Construction and the Built Environment – Unit 1

1.5 Building Structures and Forms (1 of 2)

CELLULAR CONSTRUCTIONS

- A building method using concrete, where individual cells or rooms are arranged horizontally and vertically to form a complete structural framework.
- The main weight of the building is supported by the walls, which must be sufficiently thick to bear their own weight as well as the loads from above. As a result, the potential height of a structure built in this way is limited.
- Load-bearing walls provide the primary vertical support and stability for multiple floors. External wall panels, lift shafts, and staircases may also contribute to the building's overall stability.
- These structures are typically limited to 6–10 storeys, depending on their location and exposure to wind forces.
- The most common applications of cellular construction are low-rise flats and similar buildings. This method creates structurally efficient buildings with excellent acoustic and fire separation between adjacent rooms.
- Cellular construction is particularly suitable for buildings with regular grids and repetitive floor plans, such as blocks of flats or student accommodation.
- The individual cells or pods that form the structure may be prefabricated off-site. This approach reduces construction time, as the prefabricated units can be hoisted into place upon delivery to the site.

RECTANGULAR FRAME CONSTRUCTIONS

- The weight of a building is supported by a skeleton or framework of columns and beams, rather than by the walls.
- This rectangular grid structure carries the internal floors, roof, and external walls, transferring all loads to the foundations.
- A skeletal frame structure enables the construction of tall buildings and skyscrapers, as it eliminates the need for load-bearing internal walls. This allows for flexible floor spaces that can be easily rearranged.
- In many modern commercial framed buildings, traditional load-bearing external walls have been replaced with non-load-bearing metal and glass screens or curtain walls, which act as exterior cladding.
- A braced frame is an adaptation of the skeleton frame, designed for structures subject to high lateral loads, such as wind pressure. While the beams and columns carry vertical loads, the bracing systems—such as floor slabs and diagonal steel sections—distribute lateral loads.
- Lightweight timber frames are commonly used in the construction of contemporary housing, whereas steel and reinforced concrete frames are preferred for larger structures.
- Timber frames are often favoured by contractors for modern housing due to their rapid construction time, cost-effectiveness, and the sustainability of timber as a building material.