



Unit 33: Offsite and Onsite Construction Methods

Delivery guidance

During delivery of this unit, your focus will be on a variety of offsite and onsite construction methods and their suitability for a project, considering a range of drivers.

This unit is optional for the Diploma and Extended Diploma across all pathways. Throughout delivery, you should (where possible) make links with other relevant units across the qualification. This will help to motivate learners.

Site visits will enable learners to develop their understanding of the key elements, processes, components and materials being used. The number and frequency of site visits will vary according to your delivery schedule and the availability of site(s).

Enhance the delivery of the topics by using illustrations, images, animations and video clips to explain offsite and onsite construction methods and processes. Many appropriate resources are freely available online and you may find your students engage well with these resources over other delivery approaches.

This unit allows plenty of opportunities to make links with local businesses. You could invite guest speakers to discuss both construction and non-construction related drivers by sharing current projects or case studies. These guest speakers could be from your local authority, private clients, building firms or design consultancies. Learners often find it interesting and inspiring to hear first-hand about the environment within which the construction industry operates, and to learn how choices about specific construction methods are made.

Approaching the unit

Learning aim A

This learning aim is about various offsite and onsite construction methods. It introduces a number of modular forms as well as alternative contemporary onsite construction methods. The focus is to develop an understanding of each method's suitability for a given project scenario.

Throughout delivery, engage your learners with knowledge quizzes, paired/group activities, class discussions and presentations. These activities will provide opportunities for peer learning in addition to motivating the learners.

You may wish to introduce various construction methods using animations, pictures, illustrations or videos – some resources have been suggested at the end of this guide. Then, once learners understand the basic principles, you can follow up with more in-depth group activities and class discussions – for example, asking learners to explain the rationale behind the specific construction methods used in a given scenario.

A well-planned site visit will provide a useful means of delivery for this learning aim. Ensure all appropriate safeguards are in place during the visit. Coordinate with site staff before the visit, so all parties are aware of the learning opportunities. Then reinforce this learning in class using project briefs and case studies.

Further activities to explore could include an interactive Lego™ game on modular construction, or independent research and small group presentations on offsite and onsite construction methods.



Learning aim B

This learning aim is about construction and non-construction related drivers which influence the decision to choose a specific construction method.

Use a number of case studies to demonstrate how a particular driver (such as a shortage of skills in the local area) could influence a developer to choose a construction method. You could also contact local construction companies, who are usually willing to help.

Engage learners through suitably structured research activities, in which they explore local or national projects and identify the possible drivers behind the construction methods used.

Invite a guest speaker – perhaps someone with a project management background or from the client or contractor side. The guest speaker should share with learners some examples of designs and constructions made, and explain the reasons behind them.

Learning aim C

This learning aim focuses on a client brief and constraints and the ways in which suitable construction methods can be chosen to satisfy these requirements. A series of well-planned workshop-style sessions will benefit learners here.

Ensure the project briefs include sufficient detail, especially relating to the stakeholders' requirements and local legislation. If possible, ask a guest speaker (perhaps an architect, a project manager or a client representative) to give learners a walkthrough of a project, showing how various requirements and constraints had to be satisfied both at the design stage and at the construction stage.



Assessment model

Learning aim	Key content areas	Recommended assessment approach
A Examine the different forms of construction available in industry	A1 Offsite construction A2 Onsite construction A3 Renovation and adaptation A4 Advantages and disadvantages	A report on offsite and onsite construction methods, and how they address drivers.
B Explore the drivers for different forms of construction	B1 Construction-related drivers B2 Non-construction drivers	
C Investigate the potential benefits of a specific method of construction for a given project	C1 Project parameters	A research portfolio on methods of construction and their suitability for a given construction project.

Assessment guidance

This is an internally assessed unit, with a maximum of two summative assignments: Assignment 1 covers learning aims A and B and Assignment 2 covers learning aim C.

The assignment briefs should be set within the context of a renovation and adaptation project, such as a local historic building or project where a change of use is taking place.

- For Assignment 1, provide adequate details about the project so learners can carry out suitable evaluations.
- For Assignment 2, include – in addition to the above – client requirements, local area details and any potential constraints, so learners can carry out suitable evaluations.

Submitted assessment evidence could be in the form of a project report, a research portfolio and a presentation. You could also ask learners to include sketches, illustrations and a list of information sources used.



Getting started

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

Unit 33: Offsite and Onsite Construction Methods

Introduction

Introduce learners to the unit using animations, pictures, illustrations or web-based videos relating to various offsite and onsite construction methods. Engage learners during delivery using knowledge quizzes, paired/group activities, class discussions and presentations, as well as site visits and guest speakers.

Well-organised site visits, where learners can see forms of modular construction and where alternative onsite construction methods are being used, will be invaluable to the delivery of this unit. They must be timetabled carefully to ensure learners have sufficient knowledge across the learning aims to benefit fully from the experience.

Before any visit, you will need to coordinate with the site staff to find out about:

- health and safety requirements
- the type of project
- the construction stage
- the extent to which site staff will be able to engage (e.g. project presentations, access to drawings, client briefs, local area details, design data).

Learners could prepare checklists before each visit, so they can record details of components and processes.

If it is difficult to find appropriate sites, you could find project examples online or source suitable information from local consulting and contracting companies.

Learning aim A: Examine the different forms of construction available in industry

Learning aim A1: Offsite construction

- Introduce this topic with a presentation, using images, illustrations and video clips to show various forms of offsite construction. This will allow you to engage learners in a class discussion, asking them about the advantages of using a particular modular form.
- Use class discussions to check learners' understanding of the differences between volumetric, non-volumetric and panelised offsite construction methods.
- Follow this by asking learners to work in small groups to research one of the allocated offsite construction methods and modular construction forms. Learners should share their findings, giving at least one example of a project that has used a specific modular form. Summarise learners' key points and add to them where necessary.
- Introduce learners to automated methods of construction by showing a video of 3D printing of structural forms. Then explain how robotics can be used to make construction activities more efficient.

Learning aim A2: Onsite construction

- Give learners an overview of onsite construction methods, using images, illustrations and online video clips. Lead a class discussion about the suitability of some of these methods in different situations. Summarise the key points of this discussion.



- Ask learners to work in groups and allocate one onsite construction method to each group. For example, one group could research strawbale construction while another could investigate cross-laminated timber (CLT). Each group should find out about the processes involved and the advantages and disadvantages of their allocated method, then share their findings with the class. Give constructive and developmental feedback and add to learners' key points where necessary.
- Use an online video to demonstrate onsite robotics, for example, laying interlocking bricks for a small house.

Learning aim A3: Renovation and adaptation

- Lead a class discussion about the differences between renovation and adaptation projects. Provide examples to support this.
- Then give a presentation to summarise the goals of typical renovation and adaptation projects. Focus on types of change, energy savings and cost-benefit analysis relating to such projects.
- Divide learners into groups to investigate types of change for a local building and present their findings to the whole group.
- Use a knowledge quiz to check learners' understanding of construction methods and their suitability in different situations.

Learning aim A4: Advantages and disadvantages

- Lead a class discussion to consider potential advantages and disadvantages of different types of construction. This discussion should cover all the factors in the unit content.
- Develop the task brief, based on learners' earlier work on the different construction types. This will be an extension task, in which learners have to summarise the advantages and disadvantages of their chosen offsite and onsite construction methods for a given project (for example, a renovation and adaptation project). Learners could work in the same groups as before, then present their reasoning to the class.
- Based on the results of the group activity, initiate a class discussion about the suitability of various methods and associated materials. Draw out the key points, discussing and answering any questions from learners.

A well-planned site visit will provide a useful conclusion to this learning aim. Before the visit, ask learners to prepare checklists and questions.

After the visit, ask learners to prepare a poster or oral presentation for the class, reflecting on their learning during the visit.

Learning aim B: Explore the drivers for different forms of construction

Learning aim B1: Construction-related drivers

This learning aim is about construction and non-construction drivers which influence the decision to choose a specific construction method.

Source a number of case studies to show how particular drivers – such as a shortage of skills in the local area – could influence the choice of construction method(s). You could also contact construction companies, who are usually willing to help.

Engage learners through suitably structured research activities, in which they explore local or national projects and identify the possible drivers behind the construction methods used.

- Introduce the learning aim by asking, 'what drives construction projects?' Focus on construction-related drivers such as health and safety, new technologies and materials, and the availability (or lack) of skills in the local area. Use case studies, scenarios and project



examples. Discuss with learners the main construction-related drivers in your local area.

- Engage learners through Q&A sessions and lead a class discussion about how these drivers could influence the construction methods chosen for specific projects.
- Then ask learners to work independently to explore links between construction-related drivers and construction methods – for example, skills shortages may lead to the use of modular forms. Provide support as necessary.

Learning aim B2: Non-construction drivers

- Introduce non-construction related drivers including sustainability, local and regional policies and population. Lead a class discussion and use examples (e.g. of local projects) to link these drivers with different types of construction method.
- You could then use the same renovation and adaptation project as in learning aim A and link the construction methods used with, for example, local and regional housing policies.
- Ask learners to work in groups on the same project as above. Allocate each group a topic from the unit content and ask them to identify where their allocated factor has influenced the choice of a construction method. Learners share their findings with the class.

To conclude learning aim B, you could invite a guest speaker – for example, from a project management background or from the client or contractor side. The guest speaker should share examples from projects where construction and non-construction factors have influenced the choices made during the design and construction stages, and explain the reasons behind these decisions.

Learning aim C: Investigate the potential benefits of a specific method of construction for a given project

Learning aim C1: Project parameters

- Carry out a number of workshop-style sessions covering client briefs and constraints and the ways in which suitable construction methods can be chosen to satisfy these requirements.
- Discuss with learners the parameters that influence a project. You could divide learners into small groups to investigate stakeholders, stakeholder needs, local contexts and sustainability. Then ask groups to discuss which of these parameters would have the greatest impact on a given project.
- Learners reflect upon the workshop sessions and prepare queries and questions to ask the guest speaker. Support learners during this activity.
- Invite a guest speaker – possibly an architect, a project manager or a client representative – to give learners a walkthrough of a project. The speaker should show how the various parameters, including requirements and constraints, had to be satisfied both at the design stage and at the construction stage.
- After the speaker's visit, lead a class discussion in which learners discuss the projects they have worked on and justify their choices of construction method(s). Draw out and summarise the key points.



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

This unit links to:

- Unit 1: Construction Technology
- Unit 2: Construction Design
- Unit 3: Construction Science
- Unit 6: Construction Mathematics
- Unit 7: Graphical Detailing in Construction
- Unit 18: Work Experience

Resources

In addition to the resources listed below, publishers are likely to produce Pearson-endorsed textbooks that support this unit of the BTEC International Level 3 Qualification in Construction and the Built Environment. Check the Pearson website at <http://qualifications.pearson.com/endorsed-resources> for more information as titles achieve endorsement.

Textbooks

- Chudley, R., Greeno, R., Hurst, M. and Topliss, S., *Construction Technology*, 5th edition, Pearson, 2011, ISBN 978-0-435-04682-8 – This book provides excellent illustrative content and some useful descriptions which are very relevant to the unit.
- Greeno, R. and Chudley, R., *Building Construction Handbook*, 11th edition, Routledge, 2016, ISBN 978-1-138-90709-6 – This handbook has been used by construction students over a number of years. It covers construction forms, processes and external works in a concise manner.
- Goulding, J. and Rahimian, F., *Offsite Production and Manufacturing for Innovative Construction: People, Process and Technology*, Routledge, 2020, ISBN 978-1-138-55071-1
- Smith, R., *Prefab Architecture: A Guide to Modular Design and Construction*, John Wiley & Sons, 2011, ISBN 978-0-470-27561-0 – A very good resource with information about both modular and pre-fabricated buildings.
- Smith, R. and Quale, J. (eds.) *Offsite Architecture: Constructing the Future*, Routledge, 2017, ISBN 978-1-138-82139-2

Journals

- *Construction Manager* (The Chartered Institute of Building) – This journal contains updates on construction projects, methods and materials.
- *Journal of Green Building* (Allen Press) – This journal addresses sustainability, new materials and modern methods of construction.

Videos (YouTube)

- 'Frame Wise Build Timber Frame House at Timber Expo' – This video gives details of timber frame construction.



- 'What are the Advantages of Modular Construction?' and 'Yorkon modular construction - the UK's largest modular health contract' – These videos explain modular construction techniques.

Websites

- Buildoffsite – An important and respected organisation promoting all types of offsite construction, including modular and prefab. The website contains a wealth of information and industry updates.
- Portakabin (previously Yorkon) – An excellent resource for modular construction.
- The Self Build Guide – This website explains traditional and modern construction processes in a structured way.

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.