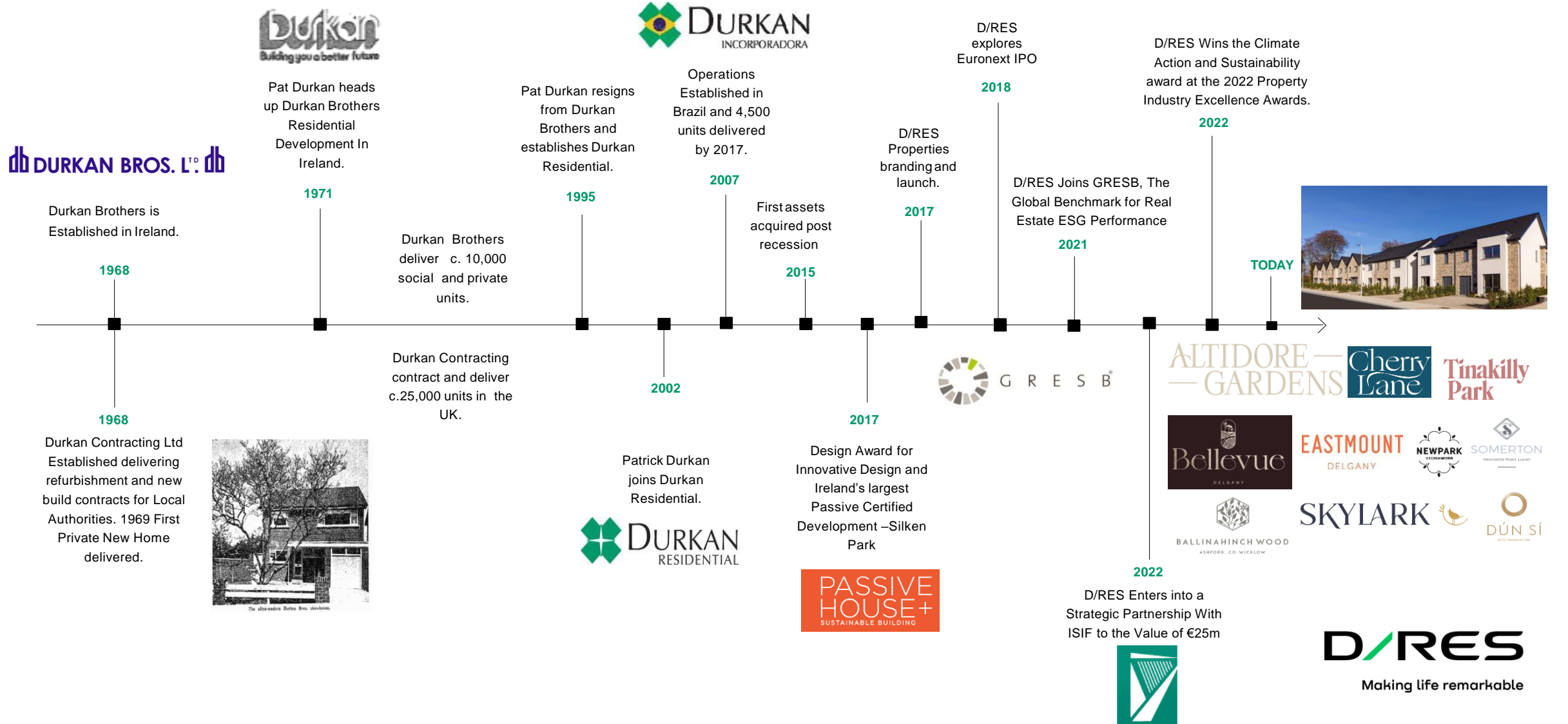


# Construct Innovate Index – Seed Funding Feedback

Image Credit: Bruno Biancardi



# DRES PROPERTIES - COMPANY TIMELINE



**95%**  
Timber Frame  
Construction




**80**  
FTE  
Employees

**5.75**  
Expected unit sales  
per FTE 2024

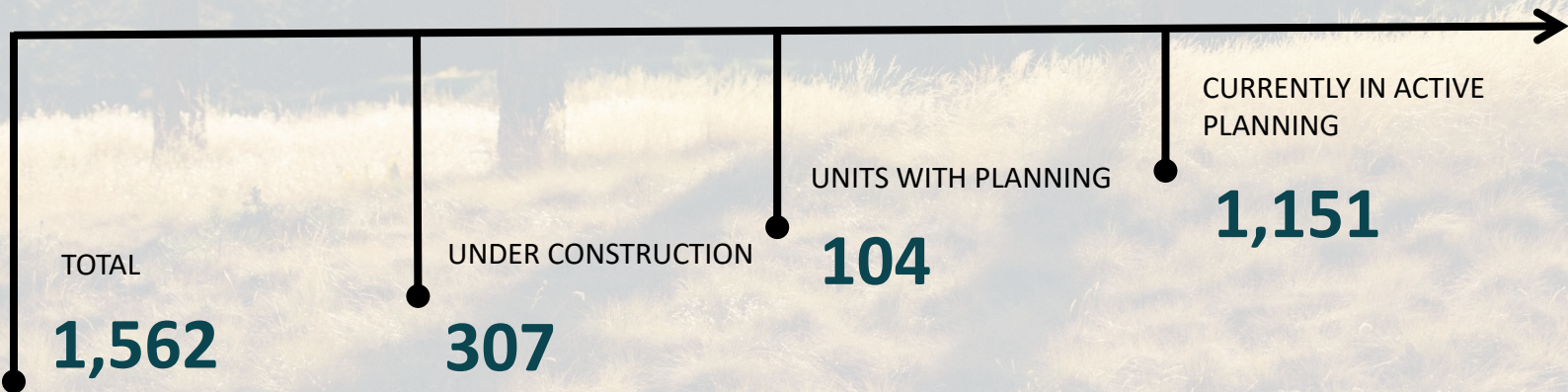
**COMPLETED UNITS**

2021**	2022	2023	2024	2025 Exp
<b>206</b>	<b>369</b>	<b>168</b>	<b>460</b>	<b>320</b>



- ALTIDORE —  
— GARDENS
- Tinakilly  
Park**
- Bellevue  
DELGANY
- Cherry  
Lane
- EASTMOUNT**  
DELGANY
-   
BALLINAHINCH WOOD  
ASHFORD, CO WICKLOW

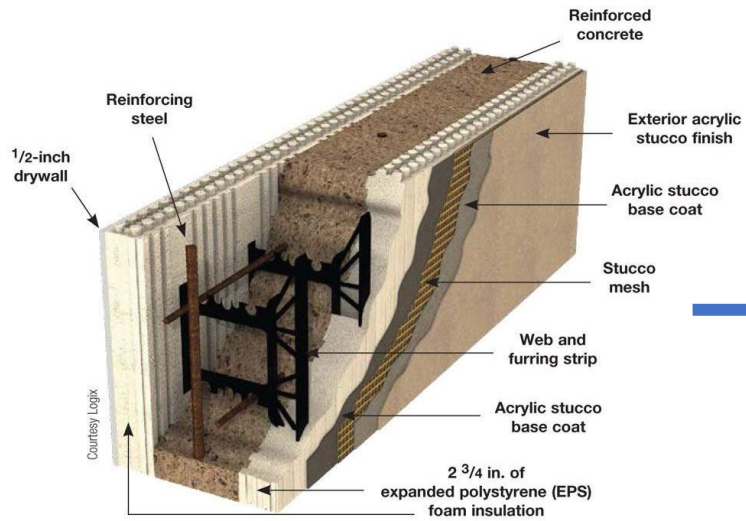
**CURRENT ACTIVITY**



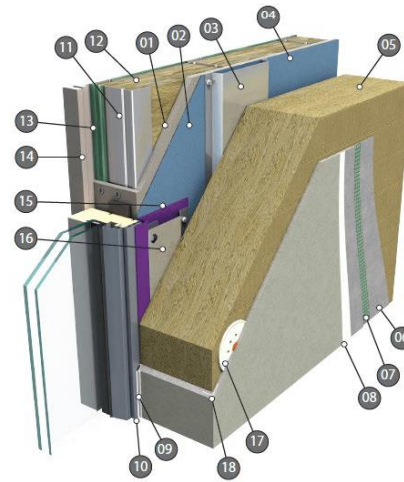
**D/RES**  
Making life remarkable

Private and Confidential  
\* Excluding sales from Cherrywood. \*\* D/RES sites were closed from December 2020 to April 2021 due to COVID-19

# DRES INNOVATION JOURNEY



**Insulated Concrete Formwork (ICF)**



**External Wall Insulation (EWI)**

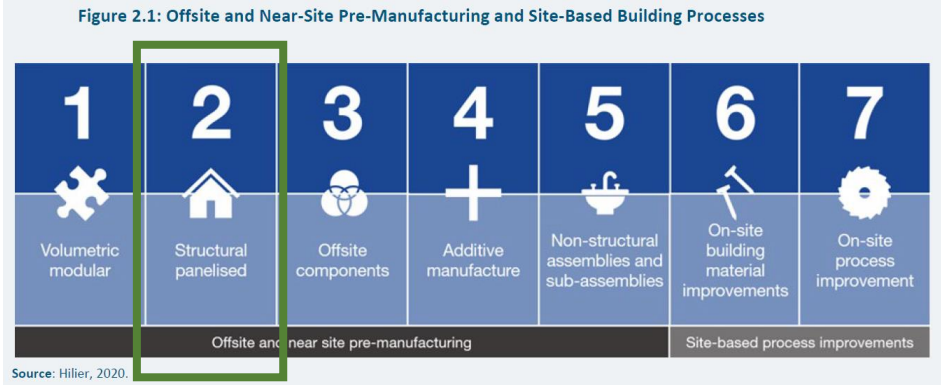


**Hybrid Panelised TF Wall Systems**

Wall Types	A1-A3 Manufacture	A1-A3 Sequestered	A4 Transport to Site	A5 Construct	B1, B2, B3	B4, B5	C1 Demolition	C2 Transport	C3/C4 (Recycled)	C3/C4 (Incinerated)	C3/C4 (Landfill)	Total A-C
5: Timber frame (I-beam, cellulose & renderboard)	3.5	-5.4	0.5	Omitted	0.0	0.0	Omitted	0.1	0.0	5.4	0.1	4.1
7: Timber frame (mineral wool + PIR, renderboard)	4.2	-4.0	0.6	Omitted	0.0	0.1	Omitted	0.1	0.0	4.0	0.0	5.0
9: Timber frame (PIR, renderboard)	4.4	-4.0	0.6	Omitted	0.0	0.0	Omitted	0.0	0.0	4.1	0.0	5.2
6: Timber frame (PIR, renderboard)	4.2	-3.3	1.1	Omitted	-0.5	1.0	Omitted	0.3	0.2	3.3	0.0	6.4
8: Timber frame (PIR, block outer)	4.6	-3.3	1.1	Omitted	-0.5	0.9	Omitted	0.3	0.2	3.3	0.0	6.6
3: Block on flat (rendered EWI)	6.2	0.0	1.6	Omitted	-1.0	0.4	Omitted	0.4	0.5	0.0	0.1	8.2
1: Cavity wall (rendered)	6.6	0.0	1.5	Omitted	-0.9	0.9	Omitted	0.4	0.5	0.0	0.1	8.9
2: Cavity wall (brick clad)	8.0	0.0	1.3	Omitted	-0.5	0.0	Omitted	0.4	0.4	0.0	0.0	9.8
11: ICF (20/25 RC, 70% GGBS, 0.4% rebar)	6.2	0.0	1.8	Omitted	-0.2	0.0	Omitted	0.5	0.5	0.9	0.1	9.9
4: Block on flat (brick slip EWI)	7.9	0.0	1.7	Omitted	-1.0	0.4	Omitted	0.5	0.5	0.0	0.1	10.0
10: ICF (28/35 RC, CEM I, 1% rebar)	11.4	0.0	1.9	Omitted	-0.4	0.0	Omitted	0.5	0.6	0.9	0.1	15.0

**Whole Lifecycle Carbon Analysis – Wall Buildups**

# MMC: 2-D MODULAR PANELISED TIMBER FRAME



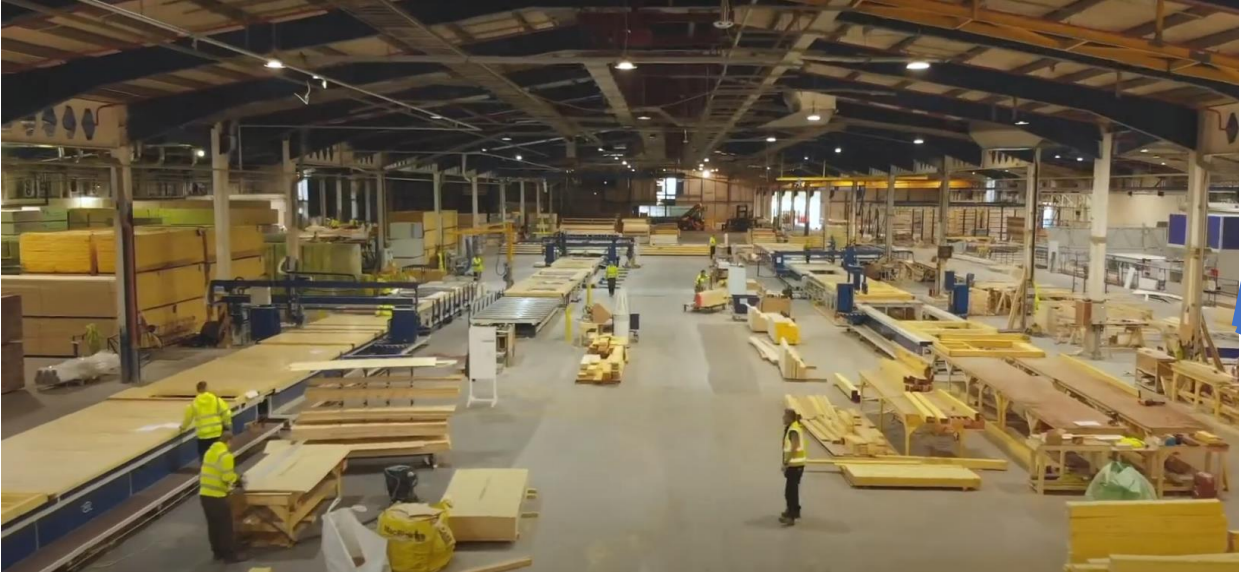
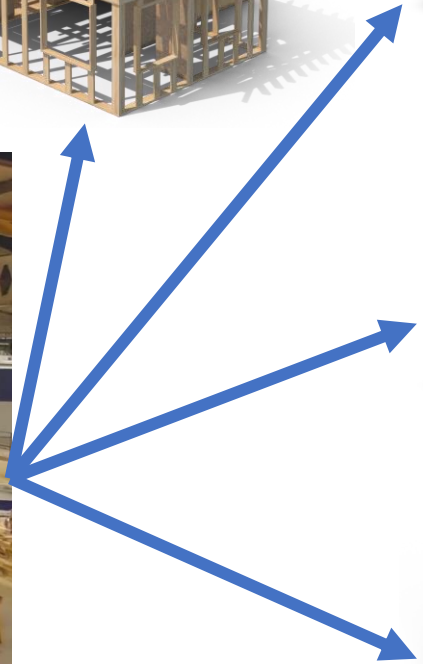
Roof Cassette



I-Joist

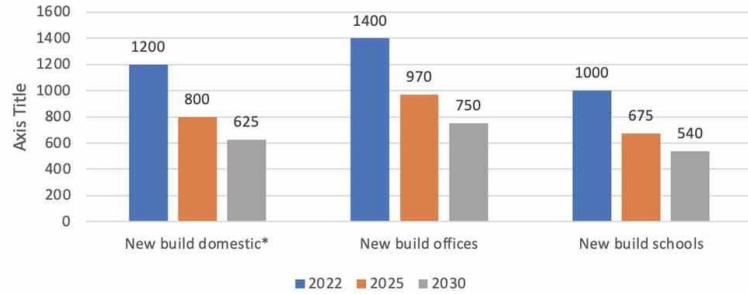


Hybrid Wall



Off-site Pre-Manufactured Components

# TIMBER FRAME – 3 BED SEMI-DETACHED EMBODIED CARBON

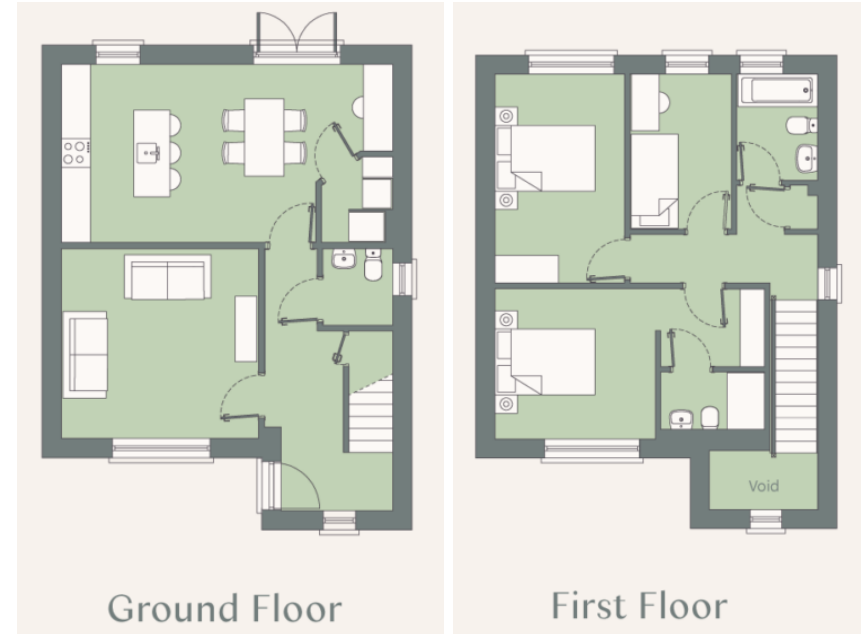


\*New build domestic includes a lower target of 450 kg CO<sub>2</sub>e/m<sup>2</sup> for dwellings over 133m<sup>2</sup>

RIAI 2030 Climate Challenge – housing target of **450kgCO<sub>2</sub>e/m<sup>2</sup>**

Cradle to grave (A1-A4, B4-B5, C1-C4)	kg CO <sub>2</sub> e/m <sup>2</sup>
<b>( &lt; 450 ) A</b>	<b>231</b>
<b>( 450-540 ) B</b>	
<b>( 540-630 ) C</b>	
<b>( 630-720 ) D</b>	
<b>( 720-810 ) E</b>	
<b>( 810-900 ) F</b>	
<b>( &gt; 900 ) G</b>	

TF Construction – achieved embodied carbon of **231kgCO<sub>2</sub>e/m<sup>2</sup>**



A close-up photograph of a person's hands operating a power tool on a vertical wooden beam. The tool is creating a large spray of bright, golden sparks that fill the right side of the frame. The background is a blurred industrial or construction site. The text 'Mass Engineered Timber' is overlaid in white, centered horizontally.

# Mass Engineered Timber

**D/RES**

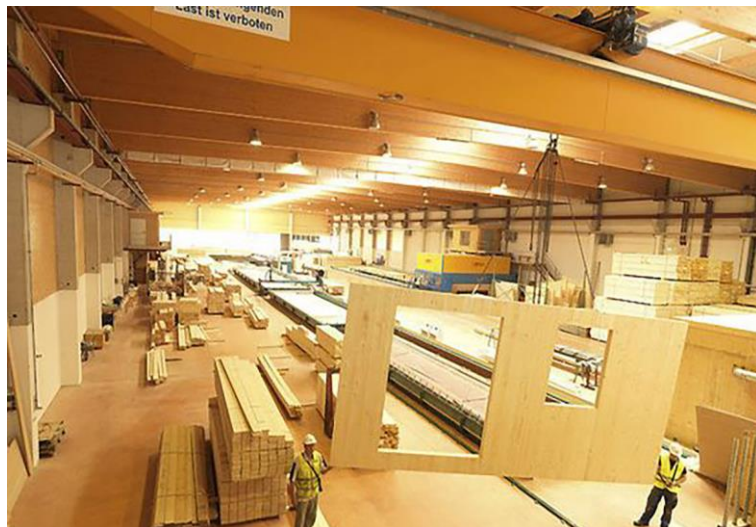
# MASS ENGINEERED TIMBER – TYPOLOGIES

## ❖ Cross Laminated Timber (CLT)

- CLT is an engineered wood product consisting of layers of kiln-dried dimension lumber (usually three, five, seven or nine) oriented at right angles to one another and then glued to form structural panels.

## ❖ Glue Laminated Timber (Glulam)

- Glulam (glued laminated timber) comprises a number of wood laminates glued together. The fibres in the laminates run parallel to the length of the piece then glued to form structural panels.





# MOTIVATION FOR USING MASS ENGINEERED TIMBER

## ❖ Sustainability

- Renewable resource via afforestation
- Sequestration of carbon within timber
- Lowest Global Warming Potential (GWP)

## ❖ Operational Effectiveness

- Lower heating consumption
- Air tightness achieved is almost Passivhaus
- Thermal comfort throughout the year
- Superior acoustic insulation & sound dampening
- Indoor quality similar to the WELL Concept

## ❖ Construction

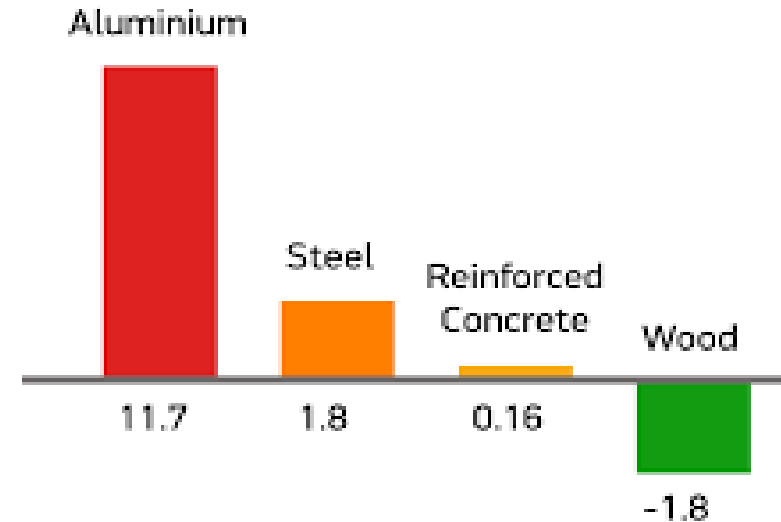
- Design for Manufacture & Assembly (DfMA)
- Shorter programme duration
- Greater precision & construction quality
- Fire safety

## ❖ User Comfort & Wellness

- Biophilia response to proximity of timber
- Improved health & wellbeing
- Enhanced productivity and learning outcomes

## Carbon footprint

Tonnes of CO2 emitted per tonne produced



Source : Ademe



The WELL Concept



AIR

Reduce indoor air pollution and optimize indoor air quality



WATER

Provide safe water through filtration and testing



NOURISHMENT

Minimize disruption to circadian system



LIGHT

Improve eating habits and food culture



FITNESS

Integrate activity through fitness programs and education



COMFORT

Ergonomic and distraction-free, productive environment



MIND

Optimized cognitive and emotional health

# NEWTOWNMOUNTKENNEDY - CRECHE & COMMUNITY CENTRE



- A. CRECHE: 600m<sup>2</sup>
- B. COMMUNITY CENTRE: 400m<sup>2</sup>

## Sub-structure

- Reinforced concrete strip foundation
- Reinforced concrete rising walls

## Superstructure

- CLT floors/walls/roof
- Glulam columns/beams/rafters

## External Envelope

- Naturheld Wood Fibre Insulation

## Roof Structure

- Solid CLT roof panel clad with:
  - Sedum green roof
  - Greencoat roof sheeting





OLLSCOIL NA GAILLIMHE  
UNIVERSITY OF GALWAY

**CONSTRUCT INNOVATE SEED FUNDING awarded for:**

## 1. Mass Timber Demonstration Building Project

**Project summary:**

Use of the Creche & Community Centre as baseline CLT buildings which can demonstrate the use of typical CLT floor cassettes, walls & roofs as well as standard mass timber structural connections, membranes & tapes that can be used across other building typologies.

## 2. Mass Timber Living Lab Project

**Project summary:**

A pioneering effort to assess the creation of a mass timber demonstrator building in order to establish criteria for measuring and monitoring the post-occupancy satisfaction of users and the overall success of the mass timber buildings.

**Supervision by:**

- Dr Patrick McGetrick (University of Galway)
- Brett Chrystal (DRES Properties)

# CONSTRUCT INNOVATE - SEED FUNDING OBJECTIVES



OLLSCOIL NA GAILLIMHÉ  
UNIVERSITY OF GALWAY

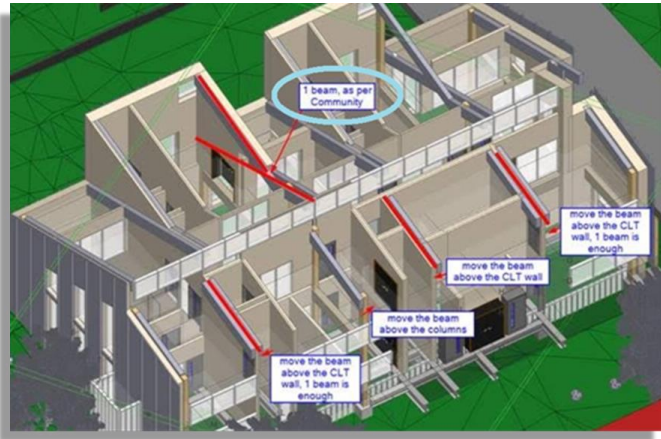
## OBJECTIVES

- Life Cycle Assessment (LCA)
- Supply Chain Analysis
- Off-site DfMA Manufacture
- Standardised Detailing
- Promote 3-D Computational Design
- Collaboration

## INNOVATION

- Whole Building Life Cycle Assessment
- Design for Manufacture & Assembly (DfMA)
- Guideline Reference Document:

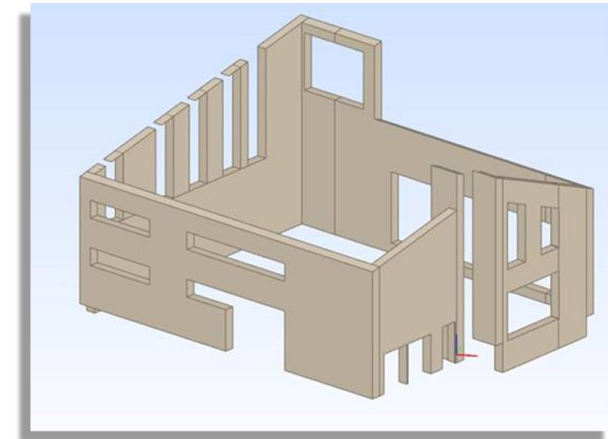
# BUILDING PERFORMANCE ANALYSIS



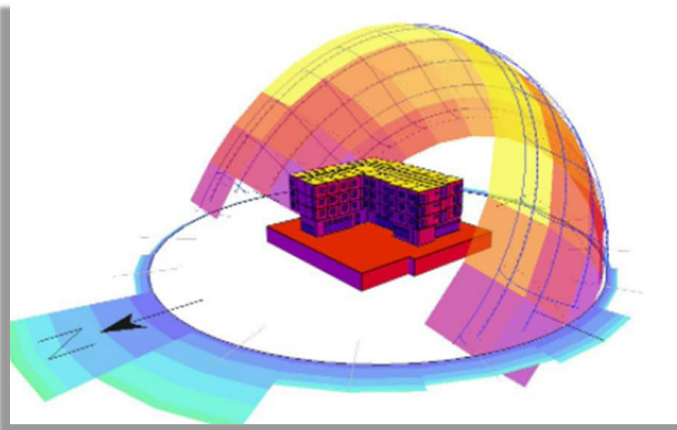
❖ 3-D Volumetric Modelling



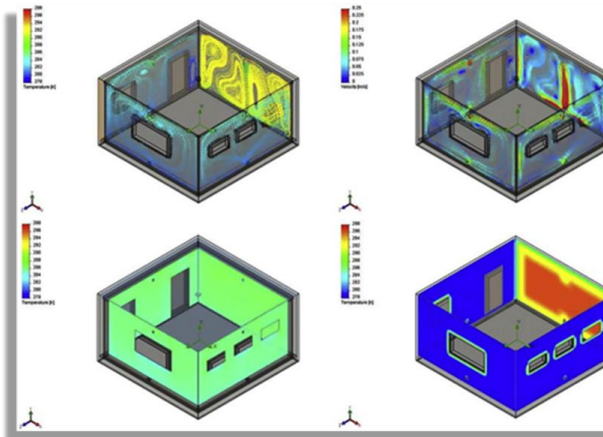
❖ 3-D Analysis of Envelope



❖ Isolation of CLT Components for DfMA



❖ Building Energy Modelling



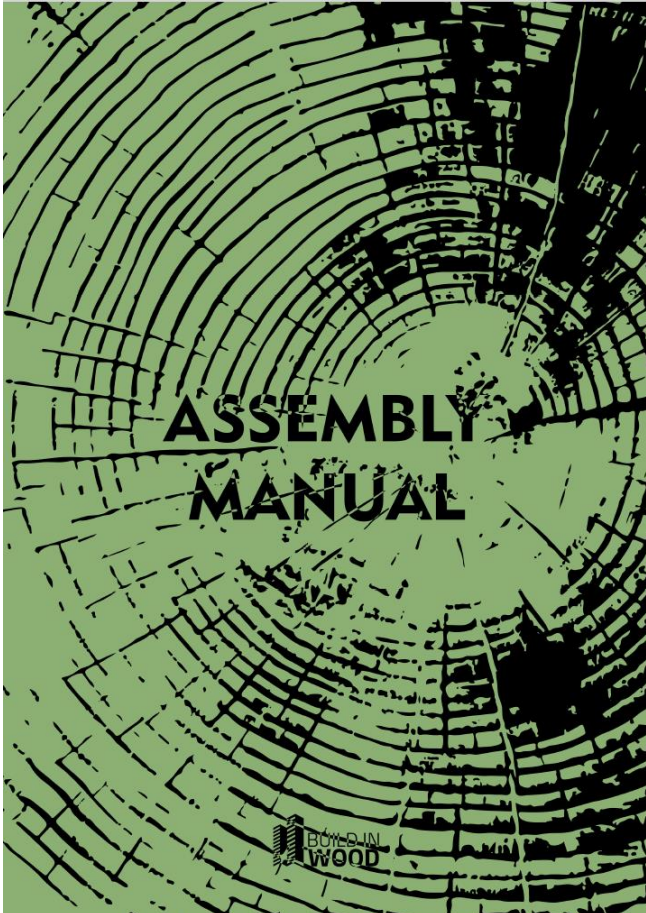
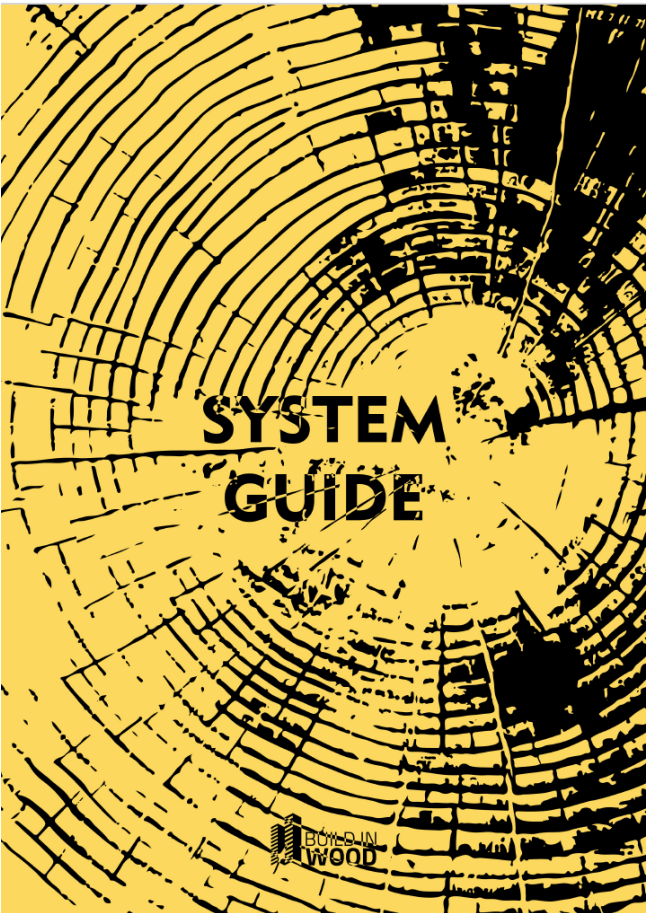
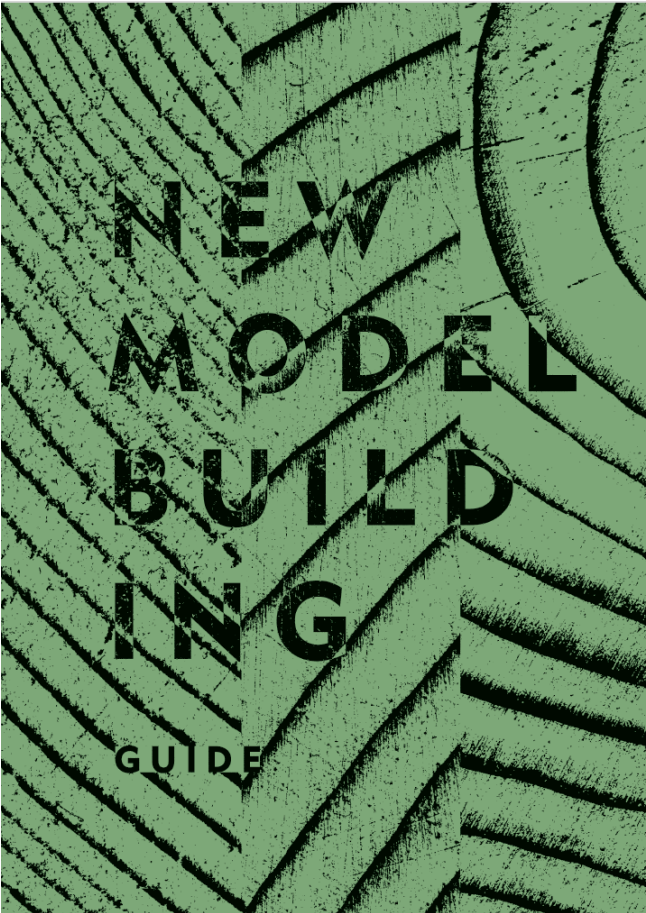
❖ Thermal Modelling

WHOLE LIFE CARBON ASSESSMENT INFORMATION					SUPPLEMENTARY INFO BEYOND THE PROJECT LIFE CYCLE
Building Life Cycle Modules and Net Zero Carbon Scopes					
PROJECT LIFE CYCLE INFORMATION					Benefits & Loads Beyond the System Boundary
A1 - A3	A4 - A5	B1 - B7	C1 - C4	D	
PRODUCT Stage	CONSTRUCTION Stage	USE Stage	END OF LIFE Stage		
A1 Raw Material Extraction & Supply	A4 Transport to Project Site	B1 Use B2 Maintenance B3 Repair B4 Replacement B5 Refurbishment	C1 Destruction/ Demolition C2 Transport to Disposal Facility C3 Waste Processing for Reuse, Recovery or Recycling C4 Disposal	D Reuse, Recycling, Repeating Presental	
A2 Transport to Manufacturing Plant	A5 Construction and Installation Procedure	B6 Operational Energy Use B7 Operational Water Use			
A3 Manufacturing & Fabrication					
NET ZERO CARBON IN CONSTRUCTION		NET ZERO CARBON IN OPERATION (B6, B7)			
WHOLE LIFE NET ZERO CARBON					

❖ Whole Lifecycle Carbon Assessment



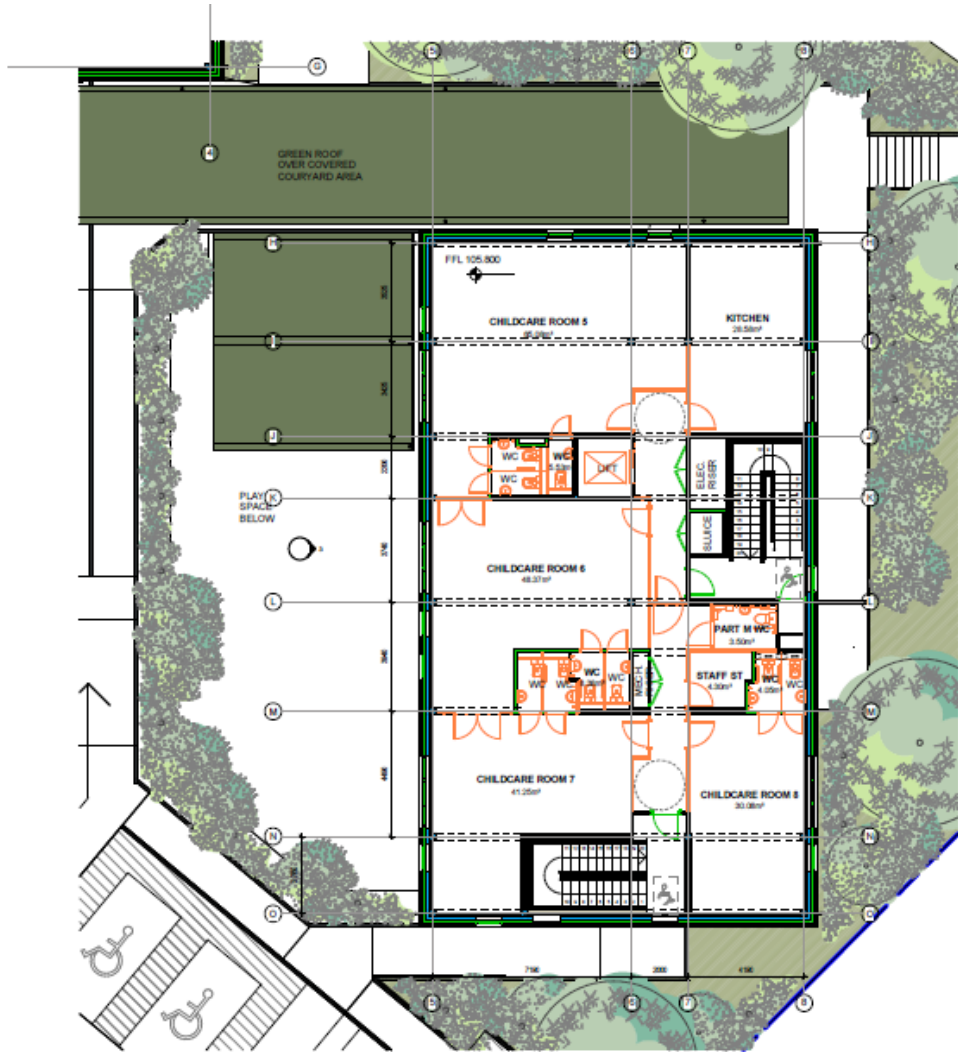
OLLSCOIL NA GAILLIMHÉ  
UNIVERSITY OF GALWAY



# CRECHE LAYOUTS



00 Creche Ground Floor - Tenant / Landlord  
1 : 100



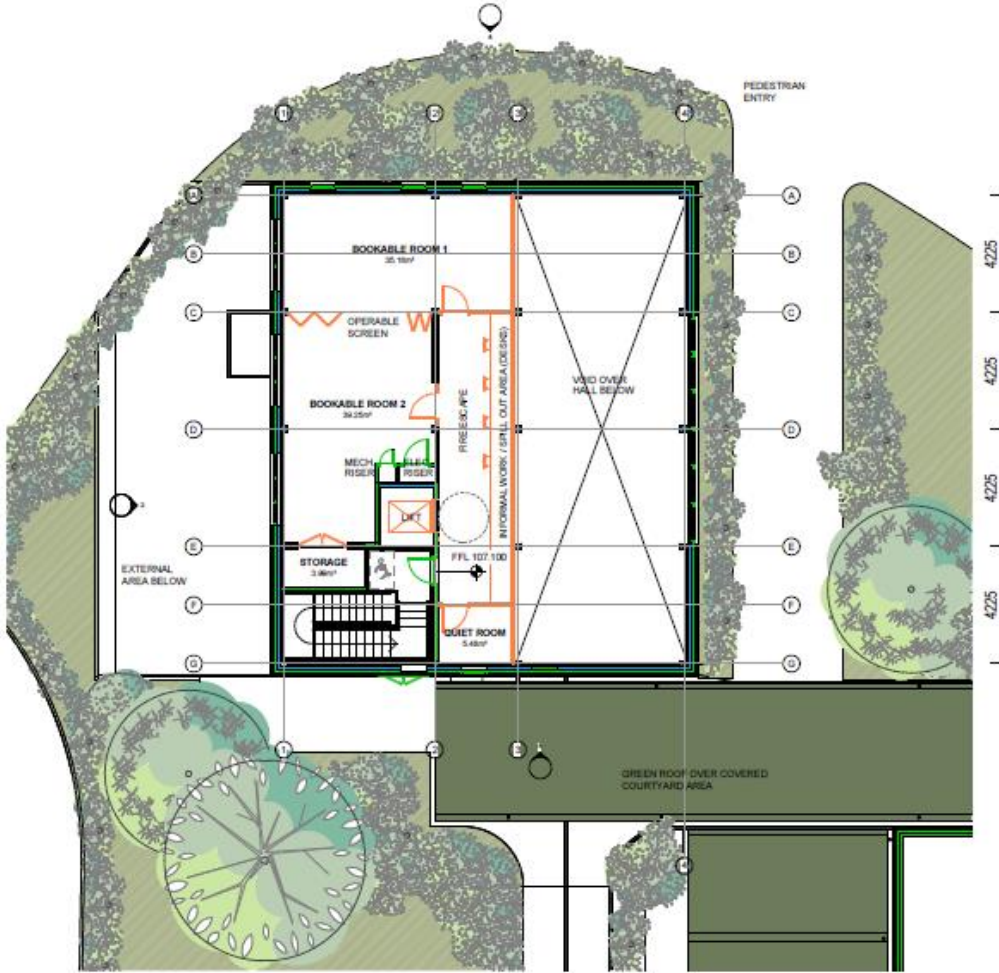
01 Creche Level 01 - Tenant / Landlord  
1 : 100

# CRECHE SECTIONS





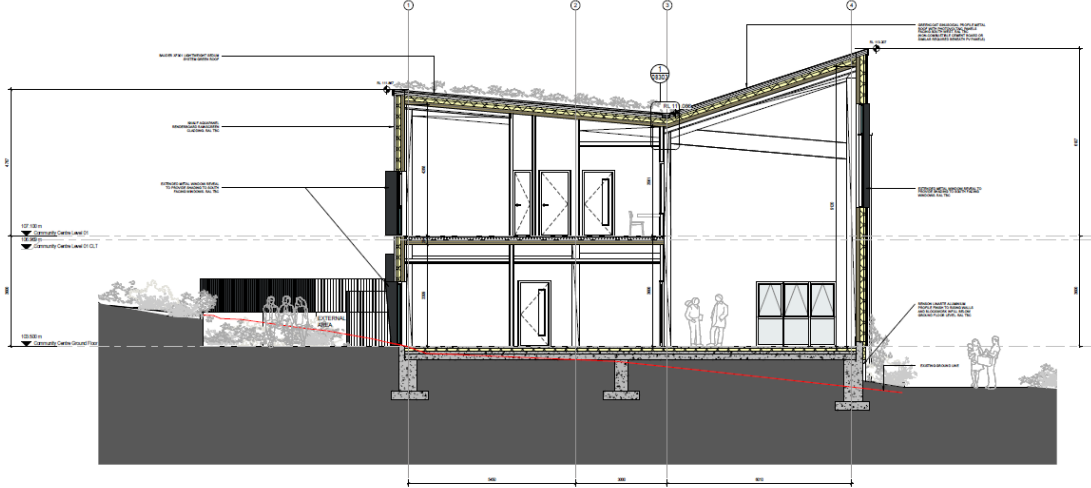
# COMMUNITY CENTRE LAYOUTS



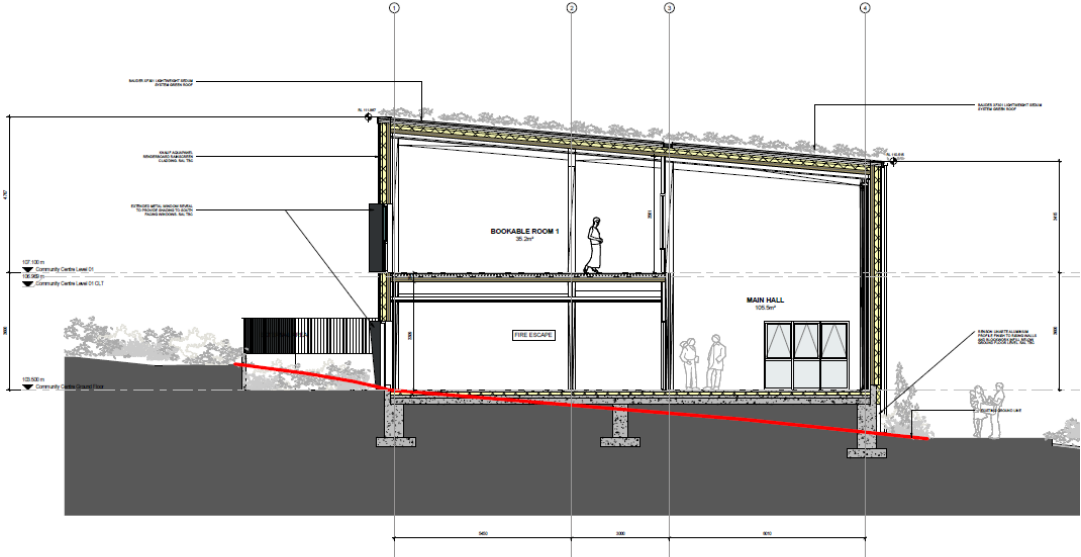
00 Community Centre Ground Floor - Tenant / Landlord  
1 : 100

01 Community Centre Level 01 - Tenant / Landlord  
1 : 100

# COMMUNITY CENTRE SECTIONS



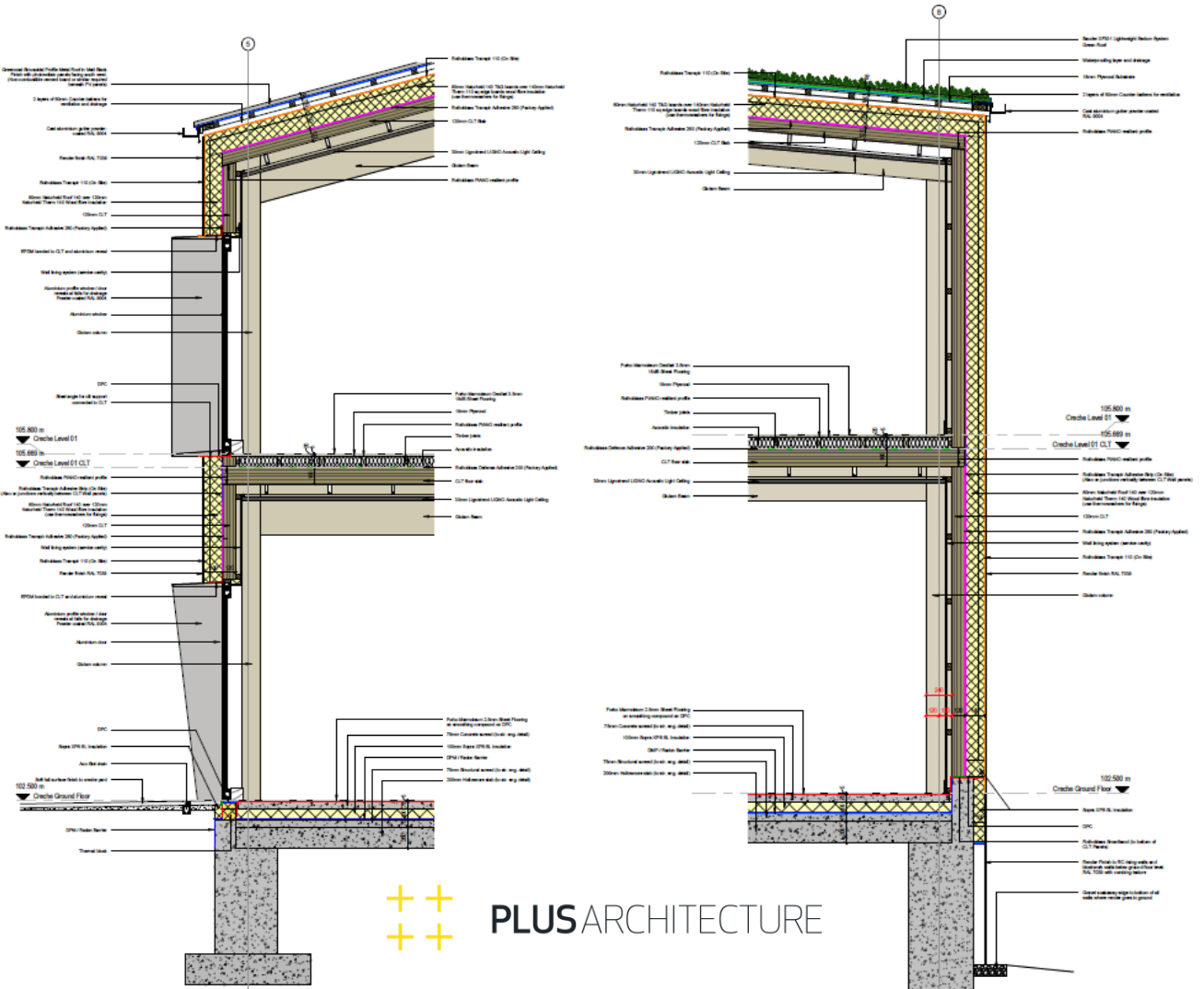
Community Centre Section A  
1:50



Community Centre Section B  
1:50



# EMBODIED CARBON ASPIRATIONS



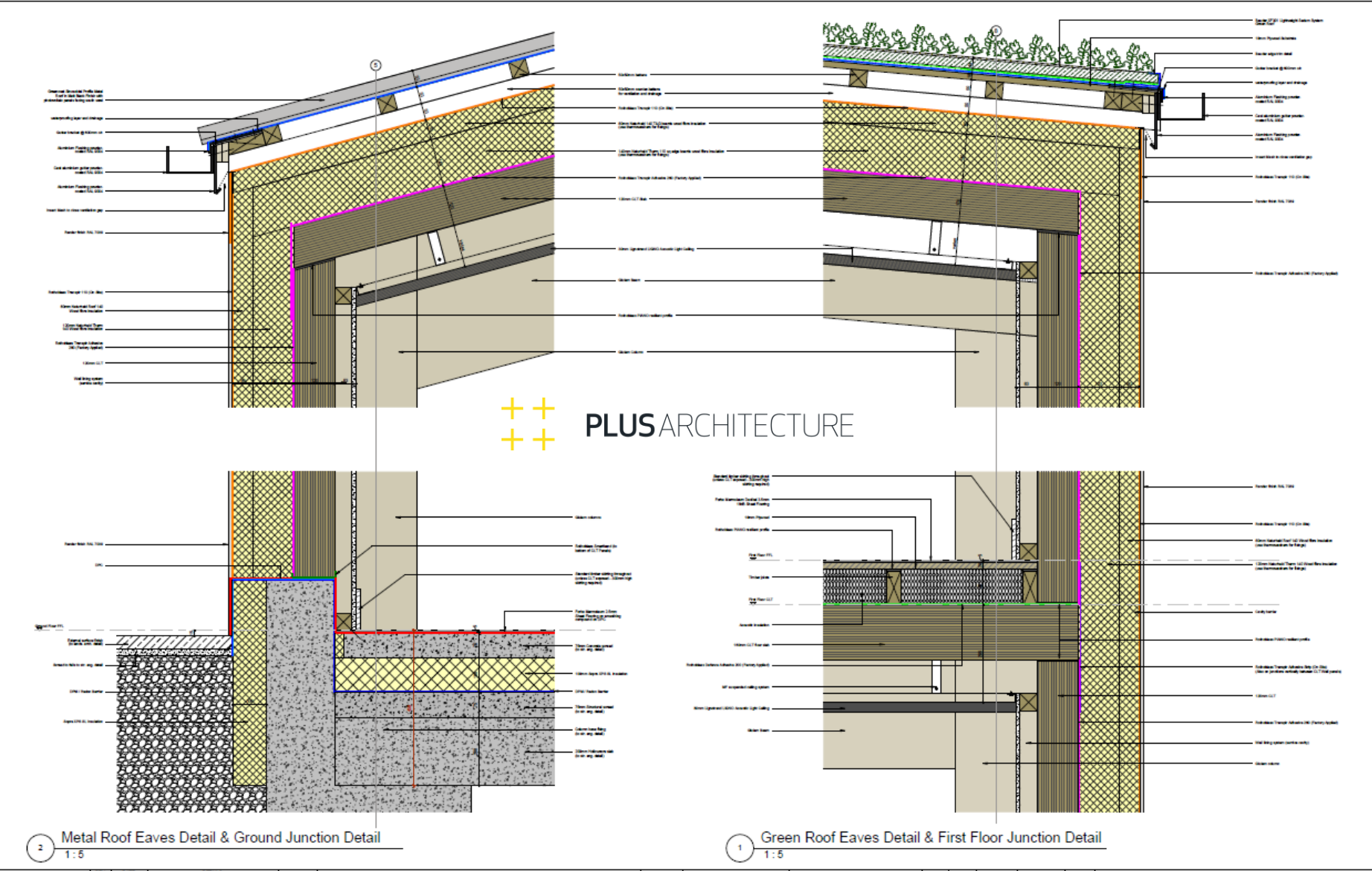
++ ++ PLUSARCHITECTURE

## ❖ TARGET – NET ZERO CARBON

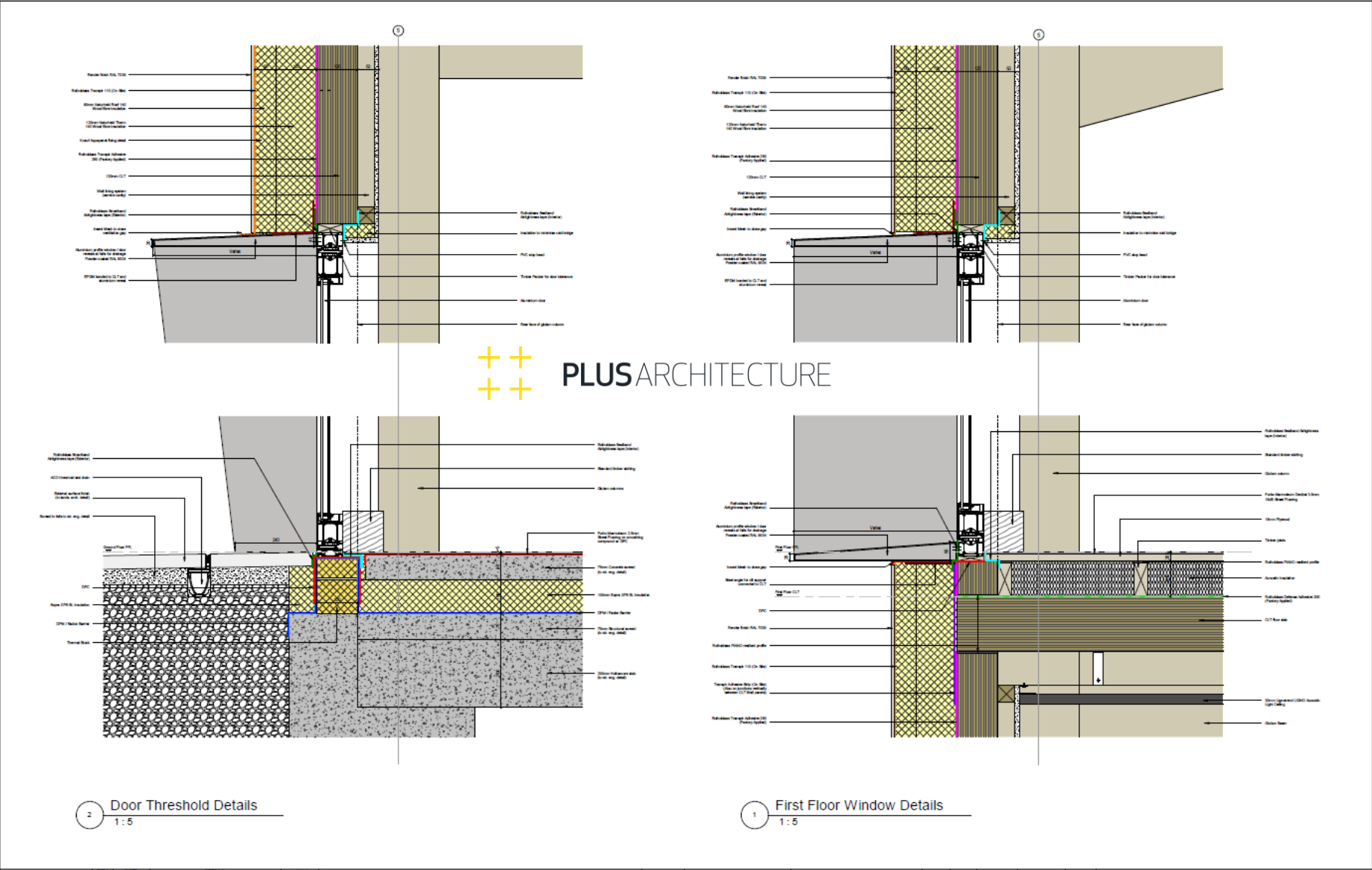
A 'Net Zero Whole Life Carbon' building does not exceed local targets for operational energy use or embodied carbon; such that the sum total Global Warming Potential for all cradle to grave life cycle stages are less than or equal to zero, where residual carbon is compensated for via renewable energy sources, or as a last resort carbon offsetting.



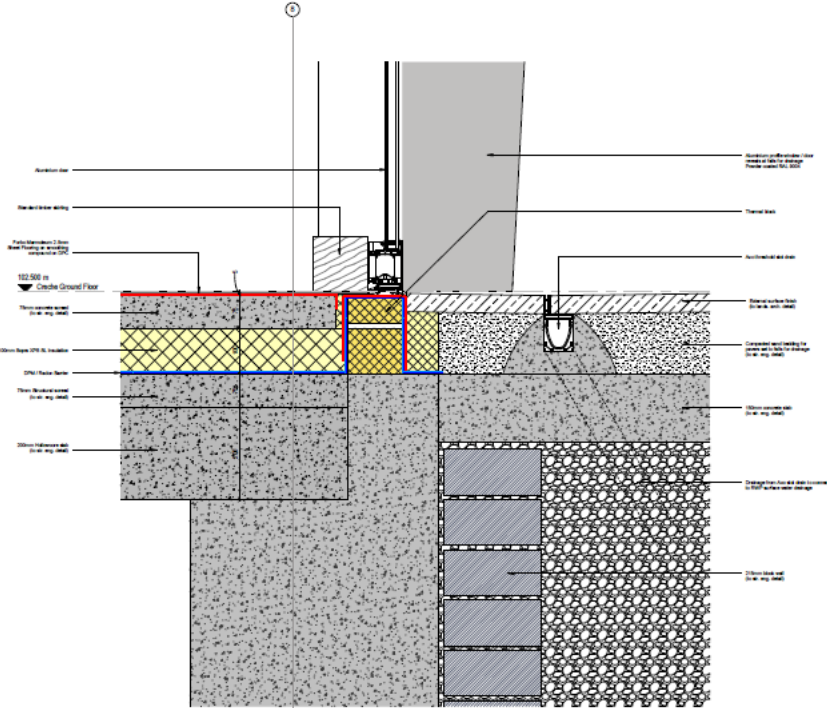
# DETAILED STUDY OF CONSTRUCTION METHODOLOGY - 1



# DETAILED STUDY OF CONSTRUCTION METHODOLOGY - 2

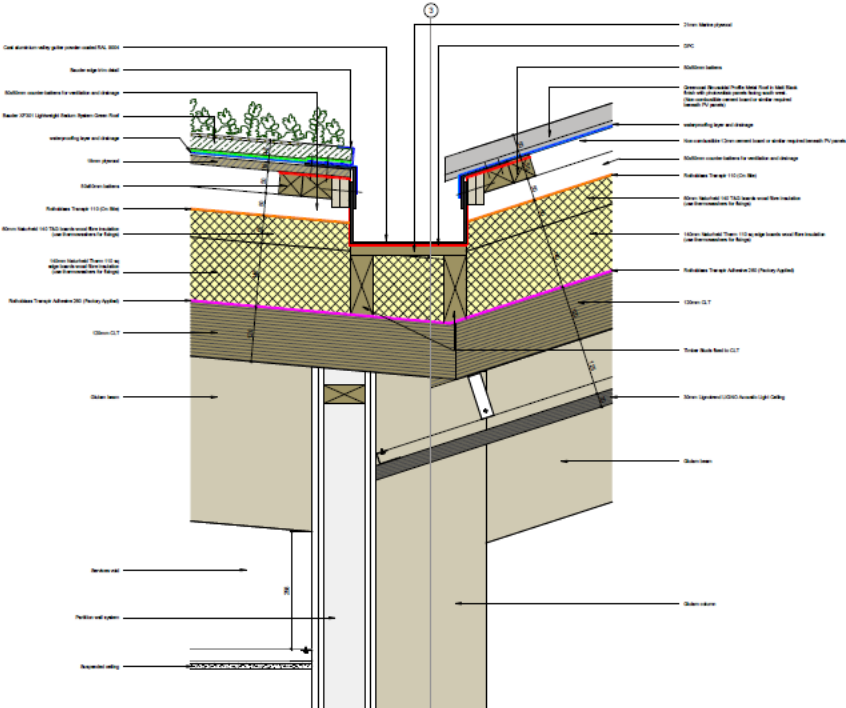


# DETAILED STUDY OF CONSTRUCTION METHODOLOGY - 3

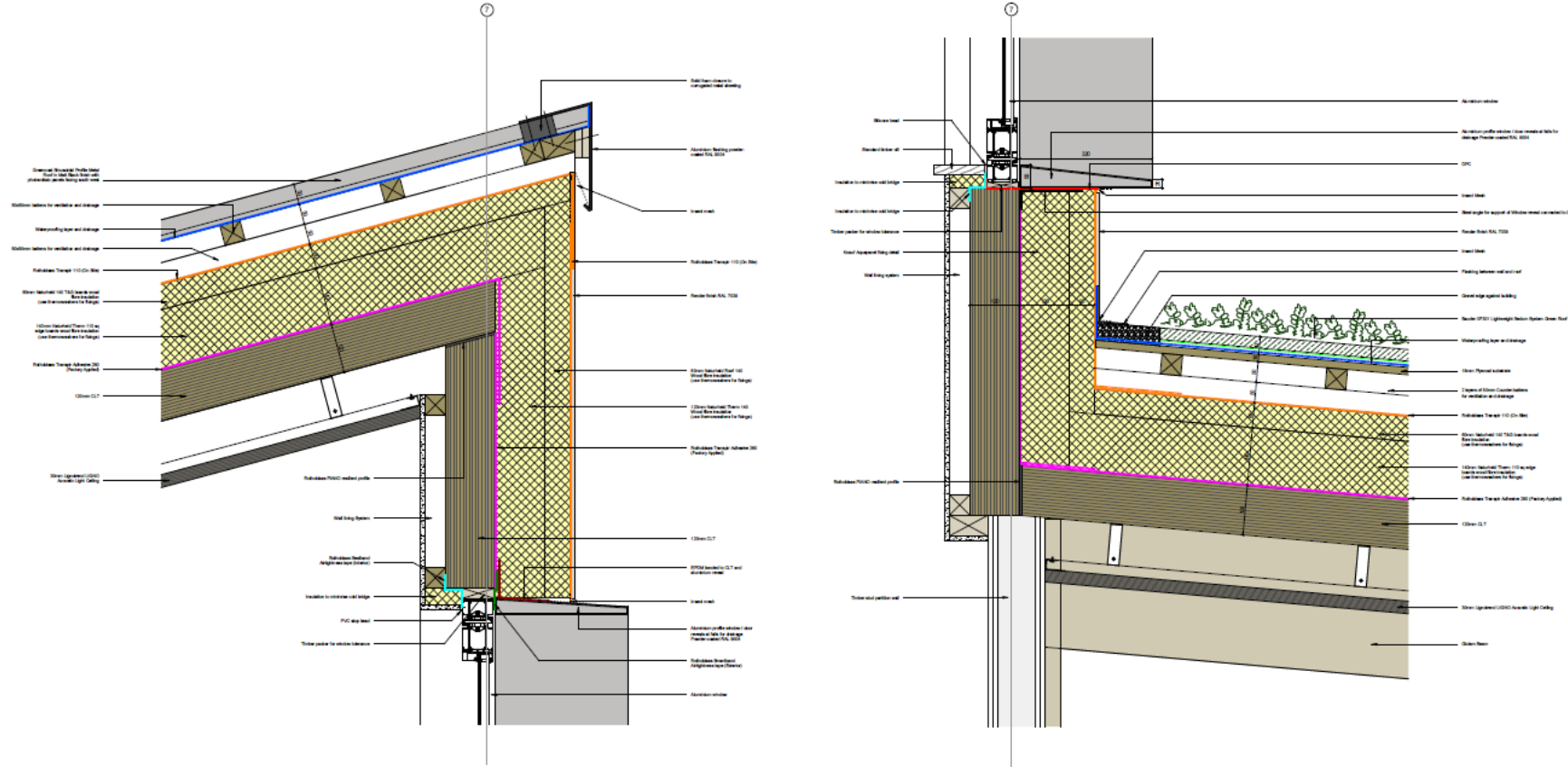


2 Door Threshold Detail with External Slab  
1:5

Note: Applicable to Numbers W.CR.00\_16 , W.CR.00\_17 , W.CR.00\_18



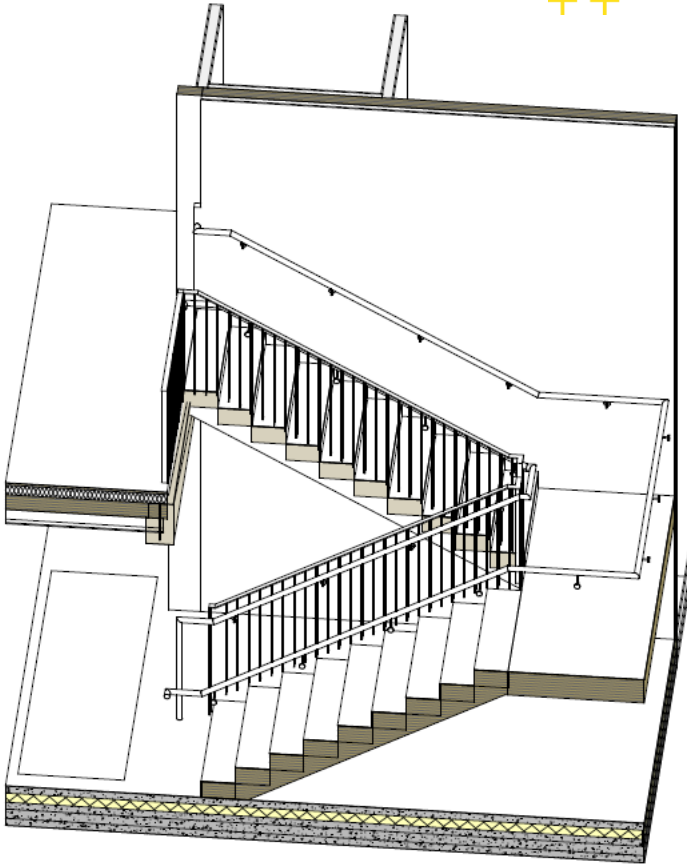
1 Community Centre Valley Detail  
1:5



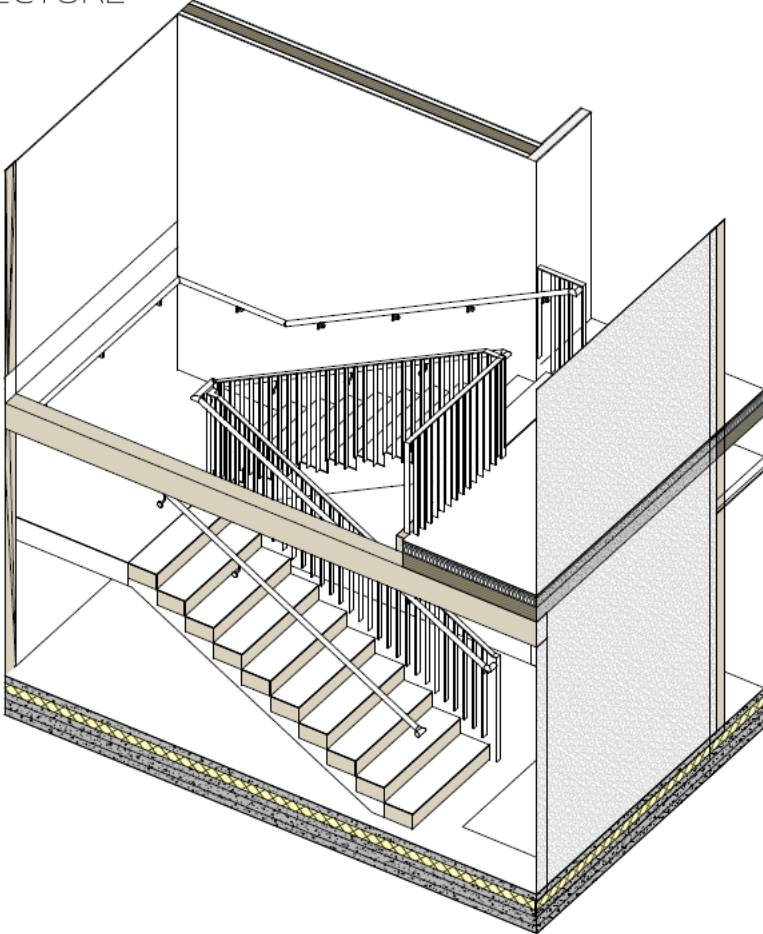
1 Metal Roof Ridge  
1:5

2 Creche Green Roof Top Junction  
1:5

++  
++ PLUS ARCHITECTURE



1 Creche Stair 1



2 Creche Stair 2



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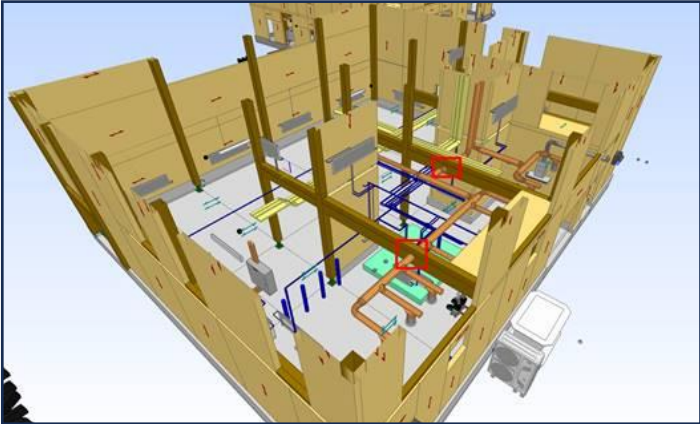
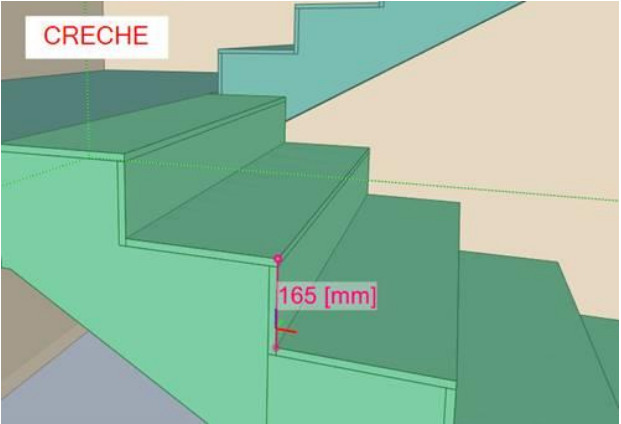
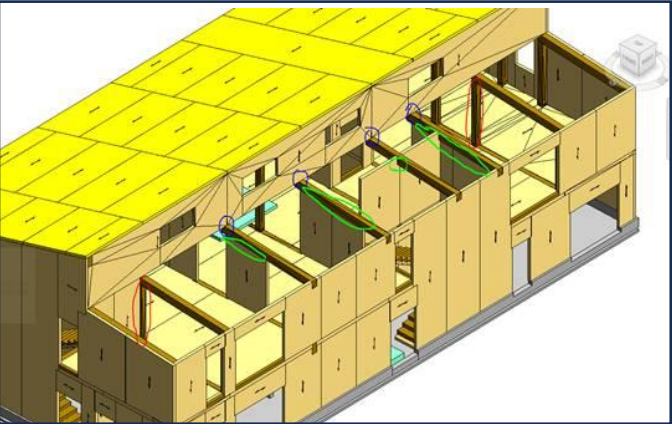
Services

## DfMA and Production Drawings

Our specialized DfMA and Production Drawing services transform timber manufacturing. We blend design precision with manufacturing efficiency, optimizing your production processes.

### 3D view 1

ergodamus



rothoblaas

**USE PERCENTAGE OF CONNECTION**  

6.1 Vertical shear (F <sub>V</sub> )	32%	6.3 Axial (F <sub>ax</sub> )	0%
6.2 Lifting shear (F <sub>up</sub> )	0%	6.4 Lateral shear load (F <sub>lat</sub> )	0%
7. Combined load	55%		

**CALCULATION OF LOCK T CONCEALED TIMBER-TO-TIMBER CONNECTOR**

**1. General information**

Date: 21/07/2024

Rothoblaas technical salesman: [redacted]

Project: B790

Designer: [redacted]

Calculation standard: EC 1993-1-1

Connection nr.: [redacted]

Notes: [redacted]

**2. Combinations**

Service class: I

Load class on plate: Medium duration

Reduction coefficient:  $k_{mod} = 1.0$

Safety coefficient of connection:  $\gamma_{M2} = 1.3$

Safety coefficient of aluminium:  $\gamma_{M3} = 1.25$

**3. Design shear strength**

Vertical shear action	$F_{v,Rd}$ [kN]	40.2
Shear action for lifting	$F_{v,Rd}$ [kN]	0
Axial action	$F_{t,Rd}$ [kN]	0
Lateral action	$F_{v,Rd}$ [kN]	0

**4. Timber element**

Configuration for lateral resistance: [redacted]

**4.1 Main element**

Column base	B <sub>0</sub> [mm]	240
Column depth	H <sub>0</sub> [mm]	240
Type of timber	-	GL24h
Main element orientation	-	Column

Timber strength class EN 14950: 2013		GL24h
Characteristic density	$\rho_k$ [kg/m <sup>3</sup> ]	385
Characteristic compressive strength parallel to the grain	$f_{c,0,k}$ [N/mm <sup>2</sup> ]	24.0
Characteristic compressive strength perpendicular to the grain	$f_{c,90,k}$ [N/mm <sup>2</sup> ]	2.5
Characteristic strength for rolling shear	$f_{r,k}$ [N/mm <sup>2</sup> ]	1.2
Characteristic shear resistance	$f_{v,k}$ [N/mm <sup>2</sup> ]	3.5

For screws on columns, see sketch to assembly.

## Horizontal Wind Load

rothoblaas

**USE PERCENTAGE OF CONNECTION**  

6.1 Vertical shear (F <sub>V</sub> )	32%	6.3 Axial (F <sub>ax</sub> )	0%
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Project: B790

Designer: [redacted]

Calculation standard: EC 1993-1-1

Connection nr.: [redacted]

Notes: [redacted]

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Service class: I

Load class on plate: Medium duration

Reduction coefficient:  $k_{mod} = 1.0$

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Lateral action	$F_{v,Rd}$ [kN]	0

**4. Timber element**

Configuration for lateral resistance: [redacted]

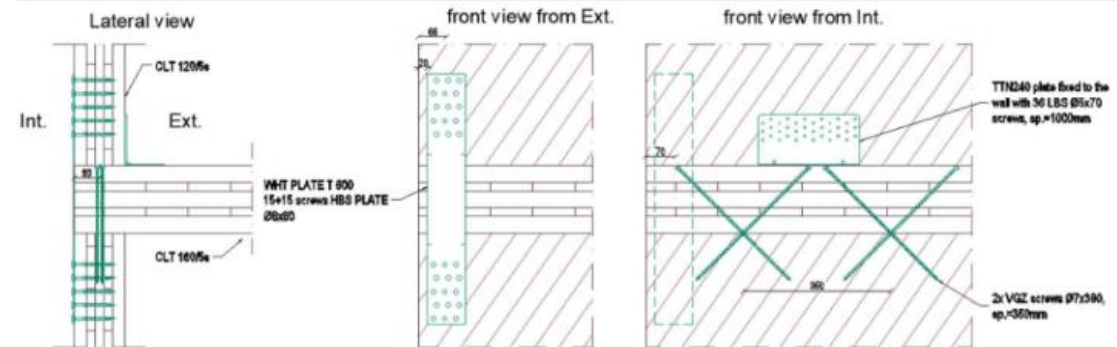
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Characteristic shear resistance	$f_{v,k}$ [N/mm <sup>2</sup> ]	3.5

For screws on columns, see sketch to assembly.

## TT\_05: slab-wall connection



# ENGINEERED TIMBER STRUCTURAL ANALYSIS - 2

Loc. Fratta, 18/4,  
38057 Pergine  
Valsugana (TN), Italy

(+39) 0461 510932  
info@ergodomus.it

ergodomus.it

## Structural Report

NTMK - Community + Creche



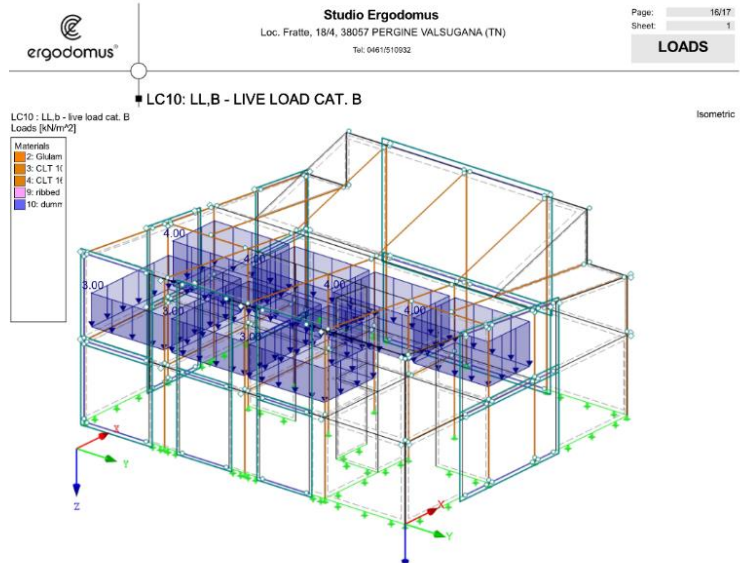
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the art of timber engineering

Internal code: 23013

### ERGODOMUS - STRUCTURAL TIMBER REPORT(233 pages)

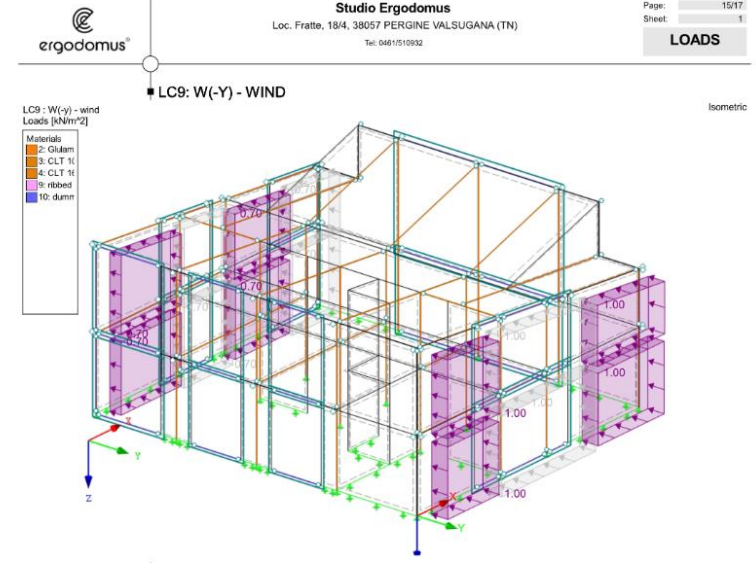


LC11  
LL,h - roof maintenance

■ **3.4 SURFACE LOADS**

No.	On Surfaces No.	Load Type	Load Distribution	Load Direction	Symbol	Load Parameters Value	Unit
1	217-220	Force	Uniform	ZL	p	0.50	kN/m <sup>2</sup>

LC11: LL,h - roof maintenance



LC10  
LL,b - live load cat. B

■ **3.4 SURFACE LOADS**

No.	On Surfaces No.	Load Type	Load Distribution	Load Direction	Symbol	Load Parameters Value	Unit
1	194,195,200	Force	Uniform	ZL	p	3.00	kN/m <sup>2</sup>
2	196-199	Force	Uniform	ZL	p	4.00	kN/m <sup>2</sup>

LC10: LL,b - live load cat. B

# ENGINEERED TIMBER CONNECTIONS & TAPES



## WHT

### WHT HOLD DOWN ANGLE BRACKET: VERSATILITY AND STRENGTH

The WHT **hold-down angle bracket** from Rothoblaas is on the market in an optimised version of the classic angle bracket for tensile loads. The new variant offers a more efficient fastening without compromising the performance of an already outstanding product.

Available in 5 sizes, the WHT **hold-down angle bracket** is suitable for every static or seismic requirement, providing freedom of fastening with nails, screws or partial nailing.



## HBS

### COUNTERSUNK SCREW

#### 3 THORNS TIP

Thanks to the 3 THORNS tip, minimum installation distances are reduced. More screws can be used in less space and larger screws in smaller elements. Costs and time for project implementation are reduced.

#### FAST

With the 3 THORNS tip, screw grip becomes more reliable and faster, while maintaining the usual mechanical performance. More speed, less effort.

#### JOINTS WITH SOUNDPROOFING PROFILES

The screw has been tested and characterised in applications with soundproofing layers (XYLOFON) interposed on the shear plane. The impact of acoustic profiles on the mechanical performance of the HBS screw is described on page 74.

#### NEW-GENERATION WOODS

Tested and certified for use on a wide variety of engineered timbers such as CLT, GL, LVL, OSB and Beech LVL. Extremely versatile, the HBS screw guarantees the use of new-generation woods for the creation of increasingly innovative and sustainable structures.



MY	BT INCLUDED
DIAMETER (mm)	3 3.5 4 5 6 8 10 12
LENGTH (mm)	18 20 1000 (100)
SERVICE CLASS	1 2 3 4 5
ATMOSPHERIC CORROSION	C1 C2 C3 C4 C5
WOOD CORROSION	1 2 3 4 5
MATERIAL	Zn electrogalvanized carbon steel

## SMART BAND

### UNIVERSAL SINGLE-SIDED TAPE WITH SEPARABLE LINER

#### SPECIAL LINER

The product has a unique separating film which, thanks to a special treatment, can be divided at any point without pre-cutting, thus adapting to any installation requirement.

#### FLASHING TAPE

It meets all the requirements to be classified as a tape for sealing external doors or windows, ensuring maximum safety even in case of stagnating water.



# MOISTURE MANAGEMENT PRINCIPLES



## The Mass Timber Insurance Playbook:

A guide to insuring mass timber buildings



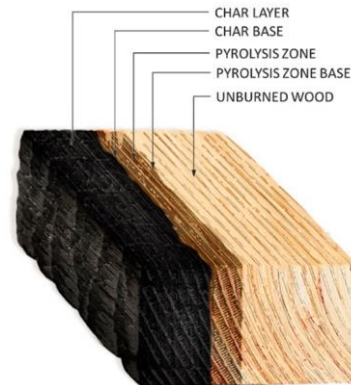
Co-authored by Philip Callow and Jim Clookling.  
Funded by Built by Nature, Marsh, and Zurich  
Resilience Solutions.



# FIRE PROTECTION PRINCIPLES



## A. Fire Performance as per TGB – Part B (Fire Safety)



The charring rate for CLT walls constitutes 0.65 mm/min where only the outermost layer is charred and 0.8 mm/min where charring progresses past the first layer

**ENCAPSULATION TO CLT STRUCTURAL MEMBERS TO ACHIEVE:  
FIRE CLASS B-s1,d0 (EN 13501)**

## B. Surface Spread of Flame



**NT**  
NORD  
TREAT

**NT DECO**

**CERTIFIED FLAME RETARDANT FOR INTERIOR AND EXTERIOR USE**

*NT DECO is designed for durable, colorless or translucent toned fire protection of wood products made of spruce, larch and cedar. Also other species can be treated. The product is ideal for interior and exterior applications. It can be applied industrially or manually by surface treatment.*



**RETARDANT TO CLT STRUCTURAL MEMBERS TO ACHIEVE:  
FIRE CLASS B-s3,d2 OR Class 0 (National Class)**