

## Unit 41: Mathematics in Construction and the Built Environment

Unit code: J/600/0451

OCF Level: 3

Credit value: 10

Guided learning hours: 60

### Unit aim

This unit aims to give learners the opportunity to gain an understanding of common forms of low-rise construction, including the design and construction of foundations, the techniques used in the construction of superstructures and the implications of issues and constraints on building construction.

The unit will introduce learners to the common forms of low-rise construction used for domestic and commercial buildings, including their sub-structures and superstructures.

### Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning outcomes	Assessment criteria
1 Understand common forms of low-rise construction currently used for domestic and commercial buildings	1.1 Explain the different forms of low-rise construction currently used for domestic and commercial buildings
2 Understand foundation design and construction	2.1 Explain how the procedures used in subsoil investigation provide information for the design of sub-structures
	2.2 Describe the principles of foundation design
	2.3 Explain the methods used to construct different types of foundation

3 Understand the techniques used in the construction of superstructures for low-rise domestic and commercial buildings	3.1 explain the principles of superstructure design
	3.2 describe the techniques used to construct and finish the component elements of a superstructure
4 Understand the implications of issues and constraints on building construction	4.1 explain the implications of environmental issues and legislative constraints for building construction
	4.2 explain the purpose of the various parts of the infrastructure required to support the construction process

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## Unit content

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### **1 Understand common forms of low-rise construction currently used for domestic and commercial buildings**

*Forms of low-rise construction:* prefabricated including timber frame, steel frame, concrete frame, load bearing, non-load bearing; single storey and low-rise of two to three storeys; detached; terraced; pitched roofs; flat roofs; short span; medium span; differences in construction methods; advantages and limitations of each method

*Buildings:* houses; flats; warehouses; light industrial units; retail; offices

### **2 Understand foundation design and construction**

*Subsoil investigation:* site survey and subsoil investigation (regional geology, lithology, ground water); recording and interpretation of results; classification of soils; foundation design

*Foundation design:* principles of design; factors affecting choice of foundations (strip, pad, raft and pile foundations); structural requirements; effects of and precautions against subsoil shrinkage; ground heave; differential settlement

*Methods:* excavation; construction

*Excavation:* up to five metres depth; water elimination; ground improvement; temporary supports in trenches and associated health and safety issues; various types of excavation and earth-moving plant

*Construction:* techniques used for strip, pad, raft, pile and beam foundations; selection of materials; economic implications of methods used; plant requirements; health and safety issues; environmental issues; legislative constraints

### **3 Understand the techniques used in the construction of superstructures for low-rise domestic and commercial buildings**

*Principles of superstructure design:* principles of design and factors affecting choice of primary and secondary elements (floors, walls, roofs, stairs, windows, doors)

*Superstructure construction:* techniques used for construction of primary and secondary elements (floors, walls, roofs, stairs, windows and doors); selection of materials; economic implications of methods used; plant and equipment requirements; health and safety issues; environmental issues; legislative constraints to include the code for sustainable homes

*Superstructure finishes:* factors affecting the choice of internal and external finishes; types of finish available and methods used in their application; economic implications of methods used; plant requirements; health and safety issues; environmental issues; legislative constraints

#### **4 Understand the implications of issues and constraints on building construction**

*Environmental issues:* environmental impact resulting from materials and methods used in the construction of buildings; extraction; manufacture; construction methods; environmental protection; recycling; waste; energy usage; CO<sub>2</sub> emissions; noise; pollution

*Legislative constraints:* Building Regulations; Health and Safety at Work Act 1974; Construction Health, Safety and Welfare Regulations 1996; Construction Design and Management Regulations 2008; PUWER; COSHH; PPE; RIDDOR; Town and Country Planning legislation

*Infrastructure:* construction plant (characteristics, uses); supply of building materials for traditional and modern projects; prefabricated components; system building

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