

# Higher Nationals

## Construction and the Built Environment

Unit Study Guide

Unit 2: Construction Technology

**Higher National  
Certificate** Lvl 4

**Higher National  
Diploma** Lvl 5

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BTEC**

# Exploring Learning Outcomes and Assessment Criteria



Through this section of the Study Guide we will examine each LO in more detail, We will seek to establish an approach to exploring the associated Essential Content and how this may inform our understanding of the relationship between the Essential Content and the Assessment Criteria, that will be used to measure our achievement of the learning outcome.

This unit contains four learning outcomes as follows

1. Explain the terminology used in construction technology.
2. Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria.
3. Identify the different types of civil engineering/infrastructure technology used in support of buildings.
4. Illustrate the supply and distribution of a range of building services and how they are accommodated within the building.

## ***LO1 Explain the terminology used in construction technology.***

### **Essential Content**

#### ***Topic: Types of construction activity***

How do we classify buildings?

How are building types expressed in use or scale?

## Things to Remember

The construction of buildings can be classified in many different ways, such as:

- **low-rise** – buildings of only a few storeys in height; for example, a single family residence, a restaurant, or a small office building
- **medium-rise** – sometimes defined as buildings of 4–12 storeys; may include multi-occupancy residential buildings (apartments), medium-sized commercial or office buildings, or small retail shopping malls
- **high-rise** – usually considered to be buildings over 12 storeys (such as skyscrapers); often contain multiple functions such as commercial premises and office uses, or retail units and residential units.

These definitions will vary depending on the region. Some major cities have specific definitions for low-rise, medium-rise and high-rise that are used in their local regulations for planning and building control.

Storey height is the modular system used to define the height between floors. This will include the structure of the floor above and the space required for structure, services, etc. Storey heights are sometimes defined by minimum ceiling heights, as set out by local building regulations. For example, a recent draft of housing regulations for London states:

“The minimum floor to ceiling height must be 2.5 m for at least 75 per cent of the Gross Internal Area of each dwelling.”

Building use is also classified in different ways. For residential buildings, we may find:

- **domestic buildings** – typically, single occupancy residential buildings, such as houses (terraced houses, bungalows, semi-detached, detached)
- **Multiple Occupancy Buildings or Houses in Multiple Occupation (HMO)** – converted or purpose-built accommodation that contains both common areas and bedrooms, such as a large house that is occupied by a group of individuals who form more than one household.

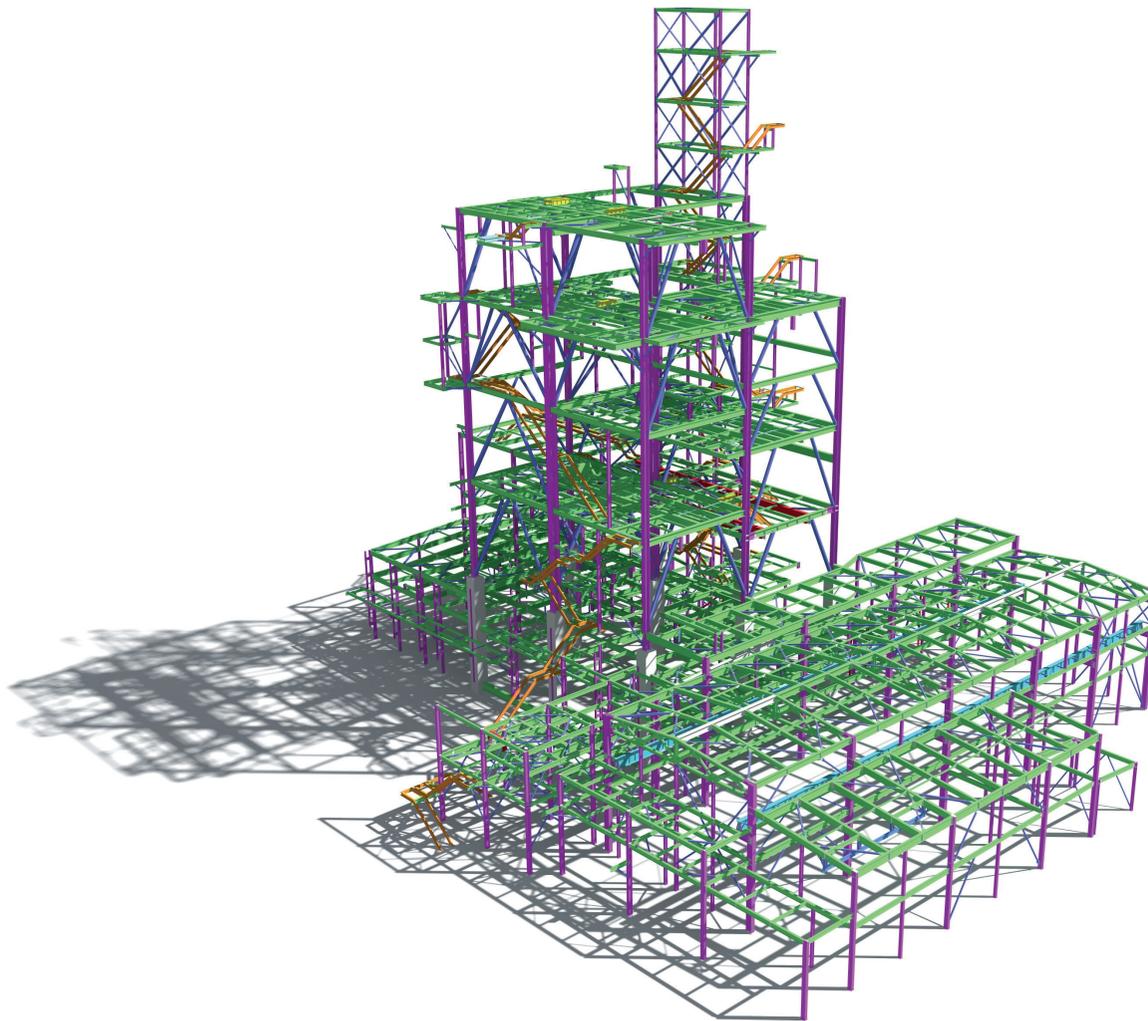
Similarly, for non-residential buildings, we find:

- **commercial** – cinemas, public houses, fast food outlets, retail parks, office buildings
- **industrial** – buildings that support specialised processes, such as factories, chemical plants and power stations, and warehouses.



Classifications and terminology may vary with location. For example, a ‘flat’ may be called an ‘apartment’ in the USA or Europe.

Different types of building will use different types of technology. For example, a domestic house will, typically, use a different form of wall construction when compared to a large commercial building. Similarly, the types of foundation for a small building (such as strip foundations) will differ from those for a tall building (such as pad footings).



Most construction information is now produced and stored digitally and it is increasingly common for construction drawings to be viewed on tablet computers, not printed.

Building Information Modelling is rapidly becoming a standard approach for projects. In many parts of the world, there are now specific regulations that require the use of BIM processes. Clients are also increasingly likely to request BIM is used in their project, as the data related to the project will have uses beyond the construction phase.

Many architecture and construction software vendors provide a wealth of free information related to their products, including CAD and BIM. You may also be able to obtain free versions of their software for educational use.

- **Deep strip** – This is a strip foundation with a greater depth. As strip foundations become deeper, steel reinforcement must be added to the concrete, to prevent damage caused by increased tensile forces.

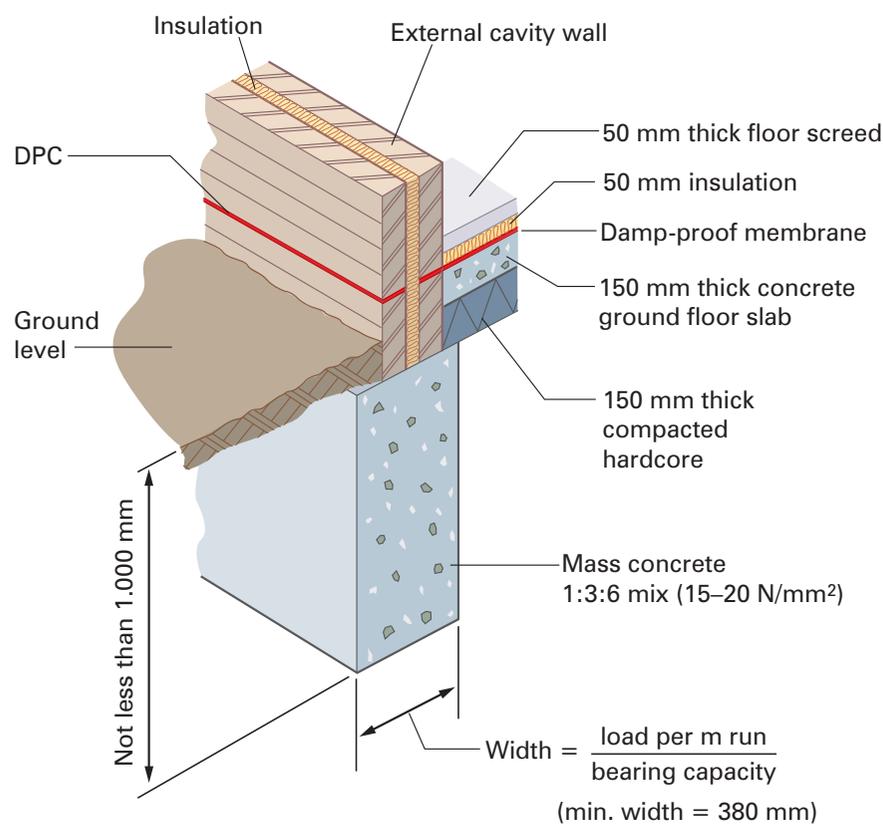
**Deep Piled** – A foundation is considered a pile when its depth is more than three times its width. Piled foundations are typically used where there is a need for very deep foundations, for example:

- due to weak soil bearing, meaning you must excavate to a very deep level to find suitable bearing
- in situations where the size of the building (such as a skyscraper) would exert such extreme forces that a shallower foundation would not provide suitable support.

A **pile** is a vertical column of steel or reinforced concrete (or, less commonly, timber). Piles are driven, bored (a bore hole is removed and the pile is inserted) or screwed into the subsurface, down to the required depth. Piles provide support through a combination of friction (over the vertical length in contact with the soil) and the bearing of the material below the bottom of the pile. There are other forms of pile, such as **sheet piles**, **geothermal piles** and **pile walls**.

**!** Soil testing will confirm the ability of a soil to resist loading and prevent settling, which could cause damage to a structure.

As you travel around your local area, look for building sites. If they are still installing foundations, what type of foundation is being used? From this, can you make assumptions about the type of building to be constructed?



Deep strip foundation

LO3 Identify the different types of civil engineering/infrastructure technology used in support of buildings	
Assessment Criteria	Areas for consideration
<b>P6</b> Describe techniques used for remediating the site prior to construction commencing	In responding to this criterion, you should consider a range of different forms of remediation. This may include contamination, dewatering, structural and environmental factors.
<b>P7</b> Describe the types of substructure works carried out by civil engineers	<i>Note that this criterion specifically references civil engineers. What do civil engineers do? What types of project might you need to consider in responding to this criterion?</i>
<b>M4</b> Compare different types of structural frame used to carry the primary and secondary elements of the superstructure	This is a comparison criterion, so you will need to consider two or more types of structural frame. You may wish to approach this by creating a table of different factors and listing how each type of frame addresses these factors.
<b>D2</b> Prepare a design report identifying superstructure, substructure and civil engineering structures necessary for a given building construction project	Whether you are working in relation to a project assigned to you by your tutor, or a project you have selected, your report will need to be detailed and thorough to achieve this distinction criterion.

## Activities

### Activity 1

What are the regulations associated with 'brownfield' sites in your region? Use your local/regional/national planning and building regulations to find this information.

### Activity 2

Select one permanent and one temporary technique from the following:

Temporary	Permanent
Sump pumping	Diaphragm walling
Borehole wells	Secant piling

Research the techniques you have chosen and compare their advantages and disadvantages. Consider the conditions under which you might use each technique.

### Activity 3

Reinforced concrete superstructures may require column and beam formwork. The latter is often referred to as a 'table form'. Investigate the properties and use of a table form.

# Appendix 1: Glossary of Command Verbs

This is a summary of the key terms used to define the requirements within units.

Term	Definition
Analyse	<p>Present the outcome of methodical and detailed examination either:</p> <ul style="list-style-type: none"> <li>• breaking down a theme, topic or situation in order to interpret and study the interrelationships between the parts and/or</li> <li>• of information or data to interpret and study key trends and interrelationships.</li> </ul> <p>Analysis can be through activity, practice, written or verbal presentation.</p>
Apply	<p>Put into operation or use.</p> <p>Use relevant skills/knowledge/understanding appropriate to context.</p>
Arrange	Organise or make plans.
Assess	Offer a reasoned judgement of the standard/quality of a situation or a skill informed by relevant facts.
Calculate	Generate a numerical answer with workings shown.
Carry out	To put into execution.
Communicate	Convey ideas or information to others.
Compare	<p>Identify the main factors relating to two or more items/situations or aspects of a subject that is extended to explain the similarities, differences, advantages and disadvantages.</p> <p>This is used to show depth of knowledge through selection of characteristics.</p>
Compose	Create or make up or form.
Conduct	Organise and carry out.
Create/Construct	Skills to make or do something, for example a display or set of accounts.
Critically analyse	Separate information into components and identify characteristics with depth to the justification.
Critically evaluate	Make a judgement, taking into account different factors and using available knowledge/experience/evidence where the judgement is supported in depth.

**ALWAYS LEARNING**

