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**structural**  
**TIMBER**  
CONFERENCE 2025

1 October 2025

# **Adaptation of Prototype housing schemes. How to re-think traditional design**

Presentation

## Agenda

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Who are we

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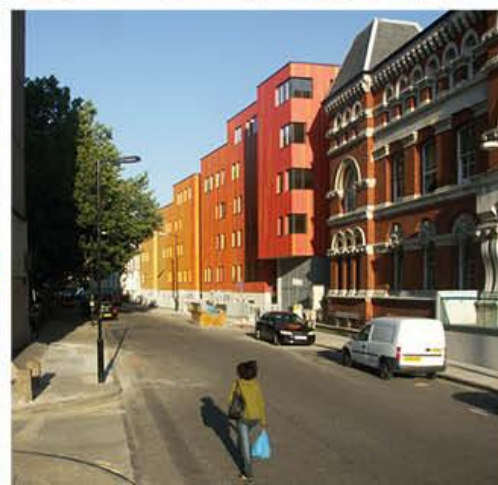
First thoughts on the prototype

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In practice

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# London studio



**Victoria Hale**

dRMM (London)

**Associate Director**

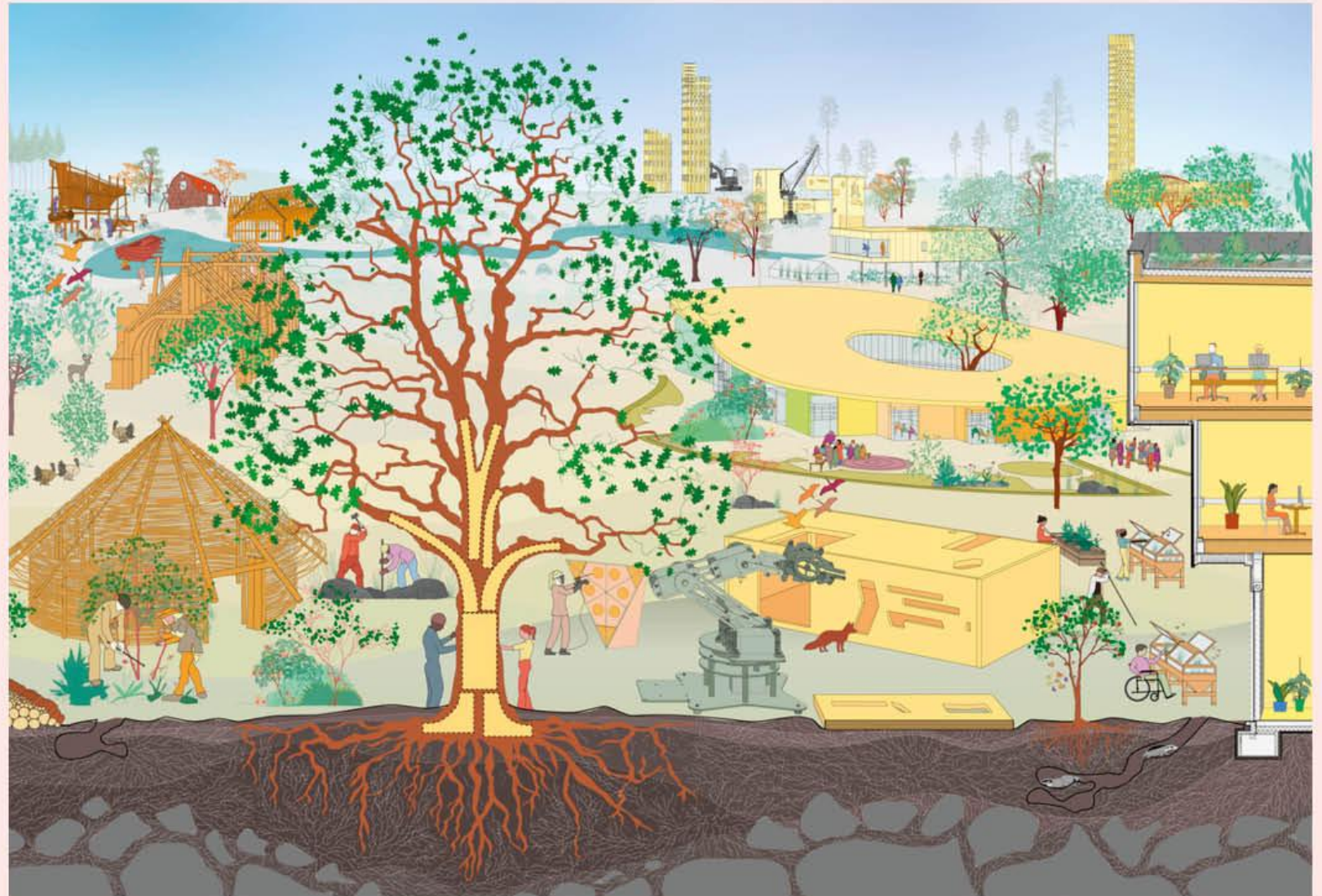
Expert on timber frame  
housing and its scalability  
/ applicability across  
ranges of contexts.



## Building from England's Woodlands

dRMM are proud to be part of a consortium of timber experts leading a research project into the potential of English woodland to provide hardwood for homegrown products from the construction industry.

“By manufacturing viable and scalable homegrown timber alternatives to carbon-intensive materials, we are aiming to reduce the UK's reliance on imported products. Widening the range of species that provide a domestic wood supply could also provide a boost for localised manufacturing facilities and supply chains.”





## Measuring Mass Timber

dRMM were awarded funding from the network and grant-making accelerator Built by Nature for a research study into the whole life carbon and quality of life impacts of mass timber buildings.

Our study presents a consistent method for surveying mass timber buildings as a means to quantifying, and eventually disseminating, the benefits of timber – transcending typology, programme or scale.

By evaluating five UK exemplars of a range of mass timber construction types and use classes, the study will provide a scalable method for understanding the carbon and well-being benefits of mass timber, and how they can be maximised across national and international development.



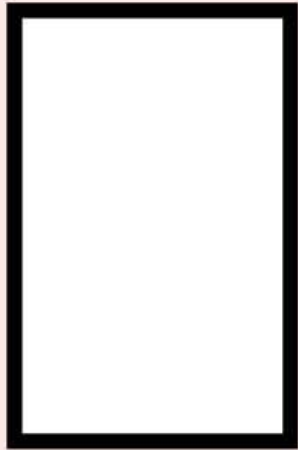
**First thoughts on the  
prototype**

**1**

# Setting the brief: a vernacular for low-rise homes

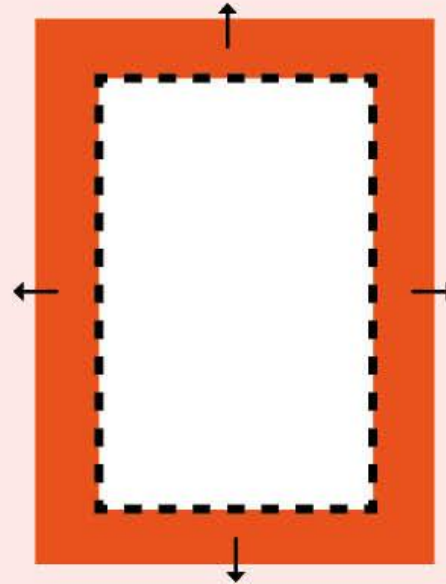


1. Homes need to be affordable - so areas need to be practical but efficient. We need to be mindful of what minimal standards are.



Core product

2. Introducing a small amount of 'special' product is a good way to test ideas and sales strategies without risking project wide innovative designs.



Special product

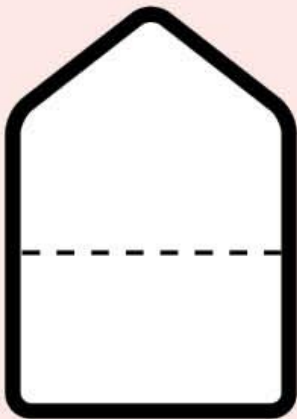




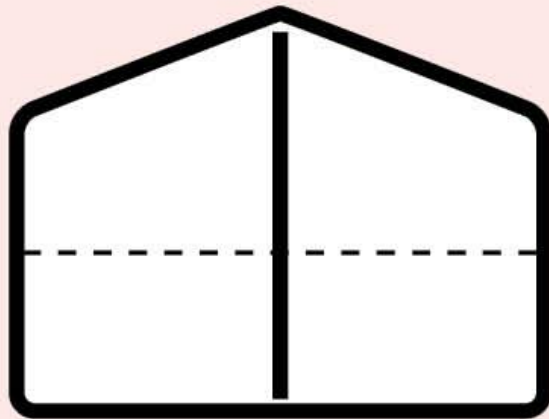
# Low rise housing typologies



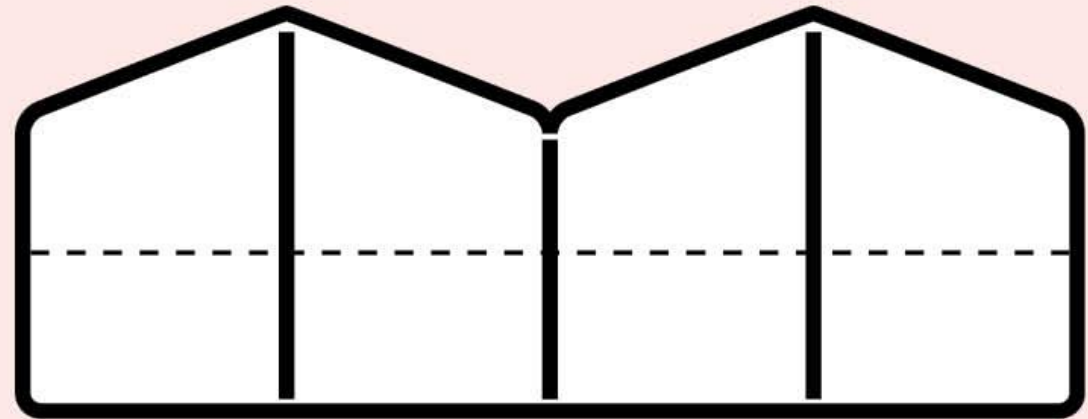
Cost effective and sustainable design often go hand-in-hand. When designing low-rise housing, the grouping of homes together drives efficiencies across the board.



Detached houses



Semi-detached houses



Terraced houses

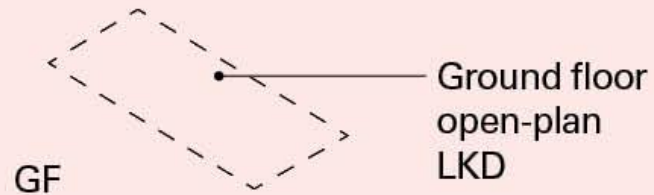
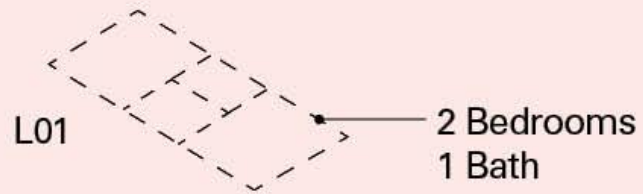


Increased cost efficiency, improved form factor  
Better operational energy efficiency  
Lower embodied carbon

# Relationship between footprint and mass

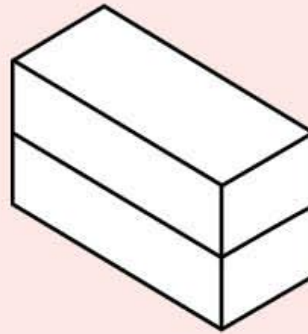


Two-bedrooms equate well to the standard size for a living kitchen diner at the ground floor. A simple massing can be achieved for two and four bed homes.

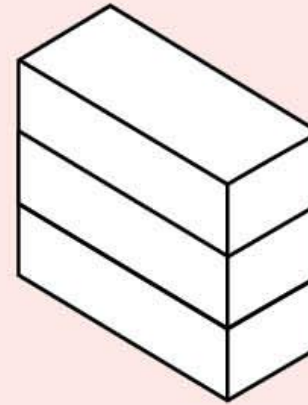


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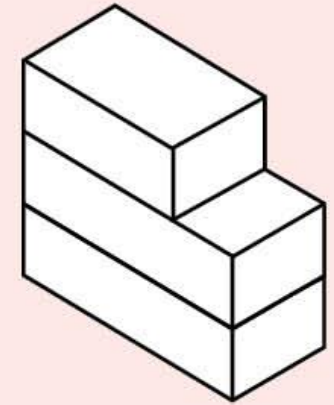
2-bed  
massing



4-bed  
massing



3-bed  
massing



Two-beds / two storey  
building works well for area

Adding a storey means a  
4-bed in terms of area

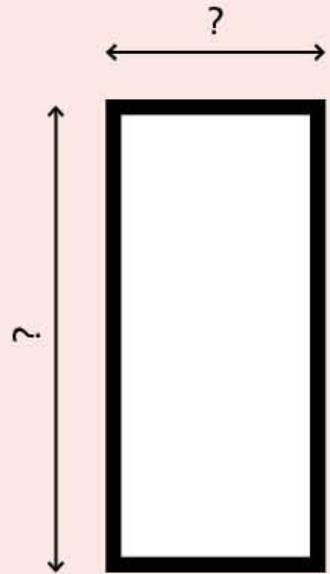
Unless a terrace is  
introduced but detailing  
impact to be considered



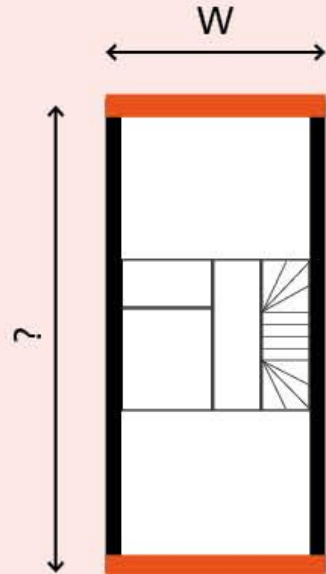
Fire Safety requirements for  
buildings with a storey above 4.5m:  
**Enclosed staircase  
or sprinkler system**



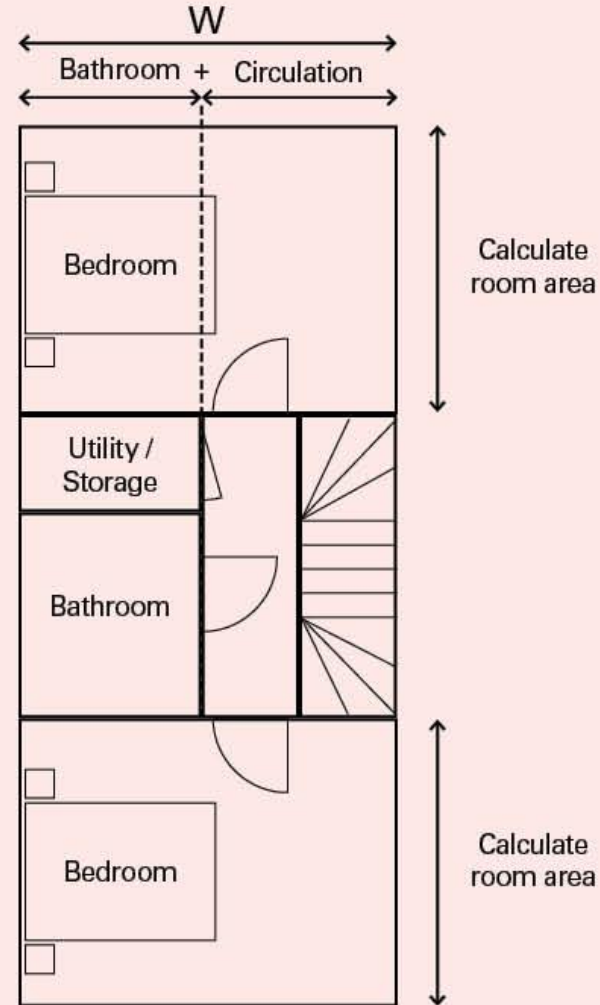
# How to determine the width



1.  
Rational plan  
with optimised dimensions

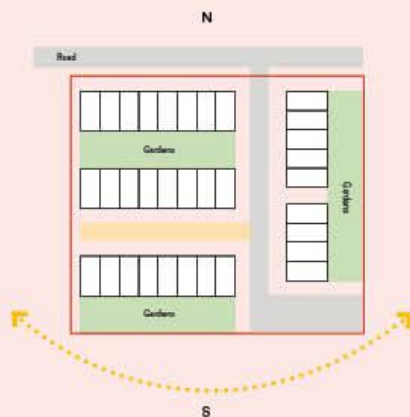


2.  
Minimising facade area  
by reducing width



Calculating the optimal  
width

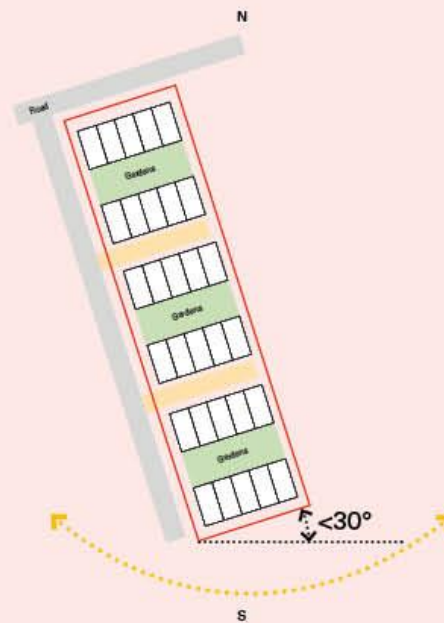
# Optimised site layouts



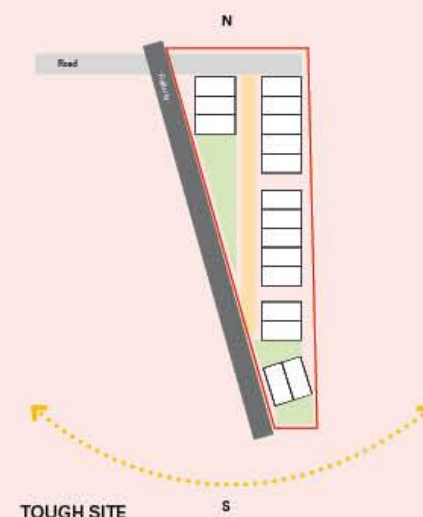
IDEAL SITE



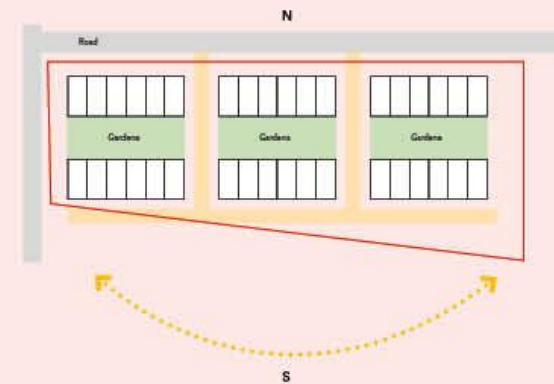
SITE SPECIFIC



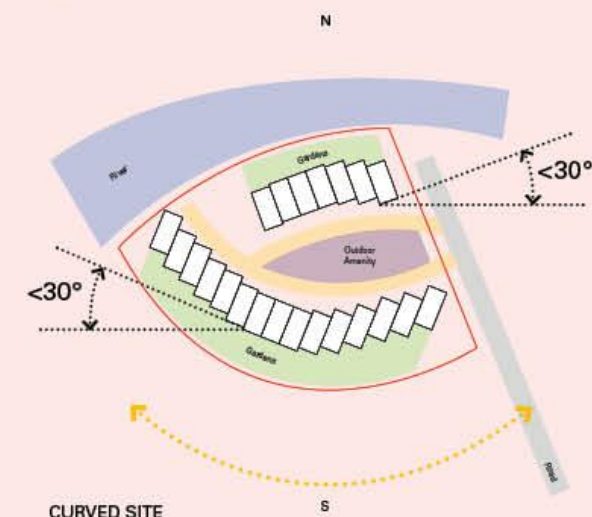
WITHIN 30° OF SOUTH SITE



TOUGH SITE



EASY SITE



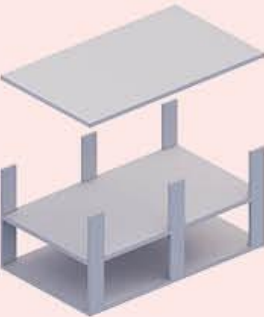
CURVED SITE



# Structural options



## RC FRAME



£222 /sqft (base build)    £273 /sqft (overall)

**253 kgCO<sub>2</sub>e/m<sup>2</sup>**  
**SCORS D**

Structural embodied carbon

Cheapest option (5% below average)

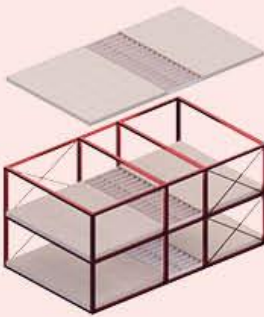
Longest time on site and highest carbon footprint (35% above average)

Least risk and most standard approach with regards to fire

Heaviest foundations required

Good acoustic performance and full range of floor finishes available

## STEEL FRAME CLT HYBRID



£228 /sqft (base build)    £281 /sqft (overall)

**178 kgCO<sub>2</sub>e/m<sup>2</sup>**  
**SCORS B**

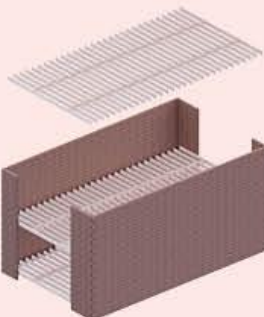
Structural embodied carbon

Cost effective and time efficient

Higher than average carbon footprint due to steel frame

Detailing of steel-timber connections may require fire separation boards and specialist testing

## MASONRY W. TIMBER JOISTS



£232 /sqft (base build)    £288 /sqft (overall)

**206 kgCO<sub>2</sub>e/m<sup>2</sup>**  
**SCORS C**

Structural embodied carbon

Higher than average cost and long time on site

Impractical above 4 storeys due to disproportionate collapse considerations

Higher than average carbon footprint due to steel and masonry

## NEW MODEL BUILDING

## CLT WALLS AND SLABS



£243 /sqft (base build)    £296 /sqft (overall)

**120 kgCO<sub>2</sub>e/m<sup>2</sup>**  
**SCORS A**

Structural embodied carbon

Lightweight and quick to erect

Most expensive option (3% above average)

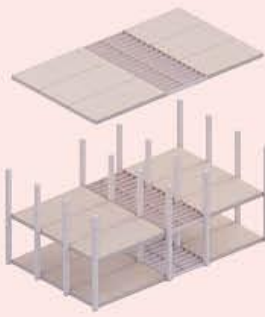
Good acoustic performance and full range of floor finishes available

Design compliance using tested detailing

High cost of encapsulation

Risk of moisture damage during construction

## GLULAM COLUMNS AND CLT SLABS



£241 /sqft (base build)    £294 /sqft (overall)

**91 kgCO<sub>2</sub>e/m<sup>2</sup>**  
**SCORS A+**

Structural embodied carbon

Lightweight and quick to erect

Opportunity for raft foundation

More expensive option (2% above average)

Design compliance using tested detailing

Less timber to encapsulate

Risk of moisture damage during construction

Exceptional embodied carbon performance (45% below average)

**In practice**

**3**



# Materials & Systems



Following a market review of contractors with a track record of delivering, with a low impact, timber frame has emerged as the preferred structural material for the low rise homes. A wide range of proprietary systems are adapted to meet Passivhaus requirements.



**Pitched Roof**

To shed rainwater and allow for high-level air changes.



**Internal stud framing**

Sheathed in OSB for lightweight construction and services integration



**Deep External Wall Structure**

Larsen Truss, Engineered Joist or Composite Joists



**Lightweight floor structure**

Services in structural zone of posi-joist (or similar)



**Airtightness measures**

OSB 3 with airtightness tapes at junctions and openings



## Proposed Site





# Proposed 3bed 5person layout

## Target Performance

Passivhaus 'Classic'  
Certified

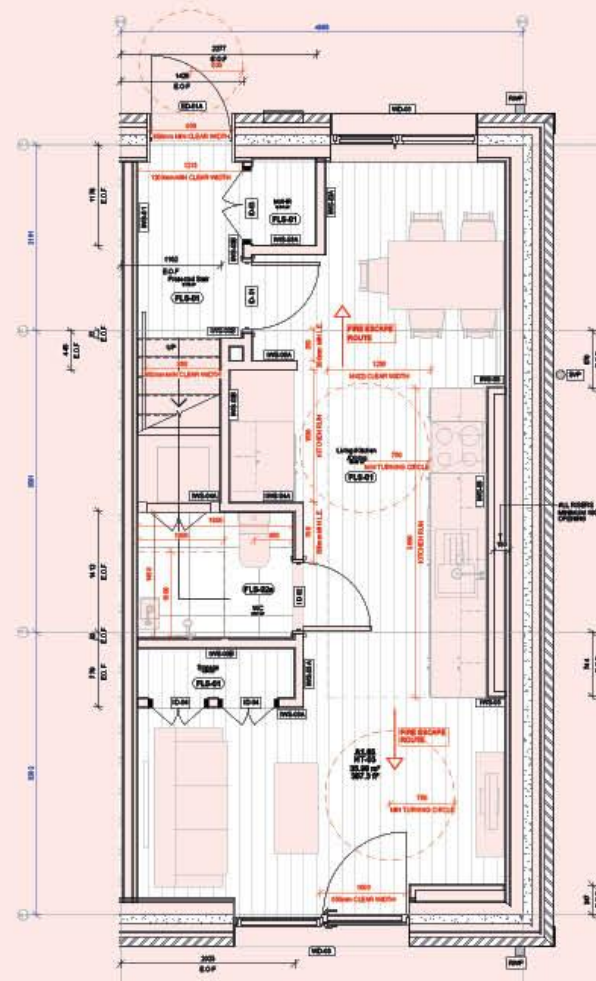
Ext Wall U-Value Target  
(0.11 W/m<sup>2</sup>K)

Air Tightness  
(0.6 ach@50pa)

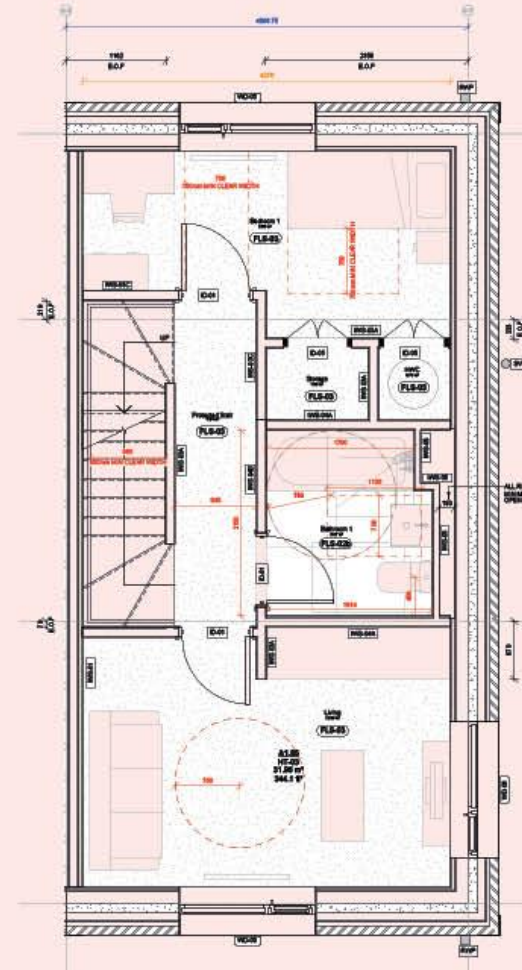
Fire Compartmentation  
Requirement  
60 REI

Fire Protection of Primary  
Structure  
30 REI

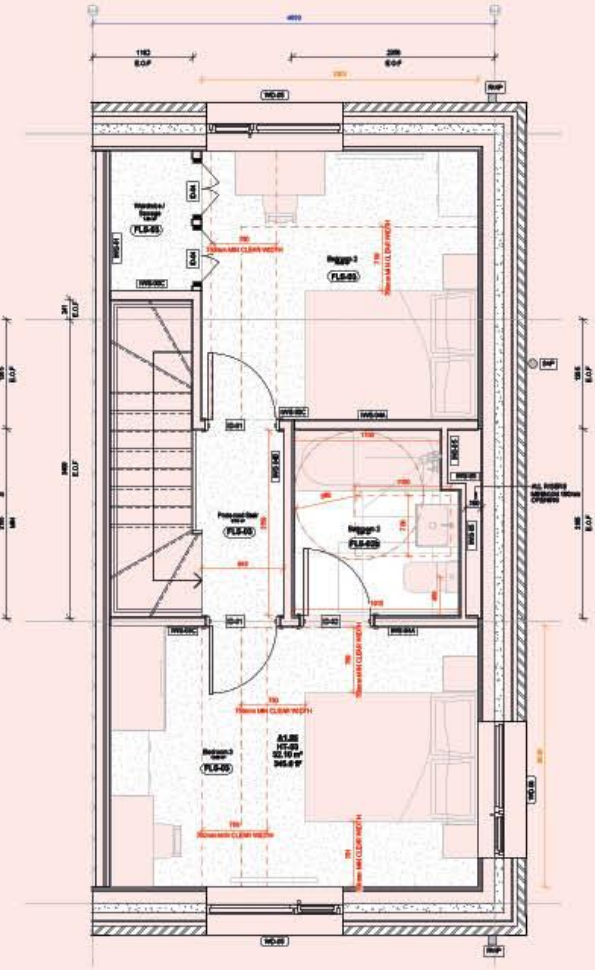
Ext Acoustic Target  
40dB



Ground Floor

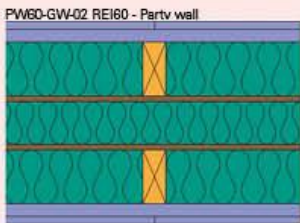
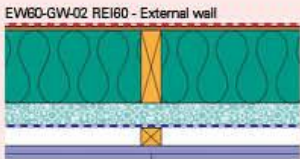


First Floor



Second Floor

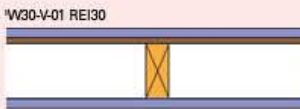
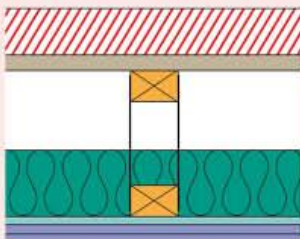
# Proposed Build Up's



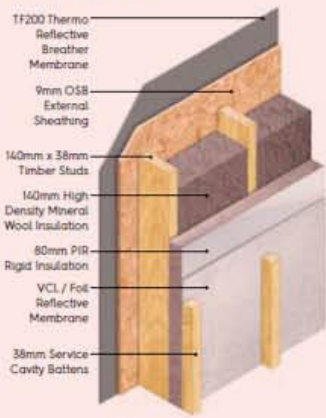
External wall  
Cut / Vaulted Roof System U-Value 0.10W/m²K



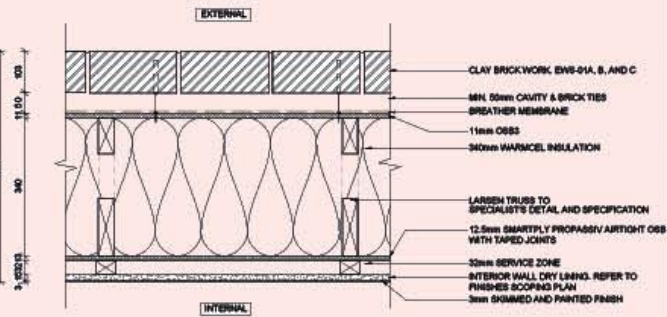
Roof



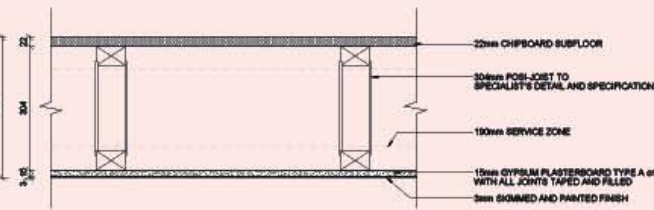
0.11W/m²K U-Value



EWS-01	A: STRETCHER BOND BRICK PATTERN B: HEADER COURSE BRICK PATTERN C: SOLDIER COURSE BRICK PATTERN	TARGET U-VALUE: 0.11 W/m²K FIRE RESISTANCE: REI 60 SOUND INSULATION: 45 dB Rw+Ctr	FFS-03	TARGET U-VALUE: NA FIRE RESISTANCE: REI 60 SOUND INSULATION: 45 dB Rw+Ctr AS PER STA SYSTEM: FFS-03-U-01
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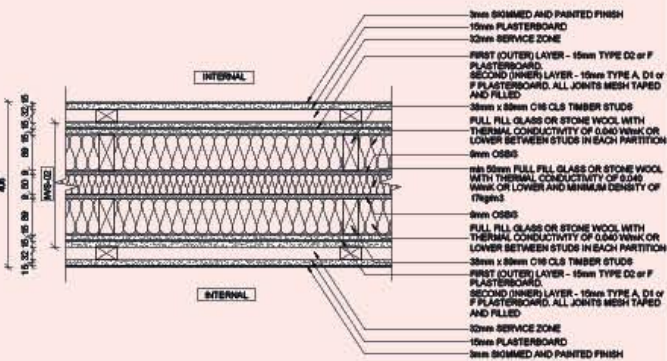


TYPICAL EXTERNAL WALL  
15

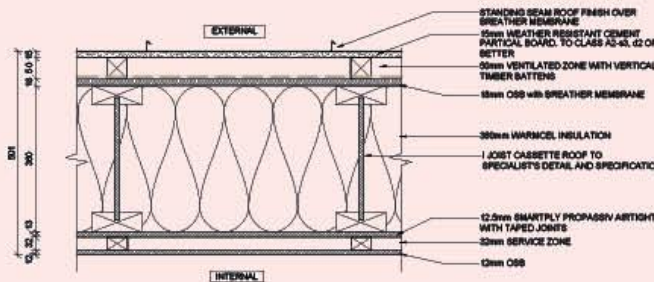


TYPICAL INTERNAL FLOOR  
15

IWS-01	TARGET U-VALUE: NA FIRE RESISTANCE: REI 60 SOUND INSULATION: 45 dB Rw+Ctr STA SYSTEM: PW60-GW-02	RFS-01	TARGET U-VALUE: 0.11 W/m²K FIRE RESISTANCE: NA SOUND INSULATION: 55 dB Rw+Ctr
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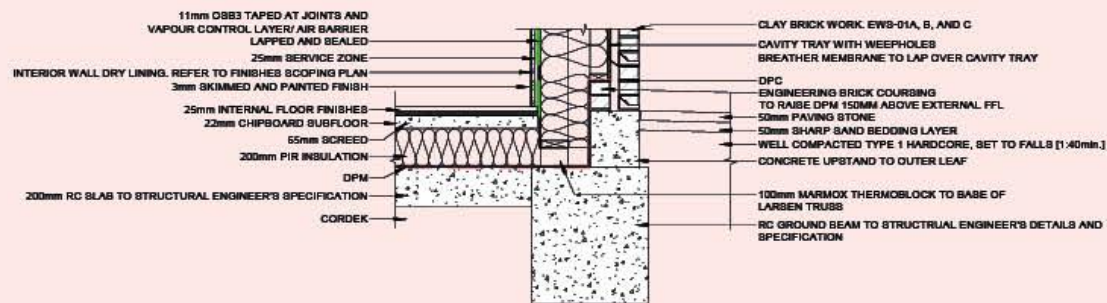
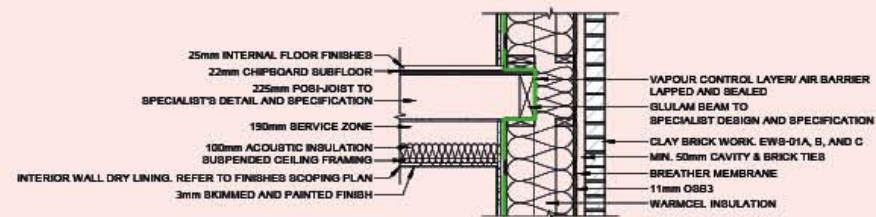
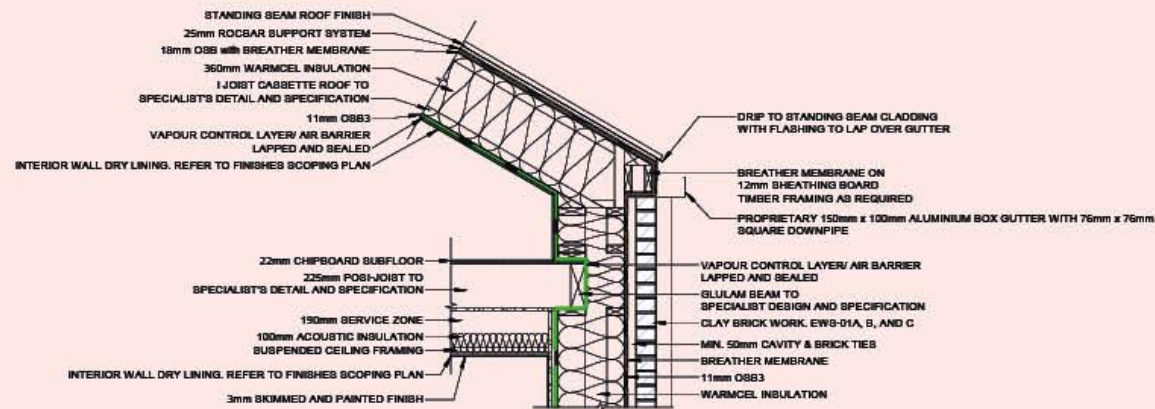
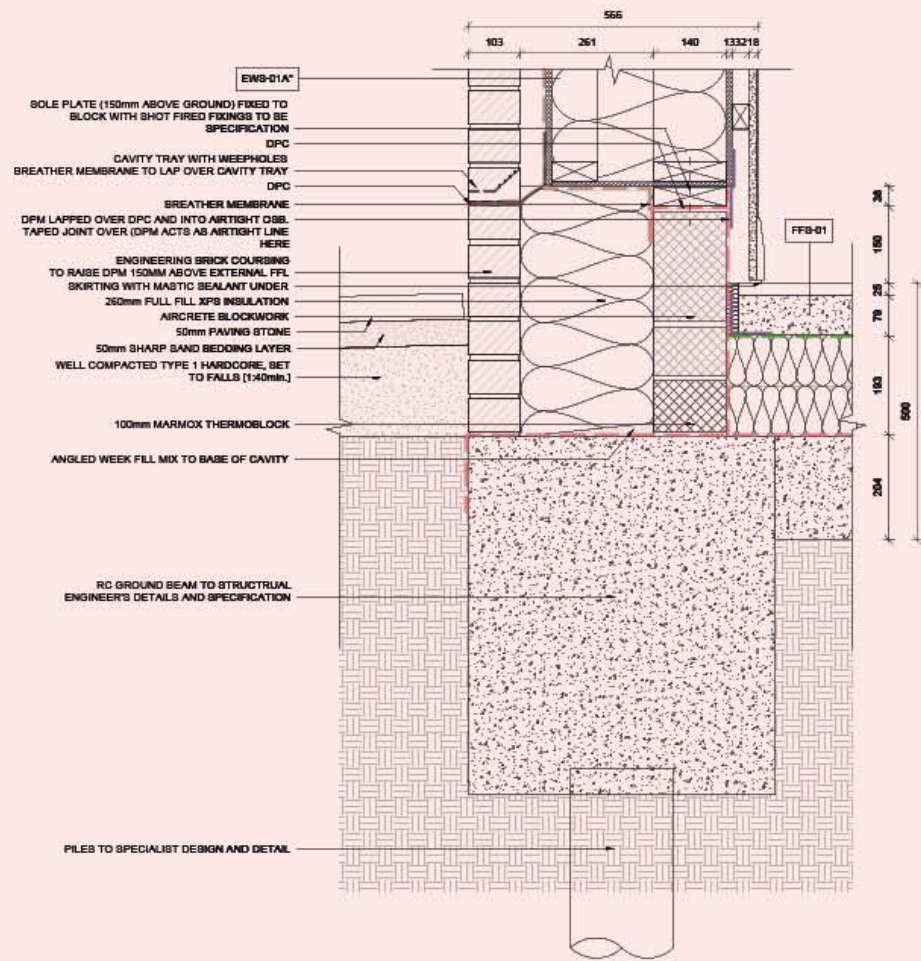
TYPICAL PARTY WALL  
15



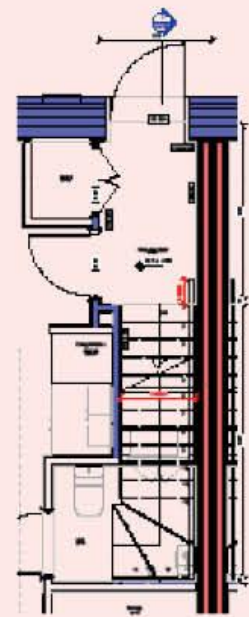
TYPICAL ROOF  
15



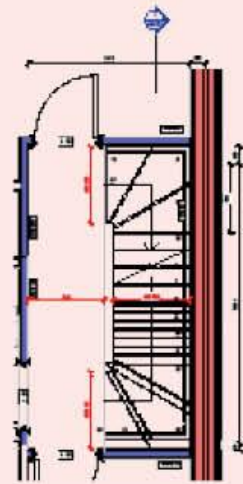
# Building in Section



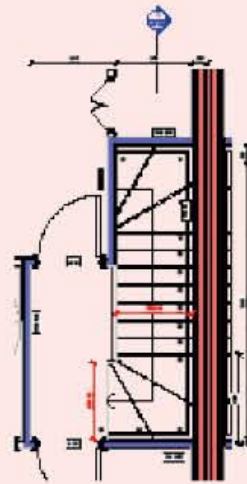
# Fire Strategy



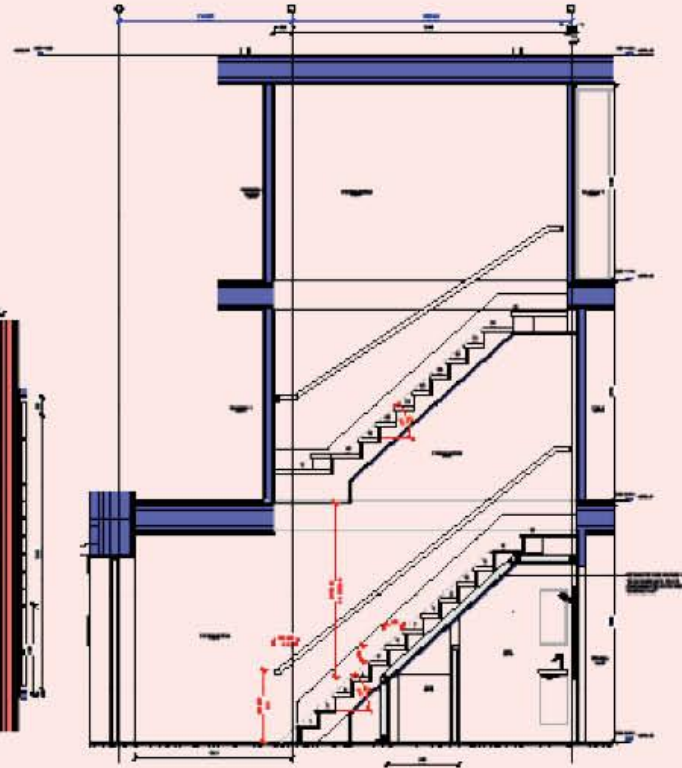
1. STAIRCASE TYPE 1 LEVEL 31



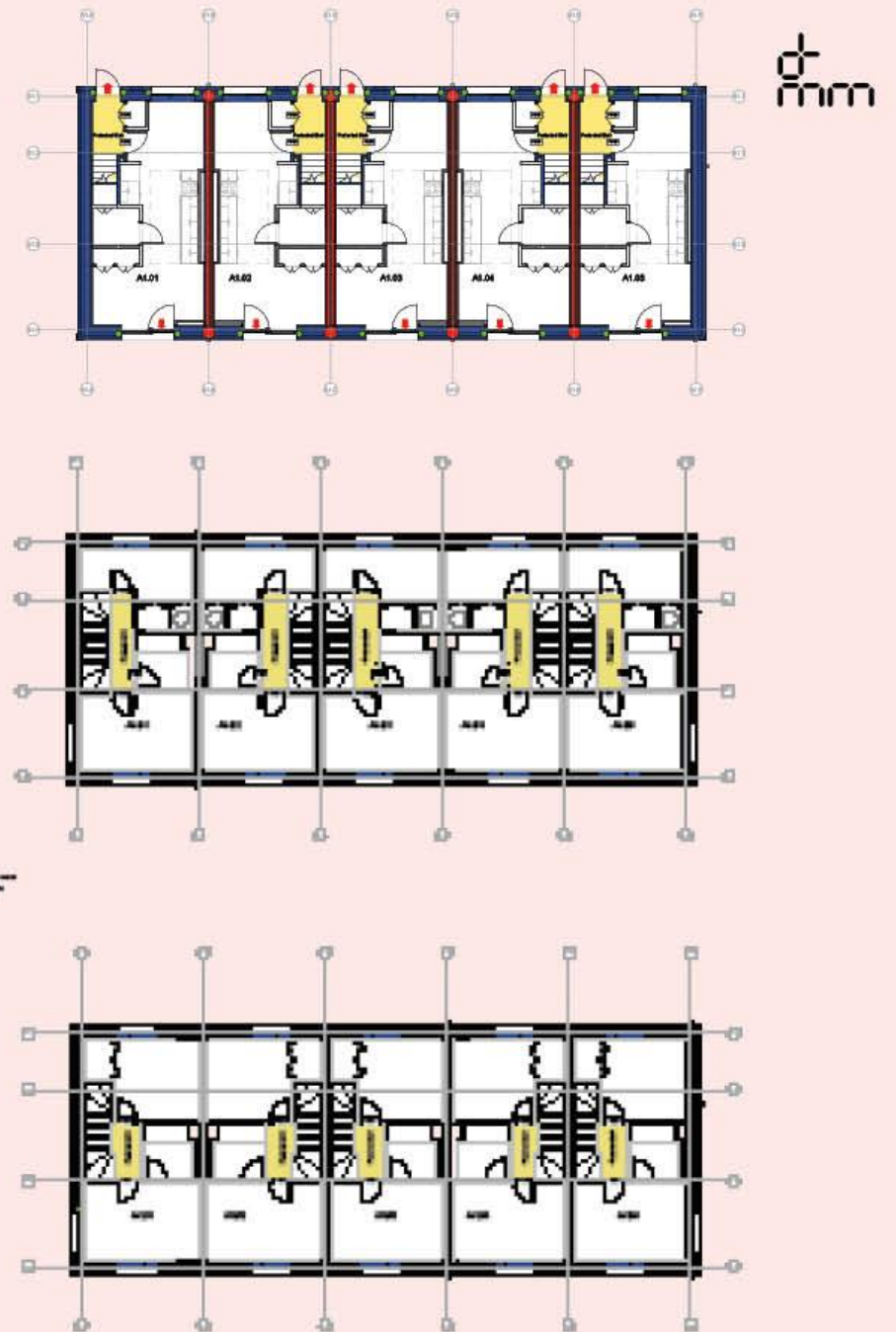
2. STAIRCASE TYPE 1 LEVEL 32



3. STAIRCASE TYPE 1 LEVEL 33



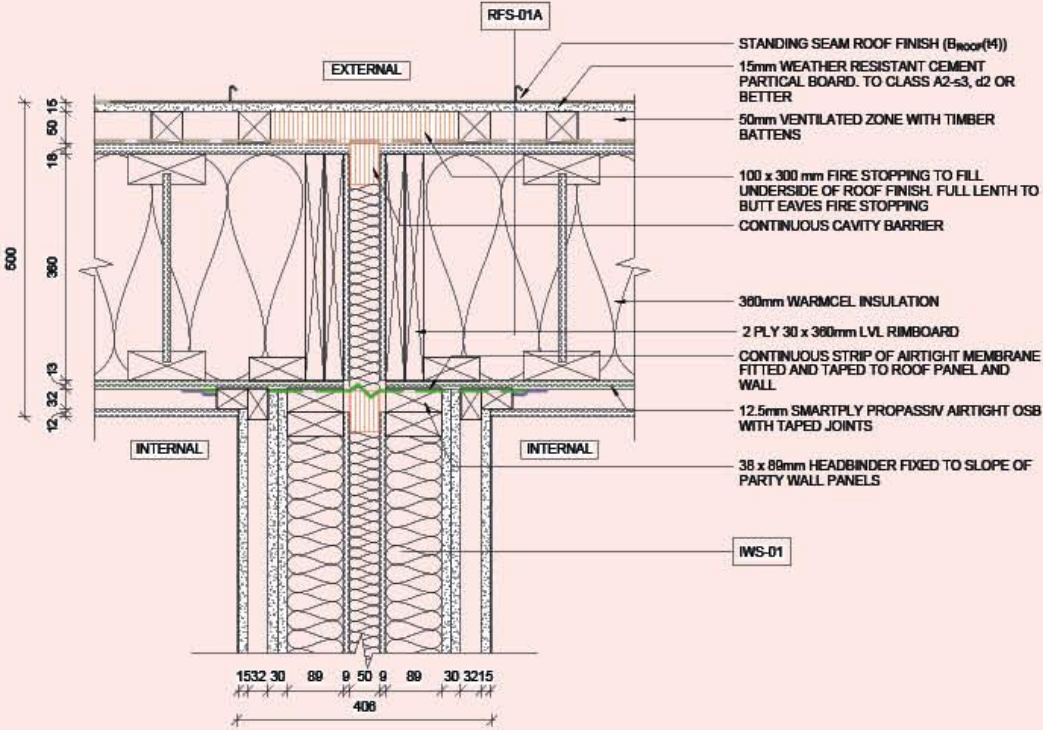
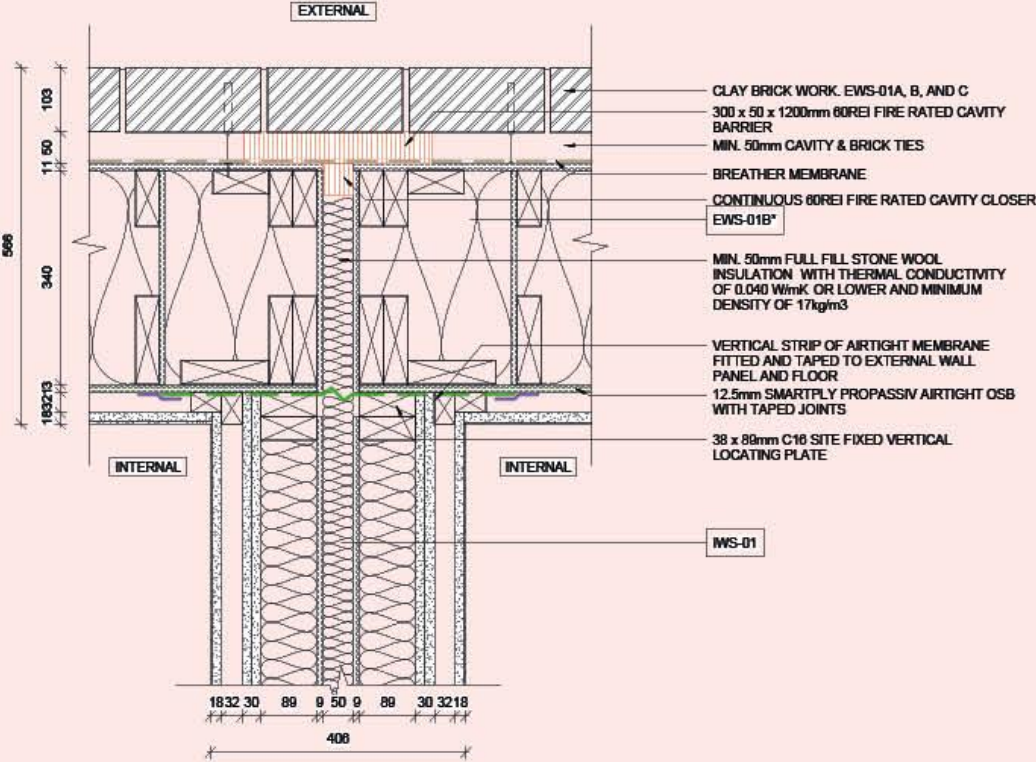
4. STAIRCASE TYPE 1 SECTION 4



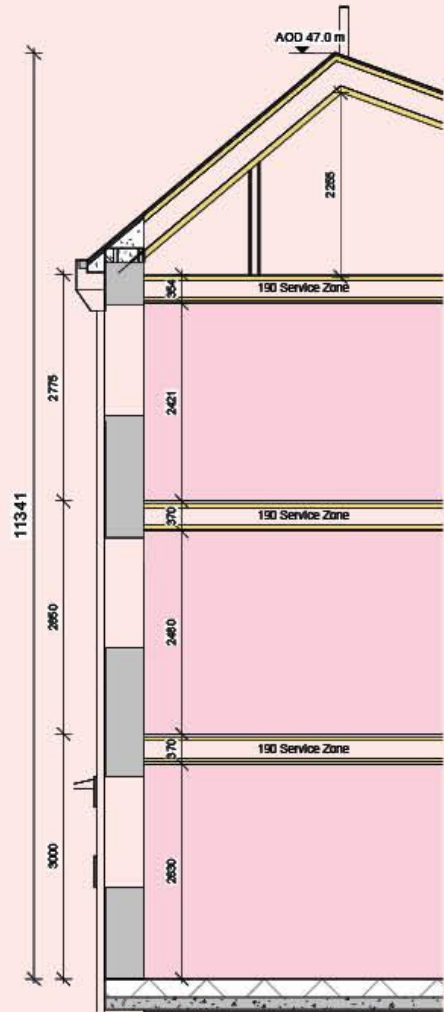
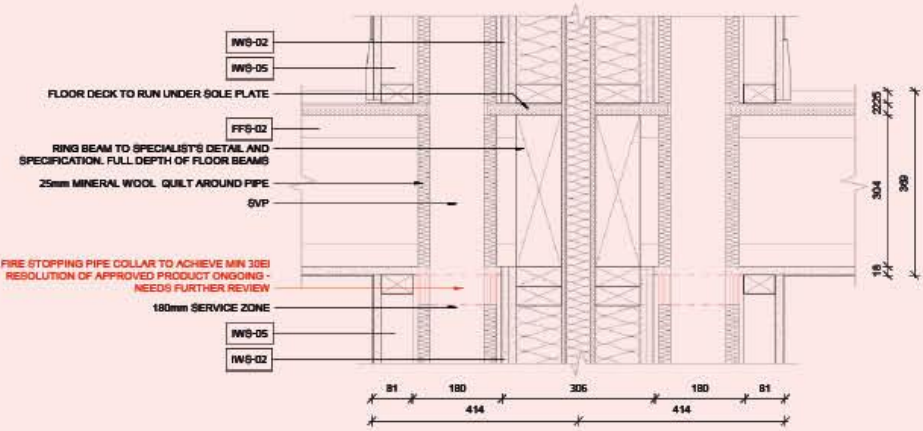
mm



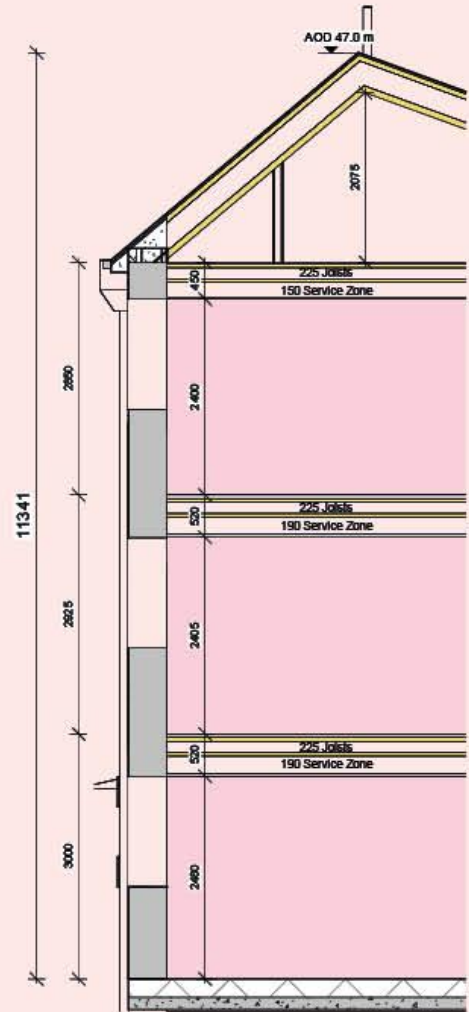
# Compartmentation Detailing



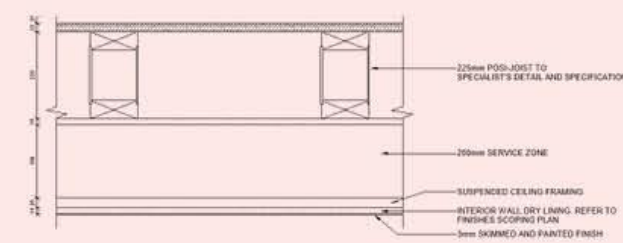
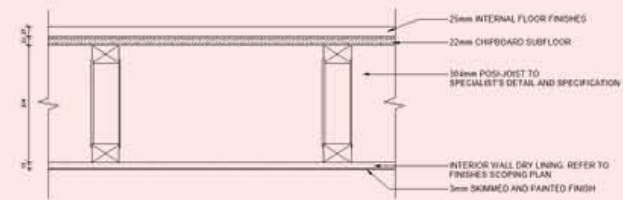
# Posi-Joist Flooring



Typical 3-Bed house section - Integrated Service Zone



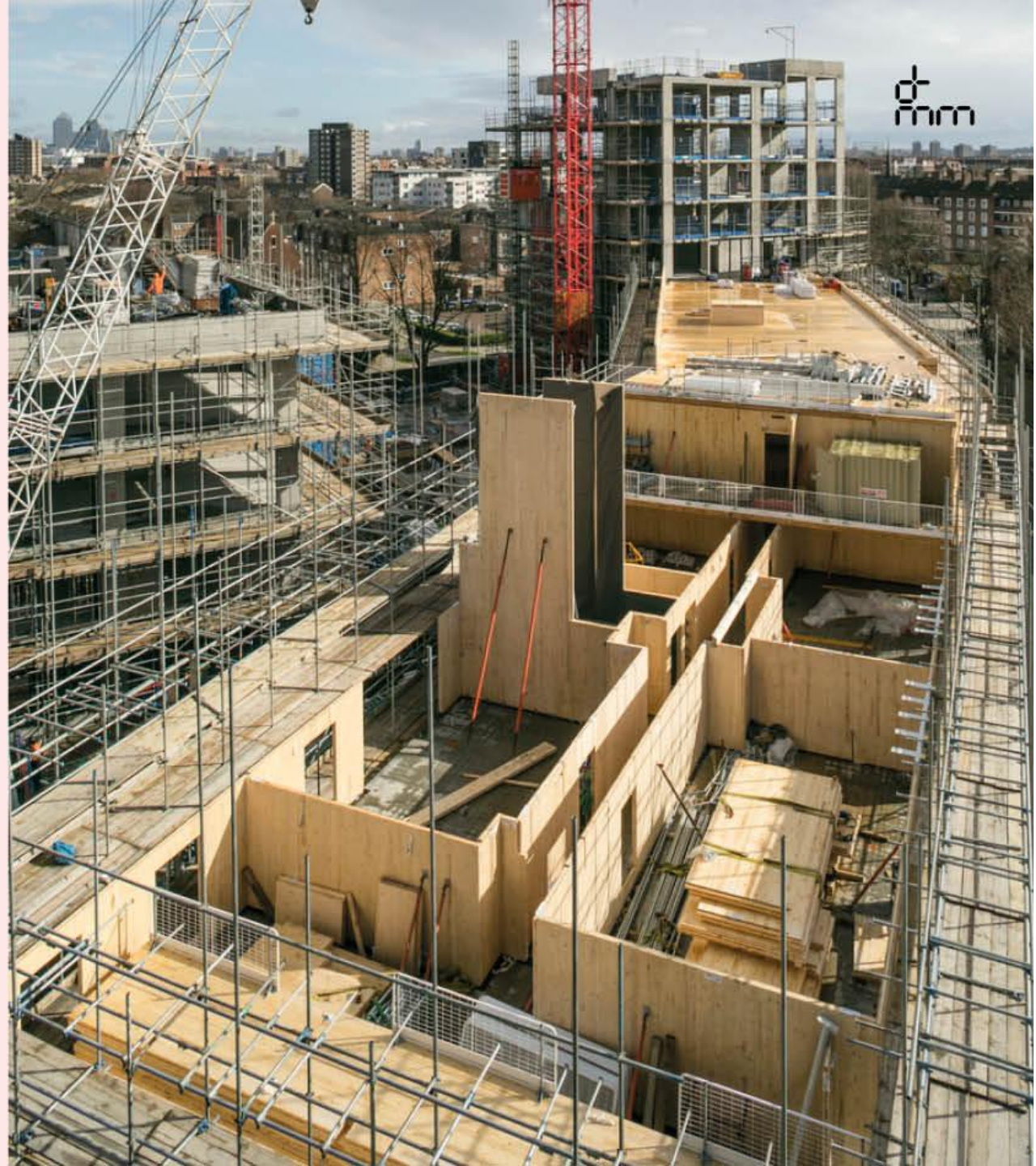
Typical 3-Bed house section - Ceiling Service Zone





## Key Take Homes:

- Think of the building as a series of systems, not an assembling of products. Tested data for products within timber systems is challenging.
- Do not design to minimum widths, allow tolerance - we were keen to keep areas to a minimum for viability, but we restricted ourselves as the design developed
- Early engagement with the timber supply chain, although principles may seem consistent the execution of the detail is imperative to coordinate
- Careful consideration of the horizontal and vertical distribution of services with the timber frame.
- Utilise Service zones to walls and floors
- Consistent cost planning alongside market testing to ensure viability of timber construction is retained
- 16 Steps to Fire Safety by STA is vital for early consideration







**Thank you**