

AIA CES PROGRAM MPS 03



Flashing and its Importance in All Buildings



AIA Continuing Education

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Flashing

Brick Engineering 1939

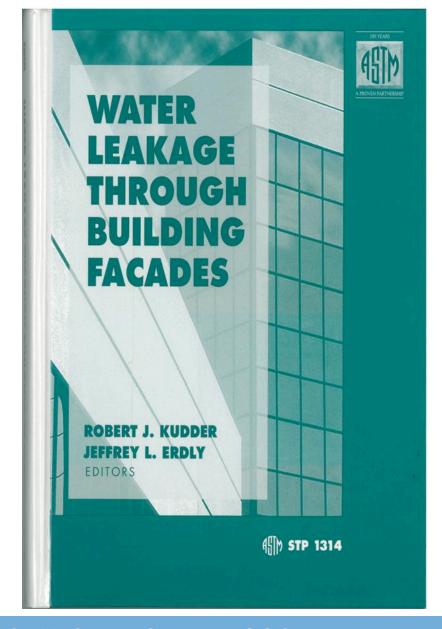
Harry Plummer & Leslie Reardon

"At the onset, it might be stated that <u>no flashing</u> at all is better than poor flashing ... defective flashings tend to collect [moisture] in a manner to cause serious damage to the structure"

Learning Objectives

At the end of this program, participants will be able to understand:

- The History of Flashing
 - How this complex specialty within construction is often ignored.
- The Impact of Proper Flashing
 - Water collection and management within a wall assembly is critical to long-term preservation.
- The 5 Fundamental Flashing Principals
 - It takes more then specifying the next "great" material!
- Flashing Failures and Corrective Measures
 - What you need to know to get it right!



ASTM STP 1314 - 1998 Robert J. Kudder & Jeffrey L. Erdly, Editors

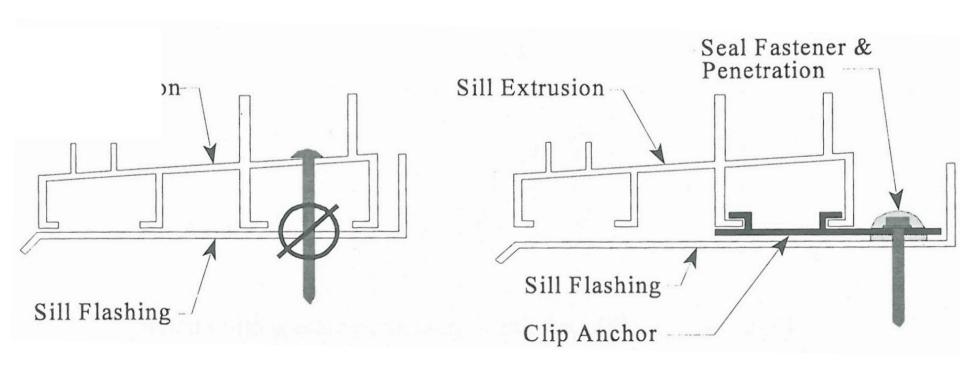


FIGURE 5: Sill Anchorage Considerations to Avoid Blind Penetrations in Sill Flashings

Window Detail Consideration for Leakage Prevention Kenneth M. Lies & Brian A. Faith

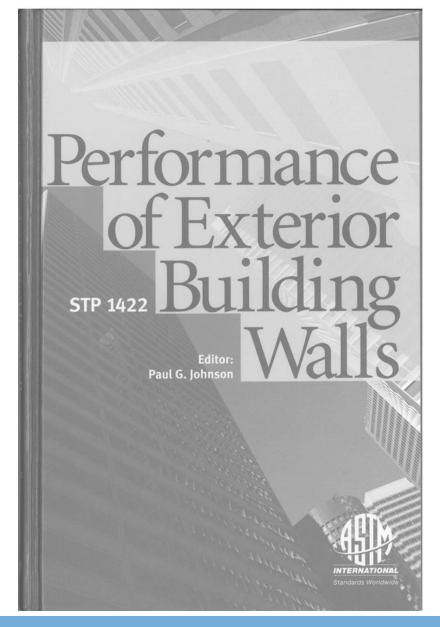


Stupid mistakes

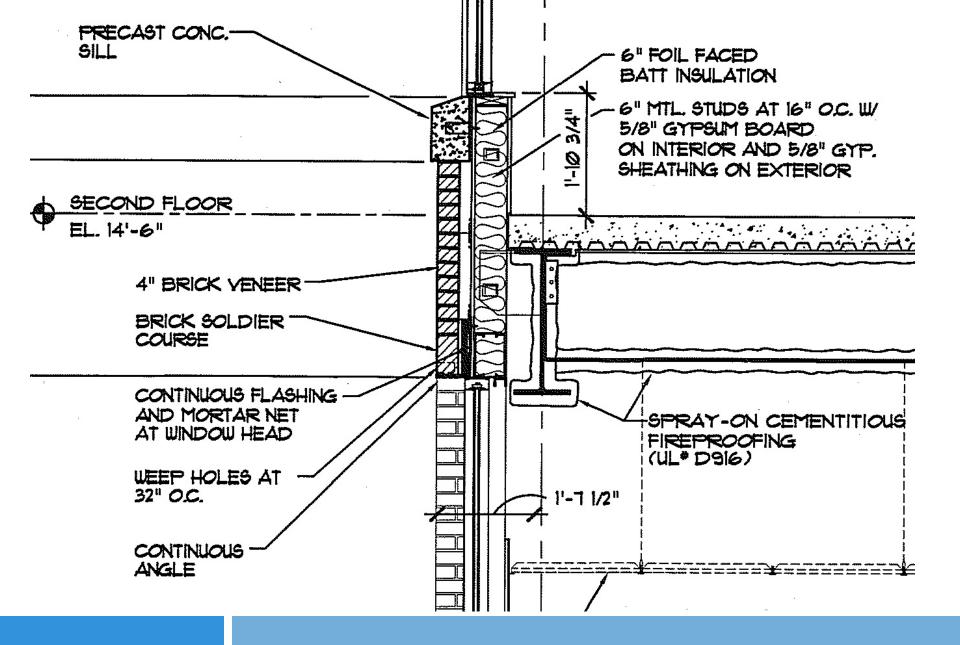




Standardized mustard bottle test



ASTM STP 1422 - 2003 Paul G. Johnson, Editor



Is this detailing sufficient?

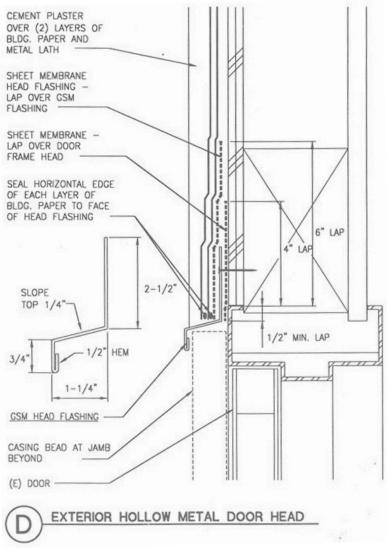


FIGURE 2: Cross-Section Detail at Enlarged Scale with Separation of Materials and Exaggerated Line Thickness

A Detailing Method for Improving Leakage Prevention of Exterior Wall Weatherproofing - Robert Bateman



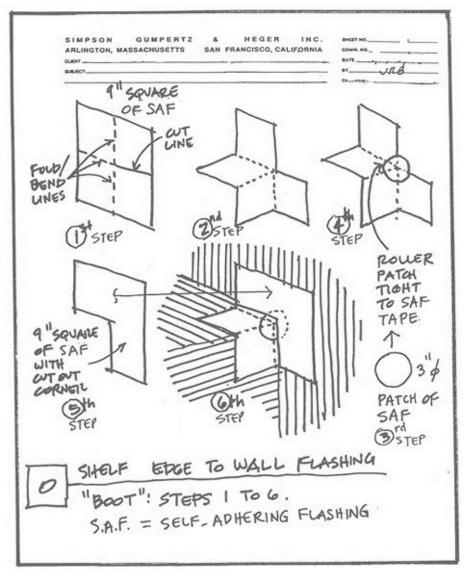
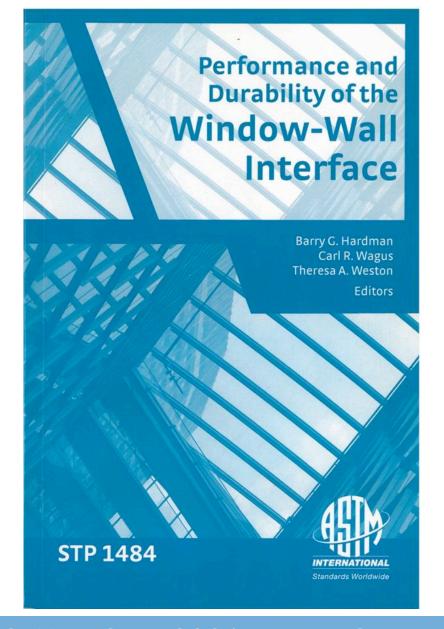
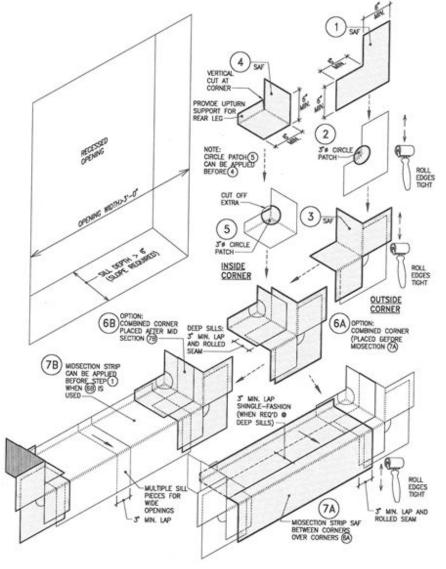


FIGURE 7: Combined 3-D & Sequence Diagrams (Freehand Sketches)

A Detailing Method for Improving Leakage Prevention of Exterior Wall Weatherproofing - Robert Bateman

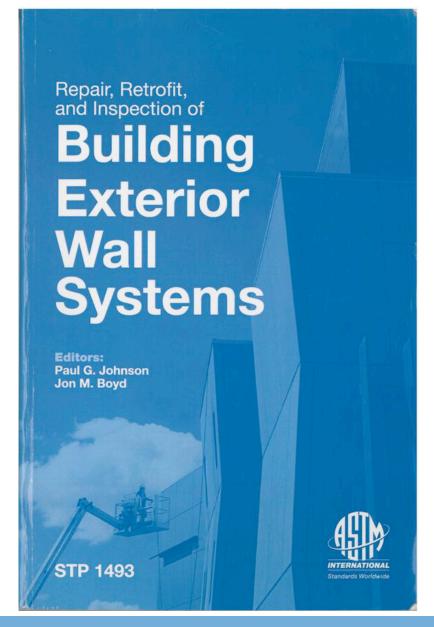


ASTM 1484 – 2006 Barry G. Hardman, Carl R. Wagus & Theresa A. Weston, Editors



APPENDIX 1: Sill Pan Flashing - Multiple-Piece SAF

Designing and Specifying Self-Adhering Flashings for the Window-Wall Interface - Robert Bateman



ASTM STP 1493 - 2009 Paul G. Johnson & Jon M. Boyd, Editors

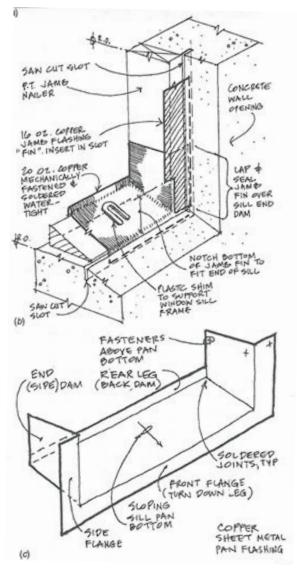


FIGURE 15: Sill-Jamb Corner and Sill Pan Flashing.

Sill Pan Flashing for Block-Frame Windows in Recessed Concrete Openings, Case Studies - Robert Bateman

Flashing Importance

- What is flashing?
 - Assembly to manage water
- Important in all types of construction
- Value in adding flashing to historic structures
- Careful detailing with modern buildings
- Interface with current & future roofing efforts
- Must understand the cause
- Remediation is costly:
 - Correcting structures, once built, generally requires creative and usually expensive remedial measures



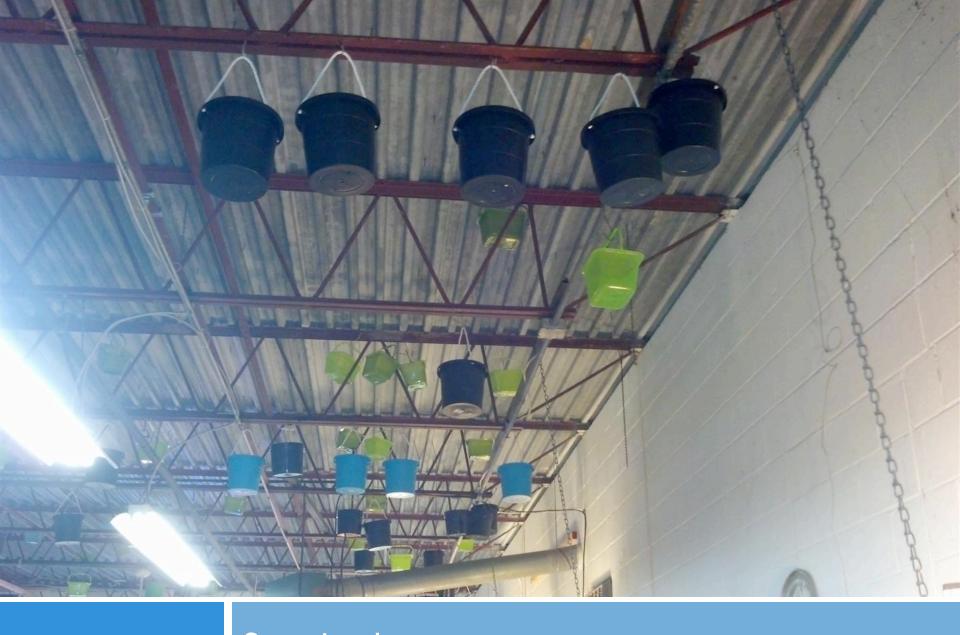
Why bother with flashing?



Preserve history



Correct deficiencies

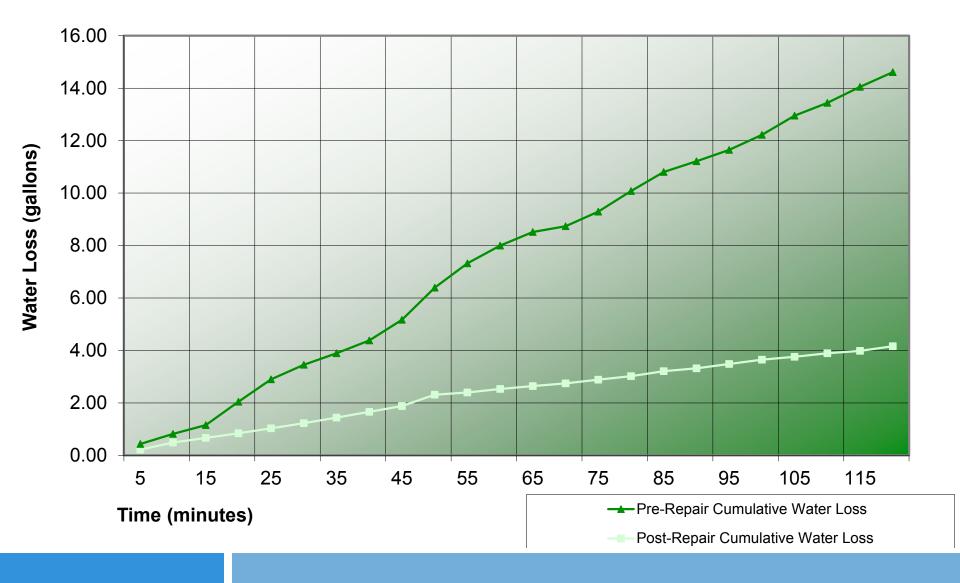


Stop Leaks

Masonry not waterproof - ASTM C1601 test



Water Loss



Water loss comparison



Looks good?



Water penetration of 5 gals/hr/12 sf

Flashing Assemblies

- Learn from experience
- Intent
 - Impact of lack of or improper flashing
 - Bad flashing
 - Proper flashing
- Success is possible
 - Good details
 - Quality trained craftsmen
 - Quality materials

Flashing Principles

ı. Flash

Continuous, seal laps, positive termination, end dams

2. Weep

Path to evacuate water from within wall

3. Drip

Away from wall surface

4. Quality Materials

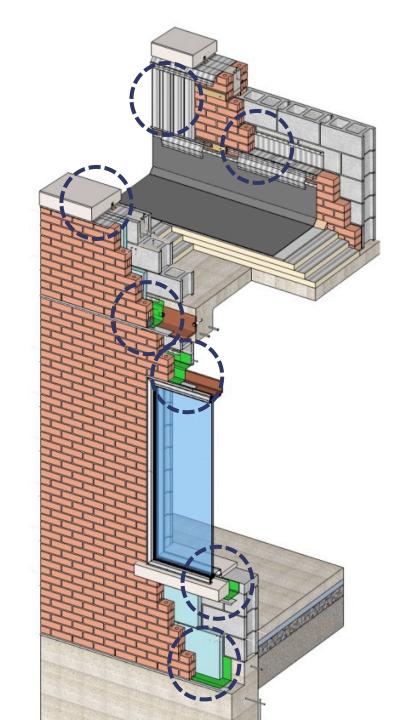
Durable long-term

5. Skilled Craftsmanship

Specialty expertise

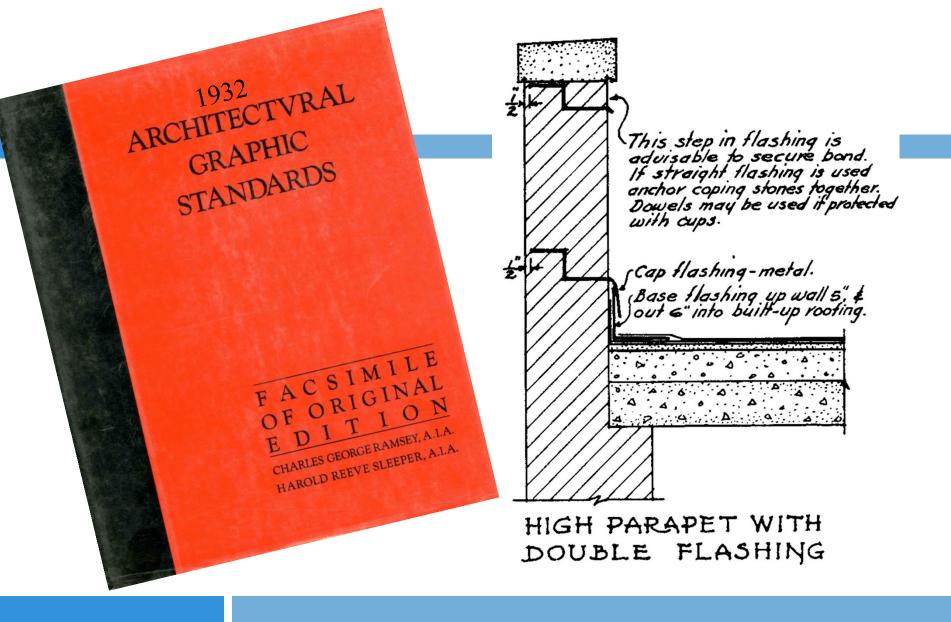
Typical Locations

- Coping
- Parapet
- □ Shelf Angle
- Lintel
- □ Sill
- Rising Wall
- Base Building

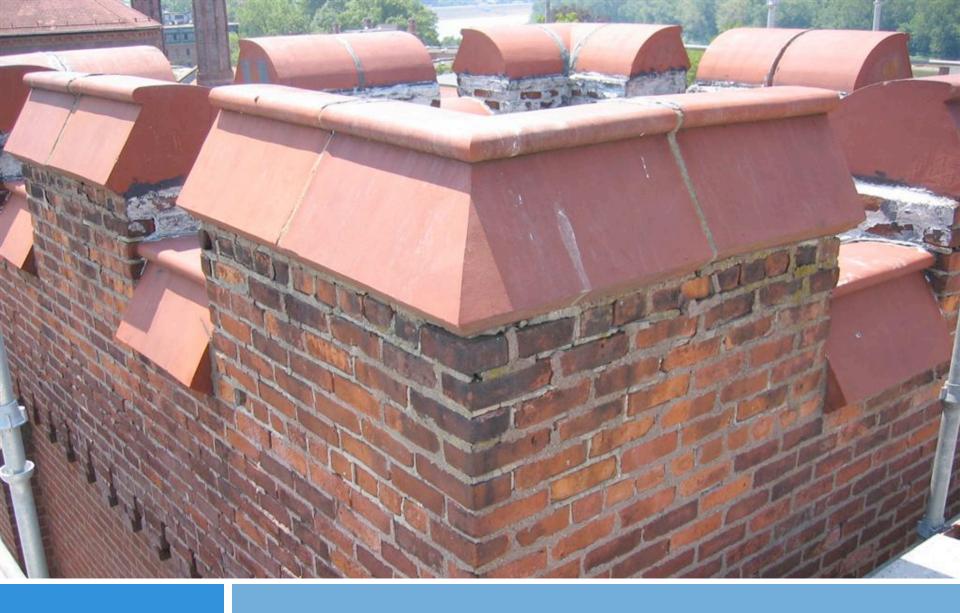


Coping Flashing

- Interface with inboard side of wall
 - Counterflashing or rain screen
- □ Pins & thimbles
- Head joints sealant
- □ Bed joints mortar



Time tested ideas are valid



Protect most exposed part of building



Suffer from lack of maintenance



Damage ensues



Safety concerns arise

Low bid approach not well suited





Poor material selection - building paper



Through-wall with receiver counter-flashing



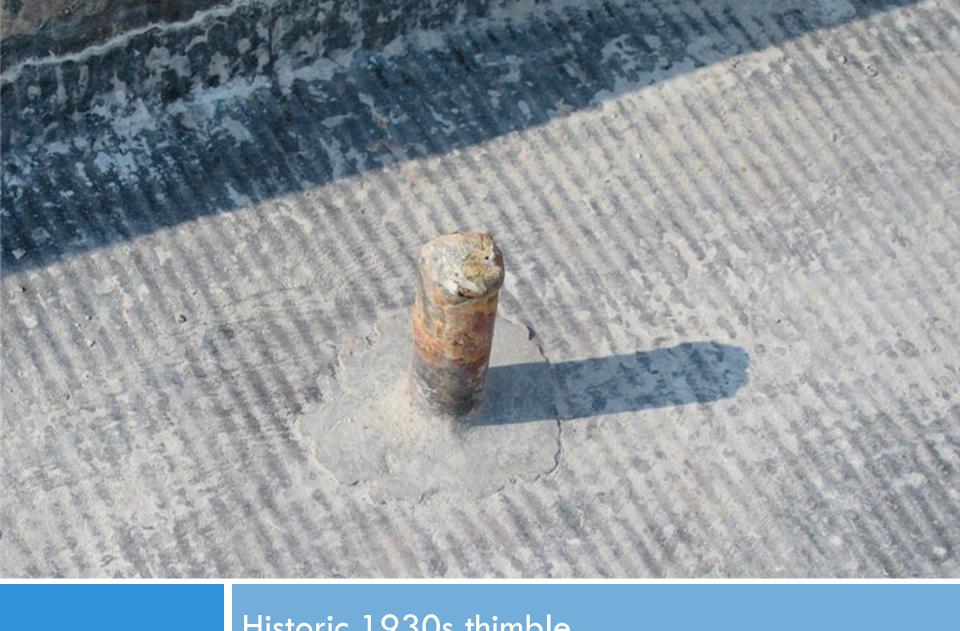
No accommodation for movement



Loose laps



Bond loss & freeze-thaw impact



Historic 1930s thimble



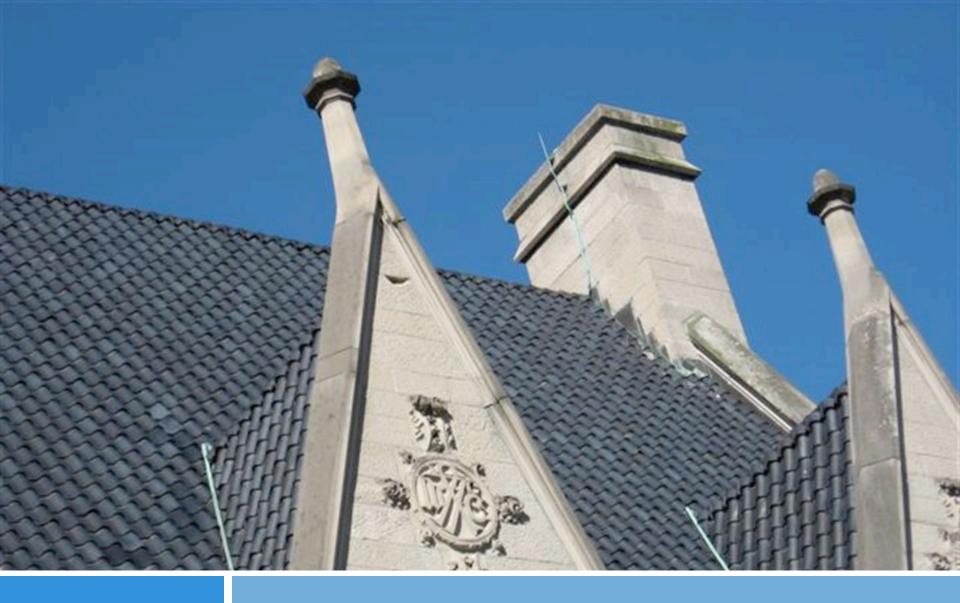
Modern thimble



Two-piece

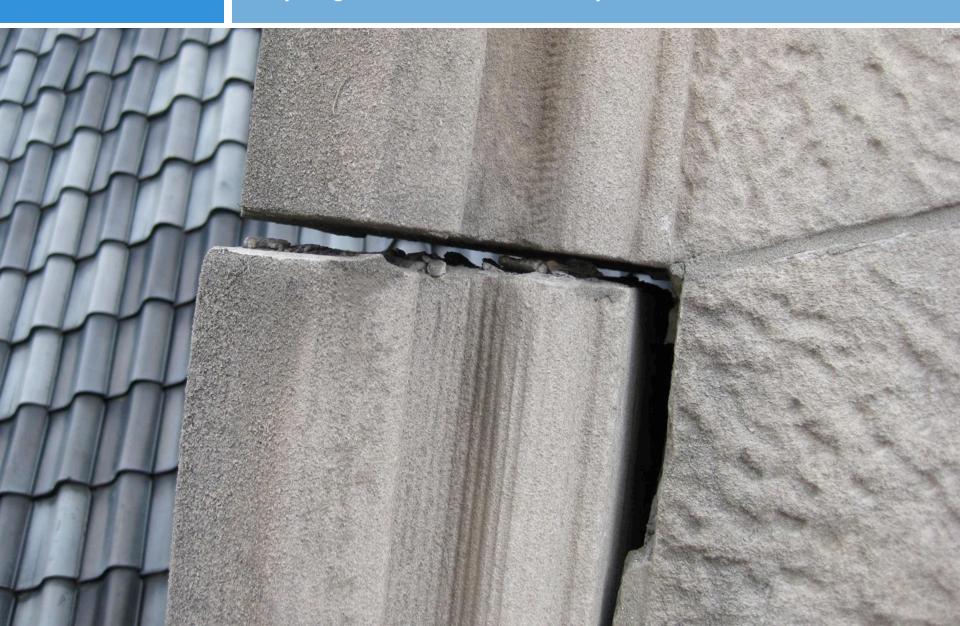


Overall protection



Severely sloped gables

Coping has shifted away from the wall



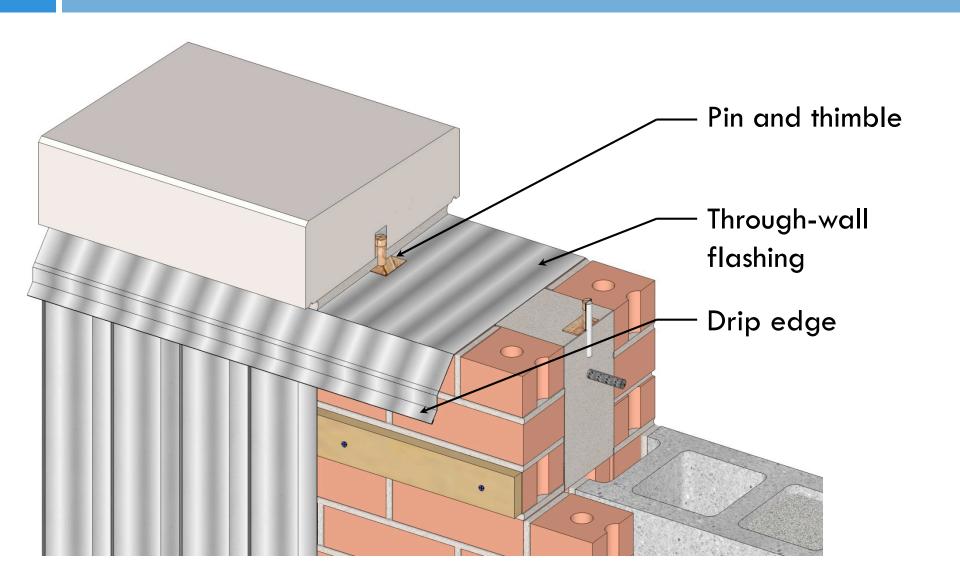


New through-wall metal flashing installed

Specialty anchor designed to hold coping against the wall



Coping



Parapet & Rainscreen

- Allow masonry to breathe
- □ Protect inboard side with rainscreen
- Limit temptation of direct applied membrane

Moisture & membrane impact

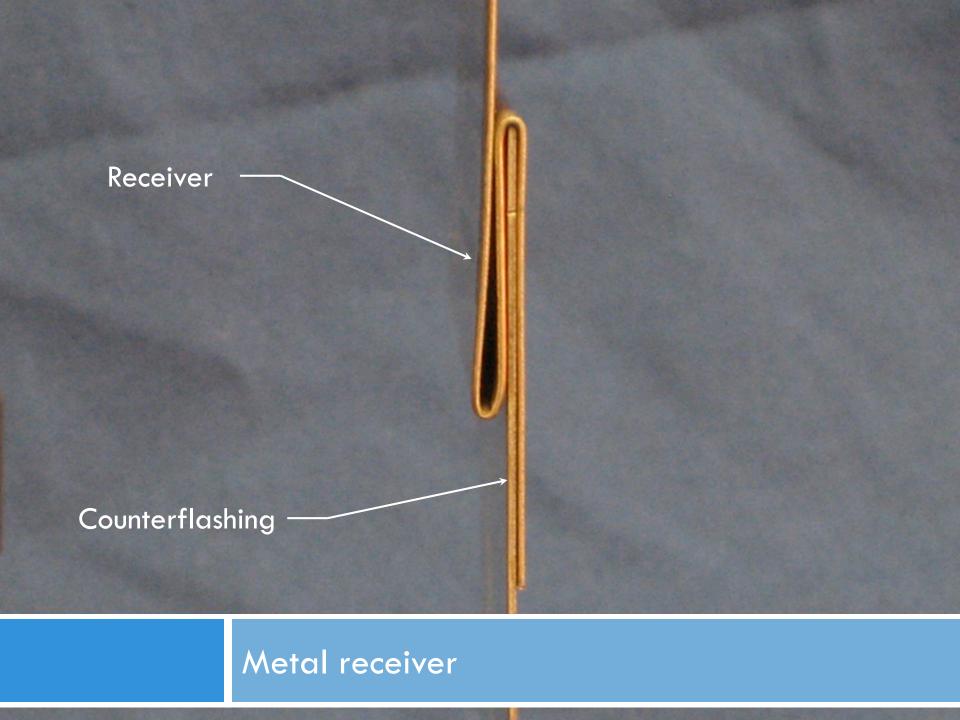




Long-term solution



Aesthetic options

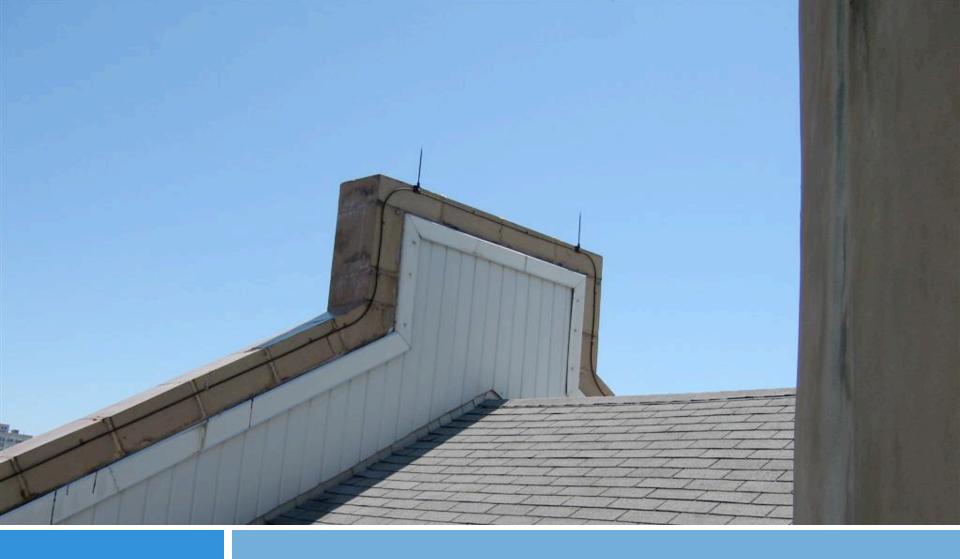




Integrated system detailing



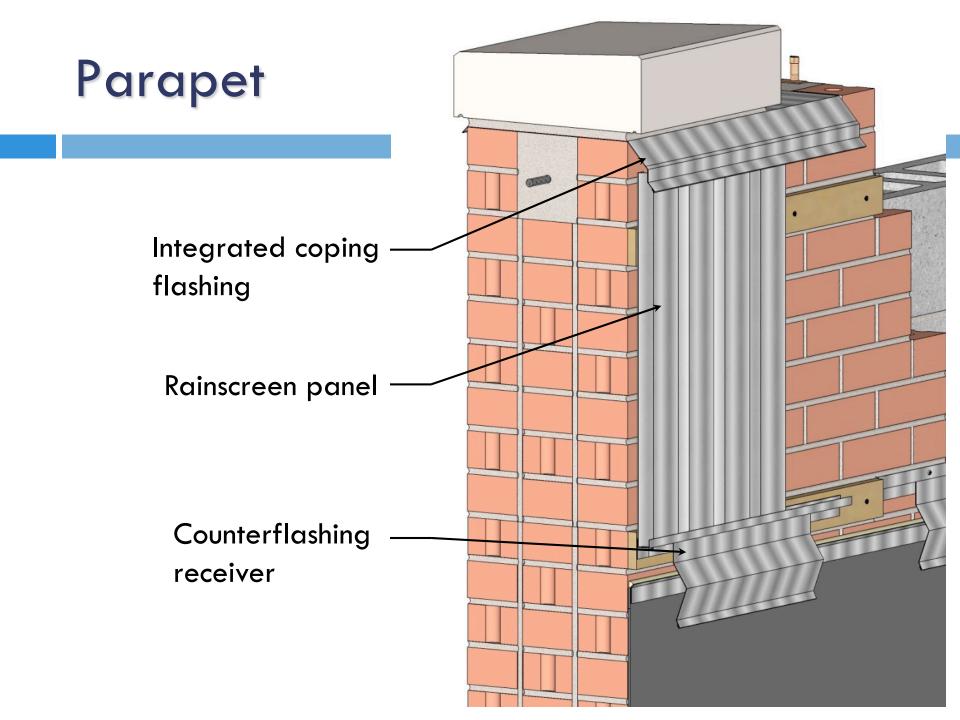
Roof interface



Does not alleviate all detailing responsibility



Still need to terminate roof



Through-wall Flashing

- Continuity at plane changes
- Detailed laps
- Un-fouled cavity

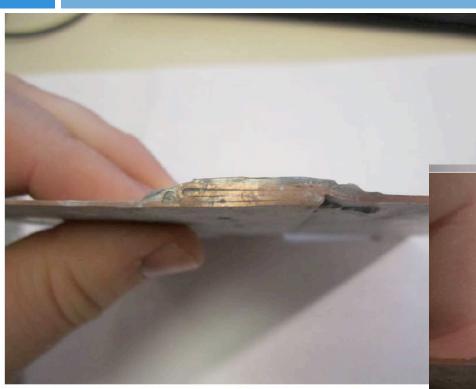


Workmanship key – no matter the complexity

Pre-tinning

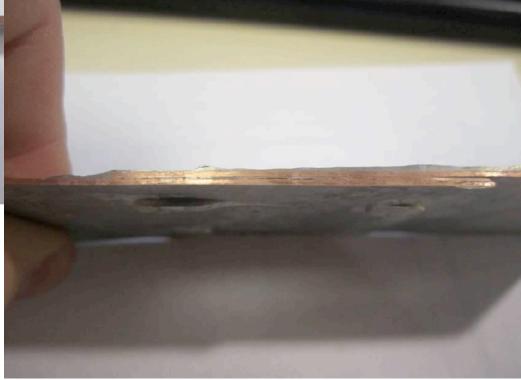


QA/QC - Soldering Test: Pass

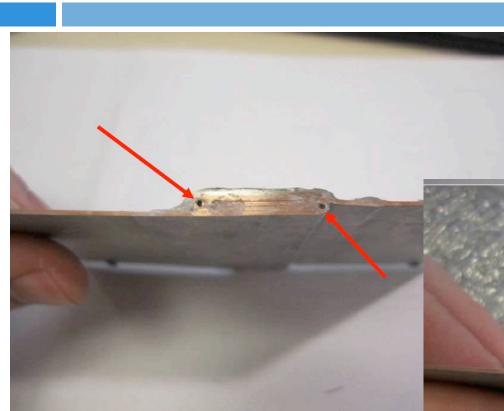


Lap joint – completely filled with solder

3/4 in. lock joint – all three legs filled with solder



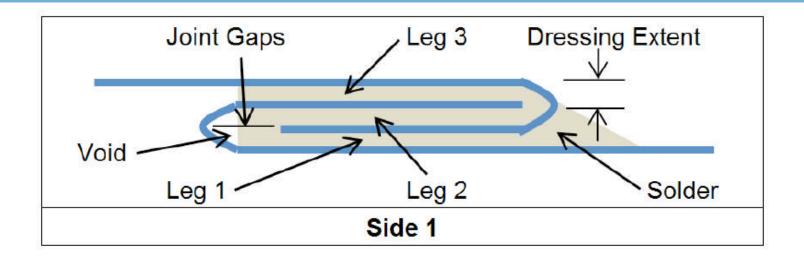
QA/QC - Soldering Test: Fail

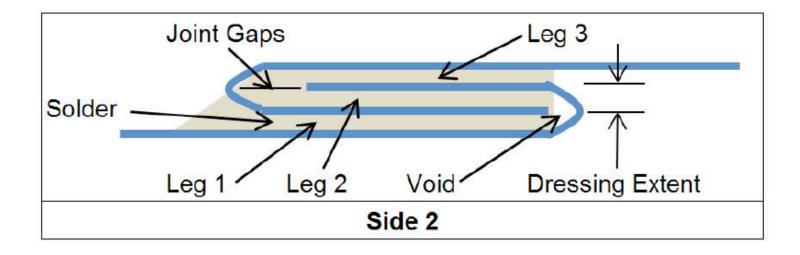


3/4 in. lock joint with pinholes, not filled with solder

Lap joint not filled with solder

Soldering Tests





Sample Openings





Craftsmanship



Don't always get the specified detail



Redundancy is ok

Shelf Angle & Lintel Flashing

- End dams to limit lateral water transmission
- Detailed laps
- □ Hemmed drip edge



Omitted, end dam location



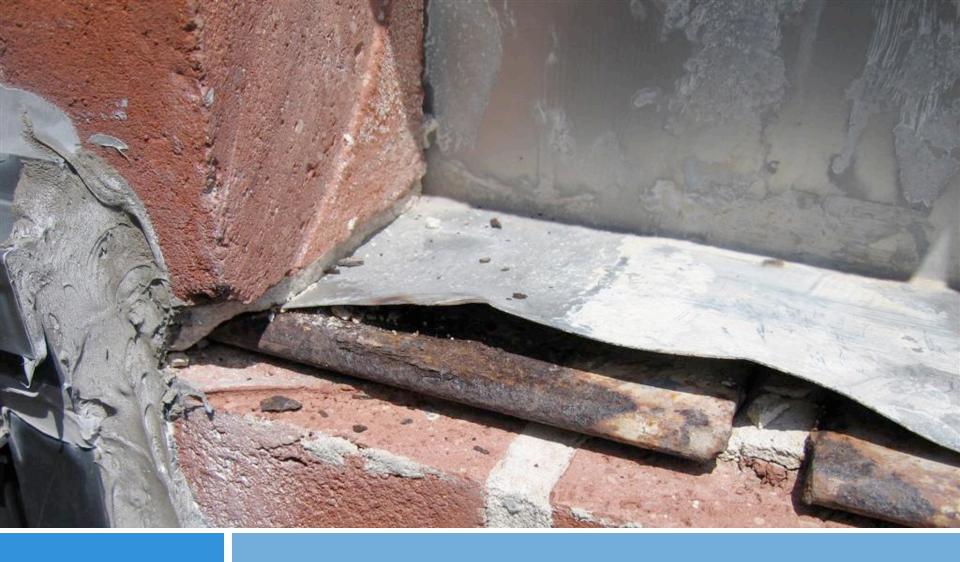
Sealed

Brick cores exposed





Water collection



Window over angle



Extension and drip



Bypass flashing line



Accelerated corrosion



Corrosion by-product



Corrosion layer expansion



Corrosion layers removed



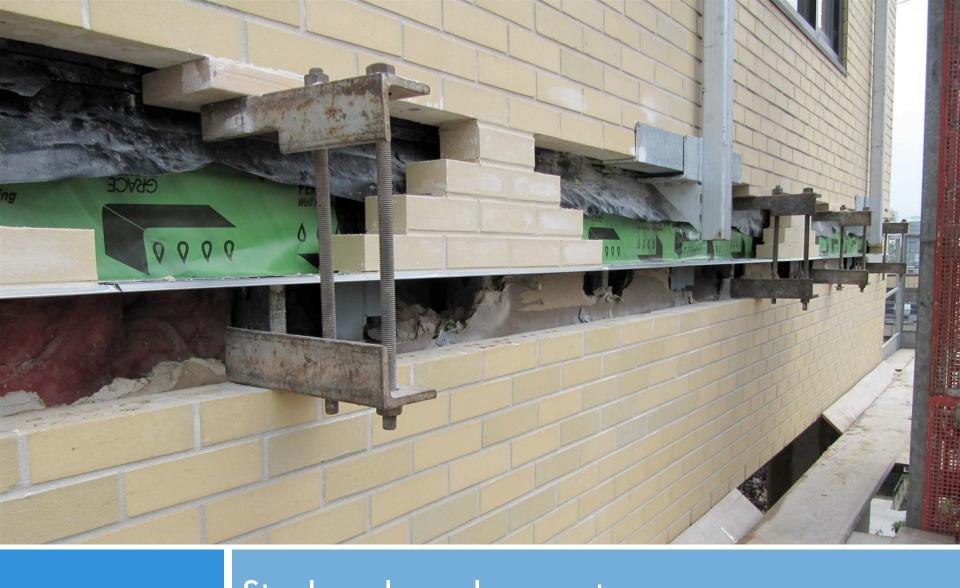
Corner shelf angle replacement and flashing

Basic water management in typical building



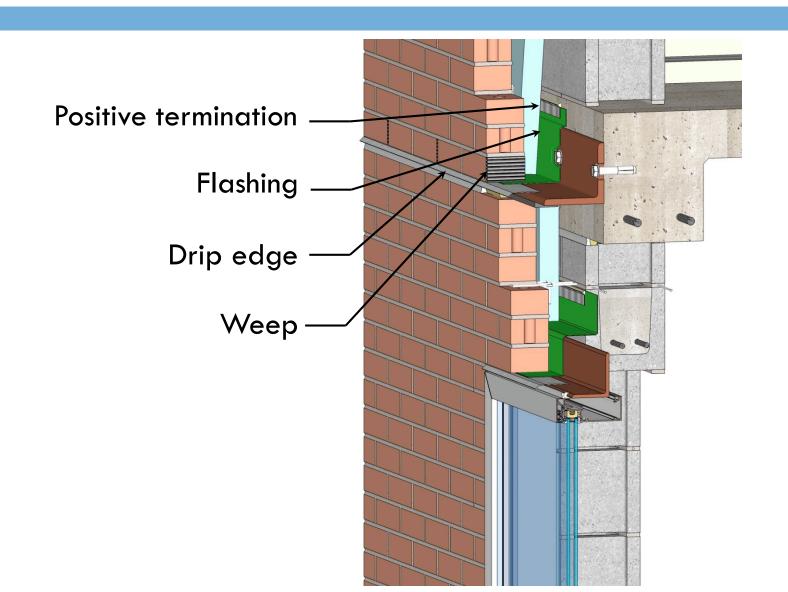


Brick support



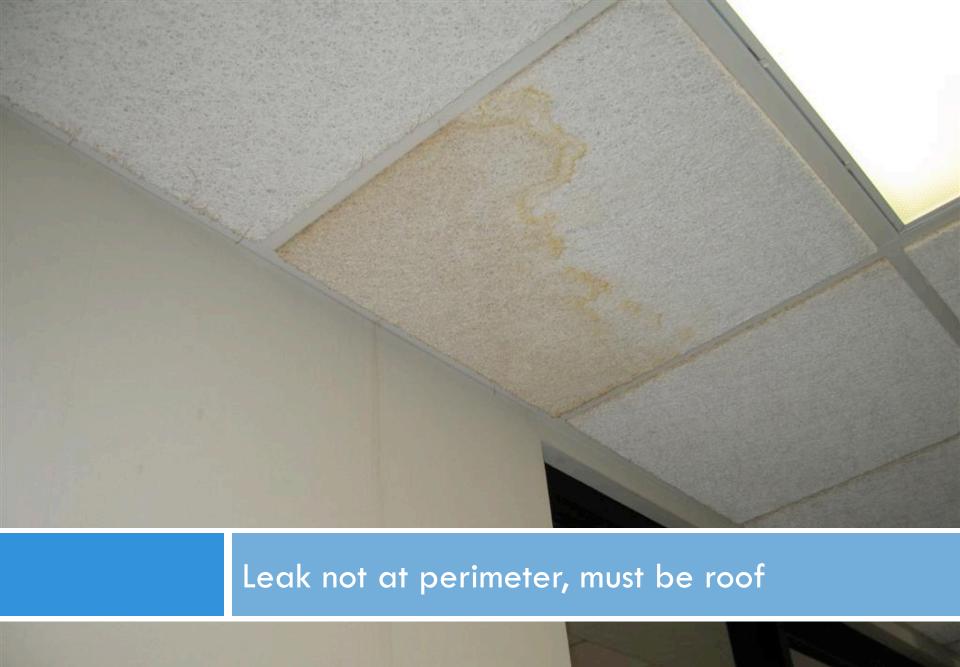
Steel angle replacement

Shelf Angle & Lintel



Rising Wall Flashing

- Critical detail
 - Occupied space typically directly below
- Positive termination
- Back dam sloping out





Follow leak up

Improper detail



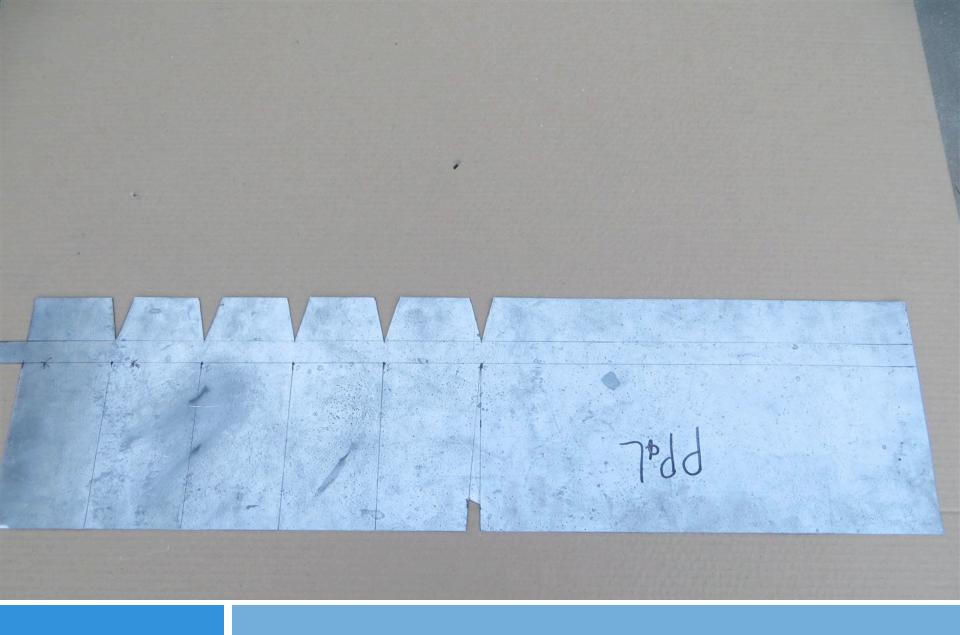


Mass masonry rising wall



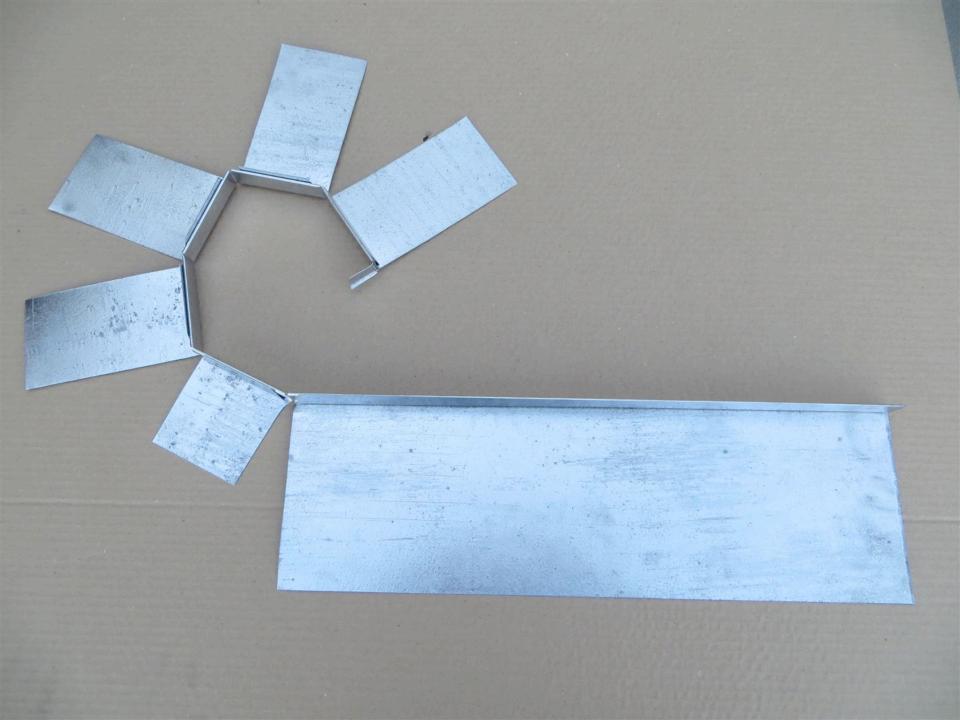
Double-wythe flashing





Complexity of flashing









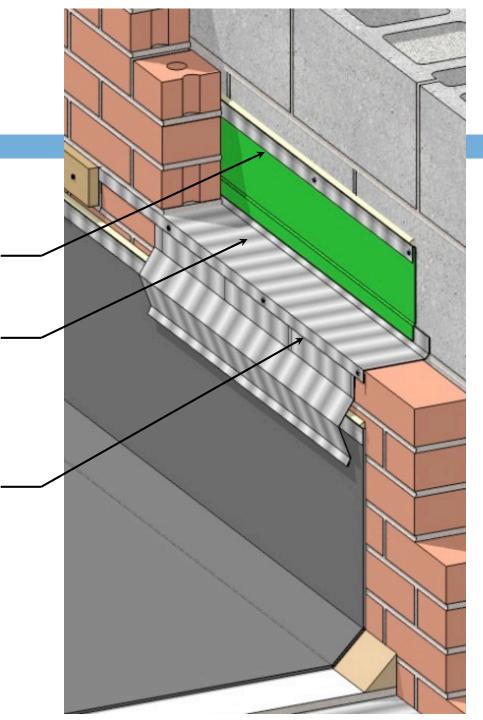


Rising Wall

Positive termination

Through-wall flashing

Counterflashing receiver



Sill Flashing

- □ Second line of defense
- □ End dams important
- Evacuate water once window sealants fail



Water infiltration & deterioration



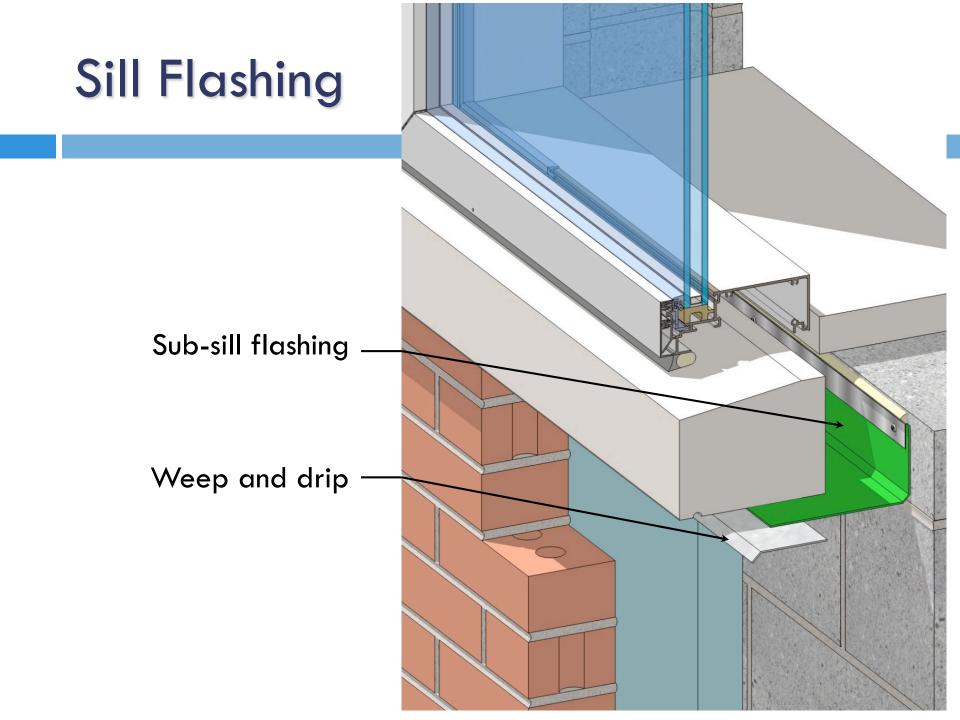
Don't value-engineer flashing out

Cracks & brick failure



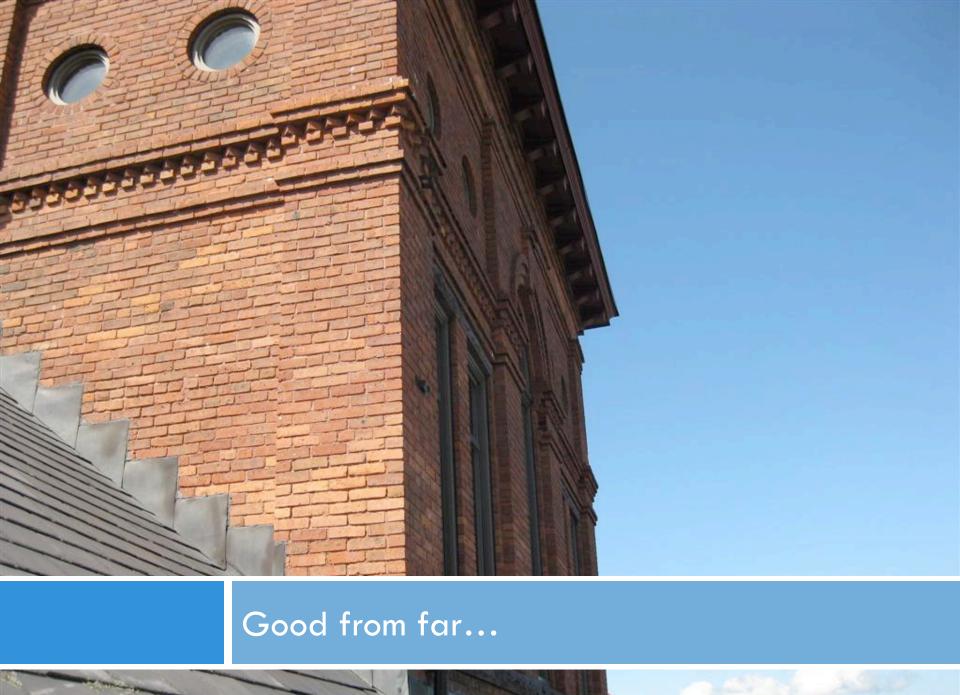


Copper fabric thrown in. How is unqualified bidder going to get it correct in restoration



Step Flashing

- Mass masonry and cavity walls
- Requires careful detailing
- Steep roof to wall interface
- Limit surface mounting only





...but far from good



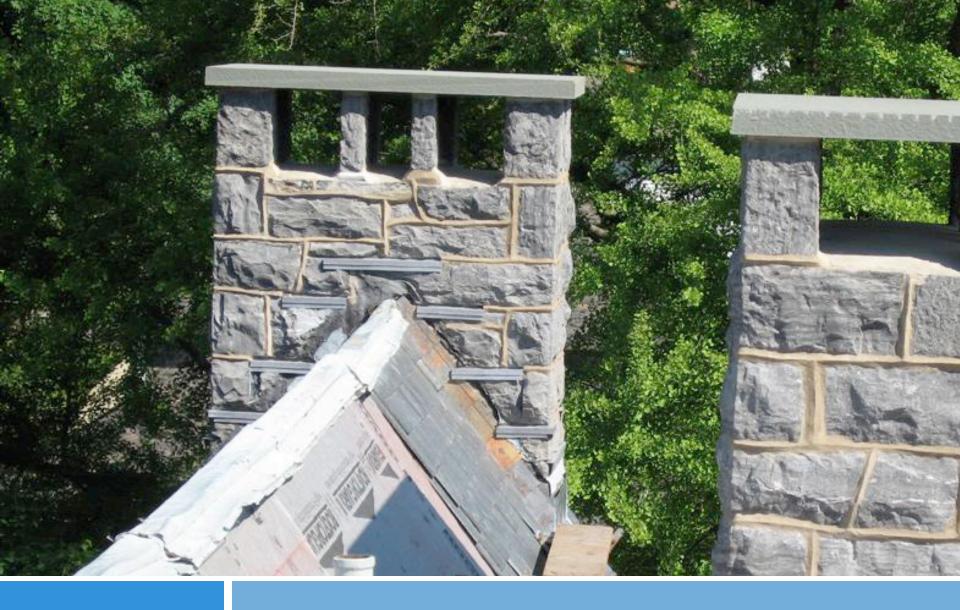
Step pans



Overlap and weep



Stop difficult leaks



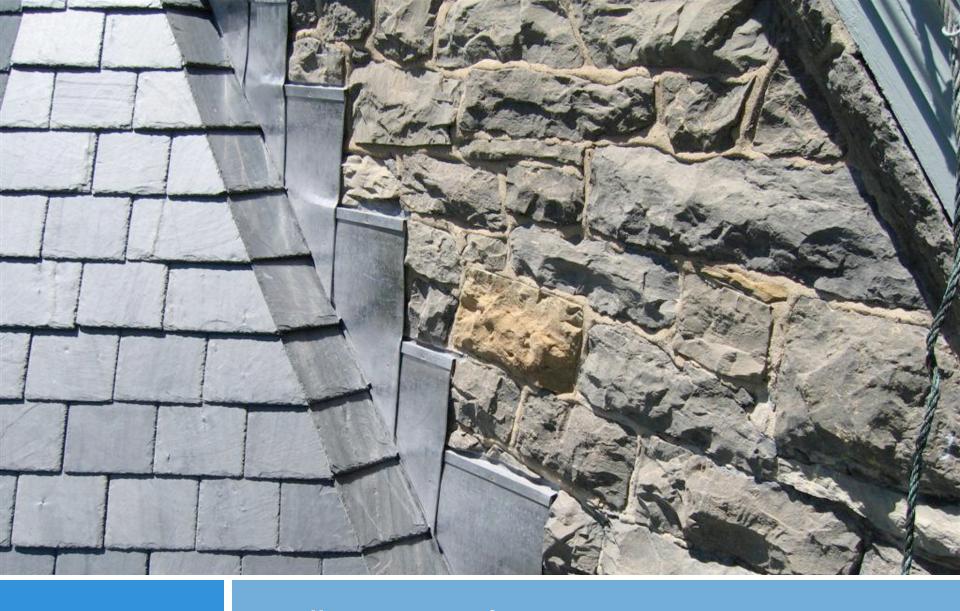
Regleted step flashing



Lead wool

Long-term option for difficult access locations



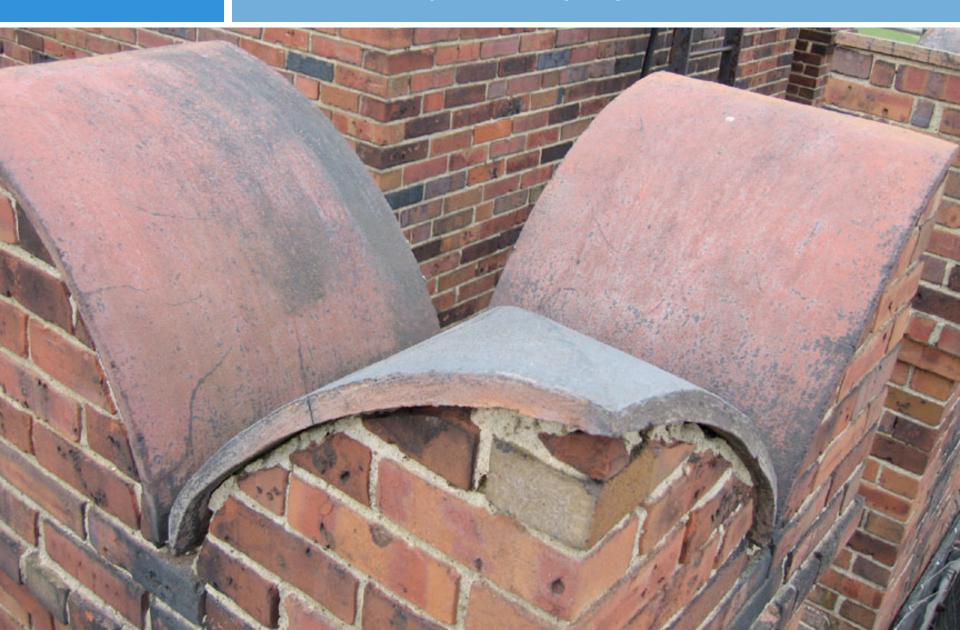


Excellent option for mass masonry

Special Circumstances

- Attention to detail
- Creative approaches
- Ensure coordination with roofing
- Many other locations to flash aside from typical locations covered

Effects of exposed coping





Valley flashing & seal



Sheet lead for difficult geometry





Column stub

Integrate with through-wall flashing





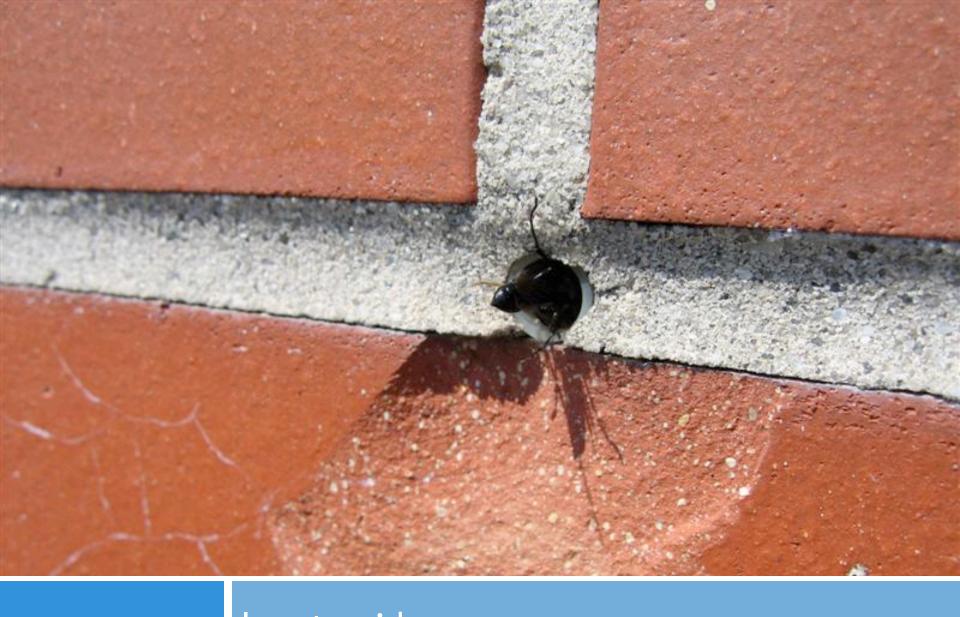
Supersized end dam

Weeps

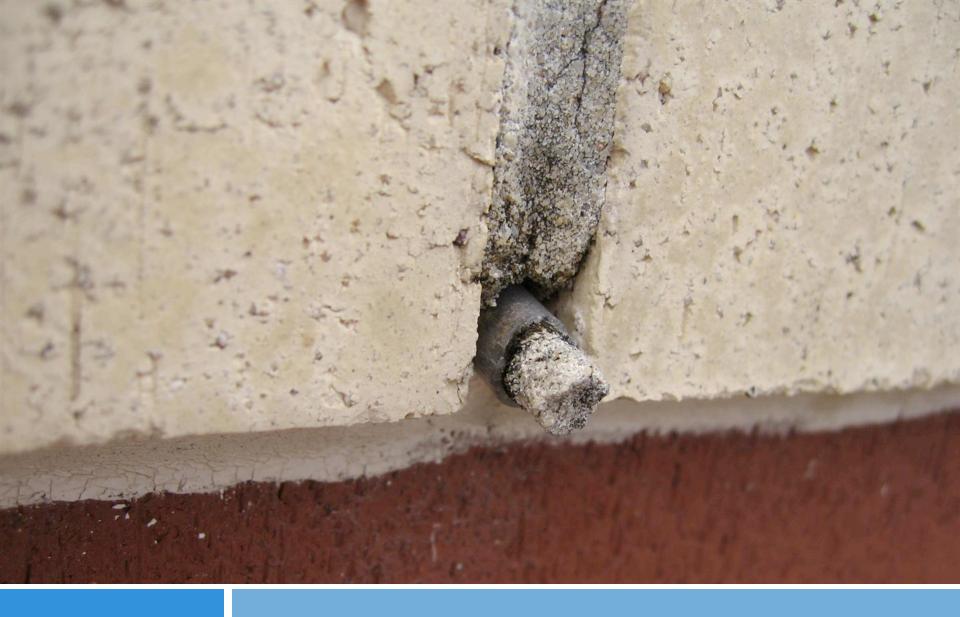
- Not a minor irrelevant detail
- Mortar droppings can foul cavity
- Important to flashing performance
- □ A common failure



Brittle



Insect residence

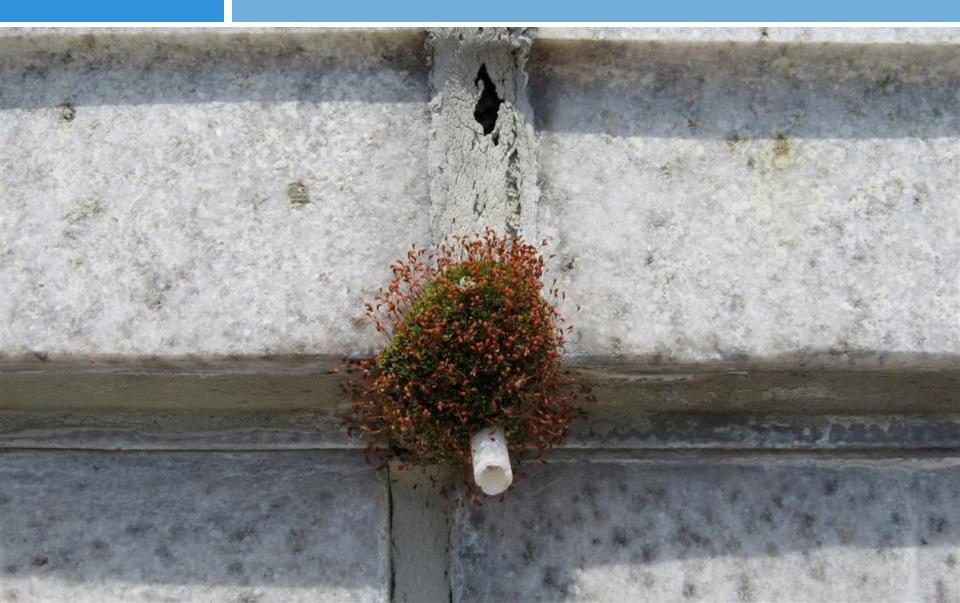


Full of mortar

No flow



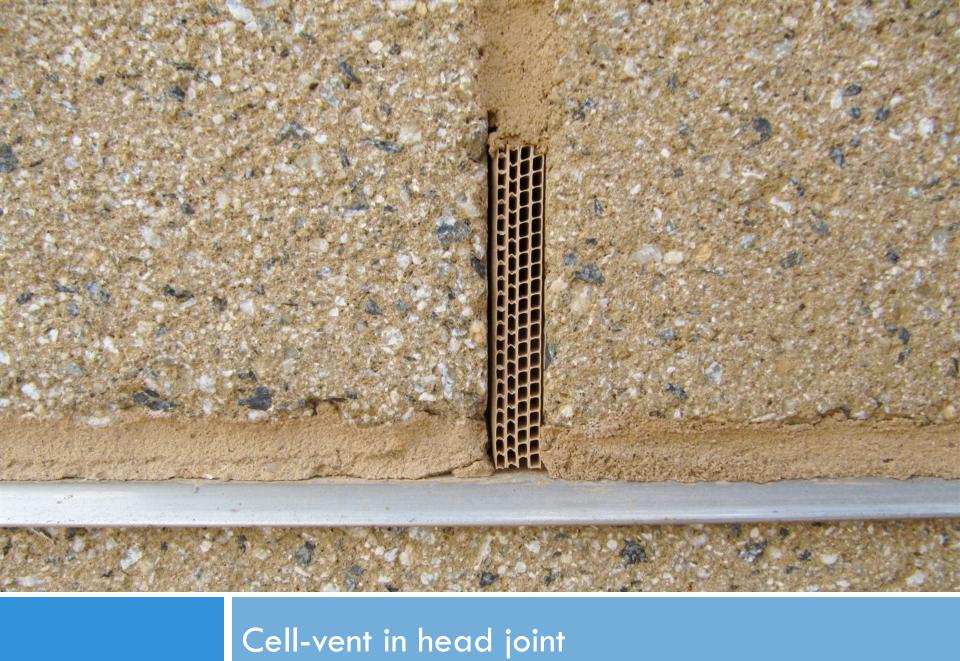
Growth





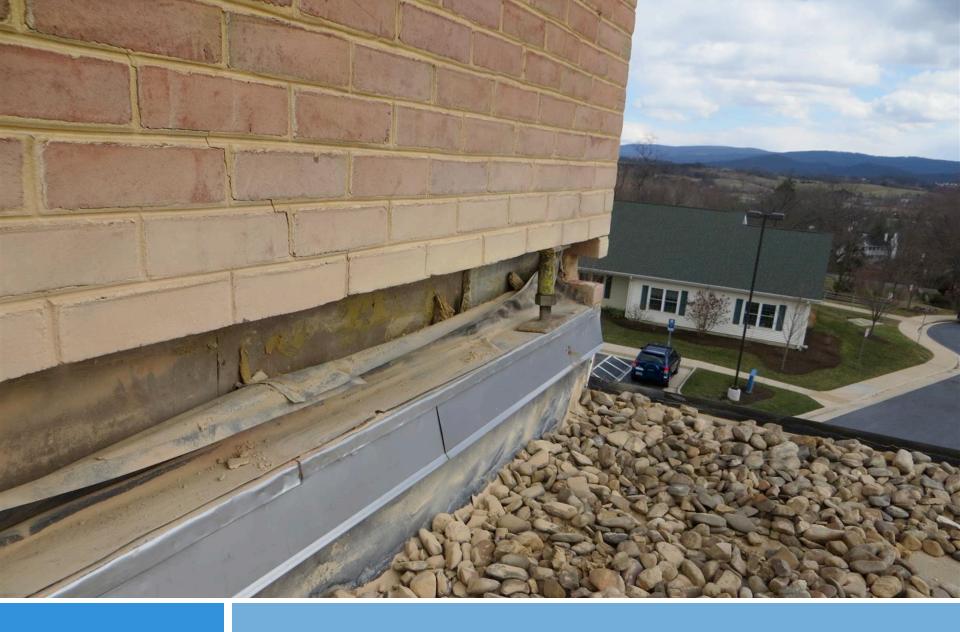
"Simulated" weep





Flashing Principles NOT Applied

- Repairs improperly implemented
- □ Failures repeated
- Wasted money



Flashing replacement already completed once



Flashing not properly terminated in the cavity



Plastic flashing was not sealed at lap joints



No continuity

Summary

- Implement fundamental flashing principles first
- Must understand cause, before problem can be corrected
- Poor flashing costs owners millions of dollars each year
- Historic and modern buildings can benefit from flashing to manage inevitable water infiltration and improve building performance

Course Evaluation

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