

Controlling Rain Penetration

- **Deflection**
 - reduce water on building
 - redirect water away
 - slope surfaces, use flashing
- **Drainage / Exclusion / Storage**
 - enclosure design
 - provide drainage, or storage or barrier
- **Drying**
 - allow any remaining water to dry

Deflection

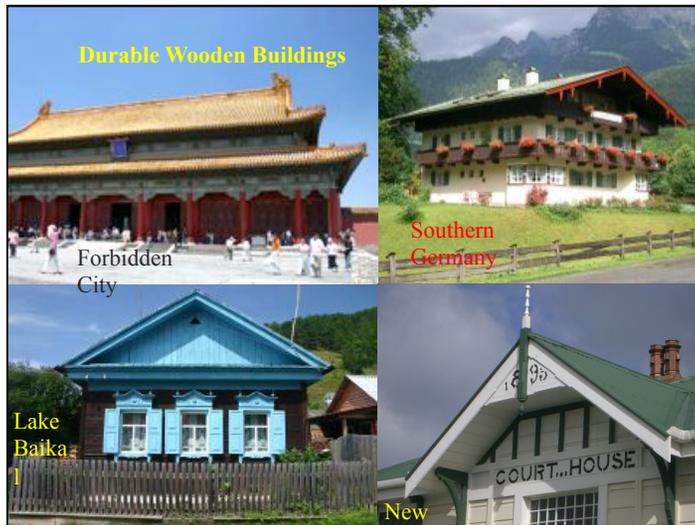
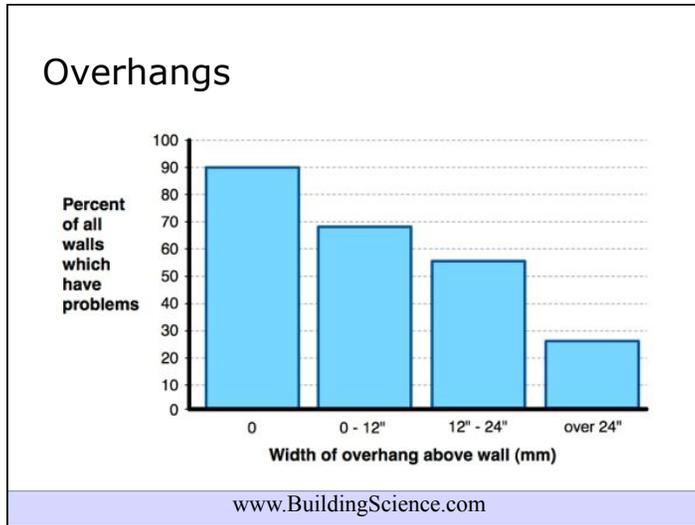
- **Surface & site features are also important**

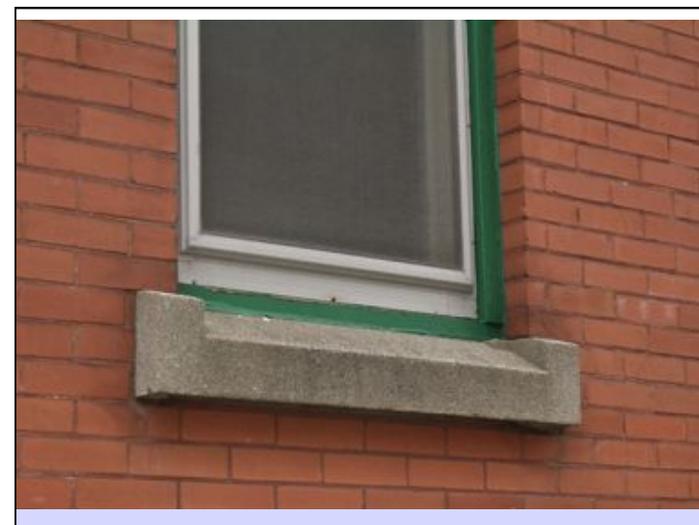
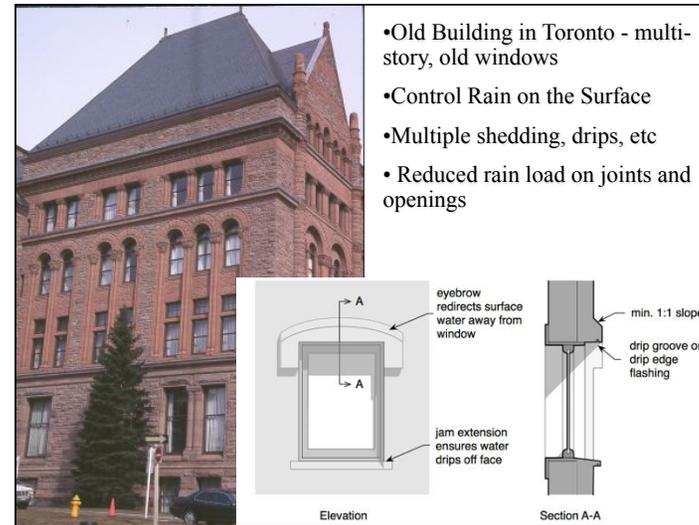
The diagram illustrates rain deflection from a building's overhang. Rain is shown falling from the sky and being deflected by the overhang. Labels include 'Overhang' pointing to the roof edge, 'Drips at Opening Heads & Sills' pointing to the underside of the overhang, and 'Splash Height' with a '200 min' dimension indicating the distance from the overhang to the ground.

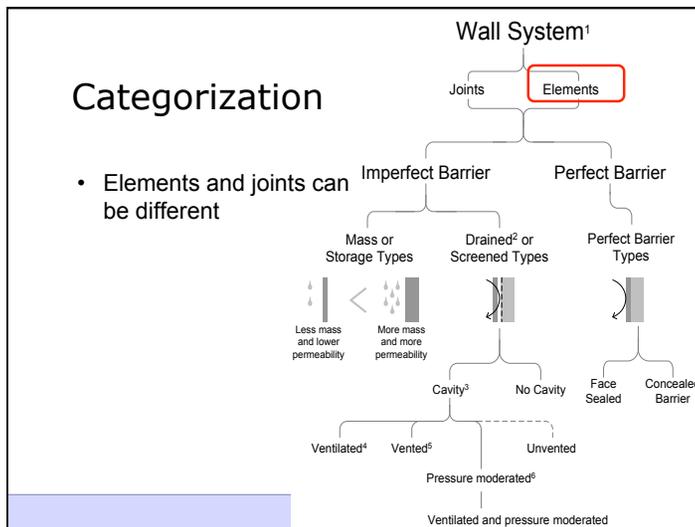
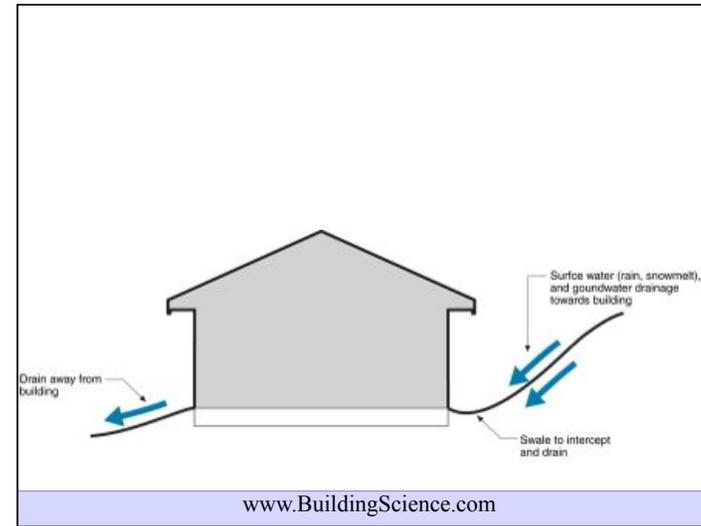
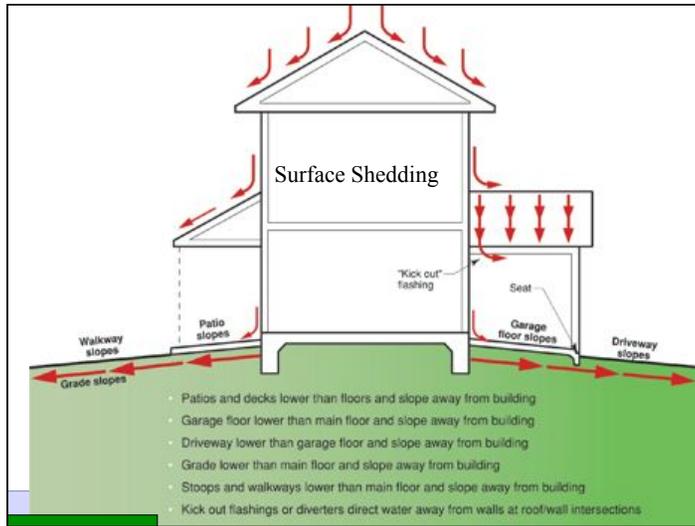
Rain Deposition and Wind Flow Patterns

The diagram shows wind flow patterns around a building. On the left, a curved wall is shown with wind flow lines. In the center, a 3D box represents the building with blue arrows indicating wind flow around it. On the right, a 2D cross-section of the building shows wind flow lines and a blue shaded area representing rain deposition on the roof and walls.











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Claddings that leak

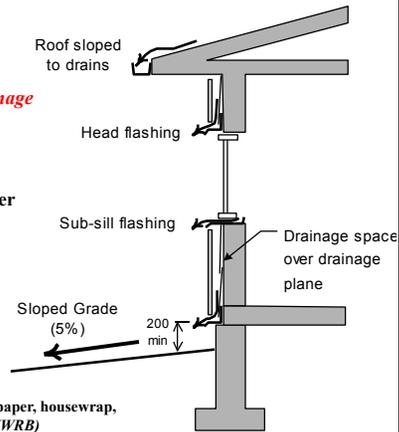
- Brick
- Stucco
- Wood, vinyl, fiber cement
- Adhered veneer
- EIFS
- Metal panels, metal roofs
- Shakes, shingles

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Drainage

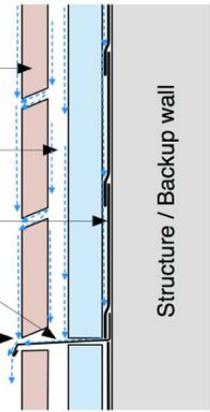
- Must have *continuous drainage plane*
- Drainage plane must be:
 1. Water tolerant
 2. Capillary inactive (water repellent / non-wicking)
- Small *gap* required
 - As small as 1 mm
- *Flashing* is very important
- *Weep holes*

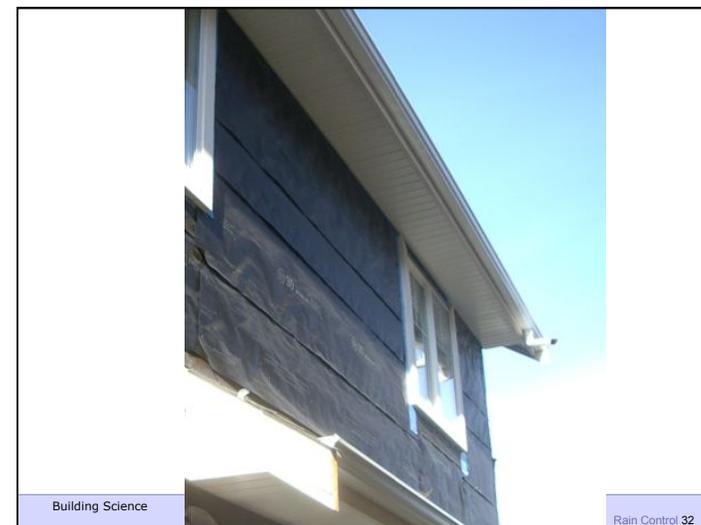
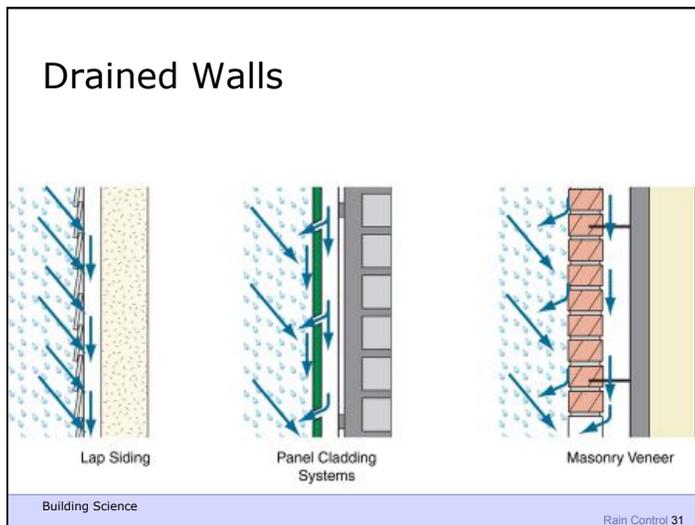
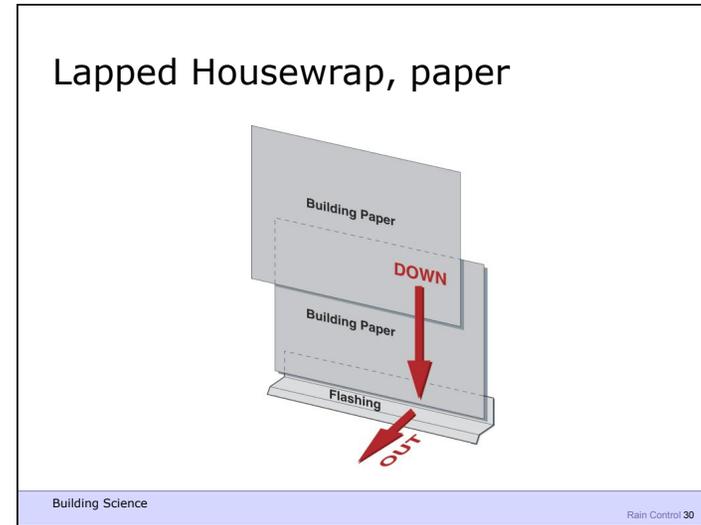


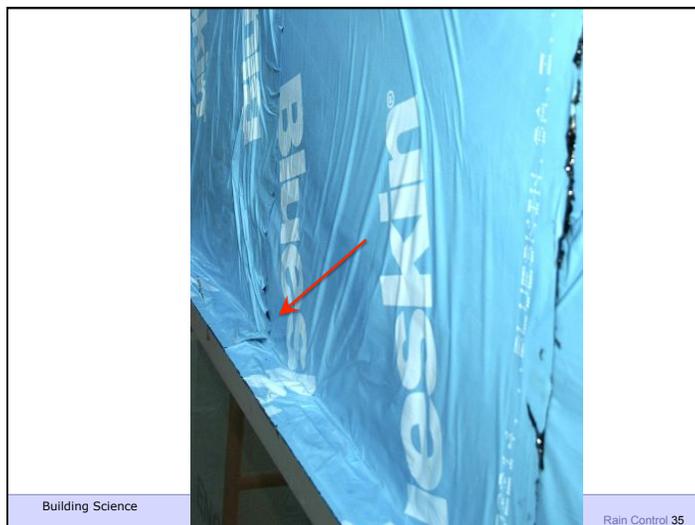
Terms: sheathing membrane, building paper, housewrap,
Stupid terms: weather resistant barrier (WRB)

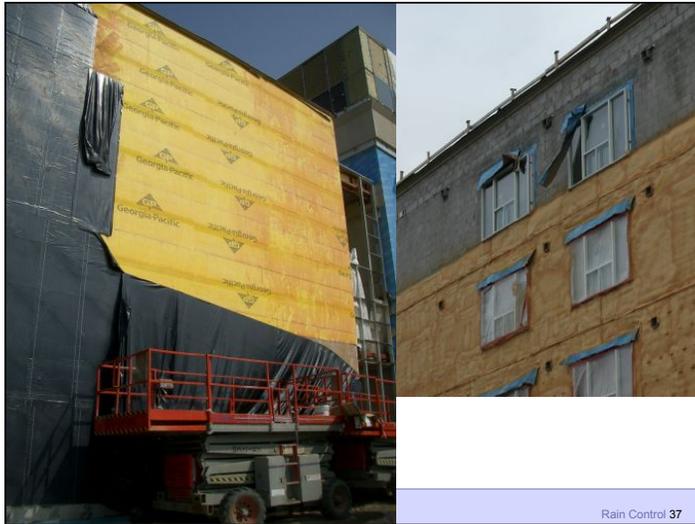
Requirements for a Drained Enclosure

1. "Rainscreen" cladding
2. Drainage space
3. Drainage Plane
4. Flashing
5. Drain Opening ("weep")











Drainage Gaps

- Gap avoids hydrostatic pressure
 - drains away water
 - Requires only small gap, e.g. 1/16"
- Reduces time of wetness on housewrap sheathing membrane
- *May allow ventilation drying if >1/8"-1/2"*

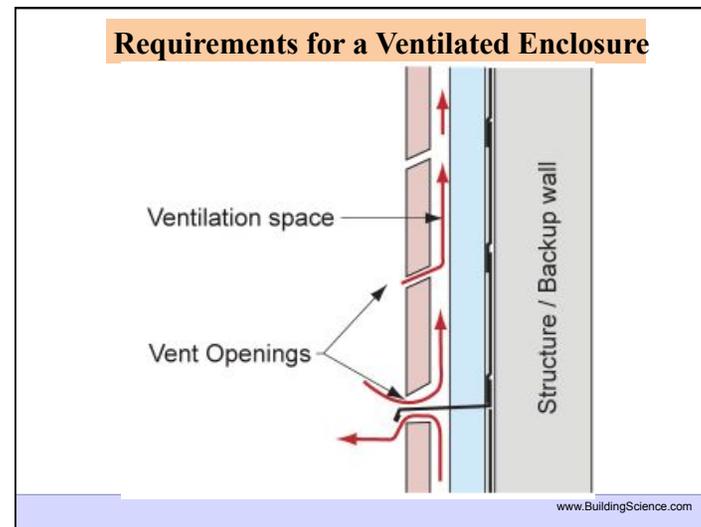
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Drained gap behind brick



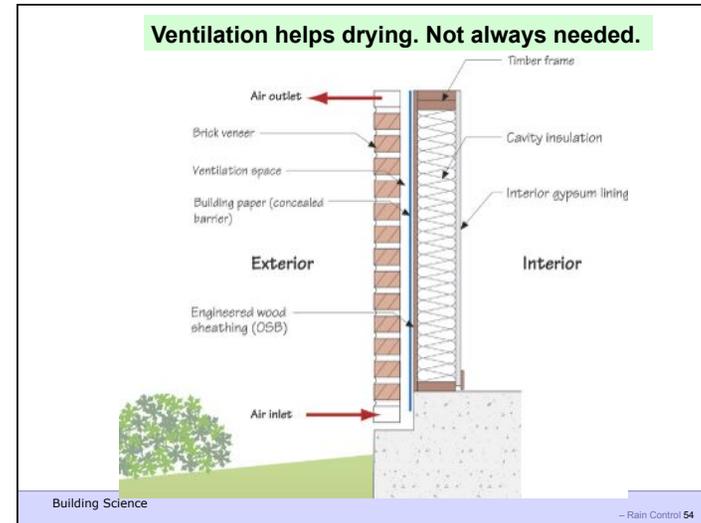
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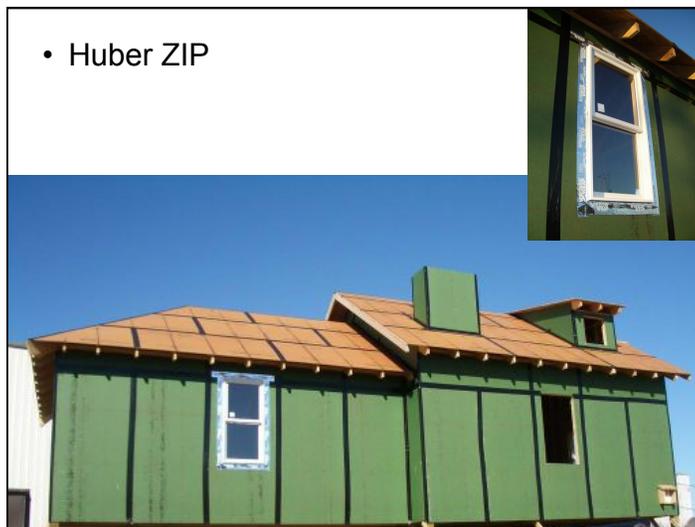




How much Ventilation do you need

- Are you drying the cladding back?
- Are you drying the wall sheathing?
- Are you controlling inward vapor drives?
- Are materials adjoining the ventilation cavity moisture sensitive?



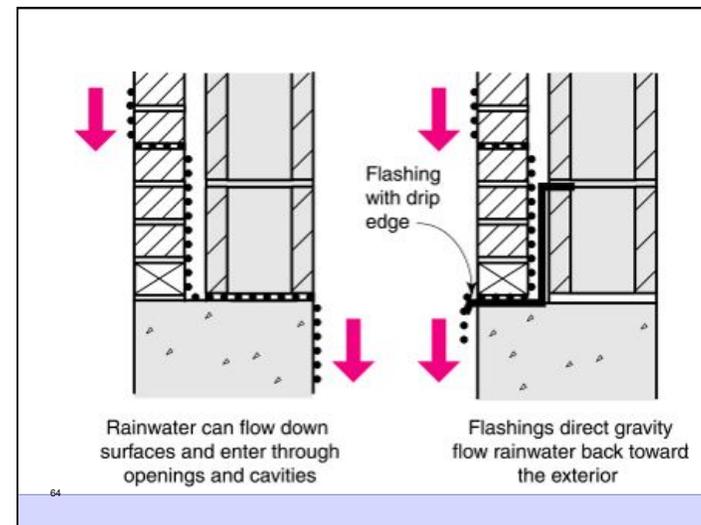
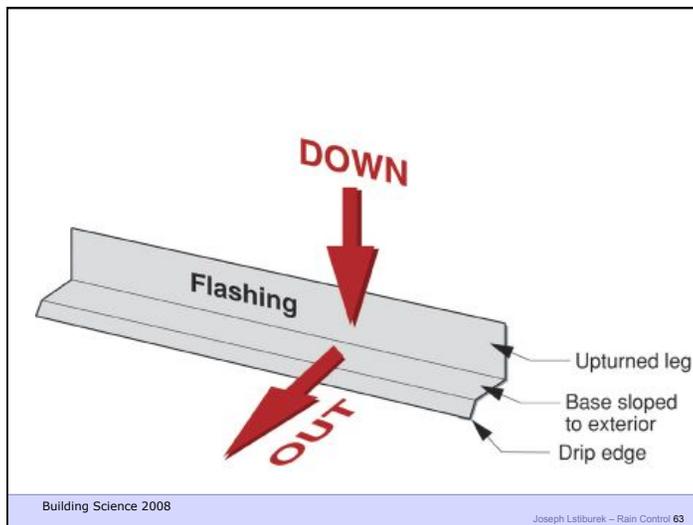


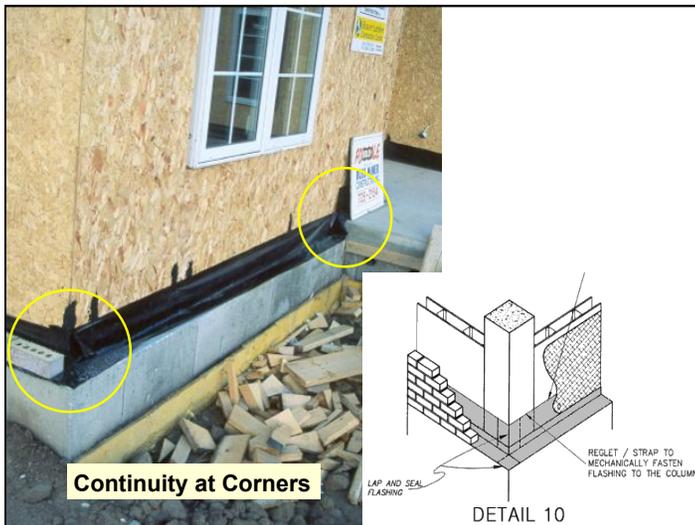
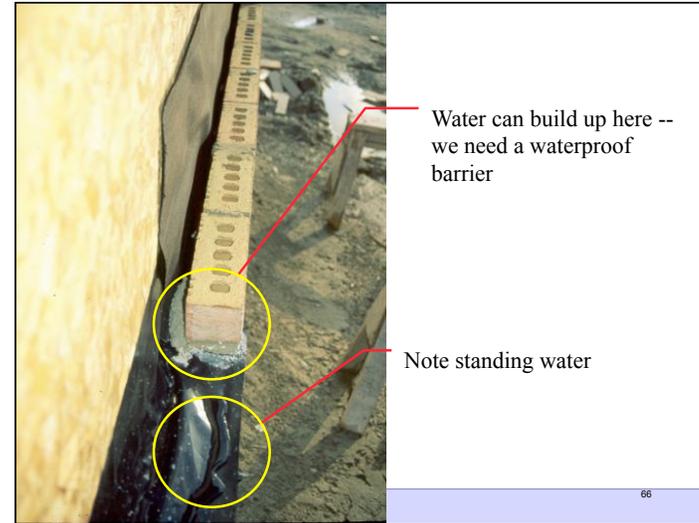


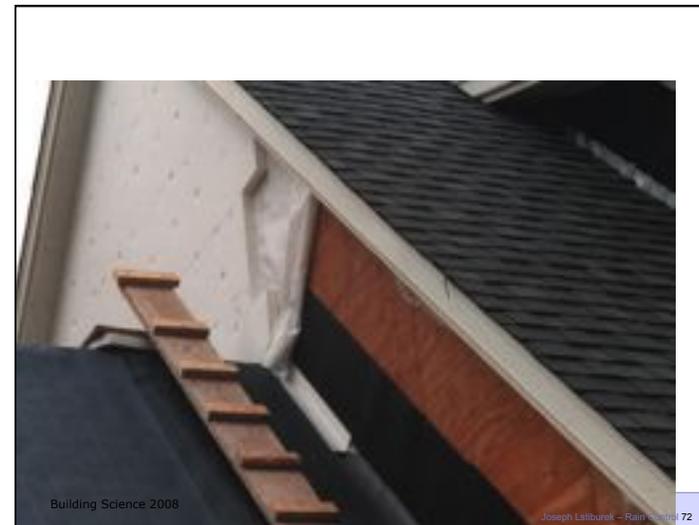
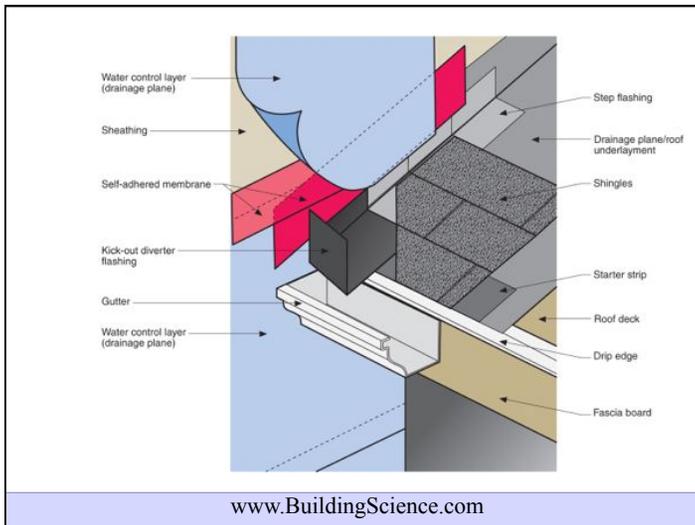
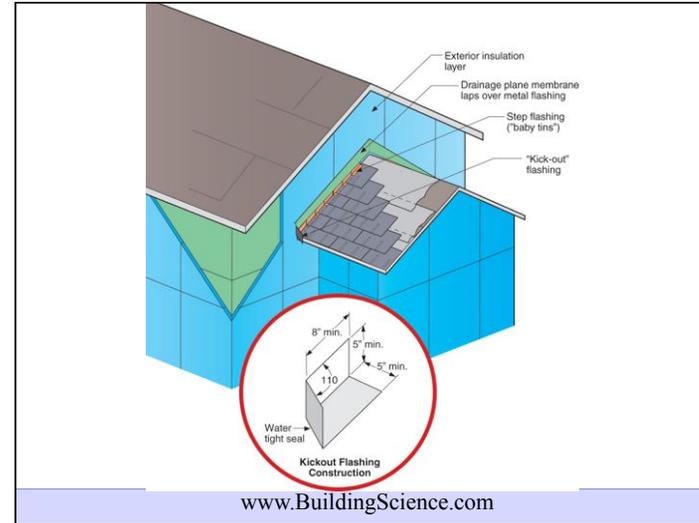
Details required at

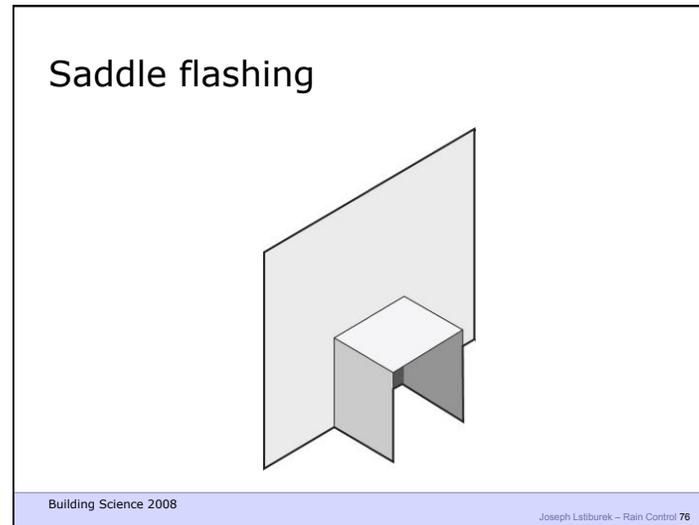
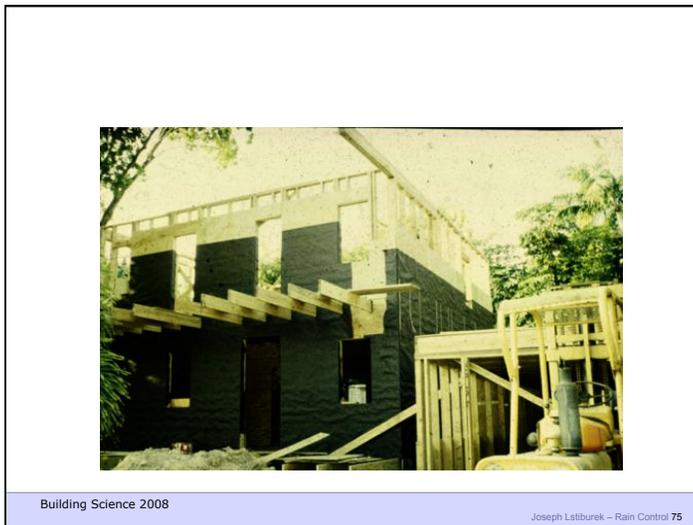
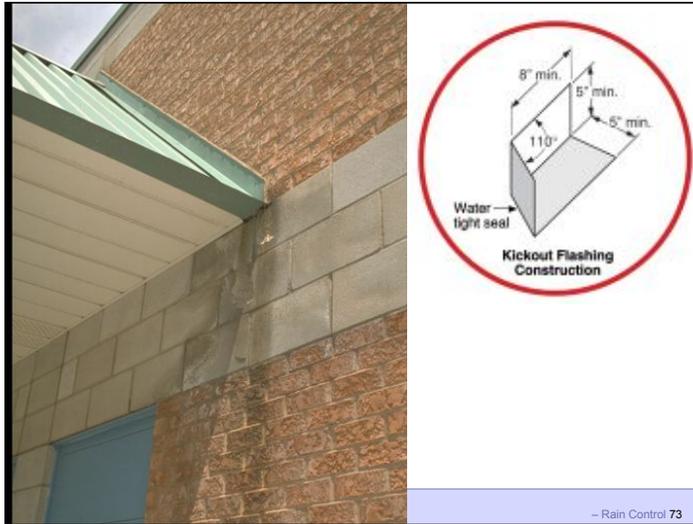
1. Changes in plane
2. Changes in material
3. Changes in system / trade

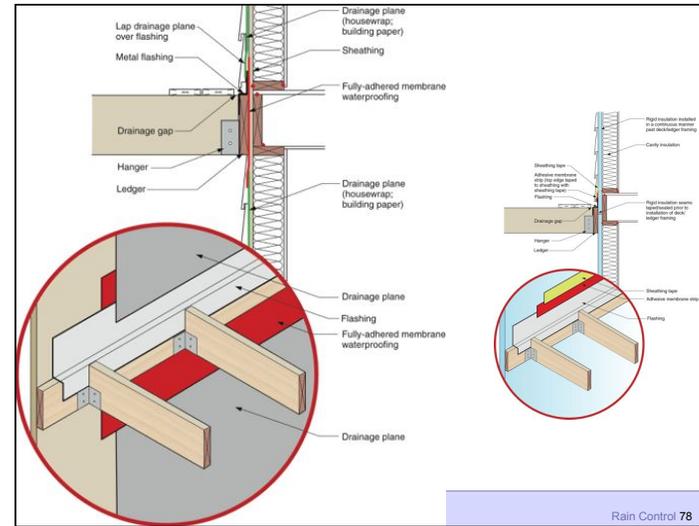
Thus penetration, windows, rails, signs etc.











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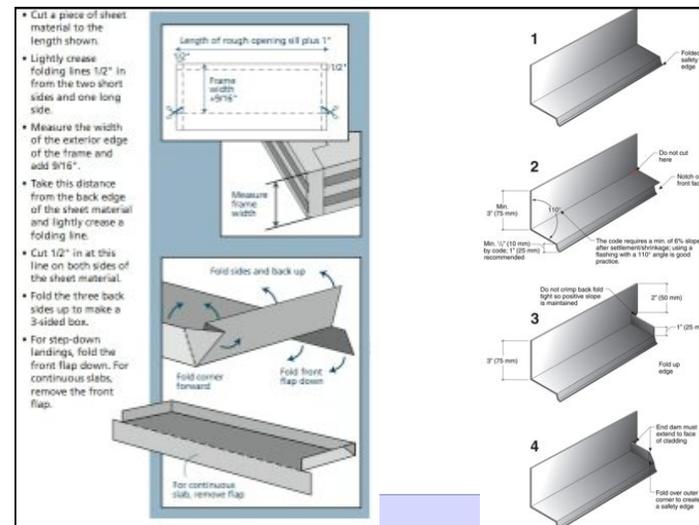
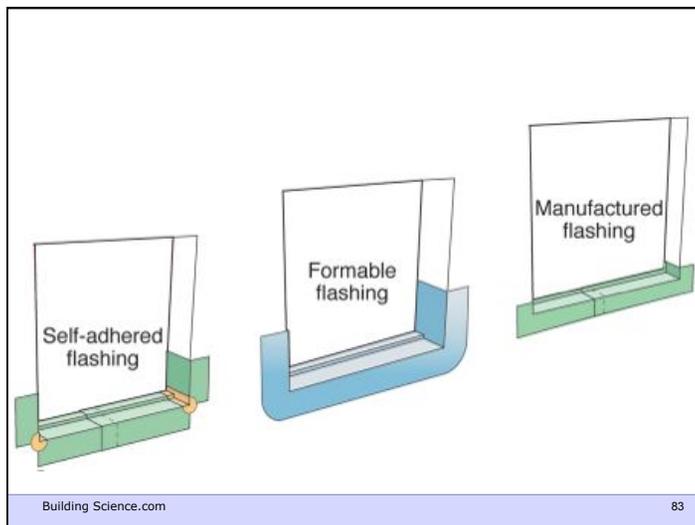
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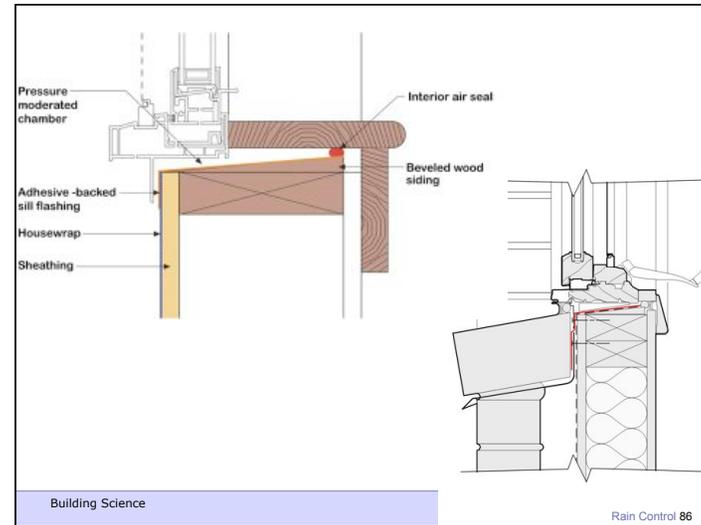
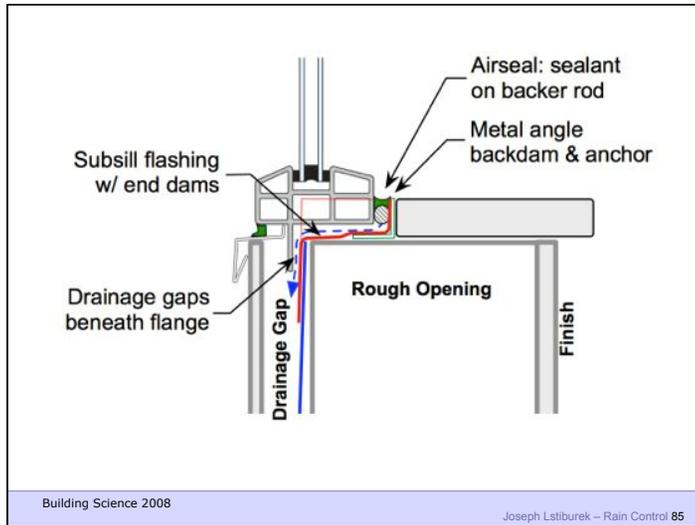
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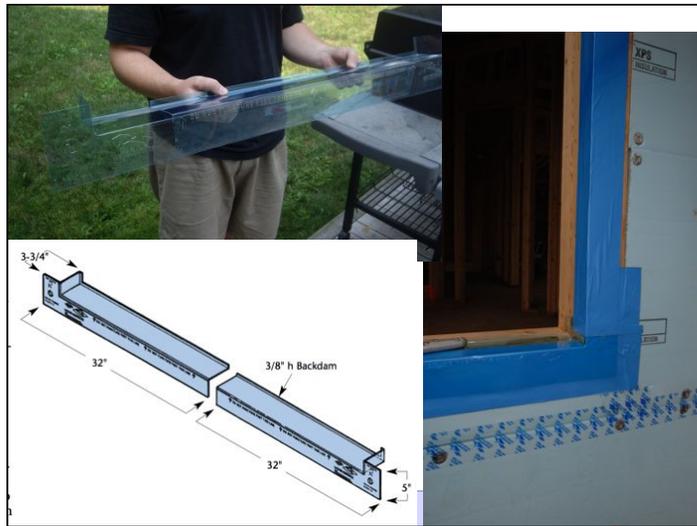


Leaky windows

- Moisture sensitive substrates are a problem





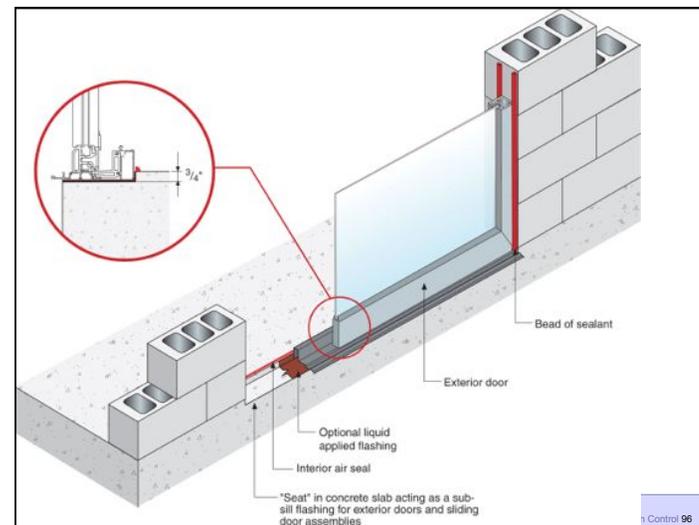
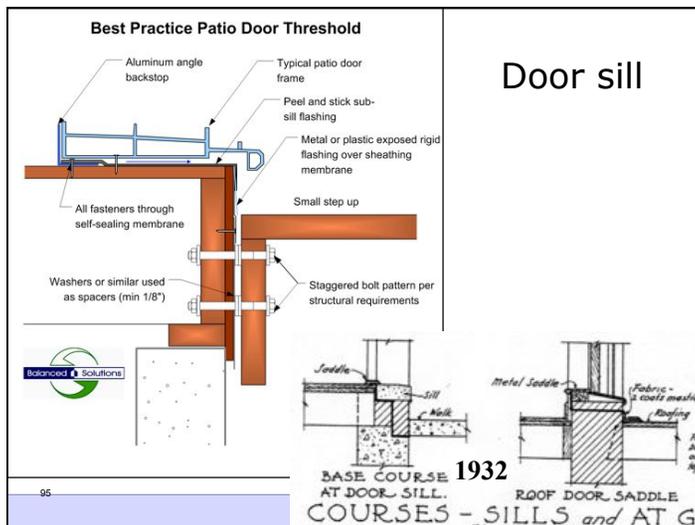
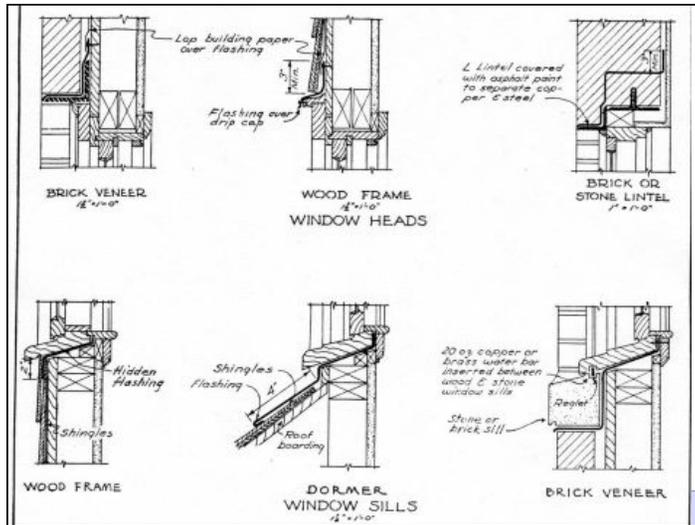


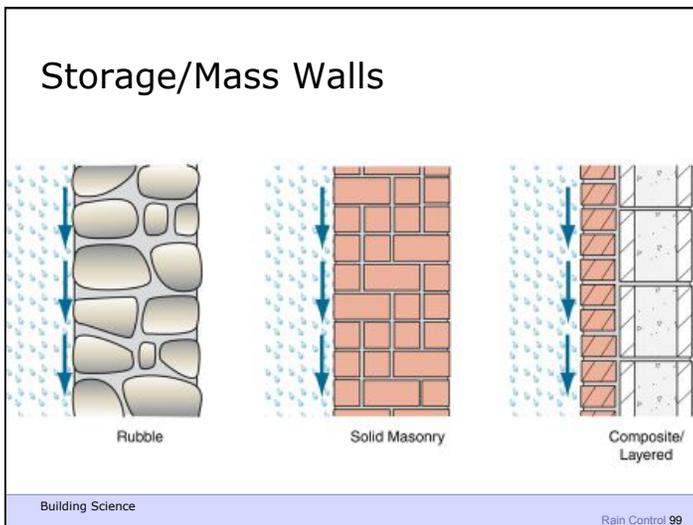
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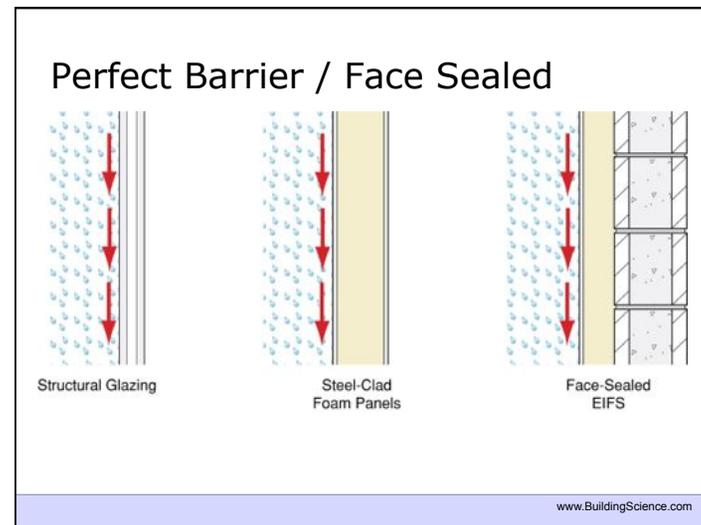
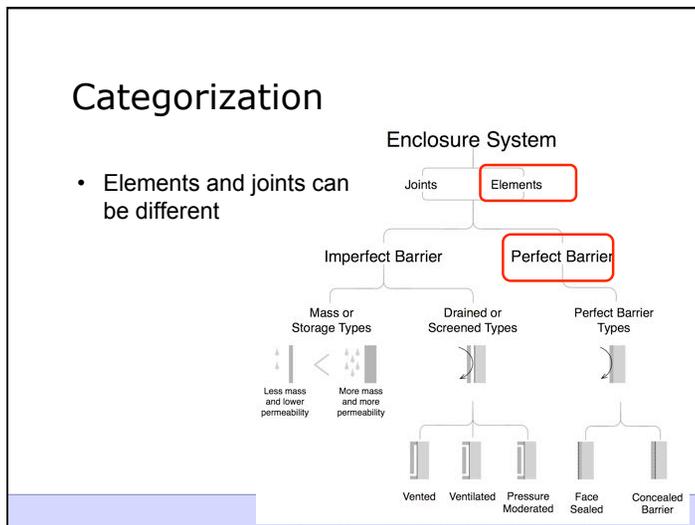
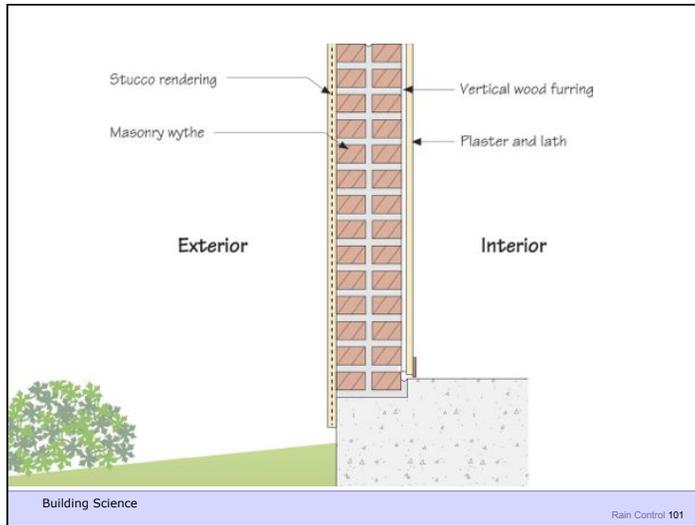


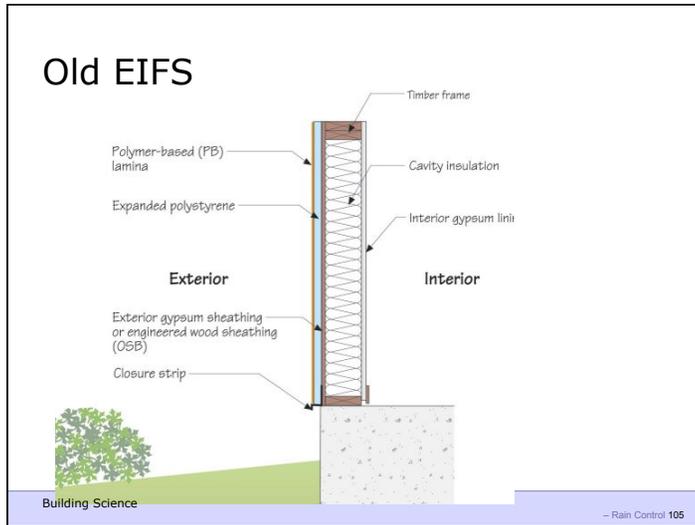
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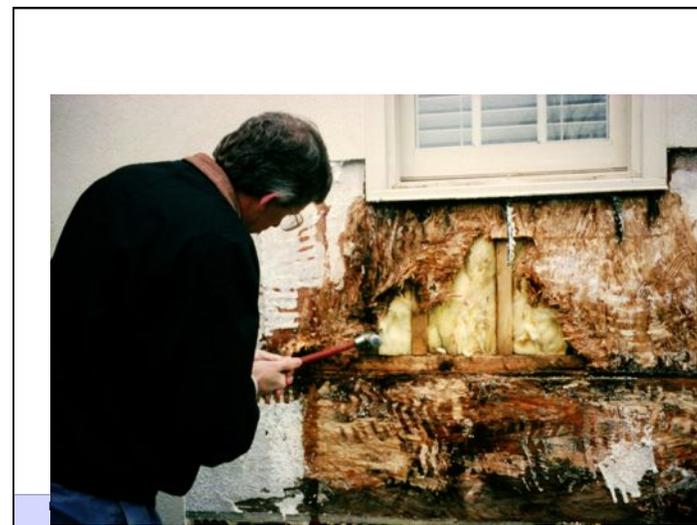


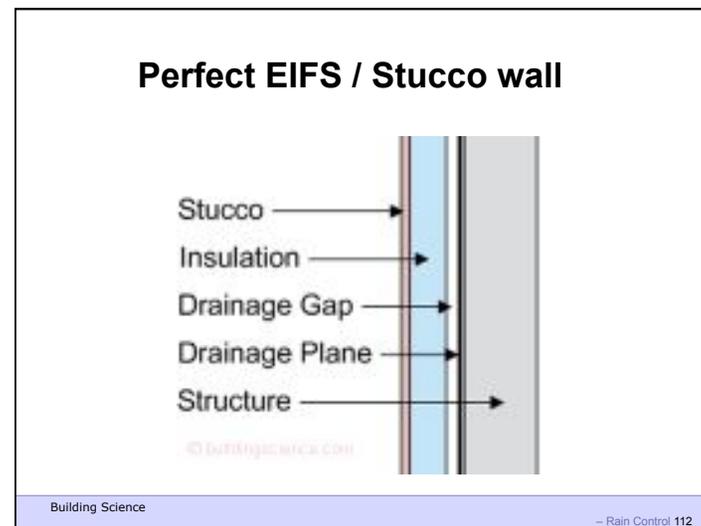
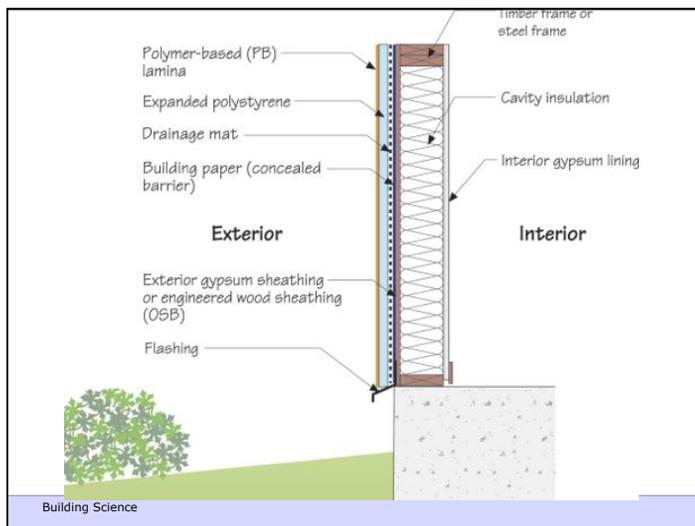


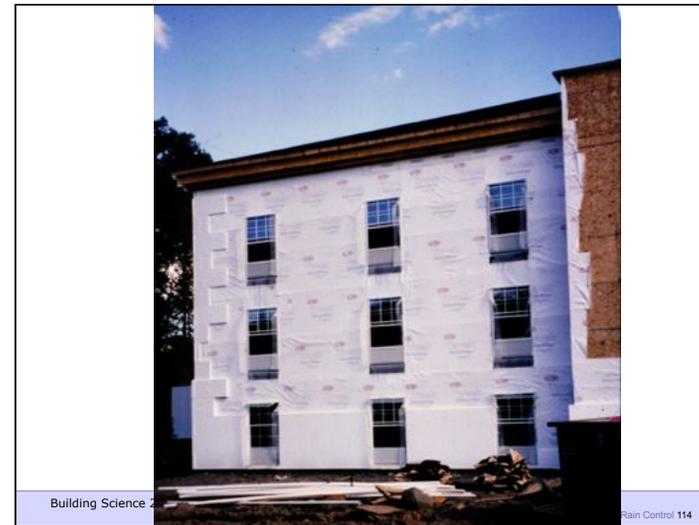


Substrate + moisture = problem

- Moisture sensitive substrates are a problem







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Conclusions

- Drainage is the key, cladding leaks
- All penetrations need to be drained!
- Beware flashing, it needs to waterproof
- Understand older systems are different

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- Details required at
1. Changes in plane
 2. Changes in material
 3. Changes in system / trade

Thus penetration, windows, rails, signs etc.

