

NEW BUILD DWELLING TECHNICAL REPORT

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Table of Contents

1.0 Executive Summary

2.0 Design

3.0 Attic Room

4.0 Offsite Construction

5.0 References

1.0 Executive Summary

- 1.1** The aim of this report, is to provide the client with the technical details involved in the construction of her proposed timber frame build.
- 1.2** To produce drawings of details and sections of key structural elements of the building, to allow for better understanding of the construction methods and of compliance with current building regulations.

The focus are:

Detailed sections of the ground floor and first floor, showing junctions and fittings. Showing the materials used in construction and how the insulation meets the requirements of building regulations.

A detail of the eaves section including junctions and lappings of the roof, how the insulation is applied through the floors and roof.

The structure of the main roof showing the truss and how the timber is fitted.

A plan view detail of a window opening with focus on connections and insulation application.

- 1.3** Provide options for an alternative roof structure better suited to accommodate an attic room.
- 1.4** Advise the client on offsite construction and its potential relevance to her own project.

2.0 Design

2.1 The overall design of the dwelling focuses around its thermal performance. A thick outer skin of clay brick and aggregate concrete block, combined with an inner skin of insulated timber frame.

The benefit being its thermally heavy profile absorbing heat slowly through conduction, while the inner skin is able to retain its temperature through convection making its thermal performance very efficient. – Sadler (2020).

2.2 A continuous application of thermal insulation throughout the timber frame and below the underfloor heating system will ensure optimal thermal performance. The maximum U-values as set out in approved document L1(a) are provided in the attached drawings.

3.0 Attic Room

3.1 The current plan for the dwelling proposes a total height of 6757mm. Although the attic space could be converted into a usable room, the profile of the roof being pitched and hipped would result in being unable to stand anywhere other than the centre of the attic.

Furthermore there is the problem of the structural elements of the roof that will have to be reconsidered, along with thermal insulation being installed to ensure compliance with building regulations.

3.2 A potential solution to allow for better use of the attic would be to propose a couple roof, removing the hipped design element.

Where this would maximise space, the dead load of the structure would increase and potentially compromise its stability.

3.3 A more desirable approach could be to proceed with the current style of roof, but to redesign the truss internally to allow for a small storage room or bedroom excluding the hipped elements or utilising for storage areas.

4.0 Offsite Construction

4.1 Offsite construction is a modern method of construction that includes a variety of different construction processes used to manufacture and assemble different elements of a structure off site. The modules are typically manufactured in a factory, where the environment is less hazardous, and more comfortable for those producing them, and where the storage of materials is in a location less exposed to weather damage, vandalism and theft.
Additionally, waste is managed more effectively in a controlled environment, saving money on materials and on disposal from site.

4.2 There are four main methods of offsite construction, all of which could be used within the project:

i Panelised systems

Use of pre-built timber frame panels delivered to site are an option for this project. Structural insulated panels to be erected saving time within the construction process, brick and blockwork can begin within a shorter timeframe. It is possible for certain services elements to be installed saving additional costs. – Modularize (n.d.)

ii Volumetric systems

A three dimensional offsite construction process.
A useful application for this project would be a non-structural bathroom pod. It is possible to prefabricate a fully finished room fit with utilities and services delivered to the site and installed, saving time with fitting after construction.

iii Sub-assemblies and components

Pre-assembling smaller elements of the dwelling to reduce time spent on site.
Components most effective to assemble would be the roof truss, doors and door frames and windows.

iv Hybrid systems

This includes a combination of methods to allow for multiple offsite construction methods to be used together.
An application of hybrid offsite construction would be constructing structural insulated timber frame alongside a subassembly roof truss offsite, resulting with the majority of the timber frame produced offsite.

5.0 References

Andrew Sadler 2020. *What are the Benefits of Thermal Mass?*. [online]

Available from:

<https://buildpass.co.uk/blog/what-are-the-benefits-of-thermal-mass/>

(Accessed: 23 April 2023).

HM Government 2010. *The Building Regulations 2010 – Conservation of Fuel and Power Approved Document L*.

Available from:

<https://www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l>

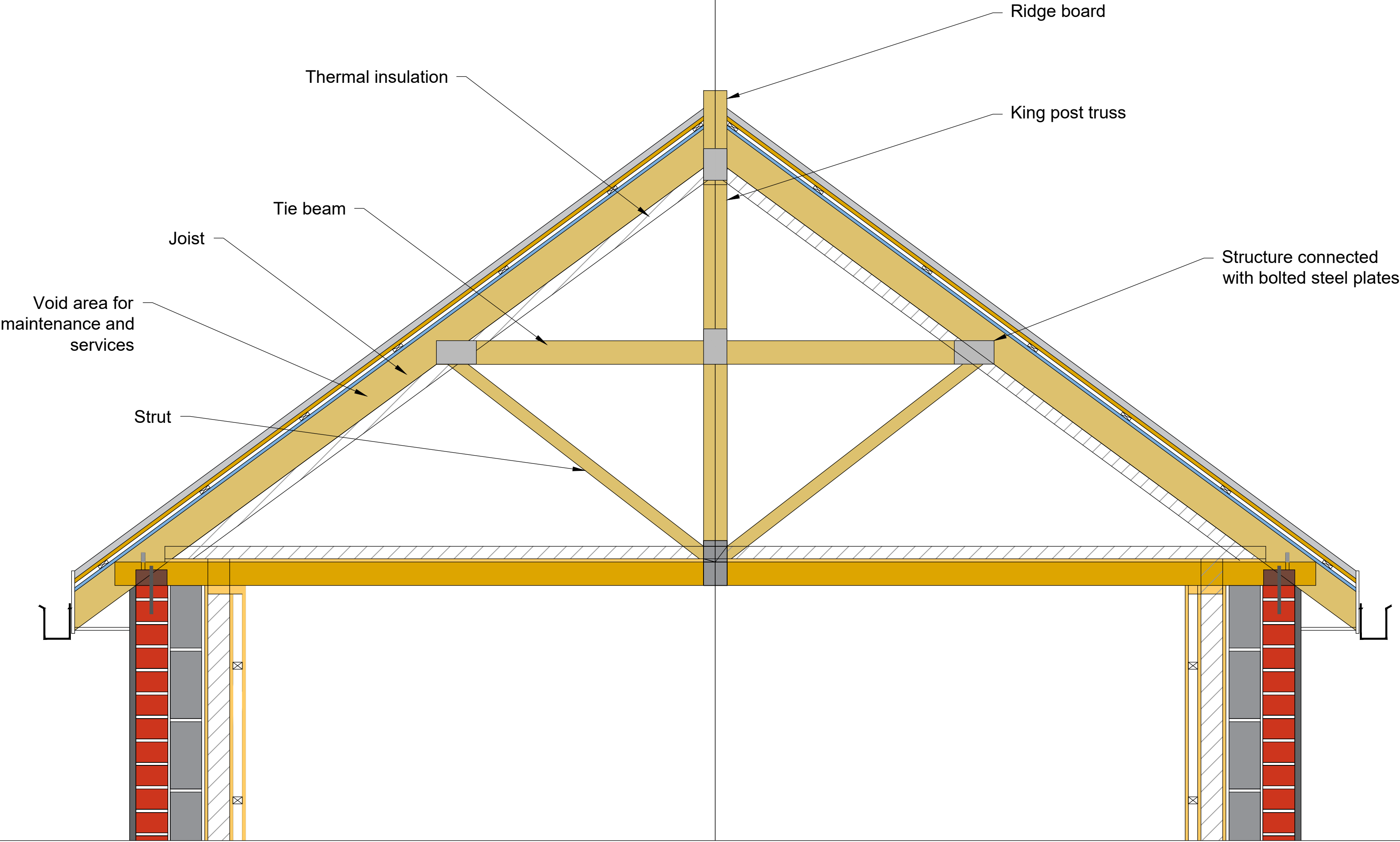
(Accessed: 24 April 2023).

Modularize n.d. *A Brief Guide to Offsite Construction*. [online]

Available from:

<http://www.modularize.co.uk/documents/A%20Brief%20Guide%20to%20Offsite%20Construction.pdf>

(Accessed: 25 April 2023)



Design in compliance with approved document L1(a) 4.15 f:
The maximum U-value for a roof in a new dwelling is 0.16 W/(m2K)
Insulation fitted tight to rafters without air gaps extending to wall insulation of first floor.
Void area inside roof allowing access for services and maintenance.

Project					
NEW BUILD DWELLING					
Title					
ROOF STRUCTURE DETAIL					
Made By	Date	Checked	Date	Authorised	Date
CS	24/04/2023				
Scale			Project no.		
1:10			Drawing no.		
			Revision		
			DE-03		
			-		



Ground Floor Detail
Scale 1:10

Sheathing and breather membrane

Cavity between masonry
and timber frame

Wall tie

20mm render

Stack bonded brickwork

C16 Welsh timber frame

Service void with insulation board

Nogging

Skirting

Sole plate

Tongue and groove floorboards

100mm joists with
underfloor heating

Damp proof layer

Clay brick
102.5 x 65mm

BS EN 771-3 aggregate
concrete block
100 x 215mm

Insulation

Raft foundation

100mm bearers between
joists and raft foundation to
improve structural stability and
to create void for insulation

Suspended floor to allow for
thermal insulation and reduce
penetration of ground water

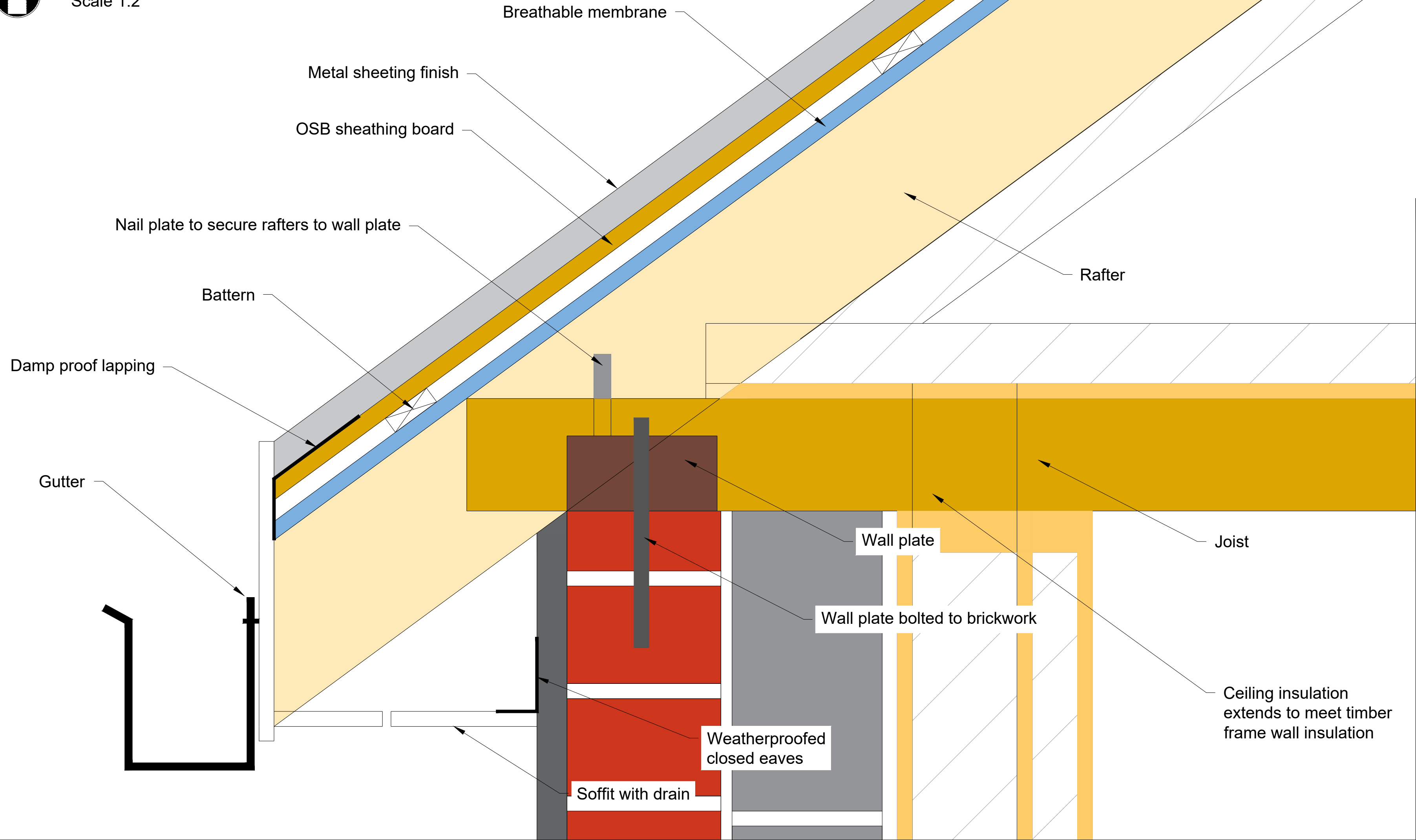
Design in compliance with approved document L1(a) 4.15 e:
The maximum U-value for a wall in a new dwelling is 0.26
W/(m²K)
Insulation installed without air gaps.

First Floor Detail
Scale 1:10

Joist fixed to blockwork

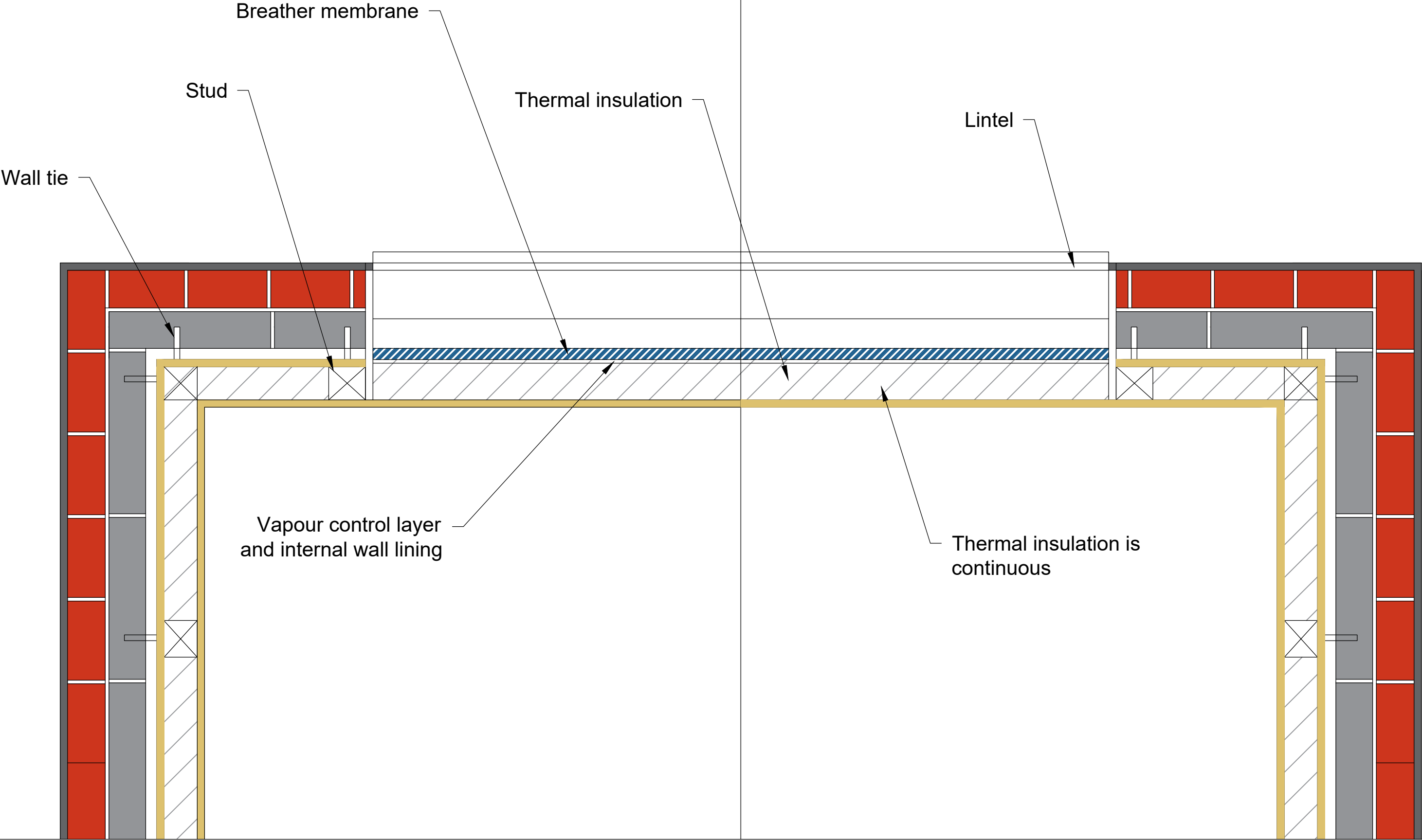
Tongue and groove
flooring

Project					
NEW BUILD DWELLING					
Title					
GROUND FLOOR AND FIRST FLOOR DETAIL					
Made By	Date	Checked	Date	Authorised	Date
CS	21/04/2023				
Scale			Project no.		
1:10			Drawing no.		
			Revision		
			DE-01		
			-		



Design in compliance with approved document L1(a) 4.15 f:
The maximum U-value for a roof in a new dwelling is 0.16 W/(m2K)
Insulation fitted tight to rafters without air gaps extending to wall insulation of first floor.

Project					
NEW BUILD DWELLING					
Title					
EAVES DETAIL					
Made By	Date	Checked	Date	Authorised	Date
CS	22/04/2023				
Scale			Project no.		
1:2			Drawing no.		
			Revision		
			DE-02		
			-		



The maximum U-value for a window in a new dwelling is 1.6 W/(m2K)
As per approved document L 4.15 d: insulation continuity is maintained with minimum tolerance surrounding the opening.

Project					
NEW BUILD DWELLING					
Title					
WINDOW PLAN DETAIL					
Made By	Date	Checked	Date	Authorised	Date
CS	25/04/2023				
Scale			Project no.		
1:10			Drawing no.		
			Revision		
			DE-04		-