# FWPA Pushing up the Height of Timber Buildings

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Forest & Wood Products Australia

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# Current Situation

- The Building Code of Australia (BCA) limits the height of combustible construction based on fire provisions
- Non-combustible construction is deemed-to-satisfy (DTS) for taller non-domestic type buildings i.e. apartments built in concrete and/or masonry
- Developers, builders, designers are required to demonstrate that a proposed timber building can meet the performance requirements of the BCA before timber can be approved for use

# AIM

- To provide a deemed-to-satisfy option for mid-rise timber buildings that:
  - Enhances life safety and property protection compared to current deemed-to-satisfy provisions
  - Is economically viable
  - Facilitates consistent approaches to mid-rise timber buildings
  - Facilitates Sustainable Construction practices
  - Is compatible with existing Building Code of Australia approaches
  - Achieves broad support from relevant stakeholders

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# Maximum Timber Storey Height by Building Classification (BCA 2013)

| Rise in storey | Type of Construction | | | | | |
|---|---|---|---|---|---|---|
| | Class 2 | Class 3 | Class 5 | Class 6 | Class 9a | Class 9b |
| | Apartments | Hotels | Office | Shops | Healthcare | Schools & public buildings |
| 4 or more | A | A | A | A | A | A |
| 3 | A | A | B | B | A | A |
| 2 | B | B | C | C | B | B |
| 1 | C | C | C | C | C | C |

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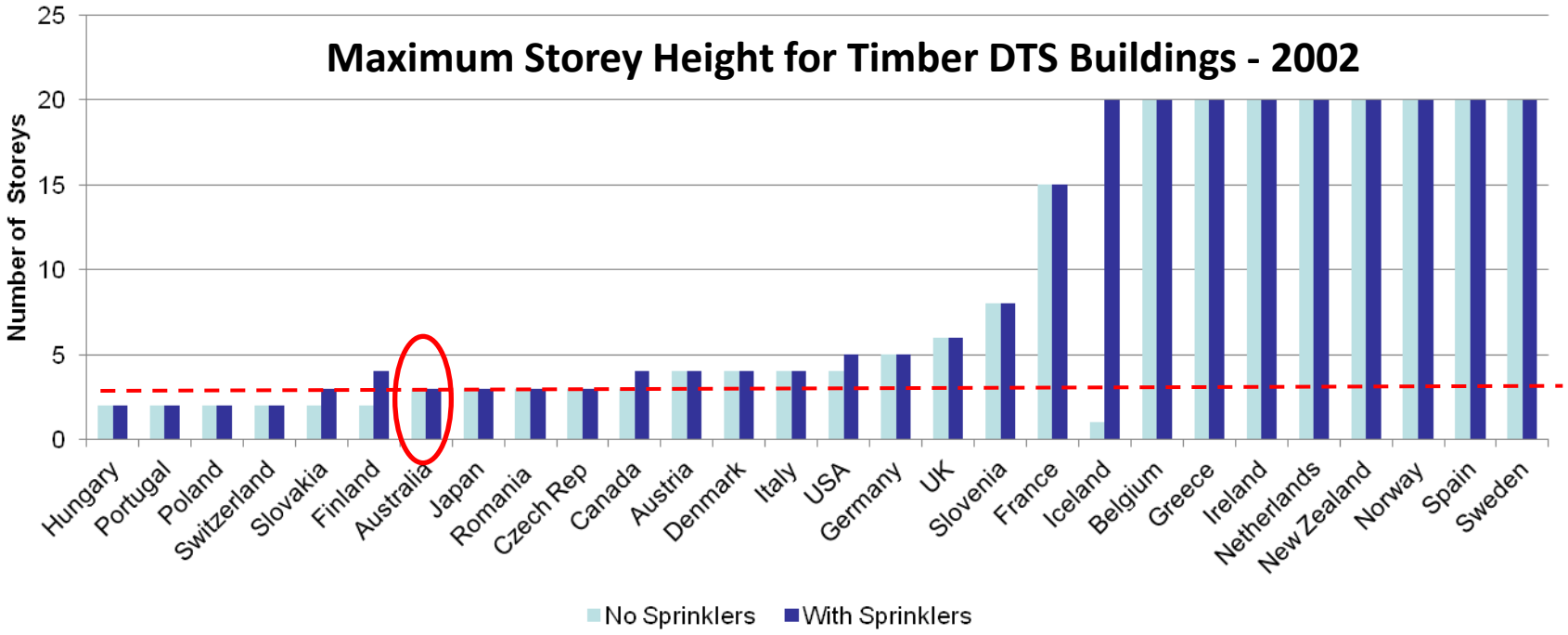
# How does Australia Compare to the rest of World?

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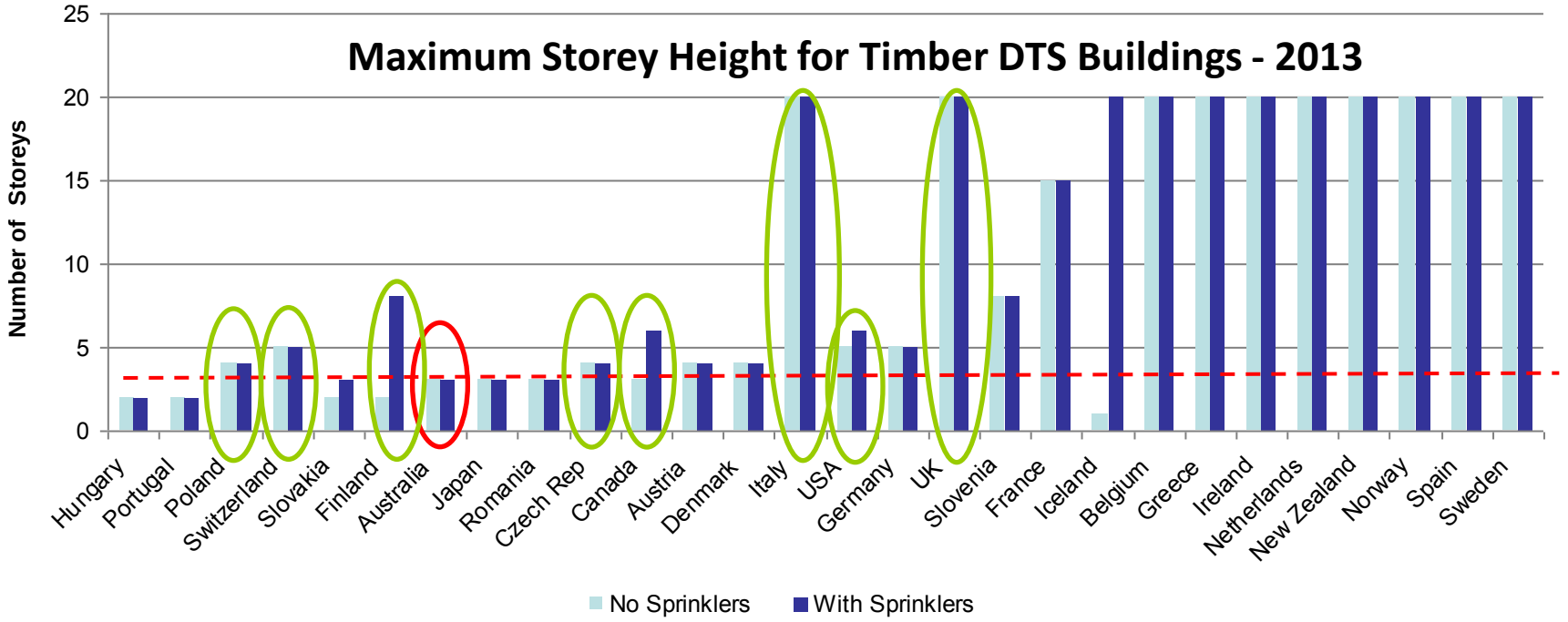


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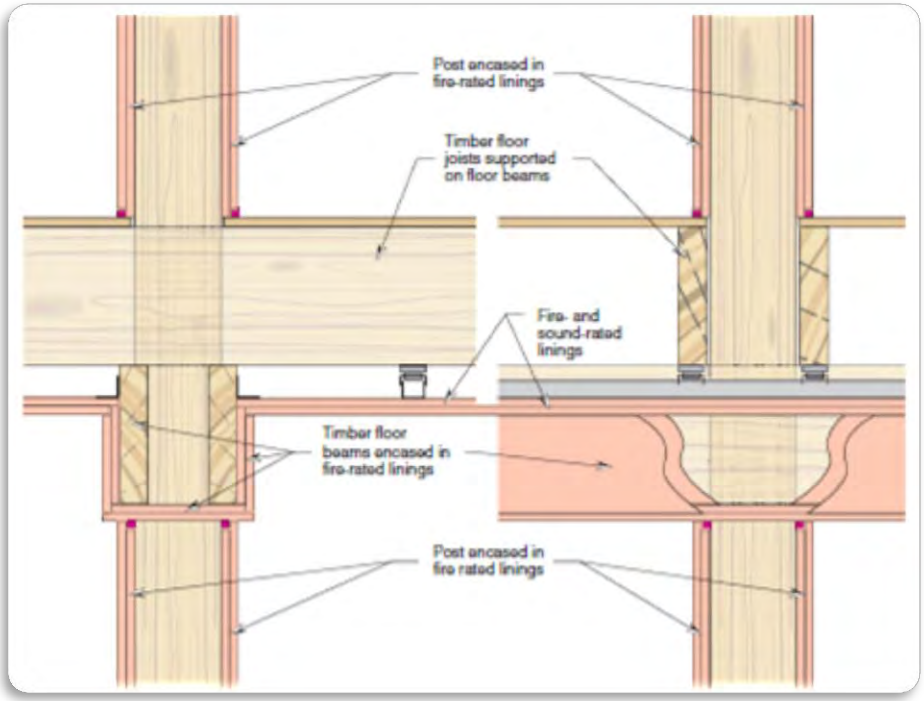
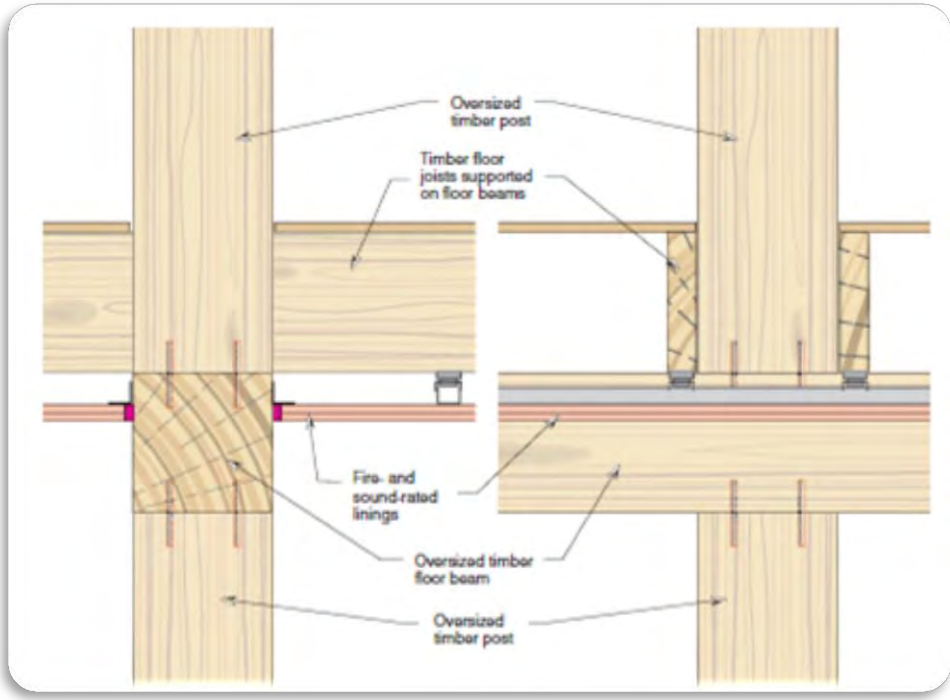
# Fire Protection – Two Methods

## Wrapped in Plasterboard




## Exposed timber

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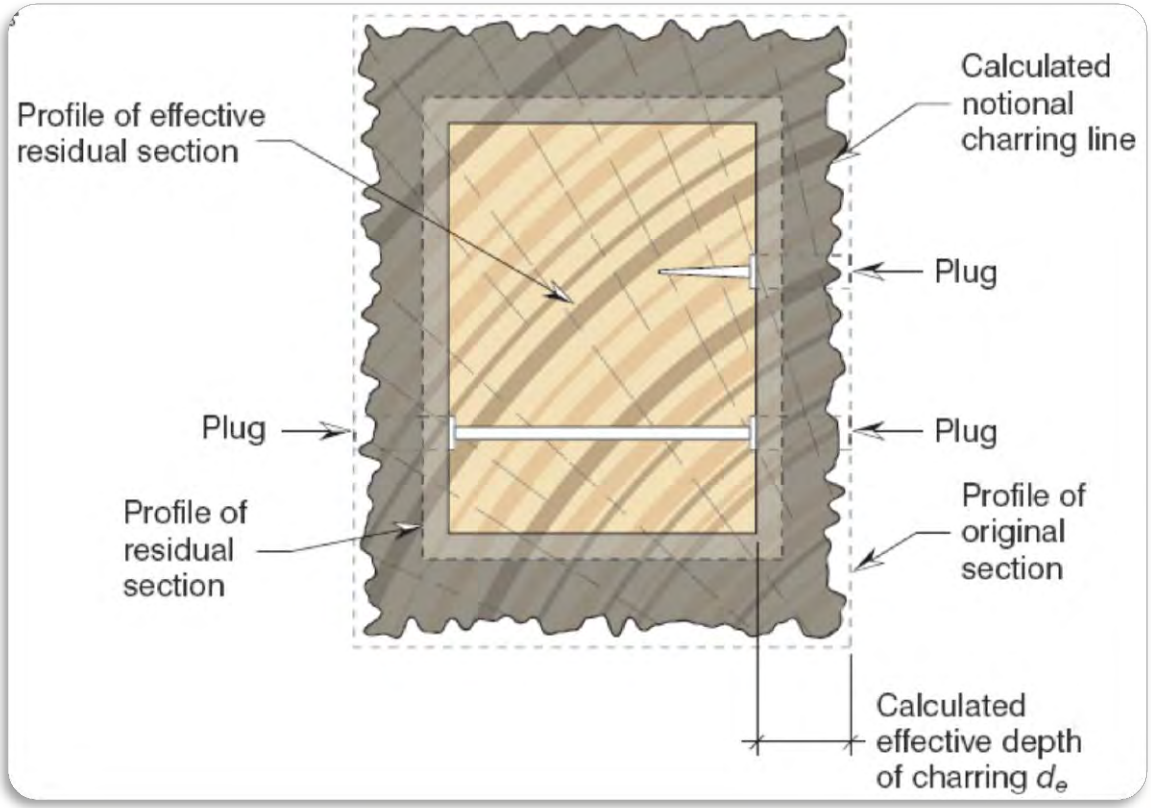
# Calculations by AS 1720.4

- Structural Purposes

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# Calculations by AS 1720.4

## 2.4 NOTIONAL CHARRING RATE

The notional charring rate for untreated timber exposed to a fire is calculated as follows:

$$c = 0.4 + \left(\frac{280}{\delta}\right)^2 \quad \ldots 2.1$$

where

$c$ = notional charring rate, in millimetres per minute

$\delta$ = timber density at a moisture content of 12%, in kilograms per cubic metre

## 2.5 EFFECTIVE DEPTH OF CHARRING

For each fire-exposed surface, the calculated effective depth of charring ($d_c$) after a period of time ($t$) is calculated as follows:

$$d_c = c\,t + 7.5 \quad \ldots 2.2$$

where

$d_c$ = calculated effective depth of charring, in millimetres

$c$ = notional charring rate, in millimetres per minute

$t$ = period of time, in minutes

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Fire Tests

# 2 minutes

***Steel framed test***

***Timber framed test***

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# 30 minutes

***Steel framed test***

***Timber framed test***

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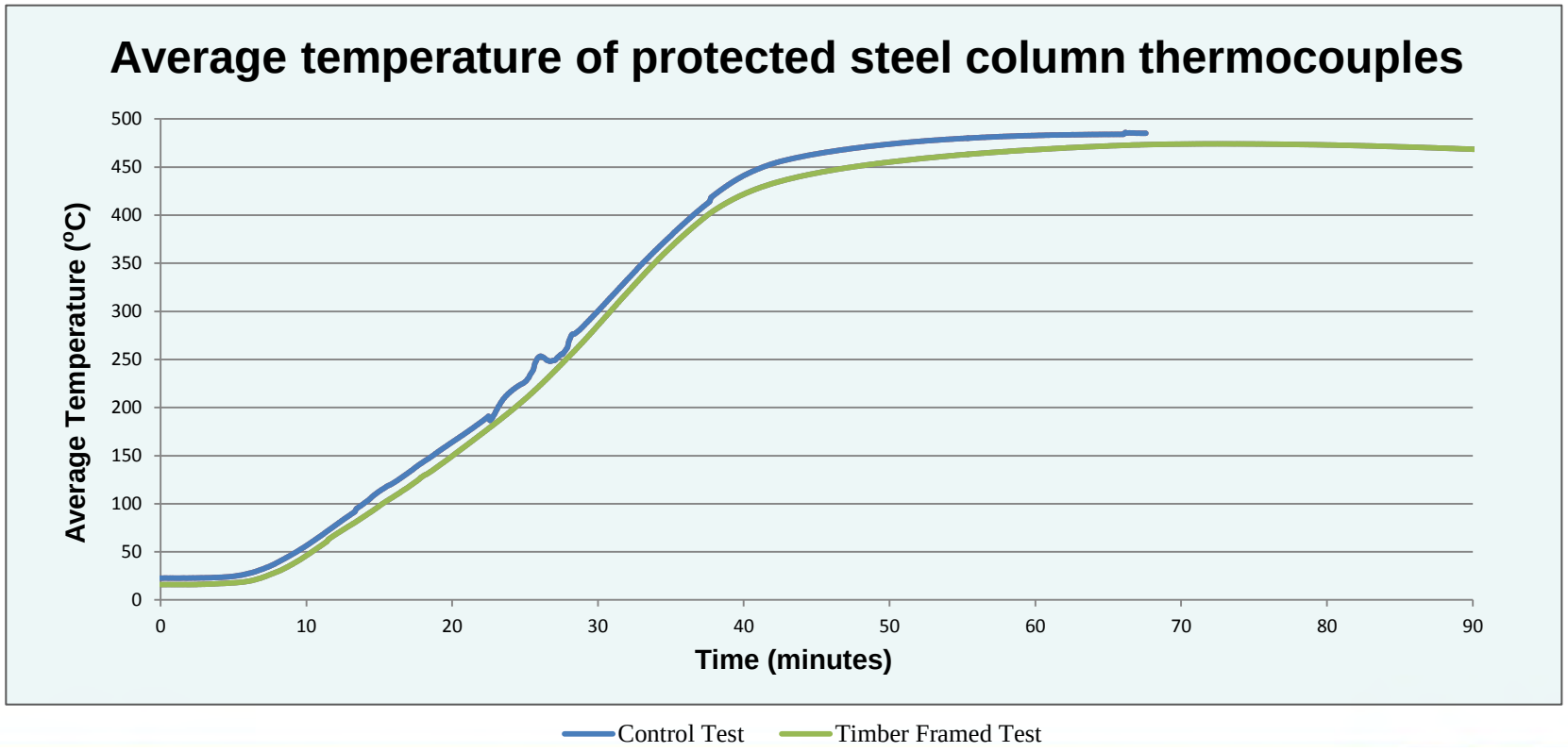
# Results – Time to Failure

Non-combustible frames – 66 mins

Timber – 114 mins

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# The Green – Parkville, Victoria

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# Lightweight Construction

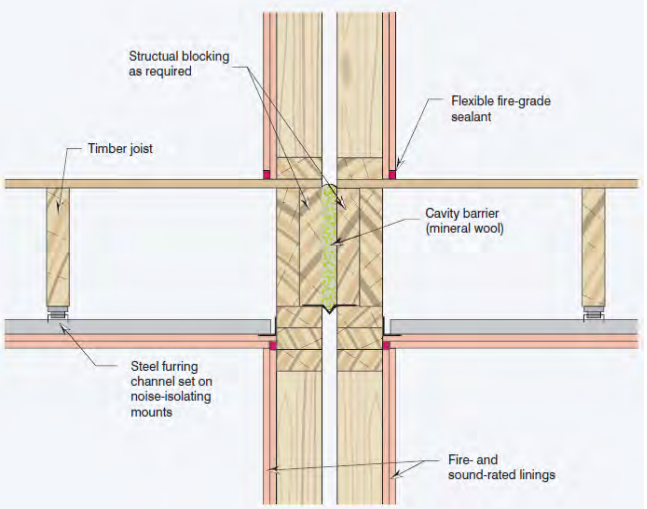


Figure 1 Floor / Wall Junction Cavity Barrier

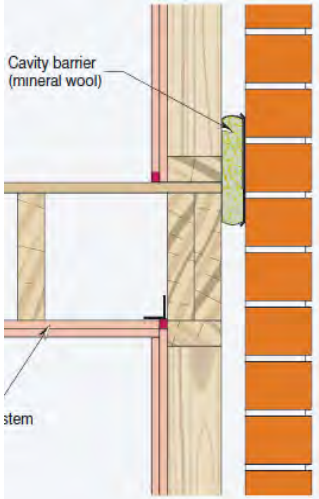


Figure 2 Floor / External Wall Cavity Barrier

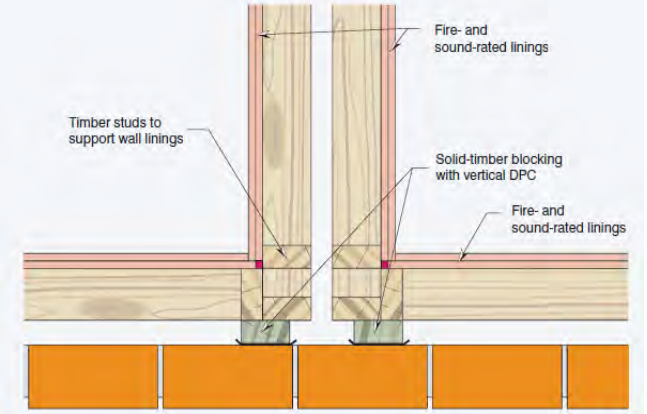


Figure 3 Wall / External Call Timber Cavity Barrier

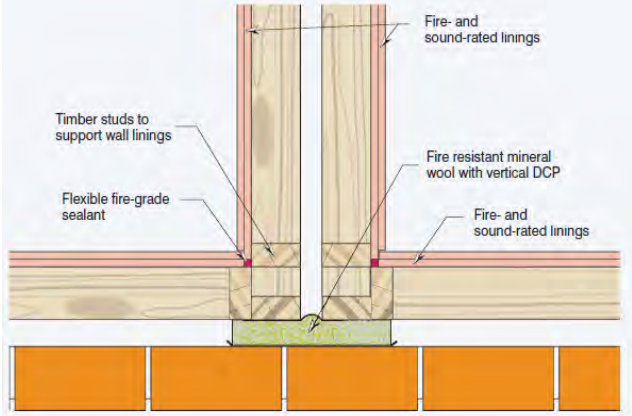


Figure 3 Wall / External Call Mineral Wool Cavity Barrier

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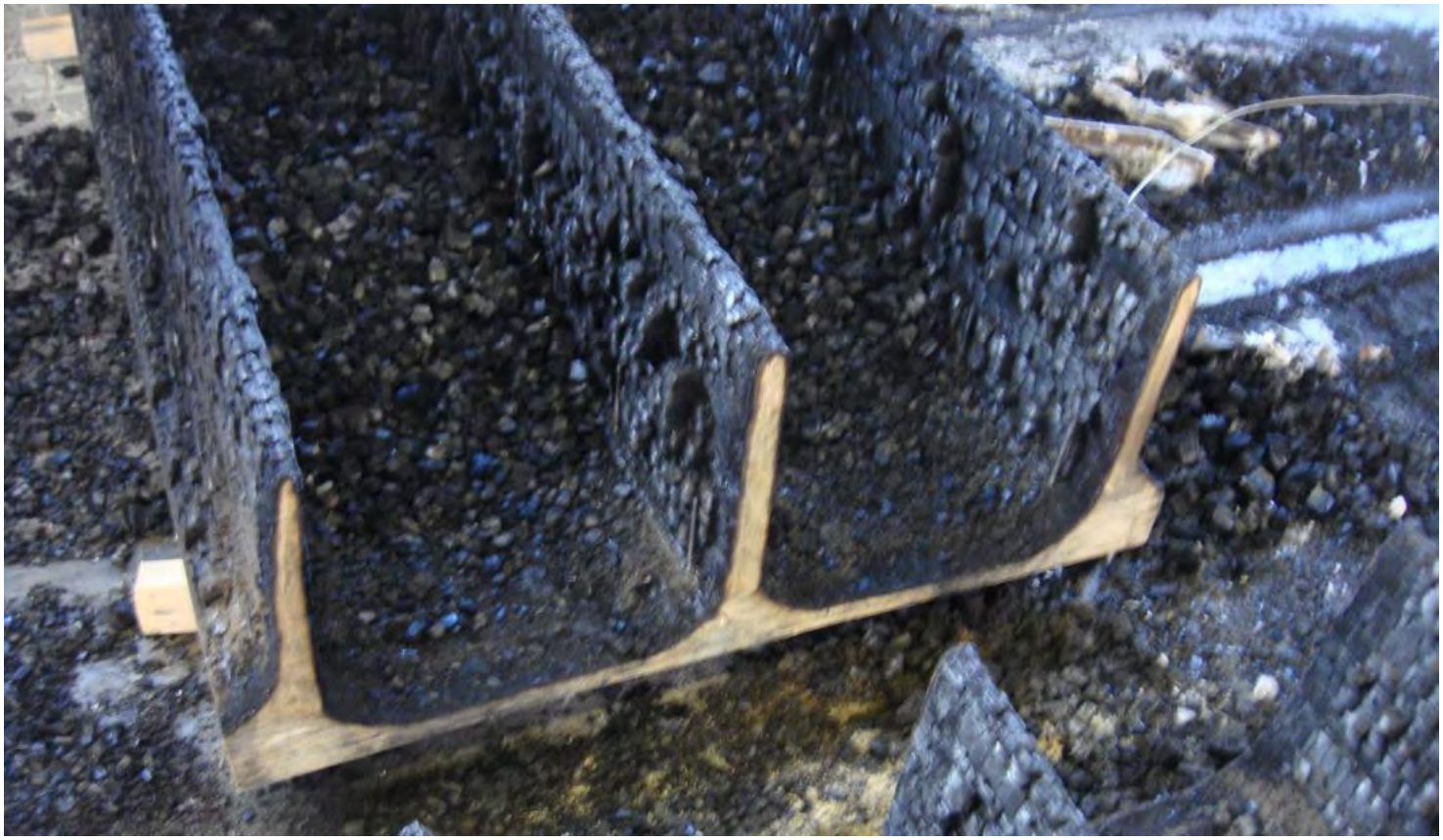
# Fire Protection

- Fire protection provided by increased thickness to timber elements.

# Char for FRL 90/90/90



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# New Building Materials & Systems

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# Cross Laminated Timber

- Multiple layers of laminated timber cross at each laminate i.e. “Jumbo plywood”

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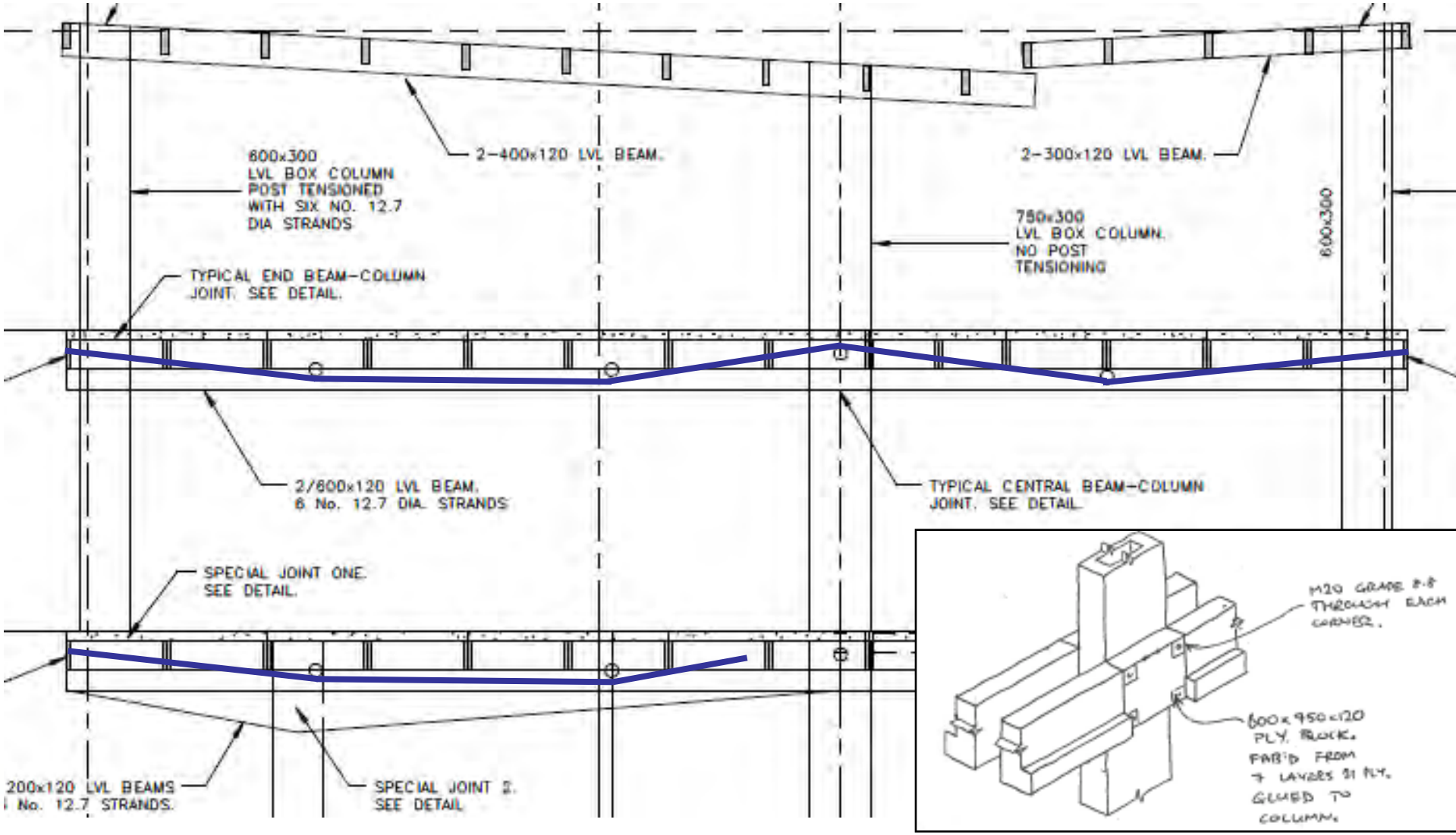
# Post-tensioned timber frames

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# Post-tensioned timber frames

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# Post-tensioned timber frames


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# How High Can we Go?


807 Bourke St
Victoria
Harbour

10 storeys
23 apartments
4 townhouses

Project: Forte
Builders: Lend Lease
Location: Melbourne, Vic

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**32.17M HIGH** THE WORLD'S TALLEST TIMBER APARTMENT BUILDING

**5★ GREEN STAR** EXPECTED TO BE THE FIRST RESIDENTIAL BUILDING TO ACHIEVE THIS

**485** TONNES OF TIMBER

**759** CLT PANELS

**34,550** SCREWS

**5,500** ANGLE BRACKETS

SHIPPED IN **25** CONTAINERS

**ON 2 SHIPS**

BUILT WITH **2** LL APPRENTICES

SAVING **1,451** TONNES OF CARBON

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FORTÉ

LIVE WEBCAM

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# How High Can we Go?

TALL WOOD
THE CASE FOR
Tall Wood BUILDINGS

Vancouver, British Columbia's Timber Highrise Feasibility Study: Tall Wood

- Michael Green Architects have designed prototype for 12, 20 and 30-story massive wood buildings
- Demonstrates carbon neutral construction for highly urban areas

TALL WOOD


Source: Michael Green Architects

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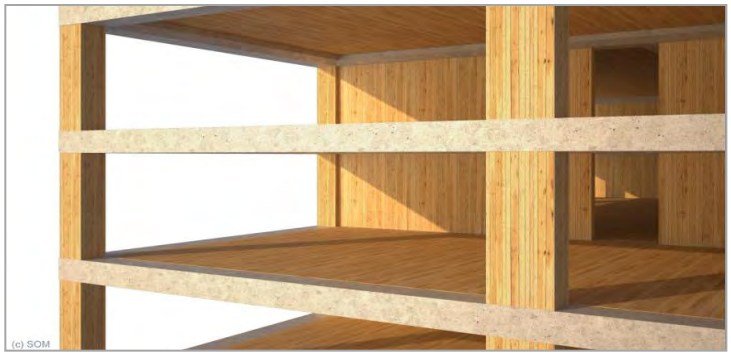
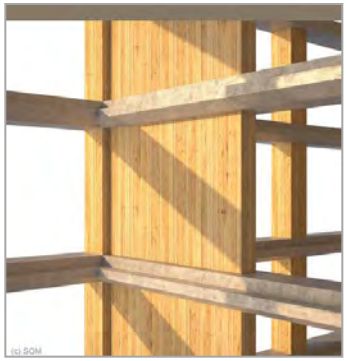
# How High Can we Go?

Timber Tower Research Project

- 42 Storey
- “Concrete Jointed Timber Frame”
- Carbon footprint reduced by 60-75%.

SOM
SKIDMORE, OWINGS & MERRILL LLP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# Where to next?

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# Overview of Proposal for Change

- FWPA is preparing a Proposal for Change (PFC) to the National Construction Code (NCC) for the use of timber framing for buildings in Class 2 (apartments) and 3 (hotels) up to 25 metres in effective height (approximately 8 storeys).
- The proposed solution will cover both 'lightweight timber framing' and 'massive timber systems' and will consist of the use of appropriate layers of fire resistant plasterboard and sprinklers.
- The PFC must be supported and submitted before 2nd February 2015; otherwise the next opportunity for its introduction is 2019.

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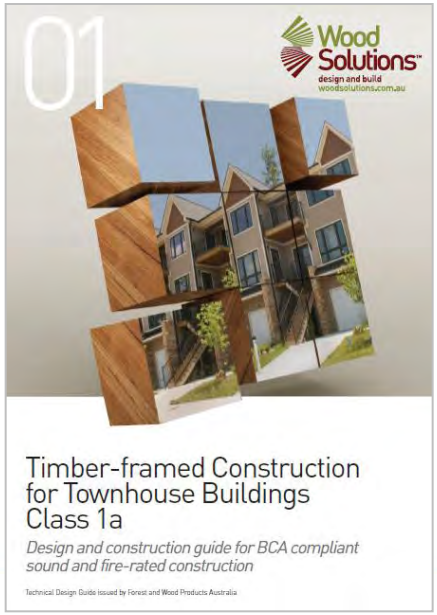
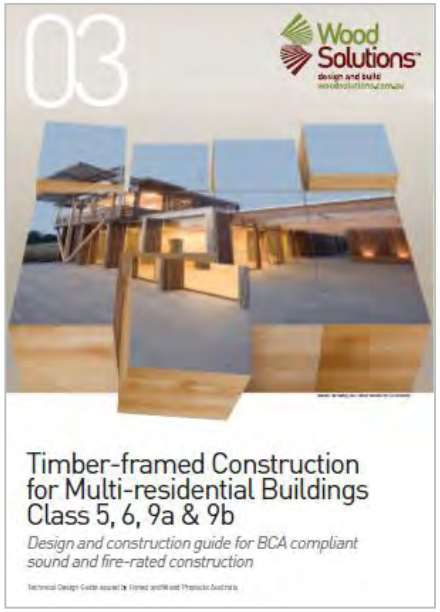
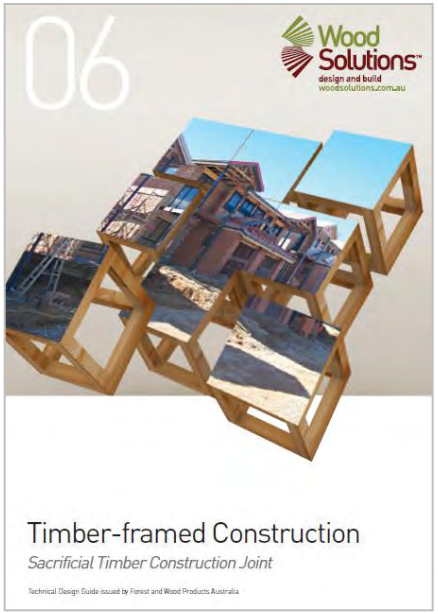
# WoodSolutions™: Design Guides

- The following guides are related to Multi-storey Timber-framed Construction (MRTFC).





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# WoodSolutions™: Design Guides

- The following guides are related to fire engineering and developing Alternative Solutions.




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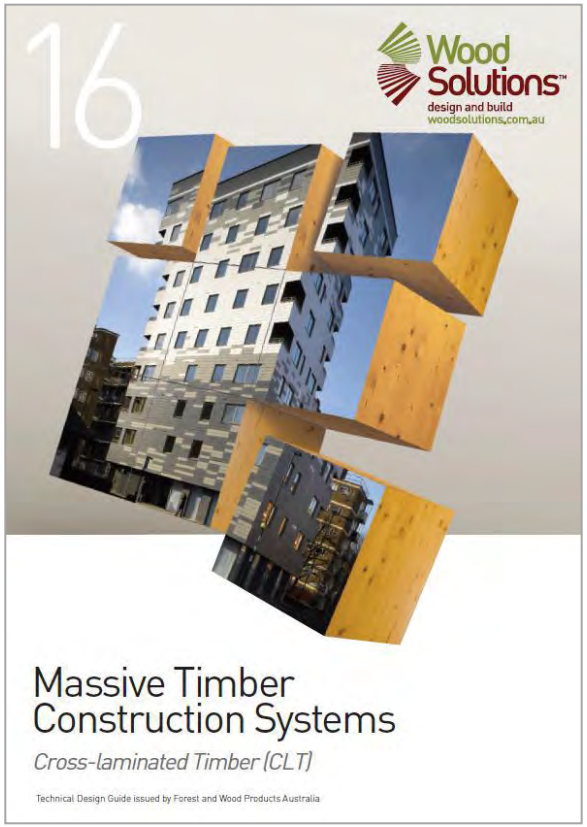
# Fires During Construction


- Only addressed to a limited extent in BCA
- More detailed approach considering broader range of issues required under WHS legislation
- Guide published June 2014 – already being used by some contractors

# WoodSolutions™: Design Guides

- Available for free download by registering at:

www.woodsolutions.com.au

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