Construct Innovate IndEx– Seed Funding Feedback

Image Credit: Bruno Biancardi

Construct Innovate
Built Environment Research Ireland

D/RES
Making life remarkable

DRES PROPERTIES - COMPANY TIMELINE

D/RES

DURKAN BROS. LTD

1968

Durkan Brothers is Established in Ireland.

1968

Durkan Contracting Ltd Established delivering refurbishment and new build contracts for Local Authorities. 1969 First Private New Home delivered.


The ultra-modern Durkan Bros. showhouse.

Durkan – Building you a better future

1971

Pat Durkan heads up Durkan Brothers Residential Development In Ireland.

Durkan Brothers deliver c. 10,000 social and private units.

Durkan Contracting contract and deliver c.25,000 units in the UK.

1995

Pat Durkan resigns from Durkan Brothers and establishes Durkan Residential.

2002

Patrick Durkan joins Durkan Residential.

DURKAN RESIDENTIAL

DURKAN INCORPORADORA

2007

Operations Established in Brazil and 4,500 units delivered by 2017.

2015

First assets acquired post recession

2017

Design Award for Innovative Design and Ireland's largest Passive Certified Development –Silken Park

PASSIVE HOUSE+ SUSTAINABLE BUILDING

2017

D/RES Properties branding and launch.

2018

D/RES explores Euronext IPO

2021

D/RES Joins GRESB, The Global Benchmark for Real Estate ESG Performance

GRESB

2022

D/RES Enters into a Strategic Partnership With ISIF to the Value of €25m

2022

D/RES Wins the Climate Action and Sustainability award at the 2022 Property Industry Excellence Awards.

TODAY

ALTIDORE GARDENS · Cherry Lane · Tinakilly Park · Bellevue Delgany · EASTMOUNT DELGANY · NEWPARK · SOMERTON · BALLINAHINCH WOOD ASHFORD, CO WICKLOW · SKYLARK · DÚN SÍ

D/RES

Making life remarkable

95%
Timber Frame Construction

80
FTE Employees

5.75
Expected unit sales per FTE 2024

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

COMPLETED UNITS

2021**	2022	2023	2024	2025 Exp
206	369	168	460	320

CURRENT ACTIVITY

TOTAL
1,562

UNDER CONSTRUCTION
307

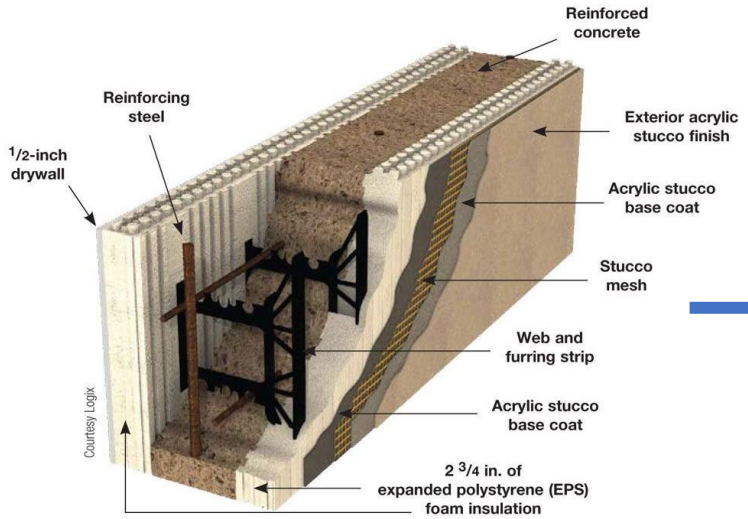
UNITS WITH PLANNING
104

CURRENTLY IN ACTIVE PLANNING
1,151

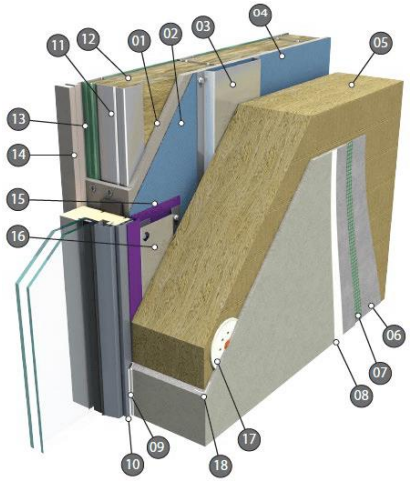
D/RES
Making life remarkable

* 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)



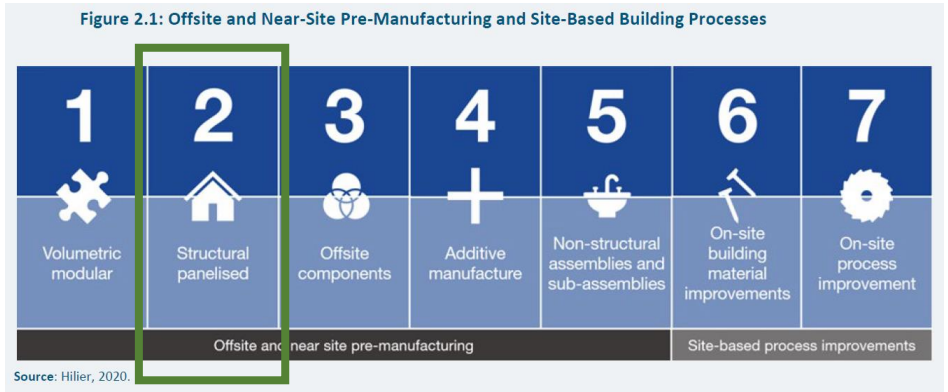
External Wall Insulation (EWI)

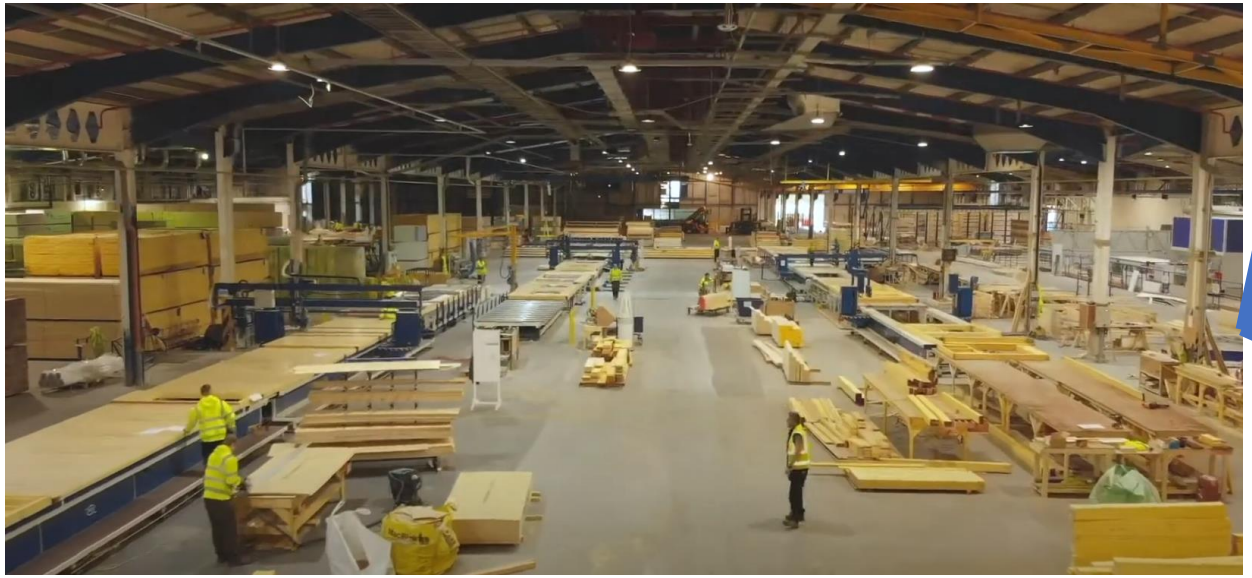
Hybrid Panelised TF Wall Systems

Wall Types	A1-A3 Manufacture	A1-A3 Sequestered	A4 Transport to Site	A5 Constuct	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

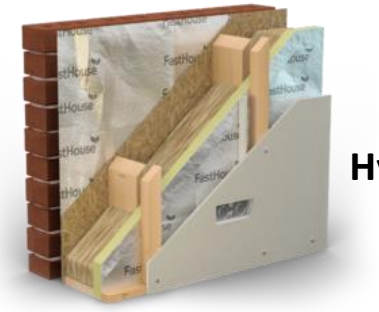




Off-site Pre-Manufactured Components

Roof Cassette

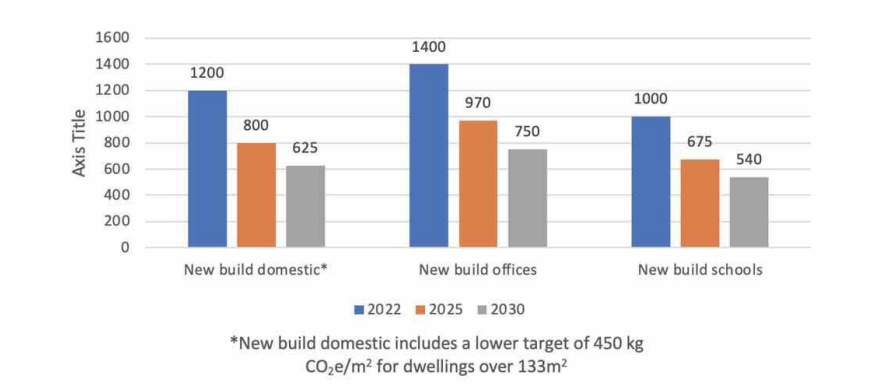
I-Joist



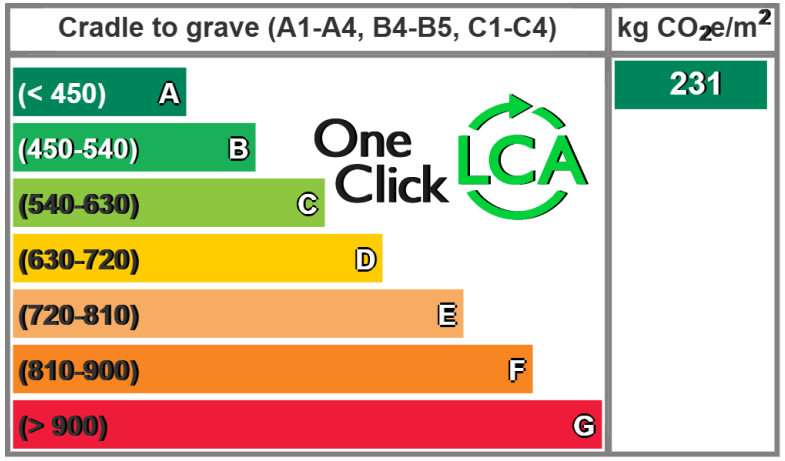
Hybrid Wall

TIMBER FRAME – 3 BED SEMI-DETACHED EMBODIED CARBON

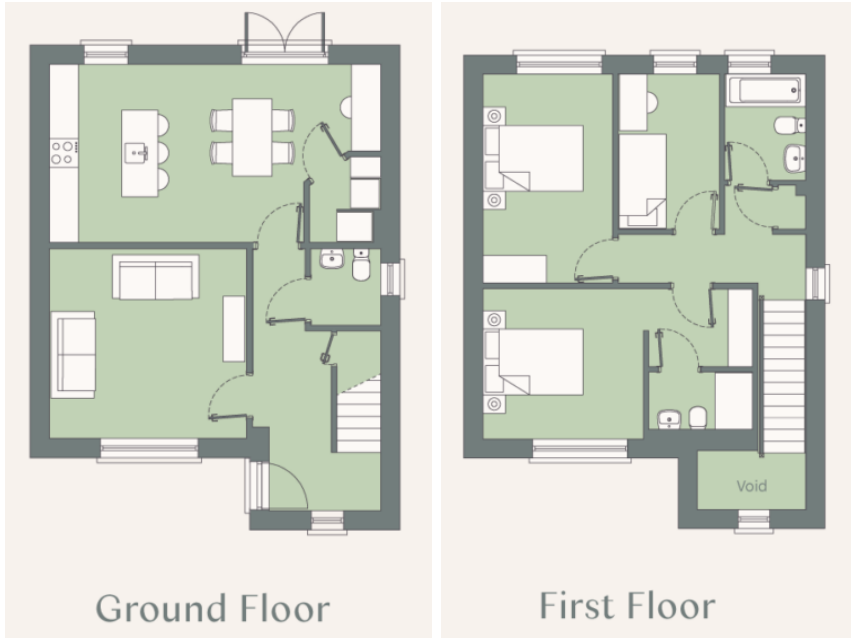
RIAI 2030 Climate Challenge
An Architect's Guide



RIAI 2030 Climate Challenge – housing target of 450kgCO2e/m²



TF Construction – achieved embodied carbon of 231kgCO2e/m²



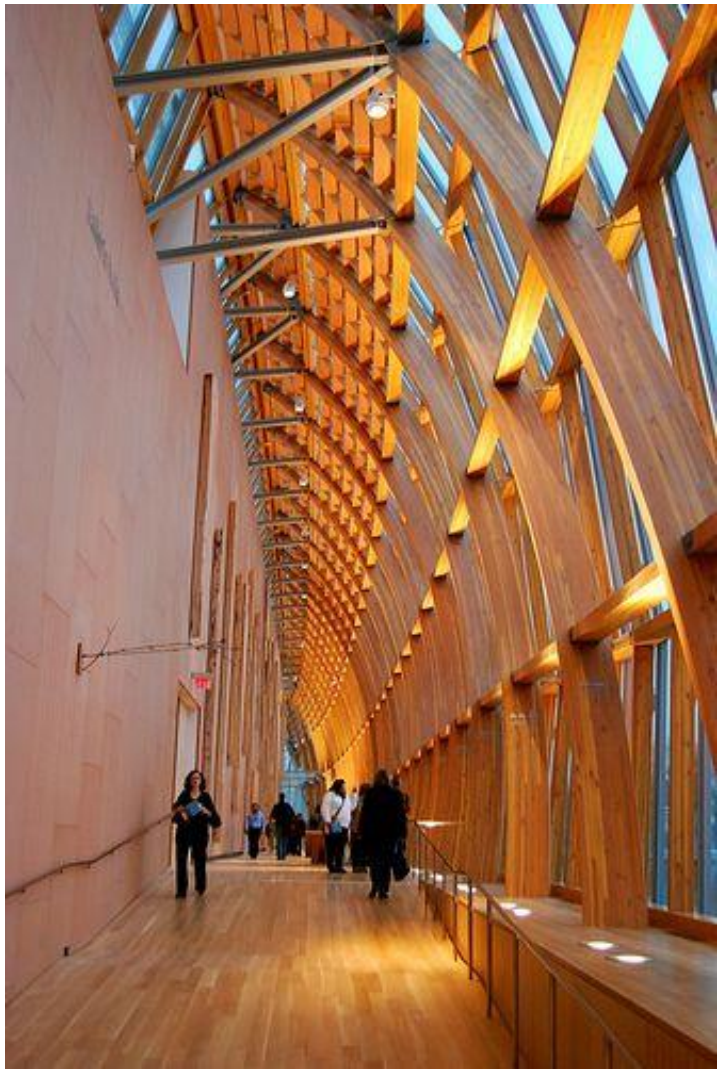
Mass Engineered Timber

D/RES

MASS ENGINEERED TIMBER – TYPOLOGIES

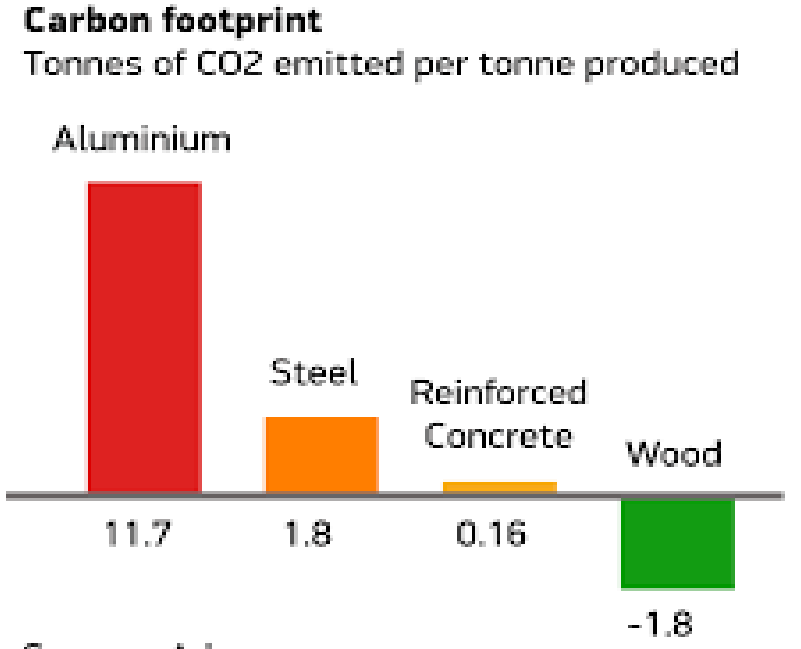
- **Cross Laminated Timber (CLT)**
  - CLT is an engineered wood product consisting of layers of kiln-dried dimension lumber (usually three, five, seven or nine) oriented at right angles to one another and then glued to form structural panels.

- **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



NEWTOWNMOUNTKENNEDY - CRECHE & COMMUNITY CENTRE

A. **CRECHE: 600m²**
B. **COMMUNITY CENTRE: 400m²**

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

CONSTRUCT INNOVATE - SEED FUNDING TOPICS

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

Construct Innovate

Ollscoil na Gaillimhe
University of Galway

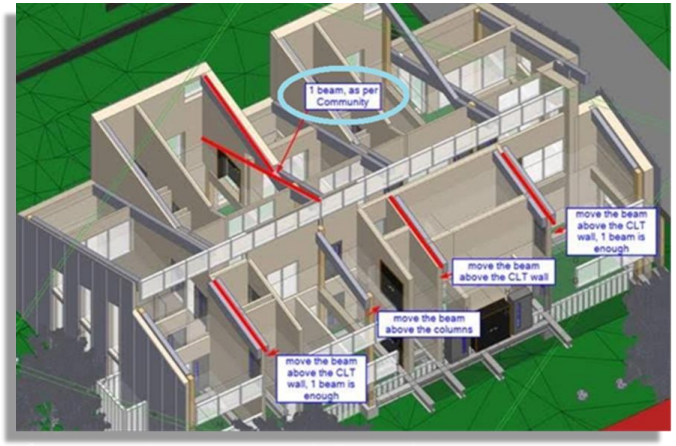
OBJECTIVES

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

INNOVATION

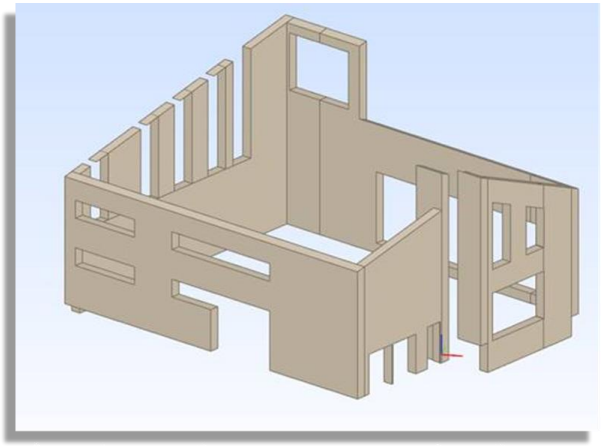
- Whole Building Life Cycle Assessment
- Design for Manufacture & Assembly (DfMA)
- Guideline Reference Document:

BUILDING PERFORMANCE ANALYSIS

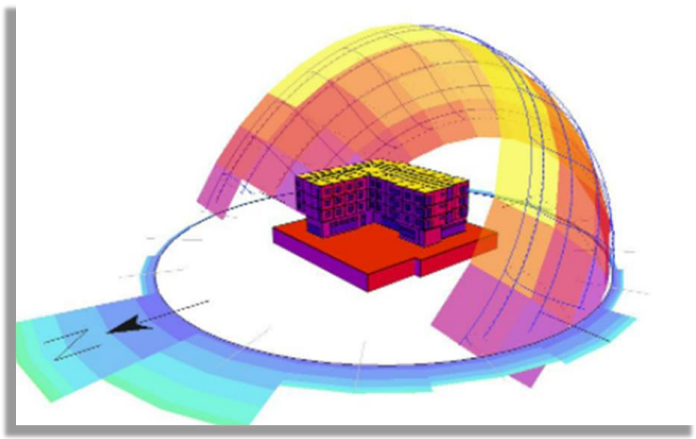


❖ 3-D Volumetric Modelling

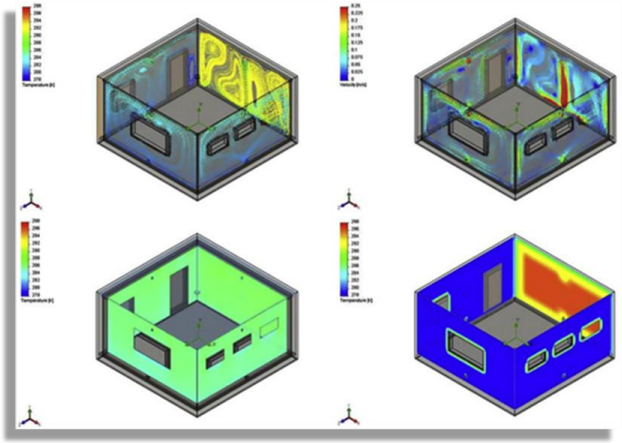
❖ 3-D Analysis of Envelope



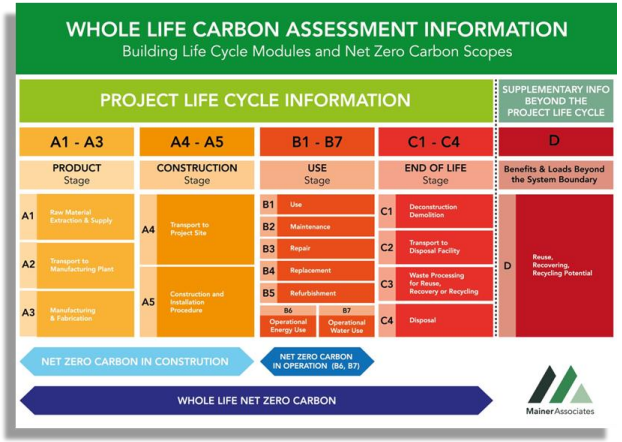
❖ Isolation of CLT Components for DfMA



❖ Building Energy Modelling



❖ Thermal Modelling



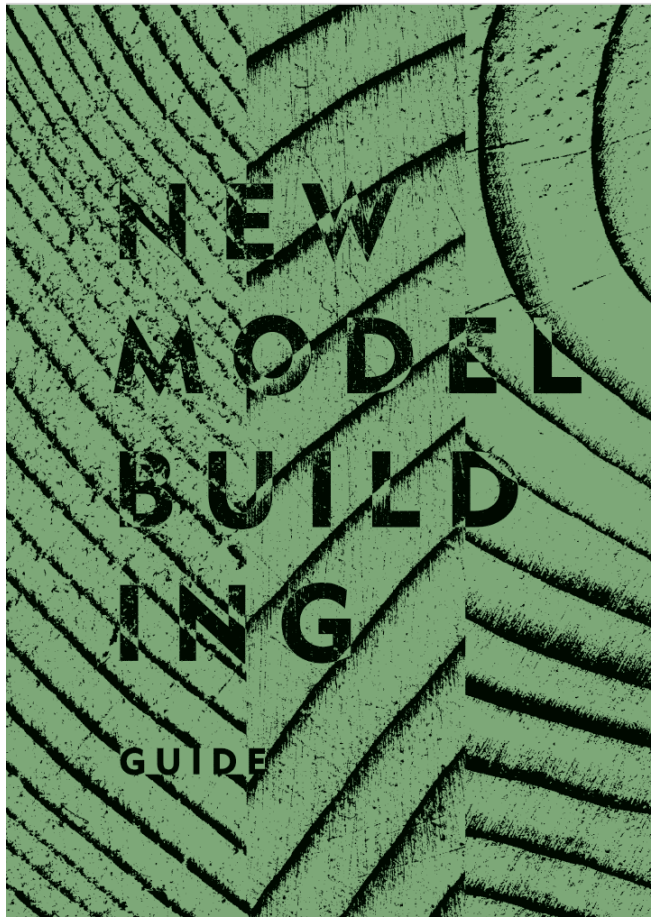
❖ Whole Lifecycle Carbon Assessment

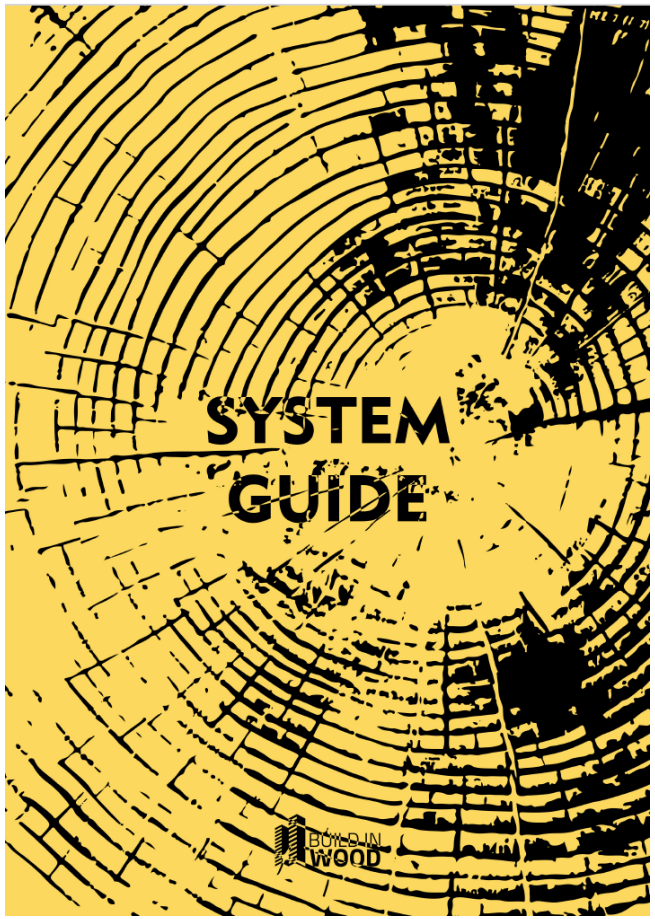
CONSTRUCT INNOVATE – GUIDELINE REFERENCE DOCUMENTS

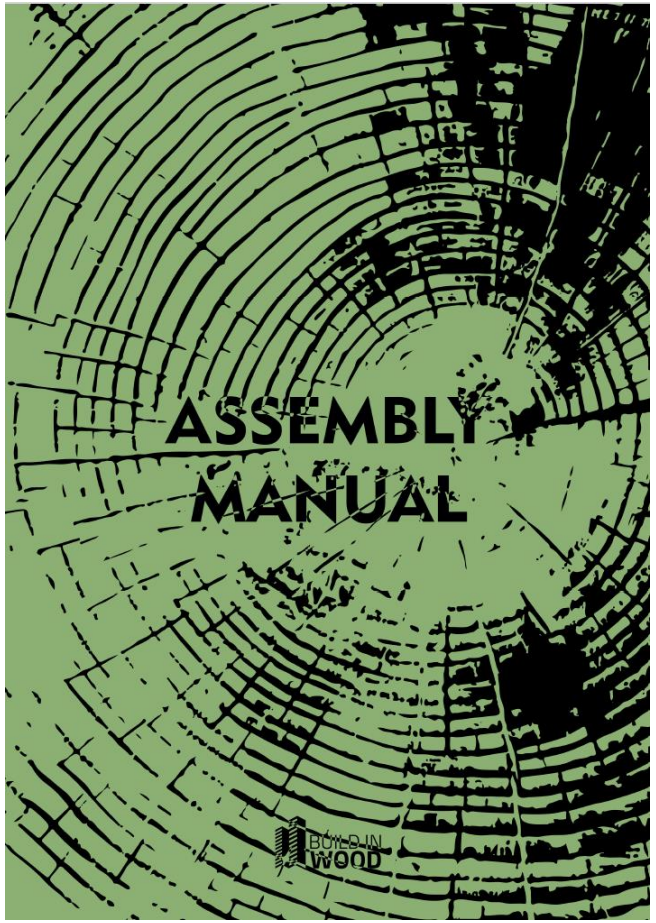
D/RES

Construct Innovate

Ollscoil na Gaillimhe
University of Galway

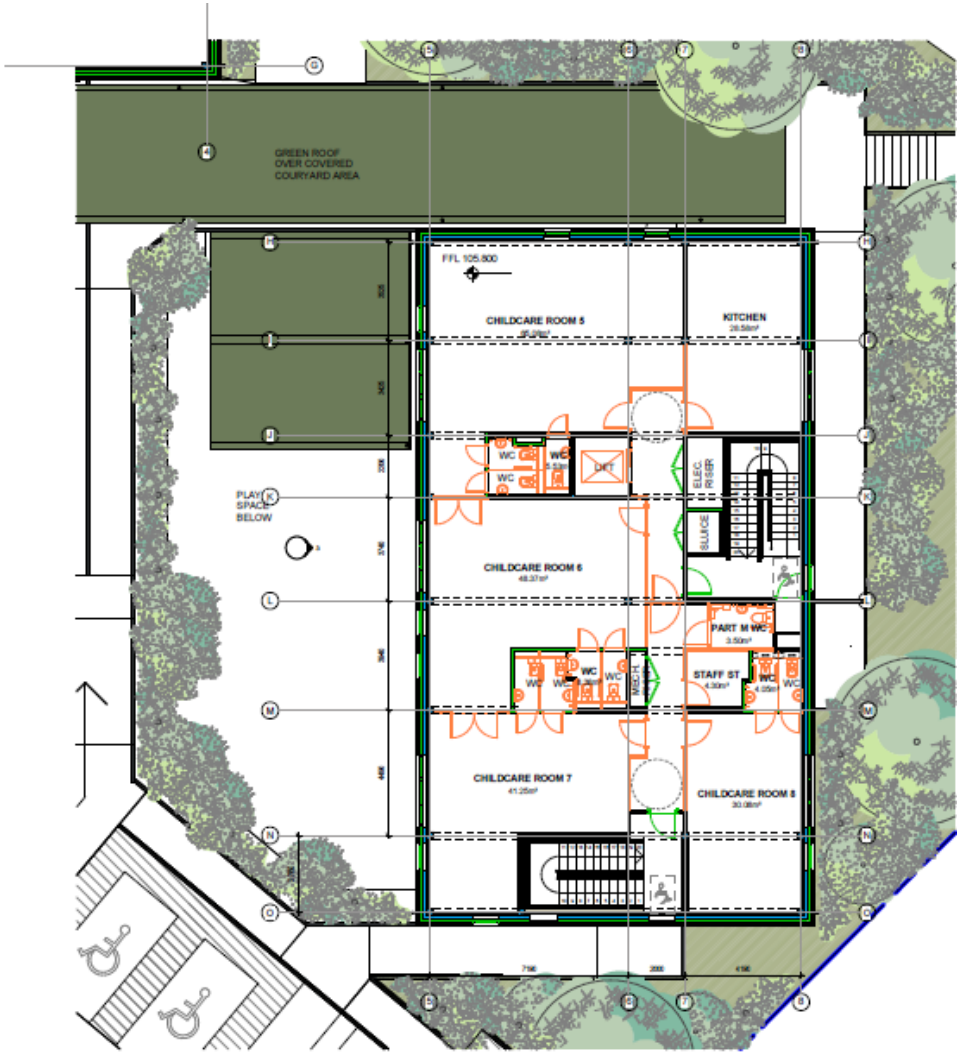






CRECHE LAYOUTS

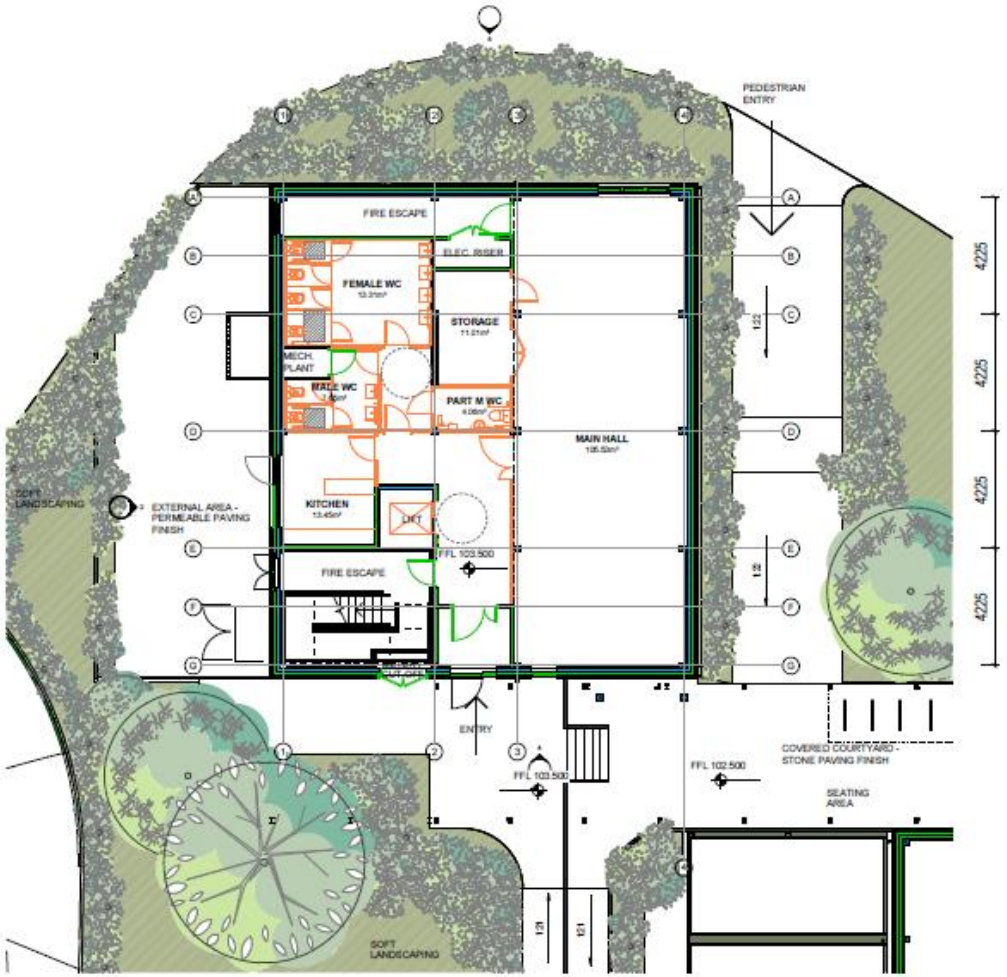
00 Creche Ground Floor - Tenant / Landlord
1 : 100



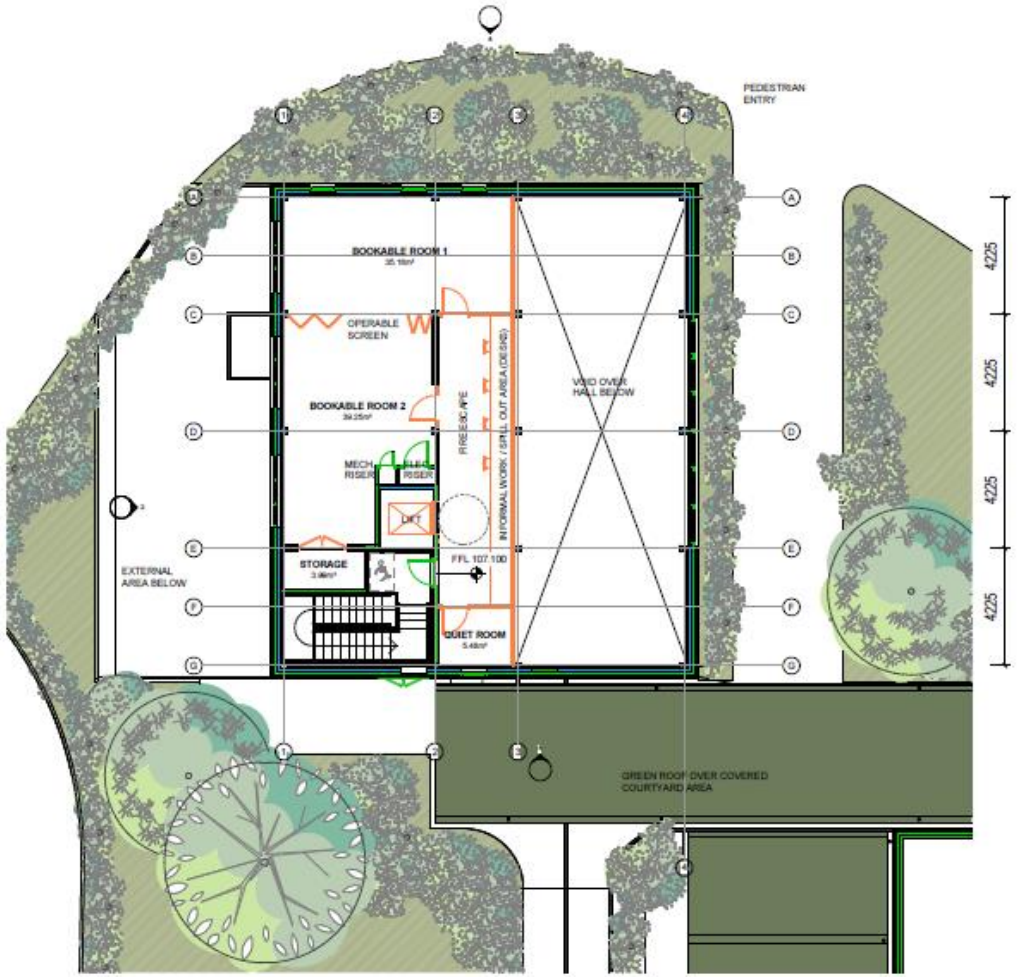
01 Creche Level 01 - Tenant / Landlord
1 : 100

CRECHE SECTIONS

COMMUNITY CENTRE LAYOUTS

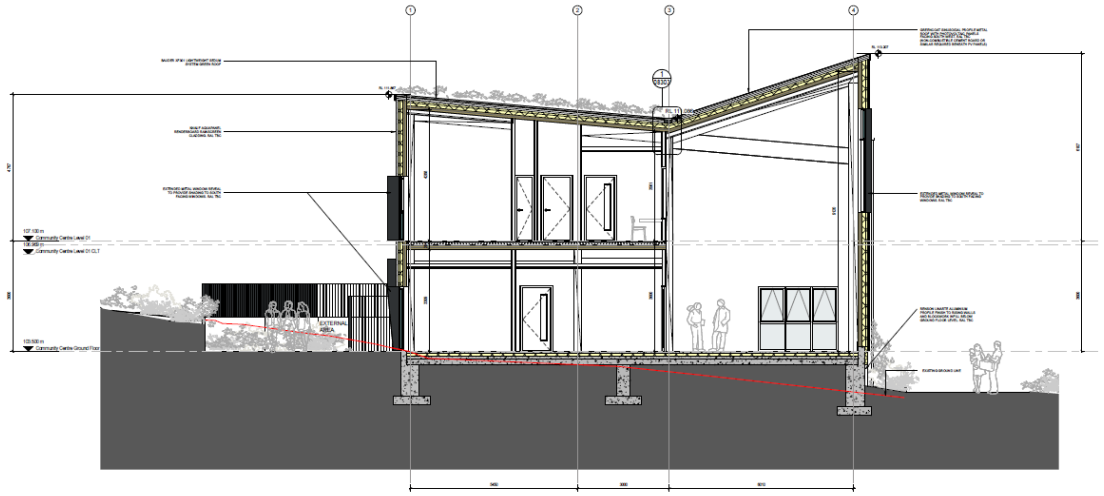


00 Community Centre Ground Floor - Tenant / Landlord
1 : 100

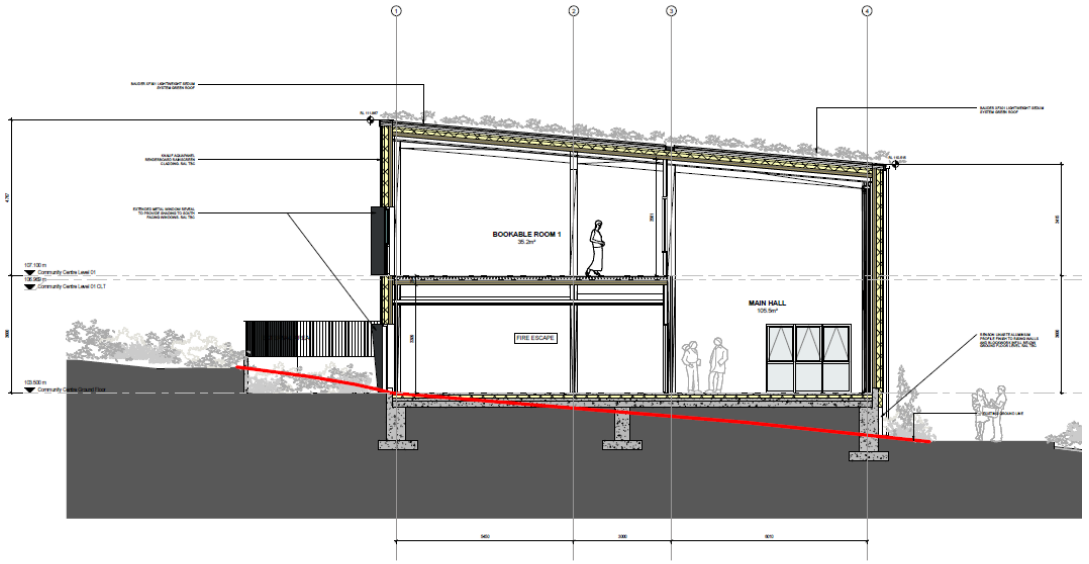


01 Community Centre Level 01 - Tenant / Landlord
1 : 100

COMMUNITY CENTRE SECTIONS

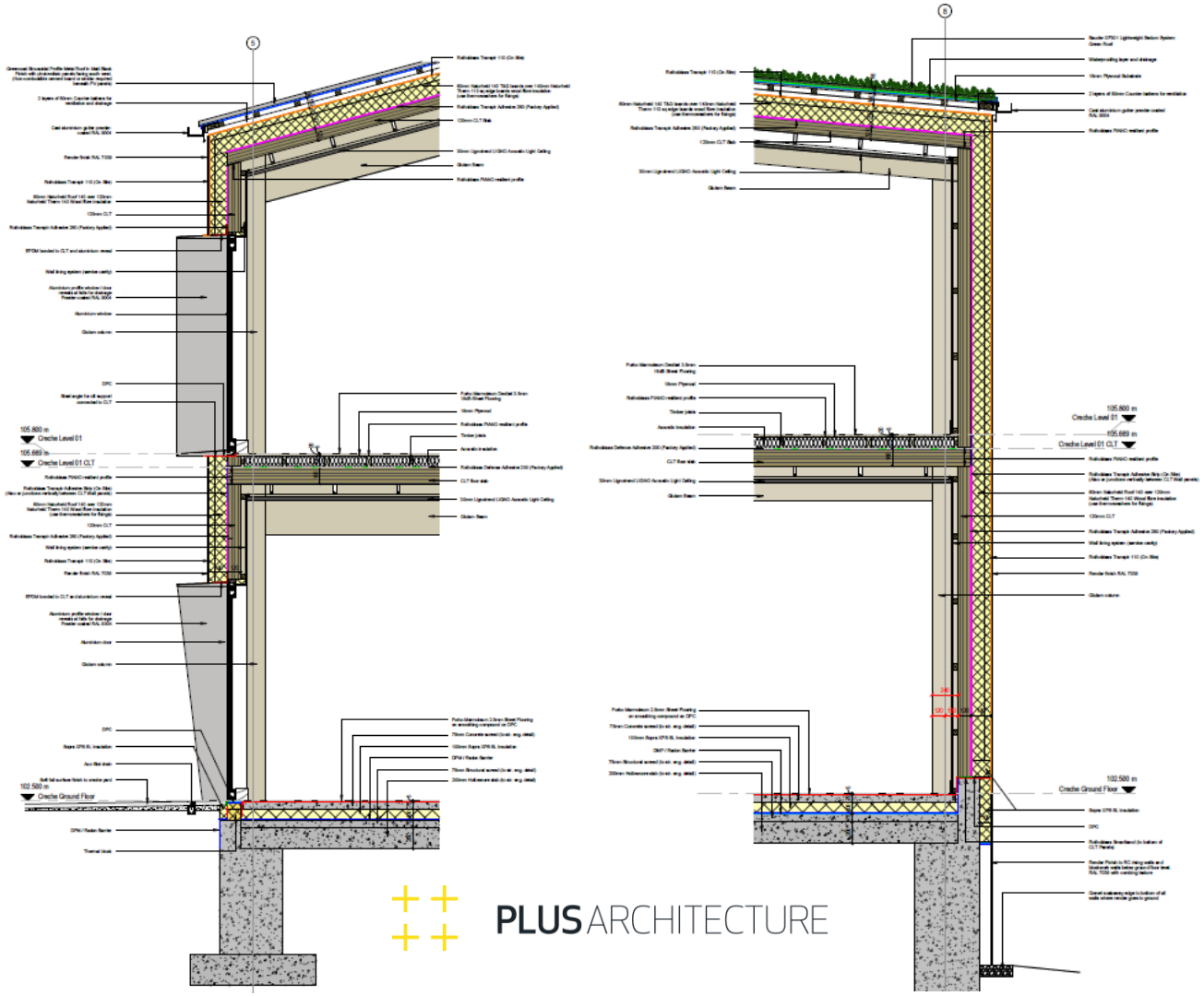


A Community Centre Section A
1 : 50



B Community Centre Section B
1 : 50

EMBODIED CARBON ASPIRATIONS

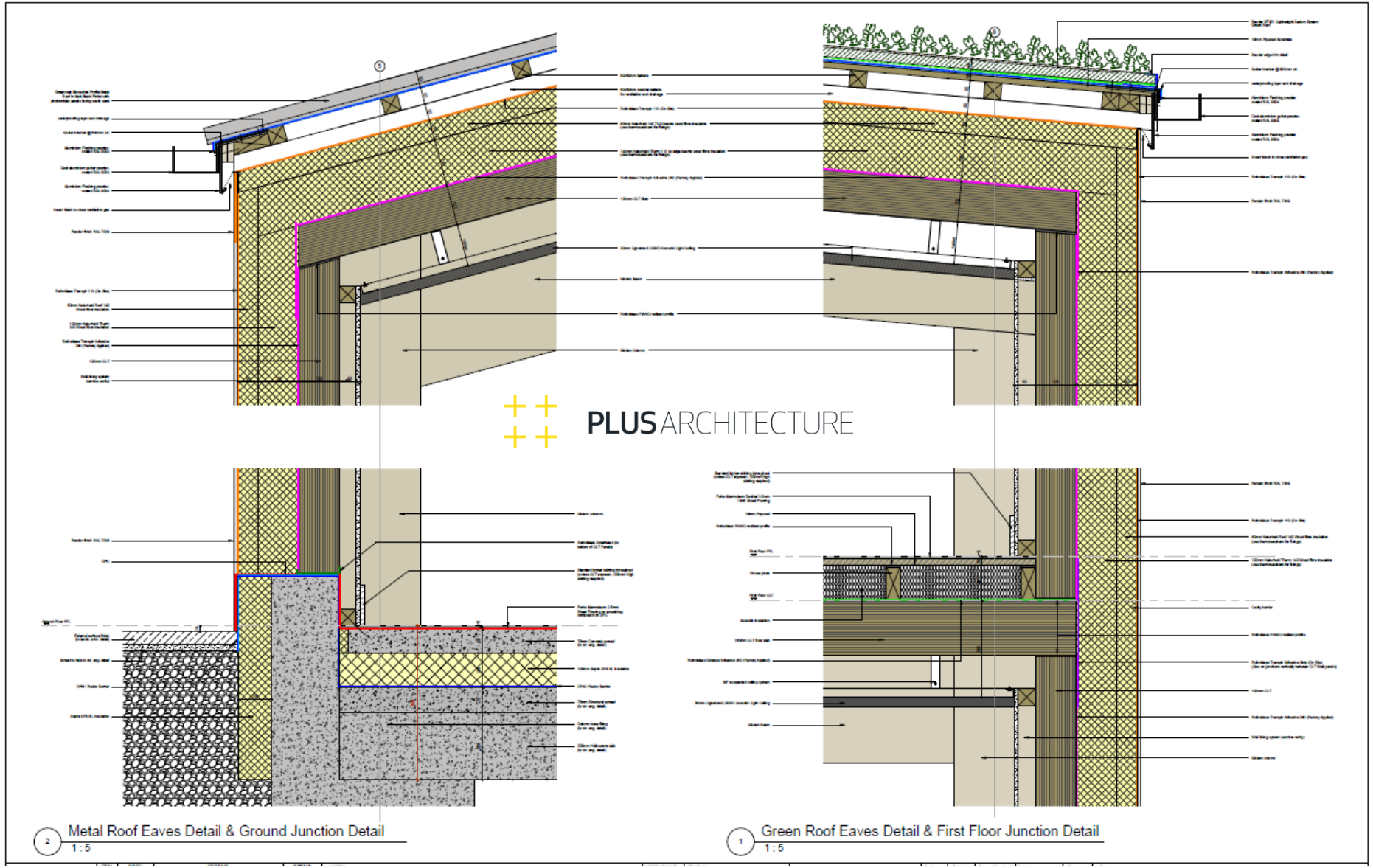


❖ **TARGET – NET ZERO CARBON**

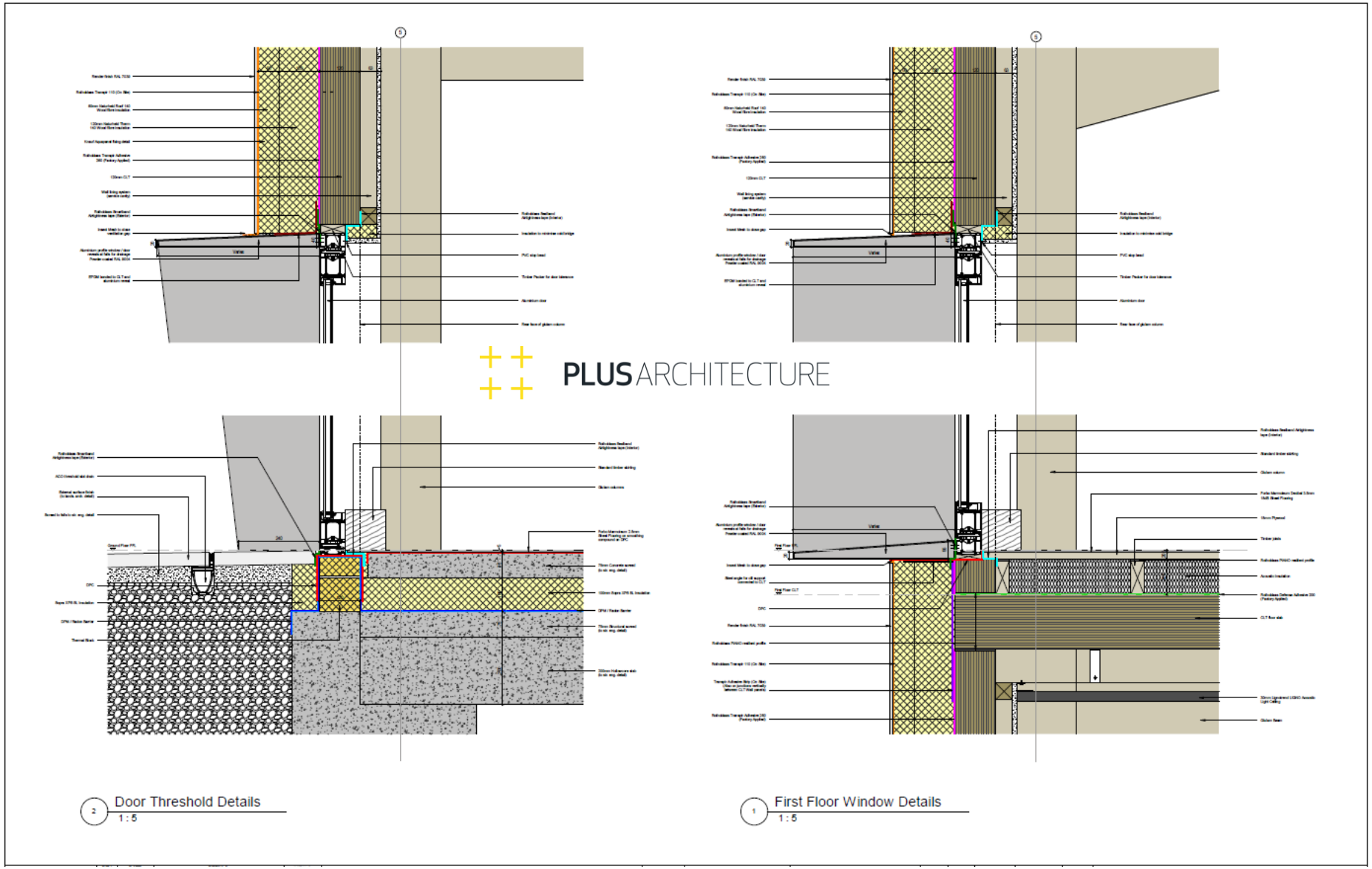
A ‘Net Zero Whole Life Carbon’ building does not exceed local targets for operational energy use or embodied carbon; such that the sum total Global Warming Potential for all cradle to grave life cycle stages are less than or equal to zero, where residual carbon is compensated for via renewable energy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

IGBC
IRISH GREEN BUILDING COUNCIL

DETAILED STUDY OF CONSTRUCTION METHODOLOGY - 1

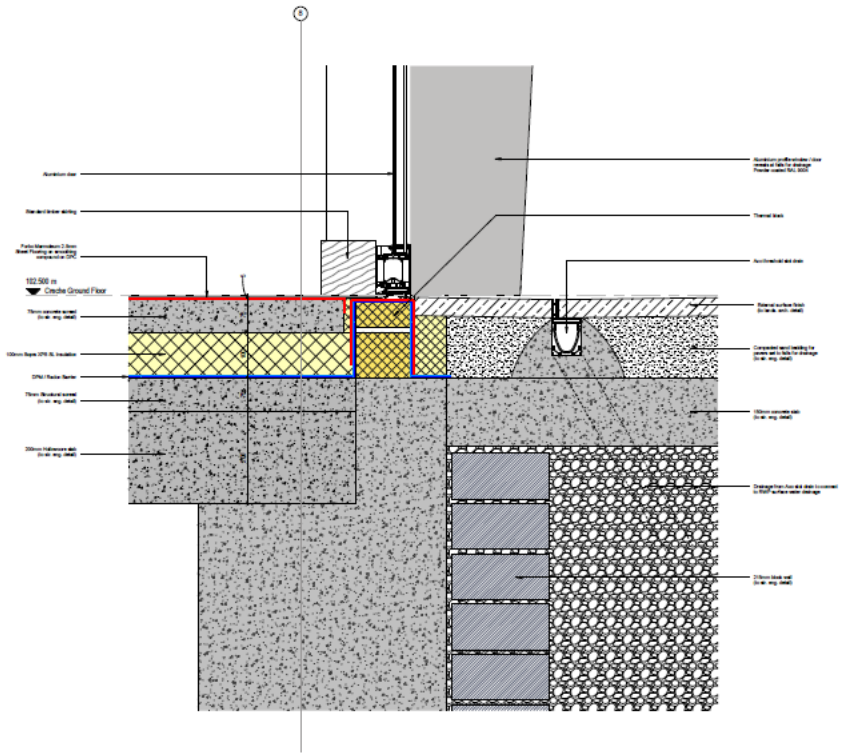


DETAILED STUDY OF CONSTRUCTION METHODOLOGY - 2



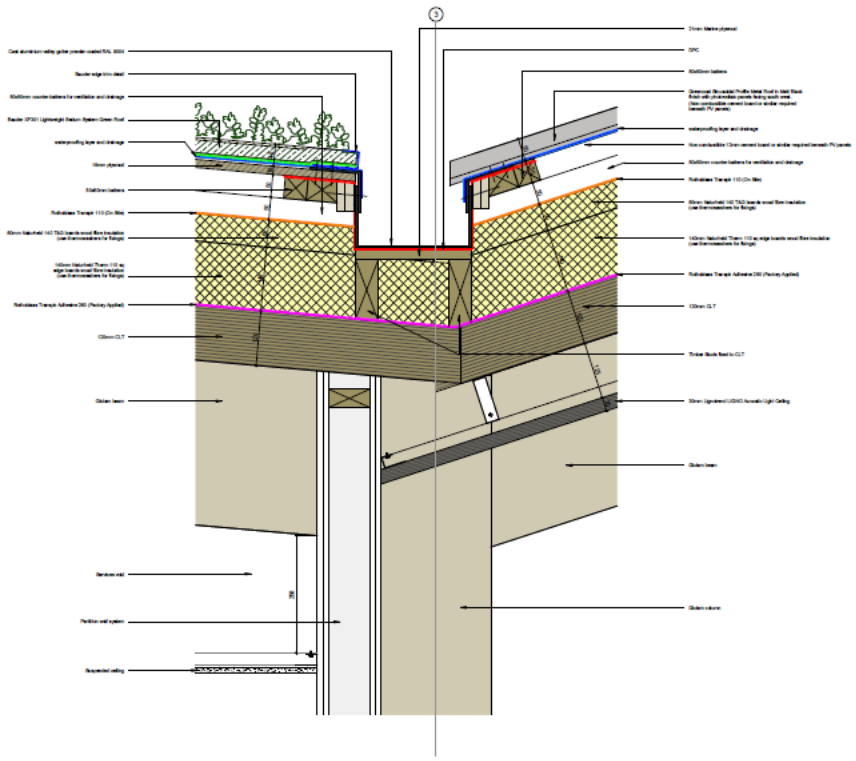
DETAILED STUDY OF CONSTRUCTION METHODOLOGY - 3

PLUS ARCHITECTURE



2 Door Threshold Detail with External Slab
1 : 5

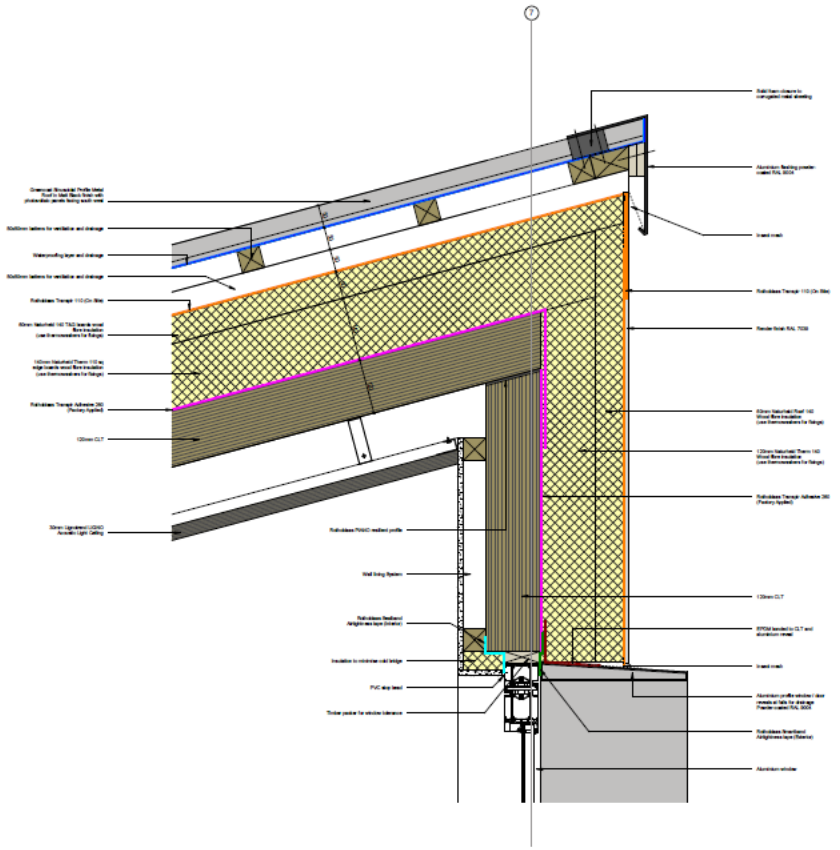
Note: Applicable to Numbers W.CR.00_16 , W.CR.00_17 , W.CR.00_18



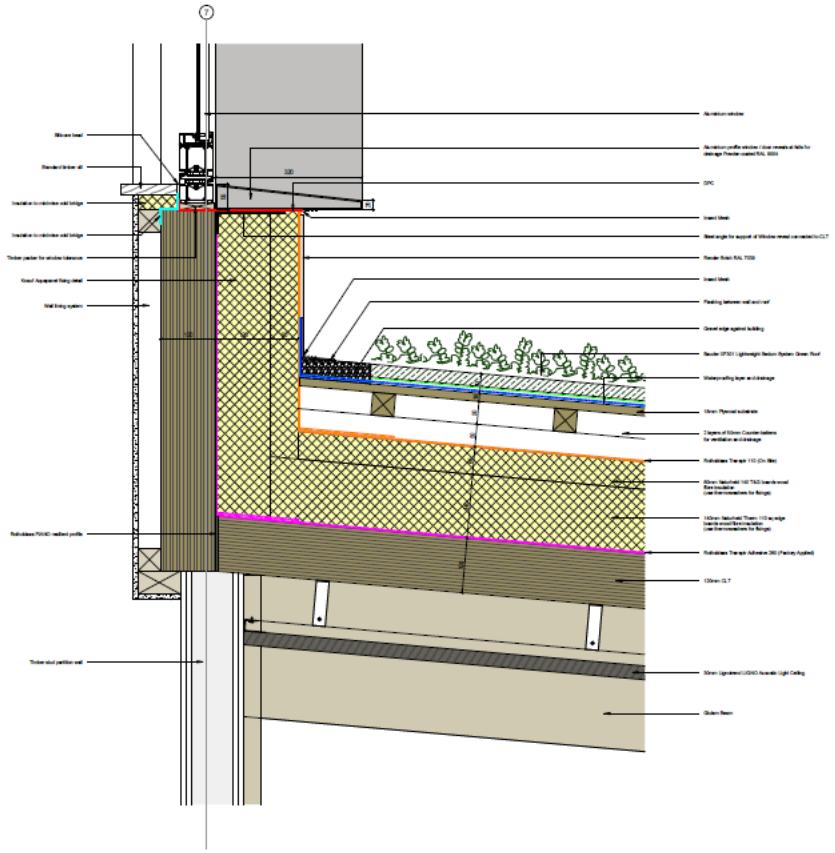
1 Community Centre Valley Detail
1 : 5

DETAILED STUDY OF CONSTRUCTION METHODOLOGY - 4

PLUS ARCHITECTURE



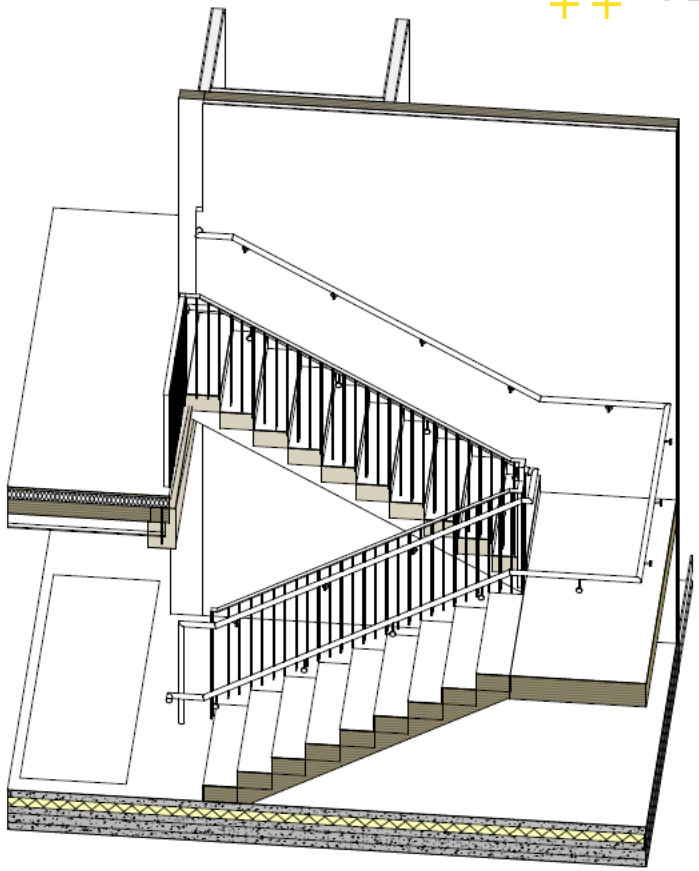
1 Metal Roof Ridge
1 : 5



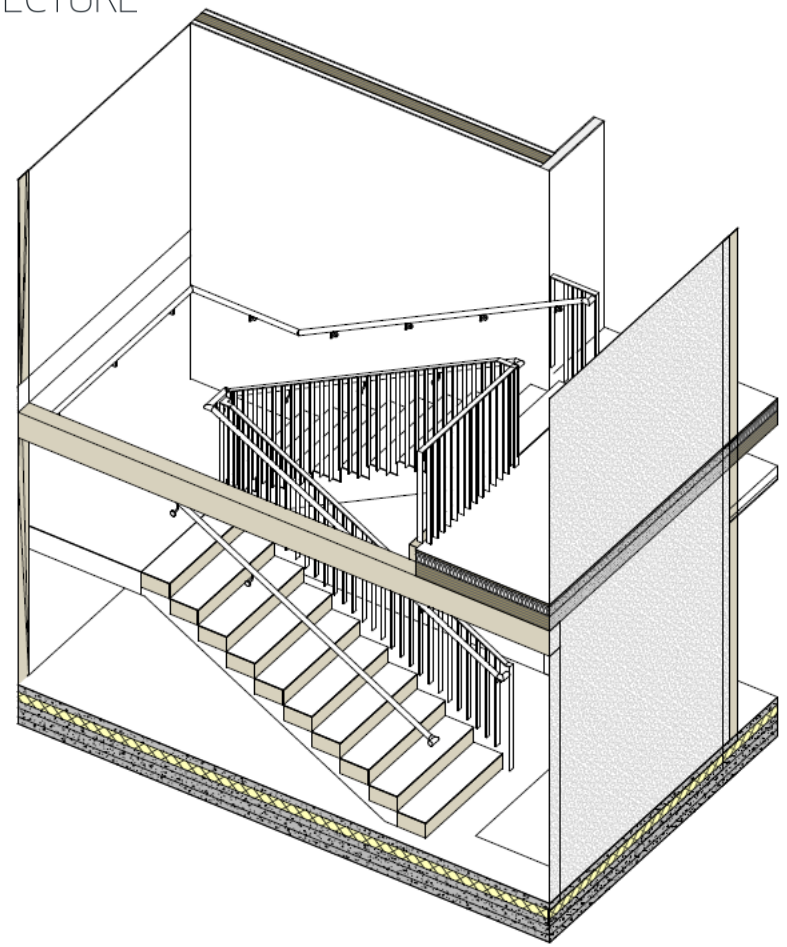
2 Creche Green Roof Top Junction
1 : 5

DETAILED STUDY OF CONSTRUCTION METHODOLOGY - 5

PLUS ARCHITECTURE

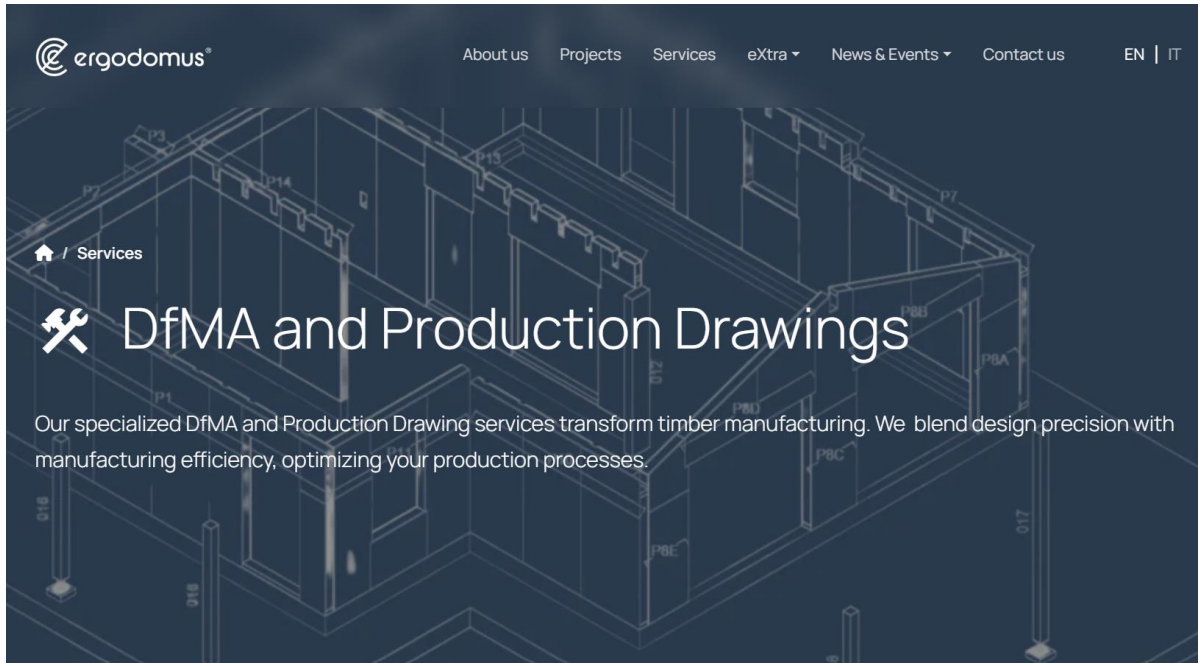


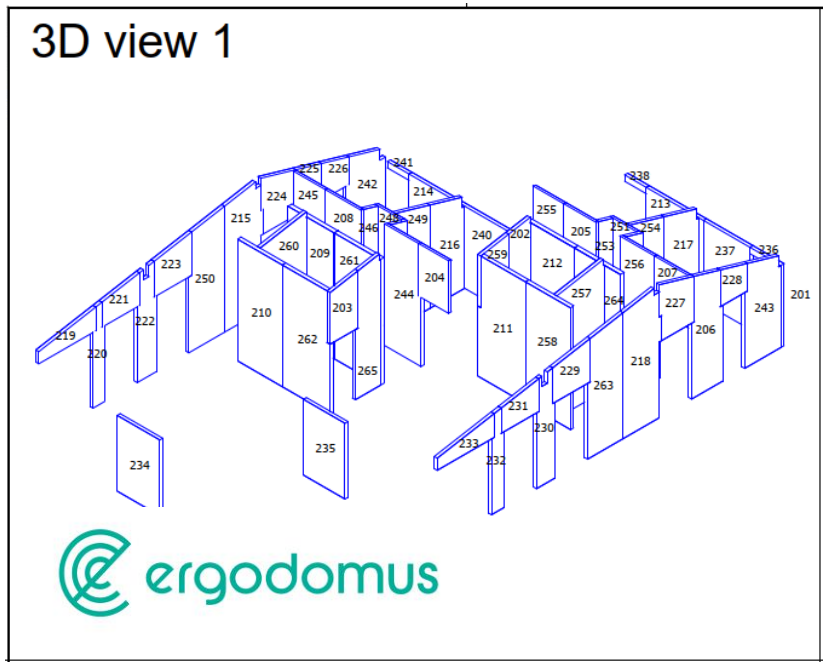
1 Creche Stair 1

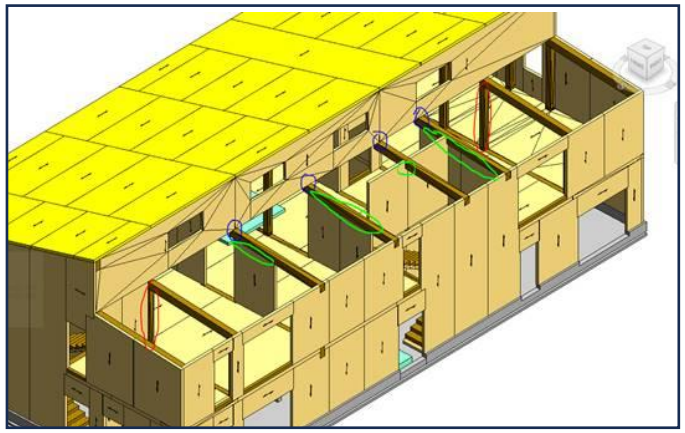


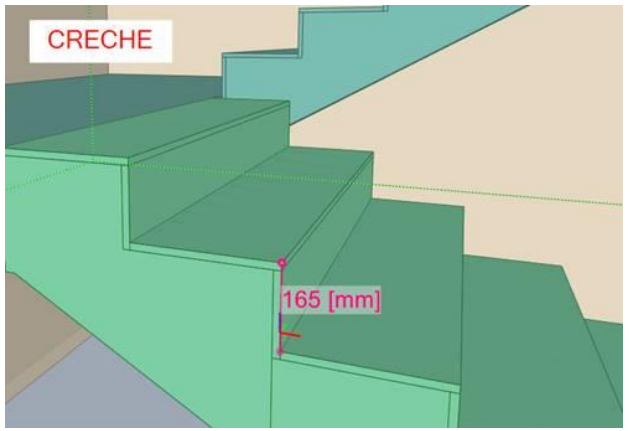
2 Creche Stair 2

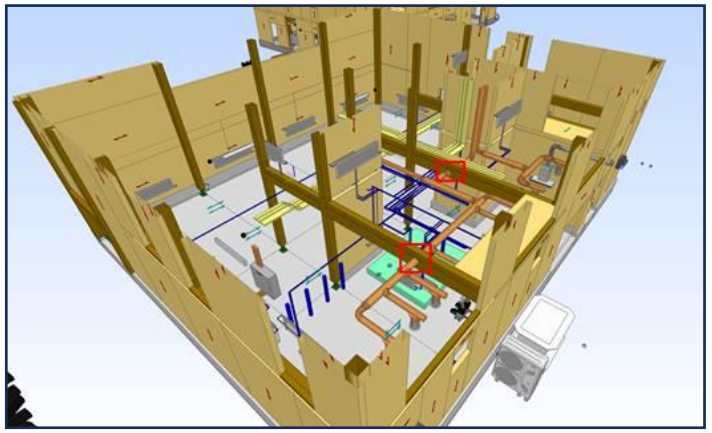
SPECIALIST TIMBER ENGINEERING EXPERTISE



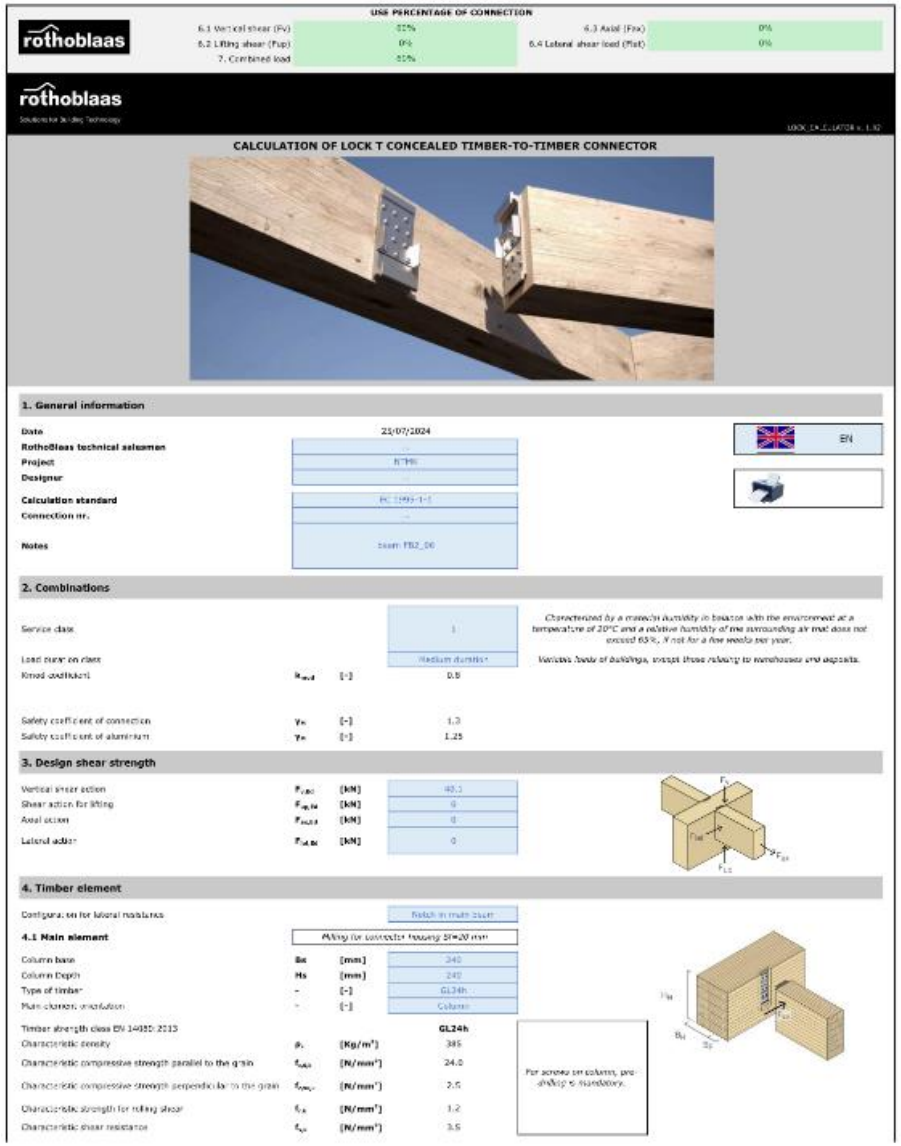




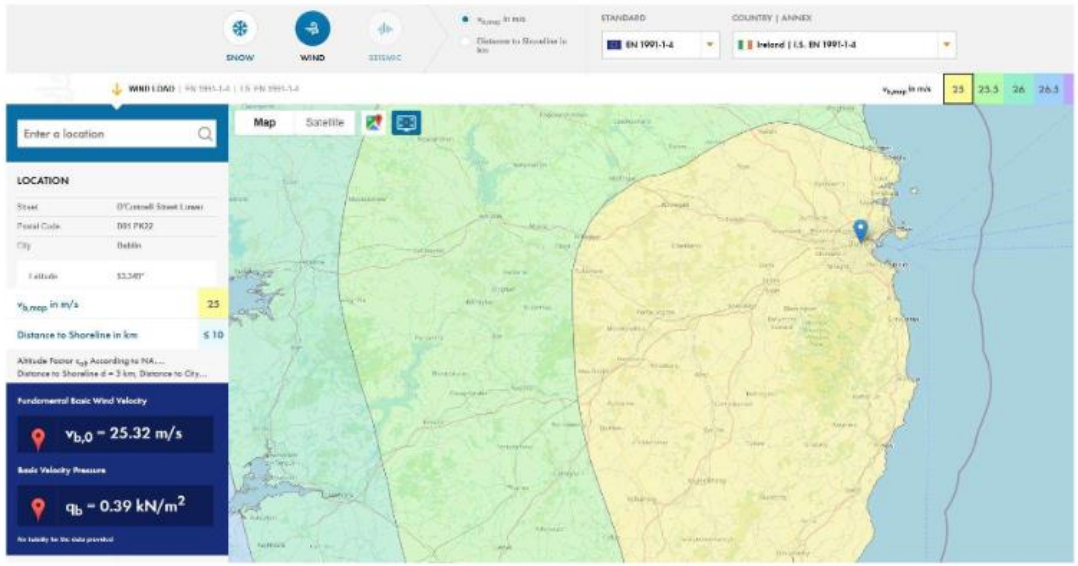


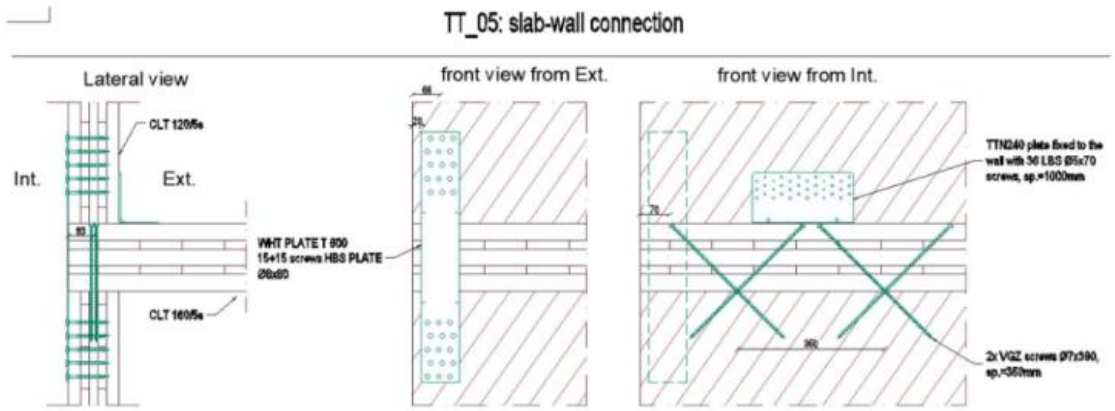


ENGINEERED STRUCTURAL ANALYSIS - 1

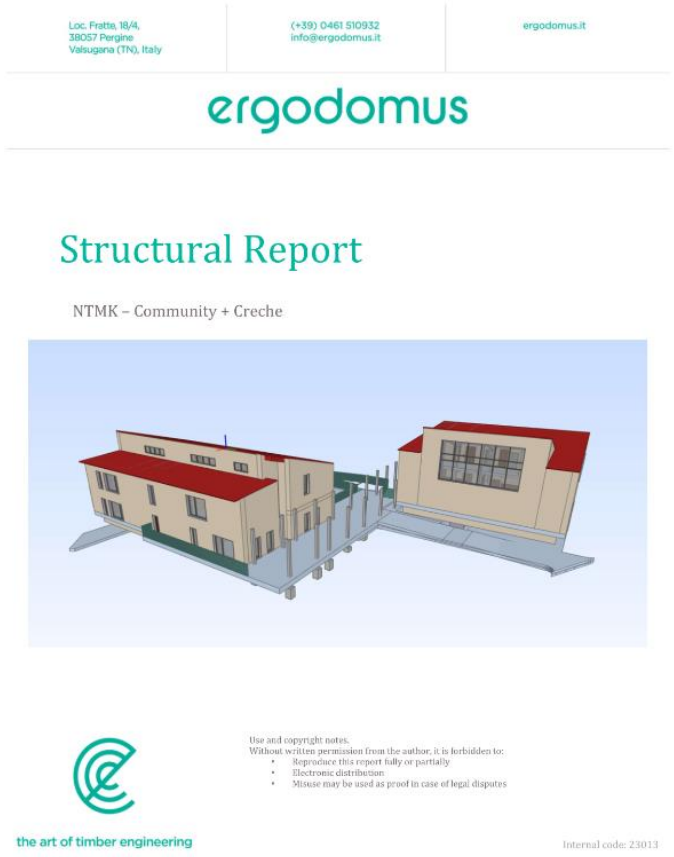


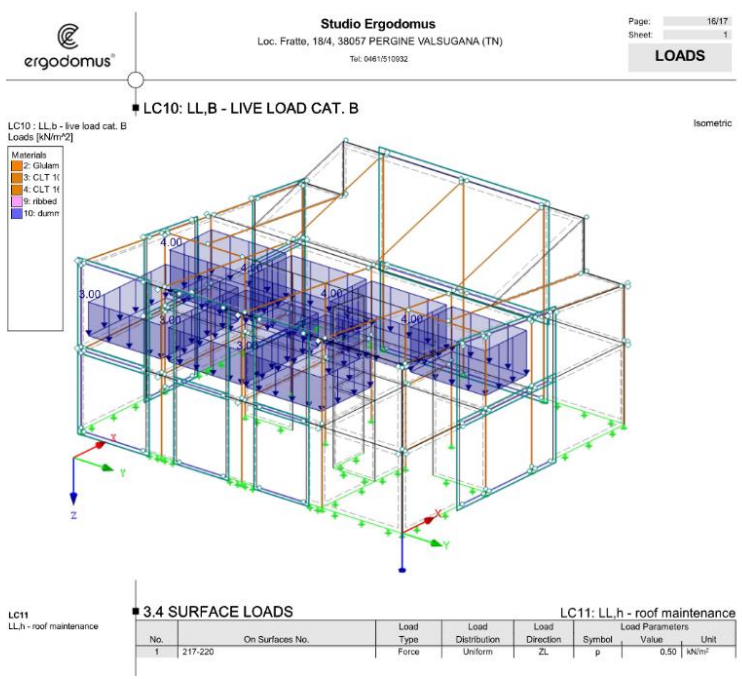
Horizontal Wind Load

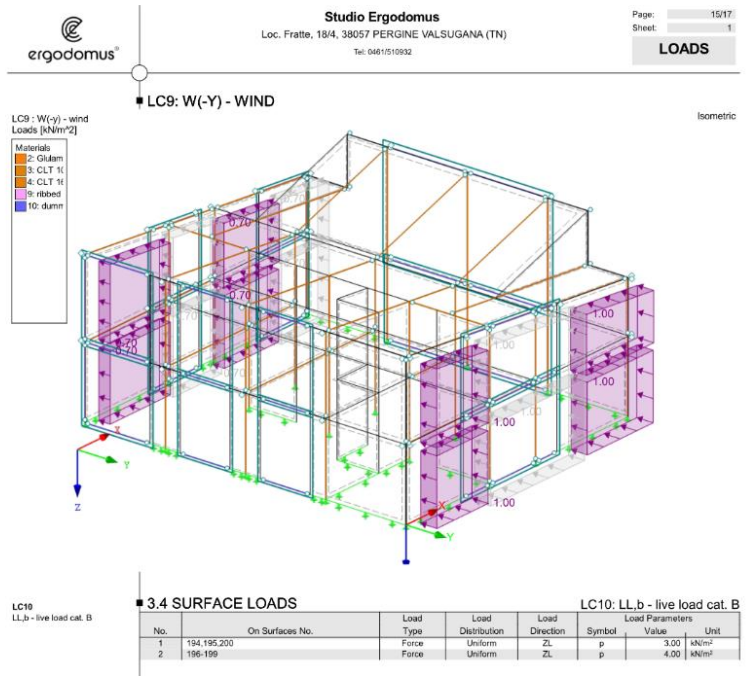




ENGINEERED TIMBER STRUCTURAL ANALYSIS - 2







ERGODOMUS - STRUCTURAL TIMBER REPORT(233 pages)

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 sound-proofing 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.

DIAMETER [mm]	3 (3,5) 12 12
LENGTH [mm]	12 (30) 1000 1000
SERVICE CLASS	SC1 SC2
ATMOSPHERIC CORROSIVITY	C1 C2
WOOD CORROSIVITY	T1 T2
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.

rothoblaas
Solutions for Building Technology

MOISTURE MANAGEMENT PRINCIPLES

The Mass Timber Insurance Playbook:

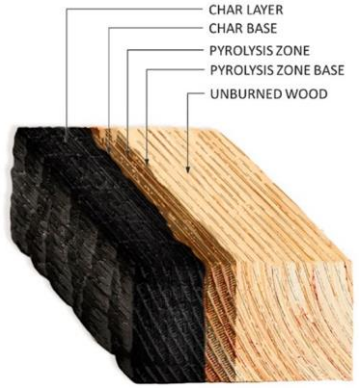
A guide to insuring mass timber buildings

ASBP The Alliance for Sustainable Building Products

Co-authored by Philip Callow and Jim Glockling. 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

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