AS Unit 1: Our Built Environment

2.1.5: STRUCTURES OF LOW-RISE BUILDINGS

KEY TERMS

Term	Definition
Prefabrication	Factory based production of building components for delivery to site.
Modular buildings	Buildings constructed using prefabricated modular parts, such as wall panels, frames, doors, external cladding.
Volumetric construction	Building constructed using large numbers of repeating modules, such as factory built hotel rooms, delivered fully finished internally, including fittings and furnishings.
Traditional buildings	Generally, pre 1919 with sold masonry structures, i.e. built before cavity wall construction became the norm.
dpc	Damp proof course. A barrier built into a wall to prevent rising damp.
Insitu	Constructed on-site. Usually refers to reinforced concrete components.

PREFABRICATION

Structures and complete building modules that can be prefabricated and then delivered to site for final assembly.

Advantages:

- Programme savings arising from ability to progress work as a parallel operation in a factory and on a construction site.
- Greater programme and cost certainty.
- Factory tolerances and workmanship is of a higher quality and consistency to that achieved on site.
- Less waste and fewer delays due to adverse weather.
- Not affected by shortages of local skilled labour.
- Better safety in the factory than on a building site.

Disadvantages:

- Difficulties connected with road transport of large objects, including maximum widths, need for police escorts, height restrictions under bridges and daytime traffic restrictions in city centres.
- Additional cost of site craneage and assembly.
- Factory production being suited to predictable and consistent demand, whereas construction demand tends to be inconsistent.

TRADITIONAL BUILDING STRUCTURES

Understanding the different characteristics of traditional buildings will prevent repairs with incompatible materials that lead to accelerated decay.

MODULAR BUILDINGS

Advantages - As for prefabrication and as follows:

- Overall speed of supply and installation.
- Reduced cost and improved quality (through economies of scale, reduction of waste and working in a controlled environment).
- Reduced site time (disruption, noise), and potential to de-construct for re-location and re-use.

Disadvantages - As for prefabrication and as follows:

- Restricted flexibility. Module sizes and shapes can be limiting and not user specific.
- Difficulty transporting and handling large modules.
- Level of investment required to develop designs and manufacturing processes for modular buildings.

Traditional Buildings	Modern Construction
Solid stone, or brick, with lime mortar and voids which absorb water which evaporates during drying periods.	Relatively slender wall construction with barriers and/or cavities to prevent water penetration.
Limited range of natural materials, with no preservatives, low levels of insulation and slate or lead dpc.	Mass produced products, often treated with preservatives, high levels of insulation, with dpc and floor membrane.
Vapour permeable 'breathable' materials absorb moisture which then evaporates to maintain balanced conditions. Voids in walls, floors, chimneys, all aid air movement / provide good levels of ventilation that reduces damp.	Relies on a sealed envelope and the prevention of water penetration, with limited permanent ventilation. Any water ingress does not readily evaporate.

OTHER STRUCTURAL FORMS

See prefabrication for advantages and disadvantages of structural forms fabricated off site for on-site assembly.

Steel frames have a high strength to weight ratio and offer a variety of jointing methods. A main disadvantage is the need for fire proofing.

Precast concrete structures are fire resistant, can be used as frames and floor slabs and can be pre tensioned for improved strength, but complicated to join and are slower to manufacture.

Engineered timber frames utilise a sustainable resource and can be an attractive feature, but they require fire protection and are susceptible to moisture damage.

Insitu concrete structures can be shuttered and poured to form complex shapes, are fire resistant and have high load bearing capacities, but they are slow to build, and produce heavy dead loads.