Uncontrolled rainwater penetration and condensation are two of the most common threats to building enclosure performance.

Together, they represent up to 80% of all construction-related claims in the United States.

from Dan Lemieux from WJE in DC

What we have to control and plan for in buildings:

1. **Water**
2. **Air**
3. **Vapor**
4. **Thermal**

from Dr. Joseph Lstiburek of Building Science Consulting

Through-Wall Flashing Selection and Installation

Presented by: Craig Wetmore, CSI, CDT

AIA Course: YORK16
GBCI CMP Course: 0090005315

YORK Flashings™

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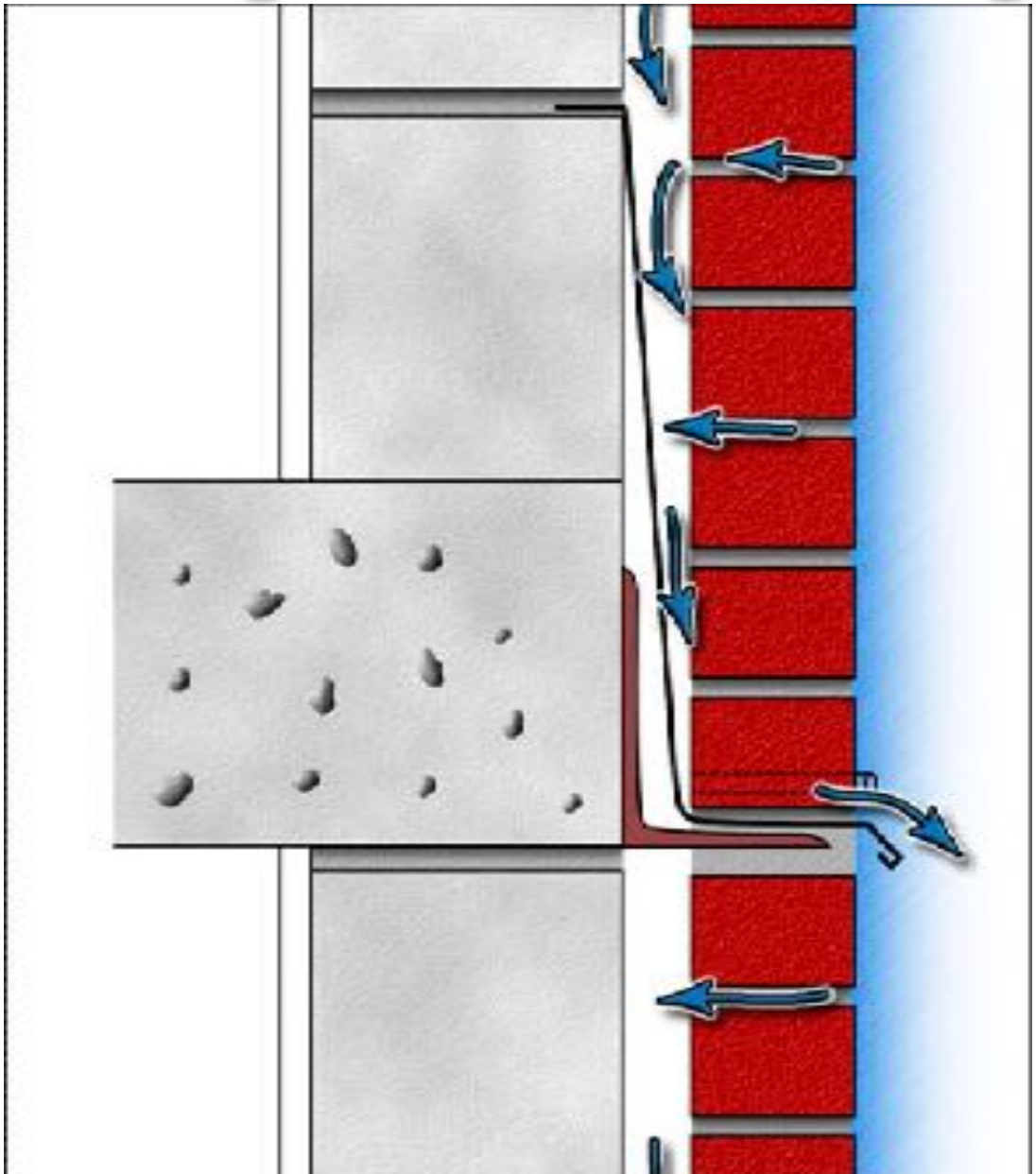
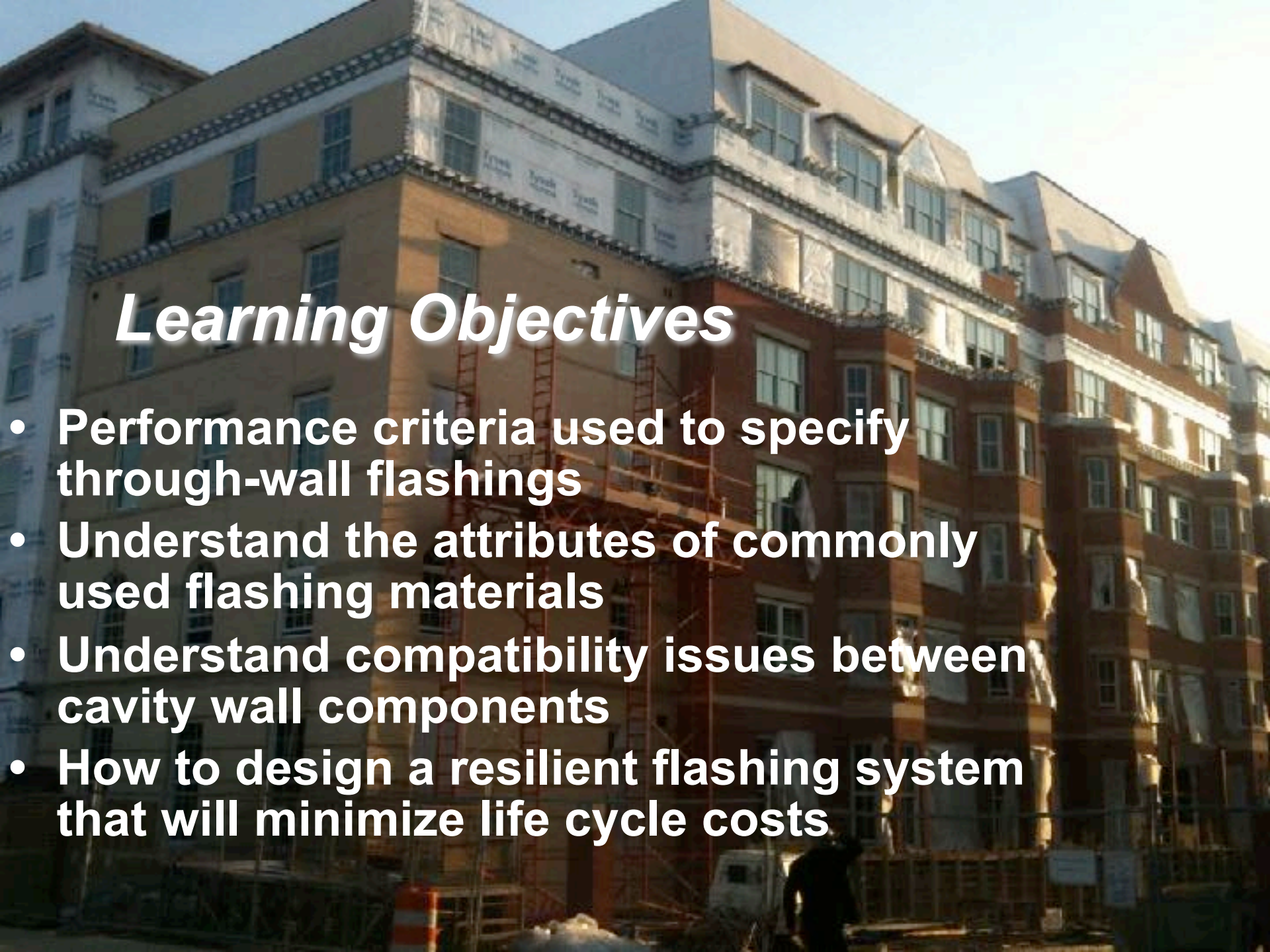
Course #0090005315

Through-Wall Flashings





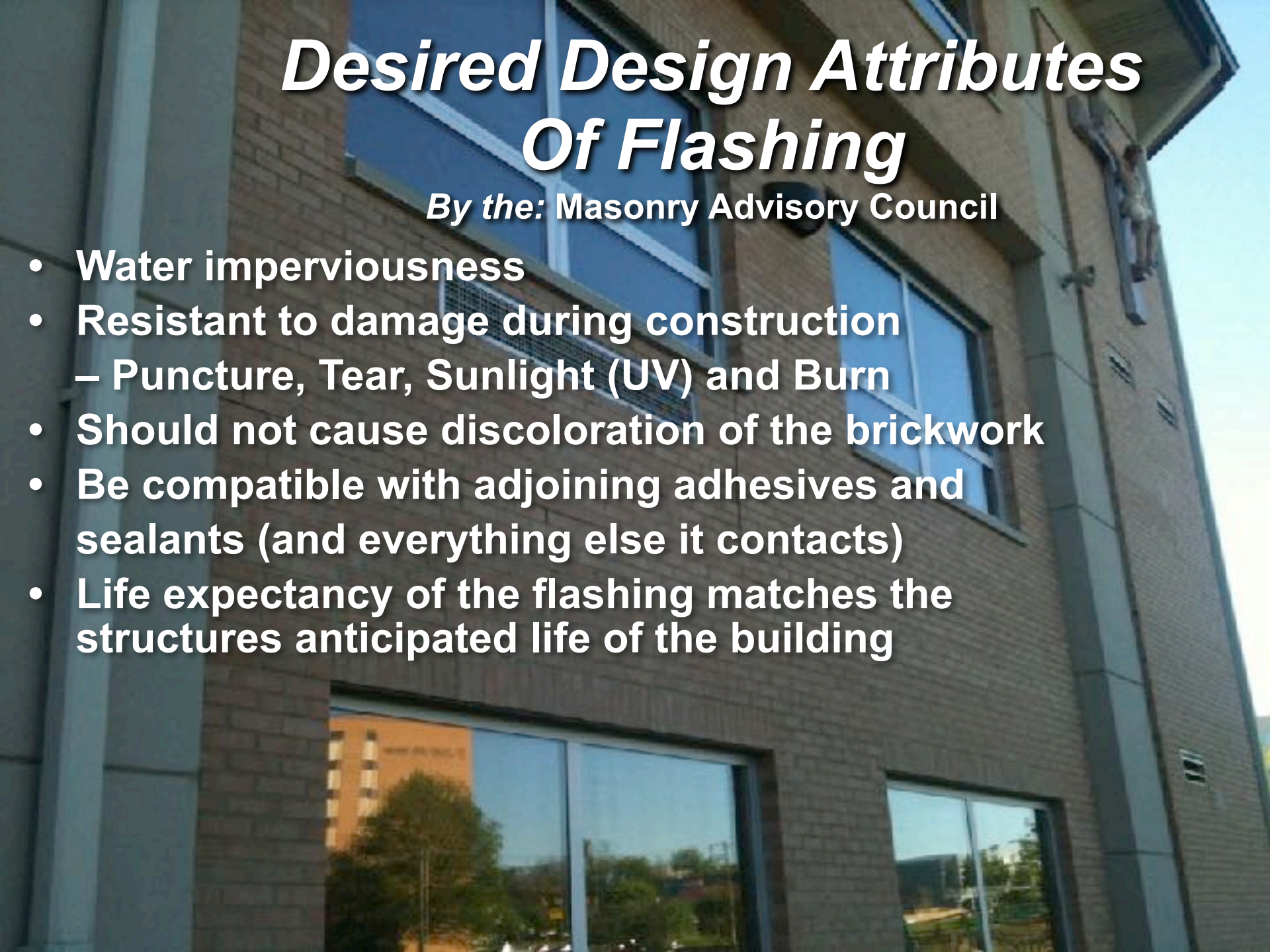
Learning Objectives

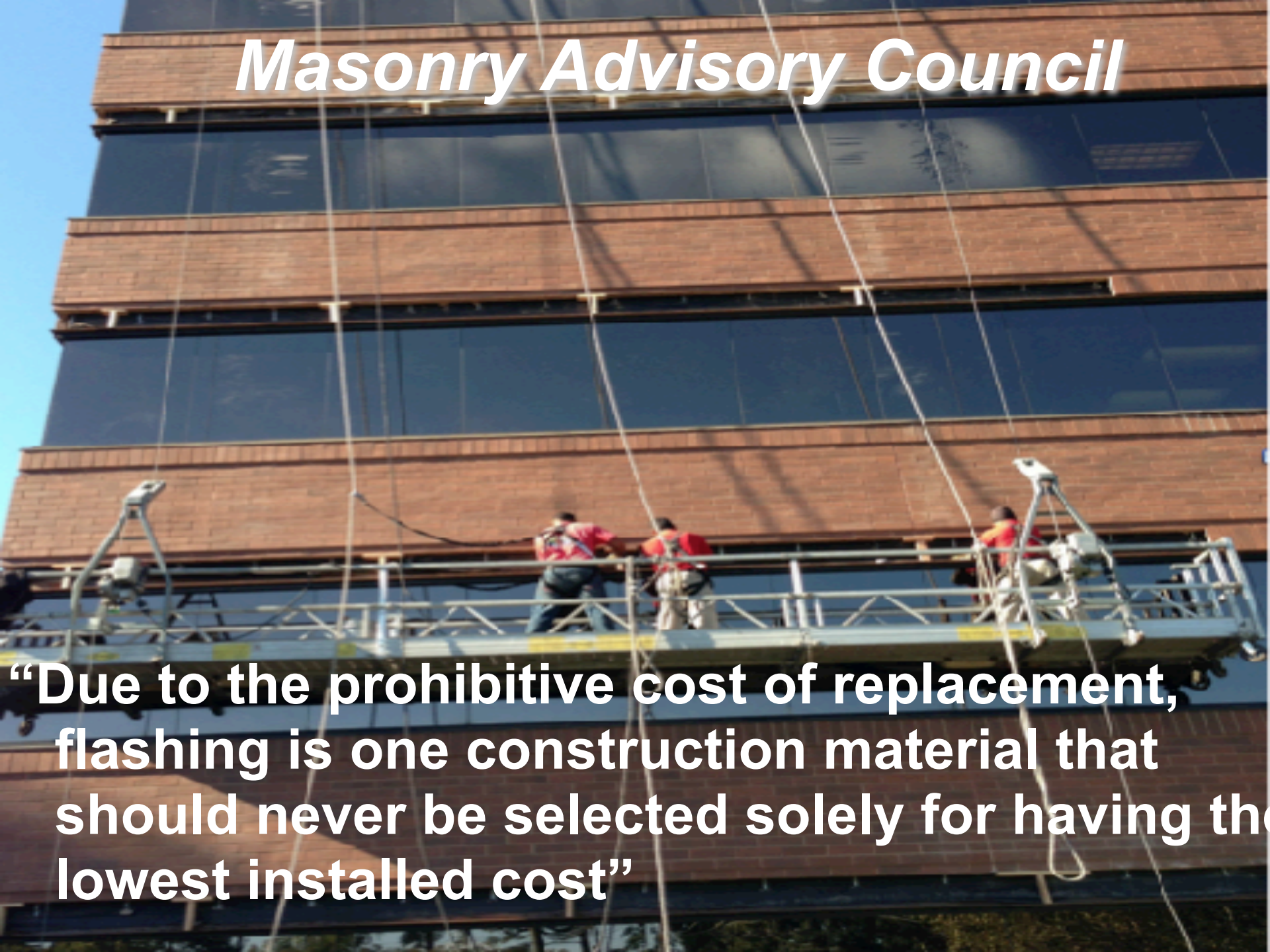
- Performance criteria used to specify through-wall flashings
- Understand the attributes of commonly used flashing materials
- Understand compatibility issues between cavity wall components
- How to design a resilient flashing system that will minimize life cycle costs

Desired Design Attributes Of Flashing

By the: **Masonry Advisory Council**

- **Water imperviousness**
- **Resistant to damage during construction – Puncture, Tear, Sunlight (UV) and Burn**
- **Should not cause discoloration of the brickwork**
- **Be compatible with adjoining adhesives and sealants (and everything else it contacts)**
- **Life expectancy of the flashing matches the structures anticipated life of the building**




Masonry Advisory Council
"Due to the prohibitive cost of replacement, flashing is one construction material that should never be selected solely for having th lowest installed cost"

Cavity Wall Components

Cavity Wall Components

Air Barriers:

- Required by:
  - ASHRAE 90.1-2010 (Sept. 2010)
    - LEED v.4
- Types
  - Liquid Applied: Asphalt, Acrylic, Silicone, etc…
  - Membrane: Asphalt, Butyl
    - Primer compatibility
  - Spray Polyurethane Foam
  - Building Wraps/Papers

Cavity Wall Components

Insulations:

- Polystyrene, Polyisocyanurate, Spray Polyurethane Foam, Mineral Wool

Sealants:

- Mastic, Emulsion Mastic, Butyl, Polyether, Polyurethane, Silicones, etc…

Transition membranes:

- Asphalt, Butyl, Fabric

Through-Wall Flashings

- Plastics (PVC)
- Self-Adhesive Rubberized Asphalt (Peel & Stick)
- EPDM
- Flexible Metals
- Rigid Sheet Metals

PVC Flashings

PVC

- Plasticizers
- BIA min. 30 mil for *short term buildings*
- UV sensitive, must use drip edge
- Not to be in contact with solvents
- Not recommended as a through-wall flashing

Peel & Stick Flashings

Peel & Stick

8 MILS
Cross Laminated Polyethylene Sheet
with a 30 Day UV Exposure Limit
(The Workhorse of the Total Product)

4 MILS (Each Side)
APP or SBS Polymer Enhanced
Asphalt for Adhesion

24 MILS
Emulsion of Ashpalt
Containing various organic
fillers (clay/dirt) to build bulk

PCK or Polypropylene
Release Sheet

Peel & Stick

- Spanning a gap
  - Cannot span a gap of 1/4”
  - Gaps must be reinforced
  - Drip edge required
- UV Sensitive (30 day)
  - Drip edge required
- Prime exterior surfaces
- Install termination bars

BIA Tech Note #7

- **Select flashing that is waterproof, durable, UV resistant and compatible with adjacent materials**
- **Use a metal drip edge to extend flashings that degrade when exposed to UV light**

PVC KEE

Poly Vinyl Chloride Ketone Ethylene Ester

PVC KEE

- Thermoplastic
  - KEE polymer (type of solid plasticizer)
- Short history as a flashing
- Most roofing systems are heat welded at joints
- Types:
  - Self adhered: 25 mil sheet with 15 mil asphalt
  - Membrane: 40 mil sheet
- Cannot span a gap ¼”+
- Low puncture and tear resistance

EPDM

ETHYLENE-PROPYLENE-DIENE MONOMER

EPDM

- Thermoset rubber
- Well known roof material
- Multiple component installation
- BIA Tech Note 7
  - Dimensional stability may be a concern
  - 2% shrink acceptable per ASTM D1204
- Cannot span a gap +¼”
- Compatibility issues
  - Asphalt (air barriers/damp proofing)
  - Oils/Solvents (mastics/spray foams)

SPF Heat Issues

- Spray Polyurethane Foam can damage synthetic flashing materials due to the exothermic reaction when curing

Flexible Copper Flashings

Copper Fabric Flashing

- Asphaltic coated copper covered in Mica Dust (a bond breaker), which is not compatible with:
  - Air barriers
  - Spray polyurethane foam
  - Polystyrene insulations
    - Mastic (20%-40% solvents)

Copper Fabric Flashing

Non-Asphaltic copper flashing:

- Stronger than synthetic flashings
- Longer rolls for less laps
- Compatible with:
  - Air barriers
  - Sealants
  - Insulations
- Color coded

Flexible Stainless Steel Flashings

Flexible Stainless Steel Flashing

- Sheet of 304 stainless steel (2 mil maximum)
- Compatible with sealants & air barriers
- Strongest flexible through-wall flashing
- Able to span the cavity air gap
- Fire resistant
- Life of the wall performance
- UV stable

Flexible Stainless Steel Flashing

- Type 316 – Severe Environments
  - Close to the ocean
  - Chemical environment

Flexible Self-Adhering Stainless Steel Flashings

Self-Adhering Stainless Steel

- Sheet of 304 stainless steel
- Butyl adhesive
- Used as:
  - Through-Wall Flashing
  - Transition Flashing
  - Parapet Flashing
  - Lap tape
  - Sill pans

Sill Pan Flashing

- For windows and doors
- Collects and exhausts water out of the wall

Drainage Plane Flashings

Drainage Plane Flashing

- Flashing:
  - Copper
  - Stainless steel
- Drainage plane fabric
- Fabric is a continuous weep
- Does not need mortar netting

Rigid
Sheet
Metal

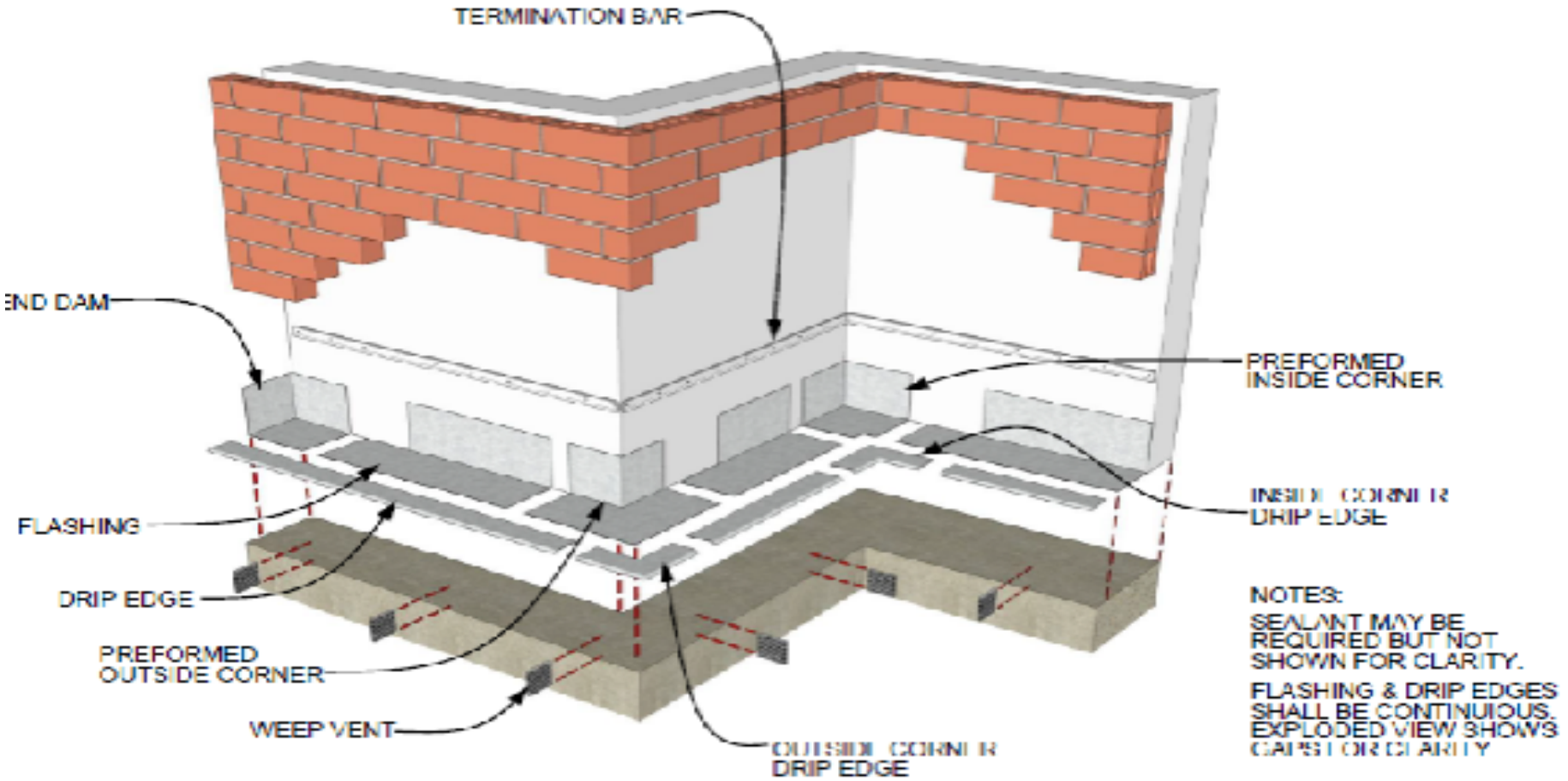
Rigid Sheet Metal

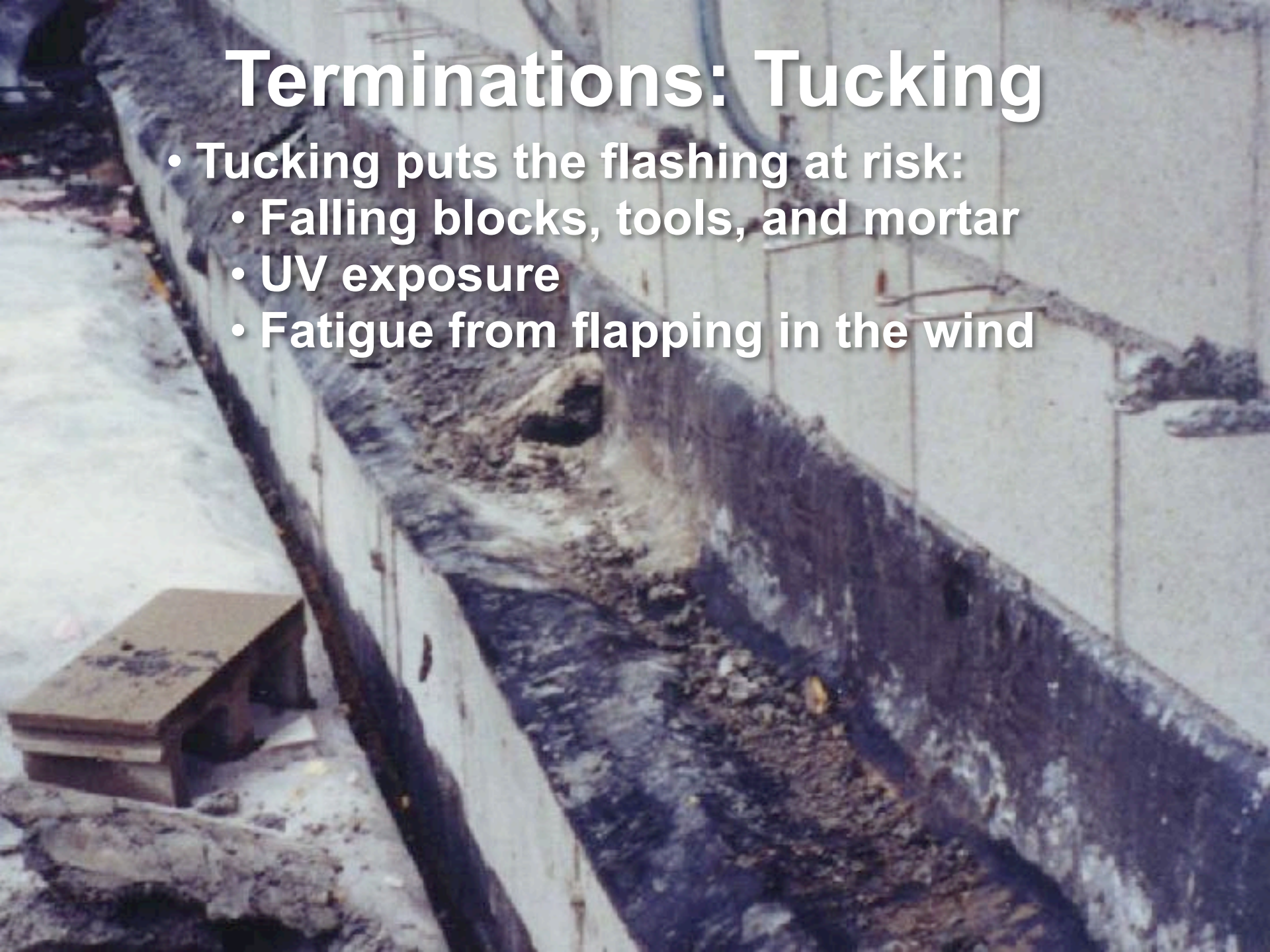
- Choices of Copper or Stainless Steel
- Mechanically bent
- Soldered or welded
- Highest material, waste and labor costs
- Longevity

Longevity

Accessories

- Terminations
- Sealants
- End Dams & Corners
- Weep Vents
- Mortar Deflection





Terminations: Tucking

- Tucking puts the flashing at risk:
  - Falling blocks, tools, and mortar
  - UV exposure
  - Fatigue from flapping in the wind

Termination Bars

- **Materials:**
  - **Stainless Steel**
  - **Plastic/PVC**
  - **Aluminum**

Termination Clamp

- Installs in the backer wall
- Minimizes flashings exposure
- Compared to termination bar
  - Less dependent on sealant
  - Quicker and easier to install

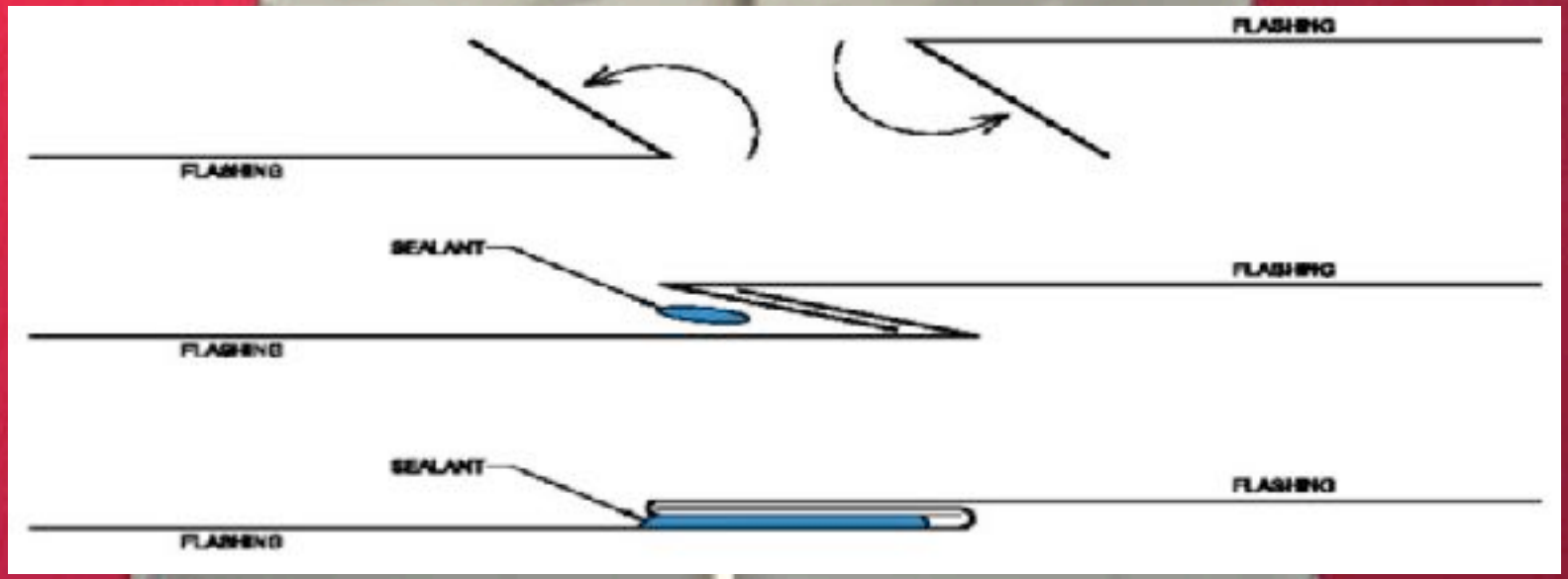
Sealants

- Be specific on what you want
- Chemical compatibility with <u>all components</u>
  - » Get it in writing
- Polyurethanes: no contact with asphalt
  - Air barriers, tapes, flashings, underlayments, roofing materials
  - No contact with PVC, Vinyl, XEPS, or EPS foam
- Water based latex sealant should not be used
- Polyethers, butyls and some silicones recommended

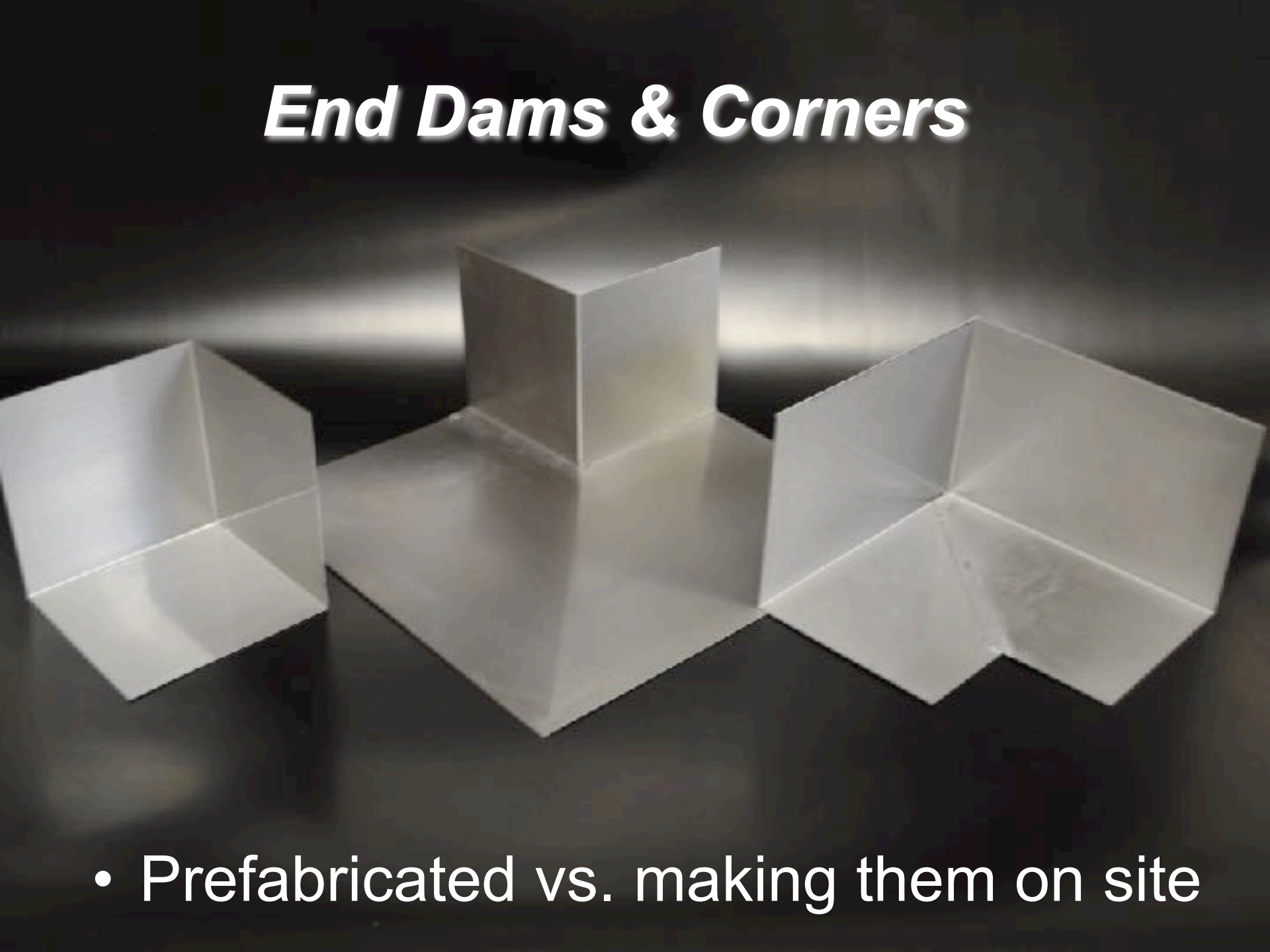
Lap Joints

- **Number of laps in 100’ section:**
  - **Copper Fabric Non-Asphalt: 1**
  - **Flexible Stainless Steel 1**
  - **Drainage Plane Copper: 2**
  - **Copper Fabric Asphalt: 4**
  - **Peel & Stick: 17**
  - **EPDM self adhered: 17**

Lap Joints


FLASHING
FLASHING
SEALANT
FLASHING
FLASHING
SEALANT
FLASHING
FLASHING

End Dams & Corners



- Prefabricated vs. making them on site

Weep Vents

- Always above grade
- Should be placed on top of flashing, not on top of the mortar (BIA TN21B) no more than 24” apart
- Tubes and open joints get clogged
- Use materials made for the life of the wall

Drip Edges

BIA Tech Note #7

- **Must be continuous**
- **Made of a non-corrosive material**
  - **Stainless steel**
  - **Copper (be careful of patina staining)**
- **Must extend out to at least the leading edge**

Weep Vent Protection Devices

– Netting devices
  - Keeps mortar droppings from blocking the flow of water to the weep devices
  - Flashing must be 6” higher than netting
  - Must fill entire width & depth of cavity

Weep Vent Protection Devices

- Drainage filter fabrics
  - Keeps mortar droppings, dirt and debris from blocking weeps
  - Reduces efflorescence
  - Insect barrier
  - **One size fits all**

Flashing Must be Sealed Down

- Don’t lay your flashings and/or drip edges down dry….Place them in a bed of compatible sealant

Conclusion/Questions

- Puncture resistance and tensile strength are “Critical to Quality” properties of through-wall flashings that are measurable and comparable.
- Add longevity, compatibility and ease of installation to selection criteria and increase each of these values as the life expectancy and complexity of the project increases.

*This concludes the AIA/CES Systems Program

GBCI CMP

CONTINUING EDUCATION AIA


What is wrong with this picture?

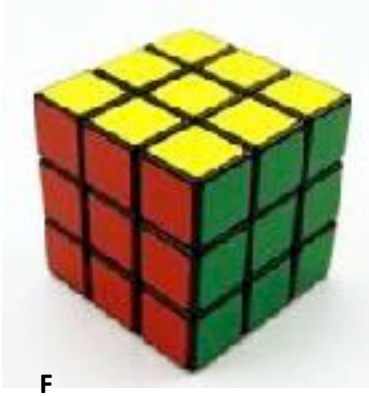
Performance Characteristics

	Rubberized Asphalt	Asphaltic Fabric 5oz Copper	Multi-Flash 5oz Copper	Multi-Flash Stainless Steel
Puncture (PSI) (ASTM E154)	80	390	780	2,500+
Tensile (ASTM D412)	1,200	32,000	32,000	100,000+
UV exposure (days)	30	30	60	Unlimited
Fire Resistant (ASTM E84)	Not Tested	Not Tested	Pass	Pass
Mold Resistant (ASTM D3273)	Not Tested	Not Tested	Pass	Pass
Recycled Content	1%	90%	90%	60%
Recyclable Material	No	Yes	Yes	Yes
Warranty (average)	5 year	none	Lifetime	Lifetime

ARE THEY GREEN?

	Max Recycled Content	Recyclable	Maximum Warranty
PVC	80%	Yes	5 years
Peel & Stick	1%	No	5 years
EPDM	3%	No	10 years
Copper	90%	Yes	Lifetime
Stainless Steel	60%	Yes	Lifetime

Are They Compatible?



		AIR BARRIERS & INSULATIONS					
		Spray Polyurethane Foam	Liquid Applied Asphaltic Air Barrier	Liquid Applied Acrylic Air Barrier	Membrane Applied Asphaltic Air Barrier	Polystyrene Foam Insulation	Maximum Warranty
F							
L	Asphaltic copper fabric						None
A	Non-asphaltic copper fabric						**Lifetime**
S	Stainless Steel fabric						**Lifetime**
H	Copper Drainage Plane						**Lifetime**
I	EPDM						10 years
N	PVC						5 years
G	PVC KEE Self Adhered						10 years
S	Peel & Stick						5 years

NOT COMPATIBLE

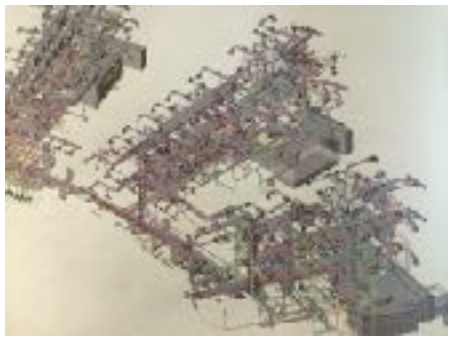
CAUTION

COMPATIBLE

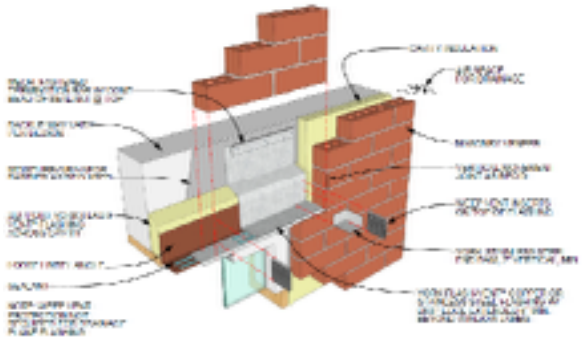
SPECIFIER'S NOTE: ALL MANUFACTURERS OF AIR BARRIER, INSULATION, SEALANT AND FLASHING PRODUCTS SHOULD PROVIDE LETTERS OF COMPATIBILITY FOR THESE PRODUCTS IN COMBINATION WITH EACH OTHER

YORK Flashings™

- Life of the Wall Warranty
  - Zero Lifecycle Cost
- Health Product Declaration (HPD's):
  - Multi-Flash: copper and stainless steel
  - Flash-Vent: copper and stainless steel
  - York 304: self-adhering stainless steel



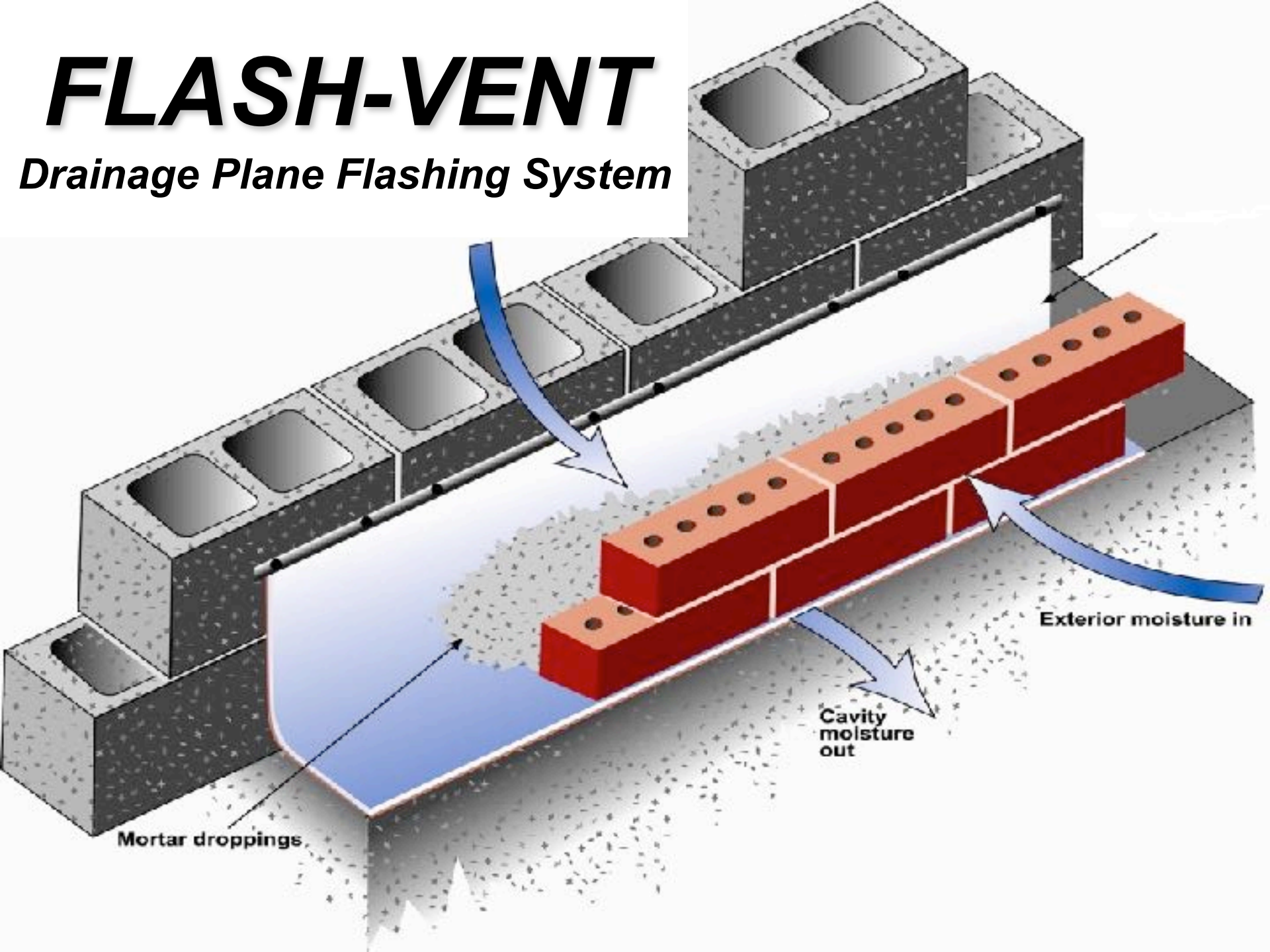
BIM Objects



Details

FLASH-VENT

Drainage Plane Flashing System



2004 FLASH-VENT DEMO

Cost Comparison: 1/4/2016

• Peel & Stick 24“ width flashing	$1.08 PLF
• Stainless steel drip edge	$0.98 PLF
• Termination bar	$0.37 PLF
• Primer	$0.23 PLF
• Mortar Deflection Device	$1.35 PLF
Peel & Stick total material cost	**$4.01 PLF**

• ***Flash-Vent*** SS 16” width flashing	$3.61 PLF
• Termination bar	$0.37 PLF
Flash-Vent total material cost	**$3.98 PLF**

Cost Comparison: Labor

Installation based on mason hourly rate of $32.10 per hour (national average) for an eight foot section.

- **Peel and Stick - 32 minutes @ $0.535/min = $17.12 or $2.14 PLF**
- ***Flash-Vent* system -17 minutes @ $0.535/min = $9.10 or $1.14 PLF**

Cost Comparison: Total

- **Total installed cost per lineal foot:**

Peel-and-Stick -	**$6.15 PLF**
Flash-Vent SS -	**$5.12 PLF**
Cost Savings -	**$1.03 PLF**

- **Warranty**
  - **Peel & Stick –** **5 years**
  - **Flash-Vent SS–** **Life of the wall**

Flash-Vent

- **Mold:**
  - Passes ASTM D3273
  - Passes ASTM G21

- **Flame spread and smoke generation:**
  - Passes ASTM E84
    - Class A material

MULTI-FLASH

Copper or Stainless Steel Flashings

Weep Armor

- Geotextile filter fabric
  - Keeps weep vents clear of debris and mortar
- Hydrophobic
- Lowest cost weep protection system

UniverSeal US-100

Roofing Contractor Magazine

"As contractors and specifiers become familiar with the attributes of polyether MS type sealants, they will rapidly displace the older, more familiar, technologies that now dominate the sealant market."

Polyether Sealants

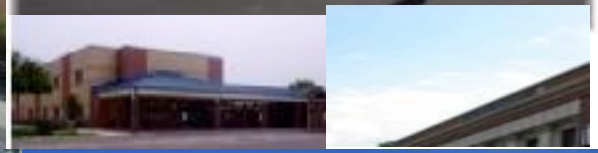
- Meets all VOC requirements
- No solvents
- 100% Solids
- Compatible with almost all building components
- Approved for use with polystyrene by.
  - Owens Corning
  - Pactiv
  - Dow

Spec Check-Up

- Free service offered by York
- Send York your specifications for
  - Masonry flashings
  - Air Barriers
  - Wall insulations





GBCI CMP

Course #0090005315


What is wrong with this picture?

Inspection

With No Inspection…
There Is No Correction.