Rain

- Rain is the largest source of moisture
- We need better control for better insulation and airtightness
- Rain penetration control
  - Site and massing
  - Surface features
  - Enclosure wall strategy
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

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**Surface & site features**

- Overhang
- Drips at Opening Heads & Sills
- Splash Height

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**Building Science**

- Rain Control

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Don’t concentrate water!

Categorization

- Elements and joints can be different

Wall System

- Imperfect Barrier
- Perfect Barrier

Mass or Storage Types
- Low mass and low permeability
- More mass and low permeability

Drained or Screened Types
- Cavity
- No Cavity

Perfect Barrier Types
- Ventilated
- Vented
- Unvented
- Pressure moderated
- Ventilated and pressure moderated

Mass/Storage/Reservoir Walls

- Rubble
- Solid Masonry
- Composite/Layered
Categorization

- Elements and joints can be different
Claddings that leak

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

• 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 Drained Walls

• Drainage plane
  • Water repellent, continuous
• Drainage gap
  – 1/16” is enough!
• Flashing
  – Waterproof to direct water outward
• Weep holes
  – Above grade

Lapped Housewrap, paper
Drained Walls

Laps are the most reliable

Liquid applied = continuous

Drained gap behind brick
Beware: These are vapor barriers!!!
**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”
Weep holes
Stucco sticks to paper/housewraps

Water drained astonishingly well between sheets of building paper

• Vinyl drains well with no strapping
Drained gap behind wood

Water can build up here -- we need a waterproof barrier

Note standing water
Continuity at Corners

Base Flashing
Saddle flashing
Exterior sealant is temporary, aesthetic, water shedding layer

Leaky windows

- Moisture sensitive substrates are a problem
Door Sills

Door sill
Substrate + moisture = problem

- Moisture sensitive substrates are a problem
Conclusions

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