

# **Unit 7: Planning, Organisation and Control of Resources in Construction and the Built Environment**

**NQF Level 3: BTEC National**

**Guided learning hours: 60**

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## **Unit abstract**

A successful project requires careful planning, organisation and control throughout to achieve the correct result for the client. For the contractor, good planning, organisation and control are essential in order to achieve a timely and satisfactory outcome for the client, and to ensure a financial profit.

The resources of labour, plant, materials and management must be employed efficiently to ensure a satisfactory conclusion to a project. This encompasses the logistical organisation of the site, ordering procedures, materials movement and handling, plant selection and usage, construction activities, the management and effective use of site labour, co-ordination of sub-contractors, the allocation of appropriate durations and resources for the construction work and the continuous monitoring of site progress and costs.

Learners will develop an understanding of the management functions of planning and the techniques that are available both off and on site to effectively plan the deployment of resources needed successfully to complete a project. They will develop an insight into the importance of planning and resource control to the overall construction process. They will acquire knowledge and understandings of the techniques used in planning, be able to identify the human and physical resources needed for a typical low-rise domestic or commercial building, to produce a simple programme and to explain the associated resourcing, monitoring and controls.

## **Learning outcomes**

**On completion of this unit a learner should:**

- 1 Understand the roles and responsibilities of, and interaction between, the parties involved at each stage of the construction process
- 2 Be able to identify the resources required to complete a construction project and describe how each is used
- 3 Understand the functions of management in the organisation of the production stage of a construction project
- 4 Be able to produce and interpret the simple bar charts, networks, and schedules used by construction teams.

## Unit content

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### 1 Understand the roles and responsibilities of, and interaction between, the parties involved at each stage of the construction process

*Roles and responsibilities:* management at director or site level; technical roles, eg as planner, quantity surveyor, buyer, estimator; supervisory roles, eg contract supervisor, general foreperson, general operative roles; craft roles, eg joiner, bricklayer, steel fixer

*Team working and interaction of roles:* head office and site organisational charts; team interaction and communication (communication methods, instruction, co-operation, co-ordination, control); levels of responsibility and accountability

*Stages of construction:* elements of a typical low-rise domestic or commercial building; design; production; maintenance; alteration; refurbishment; demolition

*Planning the construction process:* feasibility studies; design; procurement; production; maintenance and repair; refurbishment

### 2 Be able to identify the resources required to complete a construction project and describe how each is used

*Resources:* human (direct and sub-contract labour, management and supervision); plant and machinery; materials; sub-contractors)

*Factors in the planning process:* labour factors, eg availability and cost, skill levels, motivation, productivity; plant factors, eg output rates and efficiency; material factors, eg availability, delivery periods, site handling, waste

*Context:* finance; site layout and organisation; temporary facilities and works; health safety and welfare issues

*Uses:* production of long and short term programmes; scheduling of material requirements; requisitioning, ordering; receiving and checking; site handling; storage and security issues; labour management techniques, (work and method study, control and organisation of labour); plant management (hire, lease or purchase, utilisation and control); relevant documentation

### 3 Understand the functions of management in the organisation of the production stage of a construction project

*General functions:* forecasting; planning; organising; monitoring; controlling; co-ordinating; reviewing

*Organisational aspects:* site layout plan; traffic routes; labour movement; materials and plant location; access and egress; site accommodation; storage; security; health safety and welfare; method statements; progress monitoring; site meetings; sub-contractor liaison; site resources documentation control; programmes of work; bar charts; schedules, eg line of balance; network diagrams, eg arrow diagrams

*Variables:* weather; availability of skilled labour; labour disputes; confined access; late design changes; late construction information; material shortages

**4 Be able to produce and interpret the simple bar charts, networks, and schedules used by construction teams**

*Resource allocation documentation:* use of head office and site documentation to organise, control and monitor the movement, cost and allocation of resources

*Programming and resource-management techniques:* bar charts; schedules, eg line of balance; network diagrams, eg arrow diagrams

*Software applications:* availability and use of software for programming and monitoring

## Grading grid

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all of the learning outcomes for the unit. The criteria for a pass grade describe the level of achievement required to pass this unit.

| Grading criteria   |   |   |
|--|---|---|
| To achieve a pass grade the evidence must show that the learner is able to:  | To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to: | To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to: |
| <p>P1 identify and describe the various stages of the construction process for a low-rise domestic or commercial building</p> <p>P2 investigate and explain the roles and inter-relationships of those members of the building team involved in resource management, planning and production</p> <p>P3 identify the physical and human resources required to complete a building project</p> <p>P4 identify and explain the techniques commonly used to monitor and control resources</p> <p>P5 recognise and interpret examples of resource planning and management documentation</p> | <p>M1 produce organisational charts to explain the group dynamics of team working</p>                           | <p>D1 evaluate two software systems that can facilitate planning, organisation and control processes</p>                        |

| Grading criteria   |   |  |
|--|---|--|
| <p>To achieve a pass grade the evidence must show that the learner is able to:</p>                                       | <p>To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:</p>  | <p>To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:</p> |
| <p>P6 produce and interpret bar charts, networks and schedules for typical low-rise domestic or commercial projects.</p> | <p>M2 compare and evaluate the advantages and disadvantages of a range of resource management techniques</p> <p>M3 discuss the factors that may adversely impact on planning and organisation if not taken into consideration and explain their possible effects.</p> | <p>D2 evaluate a range of planning, organisational and control techniques in terms of utility and efficacy.</p>                        |

## Essential guidance for tutors

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### Delivery

Tutors delivering this unit have opportunities to use a wide range of techniques. Lectures, discussions, seminar presentations, site visits, supervised practicals, research using the internet and/or library resources and the use of personal and/or industrial experience are all suitable. Delivery should stimulate, motivate, educate and enthuse learners. Visiting expert speakers could add to the relevance of the subject.

An overview of the resources and logistical requirements needed to complete a construction project should be imparted at an early stage of the unit's delivery to help place resource planning and control into context. The learner must then develop a detailed insight into the physical and human resources required for a typical project and the techniques used to organise, plan, monitor and control their deployment. The learner should be aware of the key players who are directly responsible for planning, site organisation and control, their specific roles and the ways in which they interact to achieve the goals of completing a project on time and to budget.

Learners should understand the applications of, and be able to compare and evaluate, a range of programming techniques, including those that use computer software. The ability to produce simple programmes for the resource management of typical low-rise domestic or commercial buildings should be developed along with the ability to use monitoring strategies to make adjustments for variations in progress or other unforeseen factors.

Where possible, links should be formed with industry and visits to construction sites should be arranged as this will provide an opportunity for learners to contextualise their learning and to use this to inform their study of the various aspects of planning, organisation and control. A further enhancement to the learning process could be made by seeking specialised input from current practitioners.

Overall delivery of the unit should be supported by the use of case studies and visual media where appropriate including real construction programmes, photographs, video, DVD and drawings to demonstrate the methods used for planning, organisation and control.

Group activities are permissible, but tutors will need to ensure that individual learners are provided with equal experiential and assessment opportunities.

**Health, safety and welfare issues are paramount and should be strictly reinforced through close supervision of all workshops and activity areas, and risk assessments must be undertaken prior to practical activities. Centres are advised to read the *Delivery* approach section on page 24, and *Annexe G: Provision and Use of Work Equipment Regulations 1998 (PUWER)*.**

## Assessment

Evidence for this unit may be gathered from a variety of sources, including well-planned investigative assignments, case studies or reports of practical assignments.

There are many suitable forms of assessment that could be employed, and centres are encouraged to consider and adopt these where appropriate. Some examples of possible assessment approaches are suggested below. However, these are not intended to be either prescriptive or restrictive, and are provided as an illustration of the alternative forms of assessment evidence that would be acceptable. General guidance on the design of suitable assignments is available on page 19 of this specification.

Some criteria could be assessed directly by the tutor during practical activities. If this approach is used, suitable evidence from guided activities would be observation records or witness statements. Guidance on the use of these is provided on the Edexcel website.

The structure of the unit suggests that the grading criteria may be fully addressed by using two assignments. The first of these would cover criteria P1, P2, P3, P4, P5, M1 and D1 and the second would cover criteria P6, M2, M3 and D2. Case studies could provide suitable vehicles for the assessments. As the time required for completion of each assessment is likely to be extensive, staged submissions should be considered and regular, interim feedback from the tutor would be essential.

To achieve a pass grade learners must meet the six pass criteria listed in the grading grid.

For P1, learners have to identify and describe the various stages of the construction process for a low-rise domestic or commercial building. This should encompass all stages from design to construction and handover of the completed building. Learners should be able to split a construction project into a manageable number of stages and should include all elements of the completed building, along with all the temporary infrastructures needed to complete the work.

P2 requires learners to investigate and explain the roles and inter-relationships between the members of the building team involved in resource management, planning and production. Learners have to examine the functions of each and the ways in which they interact in the management of construction resources. The key aspects of interaction should be identified including communication, instruction, co-operation, coordination and control.

P3 calls for learners to identify the physical and human resources required to complete a building project. Learners should identify the principal physical resources such as plant and materials and the human resources needed to execute the building work. Learners should also have an understanding of the role of sub-contractors in the construction process.

P4 requires learners to identify and explain the techniques commonly used to monitor and control resources. Learners must convey a knowledge and understanding of standard organisational aspects and documentation, such as delivery documentation, goods received sheets, stock issue sheets, plant utilisation sheets, timesheets, job cards, requisition orders and software resource allocation.

For P5, learners have to recognise and interpret examples of resource planning and management documentation. There are many ways to do this and the evidence will depend upon the specific nature of each project. Bar charts, scheduling methods such as line of balance, and network diagrams such as arrow diagrams could all be used in this context provided that learners are able to explain their applications.

For P6, learners have to produce and interpret bar charts, networks and schedules for typical low-rise domestic or commercial projects. A knowledge of the standard formats used and an understanding of the need for the logical sequencing of construction activities must be demonstrated.

To achieve a merit grade learners must meet all of the pass criteria **and** the three merit grade criteria.

For M1, learners must produce organisational charts to explain the group dynamics of team working. Team working for a typical construction project should be investigated and the links and interdependencies between team members shown and explained in a chart or diagrammatic format. This should be completed both for management and site operatives.

For M2, learners have to compare the advantages and disadvantages of a range of resource management techniques. The use of paper-based and computer-based systems should be evaluated including site documentation, contract programs and materials schedules. Learners should also evaluate and compare different programming techniques for various scenarios.

For M3, learners are required to discuss the factors that may adversely impact on planning and organisation if not taken into consideration and explain their possible effects. Variables can be taken to include unforeseen factors such as the weather, changes to the design, changes to construction methods and materials and problems with supply and delivery. The effects of each of these on the planning and organisation of the project should be explained.

To achieve a distinction grade learners must meet all of the pass criteria **and** merit grade criteria **and** the two distinction grade criteria.

For D1, learners are required to evaluate two software systems that can facilitate planning, organisation and control processes. Learners should identify and describe typical examples of software systems used for planning, organising and controlling building projects, and explain their applications.

For D2, learners have to evaluate a range of planning, organisational and control techniques in terms of utility (how useful they are) and efficacy (how efficient they are). A range of techniques could be used to provide the evidence including contract programs, the control of labour, site organisation strategies such as traffic planning, site layout charts, work study and waste management.

### **Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications**

This unit has links to *Unit 1: Health, Safety and Welfare in Construction and the Built Environment*, *Unit 5: Construction Technology and Design in Construction and Civil Engineering* and *Unit 6: Building Technology in Construction* together with similar units at Higher National and degree level.

This unit may have links to the Edexcel Level 3 Technical and Professional NVQs for Construction and the Built Environment. Updated information on this, and a summary mapping of the unit to the CIC Occupational Standards, is available from Edexcel. See *Annexe D: National Occupational Standards/mapping with NVQs*.

The unit provides opportunities to gain Level 3 key skills in: application of number; communication; and information and communication technology. Opportunities for satisfying requirements for Wider Curriculum Mapping are summarised in *Annexe F: Wider curriculum mapping*.

### Essential resources

A set of construction drawings, a site layout plan, a construction programme and other relevant schedules for a typical project.

Access to computing facilities and planning software would give the learner an appreciation of what can be achieved using non-manual techniques in programming.

The use of live or completed construction projects on which to base assessment tasks would enhance the learning experience by contextualising the study of planning, organisation and control.

### Indicative reading for learners

#### Textbooks

Burke R – *Project Management: Planning and Control Techniques* (John Wiley and Sons Ltd, 2003) ISBN 0470851244

Forster G – *Construction Site Studies Production Administration & Personnel* (Longman, 1989) ISBN 0582019710

Gould F E – *Managing the Construction Process: Estimating Scheduling and Project Control* (Prentice Hall, 2001) ISBN 0130604062

Oxley and Poskitt – *Management Techniques Applied to the Construction Industry* (Blackwell Science (UK), 1996) ISBN 0632038624

## Key skills

Achievement of key skills is not a requirement of this qualification but it is encouraged. Suggestions of opportunities for the generation of Level 3 key skill evidence are given here. Staff should check that learners have produced all the evidence required by part B of the key skills specifications when assessing this evidence. Learners may need to develop additional evidence elsewhere to fully meet the requirements of the key skills specifications.

| Application of number Level 3  |  |
|--|--|
| When learners are:   | They should be able to develop the following key skills evidence:  |
| <ul style="list-style-type: none"> <li>producing a range of bar charts, networks and schedules for a typical construction project.</li> </ul>  | <p>N3.1 Plan an activity and get relevant information from relevant sources.</p> <p>N3.2 Use this information to carry out multi-stage calculations to do with:</p> <ul style="list-style-type: none"> <li>a amounts or sizes</li> <li>b scales or proportion</li> <li>c handling statistics</li> <li>d using formulae.</li> </ul> <p>N3.3 Interpret the results of your calculations, present your findings and justify your methods.</p> |
| Communication Level 3  |  |
| When learners are:   | They should be able to develop the following key skills evidence:  |
| <ul style="list-style-type: none"> <li>identifying and describing the various stages of the construction processes, the roles and functions of team members, the resources needed and the techniques used to control resources.</li> </ul> | <p>C3.2 Read and synthesise information from at least <b>two</b> documents about the same subject.</p> <p>Each document must be a minimum of 1000 words long.</p> <p>C3.3 Write <b>two</b> different types of documents, each one giving different information about complex subjects.</p> <p>One document must be at least 1000 words long.</p>   |

| <b>Information and communication technology Level 3</b>   |   |
|---|---|
| <b>When learners are:</b>   | <b>They should be able to develop the following key skills evidence:</b>  |
| <ul style="list-style-type: none"> <li>• using the internet and other electronic media to research and gather information on construction methods</li> <li>• using ICT processes to produce the assessment evidence.</li> </ul> | <p>ICT3.1 Search for information using different sources, and multiple search criteria in at least one case.</p> <p>ICT3.2 Enter and develop the information and derive new information.</p> <p>ICT3.3 Present combined information such as text with image, text with number, image with number.</p> |