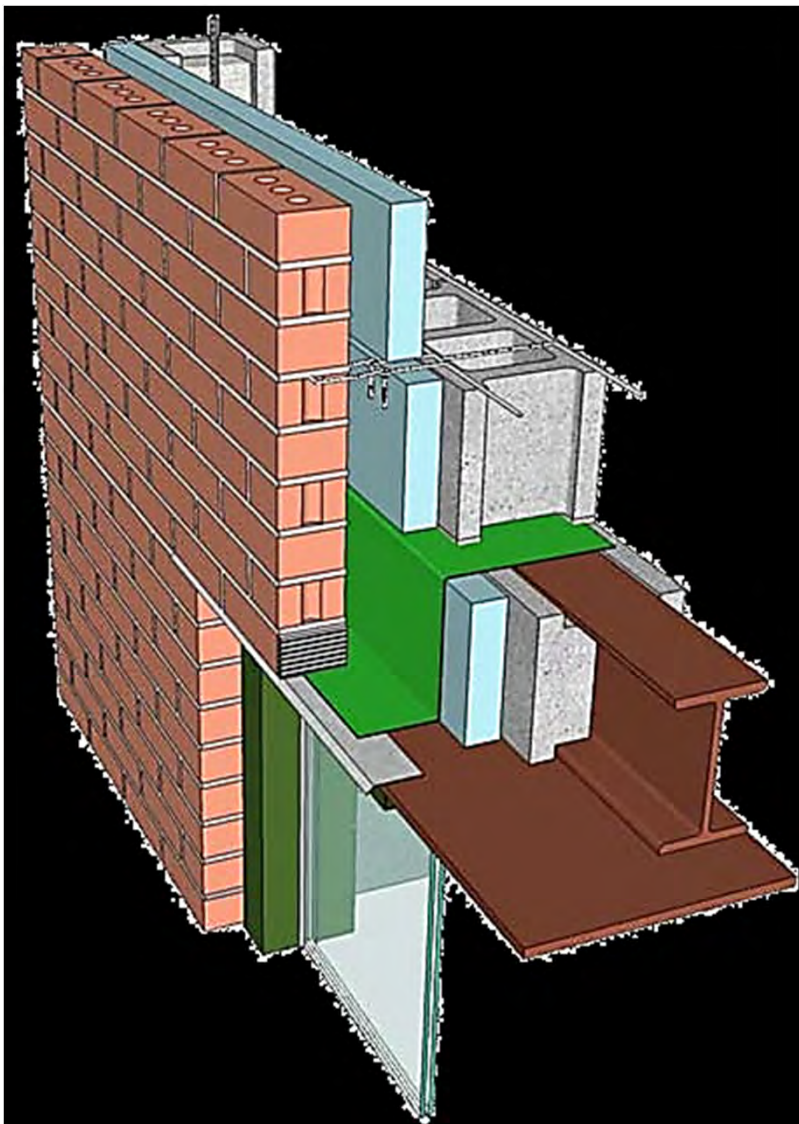
- Failure to provide underside soft joint
- Failure to get moisture “all” the way out
- Rust jacking of shelf due to condensation or other moisture
- Differential shrinkage of concrete, block and brick
- Wire tie failure



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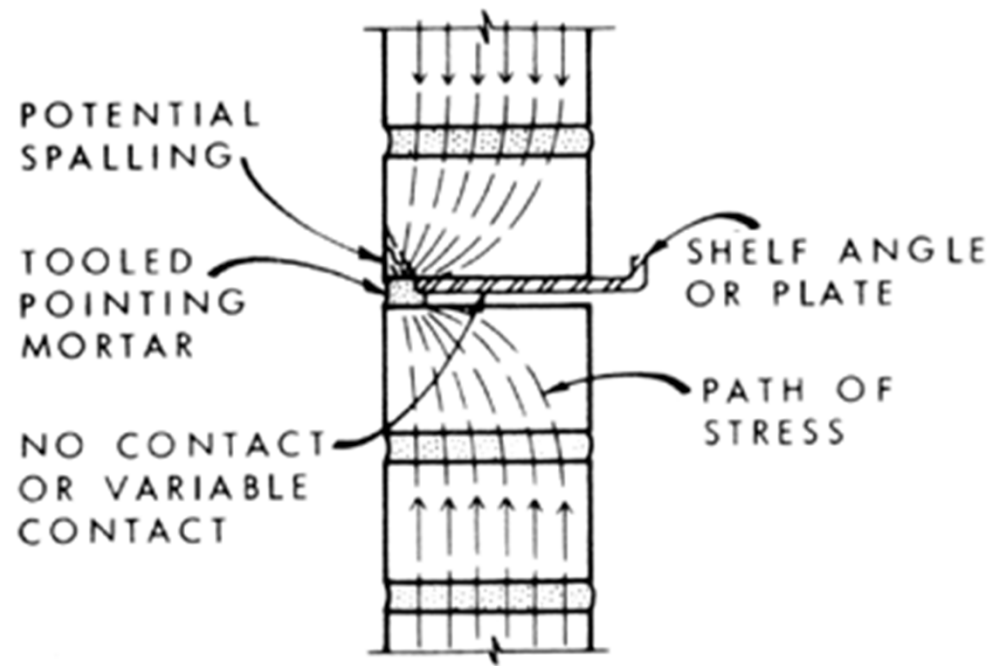
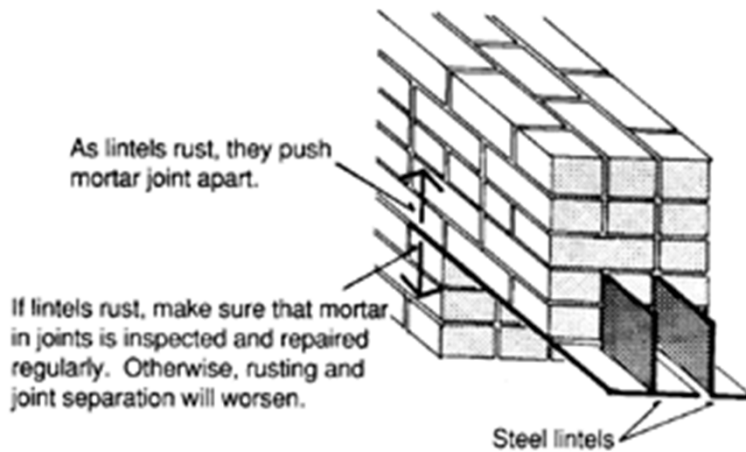
## Hidden Lintel Conditions

- Extent of oxidation cannot be seen without investigation.
- Were the lintels installed as designed or could double angles have been used.
- How do you stop oxidation once it starts and budget its accurate repair?



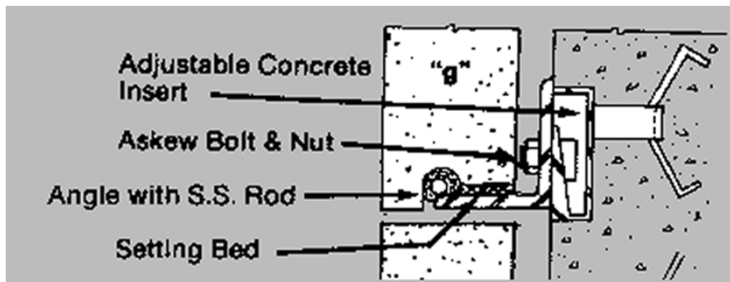
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- Once deterioration starts, common “fix” is to caulk or point, sealing in more moisture.

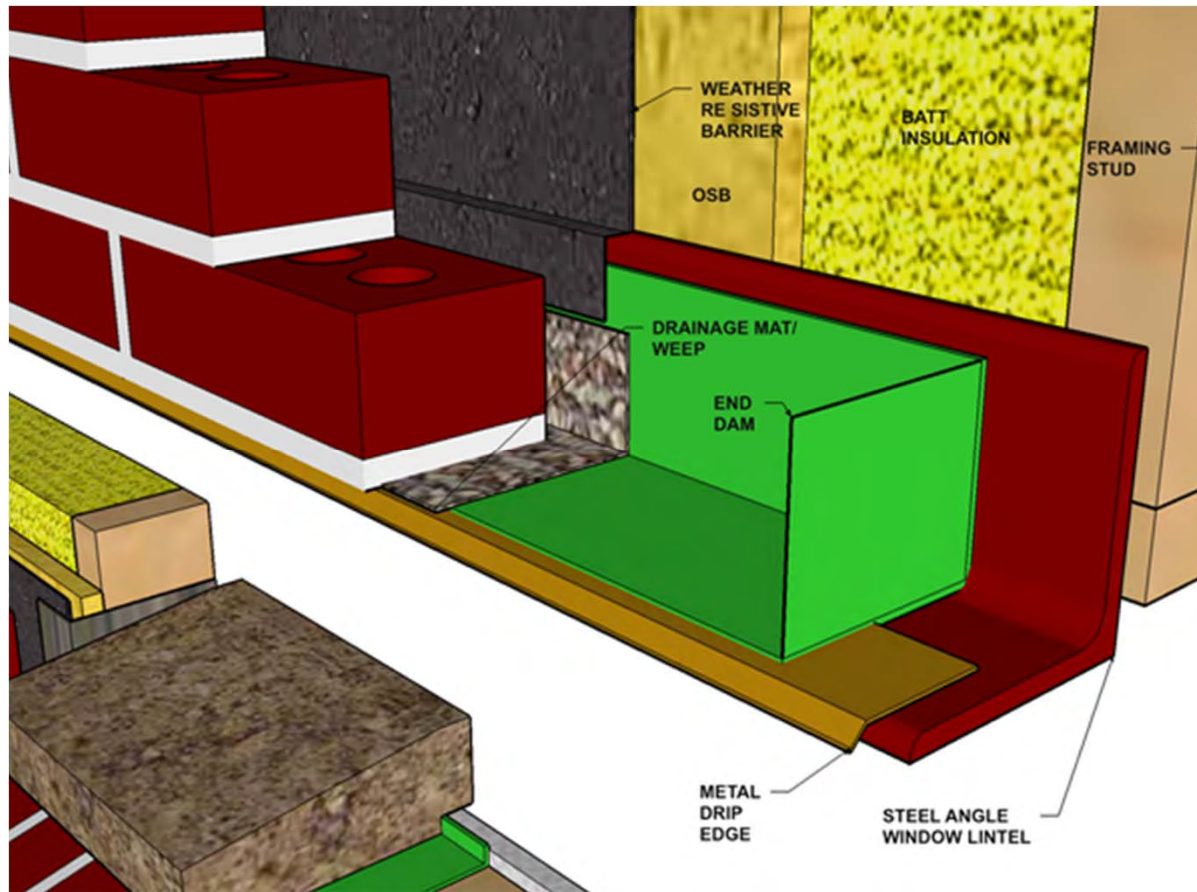
- Patented systems will likely be even less understood by construction or maintenance personnel



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# Mid-Century Challenges – End Dams



- On shelf angles
- At corners and offsets
- On window curtain walls
- On windows
- Critical to short and long term performance

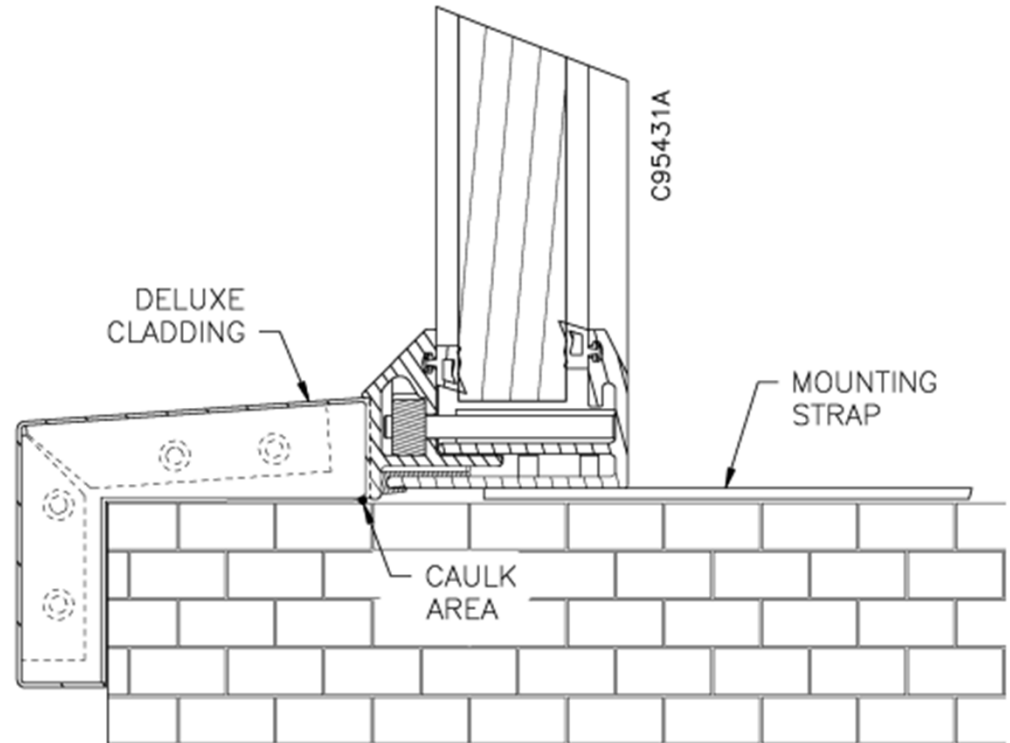
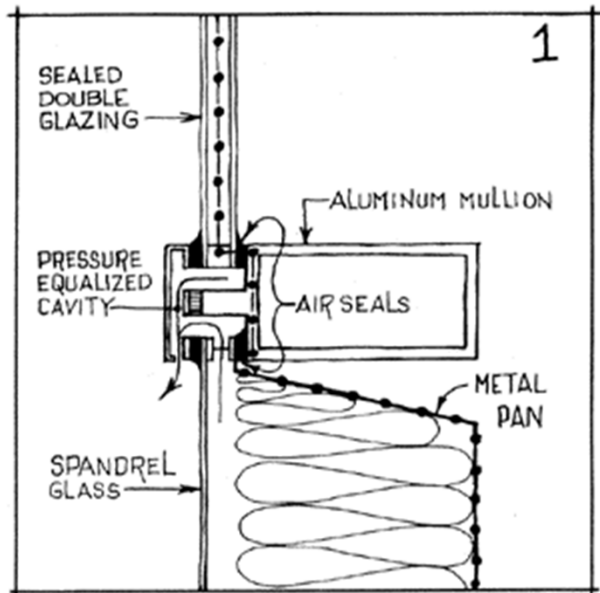


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# Mid-Century Challenges – Glazing Systems



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# The Construction Material of the Mid-Century, and Beyond?



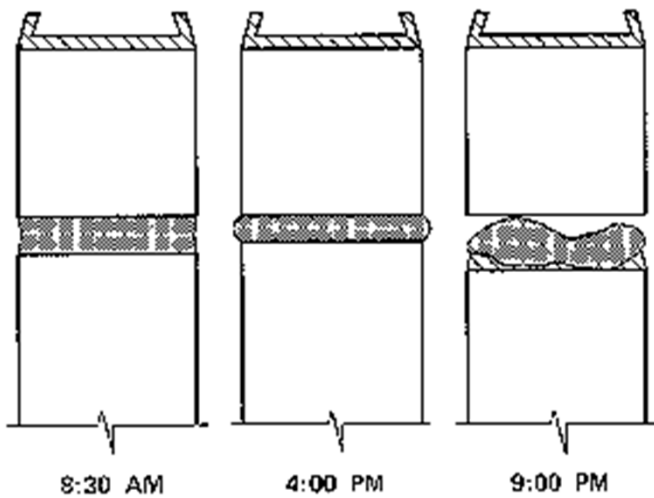
How did we build for centuries and keep water out of buildings without sealants?

*This single product is misused, inappropriately installed and not maintained to create the most problems in mid-century buildings.*



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## Importance of Sealant System Design

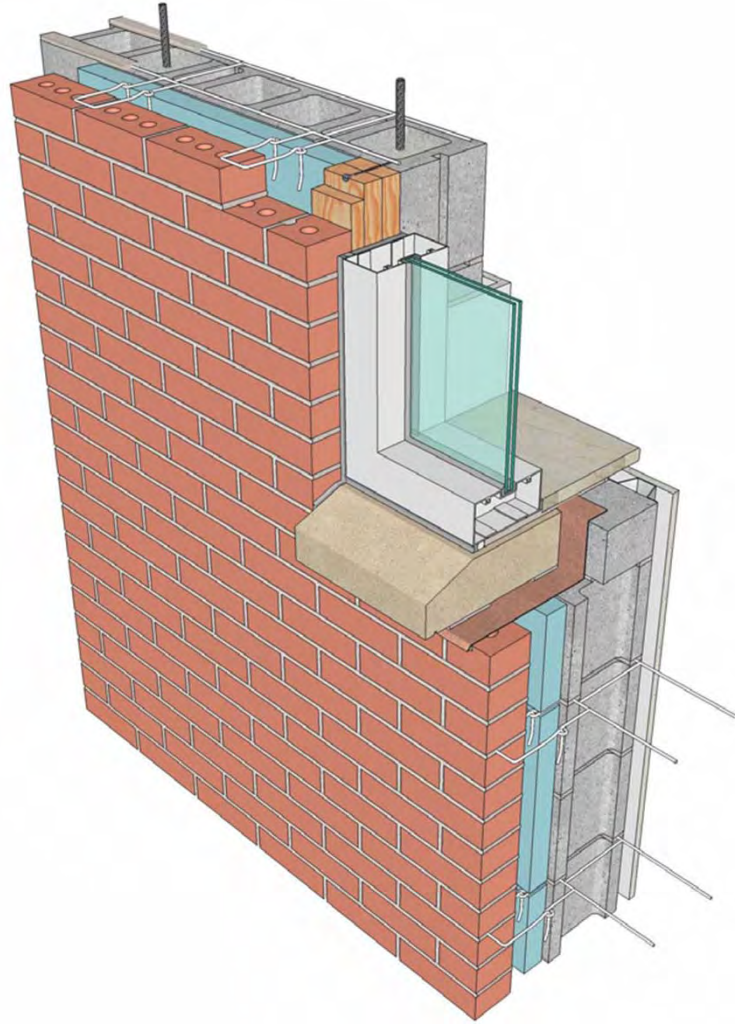
- Material compatibility
- System requirements for performance
- Maintenance requirements
- Implications of failure ... where's the water and air going?



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## Case Study on Mid-Century Window Upgrade

- Need for better thermal performance
- Gasket failure / replacement
- Desire to match previous design of glass and spandrel panels

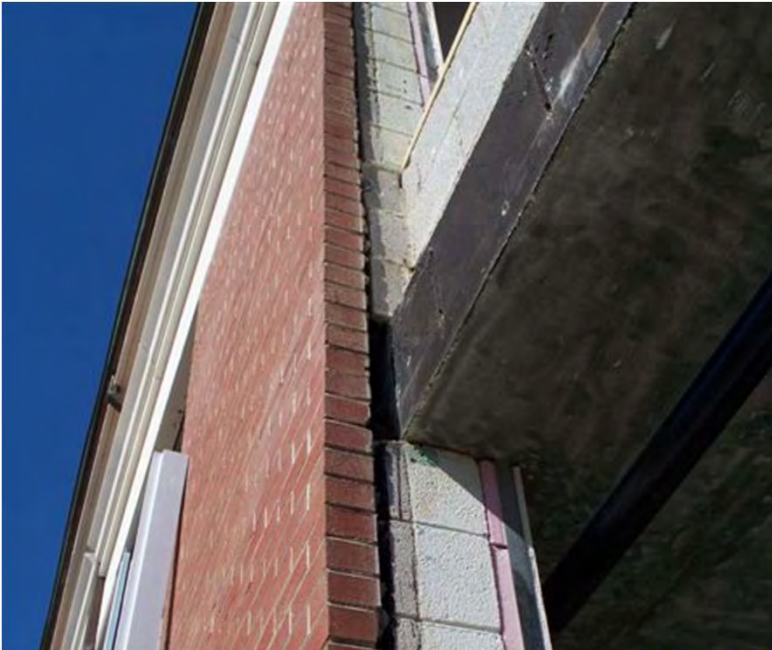


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## A “simple window replacement” opens many details ...

- Lack of a nailer to secure new design
- Width of system to cover previous sealant joint
- Fire stop floor to floor
- Connection / interface with previous moisture control systems



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## A “simple window replacement” opens many details ...



- Head offset discovery
- Existing sealants which would be near impossible to remove

*The best opportunity for success is to:*

- 1. Discover these issues early*
- 2. Engineer the solution as part of the bid*



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# Best Practices for Mid-Century Buildings

- Most mid-century buildings typically have very stable and salvageable structural frames.
- Skin systems are less forgiving than early century or turn of the century systems.
- Hidden corrosion and rust jacking must be corrected, can be hard to determine, and expensive to correct.
- Floor to floor dimension may be tighter than desired but with good design and BIM, space can be made efficient for today's systems.



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# How Best Can a CM Add Value?

1. Understand the building type, challenges and opportunities.
2. Assist with a detailed condition assessment.
3. Assist with a comprehensive existing construction detail investigation (probes).
4. Estimating team must be able to conceptualize cost impact to “fit” a contemporary larger air volume HVAC systems into building with limited floor to floor spacing.



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# Mid-Century Buildings Can Be Reused!



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# Questions?

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