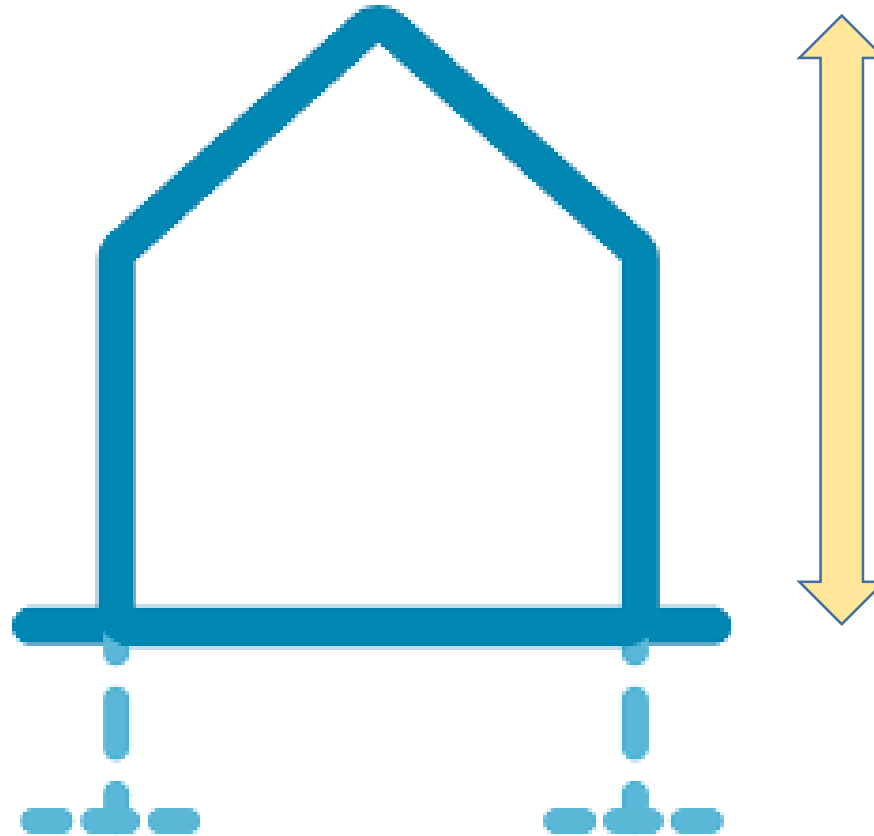


Superstructure 6: Fundamentals of Construction Technology



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Calendar

Files

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GROUND WORKS 3

Groundworks 1

GROUNDWORKS 5

SUB-STRUCTURE and GROUNDWORK INTROD...

Superstructure wk1

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General

Posts

Files

Class Notebook

Assignments

Grades

Insights

+

↗ ↺

Meet

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+ New

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↑ Upload

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General

📄	Name	Modified	Modified By
📁	Class Materials		Alan Nantel
📄	ACBA4001 Assignment 1 - brief.docx	October 14	Oliver James Macki...
📄	ACBA4001 Assignment 1...		
📄	Assignment 1.docx		
📄	Borehole Log to print for		
📄	Construction Management		
📄	CPD Presentation.pptx		
📄	EXAMPLE-Site-Investigati		
📄	FOUNDATIONS1.pptx		
📄			

General > Superstructure Lectures

📄	Name	Modified	Modified By
📄	Fundamentals Con Tech Superstructure 1.pdf	November 10	Gavin Traylor
📄	Fundamentals Con Tech Superstructure 2.pdf	6 days ago	Gavin Traylor
📄	Wk 01 Superstructure - Introduction.mp4	6 days ago	Gavin Traylor
📄	Wk 01a Superstructure - Walls.mp4	6 days ago	Gavin Traylor
📄	Wk 02 Superstructure Walls Openings.mp4	6 days ago	Gavin Traylor
📄	Wk 02a Superstructure - Building Regs.mp4	6 days ago	Gavin Traylor

Fundamentals of Construction Technology (ACBA4001)

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ExLibris
Leganto Online Resources List



Fundamentals of Construction Technology (ACBA4001)

PUBLISHED ACBA4001 (2019-20) 14 items in 2 sections

LIST SENT NEW SECTION ADD ITEMS +

Essential reading (4) Material which is an essential part of the course and students are expected to draw on as a core part of their learning. Must be available from the library and should be available online.

	BOOK Construction technology. 1, House construction Riley, Mike., Cotgrave, Alison., Third edition., Basingstoke, Hampshire :, Palgrave Macmillan, 2013., Total Pages vii, 382 pages, 8 pages of unnumbered plates : Essential Complete Check holdings	11
	BOOK Construction technology : industrial and commercial building. 2 Riley, Mike., Cotgrave, Alison., 3rd edition., Basingstoke :, Palgrave Macmillan, 2014., Total Pages 427 p. : Essential Complete Check holdings	8
	BOOK Building construction handbook Chudley, R., Greeno, Roger., 8th ed. , Oxford ;, Butterworth-Heinemann, 2010., Total Pages xi, 828 p. : Essential Complete Check holdings	6
	BOOK Architectural technology [electronic resource] Emmitt, Stephen., 2nd ed., Hoboken, N.J. :, Wiley-Blackwell, 2012., Total Pages 1 online resource (265 p.) Essential Complete Check availability >	2

Further reading (10)

ACBA 4001
FUNDAMENTALS OF CONSTRUCTION
TECHNOLOGY: LEVEL 4

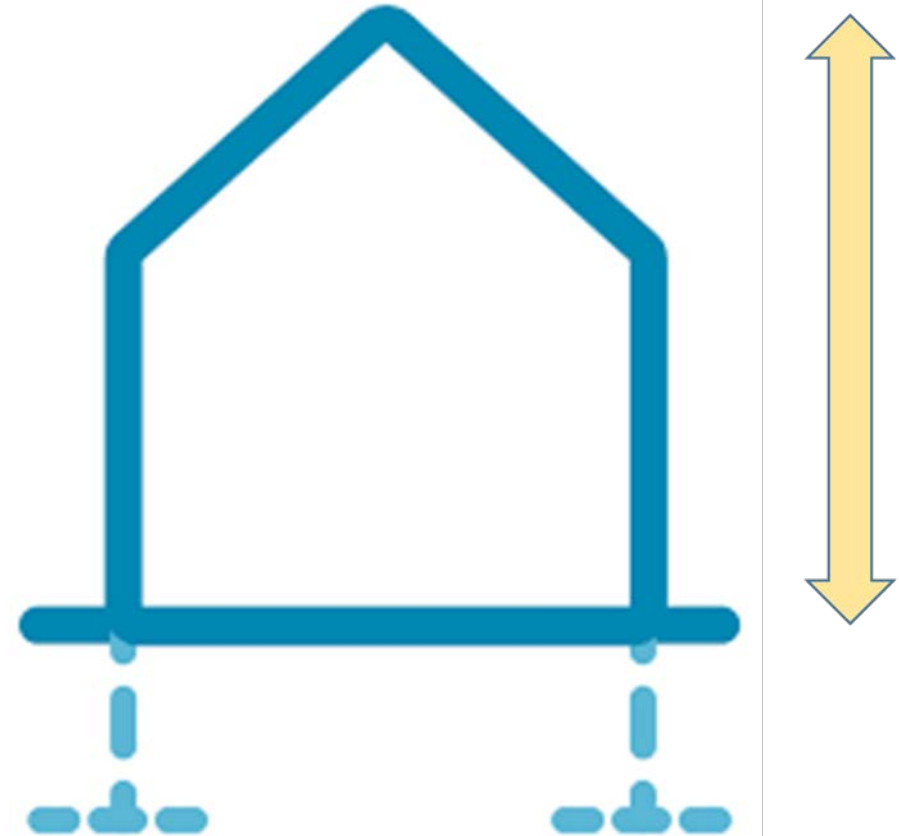
Superstructure Week 6:

Overview of the Assessment

Breakdown of the questions

Condensation

Timber Frame Construction Sources



Assessment 2

Submission
deadline:

22nd January 2021

Module Learning Outcomes (from module syllabus)

- Identify the different types of substructure available for a range of low-rise building systems and techniques used in their production.
- Define and produce annotated sketches that illustrate a broad range of common constructional forms, demonstrating understanding of their potential defect and repair needs.



APPENDIX GA36a

LEVEL 4 ASSESSMENT SPECIFICATION

Student name:		Student ID number:	
Programme:	Construction Portfolio		
Module:	Fundamentals of Construction Technology		
Module code:	ACBA4001	Contribution to Overall Module Assessment (%):	50%
Lecturer:	Gavin Traylor	Internal Verifier:	Allan Nantel
Assignment Title:	New Build Dwelling: Technical report with drawings	Word count (or equivalent):	2,500 words (or equivalent)
Submission deadline:	Friday 22 nd January	Return date of provisional marks & written feedback:	Within 20 working days
Submission method:	All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.) Alternative submission method (if applicable): Late submission of the assessment will result in a late penalty mark. Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.		
Academic honesty / referencing:	Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.		

Module Learning Outcomes (from module syllabus)

- Identify the different types of substructure available for a range of low-rise building systems and techniques used in their production.
- Define and produce annotated sketches that illustrate a broad range of common constructional forms, demonstrating understanding of their potential defect and repair needs.

Assessment 2

Submission
deadline:

22nd January 2021

New Build Dwelling: Technical report with drawings (weighting 100%)

Scenario:

You have been approached by Miss A Client who has received planning consent for her single, two storey detached domestic building. [See attached floor plans and elevations].

It is to be built on a level but reclaimed site, which prior to advanced ground works had been used as agricultural land. There is a retaining wall structure to the south of the site and the Ground Investigation report suggests a suitable raft foundation be constructed for the property.

The building is a timber framed construction where the inner skin of the 'cavity wall' is 140mm thick insulated C16 timber frame. The outer skin consists of stack bonded facing brick work and blockwork with a smooth render finish. Additional PIR insulation is contained within the cavity to improve the thermal performance. There is to be an insulated ground floor with underfloor heating in the screed with upper floors to be traditional solid timber with tongue and groove softwood flooring.

Windows and external doors are to be powder coated aluminium with triple-glazed units.

Roof structure is to be trussed rafters with a metal profile sheeting finish installed on OSB sheathing boards.

The client has asked you to prepare a technical report that addresses some of the construction details required as they are unfamiliar with timber frame construction. Your technical report should be graphical and contain the tasks highlighted below:

Assessment 2

Submission
deadline:

22nd January 2021

*The following tasks are allocated a percentage to emphasise the suggested **time** you should spend on each individual task. Marks will be allocated against the set Marking Criteria indicated on page 5.*

1. Produce **neatly drawn, proportionate and suitably annotated sections and sketches** that illustrate the materials and methods for the detailing of the following building elements and construction inter-faces. Ensure that detailing shows how the design will meet the current **Building Regulations for a domestic new-build**:

The Ground floor Construction, detailing and junctions with external walls. (20%)

The First floor Construction, detailing, junctions with external walls and restraints. (20%)

Eaves detailing and roof covering – indicating appropriate weathering, fixing and laps. (20%)

The main roof **structure**. Construction, detailing and fixing. (20%)

2. Given the specified roof structure and finish describe the advantages and disadvantages of such a method. Give an example of an alternative method of construction and describe what advantages or disadvantages that it may have. (10%)

3. Appropriate ventilation can play an important part of the design of a domestic building and is even more critical when considering a timber framed construction. Clearly describe the causes and sources of condensation, and the detrimental effects of condensation upon building fabric. (5%)

Using neat, annotated, proportional sketches where necessary, describe the appropriate methods of ventilation that will reduce condensation within this proposed building. (5%)

Assessment 2

Guidance specific to this assessment:

Engagement with Literature Skills

Where techniques are suggested in the report make reference to the sources such as the Building Regulations and Good Practice. Use sources such as the CIS.

Knowledge and Understanding Skills

Demonstrate your understanding of the methods and techniques. This will be assessed by the depth and awareness of a professional context within this scenario.

Cognitive and Intellectual Skills

Demonstrate your knowledge and skills and present the work in a coherent and professional manner. This will also be assessed by the quality of your evaluation and conclusions.

Practical Skills

This will be assessed via the scenario and how your knowledge has been applied.

Transferable Skills for Life and Professional Practice

The report and drawings should be presented in a professional manner with all work clearly labelled and cross-referenced.

Submission
deadline:

22nd January 2021

STUDENT FEEDBACK FORM		
This section details the extent to which the assessment criteria are demonstrated by you, which in turn determines your mark. The marks available for each category of skill are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.		
Generic Assessment Criteria	Marks available	Marks awarded
1. Engagement with Literature Skills	10	
2. Knowledge and Understanding Skills	25	
3. Cognitive and Intellectual Skills	25	
4. Practical Application Skills	25	
5. Transferable Skills for Life and Professional Practice	15	
Assessment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)	Late Submission Penalties (tick if appropriate) (Up to 1 week late (10% loss)) (Over 1 week late (20% loss))	%

Assessment 2

Submission
deadline:

22nd January 2021



FRONT VIEW



FRONT VIEW

Your sketches not images

1. Produce neatly drawn, proportionate and suitably annotated sections and sketches that illustrate the materials and methods for the detailing of the following building elements and construction interfaces. Ensure that detailing shows how the design will meet the current Building Regulations for a domestic new-build:

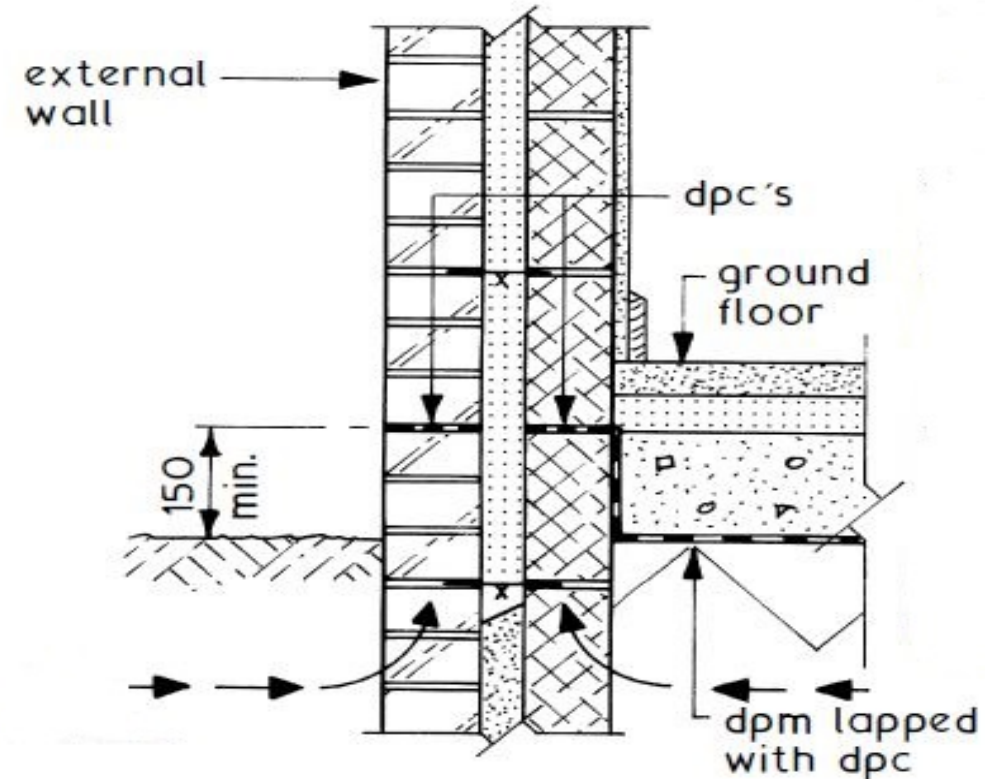
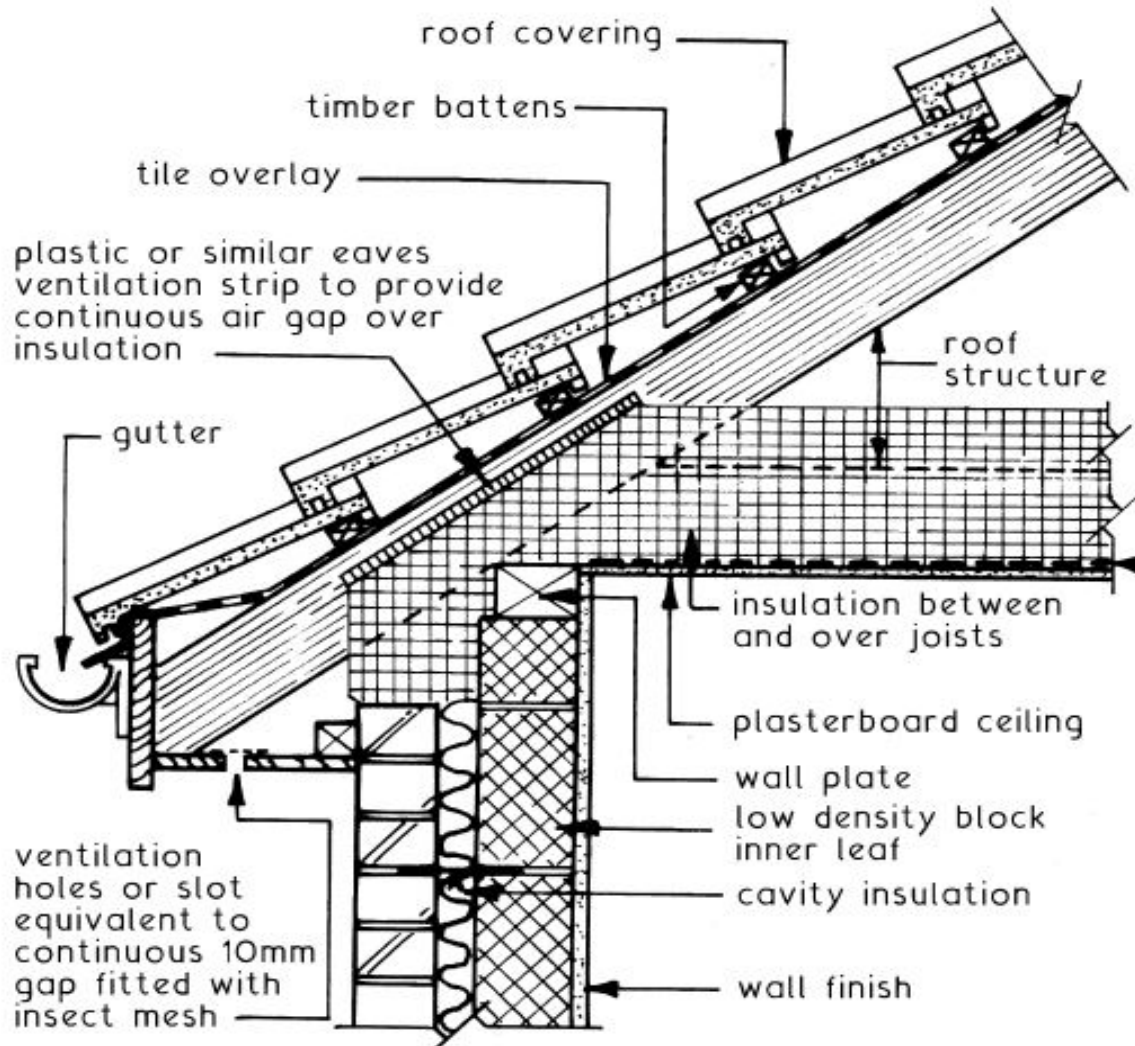
The Ground floor Construction, detailing and junctions with external walls. (20%)

The First floor Construction, detailing, junctions with external walls and restraints. (20%)

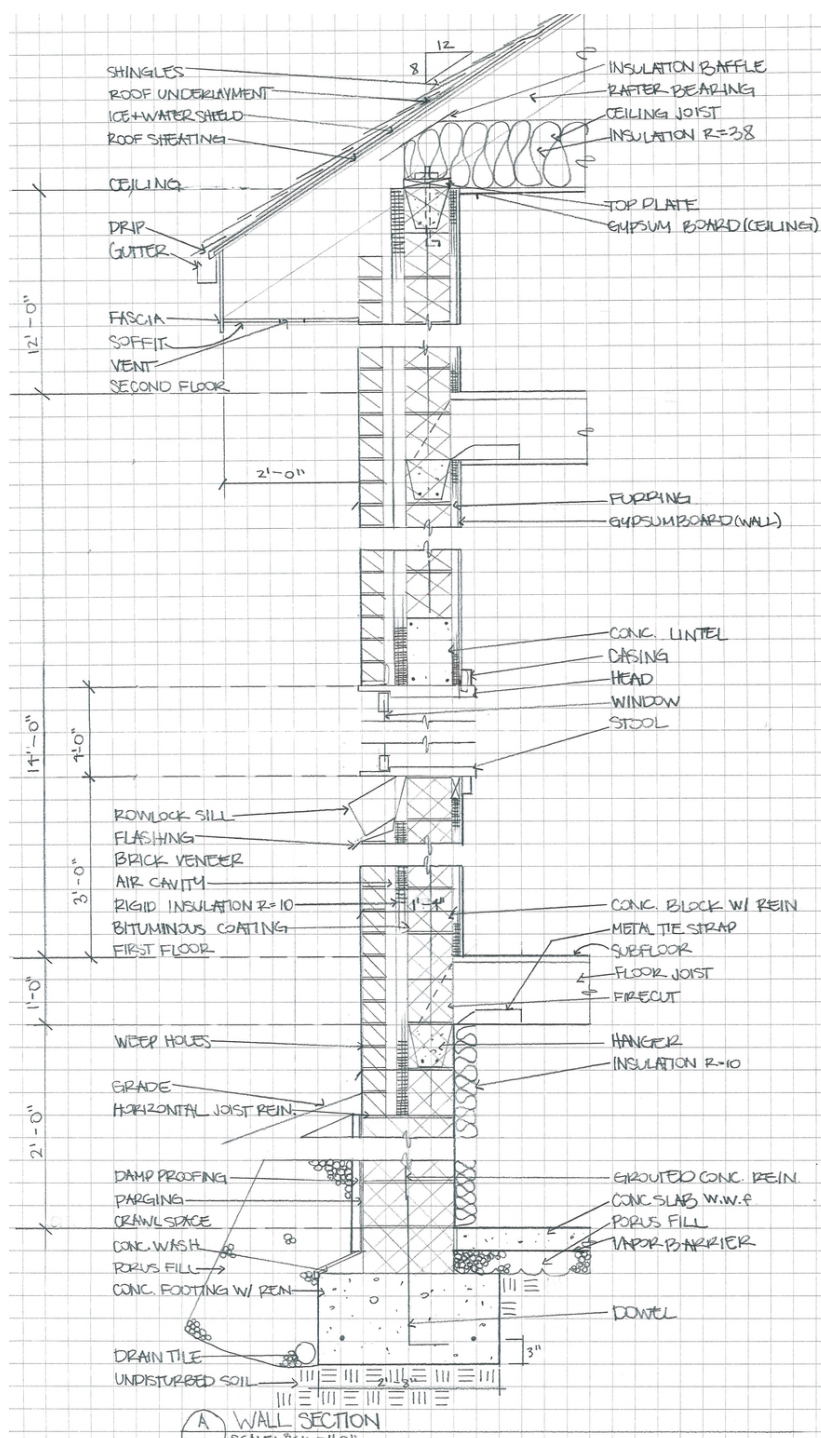
Eaves detailing and roof covering – indicating appropriate weathering, fixing and laps. (20%)

The main roof **structure**. Construction, detailing and fixing. (20%)

Your sketches not images

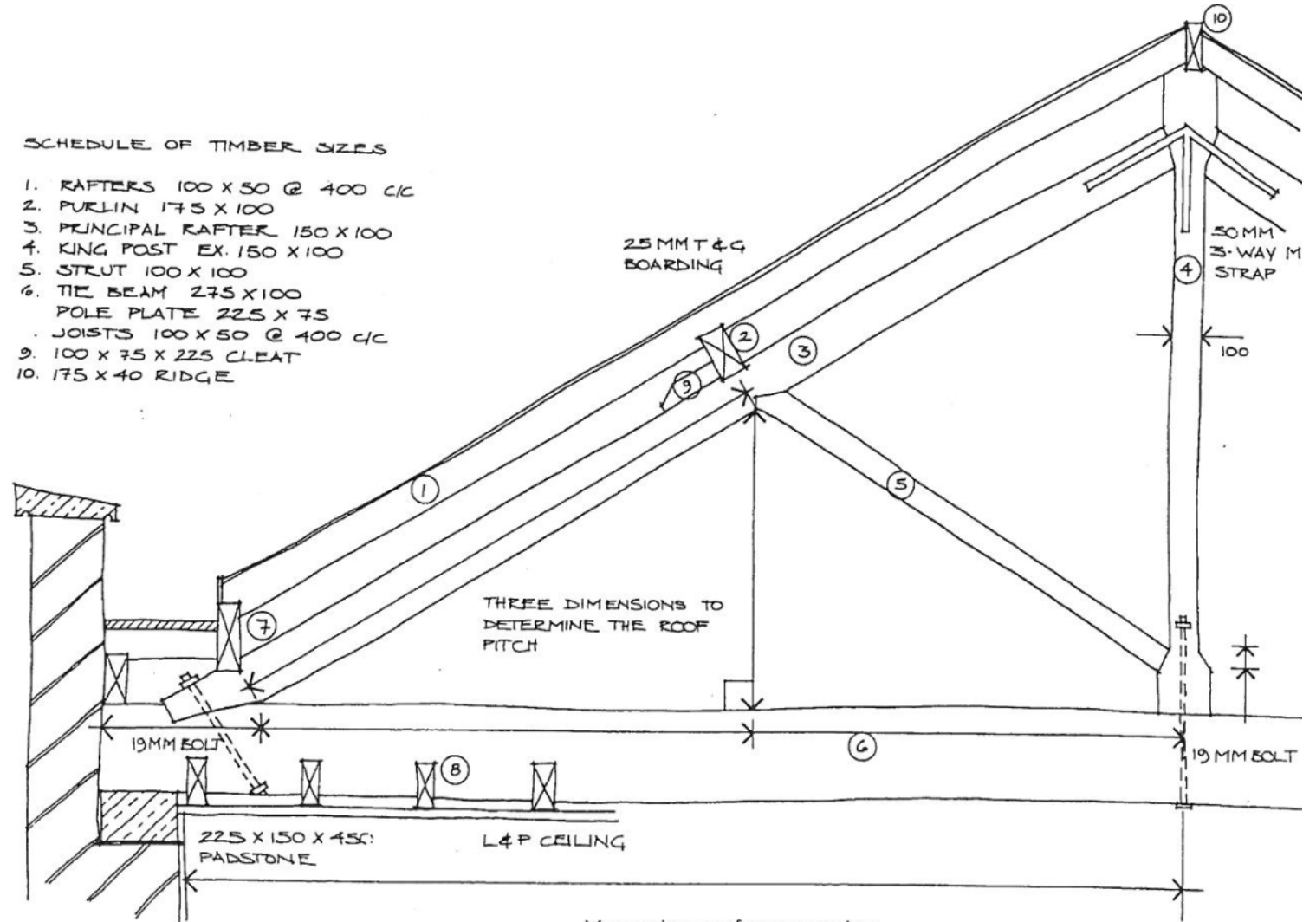


sketches not images



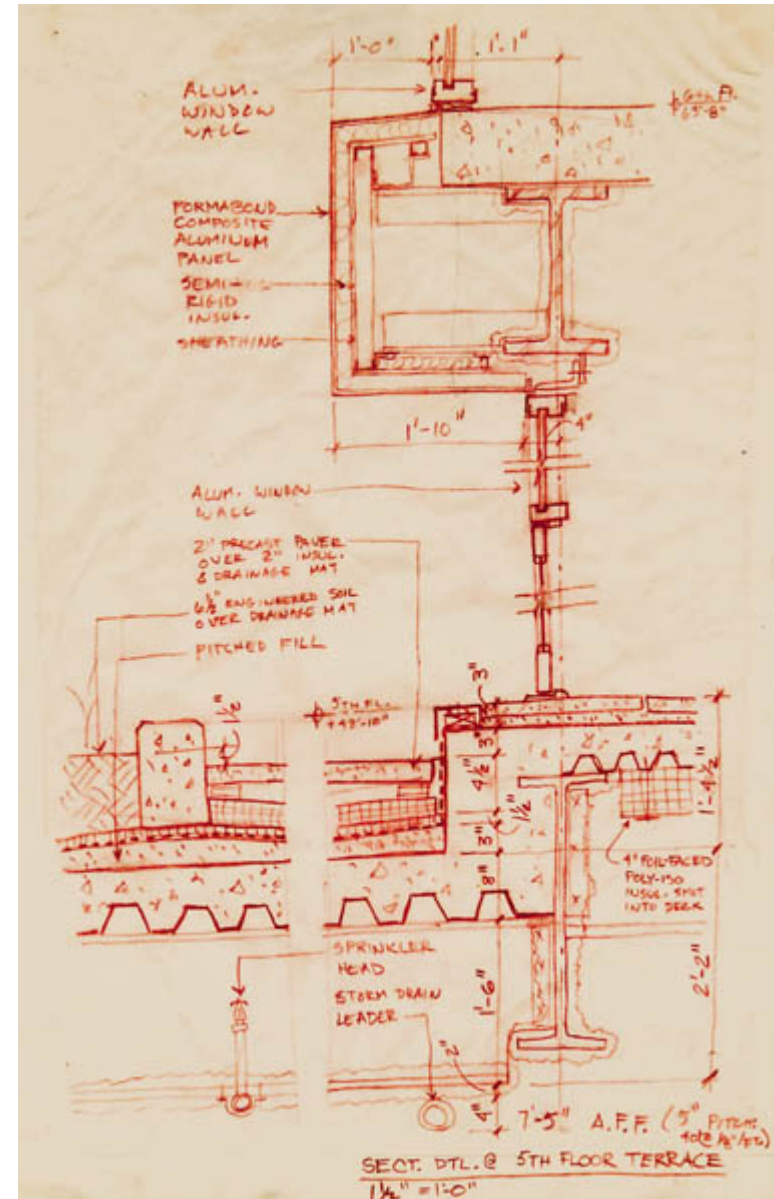
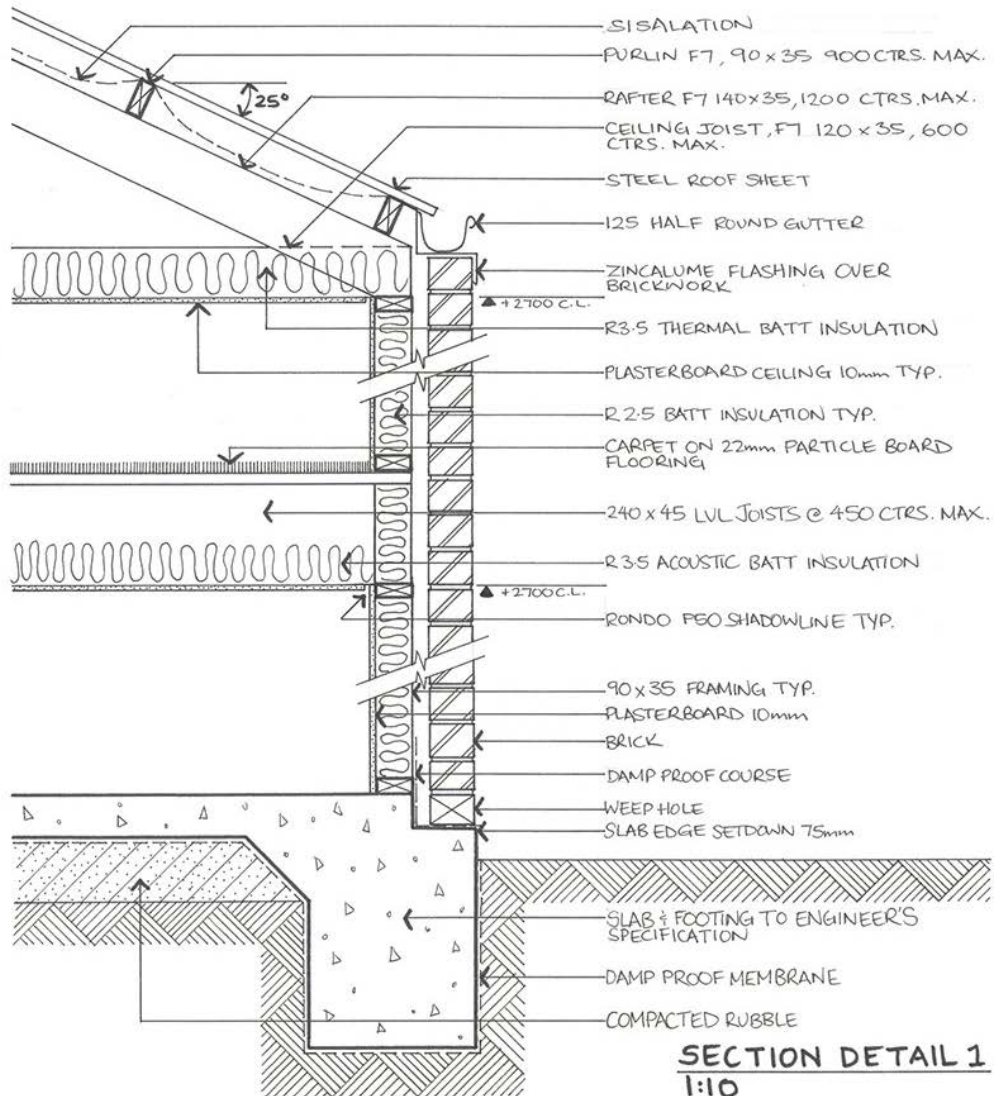
SCHEDULE OF TIMBER SIZES

1. RAFTERS 100 X 50 @ 400 C/C
2. PURLIN 175 X 100
3. PRINCIPAL RAFTER 150 X 100
4. KING POST EX. 150 X 100
5. STRUT 100 X 100
6. TIE BEAM 275 X 100
POLE PLATE 225 X 75
JOISTS 100 X 50 @ 400 C/C
9. 100 X 75 X 225 CLEAT
10. 175 X 40 RIDGE

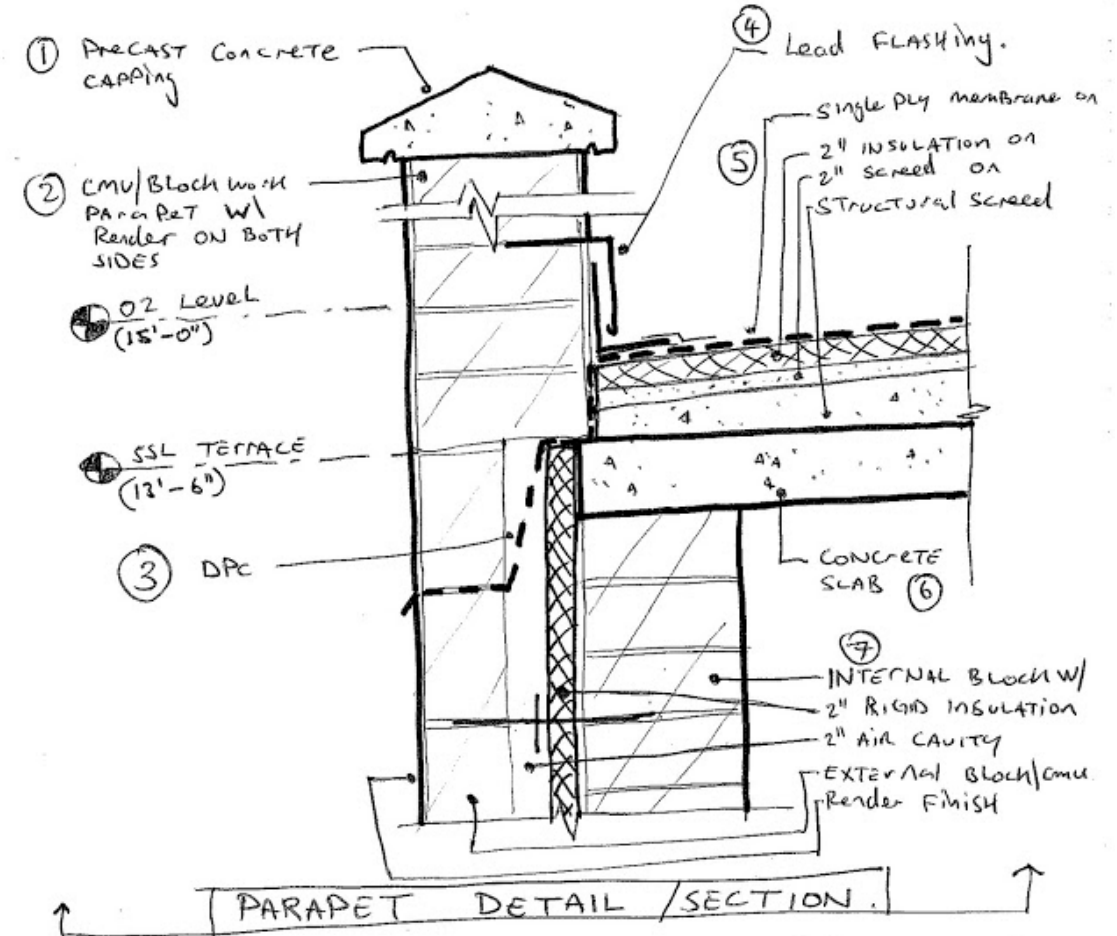
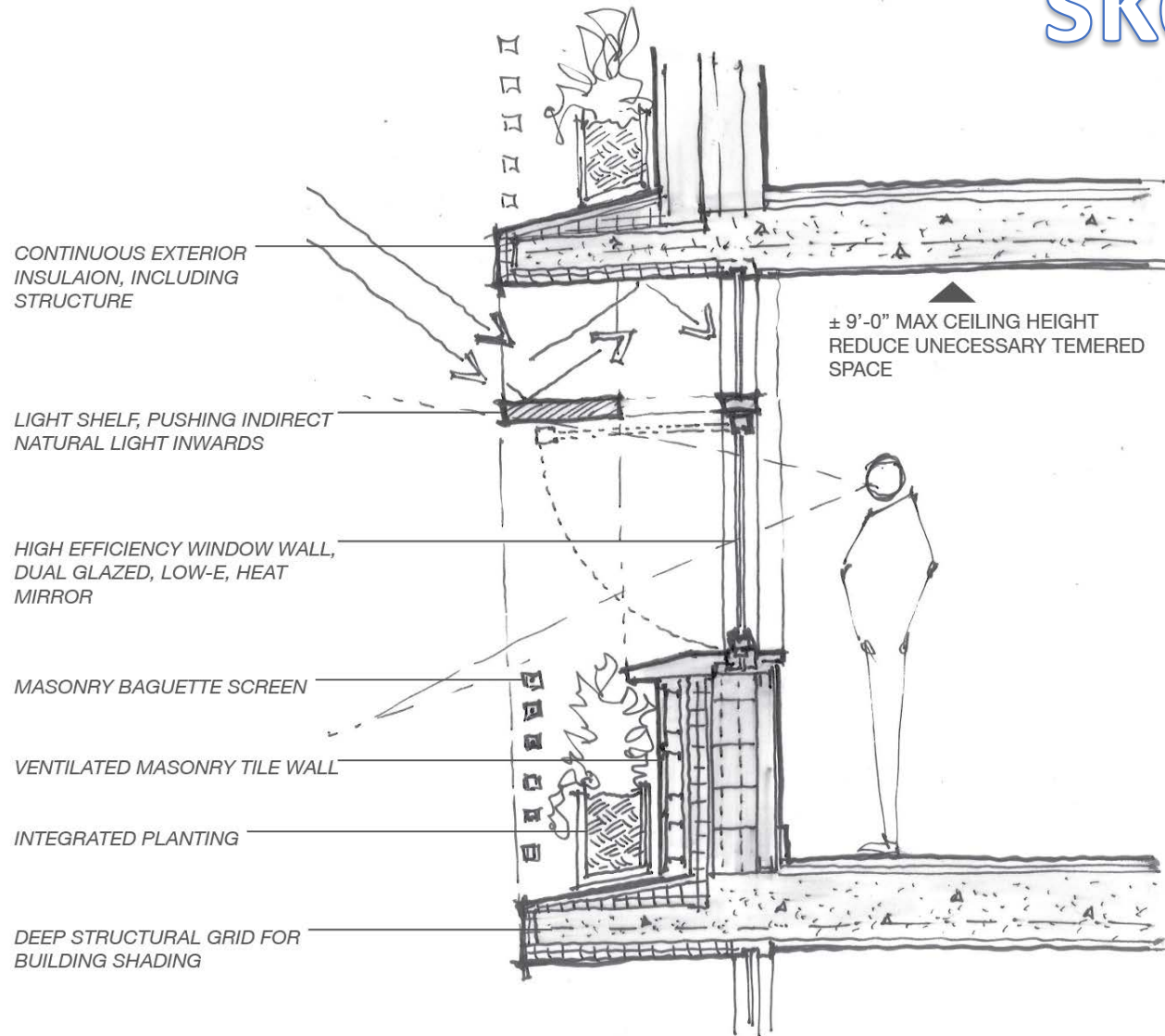


Measuring roof construction.

sketches not images



sketches not images



The Building Regulations

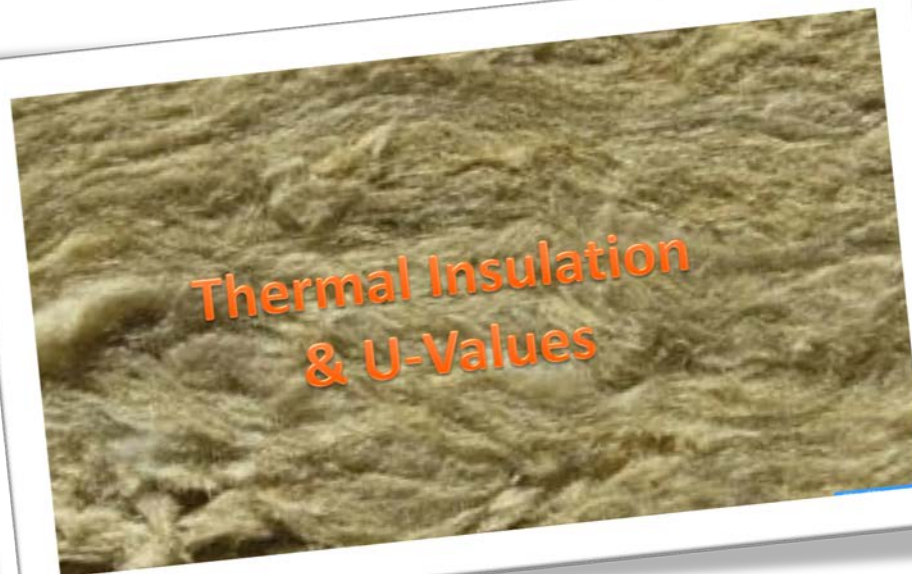
Access your individual products

► The Construction Information Service - CIS
The most comprehensive source of technical standards legislation and technical guidance for construction professionals



<https://www.cis.gov.uk/building-regulations/2010/conservation-of-fuel-and-power/part-l1a-domestic-buildings>

Ensure that detailing shows how the design will meet the current Building Regulations for a domestic new-build:



Part L of the Building Regulations (Conservation of fuel and power) now prevents certain forms of construction by setting limiting standards (i.e. maximum U-values) for building elements.

It should be noted however that these are maximum permitted values, the specification for the notional domestic building referred to in Part L1A has considerably lower values, for example:

External wall: 0.18 W/m²K.

Floor: 0.13 W/m²K.

Roofs: 0.13 W/m²K.

Windows, roof windows, glazed rooflights and glazed doors: 1.4 W/m²K.

2. Given the specified roof structure and finish describe the **advantages** and **disadvantages** of such a method. Give an example of an **alternative method of construction** and describe what **advantages or disadvantages** that it may have. (10%)

Roof structure is to be trussed rafters with a metal profile sheeting finish installed on OSB sheathing boards.

Alternative type of roof structure and/ finish

Compare and contrast

Tables / Text / Drawings

3. Appropriate ventilation can play an important part of the design of a domestic building and is even more critical when considering a timber framed construction. Clearly describe the causes and sources of condensation, and the detrimental effects of condensation upon building fabric. (5%)

Using neat, annotated, proportional sketches where necessary, describe the appropriate methods of ventilation that will reduce condensation within this proposed building. (5%)



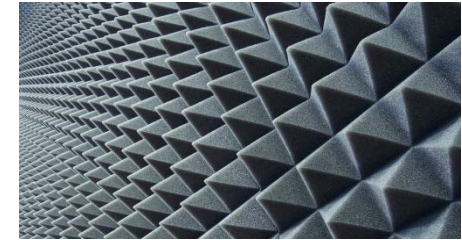
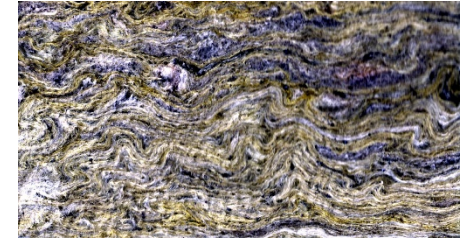
What is condensation and how can it be prevented.

Sketch section details

The use of buildings to house people, equipment and processes have resulted in the development of buildings that can control these internal environments with greater accuracy.

As well as protection and **enclosure** we can now consider:

- Thermal Insulation and temperature control
- Acoustic insulation
- Provision of Light (natural and artificial)
- Controls for humidity and ventilation
- Exclusion of contaminants.



Performance Requirements of the Building Fabric

What are the key drivers in providing a building that is suitable for the need?

- Structurally Stable
- Durability
- Thermal insulation
- Protection from weather and exclusion of moisture
- Acoustic performance
- Flexibility to change to changing needs
- Aesthetics
- Buildability
- Sustainability





Condensation is intrinsically linked to thermal performance, as the temperature reduction inside to outside through the building **enclosure** is a principal factor in its creation.

Key Terms

Types: Surface Condensation and Interstitial Condensation.

Surface Condensation is a familiar problem eg: humid air hitting a cold surface such as bathroom and kitchen windows.

Condensation can be damaging in extreme instances where it leads to residual dampness in plaster and other finishes, and can be the source of mould growth over time.

Interstitial Condensation – most serious type and causes the most problems in lightweight building enclosures where the condensation occurs within the constructional thickness.



Key Terms

Dew Point – The temperature at which saturation and condensation occurs. When water vapour in the humid air is cooled it eventually reaches a saturation temperature where the water vapour condenses into water droplets.

Relative Humidity - This is the relative wetness of a given volume of air. This is expressed as a % based on the amount of water vapour in the air relative to the amount of water vapour the air *could* carry.

e.g if the RH is 50% then the air's carrying capacity is at half.

If the air temperature is reduced to a where the RH is 100% - Dew point.

Examples:

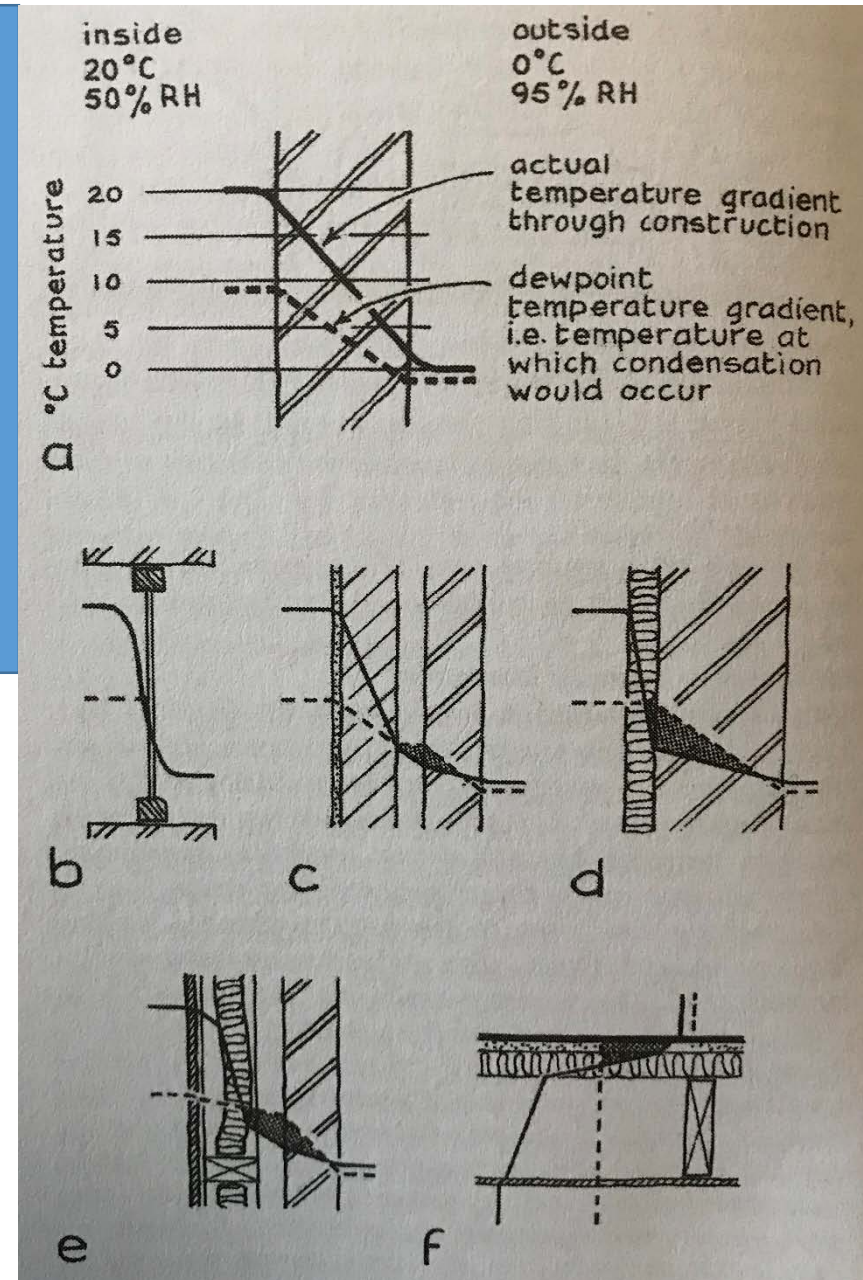
Domestic Internal temp 20 degs C and 50% RH

External Cold Winter 0 degs C and 95% RH

Note: The air outside has a higher RH than the inside only because it is colder – although it actually contains less water vapour.

Actual Temperature Gradient and Dew point Temperature Gradient
Basic Principles and Examples (a – f)

Interstitial Condensation occurs where the two gradients cross.



Preventing Condensation

Heating and Ventilation.

Improve the heating of the building and increase the ventilation. Heating on full with all the windows open? Ventilation is limited, but additional fans in kitchens and bathrooms will reduce the vapour content in the air. This will do little for the interstitial condensation.

Placing Insulation towards the Outside

This has the effect of making the gradient distortion a safer one, but is not always a practical solution. **(a)**

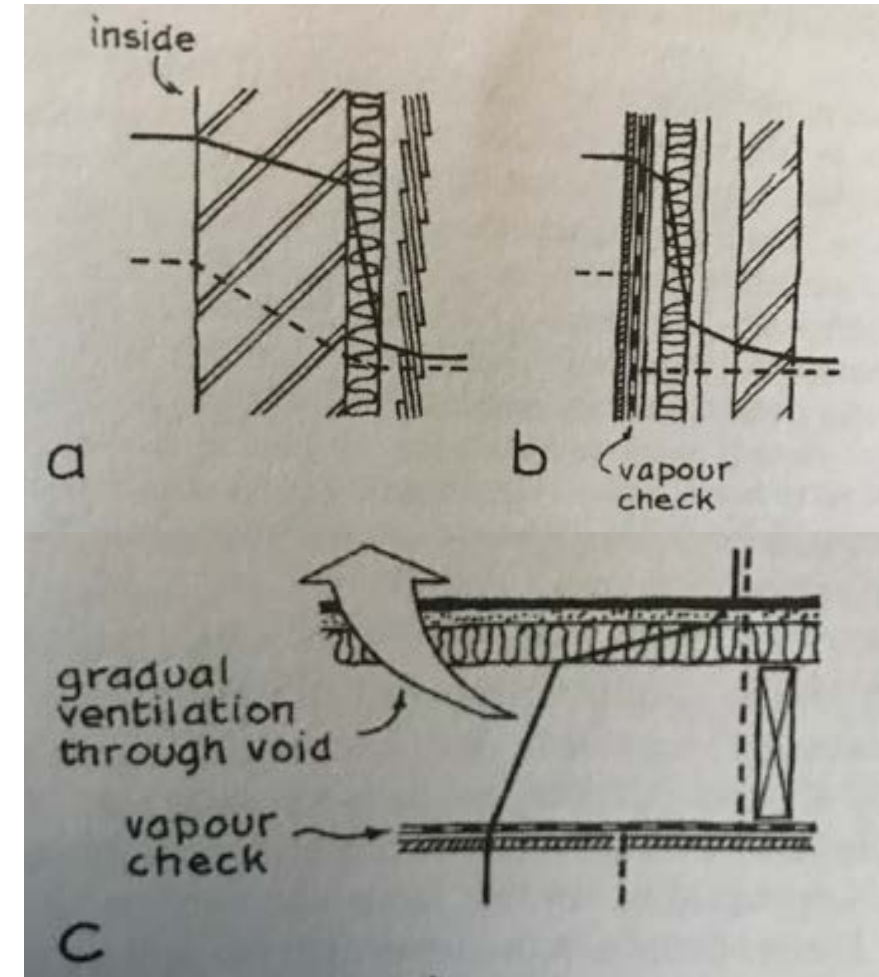
Vapour Checking

An effective vapour check can reduce the dew point gradient and makes the dew point in the enclosure the lower outside level. **(b)** Typically the positive vapour check can be a thin layer of plastic sheeting or metal foil.

Vapour Checking and Construction Ventilation

In an extreme case - flat roof timber construction **(c)** a vapour check is not enough. They can not be relied on 100% due to fixings etc.

The answer is to allow the construction some ventilation to the outside. Gradual through ventilation, (Soffit vents / eaves vents / airbricks) will carry any residual ventilation away. Vapour checking and gentle ventilation avoid condensation without significant heat loss.



Summary

Condensation is caused by warm moist air reaching cold places.
Precautions are:

- Improving heating and ventilation generally
- Possibly putting insulation to the outside
- Vapour checking **ON THE WARM SIDE** of the insulation
- Ventilating the Construction to the fresh air if there happens to be a vapour trapping membrane on the outside.

Further Reading:

Esmond Reid: 'Understanding Buildings'

Mike Riley: Alison Cotgrave: 'Construction Technology 1'

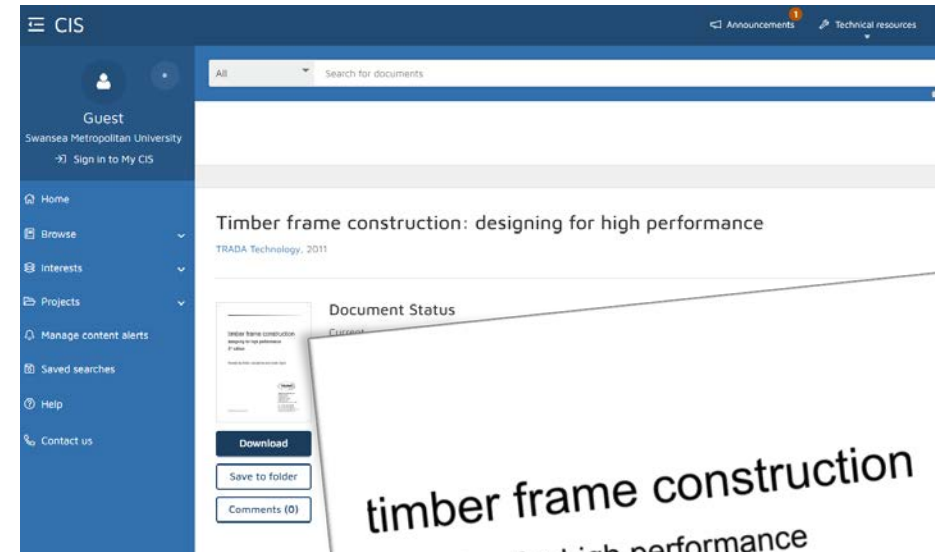
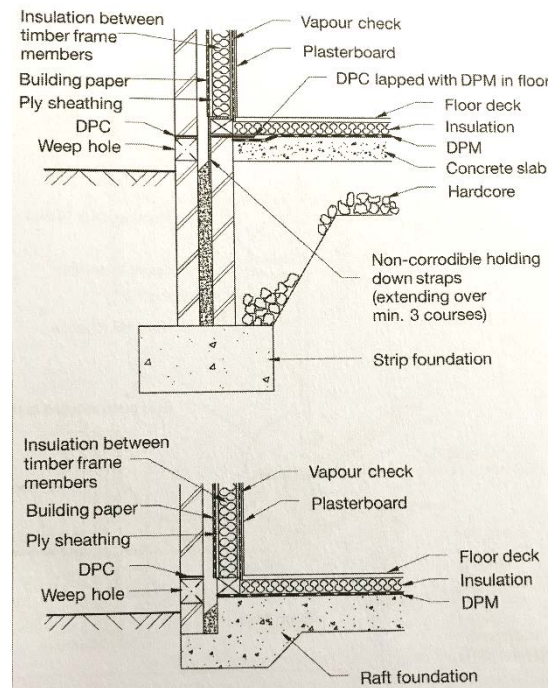
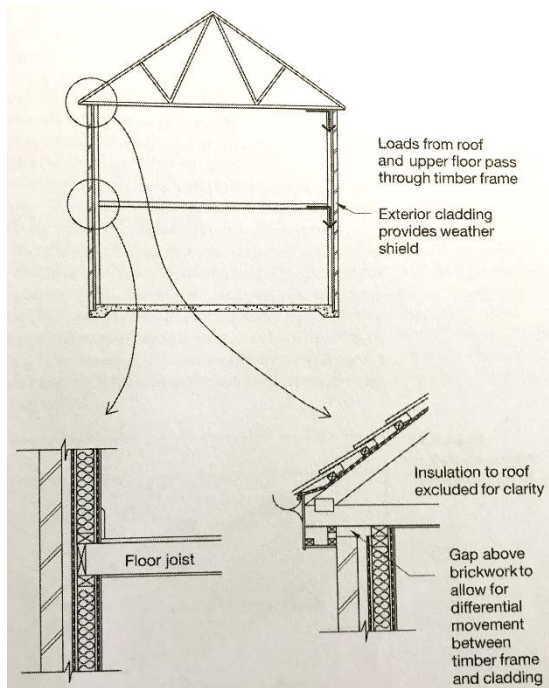
McMullans: 'Environmental Science in Building'

https://youtu.be/k_QXw1BCZ2A

Timber Frame Construction

Sources for Timber construction

<https://www.macmillanihe.com/companion/Riley-Construction-Technology-1/resources-zone/Chapter-07-Case-Study-2/>



timber frame construction
designing for high performance
5th edition

Revised by Robin Lancashire and Lewis Taylor



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Summary Week 6:

Overview of the Assessment

Breakdown of the questions

Condensation

Timber Frame Construction Sources

