4.63 Concrete Masonry

Walls constructed with stones, bricks, tiles, blocks, or concrete blocks bonded together with cement mortar are described as masonry construction. This type of construction is popular because it is durable, fire resistance, low in maintenance and attractive in appearance. It is not affected by high humility, termites and most agricultural products and wastes. However because it is more porous and more subject to cracking than concrete, it is difficult to make it water tight. Out of the aforementioned masonry units, the concrete block is the most common for Agricultural use; these block come in number of different shapes and sizes.

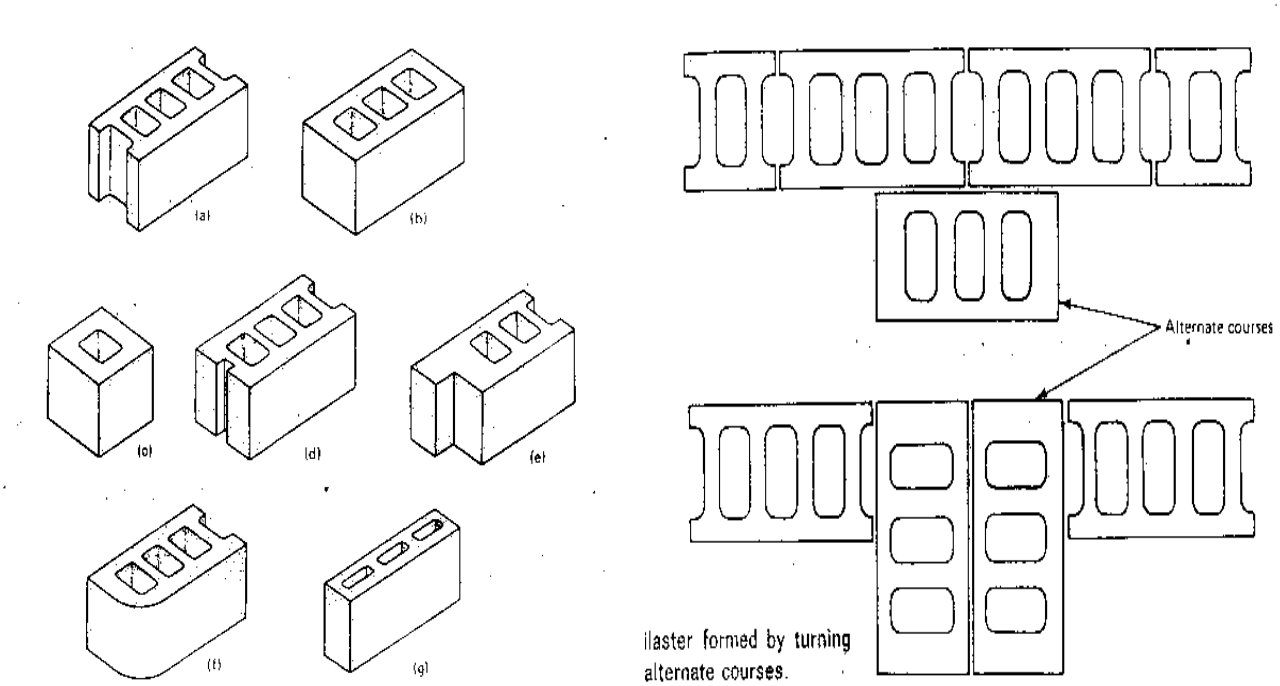

Figure 6: Shapes of concrete blocks and arrangements

4.6.3.1. Dimensioning BLOCK WALLS:

In designing a building to be constructed of concrete masonry units, it is desirable to make all dimensions divisible by 200 mm (8''). This will allow construction without the need to cut blocks, an economy of both materials and labour. Cut pieces of block also detract from the appearance of the wall. Block walls have limited lateral strength which determines the recommended unsupported length and height. 8'' (200mm) blocks may be used in walls up to 12' (3.6m) high if no more than 7' (2m) is below

grade in well-drained soil. Higher walls should be constructed with 12" (300mm) blocks although the top 12' (3.6m) may be of 8" (200mm) units. No block wall should be more than 35' (10m) high.

5.0 LINTELS AND SILLS.

Lintels are reinforced concrete beams used over doors, windows and other openings. Concrete sills below windows prevent water from seeping into the cores of the blocks. Water running off the windows is directed away from the wall to prevent streaking. Sills may be precast or cast on the site.

6.0 ROOF ANCHORAGE:

This is where the roof is anchored to the wall, this joint is subject to severe strain during high winds. A rigid connection between the roof and the wall furnishes lateral support to the walls and prevents high winds from lifting off the roof. It is common nowadays to have a head coach with 10mm steel rods inserted at regular intervals and used to hold down the rafters and trusses. In developed countries, it is common to use bolts to fasten the roof to the walls. The bolts are inserted into the core of every third block, extending down through two courses. The core area containing the bolts is filled with concrete to ensure good anchorage. After the concrete has hardened, the roof plate is placed and fastened securely to the wall. Rafters and trusses can then be attached to the plate with framing anchors.

7.0 LAYING BLOCK WALLS

Blocks should be well cured and dry before use. After delivery on the job, the blocks should be stored on a dry base, covered and not wetted prior to laying them in a wall. Cracking in the wall results from the shrinkage that occurs when damp blocks dry out. The wall should be started on a good concrete footing installed on firm, undisturbed, well-compacted soil. In laying masonry walls, mortar is placed between the ends of adjoining blocks and between the courses of adjoining blocks. The first course of blocks is laid in full mortar bedding placed on the footing. Succeeding courses are laid with face shell joints (mortar along the edges of the blocks only). All the joints should be tooled to compress the mortar, leaving it neat and compact.

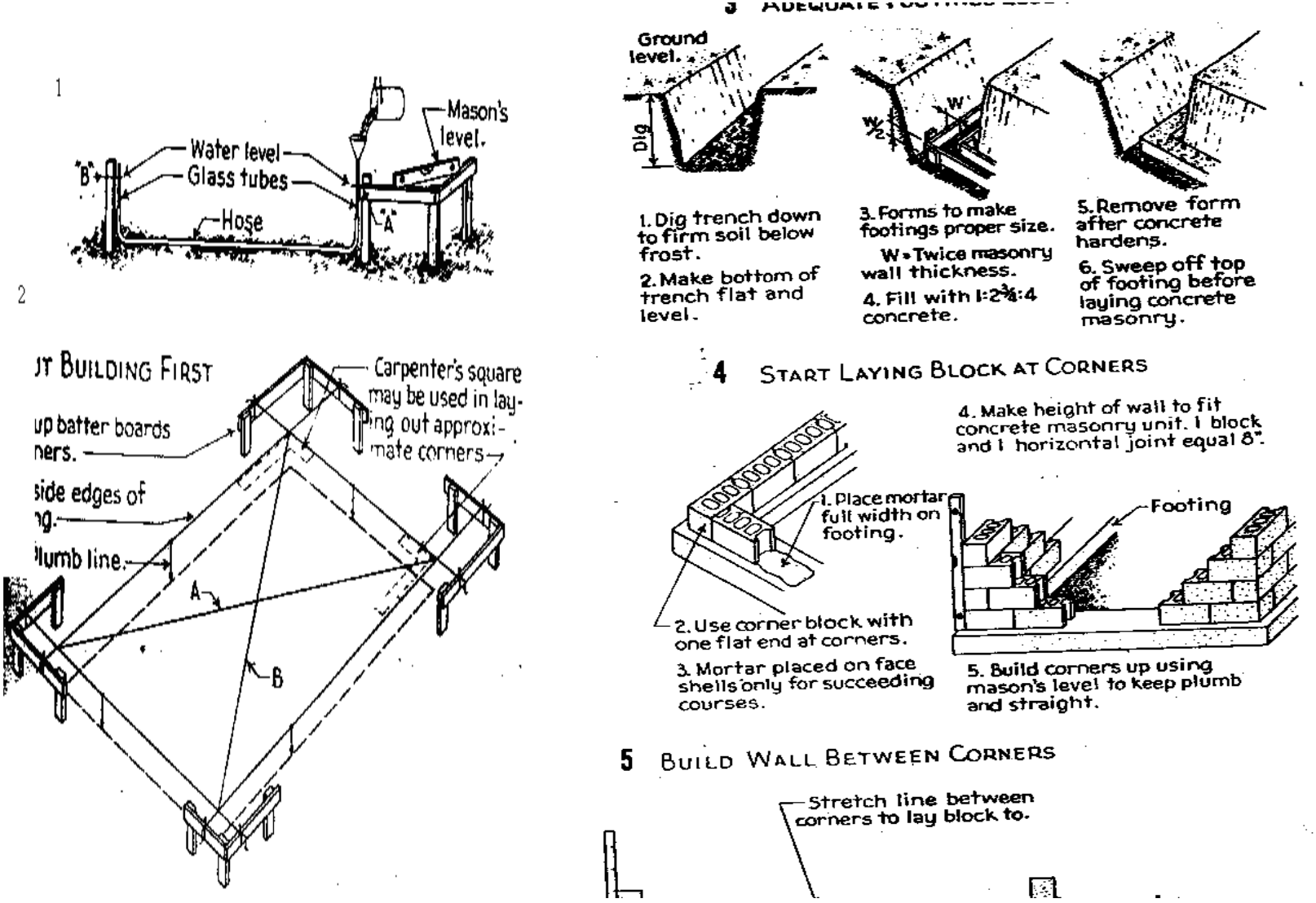

Figure 7: Steps in the building of masonry walls

8.0 ROOF FRAMING

Upon completion of block walls of buildings, the next stage is to design and construct the roof frames. Roof frames must be designed to withstand live loads expected for that locality and the dead load imposed by the framing, roof deck and roofing materials. It is pertinent to carefully fit all the joints in order to avoid reduced rigidity of the roof frame.

Roof frames differs from one another in terms of purpose of building, aesthetics and cost. Common examples of roof shapes are outlined below:

- **Flat roofs**: These are simple to construct with clear spans of 5m using roof joints. Greater spans are possible by using flat trusses. Being flat, they require a built – up asphalt or felt covering which may be expensive than others.
- **Shed roofs**: Shed roofs are inexpensive and like a flat roof, they can have a span of 5m without resorting to truss construction. A less expensive roof covering may be used.
- **Gambled roofs**: These are medium in cost, easy to construct, and the most common. Depending on the pitch, several different roof covering are satisfactory. A medium – pitch gable roof is one of the most wind resistant shapes available. Clear span of 7 – 8m are feasible with plain rafters while trusses may be used for greater widths.
- **Hip Roofs**: Hip roofs are most often chosen for their appearance. The framing and roofing are more complicated and expensive. Attic ventilation is more difficult than with a gabble roof.
- **A-frame roofs**: This type of roof is just an architectural novelty, because of their shape, outside maintenance is largely restricted to roof covering while at the same time usable floor space is restricted by the sloping walls. This type of roof is not common in Nigeria.
- **Combination roofs**: Sometimes called “offset gable”, these roofs are often used on building that are open on one side. Depending on the requirements, the high side may be left open to provide maximum clearance or the low side may be left open for maximum weather protection.
- **Monitor or Semi monitor roofs**: Although more expensive to construct, these may be chosen if a considerable amount of natural light is required near the centre of the building. In widths up to 11m, ventilation is adversely affected.
- **Gambrel roofs**: Barns with gambrel roofs came into use to provide greater storage space than was easily obtainable with gable roofs. They are expensive and have uneven roof deterioration, and are subject to greater wind forces.
- **Arched roofs**: They vary in shape from semi circular to high gothic. The choice height and shape depends on the space required.

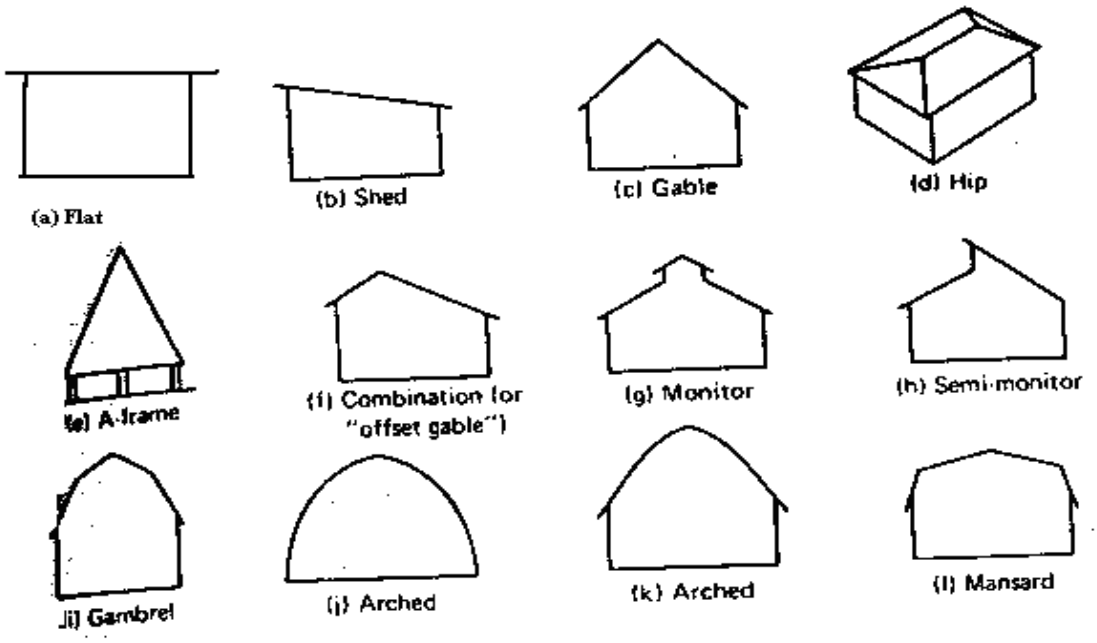

Figure 8a: Types of Roof Shapes

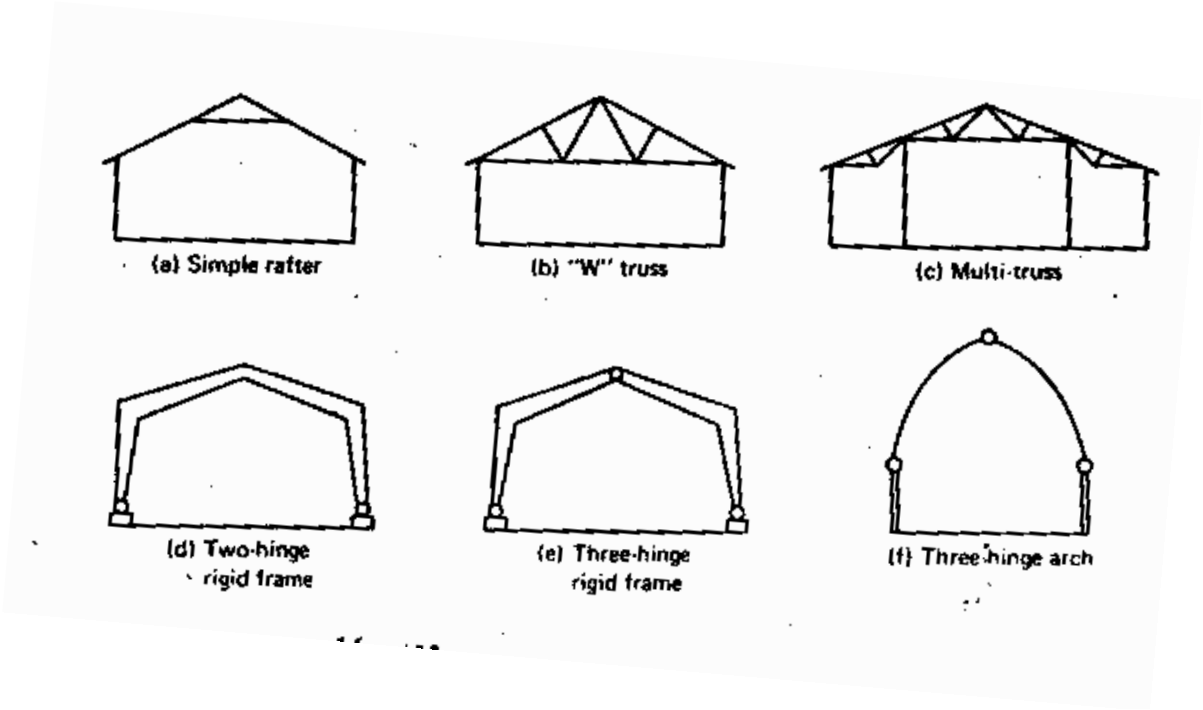

Figure 8b: Common Roof Frames