NORTHROP

The Advanced Manufacturing Research Facility First Building

Nicholas Boey (Northrop), Matthew Burke (Savcon)

Project overview

The Advanced Manufacturing Research Facility is the first stage of a new state-of-the-art manufacturing facility in the Western Sydney Aerotropolis.

Main client: NSW Government

Architect: Hassell

Builder: Taylor

Timber installer: Savcon

Timber suppliers: Australian Sustainable Hardwoods, Stora Enso

Structural engineer (timber): Northrop

Structural engineer (concrete and steel): Enstruct

Hassell

TAYLOR

NORTHROP

SAVCON

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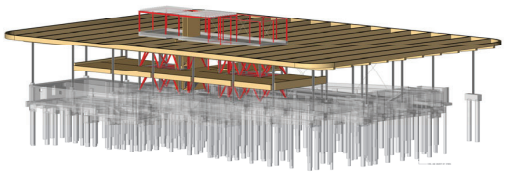
Structure overview

Concrete substructure with timber-clad steel cruciform columns supporting roof.

Steel braced frames for lateral stability of roof and suspended first floor.

3,500 sqm roof that covers the entire building footprint with timber cassette roof and a timber twin-beam grillage.



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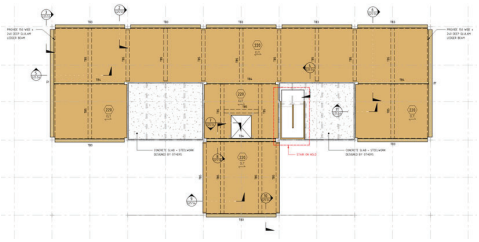
First floor

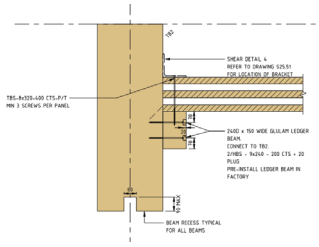
“Conventional” 220 thick CLT panel floors on glulam beams.

9m x 6.7m grid, with one 13.5m beam span.

Partial upstand beams used to control deflections over longer edge spans while maintaining same beam soffit level.

Designed for 120/120/120 FRL.





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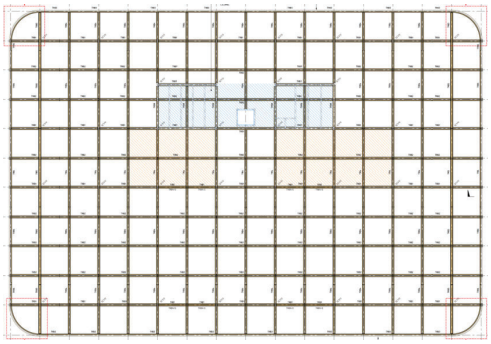
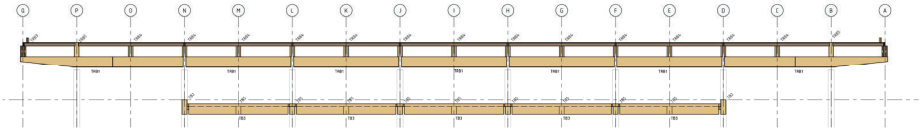
Roof

Two layers of twin 900Dx125W beams make up a grillage of timber beams.

Timber cassette system used to span 4.5m between the top layer of timber beams.

Beams taper and cantilever 4.5m at ends to provide thinner tip.





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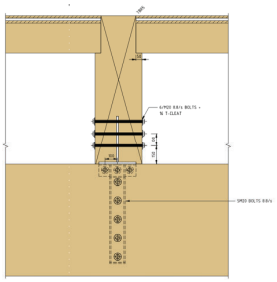
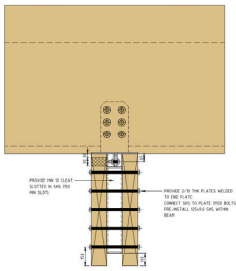
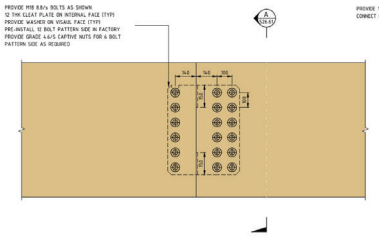
Design for disassembly

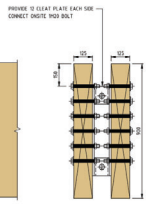
The original aim was to allow the timber components of the building to be disassembled and moved at a later date. This drove the grillage of beams, which allows the double cantilevers at the corners to work.

Detailing of the primary connections included exposed through-bolts that could be removed.









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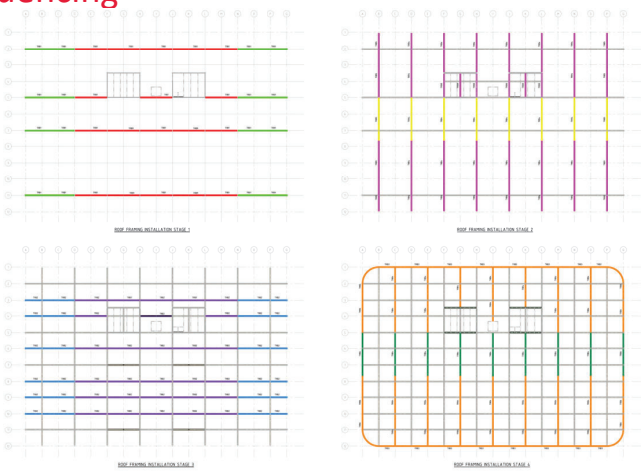
Design for construction sequencing

The grillage imposed complex construction sequencing constraints, where a minimum number of beams had to be installed first in both layers for temporary stability.



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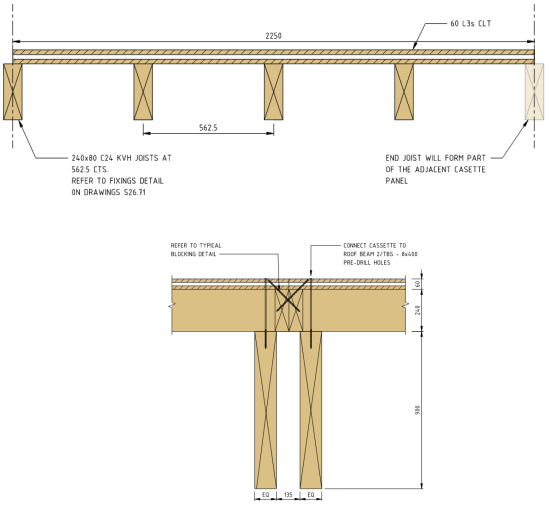
Roof cassette

2250mm wide roof cassettes made up of 240x80 C24 joists at 560mm spacing supporting a 60mm 3-layer CLT panel.

Panel lengths of 9m were used to allow the cassette to be continuous over two 4.5m spans.

Designed to withstand loads of xxx kPa, which includes green roof and waterproofed fibre cement substrate.



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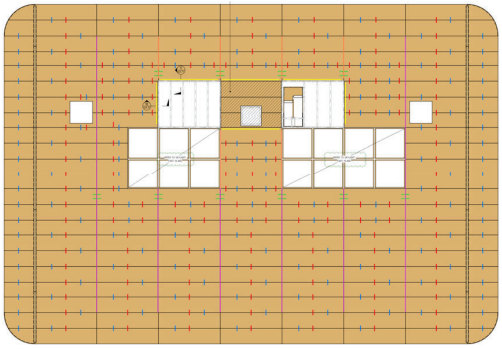
Roof diaphragm design

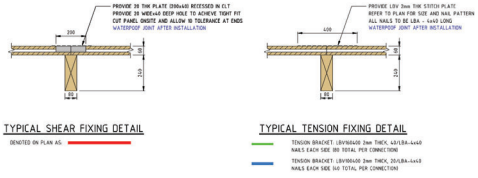
Roof diaphragm forces from wind, earthquake and gantry crane loads are carried in the CLT layer of the roof cassette.

Tension and shear fixings were detailed to carry the load from panel to panel.

Shear fixings were a 20mm plate recessed into the panels and tension fixings were nail fixed Rothoblaas 2mm LBV steel plates.

Blocking was used to carry these loads down to beam level and into the roof.





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Timber Species

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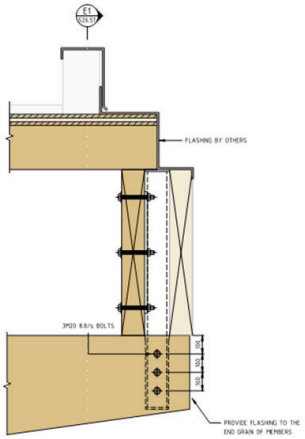
Durability



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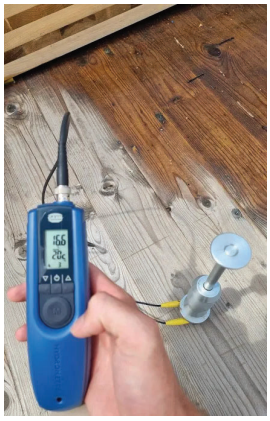

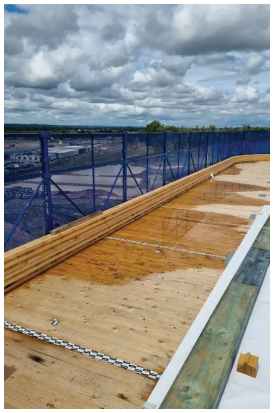

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Durability

DESIGN ⟷ SUPPLIER ⟷ MATINENACE MANAGEMENT PLAN ✖

SUPPLIER

DESIGN ⟷ MATINENACE MANAGEMENT PLAN

✓

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Curved Beams

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Curved Beams

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Living Building Challenge

- LIVING BUILDING CHALLENGE VS GREEN STAR
  - OFTEN MISUNDERSTOOD
  - LIMITS SUPPLY OPTIONS
- LIVING BUILDING CHALLENGE = FCS
- GREENSTAR = FSC & PEFC

PEFC™ FSC®

- REVIEW TIMBER SPECIFICATION! WE NEED TO INCLUDE BOTH OPTIONS (ESSENTIALLY THE SAME).

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Thank you

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