



## Building Solutions



# Michigan Case Study Field Research

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March 2016

# ■ Topics

- TEETH Project – Midland MI
  - Moisture performance comparison of 2x4 and 2x6 walls
  - Forensic Investigation
  - Air Leakage Tests

# Research Neighborhood

Midland, Michigan - Climate Zone 5-6

2X6 OSB/HW



49-Kendall



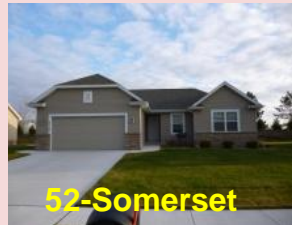
48-Somerset



50-Preston



51-Kendall



52-Somerset



53-Preston



54-Preston



56-Kendall

2x4 R5 CI



55-Somerset

Net Zero Ready Homes

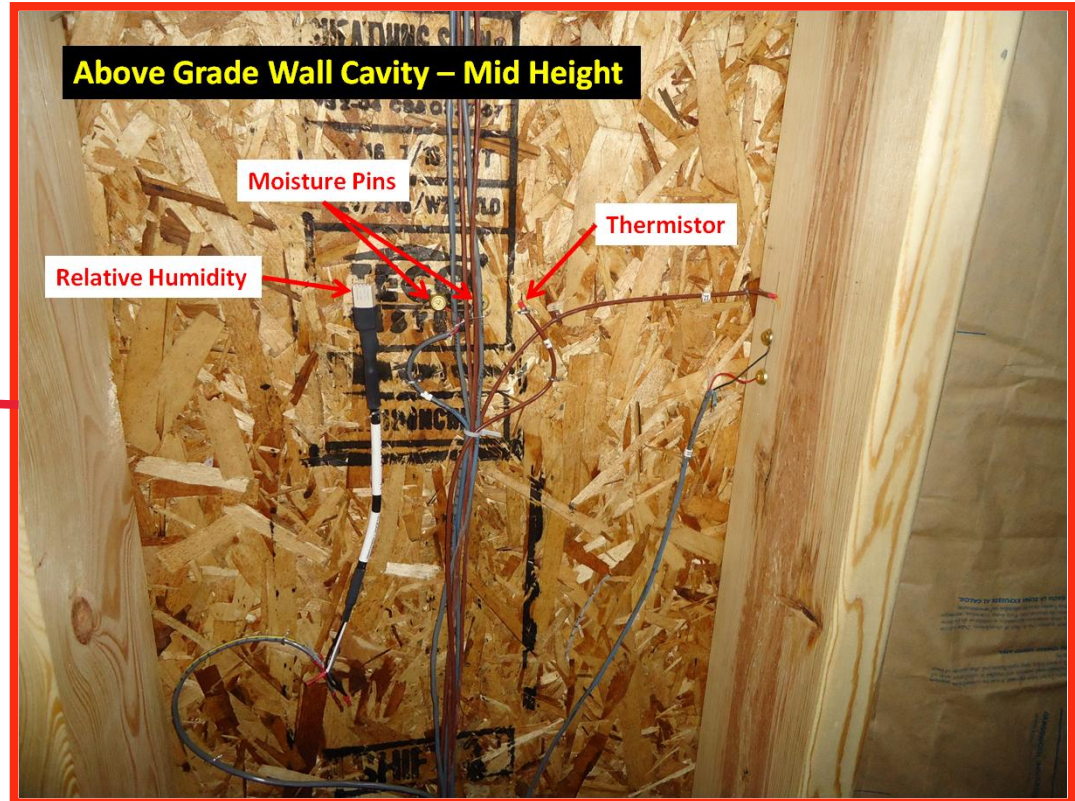


## Comparison Cases

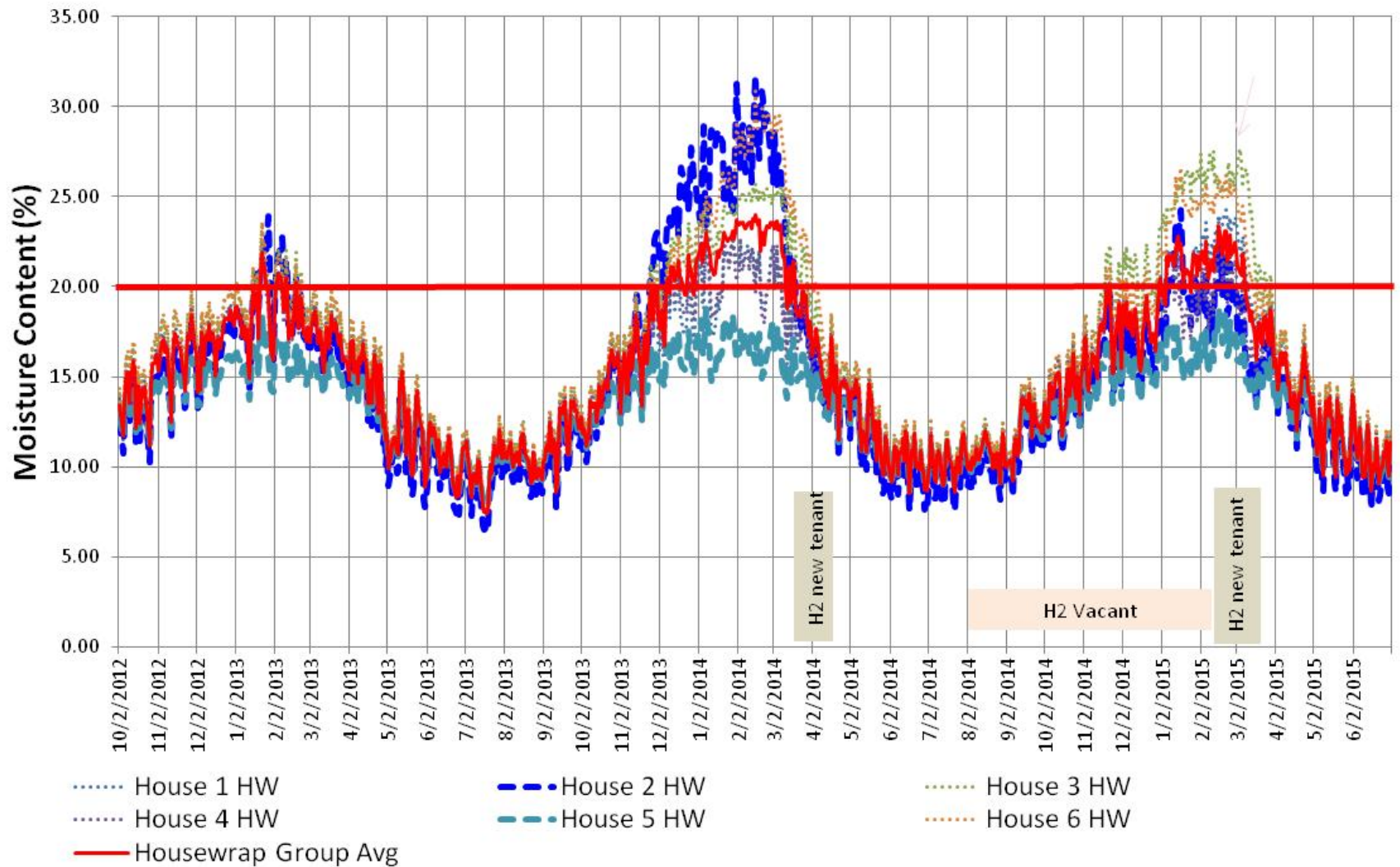
	Houses 1-3	Houses 4-6	Houses 7-9
Framing	2X6 – 16"oc		2X4 – 16"oc
Above Grade Wall – Cavity	R19 Fiberglass Batt (Kraft)		R16 Closed Cell Spray PU Foam
Above Grade Wall – Exterior	OSB & Housewrap		R5 Continuous Insulation
Rim Joist – Interior	R-19 Fiberglass Batt		R16 Closed Cell Spray PU Foam
Rim Joist – Exterior	None		R5 Continuous Insulation



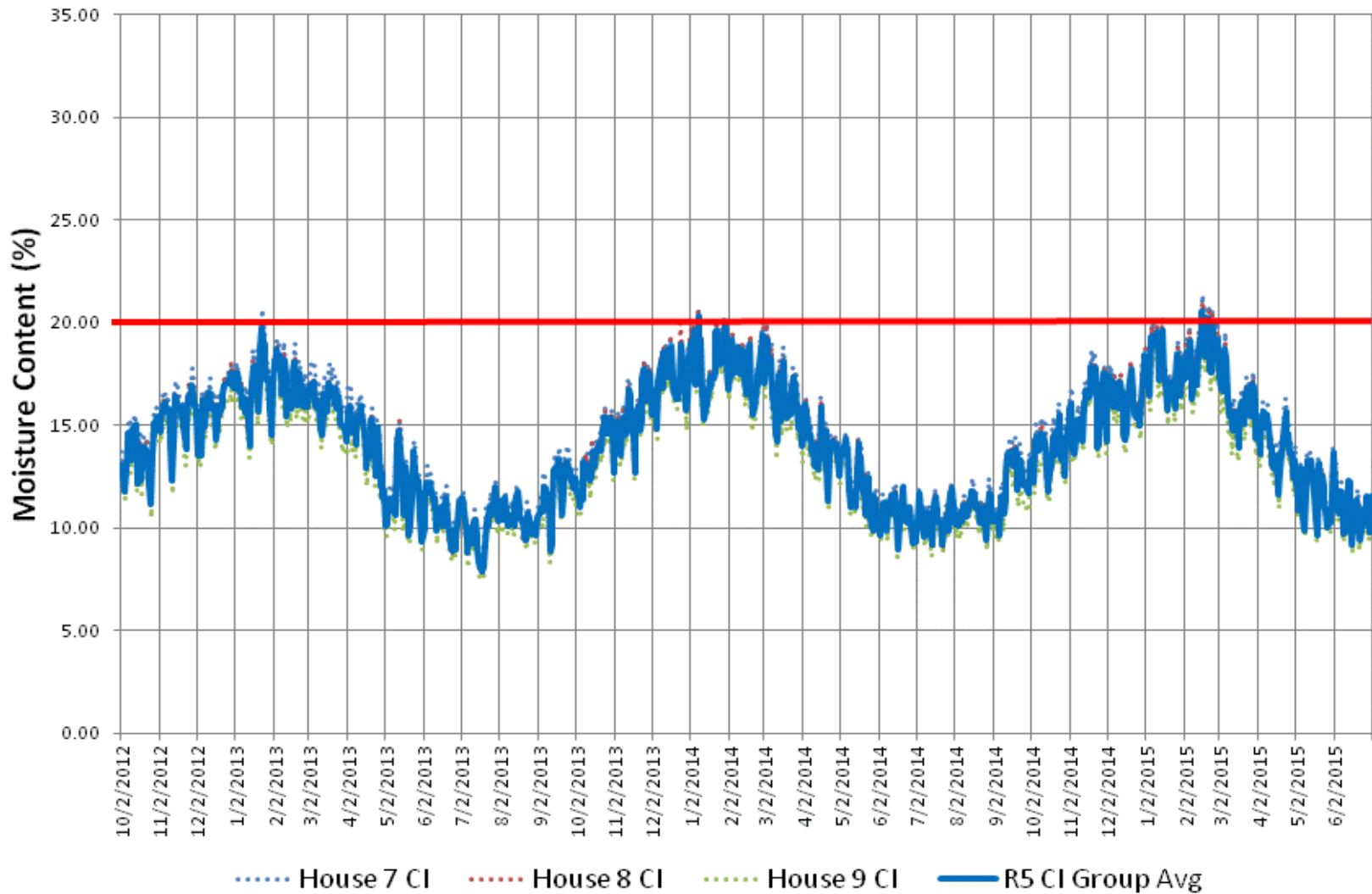
# Above Grade Wall Measurement Location



# Moisture Content - Housewrap Houses Interior Sheathing Surface - Above Grade Cavity

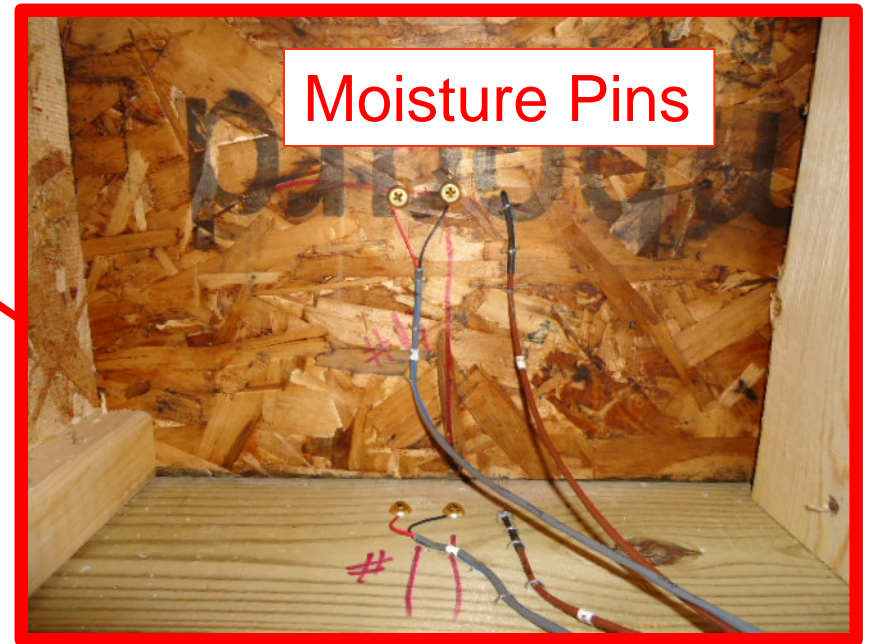


## Moisture Content- R5 CI Houses Interior Sheathing Surface - Above Grade Cavity



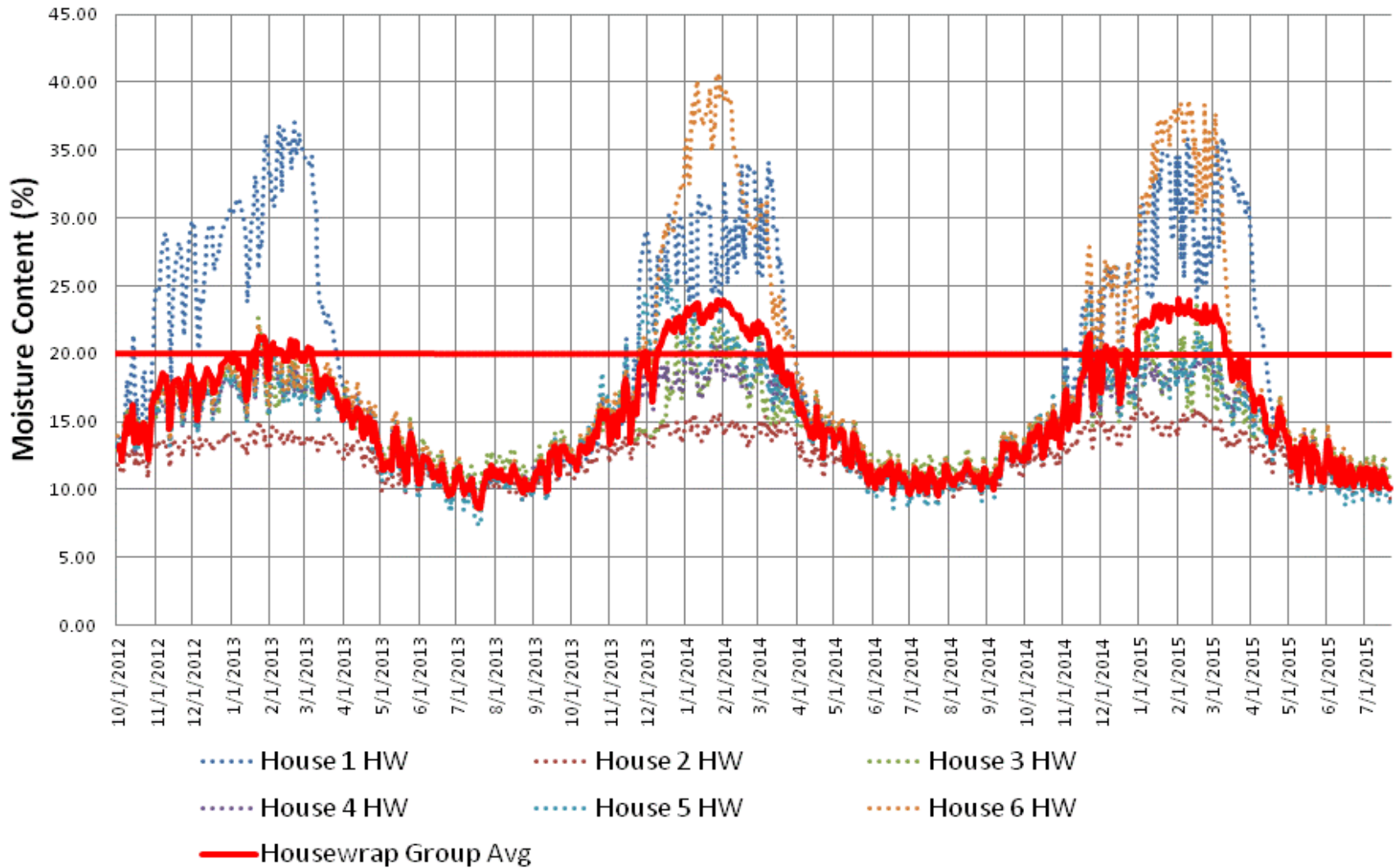


# Rim Joist Measurement Location

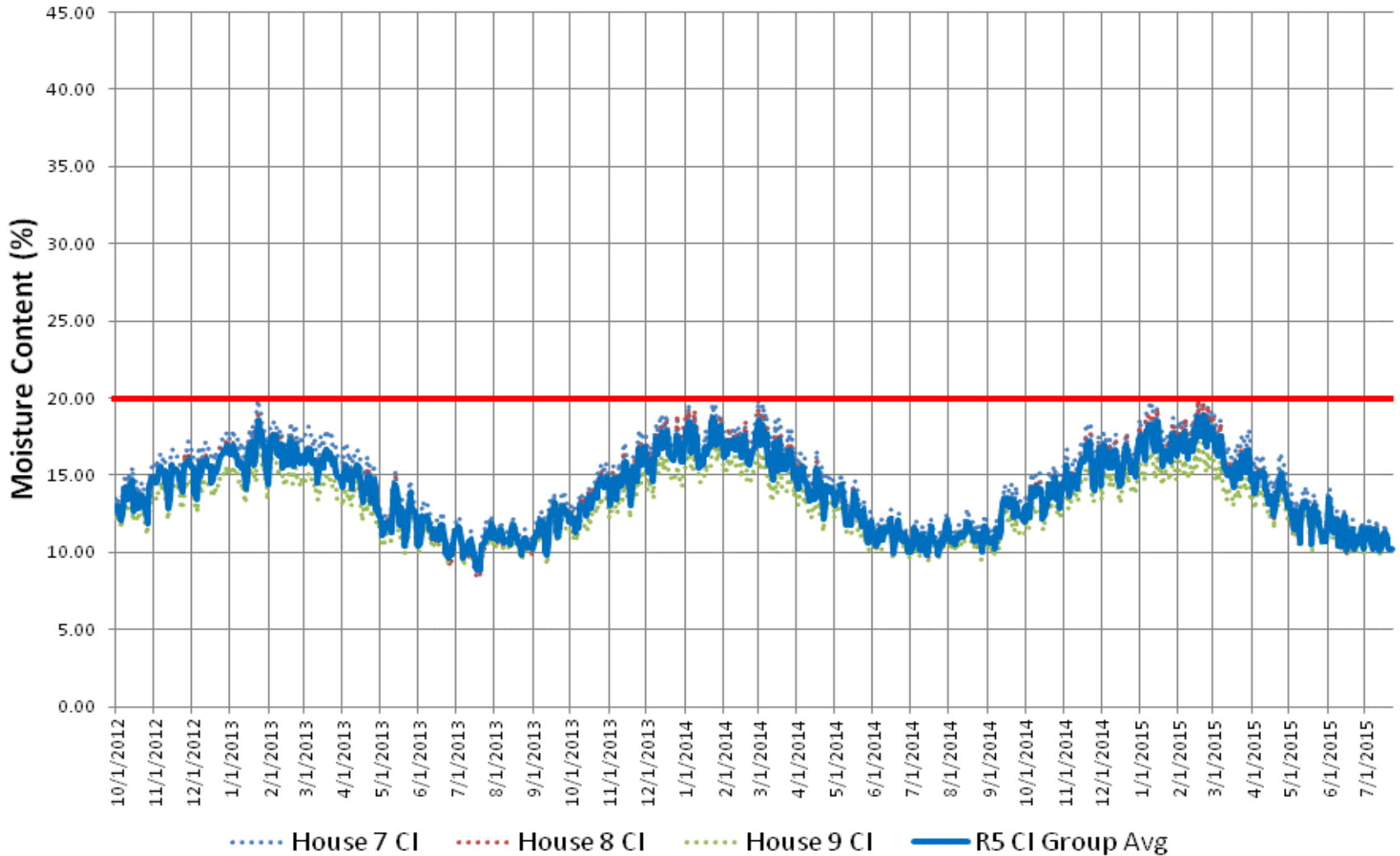




## Moisture Content - Housewrap Group Band Joist Interior Surface



## Moisture Content - R5 CI Group Band Joist Interior Surface



- **Yikes, high MC for much of the winter in some 2X6/Housewrap houses. Let's cut into them and see if they are deteriorating.....**

# ■ Summer 2015 Forensic Inspections

- Inspect Houses **2,3,6** - elevated measured moisture content
- Inspect House **5** - measured moisture content always below 20%
  
- Inspections
  - Visual Observation
  - Sampling of OSB for Strength Measurement
  - Swab for Fungal or Microbial Growth – including microscopy





## House 2





# House 5 Rim Joist

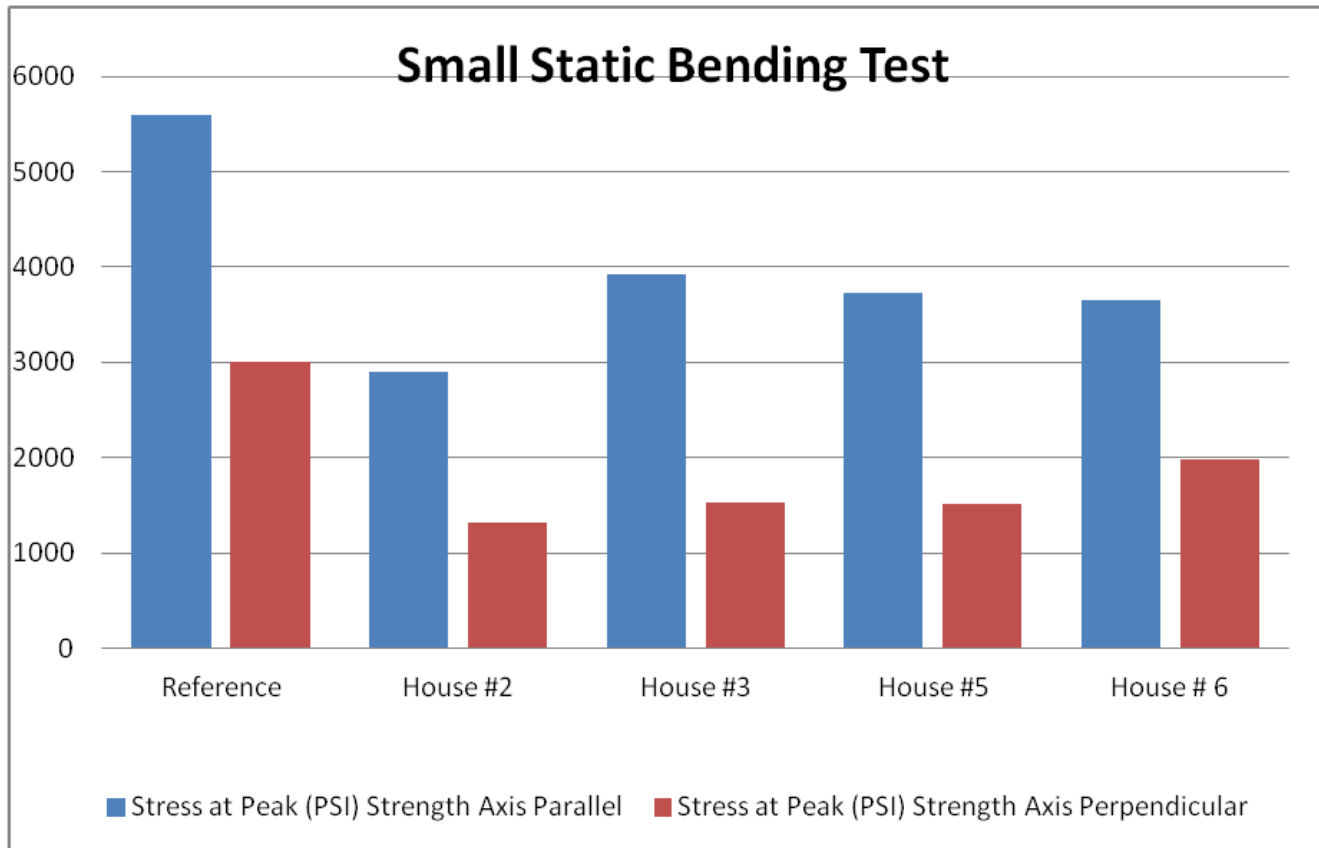
2011



2015



# OSB Strength Measurement after 4 years.



PS2 -  
Performance  
Standard for  
Wood-Based  
Structural  
Panels

4.5"x 14"  
ASTM D3043.  
Method D

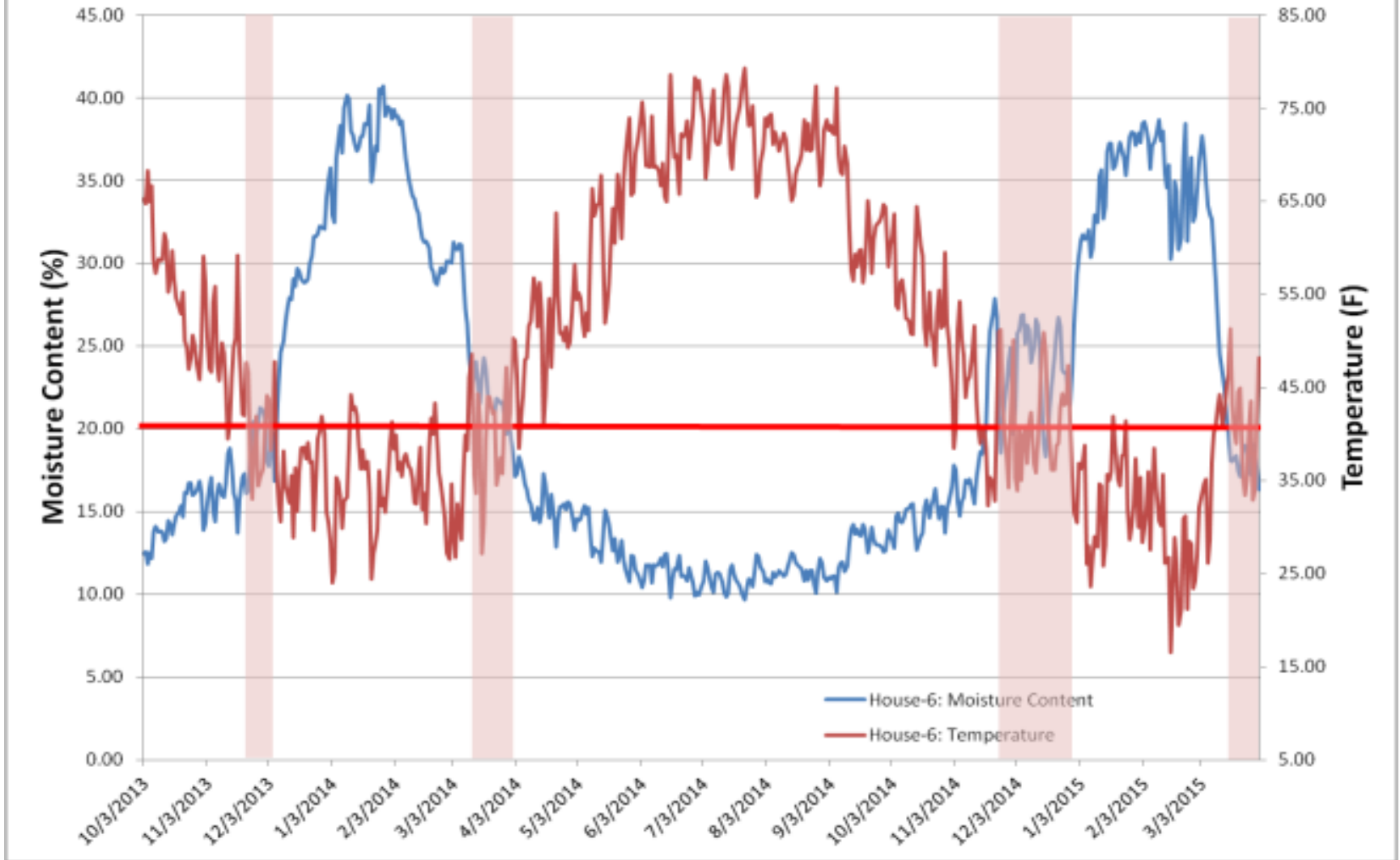


## Summary Forensic Findings

	Moisture Content	Above Grade Wall	Rim Joist	Microbial Sampling
House 2	Elevated	Water staining in cavity	No evidence of water	Moderate to heavy fungal growth – wall cavity
House 3	Elevated	Small area of dark staining	No evidence of water	Some fungal growth – rim joist
House 6	Elevated	No evidence of water	Some staining on joist bottom chord	Some fungal growth – rim joist
House 5	Low	Water staining in cavity	Rust on staples	No fungal growth

**— So, Why do we see this – high MC but no real deterioration?**

## Temperature and Moisture Content - House 6 OSB/Wrap - Band Joist Surface

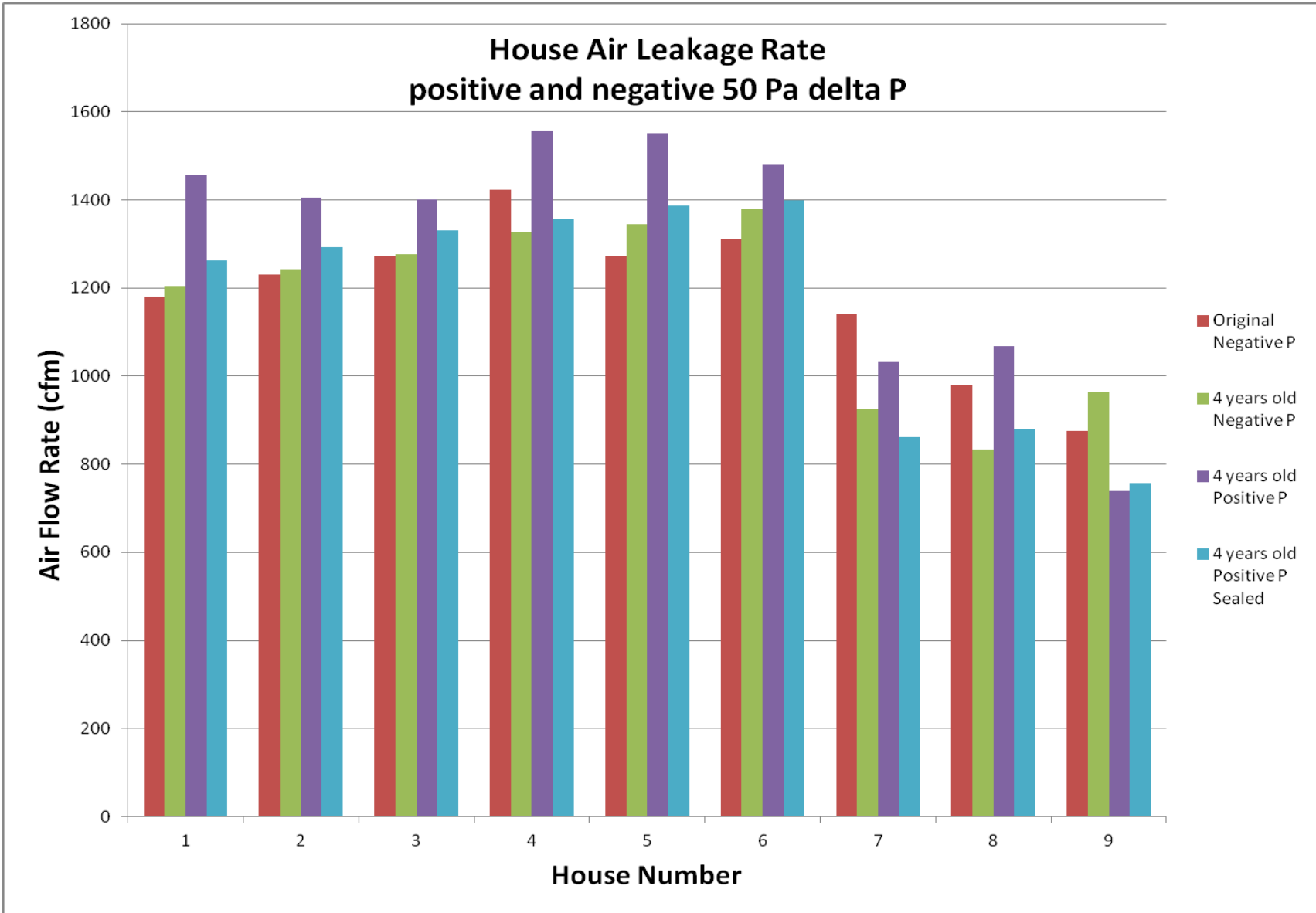


**— Do houses get leakier with age?**



## Repeat Blower Door Test

- Original tests, 2<sup>nd</sup> half 2011
  - Only negative 50 Pa delta P
- Recent tests, 2<sup>nd</sup> half 2015
  - Repeat negative 50 Pa delta P
  - Positive 50 Pa Delta P
  - Positive 50 Pa Delta P, but with sealed penetrations (i.e. bath fans, etc)





**Thank  
You**

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