



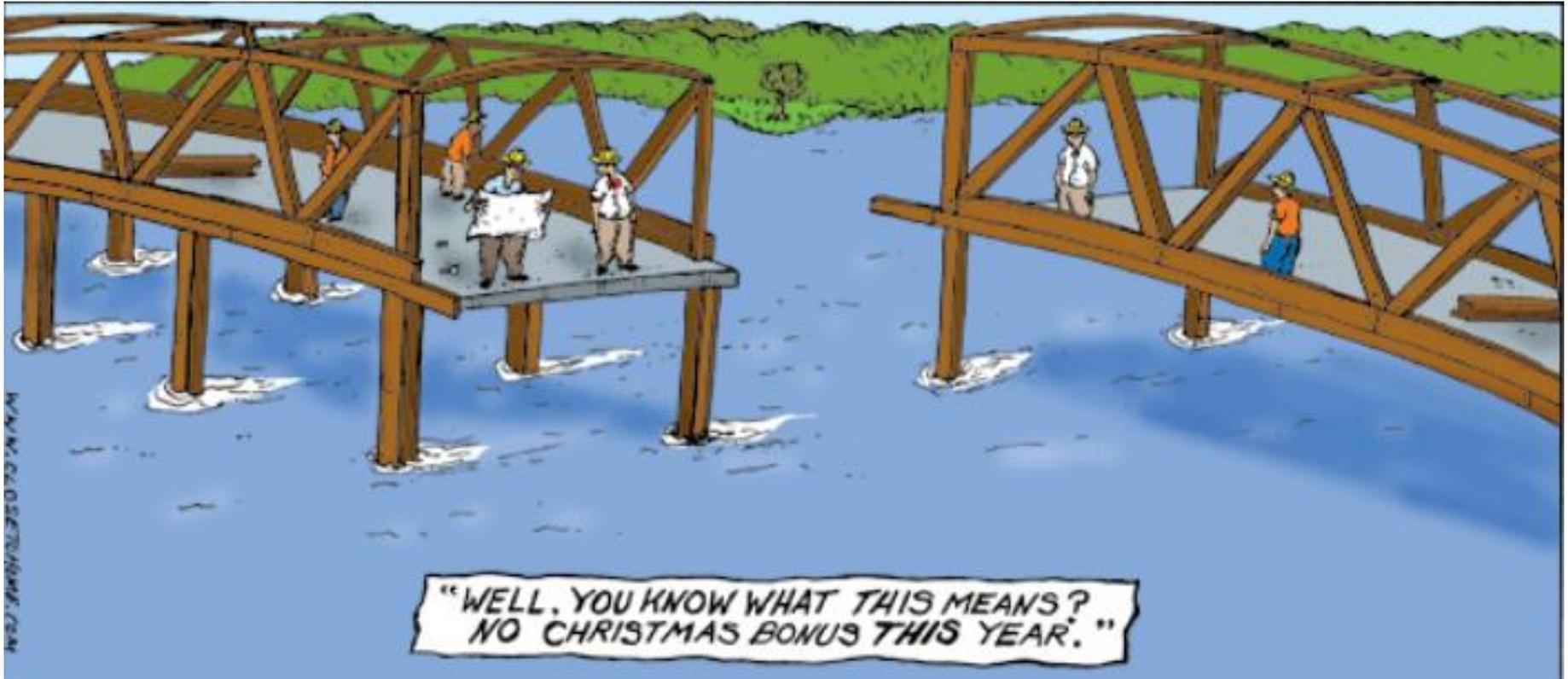
**XLam**

Construction's  
sustainable  
future

**MISHO+ASSOCIATES**

# Case Study: Iron Creek Bay Farm Stay

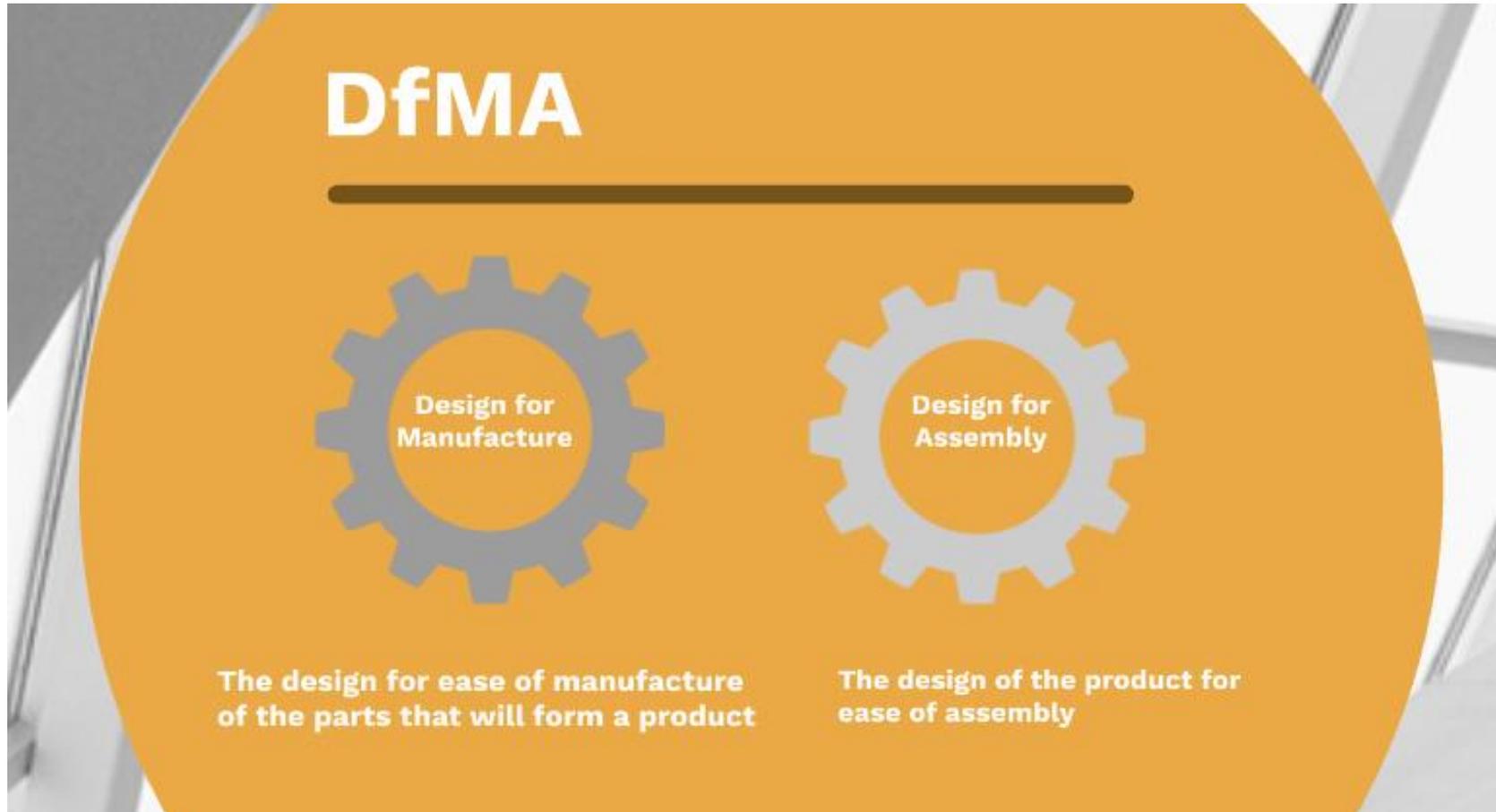
Prepared By Grant Steel  
Business Development Manager - Australia



THE BEST WAY TO PREDICT  
THE FUTURE IS TO HELP  
CREATE IT.



# Design for Manufacture and Assembly (DfMA)



# Design for Manufacture and Assembly (DfMA)

## **Benefits of DfMA**

- Productivity improvement
- Reduction of on-site manpower
- Better construction environment
- Better quality control
- Improved workplace safety

## **Challenges of DfMA**

- Cost
- Industry Mindset and Practices
- Technical Challenges

# Design for Manufacture and Assembly (DfMA)

## **DfMA Technologies**

Prefabricated Prefinished Volumetric Construction (PPVC)

Prefabricated Bathroom Unit (PBU)

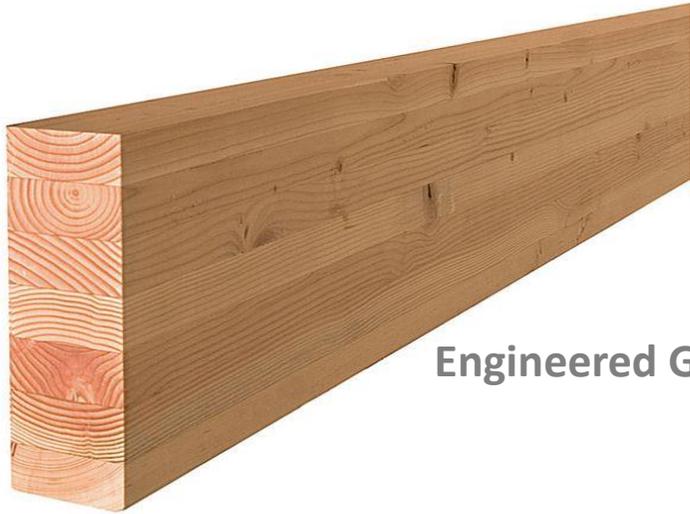
Cross-Laminated Timber (CLT)

Advanced Precast Concrete System (APCS)

Precast-steel hybrid and structural steel systems

Prefabricated MEP systems

# Mass Timber Construction (MTC) Products



Engineered Glulam (GLT)



Engineered Cross Laminated Timber (CLT)

Engineered LVL



Commodity I-Joists

Commodity LVL

# Know your Supply Chain?



**X**  
TM  
**XLAM**



Understand of the whole process

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# Sustainability Awards

2022 HIGHLY COMMENDED | COMMERCIAL ARCHITECTURE (LARGE)



**standstruct**

**MISHO+ASSOCIATES**

# IRON CREEK BAY FARM STAY

MISHO + ASSOCIATES



# Development Drivers

An aerial photograph showing a large vineyard with rows of grapevines. In the foreground, there is a large building with a dark, corrugated metal roof and a red facade. To the right of the building is a curved road with a few cars. In the background, there is a large body of water, likely a lake or reservoir, with mountains in the distance under a blue sky with some clouds.

- Carbon storage and capture
- Biophilia benefits
- Speed of construction
- Waste minimisation

# Development Challenges

An aerial photograph of a modern architectural complex built on a hillside. The complex consists of several long, low-profile pavilions with dark, flat roofs and light-colored, textured walls. The pavilions are arranged in a curved line, following the contour of the hill. The surrounding landscape is lush green, with scattered trees and a dirt road winding through the site. In the background, there are rolling hills and a body of water under a clear blue sky.

- Pavilions perched on a hill side — differential material
- Inclement weather at the inlet

- Skilled labour shortage in the area
- Access to traditional materials
- Undulating site conditions

# Site Overview

3No. Backpackers buildings

15No. 3 and 5  
bed pavilion units

1No. 2-storey restaurant  
and cellar door building



# Holiday Pavilions

- 15no. Pavilions each with private balconies
- Unrestricted views of the water in all rooms
- Exposed timber walls and soffits

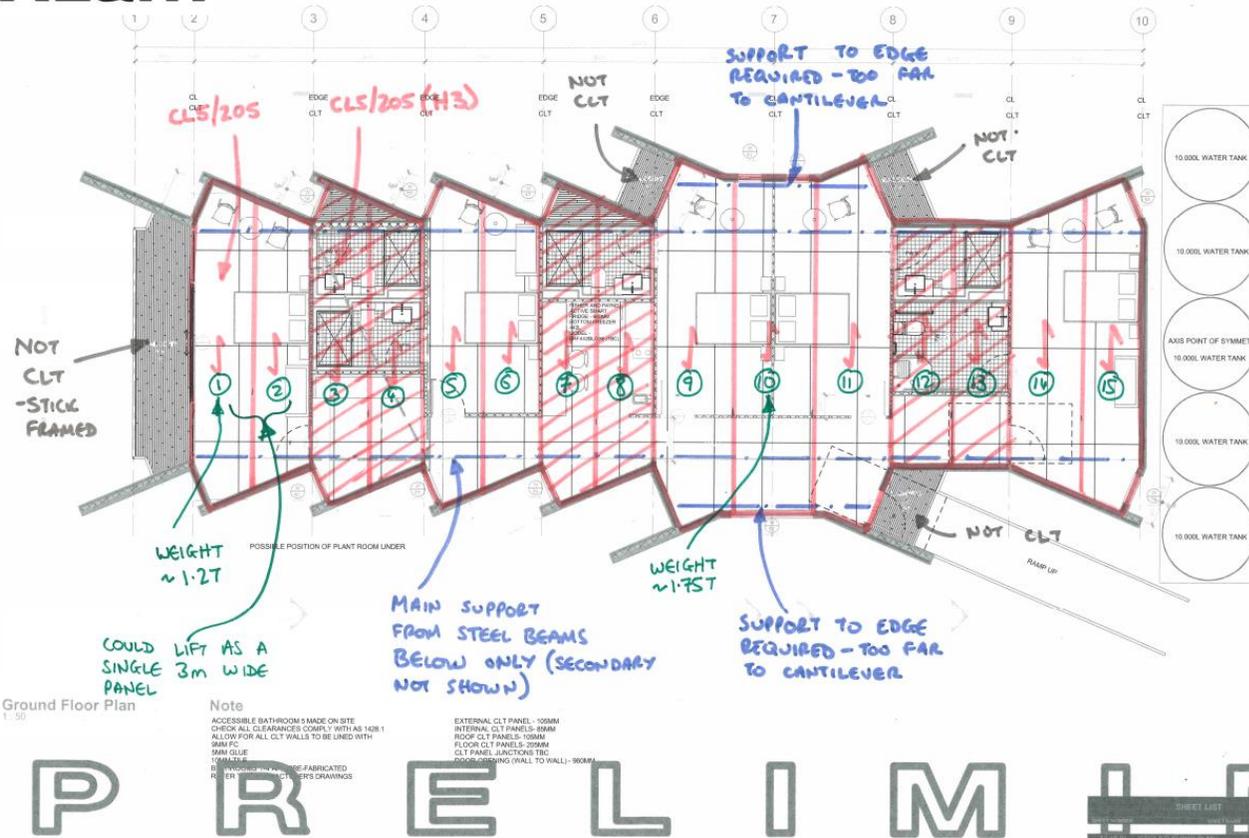


# DfMA Collaboration



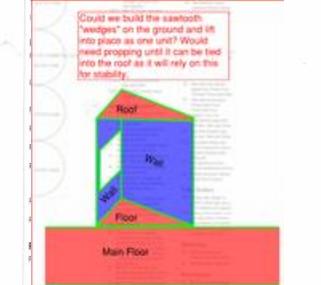
**NOT FOR CONSTRUCTION**

## FLOOR PLAN - OPTION 1



- Floor material cost: approx \$46,000  
 Transport costs: \$8250 (approx 1.5 trucks)  
 Panel lifts: 15  
 Max panel weight: 1.75T (1.2t at max radius)
- Pros:**
- Simplest construction. Floor spans over steel beams to give solid working platform
- Cons:**
- Least materially efficient in terms of CLT
  - Heaviest lifts

|      |   |      |   |
|------|---|------|---|
| EW55 | New CLT (cross laminated timber) wall panels with insulation and core ten metal casing.   | EW56 | New CLT (cross laminated timber) wall panels with insulation, exterior wall system (red colour type colour) and salvaged vertical timber wall cladding. |
| EW57 | New CLT (cross laminated timber) wall panels with insulation, exterior wall system (red colour type colour) and salvaged vertical timber wall cladding. | EW58 | New salvaged timber screen, open behind.  |
| EW59 | New core ten wall.  | EW60 | New external grade plain structural leads, steel finish.  |
| EW61 | New frame.  | EW62 | Intergro Core Ten' colour.  |



|      |   |      |   |
|------|---|------|---|
| EW63 | Intergro Core Ten' colour.  | EW64 | New clear glass balustrade.   |
| EW65 | New CLT (cross laminated timber) wall panels with insulation and core ten metal casing.   | EW66 | New CLT (cross laminated timber) wall panels with insulation, exterior wall system (red colour type colour) and salvaged vertical timber wall cladding. |
| EW67 | New CLT (cross laminated timber) wall panels with insulation, exterior wall system (red colour type colour) and salvaged vertical timber wall cladding. | EW68 | New CLT (cross laminated timber) wall panels with insulation, exterior wall system (red colour type colour) and salvaged vertical timber wall cladding. |
| EW69 | New CLT (cross laminated timber) wall panels with insulation, exterior wall system (red colour type colour) and salvaged vertical timber wall cladding. | EW70 | New CLT (cross laminated timber) wall panels with insulation, exterior wall system (red colour type colour) and salvaged vertical timber wall cladding. |

Ground Floor Plan  
 17-50

Note  
 ACCESSIBLE BATHROOM 5 MADE ON SITE  
 CHECK ALL CLEARANCES COMPLY WITH AS 1428.1  
 ALLOW FOR ALL CLT WALLS TO BE LINED WITH  
 50MM F.C.  
 MAIN CLUE  
 100MM  
 B. FINISHED TO FACE FABRICATED  
 TO FACE DRAWINGS

EXTERNAL CLT PANELS - 100MM  
 INTERNAL CLT PANELS - 80MM  
 ROOF CLT PANELS - 100MM  
 FLOOR CLT PANELS - 200MM  
 CLT PANEL JUNCTIONS TO WALLS - 80MM

P R E L I M I N A R Y

**Project: Iron Creek Bay**  
**Sketch Title: SK02 - Pavilion Floor Plan - Option 1**  
**Date: 18/10/18**  
**By: NH**

# DfMA Initiatives



# DfMA Initiatives



# DfMA Initiatives



# DfMA Initiatives



# DfMA Initiatives



# Holiday Pavilions - Concept



# Holiday Pavilions - Reality



# Holiday Pavilions – As Built



**Construction programme:** Approx 5 days per pavilion

**Construction prelims:** Crew, crane, props, screw guns

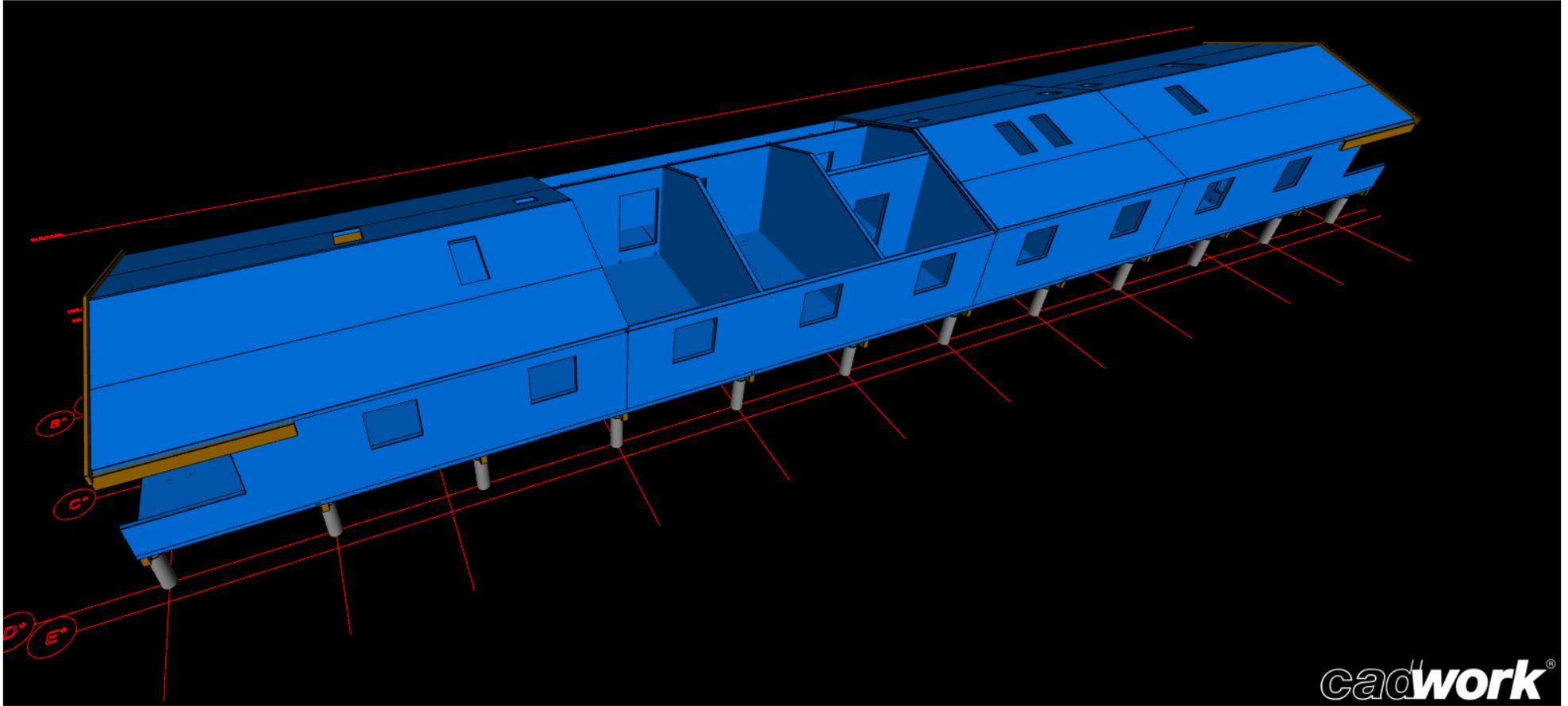
**Crew members:** 6 (including crane crew)

# Backpacker Buildings

- 3no. Units accommodating all budgets
- Private rooms
- Exposed timber walls and soffits

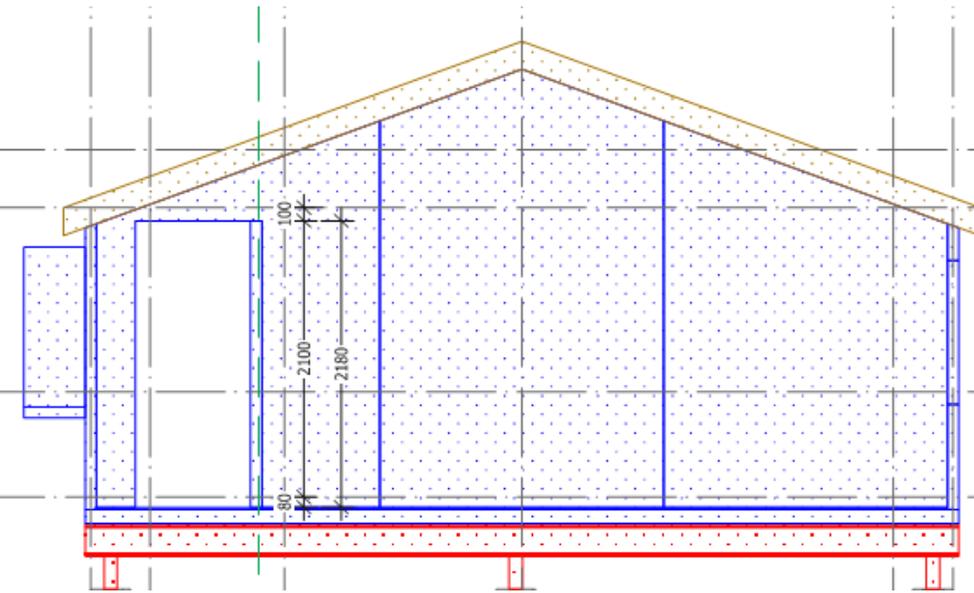


# DfMA Collaboration



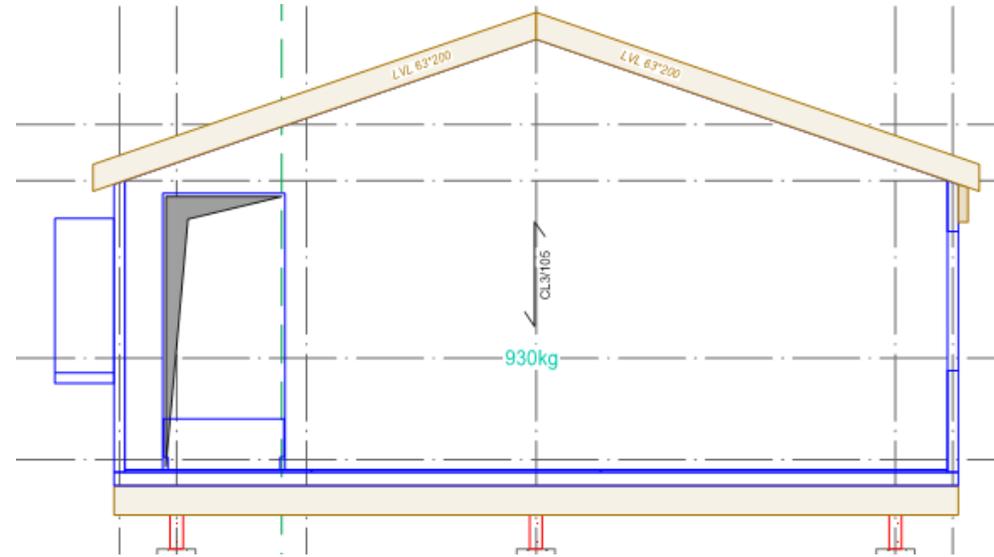
# DFMA Initiatives

Original



3 Panels

Final



1 Panel

# DFMA Initiatives



# Backpackers Building - Concept



# Backpackers Building - Reality



# Backpacker Buildings – As Built

An aerial photograph showing several long, dark-roofed buildings under construction. The buildings are arranged in a U-shape around a central area. In the center, there are two smaller buildings with blue roofs and several large, cylindrical water tanks. A paved road with a few cars is visible at the top of the image. The surrounding area is a mix of dirt, gravel, and some greenery.

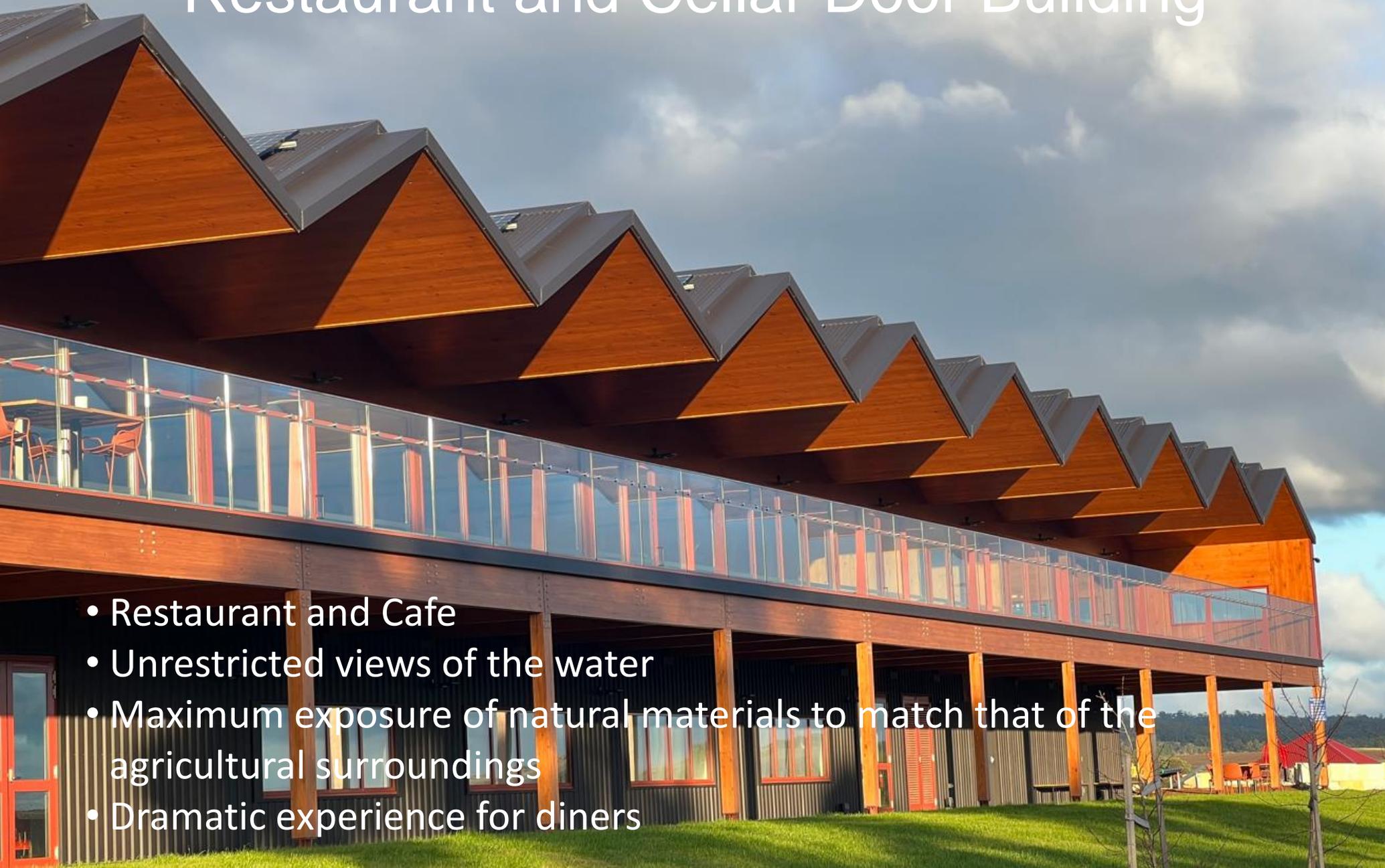
Construction programme: 1st installation – 1 week  
2nd and 3rd installation – 3 days each

Construction prelims: Crew, crane, props, screw guns

Crew members: 6 (including crane crew)

# Restaurant and Cellar Door Building

- Restaurant and Cafe
- Unrestricted views of the water
- Maximum exposure of natural materials to match that of the agricultural surroundings
- Dramatic experience for diners



# DfMA Collaboration – Original Roof

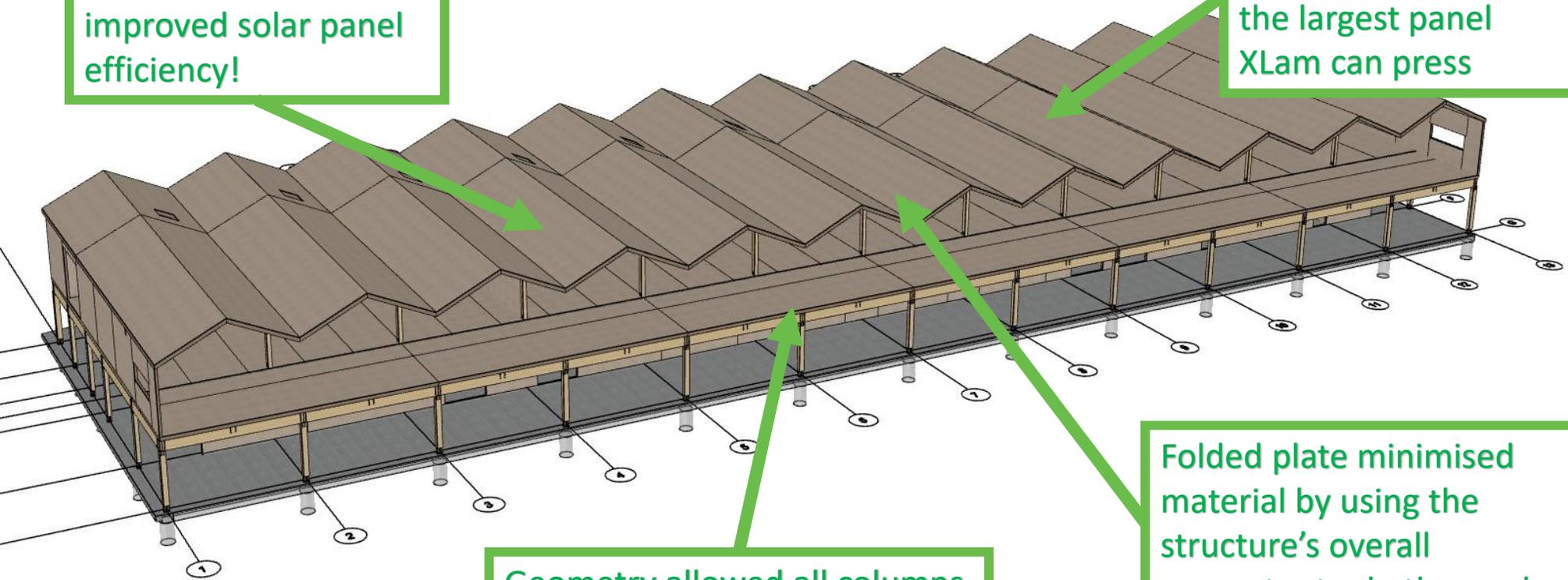
- Coffered roof
- Over 600+ components
- Huge cost



# DfMA Initiatives – Roof Solution

Roof orientation - improved solar panel efficiency!

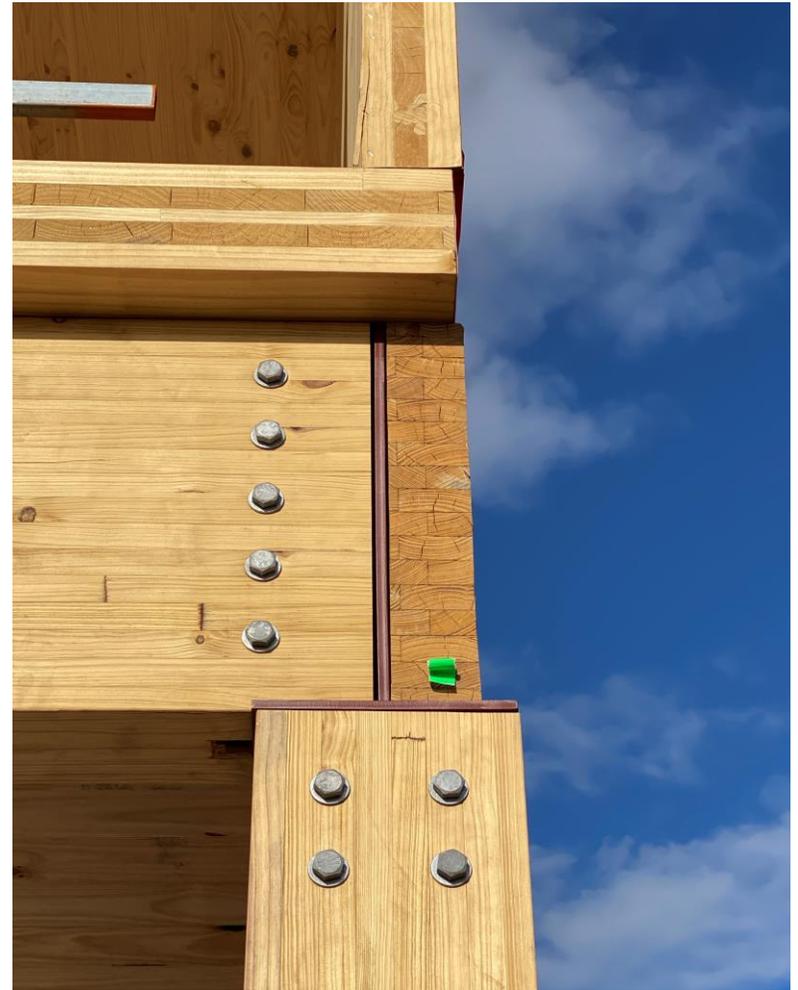
Panel size dictated roof pitch – 3.45m is the largest panel XLam can press



Geometry allowed all columns on the balcony to be removed for unimpeded views

Folded plate minimised material by using the structure's overall geometry to do the work

# DfMA Initiatives - Colonnade Connections



# Restaurant Concept



# Restaurant Reality



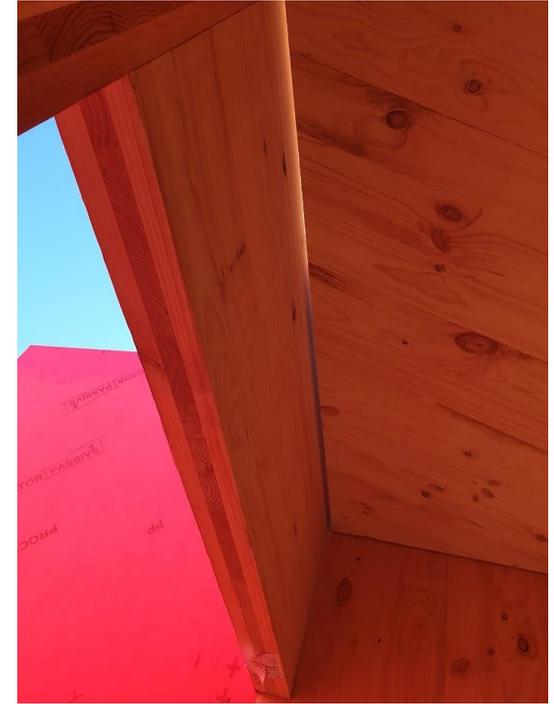
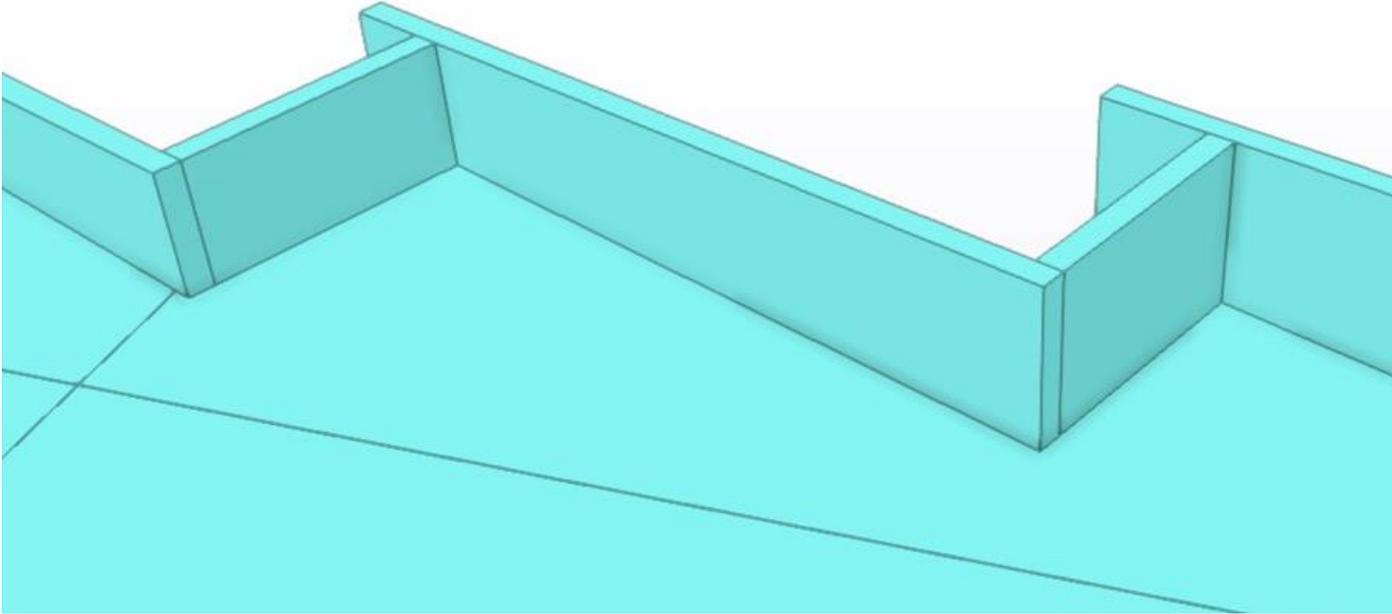
# Restaurant – As Built



**Construction programme (Structure): 6 weeks (Roof fitted in 4 days)**

“One of the coolest things I’ve ever designed” – Nick Hewson (Industry Mass Timber Engineer)

# Lessons learned – Pavilion Roof



Walls ran past the roof to form the parapet



Difficulty aligning walls to roof panels with everything on an angle, including 2 degree slope, creating gaps



Next time: Consider platform construction, stopping walls at the underside of the roof and run the roof over the top. Parapets can be constructed separately

# Lessons learned – Bathroom Pods



Fitted pipework did not align to the penetrations

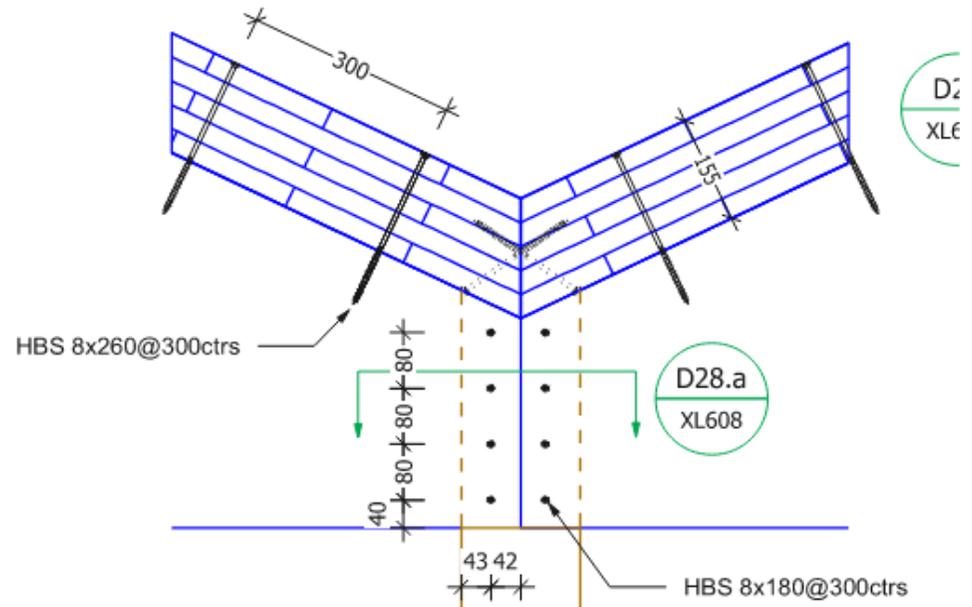


Fitting of the pipework was not as accurate as BIM



Next time: Consider larger penetrations or cut to fit on site.

# Lessons learned – Restaurant Roof



Valley details in the roof relied on a vary tight tolerance with sharp edges



Setting out of roof support structure critical. Difficult to maneuver 3.5T panel



Next time: Allow more tolerance, rounded edges and a capping piece



# Completed Development

Concept Design – February 2018

DA Awarded – August 2018

Construction – May 2019 –  
December 2021 (Structure complete  
by March 20 – progress hindered  
significantly by covid restrictions)

Operational – April 2022

















# Iron Creek Bay Case Summary

- Estimated Traditional Build Cost: \$13m
- Original off site manufacture Cost (pre DfMA): \$8.7m
- As built cost (post DfMA): \$6.7m
  
- DfMA Activity
  - **\$1.5m** reduced timber costs from original pricing (all buildings) including;
    - \$1m saving in timber roof structure
    - \$200k on window reveals and furniture
    - \$80k material reuse and mitigated disposal costs
  - **\$500k** saving in installation crew and prelims
  - **2 months** reduced from construction programme
  
- **868 tonnes** of CO2 sequestered
- **3.75hrs** to regrow tress

# Closing thoughts...

- Done properly you can see DfMA will improve quality, save costs and reduce time spent on site
- Early engagement and collaboration with the supply chain is the key to success
- Be flexible when exploring design options and don't be afraid to make big changes
- Build it virtually first but don't assume BIM means everything will magically work!
- DfMA does not happen by itself.....it requires commitment and endorsement by the internal stakeholders. So, find your champions!!

An aerial photograph of a dense forest of tall, thin trees, likely eucalyptus, with a rich green canopy. The trees are packed closely together, creating a textured, repetitive pattern of green and dark green. The lighting is even, highlighting the individual tree tops.

**Thanks for your time.**

Want to find out more?

**See [xlam.com.au](http://xlam.com.au)**