Introduction to Building

Synopsis

Buildings can be defined as man-made structure with walls and roofs. It usually stands in one place and is designed for purposes including residential, educational, institutional, assembly, business, mercantile, industrial, storage, and hazardous use. Buildings typically consist of two parts:

1. Substructure
2. Superstructure

Below is provided a description of each component of the two parts.

Substructure

The substructure refers to the parts of the building that are below ground level and not visible after construction completion. It provides stability and transmits the load of the superstructure to the ground.

Foundation

The foundation transfers loads from the building to the soil below ensuring that the bearing capacity of the soil is not exceeded.



Figure 1: Piling (deep foundation) photo from Structural Guide



Figure 2: Spread footing (shallow foundation) photo from SCS Construction Blog

Foundation ensures stability against forces such as wind, earthquakes, and soil movement by anchoring the building firmly into the ground. It is essentially the backbone of a building.

Damp Proof Course

The damp proof course (DPC) is a horizontal barrier in a building's structure designed to prevent moisture from rising through walls and floors.



Figure 3: Installation of DPC, photo from Damp Works NI

Superstructure

The superstructure includes all parts of the building above the ground.

Plinth

The plinth refers to the floor of the structure immediately above the ground level. It serves as the base or support for the entire superstructure of a building. It prevents water seepage and helps protect the building from floods and soil erosion by raising slightly above ground level.



Figure 4: Plinth visible on the ground floor of MIST academic building

Walls

The walls are vertical structures that enclose, divide and supports elements of the building. In the load bearing structure, they carry loads from the roof and floors down to the foundation and in frame structure, they are used to partition spaces or enclose areas. They also provide thermal and sound insulation.



Figure 5: Wall at the entrance of MIST Central Library

Beams

Beams are the horizontal structural element that supports load primarily by resisting bending. They transfer loads from walls, slabs, and roofs to the columns.



Figure 6: Multiple beams visible along the length and width of salt bridge between MIST Tower 1 and 2

Columns

Columns are the vertical structural members that carry loads from beams or slabs to the foundation.



Figure 7: Columns supporting salt bridge between MIST Tower 2 and 4

Floors

Floors are the flat horizontal structural elements of slabs that provide usable spaces for various activities. It divides the building into different levels.



Figure 8: Tiled floor on the first floor of MIST Tower 3

Doors and windows

Doors are the movable structures that provide access to a building or a specific room through walls, while also ensuring security and privacy. And windows are the openings in a wall that allows controlled passage of air and light.



Figure 9: Wooden door at MIST Central Library



Figure 10: Window grid at MIST Central Library

Stairs

Stairs are structural elements designed to provide connection between different levels. They consist of a series of steps arranged in a continuous sequence, facilitating safe and comfortable movement for users.



Figure 11: Wooden staircase at MIST Central Library



Figure 12: Staircase on the back of MIST Academic Buildings

Sunshades

Sunshades are architectural elements designed to provide protection from excessive sunlight and reduce heat gain within a building. They also serve as a design feature that enhances the building's exterior, offering a modern look.



Figure 13: Sunshades at the MIST Admin Tower

Roof

The roof is the topmost structural component designed to provide protection from weather elements such as rain, sun, wind, and snow.



Figure 14: Roof on top of the third storey of MIST Tower 1

Building finishes

Building finishes refer to the final layer of materials applied to the surfaces of a building's interior and exterior to improve both its aesthetic appeal and functional qualities. It provides durability, protection, and a polished appearance. Examples include plastering, painting, tiles etc.



Figure 15: Painting done on the wall of a room



Figure 16: Tiles placed on the floor of a room

Building services

Building services refer to the various systems and technologies integrated into a building that ensure its functionality, safety, comfort, and sustainability. It can be broadly categorized into mechanical, electrical, plumbing, and other systems to provide essential utilities.



Figure 17: Elevator utilizing electrical system of a building to operate

Conclusion

In conclusion, the substructure — elements like the foundation and footings provides stability and support to the entire structure, and the superstructure — encompassing floors, walls, roofs, and other components forms the functional and aesthetic aspects of a building. Additionally, building services such as plumbing, electrical, fire protection, and security systems, are integral to ensuring the safety, comfort, and efficiency of the building. A well-designed building incorporates these various elements to create a safe, functional, and sustainable environment for its occupants.