Light wood frame mid-rise construction in BC

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MLB
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Project of the Canadian Wood Council
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Conseil canadien du bois

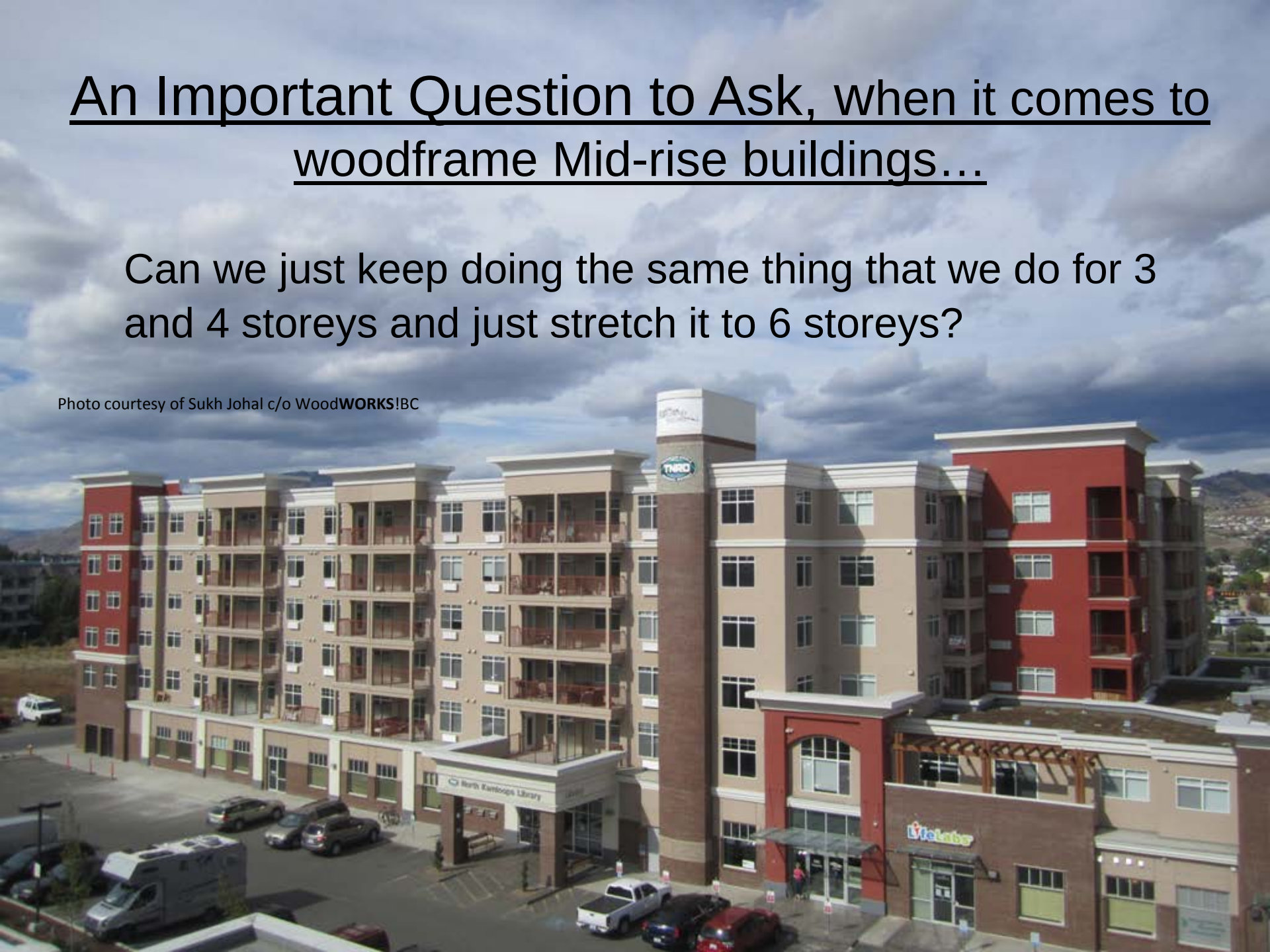
BC's Building Code-Prior to change

Kelowna 4 storey

Kelowna 4 storey+ mezzanine

An Important Question to Ask, when it comes to woodframe Mid-rise buildings…

Can we just keep doing the same thing that we do for 3 and 4 storeys and just stretch it to 6 storeys?



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technical challenges of Six storey wood structures

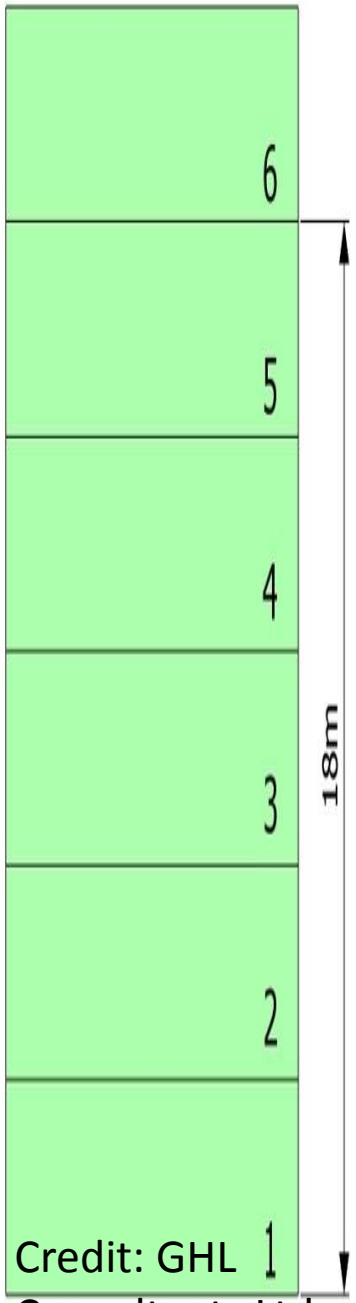
Architectural,Structural,Fire,Plumbing,Sprinklers,Mechanical-
Need to take into account……

- Effects of Shrinkage — effet du retrait
- Effects of Differential Settlement — effet du tassement
- Effects of Shear and Lateral Movement — effet du cisaillement et du movement latéral
- Fire Walls and Area Separation Walls — murs coupe-feu et murs séparateurs
- NFPA 13 Sprinkler requirements — exigence de gicleurs NFPA 13
- Non-combustible exterior cladding — parement extérieur non combustible

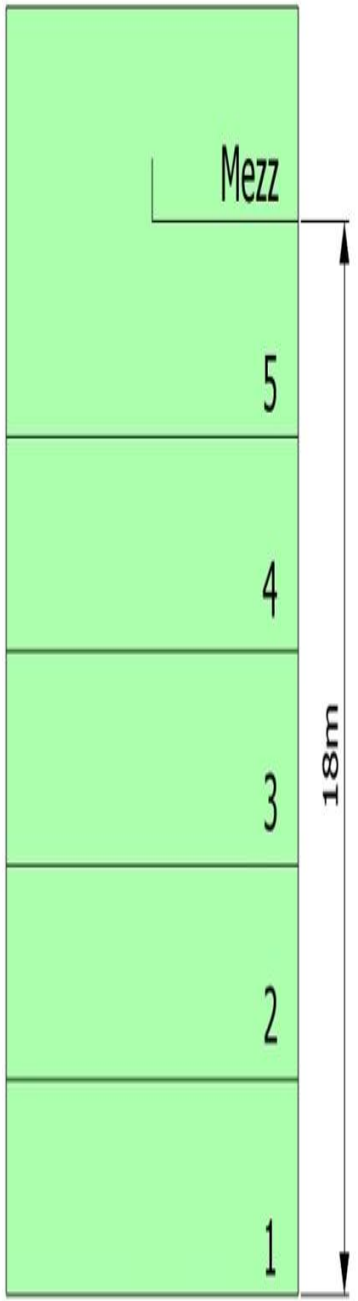
- Ceci nécessite une approche de conception intégrée avec tous les joueurs à la table avant la construction, incluant Cecobois.
- Integrated design team with Wood WORKS! support along the way

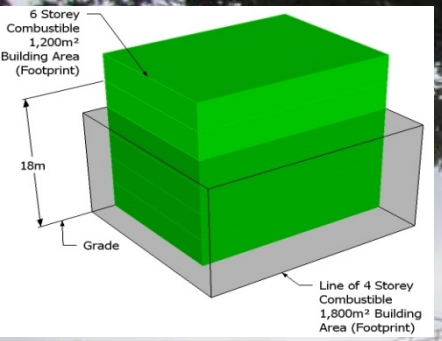
Provision #1- Building Height Clause 3.2.2.45.(1)(B)&(C)

- The building height for buildings built under 3.2.2.45 (Group C-Residential) are less than 18 meters to the uppermost floor level of the top storey, which precludes the use of top floor mezzanines to achieve additional height without triggering high building requirements.



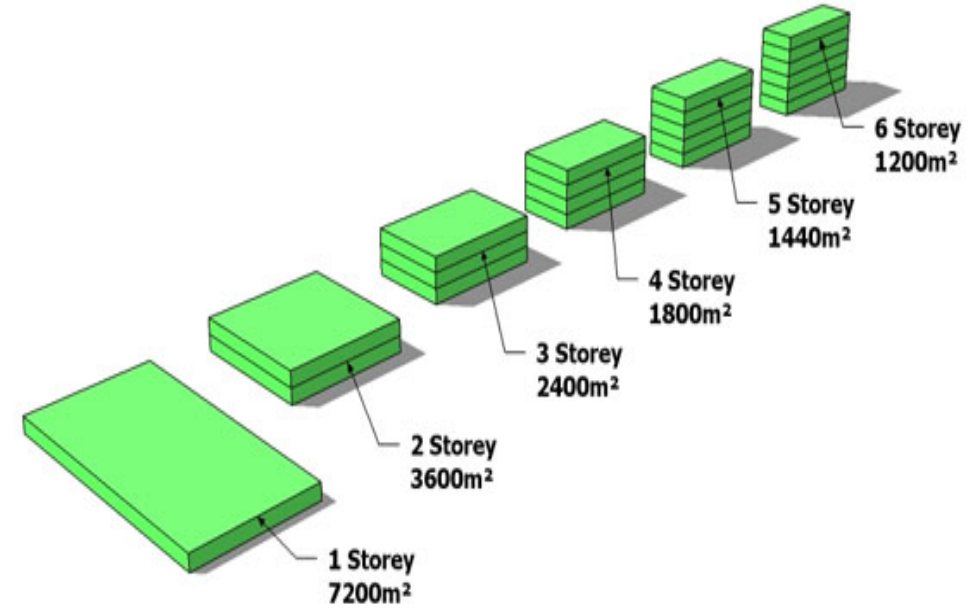
Credit: GHL Consultants Ltd

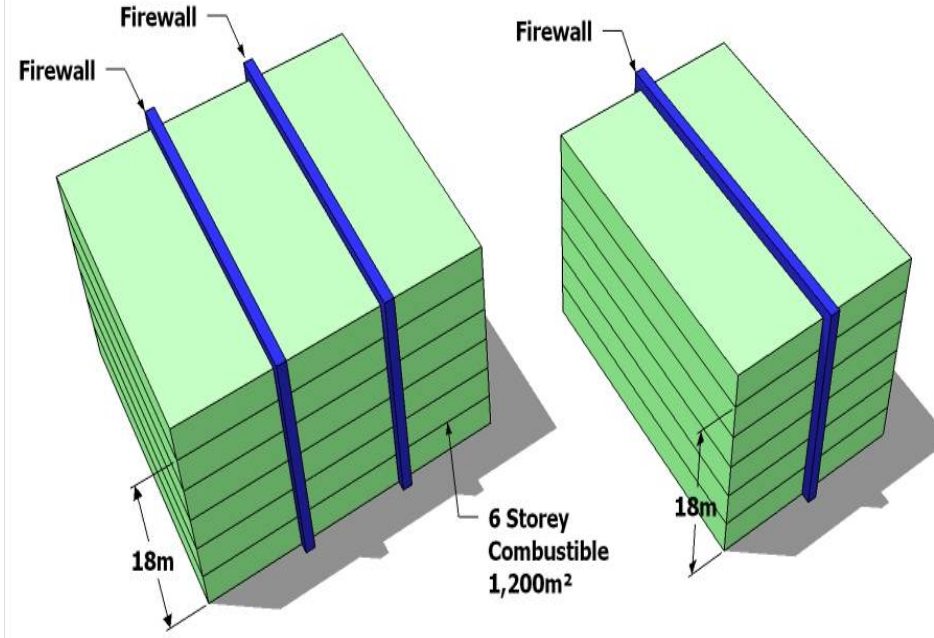




Provision# 2 – Building Area Sub-Clauses 3.2.2.45.(1)(D)(V) & (VI)

- This code change for building area defines the total permissible building area for each floor of a five and six-storey wood-frame building (1440m^2 if 5 *storeys* or 1 200 m^2 if 6 *storeys* in *building height).*
- The same gross floor area and the same fire engineering philosophy of compartmentalization and sprinkler protection results in the probability of no additional fire risk in these areas.



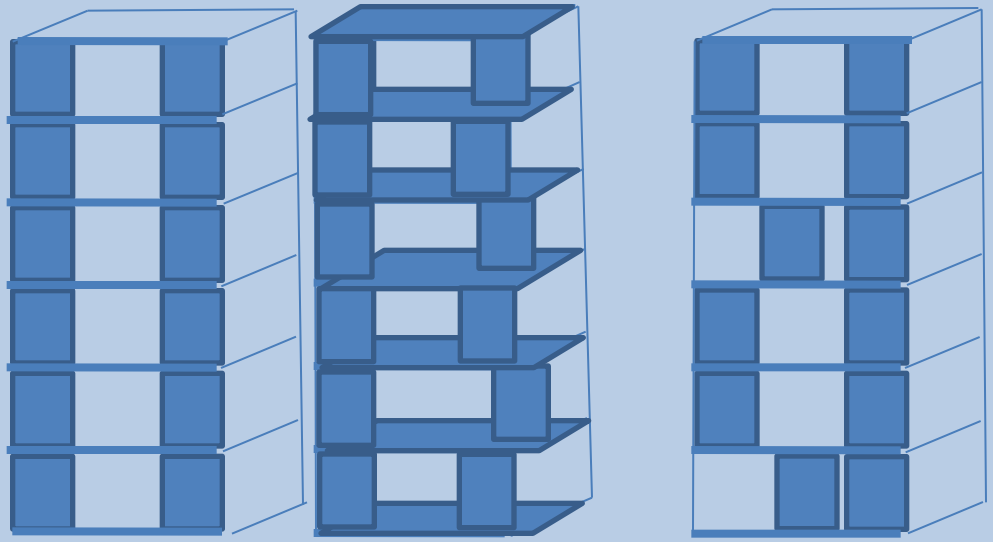


Provision #3- Exterior Cladding Materials

- Only noncombustible material or fire retardant treated wood siding will be allowed. As this reduces the probability of ignition of the building face and the likelihood of fire spread to adjacent buildings beyond the compartment of origin.

Provision #4- Shear Walls Sentence 3.2.2.45.(4)

- This code change for shear walls provides direction to the structural engineer on designing and locating shear walls.
- This provision prohibits certain types of irregularity in a shear wall system so that expected responses of this type of structure are maintained at reasonable levels by well-defined lateral-load resisting systems. In-plane discontinuity and out-of-plane offset in a timber shear wall system will not be allowed over the entire height of a mid-rise timber structure.



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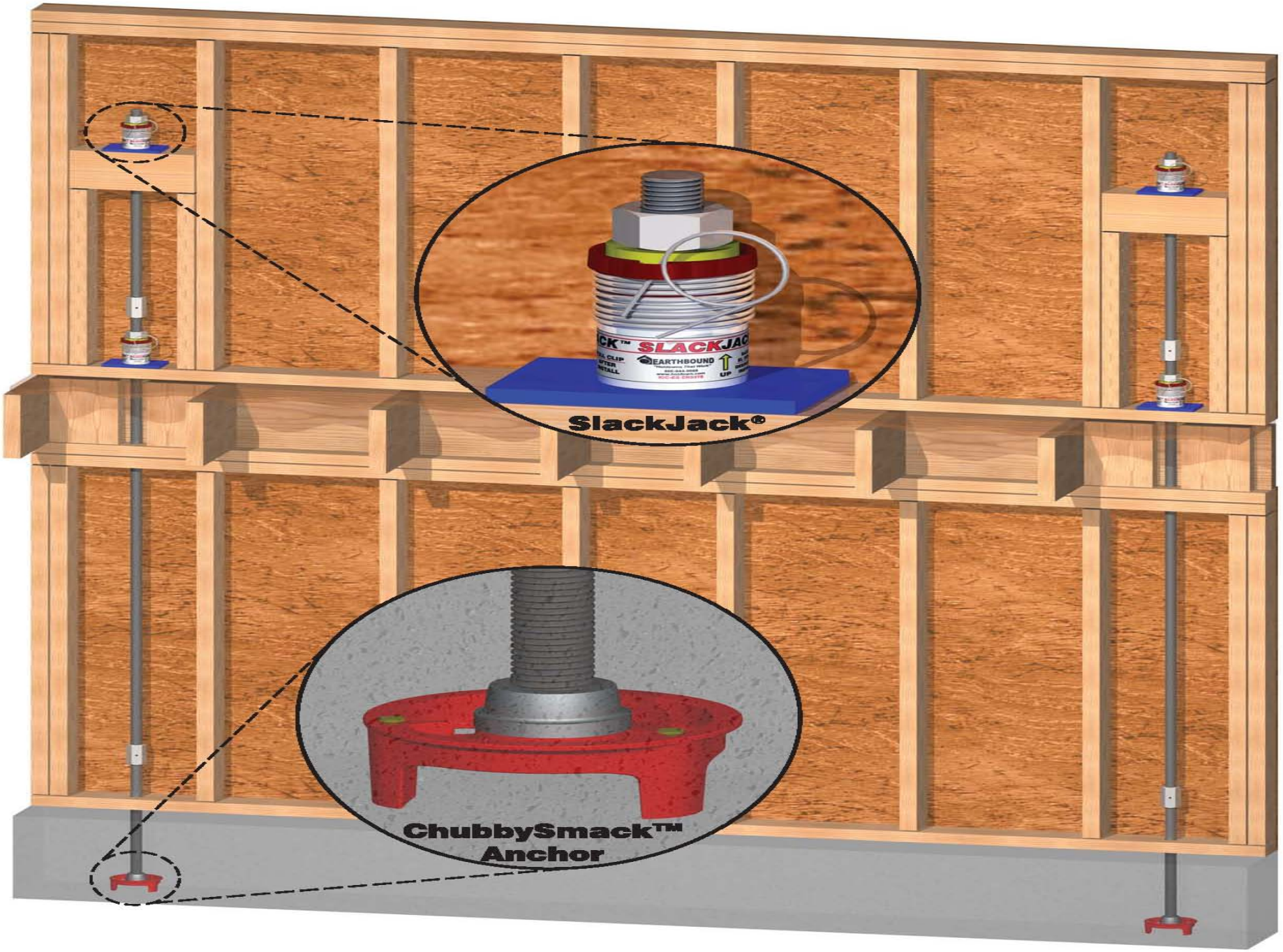
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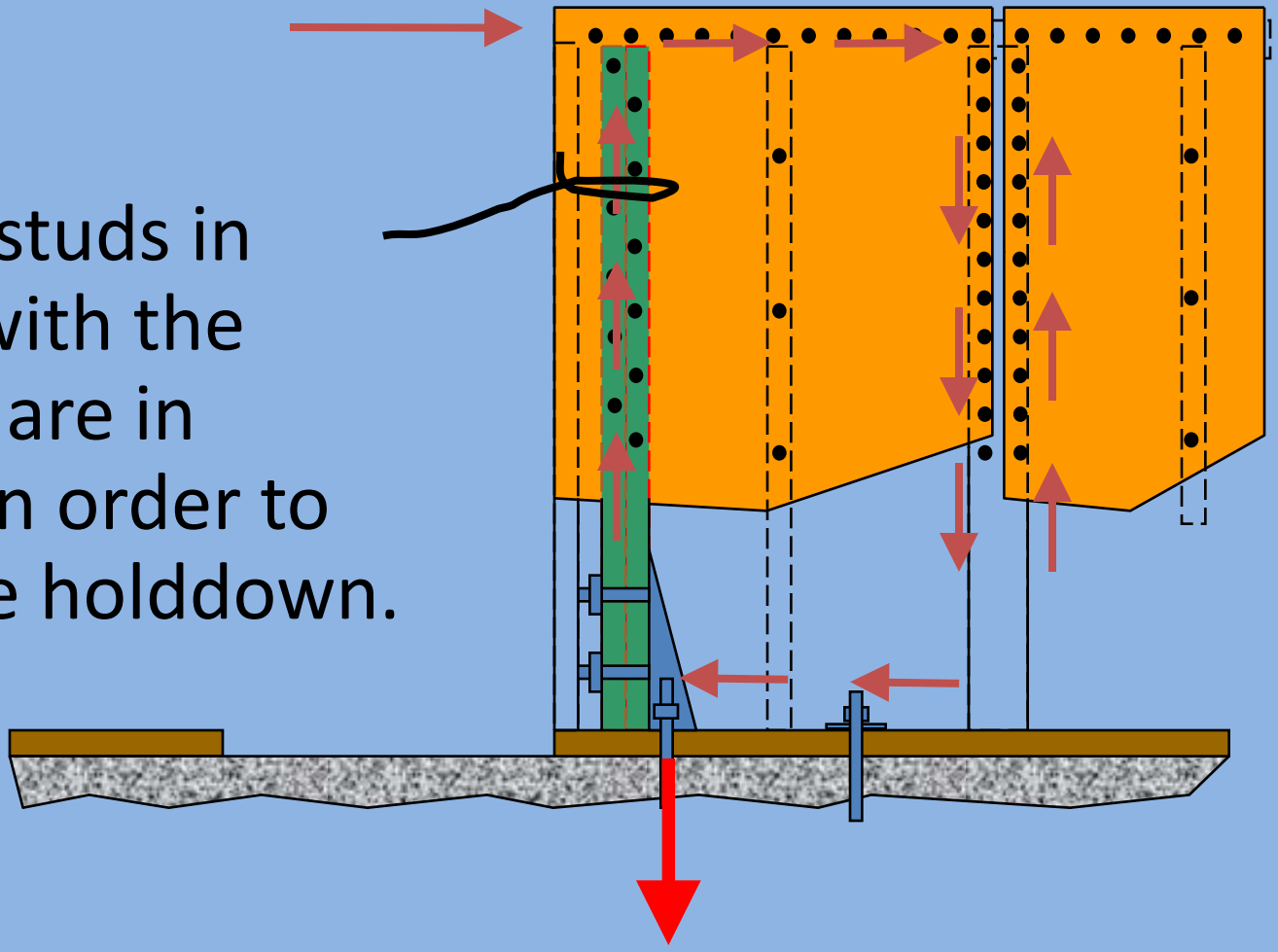
Anchor

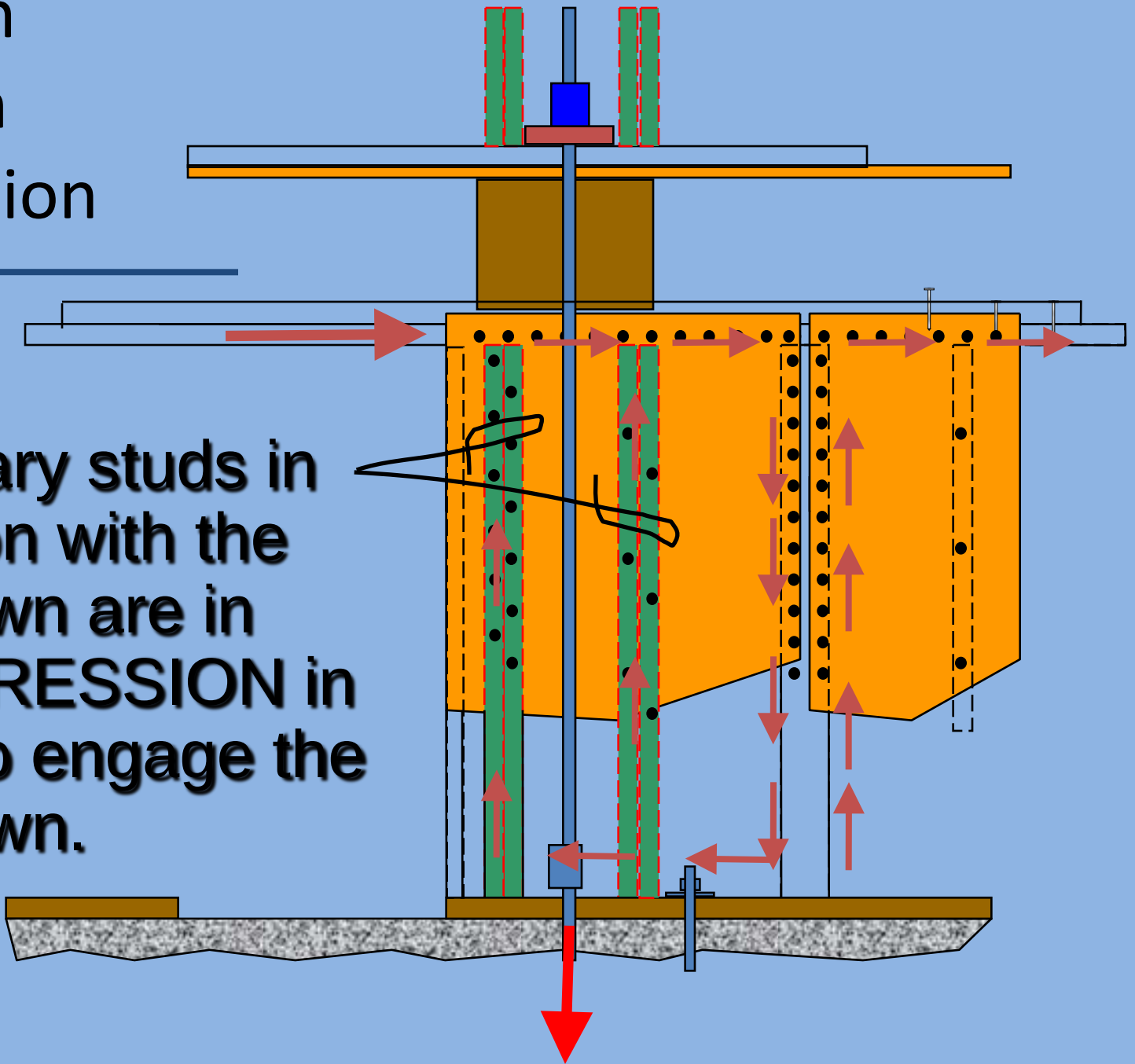
Holddown Lumber in Tension

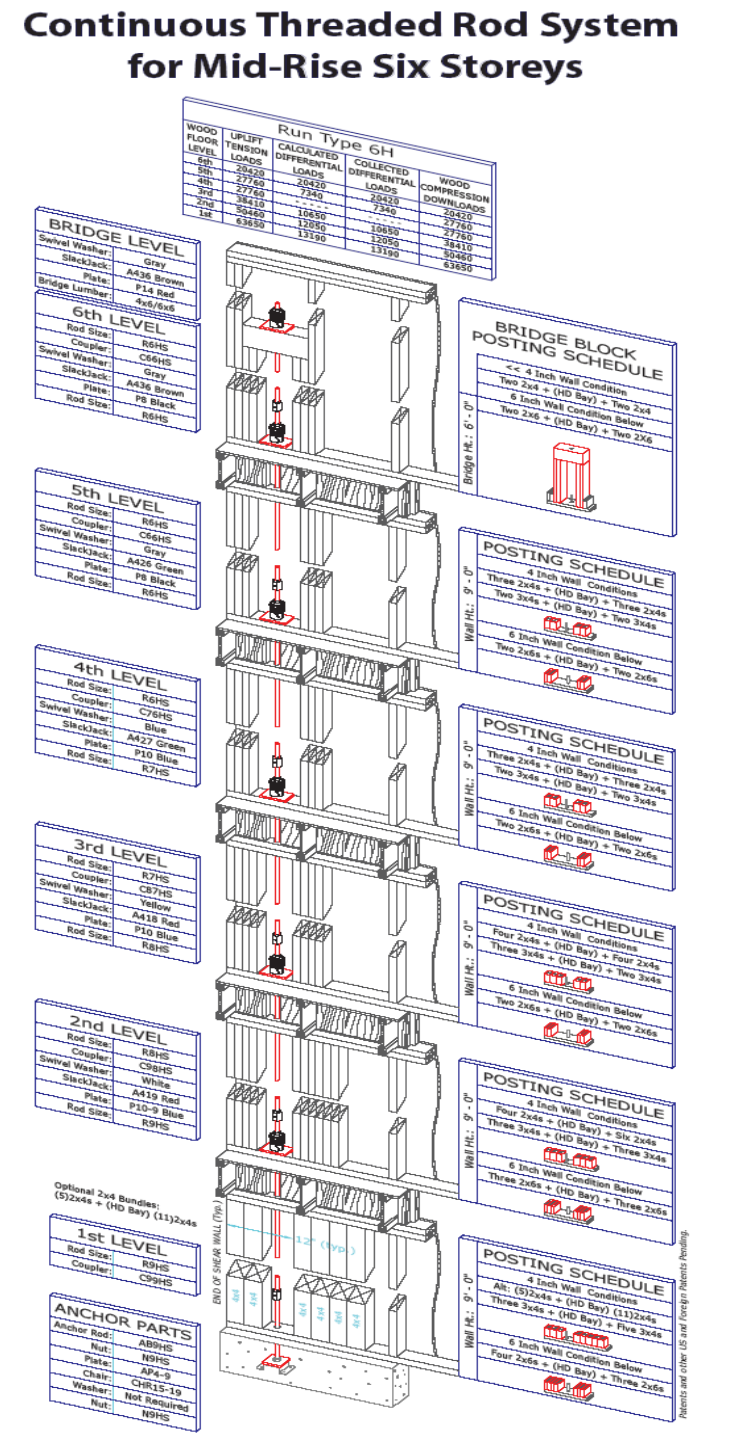
- Boundary studs in common with the holddown are in **TENSION** in order to engage the holddown.



Holddown Lumber in Compression

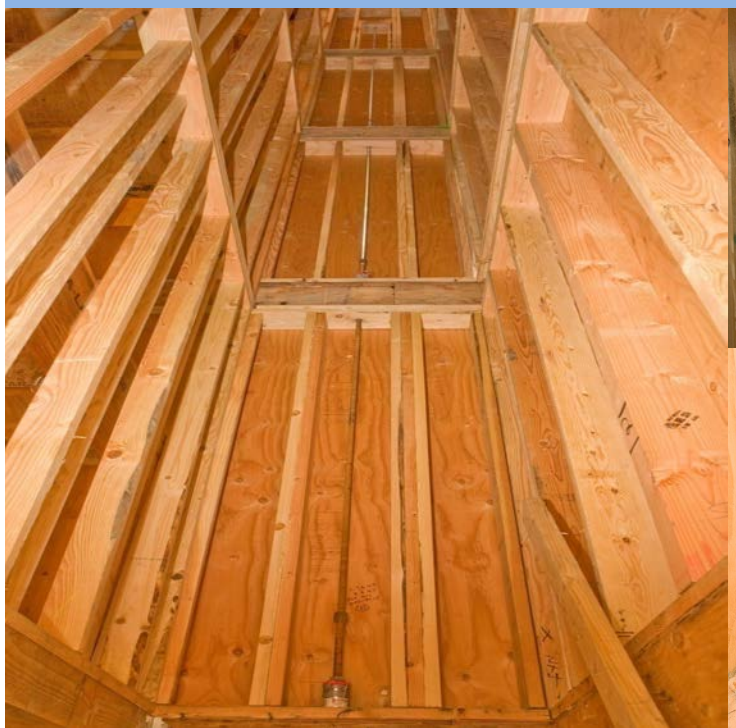
- **Boundary studs in common with the holddown are in COMPRESSION in order to engage the holddown.**

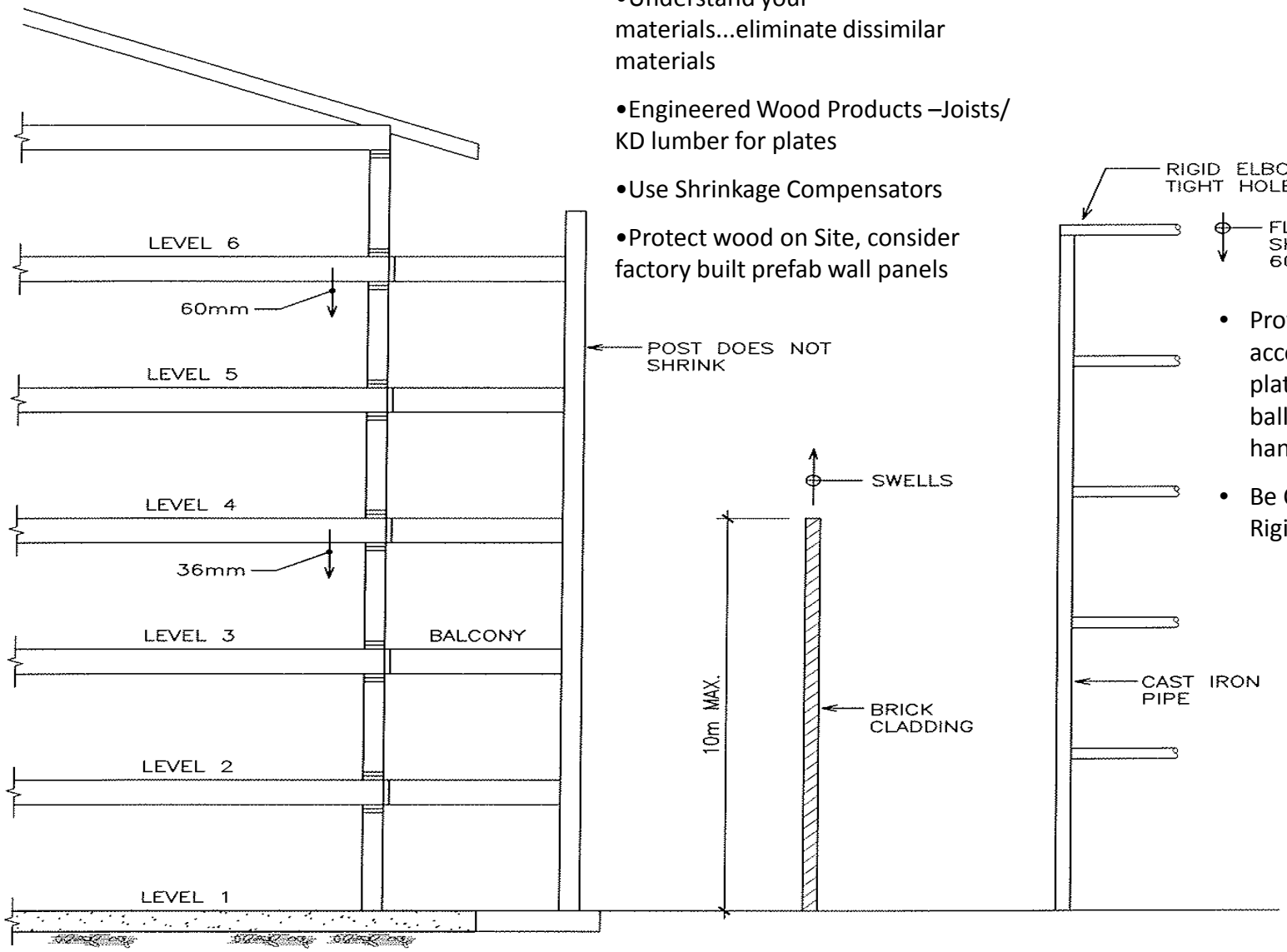




Provision #7- Structural Material Shrinkage
Subsection 4.3.1.1.1A-4.3.1

- Shrinkage must be a design consideration in wood-frame construction, particularly for buildings of five and six storeys in building height. Shrinkage parameters should be coordinated among design professionals of the other impacted building systems.





- Understand your materials...eliminate dissimilar materials
- Engineered Wood Products –Joists/ KD lumber for plates
- Use Shrinkage Compensators
- Protect wood on Site, consider factory built prefab wall panels

- Provide Details to accommodate platform framing or balloon with hangers?
- Be Cautious with Rigid Materials

SHRINKAGE

Party wall to party-wall framing

-affects deck framing

Photo courtesy of Stephanie Tracey c/o Photograhpy West

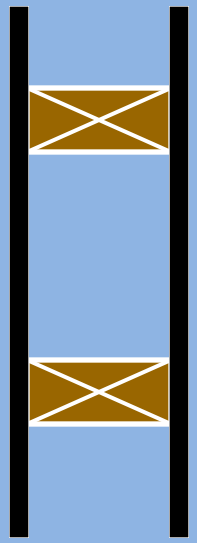
Fire Protection

Building codes require all building systems to perform to the same level of safety, regardless of material used.

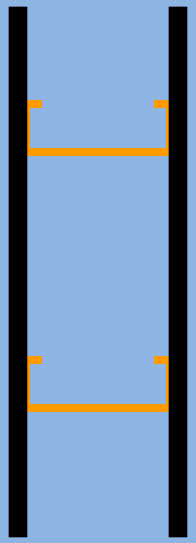
1h Fire Rated Wall Assemblies

All 3 wall assemblies may be designed to pass CAN/ULC-S101 for 1h FRR.

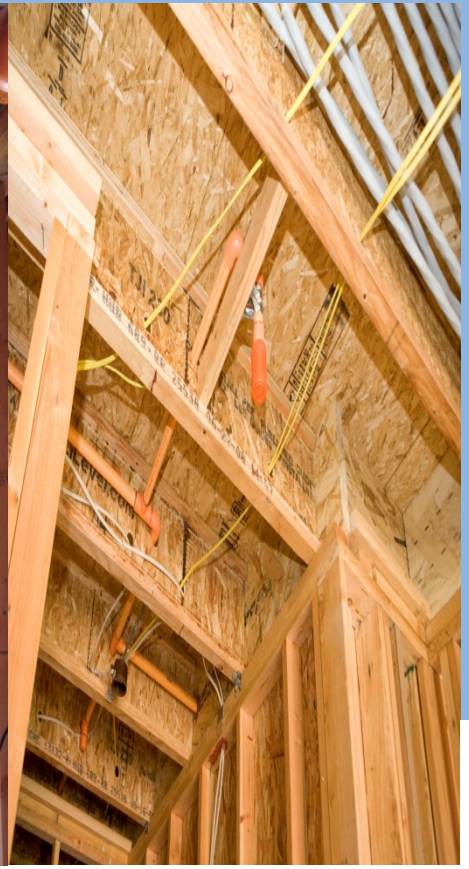
Wood Stud



Steel Stud

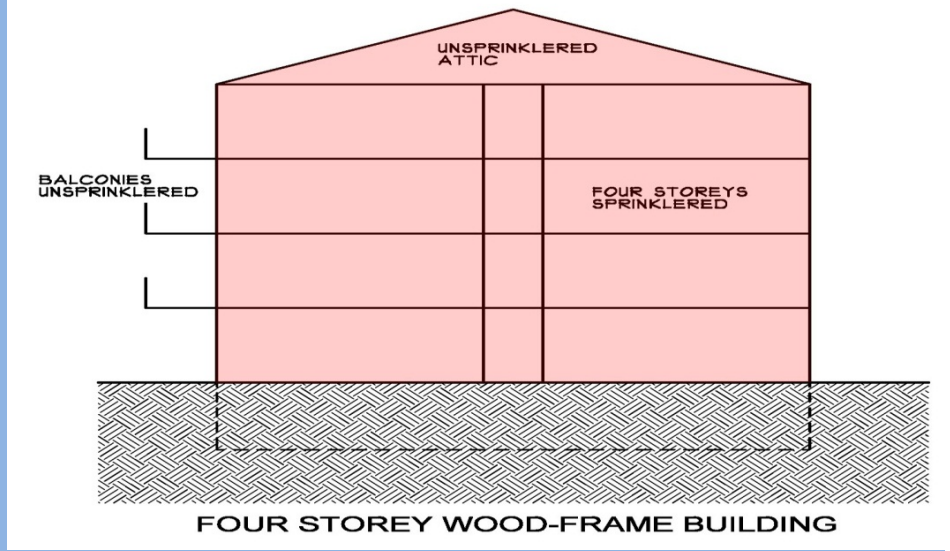


Concrete / Masonry

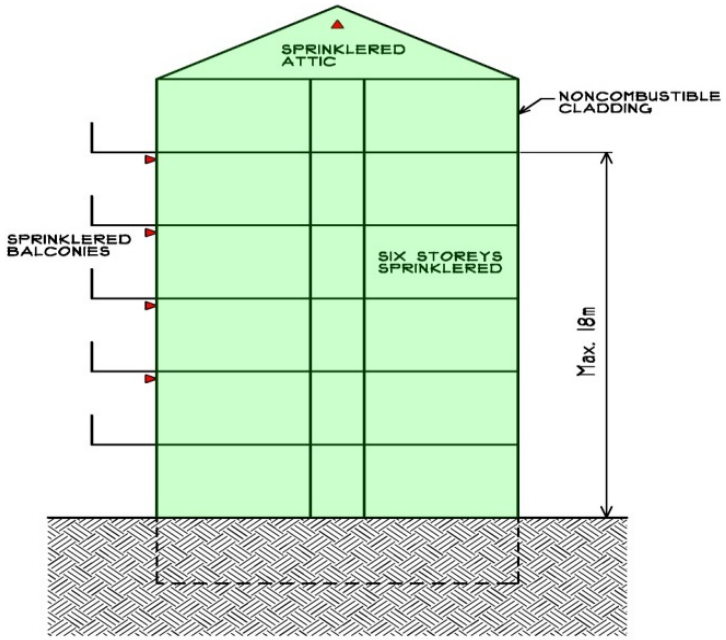


Fire Protection

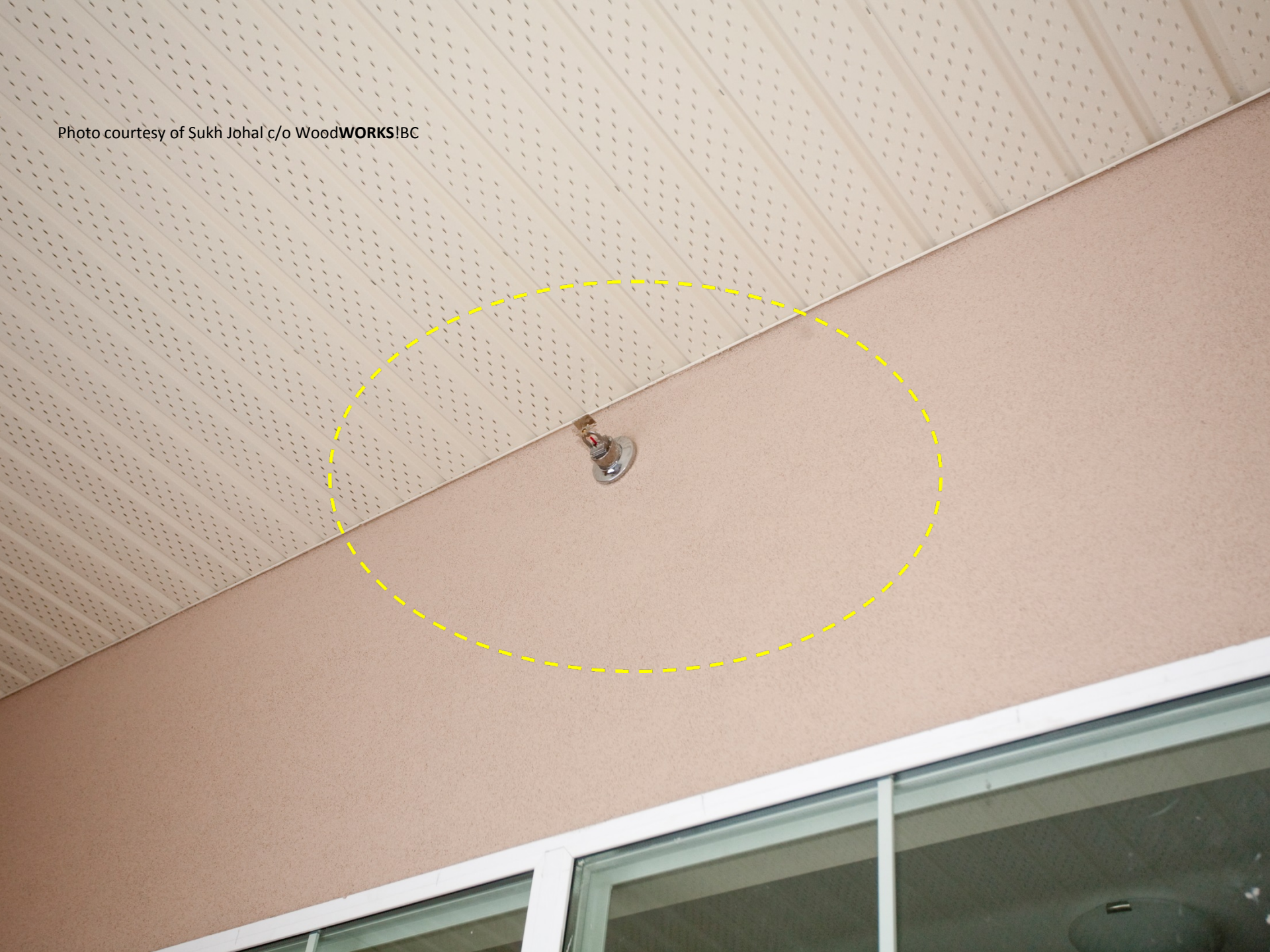
- NFPA 13 Sprinkler System
- small rooms, closets, balconies
- Attics, roof void spaces
- Combustible concealed spaces
- A larger sprinkler design area may be used



FOUR STOREY WOOD-FRAME BUILDING



SIX STOREY WOOD-FRAME BUILDING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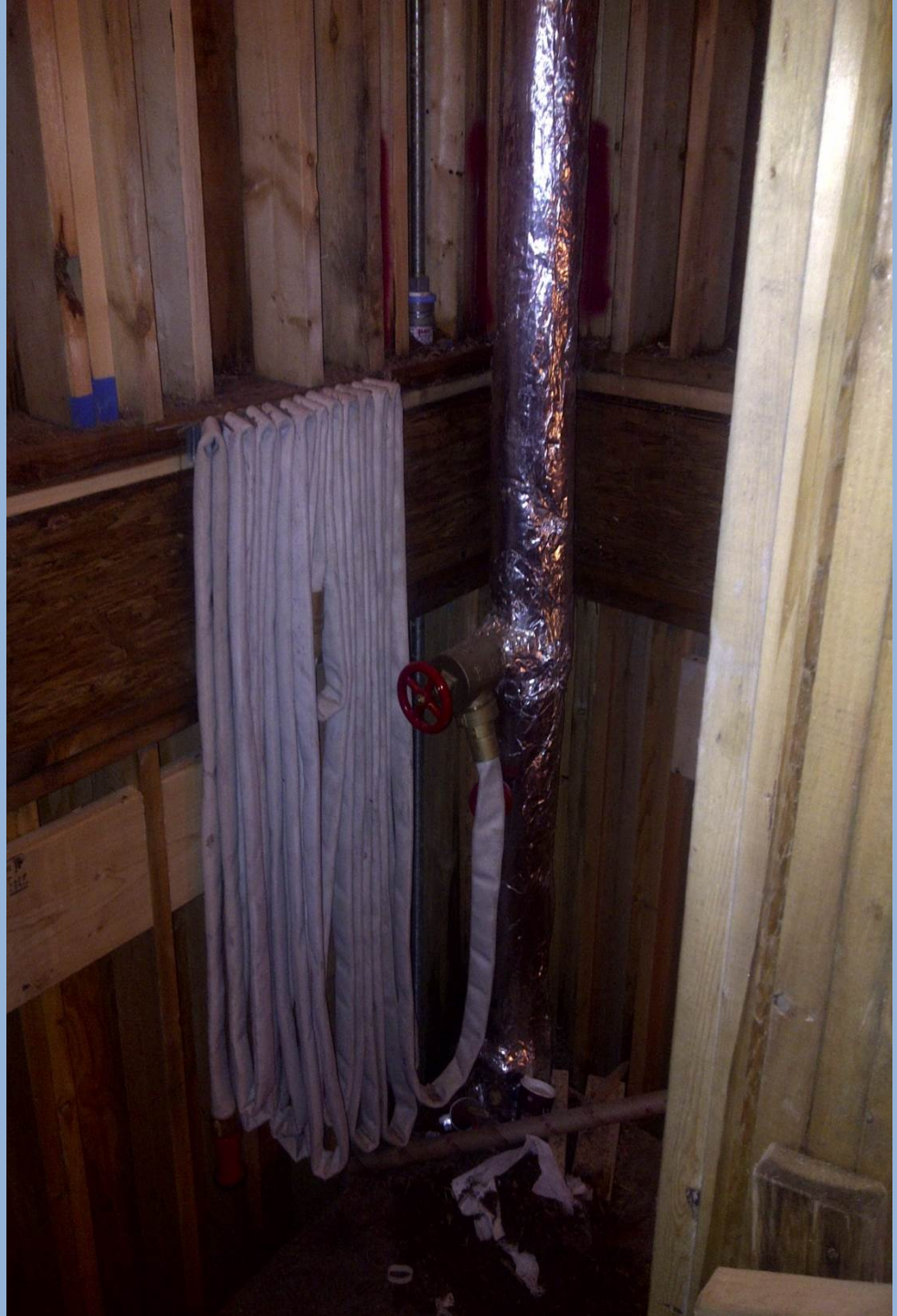
Fire Hose Reel



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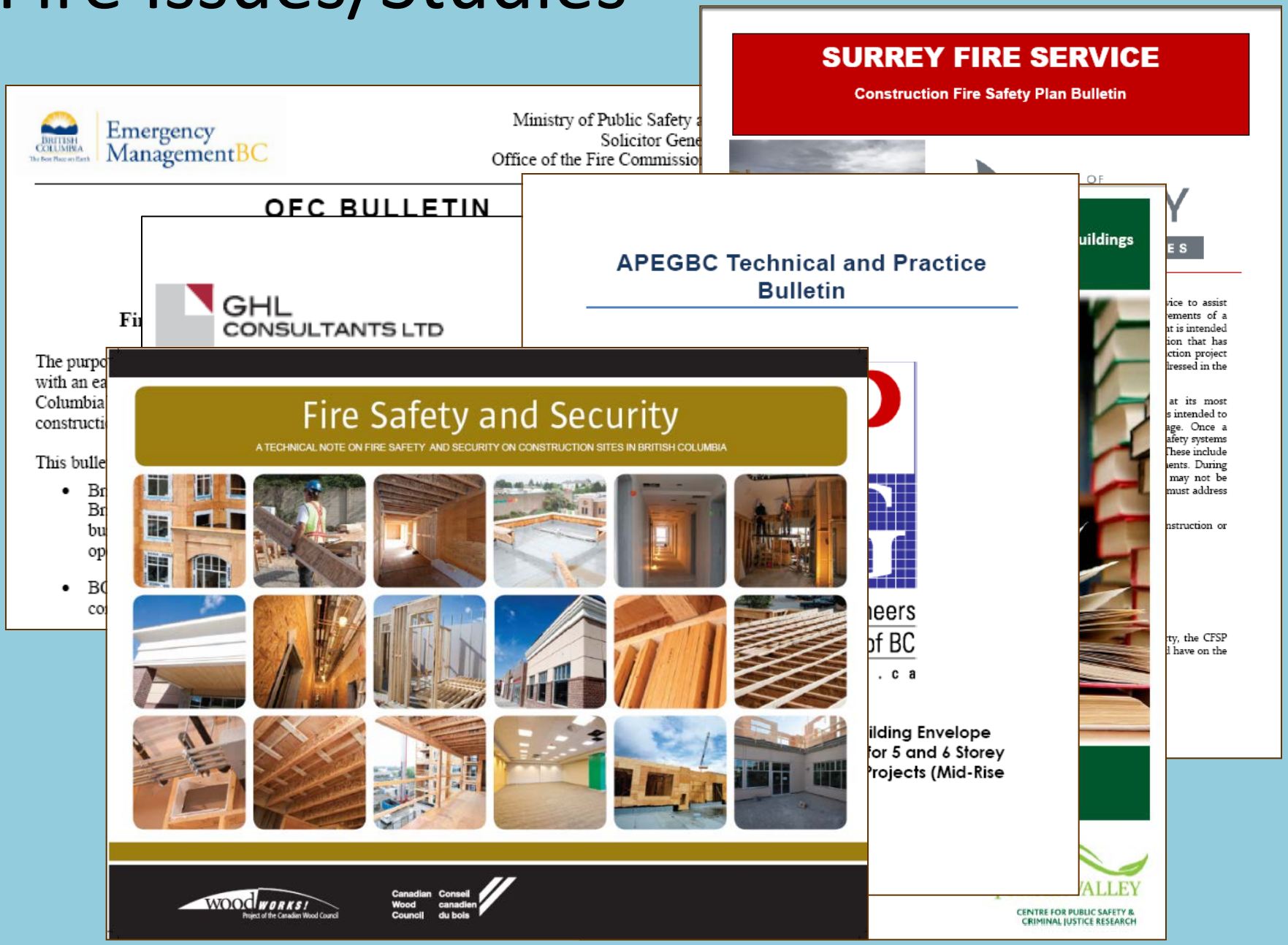
Discussion needed on new construction procedures

- Floor by floor construction to include installed Firedoors (with fuseable links) + Charges standpipes installed as you build your way up.

- Hotworks or not?
- Smoking policy

Fire Issues/Studies



Opportunities

Compared to Concrete and Steel construction:
Costs less, quicker delivery to the market, nuances are quite manageable with proper pre-planning.

Mid-Rise Support: material

Mid-Rise Support: presentations and tours

Photo courtesy of Sukh Johal c/o Wood**WORKS**!BC

Presentations and/or tours provided to:

- Architects
- Engineers
- Building Officials
- Developers
- Project Managers
- Jobsite Crews
- Real Estate Agents

Wood*WORKS!*

- is a resource for anything and everything related to wood construction, engineered wood products and building systems
- wants to help you build proficiency in using wood.
- offers many opportunities for you to increase your knowledge about designing and building with wood.

Contact:
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