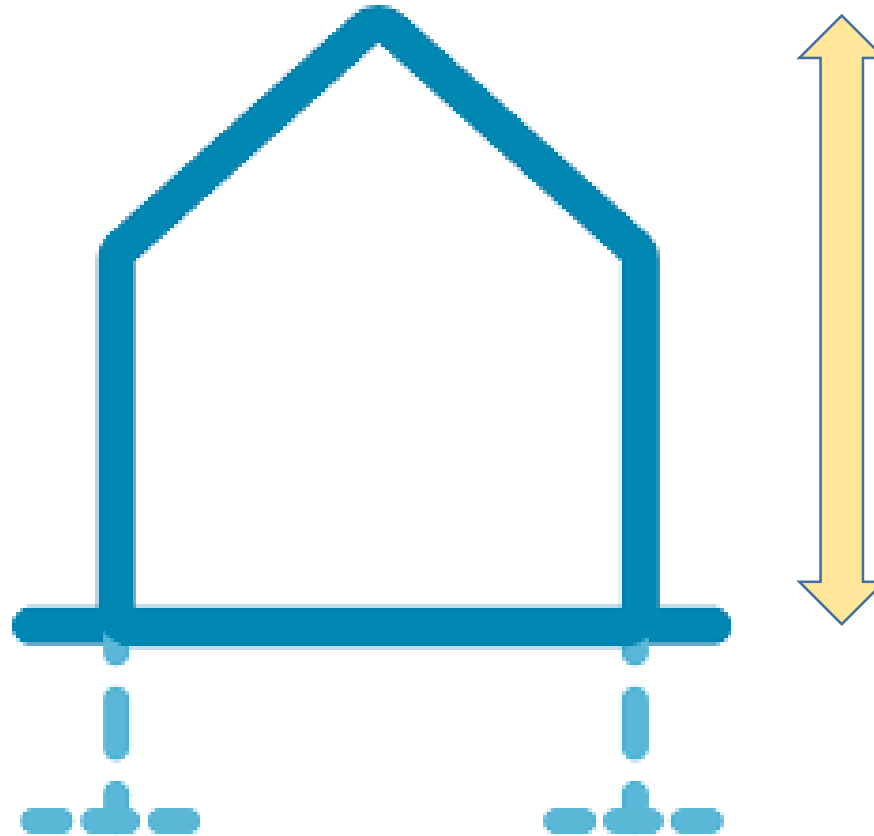


Superstructure 1: Fundamentals of Construction Technology



The background of the slide is a blue-tinted photograph of a modern building with large windows. In the top left corner, there is a large, semi-transparent Batman logo. A beam of light emanates from the logo, shining across the sky and onto the building. On the right side of the building, there is a silhouette of Batman standing on a ledge, looking towards the left.

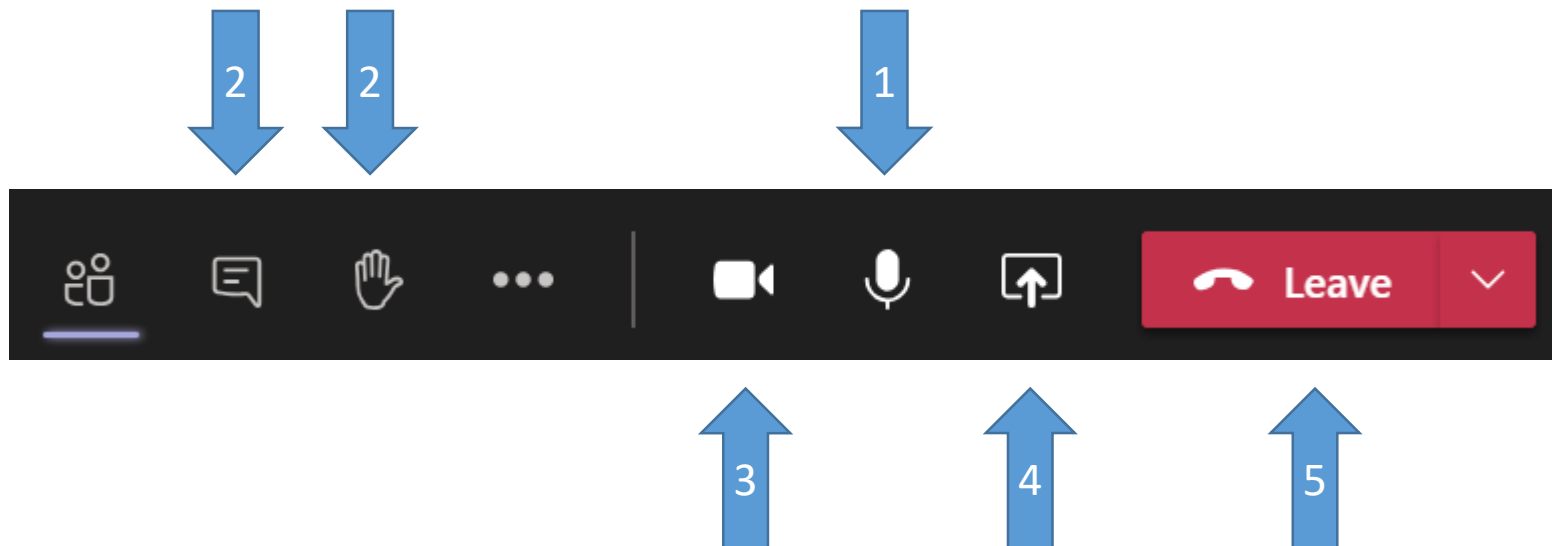
Superstructure

Session 1:

- What is it all about?
- What am I expected to do?
- How will it be assessed?
- Superstructure Introduction

MS TEAMS HOUSEKEEPING

1. Mute your Microphone
2. Use Chat to Ask Questions or Put your hand Up
3. If you have a poor connection switch off Camera
4. I may ask you to share your screen.
5. When the lecture ends please hang up



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FUNDAMENTALS OF CONSTRUC...

...

General

GROUND WORKS 2

GROUND WORKS 3

Groundworks 1

GROUNDWORKS 5

SUB-STRUCTURE and GROUNDWORK INTROD...

Superstructure wk1

1 hidden channel

FO

General

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Insights

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↗ ↺

Meet

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+ New

↶ Upload

↻ Sync

🔗 Copy link

⬇ Download

+ Add cloud storage

🔗 Open in SharePoint

☰ All Documents

↓

General

📄	Name	Modified	Modified By
📁	Class Materials		Alan Nantel
📄	ACBA4001 Assignment 1 - brief.docx	October 14	Oliver James Macki...
📄	ACBA4001 Assignment 1.docx	October 13	Luke Screen (2014...
📄	Assignment 1.docx	6 days ago	Steffan David Danc...
📄	Borehole Log to print for 20th October.docx	October 15	Alan Nantel
📄	Construction Management Industrial Place...	October 20	Alan Nantel
📄	CPD Presentation.pptx	5 days ago	Alan Nantel
📄	EXAMPLE-Site-Investigation-Report.pdf	October 27	Alan Nantel
📄	FOUNDATIONS1.pptx	5 days ago	Alan Nantel
📄	...	...	...

Module AIM

- *To cultivate the fundamental principles, materials and techniques commonly utilised in the construction of low rise residential and commercial buildings, and their related repair requirements following defect diagnosis*

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

- *Describe appropriate site evaluation, site and soil investigation techniques.*
- *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.**

What am I expected to do?

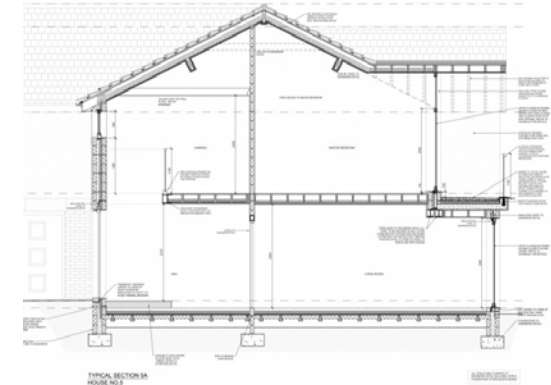
Lecture series over Semester 1, providing guidance on Construction Superstructure

General Overview (Me)

- Overview of Domestic / small scale building
- Building fabric and elemental approach to superstructure
- MMC & Alternative approaches.
- Suitability, Maintenance and repair.

General Overview (You)

- You need to know how to use the Library and Online resources
- You need to attend all timetabled activities
- You need to manage your time and meet deadlines
- Ask Gavin / Allan if you have any problems regarding the module



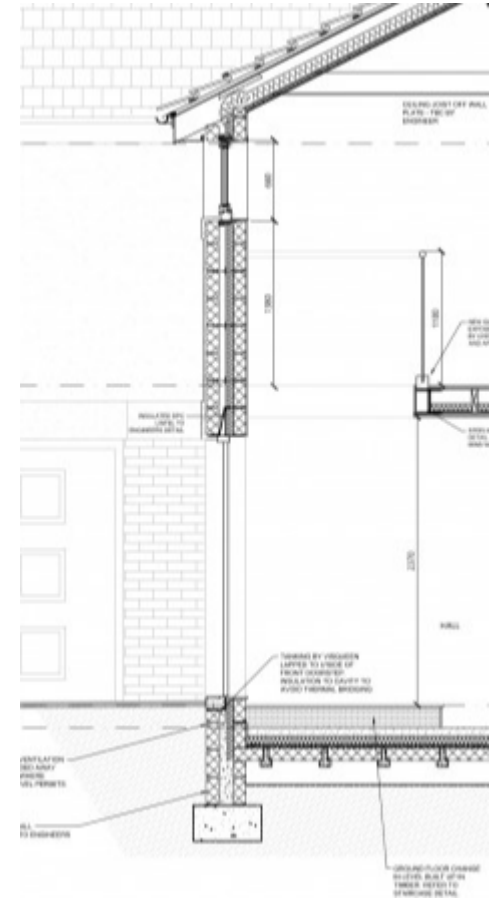
How will it be assessed?

Module Credit 20

24% Scheduled Learning and 76% Independent Learning



Assessment Component 2		
Mode of Assessment	Word Limit	Weighting
Essay	2000 Word equivalent (with drawings)	50%



Fundamentals of Construction Technology (ACBA4001)

[Home](#)[My modules](#)[ACBA4001](#)

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)

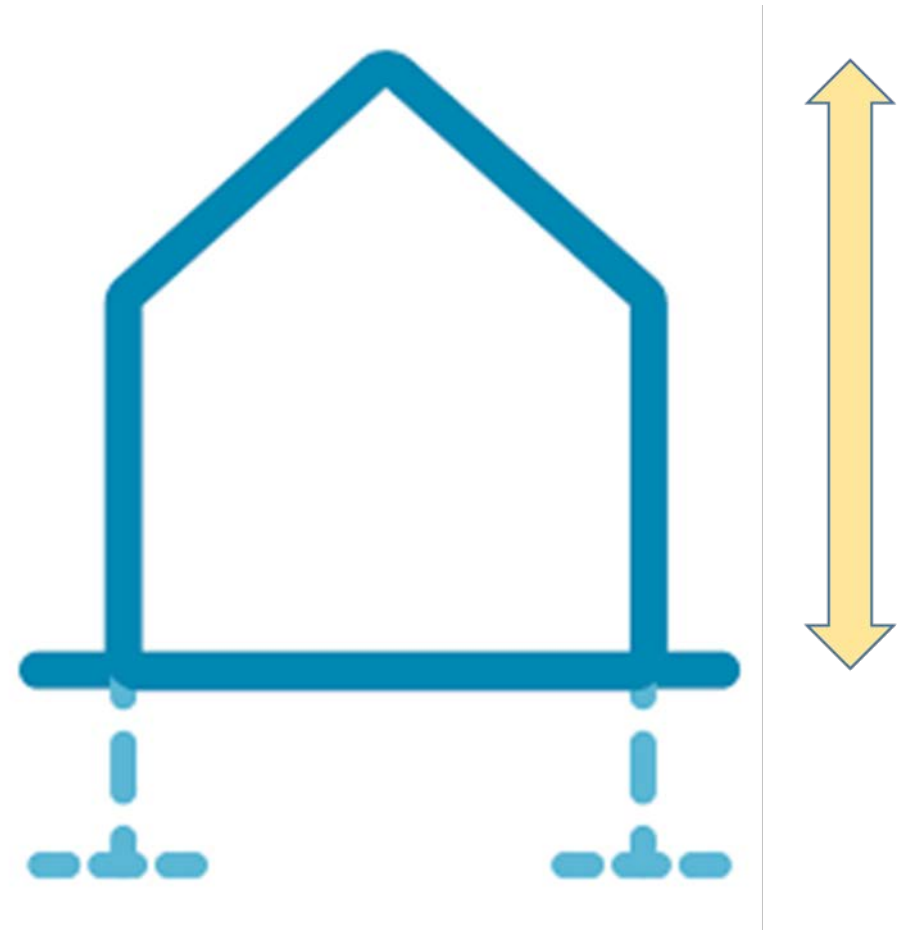
ACBA 4001
FUNDAMENTALS OF CONSTRUCTION
TECHNOLOGY: LEVEL 4

Week 1:

Functions of Buildings

Introduction to Superstructure

External Walls





Functions of Buildings

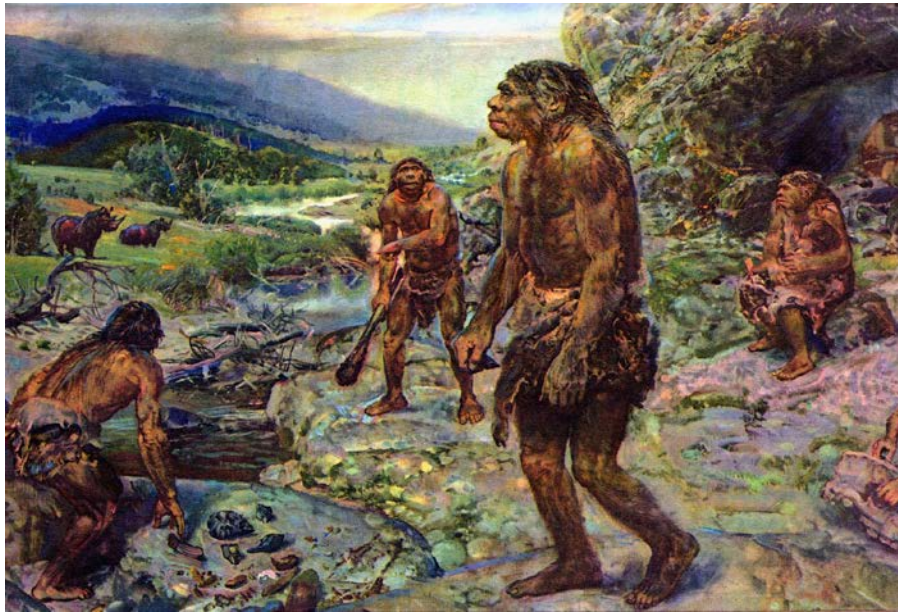
Why do we Build?

The use of buildings as protective structures or enclosures.

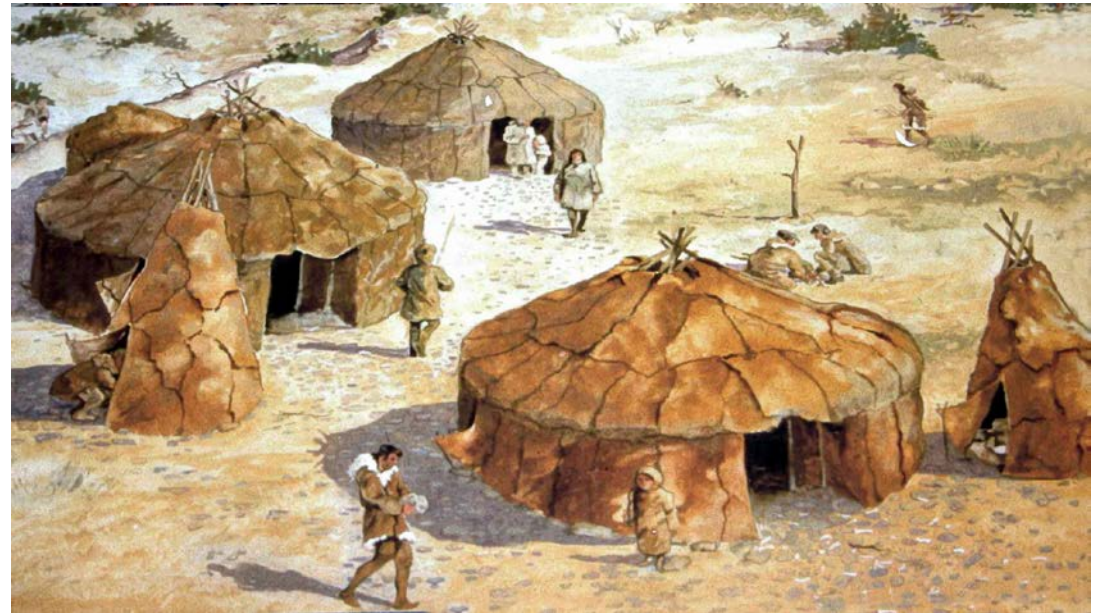
Since fire was first used by primitive people to provide light and heat, the use of energy to aid in environmental moderation has developed internal environments that reduce the effects and extremes in the external climate.



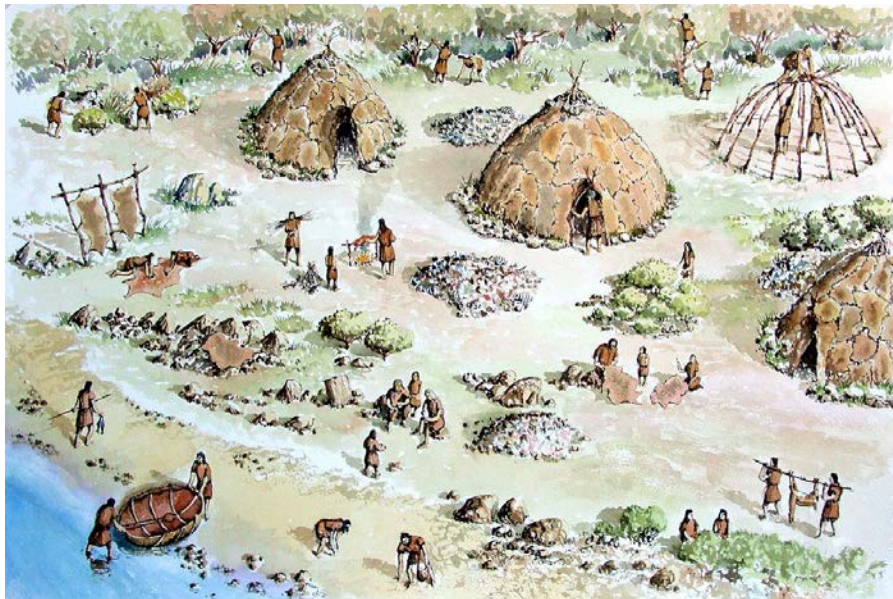
https://i.dailymail.co.uk/i/pix/2015/07/03/14/2A338A5800000578-3148511-image-a-21_1435930837225.jpg



http://4.bp.blogspot.com/-6cWvcEKKHBY/T6CVotA7KyI/AAAAAAAGTU/ySJec0U92LQ/s1600/the_neanderthal_encampment_by_zdenek_burian_1950.JPG



https://klse.i3investor.com/files/my/blog/img/bl1338_gonnorsdorfsettlement.jpg



<https://l.pinimg.com/originals/41/ce/63/41ce63be5c59f90e1150a7ea6d97de51.jpg>

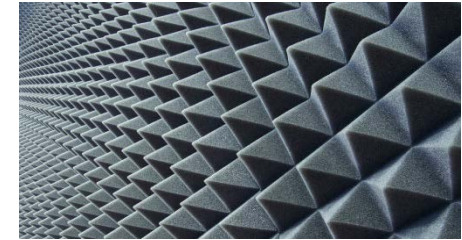
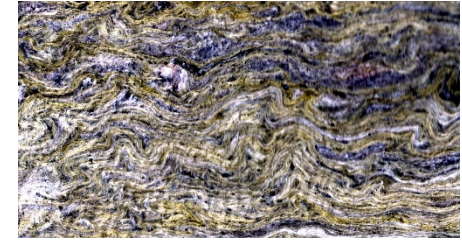


<https://museum.wales/stfagans/buildings/bryneryr/>

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.



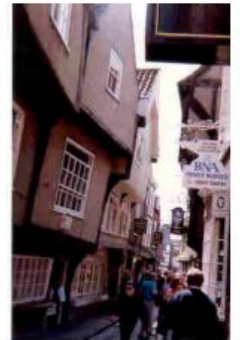
Case study 1: Styles of buildings

Thermally light structures in Thailand

These dwellings are located in Thailand. The lightweight construction form is created by the use of locally available materials. The large openings allow air to pass through the building to cool the interior quickly. Thermally light structures of this type are common throughout the Far East. They utilise local materials that are readily available. However, with the advent of more modern construction forms and the incorporation of air conditioning systems they are now restricted to rural areas.



A simple cottage dwelling located in the North of England is above. The use of slate for the roof and brick for the external walls is typical of many buildings of this age and type. In contrast, the buildings in the right-hand picture reflect an earlier form of building in which a structural timber frame is used rather than loadbearing external walls. Note that the upper floors project outwards over the street. This allows more floor area to be created within the dwelling while minimising the area of land utilised. This style was actually driven by economics rather than functionality. At the time of its construction taxes were based on the ground floor area of the building.



European vernacular buildings

These are examples of heavyweight construction forms found in England and France. The use of local stone and slate for the walls and roofing reflects regionally available materials, although the 'gothic' style of the building above is actually a copy of earlier styles. The building was constructed in the Victorian period. The windmill, in contrast, is typical of simple rural building styles.



SAIN F FAGAN

<https://museum.wales/stfagans/thesite/>

Welsh Vernacular Building types

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FUNDAMENTALS OF CONSTRUC...

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General

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GROUND WORKS 3

Groundworks 1

GROUNDWORKS 5

SUB-STRUCTURE and GROUNDWORK INTRODUCT...

Superstructure wk1

1 hidden channel

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Superstructure wk1

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Fundamentals of Construction Technology

Functions of Buildings

...

Hi Gavin, when you submit this form, the owner will be able to see your name and email address.

* Required

1. What do you consider to be the main differences between the terms 'Vernacular Building' and 'Modern House construction'? *

Enter your answer

2. How could these two styles vary in terms of the building performance? *

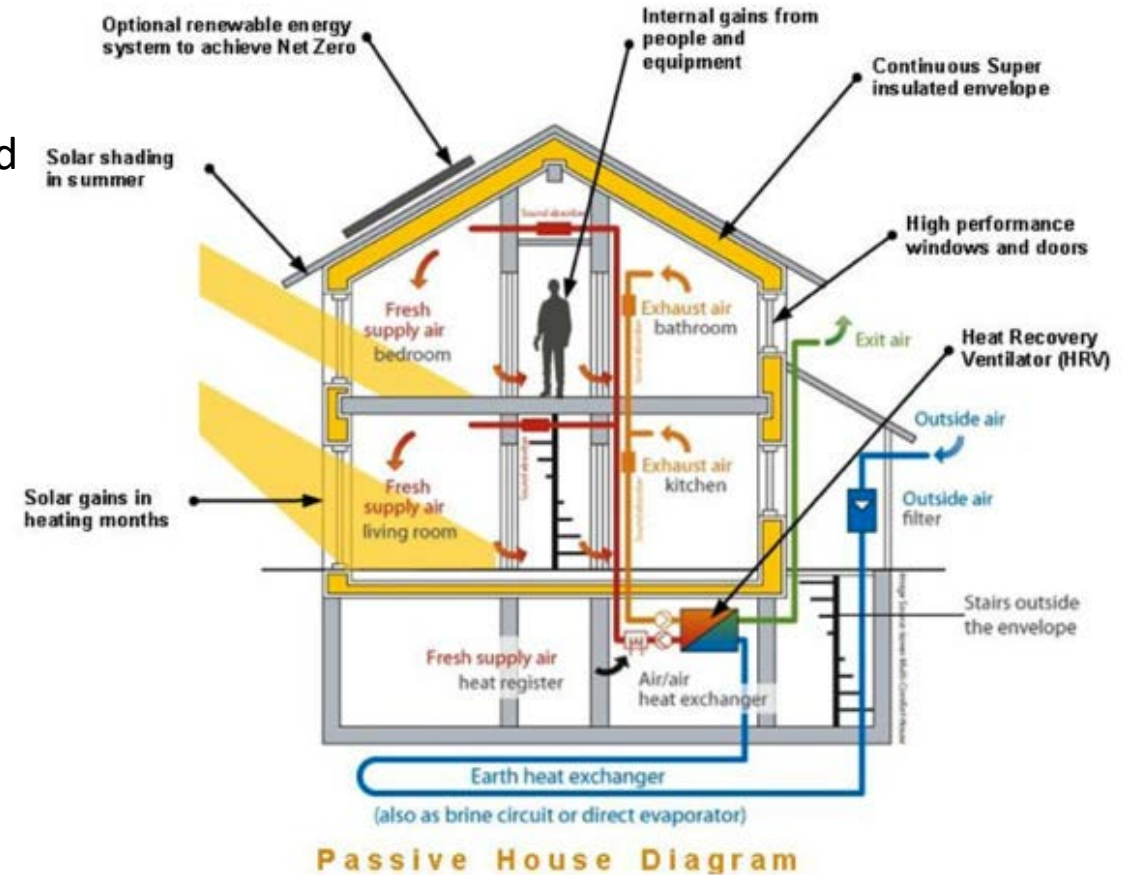
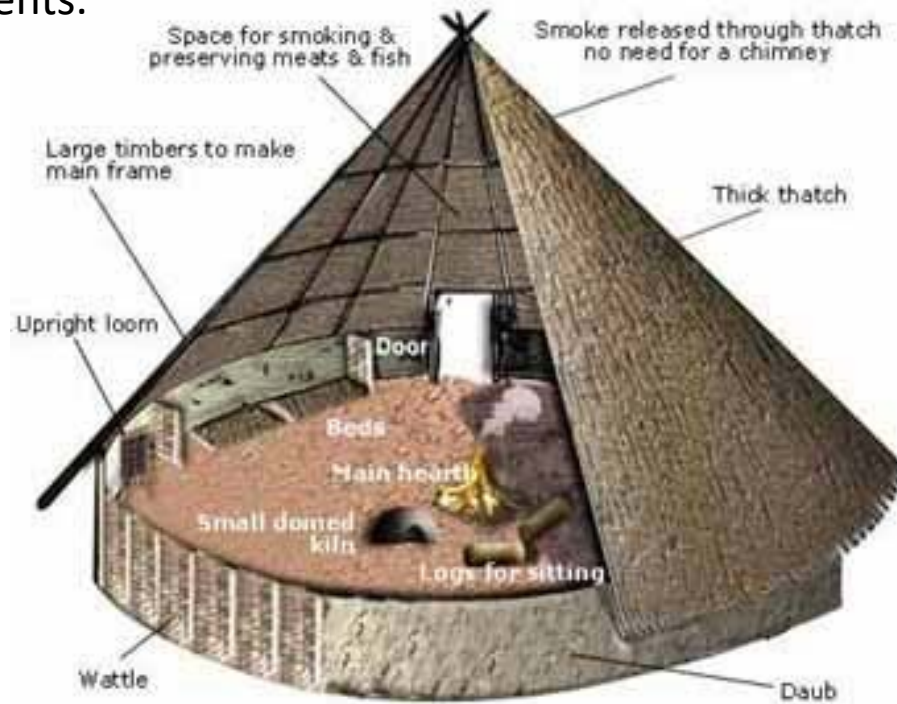
Enter your answer

3. Explain what you would consider to be a Thermally Light Building? *

Building Styles:

A vernacular building style is specific to a region and uses the local materials available in its construction to form the building fabric.

Modern House construction uses a wide variety of materials and techniques and is not specific to any particular region. Construction methods, materiality of the building envelope and performance of the building fabric can be modified to suit the requirements.



Thermally Light V's Thermally Heavy:

Thermally light buildings are physically light in weight and have a fabric which has little capacity to absorb heat. Such buildings respond quickly to changes in external temperatures.



By contrast thermally heavy often have a heavy dense fabric which reflects some heat and absorbs much of the rest. They insulate the interior by reacting slowly to variations in external temperature.



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



What is Superstructure?



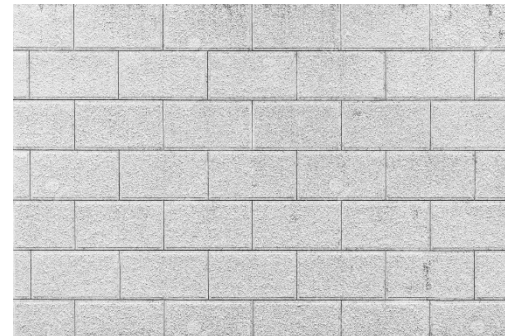
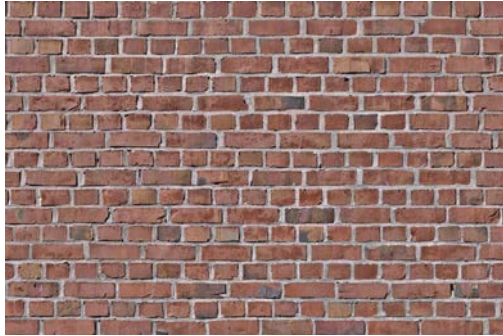
EXTERNAL WALLS



FUNCTIONAL REQUIREMENTS OF EXTERNAL WALLS

Weather protection
Fire resistance
Thermal resistance
Strength and stability
Durability
Buildability
Noise insulation

SOLID WALLS



Built with brick, stone or block



Load-bearing and non-load bearing

SOLID WALLS

Traditional construction. Pre 1919 solid walls

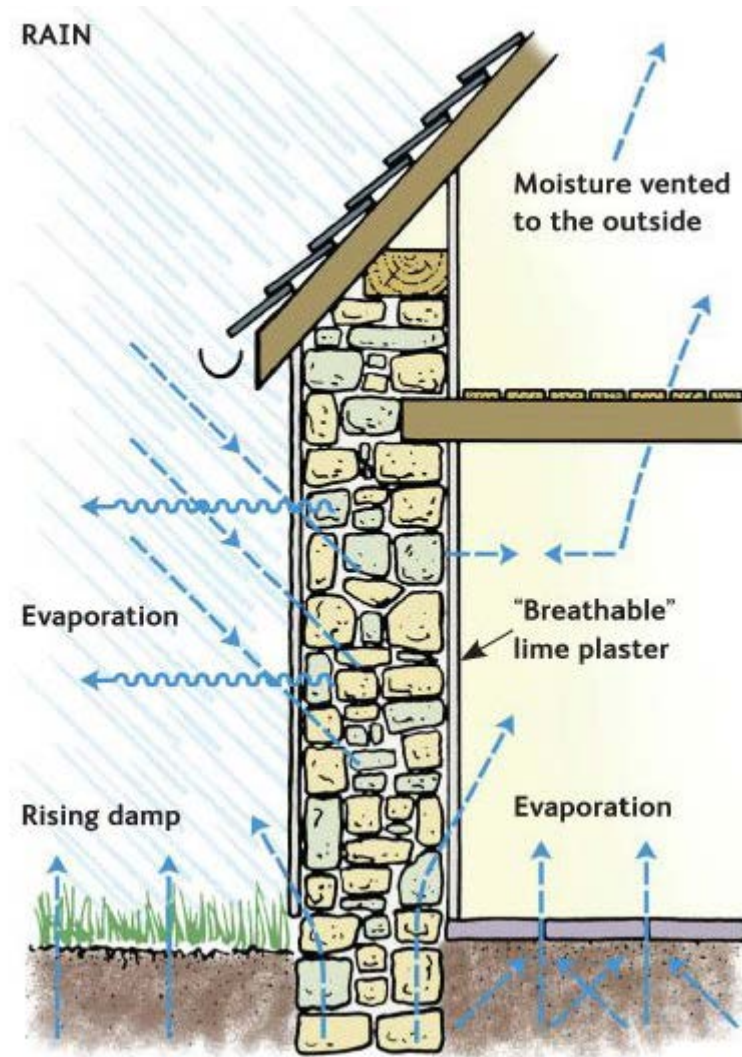


SOLID WALLS

Traditional construction. Pre 1919 solid walls

Characteristics:

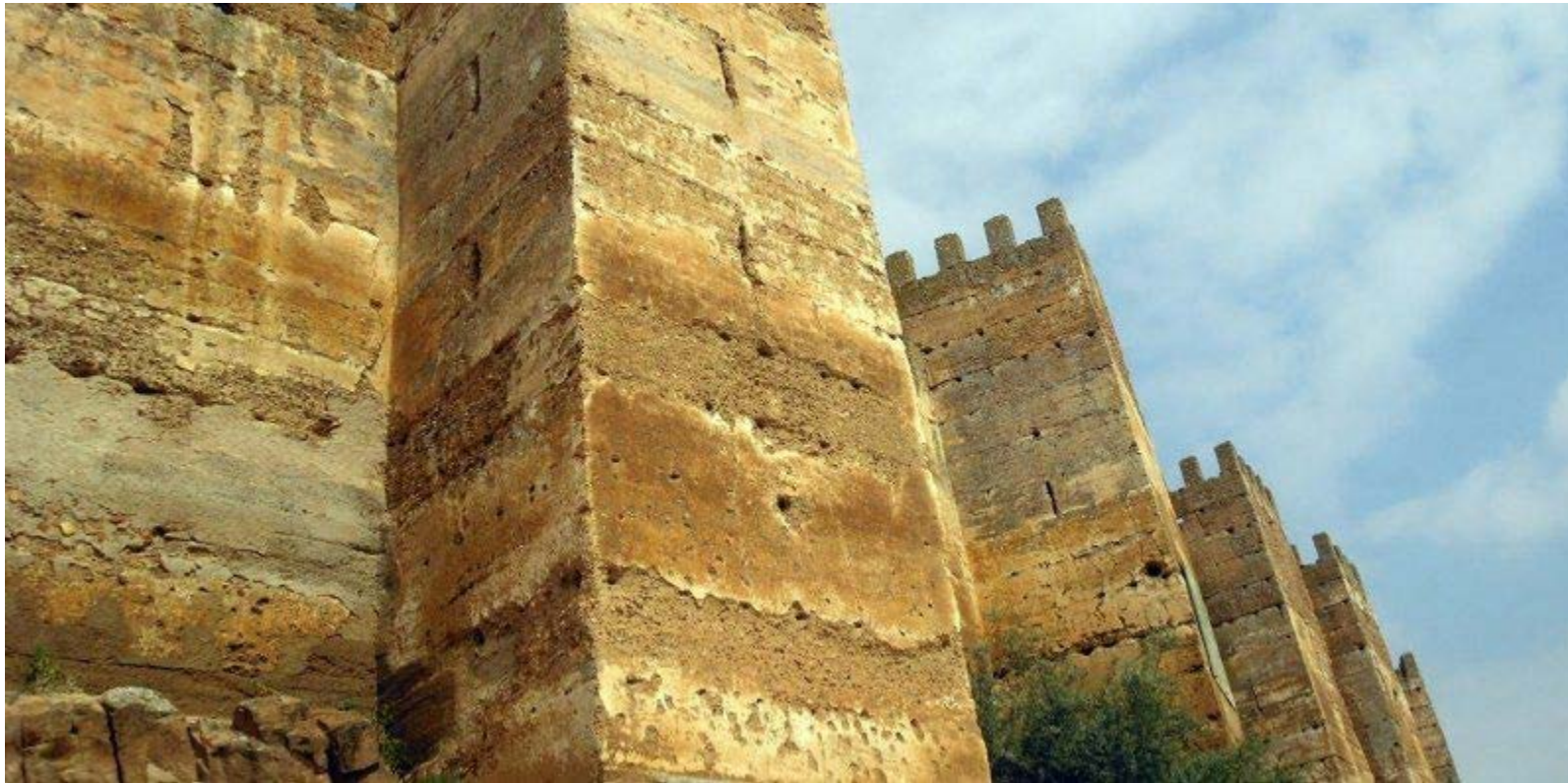
- Thick walls
- Random rubble
- Lime mortar
- Shallow foundations
- No DPC



SOLID WALLS

Traditional construction. Pre 1919 solid walls

Earth walls – Rammed Earth



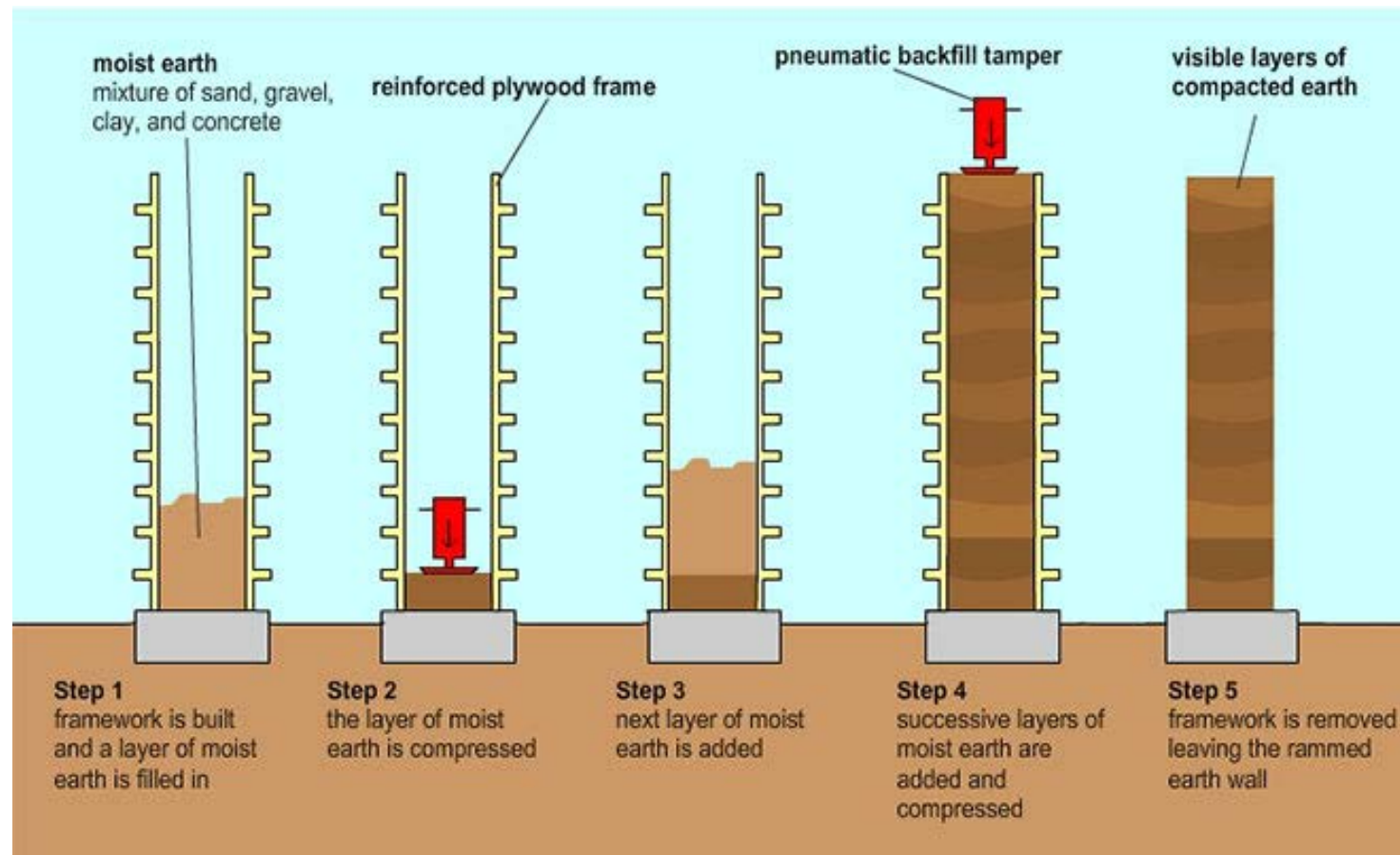
SOLID WALLS



SOLID WALLS

Traditional construction. Pre 1919 solid walls

Earth walls – Rammed Earth



SOLID WALLS

Traditional construction. Pre 1919 solid walls

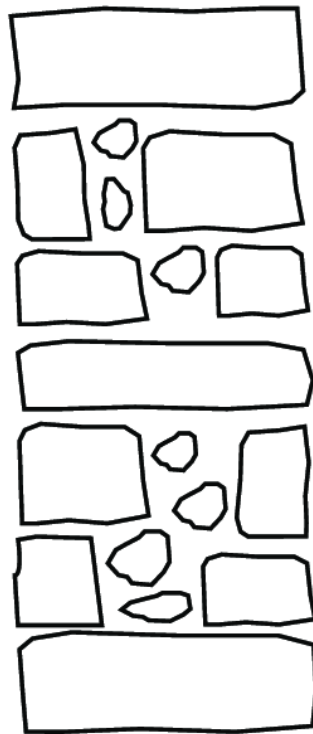
Random rubble



SOLID WALLS

Traditional construction. Pre 1919 solid walls

Random rubble



Earthquake
resistant

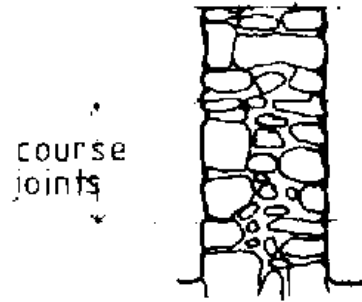


Earthquake
prone

SOLID WALLS

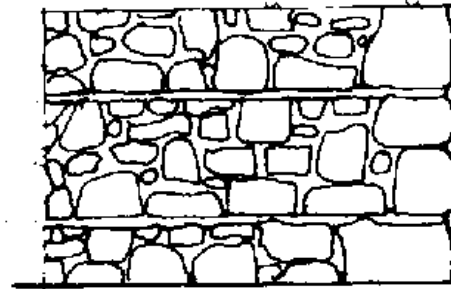


PLAN



course joints

SECTION

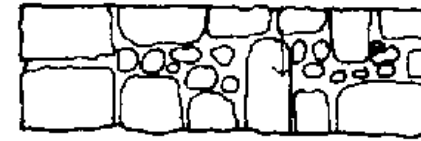


ELEVATION

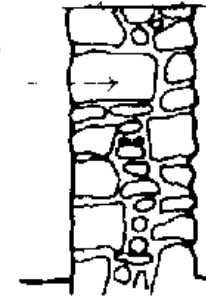


Coursed

Bonder

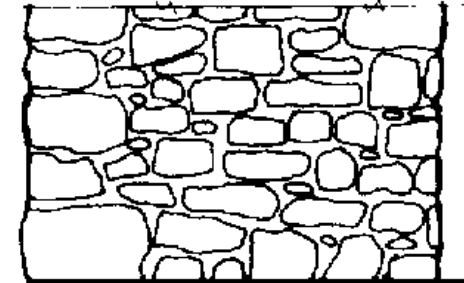


PLAN



Bonder

SECTION



ELEVATION



Uncoursed

SOLID WALLS

Traditional construction. Pre 1919 solid walls

Ashlar



SOLID WALLS

Traditional construction. Pre 1919 solid walls

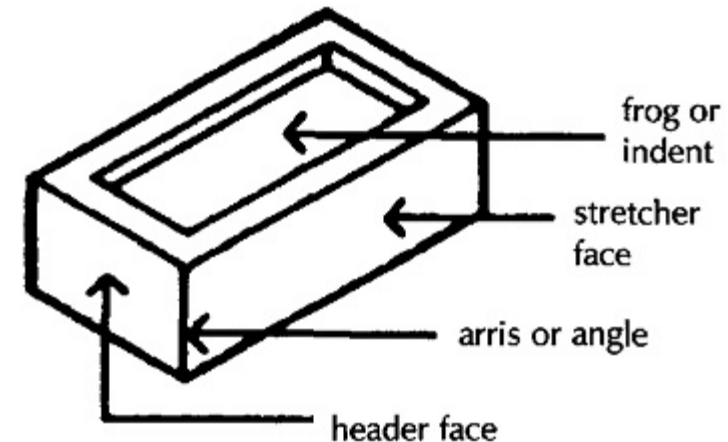
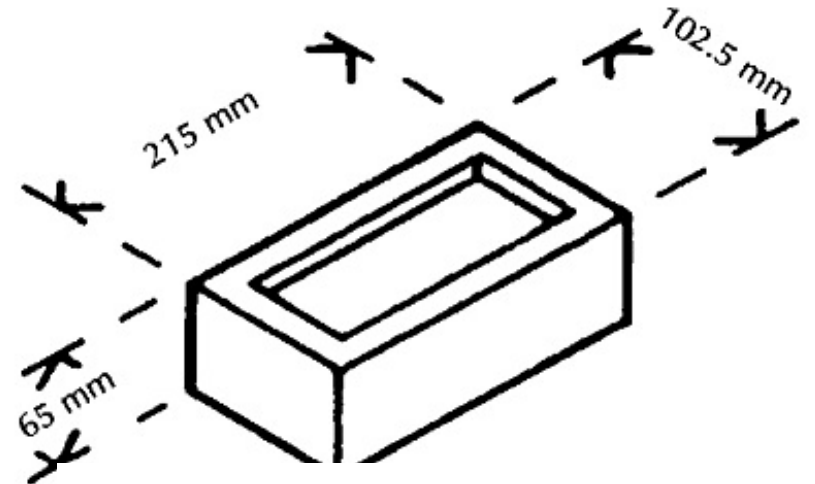
Brickwork



SOLID WALLS

Brickwork. Materials

- **Nominal size** :- A standard metric brick has coordinating dimensions of **225 x 112.5 x 75 mm** (9" x 4.5" x 3")
- **Architectural size** :- Working dimensions (actual dimensions) of **215 x 102.5 x 65 mm** (8.5" x 4" x 2.5")



QUESTIONS

What is the difference between a load-bearing and a non-load bearing wall?

What is a breathable wall?

What is a rammed earth wall?

What is the purpose of a coursed random rubble wall?

How can we achieve a better distribution of loads inside a wall: with random rubble or ashlar?

EXERCISE

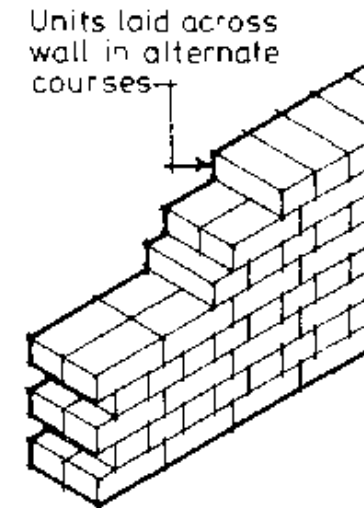
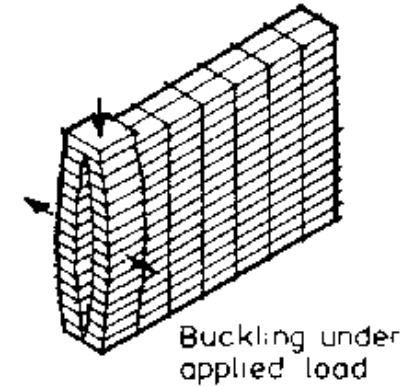
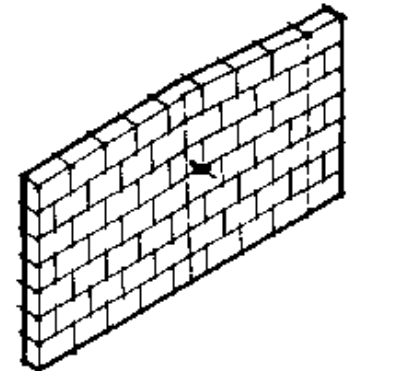
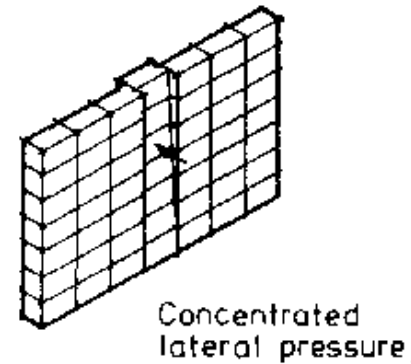
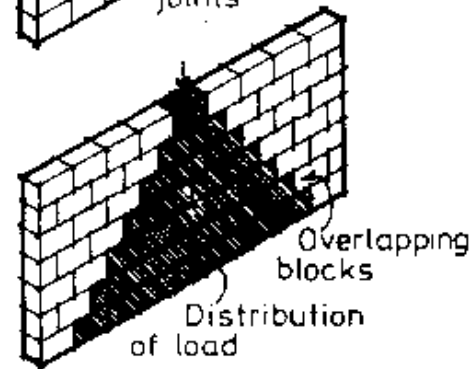
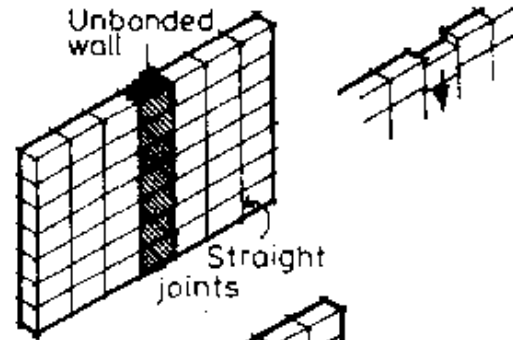
Calculate the number of bricks needed for a 20x3.5m wall surface.

$$\frac{(20,000 \times 3,500)}{225 \times 75} = 4,148.1 \approx 4,150 \text{ bricks}$$

SOLID WALLS

Traditional construction. Pre 1919 solid walls

Brickwork. Bonds



SOLID WALLS

Traditional construction. Pre 1919 solid walls

Brickwork. Bonds

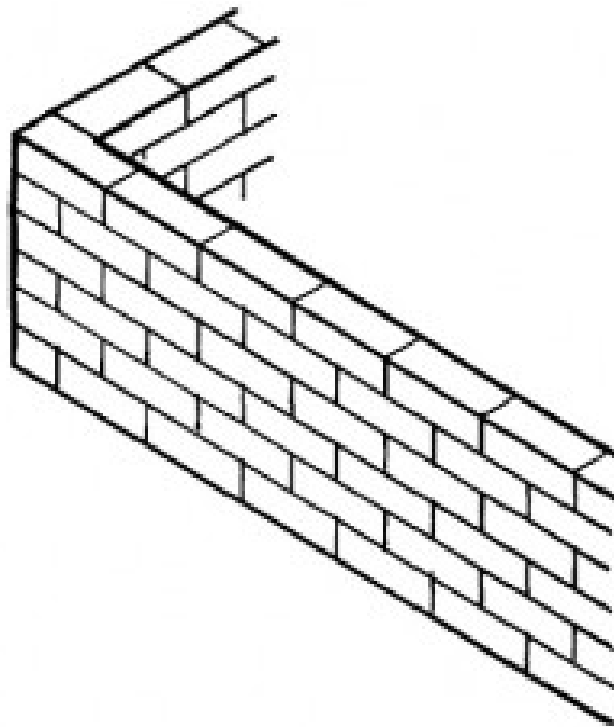


Fig. 52 Stretcher bond.

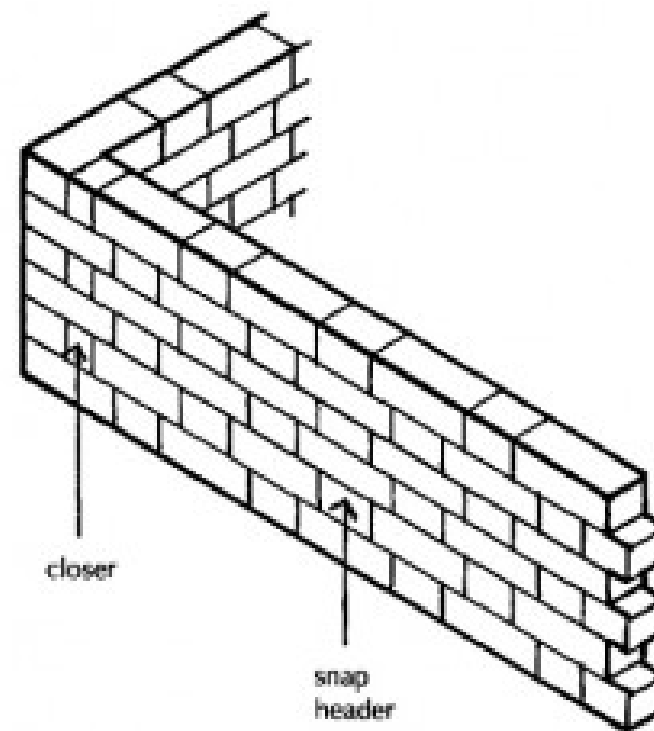
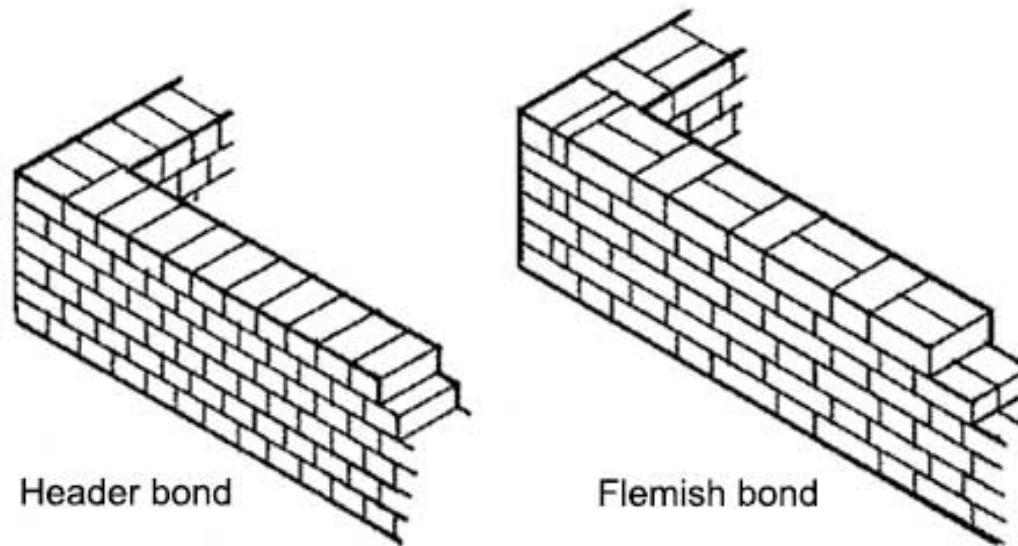


Fig. 53 Flemish bond with snap headers.

SOLID WALLS

Traditional construction. Pre 1919 solid walls

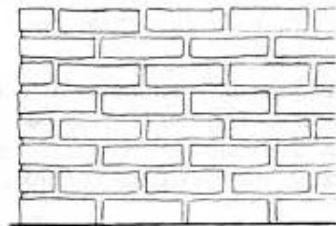
Brickwork. Bonds



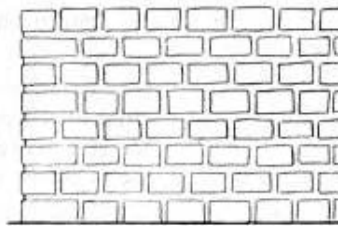
SOLID WALLS

Traditional construction. Pre 1919 solid walls

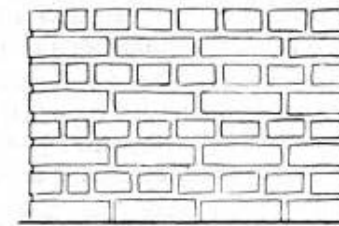
Brickwork. Bonds



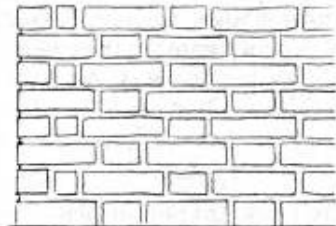
STRETCHING BOND.



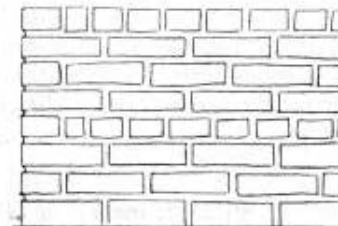
HEADING BOND.



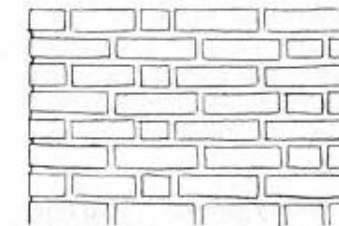
ENGLISH BOND.



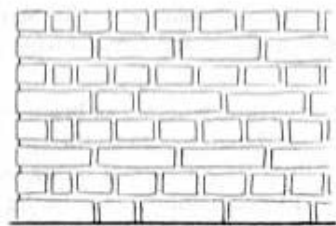
FLEMISH BOND.



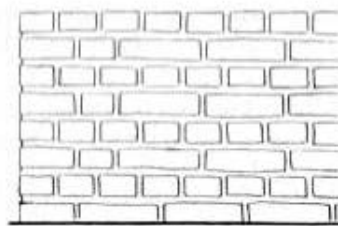
ENGLISH GARDEN
WALL BOND.



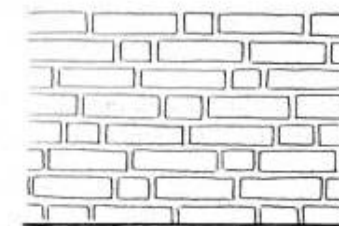
FLEMISH GARDEN
WALL BOND.



ENGLISH CROSS BOND.



DUTCH BOND.

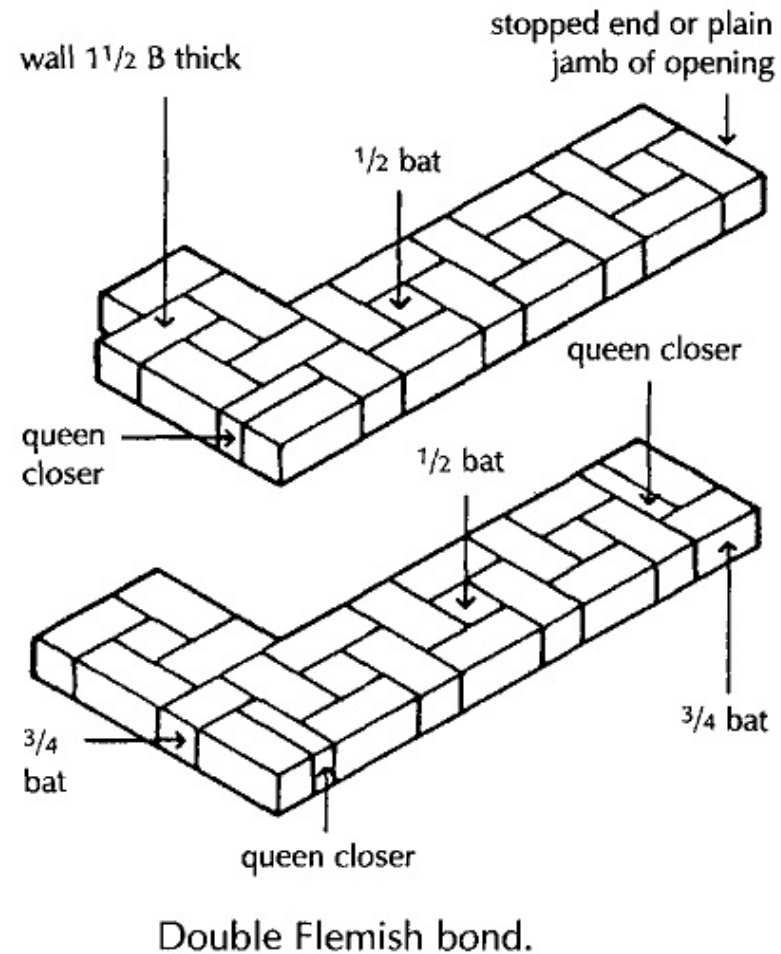
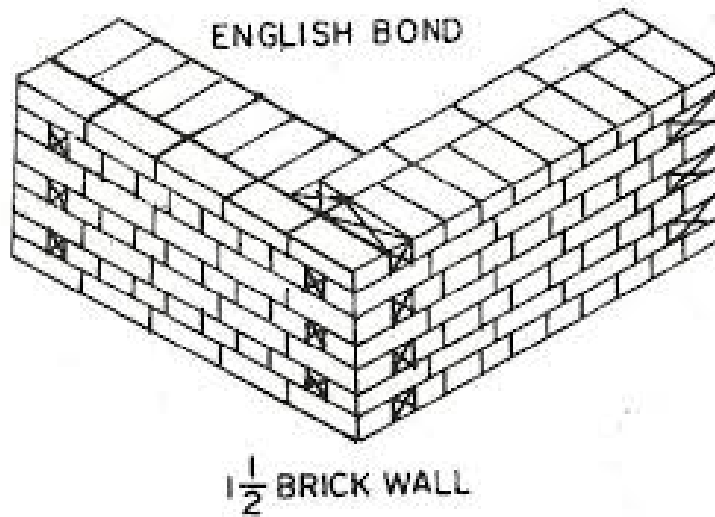


MONK BOND.

SOLID WALLS

Traditional construction. Pre 1919 solid walls

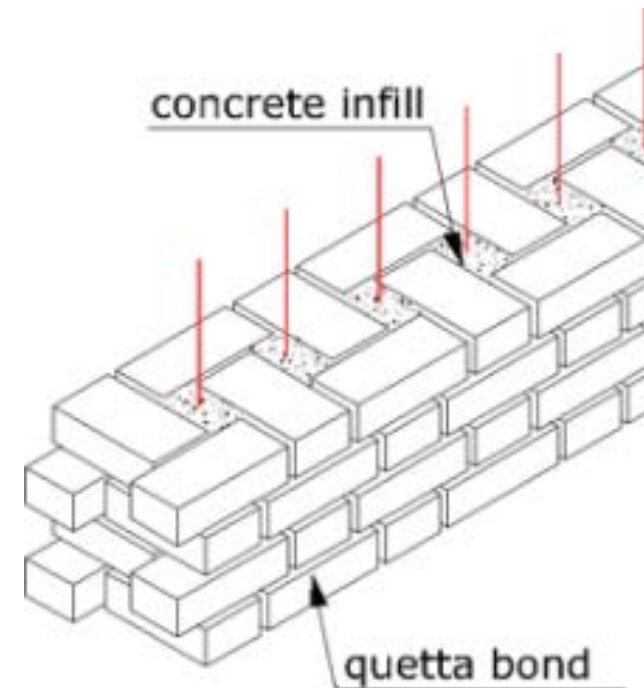
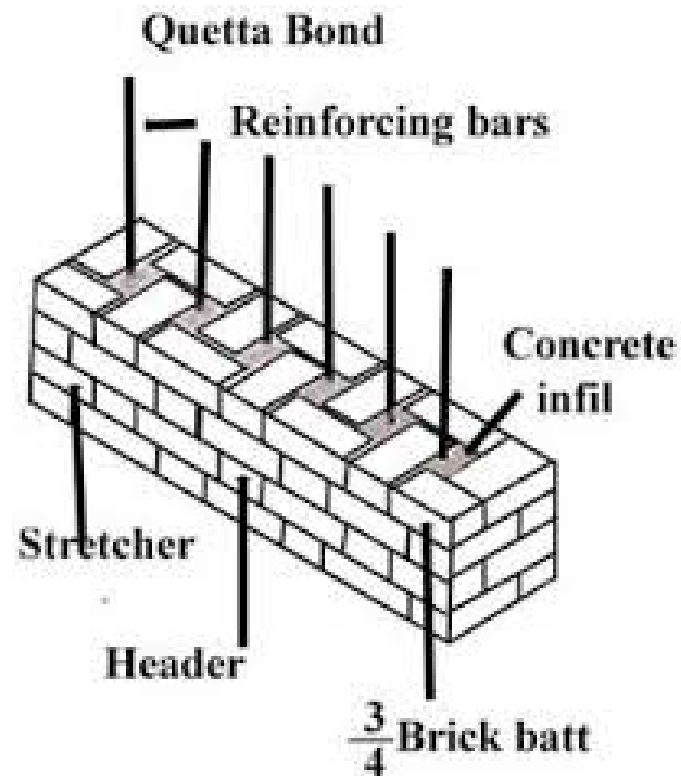
Brickwork. Bonds



SOLID WALLS

Traditional construction. Pre 1919 solid walls

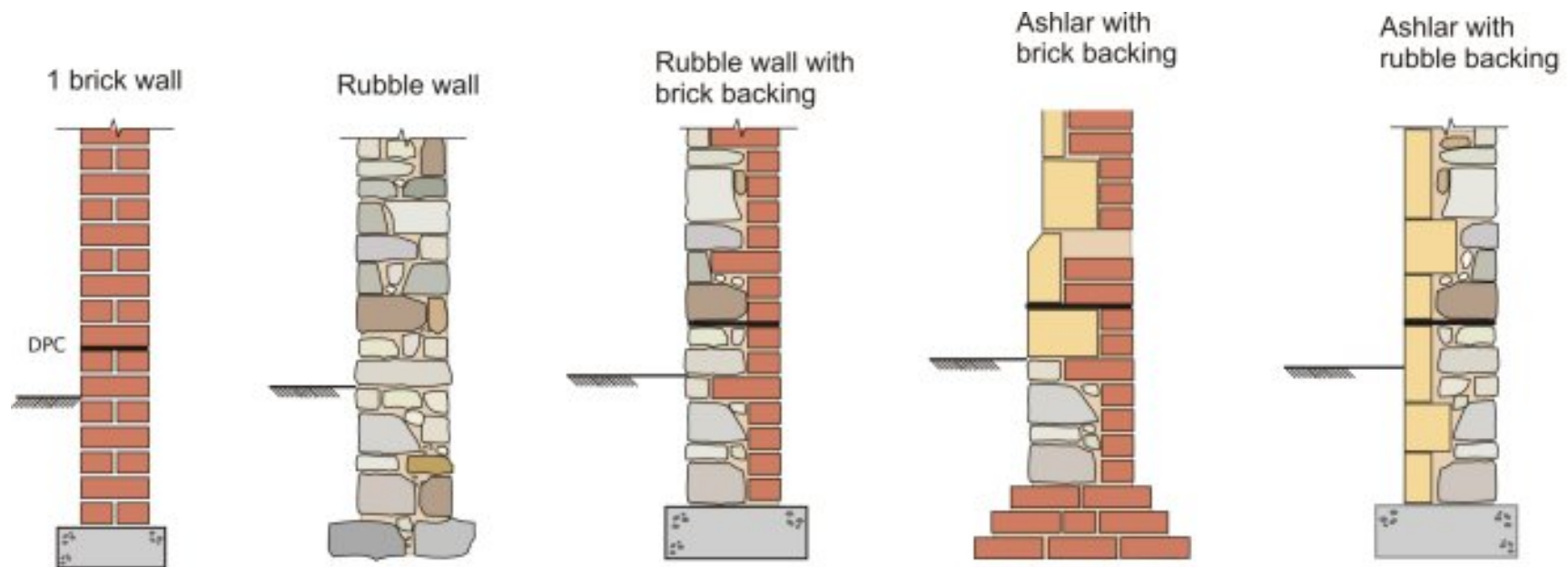
Brickwork. Bonds



SOLID WALLS

Traditional construction. Pre 1919 solid walls

Combinations



EXERCISE

Design the bond for a two-brick solid Wall:

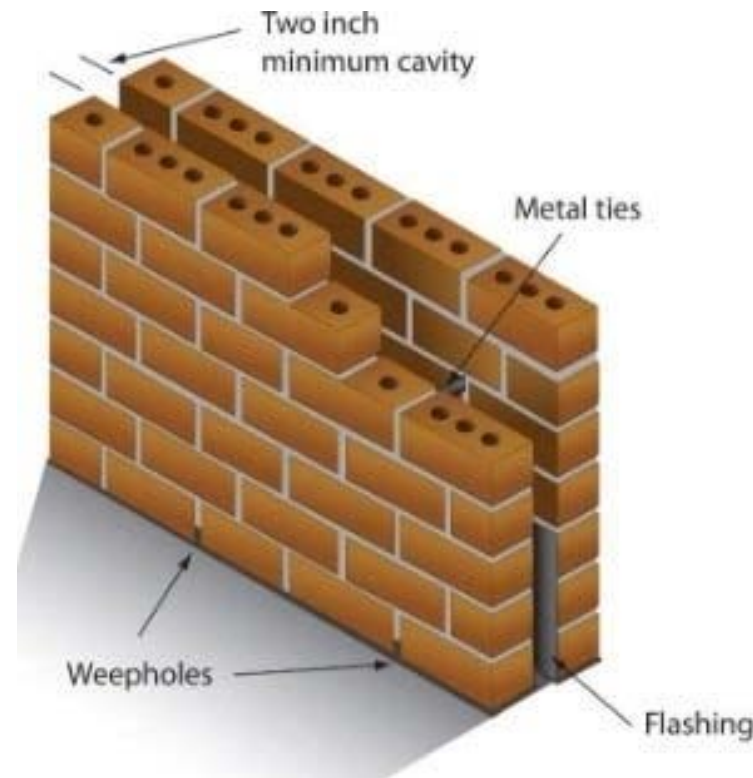
- English bond
- Flemish bond
- Heading bond

CAVITY WALLS

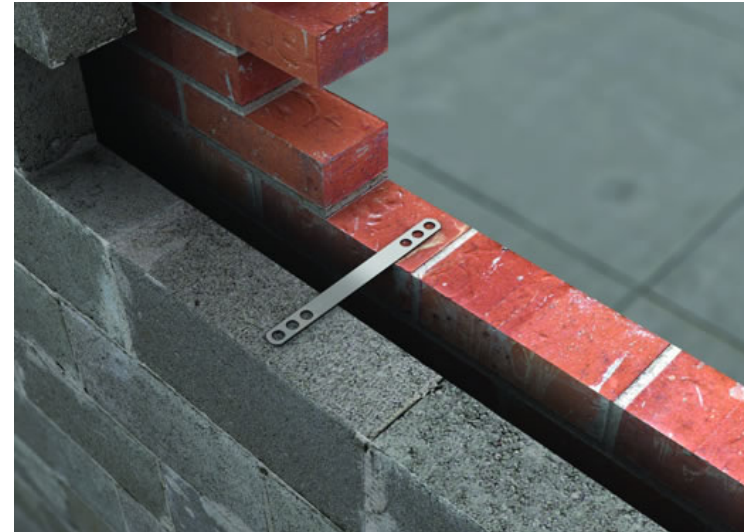
Type of double skin created by two walls and a cavity in between

Purpose:

- Weather protection
 - Thermal insulation
 - Noise attenuation
-
- Two walls joined by metal ties
 - Weepholes to release any moisture or humidity



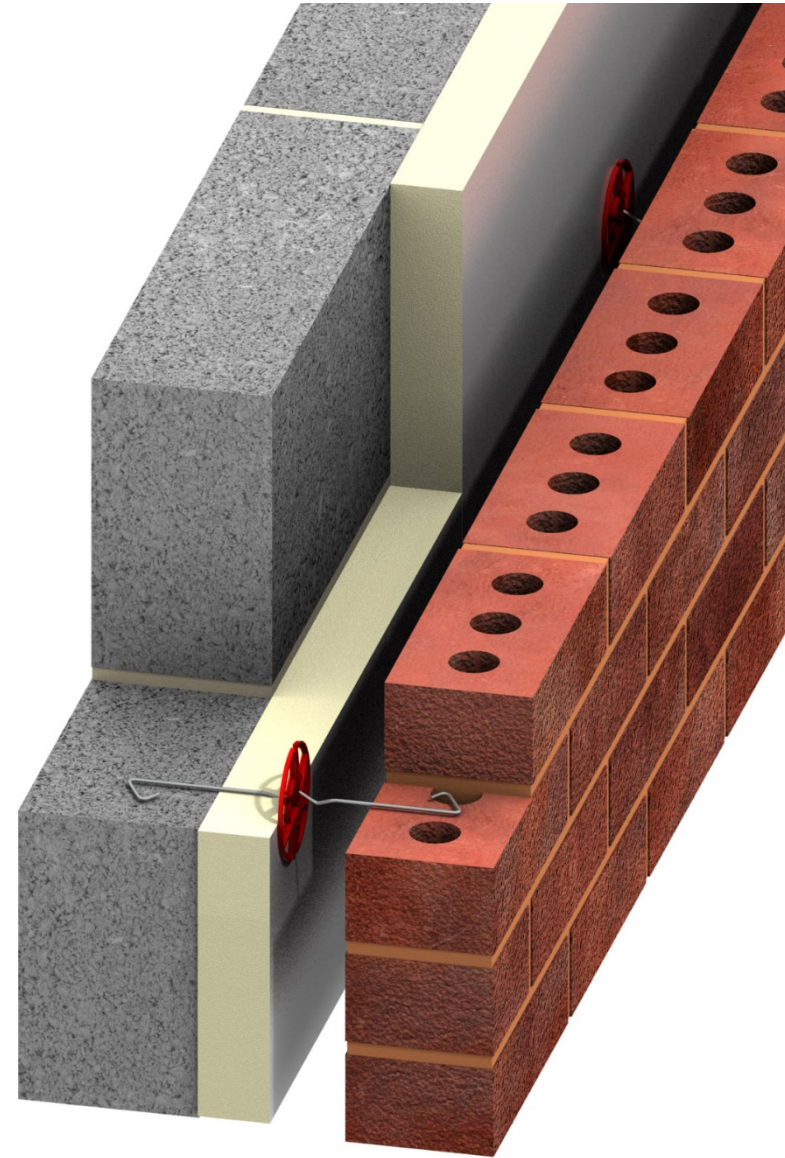
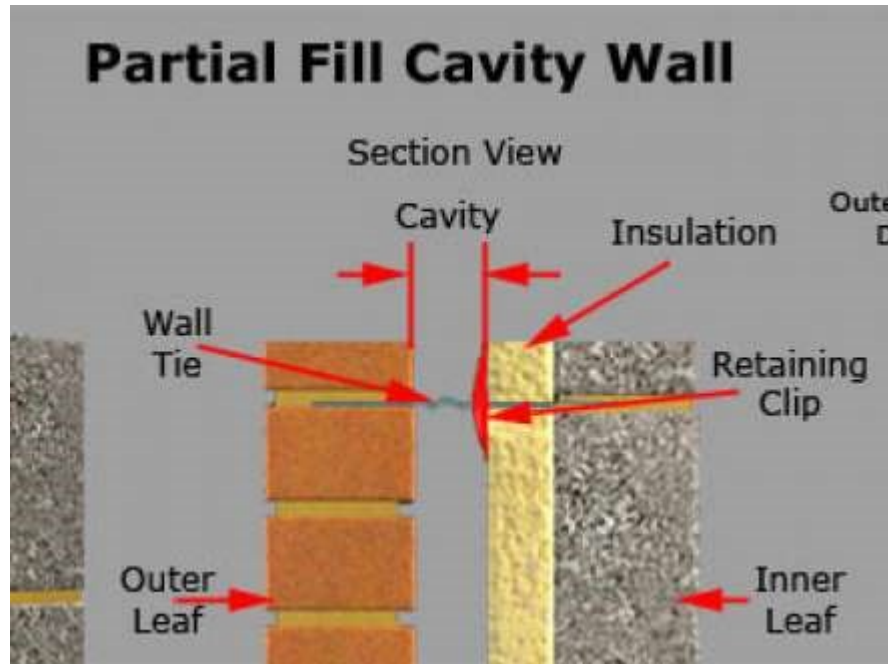
CAVITY WALLS



- Two walls joined by metal ties
- Weepholes to release any moisture or humidity

CAVITY WALLS

Insulation



CAVITY WALLS

Insulation. Some types



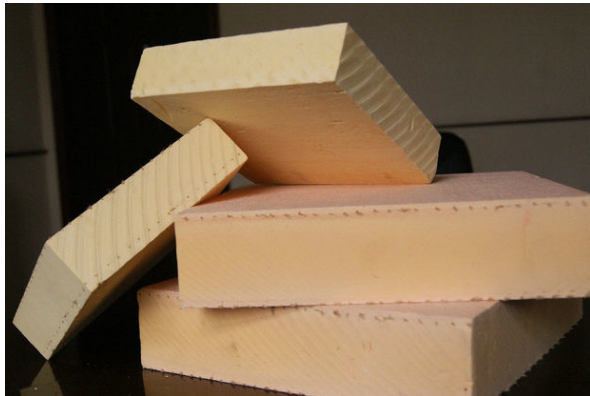
Rock mineral wool



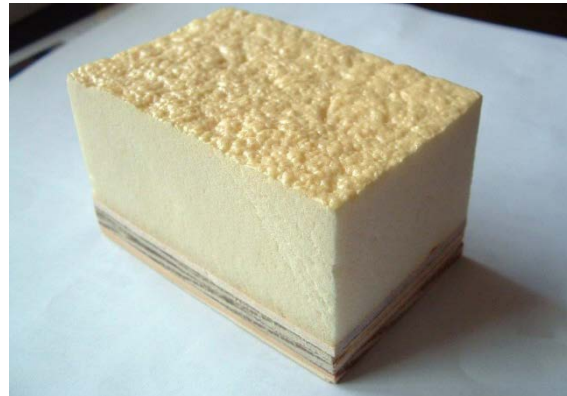
Glass mineral wool



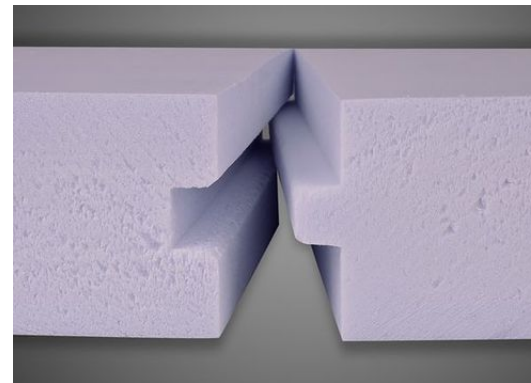
Expanded polystyrene



Phenolic foam



Polyurethane foam

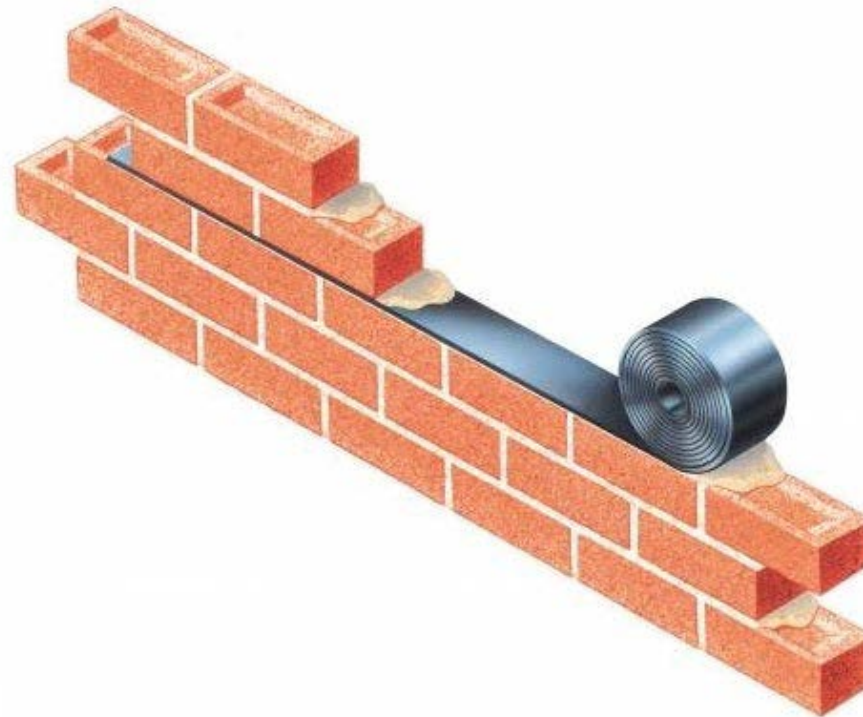


Extruded polystyrene

CAVITY WALLS

Damp Proof Course (DPC)

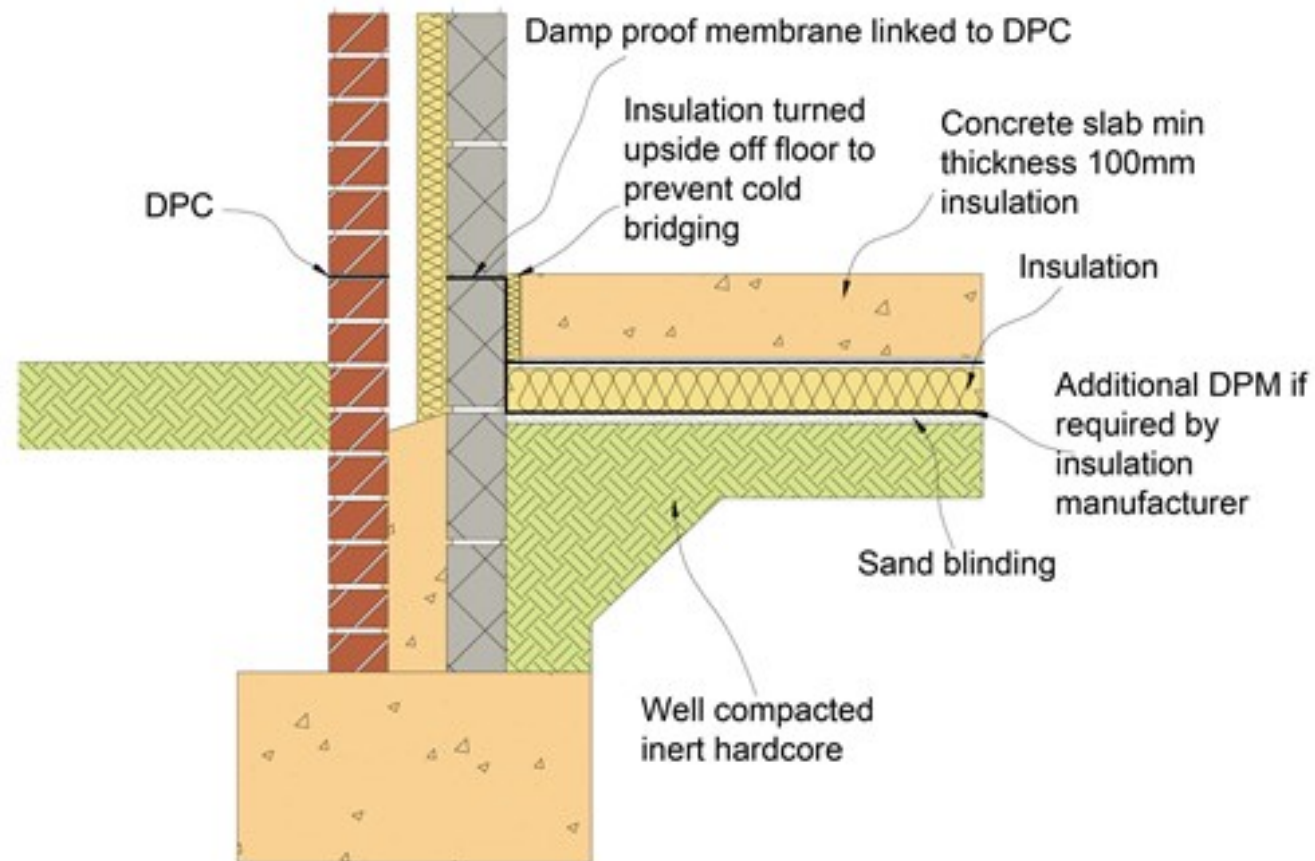
Prevents groundwater from being absorbed by capillarity action in walls



CAVITY WALLS

Damp Proof Membrane

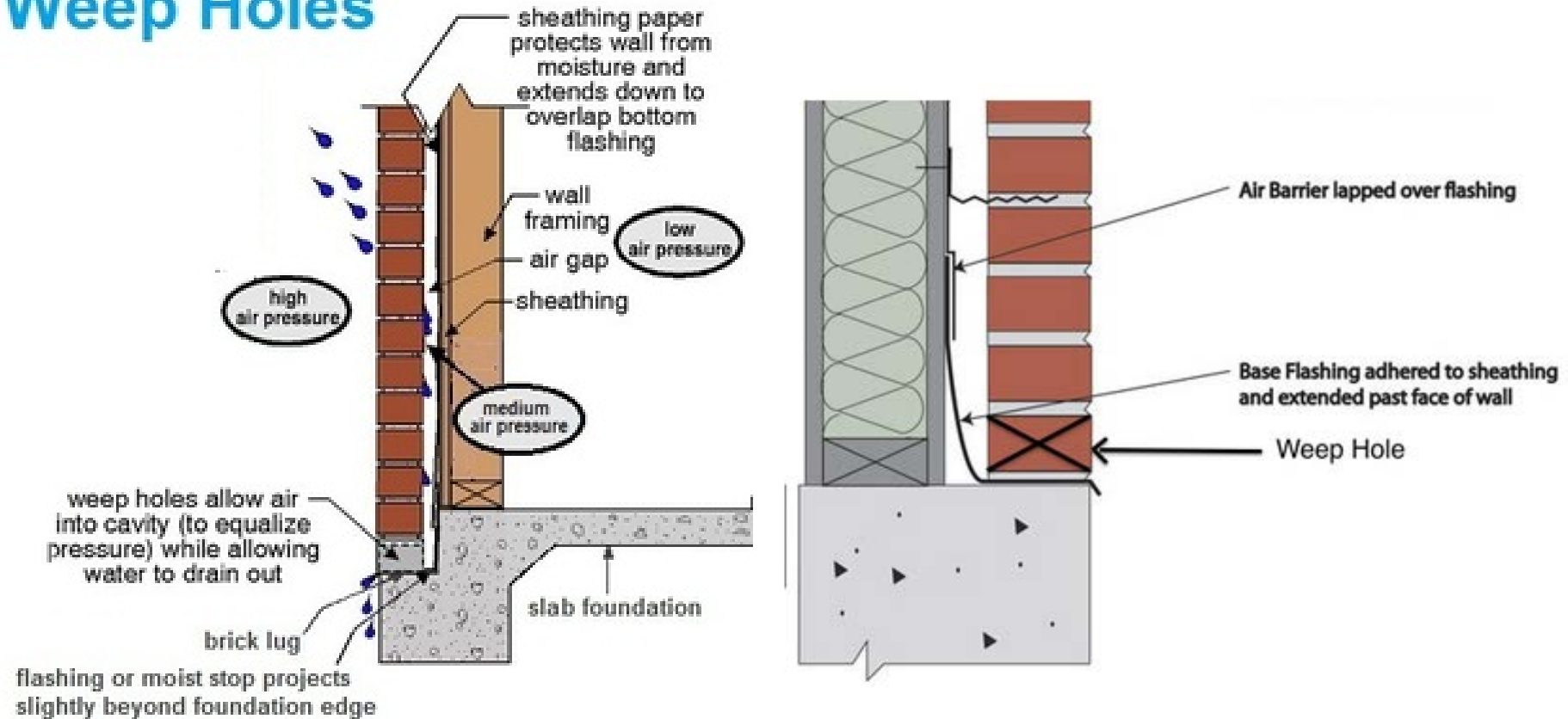
Application in floors



CAVITY WALLS

Cavity drainage

Weep Holes



CAVITY WALLS

Cavity drainage



VAPOUR CONTROL BARRIER

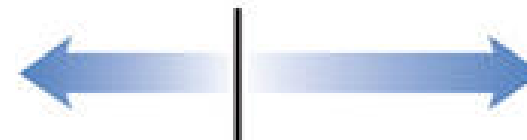
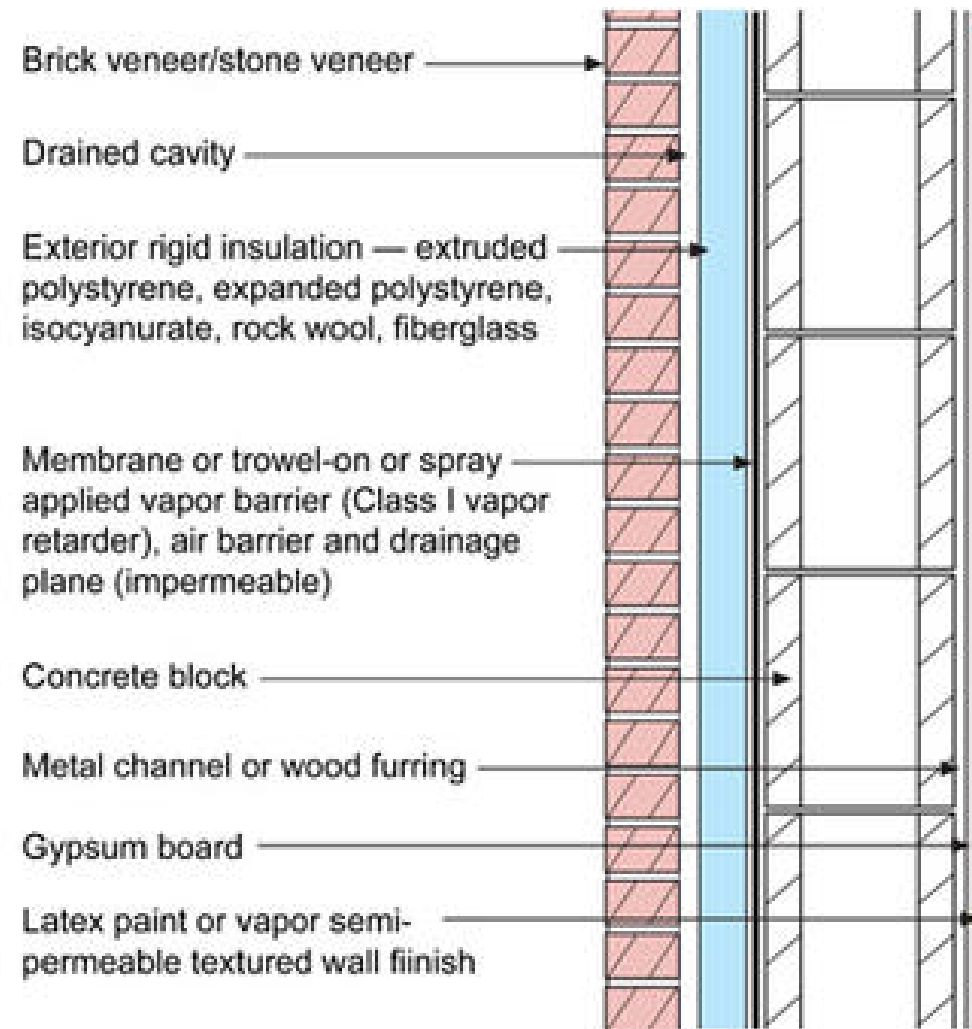
Block the warm moisture in a room to enter the wall and affect insulation and other elements inside (structure frame, other layers, etc.)

Not needed in warm climates

If in the wrong position, it can cause more harm than benefit

Always in the warm side (between insulation and drywall)

Depending on the type of construction, we can consider a waterproof, breathable layer



EXERCISE

Draw a cross section for a typical external cavity Wall in Swansea.
Include all elements that are necessary for the correct performance.

Summary Week 1:

Reviewed Functions of Buildings

Overview of Superstructure

Type of External Walls

