

BRICK, STONE AND BLOCK MASONRY

Seismic group UET LHR

BASIC DEFINITIONS

▶ BRICK MASONRY

- ▶ The art of building structures using bricks and binding materials like cement is called brick masonry.

▶ STONE MASONRY

- ▶ The art of building structures using stones and binding materials like cement is called stone masonry.

▶ BLOCK MASONRY

- ▶ The art of building structures using concrete blocks with binding materials like cement is called block masonry.

▶ **British Specification
Recommends**

▶ **LENGTH (L)**

▶ Minimum Length = $8\text{-}5/8$ "

▶ Maximum Length = $8\text{-}7/8$ "

▶ **WIDTH (W)**

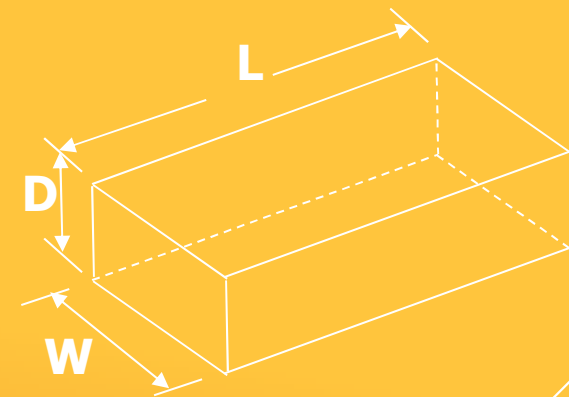
▶ Minimum Width = $4\text{-}1/8$ "

▶ Maximum Width = $4\text{-}1/4$ "

▶ **DEPTH (D)**

▶ Minimum Depth = $1\text{-}15/16$ "

▶ Maximum Depth = $2\text{-}15/16$ "



BRICK MASONRY

▶ Brick Masonry

- ▶ 1. Definitions
- ▶ 2. Classification of Brick Masonry
- ▶ 3. Bond in brick masonry
- ▶ 4. Types of bonds
- ▶ 5. Wall Junctions
- ▶ 6. Masons tools in Brick masonry
- ▶ 7. Reinforced brick Masonry
- ▶ 8. Constructions of Brick Masonry
- ▶ 9. General Principles and precautions in Brick Masonry
- ▶ 10. TECHNIQUES TO MAKE A BOND BETWEEN OLD AND NEW MASONRY
- ▶ 11. Defects and Maintenance of Brick Masonry

1. DEFINITIONS

- ▶ Masonry & Masonry Units
- ▶ Arrises
- ▶ Frog or kick
- ▶ Course
- ▶ Header & Stretcher
- ▶ Quoins
- ▶ Perpends
- ▶ Closure and brick bats
- ▶ Facing Backing & Hearting
- ▶ Reveals, Jamb, Soffit & Sill
- ▶ Column, Pillar, Pier, Pilaster and Stanchion
- ▶ Mortar and Grout
- ▶ Lintel
- ▶ Copping

▶ Masonry

- ▶ It is used for the work of a mason.
- ▶ Mason is a person who built structures with construction materials.

▶ Masonry Units

- ▶ It is an artificially prepared regular shape block used in the masonry works.

Like

- ▶ Brick in brick masonry
- ▶ Stone block in stone masonry
- ▶ Concrete block in Block masonry

▶ Arises

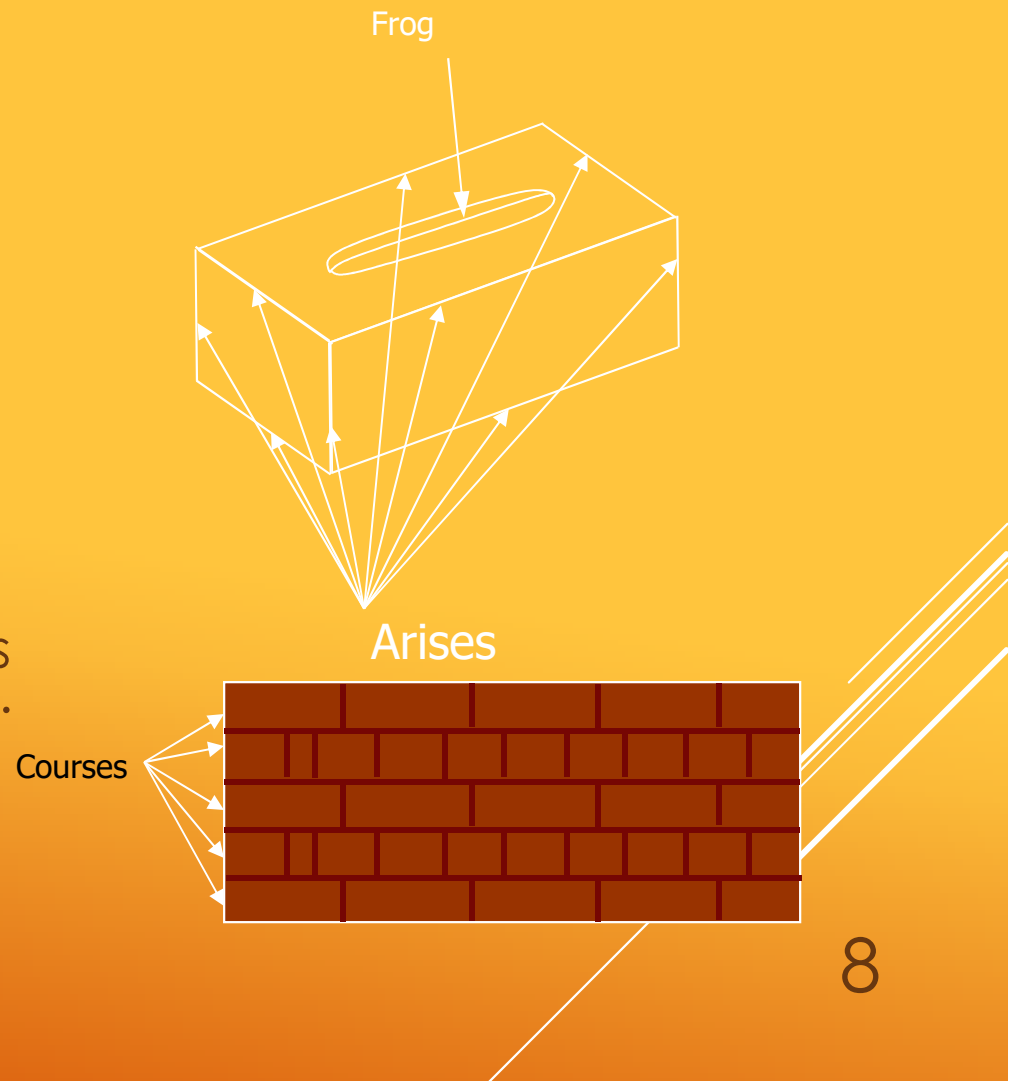
- ▶ The edges formed by the intersection of plane surfaces of a brick are called arises.

▶ Frog

- ▶ The depression provided in the face of a brick during its manufacturing is called the frog.

▶ Course

Each horizontal layer of bricks laid in mortar is called course.

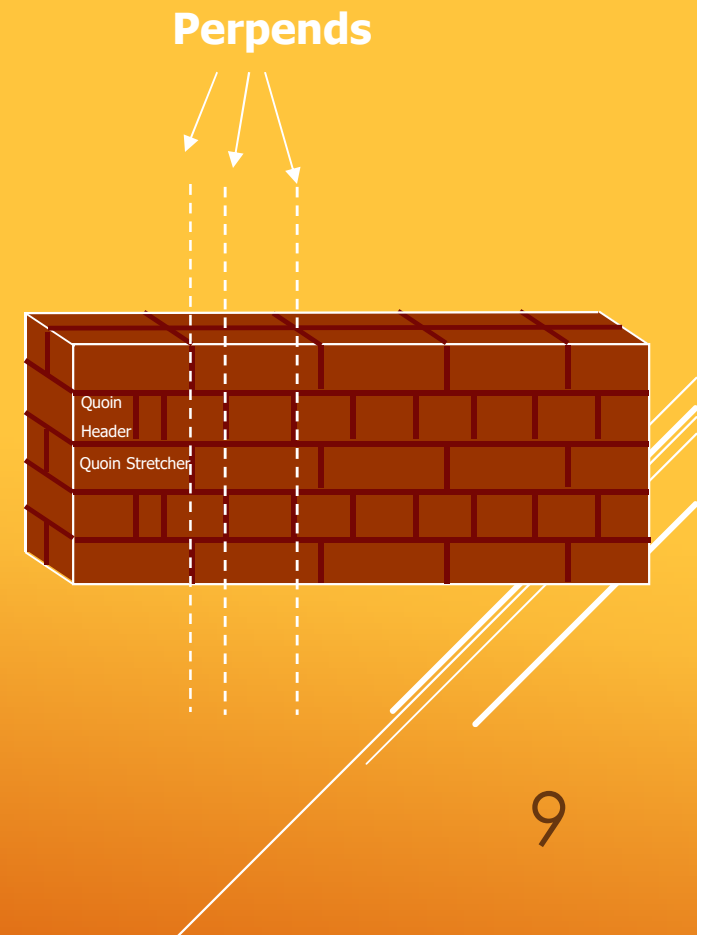


▶ Quoins

- ▶ The external corners of a wall are called Quoins. And the bricks forming quoins are called quoin bricks. e.g. quoin header or quoin stretcher.

▶ Perpend

- ▶ The vertical joints of the bricks are called Perpend. The perpend of the alternate courses should be in the same vertical line



▶ Header

- ▶ Brick laid with its width in elevation is called header. In a course in which all bricks are header is called heading or header course.

▶ Stretcher

- ▶ Brick laid with its length in elevation is called stretcher. In a course in which all bricks are stretcher is called stretcher or stretching course.

▶ Closure

- ▶ Closure bricks are prepared by cutting standard brick across length or in different ways to fulfill the requirements of bond in straight walls, corners, junctions or crosses is called closures.

They are of four types

- ▶ Queen closure
- ▶ King closure
- ▶ Bevelled closure
- ▶ Mitered closure

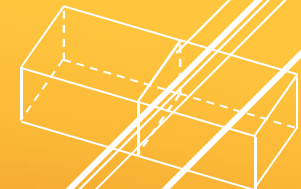


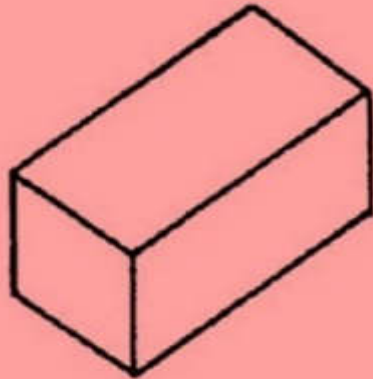
▶ Brick bats

- ▶ Brick bats are prepared by cutting standard brick across width.

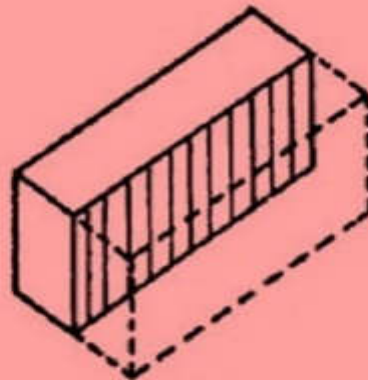
They are of four types

- ▶ Three quarter bat
- ▶ Half or square bat
- ▶ Quarter bat
- ▶ Bevelled bat

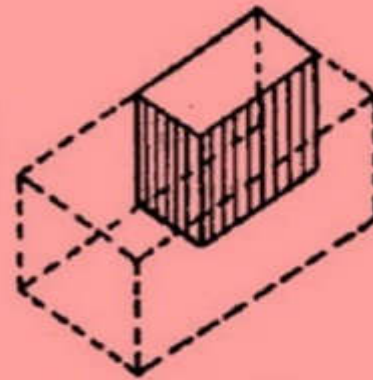




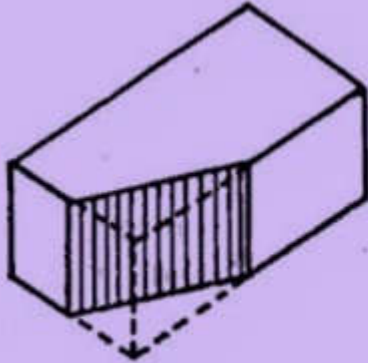
**Full
Brick**



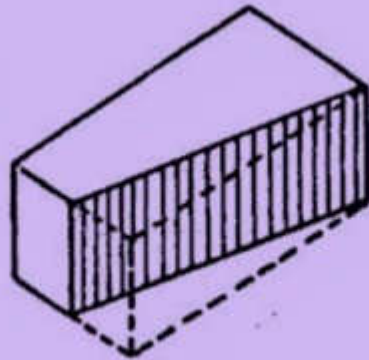
**Queen - Closer
(Half)**



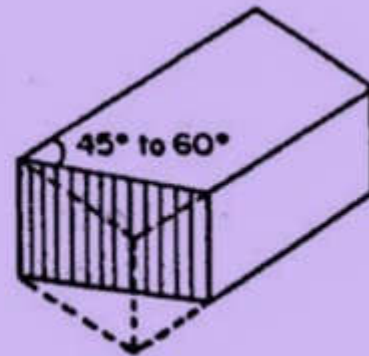
**Queen - Closer
(Quarter)**



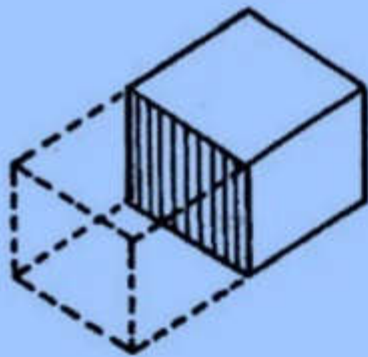
King Closer



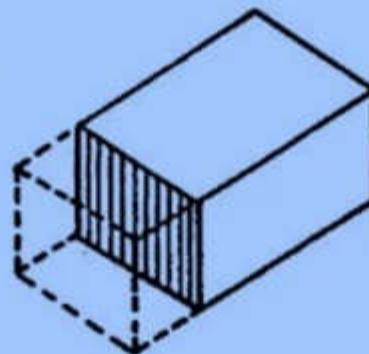
Bevelled Closer



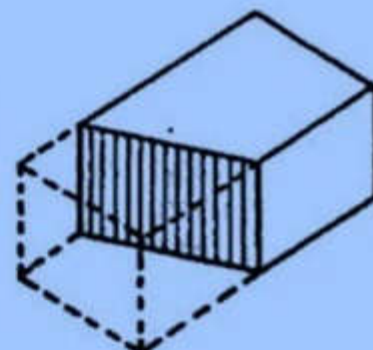
Mitred Closer



Half Bat



Three Quarter Bat



Bevelled Bat

- ▶ Facing

- ▶ The external face of wall is called facing.

- ▶ Backing

- ▶ The unexposed or internal face of wall is called backing.

- ▶ Hearting

- ▶ The interior portion between facing and backing is called hearting.

▶ Reveals

- ▶ It is the vertical brick face of sides of door or window opening from exterior side is called reveals.

▶ Jambs

- ▶ It is the vertical sides of door or window opening to which the door is or window frame is attached.

▶ Soffit

- ▶ The under surface of any structural member such as a lintel, a slab is called Soffit.

▶ Sill

- ▶ The horizontal surface at the bottom side of a door or window opening is called sill.

▶ Column

- ▶ The vertical load bearing member whose cross sectional dimensions are much lesser than its length is called column.

▶ Pillar

- ▶ The vertical member used for ornamental purpose or as memorial is called pillar. (or) It is an Architectural term for a column.

▶ Pier

- ▶ It is same as a column, but commonly this term is used for such columns which are designed to withstand lateral water loads. (or) the columns of a bridge are known as piers.

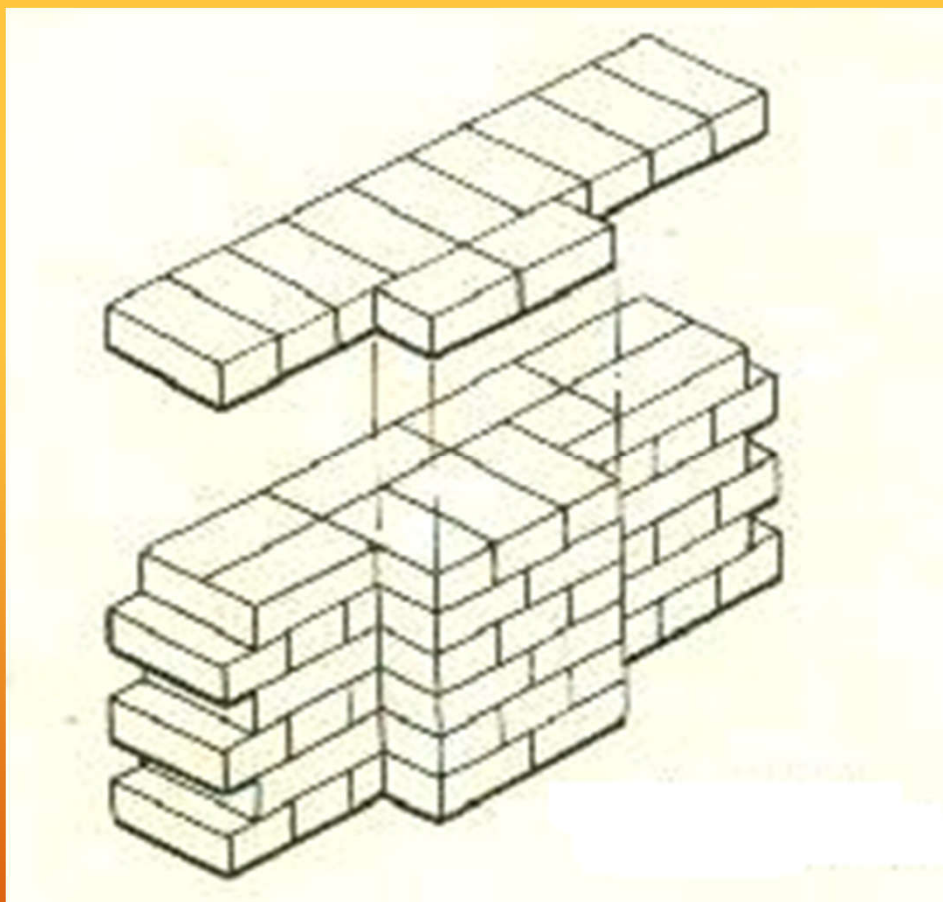
▶ Pilaster

- ▶ It is an architectural element used to give the appearance of a supporting column with only an ornamental function.

▶ Stanchion

- ▶ The vertical load bearing member constructed of rolled steel section is called stanchion.

BRICK PILASTER



▶ Mortar

- ▶ The mixture of binding material and fine aggregate forming a workable past is called mortar.

▶ Grout or slurry

- ▶ The thin paste of cement is called grout or slurry. It is used to fill the joints.

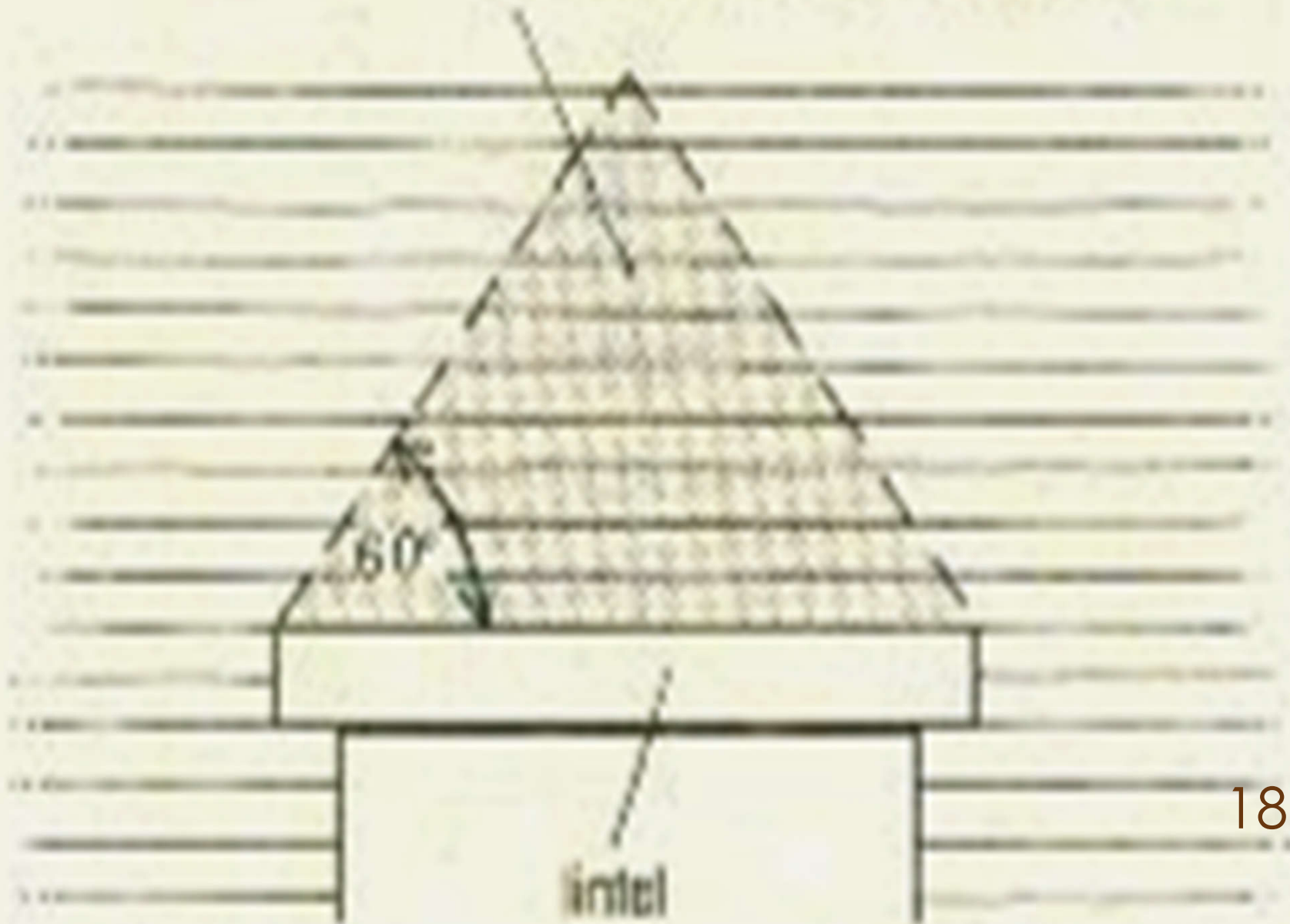
▶ Lintel

- ▶ A small horizontal member to span up small opening is called lintel.

▶ Copping

- ▶ It is provided at the top of a wall to avoid dampness. They are specially designed bricks to cover the tops of brick parapet walls.

LINTEL AND LOAD DISTRIBUTION



2.CLASSIFICATION OF BRICK MASONRY

- ▶ According to type of Mortar
 - ▶ Pucca Masonry
 - ▶ Pucca & Kutcha Masonry
- ▶ According to types of bricks
 - ▶ First class brick Masonry
 - ▶ Second class brick Masonry
 - ▶ Third class brick Masonry
 - ▶ Kutcha Masonry

3. BOND IN BRICK MASONRY

- ▶ It is the arrangement of bricks in each layer to avoid the continuity of vertical joints in any two adjacent courses.
- ▶ NECESSITY OF BOND
 - ▶ Bond in brickwork is provided for the following reasons
 - ▶ To break the continuity of vertical joints in consecutive courses.
 - ▶ To ensure longitudinal and lateral strength of the masonry work.
 - ▶ To distribute the load uniformly over the structural mass.
 - ▶ To ensure the quality of work.
 - ▶ To ensure systematic work
 - ▶ To provide good aesthetics
 - ▶ To economize the work.
- ▶ REQUIREMENTS OF GOOD BOND IN BRICK WORK
 - ▶ Bricks should be uniform in size.
 - ▶ Mortar thickness should be less than 10mm
 - ▶ Vertical joints in alternate courses should be in a single plumb line.
 - ▶ Header should be exactly in the middle of stretcher in two consecutive courses.
 - ▶ Brick bats should be avoided.

4.TYPES OF BONDS

Following are the different types of bonds used in brick masonry work.

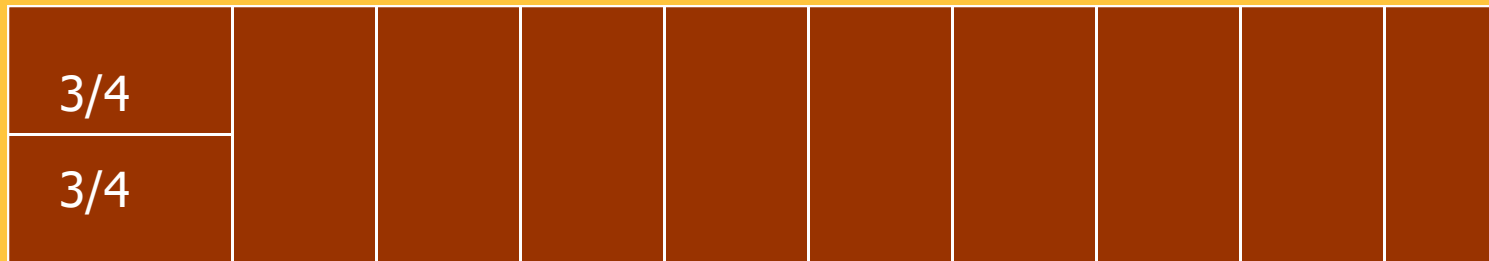
BONDS IN MASONRY WALLS

- ▶ Header bond
- ▶ Stretcher bond
- ▶ English bond
- ▶ Flemish bond
- ▶ Facing bond
- ▶ Dutch bond Monk bond

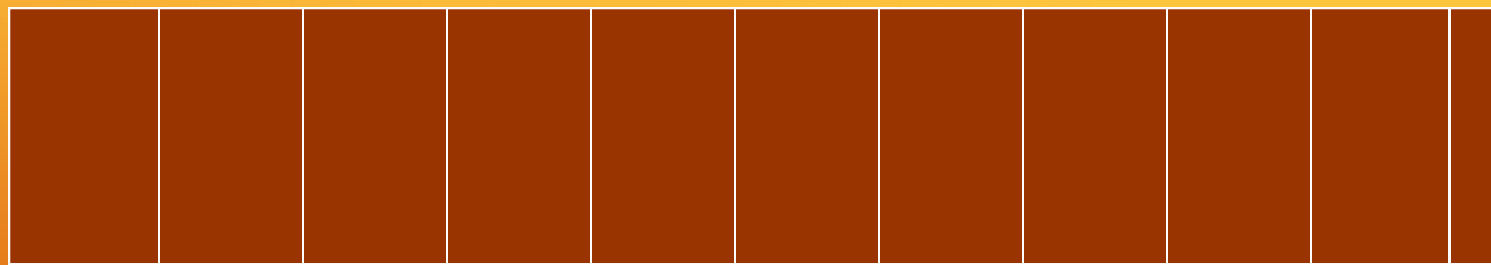
BONDS IN MASONRY COLUMNS

- ▶ English bond
- ▶ Flemish bond

Header Bond

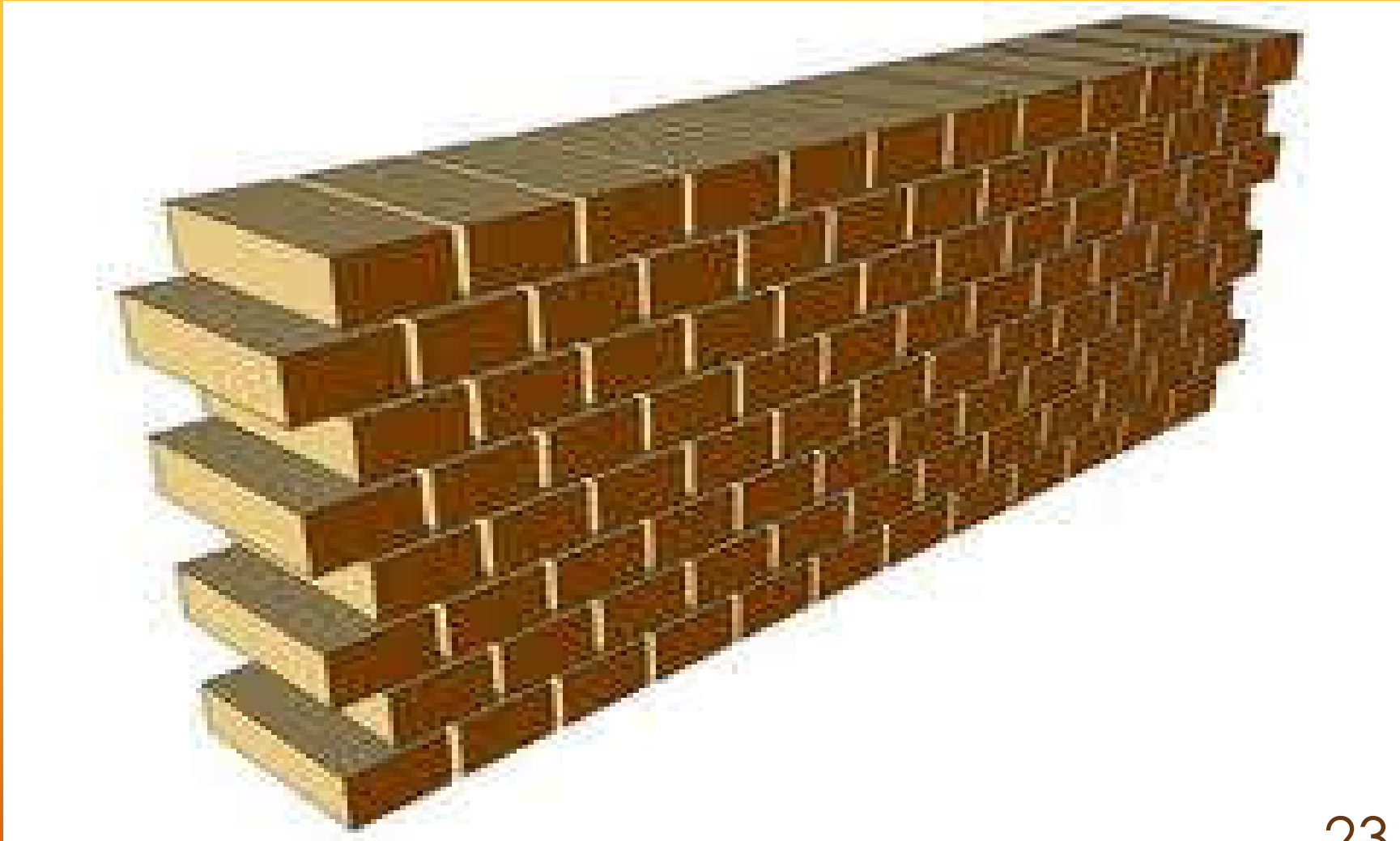


First course or Odd courses

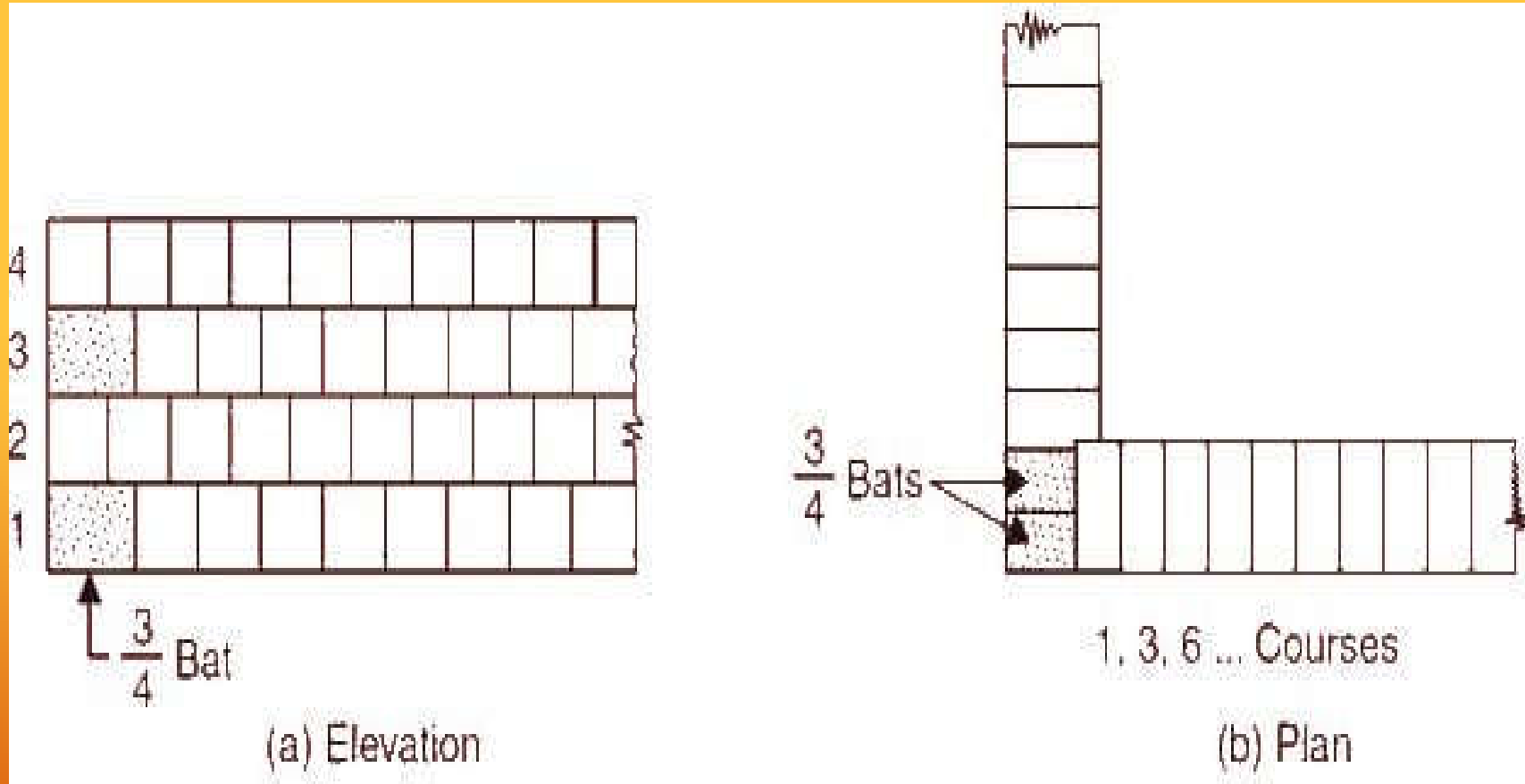


Second course or Even courses

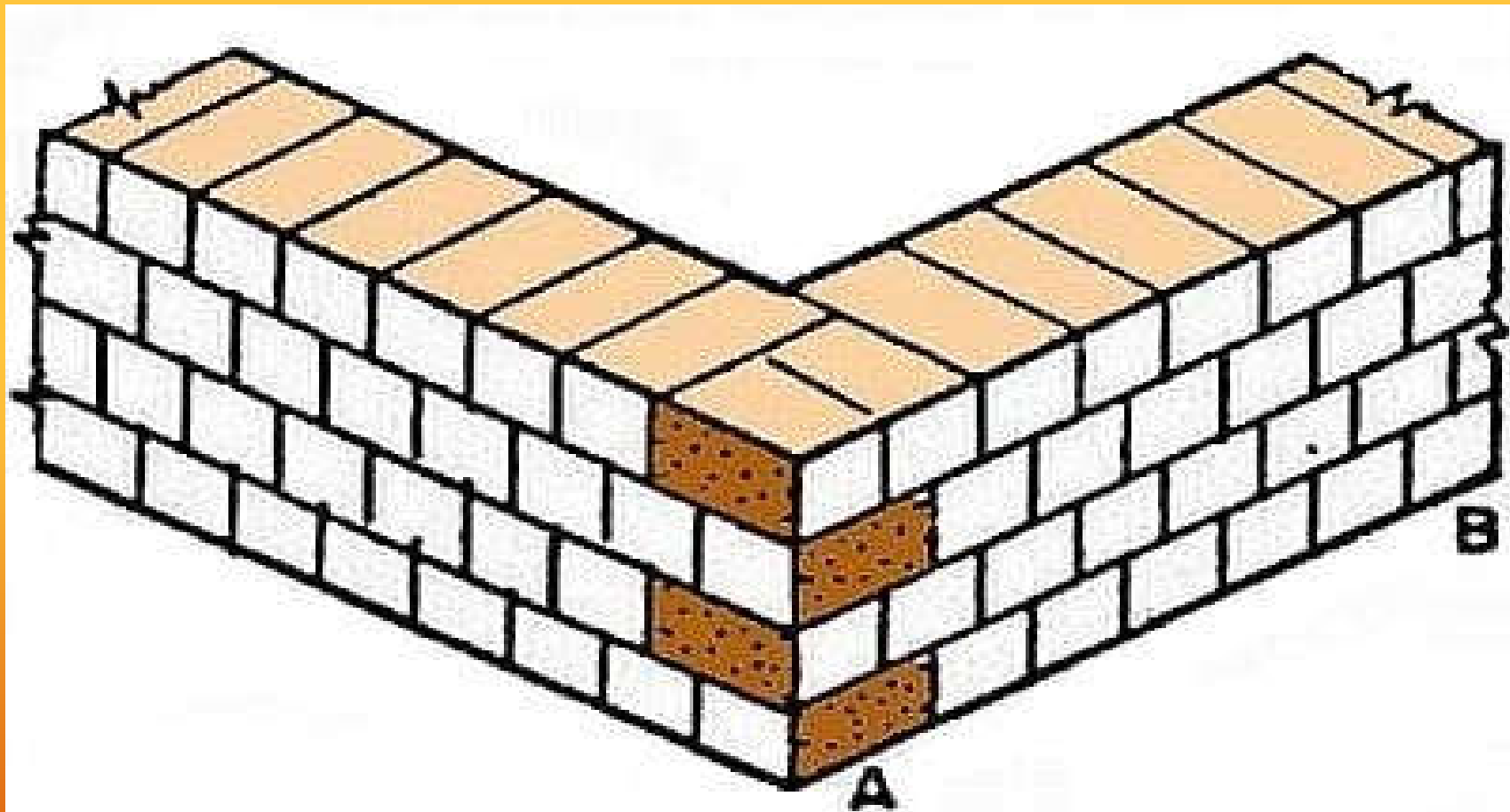
Header Bond



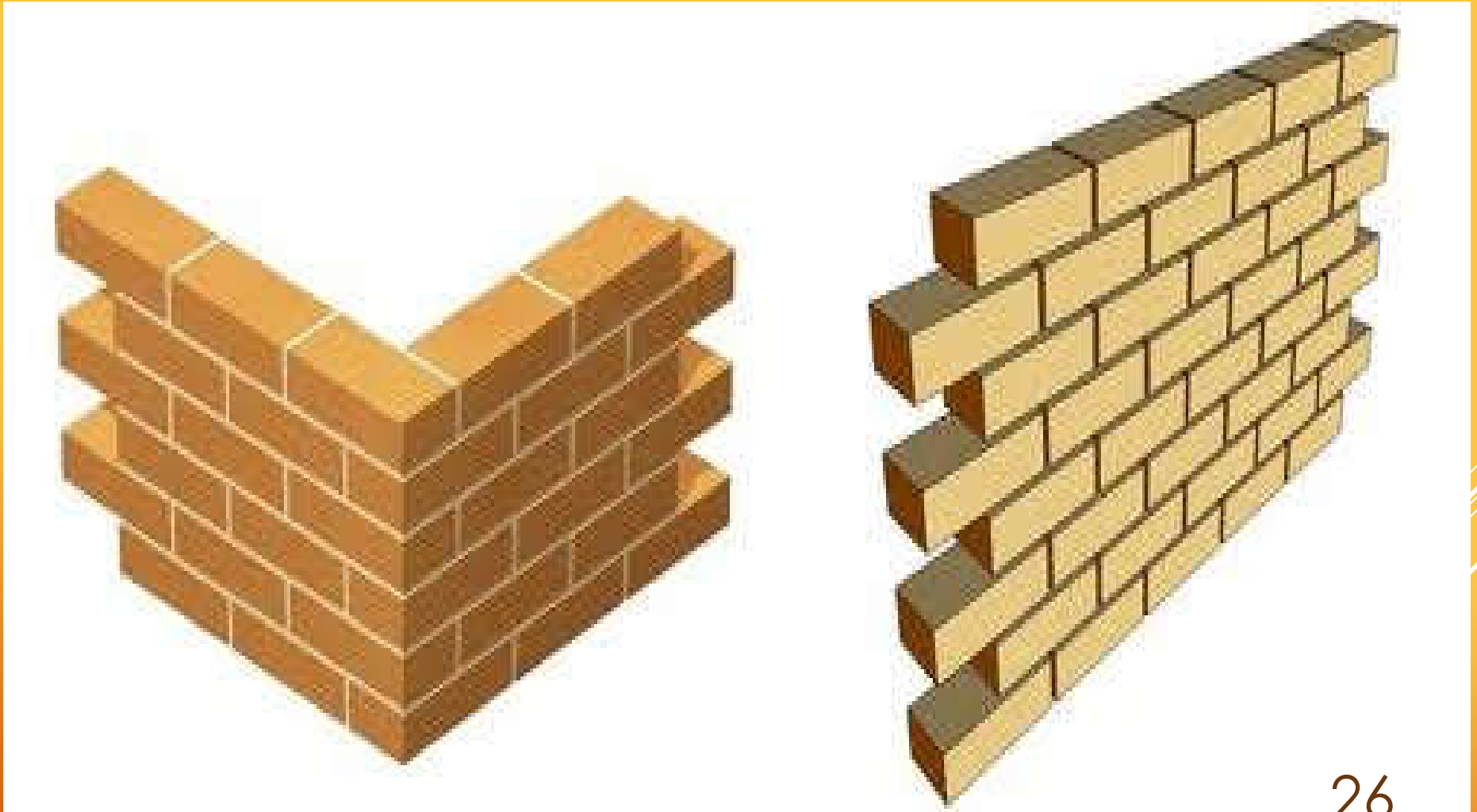
HEADER BOND



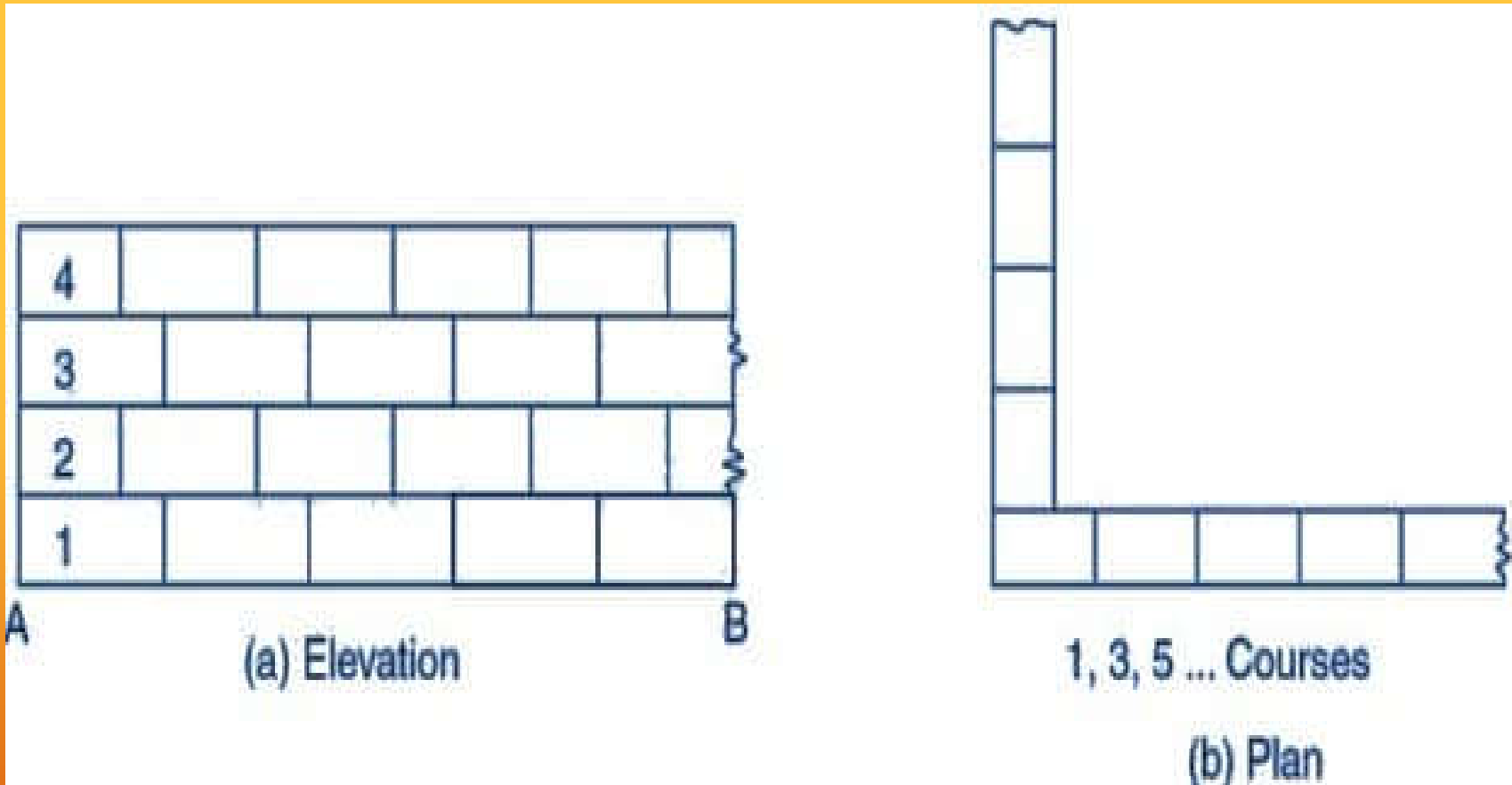
HEADER BOND ISOMETRIC VIEW



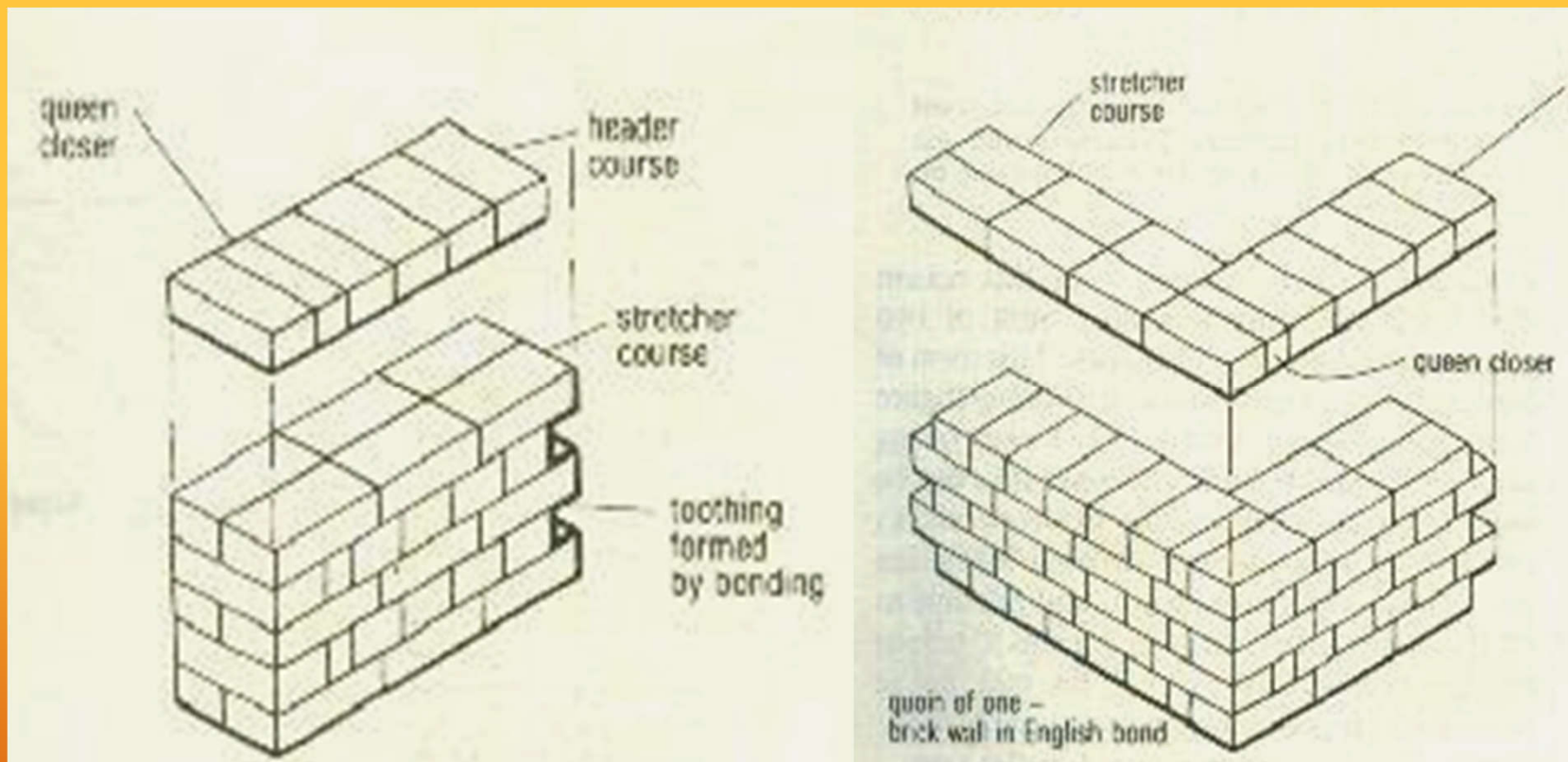
Stretcher Bond



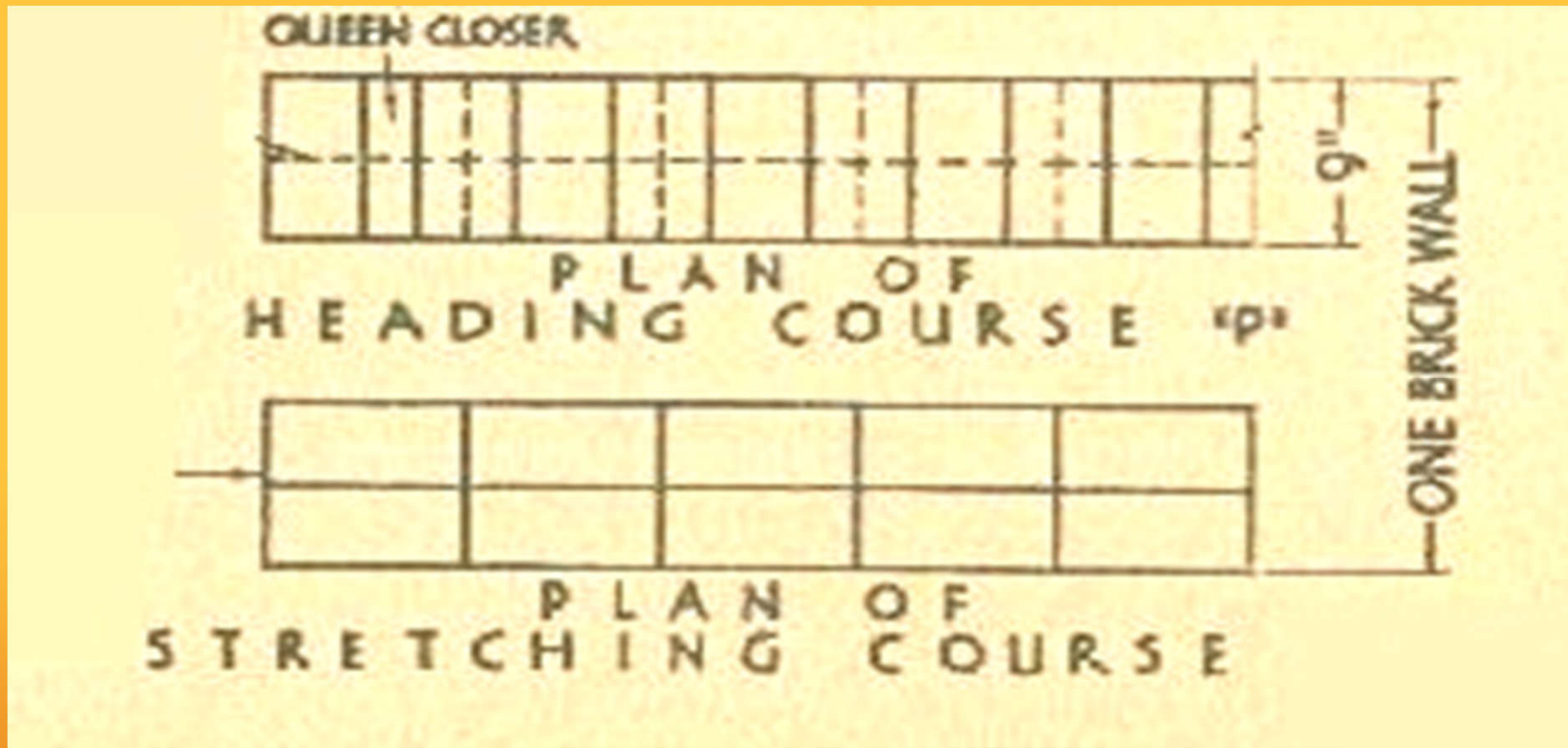
STRETCHER BOND



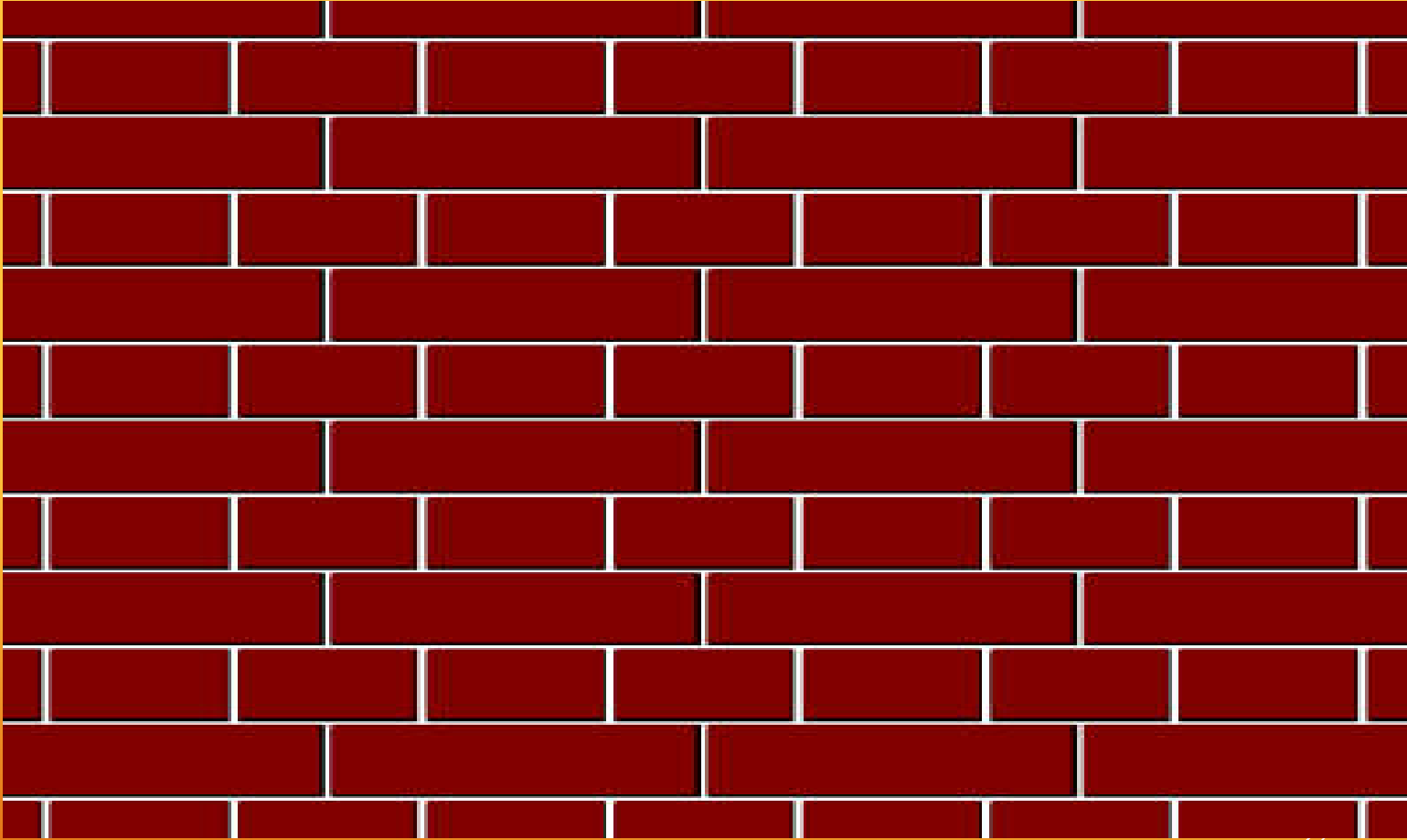
ENGLISH BOND



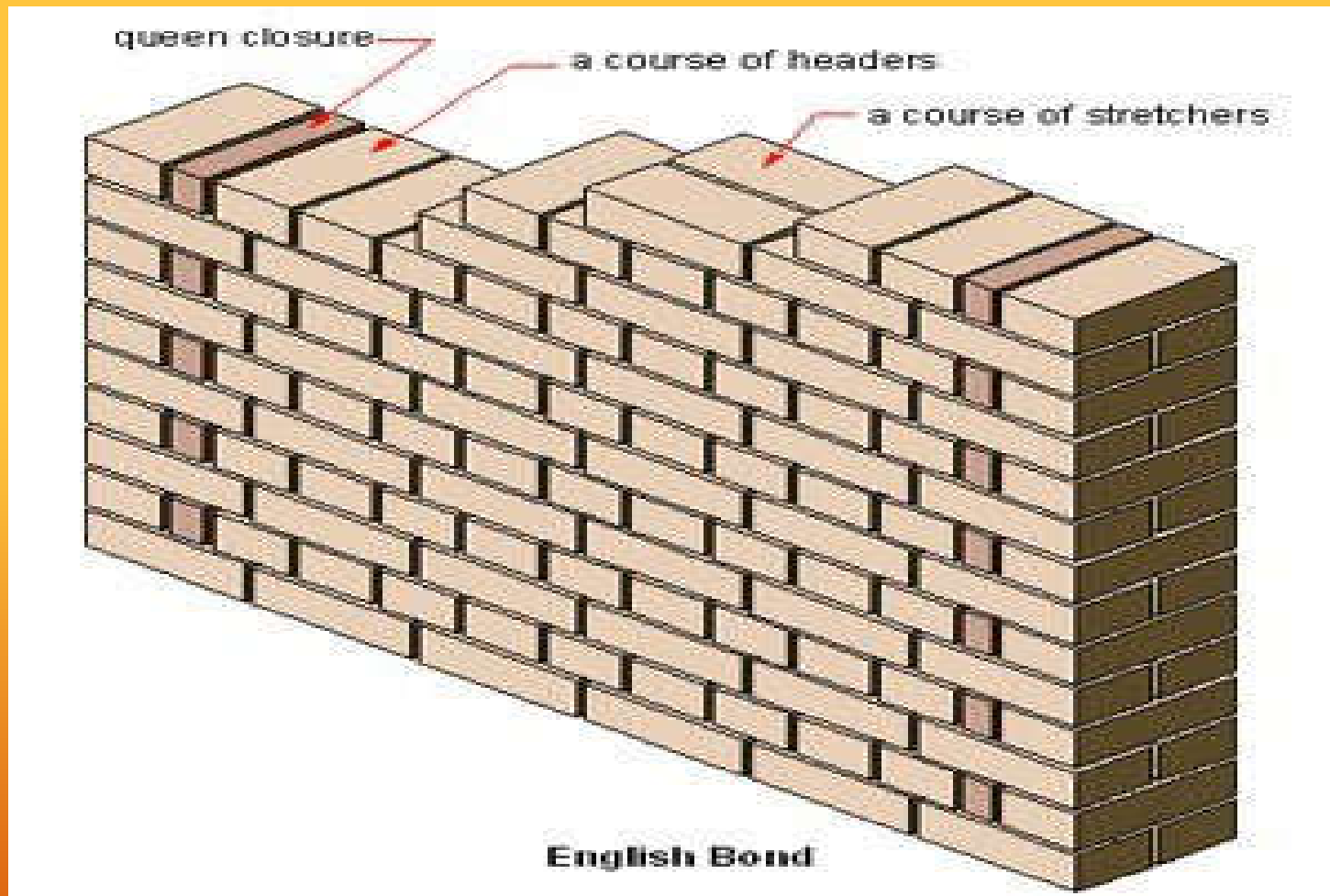
2 COURSES OF ENGLISH BOND



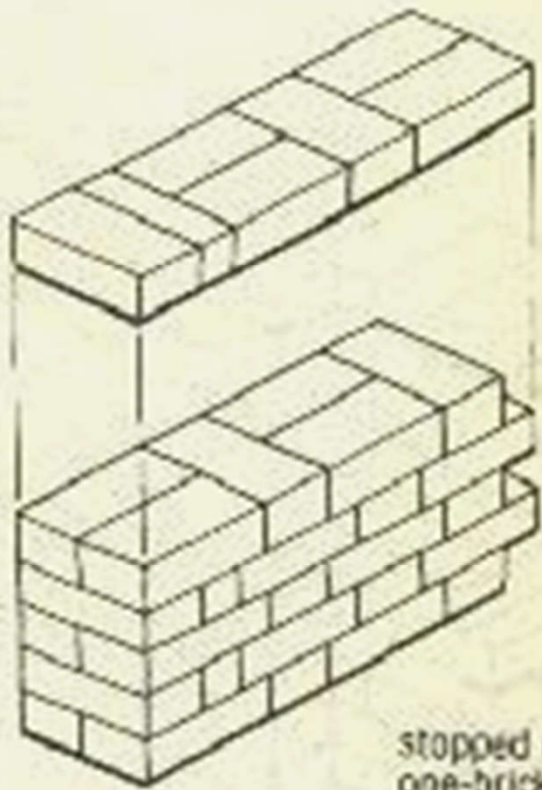
ENGLISH BOND



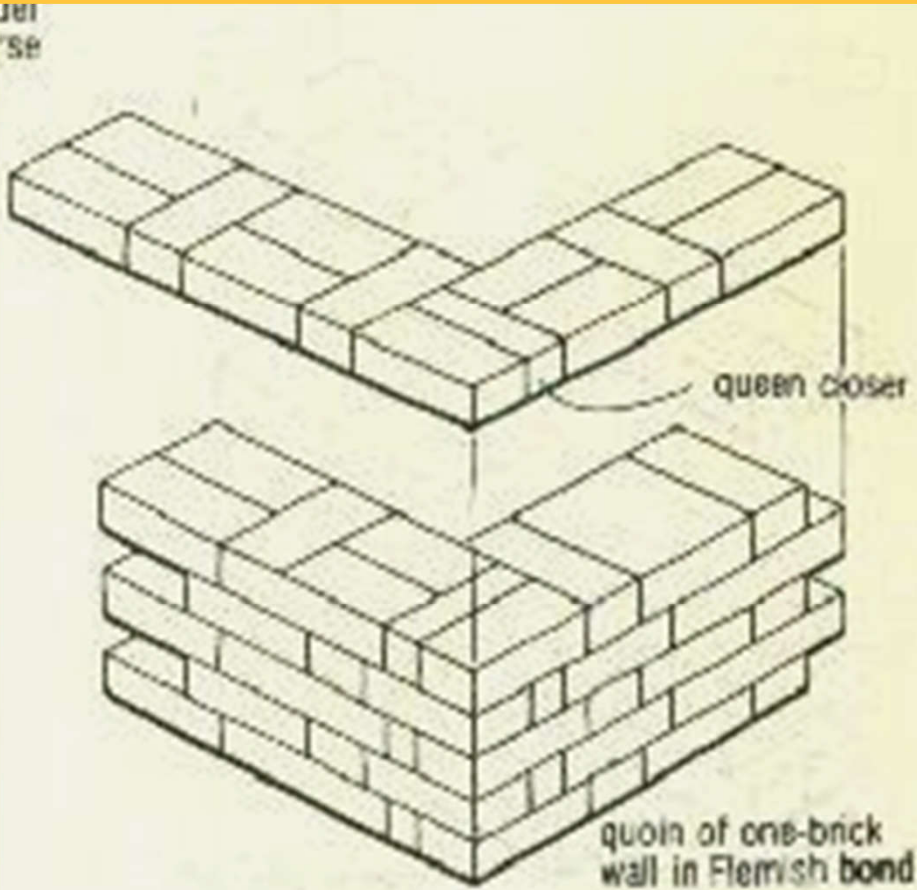
ENGLISH BOND (ISOMETRIC VIEW)



FLEMISH BOND



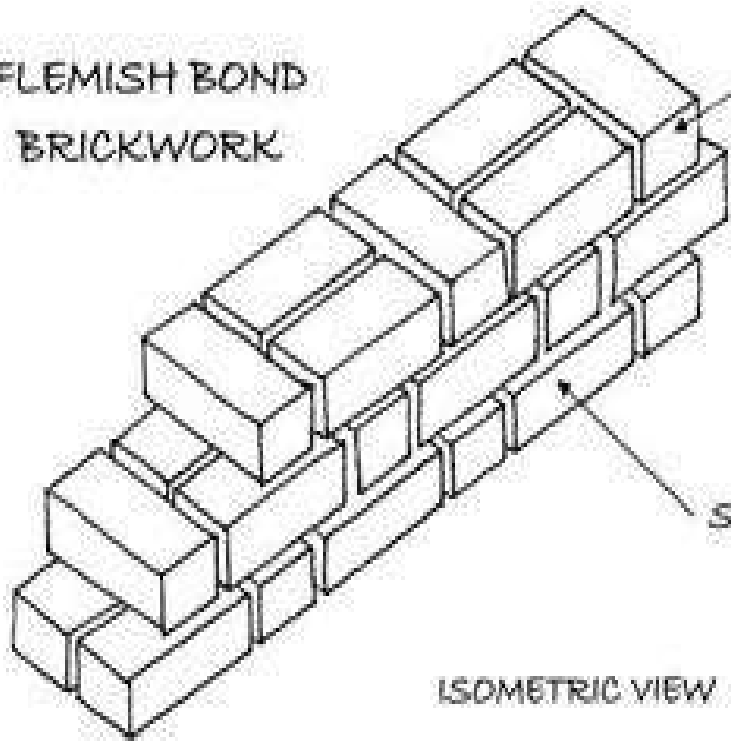
stopped end of
one-brick wall
in Flemish bond



quoin of one-brick
wall in Flemish bond

FLEMISH BOND

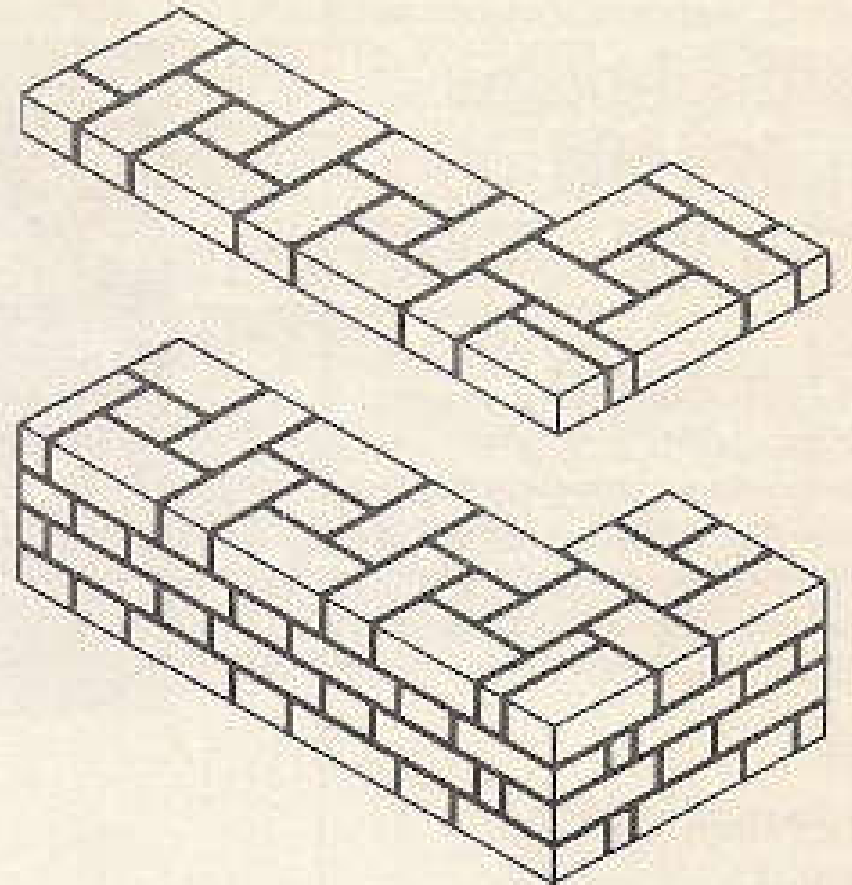
FLEMISH BOND
BRICKWORK



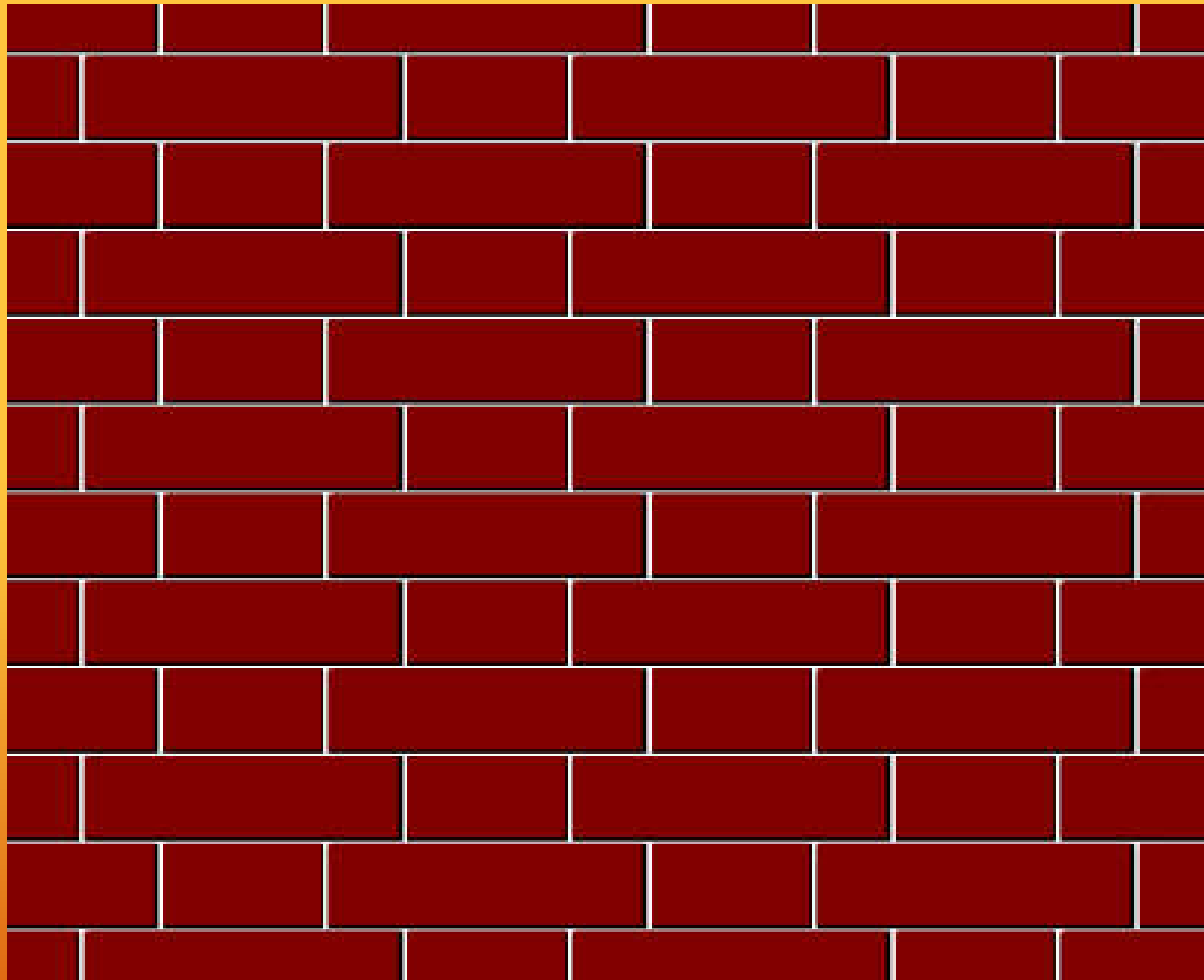
Header

Stretcher

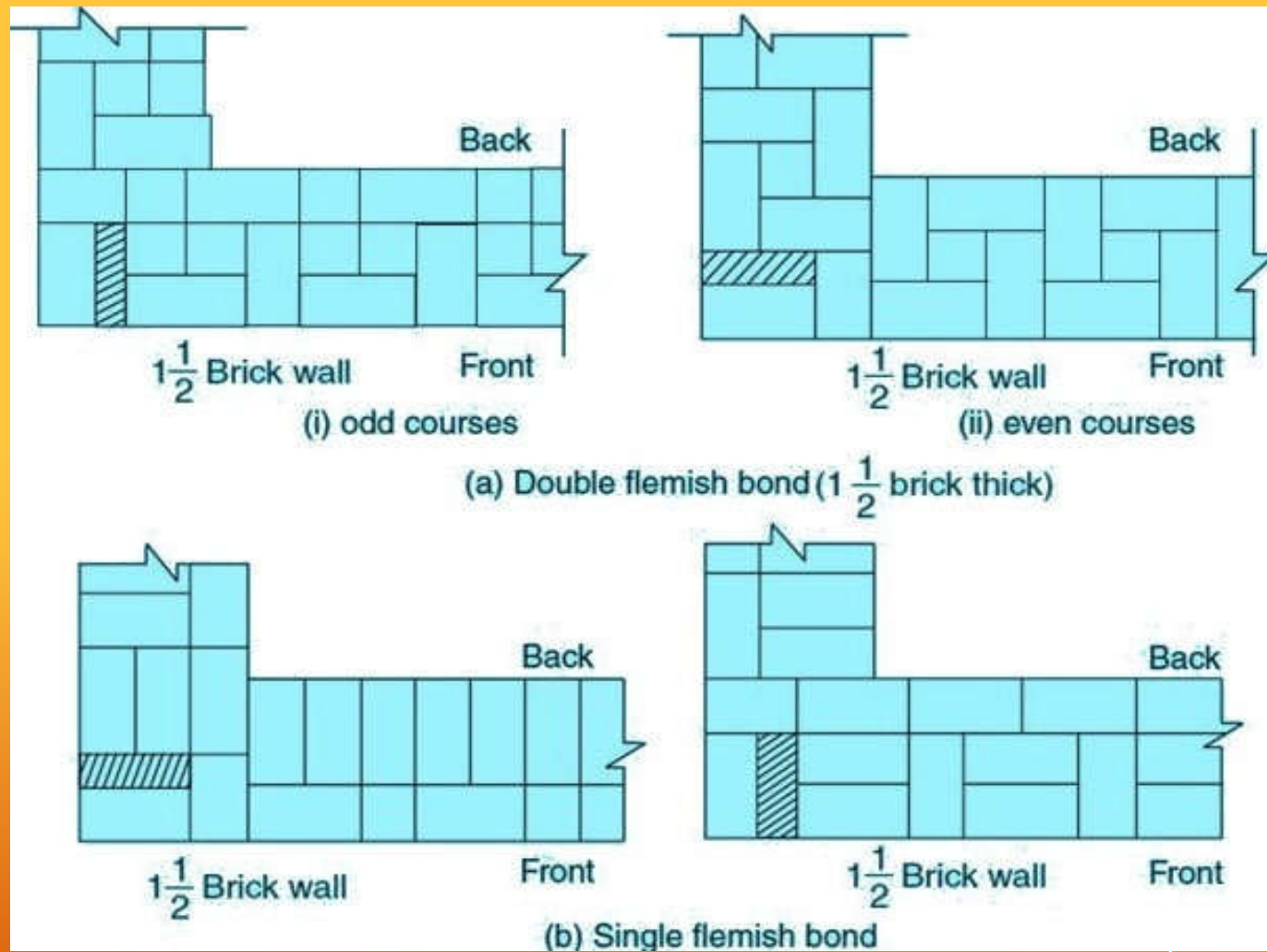
ISOMETRIC VIEW



FLEMISH BOND



FLEMISH BOND



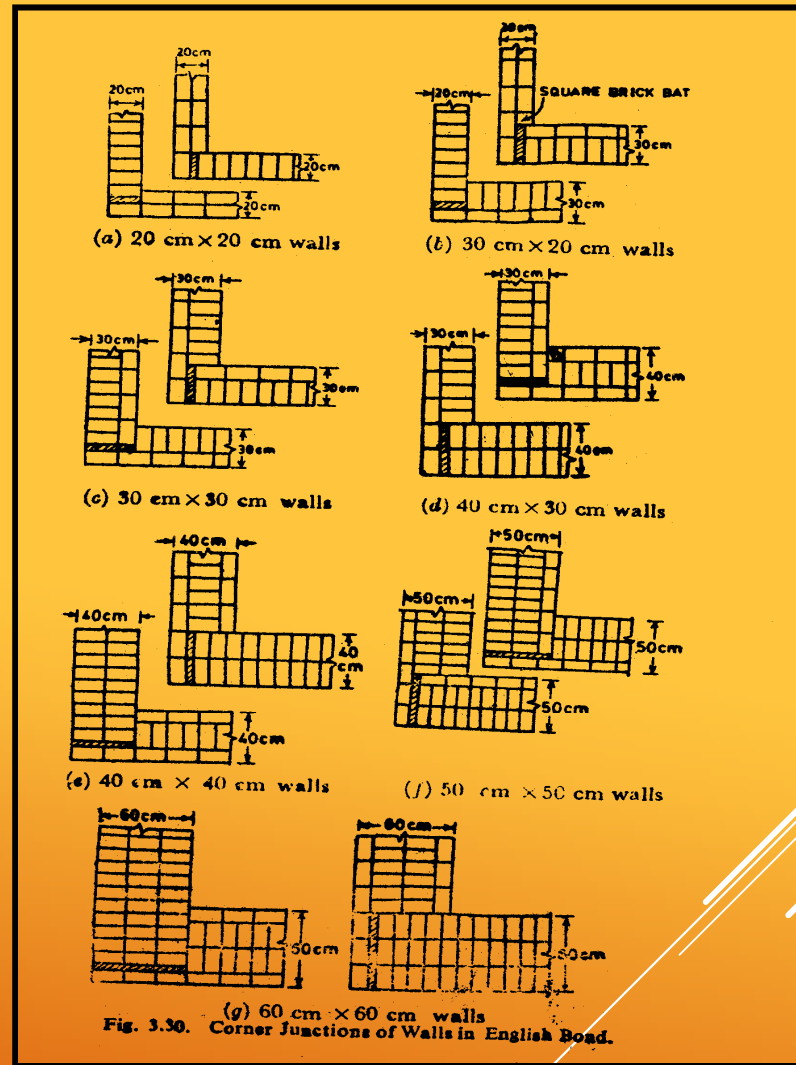
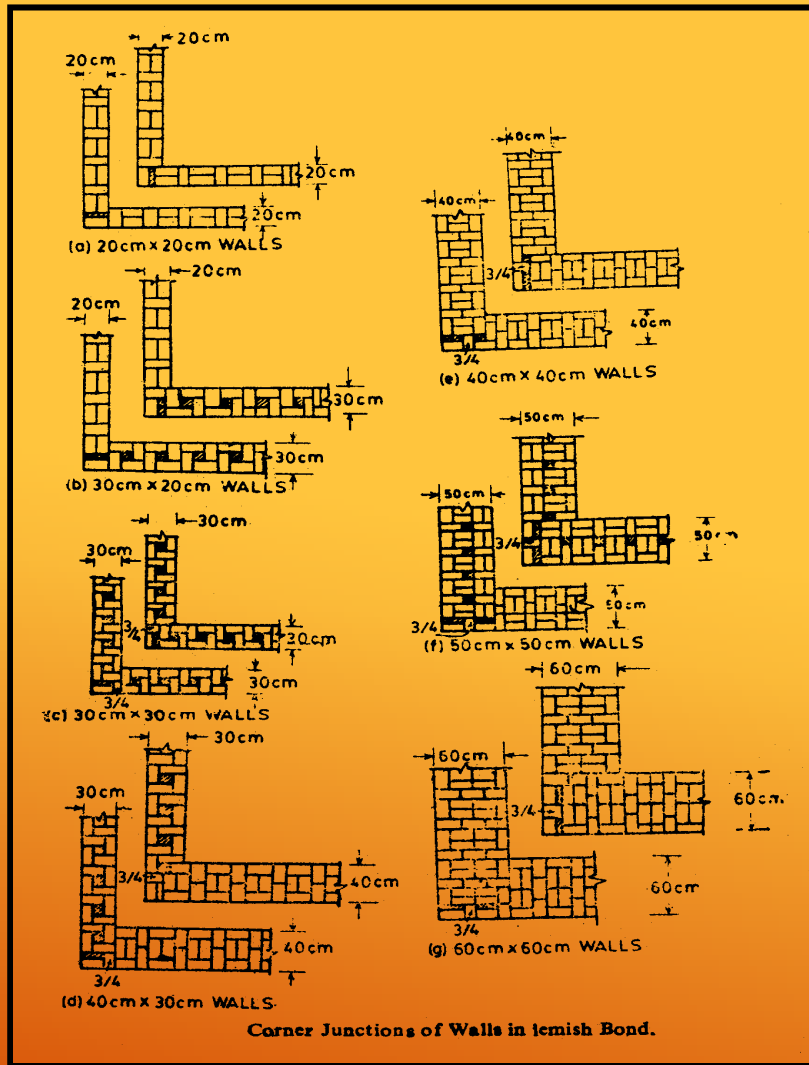
5.WALL JUNCTIONS

- ▶ The places where the walls of same or different widths meets or crosses each other are called wall junctions.

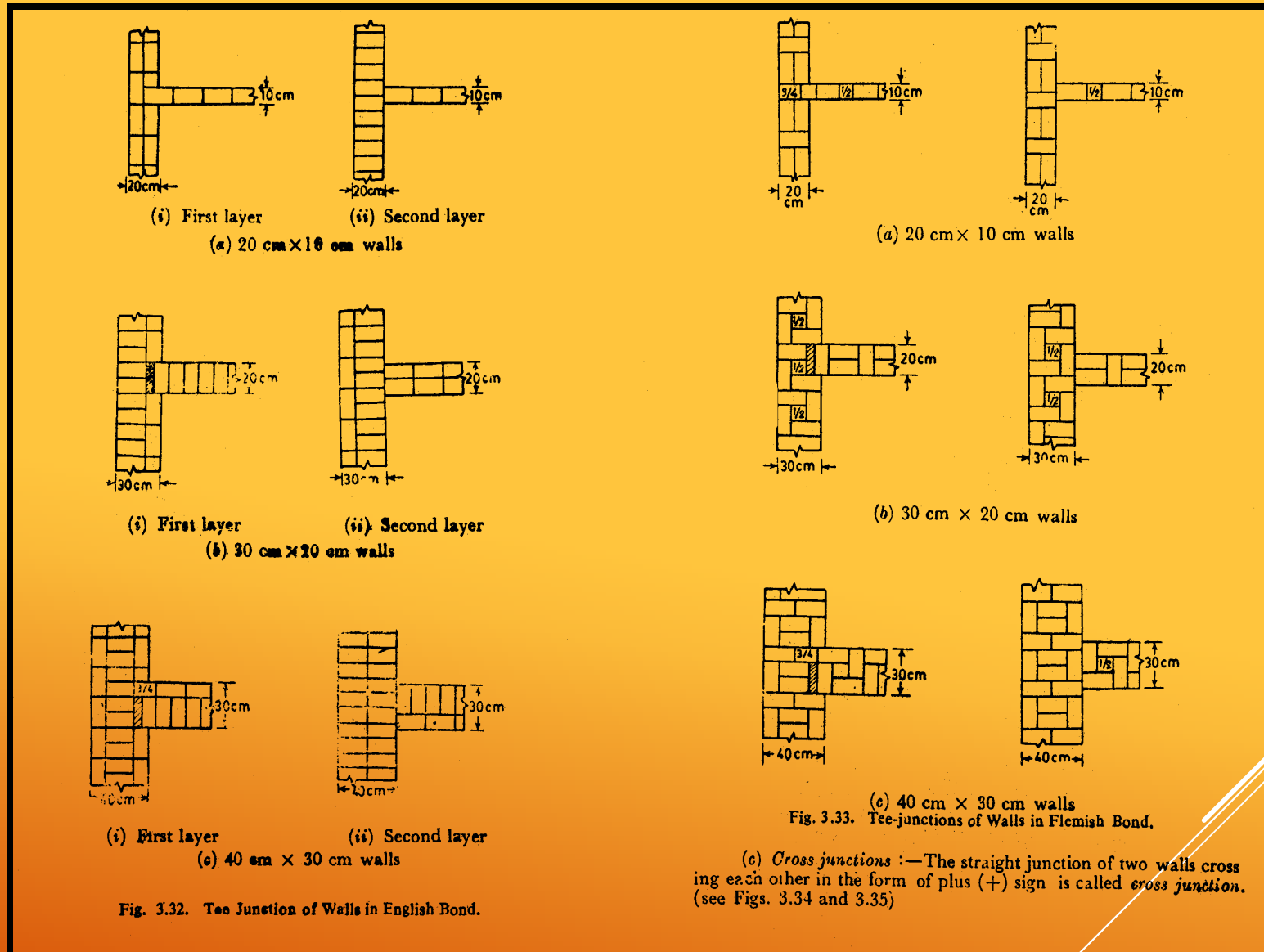
TYPES OF WALL JUNCTIONS

- ▶ Two types
 - ▶ Straight junctions
 - ▶ Squint junctions
- ▶ Straight junctions
- ▶ The junctions formed when two walls crossing each other at right angle.
 - ▶ Corner junctions
 - ▶ Tee junctions
 - ▶ Cross junctions
- ▶ Squint quoins
- ▶ The corner formed when two walls are meeting at some angle.
 - ▶ Obtuse quoins
 - ▶ Acute quoins

CORNER JUNCTIONS (FLEMISH AND ENGLISH BOND)



TEE JUNCTIONS (ENGLISH BOND & FLEMISH BOND)



CROSS JUNCTION & SQUINT JUNCTIONS

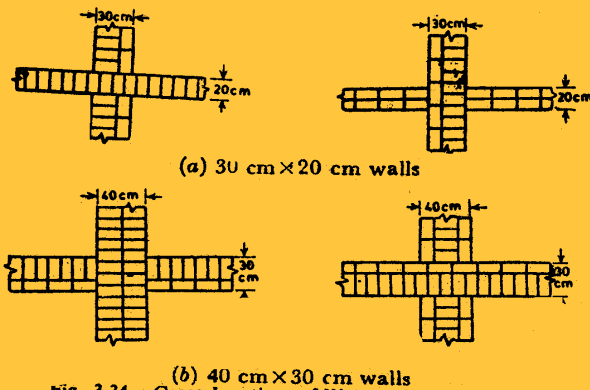
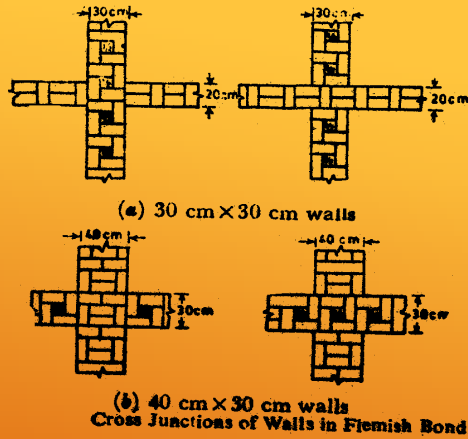


Fig. 3.34. Cross Junctions of Walls in English Bond.



(b) 40 cm x 30 cm walls
Cross Junctions of Walls in Flemish Bond.

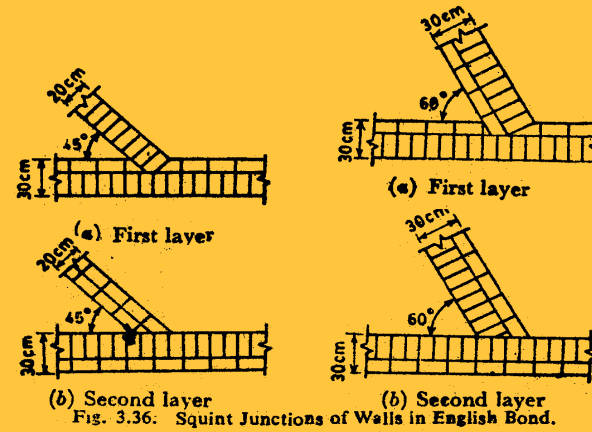


Fig. 3.36. Squint Junctions of Walls in English Bond.

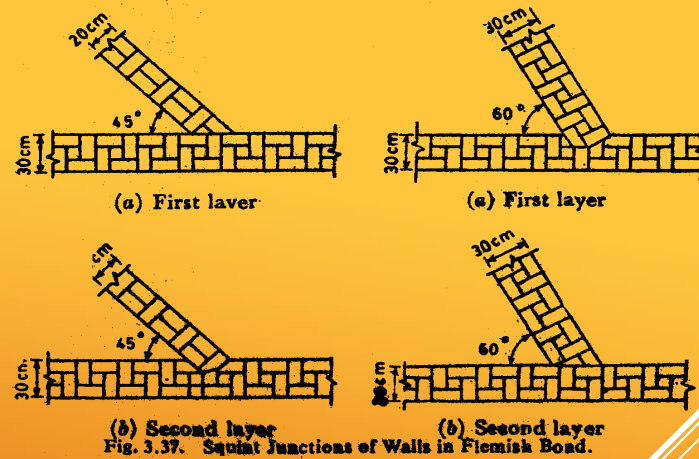
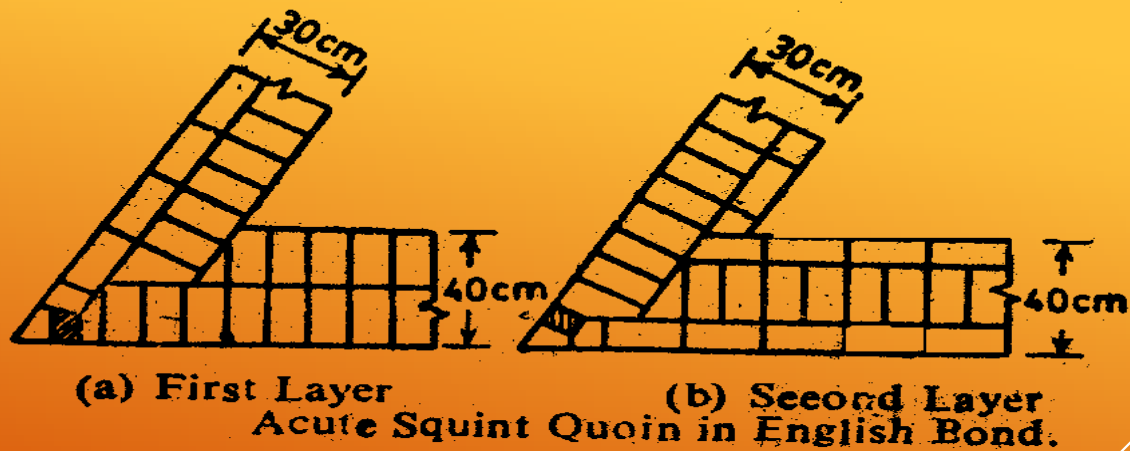
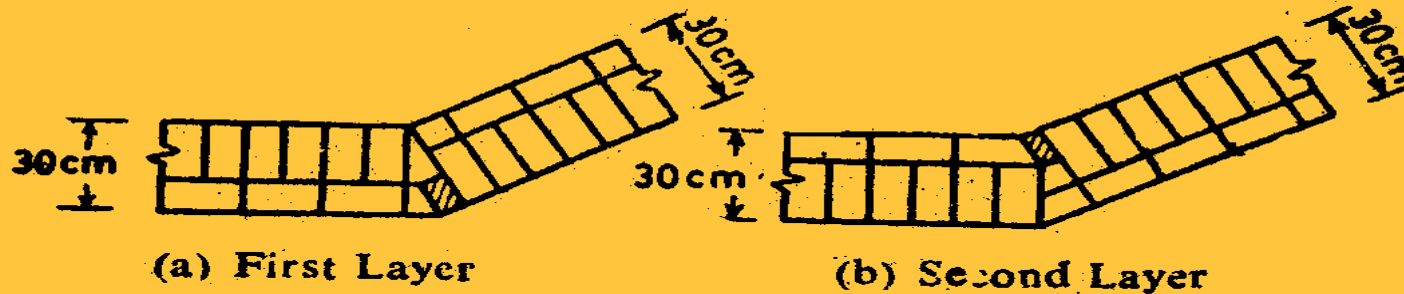


Fig. 3.37. Squint Junctions of Walls in Flemish Bond.

SQUINT QUOINS (ENGLISH BOND)



6.MASON'S TOOLS IN BICK MASONRY

- ▶ Trowel
- ▶ Brick hammer
- ▶ Lines and pins
- ▶ Spirit level and water level
- ▶ Straight edge
- ▶ Plumb Line
- ▶ Mason's square (guniya)
- ▶ Tape (steel)

MASON'S TOOLS



(a) Trowel



(b) Brick Hammer



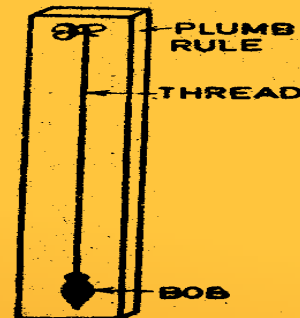
(c) Line and Pins



(d) Bubble Tube



(e) Straight Edge



(f) Plumb Rule & Bob



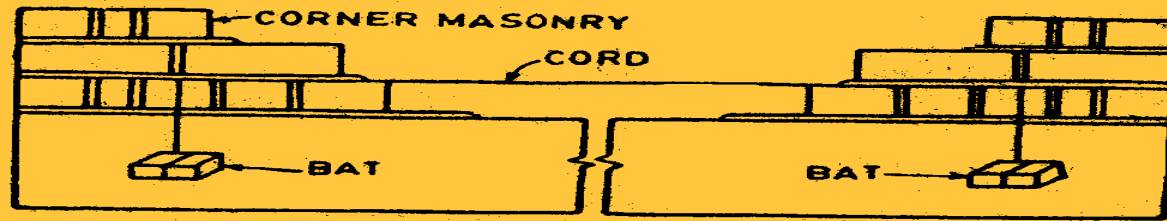
(g) Mason's Square



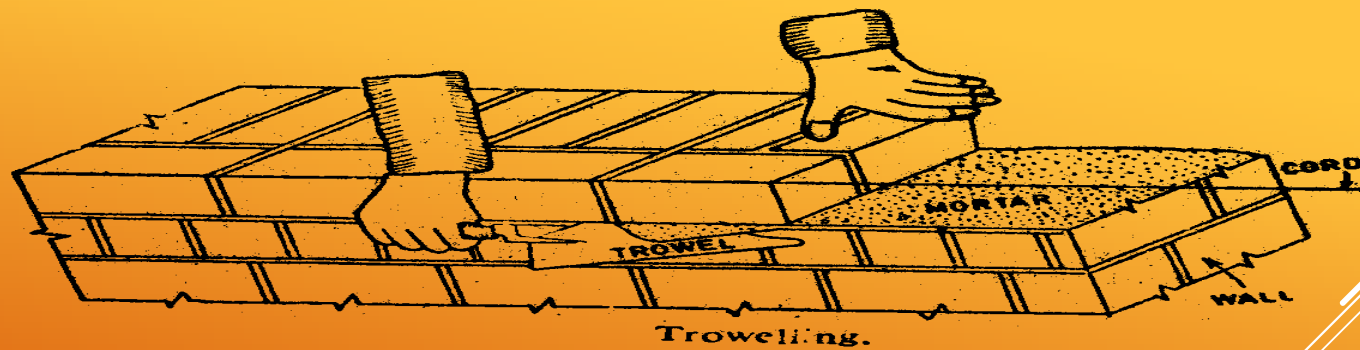
(h) Measuring Tape.

Tools Used in Brick Masonry.

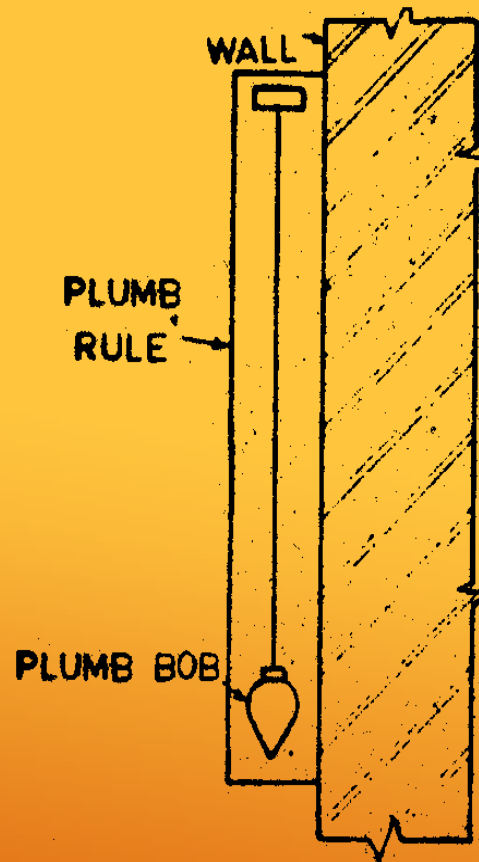
USE OF TROWEL & LINES AND PINS



Laying of Bricks into Wall above Plinth Level



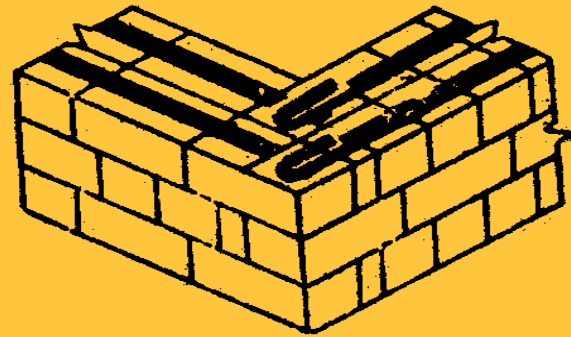
USE OF PLUMB BOB AND EDGE



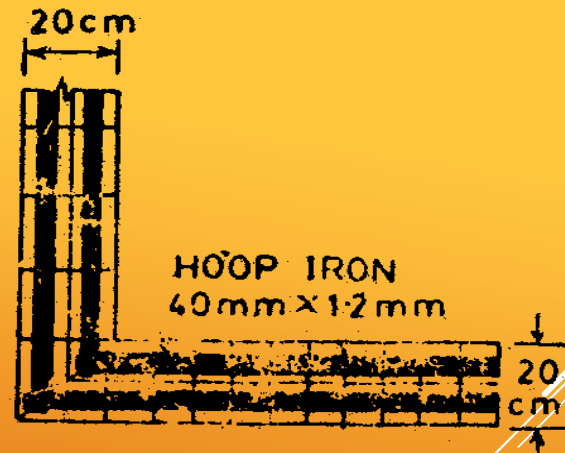
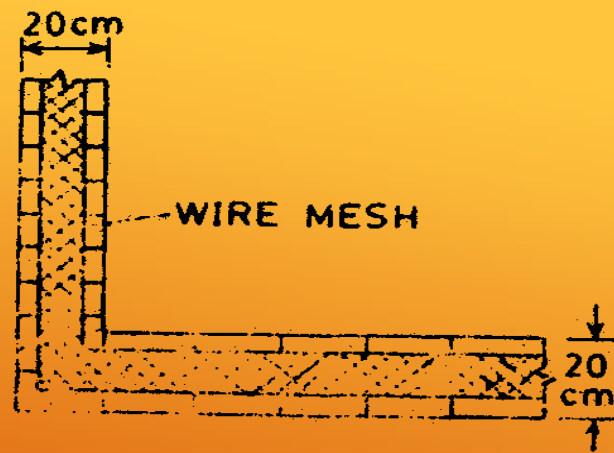
7. REINFORCED BRICK MASONRY

- ▶ The brick masonry done by embedding reinforcement in rich cement mortar is called Reinforced brick masonry.
- ▶ Reinforcement used may be in the form of
 - ▶ Steel bars
 - ▶ Hoop iron
 - ▶ Wire mesh

REINFORCED BRICK MASONRY



(a)



8.CONSTRUCTIONS OF BRICK MASONRY

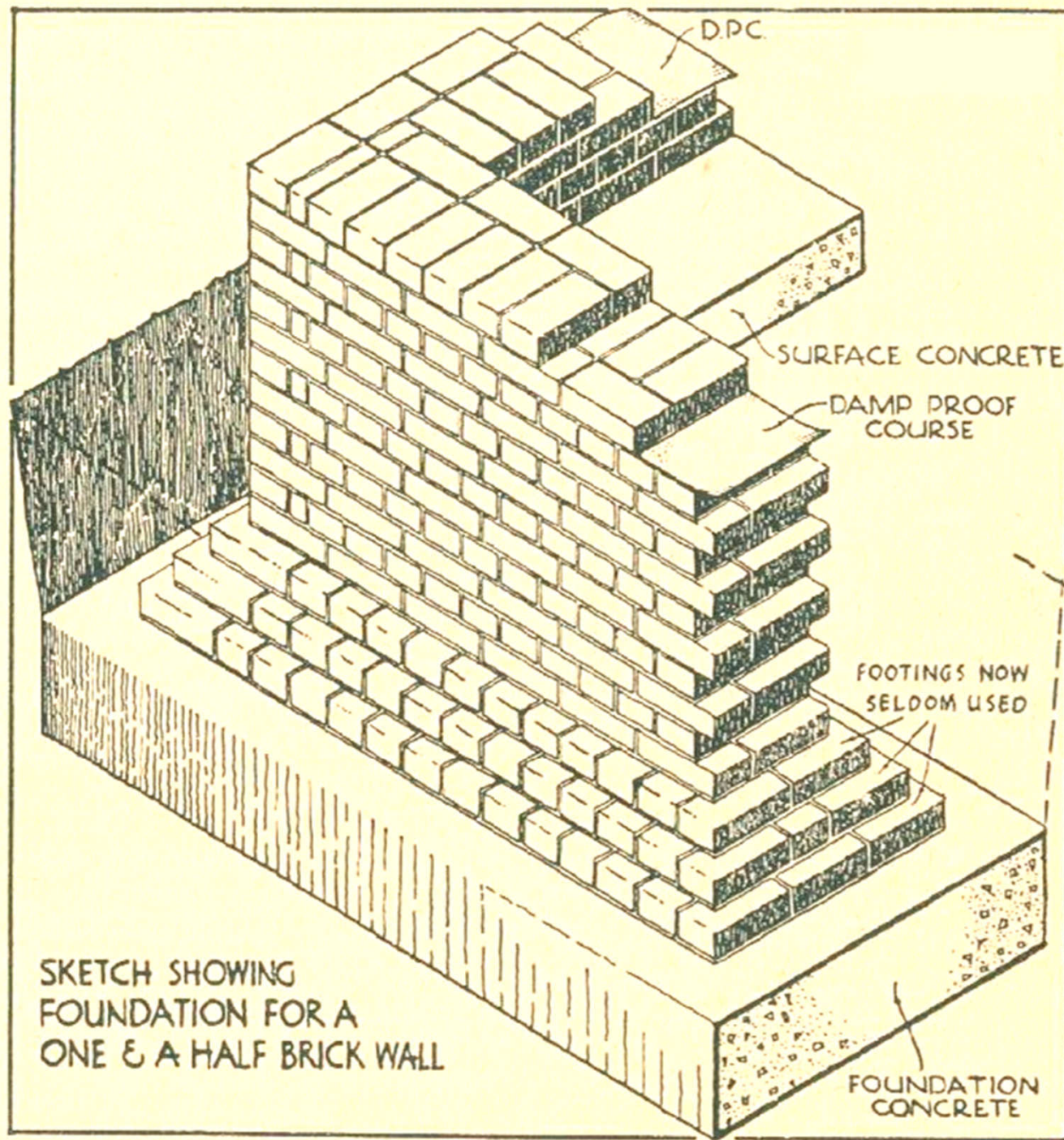
- ▶ It is the art of laying bricks in a proper bond with specified mortar to form a structure.

It involves the following activities...

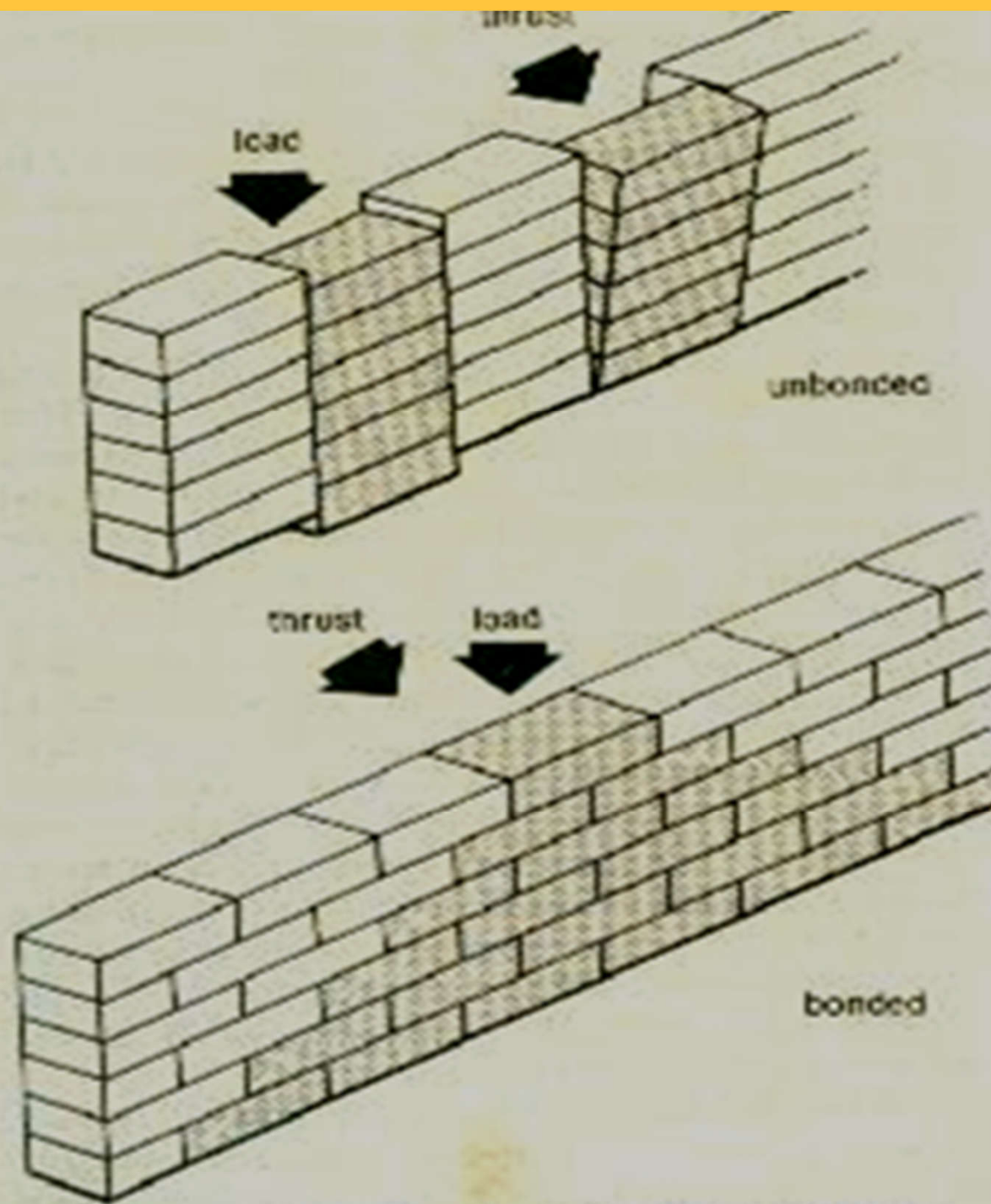
- ▶ Selection of bricks
- ▶ Stacking of bricks
- ▶ Soaking of bricks
- ▶ Preparation of mortar (ASTM Specifications C 270, "Mortar for Unit Masonry")
- ▶ Laying of bricks

9. GENERAL PRINCIPLES AND PRECAUTIONS IN BRICK MASONRY

- ▶ English bond should be used if not specified.
- ▶ Bricks used should be well burnt and should be uniform in size, shape and color.
- ▶ For facing work selected bricks should be used.
- ▶ Curing of bricks should be done for at least 2 hours.
- ▶ Frogs can be pointed downward or upward or as specified by the Engineer, but the important matter is to fill the frog with mortar.
- ▶ Mortar used in brick masonry should be of good quality.
- ▶ In walls greater than 9" or 0.225 m width hearting joints should be filled properly.
- ▶ Brick bats are avoided.



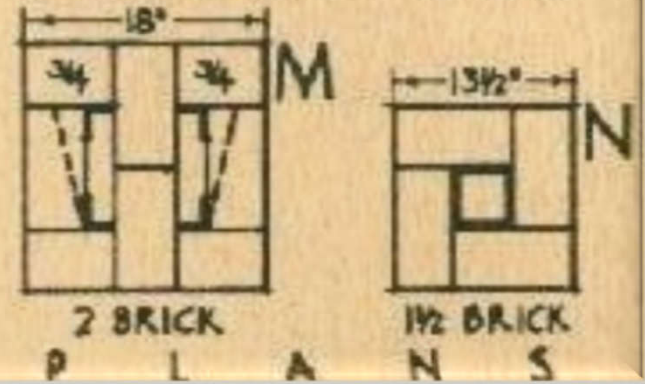
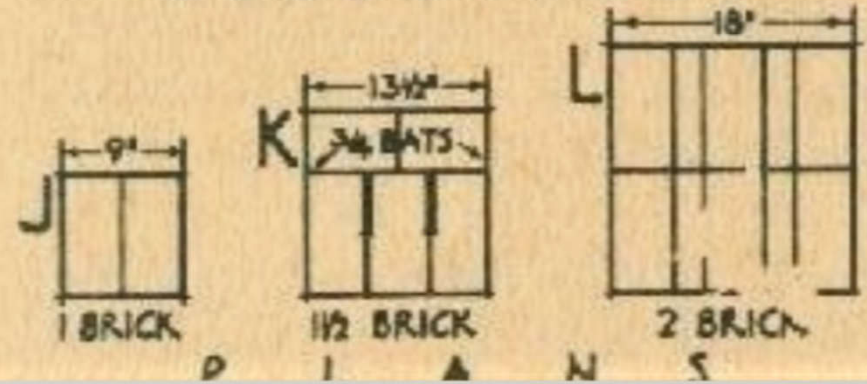
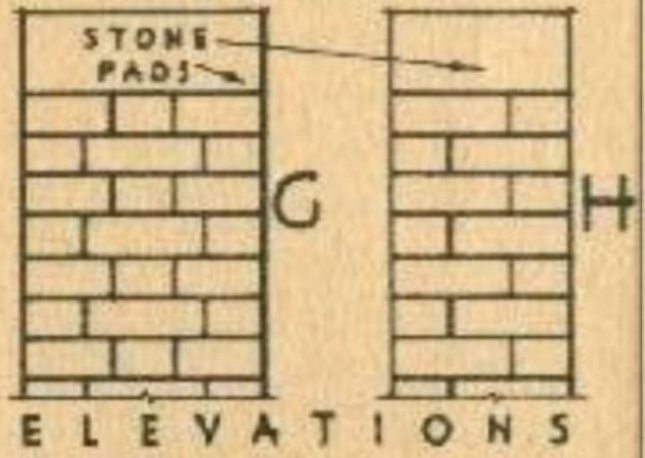
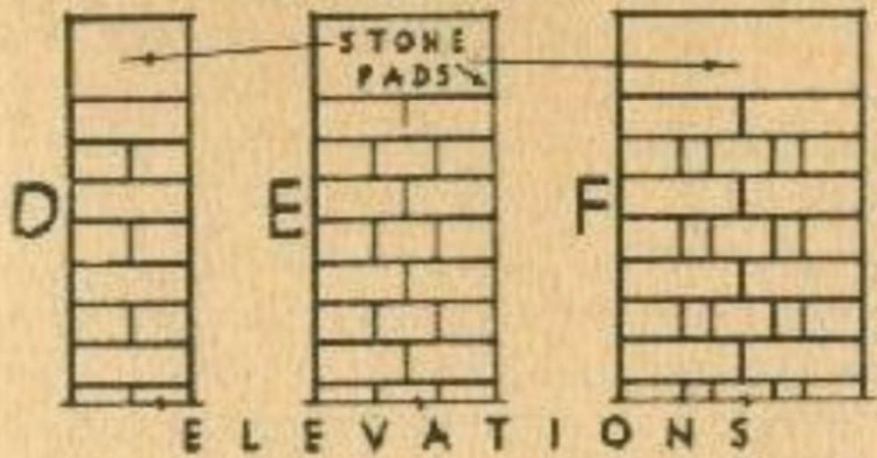
SKETCH SHOWING
FOUNDATION FOR A
ONE & A HALF BRICK WALL



P I E R S

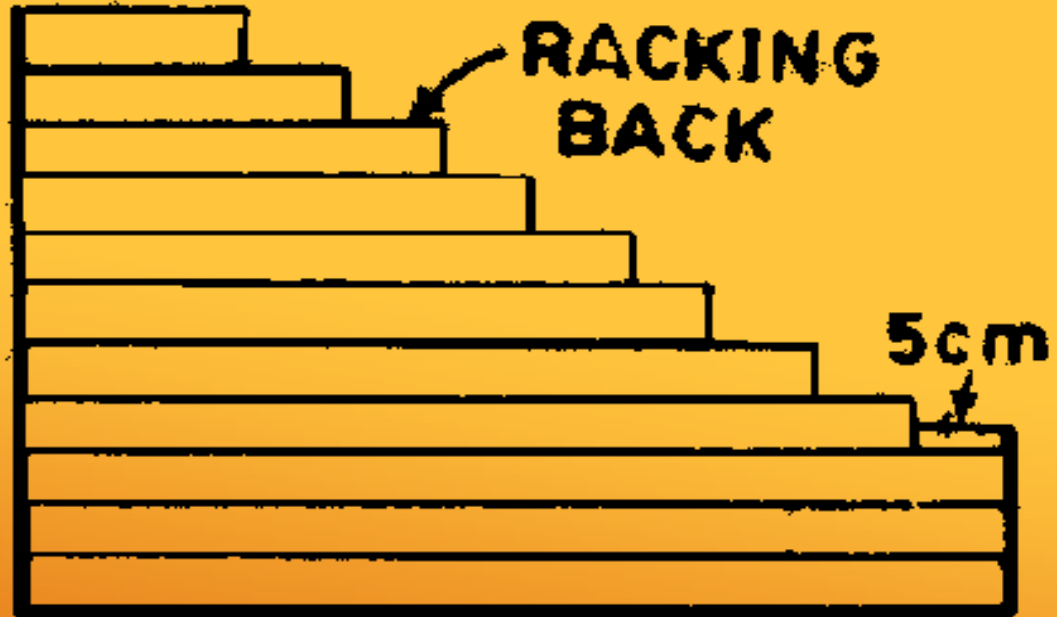
ALTERNATE DETAILS OF DETACHED PIER "C"
 ENGLISH BOND

DOUBLE FLEMISH BOND

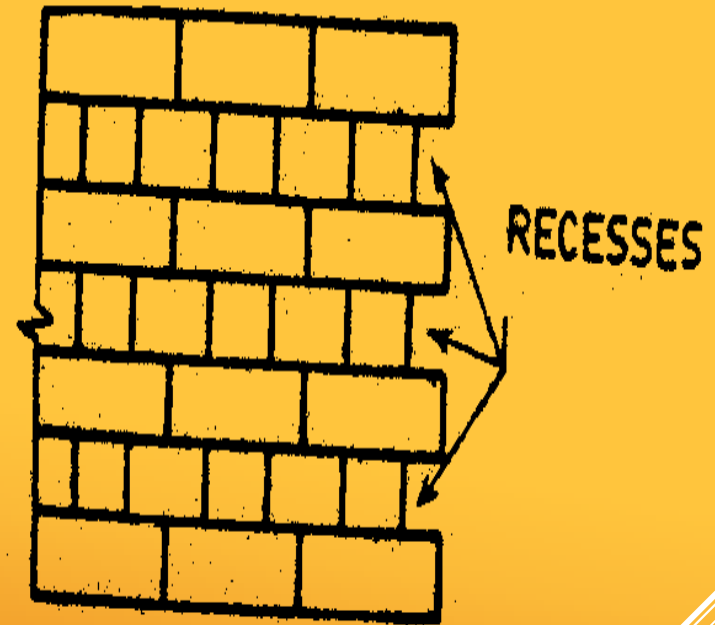


10. TECHNIQUES TO
MAKE A BOND BETWEEN
OLD AND NEW MASONRY

RACKING



TOOTHING



11.DEFECTS AND MAINTENANCE OF BRICK MASONRY

DEFECTS

- ▶ Due to Substandard materials
- ▶ Due to effect of sulphates
- ▶ Due to frost action
- ▶ Due to efflorescence

MAINTENANCE

- ▶ Cleaning brick masonry
- ▶ Removing efflorescence
- ▶ Re-conditioning the brick masonry
- ▶ Repainting the brick masonry

STONE MASONRY

DEFINITIONS

- ▶ Corbel
- ▶ Cornice
- ▶ Drip Stone
- ▶ Throating
- ▶ Coping
- ▶ Frieze
- ▶ Spalls

DEFINITIONS

▶ Corbel (Bracket)

- ▶ It is a piece of stone projected outside of a wall to provide support to a structural member of the Roof or Floor.

▶ Cornice

- ▶ It's a large course of stone masonry provided at the ceiling level of roof, projected outside of wall.

▶ Drip Stone

- ▶ A projected stone with tothing at undersurface. It is provided to through the rain water off the wall.

DEFINITIONS

▶ Throating

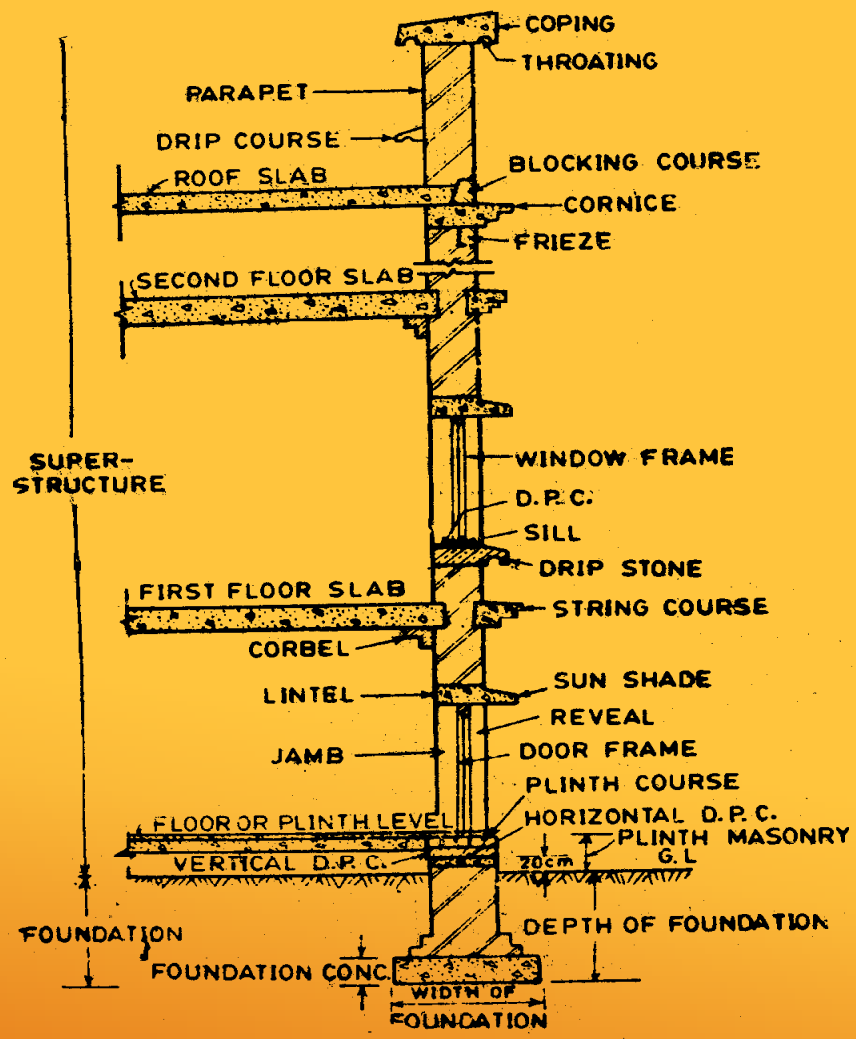
- ▶ The process of cutting groves in
- ▶ Soffits of sills
- ▶ Drip stones
- ▶ Coping
- ▶ String course etc.
- ▶ Its purpose is to avoid the dripping of rain water over the walls.

▶ Coping

- ▶ It is a special course provided at the top of a wall to avoid entry of rain water in wall.

▶ Frieze

- ▶ The stone course provided below the cornice is called frieze



Section through an External Wall of a Building showing its different Parts.

BLOCK MASONRY

Widths and heights and additional reinforcement in proportion to lengths

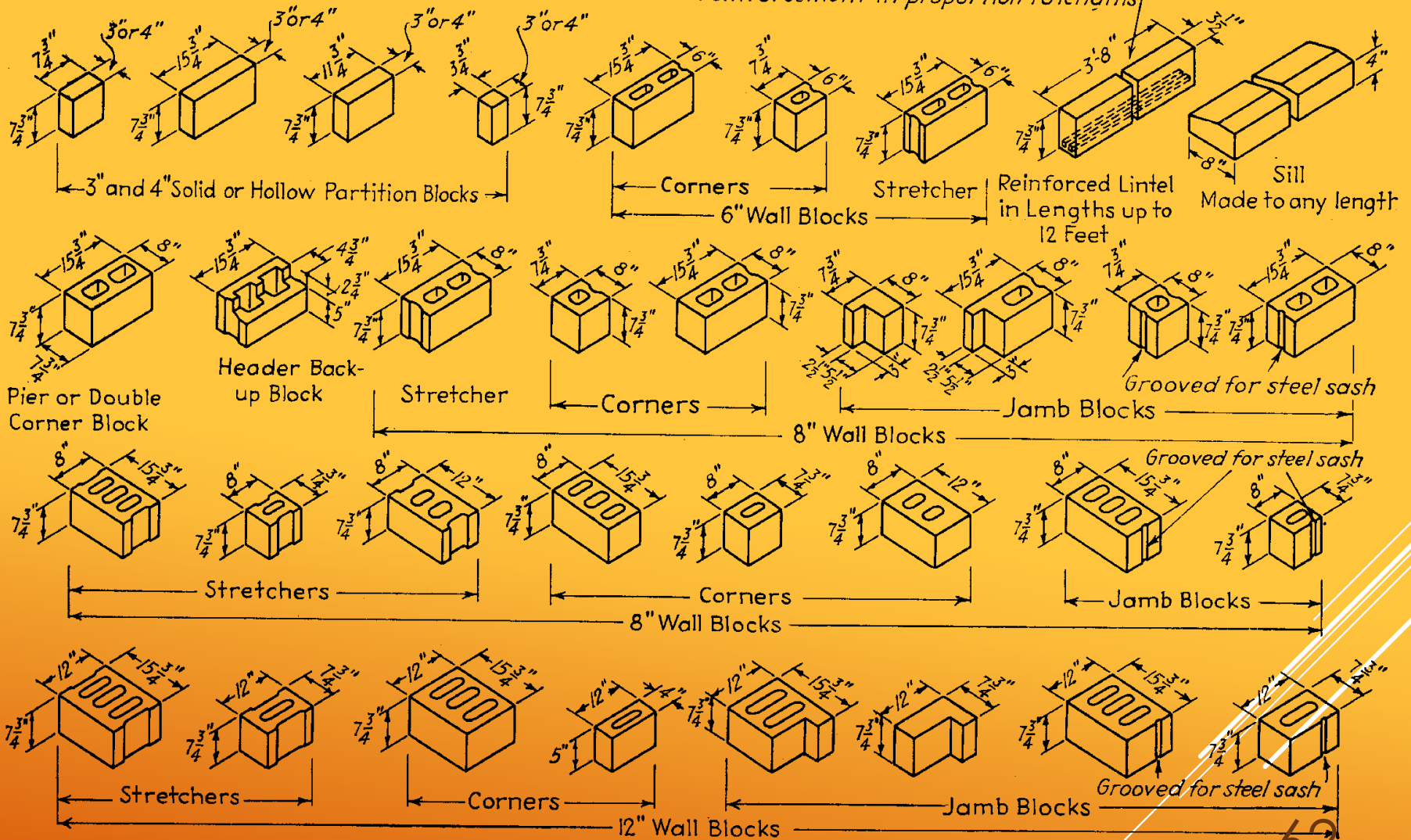


Fig. 14-14 Concrete blocks.

THE END