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# Monitoring Performance of Rainscreen Walls

CMHC SCHL | Homeowner Protection Office | BC Housing

## Monitoring

- Funded by CMHC, HPO and BC Housing
- 5 Buildings
  - *Low rise new construction*
  - *Low-rise rehabilitation construction*
  - *High-rise new construction*
  - *High-rise rehabilitation construction*
- Primary purpose was to confirm acceptable performance of rainscreen wall assemblies
- To gather data that can be subsequently analysed for relative impact of variables such as overhang, site exposure, different details, interior conditions etc.

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## Purpose of Monitoring

- To gather data that would allow comparison of performance between buildings over a period of 1 year.
- To correlate wetting events with exposure, weather conditions, and building interior conditions.
- To determine if wetted walls dry quickly enough to resist damage, and under what conditions drying takes place.
- To provide baseline data that can be used comparatively when assessing the performance of other rainscreen buildings, when they are investigated in the future

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## Nature of Monitoring System

- Continuous, automatic electronic system that records measurements from all sensors every 15 minutes for at least one year
- At least 5 wall cavities on each building, each containing 4 temperature, 4 moisture content, and 2 relative humidity sensors
- Site windspeed and direction, outdoor temperature and humidity, driving rainfall on walls, and pressure difference across walls

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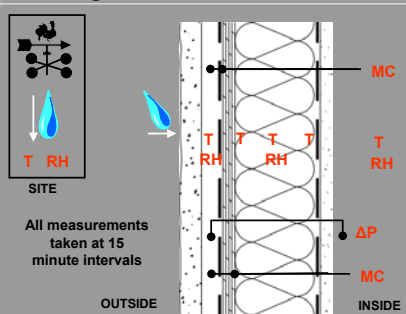
## Monitoring Performance

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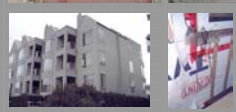
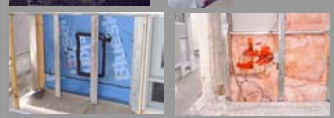
## Monitoring Performance

Building 1 – Vinyl Cladding
New Construction
(Nov 2000)



Building 2 – Stucco Cladding
Retrofit
(Jun 2001)



Building 3 – High-rise
Stucco Cladding
Retrofit
(Jan 2002)

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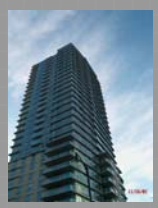
## Monitoring Performance


Building 4 – Fiber Cement Board Cladding, New Construction (Apr 2002)

Building 5 – High Rise Masonry/Stucco (Feb 2003)

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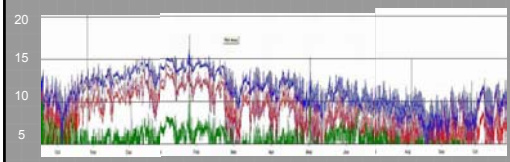
## Performance – Wood Frame

- Moisture contents all within acceptable level with one exception on Building 1
  - *a poor detail at an exhaust grill*




Red=Sheathing in Centre of Cavity
Blue=Sheathing near strapping
Green=sill plate
Magenta=Strapping

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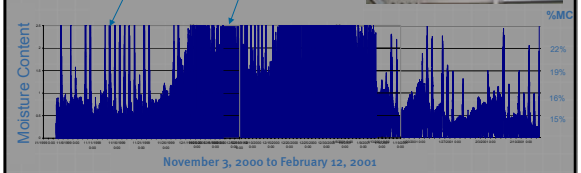
## Building 1: Dryer Vent

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## Wind Driven Rain – Building 3

EAST WALL:
Total Rainfall – 1160mm
6th Floor – 210mm (18%)
3rd Floor – 106mm (9%)

However, runoff accumulation means that 3rd floor wall will have more water running on it than the sixth floor

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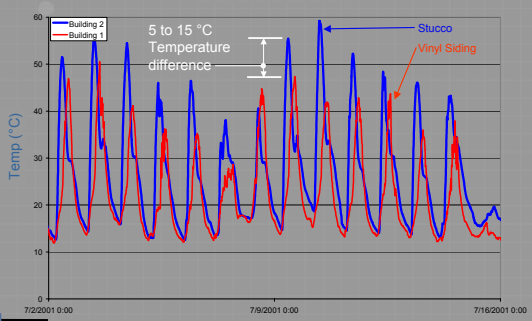
## Drainage Cavity Temperature Comparison

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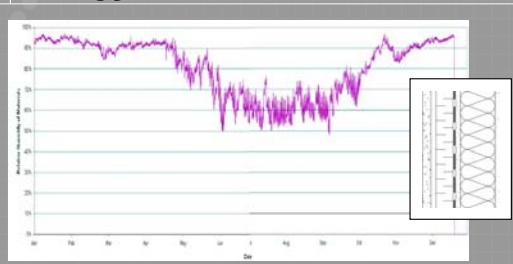
## Building 3 – Dual Insulation Rainscreen



Exterior Sheathing Relative Humidity
- Varies from 50% to 95%
- Leaf sensors indicate that condensation was occurring

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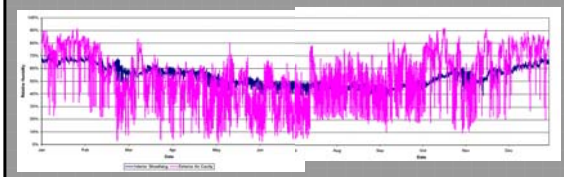
## Building 4 – Relative Humidity at Sheathing



Exterior Sheathing Relative Humidity
- Follows expected profile

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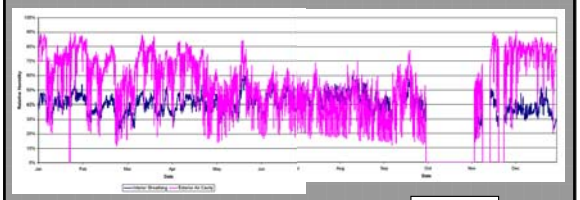
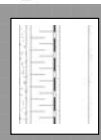
## Building 5 – Relative Humidity at Sheathing



Exterior Sheathing Relative Humidity
- Follows expected profile



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## Summary of Results

- Prevailing winds are from the SE.
- In wood frame buildings, moisture contents generally stayed within acceptable limits, except at a failed detail
  - *Rainscreen walls cannot compensate for poor details!*
- Summer drainage cavity temperatures appear to be higher in the stucco cladding than the vinyl cladding.
- Overhangs reduce wetting of walls.
- Accumulation of condensation from reverse vapour drive in the summer was not observed.
- Condensation from traditional vapour drive in the winter increases the moisture content of the exterior sheathing
- Wind driven rain increases moisture content of strapping quickly but takes longer to affect sheathing. In some cases when storm duration is small, sheathing moisture content is unaffected.

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