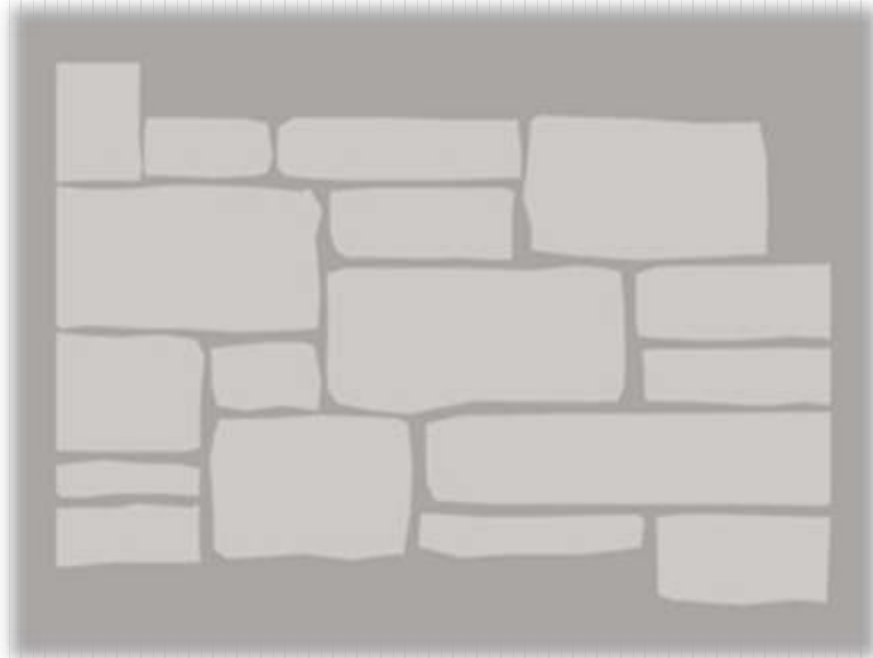


STONE MASONRY



Stone Masonry

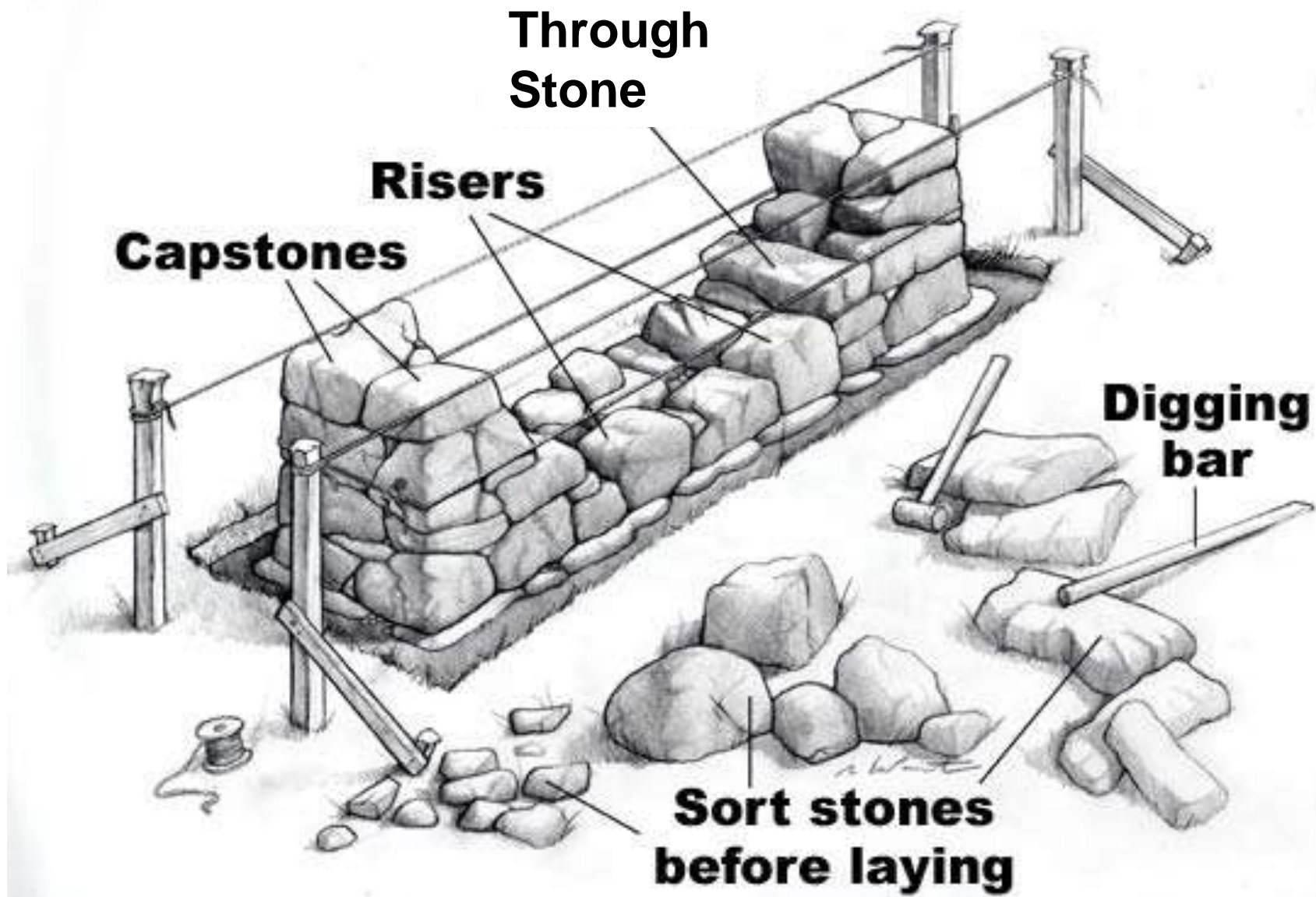
- The construction of stones bonded together with mortar is termed as stone masonry where the stones are available in a abundance in nature, on cutting and dressing to the proper shape, they provide an economical material for the construction of various building components such as walls, columns, footings, arches, lintels, beams etc.

Uses

- 1) Building foundations, walls, piers, pillars, and architectural works.
- 2) Lintels, Beams, beams Arches, domes etc.,
- 3) Roofs and Roof coverings.
- 4) Cladding Works
- 5) Dams, light houses, monumental structures.
- 6) Paving jobs
- 7) Railway, ballast, black boards and electrical switch

Selection of stone for stone masonry:

- 1) Availability
- 2) Ease of working
- 3) Appearance
- 4) Strength and stability
- 5) Polishing characteristics
- 6) Economy
- 7) Durability



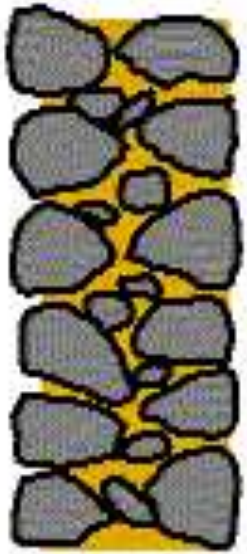
**Through
Stone**

Risers

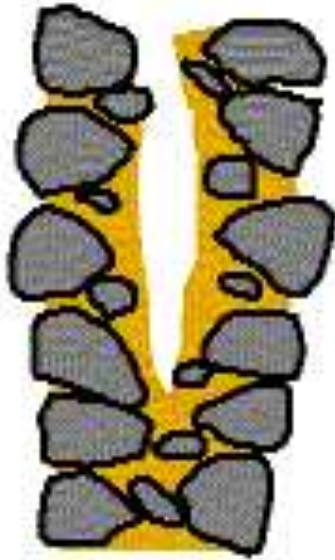
Capstones

**Digging
bar**

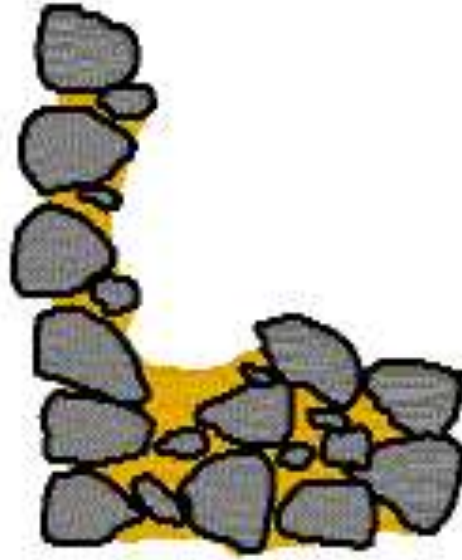
**Sort stones
before laying**



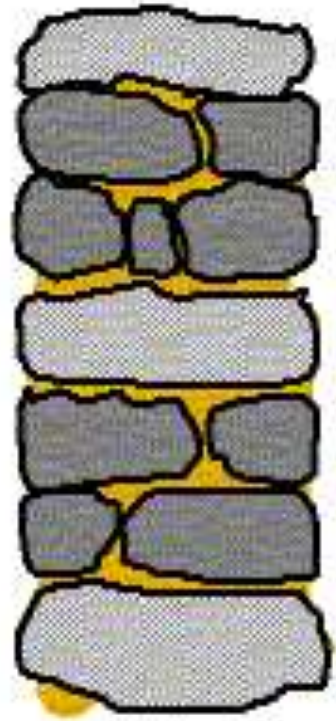
Traditionally
built wall



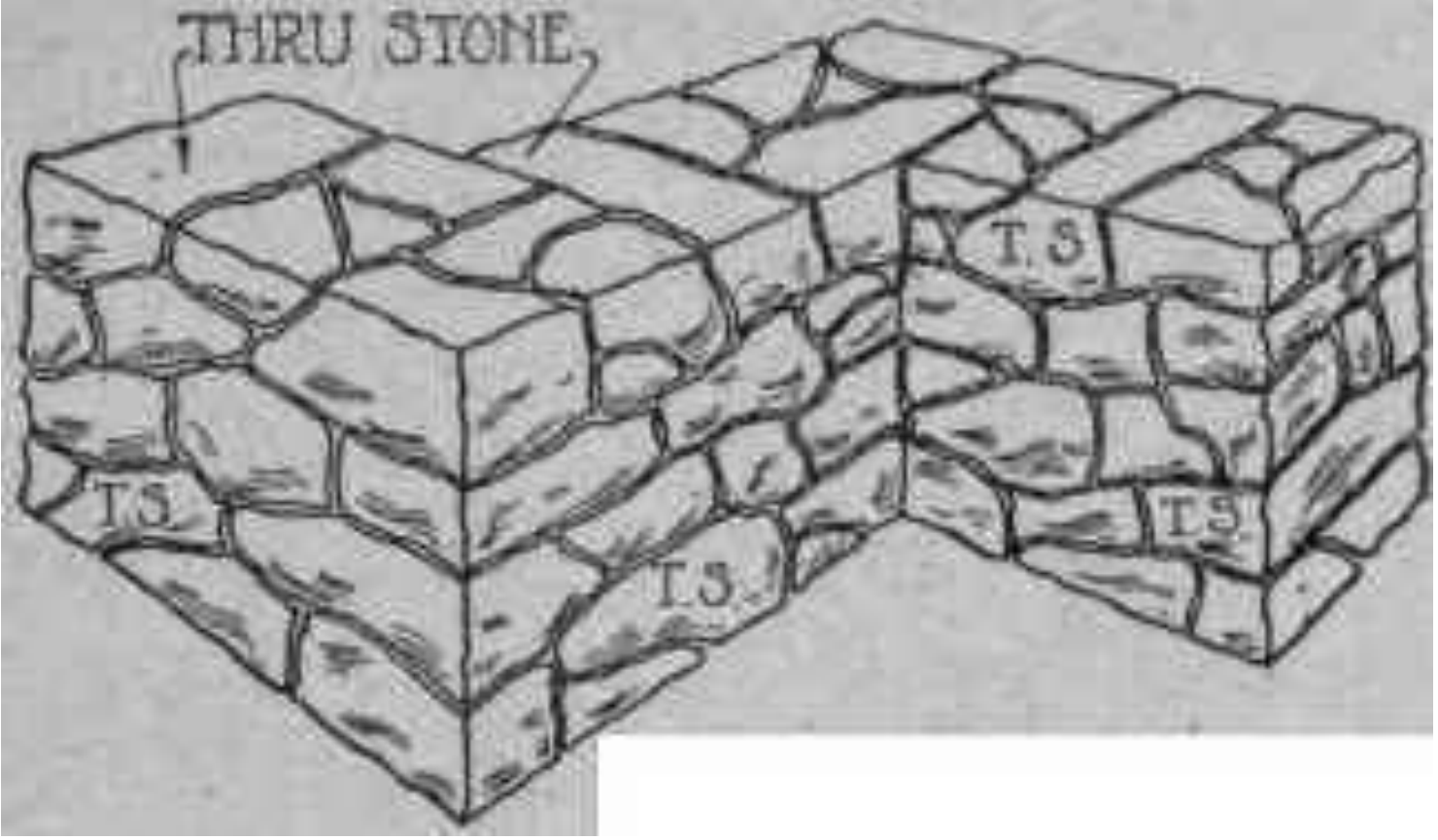
Wall
delamination



Wall
crumbling



SOLUTION:
Through Stones



General Principles

- The stones to be used for stone masonry should be hard, tough and durable.
- The **pressure** acting on stones should be **vertical**.
- The stones should be **perfectly dressed** as per the requirements.
- The **heads and bond stones** should **not** be of a **dumb bell shape**.
- In order to obtain uniform distribution of load, under the ends of girders, roof trusses etc large flat stones should be used

General Principles

- The mortar to be used should be good quality and in the specified faces.
- The construction work of stone masonry should be raised uniformly.
- The plumb bob should be used to check the verticality of erected wall.
- The stone masonry section should always be designed to take compression and not the tensile stresses.
- The masonry work should be properly cured after the completion of work, for a period of 2 to 3 weeks.

General Principles

- As far as possible **broken stones** or small stones chips should **not be used**.
- Double scaffolding should be used for working at higher level.
- The **masonry hearting** should be **properly packed** with mortar and chips if necessary **to avoid hallows**.
- The properly wetted stones should be used to avoid mortar moisture being sucked.

Laying The Stone

- Decrease the stone thickness from the bottom to the top of wall.
- Ensure that the headers in the heart of the wall are the same size as in the face and extend at least 12 in (300 mm) into the core or backing. (Avoid Dumb-bell shaped stones)
- Ensure that headers in “walls of 2 feet (600 mm) or less in thickness” extend entirely through the wall. The headers shall occupy at least 20 percent of the face of the wall.

Laying The Stone

- Lay the masonry in roughly leveled courses. Ensure that the **bottom of the foundation is large**, with selected stones.
- Lay the courses with leaning beds parallel to the natural bed of the material.
- **Regularly diminish the thicknesses of the courses**, if varied, from the bottom to the top of the wall. Keep a surplus supply of stones at the site to select from.
- Before laying the stone in the wall, shape and dress it so that it will not loosen after it is placed. **No dressing or hammering which will loosen the stone will be permitted after it is placed.**

- Clean each stone and saturate it with water before setting it. Clean and moisten the bed that will receive it.
- Bed the stones in freshly made mortar with full joints. Carefully settle the stones in place before the mortar sets.
- Ensure that the joints and beds have an average thickness of not more than 1 inch. (25 mm).
- Ensure that the vertical joints in each course break with the adjoining courses at least 6 in. (150 mm).
- Do not place vertical joints directly above or below a

- If a stone is moved or if the joint is broken after the mortar has set, take the stone up and thoroughly clean the mortar from the bed and joints. Reset the stone in fresh mortar.
- **NOTE: Do not lay the masonry in freezing weather or when the stone contains frost, except with permission subjected to the required conditions.**
- Whenever possible, properly point the face joints before the mortar sets. If joints cannot be pointed, rake them out to a depth of 1 in (25 mm) before the mortar sets.
- Do not smear the stone face surfaces with the mortar forced out of the joints or the mortar used in pointing.

- Thoroughly wet the joints pointed after the stone is laid with clean water and fill with mortar.
- Drive the mortar into the joints and finish with an approved pointing tool.
- Keep the wall wet while pointing. In hot or dry weather, protect the pointed masonry from the sun and keep it wet for at least three days after the pointing is finished.
- **NOTE: Do not perform pointing in freezing weather or when the stone contains frost.**
- After the pointing is completed and the mortar is set, thoroughly clean the walls and leave them in a neat condition.

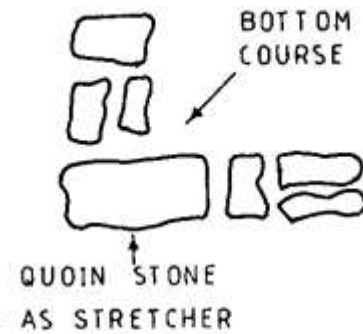
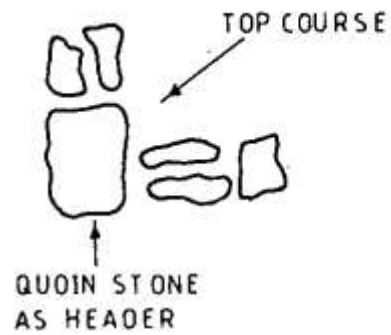
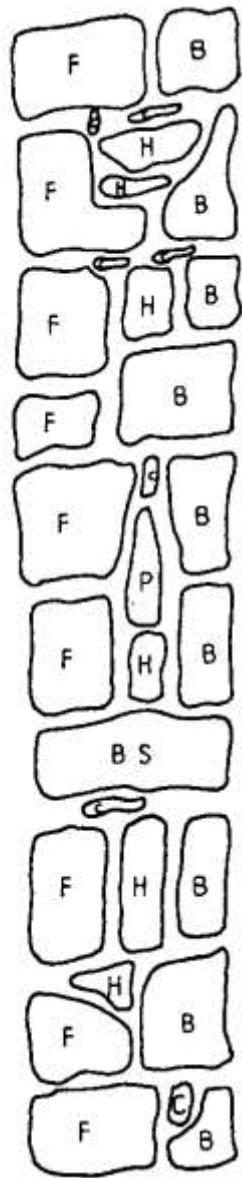


FIGURE 3 - VARIOUS STONES USED IN RANDOM RUBBLE MASONRY

- B - BACKING STONE
- H - HEARTING STONE
- P - PLUM STONE
- BS - BOND STONE
- C - CHIP STONE
- F - FACING STONE

Masonry Joints

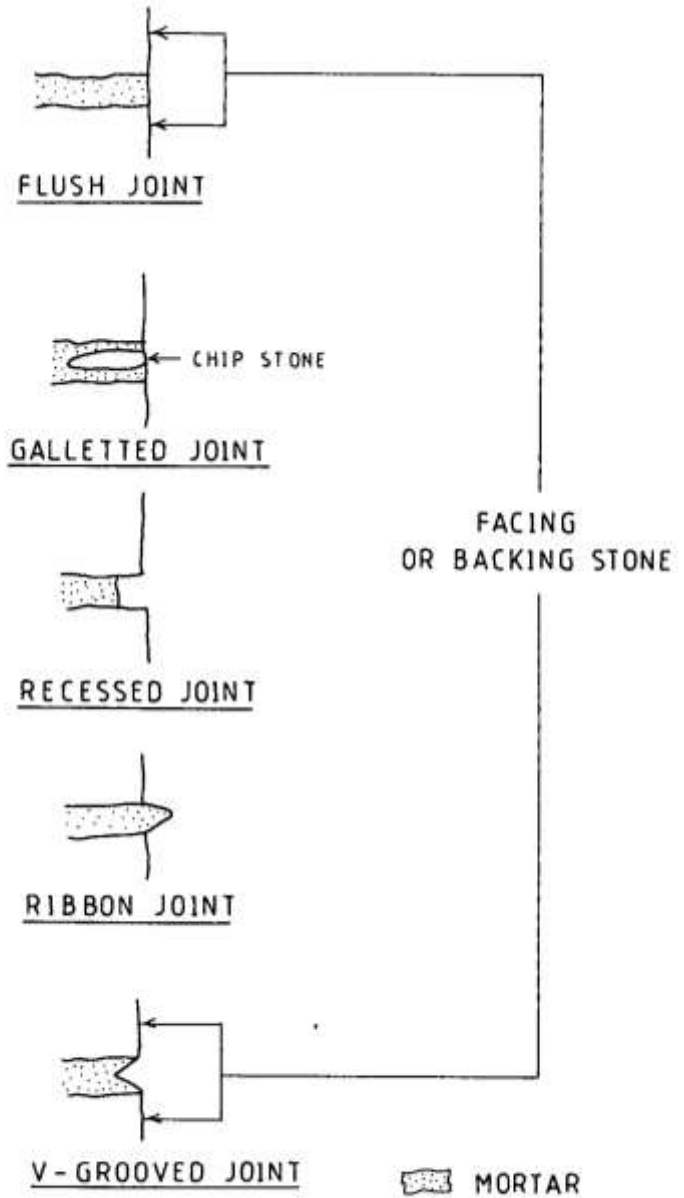
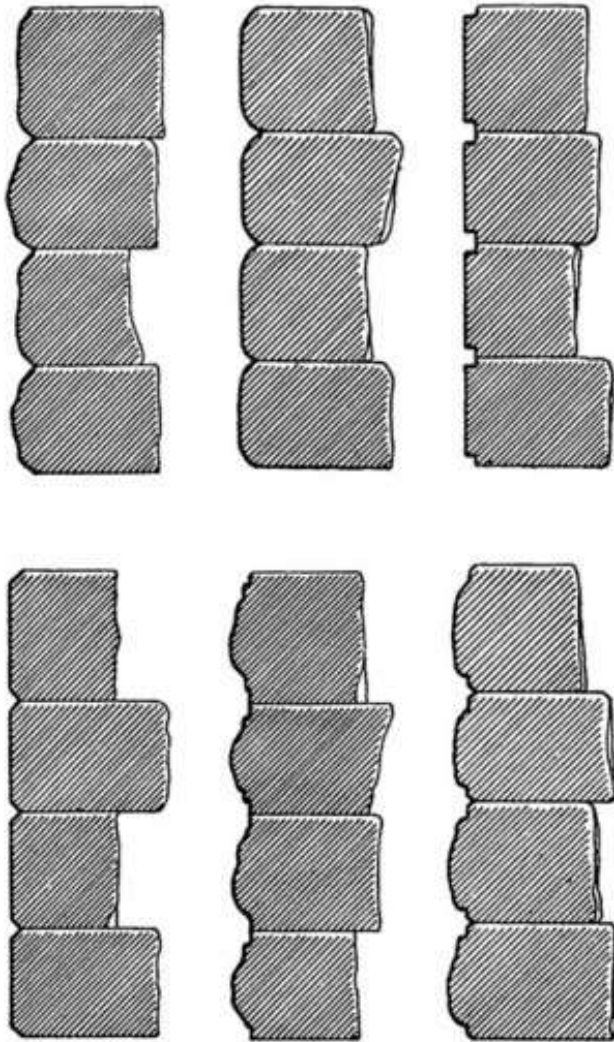


FIGURE 2 - VARIOUS JOINTS IN A RANDOM RUBBLE MASONRY WALL

Types of Stone Masonry:

Based on the arrangement of the stone in the construction and degree of refinement in the surface finish, the stone masonry can be classified broadly in the following two categories

1. Rubble masonry
2. Ashlar masonry

1) Rubble masonry:

In this category, the stones used are either undressed or roughly dressed having wider joints. This can be further subdivided as uncoursed, coursed, random, dry, polygonal and bint.

- **(i) Uncoursed rubble masonry:** This is the cheapest, roughest and poorest form of stone masonry. The stones used in this type of masonry very much vary in their shape and size and are directly obtained from quarry. Uncoursed rubble masonry can be divided into the following.

- a) Uncoursed random rubble
- b) Uncoursed squared rubble

Uncoursed rubble masonry

- *a) Uncoursed random rubble masonry*: The weak corners and edges are removed with mason's hammer. Generally, bigger stone blocks are employed at quoins and jambs to increase the strength of masonry.

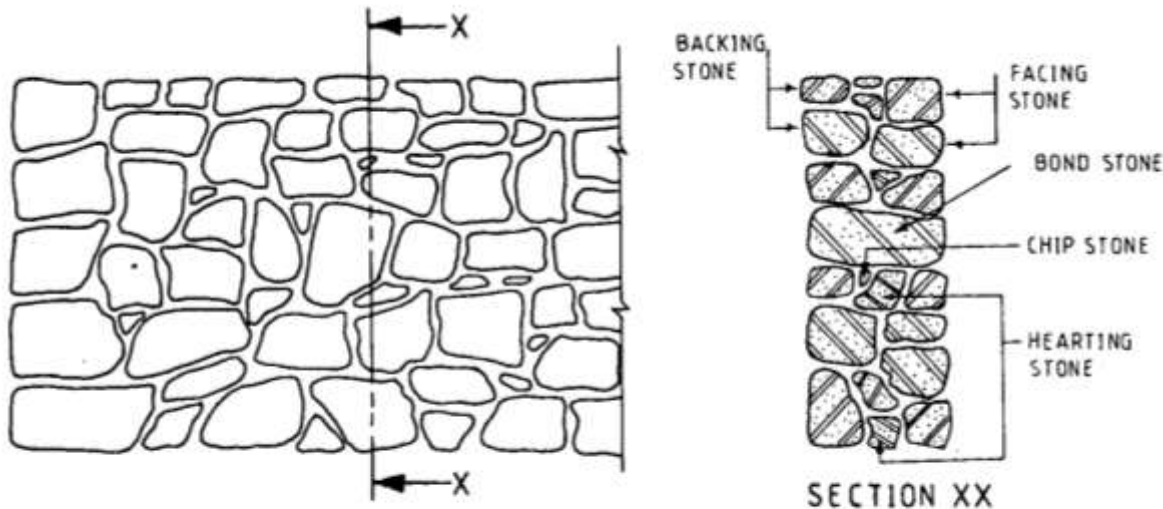
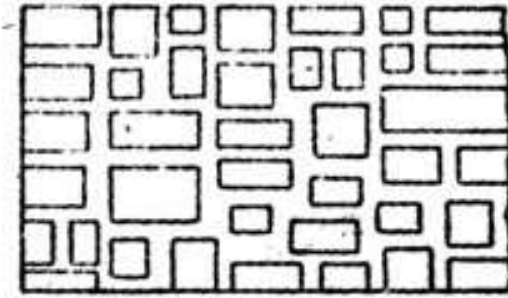


FIGURE 1-RANDOM RUBBLE MASONRY

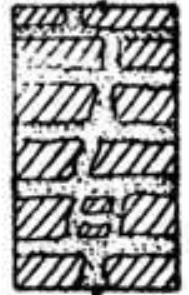
Uncoursed rubble masonry

- ***b) Uncoursed squared rubble:***

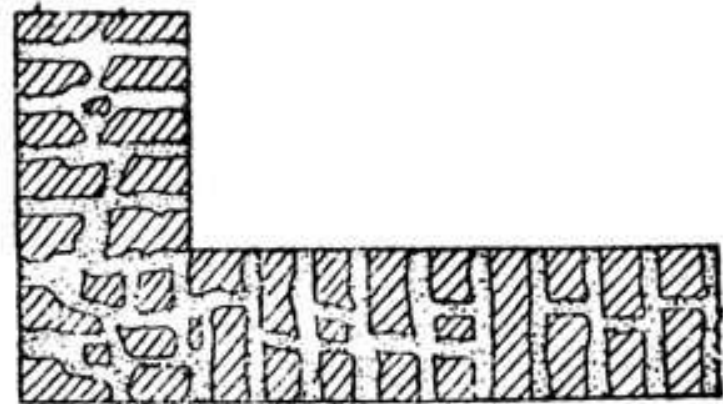
In this type the stone blocks are made roughly square with hammer. Generally the facing stones are given hammer-dressed finish. Large stones are used as quoins. As far as possible the use of chips in bedding is avoided.



Elevation



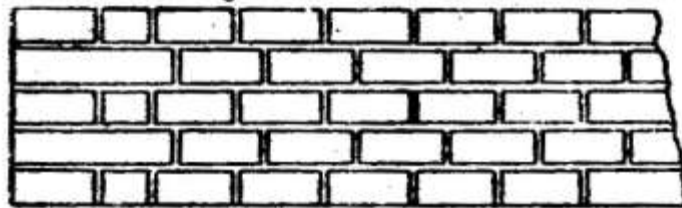
Section



Plan

Regular Course

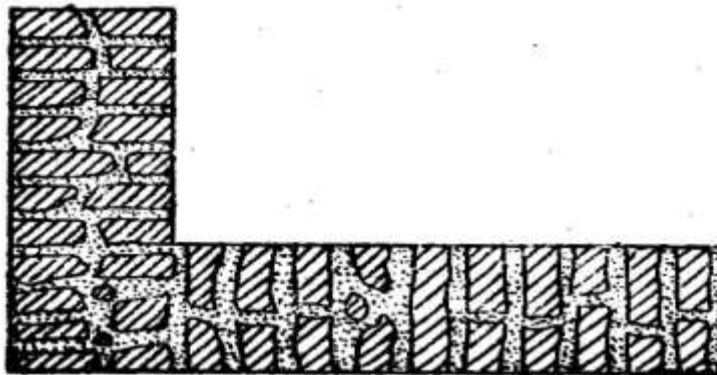
- *(iv) Built to regular course:* In this type of stone masonry the uniform height stones are used in horizontal layers not less than 13cm in height. Generally, the stone beds are hammered or chisel dressed to a depth of at least 10cm from the face. The stones are arranged in such a manner so that the vertical joints coincide with each



Elevation



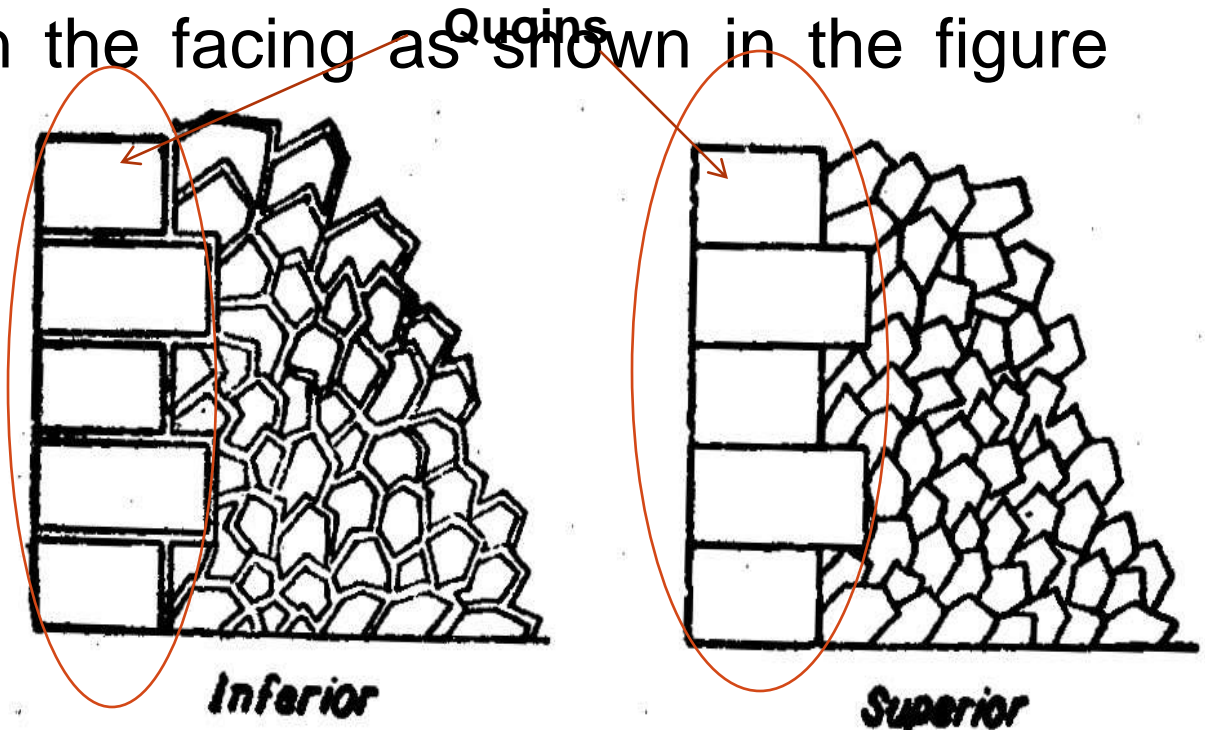
Section



Plan

coincide

- *(v) Polygonal rubble masonry:* In this type of masonry the stones are roughly dressed to an irregular polygonal shape. The stones should be so arranged as to avoid long vertical joints in face work and to break joints as much as possible. Small stone chips should not be used to support the stones on the facing as shown in the figure



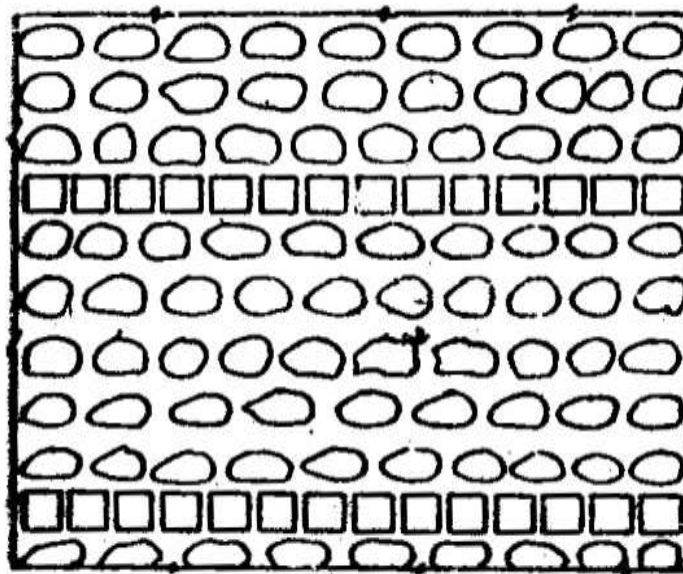
Inferior

Superior

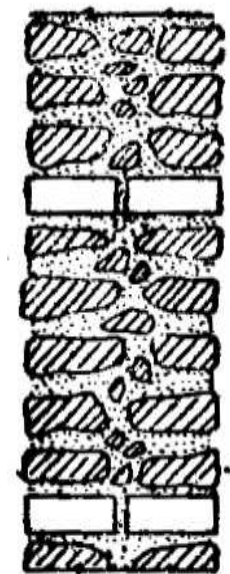
Flint rubble masonry

- *(vi) Flint rubble masonry:* This type of masonry is used in the areas where the flint is available in plenty.\

The flint stones varying in thickness from 8 to 15cm and in length from 15 to 30cm are arranged in the facing in the following manner as shown



Elevation



Section

Dry rubble masonry

- This type of masonry is used in the construction of retaining walls pitching earthen dams and canal slopes in the form of random rubble masonry without any mortar. The hallow spaces left around and stones should be tightly packed with smaller stone pieces as shown below.



Ashlar Masonry

- This type of masonry is built from **accurately dressed stones with uniform and fine joints** of about 3mm thickness by arranging the stone blocks in various patterns.
- The backing of Ashlar masonry walls may be built of Ashlar masonry or rubble masonry. The size of stones blocks should be in proportion to wall thickness.

Ashlar Masonry

- The various types of masonry can be classified under the following categories are
 - 1) Ashlar fine
 - 2) Ashlar rough
 - 3) Ashlar rock or quarry faced
 - 4) Ashlar facing
 - 5) Ashlar chamfered
 - 6) Ashlar block in course

Ashlar Masonry



Ashlar fine

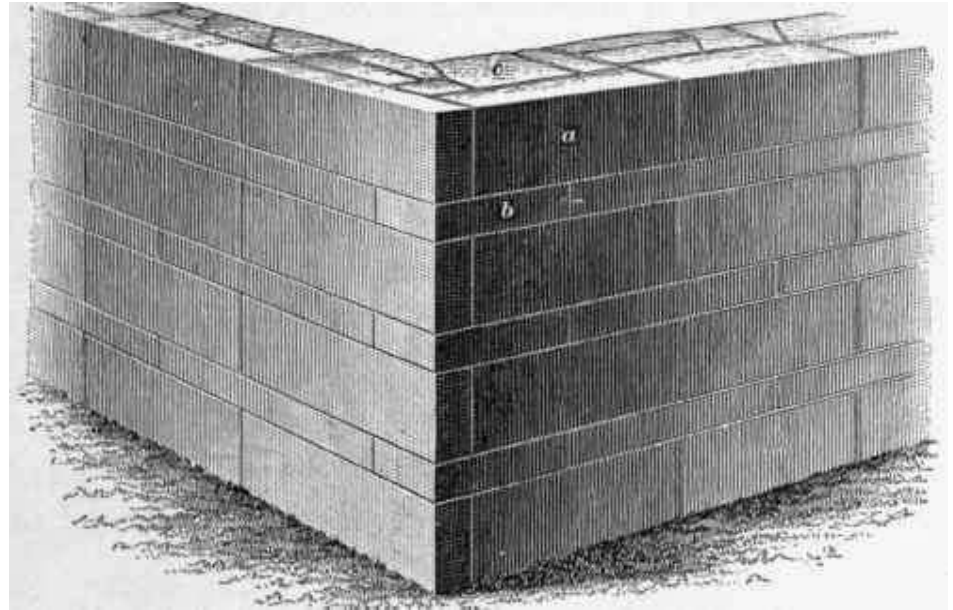


Ashlar rough

Ashlar Masonry

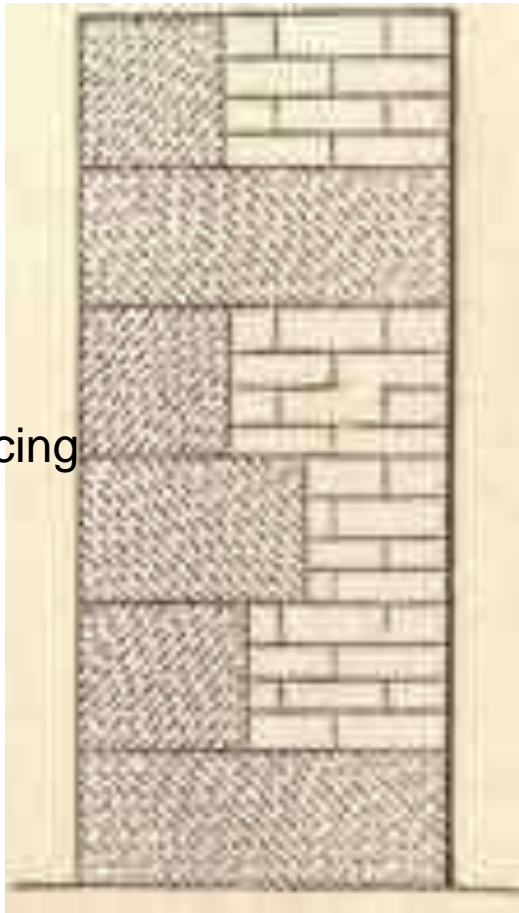


Ashlar rock or quarry faced



Ashlar block in course

Ashlar Masonry



Facing

Ashlar facing



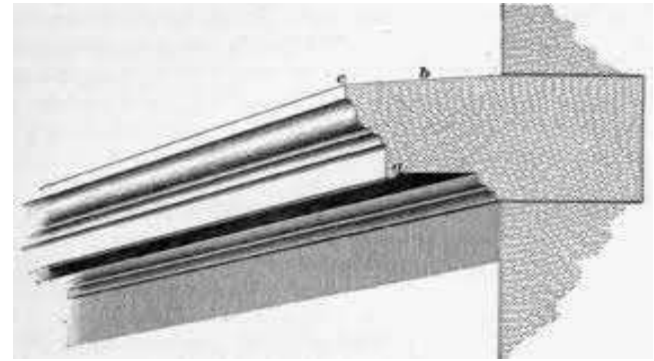
Ashlar chamfered

Cornice

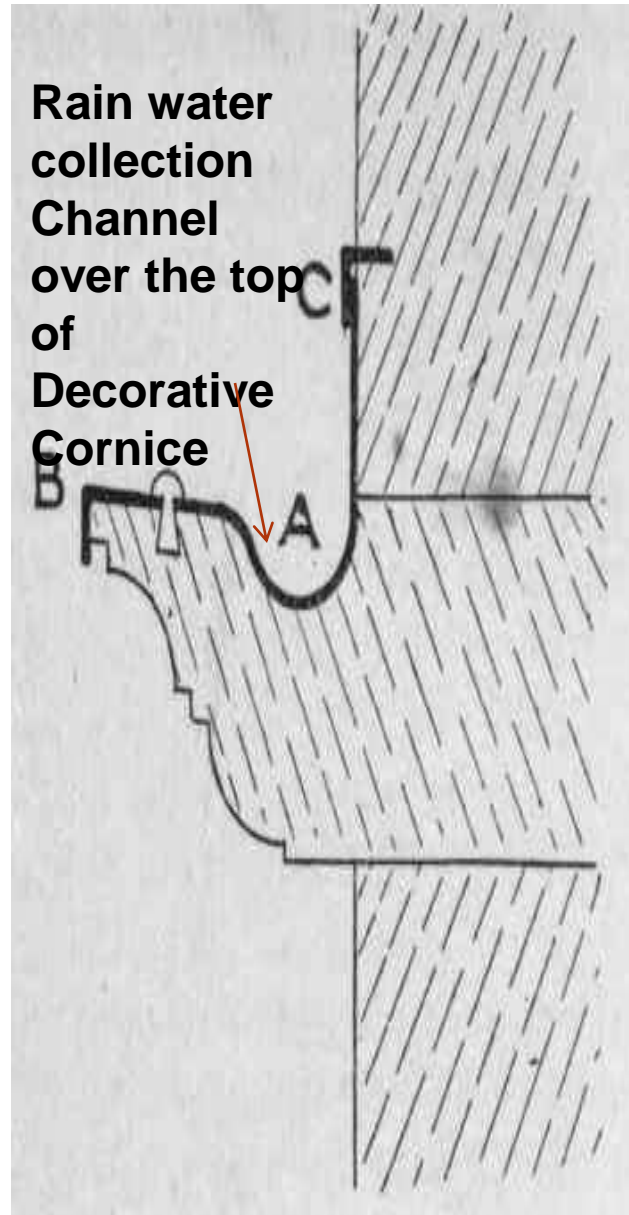
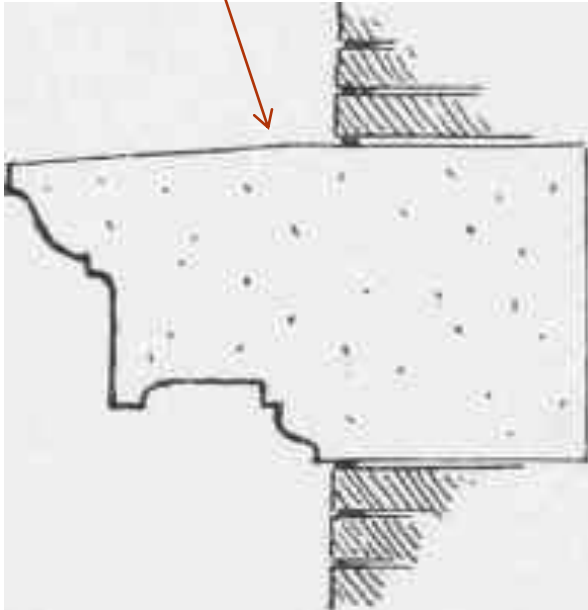
- A **cornice** (from the Italian *cornice* meaning "ledge") is generally any horizontal decorative molding that crowns a building or furniture element—the cornice over a door or window, for instance, or the cornice around the top edge of a pedestal or along the top of an interior wall.
- The function of the projecting cornice of a building is to throw rainwater free of the building's walls.





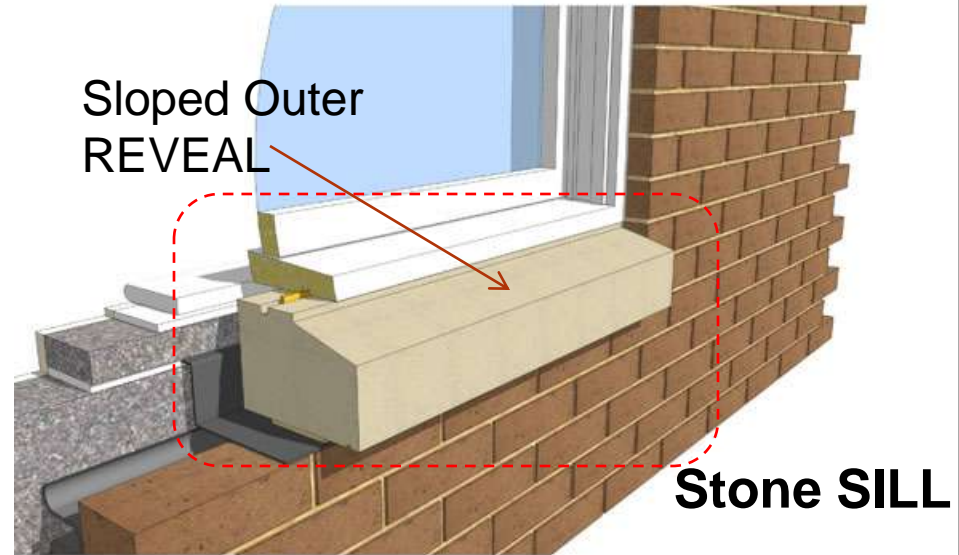


**Slope to Drain
off Rain water**



Decorative Cornice

SILLS





**Chamfered
Quoins**



Stone Sill



Edge Drop

**Rubble
Masonry
Wall**



Min 25Cm
Overlap into the
abutting masonry





**Sill as a Ledge
in the Interior**



PLINTHS





Traditional Plinth



Plinth in Random Rubble Masonry to receive A Load-Bearing wall Above.



Plinth Platform



Conventional Plinth in Rural Areas

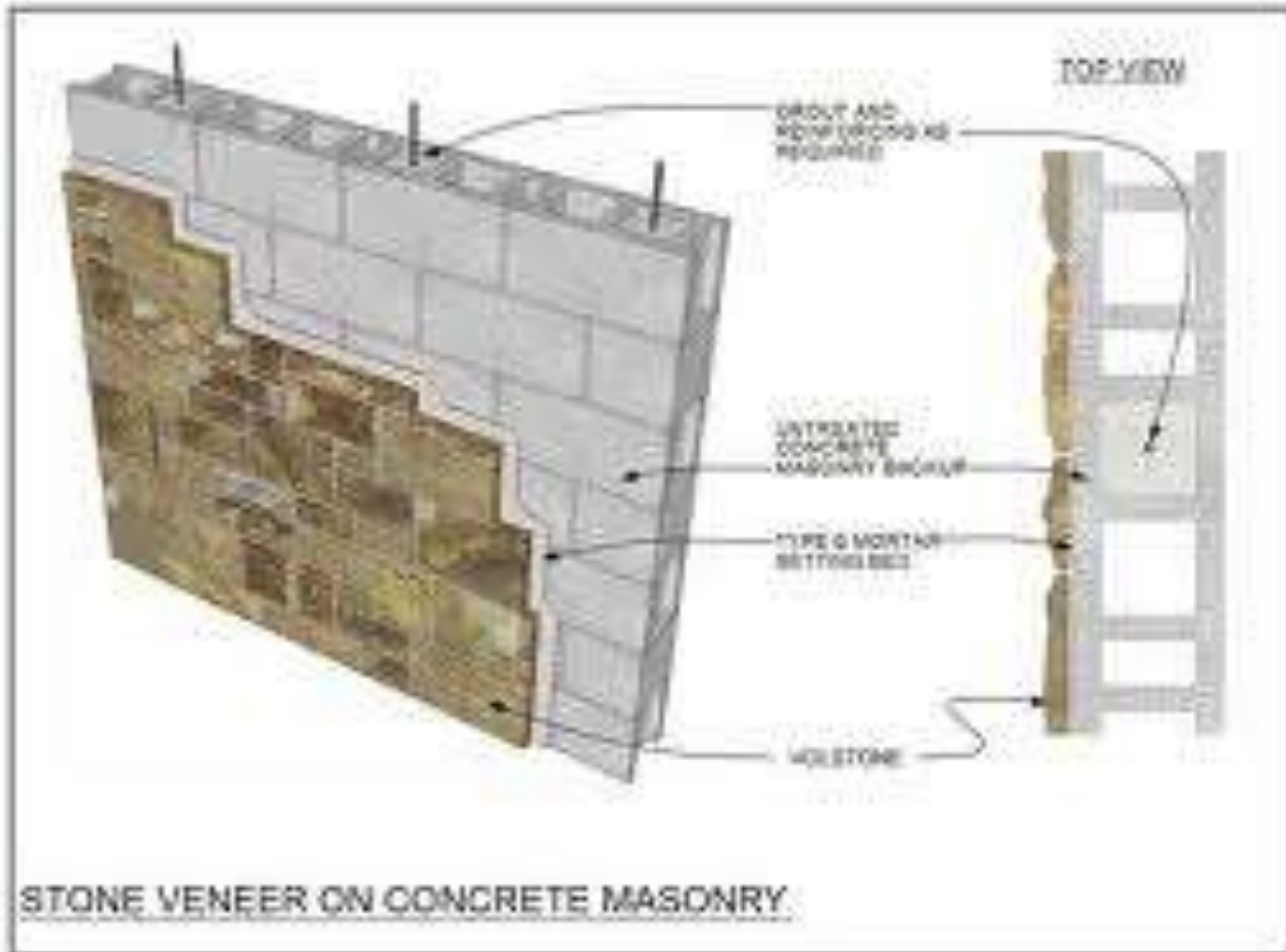


Cladding









STONE VENEER ON CONCRETE MASONRY.

Thank You