XYLO – The UK’s Largest* All-Timber** Structure

Andy Heyne, 07 October 2026



Team and Timeline

Project Team

GLOBAL HOLDINGS Management Group

Piercy&Company

MAX FORDHAM

HEYNE TILLETT STEEL

MAZE FIRE CONSULTING

IGNIS

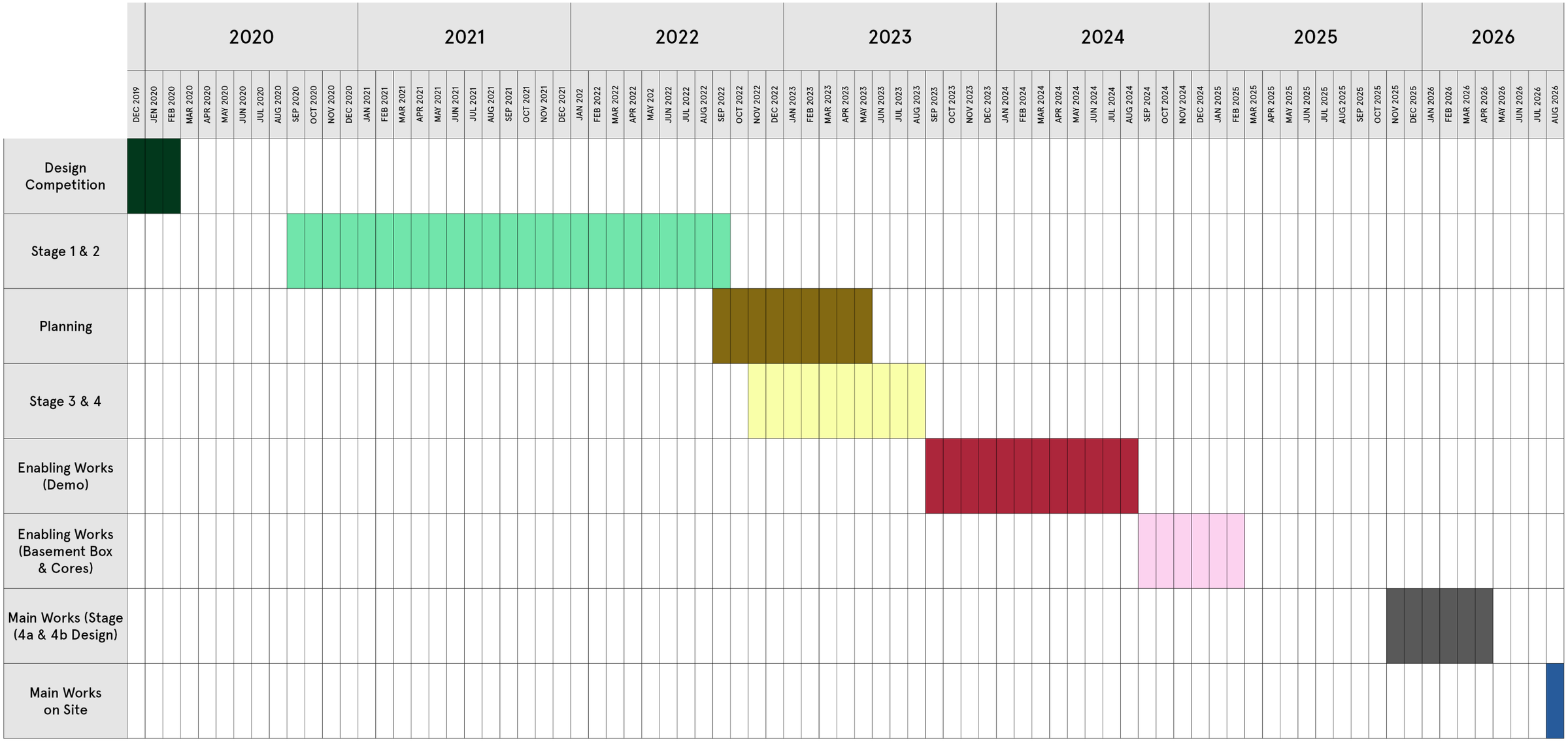
Eckersley O'Callaghan

McLAREN CONSTRUCTION

HYBRID STRUCTURES

decomo architectural precast concrete

Project Timeline



Concept Design

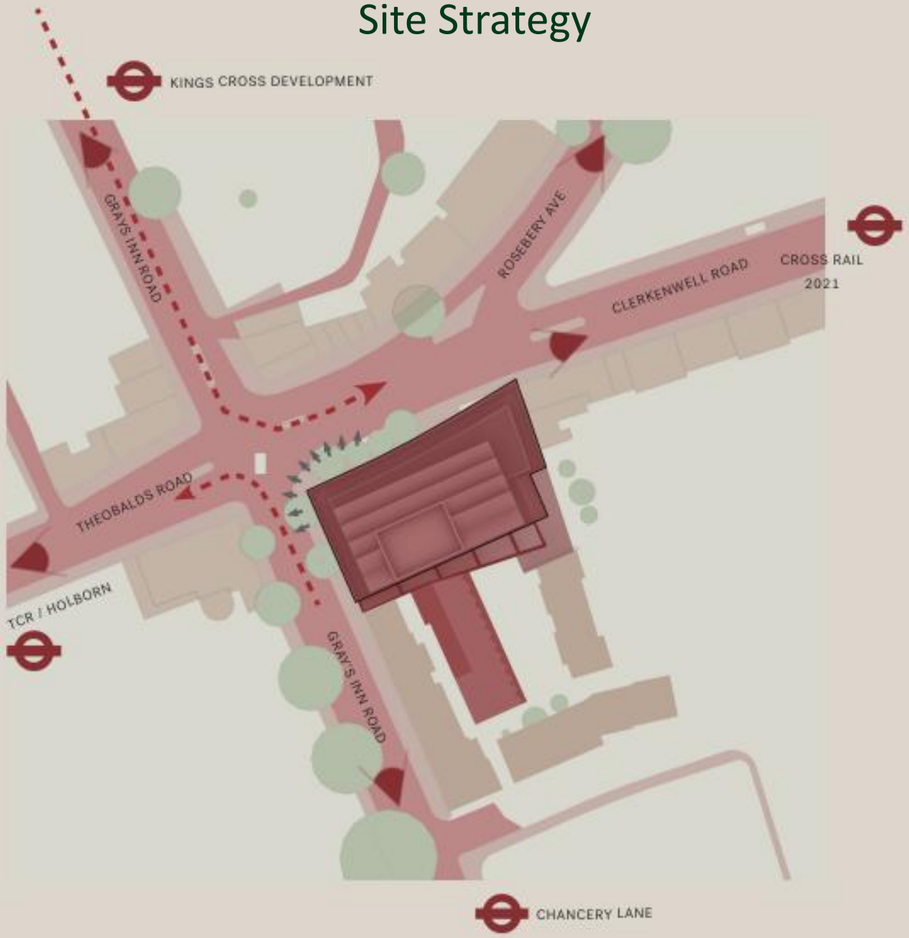
Competition [existing site]

Site History



HOLBORN TOWN HALL
1879.
Later Primitive Methodist Church Headquarters (1908)

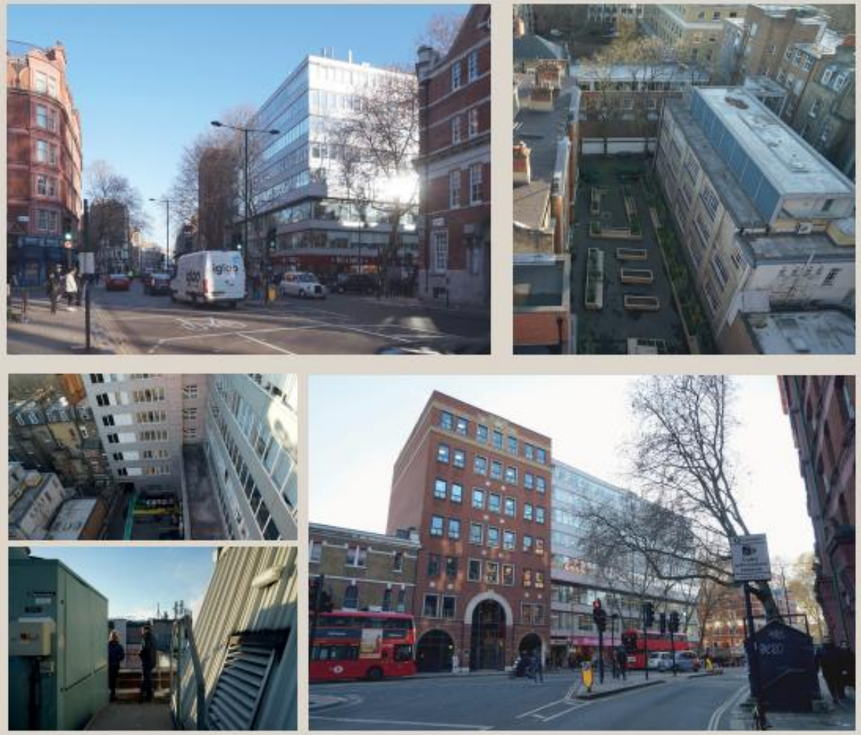
Site Strategy



SITE PLAN
The site sits at the junction of Clerkenwell Road and Gray's Inn Road.
In this highly visible connection the proposed building has the potential to act as a destination.

Competition [existing buildings]

Existing Buildings



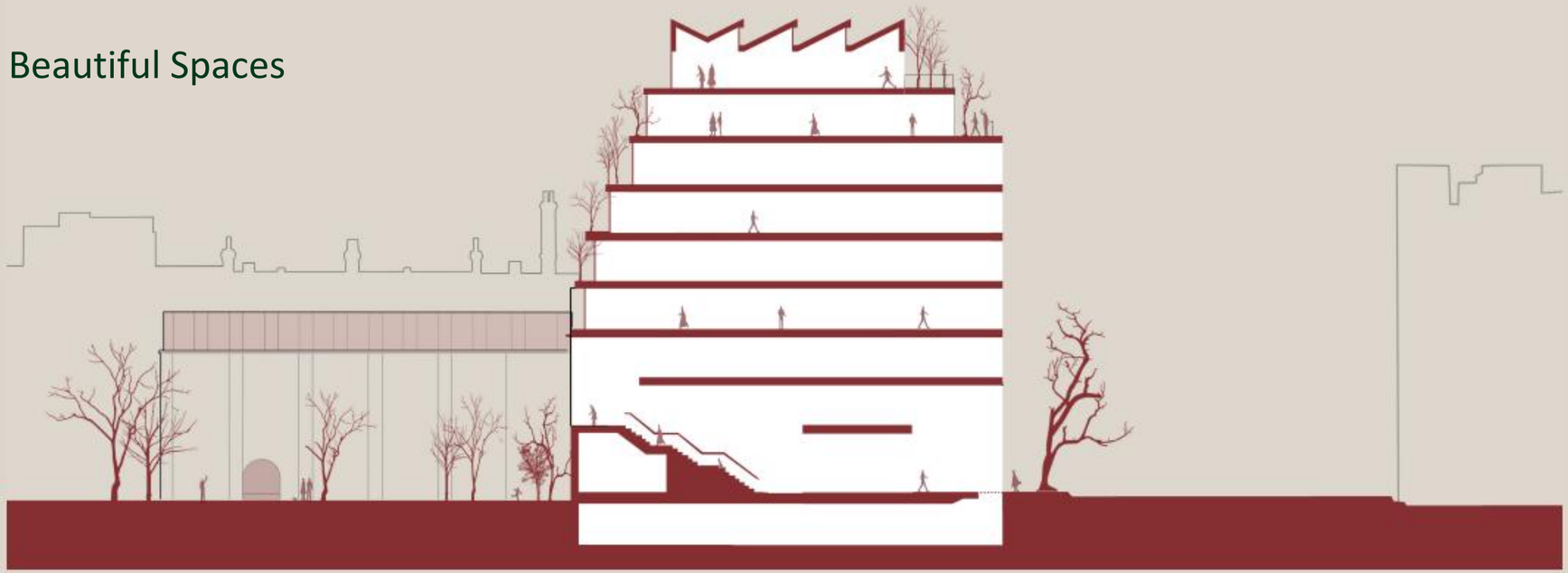
SITE PHOTOS
Of 100 & 88 Gray's Inn Road and 127 Clerkenwell Road

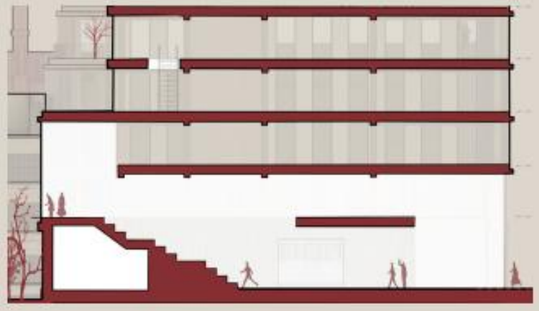


ANALYSIS
Structural Analysis of Existing Building

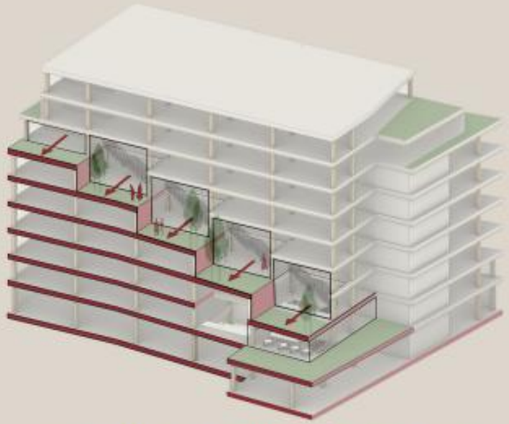
Competition [design features]

Beautiful Spaces

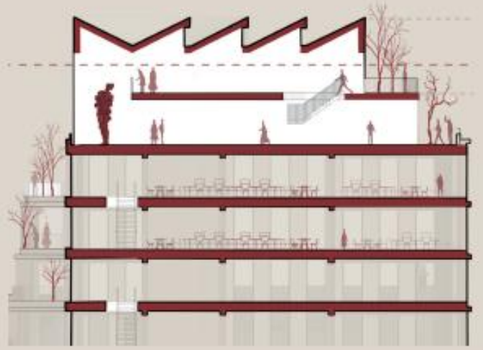




DESTINATIONS/ VENUE / CIVIC SPACE



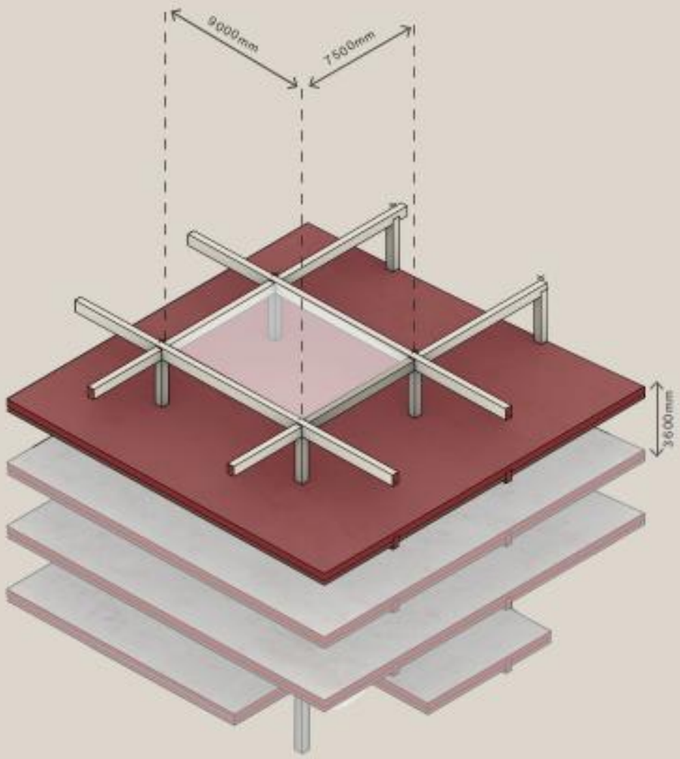
CONNECTED GARDENS & COURTYARDS



LOFTS / LIGHT / VOLUME

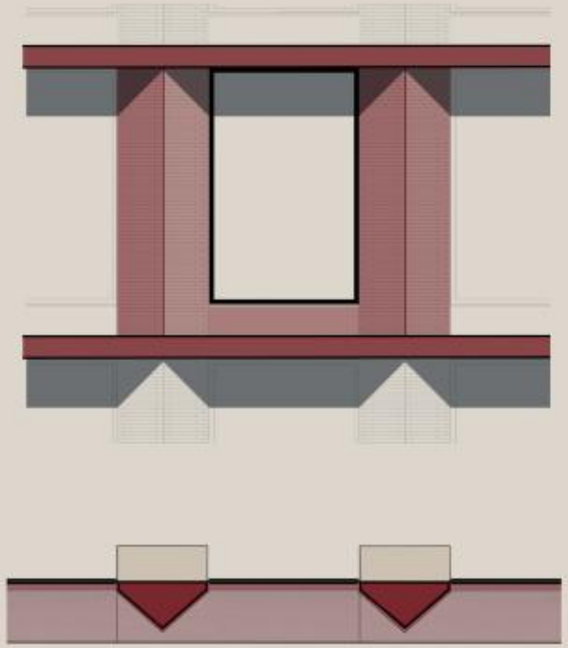
Competition [design features]

Lean, Green and Efficient



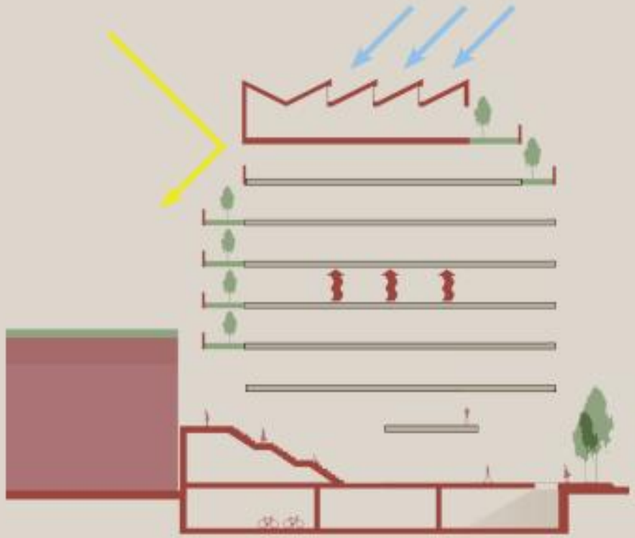
STRUCTURE

A 9m x 7.5m structural grid of Glulam beams with Cross Laminated Timber Slabs forms our structural approach. Cross Laminated Timber construction offers an off-site modern method of construction that delivers high levels of efficiency, sustainability, quality of finish and flexibility for occupiers.



FACADE

The proposed facade incorporates self shading and good percentages of solid to glazing to prevent excessive heat gains whilst maintaining good levels of daylight to the interior and good clarity and colour of glazing.
A consistent 3m wide bay means that the main facade could be constructed as brick faced prefabricated panels off-site.

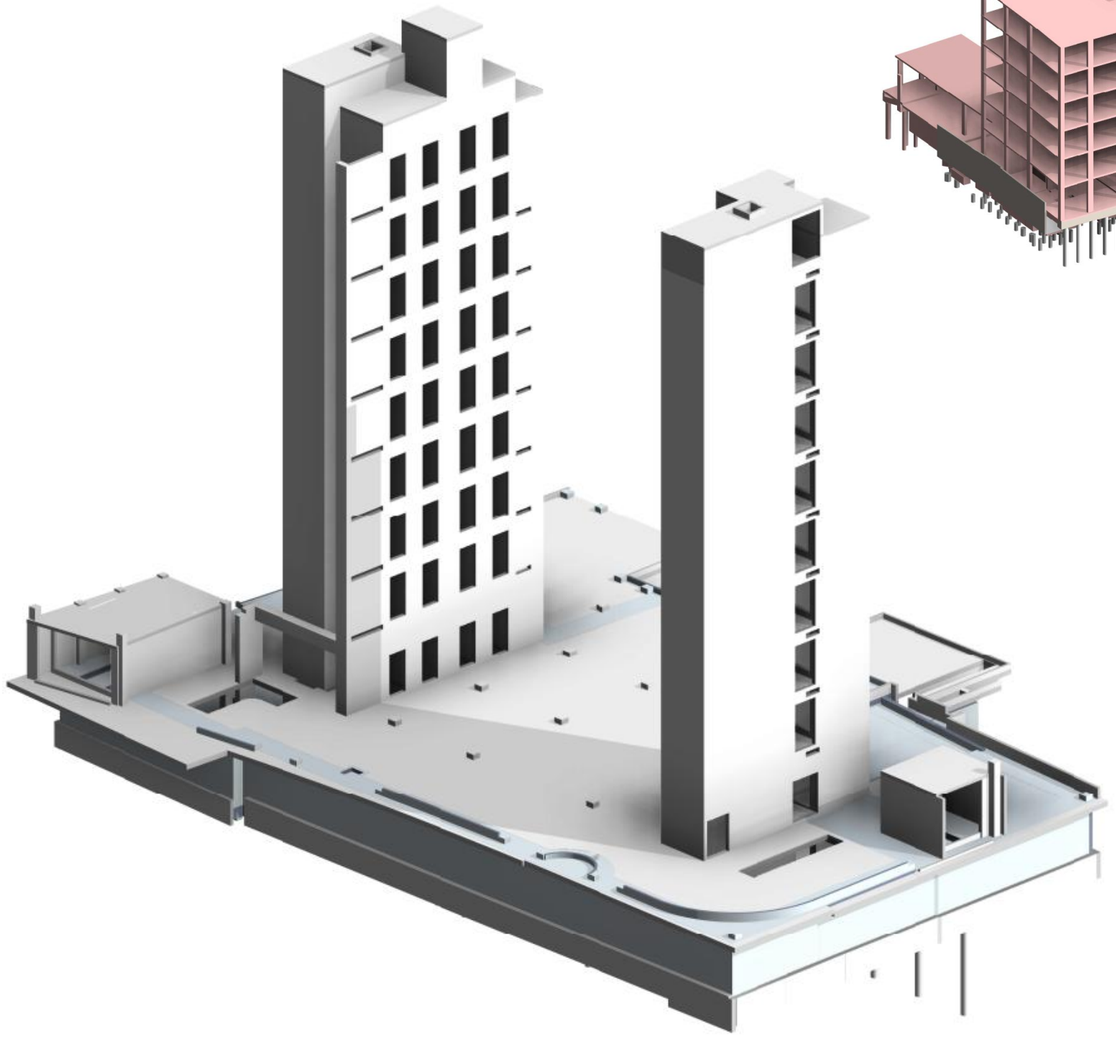


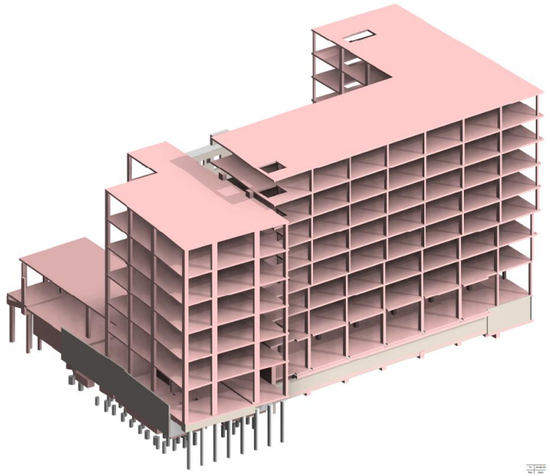
MEPH & WELLNESS

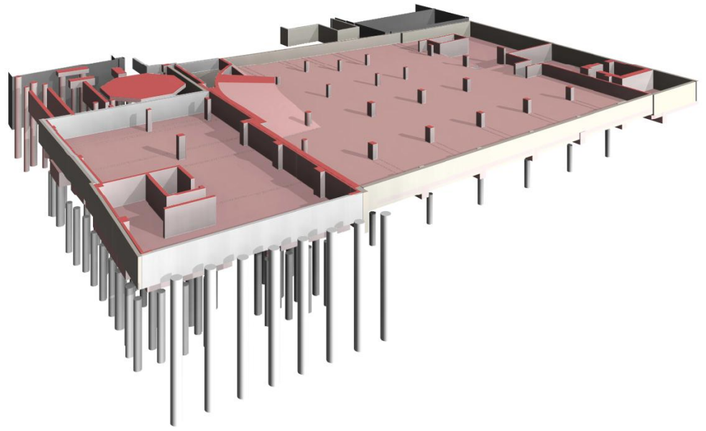
Our proposal incorporates a high performance facade, green and blue roofs, air source heat pumps, external amenity on every floor and a dedicated cycle ramp to the basement to improve user experience.
We are proposing a displacement system due to its sustainability credentials, cost efficiency, flexibility for occupiers and the fact that it creates a soffit clean of services

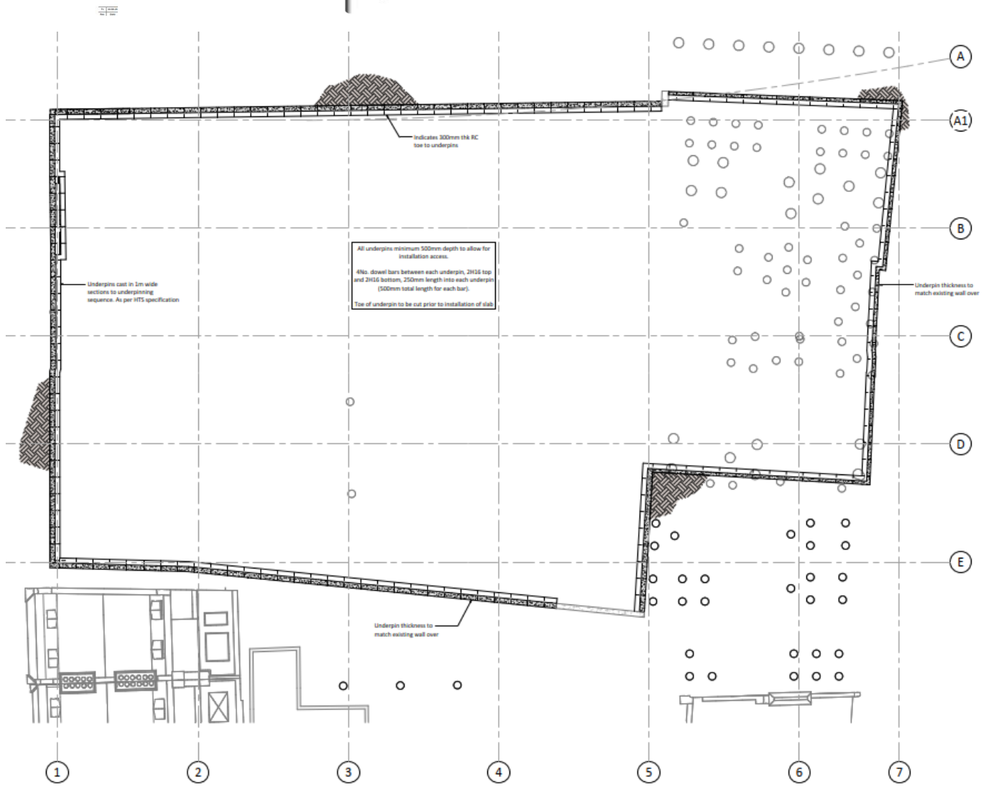
Enabling Works

Enabling Works [scope]

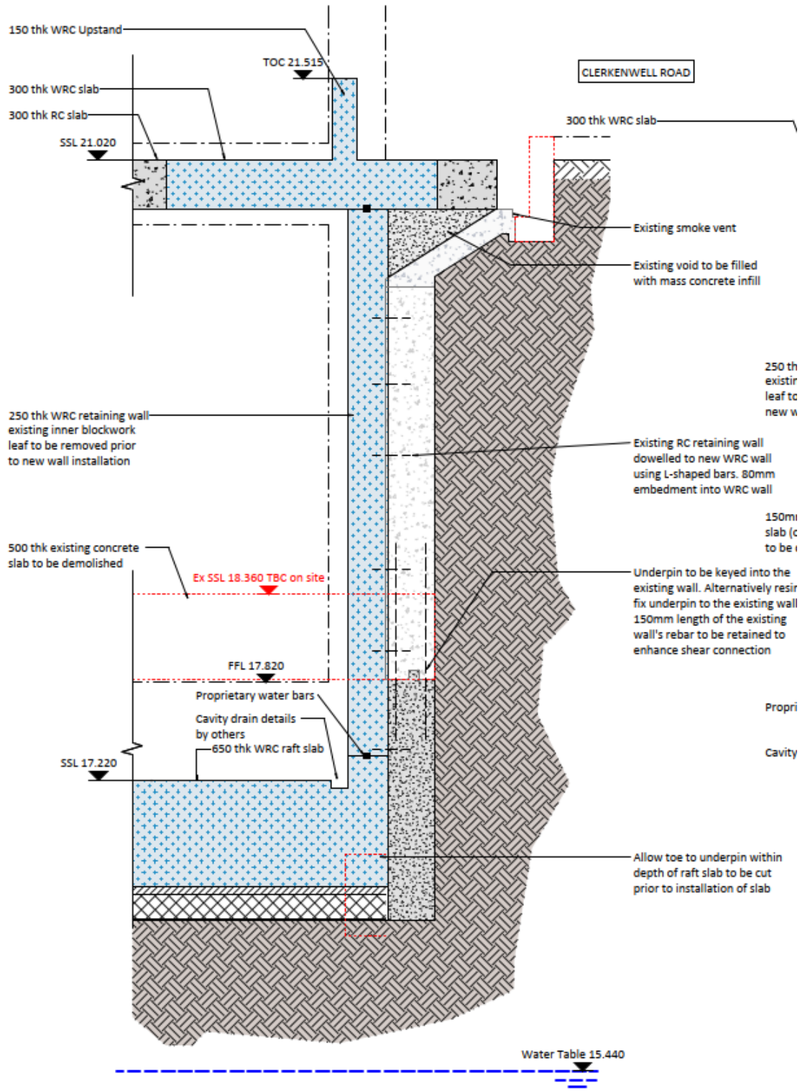


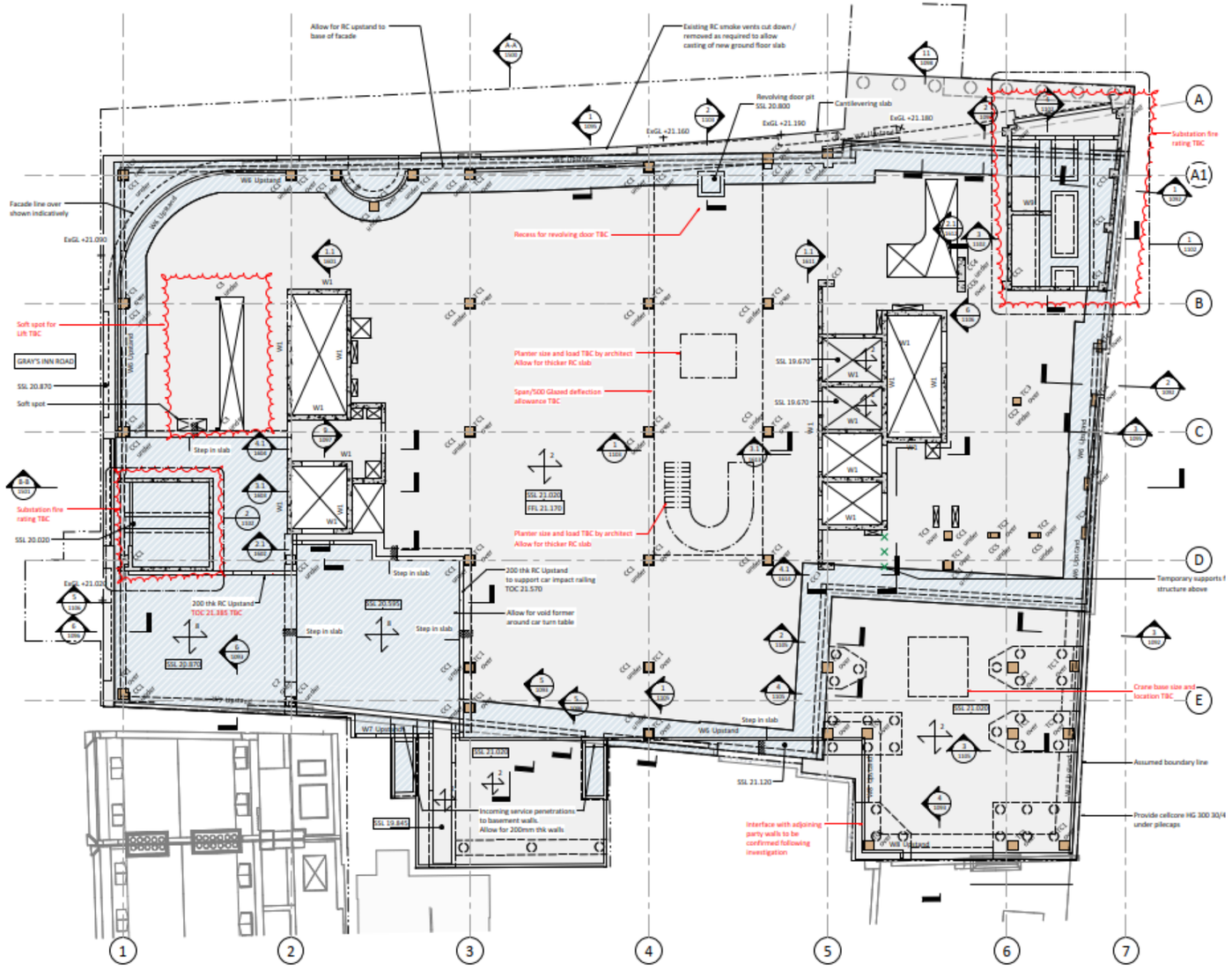




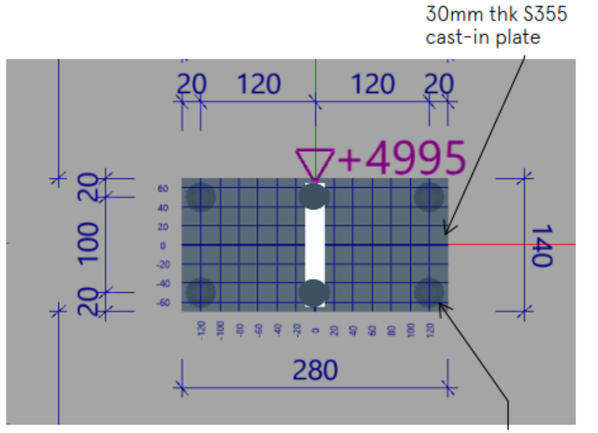


Enabling Works [details]



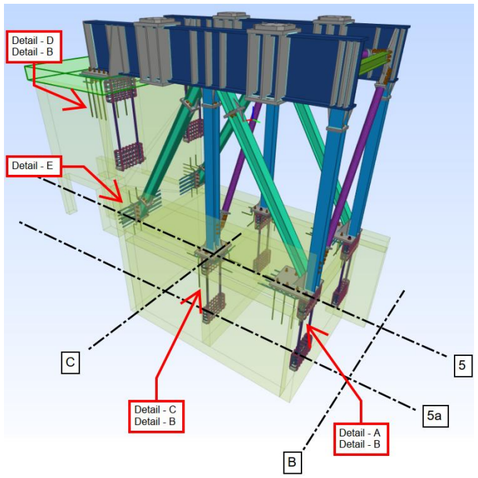


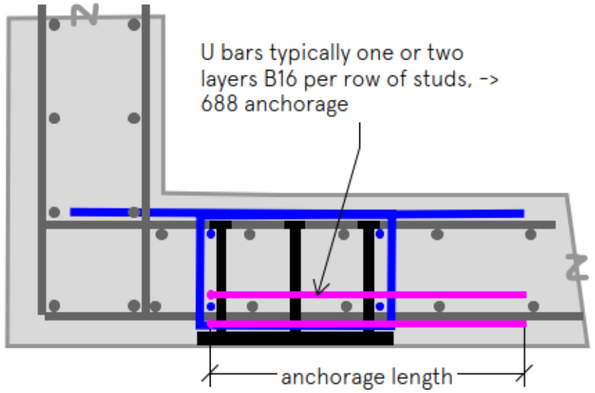
Enabling Works [details]



Standard Type B Plate
Suitable for TB1b





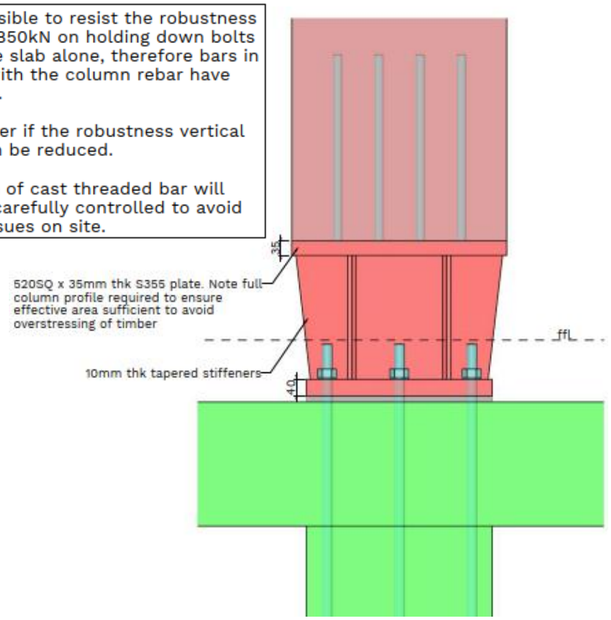


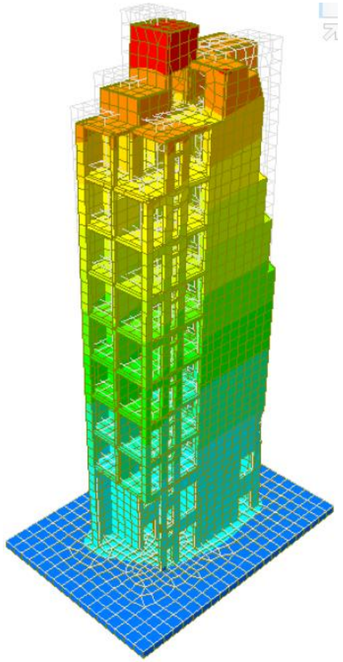
Typical stirrups + horizontal U-bars
reinforcement arrangement - plan
Typically used in proximity to openings
or wall returns

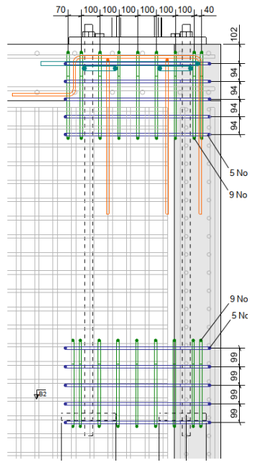
It is not possible to resist the robustness tie force of 850kN on holding down bolts cast into the slab alone, therefore bars in continuity with the column rebar have been shown.

This may alter if the robustness vertical tie force can be reduced.

The position of cast threaded bar will need to be carefully controlled to avoid tolerance issues on site.







Enabling Works [site]

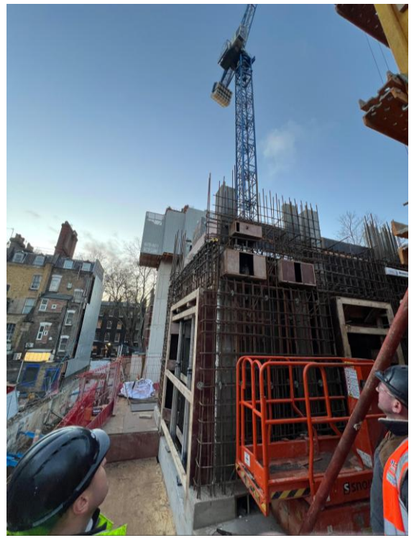






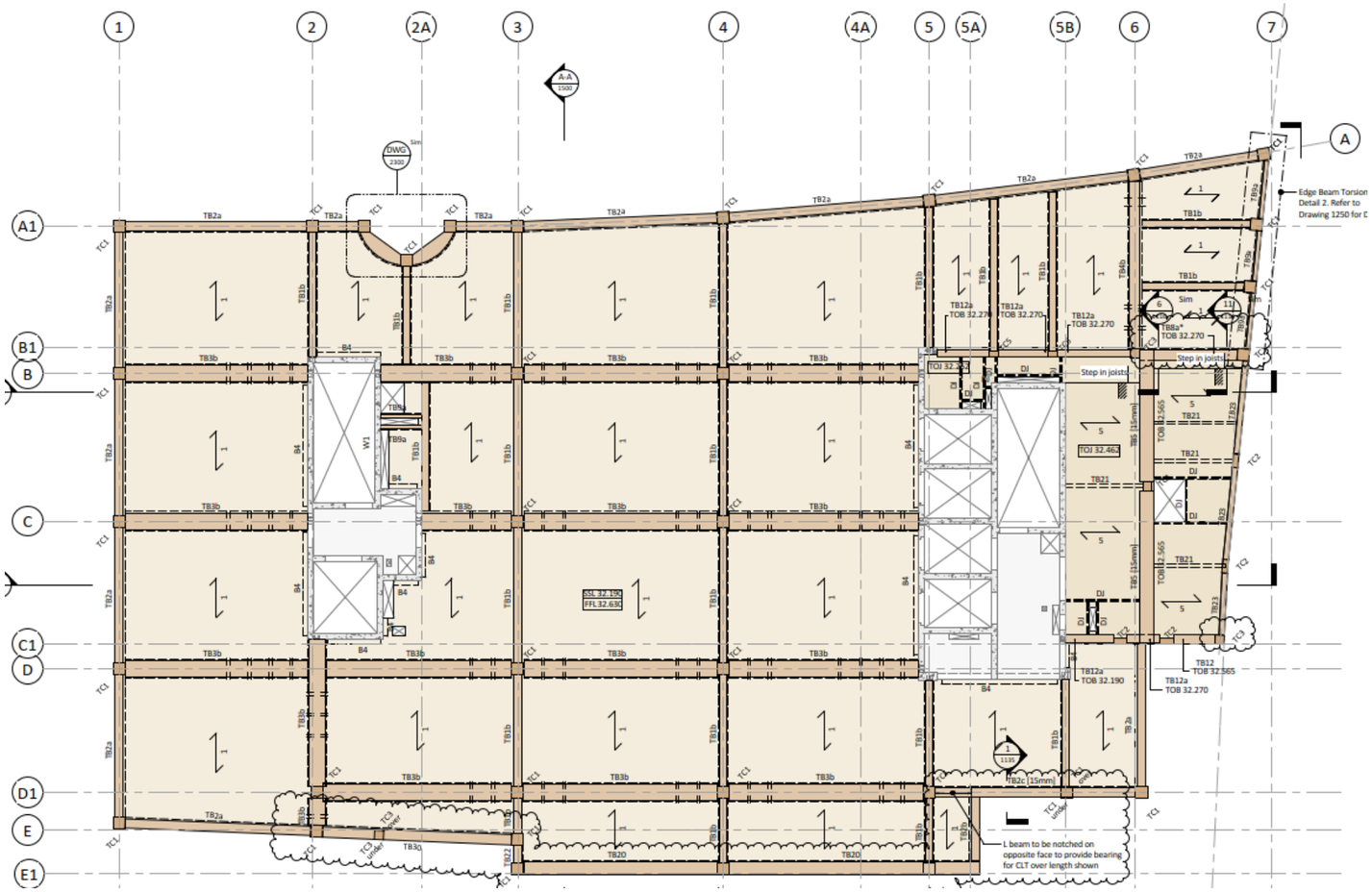


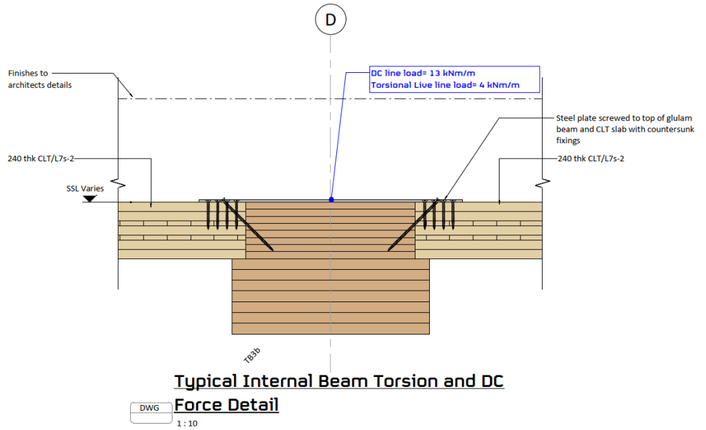




Detailed Design

Detailed Design [typical floor]

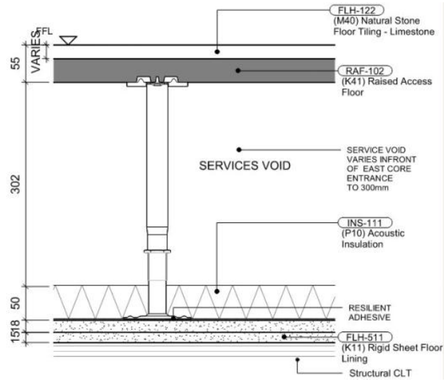


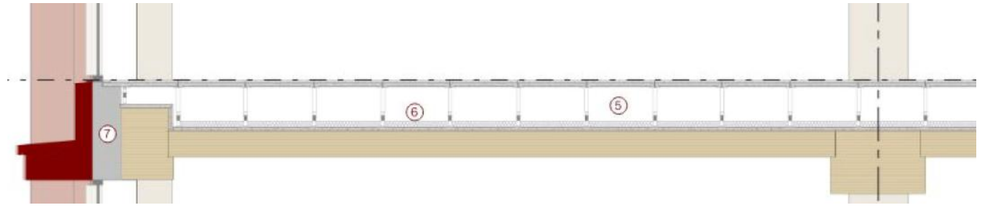


Typical Internal Beam Torsion and DC Force Detail

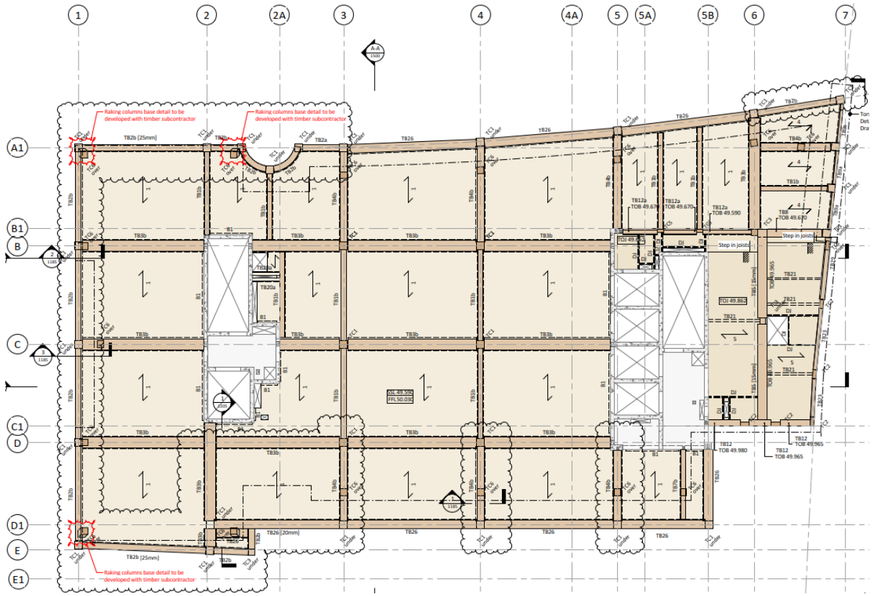
DWG 1 : 10

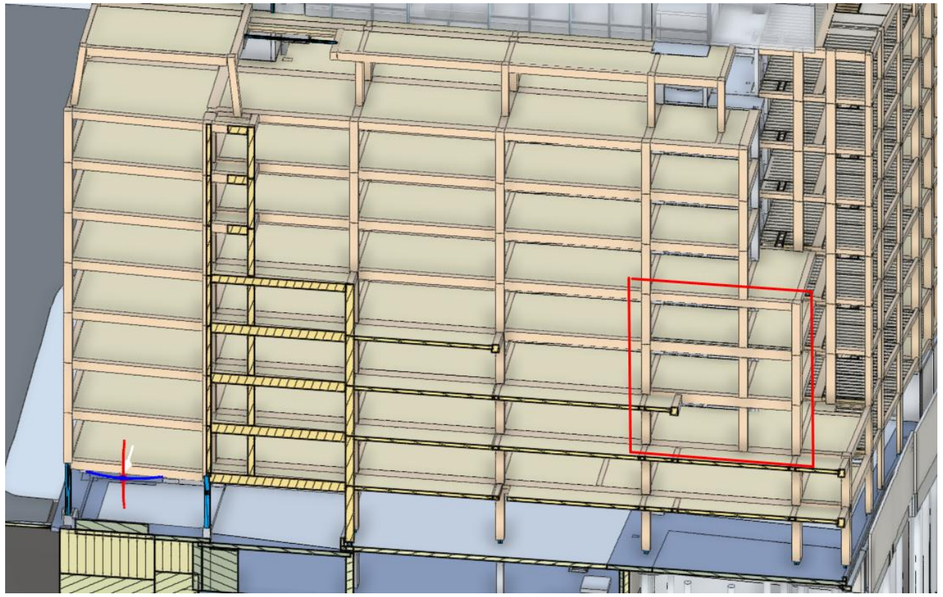
TB3b | 560d x 720/840w Glulam T beam GL28h

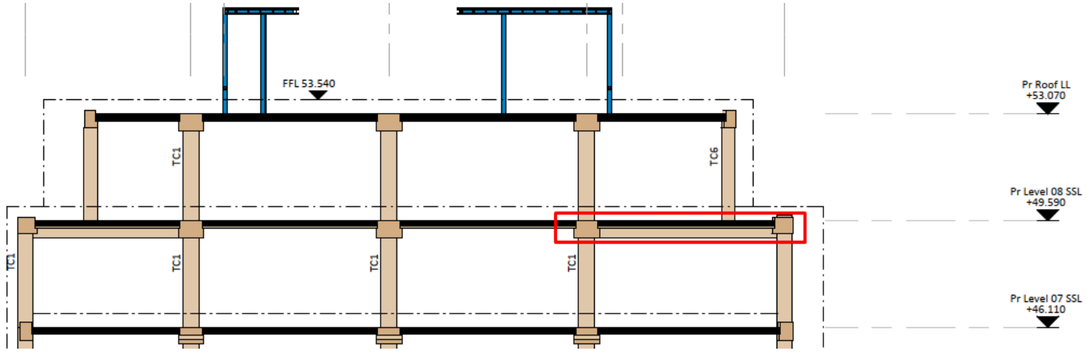




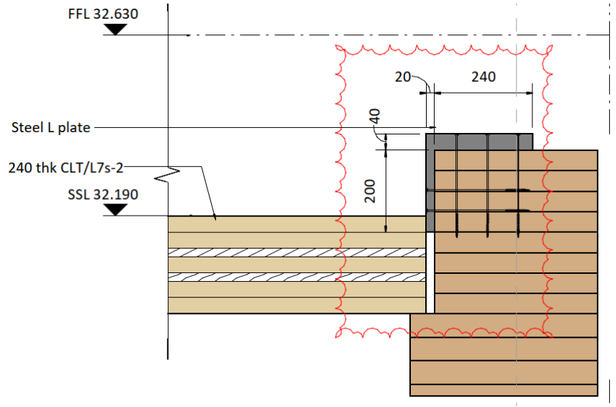
Detailed Design [transfers]



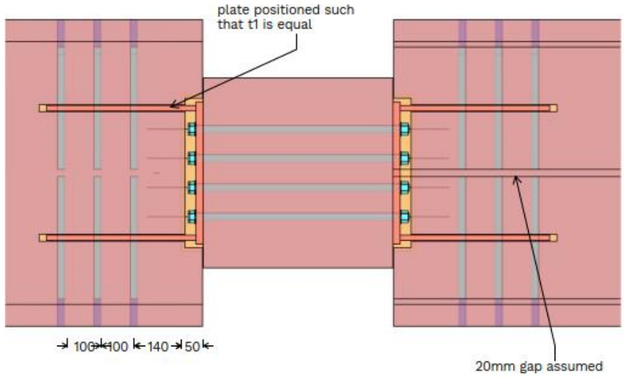


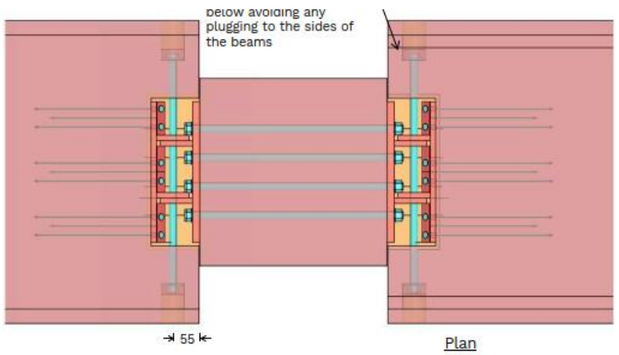


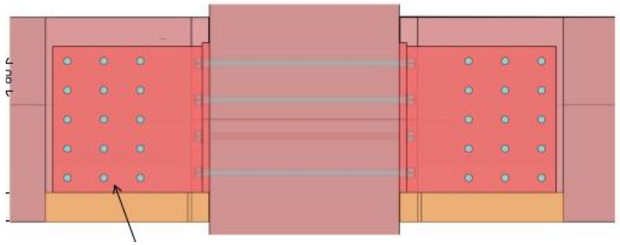
TB4b | 560d x 480/600w Glulam T beam GL28h

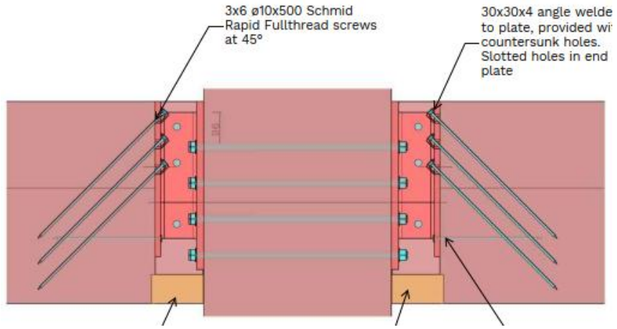


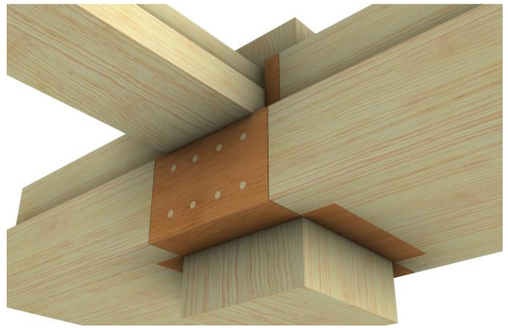
Detailed Design [hybrid structures coordination 1]

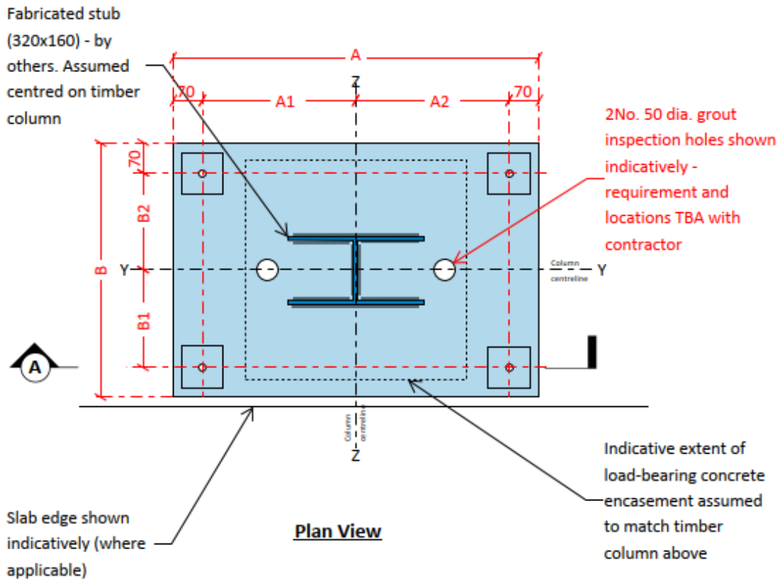




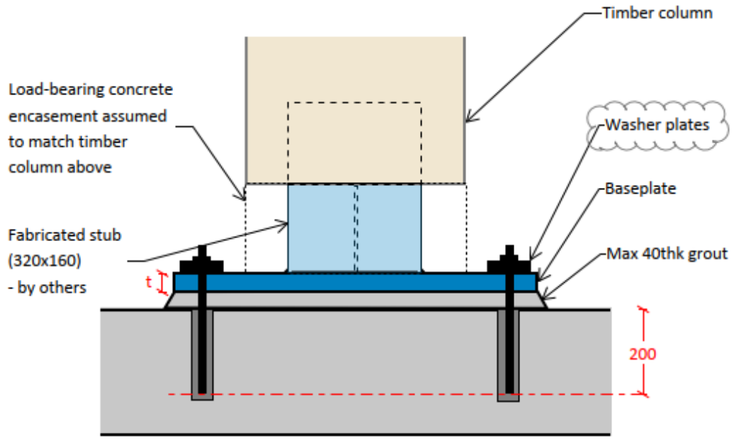








Plan View



Section A

Detailed Design [fire - residual section]

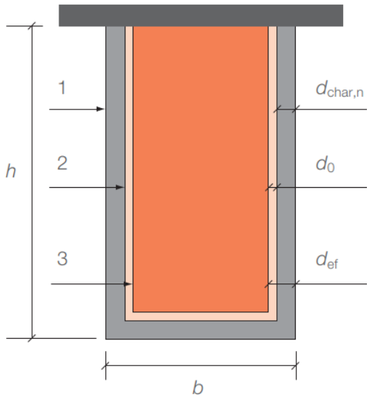
In 2025, a new standard for the fire design was published, the fire part of Eurocode 5, BS EN 1995-1-2. The standard gives design rules for the fire design under standard fire and non-standard fires defined as “physically based fires”. IGNIS recommends to follow the guidance given in the new design guidance by default. The foreseen **CLT floor slabs, glulam beams and glulam**

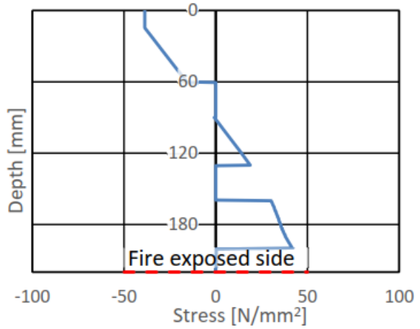
8.1 Fire resistance

With the five analyzed design fire volumes, it is shown that likely auto-extinction is achieved in any part of the building and for any possible start point of the fire. The resulting charring depth were between 40 mm and 75 mm, provided that the ceiling at standard layouts (L02 to L07) in the center area will be fire protected (encapsulated). IGNIS recommends that the maximum design charring depth of 75 mm is used throughout the building, since all design fire volumes are basically connected with each other.

Given the building will be designed for FRL 120, which is equivalent to 78 mm charring depth for typical wood species, the charring depth derived in this analysis (≤75 mm) will not be decisive anyway.

To verify the load-bearing resistance of a timber element in fire, IGNIS suggests to apply the effective cross-section method as presented in EN 1995-1-2. For CLT, IGNIS suggests to use the improved method in prEN 1995-1-2 (CEN 2023) or the application of advanced methods, see Section 17.2.





3.3 Fire design of glulam beams

The zero-strength layer (ZSL, also indicated as d_0) for **standard fire exposure, a ZSL of 10 mm** should be assumed for glulam beams in bending and exposed side in tension. Bond line integrity shall be provided by the product as for CLT (see above). Considering **physical based design fires**, **Annex A** of BS EN1995-1-2:2025 provides a design model to determine the zero-strength layer for beams, i.e. members in **bending**:

$$d_{0,fi} = \alpha_{fi} \cdot d_0 = \frac{7}{\sqrt[3]{\theta_{fi,c}}} \cdot d_0 = \frac{7}{\sqrt[3]{30}} \cdot 10 = 2.25 \cdot 10 = 22 \text{ mm}$$ (for members in bending)

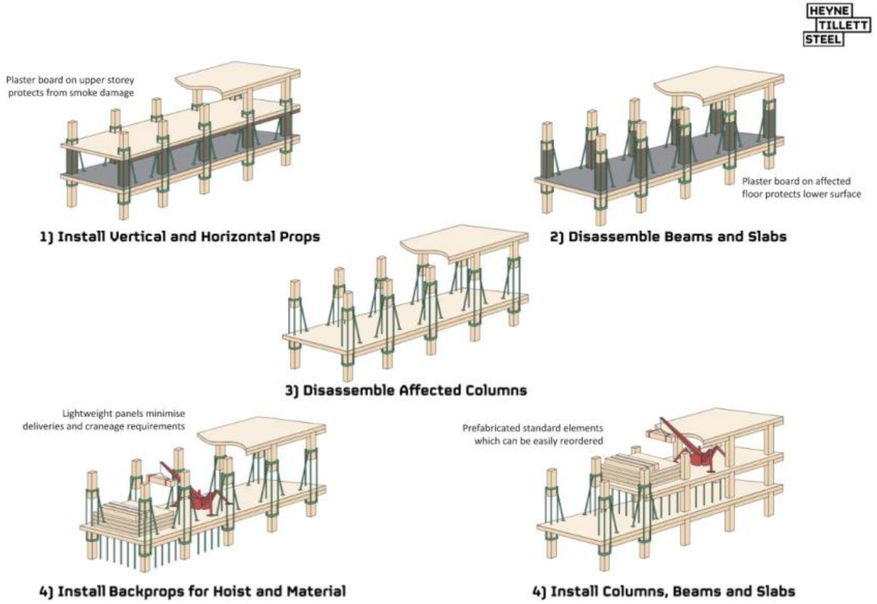
3.4 Fire Design of glulam columns

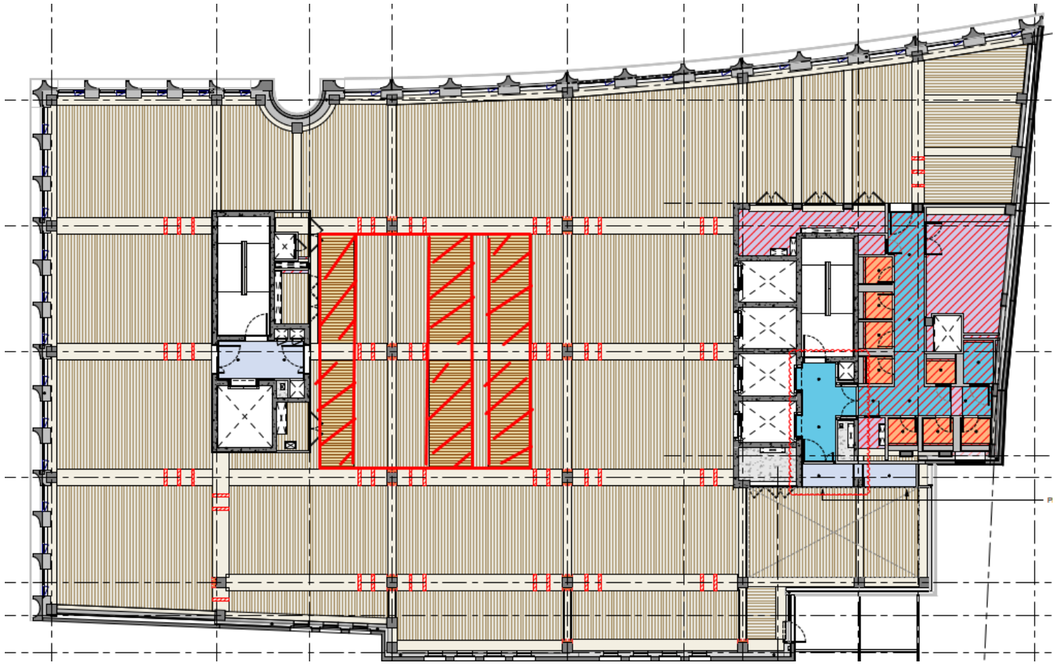
The effective zero-strength layer (ZSL, also indicated as d_0) of 14 mm is specified for glulam columns in BS EN1995-1-2:2025. Bond line integrity shall be provided by the product as for CLT (see above). The buckling length should be derived considering the height (length) of the glulam column and the support conditions with respect to the possible rotation at the joint. Considering a physical based design fire, Annex A of BS EN 1995-1-2:2025 provides a design model to determine the zero-strength layer for members in **buckling**:

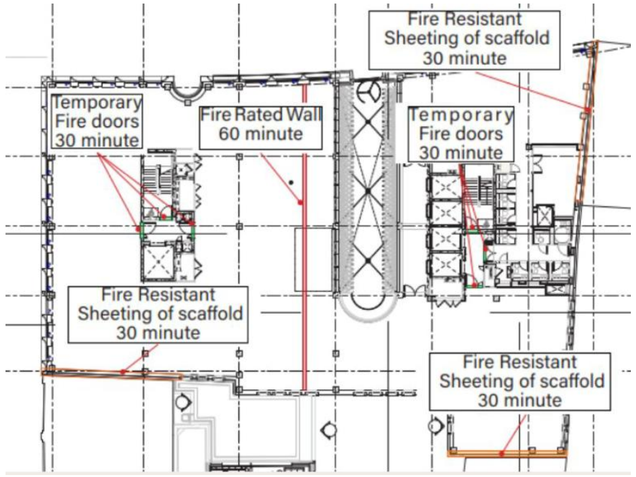
$$d_{0,fi} = \alpha_{fi} \cdot d_0 = \frac{7}{\sqrt[3]{\theta_{fi,c}}} \cdot d_0 = \frac{7}{\sqrt[3]{30}} \cdot 14 = 2.25 \cdot 14 = 31 \text{ mm}$$ (for members in buckling)

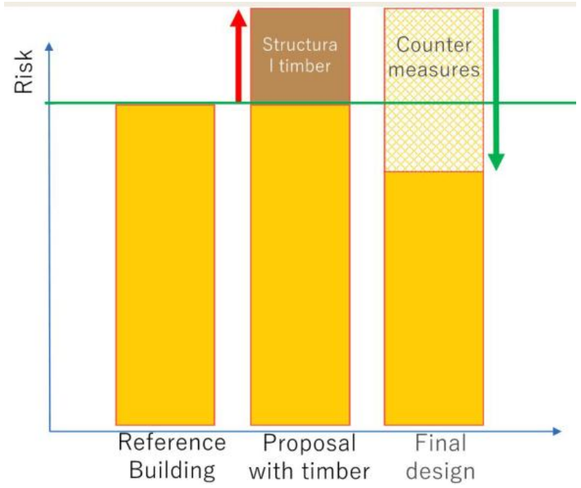
1. the actual product Xylo, London under the condition that “bond line integrity in fire” (BLIF) is provided (see Klippel et al. (2019));
2. the actual product with respect to the **particular CLT layup** (layer thickness and sequence);
3. the particular, one-sided **fire exposure** in the compartment (see IGNIS report).

Detailed Design [fire – other considerations]









SITE SAFE

STRUCTURAL TIMBER ASSOCIATION
Building offsite solutions in timber

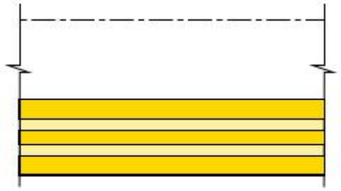
16 Steps to fire safety

Promoting good practice on construction sites
Version 4.3 October 2017



Detailed Design [water risk]

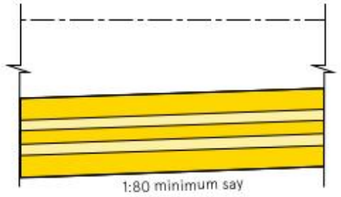
BASE OPTION:
FLAT CLT SLAB



PROS:
- Same construction as floors
- Decent aesthetic finish
- Works well with blue roofs

CONS:
- Potential for water ingress to sit / get trapped

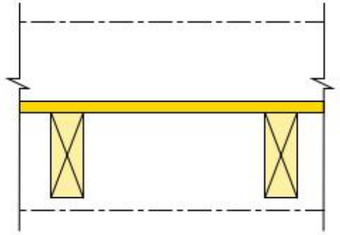
OPTION A:
CLT SLAB TO FALLS



PROS:
- Same construction as floors
- Decent aesthetic finish
- Increased opportunity for water ingress to run away

CONS:
- Works OK with Blue Roofs, but they need over-sizing
- Falls require close coordination

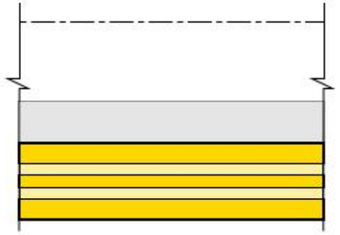
OPTION B:
TIMBER JOISTS



PROS:
- Even lower carbon than CLT
- Works fine with blue roofs

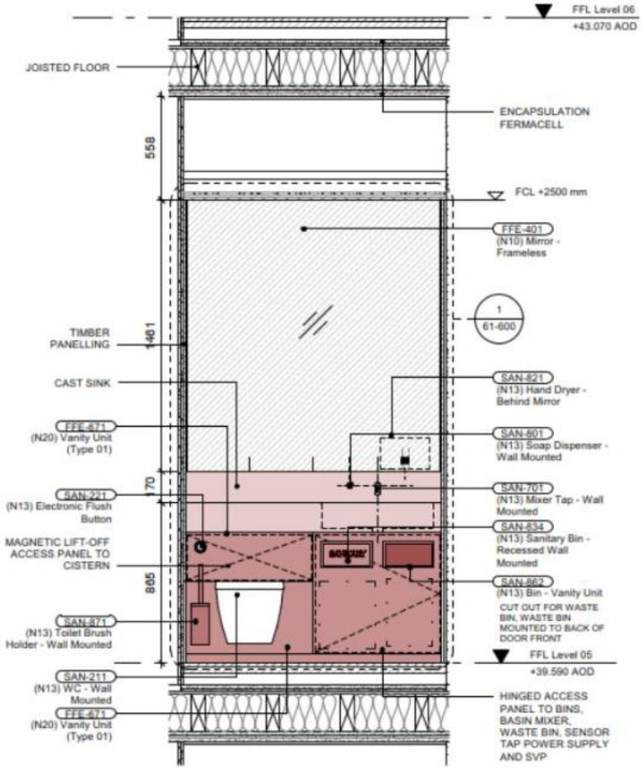
CONS:
- More elements means slower construction
- Harder to achieve decent aesthetic
- Lower strength & stiffness & vibrational performance, only suitable for non-accessible, open flat roofs
- Requires encapsulation if fire rating needed
- Unlikely to provide decent acoustic separation (e.g. rooftop plant)

OPTION C:
CLT SLAB w. CONC TOPPING



PROS:
- Same construction as floors
- Decent aesthetic finish
- Works well with blue roofs
- Improved acoustic separation (e.g. rooftop plant)
- Additional layer reduces risk(?) of CLT leak soakage

CONS:
- Significantly increased carbon, weight, programme
- Potential for leaked water to sit / get trapped
- Restraint in-service could generate additional cracking



ADDITIONAL MEASURES OF MITIGATION:

(a) INCREASED INSTALL QA



- E.g. a clerk-of-works to independently oversee installation of waterproofing

(b) 2ND LAYER MEMBRANE



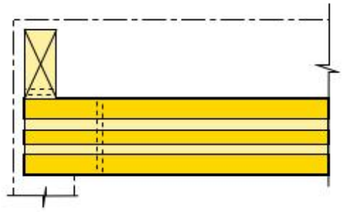
- Adds further protection both during construction and post-completion.

(c) MOISTURE SENSORS

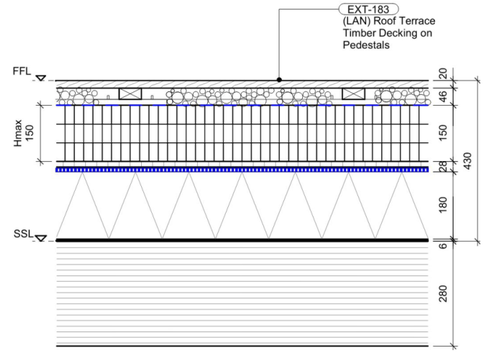


- Improving technology allows for these, ideally linked to BMS for earliest detection.

(d) WEEP HOLES

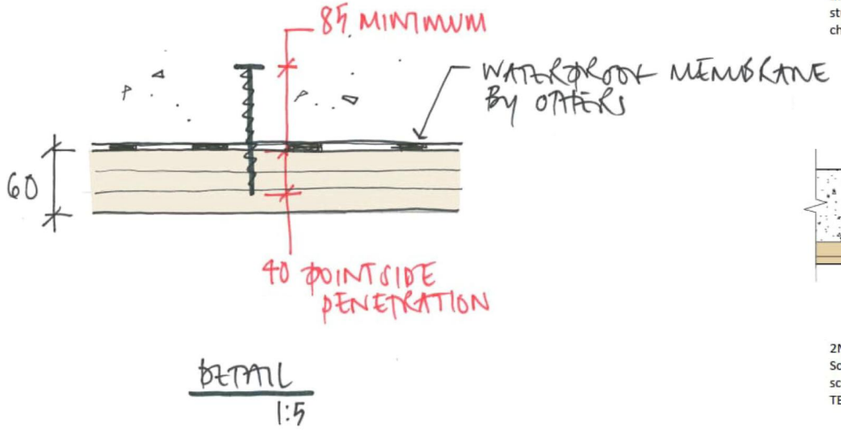


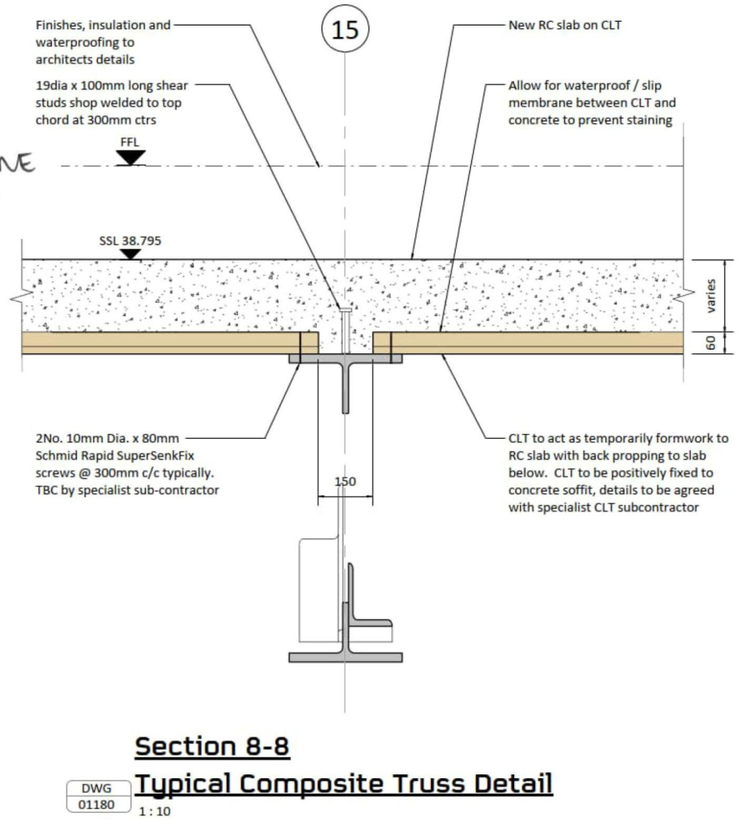
- Could work well if provided at lowest points (mid-span, base of falls), allowing earlier leak detection via dripping through holes.



Timber Square – CLT Hybrid Roof, Lesson Learnt

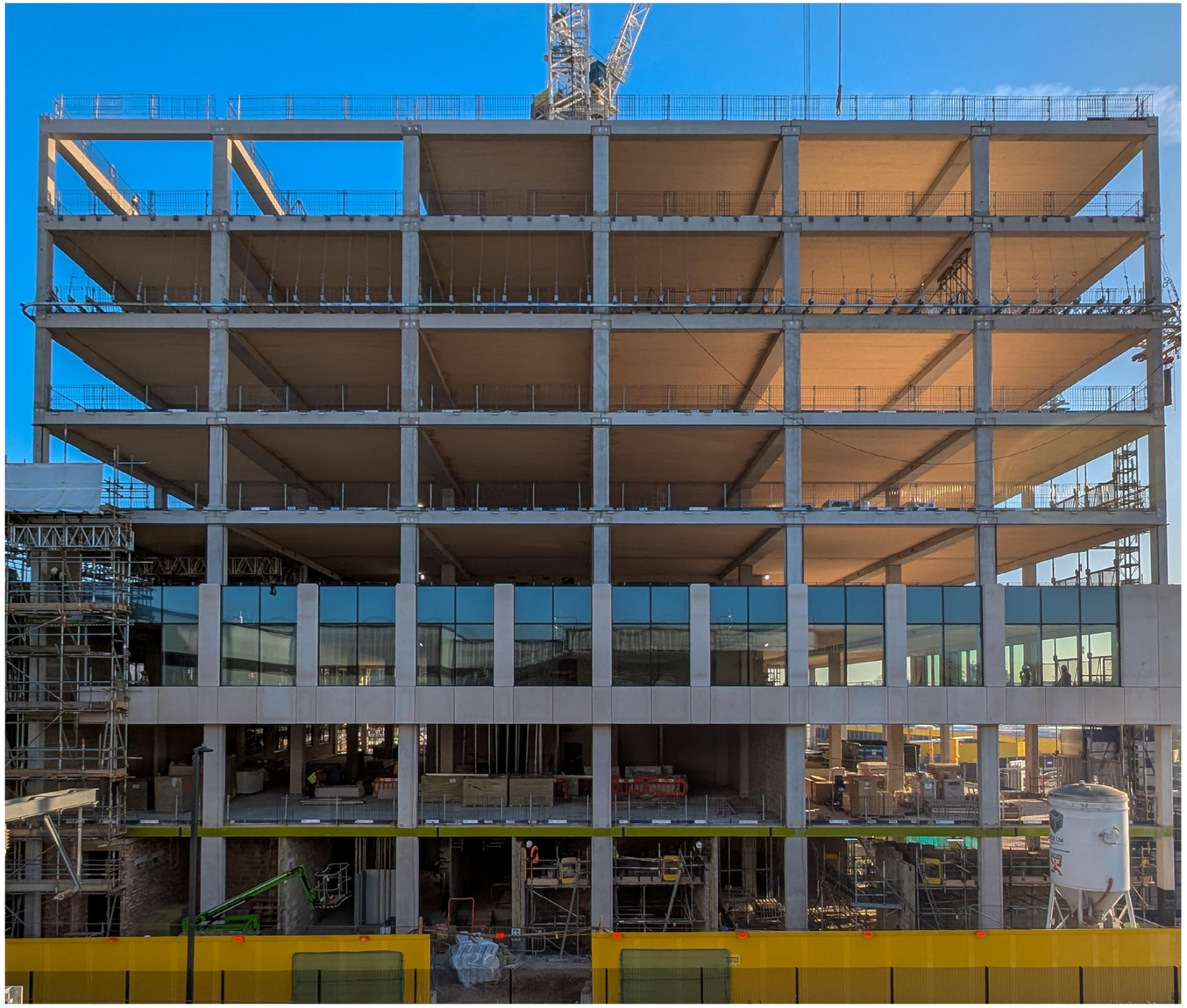
CLT / concrete slabs – late change to proposed details to avoid fixing from below



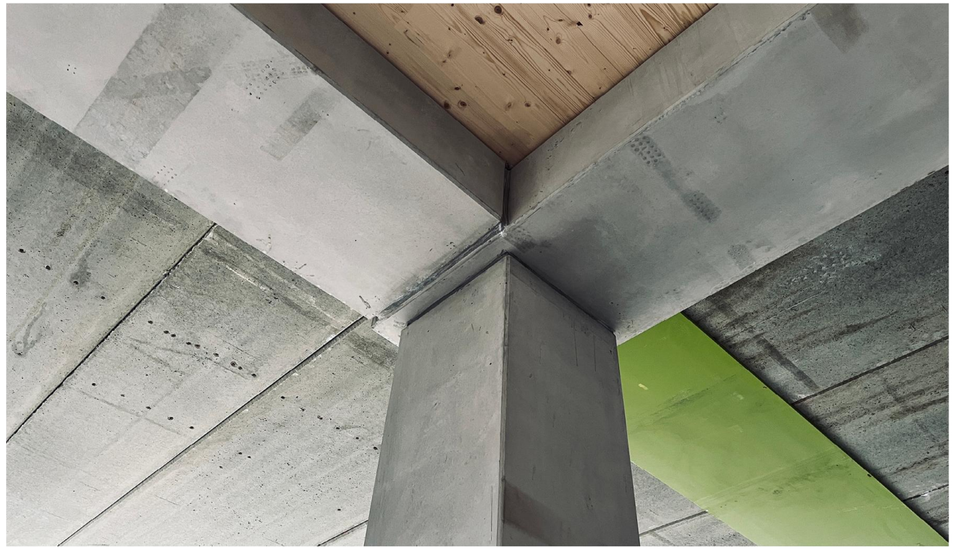




4 Arbour Street, Construction Photos







4 Arbour Street, Construction Photos



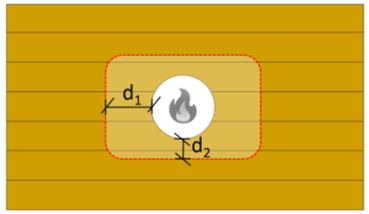






Detailed Design [fire - service pens]

According to BS EN1995-1-2:2025, the charring rate of **glulam beams in grain direction** can be determined applying the factor $k_{gd} = 2$ to consider the effect of the increased charring in grain direction (i.e. parallel to the grain). This value can also be applied as a **conservative value** to determine the charring depth **inside a penetration** in a timber member such in penetrations through glulam beams in the project Xylo, London, compare Figure 2.



Charring depth parallel to the grain:

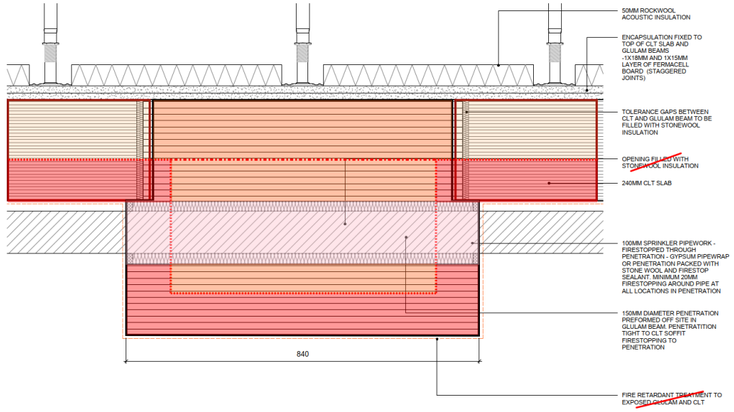
$d_1 = d_{char,1} = k_{gd} \cdot b_0 \, t = \mathbf{2.0} \cdot 0.65 \cdot t$

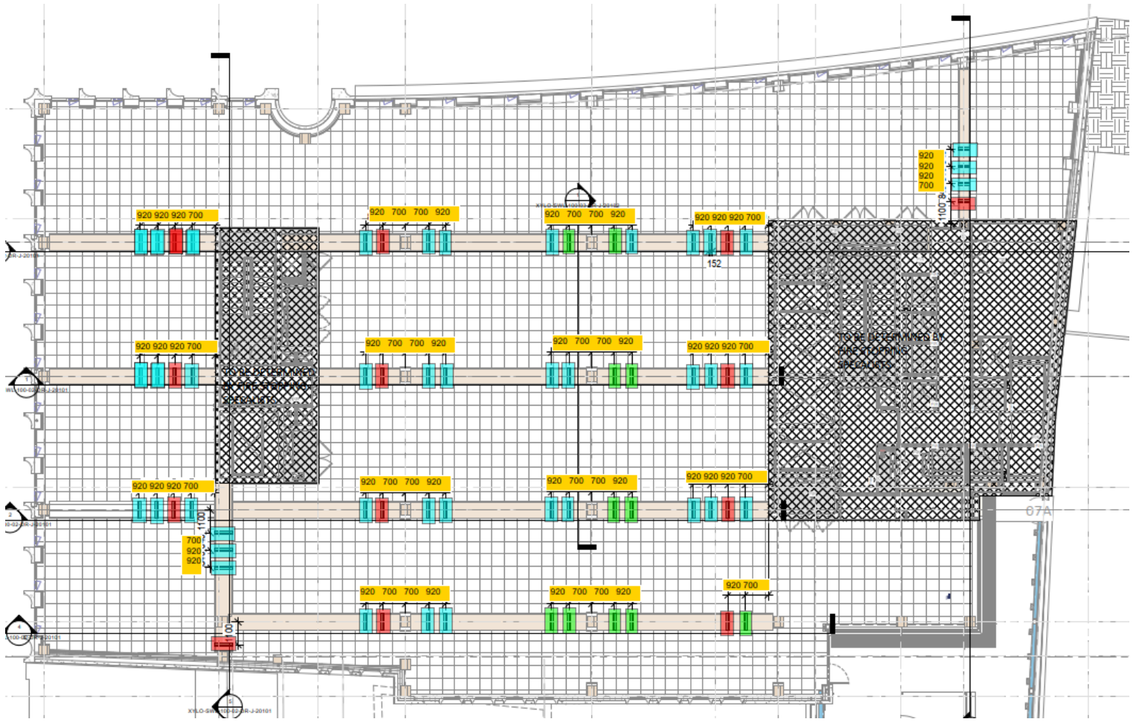
Charring depth perpendicular to the grain:

$d_2 = d_{char,2} = k_{gd} \cdot b_0 \, t = \mathbf{1.0} \cdot 0.65 \cdot t$

(in case of standard fire exposure)

thermocouple readings the charring depth d_{char} over time was determined, see Figure 3. The fire test results show that the charring depth **in grain direction** developed very similar to the charring depth **parallel to the grain**. The comparison to the basic design charring rate β_0 shows that a charring rate of **0.65 mm/min** can be applied in all directions inside the penetration in case the surfaces inside the penetrations are initially exposed (to standard fire) and thus unprotected from fire. It should be noted that this conclusion is valid for penetrations with a circular diameter of **smaller than 180 mm** and glulam beams with a **minimum width of 280 mm** and a minimum density of 400 kg/m³.



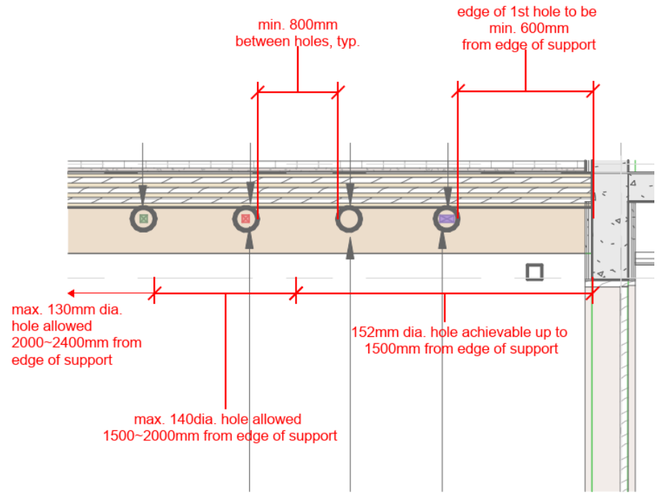


150mm opening for sprinkler

120mm opening for containment

120mm spare openings for tenants future containment

Spacings from columns and between openings to be confirmed by HTS.



Detail 1 - General rule

Detailed Design [M&T]

+ ~30mm average over building height = <4mm/floor
+ ~10mm elastic shortening (33%)
+ ~12mm moisture effects (40%) = 4 x 0.01% x ~30m
+ ~8mm creep (27%)

Shrinkage due to Moisture Content

+ **0.01% change in length per 1% moisture content change parallel to the grain.**
+ **Wood is hygroscopic, naturally releases and absorbs moisture from surrounding air. This % varies depending on its environment.**
+ **Wettest (18%) >>> Encapsulated (10%)**

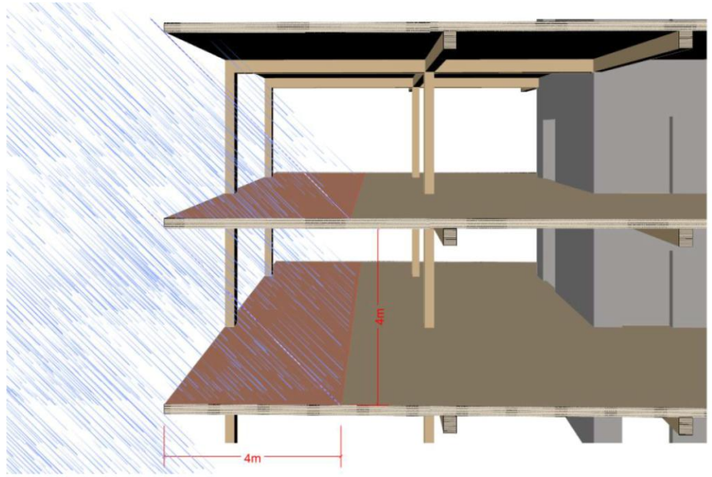


Figure 29 - Risk of direct wetting from driving rain as far into the building as the levels are tall

Type	Moisture Content			
	On delivery on Site	Handover to Main Contractor	In Service: SC1 and SC2	In Service: SC3
Softwood	<20%	< 18%	8-13%	> 20%
Glulam	12% ± 2.5%	< 18%	6-10% - 9-13%	> 20%
CLT	12% ± 2%	< 18%	6-12% - 9-15%	NA

AXIAL SHORTENING SCHEDULE - Cumulative

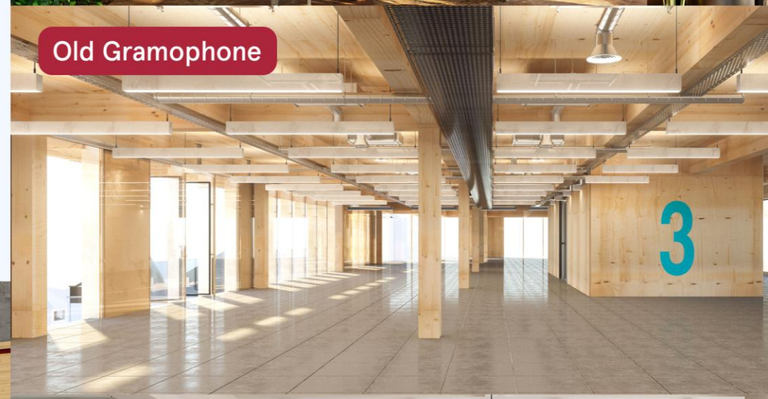
COLUMN SIZE	COLUMN REFERENCE	GF (mm)	1F (mm)	2F (mm)	3F (mm)	4F (mm)	5F (mm)	6F (mm)	7F (mm)	8F (mm)	9F (mm)	
TC1	C1	0	0	5	9	13	16	19	22	24	26	Steel colum
TC1	C2	0	7	12	17	21	25	29	32	35	37	
TC1	C3	0	7	12	17	21	25	29	32	35		
TC1	C4	0	0	5	10	14	18	22	25	28	30	RC column
TC1	C5	0	7	12	17	21	24	27	30	32		
TC1	C6	0	0	4	8	12	15	18	21	23		Steel colum
TC1	C7	0	0	4	8	11	14	17	20	22		Steel colum
TC1	C8	0	5	9	13	16	19	22	25	27		
TC1	C9	0	4	7	10	13	15	18	20	22	24	
TC1	C10	0	6	10	14	18	21	24	27	29		
TC1	C11	0	4	7	10	13	15	18	20	22		
TC1	C12	0	3	5	7	7	7	7	7	7	9	
TC1	C13	0	3	5	7	9	10	12	14	16		
TC1	C14	0	3	5								
TC7#	C15	0	3	5								
TC1	C16	0	6	11	16	20	24	28	31	34		
TC1	C17	0	3	5								
TC1	C18	0	3	5								
TC1	C19	0	6	11	16	20	24	28	31	34		
TC1	C20	0	3	5								
TC1	C21	0	3	5								
TC1	C22	0	0	5	9	13	17	21	24	26		RC column
TC1	C23	0	0	3	6	8	9	11	13	15		RC column
TC1	C24	0	7	12	17	21	25	29	32	35	37	
TC8#	C25	0	6	11	16	20	24	28	31	34	36	
TC8#	C26	0	6	11	16	20	24	28	31	34	37	
TC1	C27	0	6	11	16	20	24	28	31	34	37	
TC7	C28	0	3	5								
TC7	C29	0	3	5								
TC1	C30	0	7	13	18	23	28	32	36	39	41	
TC8#	C31	0	6	11	15	19	23	27	30	33	35	
TC1	C32	0	6	11	15	19	23	27	30	33		
TC1	C33	0	6	11	16	20	23	27	30	33		
TC1	C34	0	4	7	9							
TC1	C35	0	3	5	7							
TC1	C36	0	5	9	12	14	15					
TC1	C37	0	3	6	8	10	11					
TC1	C38	0	2	4								
TC1	C39	0	3	5								
TC1	C40	0	3	5								
TC3	C41		0	2	4	6	7	9	11	13		
N/A	C42	0	0									RC column
TC1	C43		0	3	6	8	9	11	13	15	17	
TC2	C44	0	5	9	12	15	17	20	22	24	26	

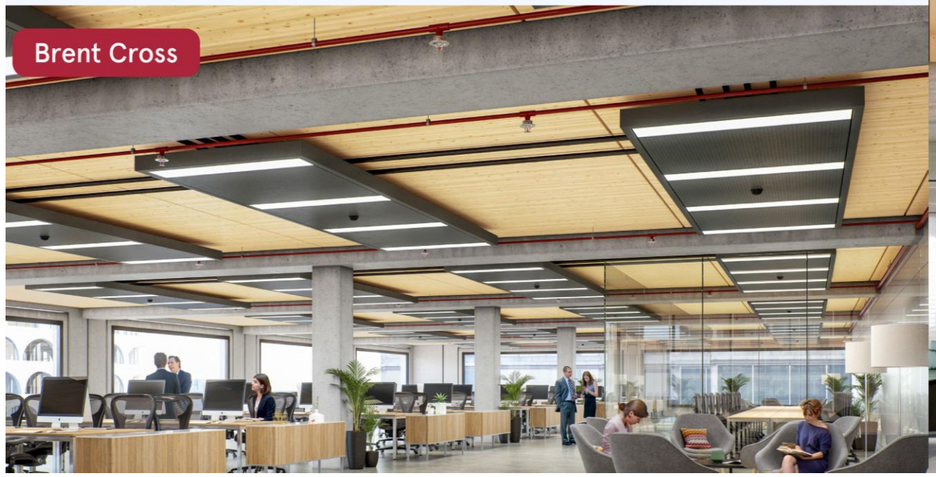
Comparing Three Built HTS Jobs – Modelled Vs Measured

- A first for HTS – physical testing of timber floors.
- Collaboration with University of Sheffield.
- Floors tested in September/October 2021.
- Measured vibration response in four built HTS projects: Timber Square, Old Gramophone Works,
- Technique, and our home, Chart Street.
- Learn more about vibration design: how does the real world reflect what was modelled?
- Compare the measured results with our modelled results to better inform our designs and support the use of timber.
- Reduce carbon in our structures based on real-world performance



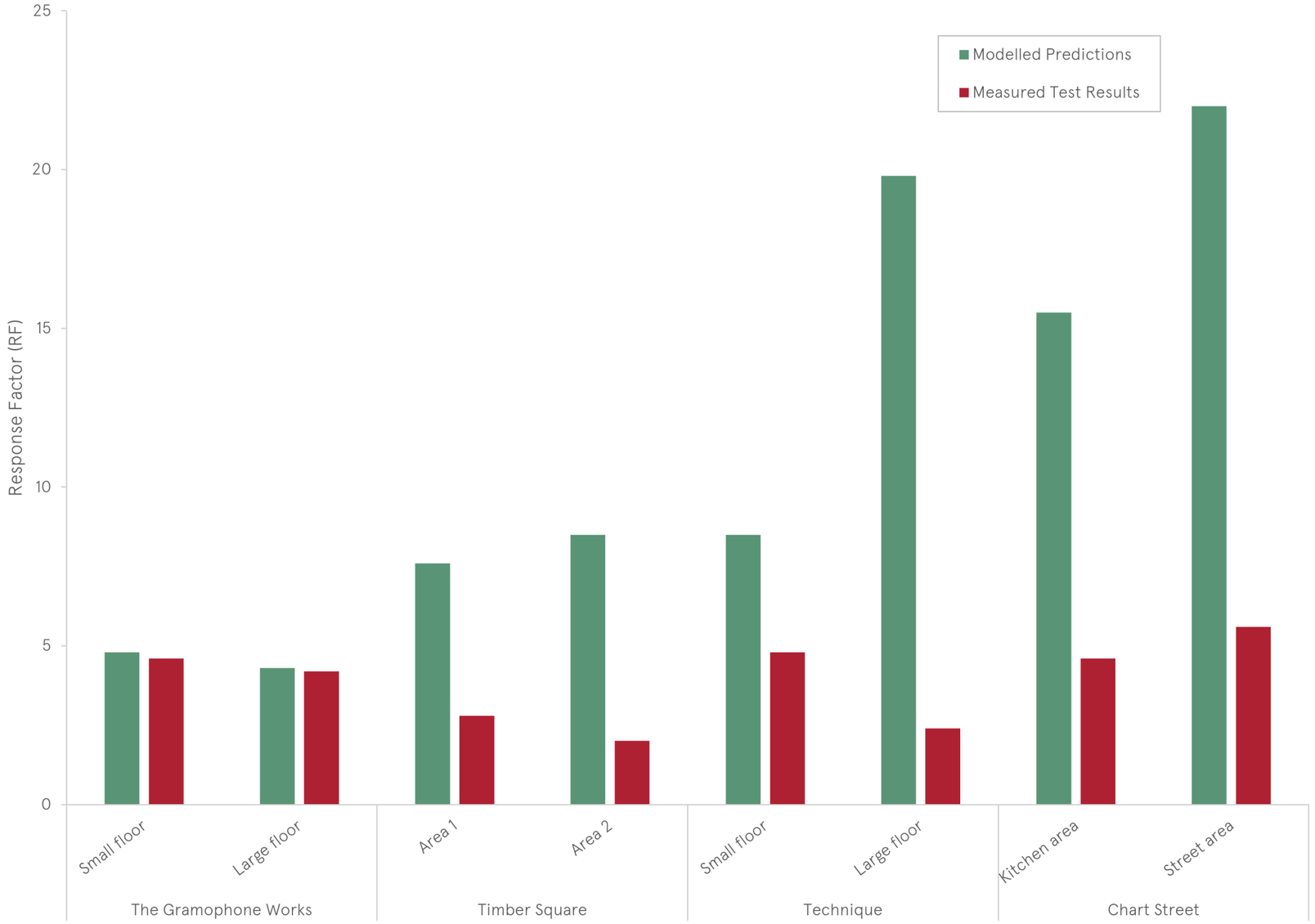




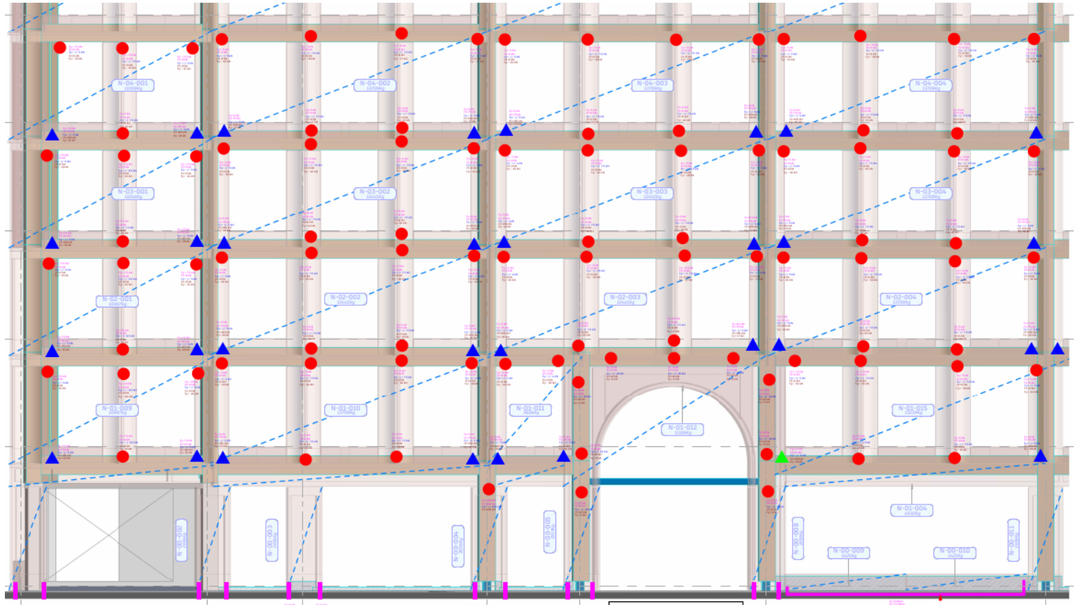


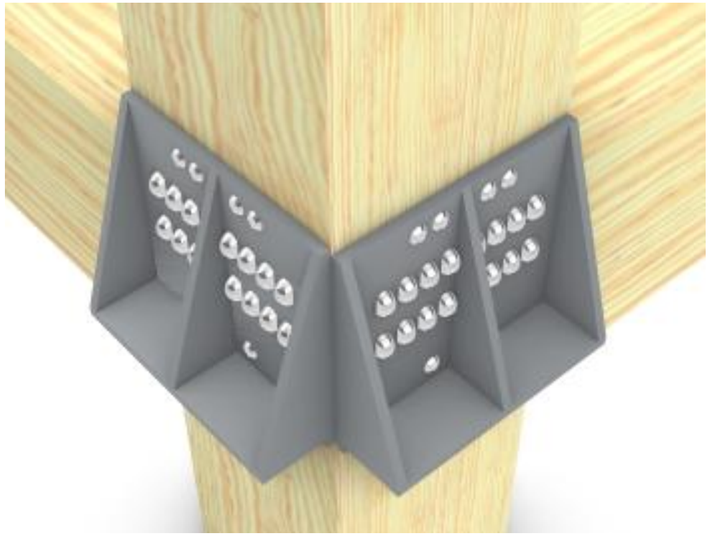


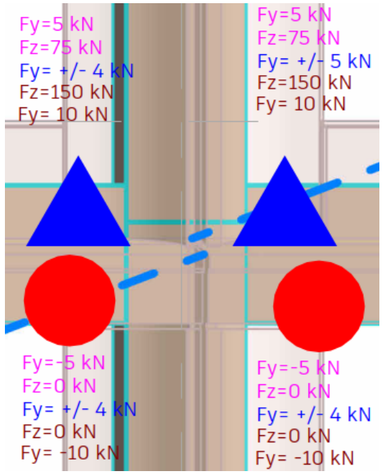
Results And Comparison With Modelling



Detailed Design [cladding]







FORCES LEGEND

Fy=xx kN / Fz=xx kN

Unfactored Force from Panel/Selfweight
Fy= Horizontal (+inwards, -outwards)
Fz= Vertical

Fy=xx kN

Unfactored Force from Wind

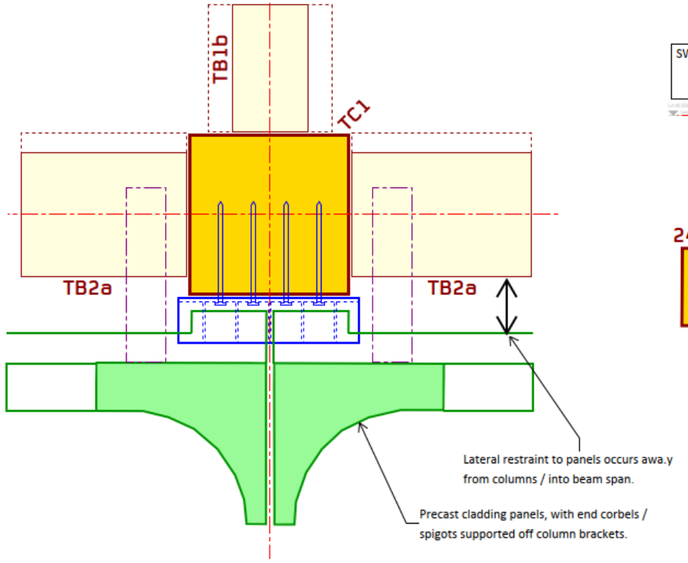
Fy= Horizontal (+inwards, -outwards)

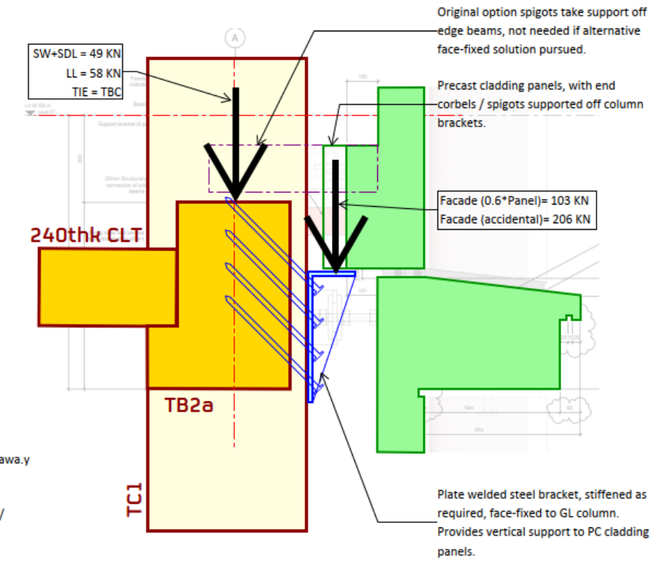
Fz=xx kN

Avoidance of Disproportionate Panel Collapse (NOT to be taken in combination with other load cases)

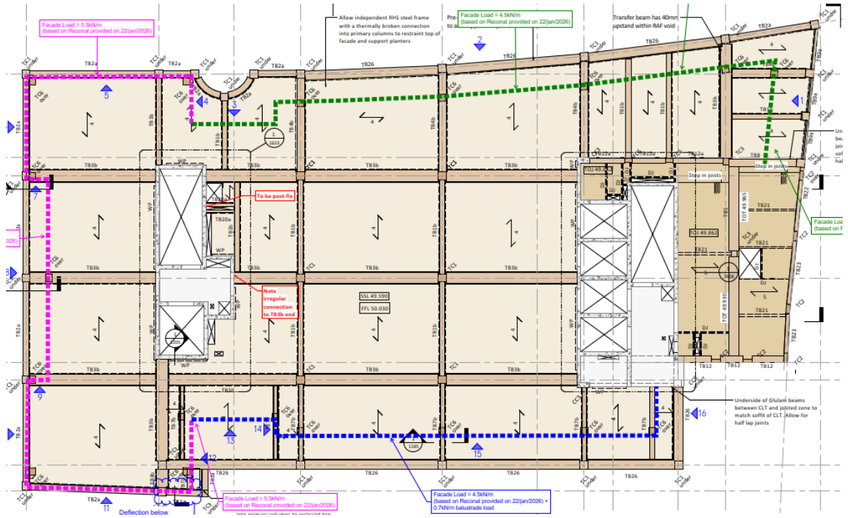
NOTE:

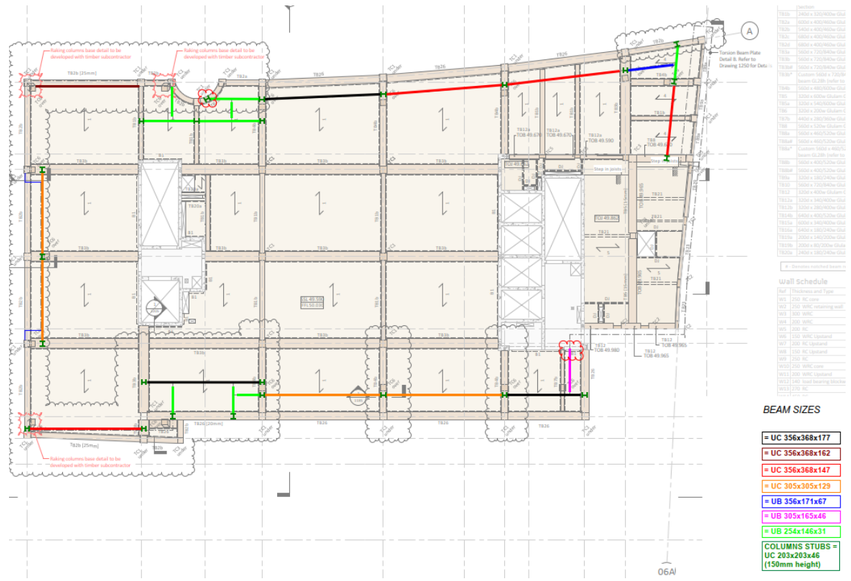
No substantial changes are expected in reaction values, however, these need to be revised once panelisation is finished and final bracket number and exact setting outs are defined.

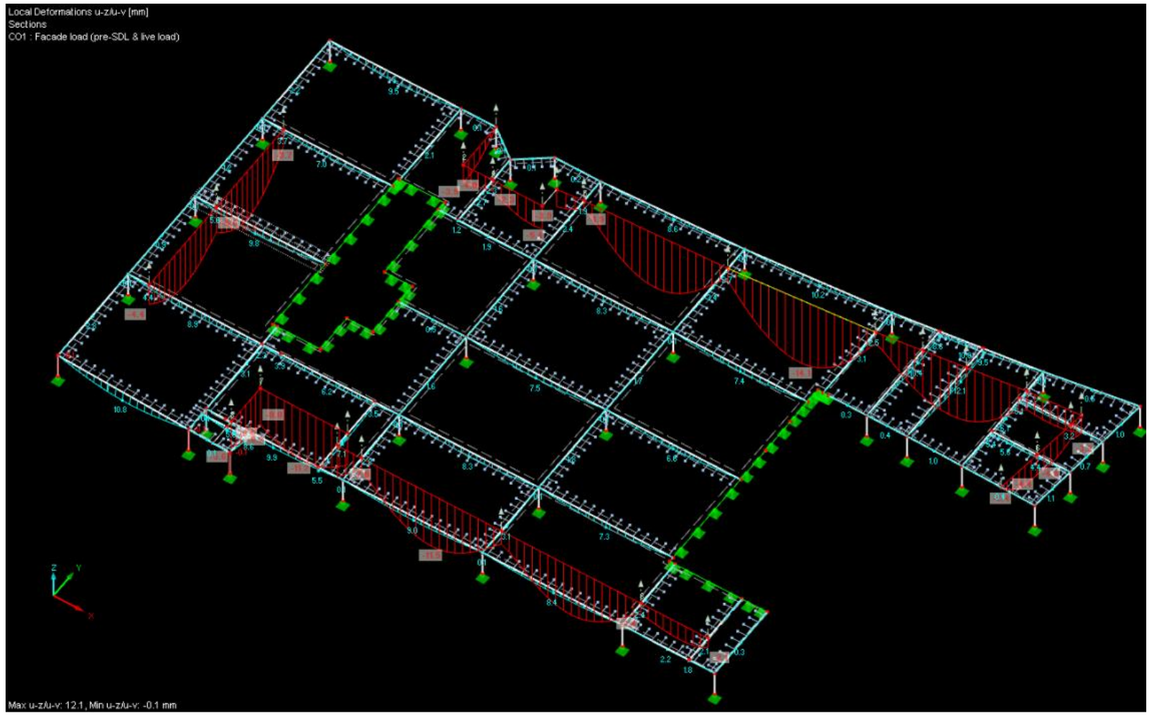


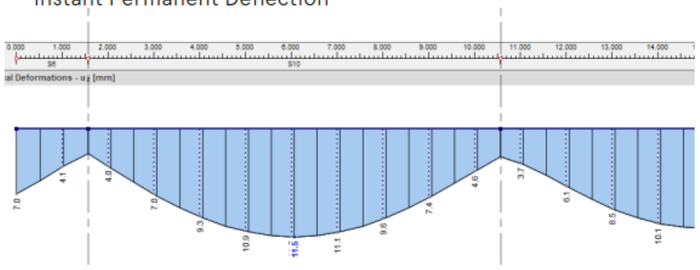


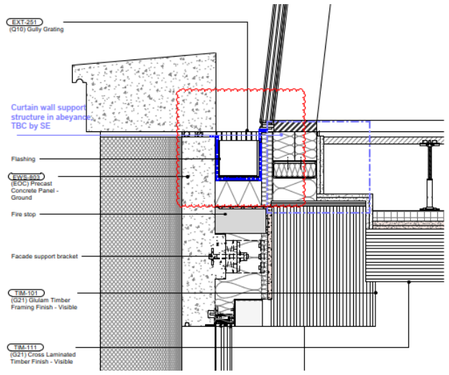
Detailed Design [curtain walling]





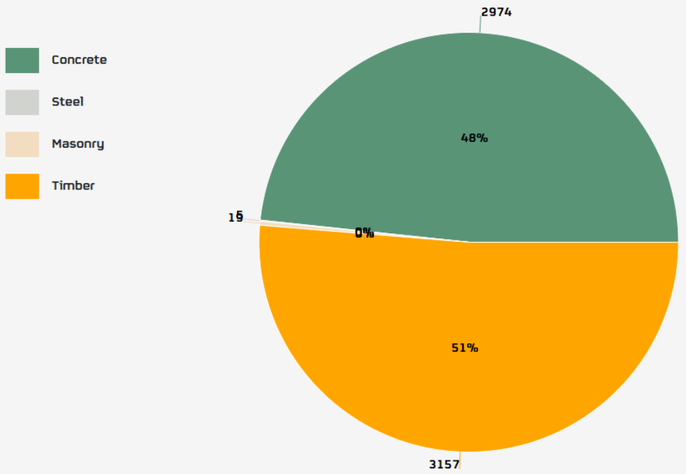




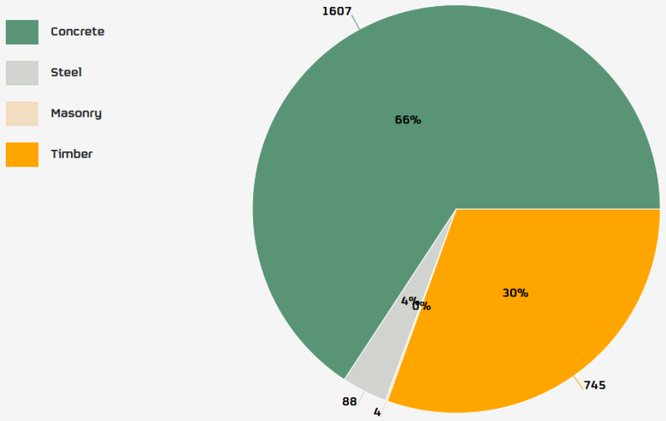


Detailed Design [carbon now]

Volume in all materials (m^3)



Embodied carbon in all materials (CO_2e and %)



Project Information

+ Office
+ 12,675 m^2 GIA
+ Built 2028 (expected)
+ HTS Default V4.0

Volumes at Completion

+ 6% Existing
+ 31% Demolished
+ 0 % Temporary
+ 63% New

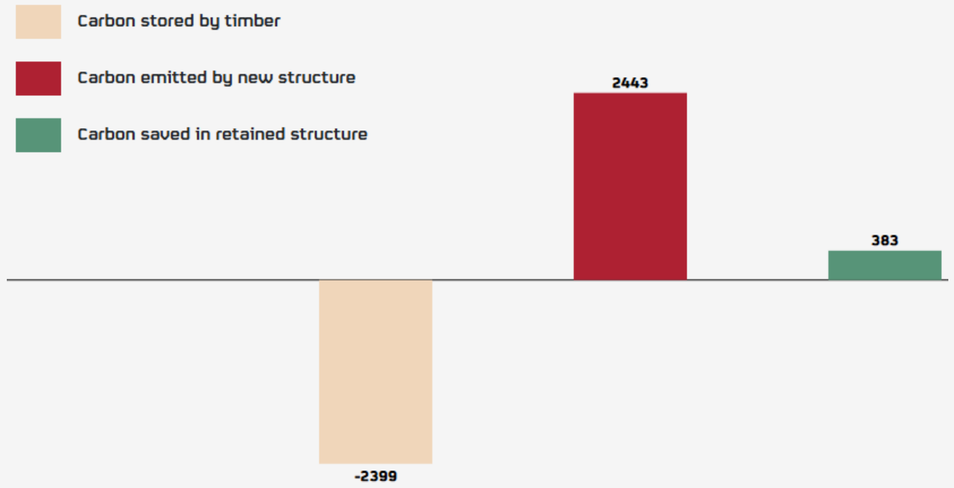
Materials

+ Timber
+ Concrete
+ Masonry

Project Summary

+ 2,443 tonnes CO_2e
+ 193 $kgCO_2e/m^2$
+ SCORS B
+ LETI A

Carbon Emitted Vs. Carbon Stored (tCO_2e)



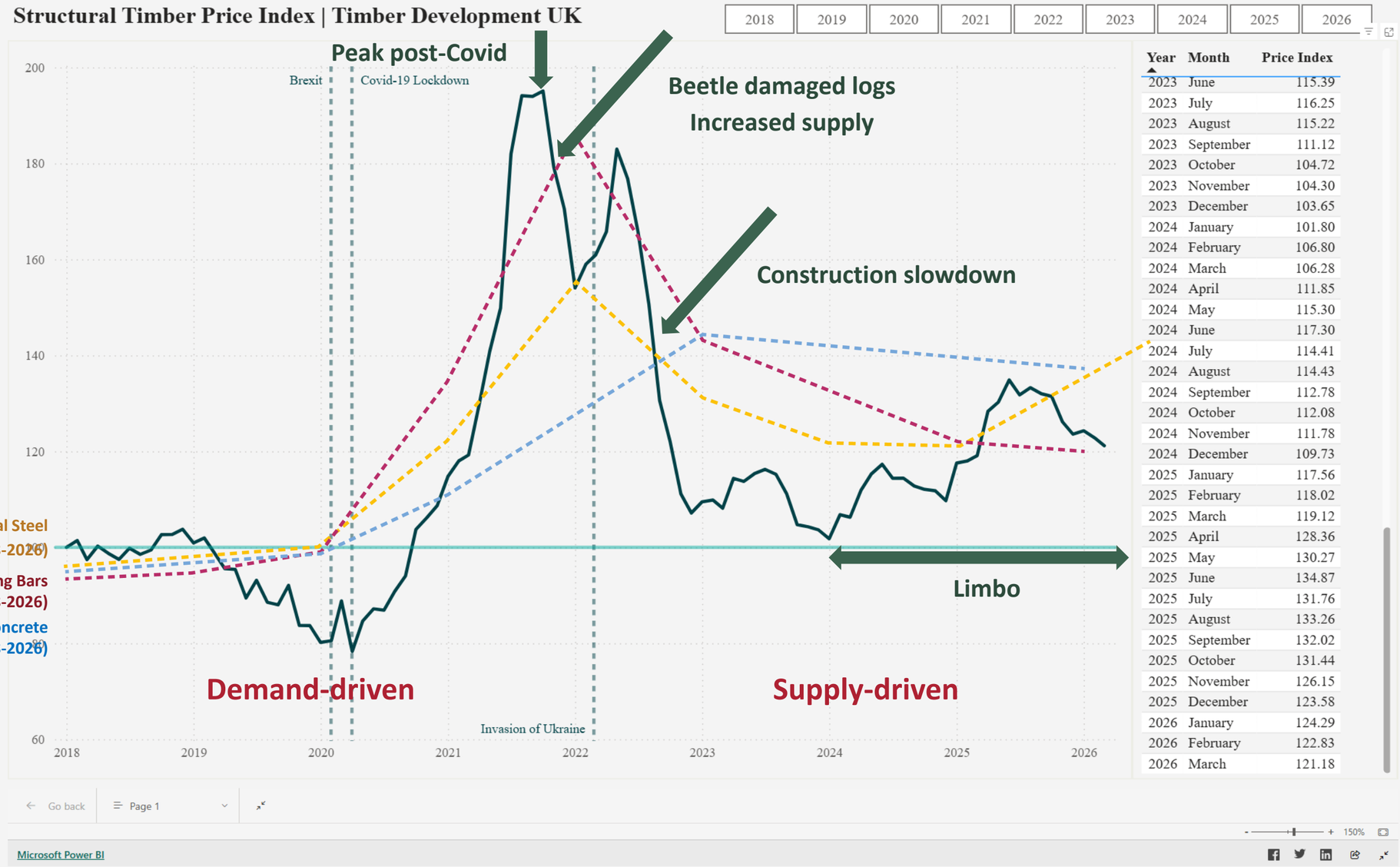
+ Timber Structure:
  + 30% of total embodied carbon
  + 75% of GIA
  + 9,554m2 GIA = **78kgCO2e/m²**

+ Enabling Concrete:
  + 3,121m2 GIA = **544kgCO2e/m²**

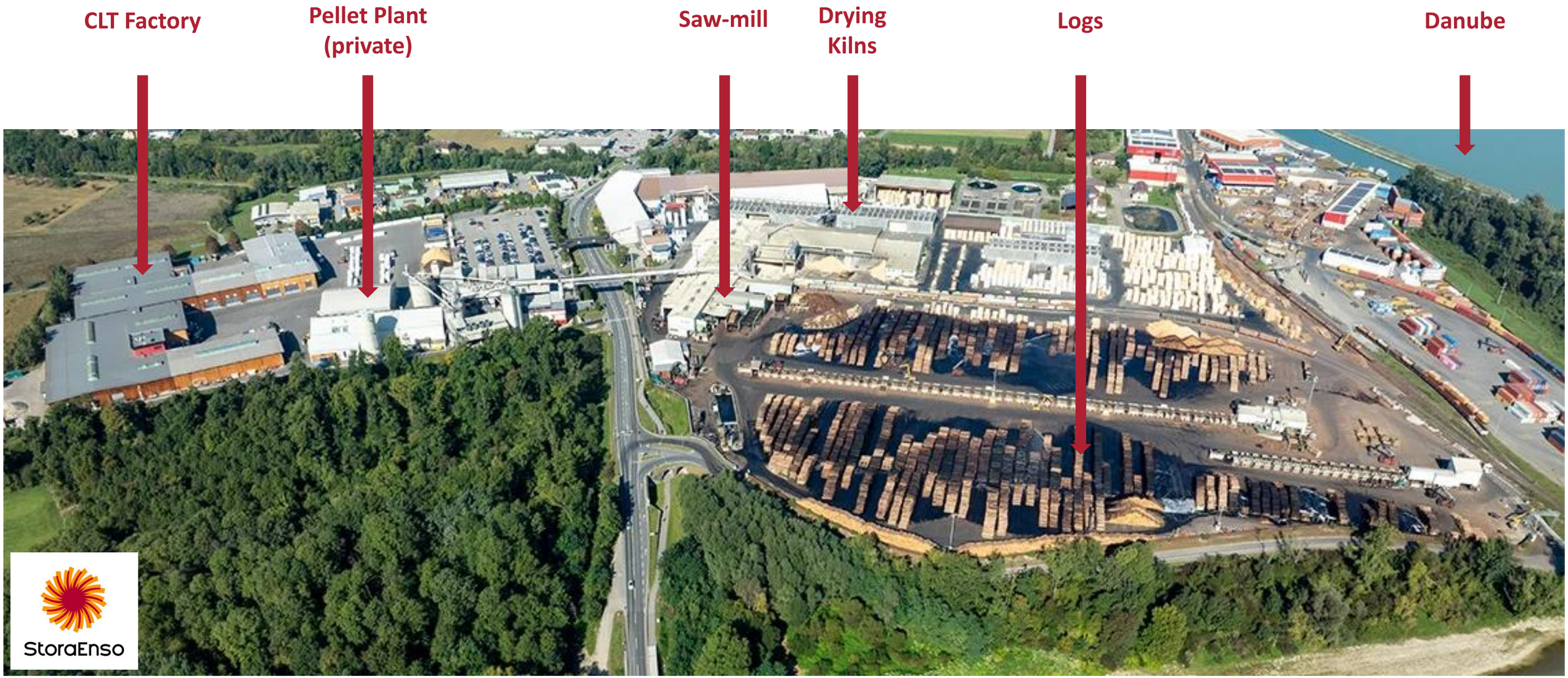
Factory Visit


HEYNE
TILLETT
STEEL
Hasslacher
Stora Enso
Leeds
Hull
Manchester
Bangor
Chester
Sheffield
ENGLAND
WALES
CYMRU
Birmingham
Norwich
Northampton
Stratford-upon-Avon
Ipswich
Stroud St Albans
Colchester
London
Cardiff
Bristol
Ashford
Salisbury
Southampton
Plymouth
English Channel
JERSEY
(UK)
Le Havre
Caen
Paris
Reims
Brest
Rennes
Le Mans
Orléans
Tours
Nantes
FRANCE
Bay of Biscay
Bordeaux
Clermont-Ferrand
Lyon
St-Étienne
Grenoble
Turin
Milan
Nîmes
Toulouse
Santander
Oviedo
Ligurian
Sea
MONACO
Genoa
Modena
Bologna
Florence
Livorno
SAN MARINO
Lausanne
Geneva
SWITZERLAND
Mulhouse
Basel
Zurich
Dijon
Strasbourg
Karlsruhe
Stuttgart
Augsburg
Munich
Innsbruck
LIECHTENSTEIN
AUSTRIA
Salzburg
Linz
Graz
Trento
Verona
Venice
Trieste
Rijeka
SLOVENIA
CROATIA
Zagreb
Pécs
Subotica
Szeged
Arad
Timişoara
Novi Sad
Belgrade
Banja
Luka
Bijeljina
BOSNIA AND
HERZEGOVINA
Sarajevo
SERBIA
Kraljevo
Split
HUNGARY
Budapest
Debrecen
Miskolc
Nyíregyháza
Gyor
Oradea
Vienna
Brno
Ostrava
Pilsen
CZECHIA
SLOVAKIA
Košice
Nuremberg
Regensburg
Ingolstadt
Wiesbaden
Mainz
Frankfurt
Prague
LUXEMBOURG
BELGIUM
Brussels
Maastricht
Lille
Charleroi
Düsseldorf
Duisburg
Arnhem
Rotterdam
The Hague
Amsterdam
NETHERLANDS
Groningen
Bremen
Hamburg
Schwerin
Elbe
Rostock
Hannover
Magdeburg
Potsdam
Berlin
Gorzow
Szczecin
Bydgoszcz
Toruń
Poznan
Zielona
Góra
Leipzig
Gera
GERMANY
Wrocław
Opole
Katowice
Krakow
Rzeszów
Kielce
Radom
Lublin
Białołęka
Warsaw
Ursynów
POLAND

UK Timber Market

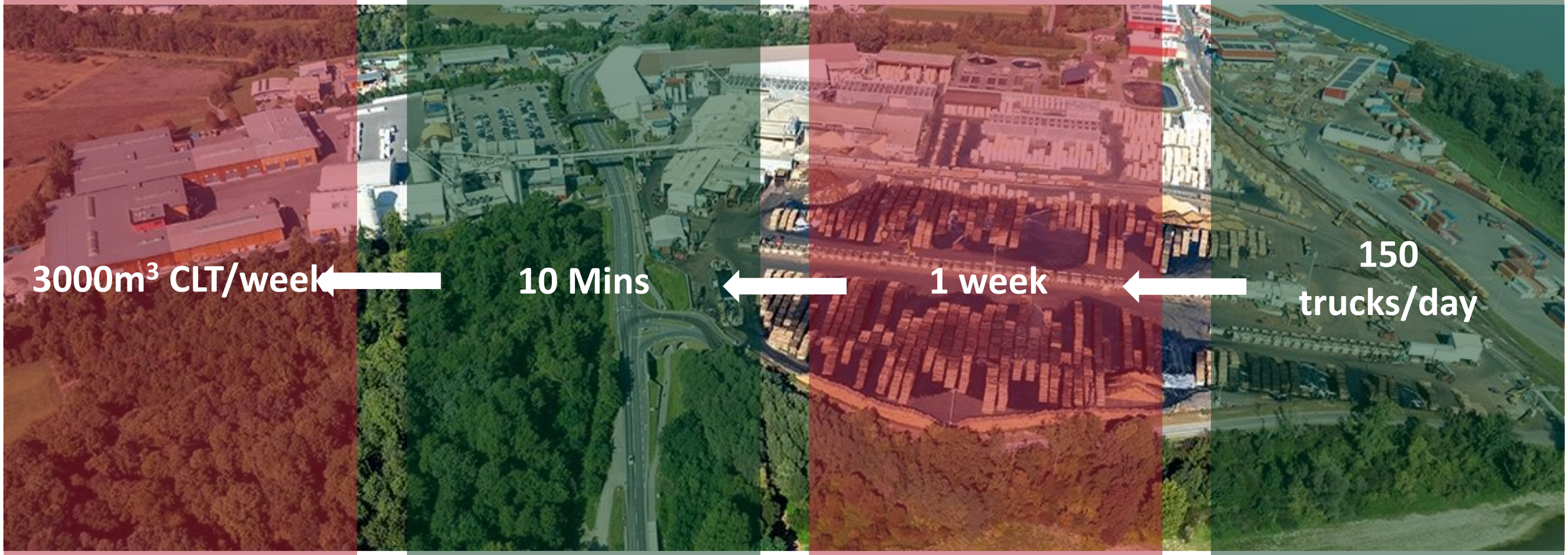


Stora Enso - Ybbs Mill



HEYNE TILLETT STEEL

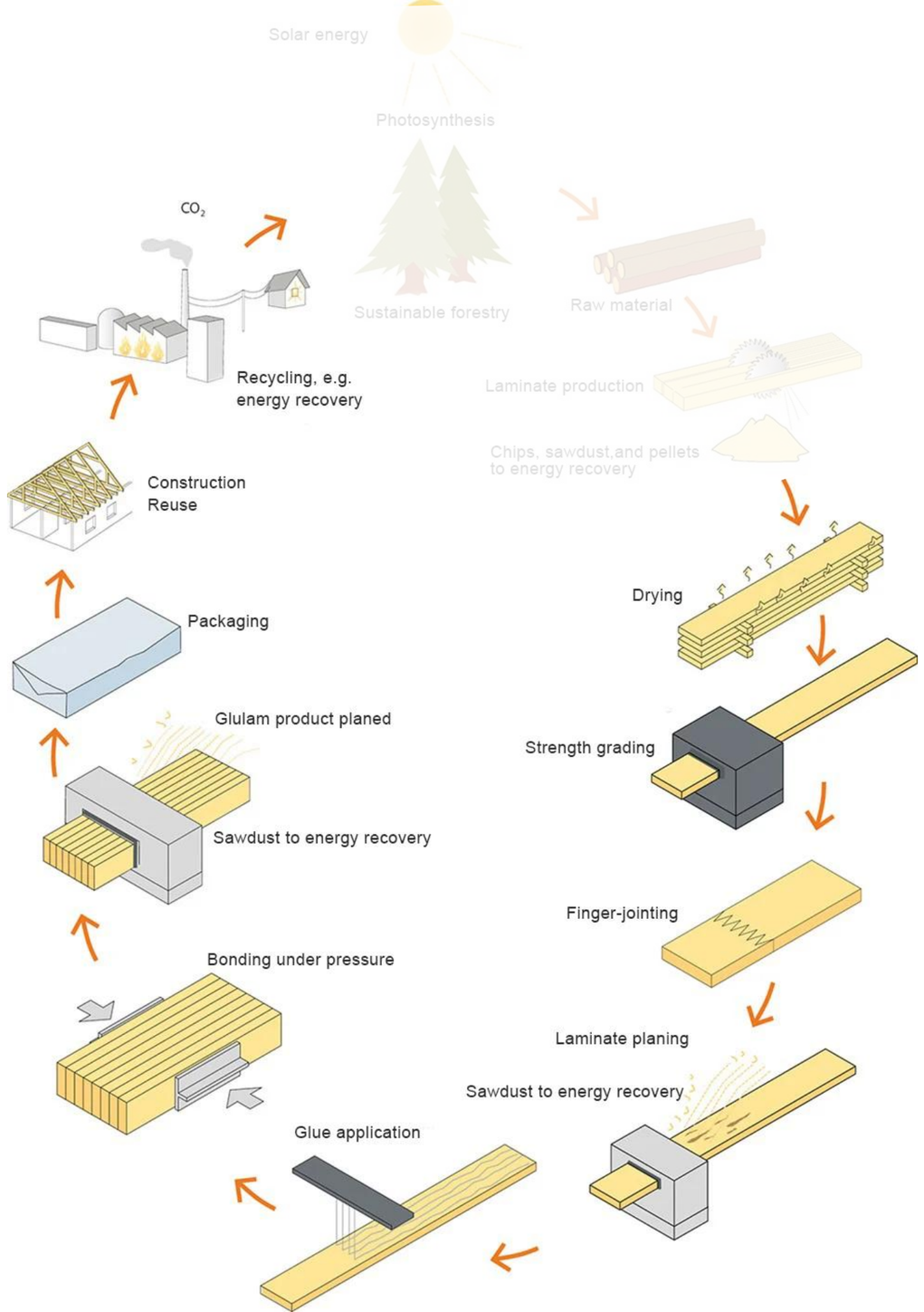
Stora Enso - Ybbs Mill



XYLO =
2064m³ CLT

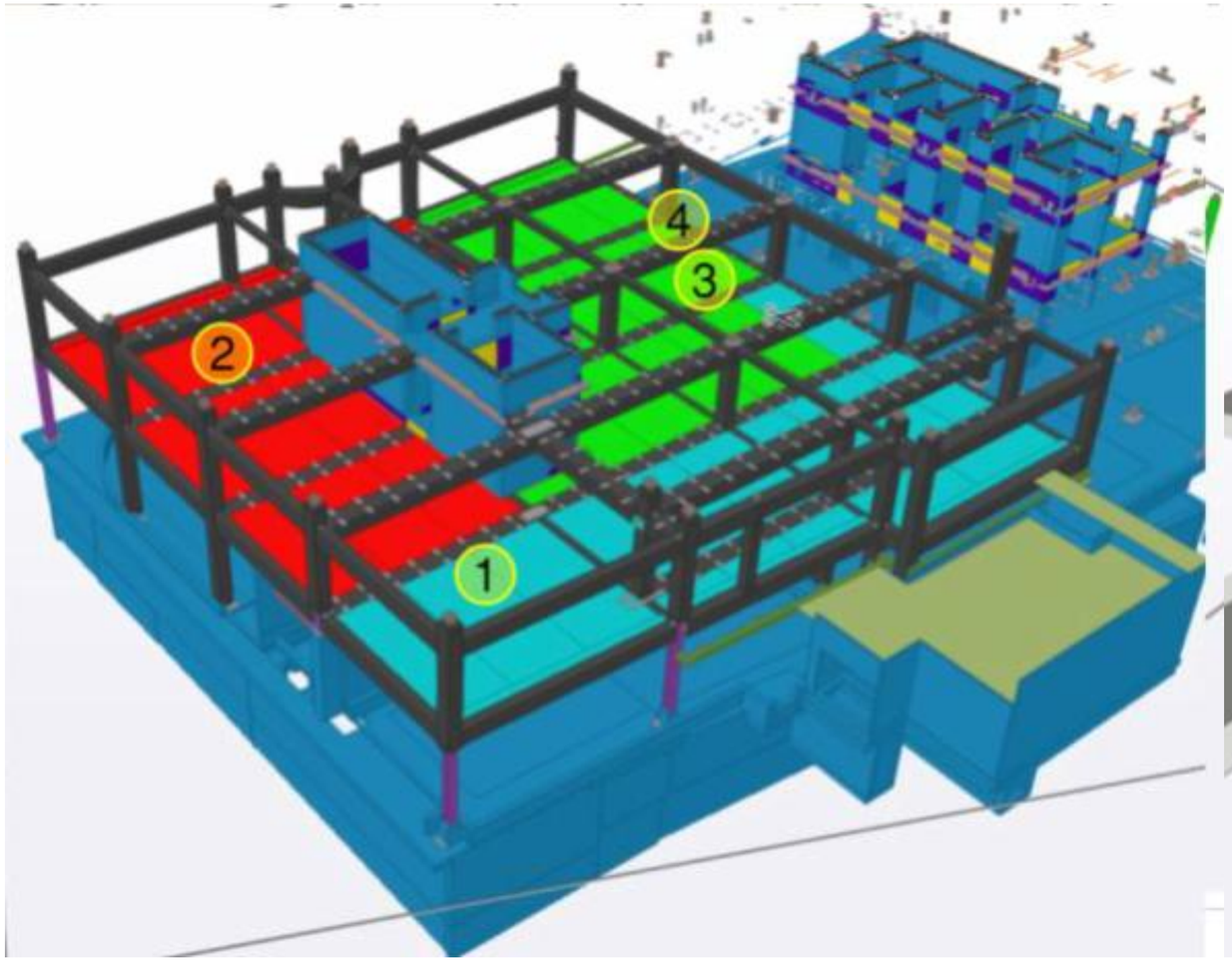
Glulam Factory

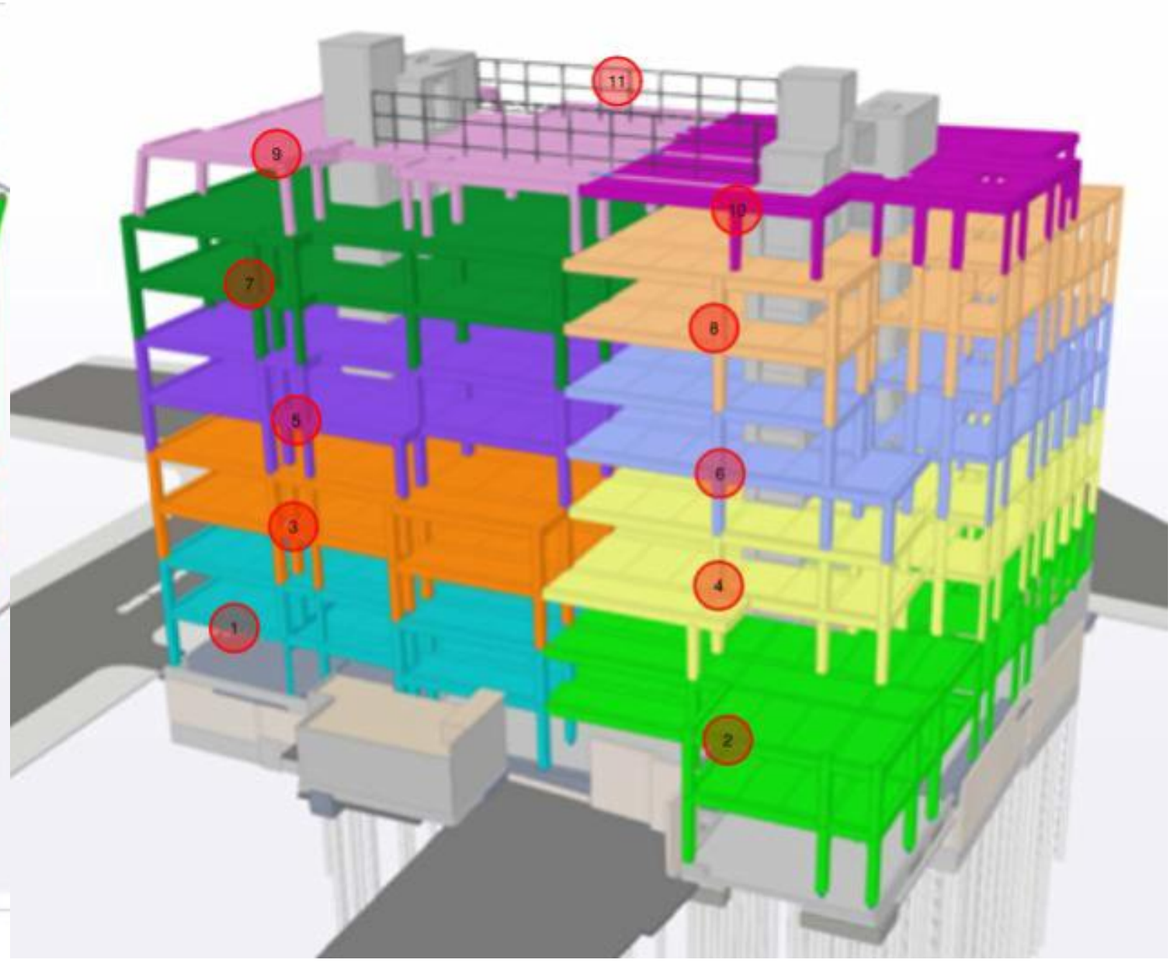
3000m³ CLT/week



HEYNE TILLETT STEEL

Build Sequence






ABUS 5t




HHT
rothoblaas
RAPID



CLT Transport



What’s Next? – CLT Species & Grade

+ Pine
+ Beech
+ OSB interlayer
+ C16



What’s Next? – Reused Timber

CLT from reclaimed wood





What’s Next? – Connections

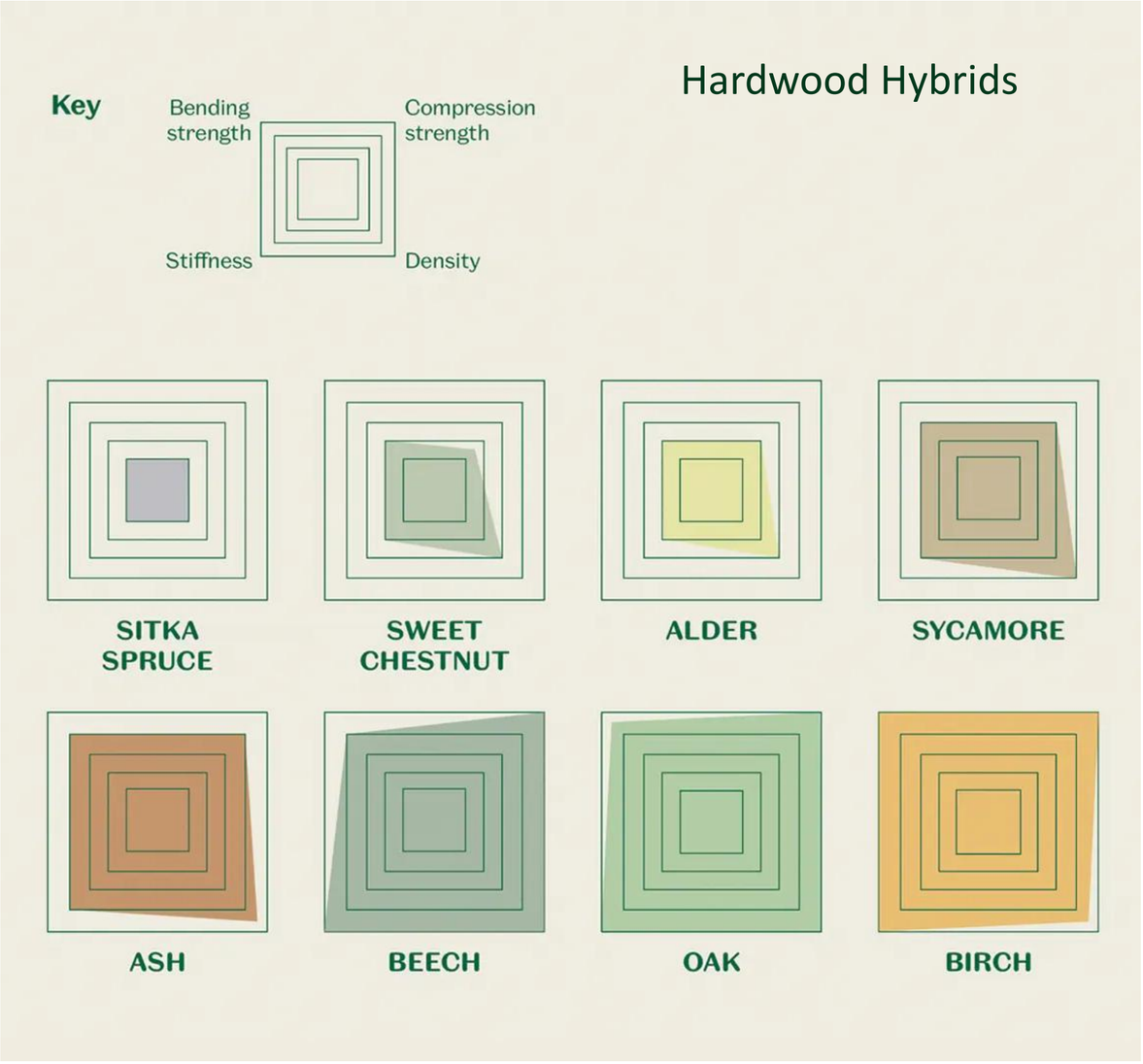








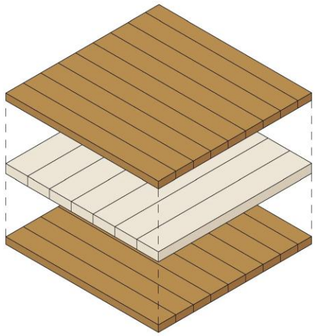
What’s Next? – UK Timber





What's Next? – UK Timber

Hardwood Hybrids

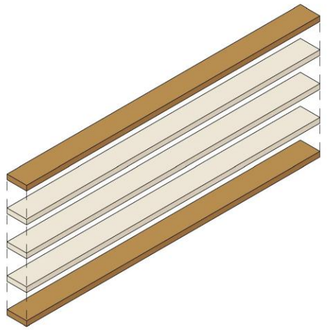


CLT sample of ash, sycamore and Sitka spruce
Made by Edinburgh Napier University
Edinburgh, 2024

New Recipes for Cross-Laminated Timber (CLT)

CLT is used for walls, floors and roofs. It is produced by gluing timber boards with the grain running in alternating directions.

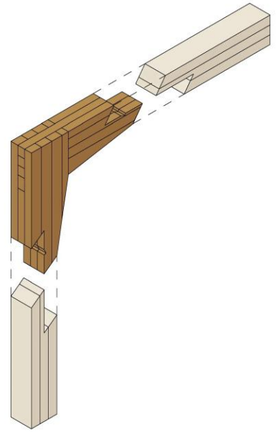
These samples, and the display structure itself, use hardwood boards from UK forest, alongside the softwood typically used. Softwood CLT requires lots of wood but by integrating stronger hardwood, the overall volume can be reduced by 15%.



Glulam sample of ash, birch and Sitka spruce
Made by Edinburgh Napier University
Glasgow, 2024

New Recipes for Glue-Laminated Timber (glulam)

Glulam is used for beams and columns up to 18 metres long. It is produced by gluing layers of timber, usually softwood, with the grain running in the same direction. Softwood glulam requires lots of wood but by integrating stronger hardwood, the overall volume can be reduced by 10%.

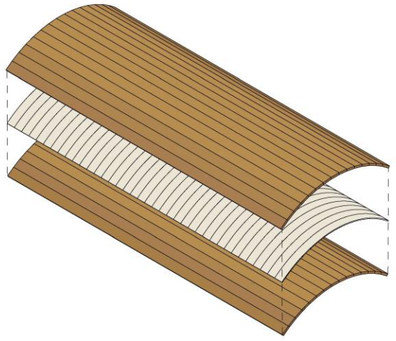


Knuckle of oak
Made by Highland Heritage Woodworks
Dunecht, Scotland, 2025

New Building Components: Knuckle

Buildings require additional strength where horizontal beams meet vertical columns. This is typically done with inserted steel plates.

A 'knuckle' connector – also used in the frame above – can achieve the same result but is made wholly from UK hardwood, layered in alternating grain directions. This innovative product distributes the stress accumulating at the corners.



Barrel vault and frame of ash, beech, birch, oak, sweet chestnut, sycamore, Douglas fir and Sitka spruce, suspended by Dyneema ropes from a CLT frame
Designed by dRMM, made by BE-ST
Blantyre, Scotland, 2025

New Building Components: Barrel Vault

Above you is a thin yet strong CLT canopy. The curved shape and hardwood content make it highly resistant to bending. It is used here as a roof, but a series of smaller units could be laid parallel in place of joists or a concrete foundation. By exploiting the strength of the hardwood, this pioneering design uses no more material than necessary.

Main Works on Site




Erith


Erith
The Enabling Specialists
SAFETY 24:7
Malletti
PIZZA E PASTA



HEYNE TILLETT STEEL

Thank You

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