

Galkangu

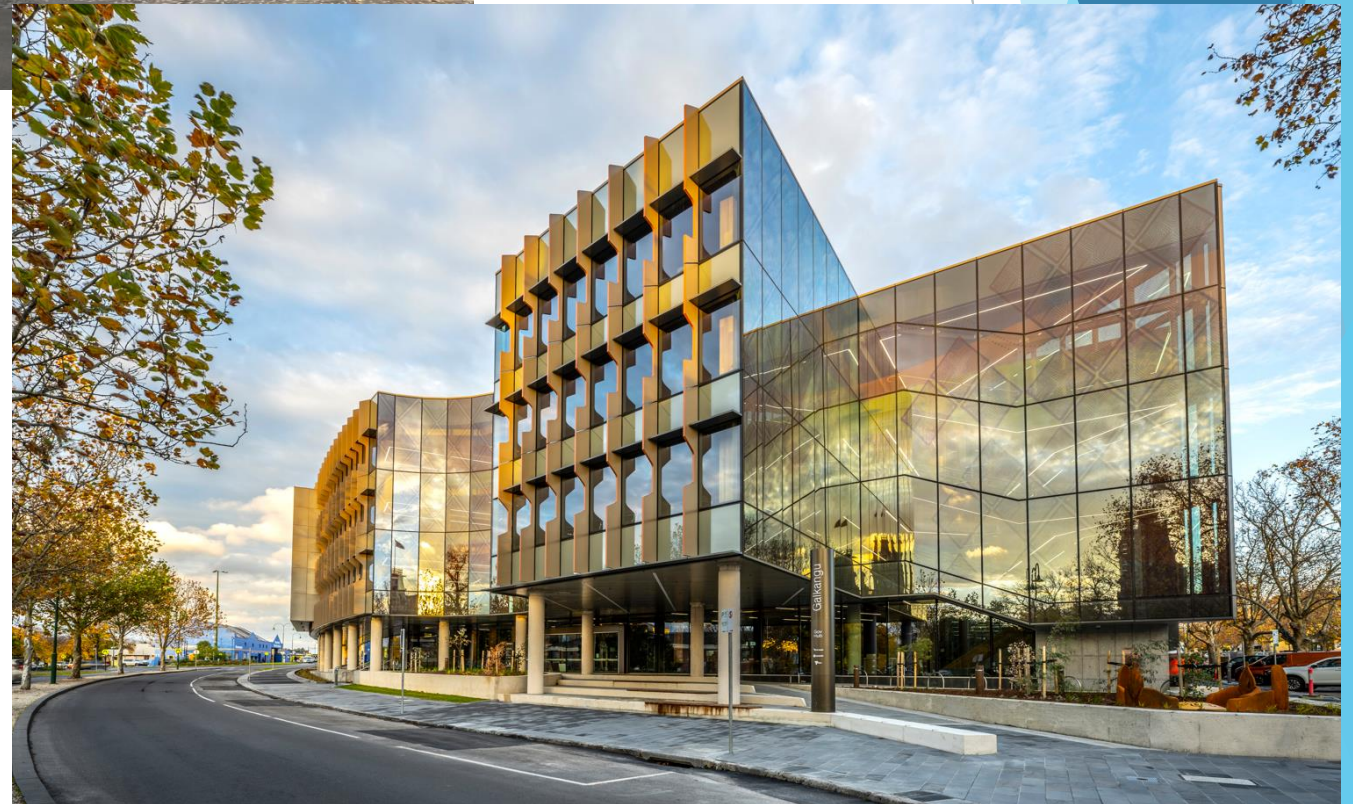
Bendigo Gov Hub

WoodSolutions Seminar

Michael Miles

Senior Design Manager, Icon

14/03/24



Galkangu Bendigo Gov Hub Joint Venture

AGENDA

Overview

Other Icon Projects

Key Parties

Programme

Design

GLT & CLT

Timber Design Considerations

Timber Design Process

Construction, Delivery & Site Logistics

Timber Procurement

Timber Installation

Outcomes

Concrete vs Timber

Opportunities & Lessons Learnt



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OVERVIEW

Client: Development Victoria

Location: 189 - 229 Lyttleton Terrace, Bendigo, Vic 3550

Commercial Building: Ground to L03, Car Park (Ground to Mez), Roof Top Plant

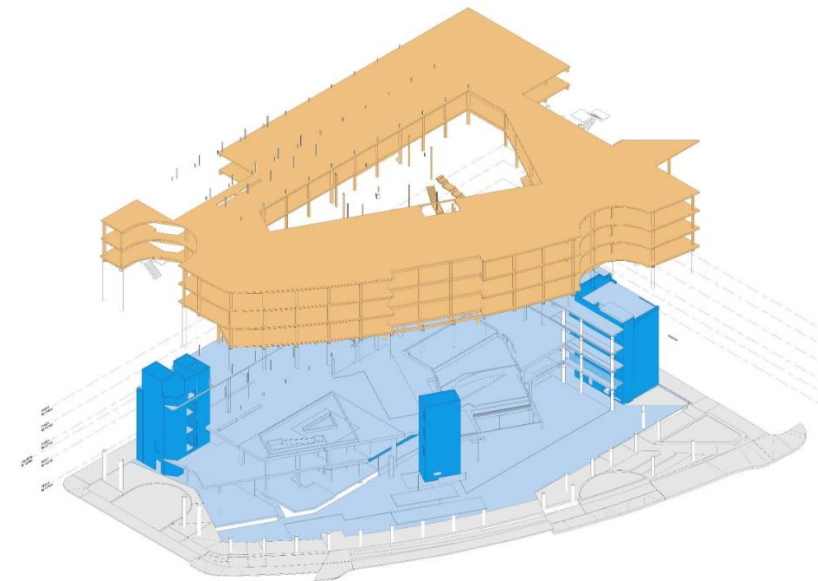
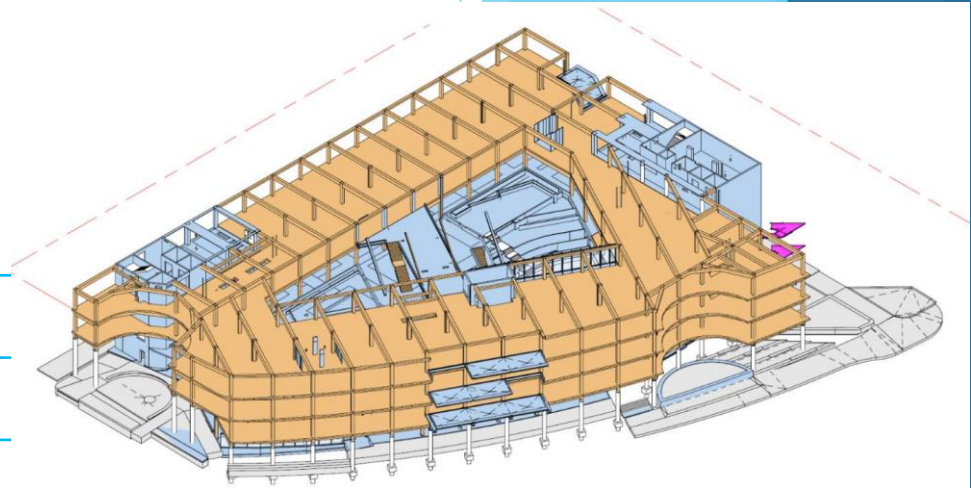
Structure: Concrete cores, concrete ground slab and carpark, mass timber remainder

Site Area: 15019m² | **Building Height:** 23.5m

Gross Building Area (GBA) 29,300m² | 12m² NLA / person

Targeting minimum 5.5 Star NABERS, 6 Star Green Star, PCA A Grade Office

Traditional Owner Engagement: Dja Dja Wurrung to inform design



1 DIAGNOSTIC AXONOMETRIC
Site

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OTHER ICON PROJECTS



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PROJECT CONTEXT

Competitive Tender: 50% DD, limited design inputs

Awarded Early Contractor Involvement (ECI): a method of construction contracting that allows a builder to become involved, and potentially start work, before the design has been completed. ECI timber designers included XLAM and ASH

Covid-19: Contract Executed Dec 2020

Procurement: 2900m³ of CT and 1000m³ of GLT required

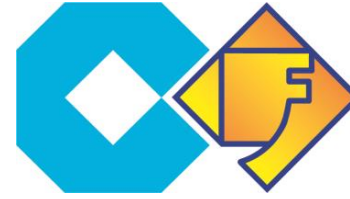
Code/Fire Engineering: FEB received at tender, authority approvals risk, required performance solution, fire use of HBX glue

Design: faceted curves, concrete/steel/timber interfaces, significant span (75m) and width (115m), no basement

Site: Heart of Bendigo CBD



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KEY PARTIES

Architect: Lyons

Structure, Services, Fire Engineers, Civil: Arup

Timber Designers: XLAM (CLT) and ASH (GLT)

Fire Test: Warrington

Timber Installer: Standstruct

RBS: PLP (now: Codus)

D&C Contractor: Icon & Fairbrother (Joint Venture)

LYONS


ARUP

warringtonfire

standstruct

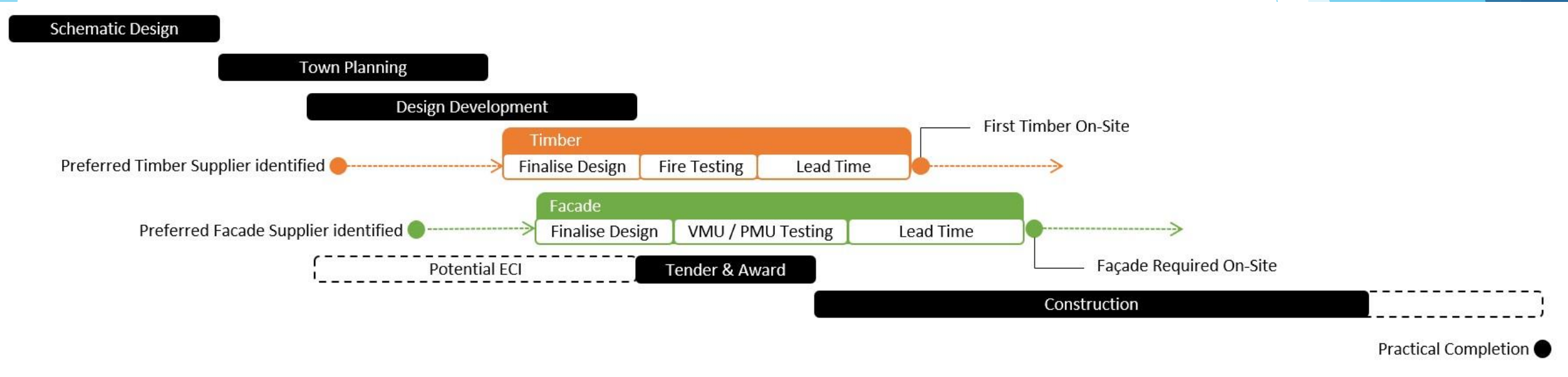

CODUS
BUILDING POSSIBILITY


XLAM


ASH

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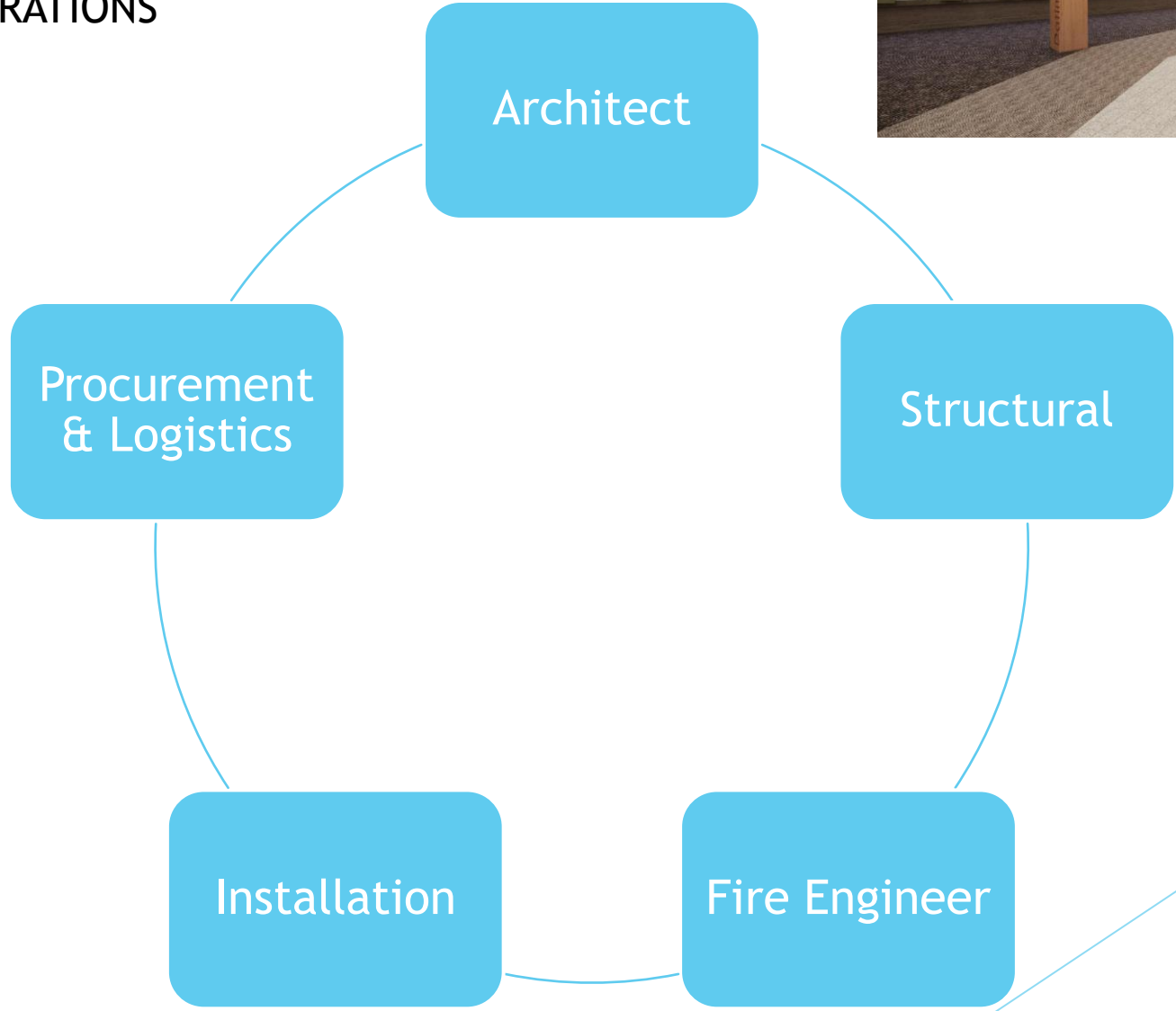
PROGRAMME



Design

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DESIGN CONSIDERATIONS

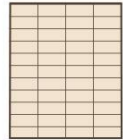


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ARCHITECTURAL - visualizing the key connections during the documentation process



TIMBER - GLT and CLT



GLT

GLUE LAMINATED TIMBER | GLT | COLUMNS + BEAMS

Supplier: Australian Sustainable Hardwoods, Heyfield, Victoria

Hardwood: *Eucalyptus Regnans* + *Eucalyptus Delegatensis*

Sourced from re-growth forests, (some bushfire affected forests). PEFC

MASSLAM 45 species used have some of the best strength-to-weight ratio timber species worldwide, highly durable building material.

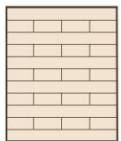
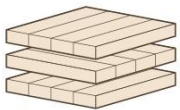
CROSS LAMINATED TIMBER | CLT | FLOOR PLATES

Supplier: Xlam Australia, Albury/Wodonga, Victoria

Softwood: Radiata Pine

Sourced from softwood plantations. PEFC

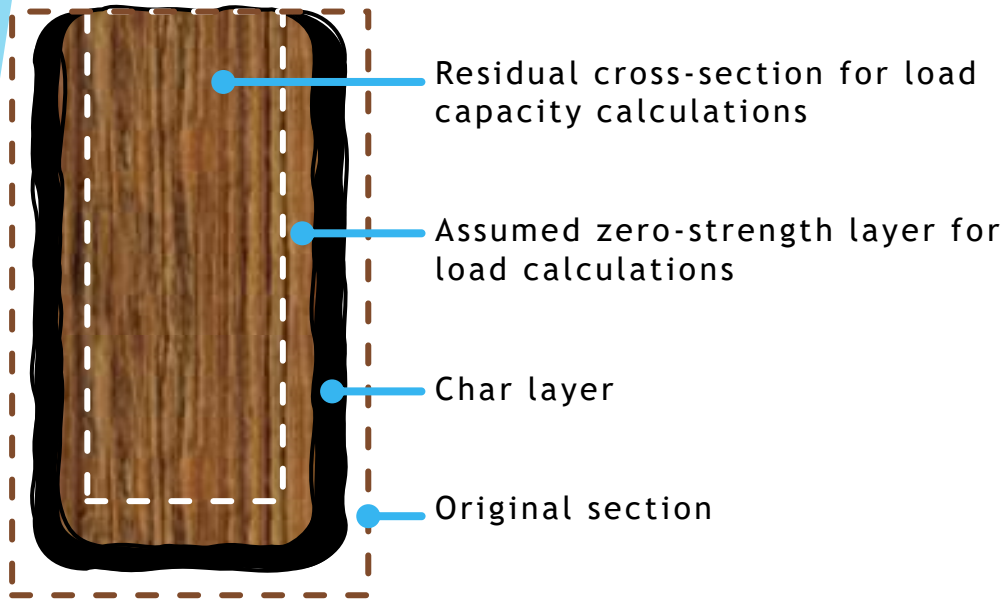
Panels are optimised by feedstock strength across their depth, using stronger MGP10 timber in the outer lamellas and lower strength MGP6 timber in the internal layers, thereby achieving a greater utilisation of the tree fibre



CLT

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TIMBER - GLT



Beams:

- 840 x 420
- 660 x 420
- 660 x 385

Columns

- 420 x 420
- 450 x 420

0.48mm
per min
HARDWOOD

0.65mm
per min
SOFTWOOD

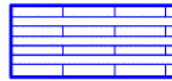
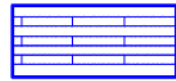


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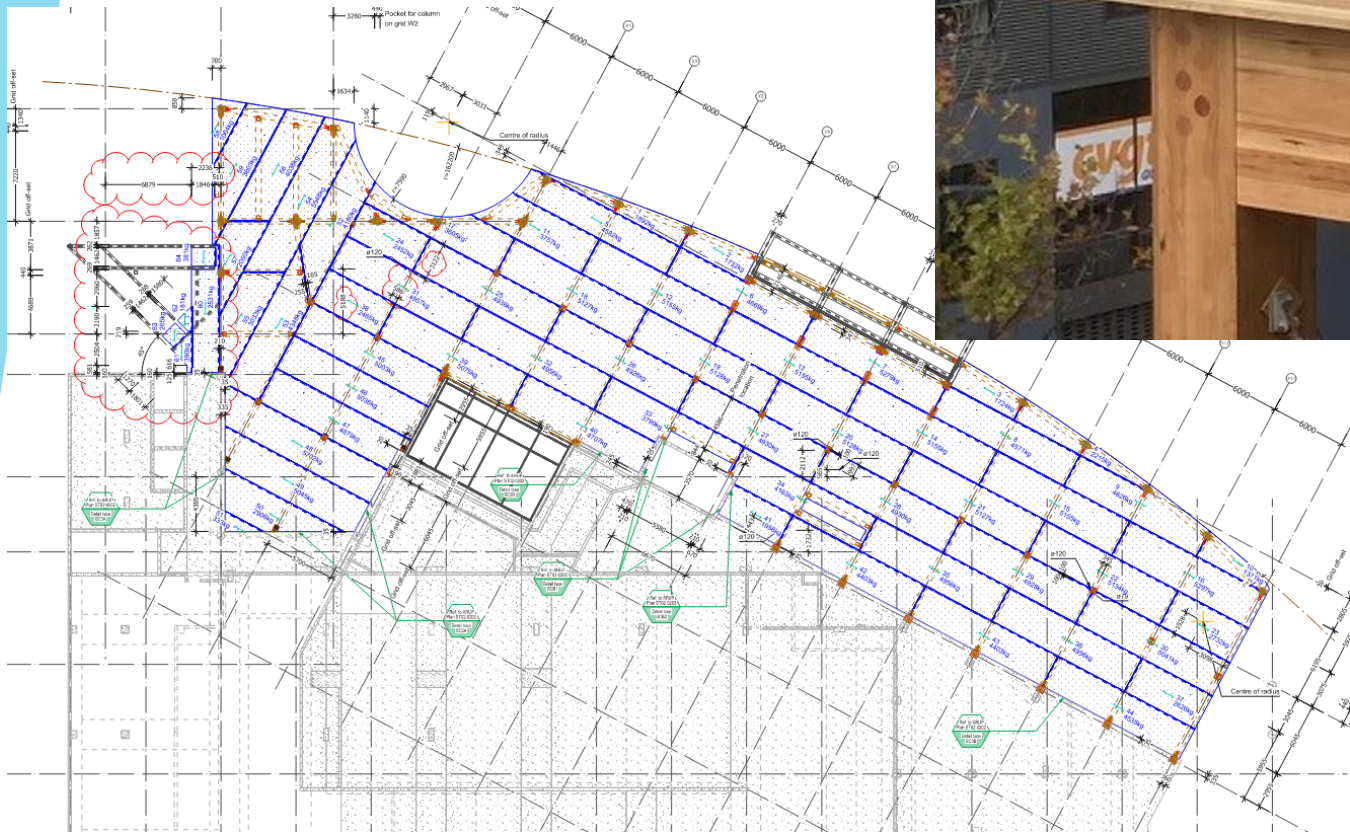
TIMBER - CLT



CL7/240 (32.5 + 5 x 35 + 32.5) - ROOF ONLY



CL7/260 (42.5 + 5 x 35 + 42.5) - FLOOR L1 to L3

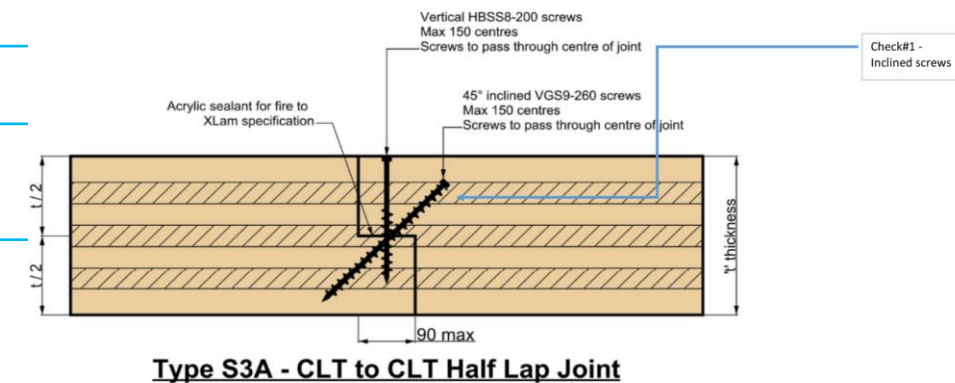
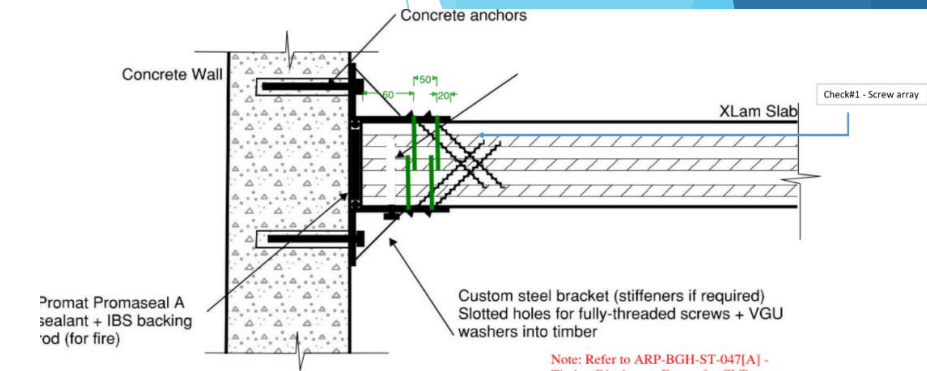
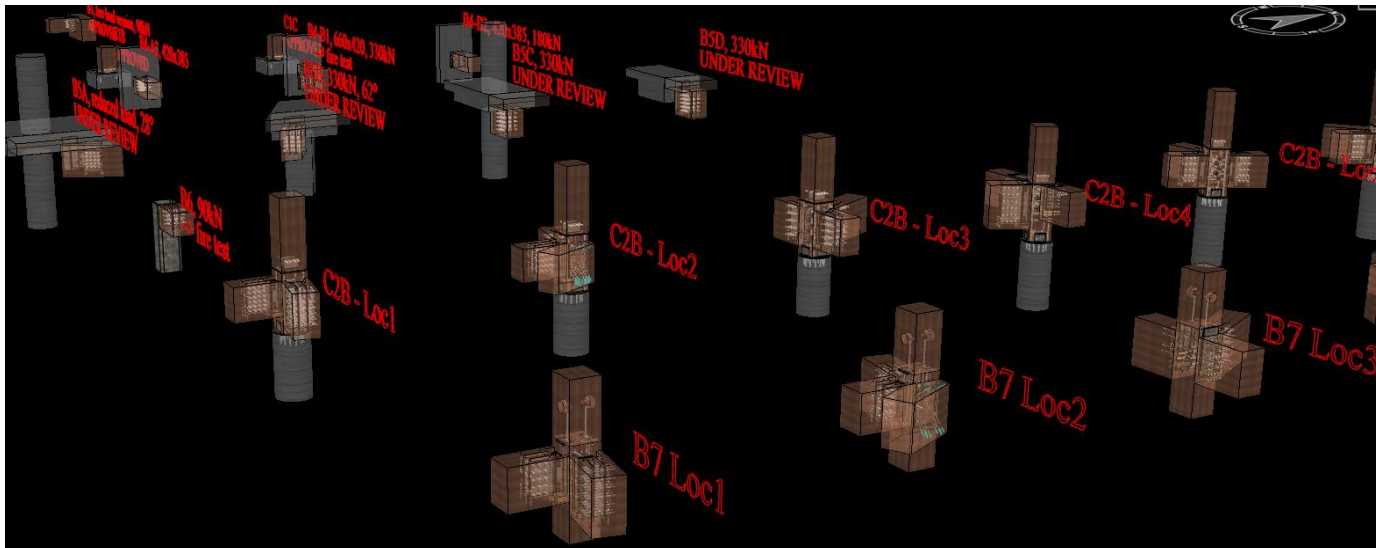


Galkangu - Timber Construction

Timber Design Process

TIMBER - DESIGN PROCESS

1. Lock in architectural model
2. Finalise structure / timber outline
3. GLT workshop on “typical connections”
4. GLT workshop on “non-typical connections”
5. CLT workshops from ground to L04
6. All up 5 months from 50% to 90% design to first timber available onsite
7. Iterative process involving all parties: Arch, Fire, Struc, Installers, RBS, Procurement

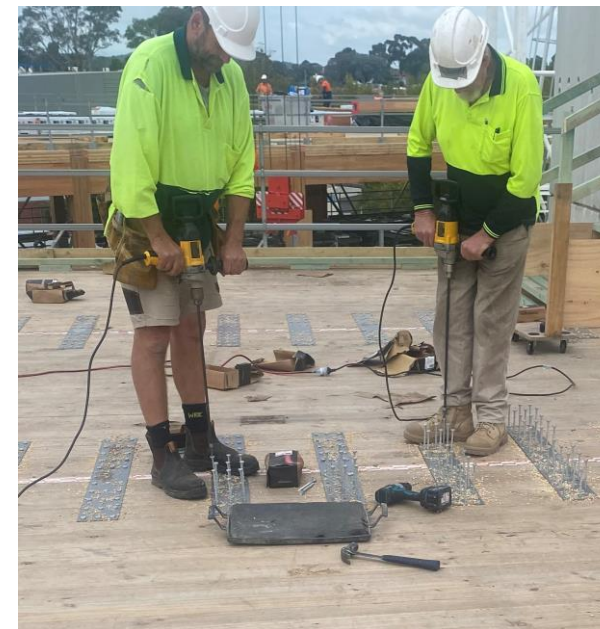
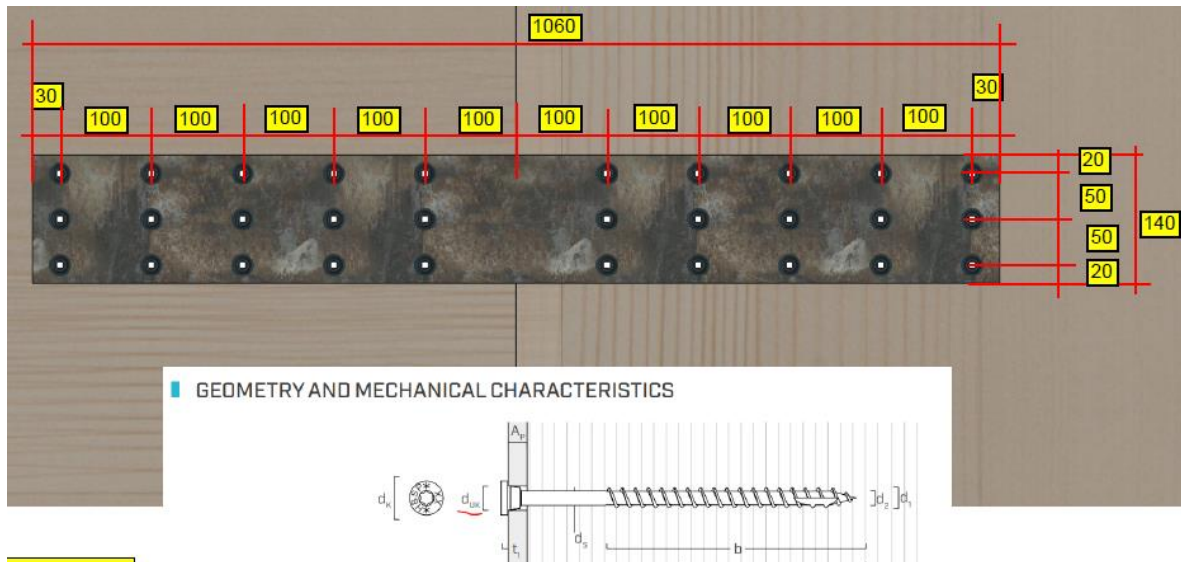


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Timber Procurement

PROCUREMENT

- GLT supplied by ASH; CLT supplied by XLAM - both sourced in Australia
- Covid impacted fixing and proprietary bracket lead times suitable to the project
- Design of CLT to CLT fixings was adjusted to suit fixing availability within Australia and New Zealand
- Custom designed locally made tension brackets were used on CLT



Construction, Delivery + Site Logistics

Galkangu - Timber Construction

Timber Installation Objectives

Efficient Handling of Timber

- All about these 3 steps (Concurrently)
 1. Unload the timber
 2. Prepare the timber
 3. Install the timber
-

Speed

- Never hold up the loading bay!
 - Always have surplus timber on site/never wait for a delivery
-

Protect the Timber (Minimize remediation costs)

- Water & Moisture
 - Quick Encapsulation
 - Subcontractors' education
 - Transportation
-

Minimal Re-work

- Efficient Assembly
 - No onsite timber rectification from install errors or damage
-

Be Prepared:

- Key was to be organized
 - Early engagement of Suppliers, Installers and Icon Coordinator & Supervisor
-



Galkangu - Timber Construction

Installation - Temp, Lifting and Protection

Temporary Works Engineer

- Ensure beam props do not impact floor install over
- Ensure deck can hold 1-2 loads of timber elements
- Lifting Plates as anchor points for fall protection harness
- Allow for all temp plant & equipment

Lifting (Hook Time Required)

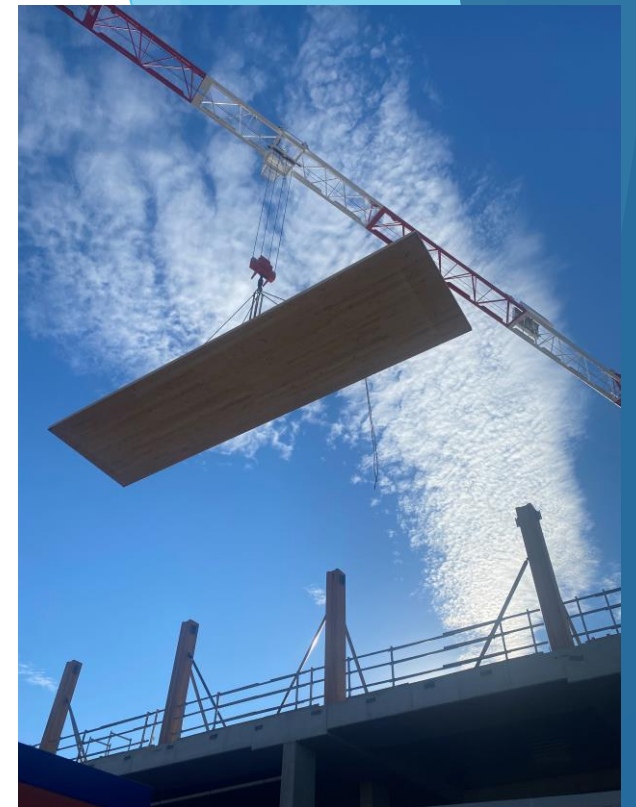
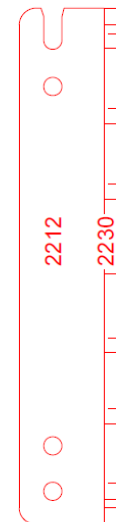
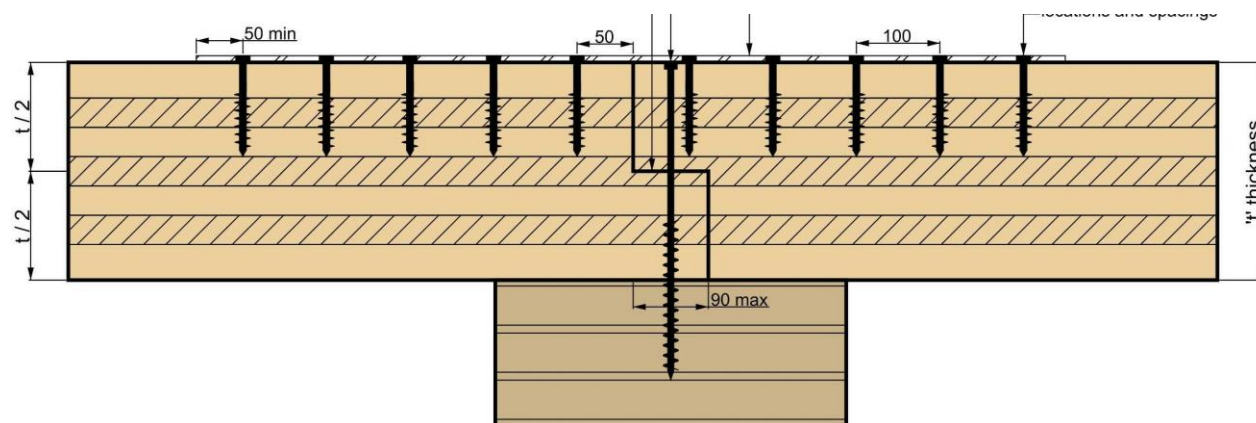
- 2 Tower Cranes allowed
 - First for Timber full time
 - Second to assist and “feed” other trades
 - Occasional use of mobile crane when required



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Timber Installation

- GLT Connection - a focus on safety (in particular crushing potential) and minimising the time “on hook”
- GLT locating or seating hook introduced to remove the need for installers hands or tool to enter the seating void whilst unsecured
- CLT was to have a standard shiplap joint for CLT to CLT Connections
- Panel size maximised to suit beam spacing and avoid additional transportation law requirements. Average CLT Panel was 12 meters long by 2.4 meters wide.
- CLT was installed directly from truck with custom lifting plates
- GLT was bundled, removed from truck, and then lifted/installed separately.
- Multiple Crane Strategy utilising both the onsite tower and mobile cranes



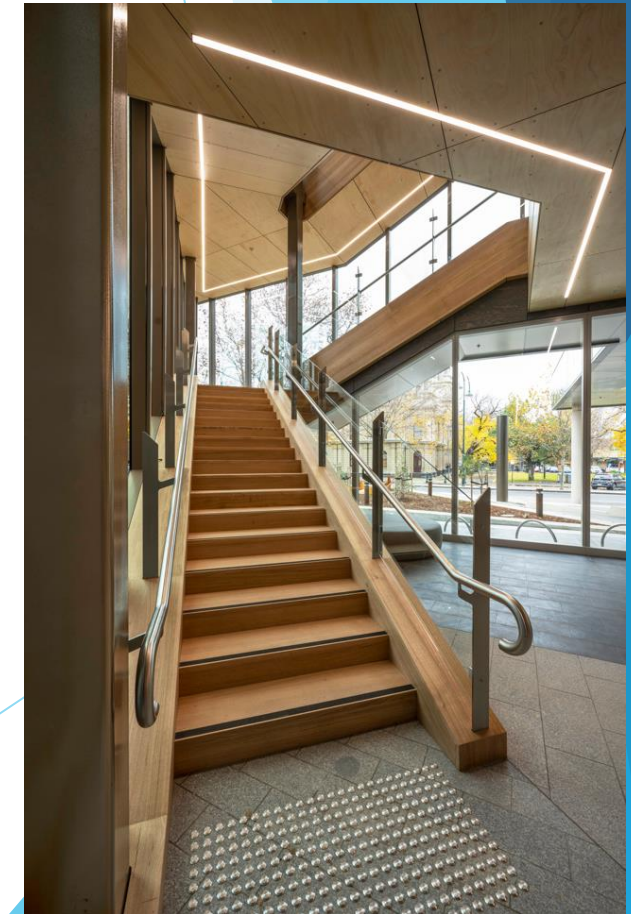
Outcomes

Galkangu - Timber Construction

Outcomes

QUANTITIES

- 525 CLT Panels
- 278 GLT Columns
- 470 GLT Beams
- 1947 Custom Stitch Plates
- 130,000 Screws and Anchors
- “Top Out” of the timber structure (1,273 members) was achieved in 87 working days
- We averaged just under 18 members for the available working days
- Best day being 37 members successfully installed



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Outcomes

TIMBER vs CONCRETE

Workers:

- Concrete: 54-58
 - Timber: 14-18 (25% less on the active deck)
 - Less Moving parts with timber (overall calmer)
-

General Safety:

- No Silica Dust
 - Reduction in High Risk Works → **Less moving parts!**
-

Important Strategies:

- Pre-installation of Handrail
 - Lanyards & Chinstraps (No Screens)
 - Anchor points for harnesses
 - Subcontractor inductions
-



Galkangu - Timber Construction

Outcomes

TIMBER vs CONCRETE

Floor Install (days)

- Average Timber Floor: 8-9
 - Average Concrete Floor: 10-11
 - Faster floor cycles compared to concrete
-

Indirect Time Benefit

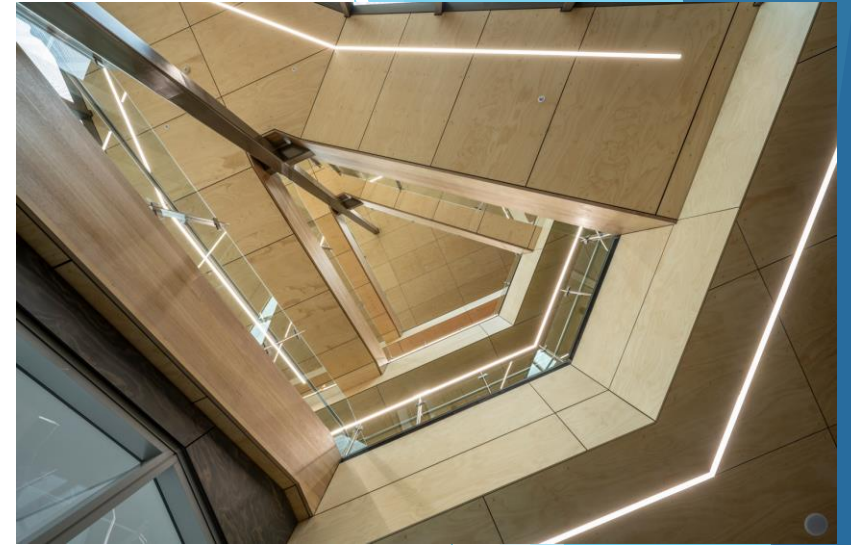
- Completion of subsequent trades
 - Façade install close as 2 floors below the live deck
 - Concrete: 3 floors of back-propping & formwork
-

Waste Reduction

- Less waste on site
 - Fewer Finishes - sand and oil
-

Rework & Mistakes

- Concrete had re-work/defects on every floor
 - Heavily impacted by weather
 - Timber all offsite manufacturing in a controlled environment
 - **NO ON-SITE REWORK**
-



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Outcomes

TAKEAWAYS

Sustainability:

- Building in timber inherently sustainable (Carbon VM)
- Critical for reducing greenhouse gases (Net-zero targets)

Icon/Fairbrother: Key part of Icon and Fairbrother future workbook & we want to be seen as leaders of timber construction

More than \$\$: Value of timber to be realised and incentivised

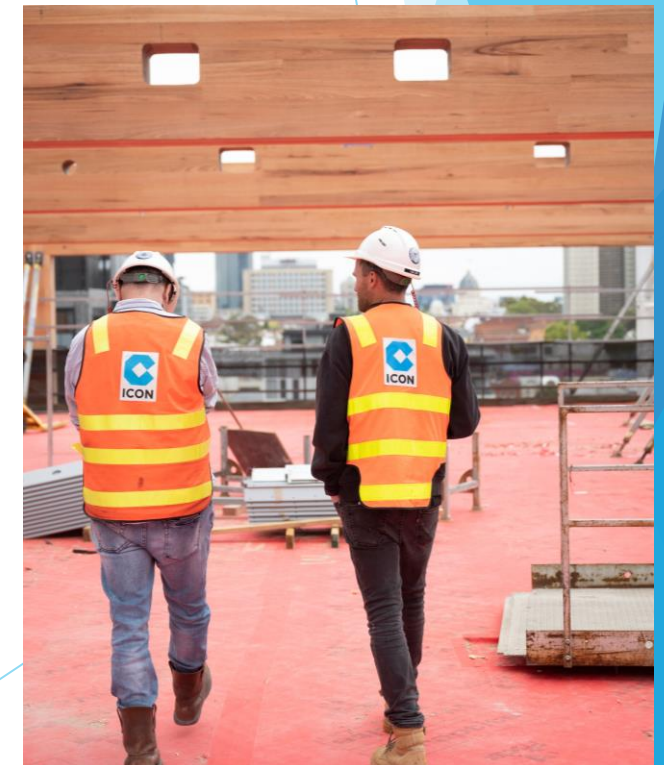
Building Code: Open up to more timber construction so entry into market is easier. Greater NCC Acknowledge “Mass Timber” at this scale

Weather proofing: During construction.

- Need to refine the best outcome project by project
- Coatings suitable for timber promoting and protecting the timber

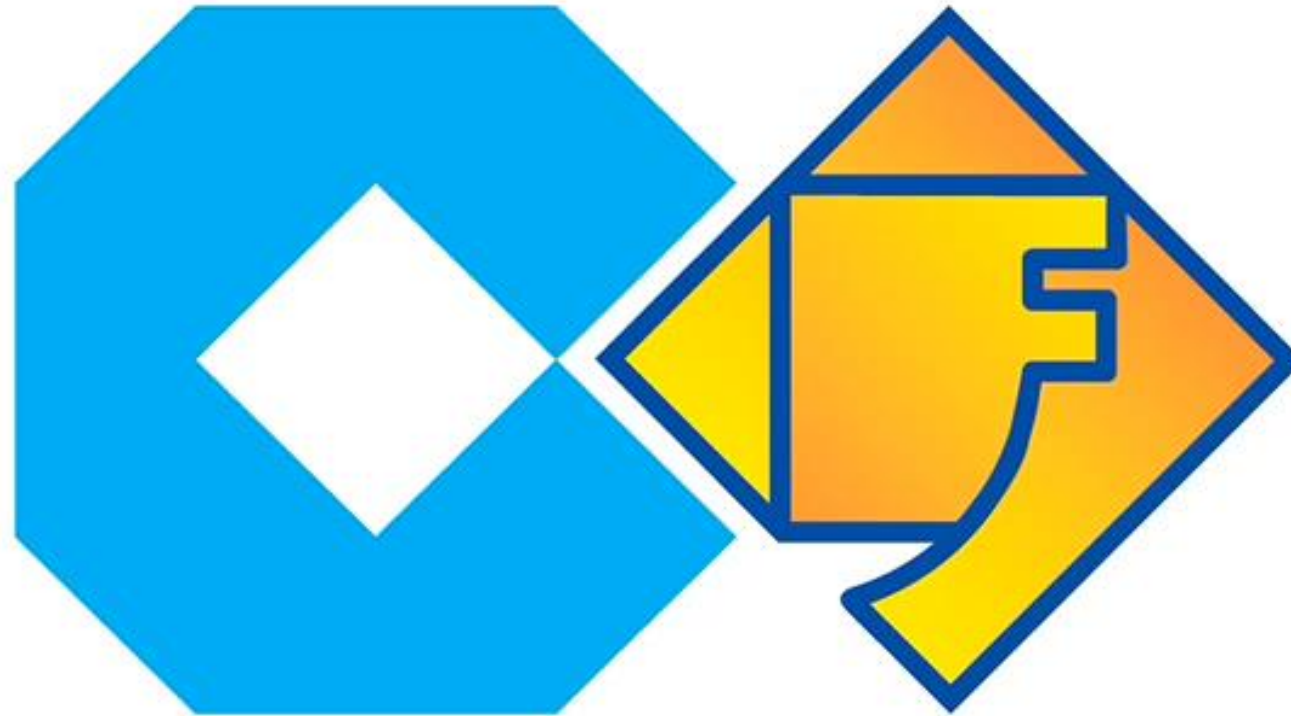
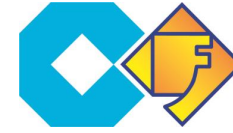
Hybrid Products: Timber products that achieve aesthetics, ecological and benefits of prefab whilst also achieving Fire Performance

The Right Team: Engage the right team for the project
General lesson learnt across mass timber projects



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Time lapse and Top Out



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Thankyou to the greater ICONFB Timber Team



- Mick Josey (Project Director)
- Cameron Bayles (Construction Manager)
- Ben Millar (Project Manager)
- Michael Miles (Senior Design Manager)
- Sophie Barmby (Design Coordinator)
- Zac Smith (Senior Site Coordinator)
- John McInerney (Senior Site Manager)
- Mark Packer (Site Manager)
- Jeff Douglass (Site Manager)
- Blair Holmes (Site Manager)
- Hardik Patel (Coordinator)
- Sam Hill (Contracts Administrator)
- Michelle Perry (Contracts Administrator)
- Ian Robertson (HSR)

