Different Types of Staircases

Assignment No.: 05.02

Assignment

What are the differences between straight, spiral, and helical staircases in terms of construction and space utilization?

Answer

Stairs can be defined as a series of steps designed to provide a means for vertical movement between floors. A staircase encloses a complete stairway. Straight, spiral, and helical stairs are some of the most common types of stairs. Their differences in terms of construction and space utilization are detailed below.

Straight staircases

Straight stairs consist of single or multiple linear flight of steps connected by landings. They follow a straight path without any curvatures.

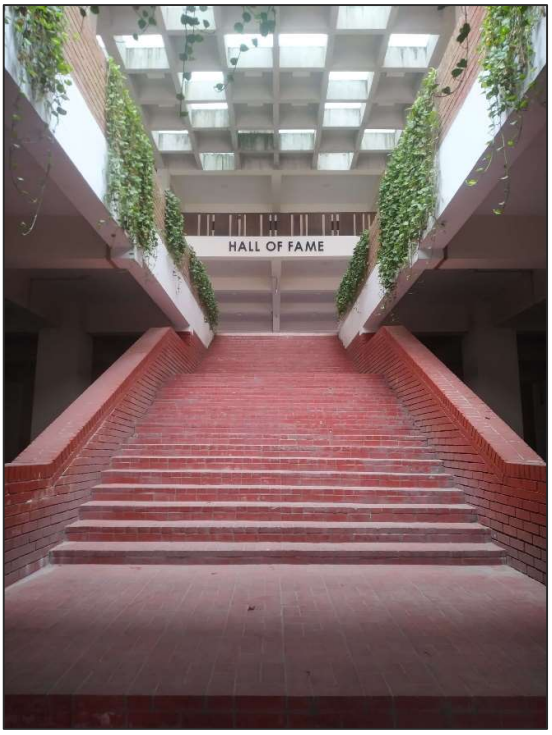


Figure 1: A straight stair between Tower 3 & 4, MIST



Figure 2: Another straight staircase at MIST Library

Construction

They are simple and linear, easy to design, construct, and build. The treads are flat horizontal surfaces with same dimension from left to right while the risers are vertical components which can be either open or close, depending on aesthetic considerations. They can provide landings between two flights for safety and to reduce span length. Commonly used materials are wood, concrete, or steel while finishing materials may be tiles.

Space utilization

They require more horizontal space depending on the pitch and configuration. In longer flights, landing is required for safety which further increases horizontal space requirements. If horizontal space is limited, then it can be divided into multiple flights of stairs connected by landings and become a half-turn stair.

Spiral staircases

Spiral stairs are designed around a central vertical pole or column, with the steps diverging in a circular pattern.



Figure 3: Spiral staircase at Osmany Hall, MIST



Figure 4: Close-up view of the same staircase

Construction

The central column is the primary load-bearing structure. It supports all the treads which are fixed to it. The treads are wedge-shaped, wider on the outer edge and narrow near the column (see

Figure 4). Steel and concrete are the common materials for the central column while treads are made of wood, metal, or glass.

Space utilization

Spiral stairs are highly space efficient, requiring the least amount of floor area making them ideal for tight and confined spaces such as small apartments. However, their curve nature makes them less convenient for frequent use, especially for carrying items.

Helical staircases

Helical stairs have a curved, continuous design that forms a helix. Unlike spiral stairs, they do not have a central pole or column, and their steps are supported by stringers along the sides.

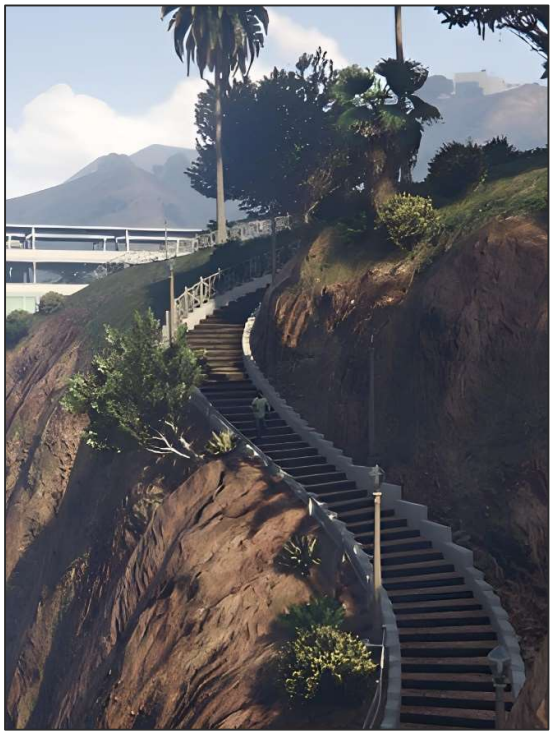


Figure 5: Helical staircase featured in GTA Online



Figure 6: Helical staircase featured in GTA Online

Construction

Helical stairs are built with two curved stringers (on both sides) that support the treads. They are often steel or reinforced concrete, shaped into a precise helix. They act as the primary load-bearing component of the structure. The treads are shaped to follow the helical pattern of the staircase.

Space utilization

Helical stairs offer a good compromise between space efficiency and user comfort. They require more space than spiral stairs but are more space-efficient than straight stairs due to their curved, compact design.