



ECO-FRIENDLY AUTOCLAVED AERATED CONCRETE (AAC) BLOCK USER MANUAL

1ST EDITION
MARCH 2023



HOUSING AND BUILDING RESEARCH INSTITUTE (HBRI)
MINISTRY OF HOUSING AND PUBLIC WORKS

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Design Consideration for AAC Block Wall

The following are key design considerations for AAC block walls:

- **Design Flexibility**

AAC blocks are lightweight, allowing for design flexibility by providing walls that are independent of beams.

- **Foundation, Columns & Beam**

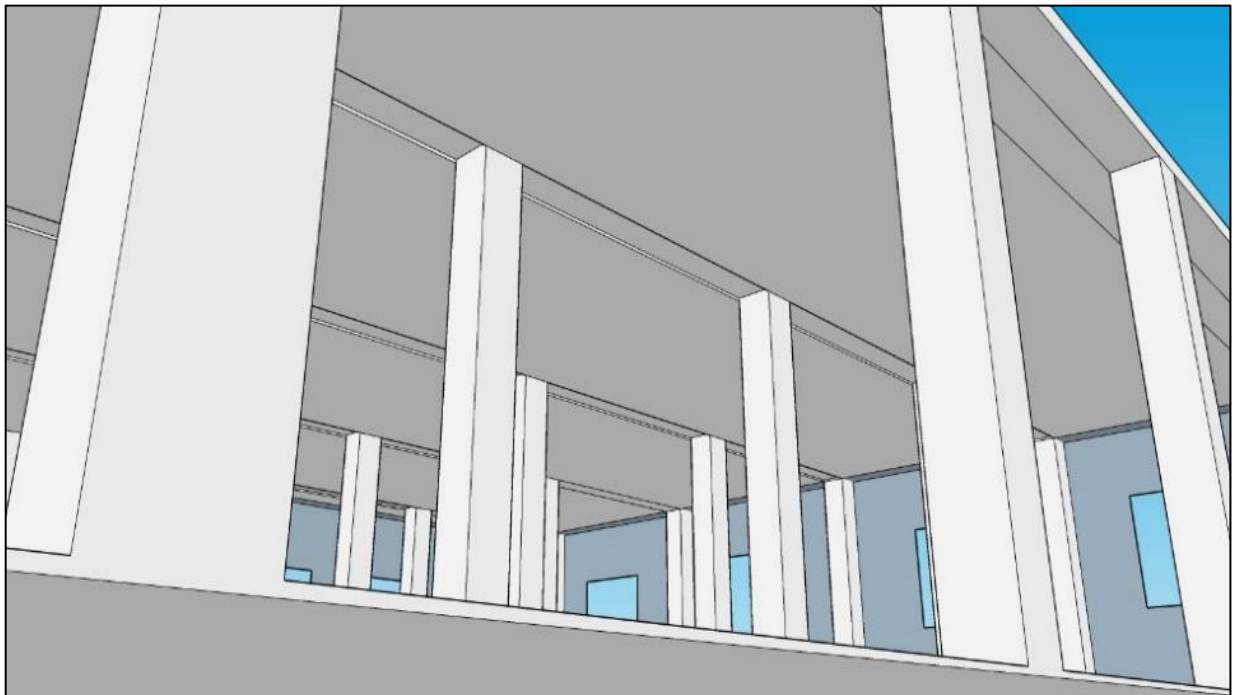
AAC blocks have a lower density than clay bricks or concrete blocks by 50-60%. This reduces the self-weight of the masonry constructed with them, which accounts for half of a building's total dead load. By using these lightweight AAC blocks, the buildings self-weight is significantly reduced, lowering the structural cost of the foundation, beams, and columns.

AAC blocks have significant cost advantages for the following foundation types:

- Buildings founded on weak soil with low SBC (Safe Bearing Capacity).
- Buildings founded on soil strata where pile foundations are required.

Flat Slab

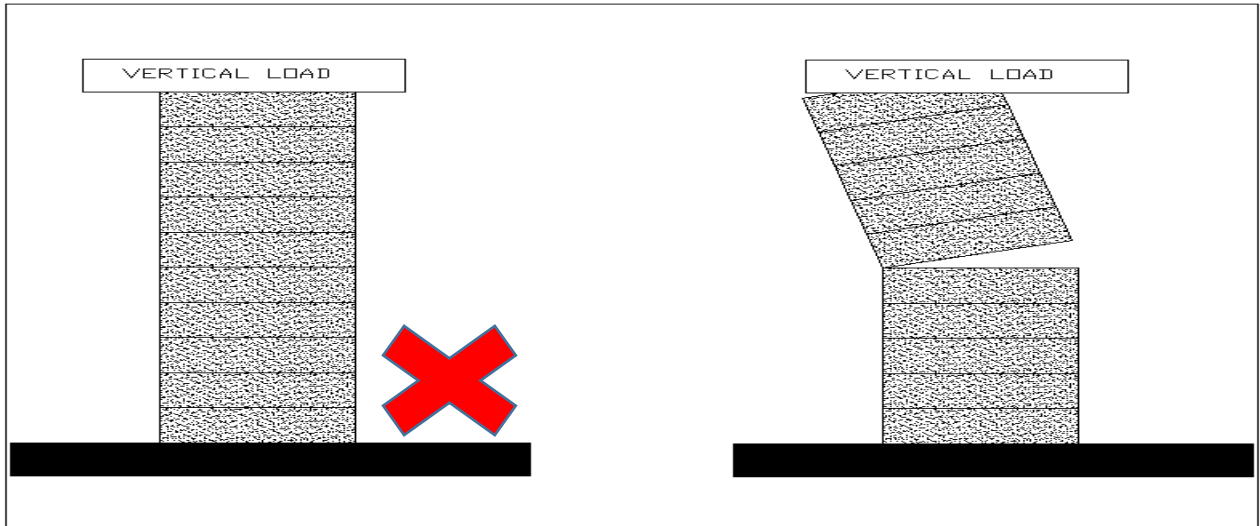
For structures that utilise flat slabs, AAC block masonry is a preferred option due to its lightweight characteristics.



Note: AAC block dry density is 550 to 660 kg/m³, as compared with the weight of cum brick masonry of 1200-1800 kg/m³.

Avoid AAC for load-bearing structure:

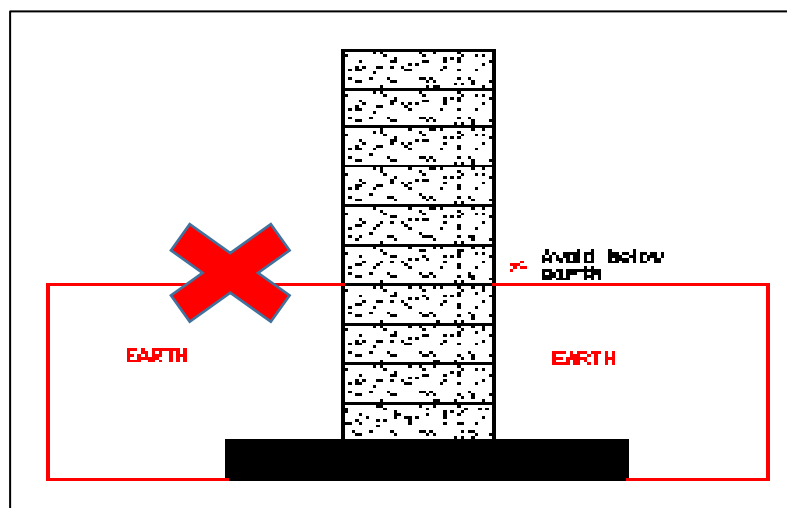
AAC block is not recommended for use in load-bearing structures as it is not strong enough to support the weight of the building without additional reinforcement from beams and columns. AAC blocks are typically used in non-load-bearing walls, partition walls, and infill walls.



Below Plinth

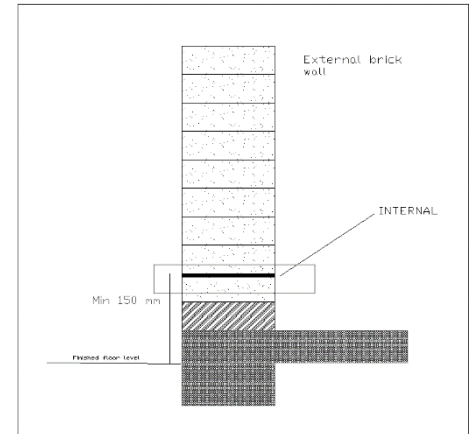
It is not recommended to use AAC blocks below the plinth level and ground level due to the following reasons:

- a) The horizontal load from filling along the side of the block can cause the block to crack or fail, leading to potential structural damage.
- b) Potential water seepage from the soil around the wall can lead to moisture accumulation within the AAC blocks, causing them to degrade over time.



Damp Proof Course / Coat

A DPC should be installed at least 150mm above the finished floor level to protect against ground moisture and precipitation, and a damp proof coat can be applied for extra protection.



Unloading

Unloading AAC blocks is a critical part of their use. Due to their honeycomb structure, AAC blocks are brittle in nature and require careful handling during unloading. It is important to unload the blocks flexibly to avoid damage.

- Unload blocks onto a flat surface.
- Do not drop blocks to the floor, as they are lightweight and brittle.
- Unload the first layer horizontally and the second layer vertically, alternating directions for subsequent layers.
- Stack blocks no more than 10 layers high.
- Carry and unload 2-3 blocks at a time when moving between floors.
- Up to 5% of delivered blocks may have acceptable cracks and chips.
- Broken blocks can be salvaged by cutting them with a hand saw for other uses on-site.

AAC Wall Span

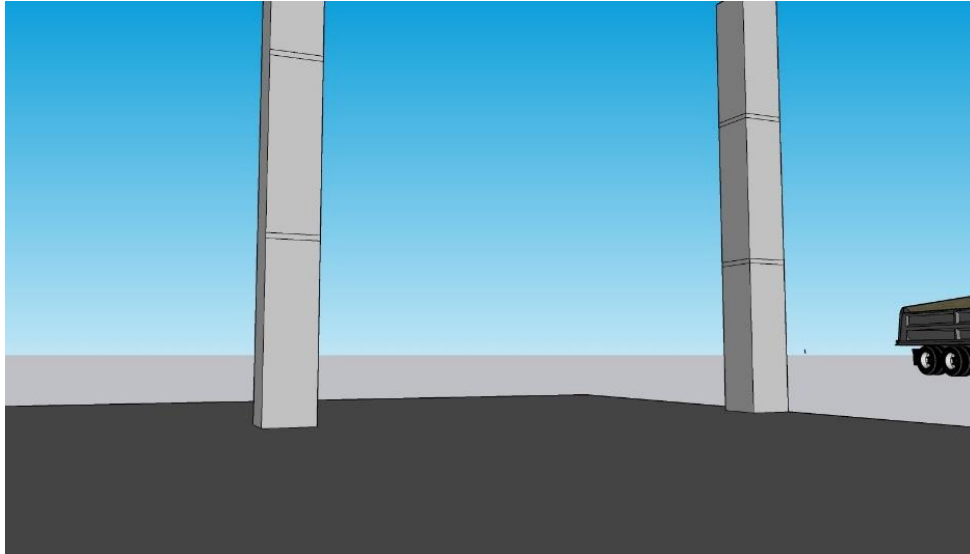
Long-span AAC block walls without reinforcement, such as reinforced concrete or stiffeners, are not recommended. This is similar to other masonry units like CMU or bricks. It is important to use reinforcement or stiffeners to provide additional strength and support to the wall, especially for long-span walls.

Laying/Joining AAC Blocks

If the mason is new to constructing AAC blocks, they will need to be taught the appropriate procedures. AAC blocks must be installed with care, otherwise, there is a greater risk of damage or cracks in the wall. The masonry laying standard for 'Nextblock' AAC Blocks should be in compliance.

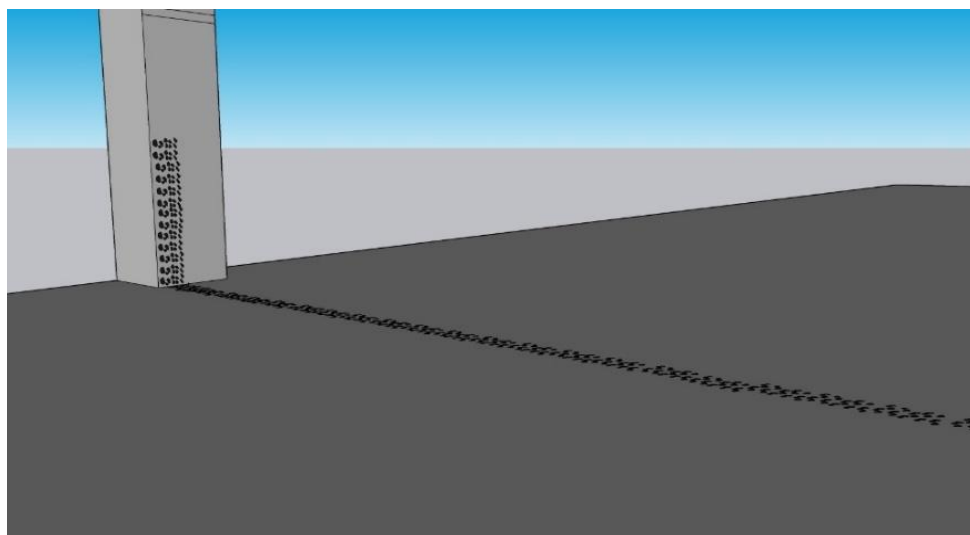
STEP 1:

Clean the foundation/beam by chipping off any uneven cement deposits and the dusting it with water.



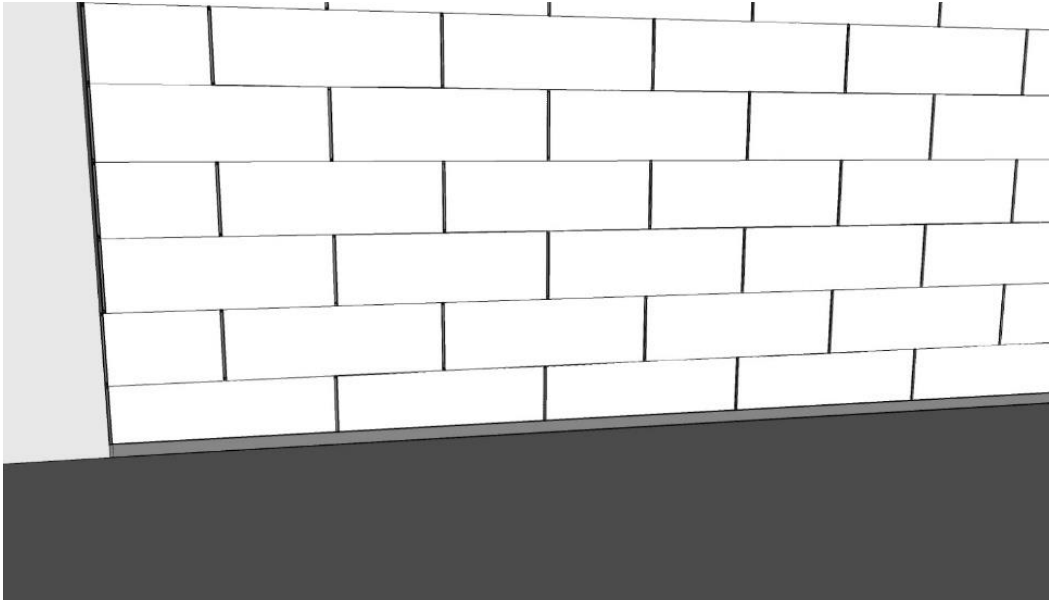
STEP 2:

Chip the floor and column for stronger bonding.

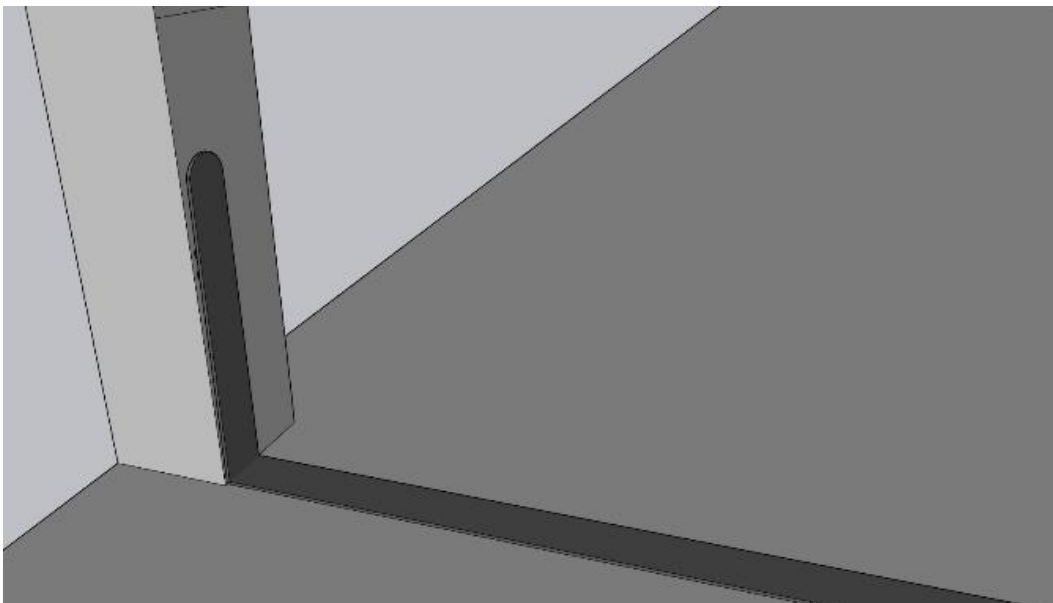


STEP 3:

Apply a damp-proof course for external walls and washrooms where water may bounce off the ground or floor. Here, a 3-inch C/C Coasting for damp-proof walls is needed.

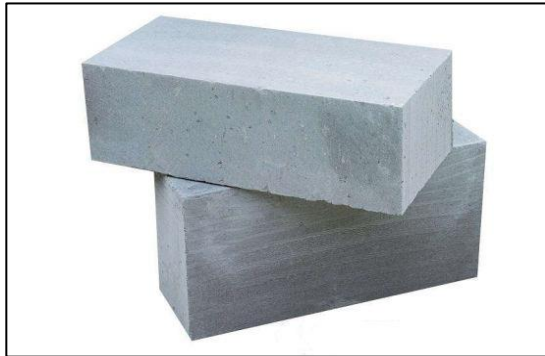
**STEP 4:**

Apply a thick layer of levelling bed by first applying a layer of mortar (cement: sand-1:4) to the walls above the ground floor to level the foundation before commencing the first course of blocks.



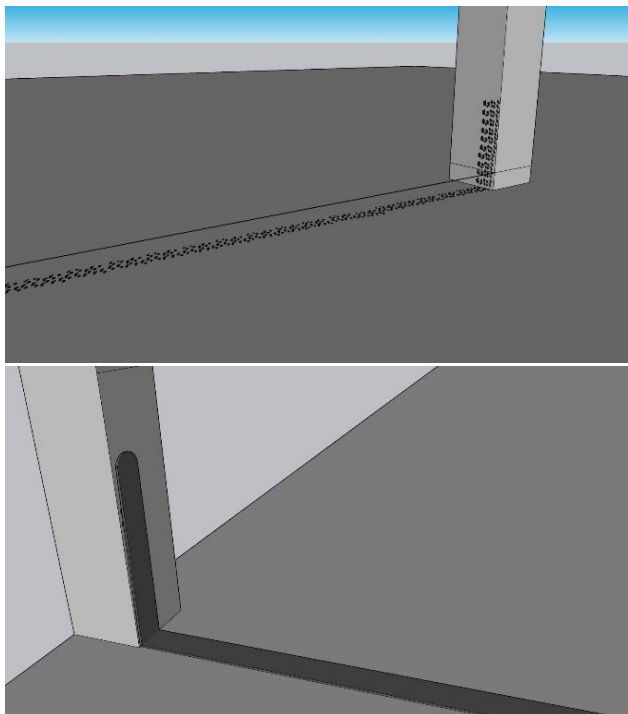
STEP 5:

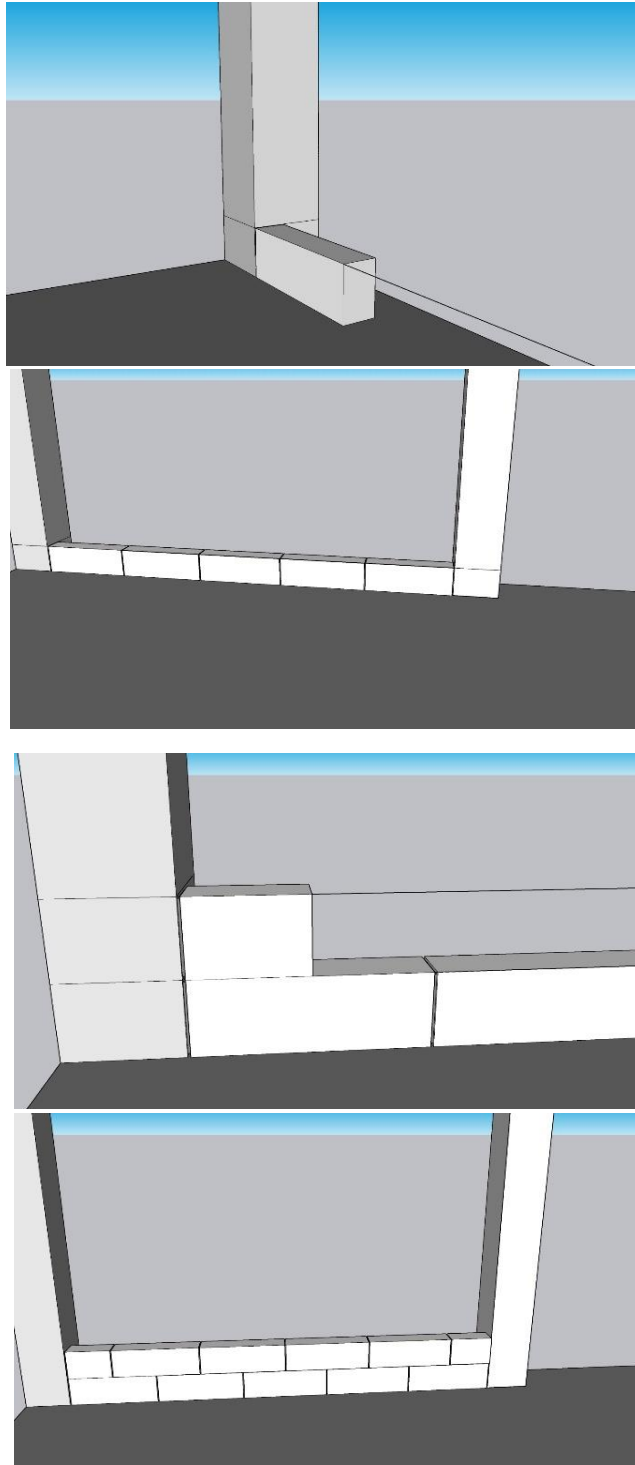
Wet the block by spraying water on AAC Block for 10 to 15 minutes before laying the blocks. Insert each block one at a time, pushing hard to ensure proper bonding without any level differences, and fill the joints between the blocks with the same mortar. The blocks should not be soaked.

**STEP 6:**

AAC First course: Lay the AAC first course on a solid bed of mortar, making sure it is aligned, levelled, and plumbed to aid the mason in laying subsequent courses to achieve a true vertical and straight wall.

To minimize air entrapment, carefully fill horizontal and vertical joints without gaps or cavities. The easiest way to achieve this is to slide the block after placing it on the mortar surface.

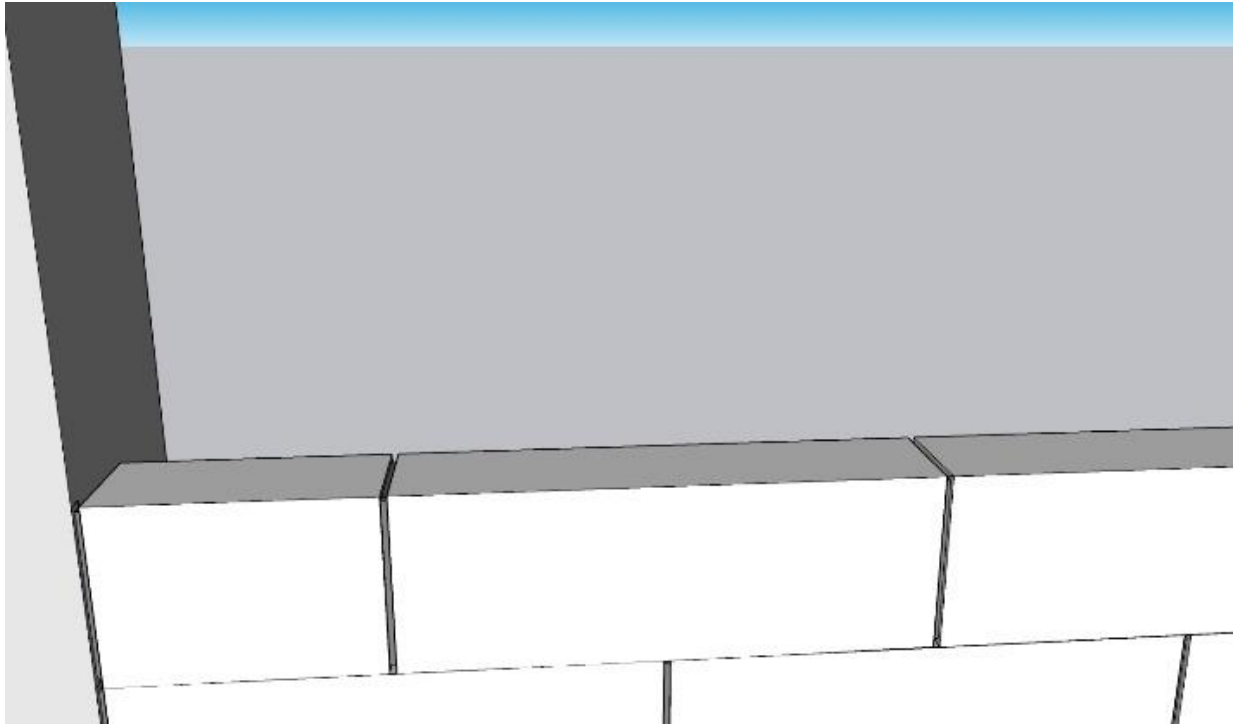


**Mortar Thickness:**

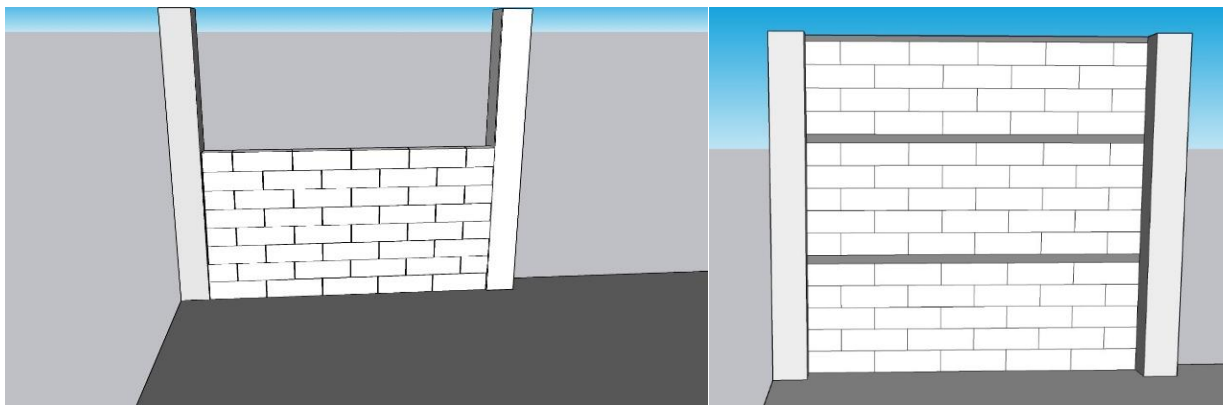
Mortar thickness should be 8mm to 10mm, uniformly applied over the AAC Blocks before placing, and the joints must be cured after laying.

STEP 7:

Before applying mortar for the second and later courses, scrape off any loose particles and dust from the top of the first course.

**STEP 8:**

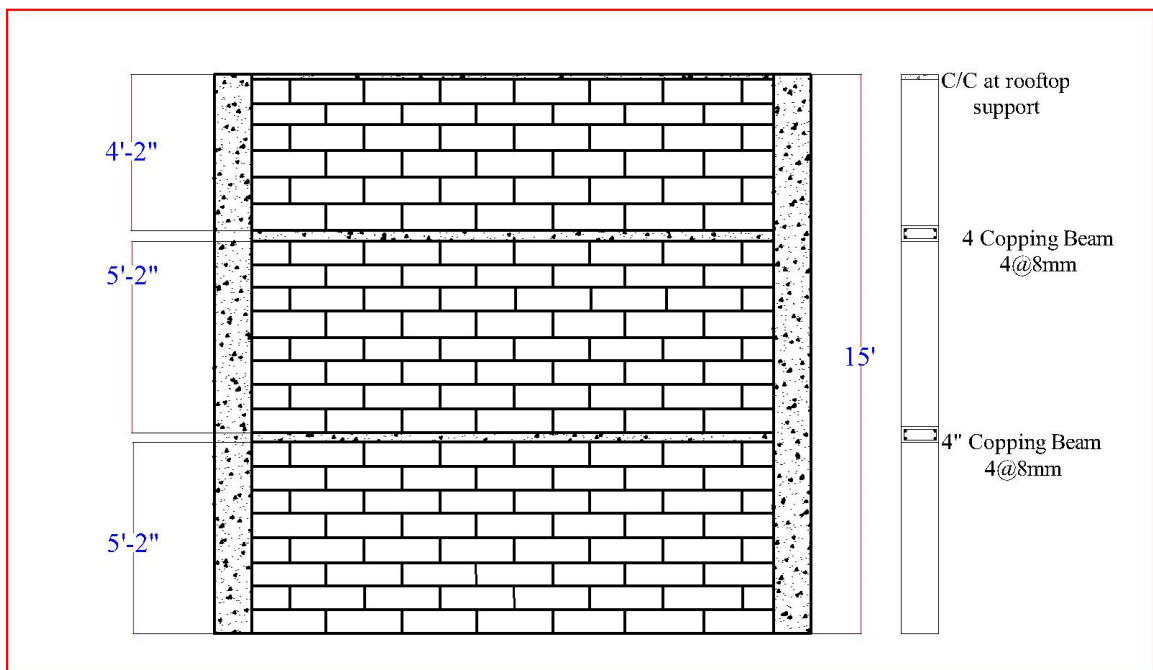
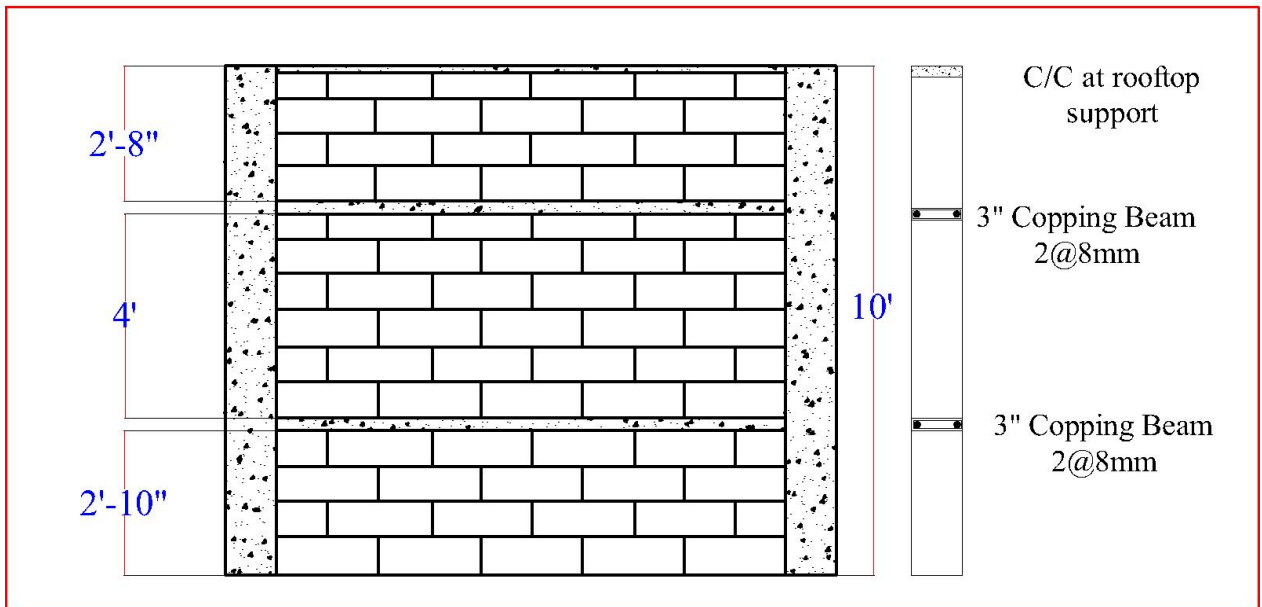
Workers can raise a five to six feet wall height on the first day with blocks. After a 6 to 8 hours break, they can raise 3 to 4 feet, and after 6 hours, the worker can finish the wall.



STEP 9:

Bond (Coping) Beam for Plain Walls. If the wall height is 10 feet and needs this bond beam to eliminate shear fractures and horizontal cracks in AAC blocks, it is essential to provide bond beams with reinforcement. This will ensure that the wall load is evenly distributed. RCC bond beam of thickness 75 mm with two no's of 8 mm dia. rods and 6 mm stirrups at 200 mm c/c is recommended by ASTM.

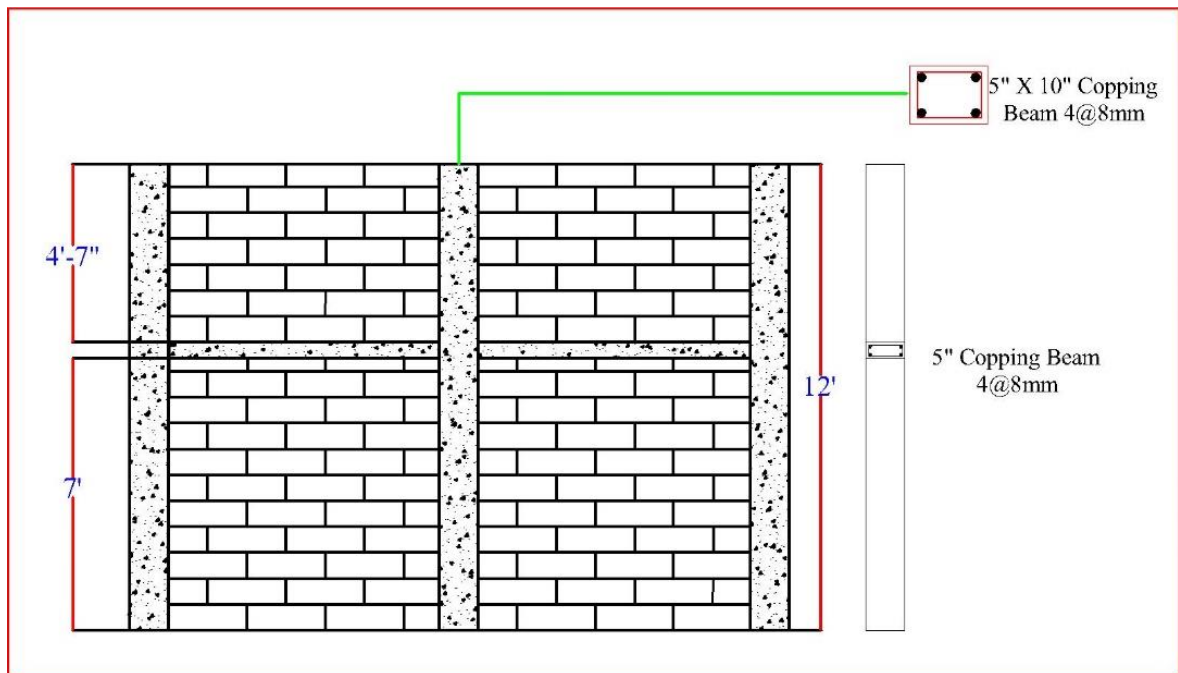
If the wall height is over 15 feet and needs this bond beam to eliminate shear fractures and horizontal cracks in AAC blocks, it is essential to provide bond beams after 5 feet and then 10 feet with reinforcement. This will ensure that the wall load is evenly distributed. RCC bond beam of thickness 100 mm with four no's of 8 mm dia. rods and 6 mm stirrups at 200 mm c/c is recommended by ASTM.



STEP 10:

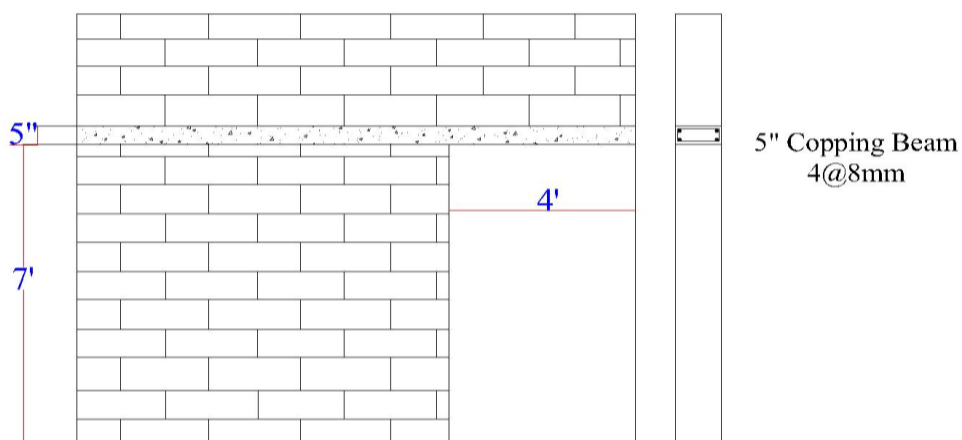
Bond (Coping) Column for Plain Walls

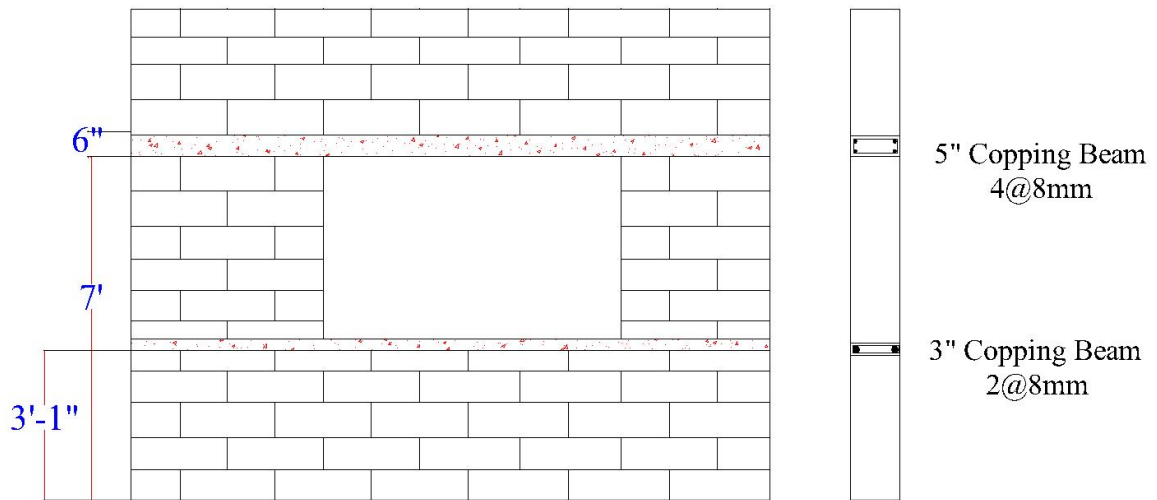
If the wall length is over 15 feet and needs this coping column or false column to eliminate shear fractures and horizontal cracks in AAC blocks, it is essential to provide a false column in the middle.



Lintel Bond (Coping) Beam for walls having windows & Doors

The recommended RCC lintel bond beam thickness is 200 mm with four no. 8 mm dia. rods and 6 mm stirrups at 200 mm c/c according to ASTM.



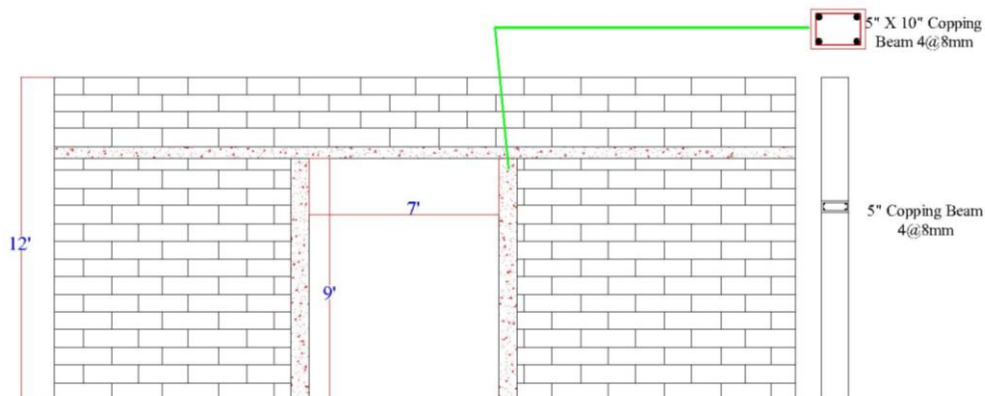


Lintels shall always rest on a full block with minimum bearing as follows.

Door & Window Opening Size	Up to 3.0 feet	3.0-6.5 feet	3.0-6.5 feet	Above 6.5 feet
Minimum Bearing (each side)	150 mm	200 mm	300 mm	To design

To avoid diagonal tension cracks, reinforce the Tie beam below the openings. The bond beam should be extended up to 300 mm on both sides from the window corners.

If the door height is over to the regular door size and Door length is over regular size. For this need door support column both side. Column thickness is wall flash with four no. 8 mm dia. rods and 6 mm stirrups at 250 mm c/c.



STEP 11:**Beam Joint:**

The joint between the final course and the beam should be filled with cement mortar.

Do's:

- The AAC wall laying design is suitable for stretcher courses, not header courses.

Don'ts:

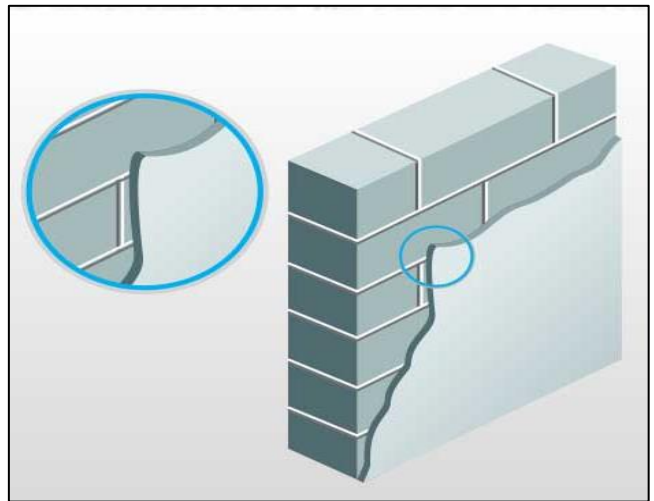
- Vertical joints must not be in a straight line, and block overlapping in the structural course must be at least 250 mm over the bottom course.
- The mortar should not be spread too much in advance of the actual laying of the blocks, as it can stiffen and lose its flexibility, resulting in poor adhesion and binding.

STEP 12:**Plastering**

Both internal and external sides of the AAC walls should be plastered.

Preparing the wall surface for plastering:

- Step 1: Remove any dust, fungi, or grease from the surface.
- Step 2: If the surface is not too hard, roughen it by wire brushing, chopping, or bush pounding.
- Step 3: Ensure that the background is even to avoid variations in plaster thickness.
- Step 4: Do not dampen the wall before plastering. Instead, evenly saturate the wall with a fog spray.
- Step 5: The plaster thickness should be 10 to 12 mm. Sprinkle a cement-water mixture on the wall and wait for 60 to 120 minutes before plastering.
- Step 6: Apply cement-sand plaster mortar (1:4 ratio) on the wall and wait for 20-30 minutes. Then adjust the thickness of the mortar with wooden or aluminium bars by choosing a plain mortar layer of 10 to 12 mm. This will help hold the mortar by the wall.
- Step 7: After complete levelling of the wall plaster, wait for 24 hours before starting to cure the wall for the next 7 to 14 days.



Cement Mortar for Plastering

To avoid shrinkage cracks, it is recommended to use cement mortar 1:4 for internal and external plastering, and PPC cement for masonry and plastering.

Internal Plastering:

The plaster thickness for internal walls should be 10 mm. plastering that is more than 10-12 mm thick should be avoided as it can cause cracks.

External Plastering:

External plastering must be done in two layers. Applying SBR coating with sand on the block surface will improve bonding and reduce plastering thickness. The plastering thickness for external walls can range from 12 to 15 mm, depending on the external forces operating on the wall.

Do's:

- The AAC wall laying design is only suitable for stretcher courses, not header courses.

Don'ts:

- Vertical joints must not be in a straight line, and block overlapping in the structural course must be at least 250 mm over the bottom course.
- The mortar should not be spread too much in advance of the actual laying of the blocks, as it can stiffen and lose its flexibility, resulting in poor adhesion and binding.



External wall plaster thickness 12-15mm



Mortar for AAC Blocks

There are two types of mortar used for AAC blocks masonry:

- Conventional cement mortar (Sand & Cement)
- Thin Bed Mortar (AAC Block Adhesive)

Conventional Cement Mortar (Sand & Cement)

For many years, mineral binders such as lime, cement, or gypsum have been used in mortars. These mortars are primarily used for the installation of stones, bricks, concrete blocks, and AAC blocks.

Ingredients: Cement and sand are mixed together before water is added to make a wet mortar for application. 0.65 present water mixed with sand cement mixer to make mortar.

Mortar Mix Ratio: The ideal "Cement: Sand" ratio for mortar mix is 1:4, rather than rich mortar mix (1:4), which will shrink and cause wall cracks. For the best results, use PPC (Portland Pozzolana Cement).

Mortar Thickness: For AAC blocks masonry, the mortar thickness should be 8-10 mm with the required water to avoid moisture movement.

Pros:

- There is a lot of raw material available.
- Labor training is minimal.

Cons:

- It is necessary to cure the joints (7 days Curing)
- The 10 mm thickness may result in minor thermal and acoustic insulation loss.
- The use of sand is required.

Thin Bed Mortar (AAC Block Adhesive)

Thin Bed mortar is a novel technique that provides a **3 to 5 mm** thin-joint alternative to traditional mortar. Thin Bed mortar is a factory-mixed mortar made from cement, graded sand, and polymers in accordance with a predetermined chemical design. a polymer-based versatile jointing material specially designed to provide high bonding.

It has strong strength and water retention qualities even at a thickness of 3 to 5 mm.

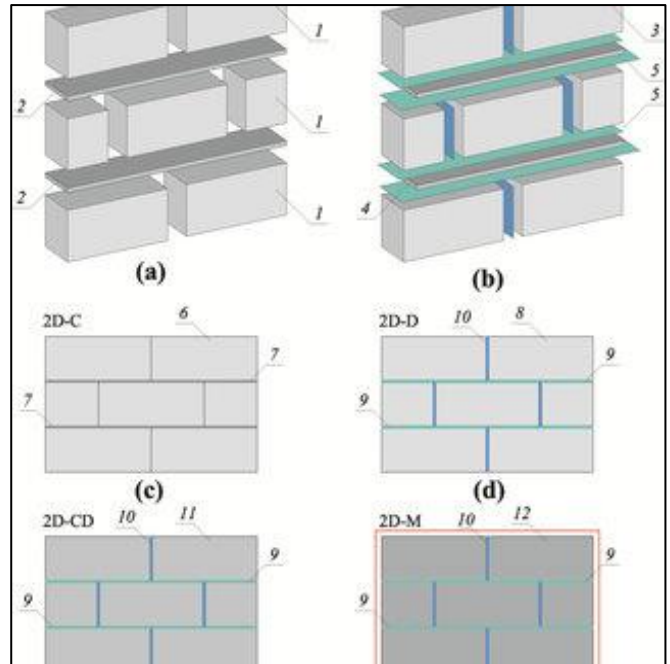
Ingredients: Block jointing mortar is a high-strength adhesive for quick and firm laying of AAC blocks with thin joints. Made of cement, graded sand, and blended with polymers, it provides high strength and water retention properties even when in thickness of 3-5 mm layer.

Wire Mesh Reinforcement

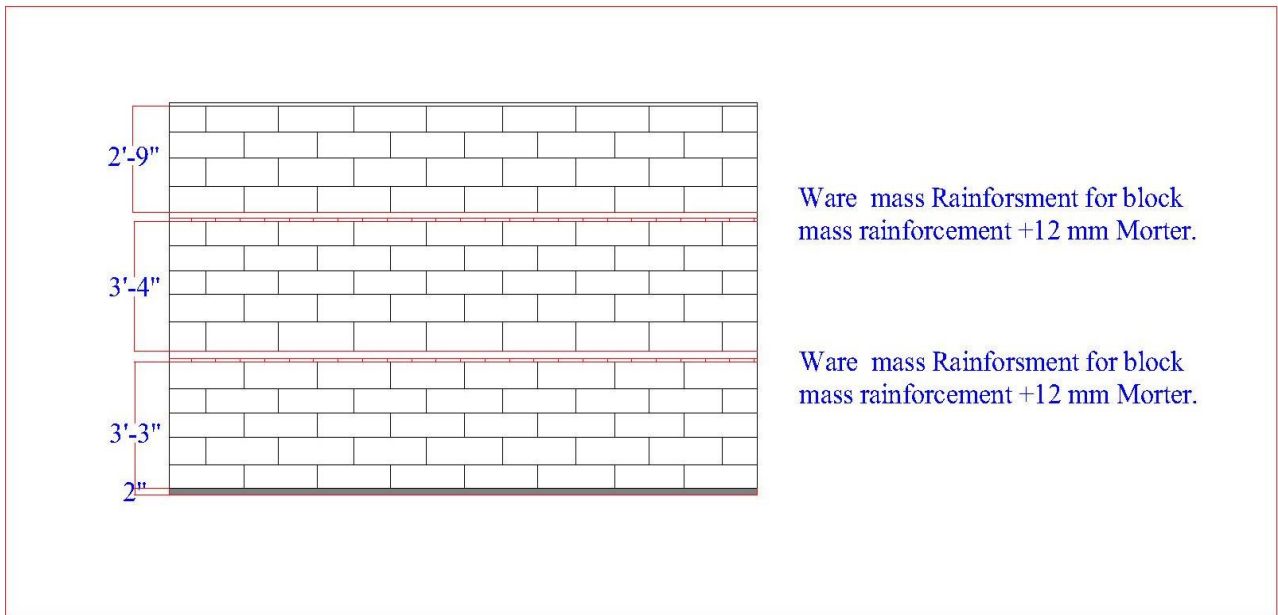
Expanded, galvanized, or stainless-steel mesh is primarily used as anti-cracking reinforcement in the construction of brick and block masonry for 5-inch (120 mm) walls.

Expanded metal reinforcement is simple to work with, and when embedded in the mortar joining brickwork or brickwork courses, it forms an integral structure with a high tensile strength that aids in resistance to vibrations and temperature changes.

Most wall thicknesses can be used with the range of reinforcement coils if laid on the mortar bed with 5 mm clearance to the outside face of the wall and lapped at least 75 mm if joining lengths. The reinforcement is then fully embedded, with most applications requiring only every third course.



The wire mesh reinforcement is depicted in the drawing below.

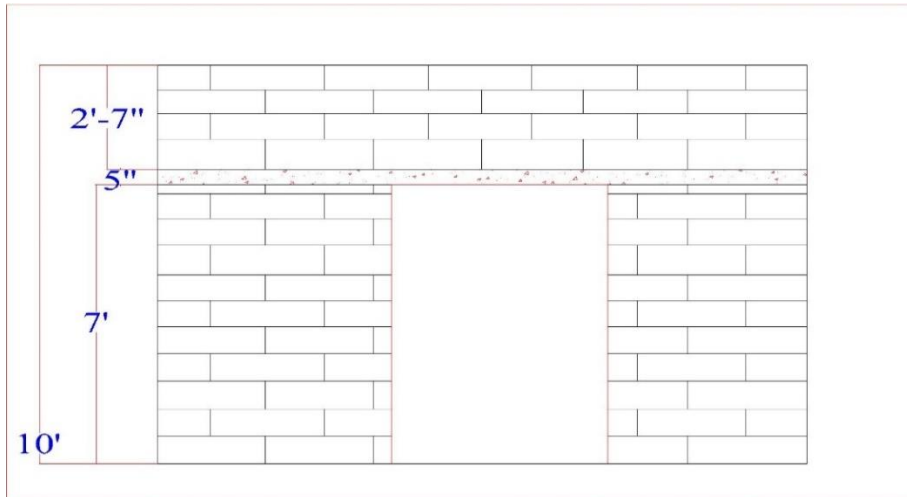


Window & Door Installations

Installation steps: Door

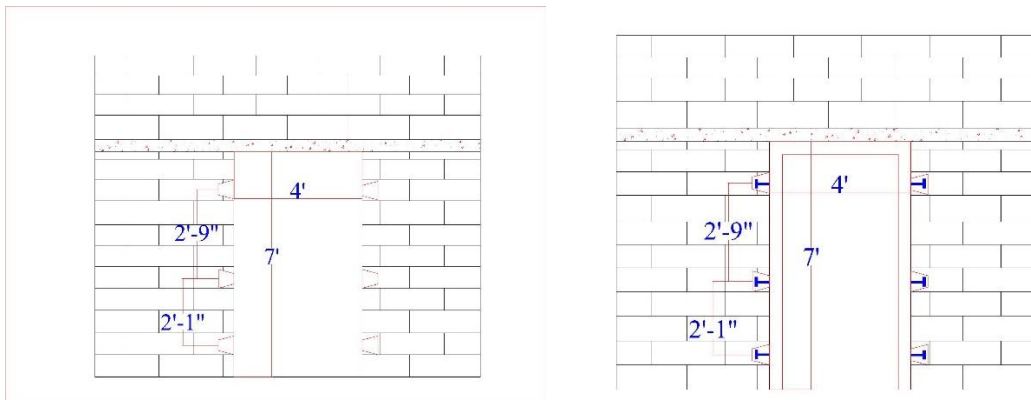
STEP 1:

Install a sufficient (2/3) number of clamps on either side of the door frame. Because nails might loosen with time and cause your door frame to come out of the wall, the clamp must be screwed to the wooden frame. As a result, try to secure the clamps with a screw.



STEP 2:

Installing the door in the wall opening: Cut the AAC wall on both sides of the door or window where the clamps will be installed.

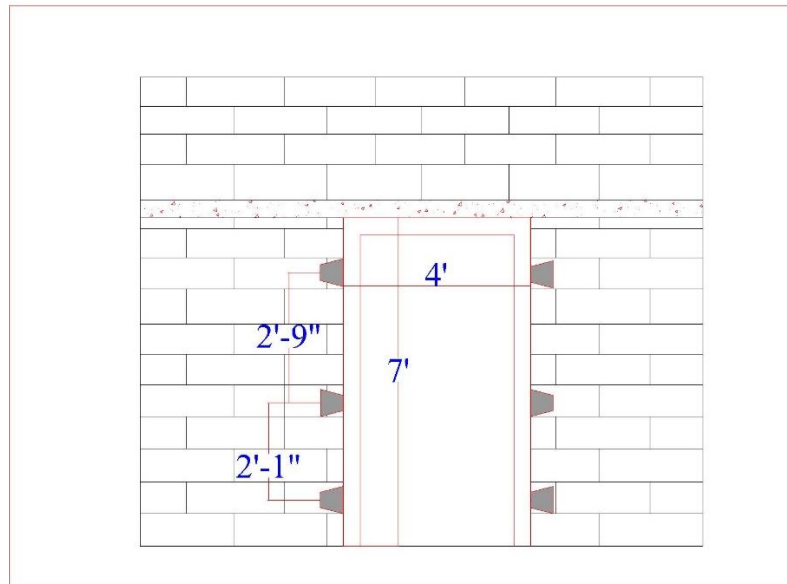


STEP 3:

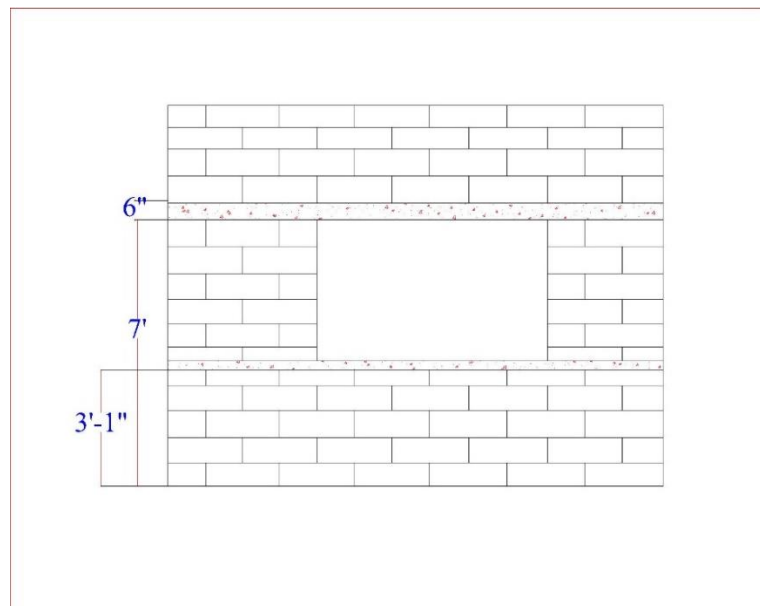
Aligning the door frame with the wall: ensures that when you plaster the wall, the plaster surface and the door frame are at the same level. Finally, examine the alignment and top level of the door frame before securely fastening it with cement concrete.

STEP 4:

Fill Concrete: To bind with the brick wall, fill the MS clamp gaps and gaps all around the door frame with cement concrete mortar (1:2:4) ratio.

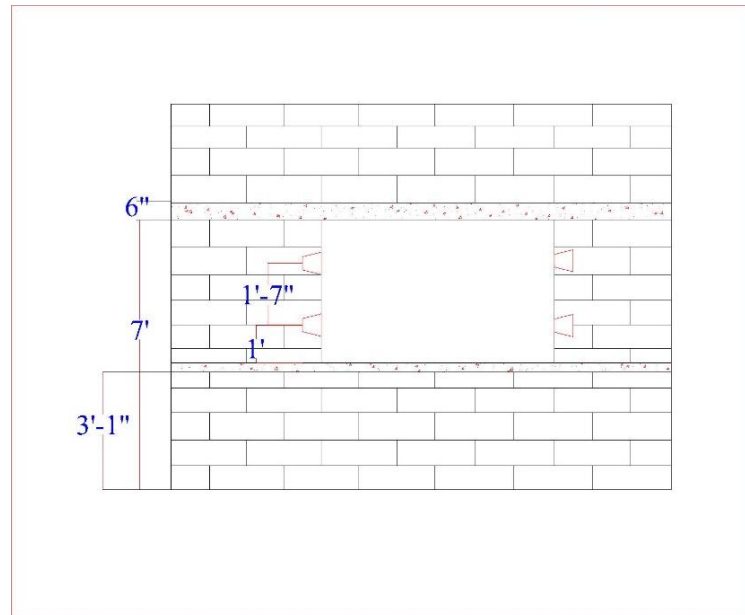
**INSTALLATION STEPS: WINDOW****STEP 1:**

MS Clamp Installation: Install a sufficient (2/3) number of clamps on either side of the window frame, the clamp must be screwed to the frame. As a result, try to secure the clamps with a screw.

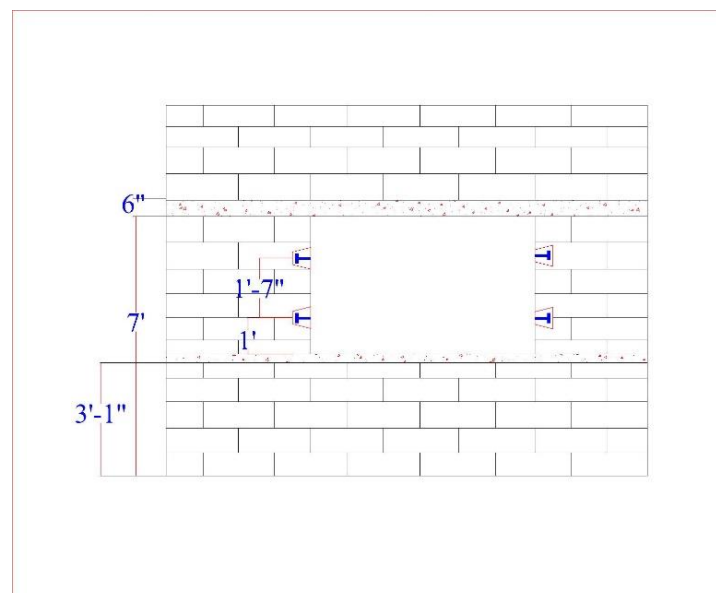


STEP 2:

Installing the door in the wall opening: Cut the AAC wall on both sides of the window where the clamps will be installed.

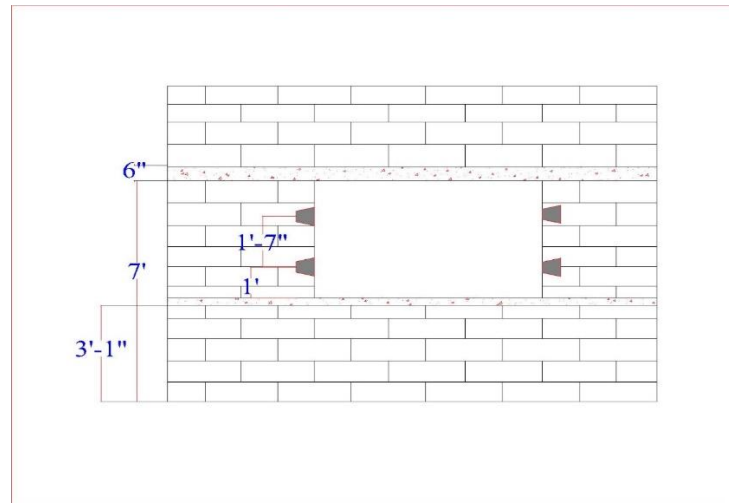
**STEP 3:**

Aligning the frame with the wall ensures that when you plaster the wall, the plaster surface and the door frame are at the same level. Finally, examine the alignment and top level of the door frame before securely fastening it with cement-concrete.



STEP 4:

Fill Concrete: To bind with the brick wall, fill the MS clamp gaps and gaps all around the door frame with cement concrete mortar (1:2:4) ratio.

**STEP 5:**

Curing: Allow at least 7 days for the concrete to cure.

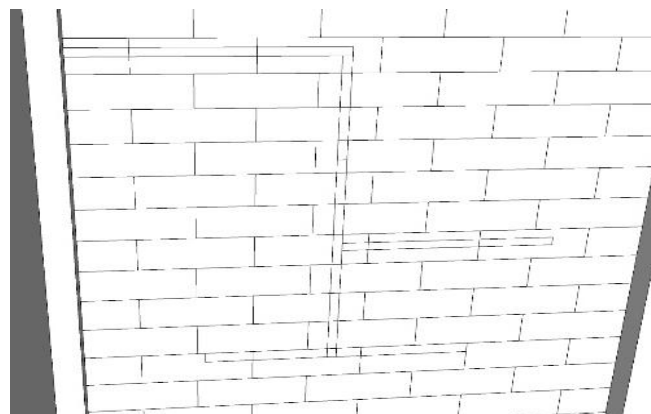
Cracks in partition walls can appear at the lintel or sill level of door and window frames. As a result, it may be preferable to offer a strengthened chicken mesh prior to plastering.

ELECTRICAL & PLUMBING INSTALLATION IN AAC

Electrical and plumbing conduits should be installed in the routed groove of an AAC wall.

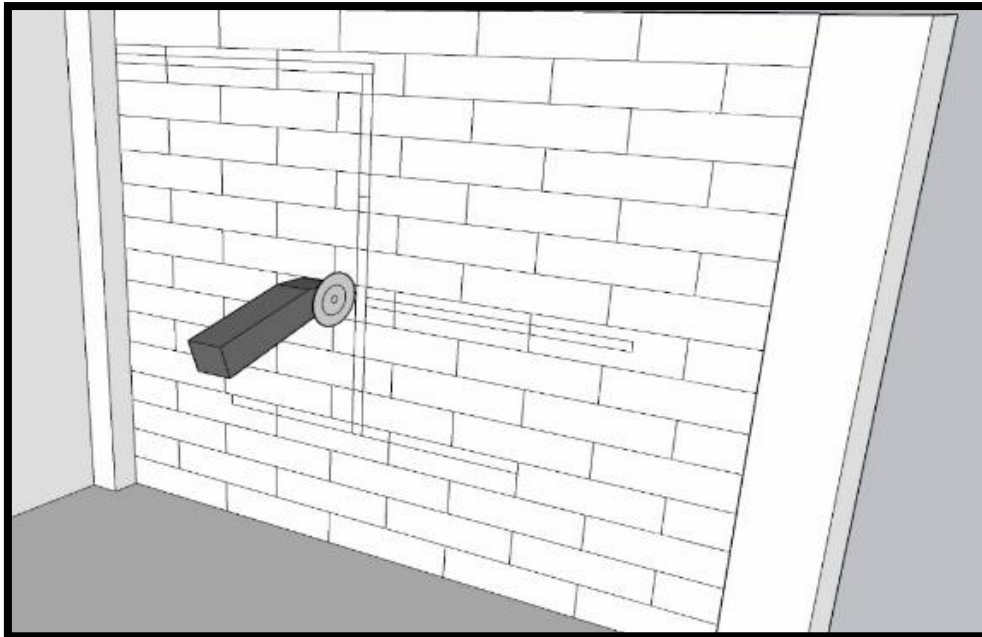
STEP 1:

Make a groove. Mark the path using a pencil or marker.



STEP 2:

Cut along the line markings using a grinder machine fitted with a concrete blade.



STEP 3:

Remove the groove using a hammer and chisel.

120 mm thickness wall 2.5"-3" Group Cutting

110 mm thickness wall 2"-2.5" Group Cutting

100 mm thickness wall 1"-1.5" Group Cutting

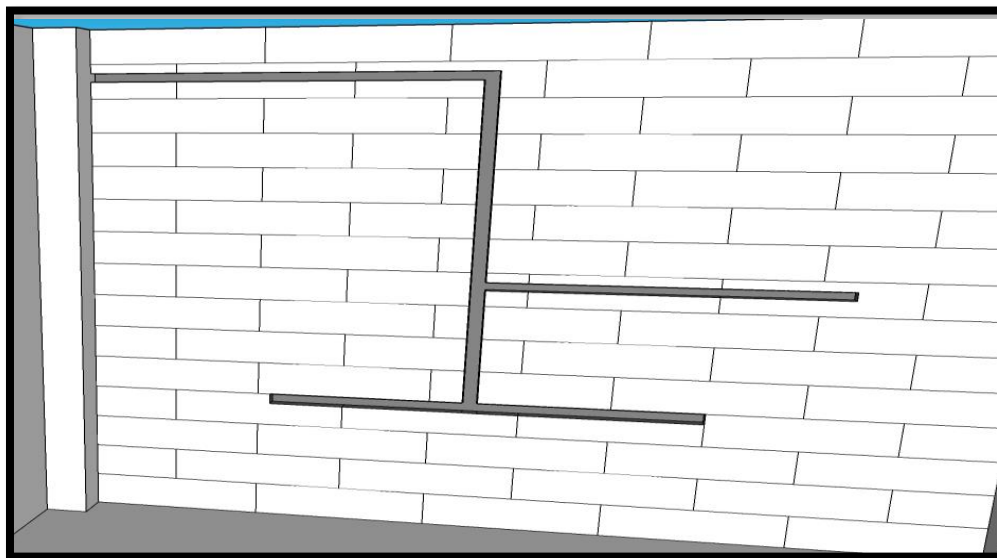
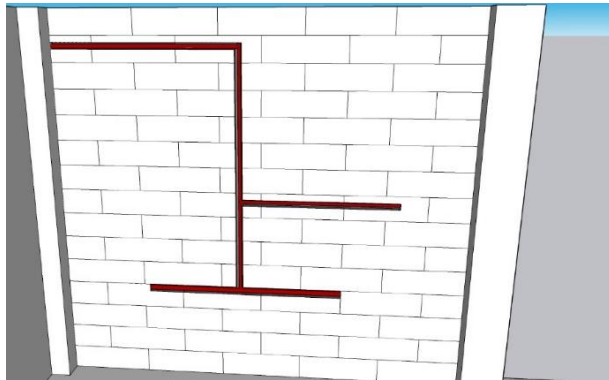


Figure: AAC Wall grooved for electrical conduits & boxes

STEP 4:

Place the conduit and electrical boxes.



STEP 5:

Fill the groove with compact mortar and cover it with wire mesh or polymer fabric.

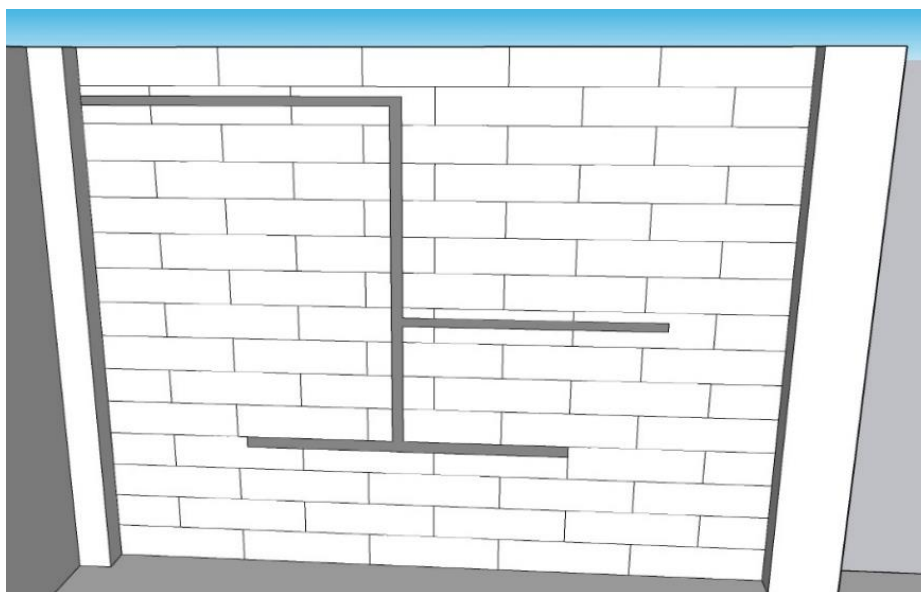
Polymer Fabric



Ware mesh

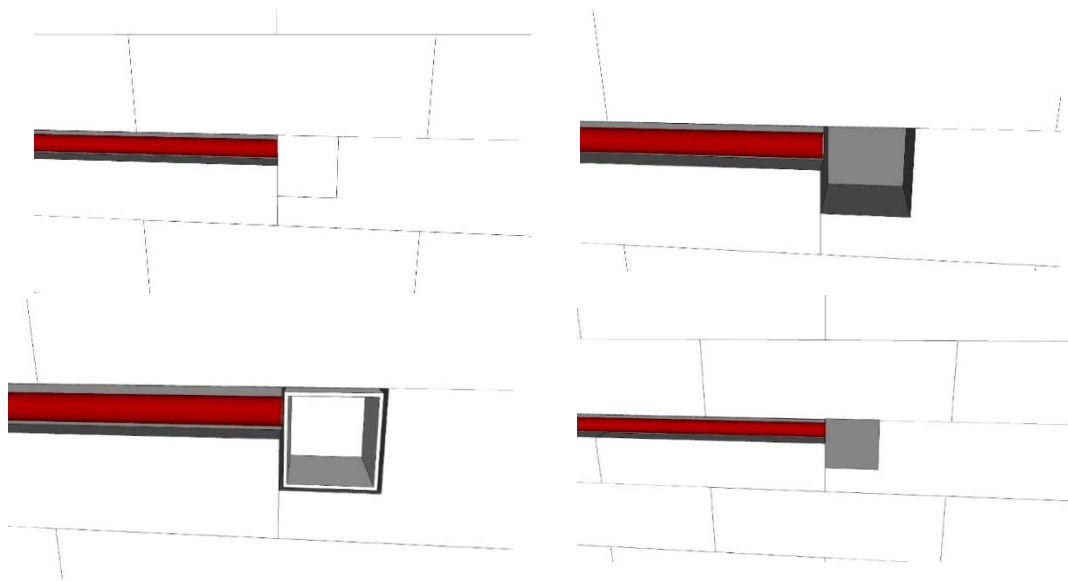


Adequate attention must be taken when laying grooves to guarantee the structural integrity of the AAC blocks is preserved. If ordinary cement mortar is used for the joint, please begin electrical work after at least 10 days of curing.



STEP 6:

- For electrical switch box installation. Draw box area.
- Cut with Grinding Machine.
- Use a hammer and Chisel to remove the cutting part of the block.
- Placed the box at the cutting place. After electric work covers the box.
- We can cut a maximum 3-inch depth of block.
- 100 mm block used only for the wall.

**Elevator/Lift Guide rails**

Elevator guide rails must be mounted on concrete or MS as per regulation, it is not recommended to mount directly on AAC blocks. Our blocks are used only for non-load-bearing walls only.

