

Lecture-8

Brick Masonry

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OVERVIEW

Load Bearing
Walls

Reinforced
Masonry

Concrete
Masonry units



Load Bearing Walls

Load bearing walls are those which are designed to carry super-imposed loads (transferred through roofs etc.), in addition to their own weight (self weight). Non-load-bearing walls carry their own load only. They generally serve as divide walls or partition walls. The external non-load bearing wall, commonly related to framed structure is termed as panel wall.



Load Bearing Walls

Load bearing walls may further be divided into following steps

- a) Solid masonry wall
- b) Cavity wall
- c) Veneered wall

Solid Masonry Wall

It is one most commonly used. These walls are built of individual blocks of material, such as bricks, clay or concrete blocks, or stone, usually in horizontal courses, cemented together with suitable mortar. A solid wall of the same type of building units throughout its thickness. However, it may have opening for doors, windows etc



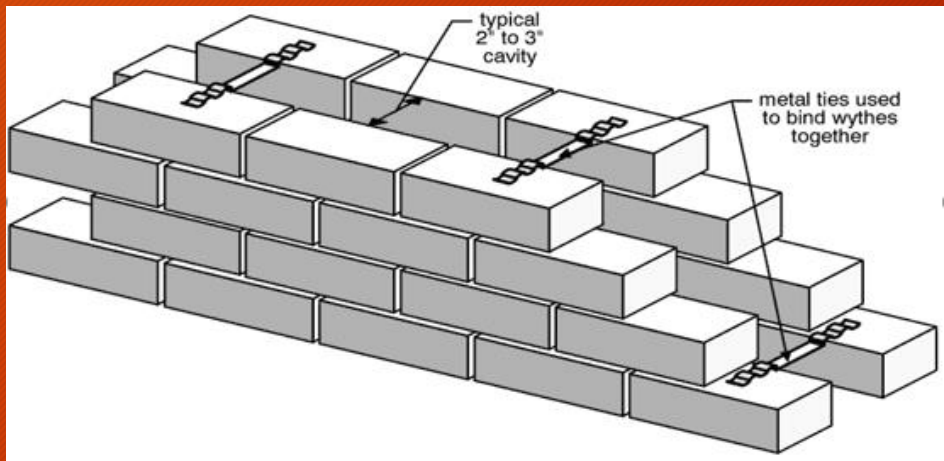
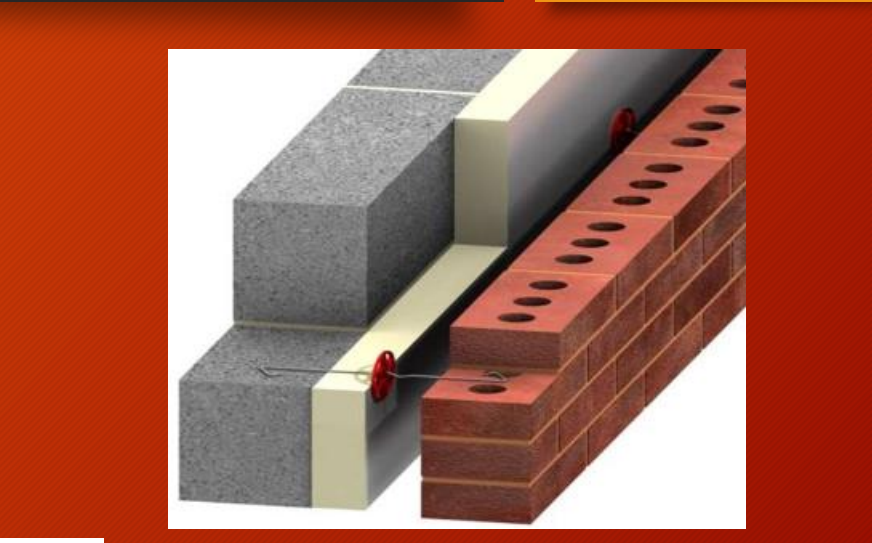
CAVITY WALL

A cavity wall is a wall comprising two leaves (skin), each leaf being built of structural units and separated by a cavity and tied together with metal ties or bonding units to ensure that the two leaves act as one structural unit. The space between the leaves is either left as a continuous cavity or is filled with non-load-bearing insulating and water proofing material

THE CAVITY WALLS CONSIST OF TWO SKINS (leaves) SEPERATED BY A HOLLOW SPACE (CAVITY)

- The skins are commonly masonry such as brick or concrete block. Masonry is an absorbent material and therefore will slowly draw rainwater or even humidity into the wall.
- The cavity can serves as a way to drain this water back out through weep holes at the base of the wall system or above windows. To prevent the penetration of rain to the internal surface of the wall
- The reason cavity insulation keeps heat in is that the polymer and air in the cavity are good insulators.





FACED WALL

- It is a wall in which the facing and backing are of two different materials which are bonded together to ensure common action under load

- **Veneered wall**

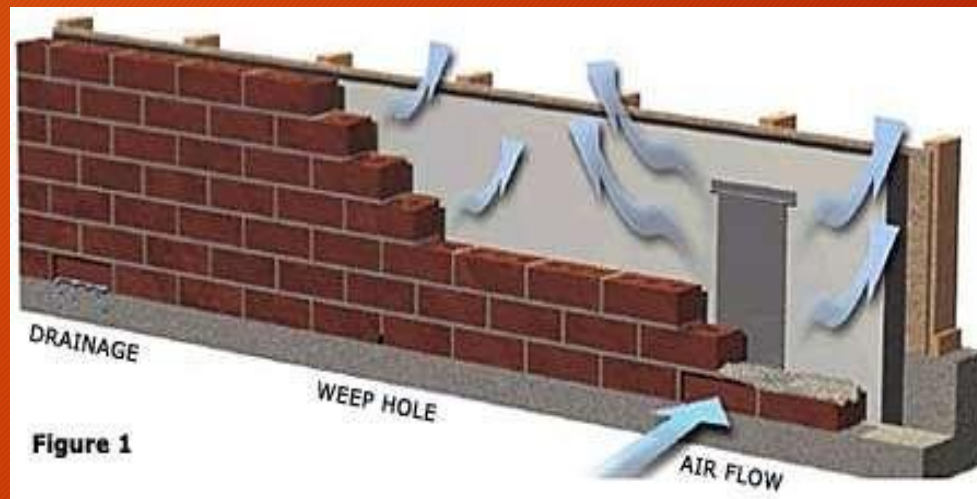
- It is a wall is a wall in which the facing is attached to the backing but not so bonded as to result in a common action under load.

Veneered wall

It is a wall in which the facing is attached to the backing but not so bonded as to result in a common action under load.

- This masonry is used as a facing material.
- In this case, the masonry does not act structurally. It serves to perform as a **weather barrier** and as a **finish material**. Insulation and mechanical equipment is normally located between studs.

A brick veneer masonry wall is light weight, thermally efficient and can help in reducing costs.



Advantages of Veneered wall

- The airspace between the brick veneer wall and the structural element acts as a drainage system.
- The cavity can be insulated and this improves the thermal performance of the wall.
- The structural element can be constructed first and this allows the rest of the construction to proceed. The brick veneer can be completed simultaneously.
- A brick veneer construction takes less time to complete than a solid masonry wall which will give cost savings.
- A veneer wall will weigh much less than a solid wall. Since the weight is less, the cost of the foundation and structural support can be reduced.



Examples of brick veneered masonry walls.



BRICK PANEL WALLING

□ A **wall panel** is single piece of material, usually flat and cut into a rectangular shape, that serves as the visible and exposed covering for a wall. Wall panels are functional as well as decorative, providing insulation and soundproofing, combined with uniformity of appearance, along with some measure of durability or ease of replacability. While there is no set size limit for a piece of material fulfilling these functions, the maximum practical size for wall panels has been suggested to be 24 feet by 8 feet, to allow for transportation



BRICK PANEL WALLING

Use of wall panels can reduce construction costs by providing a consistent appearance to the paneled surface without requiring the application of paint or another finishing material.

Wall panels may be finished on only one side, if the other side is going to be against a brick or concrete wall, or a comparable structure. Alternately, the panels may, if assembled to an appropriate framework, substitute for having any other kind of wall at all. Holes may be cut or drilled into a wall panel to accommodate electrical outlets and other devices coming out of the wall.

Reinforced Masonry

REINFORCED BRICK WORK USES

FIRST CLASS BRICK



Mortar (cemen:sand ratio : (1:3))

REINFORCEMENT



CEMENT MORTAR

- cement mortar uses in reinforced brick work has HIGH DENSITY.
- It holds reinforced at desired position
- cemen:sand ratio :
 - ✓ 1 : 3 (MOST COMMON)
 - ✓ 1 : 4



REINFORCED MASONRY

□ *Reinforced brick work* is the one in which the brick masonry is strengthened by the provision of mild steel flats, hoop iron, expanded mesh or bars. It is adopted or used in the following circumstances:

- When the brick work has to *bear tensile and shear stresses*
- When it is *required to increase the longitudinal bond*.
- When the brick work is supported on *soil* which is susceptible to large settlement
- When the brick work is supposed to *act as a beam or lintel over opening*.
- When the brick work is to *resist lateral loads*, such as in retaining walls etc.
- When the brick work is to *carry heavy compressive loads*.
- When the brick work is to *used in seismic areas*, since it can also resist lateral loads.



Reinforced Masonry

The weaknesses of the masonry without reinforcement:

1. the sensitivity to cracks
2. the low flexural bearing capacity

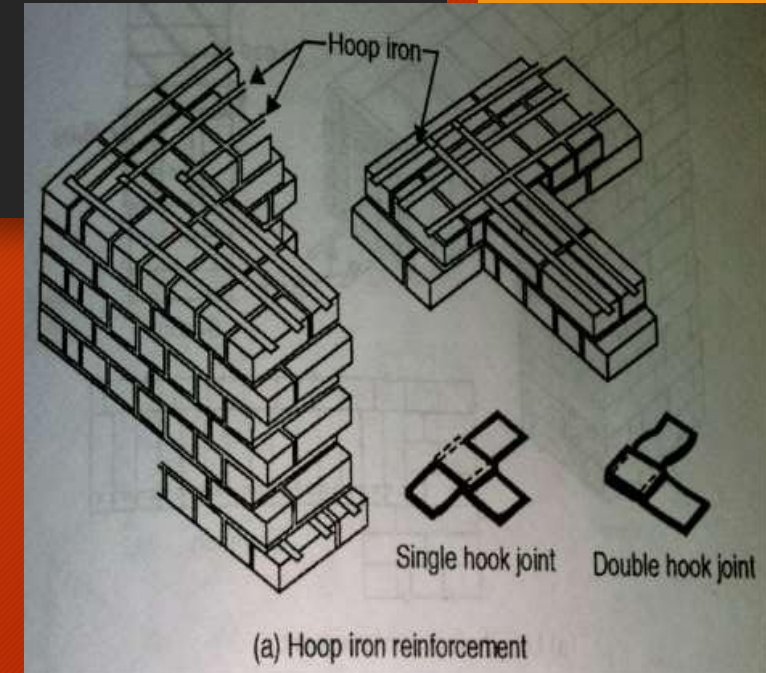
Reinforced brick work uses first class bricks with high compressive strength. Dense cement mortar is used to embed the reinforcement. The reinforcing material may be

- (i) *hoop steel bars*, (ii) *mild steel bars* (iii) *mild steel flats*
- (iv) *Expanded metal*.

The reinforcement is laid either horizontally or vertically.

Horizontal Reinforcement

- Horizontal Reinforcement for wall consists of either (i) *wrought iron flat bar, known as hoop iron, or* (ii) *steel mesh.*
- Fig shows hoop iron reinforcement for a brick wall. Generally, *two strips of hoop iron are used per header brick and one hoop iron per stretcher brick* i.e., one strand of hoop iron for each half brick thickness of wall



Its usual to reinforce every *sixth* course

Mild steel flats

Mild steel flats may also be used in place of hoop iron. It is usually to reinforce every 6th course (width 22 to 32 mm and thickness 0.25 to 1.6mm).

Protection against rust is provided by dipping the bars in hot tar; these are then at once sanded to increase the adhesion of the mortar.



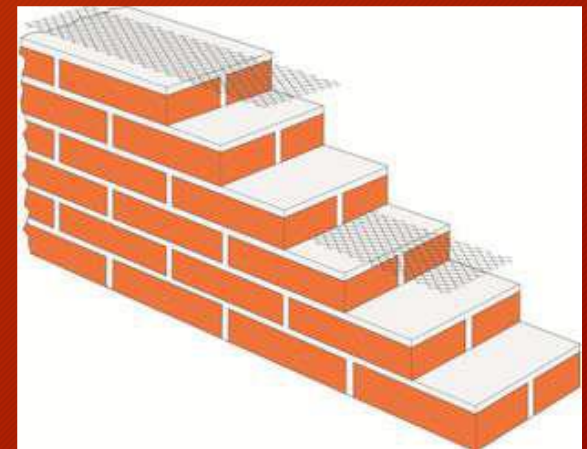
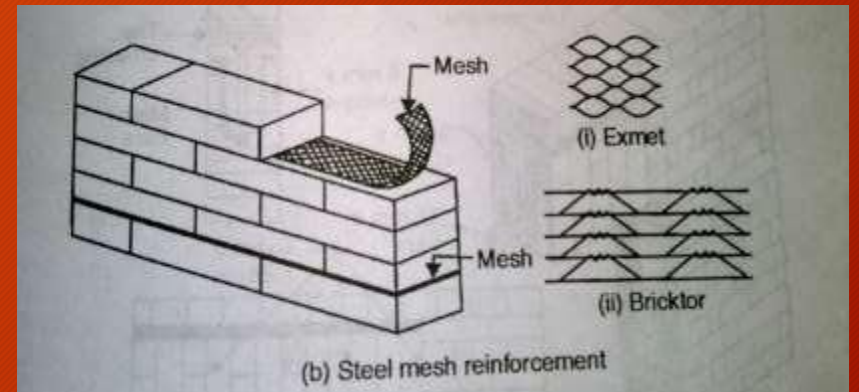
Steel Mesh

Steel meshed strips called *Exmet (Expanded Metal)* is provided at every third course. Sizes available are (width 65 mm, 178 mm and 230 to 305 mm, with thickness of 0.6 mm, 0.8 mm and 1 mm). **To prevent the corrosion, the metal in the coil form is coated with oil and then dipped in asphaltum paint.**

Cement mortar is first trowelled on the bed and the Exmet is uncoiled and pressed down in the mortar.

Another form of meshed r/f, called bricktor, is made of a number of straight tension wires (1.4 mm) interlaced with binding wires (1.1 mm).

One such strip is provided for every half-brick thickness of wall.



HORIZONTAL REINFORCEMENTS

- Mild steel bars is provided in brick columns, brick walls and brick retaining walls.
- Sometimes, special bricks, with one or two holes extending upto the face are used.
- Brick retaining walls are often reinforced since such a work is cheaper than R.C.C.

These bars are anchored by steel plate or wire-tie bars at some suitable intervals.





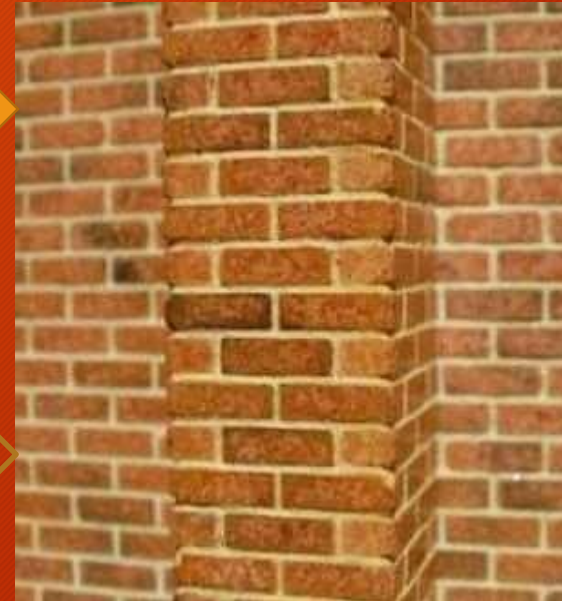
EXAMPLE OF VERTICAL REINFORCEMENT

VERTICAL REINFORCEMENT



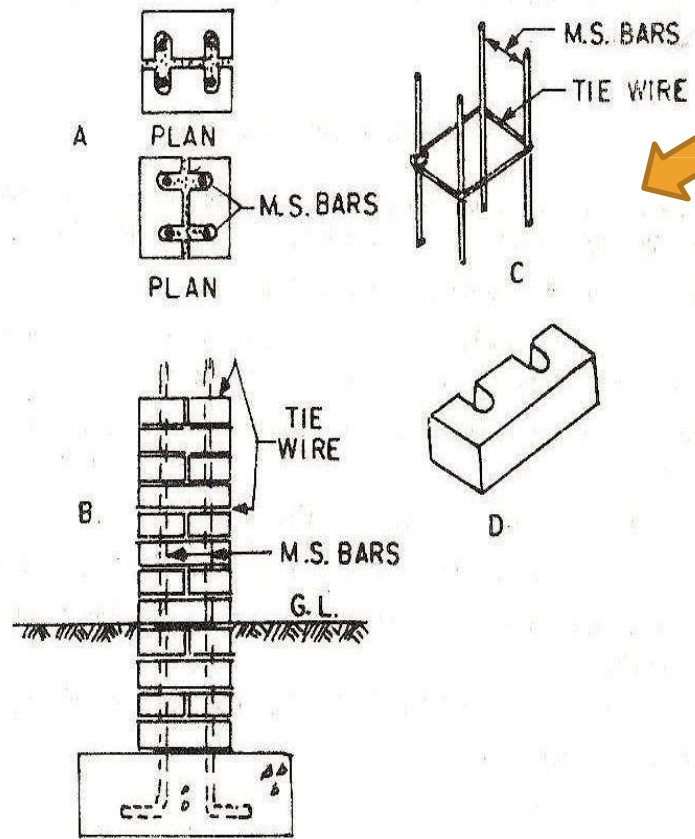
ISOLATED PIERS

ATTACHED PIER



PIERS

COLUMNS



Reinforced brick column





CONCRETE MASONRY UNITS

CONCRETE MASONRY UNITS

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Typical Shape



Bond Beam



Combination

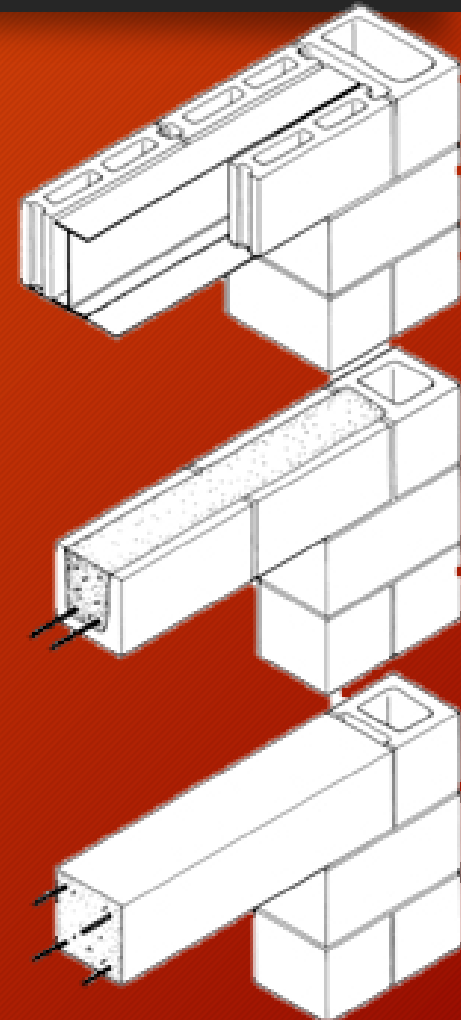


'Corner' - Round & Square

Spanning Concrete Block Openings

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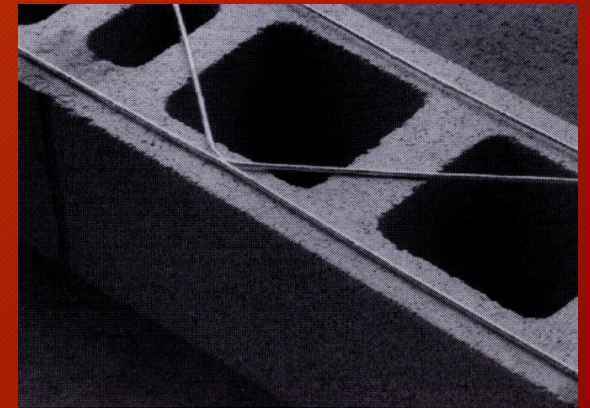
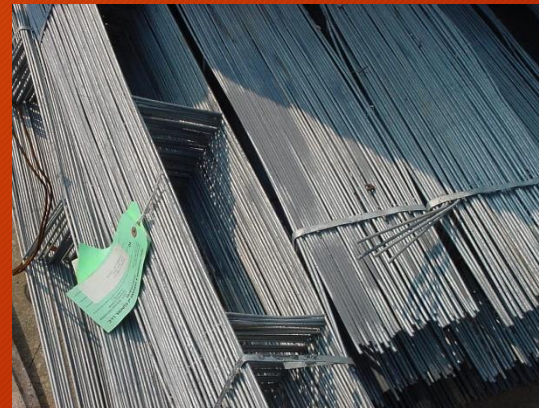
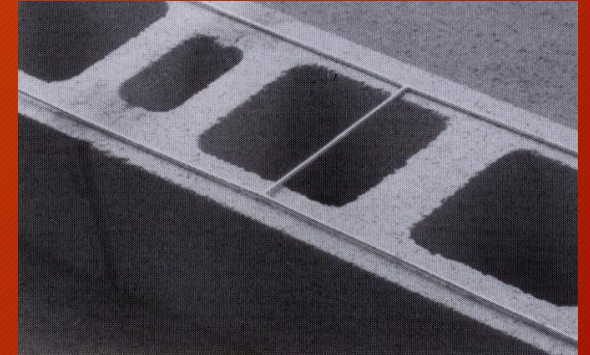
- Steel Lintels
- Block Lintels - Reinforced Bond Beam
- Precast Reinforced Concrete Lintel



REINFORCEMENT IN BLOCKS

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- Joint Reinforcing
 - Ladder
 - Truss



PRECAST CONCRETE MASONRY AND CONSTRUCTION OF WALLS

Laying of Concrete Blocks in Walls

- Mortar used in stone masonry is identical to the one used earlier in brick masonry construction
- Only the face shells of the block are mortared with the webs unsupported
- Often reinforced with steel to increase its load bearing capacity and its resistance to cracking
- Concrete masonry is often reinforced with horizontal reinforcement steel, introduced as welded grids of small diameter steel rods, that are laid onto the bed joints, at the desired vertical intervals.



CMU Installation

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Layout & Lead Blocks

Installation of Mortar Bead





Lay CMU



Reinforcement

Tooled Joints

The image shows the interior of a church, looking towards the altar. The walls are made of brick, and the ceiling has a dark, geometric wooden truss structure. A series of rectangular windows are arranged in a grid pattern on the front wall, allowing light to enter. The floor is dark, and there are some wooden structures or pews visible in the foreground. The text "Thank you" is overlaid in the center of the image.

Thank you