

# Mind the Gap: Drainage & Ventilation in Walls

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**EnerHouse 2005**



Balanced Solutions

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**BEG**

Building Engineering Group



# We have long built gaps in walls

- **Why?**
  - 1. Drainage
  - 2. Ventilation
- **BEG has been asking: How do they work?**
  - **Began pressure equalization research 1992**
    - CMHC and industry (Owens-Corning, Dow, etc)
  - **Began ventilation research 1994**
    - CMHC concepts, ASHRAE experimental
  - **Began drainage research 2000**
    - BuildingScienceCorp, industry (Dupont, James Hardie, Dryvit, Sto, Cosella-Dorken)

# Pressure Moderation

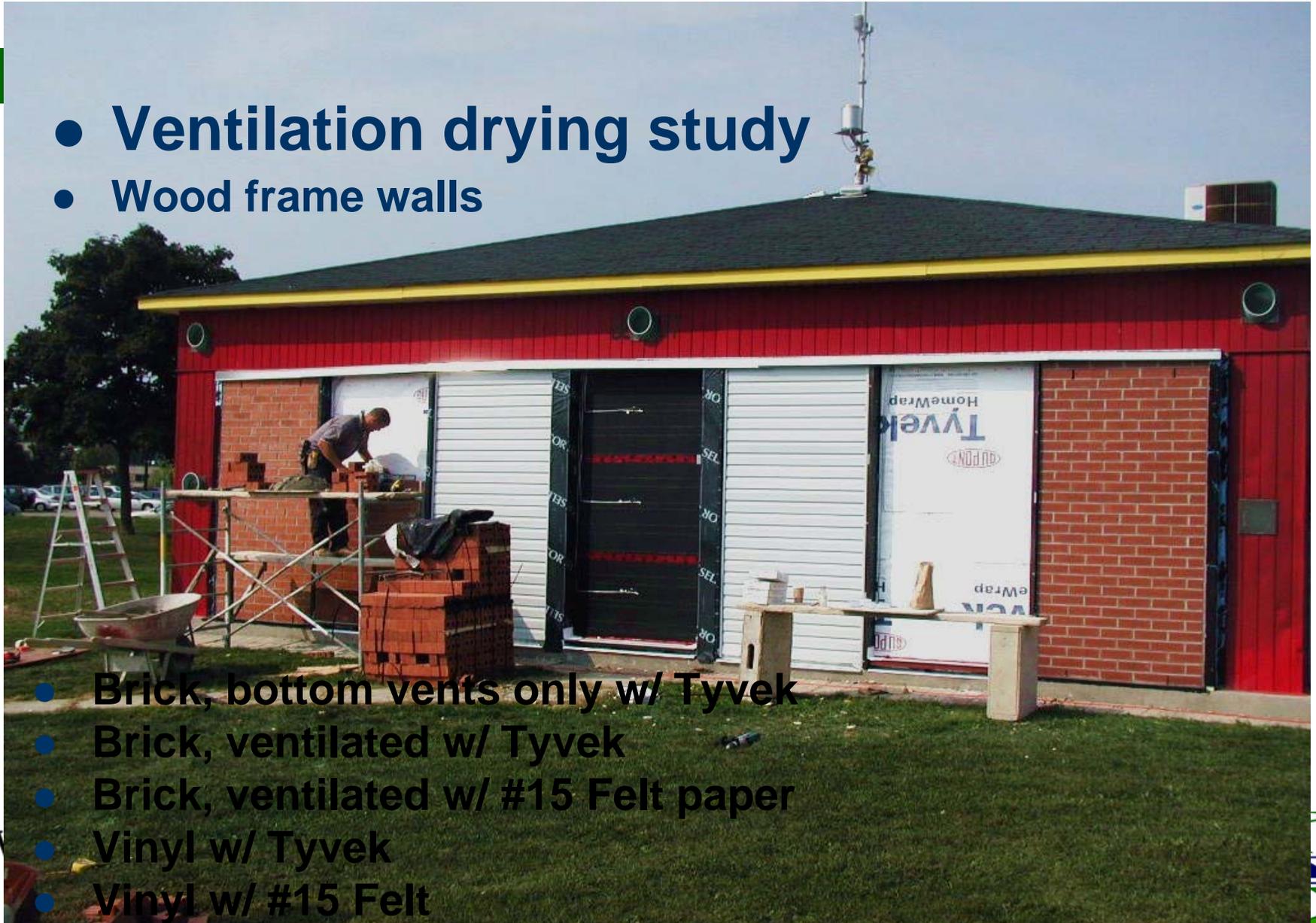
- **Research mostly complete**
- **Equalization almost never happens in the field**
- **Walls leak anyway – because of gravity!**
  - So why bother?
  - Helps reduce quantity needed to drain a bit
- **Get over it – worry about flashing**

# Ventilation

- **Intentional airflow behind cladding bypasses vapor resistance of cladding**
- **Allows faster drying**
- **Controls damaging inward diffusion**
- **Not sure how big of a gap is needed**
  - 6? to 25? mm
  - Even smaller may help

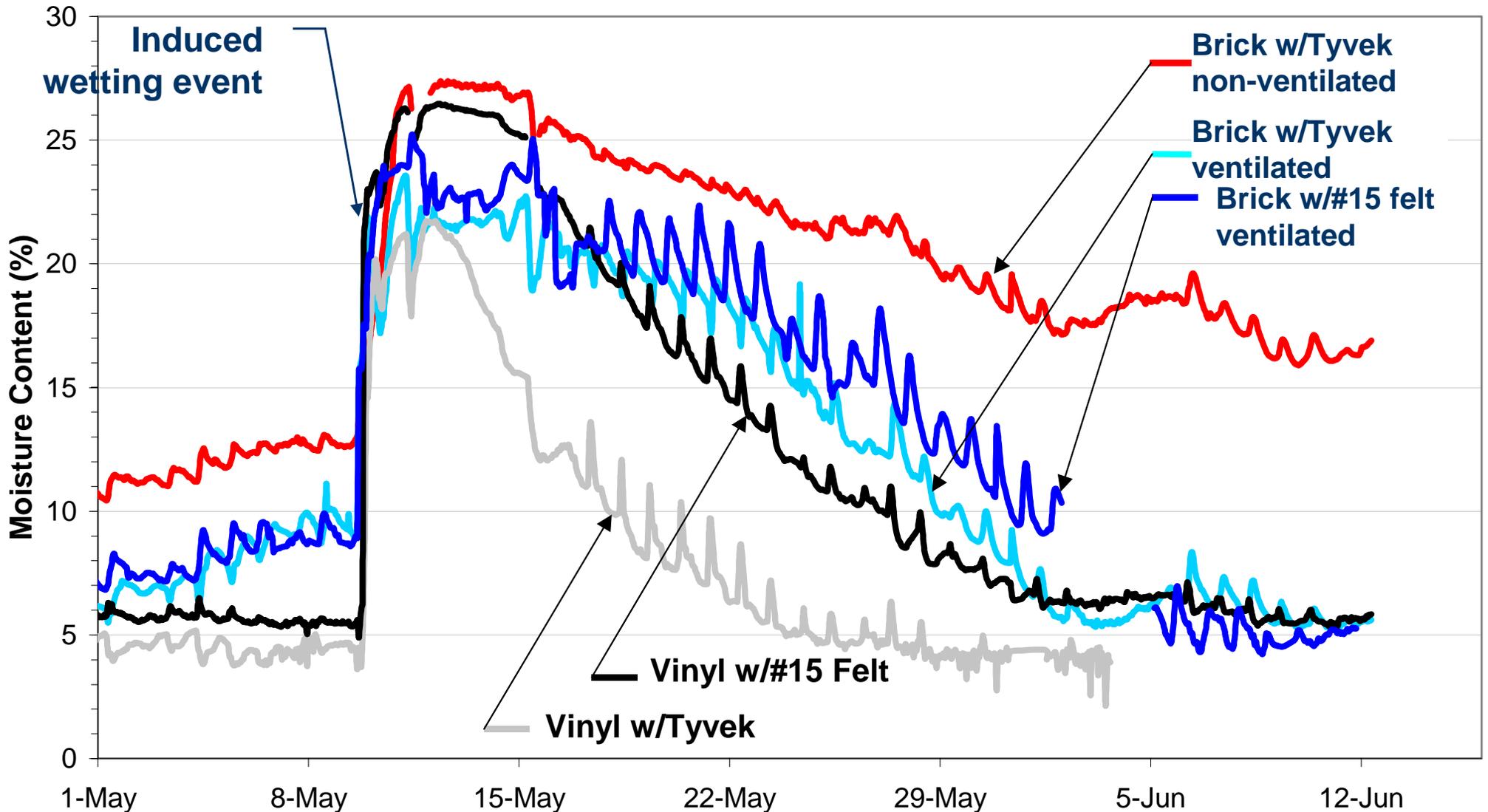
# Ventilation Research: ASHRAE 1091

- Ventilation drying study
- Wood frame walls



- Brick, bottom vents only w/ Tyvek
- Brick, ventilated w/ Tyvek
- Brick, ventilated w/ #15 Felt paper
- Vinyl w/ Tyvek
- Vinyl w/ #15 Felt

# Example Field Results: ASHRAE RP1091



# Ventilation

- **Ventilation helps drying**
- **Ventilation controls inward drives**
- **Need vent openings top *and* bottom**
- **The more vapor tight the cladding, the more it helps**
- **Surprisingly small gaps allow ventilation**

# Drainage

- **Gap avoids hydrostatic pressure**
  - drains away
- **Reduces time of wetness on housewrap sheathing membrane**
- ***May* prevent bridging if >3-6 mm**

JJAC Test house 2001



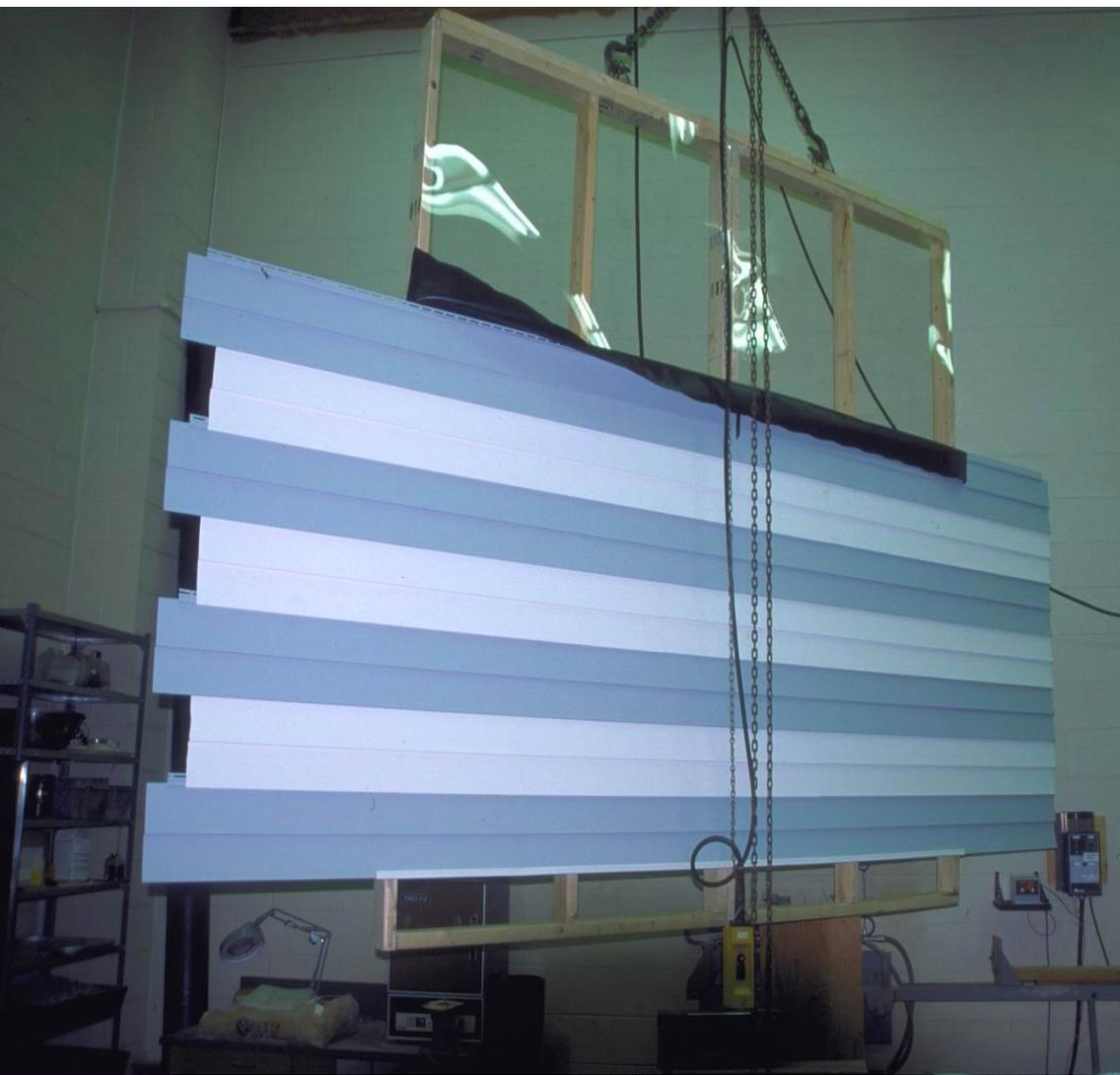
# JJAC Test house 2001







**Water drained astonishingly well between sheets of building paper**

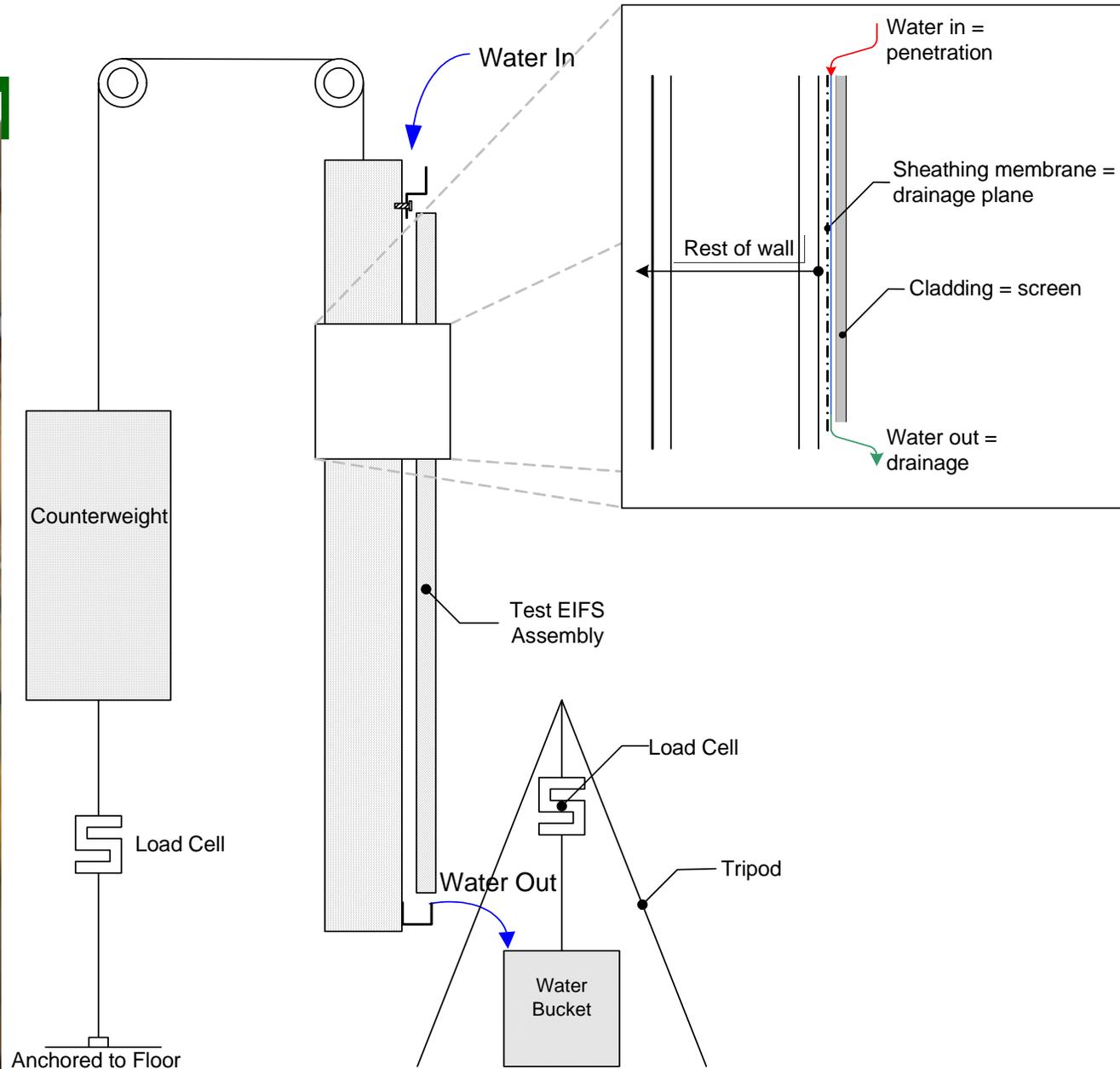


- **Vinyl drains well with no strapping**

# Drainage Test

- **Intended to show how easily water drained**
- **How much was stored?**
  - **i.e. what needs to be dried out after drainage stops?**

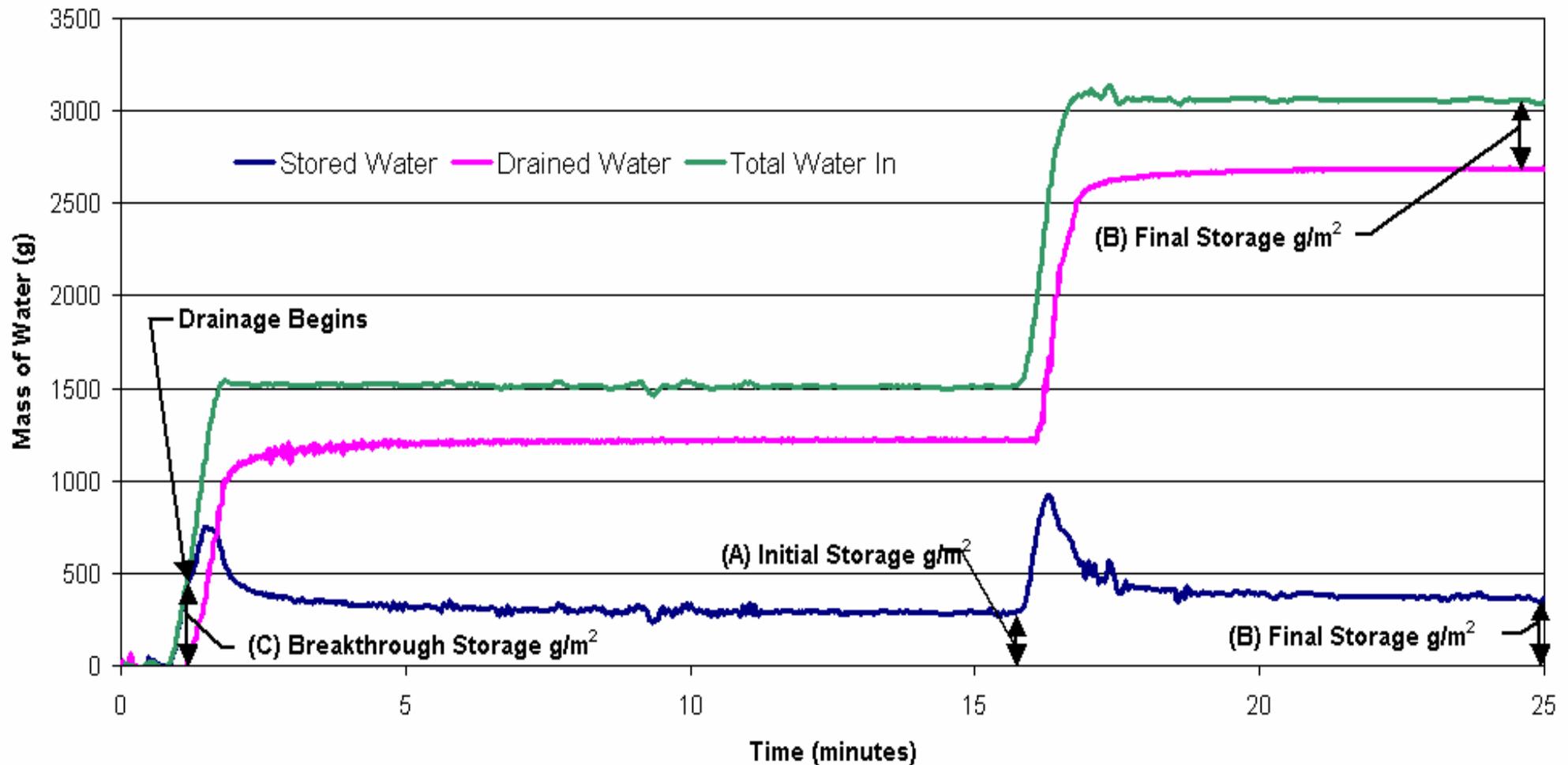
# Drainage & Drying Test Setup



# Drainage Test Procedure

- **Insert water along top of test panel**
  - 1.5 l in about 60 seconds
- **Measure water stored and time to start**
- **Measure retained water**
- **Repeat**
- **Measure drying under small “wind” pressures and/or solar heating**

# Drainage Tests Results



# Results

- **Drainage is excellent provided**
  - A clear gap exists
  - Size – maybe one mm
  - Need to build this though
- **Drainage stops leaving stored moisture**
  - This needs to be removed by ventilation or diffusion
- **Large gaps**
  - are useful for ventilation
  - But, when do you need it?

## Summary of Research- We learned:

- We need gaps to provide drainage
- Flashing is the real practical requirement
- The required size of the drainage gap is very small (1 mm?)
- Larger gaps are needed for ventilation drying (3,6,9?)
- We don't always need ventilation drying

**More information at**

**[www.civil.uwaterloo.ca/beg](http://www.civil.uwaterloo.ca/beg)  
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