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- **UNIVERSITY OF GONDAR**
- **FACULTY OF TECHNOLOGY**
- **DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND MANAGEMENT**
 - *Building Construction II*
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CHAPTER 1

Vertical circulation

- ❑ Circulation, as usually applied in architecture, is the movement of people and goods between interior spaces in buildings and to entrances and exits.
- ❑ Vertical circulation of traffic in a multistory building is the key to successful functioning of the design, both in normal use and in emergencies.

CLASSIFICATION OF VERTICAL CIRCULATION SYSTEMS

- It divided into two
Classes.

Class I systems

are intended for movement of both people and goods and include

- ramps,
- stairs,
- escalators,
- and elevators

Class II systems,

in contrast, may not be used for movement of people

- including
- Dumbwaiters
- and vertical conveyors;

1.Ramps

- When space permits a sloping surface or ramp can also connect different levels or floors.
- To save space in some buildings floor may serve as a ramp
- Ramps are especially useful when large numbers of people or vehicles have to be moved from floor to floor. So they are frequently adopted for public buildings, such as railroad stations, stadiums, and exhibition halls.

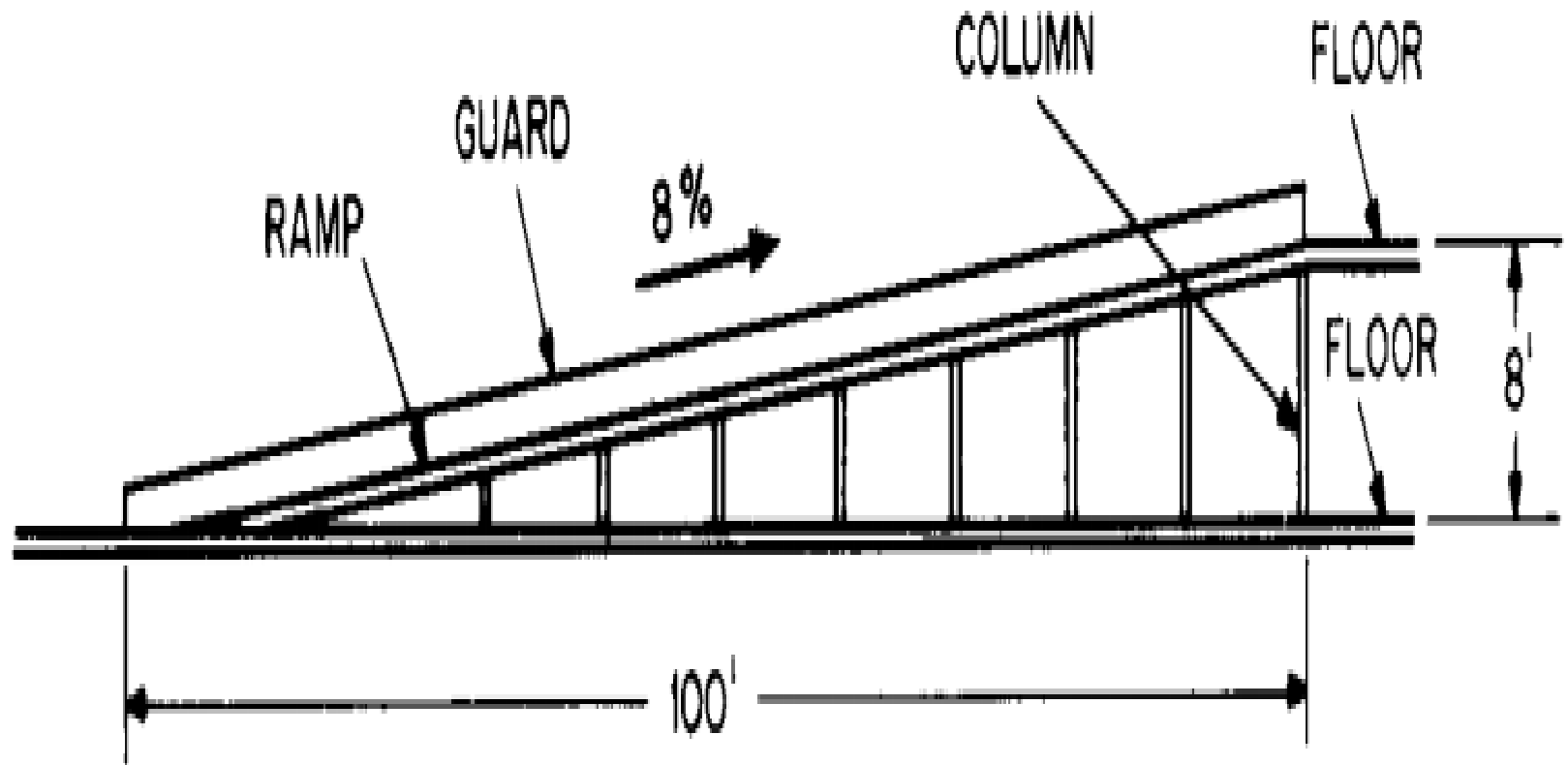
CONT...

- they are either legally required or highly desirable for all buildings, especially to accommodate persons in wheelchairs.
- ramps should be constructed with a nonslip surface.
- Short, straight ramps act as beams and may be constructed as wood, steel, or concrete floor systems.
- Long or curvilinear ramps are usually of steel or reinforced concrete
- Ramps have been built with slopes up to 15% , but 8% is a preferred

Cont...

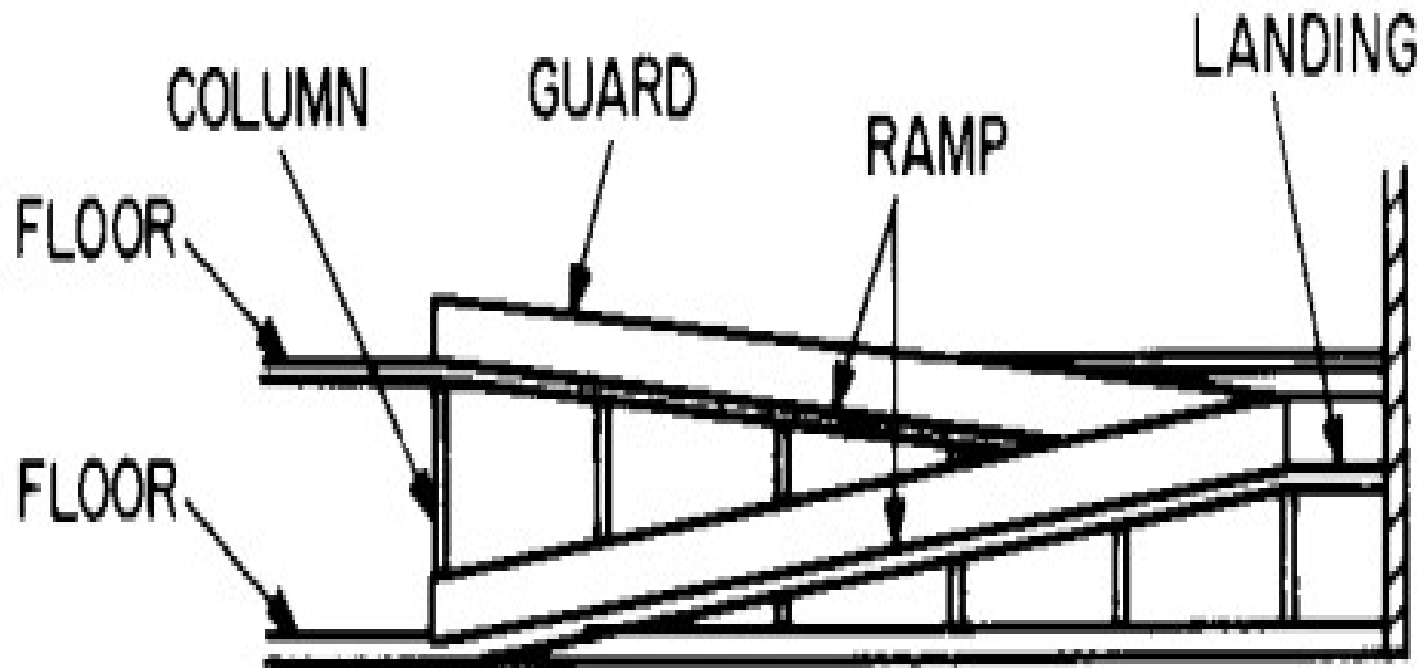
- they are either legally required or highly desirable for all buildings,
- especially to accommodate persons in wheelchairs. In all cases, ramps should be constructed with a nonslip surface.
- Ramps have been built with slopes up to 15% (15 ft in 100 ft), but 8% is a preferred maximum

straight ramp



(a)

Zigzag ramp



(b)

ELEVATOR

- An **elevator** is a hoisting and lowering mechanism equipped with a car or platform that moves along guides in a shaft, or hoist way, in a substantially vertical direction and that transports passengers or goods, or both, between two or more floors of a building

CONT...

- **Passenger elevators** are designed primarily to carry persons.

Hospital elevators are also passenger elevators but employ special cars, suitable in size and shape for transportation of patients in stretchers or standard hospital beds and of attendants accompanying them.

Freight elevators carry freight, which may be accompanied only by an operator and persons necessary for loading and unloading it.

CONT...



Elevators travel vertically to carry passengers, equipment's and freight from one level of the building to another,

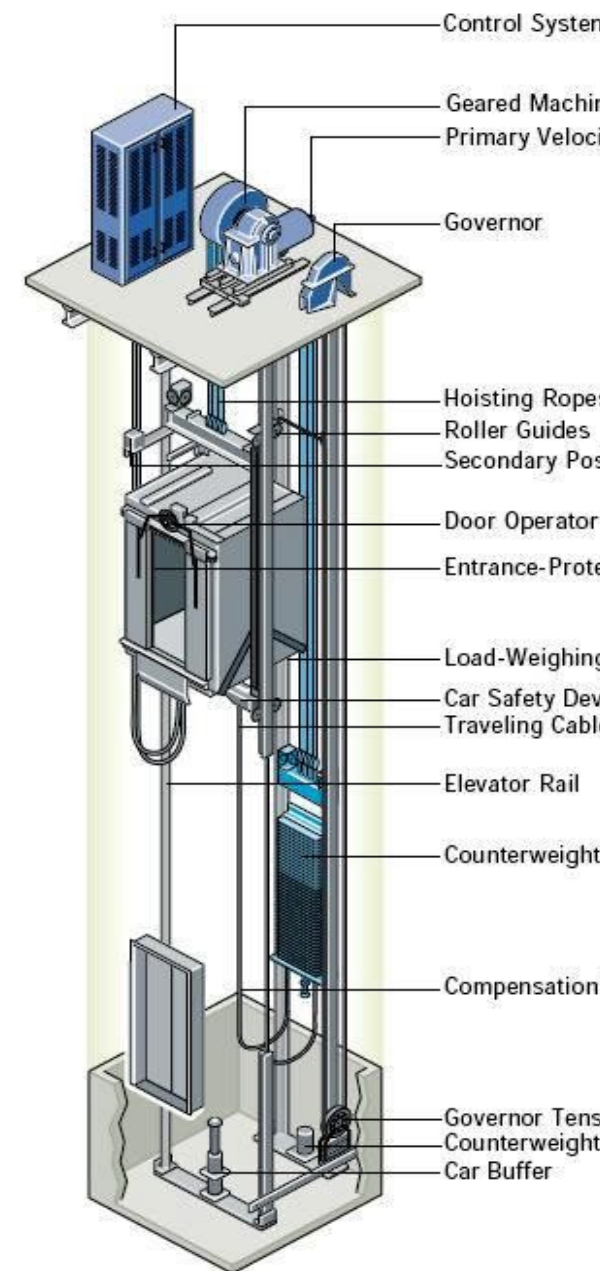
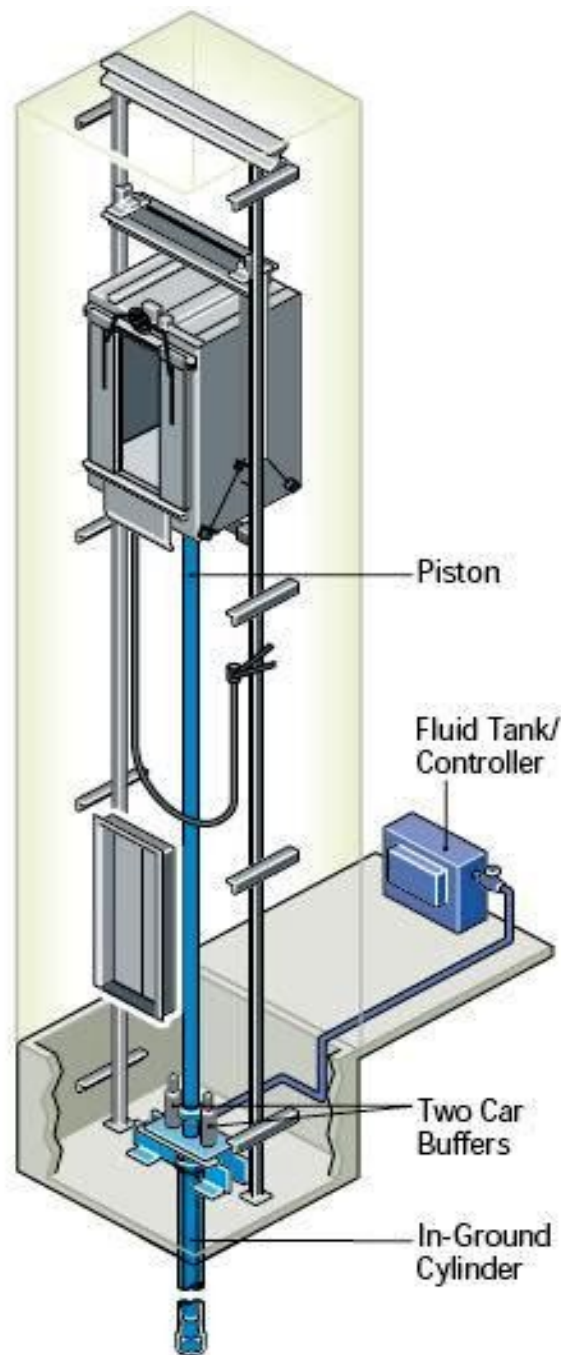
The two most common types are electric and hydraulic elevator.

1) Electric elevator:

- Consist of a car that is mounted on guide rails supported by hoisting cables, and driven by electric hoisting machinery in a pent house.

2) Hydraulic elevator:

- Consist of a car supported by a piston that is moved by or moves against a fluid under pressure.
- The type, size, number, speed and arrangement of elevators are determined by;



ESCALATORS



- Escalators, or powered stairs, are used when it is necessary to move large numbers of people from floor to floor.
- They provide continuous movement of persons and can thus remedy traffic conditions that are not readily addressed by elevators.
- Escalators should be viewed as preferred transportation systems whenever heavy traffic volumes are expected between relatively few floors
- Escalators are used to connect airport terminals, parking garages, sports facilities, shopping malls, and numerous mixed-use facilities.
- Escalators are typically used in pairs with one going up and other going down

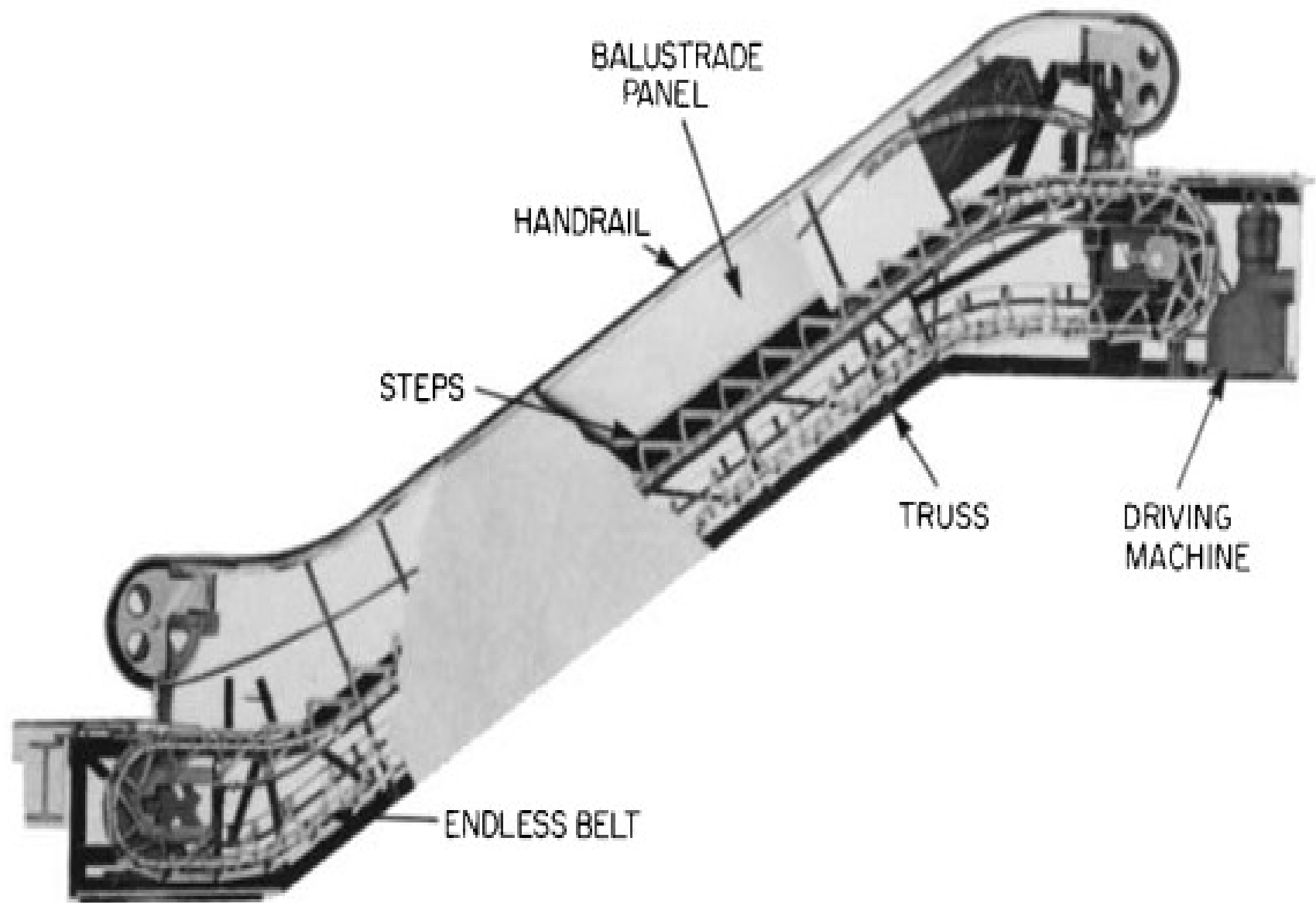


FIGURE Details of a straight escalator. (*Courtesy of Otis Elevator Co.*)

chapter two

balconies, terrace ,verendah and loggia

It is first useful to define the terms.

- **Balconies:** Refers to an "open-air" platform projecting from the interior or exterior wall of a building and enclosed by a rail.
- **Veranda:** is a porch (covered exterior space) that extends along an outside wall of a building.

Cont...

- □ **Loggia**: Refers to a covered walkway that is open on one side usually with arches running along the side of a building.
- **Terrace**: is a term used in conjunction with many things, however here for our purpose it gives two meanings.
 - A flat exterior living space area paved or partially green (grassy) outside a building but on the same level as the inside.

BALCONIES

BALCONY Concrete



BALCONY :-TIMBER MADE



BALCONY



Encarta Encyclopedia, Courtesy of Jennifer Hedeon



Encarta Encyclopedia, Western Pennsylvania Conservancy/Art Resource, NY

FLAT BALCONY



POP OUT BALCONY

LOGGIA



VERANDA



TERRACE



BALCONY VS TERRACES

- Although a balcony and terrace serve almost similar purposes, there are a lot of differences between the two
- A terrace is an entirely open and large space , whereas balconies are relatively smaller areas affixed to a room of the house.
- A balcony may or may not be covered depending upon the construction of the house. Some balconies extend much further than the periphery of the plot and are hence open spaces; others are contained within the framework of a house with a covering on the top.
- Balconies are accessible only through the room that they are attached with and terraces will usually have independent entrances.

BALCONIES

PURPOSE: Balconies are constructed on a building when an external open-air space connected to upper rooms is desired

CONSTRUCTION TECHNIQUE: Balconies are structural floors and can be constructed out of materials that are also suitable to Floor Construction. Structurally Balconies may be constructed in a number of ways:

- The structural floor construction is continued through and outside the outer wall.
- The structural balcony is secured to the floor joists.
- The balcony construction is built quite independent of the floor joists.
- The balcony construction is secured to the wall by brackets and tie Rod Bracing.
- The balcony structure is secured to the wall by a support from the vertical wall or the floor below.

Canopy

- means any structure which projects more than 500 mm from any wall of any building and at a height of not more than 7.5 m above the level of the ground to provide protection from rain or sun, not carrying any floor load, either cantilevered or supported by brackets

canopies over streets

- 1) Every canopy erected within 600 mm of the outer edge of a footpath, or projecting over a road, shall have a clear space of not less than 5.5 m beneath every part thereof.
- (2) Every canopy erected over a foot path shall have a clear space of not less than 3.3 m beneath every part thereof.
- (3) Every canopy shall be provided with adequate surface water drainage.
- (4) The maximum projection of any canopy (including cornices, moldings or other features) erected over any street shall be-

NOTE

Balcony is an added element to the main body of a building which usually juts out from its vertical face, while a **terrace** is an integral part of the building itself.

CHAPTER 3

FIRE PLACES

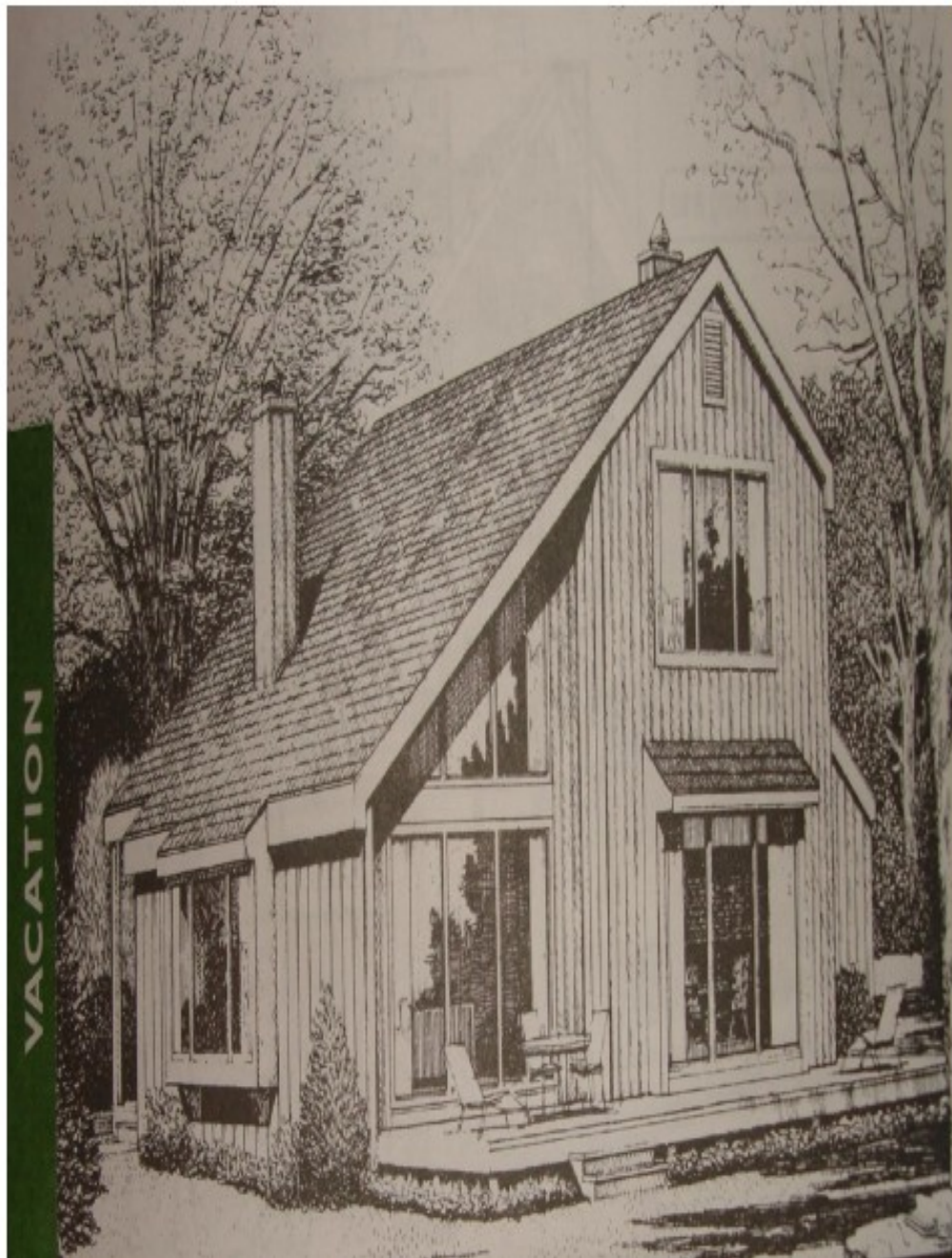
○ FIRE PLACES:

- The fire place has been the place where the open fire was burned in the house. The fireplace was a standard element in most houses until the advent of radiator heating systems as an affordable alternative. Recently the fire place has shown a revival for aesthetic reasons
- In Ethiopia, because of the favorable weather that rarely requires warming up the house, the fireplace is regarded as a luxury. Nevertheless it is still built in some houses and thus it is worthwhile to see the construction of a fire place.

○ MAIN PURPOSE:

- The Fire Place is designed to burn open fire and reflect most of the heat from the fire burning in to the room it serves as much as possible, while sending the smoke up wards through the roof into the open.

VACATION

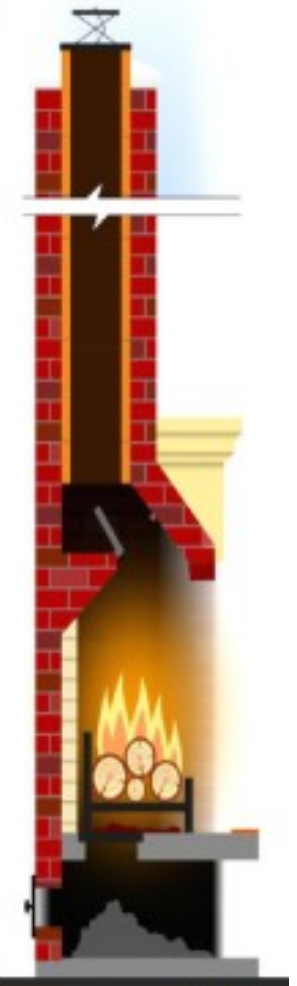




Dramatic Expanse
Of Windows

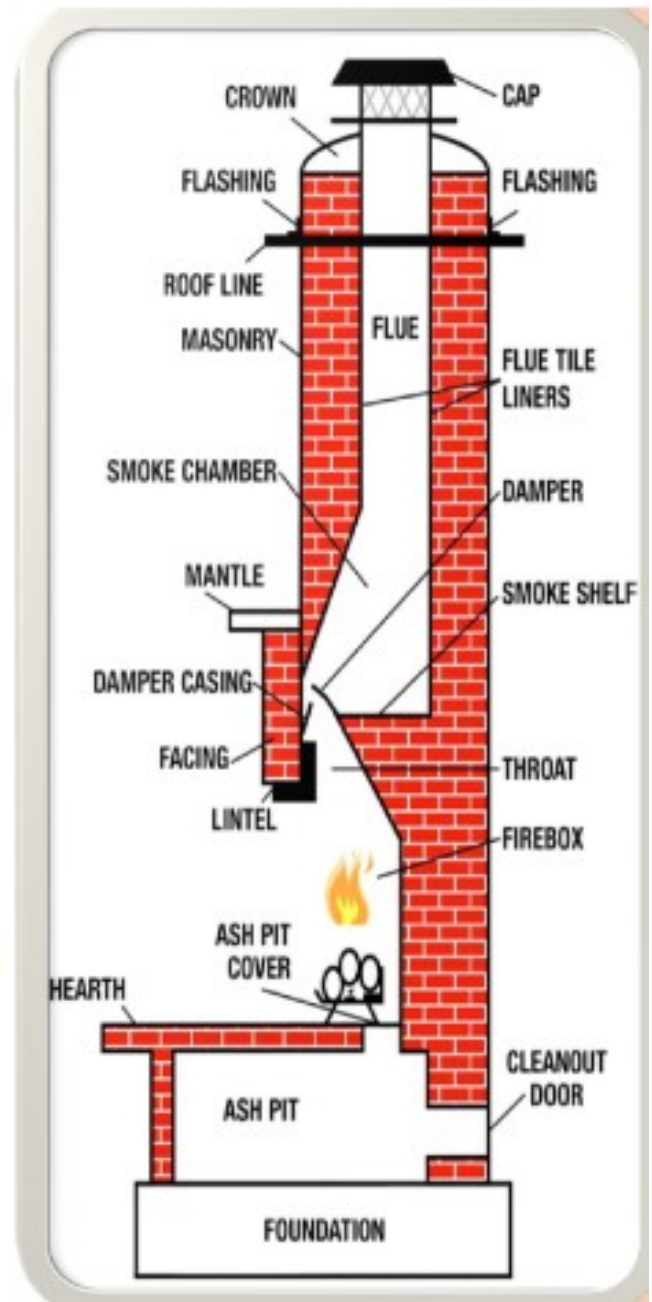
Second Floor

Fire Places and Chimneys



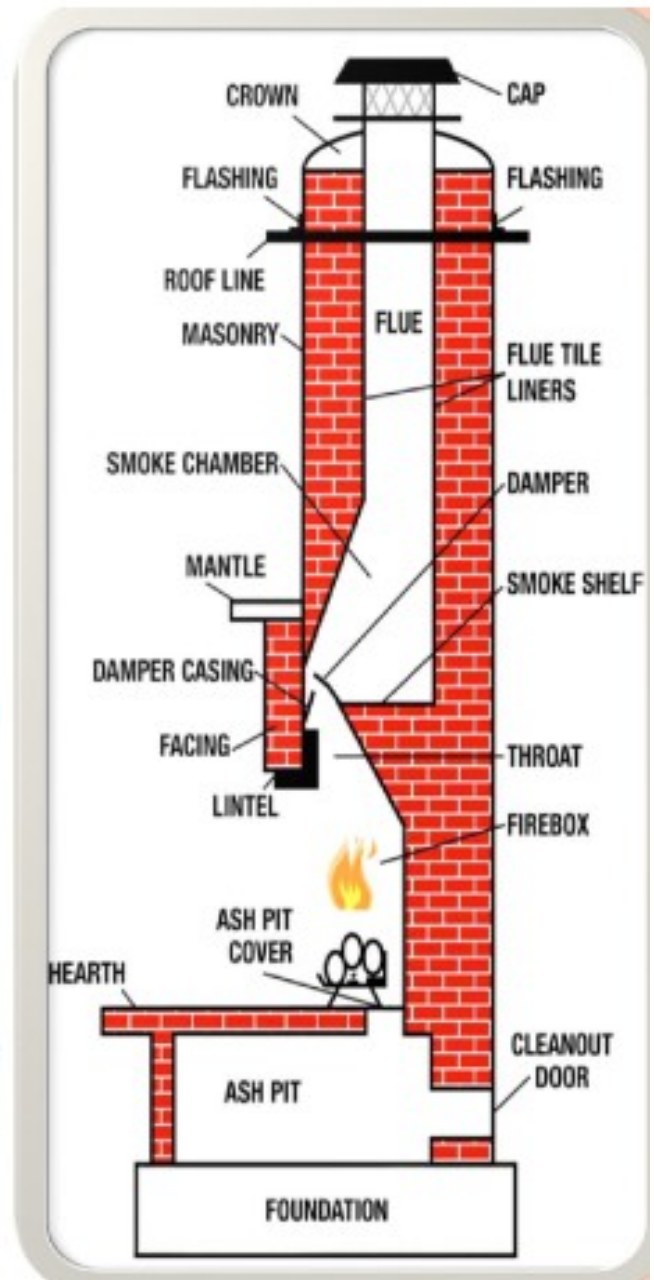
TERMS

- **Chimney:** is the solid vertical wall that covers the flue.
- **Flue:** is the slender vertical tube that takes smoke from the smoke chamber to the outside. Flue area (in plan) is proportionally related to flue height and the area of the fireplace opening. Flue termination must be located according to codes. As an exterior building part, it requires weatherproofing.
- **Smoke Chamber:** directs smoke from the fireplace into the flue by tapering up & in.
- **Throat:** passes smoke from the fireplace up into smoke chamber.



TERMS

- **Damper:** allows throat size adjustment from fully open to tightly closed.
- **Fireplace:** is where actual burning takes place, size and proportion of the fireplace determine size of other components of the fireplace/chimney system.
- **Hearth:** extends the fireplace floor beyond the opening to protect the room flooring from sparks, heat, and flame.
- **Ash Dump:** an open able louver in fireplace floor providing efficient ash removal. An external air intake may be installed in the ash pit wall to introduce outside air into the fireplace via the ash dump in order to improve combustion.



FIRE PLACES

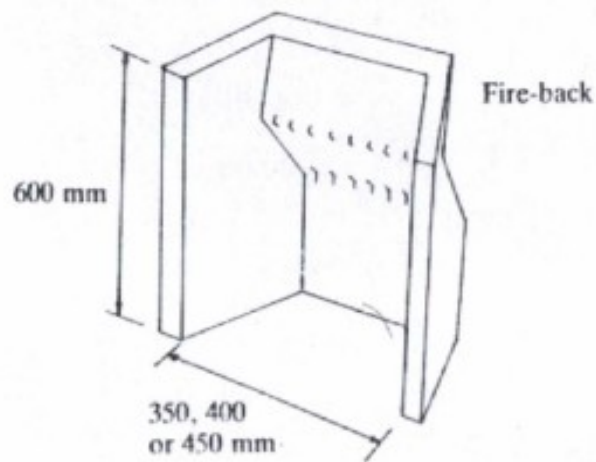
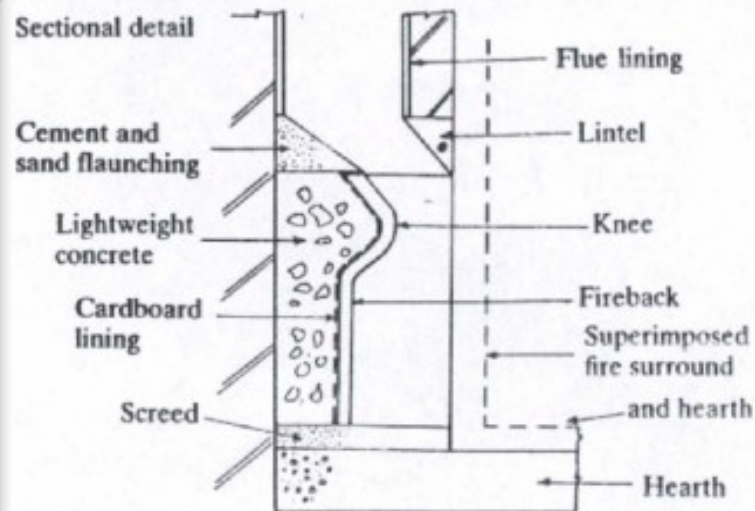


Fig. 8.6 Fireplace recess and fireback

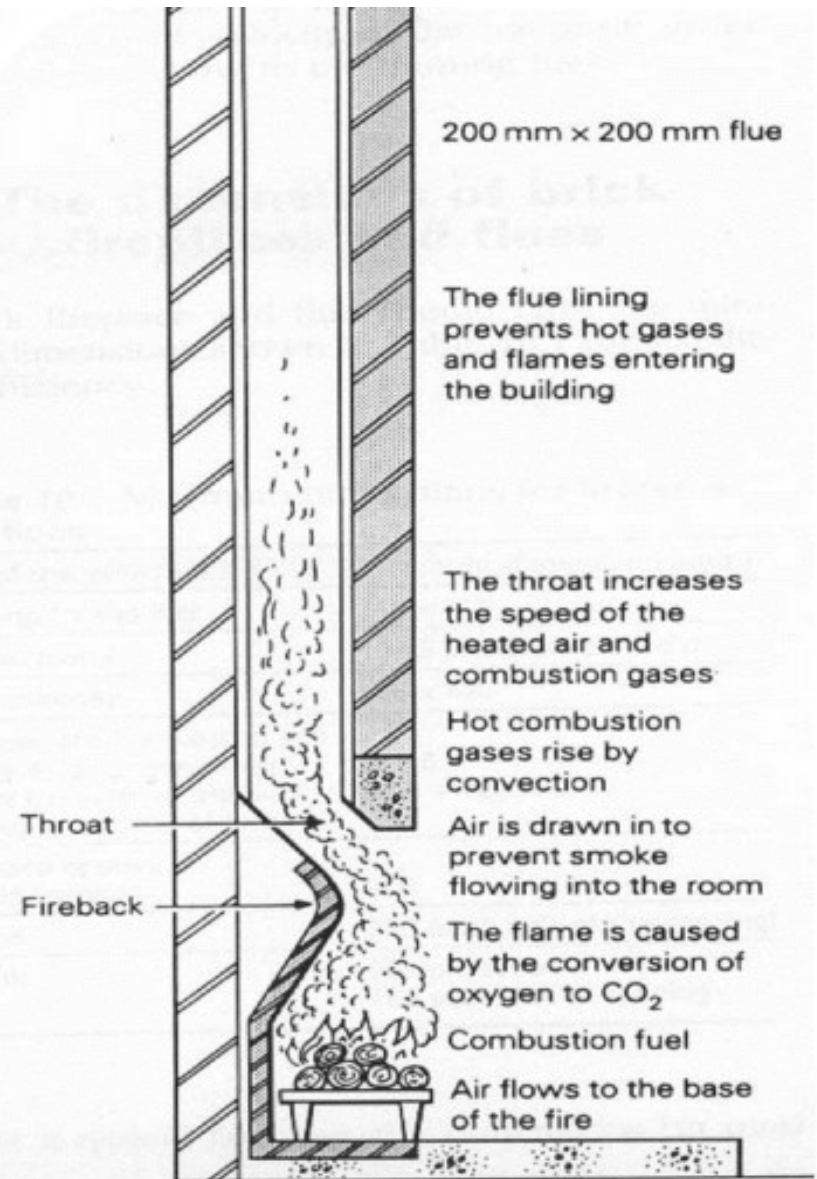


Figure 10.1 How a fireplace works.

COMMON FIREPLACE TYPES

1--Single faced

flush hearth

raised hearth

2--Double faced

interior corner designs

projecting corner

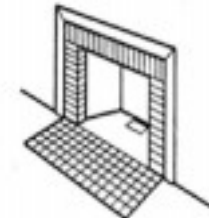
opposite sides design

3--Three faced

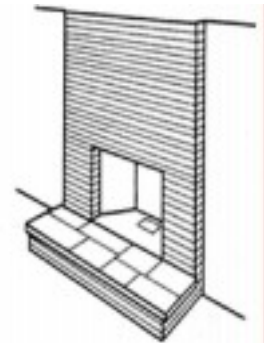
4--Free standing



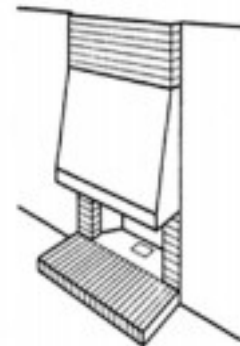
SINGLE FACED



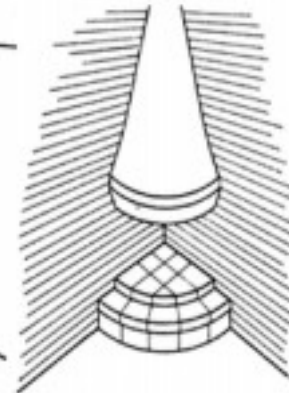
FLUSH



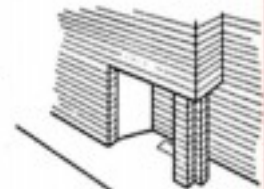
RAISED HEARTH



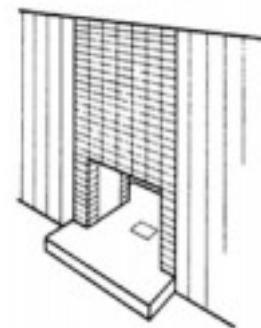
COPPER HOOD



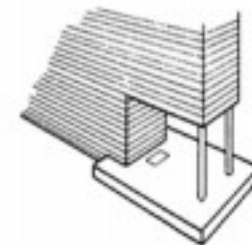
DOUBLE FACED
INTERIOR CORNER



DOUBLE FACED
PROJECTING CORNER



DOUBLE FACED
OPPOSITE SIDES



THREE-FACED



FREE-STANDING

DOUBLE FACED FIREPLACE EXAMPLE (PROJECTING CORNER)





Double Faced Fireplace Example
(Opposite Sides)

MATERIALS FOR CHIMNEY AND FIRE-PLACE CONSTRUCTION

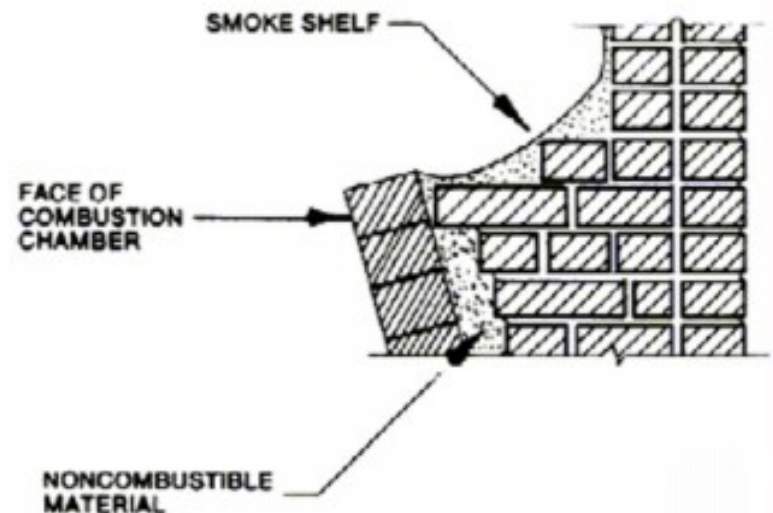
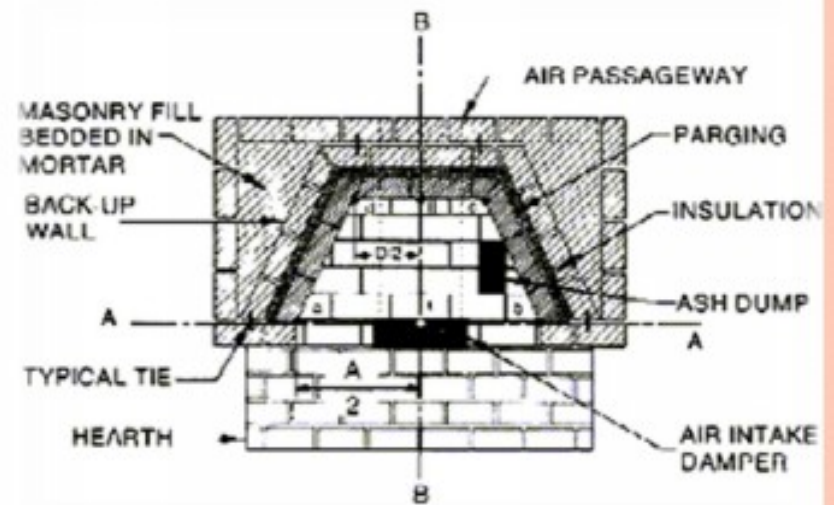
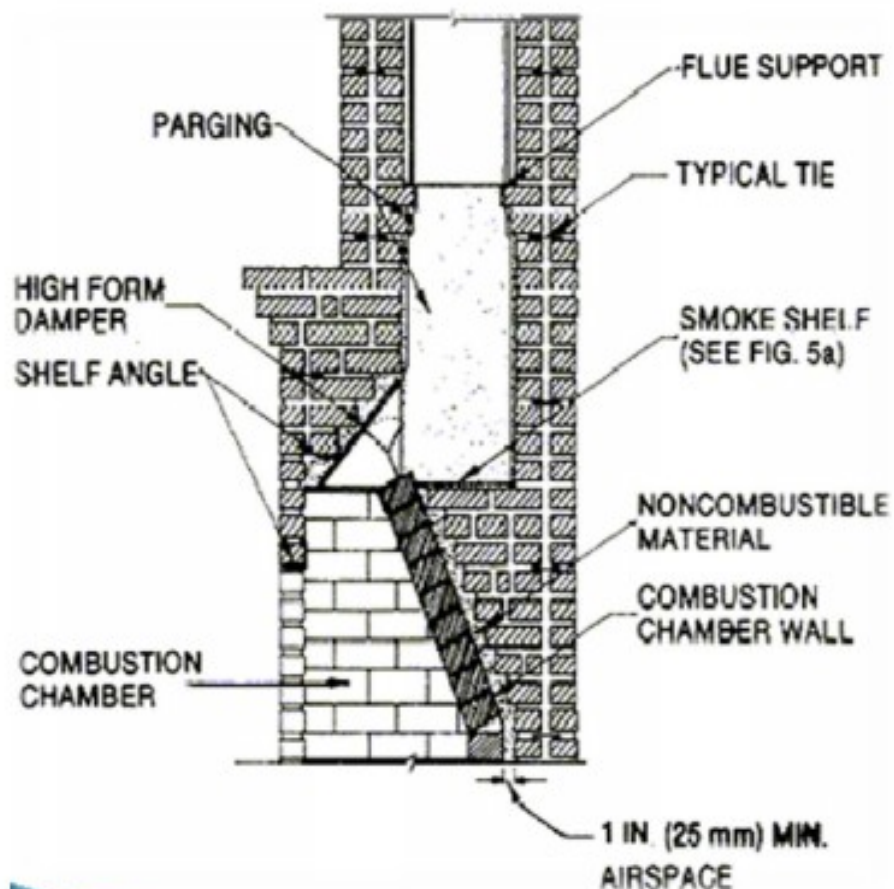
- The major building materials used for the construction of chimneys and fire places include Bricks, Concrete, Stone, and Some Metals.

A. Brick Chimneys:

- Brick is the traditional material used for building chimneys.
- The height of unsupported brick stack or shaft should not exceed six times its least horizontal dimension.
- Where the height is exceed, the stack requires to be braced, or the thickness calculated to with stand wind pressure.
- The application of damp-proof courses are necessary at the base of the chimneys to prevent rising dampness.
- Since brick chimneys are very heavy, care has to be taken during the design of foundation.

5. MATERIALS FOR CHIMNEY AND FIRE-PLACE CONSTRUCTION

A. Brick chimneys:



6. MATERIALS FOR CHIMNEY AND FIRE-PLACE CONSTRUCTION

B. Concrete chimneys:

- Concrete chimneys are becoming more popular nowadays due to their **better appearance** and **economical consideration** both initially and during maintenance.
- Concrete chimneys can be formed either by using precast units or cast in situ, or a combination of both methods.
- When reinforced concrete is used the reinforcement should have a proper cover.
- The application of damp proof courses are necessary at the base of the chimneys to prevent rising dampness.

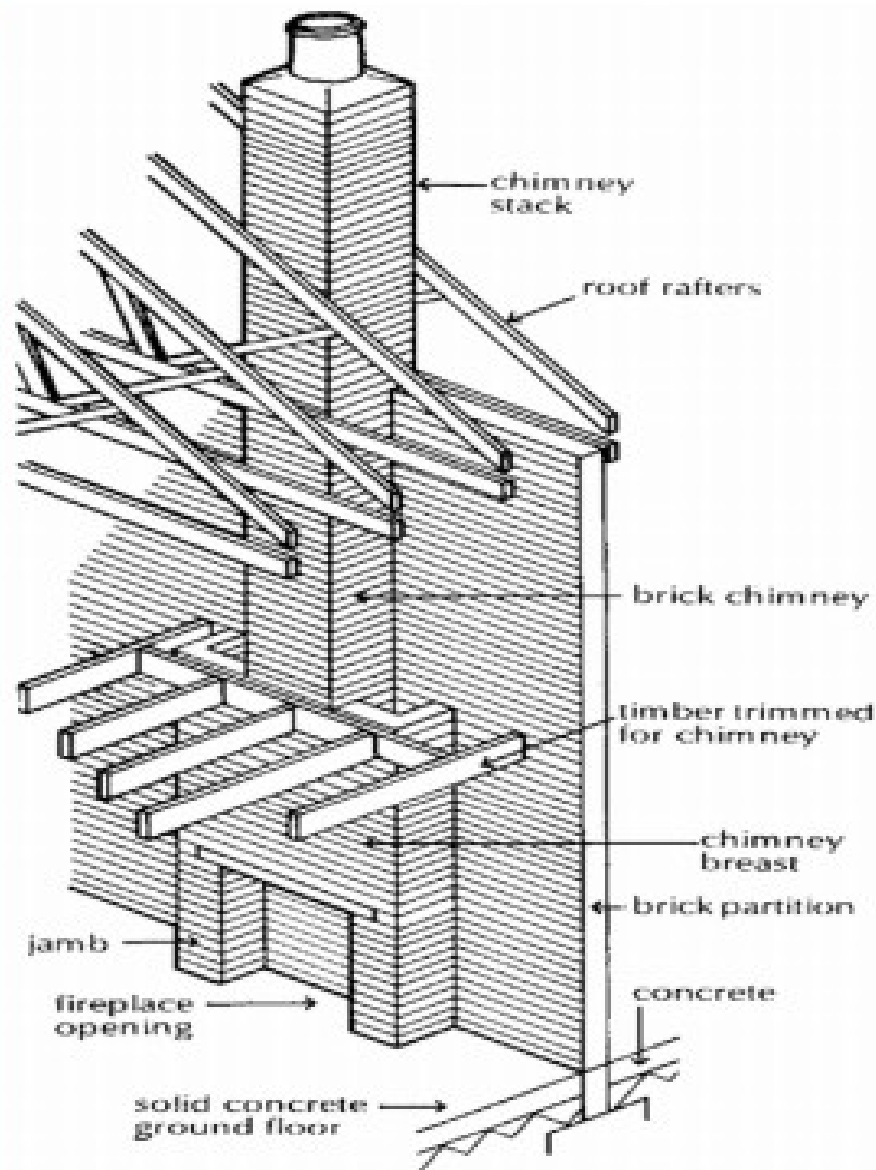
C. Hollow blocks:

- Hollow clay or concrete blocks are **generally unsuitable** for building flues unless the blocks are specially made for the purpose.

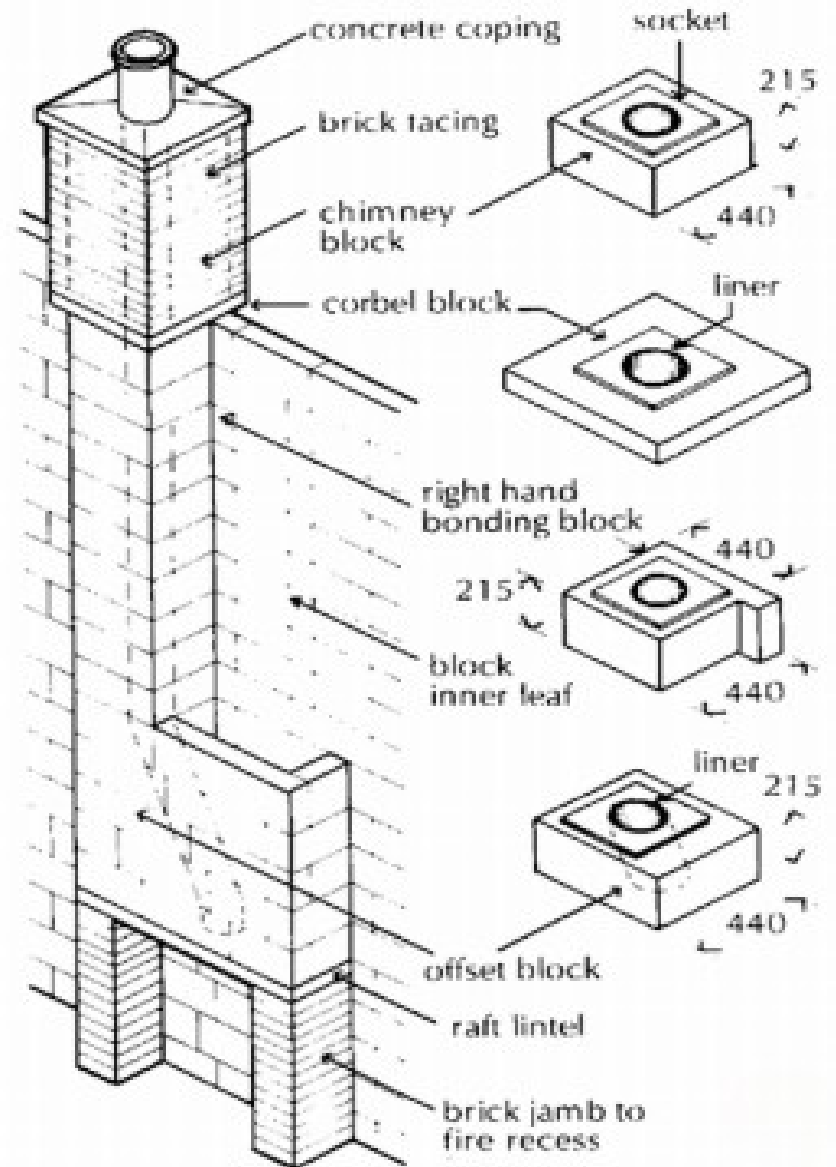
6. MATERIALS FOR CHIMNEY AND FIRE-PLACE CONSTRUCTION

D. Stone masonry chimneys:

- The conditions of exposure for chimney stacks above the roof, together with the risk of condensation of the products of combustion, limit the choice of stone.
- The temperatures normally prevailing in a domestic flue are not sufficiently high to damage good building stone except in the immediate vicinity of fire.
- On this situation, the stone has either to be sand stone or has to be protected by fire brick.
- The same precautions against damp prevention have to be taken for masonry as those taken in brick chimney.



Brick chimney and chimney



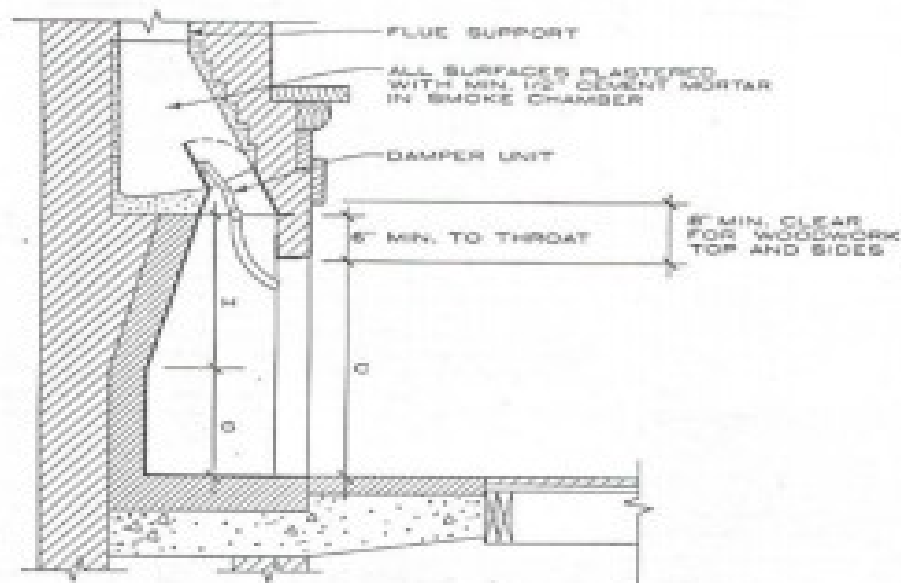
Precast concrete block chimney.

6. MATERIALS FOR CHIMNEY AND FIRE-PLACE CONSTRUCTION

D. Stone masonry chimneys:



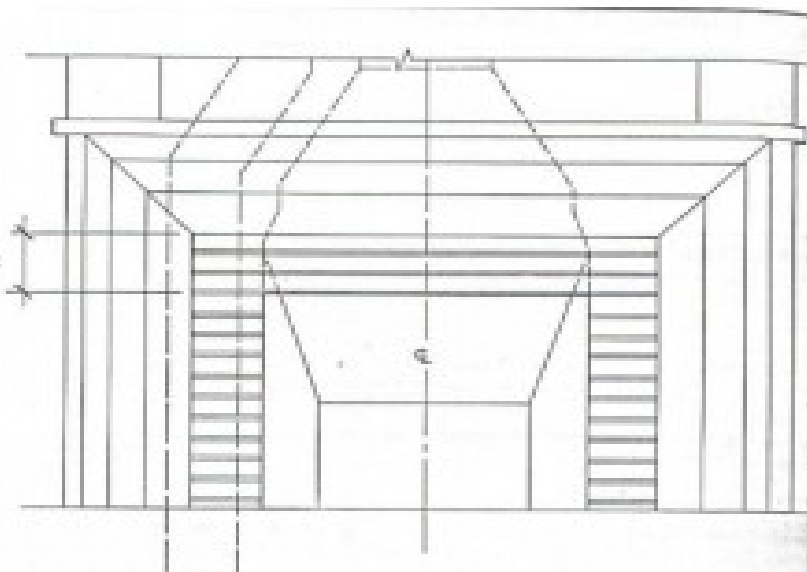
FIRE PLACE DETAIL PROPORTIONS



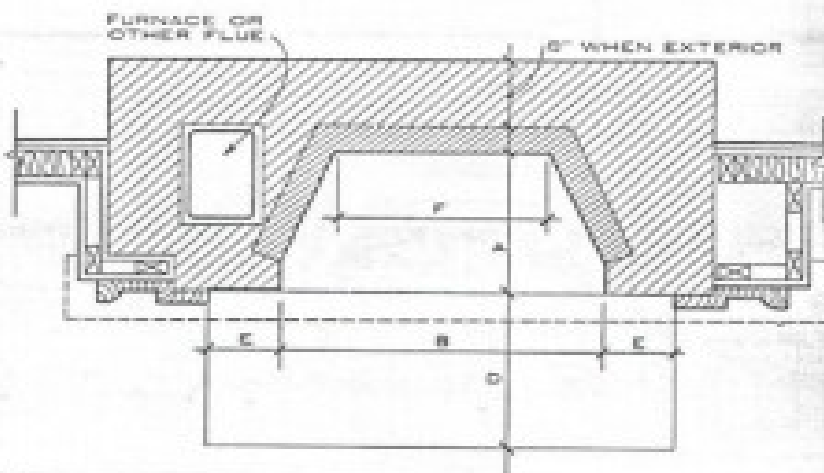
SECTION

RECOMMENDED DIMENSIONS FOR WOOD BURNING FIREPLACES, HEARTH, AND FLUE (IN.)

FIREPLACE OPENING		DEPTH A	BACK- WALL WIDTH (MIN.) F	VERTICAL BACKWALL HEIGHT G	INCLINED BACKWALL HEIGHT H	FLUE LINING	
WIDTH B	HEIGHT C					RECTANGULAR (OUTSIDE)	ROUND (INSIDE)
24	24	16-18	14	14	16	8 1/2 x 13	10
28	24	16-18	14	14	16	8 1/2 x 13	10
30	28-30	16-18	16	14	18	8 1/2 x 13	10
36	28-30	16-18	22	14	18	8 1/2 x 13	12
42	28-30	16-18	28	14	18	13 x 13	12
48	32	18-20	32	14	24	13 x 13	15
54	36	18-20	36	14	28	13 x 18	15
60	36	18-20	44	14	28	13 x 18	15
54	40	20-22	36	17	29	13 x 18	15
60	40	20-22	44	17	30	18 x 18	18
66	40	20-22	44	17	30	18 x 18	18
72	40	22-28	51	17	30	18 x 18	18



ELEVATION



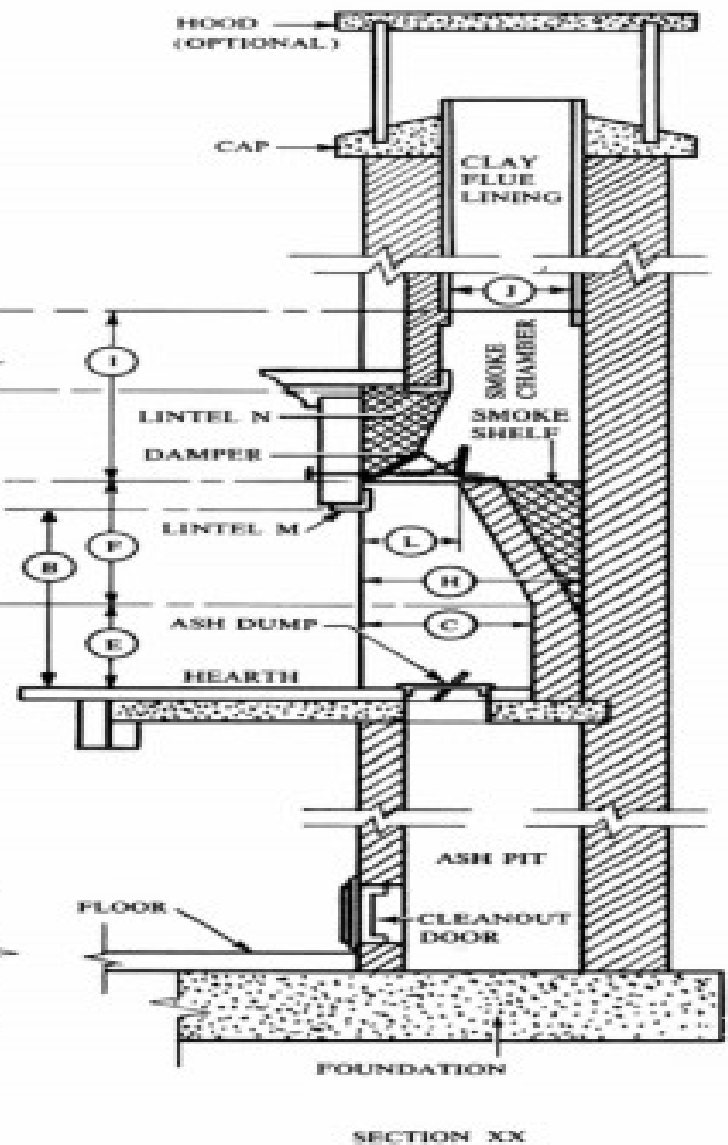
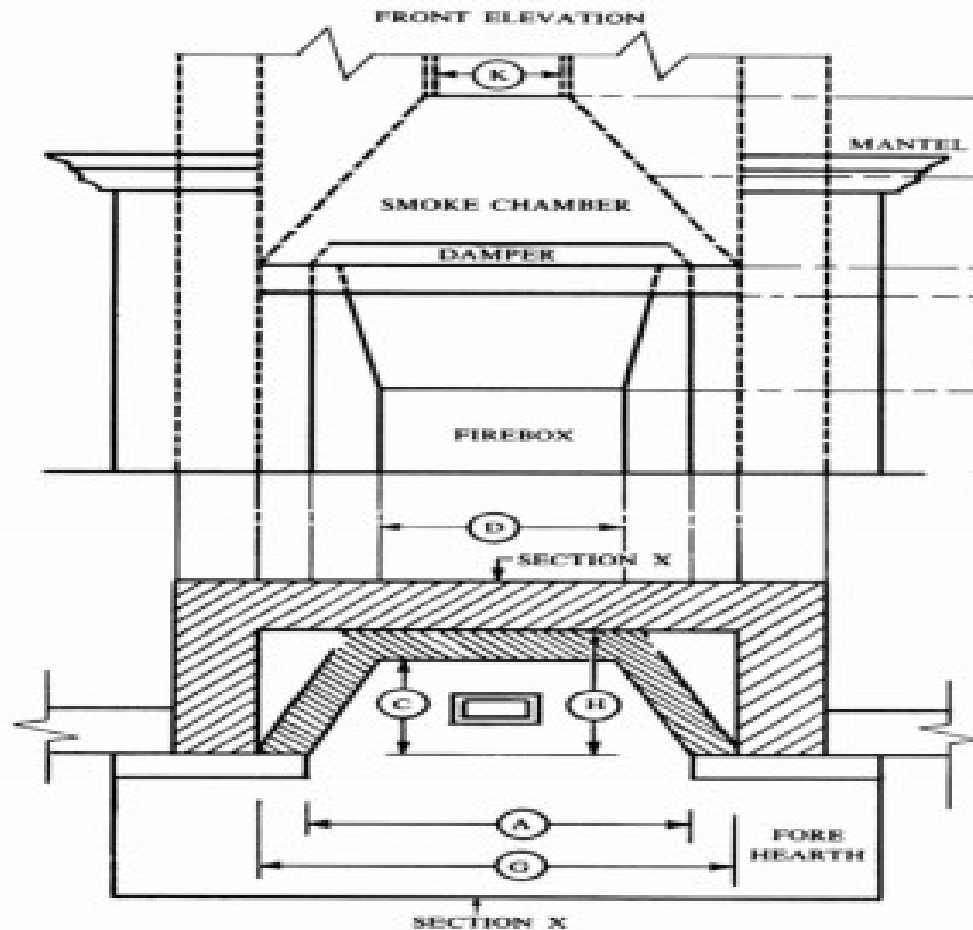
PLAN

DIMENSIONS D & E - SEE LOCAL CODES

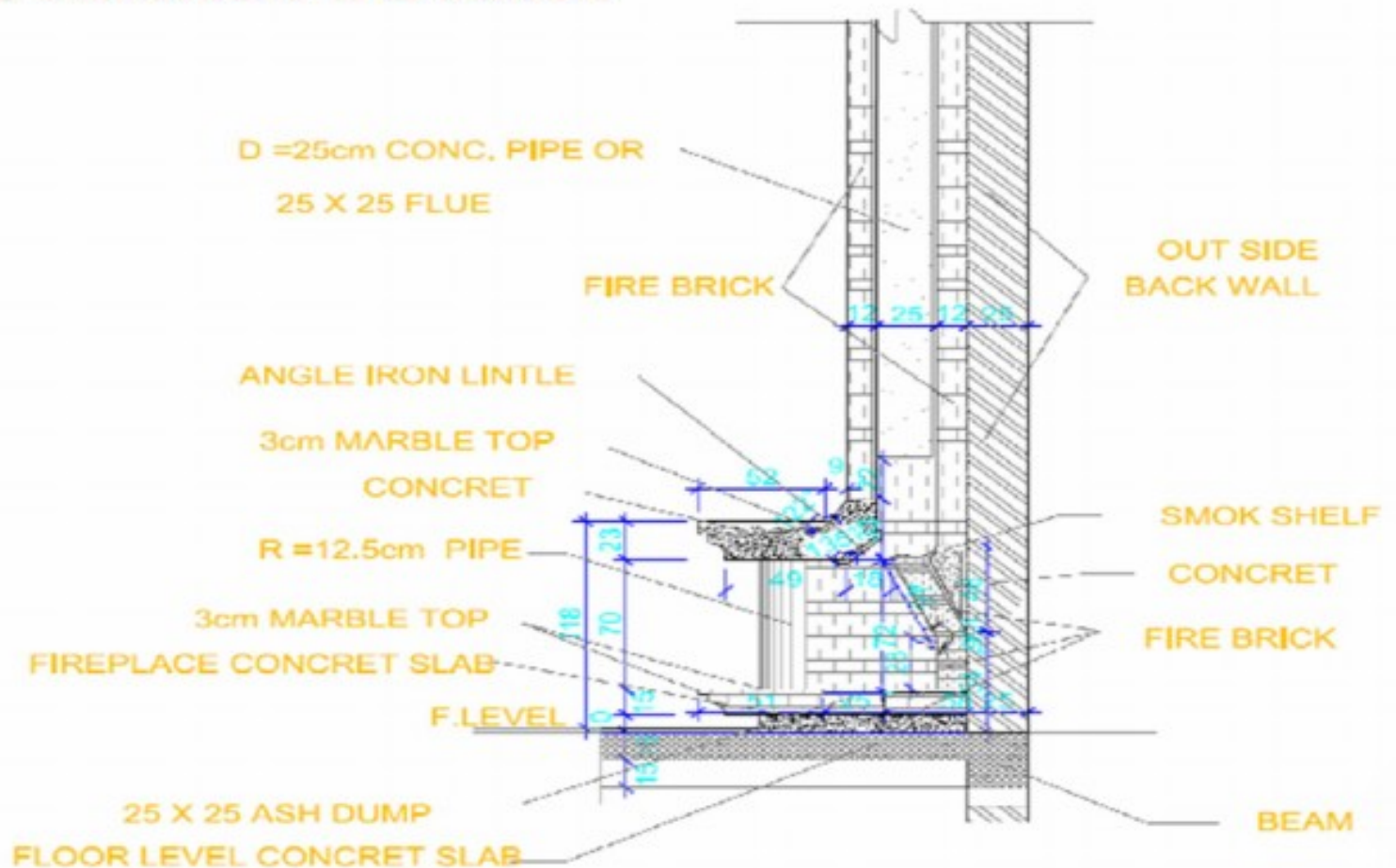
FIREPLACE CONSTRUCTION GENERAL PRINCIPLES

DETAILS AND DIMENSIONS

Drawings below show details of the different parts of the fireplace. Circled letters are keyed to table dimensions at bottom of page, which gives the proper dimensions (in inches) of the different parts for fireplaces of various typical sizes.



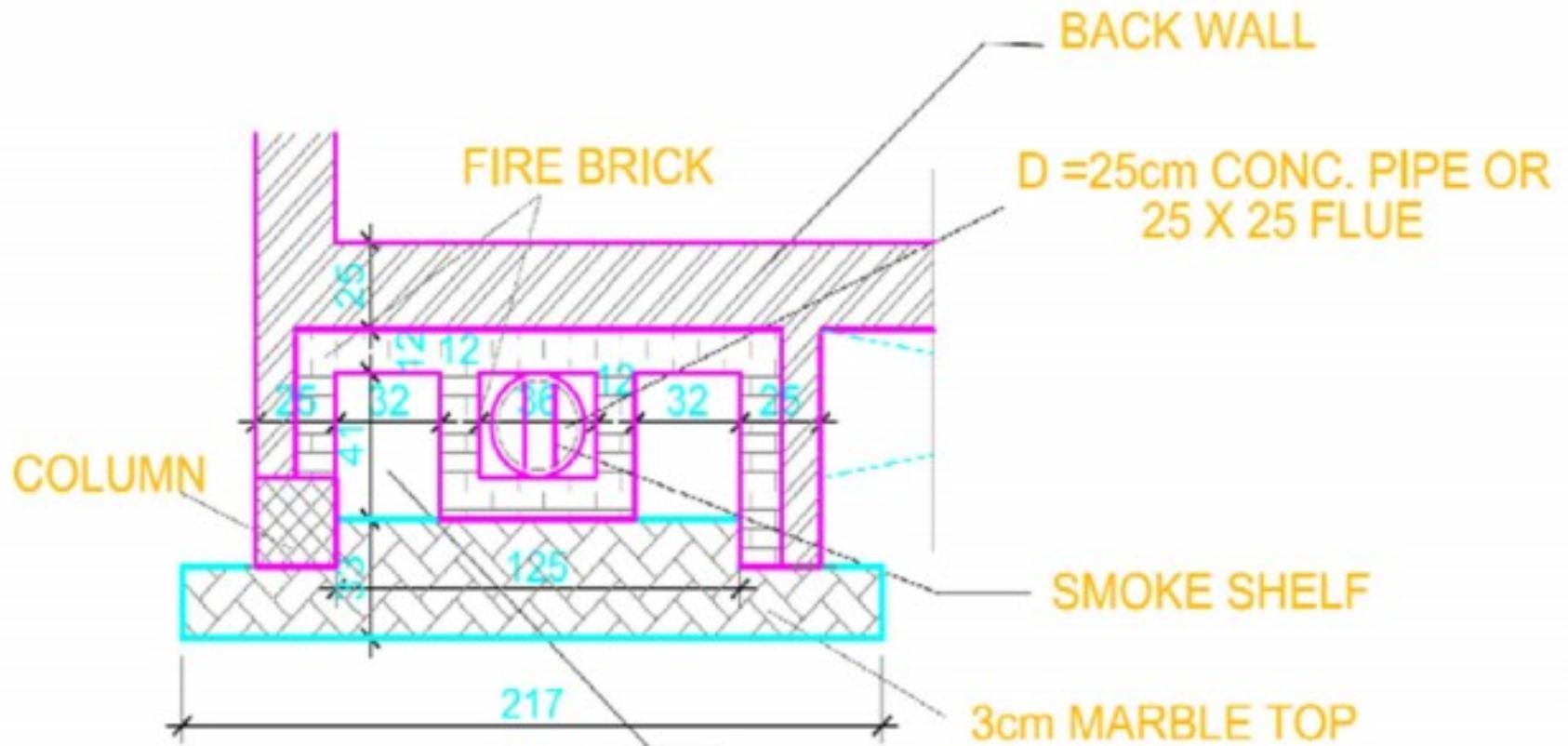
6. CHIMNEY DETAILS



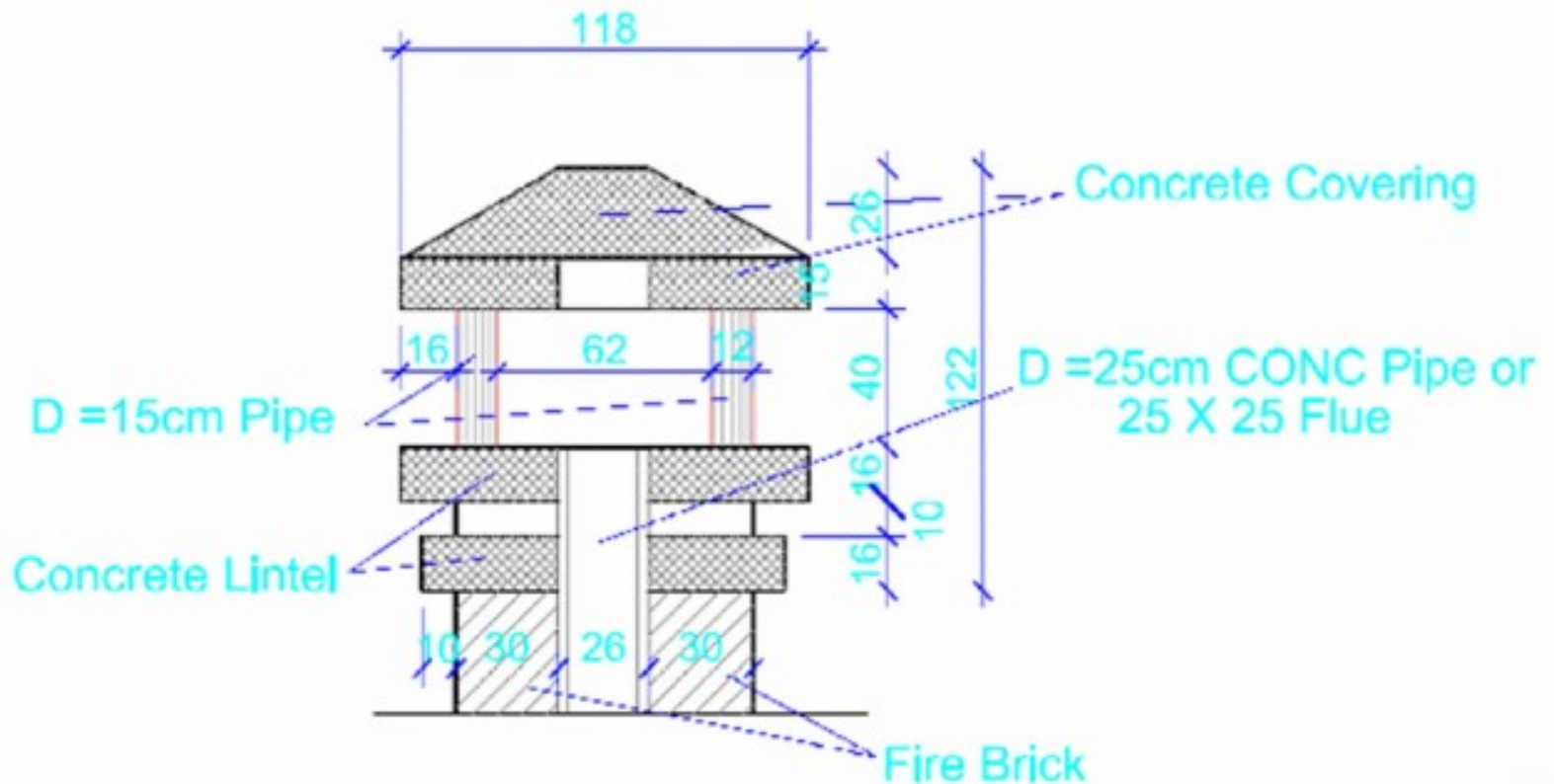
SECTION S - S & R - R

6. CHIMNEY DETAILS

PLAN at R - R



6. CHIMNEY DETAILS



CHIMNEY HEAD DETAIL - 1