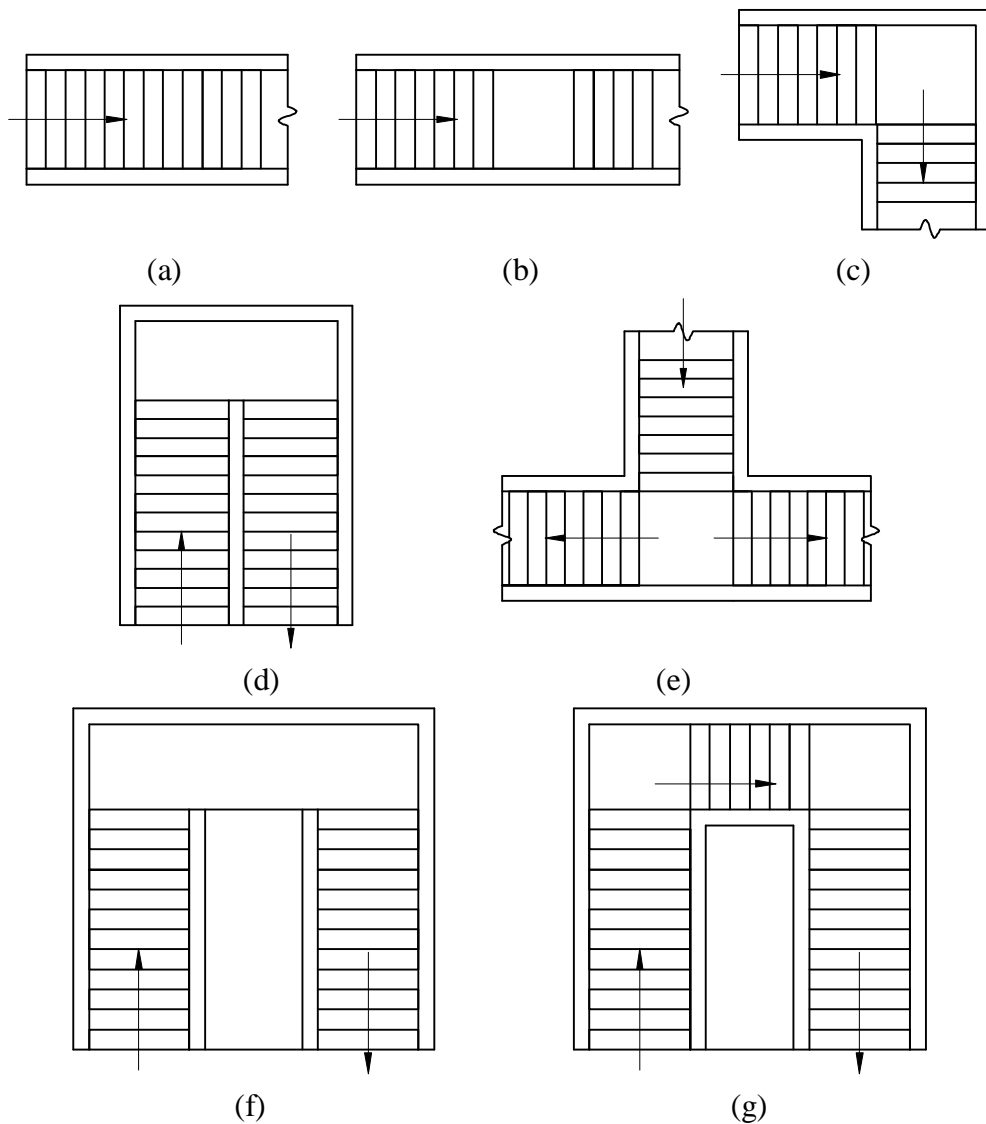


CHAPTER 10: STAIRCASES

Introduction

Staircases provide means of movement from one floor to another in a structure. Staircases consist of a number of steps with landings at suitable intervals to provide comfort and safety for the users.

Some common types of stairs are shown in Figure 10.1. These include straight-flight stairs, quarter-turn stairs, half-turn stairs, branching stairs, and geometrical stairs.



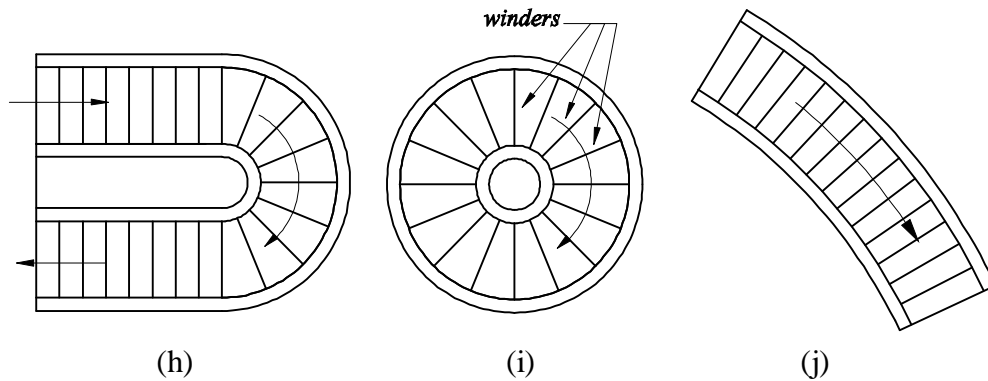


Figure 10.1: (a); (b) Straight flight stairs; (c) Quarter-turn stairs; (d) Half-turn stairs; (e) Branching stairs; (f) Open-well (half turn); (g) Open-well with quarter turn landing; (h); (i); (j) Geometrical stairs

Technical Terms

The definitions of some technical terms, which are used in connection with design of stairs, are given.

- a. Tread or Going: horizontal upper portion of a step.
- b. Riser: vertical portion of a step.
- c. Rise: vertical distance between two consecutive treads.
- d. Flight: a series of steps provided between two landings.
- e. Landing: a horizontal slab provided between two flights.
- f. Waist: the least thickness of a stair slab.
- g. Winder: radiating or angular tapering steps.
- h. Soffit: the bottom surface of a stair slab.
- i. Nosing: the intersection of the tread and the riser.
- j. Headroom: the vertical distance from a line connecting the nosings of all treads and the soffit above.

Figure 10.2 shows main technical terms associated with stairs design.

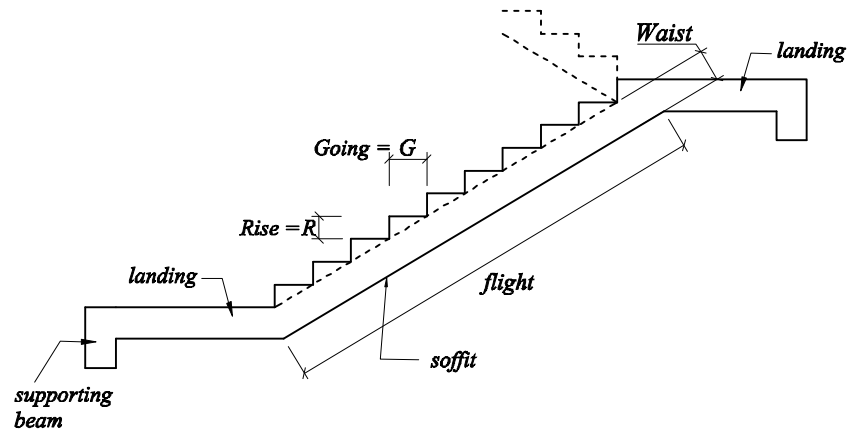


Figure 10.2: Stairs main technical terms

Types of Stairs

For purpose of design, stairs are classified into two types; transversely, and longitudinally supported.

a- Transversely supported (transverse to the direction of movement):

Transversely supported stairs include:

- § Simply supported steps supported by two walls or beams or a combination of both.
- § Steps cantilevering from a wall or a beam.
- § Stairs cantilevering from a central spine beam.

b- Longitudinally supported (in the direction of movement):

These stairs span between supports at the top and bottom of a flight and unsupported at the sides. Longitudinally supported stairs may be supported in any of the following manners:

- a. Beams or walls at the outside edges of the landings.
- b. Internal beams at the ends of the flight in addition to beams or walls at the outside edges of the landings.
- c. Landings which are supported by beams or walls running in the longitudinal direction.
- d. A combination of (a) or (b), and (c).
- e. Stairs with quarter landings associated with open-well stairs.

Design of Stairs

Simply Supported

Figure 10.3 shows a stair, simply supported on reinforced concrete walls.

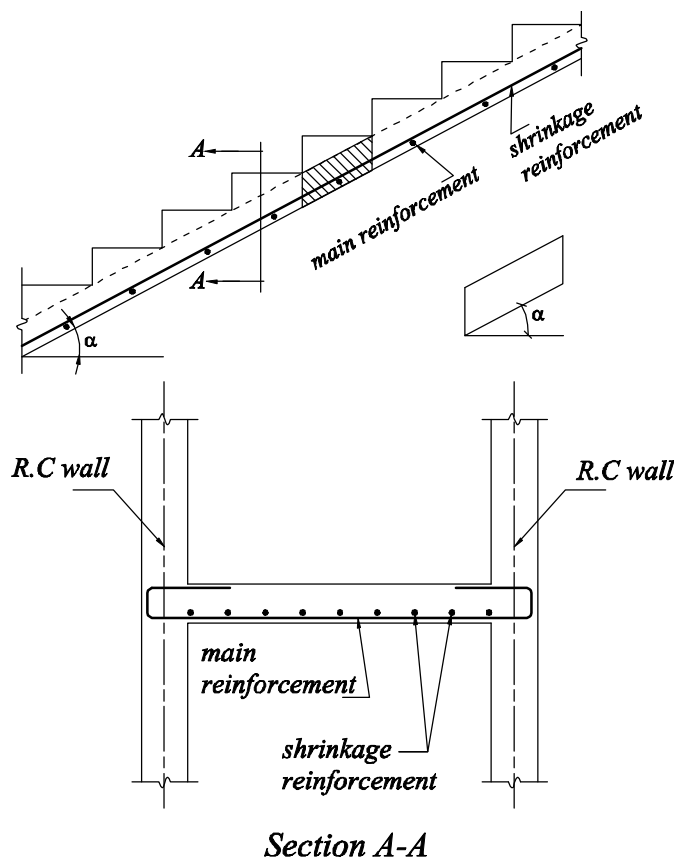


Figure 10.3: Simply supported stairs

The waist is chosen to accommodate the reinforcement using appropriate concrete cover. A waist t of 7.5 cm is reasonable for this type of stair.

Loading:

a. Dead load:

The dead load includes own weight of the step, own weight of the waist slab, and surface finishes on the steps and on the soffit.

b. Live Load:

Live load is taken as building design live load plus 150 kg/m^2 , with a maximum value of 500 kg/m^2 .