



WELCOME TO OUR PRESENTATION

Submitted By:-

Ashish Kumar, CRN- 2014015

Ashutosh Agnihotri, CRN- 2014016

Ayush Sharma, CRN- 2014017

Ayush Thakur, CRN- 2014018

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“MASONRY”



MASONRY

Masonry may be defined as the construction of Building units bonded together with Mortar.

These Building units are known as Masonry Units

1. Stones
2. Bricks
3. Pre-Cast Concrete Blocks, etc.

The Basic advantage of masonry construction lies in the fact that in load bearing structures, it performs a variety of functions :-

1. Supporting Loads
2. Sub-Dividing Space
3. Providing Thermal Insulation



TYPES OF MASONRY

MASONRY



STONE MASONRY

BRICK MASONRY

**HOLLOW CONCRETE BLOCKS
MASONRY**

COMPOSITE MASONRY

REINFORCED BRICK MASONRY





“BRICK MASONRY”

BRICK MASONRY

Brick masonry is a structural technique in which the Bricks are laid out in a systematic pattern and the joints are filled with mortar to make a solid structure.

TYPES OF BRICKS

Bricks used in Brick masonry are of 2 types:-

(1) Traditional Bricks:

In case of traditional Bricks, the sizes are not standard.
These vary from one place to another.

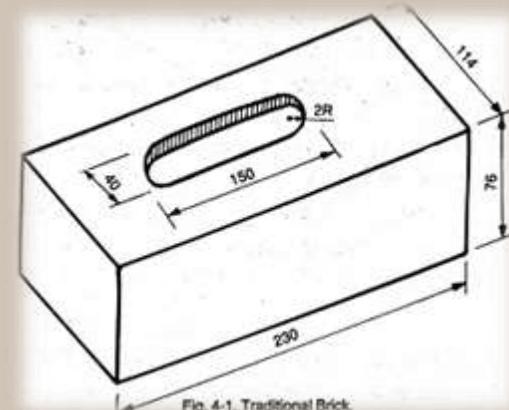
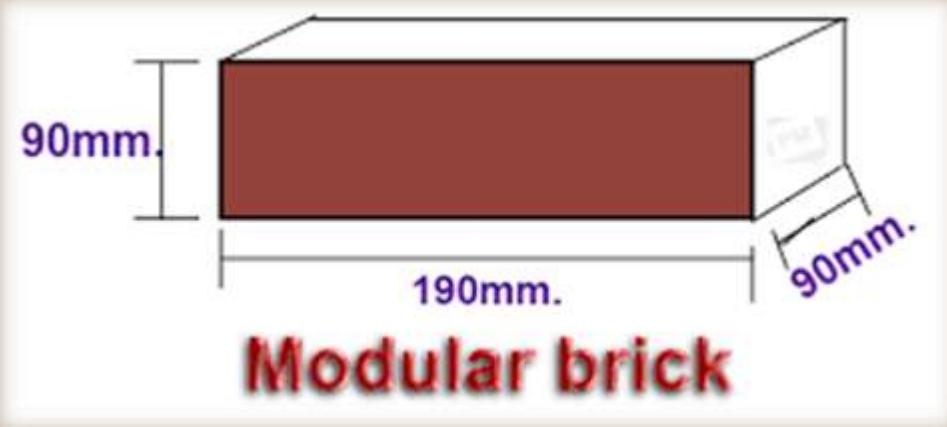


Fig. 4-1. Traditional Brick.

(2) Modular Bricks:

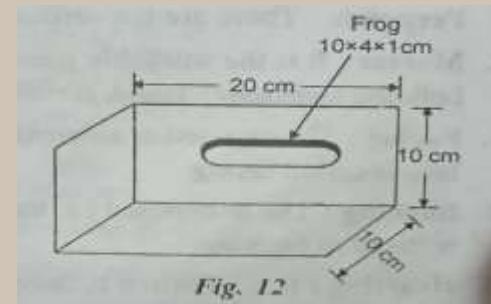
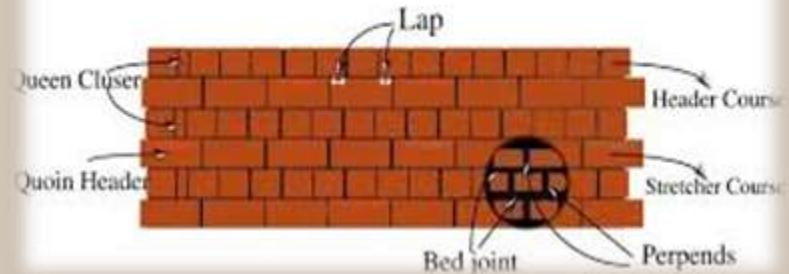
In case of modular bricks, the nominal size laid down by B.I.S (Bureau of Indian Standard Institution) is 20 cm x 10 cm x 10 cm (with mortar) and 19 cm x 9 cm x 9 cm (without mortar). Modular bricks are Economical and reduce the construction cost.



GENERAL TERMS

1. **Stretcher : Longer Face**
2. **Header : Short Face**
3. **Bed : Top Face of a Brick**
4. **Frog: Depression in Bed**
5. **Perpends: vertical joints between the Bricks**
6. **Lap: Horizontal distance left between the successive brick courses**
7. **Quoin Brick: Whose one edge is exposed to atmosphere (used at corner of the wall)**

Technical Terms Used In Brick Masonry



SPECIAL TYPE OF BRICKS

CLOSER

BAT

BULL NOSE

HALF QUEEN

HALF BAT

SINGLE

QUARTER QUEEN

THREE QUARTER

DOUBLE

KING

BEVELLED

MITRED

BEVELLED

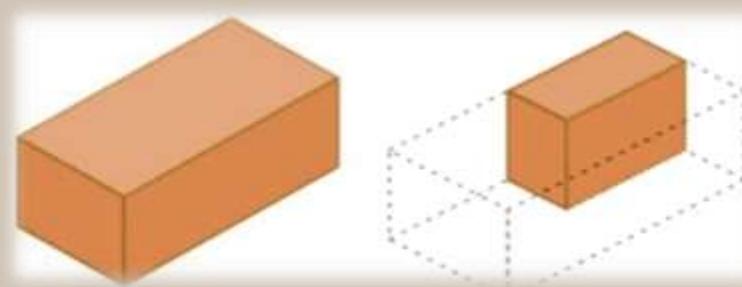
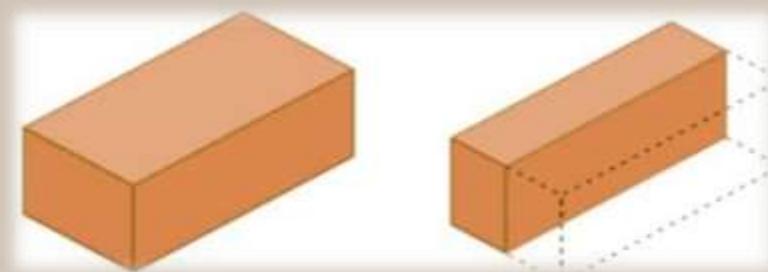
CLOSER BRICKS

A portion of the brick cut across the length is called closer brick.

TYPES OF CLOSER BRICKS:-

1. HALF QUEEN:- A Brick When cut along its Length into two halves , the Brick is termed as Half Queen Closer Brick.

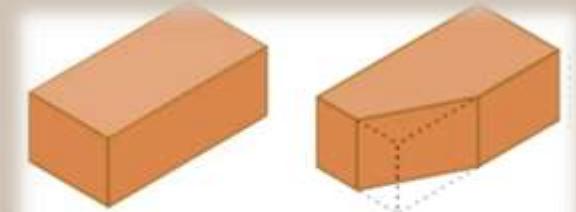
2. QUARTER QUEEN:- A Brick When cut along its Length into 4 Equal half's, the Brick is termed as Quarter Queen Closer Brick.



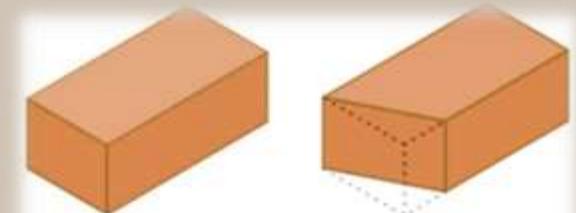
3. KING:- A Brick When cut Half along length & half along width, the remaining part of the Brick is termed as King Closer Brick.

4. MITRED:- A Brick When cut along its Width considering 45 to 60 degree angle at one end of the Brick, the remaining part of the Brick is termed is Mitred Closer Brick.

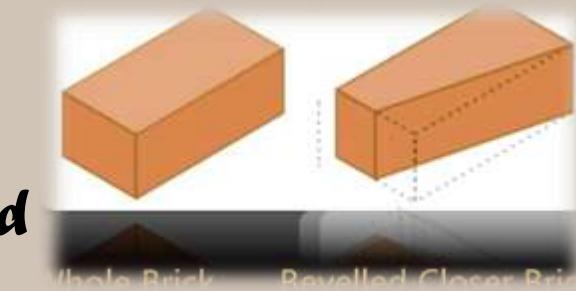
5. BEVELLED:- A Brick When cut along its Length considering half width at one end and full width another end of the Brick, the Brick is termed as Bevelled Closer Brick.



Whole Brick King Queen Closer



Whole Brick Mitred Closer Brick



Whole Brick Bevelled Closer Brick

BAT BRICKS

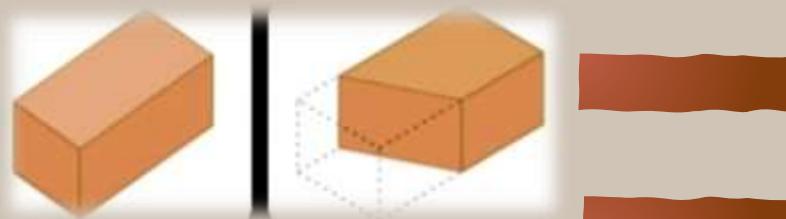
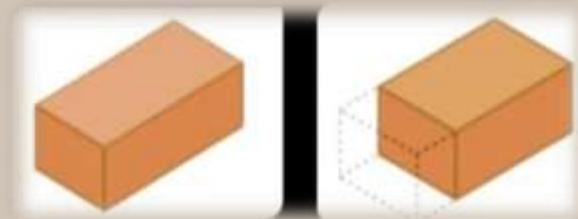
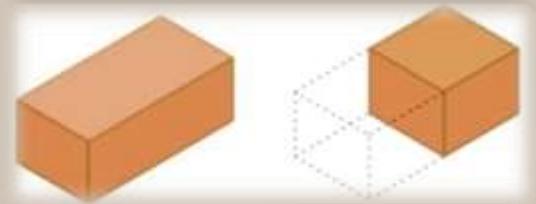
A portion of the Brick cut across the width is called Bat brick.

TYPES OF BAT BRICKS:-

1. HALF BAT:- If the length of the Bat is equal to half the length of the full Bricks.

2. THREE QUARTER:- It is the form of Brick Bat having its length equal to three quarter of length of a full Bricks.

3. BEVELLED:- A Brick When cut along its Width considering half of the length from one end and $\frac{1}{4}$ of the length from another end of the Brick, the remaining part of the Brick is termed as Bevelled Bat Brick.



BULL NOSE BRICKS

It is a special moulded brick having one edge rounded. It is used in coping and specially at places where rounded corners are preferred.

TYPES OF BULL NOSE BRICKS:-

1. **SINGLE BULL NOSE:-** Curve applied to one edge to form a half rounded off header.
2. **DOUBLE BULL NOSE:-** Curve applied to both edges to form a totally rounded off header.



BOND NECESSITY

The necessity of providing bond is:

- a) To ensure lateral as well as longitudinal strength of the structure.
- b) To provide pleasing appearance.
- c) To finish up the construction work quickly by engaging more masons.
- d) To break the continuity of the vertical joints.

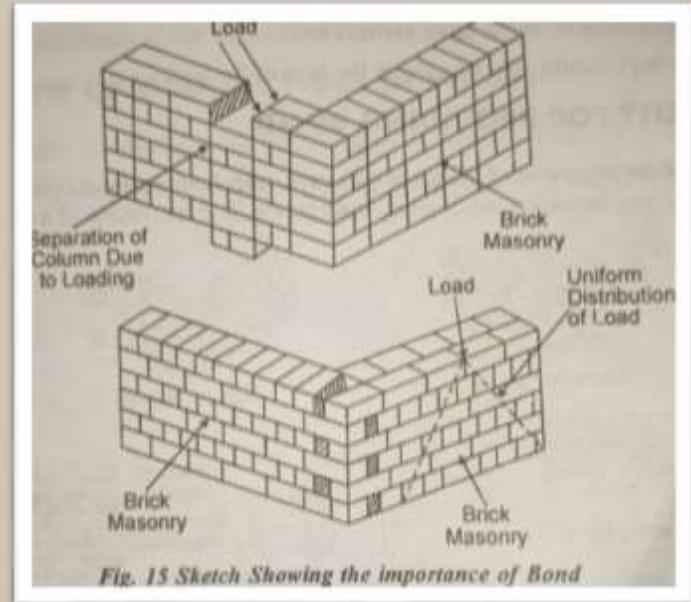


Fig. 15 Sketch Showing the importance of Bond

PRINCIPLES OF ACHIEVING GOOD BOND

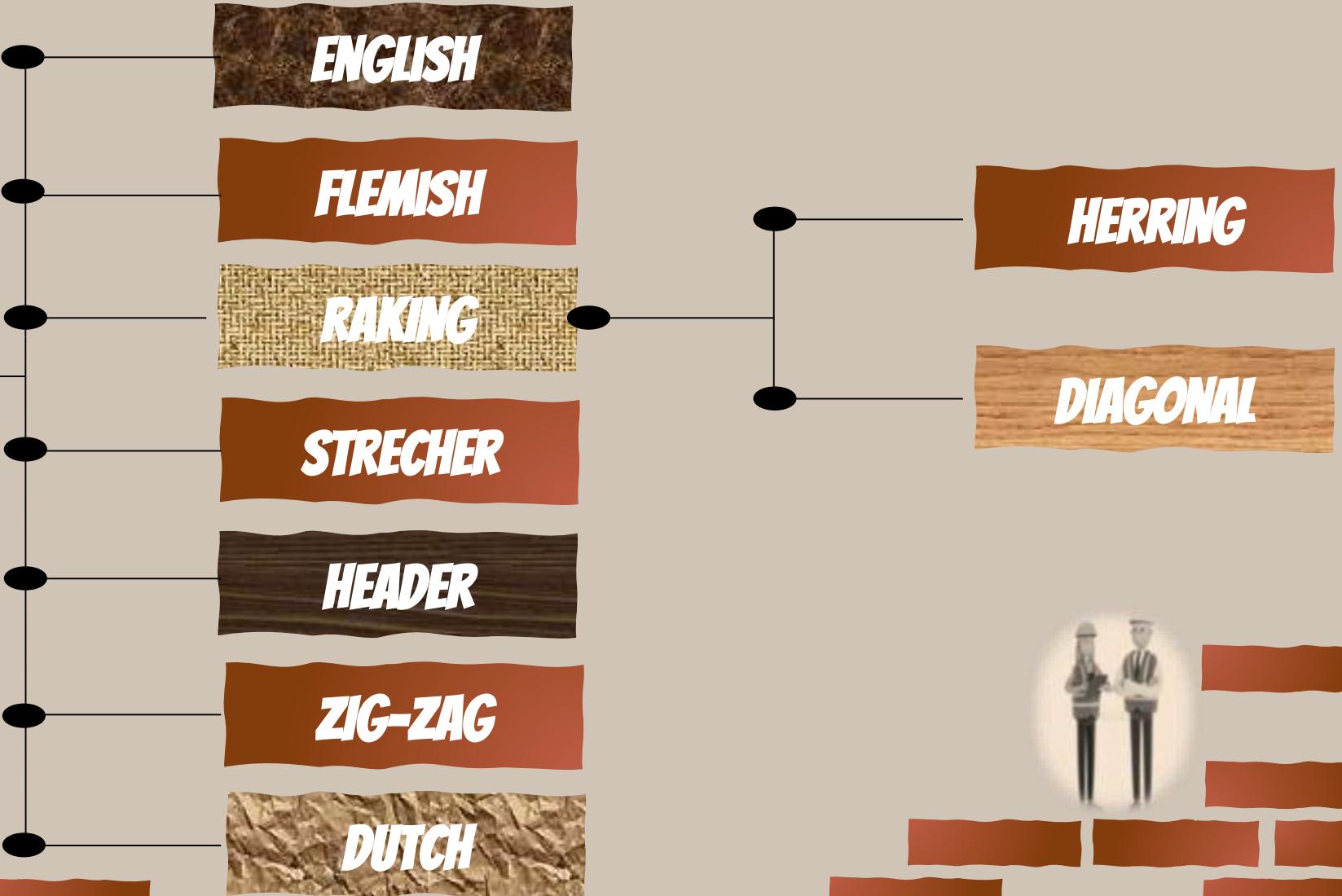
The principles of achieving good bond in brickwork are:-

- (i) The joints whether horizontal or vertical must be of proper thickness.
- (ii) The bricks should be of uniform size and shape.
- (iii) The laying out of bricks must be uniform.
- (iv) The lap in the successive courses of a wall of thickness more than 10 cm should be greater than 5 cm .
- (v) The hearting should only be done in headers for walls having thickness 40 cm or more.
- (vi) The alternate vertical joints should be vertically above each other.
- (vii) The headers must be in the same vertical line.
- (viii) The stretchers should only be used in the face of the wall.



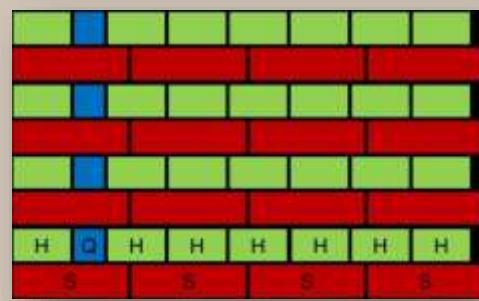
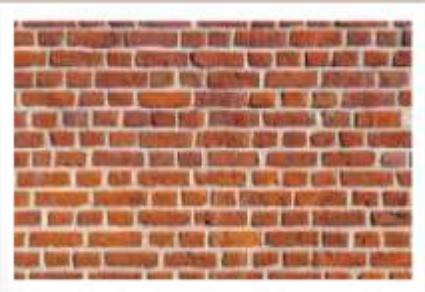
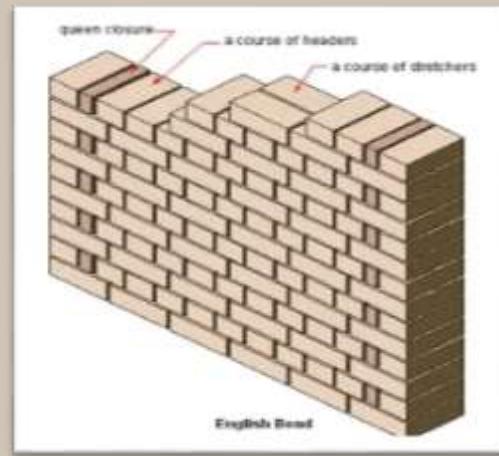
TYPES OF BONDING

TYPE OF BONDS



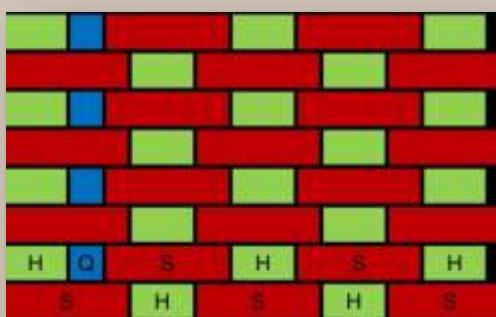
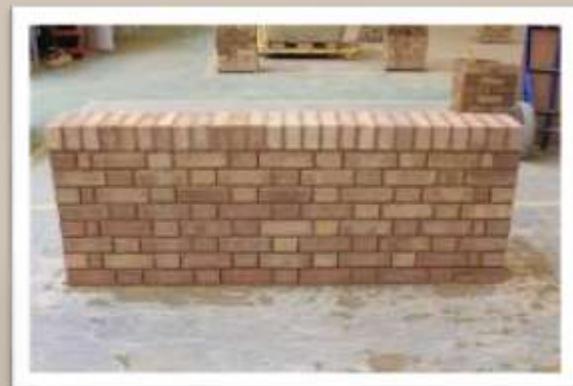
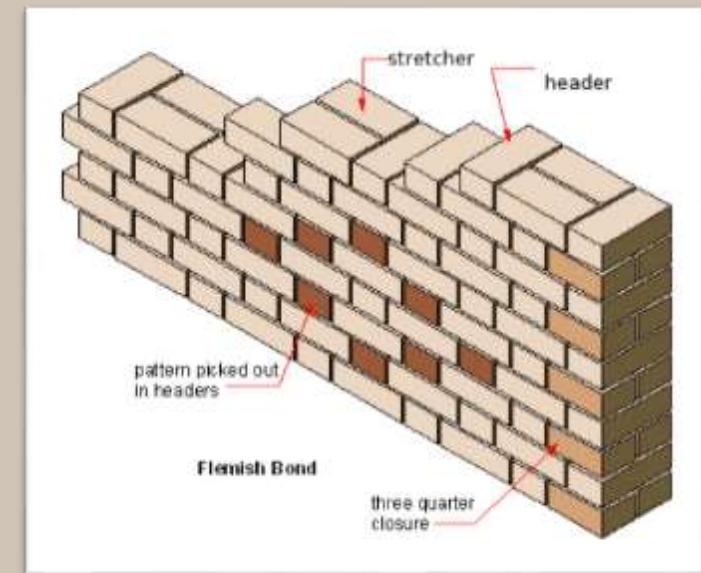
1. ENGLISH BOND:-

- The Arrangement of Bonding that consist of Alternate Header and Stretcher placed one over each other.
- queen Closer is placed next to Quoin Header in each Alternate Course. When Building a 1 Brick wall (215mm wide) or wider, the strongest Bond is English Bond.
- A lap of 1/4th Brick is Available for each stretcher over the header in the course below it.
- Commonly used for all types of construction.



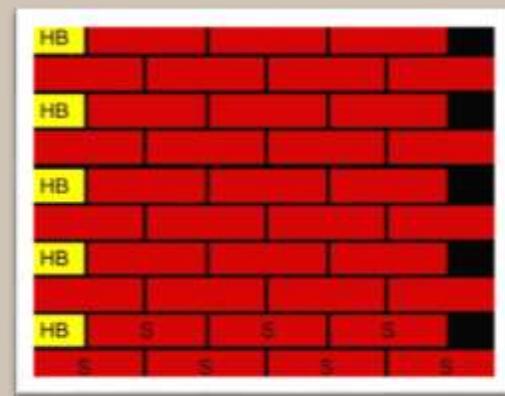
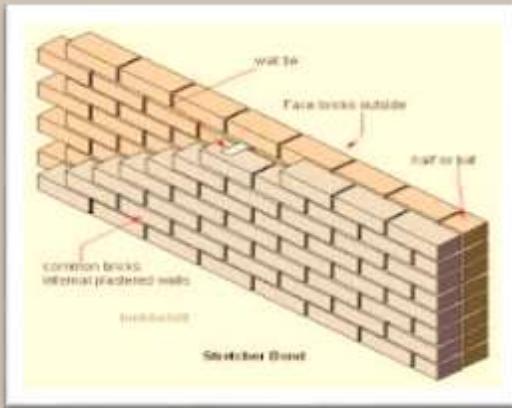
2. FLEMISH BOND:-

- Flemish Bond is found to more Economical than English Bonding, but highly skilled Labour is required.
- Wastage in Flemish Bonding is less while number of joints in Flemish Bonding are more. The main purpose of using Flemish Bond is to provide greater aesthetic appearance on the front surface.
- Generally for wall less than 30 cm.



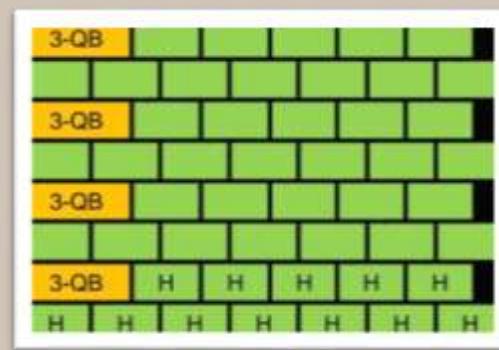
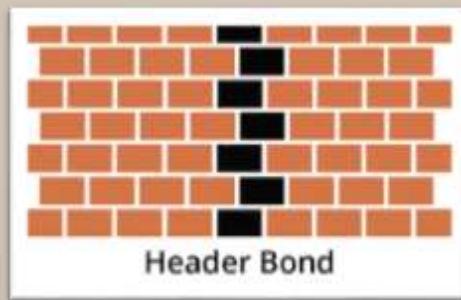
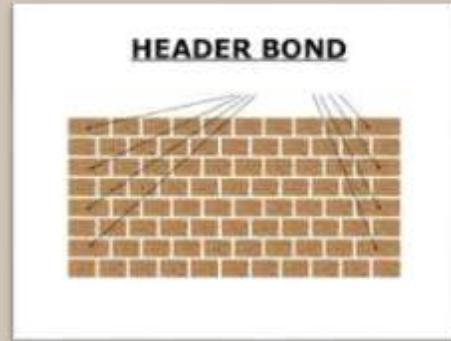
3. STRETCHER BOND:-

- It is the arrangement of bonding that consist of stretcher in each Course. In order to break the alignment of vertical joint to break the alignment of vertical Joint to be in same straight line its each alternate coarse started with half bat.
- A lap of Half Brick is available for each stretcher in all the courses. This Bond Is Provided when half brick thick wall required. In order to break the alignment of vertical joint to break the alignment of vertical Joint to be in same straight line its each alternate coarse started with half bat.
- For walls 10 cm thick.



4. HEADER BOND:-

- In order to break the alignment of vertical joint to break the alignment of vertical Joint to be in same straight line its each alternate coarse started with 3 Quarter Bat Brick.
- A lap of Half Brick is available for each Header in all the courses. This Bond Is Provided in foundation work. A lap of Half Brick is available for each Header in all the courses. It is the arrangement of bonding that consist of Header in each Course.
- For wells, corbels, cornices, footings, curved walls etc.



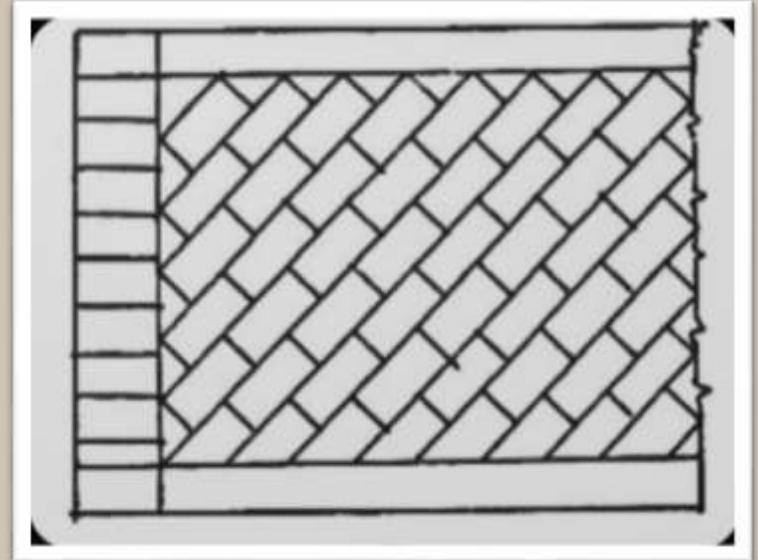
5. RAKING BOND:-

Bricks are kept at an inclination to the direction of the wall. Suitable for inner filling of walls having thickness more than 4 Bricks. Raking Bonds are of two types:

- ❖ Diagonal Bond
- ❖ Herring Bone Bond

DIAGONAL BOND:-

Bricks are arranged at 45° in such a way that extreme corners of the series remain in contact with the external line of stretchers. These are suitable for walls which are 2-4 brick thick.



HERRING BOND:-

- Bricks are arranged at 45° in two opposite directions from the centre of the wall thickness.
- Suitable for Brick Flooring, ornamental finish works.
- These are suitable for walls which thicker than 4 brick thick.

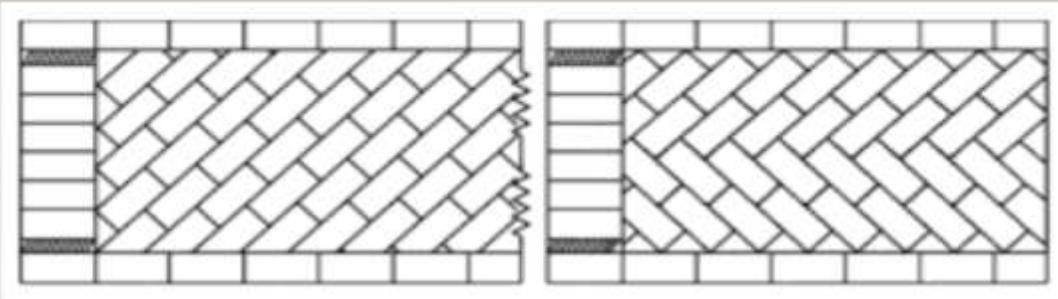
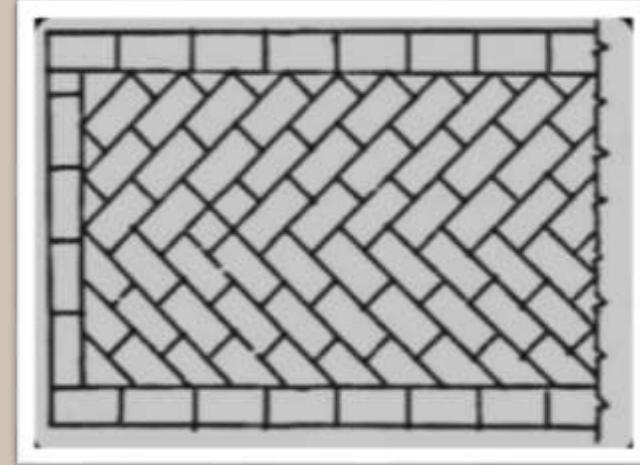
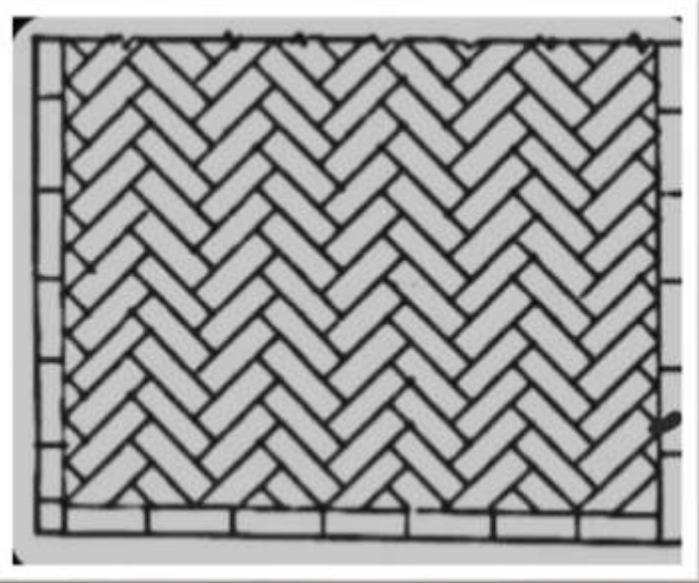


Figure 11.12 Rakine bond

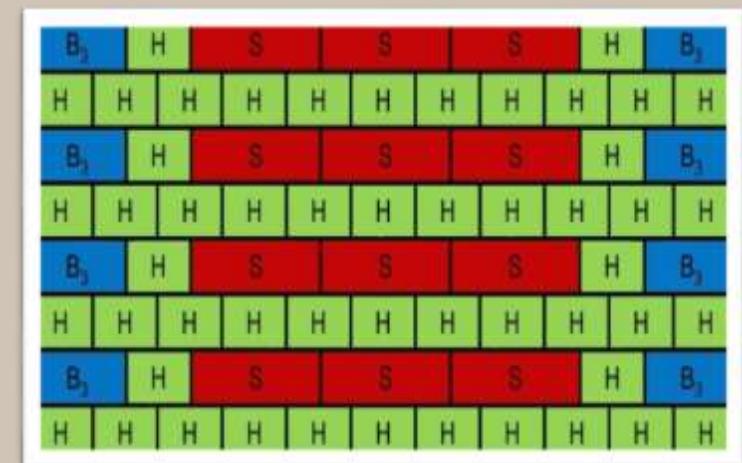
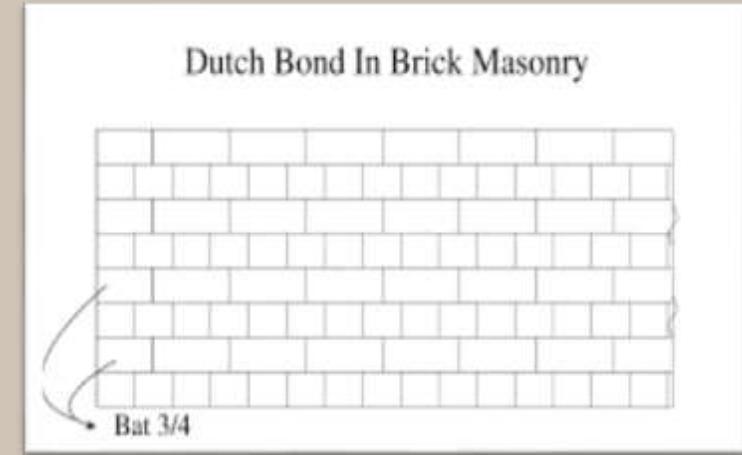
6. ZIG ZAG BOND:-

- It is like herring bone bond, except that the bricks are laid in zigzag fashion.
- Suitable: Ornamental Panels in the brick flooring



7. DUTCH BOND:-

- This is another modified form of English Bond.
- In this bond the corners of the wall are strengthened.
- Alternate Courses of headers and stretchers are provided in English Bond.
- Every Stretcher course starts at the quoin with a $\frac{3}{4}$ Bat.
- In every alternate stretcher course, a header is placed next to the three-quarter brick bat provided at the quoin.
- Used where strength is of prime importance.



SPECIFICATIONS FOR THE CONSTRUCTION OF BRICK MASONRY

The important specifications for the construction of Brick walls are :-

- Bricks should be well Burnt and of uniform size, shape and colour.
- Bricks must be laid with frog in the upward direction in the horizontal plane, until or unless specially specified.
- Bricks should be laid in English Bond unless otherwise specified.
- The iron fixtures should be well embedded in 1:4 cement mortar during the progress of the work.
- The junctions of the wall should be properly bonded.

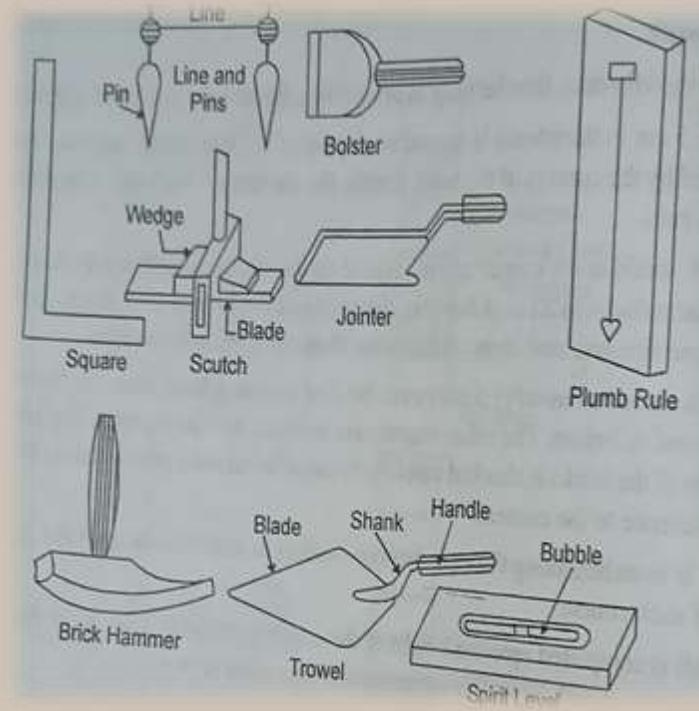


- 
- The vertical joints in alternate courses should be in the same vertical line and the horizontal joints should be truly in level. The vertically of the brick work should be checked frequent by means of plumb-bob.
 - In order to avoid any uneven settlement, the brick work should be raised uniformly throughout the length of the wall.
 - The mortar to be used should be of specified quality.
 - The brick bats should be used only if required to achieve a particular bond.
 - At the end of the day's work, all the joints should be raked out to about 1 to 1.5 cm deep where painting or plastering is to be done afterwards.

TOOLS USED FOR BRICK LAYING

Various tools which are used for Brick laying:

- (i) **Square:** for checking the right angle.
- (ii) **Jointer:** for pointing the joints.
- (iii) **Scutch:** for cutting soft bricks.
- (iv) **Bolster:** for accurate cutting of bricks.
- (v) **Line and pins:** for maintaining alignment of courses.
- (vi) **Plumb rule:** for checking vertically of masonry work.
- (vii) **Trowel:** for spreading mortar, lifting mortar and cutting bricks.
- (viii) **Brick hammer:** for pushing bricks in courses and cutting bricks.
- (ix) **Spirit Level:** for levelling, for obtaining horizontal surface.



LAYING OF BRICKS

- Bricks should be laid in English bond unless otherwise specified.
- Every course of brick should be horizontal.
- Wall should be truly in plumb.
- Vertical joints of consecutive brick layer should not come on each other.
- Vertical joints of alternate brick layer should come directly over one another.
- Closers should be of clean cut bricks.
- Closers should be placed at the end of the walls.
- Best shaped brick should be used for face work.
- The thickness of Mortar joints should be 10mm
- Joints should be fully filled with mortar.



- Bricks should be laid with frogs upwards except in the top brick layer.
- In the top course of brickwork, frog should be laid downward.
- Brickwork should be done for 1 meter or 3 feet height at a time.
- When one part of the wall has to be delayed then stepping should be done at an angle of 45 degree.
- Projections where made should not be more than 1/4th of the brick in one course.
- All joints should be raked and faces of wall should be cleaned at the end of every day's work.



DEFECTS IN BRICK MASONRY:-

The joints may break in masonry due to the following reasons:

- (i) Due to the use of inferior quality of Bricks which causes small depression at the joints.
- (ii) Due to the expansion of mortar joints caused by the presence of sulphate in mortars.
- (iii) Due to the disintegration of Brick work caused by the white deposits on the surface of the brickwork. These deposits are formed by the salts coming from the Bricks or the soil or seawater used in construction.
- (iv) Due to the increased volume of masonry caused by the corrosion of the reinforcement in the presence of moisture in case of reinforced brick masonry.
- (v) Due to the freezing action of water present in the Brick work in snow-bound areas. This increases the volume which may crack the masonry.

(vi) Due to the development of shrinkage cracks caused by the first long spell of dry weather after construction. These shrinkage cracks allow rain water to seep in which deteriorates the masonry.



SULPHATE ATTACK



UNSOUND MATERIAL



FROST ACTION



CORROSION of METAL



Efflorescence



SHRINKAGE EFFECTS

QUESTIONS:-

Q1:- Why Bat or closer Bricks are used?

- Ans:-**
1. To avoid vertical joints of consecutive courses in the same vertical line.
 2. To finish off a wall at the corners.
 3. To maintain the bond patterns.

Q2:- Which Bond is generally used for walls having thickness less than 30 cm?

Ans:- Flemish Bond

Q3:- What are the defects in Brick masonry?

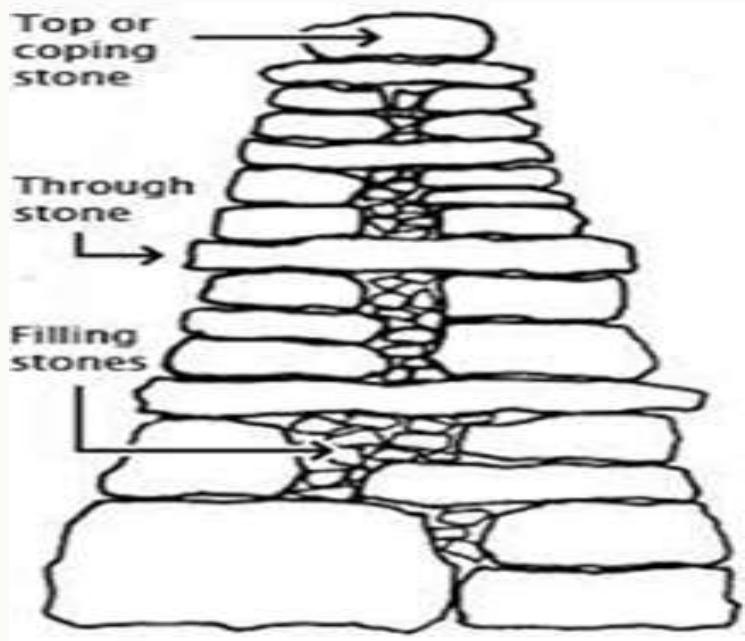
- Ans:-**
1. Depression at the joints.
 2. Increase in the volume of Brick.
 3. Efflorescence

THANK YOU

Stone Masonry

-: IMPORTANT TERMS:-

- Face:-** It is the surface of the wall exposed to the weather.
- Back:-** The inner surface of the wall which is not exposed to weather is termed as Back.
- Facing:-** The material used in the face of the wall is known as facing.
- Hearting:-** The inner portion of the wall between the facing and backing is known as the hearting.
- Through Stone:-** A through stone is a stone header. Through stone are placed across the wall at regular interval.



-:IMPORTANT TOPICS:-



Sill

The bottom surface of a door or a window opening is known as a sill.

- ❖ Sill is thus the horizontal member of a brick, stone, concrete or wood provided to give support for the vertical members of the opening.
- ❖ They all prevent the entry of water to the interior of the building.



String Course

It is the continuous horizontal course of masonry, projecting from the face of the wall for shedding rain water of the face. It is generally provided at every floor and sill level. A string course breaks the monotony of a plane surface, thus imparts aesthetic appearance to the structure.

Corbel

Corbel in stone masonry is defined as the projection stones for the support of roof truss, beam, weather shed, etc. Corbel are generally moulded and given ornamental treatment.



Lintel

It is a horizontal member of stone , brick, wood, steel, RCC used to support the masonry and the superimposed load above an opening.

Jambs

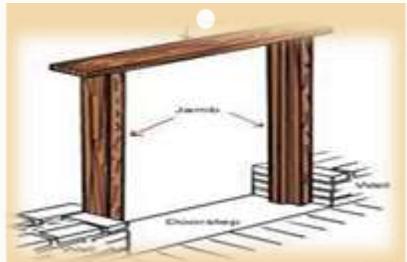
Jambs are the vertical sides of a finished opening for the door, window or fireplace, etc.

Coping

It is a covering of stone, concrete, brick or terracotta, placed on the exposed top of a wall, to prevent seepage of water.



Lintel



Jambs



Coping

Cornice

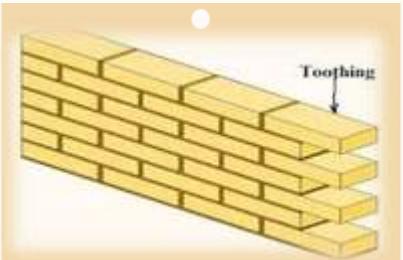
Cornice in stone masonry is a course of the stone that is provided at the top of the wall. It is provided at the junction of the wall and ceiling.

Toothing

These are the bricks left projecting in alternate courses for the purposes of bonding future masonry work.

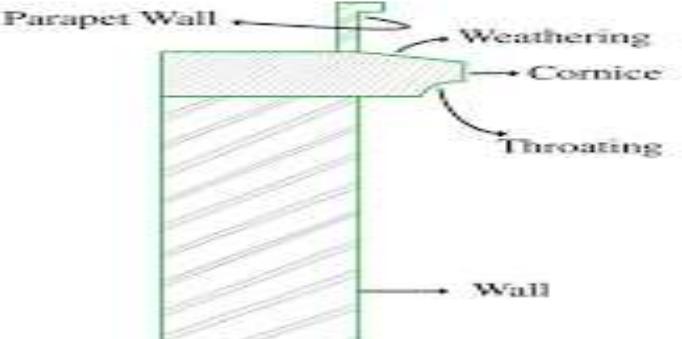


Cornice



Toothing

Cornice



- **Weathering**
- It is a term used to denote the provision of the slope on the upper surface as sills, cornices, coping, etc.

Throating

It is a groove provided on the underside of projecting elements such as sills cornices, copings, etc. so that the rainwater can be discharged clear of the wall surface.

Parapet

It is the portion of low height wall constructed along the edge of the roof to protect the users.

Gable

It is a triangular shaped masonry work, provided at the ends of a sloped roof.

Buttress

It is a triangular shaped masonry work, provided at the ends of a sloped roof.



Thresholds

It is the arrangement of steps provided from the plinth level of external door or verandah to the ground level. These may consist of stone, bricks, concrete and are constructed at the last stage of construction activities of the building.

Classification of Stone Masonry

Depending upon the arrangement of stones in the construction, degree of refinement used in shaping the stone and finishing the stone

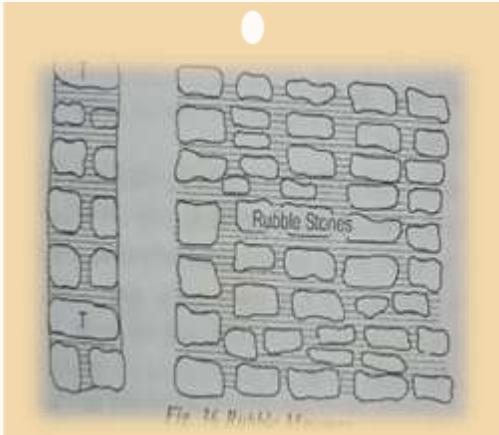
They are classified as follows:

- A. Rubble Masonry
- B. Ashlar Masonry

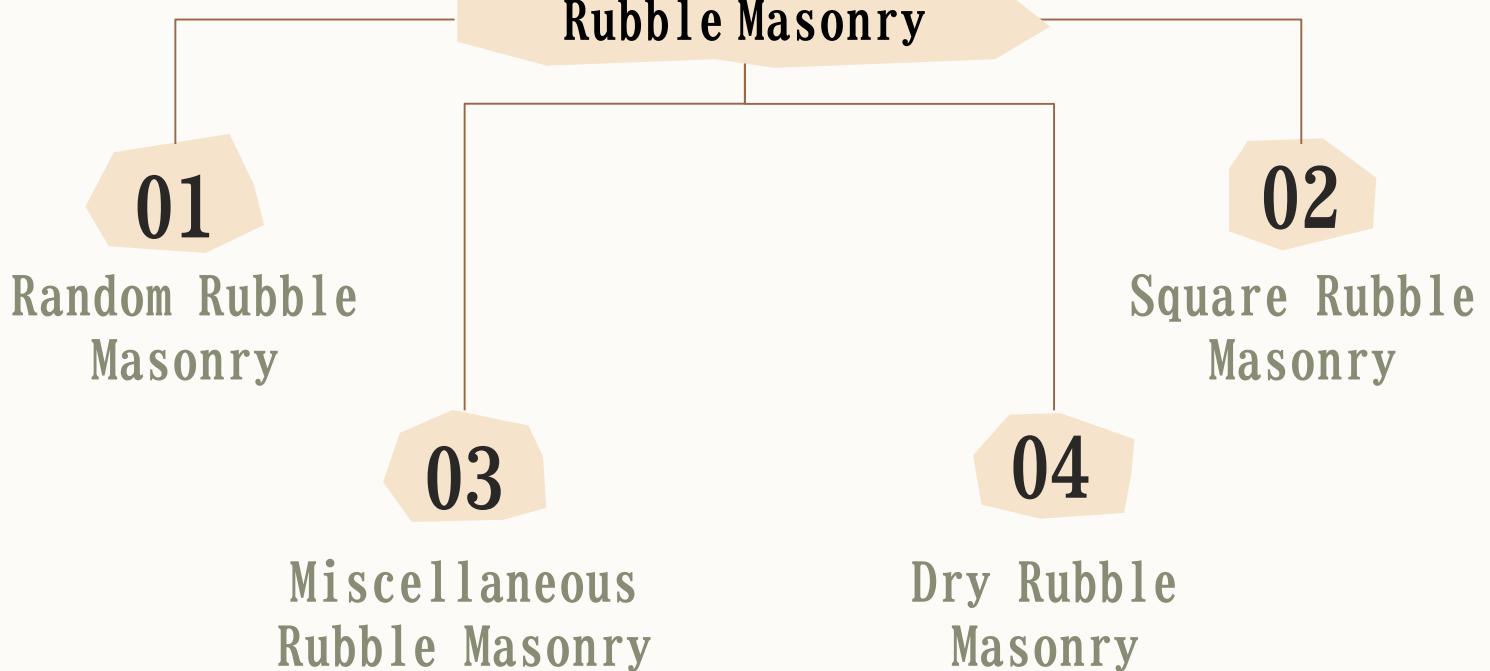
A. Rubble Masonry

The stone masonry in which either roughly dressed or undressed stones are laid in a specified mortar is called rubble masonry. Uniform thickness at the joints is not maintained in this masonry. In this case, the joints are wider.

This type of masonry is used for walls of low height, residential buildings, godowns, boundary walls, hospitals, schools, markets, ordinary buildings in hilly areas etc. This masonry is further divided into various types such as coursed, uncoursed, random, dry, polygonal etc.



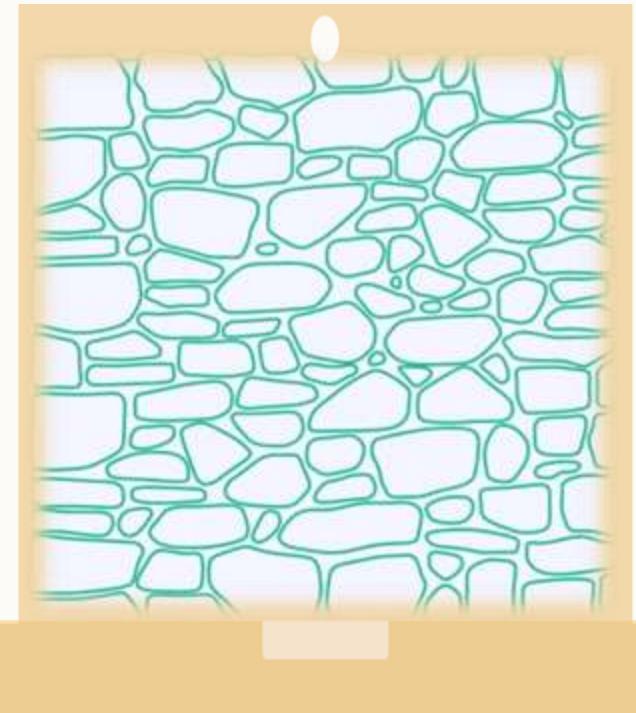
Types of Rubble Masonry



1. Random Rubble Masonry

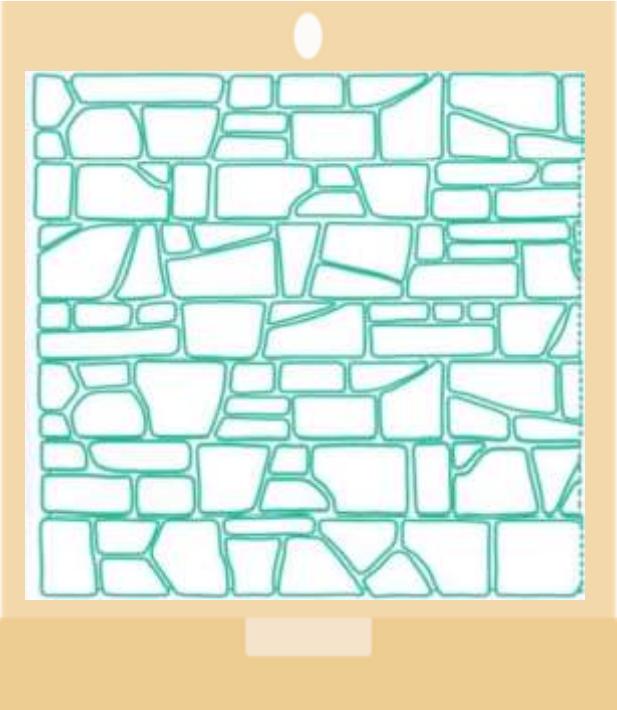
a) Uncoursed Random Rubble Masonry:

- This is the roughest and cheapest form of stone walling.
- Stones used are of widely different sizes.
- Since the stones are not of uniform size and shapes, greater care and ingenuity have to be exercised in arranging them in such a way that they adequately distribute the pressure over the maximum area.
- Long Continuous joints are avoided both transversely and Longitudinally.
- The minimum thickness that can be constructed with great care in ordinary buildings is 225 mm



b) Built to Courses Random Rubble Masonry:

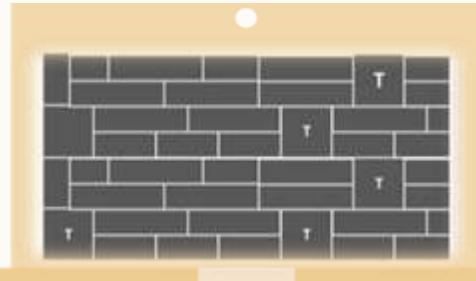
- The Method of construction is the same as above except that the work is roughly levelled up to form course varying from 30 to 45 cm thick.
 - All courses are not of same height .
 - For construction of this type of masonry, Quoins are built first and line is stretched between the top of quoins
 - This type is commonly employed in the construction of public buildings, abutments, residential buildings and piers of ordinary bridges.



2. Square Rubble Masonry

a) Uncoursed Square Rubble Masonry (Square Snecked Rubble):

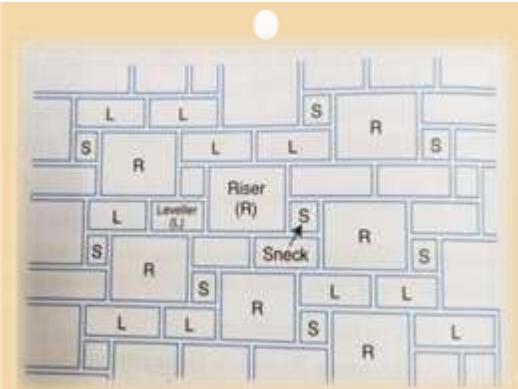
- Square rubble masonry uses stones having straight bed and sides.
- The stones are usually squared and brought to hammer dressed or straight cut finish.
- They are arranged on face in several irregular pattern.
- Good Appearance can be achieved by using > Riser (Large Stone) > Leveller (Thinner Stone) , sneck smaller stones.



b) Built to Course Square Rubble Masonry:

- This type of Masonry also use the same stone as used for uncoursed square rubble.
- But the work is levelled upto course of varying depth.

The courses are of different heights



3. Miscellaneous Rubble Masonry

a) Polygonal Walling:

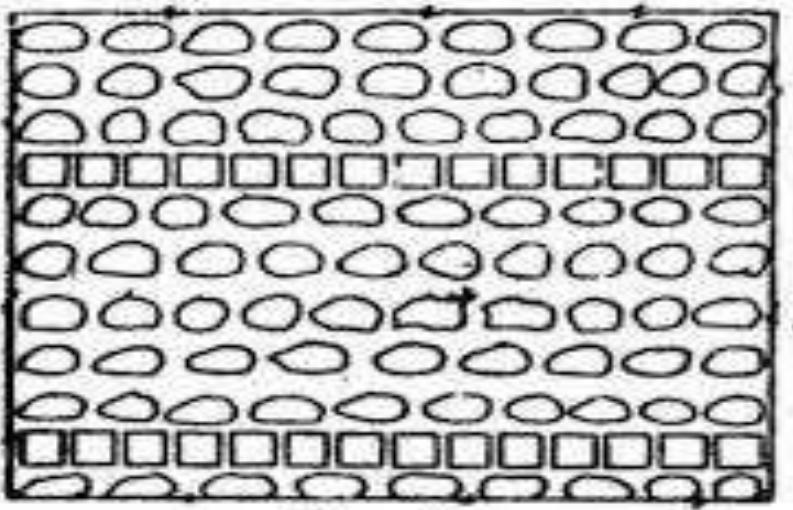
- In this type of masonry, the stones are roughly hammer-pitched into irregular polygonal shapes.
- These stones are embedded in the facing to show the irregularity of face joints in all directions for aesthetic appeal.
- It is mostly similar to Course Rubble Masonry of the first sort.



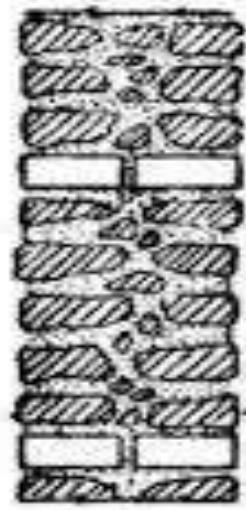
b) Flint Rubble Masonry:

- This type of masonry is generally put to use where flint/cobble is available in abundance.
- These stones are 8–15 cm thick, 15–30 cm long.
- These stones are hard but brittle. They are laid in the facing, either coursed or uncoursed.

NOTE: The brittleness of these stones reduces the strength of this masonry, which is supplemented by placing a Lacing course of thin stones/bricks at 1–2 m intervals in the vertical direction.



Elevation



Section

4. Dry Rubble Masonry

- It is constructed in the form of random rubble masonry without mortar.
 - This is achieved by filling up the hollow spaces around the stones placed by smaller stone pieces and so on until the stones are tightly packed.
 - This is cheaper as the cost of mortar is nullified. But, at the same time, skilled manpower is required to manage the stones alone without mortar.
 - The height of the stone pieces should be, In no case greater than 6 m.

Use:

- Non-load bearing walls- retaining walls
- Pitching of earthen dams & canal slopes



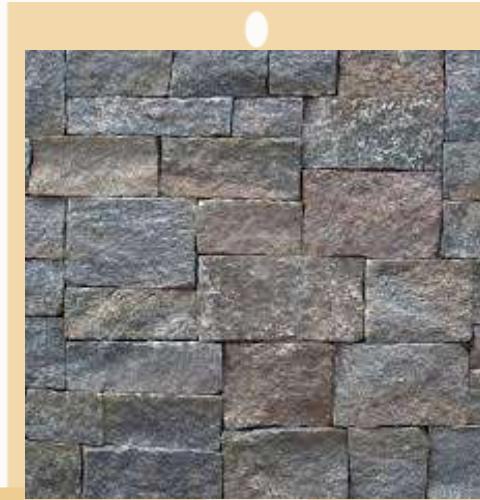
B. Ashlar Masonry

Ashlar masonry is a type of stone masonry which is formed using finely dressed stones of same size, shape, and texture laid together in cement or lime mortar of equal size joints at right angles to each other.

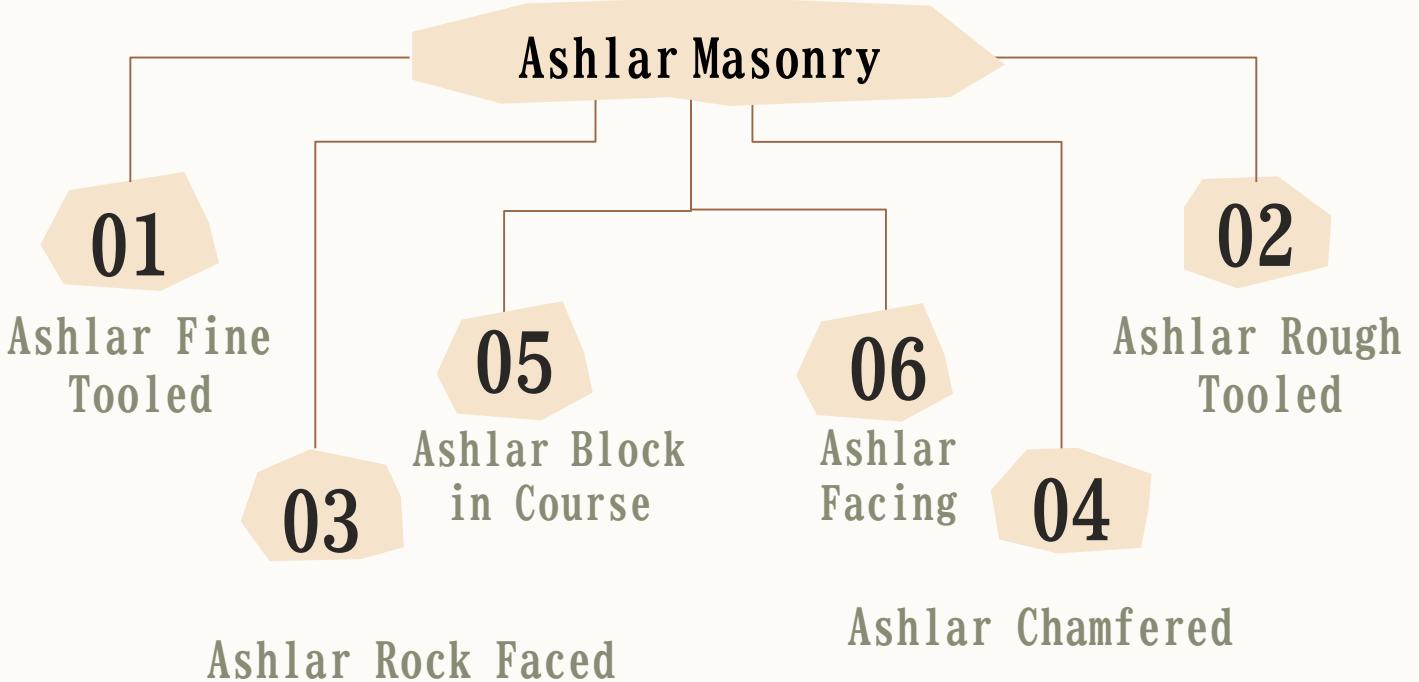
The Height of the stone varies from 25 to 30 cm.

It takes quite a long time to prepare the finely dressed stones and then build with them; furthermore, the process of construction is expensive.

Therefore, it's usually reserved for large imposing structures like • Fortification walls • Castles • Palaces



Types of Ashlar Masonry



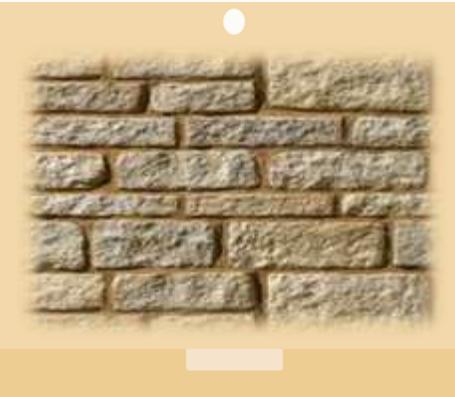
1. Ashlar Fine Tooled (Coursed Ashlar Masonry):

- This is the finest type of stone masonry work.
- The height of the layer does not exceed 30 cm.
- The thickness of the Mortar joints does not exceed 3 mm.
- Masonry has good aesthetics but costly.



2. Ashlar Rough Tooled:

- This types of stone masonry has stone beds and sides chisel-dressed while the surface is rough with a tool.
- The thickness of the mortar joints does not exceed 6 mm.



3. Ashlar Rock Faced (Rustic or Quarry Faced):

- In this types of stone masonry, a 25 mm wide strip is made with chisel on all four sides on the surface visible outside the stone.
- Projection larger than 80 mm on the outer surface are removed with a hammer.
- The height of each block may vary from 15 cm to 30 cm.
- The thickness of mortar joint may be up to 10 mm.



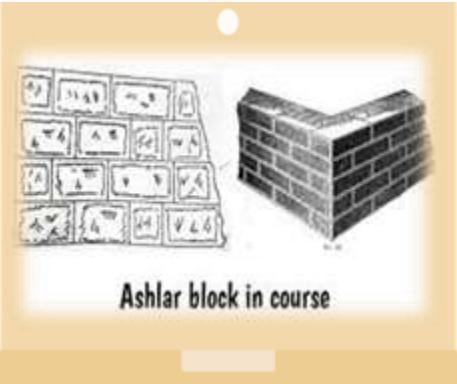
4. Ashlar Chamfered:

- In This types of stone masonry a 25 mm wide strip around the outer surface of the stone is made with chisel.
- The strip is chamfered at an angle of 45 degree to 25 degree to a depth of 25 mm.

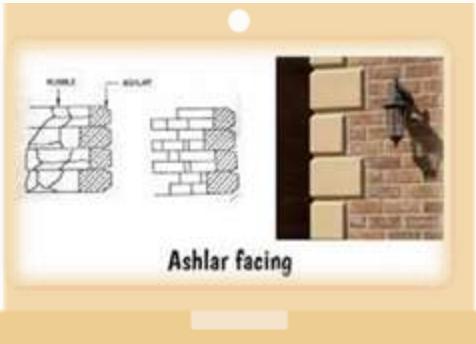


5. Ashlar Block in Course:

- This occupies an intermediate position between rubble masonry and ashlar masonry.
- 1. In this types of stone masonry the thickness of course is 15 cm to 30 cm.
- 2. The stone face is hammer dressed.
- 3. The thickness of the joints should not increase beyond 6 mm.
- 4. This type of masonry is used in heavy engineering constructions like maintenance wall, coastal wall, railway station, bridges etc.



Ashlar block in course



Ashlar facing

6. Ashlar Facing:

- Ashlar facing masonry is provided along with brick or concrete block masonry, to give better appearance.
- The sides and beds of each block are properly dressed so as to make them true to shape.

Questions

Q1:- What is the use of throating in stone masonry?

Ans:- Throating is a groove provided inside the cornice, sill, and coping to prevent water flows with the wall surface and allows it to discharge away from the wall surface. It protects walls from the impact of rainwater.

Q2:- why ashlar masonry expensive than rubble masonry?

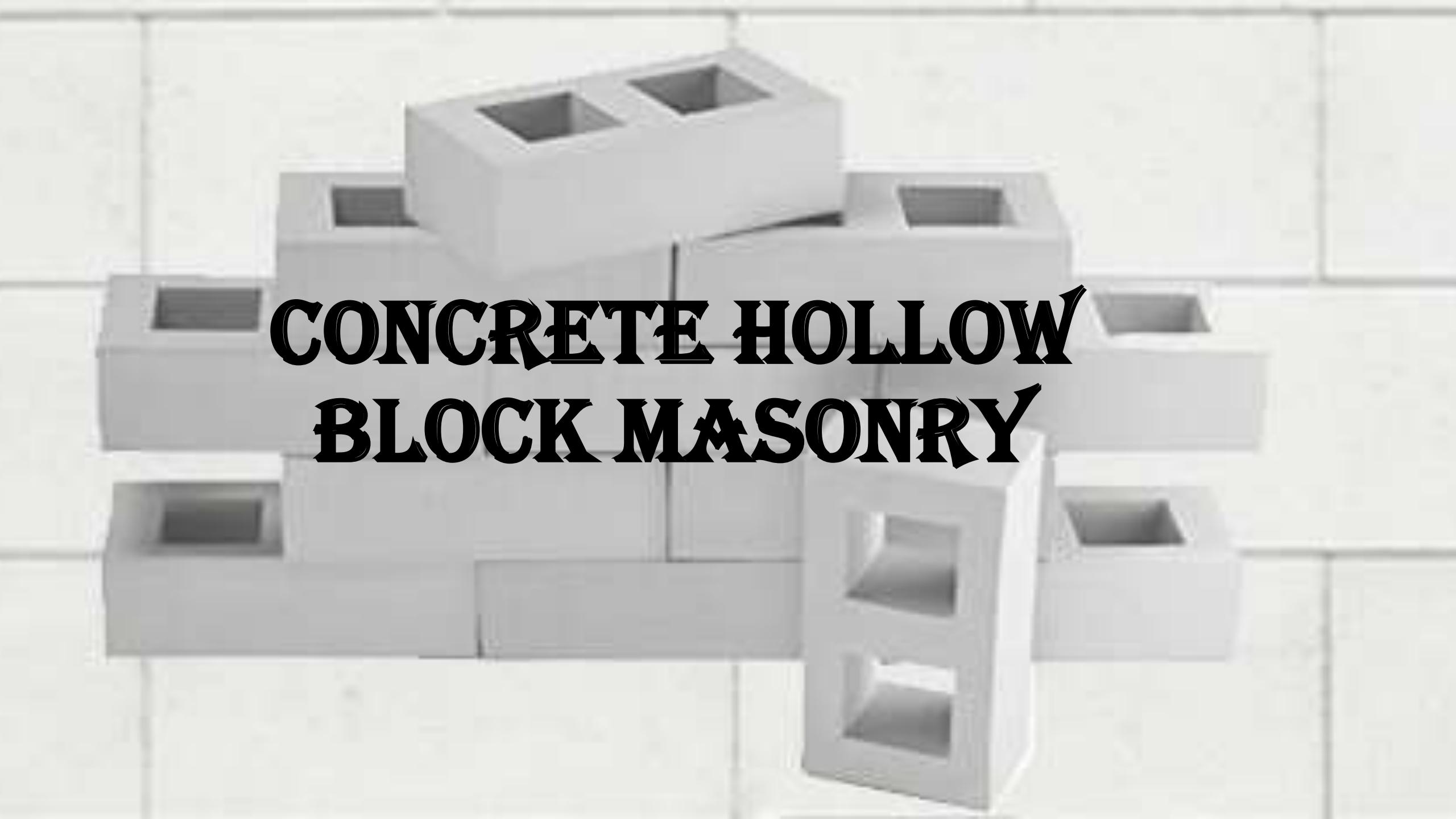
Ans:- It is an expensive type of stone masonry as it requires heavy labor and wastage of material while dressing.



INDEX

- ❖ **Masonry**
- ❖ **Types of Masonry**
- ❖ **Concrete hollow block masonry**
- ❖ **Physical properties**
- ❖ **Manufacturing**
- ❖ **Laying**
- ❖ **Types of hollow concrete blocks**
- ❖ **Advantages and disadvantages**
- ❖ **Applications**





CONCRETE HOLLOW BLOCK MASONRY

INTRODUCTION

Hollow concrete blocks are substitutes for conventional bricks and stones in building construction. They are lighter than bricks, easier to place and also confer economics in cost and consumption of cement. In comparison to conventional bricks, they offer the advantages of uniform quality, faster speed of construction, lower labour involvement and longer durability. In view of these advantages, hollow concrete blocks are being increasingly used in construction activities.



PHYSICAL PROPERTIES

Hollow concrete blocks come in three grades:

Density :-

- Grade A has a minimum density of $1,500 \text{ kg/m}^3$
- Grade B has a density of less than $1,100 \text{ kg/m}^3$ to 1500 kg/m^3 .

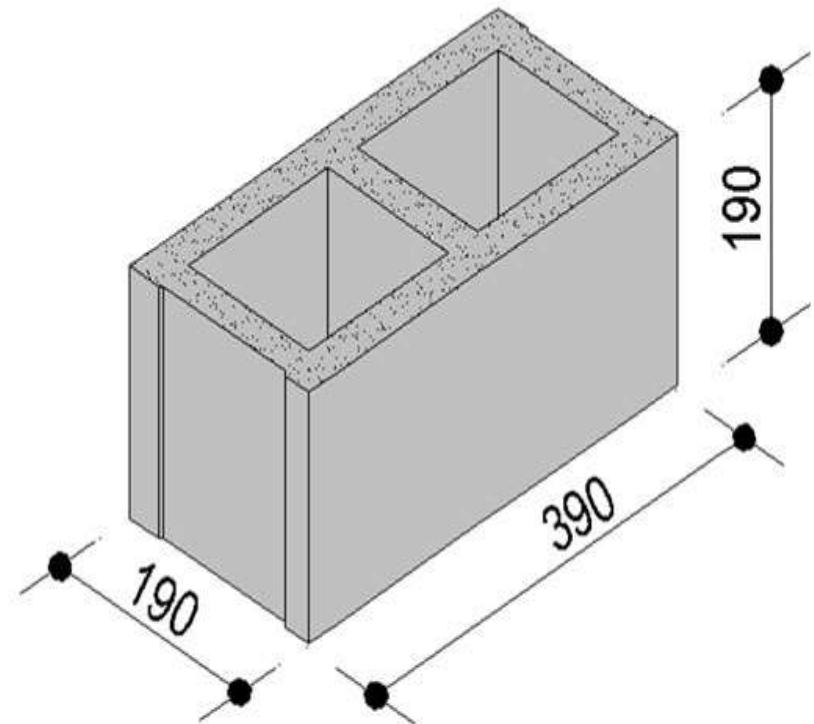
Compressive Strength :-

- **For Grade A :** 3.5 to 15.0 N/mm^2
- **For Grade B:** 3.5 and 5.0 N/mm^2

Moisture Movement: Not more than 0.09%

Water Absorption: Not more than 10%

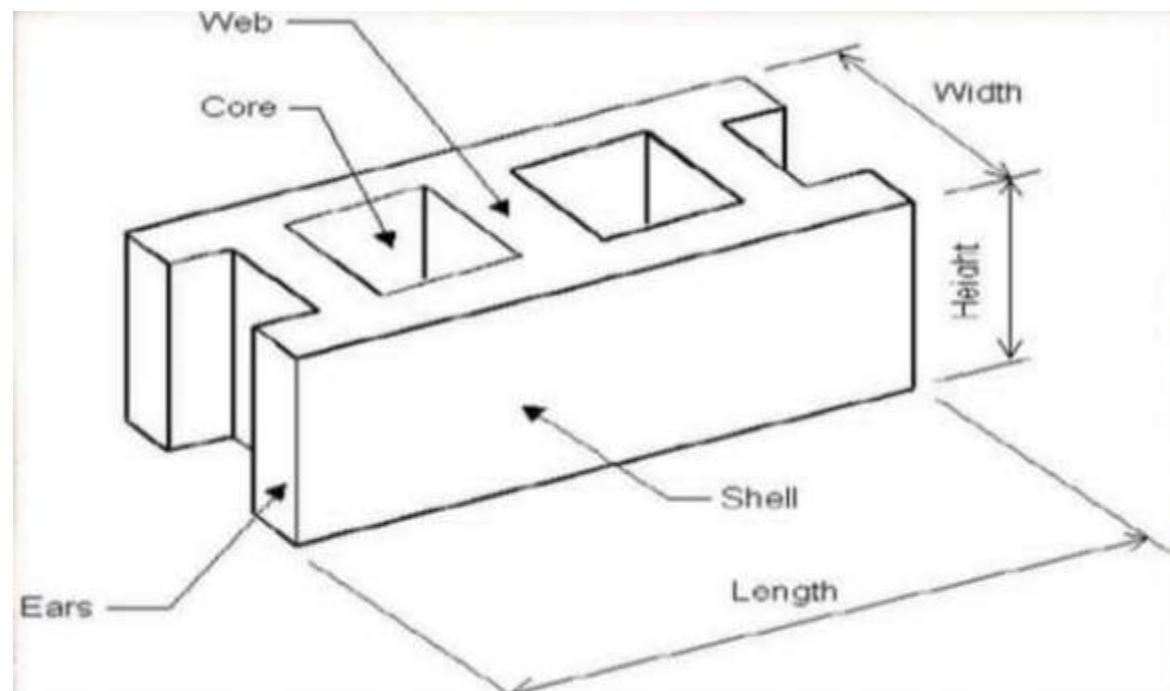
Drying Shrinkage: Not more than 0.06%



MANUFACTURING

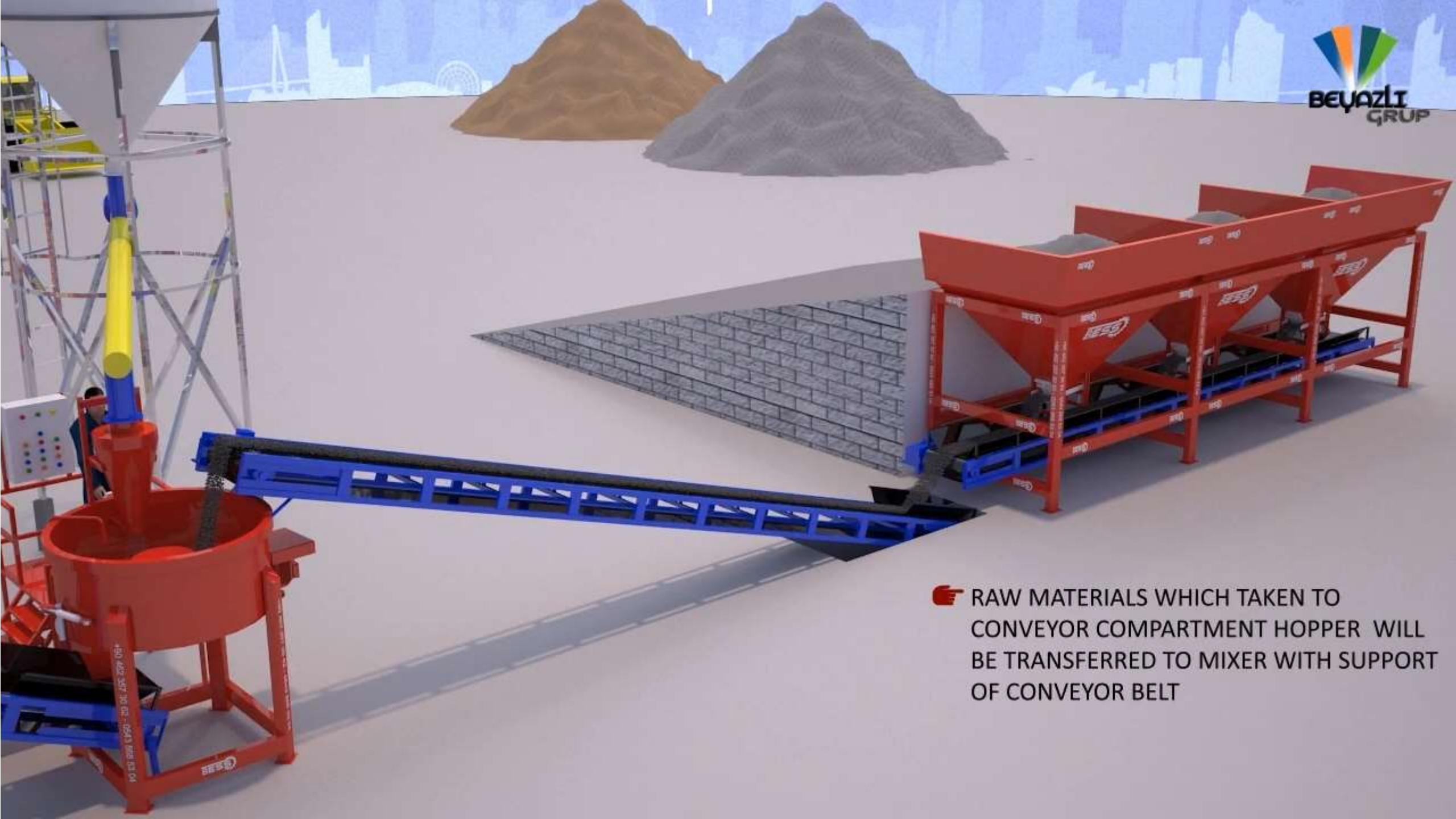
- The process of manufacture of cement concrete hollow blocks involves the Following stages :-

1. Proportioning
2. Mixing
3. Molding
4. Curing





RAW MATERIAL WHICH NEEDS FOR
PRODUCTION FILLS IN THE HOPPER PARTS
(HOLDING HOPPER CAN BE PREFERRED ON LOCATIONS
WHERE ARE NOT SUITABLE FOR AGGREGATE HOPPER RAMP
OR WHERE THE PLANT CAN BE RELOCATED)



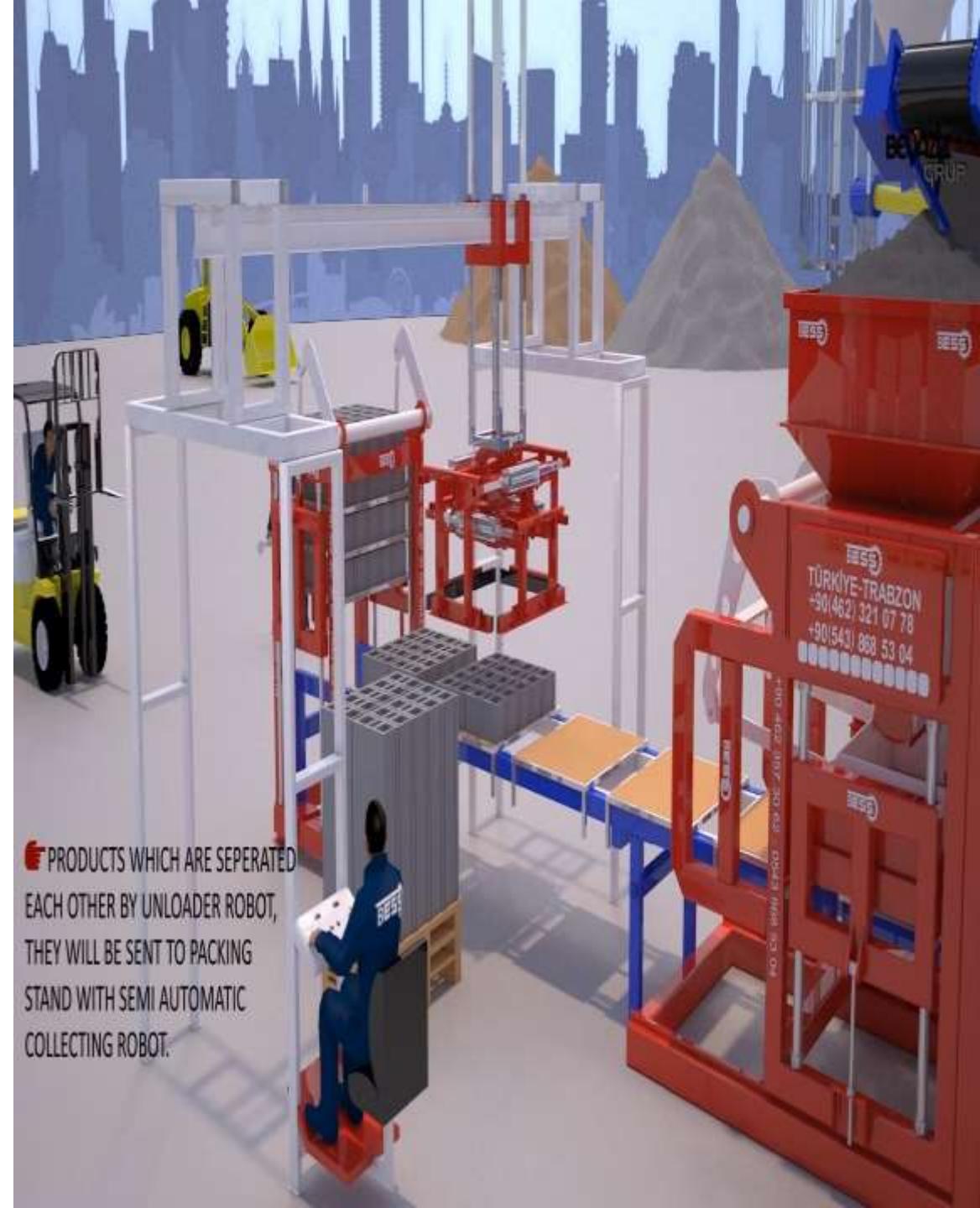
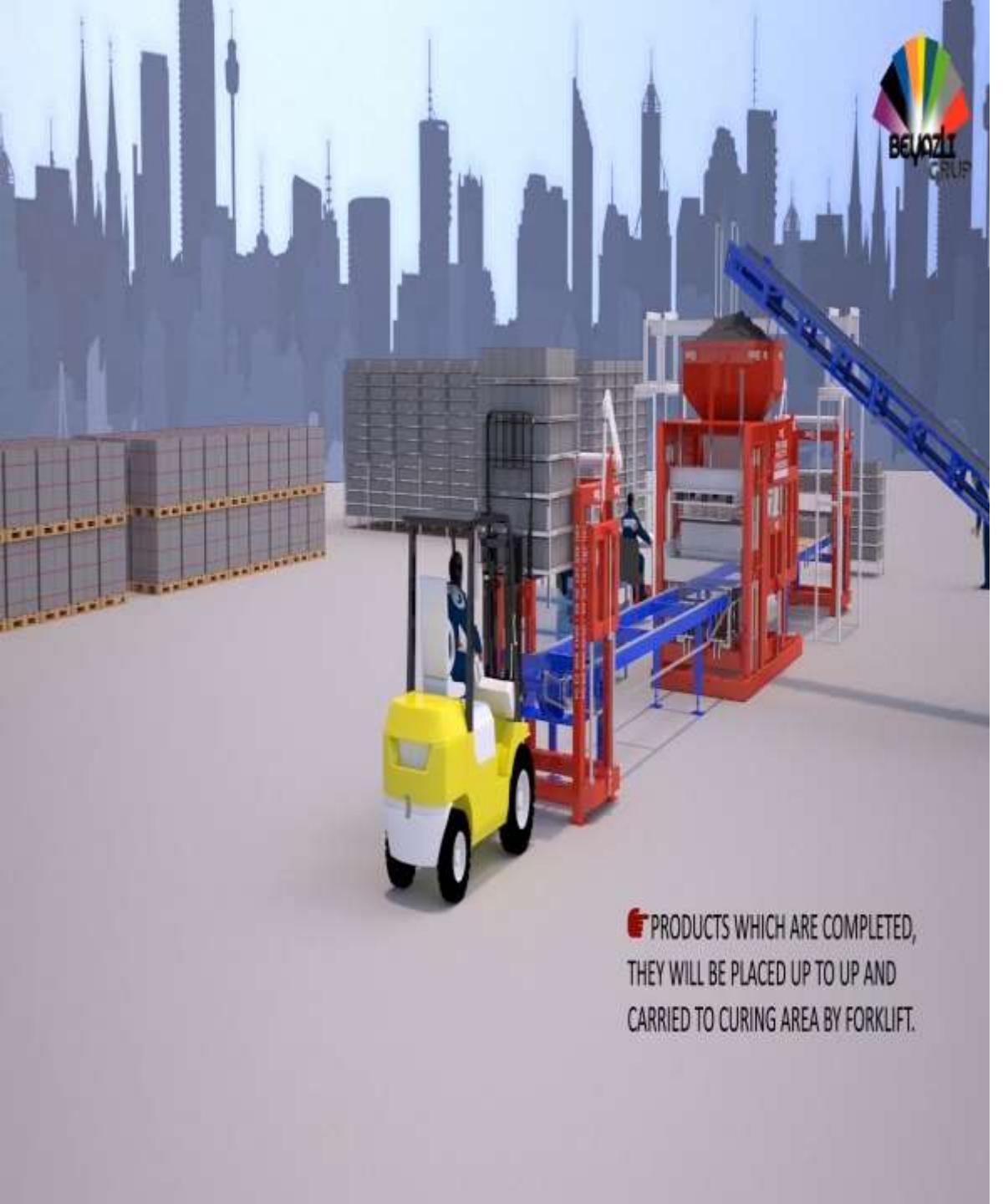
➡ RAW MATERIALS WHICH TAKEN TO CONVEYOR COMPARTMENT HOPPER WILL BE TRANSFERRED TO MIXER WITH SUPPORT OF CONVEYOR BELT



👉 OPENING THE COVER OF MIXER,
PREPARED MORTAR WILL BE
TRANSFERRED TO COARSE
GROUT HOPPER OF MACHINE
WITH CONVEYOR BELT.



MACHINE CAN BE
COMPLETED THE PRESS
WHICH IS TAKEN EMPTY
PALLETS COME FROM
PALLET UNLOADER ROBOT
AND SENT LOADER ROBOT.



GLOBMAC
GLOBAL CONCRETE



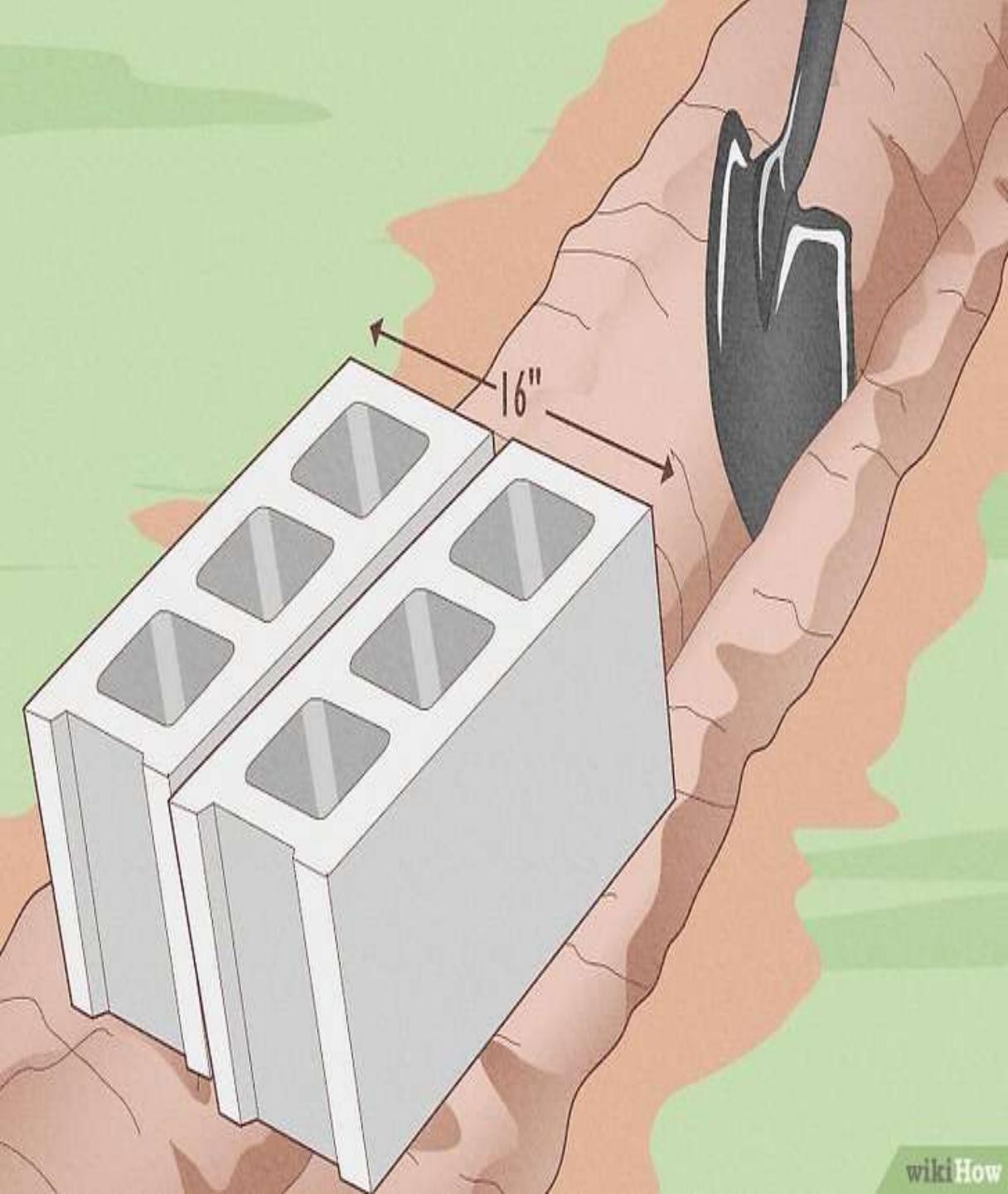
How To Lay Concrete Block



1.

Dig below the frost line.

- The footing is the solid concrete perimeter that your concrete blocks will sit on. Then dig beneath that line to start your footing. Be sure you're not going to dig through a utility line as you start your project.
- Your local building codes may also specify how deep the footing needs to go. Typically, you need to make your footing twice as deep as the thickness of the wall.



2.

Make your footing twice as wide as your concrete blocks.

If you're using standard blocks, which are 20 cm, make your footing at least 16 in 41 cm wide. Dig the perimeter where your concrete wall is going to go that's at least twice as wide as your blocks. To ensure you're digging in a straight line, snap a chalk line onto the ground to create your base shape.



3.

Place 2"x4" in the hole to keep the concrete in place.

- Grab 2"x4" and place them inside of the hole that you dug for the footing. Use the 2"x4" around the perimeter as a guide to hold the concrete in place while it dries.
- Make sure that the 2"x4" are flush with the top of the hole that you dug. That way, the concrete won't spill out of the top.



4.

Pour the base concrete.

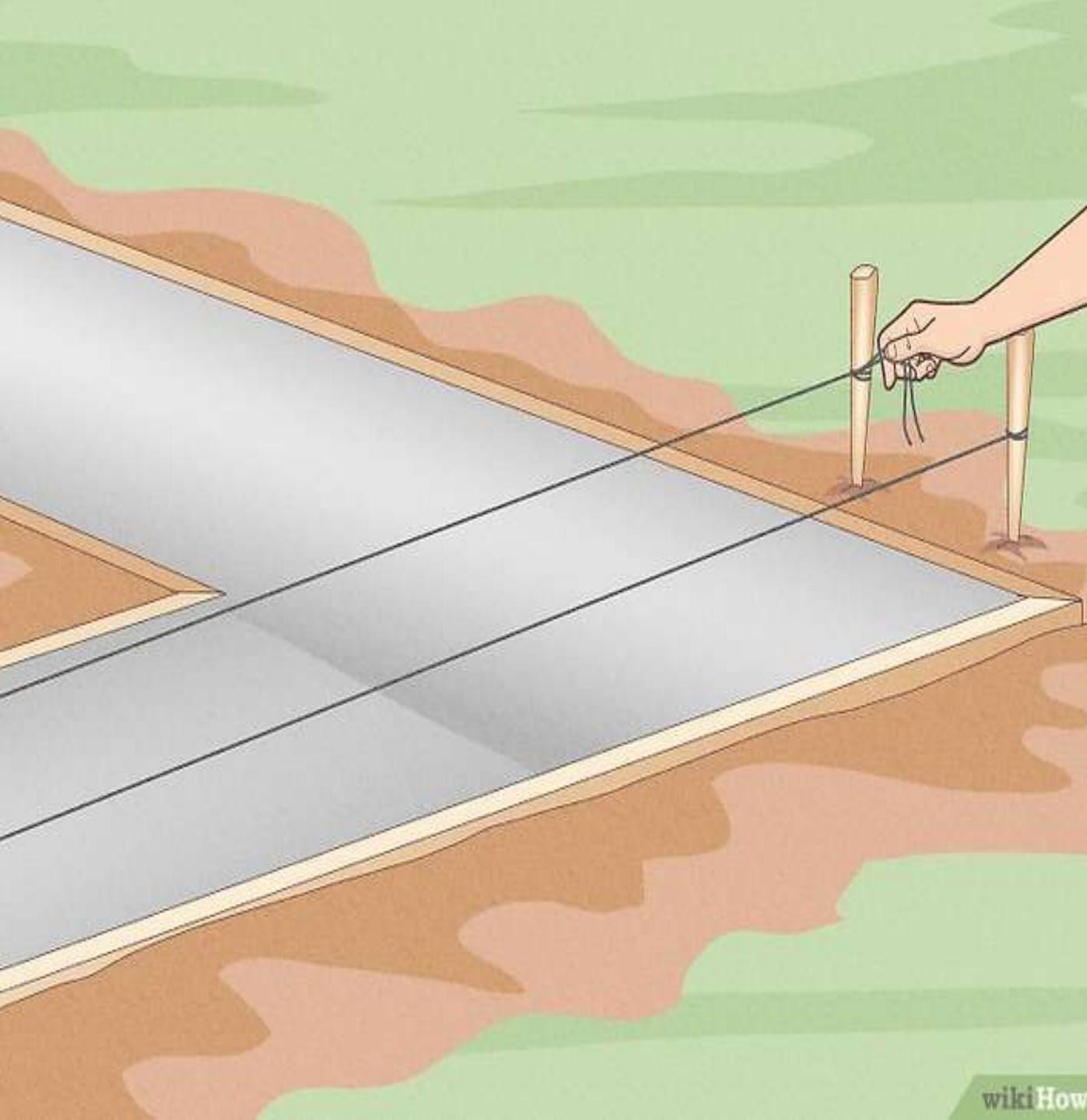
Mix a batch of concrete in a wheelbarrow with a shovel. Fill the frame that you just dug up to the edge. Level the freshly poured concrete by running a 2"x4" across the top, and fill any spots that are low with additional concrete. For a large retaining wall, consider renting or hiring a concrete mixing truck to come and pour the concrete for you.



5.

Wait 3 days for the footing to dry.

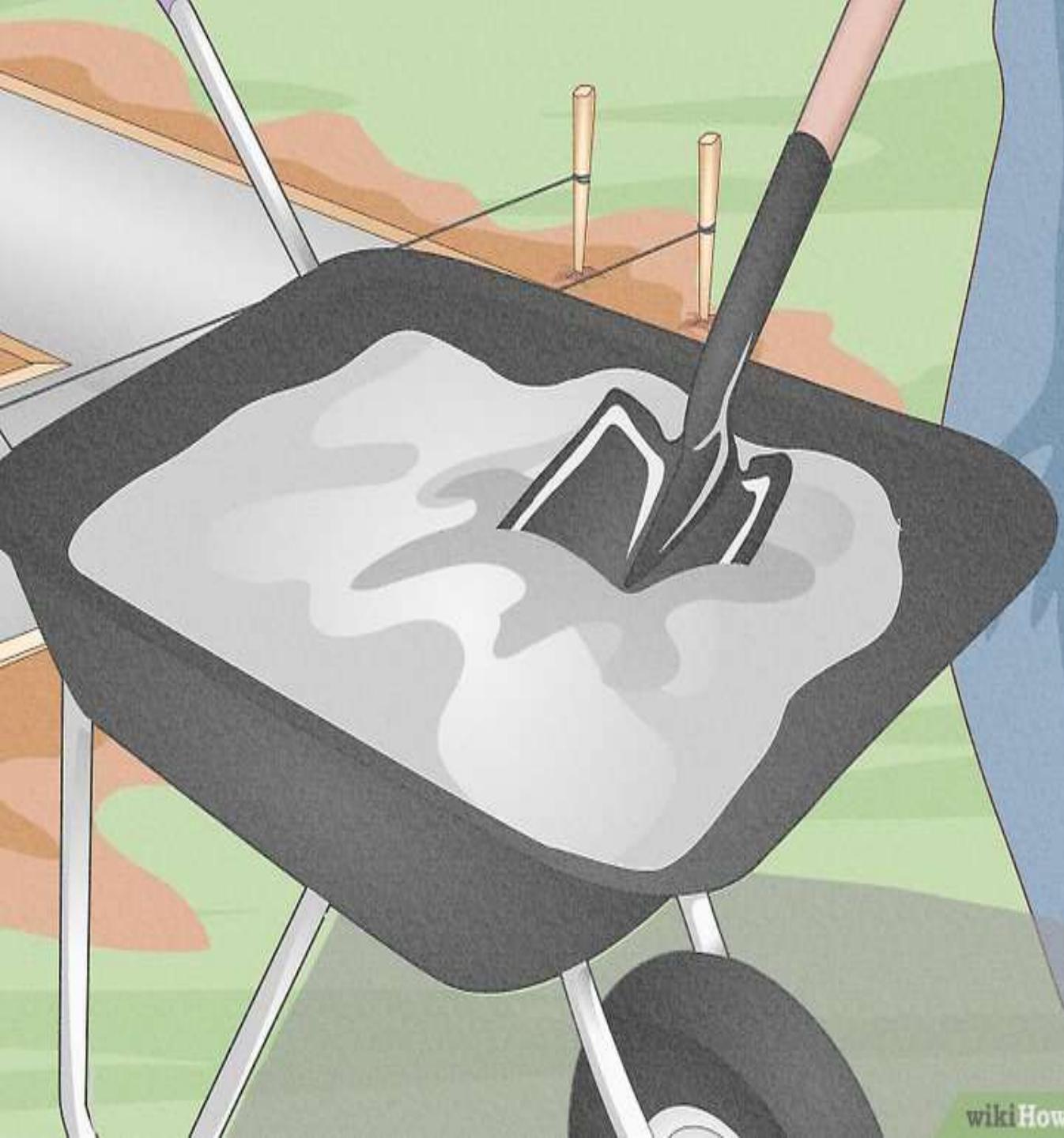
Before you can begin building, you'll need to give the concrete ample time to dry. Building on wet concrete can lead to sagging, and your concrete wall may not be as sturdy as it needs to be.



6.

Section off the corners with wooden stakes.

Before you begin laying the blocks, visualize all the corners of your frame. Place a wooden stake in each corner, and use a cord or string to tie off exactly where the corners' edges will be. Attach a cord or string to the wooden stake used to mark the corners and lay out a perimeter.



7. **Mix cement mortar with water.**

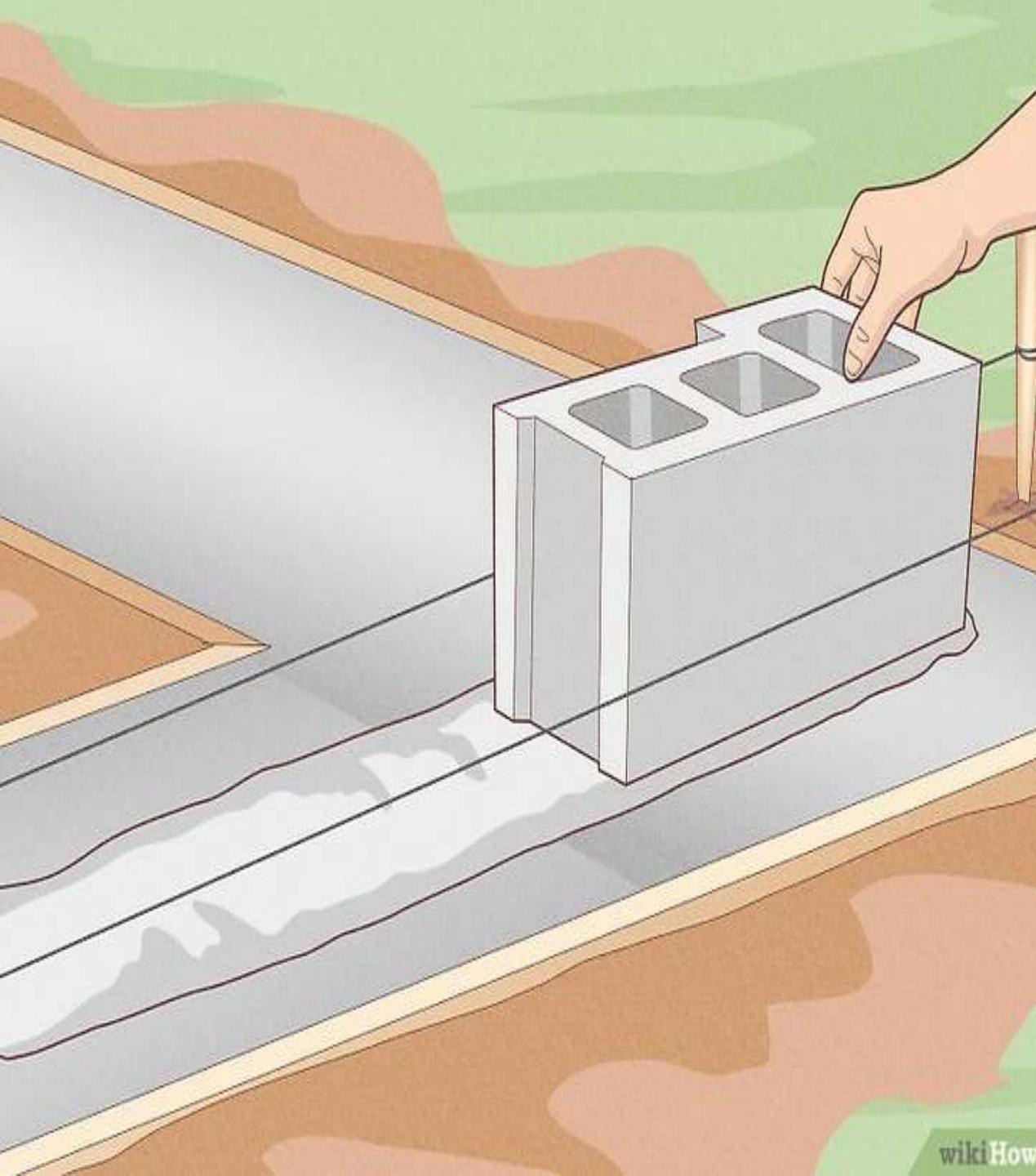
Take the bag of dried concrete, and look at the bag's specifications to find the ratio of mortar to water. Use a 5-gallon bucket or a wheelbarrow to mix the mortar with a shovel until it's thick and paste-like



8.

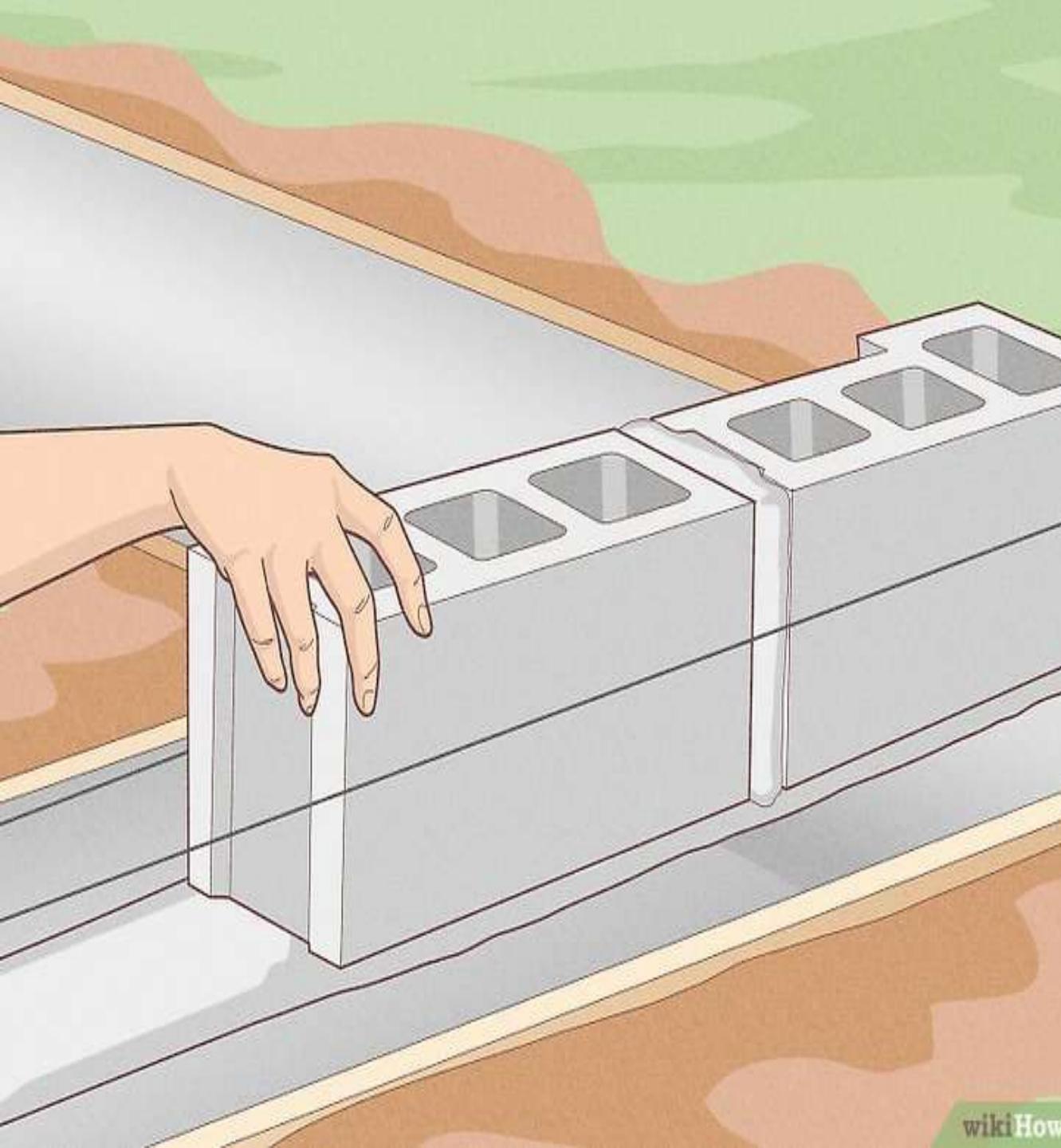
Spread the mortar along 1 corner of the footing

- Use your trowel to spread a few slabs of mortar around the corner's base of the footing. Spread the mortar 1 in (2.5 cm) deep and 8 in (20 cm) wide in the marked area. Continue to spread the mortar to account for the distance of about 3 to 4 blocks.
- You may notice that the mortar falls off your trowel quickly, which can be frustrating. To keep it contained, scoop mortar up with your trowel, then tap the flat side of the trowel onto a flat surface. The remaining mortar will be thin and stick to the trowel until you're ready to apply it.



9. **Center the corner block on the footing.**

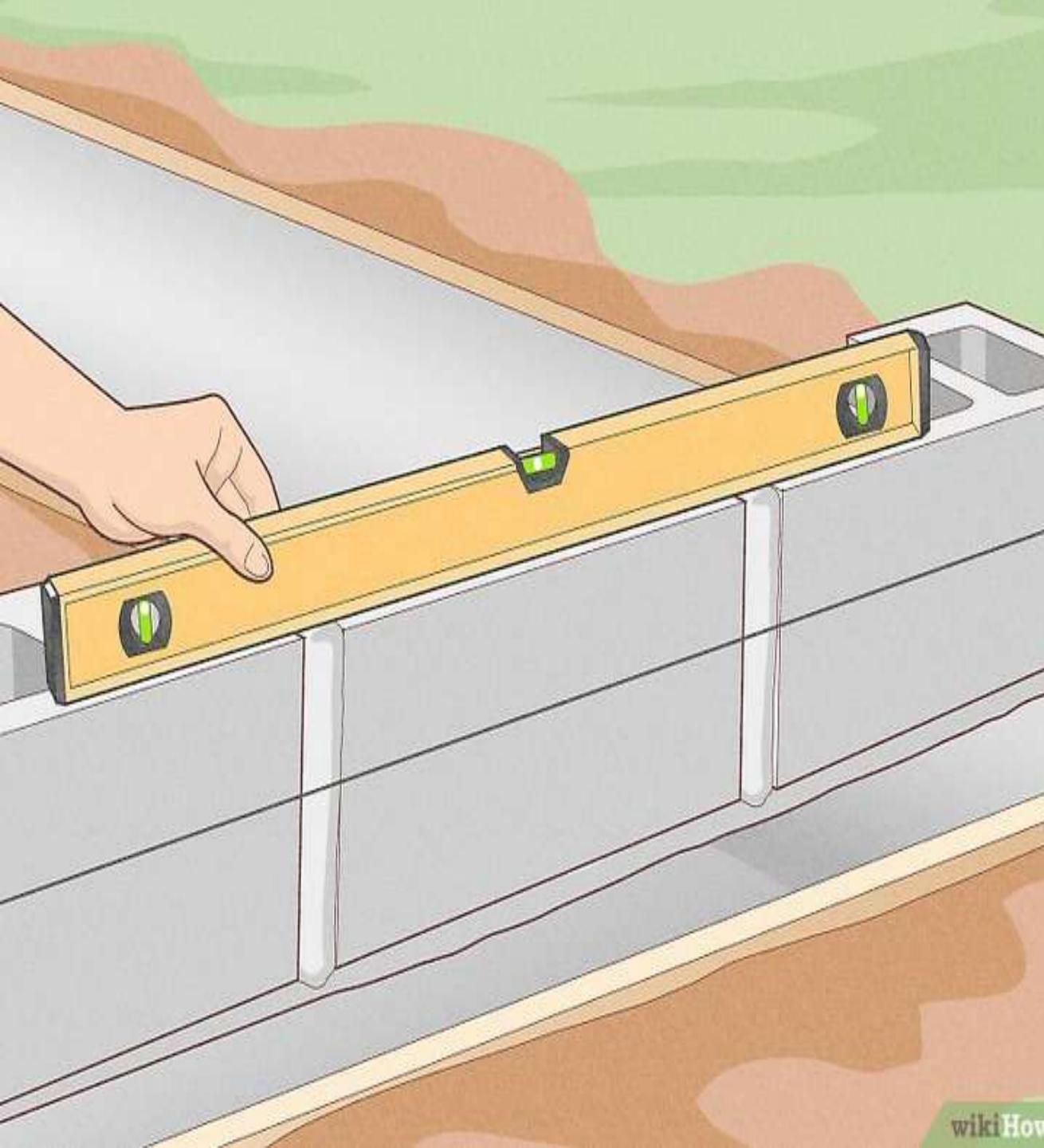
- Stand over the footing and gently set the concrete block down, making sure it's level and flat. Center the corner block in the footing by measuring around the block and making sure it's even.
- Use your string to make sure your corner block is level and in a straight line.



10.

Use your string to make sure your corner block is level and in a straight line

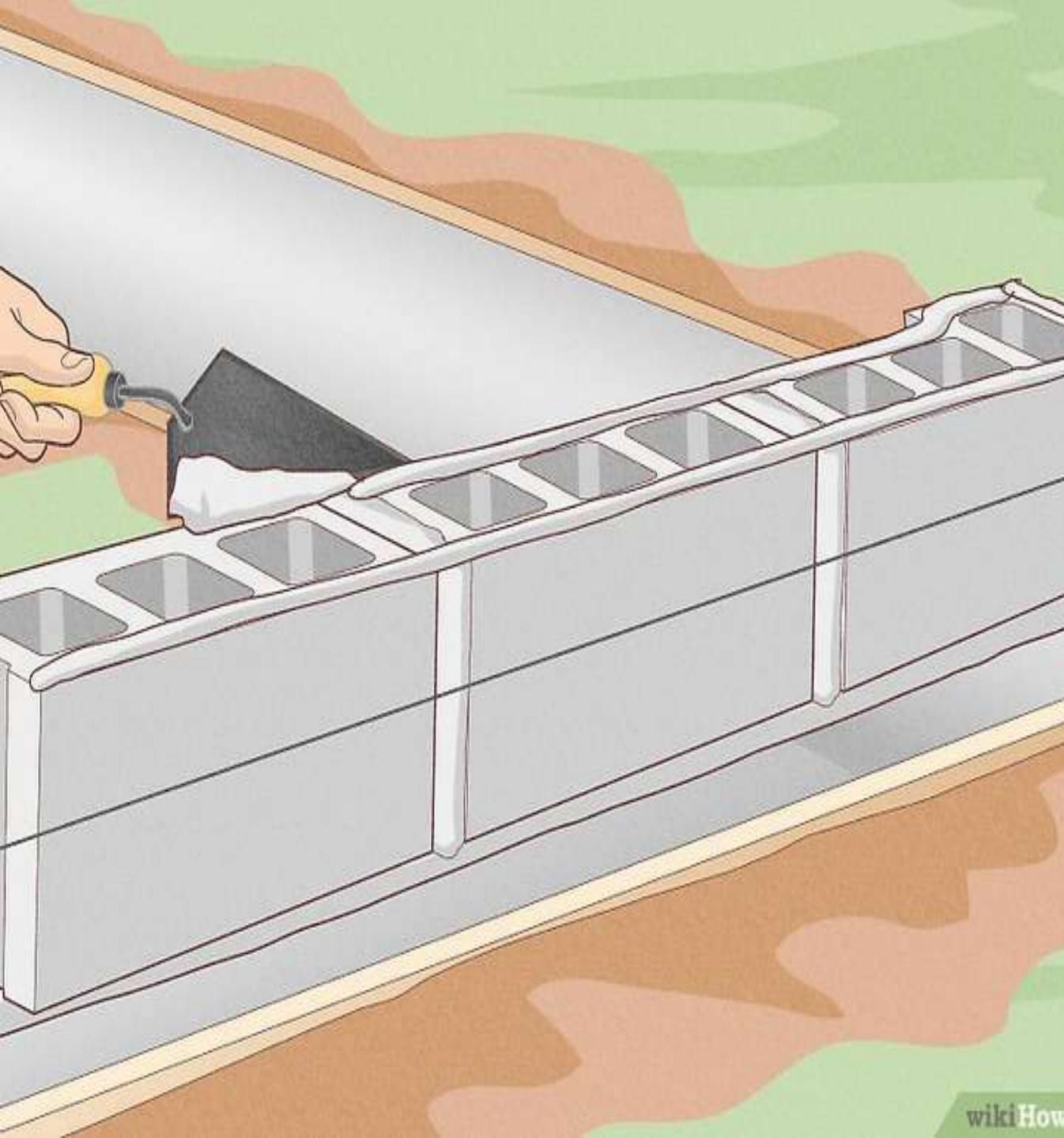
- Start laying blocks from the corner or edge of the wall to work in one direction. Apply a 1 in (2.5 cm) thick layer of mortar to the sides of each block as you go. Keep laying blocks and applying mortar until you reach the next corner.
- Apply mortar at the end of the block before you place the block adjacent to it.



11.

Check the alignment of the blocks with a level.

- Before stacking more concrete blocks on top of your initial foundation, check if everything is aligned. Use your mason's level by laying it on the first set of blocks. Check both the outside and center section of the bricks. Tap the blocks for any alignment adjustments while the mortar is still wet.
- Do not try to move a block after the concrete has set, since that could make your wall unstable.



12.

Apply mortar to the top of the blocks.

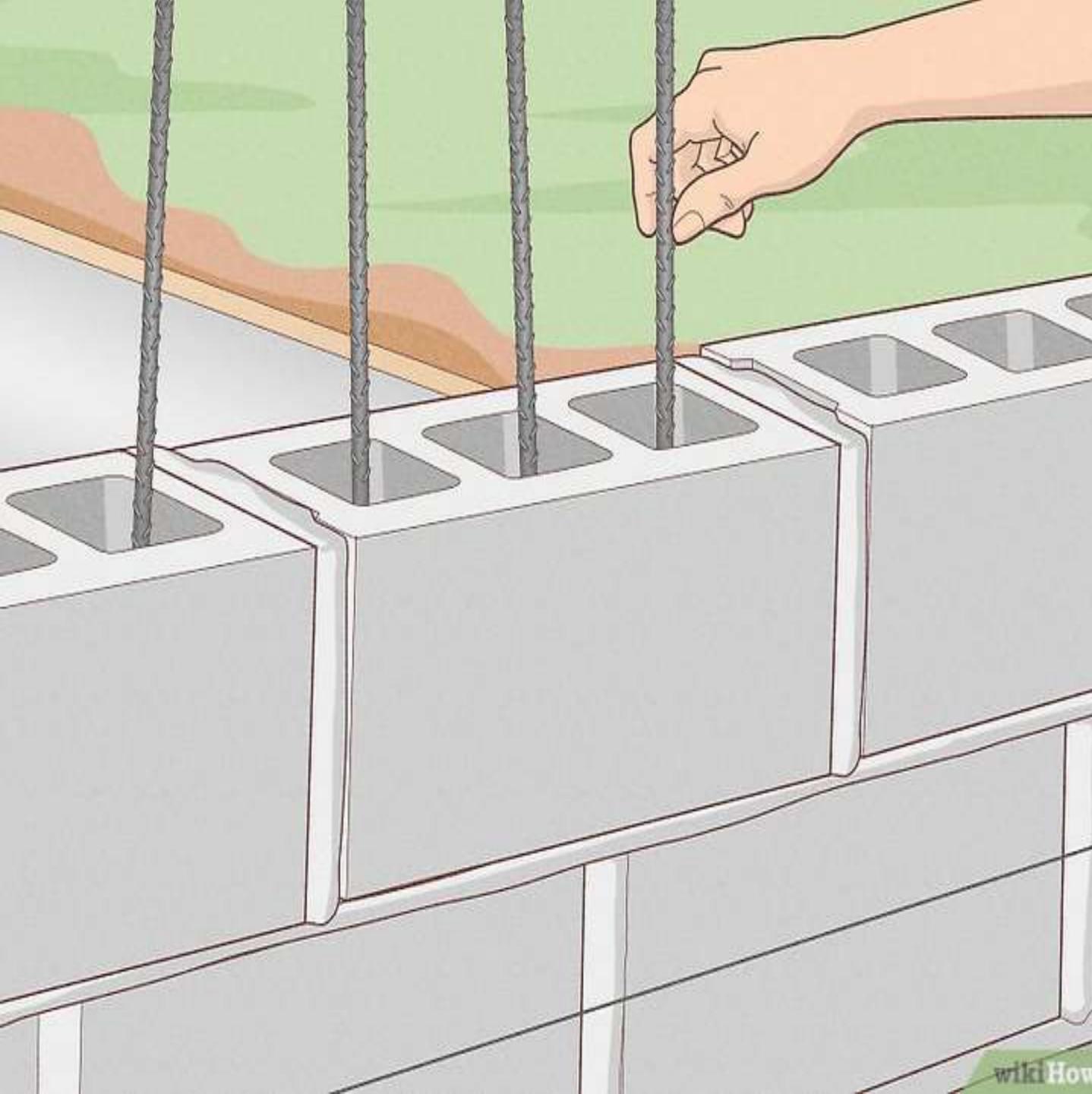
- Use your trowel to spread 1 in (2.5 cm) of mortar over the entire width of the block. Then, spread the mortar so it covers the length of about 3 blocks in the direction that you are laying the bricks.
- Keep the mortar on the sides of the blocks so that it doesn't fall into the hollow center. It won't hurt your retaining wall, but it will just waste your mortar.



13.

Stack the blocks on top of each other.

- Lay the block down on top so the edge of the top block aligns with the halfway mark of the bottom block. You'll recognize the pattern as a standard among the construction sites. The top block will fit in between 2 bottom blocks.
- Use a level every 2 to 3 layers to ensure your wall is flat. If not, remove bricks from the uneven layer and try again.



14.

Add reinforcement rods for high walls.

- If you're building a house or a large shed, consider adding reinforcements. You can also use reinforcements if the ground pressure on the site is not stable. Place the 1/4" steel reinforcement rods into each opening of the concrete blocks.



15.

Strike the mortar joints.

- The mortar joints are the spaces between the bricks that are filled with mortar. Once the mortar mix has set enough so you can leave a thumbprint in it, run a concave jointing tool along each joint to remove the excess mortar. Start with the horizontal joints, then move to the vertical joints.
- For best results, move across each joint 2 times, and keep your tool wet.



16.

Wait 24 hours for the mortar mix to cure.

- Mortar mix will start drying within 20 to 40 minutes, but it's best to wait at least 24 hours before adding anything on top of your walls. After 1 day or so, the mortar mix will be mostly cured, and it will be strong enough to support other construction materials.
- Mortar mix can take up to 28 days to reach its full cured strength.

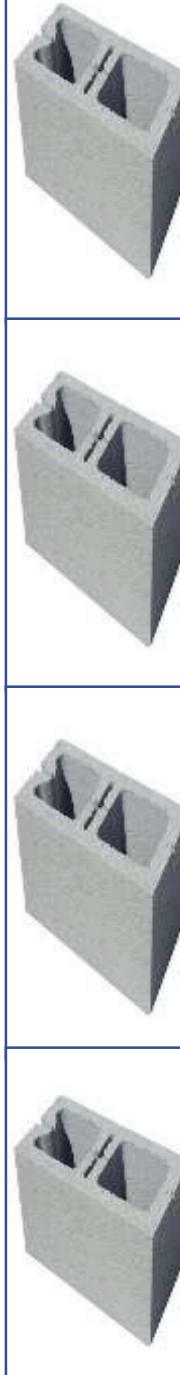
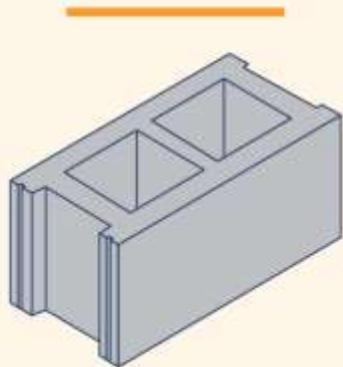
TYPES OF HOLLOW CONCRETE BLOCKS

- Stretcher block
- Corner block
- Pillar block
- Jamb block
- Partition block
- Lintel block
- Frogged brick block
- Bull nose block

STRETCHER BLOCKS

- These hollow blocks are widely used in construction. The blocks are used to join the corner of masonry units. These blocks are placed with their length parallel to the face of the wall.

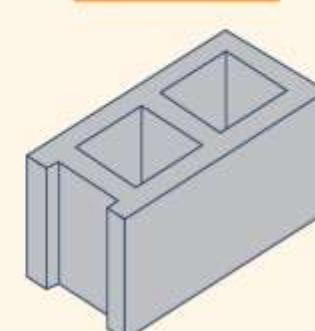
STRETCHER BLOCK



CORNER BLOCKS

- These blocks are used in corners of masonry at the end of the window or at the door opening. One corner of the block is plain and the other is stretcher design. The blocks are arranged that the plane end of the block is at the outside and another end is locked with a stretcher block.

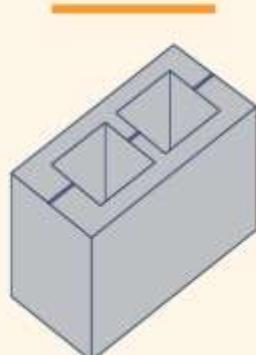
CORNER BLOCK



PILLAR BLOCKS

- These blocks are also known as double corner block as both of its corners are plain. The blocks used when two ends of the corner are visible. As of its name, it is widely used in pillars or piers

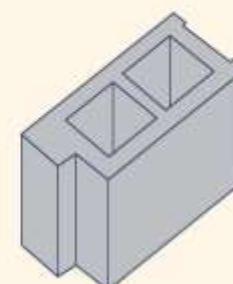
PILLAR BLOCK



JAMB BLOCKS

This block is used when the elaborated window opening in the wall. It is connected to the stretcher and corner of the block. These blocks provide space for the casing member of the window.

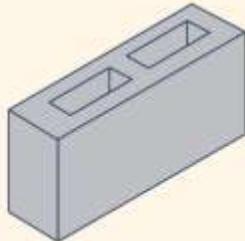
JAMB BLOCK



PARTITION BLOCKS

- These blocks are ideal for partition wall construction. The hollow part of the blocks is divided into two or three components. The height of the partition block is larger than its breadth.

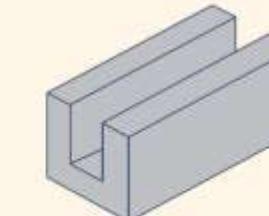
PARTITION BLOCK



LINTEL BLOCK

- The lintel blocks are called channelled blocks or beam blocks. This is a U-shaped concrete masonry unit. The blocks have a deep groove with a length of the block. After placing the blocks this groove-filled with concrete with reinforcement. These blocks are used at top of the portion of doors and windows as it transfers the load comes from the top.

LINTEL BLOCK



FROGGED BRICK BLOCKS

- Like the frogged brick these frogged brick blocks have a frog on the top with a header and stretcher. This frog helps the blocks to hold mortar and develop a strong bond with the top lying block.

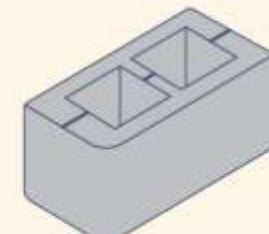
Frogged Brick Blocks



BULL NOSE CONCRETE BLOCKS

These bull nose concrete blocks are similar to corner blocks in structure and function. When the round edges are required these blocks are used.

BULLNOSE BLOCK



ADVANTAGES

Highly durable : - One of the major advantages of is their high durability. It is because of hollow concrete blocks their manufacturing process; they are produced with vibration and high pressure. This makes it very strong; it can withstand a high level of loading. Cement also makes it resistant to fire. These blocks are produced with hollow block making machines.



HIGH RESISTANCE OF HOLLOW CONCRETE BLOCKS AGAINST EARTHQUAKE:

- It is because of their lightweight compared to other materials used in buildings. It reduces the total weight of the building and makes the building resilient to natural hazards and earthquakes.



SPEEDY CONSTRUCTION

- The Uniform shape and size of hollow cement blocks enable you to install them easier. It doesn't require any special skills to work with them. Even unskilled laborers can work with hollow blocks.



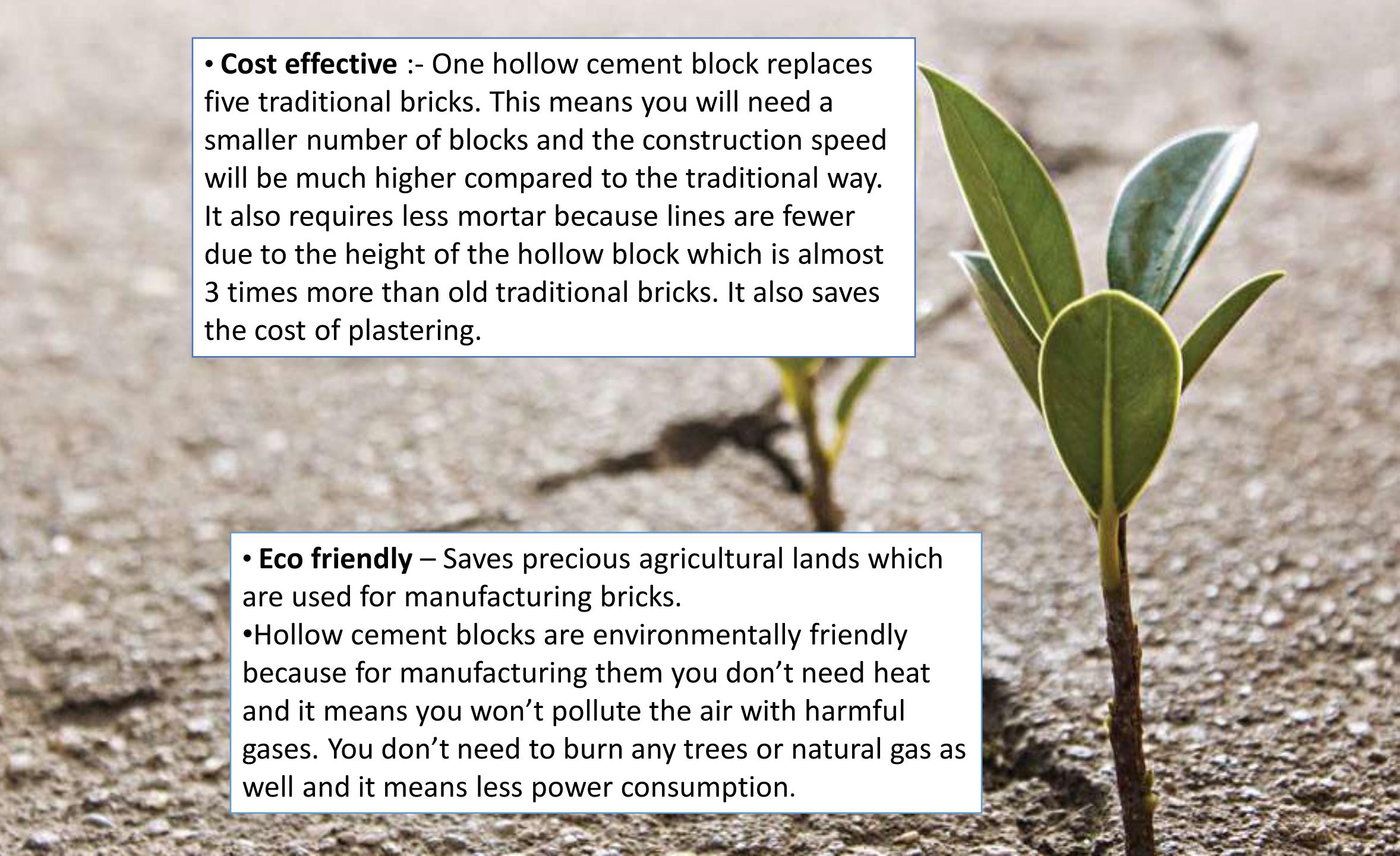
COMFORTABLE INTERIORS

- Due to the thermal insulation of a hollow concrete block, it keeps your home cool in summer and hot in the winter season. Hollow cement blocks are also soundproof or at least it keeps the sound between their walls due to their hollow nature.





- **Cost effective** :- One hollow cement block replaces five traditional bricks. This means you will need a smaller number of blocks and the construction speed will be much higher compared to the traditional way. It also requires less mortar because lines are fewer due to the height of the hollow block which is almost 3 times more than old traditional bricks. It also saves the cost of plastering.



- **Eco friendly** – Saves precious agricultural lands which are used for manufacturing bricks.
- Hollow cement blocks are environmentally friendly because for manufacturing them you don't need heat and it means you won't pollute the air with harmful gases. You don't need to burn any trees or natural gas as well and it means less power consumption.



DISADVANTAGES



- Concrete has a high compressive strength but low tensile strength.
- The cost of these blocks is higher than the conventional bricks.
- The structure built with hollow blocks without any interior reinforcement may damage in earthquake.
- It is really risky to hang large things on walls like this.
- The compressive strength and load-bearing capacity of hollow bricks are much lower than first-class clay bricks. Hence they can not be used in the large load-bearing structure. They are also not recommended in earthquake-prone areas.
- The density of these bricks is also much lower than solid bricks. Therefore they are not suitable for foundation and base-slab works or where the groundwater table is high as they can not resist the negative pressure of water and capillary action.



APPLICATION OF HOLLOW CONCRETE BLOCKS



- It is used in partition walls and panel walls.
- It is also used in curtain walls.
- It is used in construction of boundary walls.
- It is also used for architectural decoration.
- It is also used on rooftop for heat protection.
- It is used as retaining walls.
- It is also used as fire safe walls.