



BTEC INTERNATIONAL LEVEL 2 IN CONSTRUCTION

UNIT 1: CONSTRUCTION TECHNOLOGY

Unit 1: Construction Technology

Delivery guidance

Learners will acquire an understanding of the performance and construction of low-rise structures both above and below ground.

Approaching the unit

In this unit learners will develop an understanding of how walls, floors and roofs are constructed, using different materials such as timber, blockwork, brickwork and structural insulated panels. They will examine traditional and modern methods of construction that rely heavily on offsite prefabrication, which benefits the environment sustainability. They will gain an understanding of the methods used to construct several different types of foundations. They will learn how to set up a construction site, examining the tasks that must be completed before starting construction work, along with the health and welfare infrastructure that you will need to put in place to run a construction project efficiently and safely.

Delivery of this unit is likely to use a range of methods, including a large proportion of tutor presentations and demonstrations along with individual, paired and group work when sketching construction details of building elements or investigating the properties of materials. On completion of this unit learners will be able to select and sketch different forms of construction used in low-rise (up to 5.2 metres in height) offices, retail units and homes. They will understand how to complete basic calculations (area, volumes, distances, perimeter, time durations) to quantify materials required in construction. It would be helpful if learners have access to the internet and a CAD package whilst completing this unit. The unit is assessed by a Pearson set assignment and care must be taken to ensure learners are prepared and the full breadth of the unit content is covered.

You could involve local employers in the delivery of this unit if there is an opportunity to do so – for example, through a site visit to view the construction of the sub-structures for a low-rise building or a guest speaker to discuss the measures taken to make low-rise buildings fire-resistant.

Delivering the Learning aims

Learning aim A will introduce learners to the characteristics that govern the structural performance required of low-rise buildings (up to 5.2 metres in height) such as offices, retail units and homes. Learners are to acquire an understanding of how buildings are designed and constructed focusing on building strength and stability, fire resistance, thermal insulation, sound insulation, weather resistance and aspects of sustainability. Within these contexts learners will learn about construction details and materials. Learners will benefit from the opportunity to handle and view samples of materials in the classroom or to conduct some basic material tests in a laboratory e.g. learners might mix concrete and carry out slump test.



BTEC INTERNATIONAL LEVEL 2 IN CONSTRUCTION

UNIT 1: CONSTRUCTION TECHNOLOGY

Once learners have had gained a basic understanding of the characteristics that govern the structural performance of low-rise buildings, they can progress on to learning aim B and C, exploring how sub-structure and superstructure of buildings are constructed. It is sensible to consider the building sub-structures first with learners initially being introduced to different types of foundation such as strip or short bored piles. It is anticipated that learners will make sketches by hand or using CAD of foundation details and undertake some calculations (using areas, volumes distances, perimeters or time duration) e.g. learners might determine the quantity of concrete required in a foundation footing or calculate the area of a ground floor slab. Learners can then progress and consider the function, form and materials used in building superstructures, specifically in floors, walls and roofs.

Learners will benefit from opportunities to apply the skills they have developed to a project scenario requiring them to propose a solution for a low-rise building. It would also be useful for learners to visit a construction site to view the sub-structure and superstructure of low-rise buildings e.g. a new homes site. If it is not possible for learners to visit a live construction site, then learners might go on a tour of a local urban area, to view features of different buildings or watch a time lapse video of a new home under construction.

As part of learning aim B learners must understand the planning work that needs to be undertaken prior to commencing construction on site. They also need to acquire an understanding of the infrastructure needed for health and welfare on site. There is the opportunity for some cross teaching here with the content from Unit 2 - Exploring Health, Safety and Welfare in Construction. Learners will focus pre-construction on the site e.g. the position of gates and security fences. Learners might be given a proposed site plan for a project to annotate their site set-up plans.



BTEC INTERNATIONAL LEVEL 2 IN CONSTRUCTION

UNIT 1: CONSTRUCTION TECHNOLOGY

Assessment model

| Learning aim | Key content areas | Recommended assessment approach |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| A Understand the structural performance required for low-rise construction | A1 Performance requirements A2 Common structural forms for low-rise construction | This unit is assessed through a Pearson Set Assignment. |
| B Explore how sub-structures are constructed | B1 Preconstruction work B2 Sub-structure groundworks | |
| C Explore how superstructures are constructed | C1 Superstructures - walls C2 Superstructures - floors C2 Superstructures - roofs | |

Assessment guidance

The unit is assessed by a Pearson Set Assignment (PSA). The assessment is set by Pearson and must be taken under controlled conditions before it is marked by tutors.

There are 30 guided learning hours assigned to the unit, of which 13 hours will be required for assessment.

Set assignments are available from September each year and are valid for one year only.

Delivery must cover all the unit content and prepare learners to produce evidence to meet the assessment criteria and assessment guidance in preparation for taking the PSA. Sample Assessment Materials are available on the Pearson website. These can be used or adapted to help learners prepare for assessment.



BTEC INTERNATIONAL LEVEL 2 IN CONSTRUCTION

UNIT 1: CONSTRUCTION TECHNOLOGY

Getting started

This gives you a starting place for one way of delivering the unit, based around the recommended assessment approach in the specification.

Introduction

In the delivery of this unit, there are opportunities for you to develop links with a range of local organisations including construction companies, material suppliers and to an extent, landowners and local authorities. These organisations may be able to give information about construction sites or designs of buildings and developments that can be used as a starting point for scenarios to use when delivering learning aims B and C. They may also be able to arrange site visits for learners to view the substructure and superstructure of low-rise buildings.

Centres may also consider it appropriate to deliver aspects of learning aim B1, which focuses on the activities that has to be completed before work can begin on site and what has to be provided on site, with Unit 2 - Exploring Health, Safety and Welfare in Construction.

Learning aim A – Understand the structural performance required for low-rise construction

Learning aim A1

- You could introduce this learning aim by asking learners to collaborate in small groups to consider and discuss the different forms of construction of their favourite low-rise structures. This will provide a useful initial differentiation exercise to establish learners initial understanding of the topic.
- This learning aim focuses on the structural performance requirement of low-rise (below 5.2m in height) office, retail units and homes. Structural performance has seven elements at its core: strength, stability, fire resistance, thermal insulation, sound insulation, weather resistance and sustainability. These core subjects can be tackled in any order either independently or in suitable pairs, for example it is suggested that sound and thermal insulation might be combined together in one session.
- You could start by introducing learners to the concept of structural stability and strength, developing an understanding of types of loads and load bearing elements of a building. Learners could be divided into small groups and be asked to annotate load transferring elements (both vertical and horizontal) on schematic plans/elevations of a low-rise building. The low-rise building selected might be of traditional form or of modern construction such as a modular building. You can then review the tasks completed by the groups and offer support and guidance where mistakes have been made. Learners as part of this structural performance theme need to understand construction materials including, how and why these are tested. One way of delivering this understanding would be to arrange a session in the laboratory for learners to complete some simple testing on materials, for example they might mix concrete and carry out a slump test.
- Moving on you could then introduce learners to the fire resistance properties of some construction materials. Learners need to understand how these materials are used to form fire-resistance low-rise buildings. This is an opportunity for a guest speaker, perhaps a



BTEC INTERNATIONAL LEVEL 2 IN CONSTRUCTION

UNIT 1: CONSTRUCTION TECHNOLOGY

member of the local fire brigade or a local architect to speak to the learners about fires in buildings, fire compartments and barriers.

- This session could be followed by learners being informed on how to insulate low-rise buildings against heat loss and for unwanted sound. Learners should be encouraged in this session to prepare sketches and/or CAD drawings of standard thermal and sound insulation details for different elements for example a party wall or ceiling. Learners might work individually, or in a small groups where each learner might tackle insulating a different building component (wall, floor, roof e.tc).
- Once learners have established an understanding of thermal and sound insulation, you could then introduce techniques to make buildings weather resistant. Learners might go on a walking tour of low-rise buildings in their local area and take photographs and draw sketches of the buildings' weather resistance features. Learners might present these photos and sketches to their peers in class, discussing the purpose of each feature and how it works to make a building water resistant.
- Finally, you could introduce learners to the concept of sustainability, focusing on the purpose of making low-rise buildings sustainable including the methods and materials used. Alternatively, you might choose to make sustainability a theme which is covered in conjunction with all six of the other structural performance core topics, and therefore introduce at the start of the sequence of sessions for learning aim A1. In any event it would be helpful for learners to watch a video exploring building design and construction for low-rise sustainable buildings.

Learning aim A2

- Once learners have an understanding of the structural performance of low-rise buildings you can then introduce common structural forms of construction for low-rise buildings. You should discuss as a minimum the advantages and disadvantages of the use of traditional cavity wall, cross-wall, structural insulated panels and timber frame construction. Learners' might work in small groups using the internet to research construction details for the different types of structural form of construction. You should encourage learners to sketch these details, for a given project scenario. This project scenario will be contain sufficient scope for learners to use it in subsequent tasks covering learning aim B and C.

Learning aim B: Explore how sub-structures are constructed

Learning aim B1

- Learning Aim B1 focuses on the activities that need to be completed on site prior to construction and why these need to be carried out. These include site enabling works, and the infrastructure required for health safety and welfare. Here, there is an opportunity for some cross teaching with 'Unit 2 – Exploring Health, Safety and Welfare in Construction' if desired. You could set learners working in small groups an activity to consider the project scenario introduced in learning aim A2 and draw s on the preconstruction works required. You could then review the tasks completed by the groups and summarise with the class the key preconstruction activities.

Learning aim B2

- You could introduce learning aim B2, by considering the function of foundations and ground slabs and how they are detailed. You will provide an overview of the different types typically



BTEC INTERNATIONAL LEVEL 2 IN CONSTRUCTION

UNIT 1: CONSTRUCTION TECHNOLOGY

used for low-rise structures. Learners could then work individually to sketch details (by hand or using CAD) and prepare a plan of a suitable foundation and ground slab for the project scenario introduced in learning aim A2. Finally, learners should be set a task to take-off some basic quantities from their sketches using areas, volumes, distances and perimeters. For example, learners might determine the volume of concrete required to construct the foundations or the area of damp proof membrane (DPM) needed for a ground floor slab.

Learning aim C: Explore how superstructures are constructed

Learning aim C1

- This could be introduced by discussing learners' prior experience of wall construction; the types of materials used and typical finishes. You could then move on to consider the function of walls and how they are detailed. Learners might then work individually to sketch wall details and prepare a plan (either by hand or on CAD) showing wall locations for the project scenario introduced in learning Aim A2. Finally, learners will be set a task to take-off some basic quantities from their sketches using areas, volumes, distances and perimeters. For example, learners might determine the number of bricks required to construct a length of wall or the length of a required damp-proof course.

Learning aim C2

- This could be introduced by discussing learners' prior experience of floor construction; the types of materials used and typical finishes. You could then move on to consider the function of floors, floor components, and how they are detailed. Learners might then work individually to sketch a timber or beam and block floor solution for the project scenario introduced in learning Aim A2. Finally, learners will be set a task to take-off some basic quantities from their sketches using areas, volumes, distances and perimeters. For example, learners might determine total length of timber joists or area of blocks required to construct the first floor of the low-rise building.

Learning aim C3

- This could be introduced by discussing learners' prior experience of roof construction; the types of materials used and typical finishes. You could then move on to consider the function of roofs, roof components, and how they are detailed. Learners might then work individually to sketch a timber purlin and tile solution for the project scenario introduced in learning Aim A2. Finally, learners will be set a task to take-off some basic quantities from their sketches using areas, volumes, distances and perimeters. For example, learners might determine the total number of tiles required to cover the project scenarios roof slopes.



BTEC INTERNATIONAL LEVEL 2 IN CONSTRUCTION
UNIT 1: CONSTRUCTION TECHNOLOGY

Details of links to other BTEC units and qualifications, and to other relevant units/qualifications

This unit links to:

- Unit 2: Exploring Health, Safety and Welfare in Construction
- Unit 3: Scientific and Mathematical Applications for Construction
- Unit 4: Construction and Design
- Unit 5: Construction Processes and Operations for Low-Rise Domestic Buildings
- Unit 6: Construction Methods and Techniques for Low-Rise Domestic Buildings
- Unit 7: Construction Drawing Techniques
- Unit 27: Exploring Facilities Management
- Unit 28: Maintenance and Adaptation of Buildings

Resources

In addition to the resources listed below, publishers are likely to produce Pearson-endorsed textbooks that support this unit of the BTEC International [L2 Qualifications in Construction](#). Check the Pearson website at: (<http://qualifications.pearson.com/endorsed-resources>) for more information as titles achieve endorsement.

Textbooks

Chudley , R – *Chudley and Greeno's Building Construction Handbook Updated and Edited by Karl Kovac 2020* 12th Edition ISBN 9780367135430 - a classic text providing information on forms of construction, materials and site processes.

Riley, M, and Cotgrave, A – *Construction Technology 1 – House Construction* 4th Edition ISBN 9781352001891 – Part 2 and 3 provide information on building substructure and superstructure respectively.

Websites

Expeditionworkshed – a website that contains a range virtual laboratory of construction material tests, games and project case studies.

TRADA – the Timber Research and Development Association website has an academic area providing information of timber construction methods.

Pearson is not responsible for the content of any external internet sites. It is essential for tutors to preview each website before using it in class so as to ensure that the URL is still accurate, relevant and appropriate. We suggest that tutors bookmark useful websites and consider enabling students to access them through the school/college intranet.