

RDH

5 & 6 Storey Wood Frame Buildings

Impact on the Building Envelope

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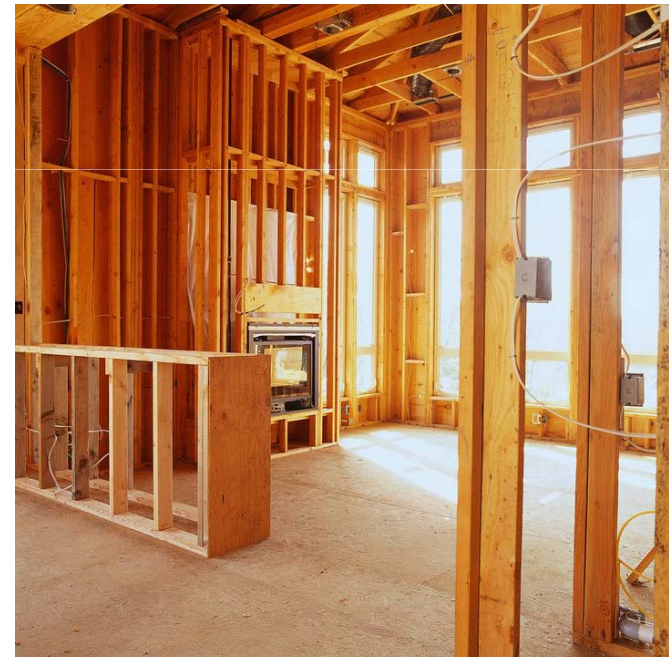
2009/04/16





Introduction

- Ministerial order – January 2009
- Changes to building code took effect April 6, 2009
- APEGBC retained to write a bulletin regarding the three areas of building design and construction that are primarily impacted by the changes:
 - Structure
 - Fire Protection
 - Building Envelope
- Bulletin not a guideline
 - Released very soon





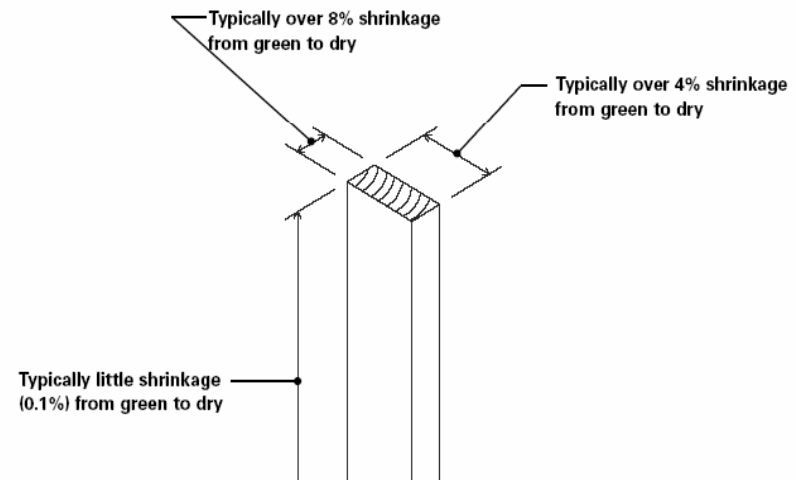
Key Features of Code Changes

- Height limitation
 - 18m to uppermost floor level
- Maintain current ratio of building height to cumulative floor area
- Restrictions on the configuration of timber shear wall systems
- Appendix notes
 - Need to consider shrinkage of wood in structural design
- Sprinklering
- Energy efficiency
 - ASHRAE 90.1
- Exterior cladding combustibility
 - Non combustible cladding



→ Impact on the Building Envelope – Wood Shrinkage

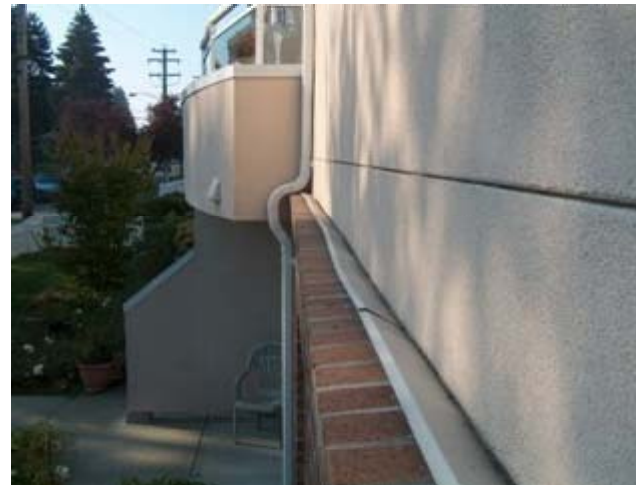
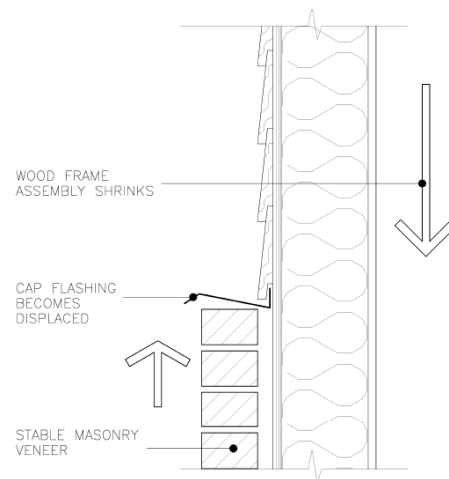
- Shrinkage is cumulative so that biggest impact is experienced at upper floors
- Both initial shrinkage and then some seasonal fluctuations
- Partial solutions to limiting overall shrinkage
 - Limit amount of cross grain wood used (modified platform or balloon framing)
 - Using dry wood (and keep it dry)
 - Use of engineered wood products



→ Impact on the Building Envelope – Wood Shrinkage

→ Differential shrinkage

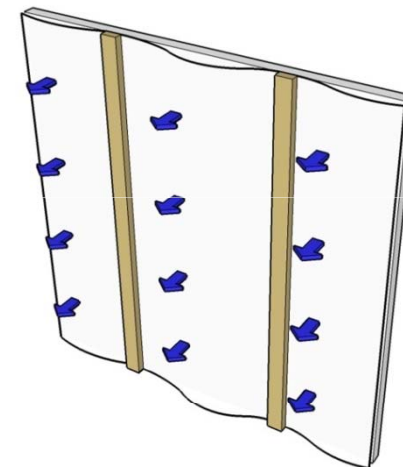
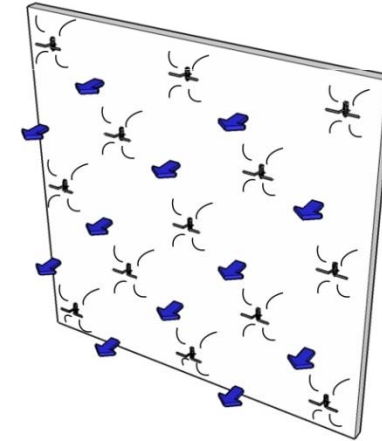
- Wood frame and masonry or concrete walls (fire walls, stairwells, elevator core)
- Masonry cladding
- Floor and roof penetrations (plumbing, sprinkler pipes, tops of masonry walls)
- Different support structure (balconies with exterior columns)





Impact – Increase in Environmental Loads

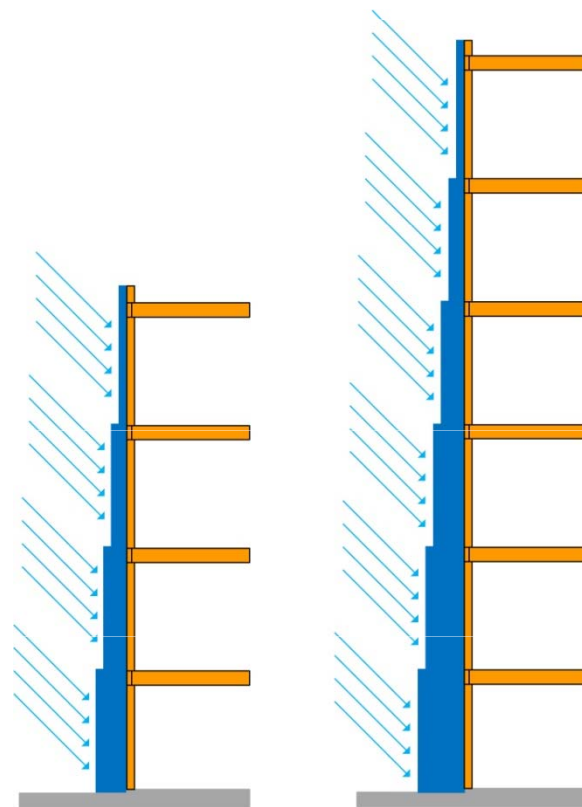
- Increase in height generally means higher wind loads (in the order of 10%), and increased rain deposition
- Other factors just as significant
 - Proximity to open water
 - Sloped site
 - Local terrain
- Wind uplift on roofs
- Air barrier
 - Exterior sheathing membrane approach
 - Sealed poly





Impact – Increase in Environmental Loads

- Specified structural and water penetration performance criteria for windows
 - Some low-rise windows may not work as well in mid-rise buildings
- Cumulative runoff
 - Water shedding features become more critical – continuity, drip edges
 - Water penetration control strategy
 - Selection of materials
- Moisture during construction





Impact – Increase In Structural Mass

- Where to put the insulation
 - 38x140@400 to 102x400@400 effective R value R18.3 to R14.8
 - ASHRAE 90.1
 - Exterior insulation approach?
- Service penetrations
 - Space to run pipes and ducts more limited
 - More careful planning and coordination required during design





Impact – Maintenance and Renewals

→ Access

- Not by ladder
- Bosun chair, swingstages – complicated roof lines
- Boom lifts – movement around the building and structural support provided by garage roof slab

→ Dryer vent cleaning

- Accessible from balconies or roof
- Additional lint clean-out

→ Durable envelope components

- Finishes
- Sealants
- Dual seal IGU's, interior glazed



→ Concluding thoughts:

- Don't underestimate the impact of this change
- Arguably the industry did this once before with disastrous consequences