# Unit 11: Management of a Construction Project

## Delivery guidance

The management of a project in construction is a complex operation with numerous operatives and contractors to be organised, coordinated and communicated with. All aspects of a project must pull together to ensure the successful completion and hand over of the building, and this unit will show learners the many techniques and considerations that staff in management roles must take on in order to achieve this.

### Approaching the unit

Employer engagement through a site visit that demonstrates how a construction site is organised and managed is an ideal method to get learners motivated and interested in various aspects of site, contract and project management. This would provide a valuable opportunity to discuss the management role with a site manager in a live construction context.

Building good links with a local main contractor would provide you with a valuable source of information and live examples that would cover many aspects of the unit's content and you will find learners motivated and engaged by working with relevant and tangible source material.

### Delivering the learning aims

#### Learning aim A

Learning aim A covers the principles and practice of site management. Tutor presentations to introduce the concepts, supported by the engagement of guest speakers, would provide an ideal combination for delivery. If possible, the guest speaker should be a site manager, a contracts manager or a project manager. All would be able to provide a view on the roles of the construction team and their individual responsibilities, along with an overview of the various techniques used on a construction site. Learner research and presentations on the principles of scientific management (Maslow, Fayol, McGregor) could then be followed by small group work, each focusing on a specific role within the construction project management team for further presentations to class.

The practical application of construction management techniques could initially be introduced by the tutor, but you may also consider online video resources to lay the foundations for understanding. Learners will need to understand the purpose of creating critical path analysis, Gantt charts and line of balance charts. There are many working examples of software to

achieve the programming demonstration that produce Gantt charts and critical paths. Microsoft Project is also part of the office suite and is available to use to demonstrate the ease of putting together a programme. Demonstrate examples of each so that learners can then work through in a logical sequence.

### Learning aim B

Learning aim B examines the application of purchasing methods. Obtaining the services of a buyer within a large construction operation would cover many of these aspects. Similarly, any person with a procurement capacity would be able to help with the delivery of the aspects of the content such as, ethical purchasing, the purpose of the purchase order, enquiry documentation and meeting planning requirements.

Materials and their supply (from various sources) can be investigated through small group work. You could ask learners to resource, procure and order a material to meet a given date on a programme using mock documentation. Obtaining administrative documentation from a contractor's buying department would provide a valuable resource in illustrating how orders are procured and placed in time to meet a main contract programme. In addition to this, online research and review of example purchasing policies would provide an effective illustration of industry concern regarding ethical buying, sustainability, social responsibility and conformance with legislation.

For the delivery of cost management techniques, you can explore opportunities to link delivery with *Unit 22: Economics and Finance in Construction,* as many common themes exist. Content for this learning aim could be delivered initially with a review and analysis of example budget and valuation data. Learners would benefit from hands-on practical application through mock budget and cost control exercises to reinforce their understanding. Such activities could be carried out in a small group or as an individual work.

### Learning aim C

Learning aim C covers the production control systems and the measurement of progress. Programming construction activities can be explored through a range of methods. For example, you could task learners to view a video of a work activity and ask them to write a method statement for the task that is being conducted. Learners could work individually or in small groups to produce key documents, such as a site layout plan from a provided design layout, and an environmental waste management policy for the site.

Learners will also need to demonstrate their understanding of the importance of accurate progress measurement, and this can be done by revisiting the Gantt chart produced in learning aim B and providing learners with the data they will needs to capture.

## Assessment model

| Learning aim | Key content areas | Recommended assessment approach |
|---|---|---|
| **A** Understand the principles and application of management in construction | **A1** Principles of management<br>**A2** Application of construction management techniques | A report about the management systems in use in the construction company. |
| **B** Understand purchasing and cost management techniques | **B1** Application of purchasing methods<br>**B2** Cost management techniques | |
| **C** Develop a programme of activities for construction works | **C1** Production control systems | A training pack for trainee site managers joining a large national housing contractor. |

### Assessment guidance

There are two key areas of assessment that address the learning aims, as recommended above. The report for learning aim A and B should contain a system of management, followed by applications of these techniques and include examples of how they are used on a construction site. Learners should demonstrate their understanding of the management requirements for both employees and sub-contractors.

The second assignment covering learning aim B is recommended as a training pack for a trainee site manager. Learners will need to show knowledge of the process of procurement, cost control against budgets and social ethics in purchasing as they describe the procurement, administration and supply of materials to a construction site.

Finally, learners will need to produce a presentation of the various methods that can be used for the production of programmes. The presentation should contain relevant imagery along with clear explanation on monitoring the elements, both critical and non-critical.

All three assignments can be produced using traditional word-processing methods. There are some software programmes (such as Microsoft Project) that could be used to prepare programmes – some suggestions have been listed in the Resources section.

## Getting started

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

### Unit 11: Management of a Construction Project

Introduction

This unit covers management techniques and methods specific to construction, therefore a site visit would provide an ideal opportunity for learners to witness them being utilised to operate and manage a construction site. This would also provide a first-hand opportunity for learners to interview the site manager and gain valuable knowledge on all aspects of site management.

You may struggle to find a holistic method of applying assessment tasks for this unit as the learning aims are too distinct. However, you will be able make links between the aspects of learning aims A and C where contract programmes can be delivered to meet the content requirements of both.

For learning aim C, learners have to develop a programme of activities for a project; therefore access to a real site with real project documentation would be of great benefit as it will enable them to see the impact of the management tools and techniques on the project progress and outcomes. In the absence of this, learners must be given a realistic scenario or a brief around which programmes can be planned and monitored.

### Learning aim A – Understand the principles and application of management in construction

This aim covers the principles and application of management. When delivering topics, you will need to ensure that there are examples of how these are applied within industry to place the learning in a vocational context. Developing a relationship with a main contractor would prove valuable. As an opener, ask learners to examine what is the principle of management and brainstorm this activity.

**A1**

- Invite a guest speaker to come and discuss the principles of management, as outlined in learning aim A1. The guest speaker should ideally have a background in site management, contracts management or project management. To maximise the time spent with them, learners should be encouraged to prepare questions in advance relevant to the learning aim content. The session could also be videoed (with the guest speaker's permission) for future use and debate in class.
- An effective introduction to the management theories to be covered could be through learners working in small groups to research, prepare and deliver a presentation on one of the methods of scientific management from the unit content. Presentations should be focused towards its application in a construction context, providing examples where possible.
- For a deeper exploration to define roles and responsibilities within the

construction project management team, learners could remain in their groups and be issued a specific role from the unit content; architect, quantity surveyor, construction manager, project manager, structural engineer, services engineer, site manager, buyer and planner. They would need to research and define:

- the role of this person
- their responsibilities in the management of a project and
- finally, how they would interact with two other teams.

- Results of this activity could be shared in a tutor-led discussion, to collate and summarise key points, and fill in any gaps in the content. Group presentations could then be saved to the VLE or server, so all have access to this resource for reference.
- A site visit would prove valuable in allowing an opportunity for learners to examine aspects of plant, materials and labour management, along with the management of sub-contractors. This perspective on management needs to cover incentives, motivation, organising, procurement and coordinating and controlling of all resources. These management functions can then be contrasted with those that would fall under the responsibility of a head office.

**A2**

- Techniques for site management could be delivered through a combination of online research, demonstrations and practical activities. You could begin with a tutor-led discussion to gauge prior knowledge of the purpose of planning a project and the various means by which you can monitor its progress. Learners need to be able to interpret the data on, for example, Gantt charts, line of balance charts and critical path analysis and can work individually or in pairs to examine this.
- This could lead into the following task: learners are given a list of programme activities with sequencing and durations from which they must prepare a contract programme. This programme can take the form of a Gantt chart that has a range of activities included within it, opportunities for sub-contract inclusion and a critical path identified across the timeline.
- A further extension could follow where learners are each given a technique from the following list and asked to examine exactly how it manages the aspect it is used for:
  - daily activity sheets
  - drawing registers
  - materials testing
  - site layout plan.
- Learners then collaborate in a group exercise and capture findings on a flipchart sheet, each to be presented for discussion and debate.
- The two aspects of the management of directly employed labour and sub- contractors can be delivered by some of the following activities:
  - Setting a task on motivation of labour force, without using money as an incentive. For example, identifying good working conditions on site, to include a safe and dry environment and one that enables effective production.
  - Outlining the methods that can be used to communicate with the

workforce and sub-contractors. For example, notice boards, site induction, safety committees and toolbox talks.

## Learning aim B – Understand purchasing and cost management techniques

**B1**

This learning aim covers the procurement and buying of materials for a construction project and provides opportunity for a range of different and engaging delivery methods for learners to practically apply the techniques covered. Such activities could include the following:

- Learners are tasked to formulate a list of selected suppliers for a given material, stating why they have been included as a viable option. Learners need to understand that a 'select' list contains a pre-approved resource that already meets the company's procurement strategies.
- Schedule materials enquiries from a given bill of quantities section provided by a quantity surveying company. This would demonstrate that a bill has to be worked through to identify any materials with long lead in times so that, prior to delivery on site, these are recognised to have a major effect on a programme.
- Analysis of a given contract program to obtain the dates required for delivery to the project. For example, examination of the dates that sub-contractors are required on site for coordination with others
- Establish lead-in times for a given material.
- Learners will need to understand the implications for contractors of the terms and conditions specified by suppliers. This can be done by obtaining a typical purchase order and analysing the terms and conditions. Researching supplier terms online and in example contracts should also be explored in a tutor-led activity, asking learners to identify the benefits of such arrangements (for contractor as well as supplier).
- Initiate class discussion and debate, you may wish to view online videos outlining the position construction firms are taking on ethical purchasing, sustainability and social responsibility. You could ask learners what they see as the main challenges in evaluating the sustainability of materials for firms to meet their own 'green requirements'.
- Research the green status for materials in terms of standards. For example, PEFC is an organisation that provides a quality mark to use on timber products.
- Look at the methods to ensure sustainable compliance of materials, such as, 'fair trade' status for the supply of products.
- Explore the ethical supply chain further, where learners can research the local Government website for policies on the ethical supply of materials for Government contracts. You could then task learners to analyse an ethical purchasing policy from a construction firm to see how it compares with the Government policy.
- A builders' merchant sales representative could be invited in to discuss the supply chain and how it operates. Learners could be invited to submit questions in

advance for an interview style Q and A session.

- Working in pairs, learners could investigate how a supplier can offer a discount and the methods that can be used for a main contractor. This should include a trade discount, annual discount, cash discount and loyalty schemes.
- Learners could carry out a number of practical and analytical tasks, such as the completion of a mock purchase order from given data or checking a provided quotation against a specification for compliance. They could also match the requirements of a material to a specification item and check the compliance, advising a 'client' if this does not match their specification. Learners can then swap and peer review each other's work.

**B2**

- Moving on from purchasing methods to cost management techniques, learners could be issued examples of interim valuations for a project. This should be demonstrated in a way that learners can clearly identify the breakdown of items from various sources to see how this is compiled into an overall valuation.
    - Use of a mock budget to identify costs savings that could be recommended by learners. This covers aspects of cost value engineering where a project's tender value may be over the original budget and savings have to be made. Learners could make recommendations as to changes in specifications for cheaper products.
    - Small group working, with each given a technique to manage costs, e.g. unit, elemental, marginal and variance. This will allow each group to investigate and then report back collectively what each of the costing techniques is and how it operates.
    - Learners can then be asked to prepare a budget from given data. This should be a simple set of data that learners have to analyse, from which they must produce a new budget. For example, simple rates per $m^2$ against a new area taken off a drawing would be ideal.

## Learning aim C – Develop a programme of activities for construction works

**C1**

For this learning aim, learners have to develop a portfolio of programs and other contract documentation that demonstrates certain aspects of the following:

- Method statements that describe the resources, including how they are used, for an activity such as forming a foundation or constructing walls.
- A site layout plan that details traffic management, location of offices, accommodation and compounds, site entrance and security, waste storage and removal and parking.
- Use of Gantt charts, including updating of data for given activities on site, so learners are aware what affect one key critical activity can have on a program's timeline.
- To capture measurement of progress on site, you could provide a list of completion percentages against activities and ask learners to update their control system to understand which activities are behind or ahead of schedule.
- Preparation of financial information could be accomplished by demonstrating the type of administration that is generated on site. For example, goods received sheets, plant hire sheets, site diary and site returns on labour.

If you could obtain the services of a guest speaker, such as a planner from a large construction company, this would provide an ideal opportunity to enhance learners' knowledge of the above unit content.

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

- Unit 1: Construction Technology
- Unit 4: Safe Working Practice
- Unit 11: Management of a Construction Project
- Unit 19: Projects in Construction
- Unit 20: Quantity Surveying

## Resources

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

## Textbooks

Clark W, *The Gantt Chart: A Working Tool of Management,* Nabu Press, 2012 ISBN 9781278642062 – a useful resource for producing Gantt charts.

Cooke B and Williams P, *Construction Planning, Programming and Control* (Third Edition), Wiley-Blackwell, 2009 ISBN 9781405183802 – this will help with the development of a contract program.

Harris F, McCaffer R and Edum-Fotwe F, *Modern Construction Management* (Seventh Edition), Wiley-Blackwell, 2013 ISBN 9781405133258 – this book deals with aspects of management for construction projects.

## Videos - YouTube:

"Career Advice on becoming an Assistant Construction Manager by Scott D (Full Version)"

"Creating a Gantt in Excel - Basic"

"Leading the way in responsible sourcing"
- Tata Steel on responsible sourcing

## Websites

Visit the Chartered Institute of Building website for educational resources, CPD, career advice and standards

Visit the Chartered Institute of Procurement and Supply (CIPS) website and search "Ethical Purchasing Practices" for a PDF on ethical purchasing policy

Visit the Designing Buildings website, a general construction website full of useful links

Visit Ganttproject.biz  a free application to create Gantt charts

The Institute of Materials website has some publications that may be useful

Find Microsoft Project on the Microsoft website

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