Unit 22: Design Procedures in Construction

NQF Level 3: **BTEC National**

Guided learning hours: 60

Unit abstract

Architectural design may be viewed as an art form which is combined with 'buildable' construction technology, compliance with building legislation and quality performance standards. Within this complex set of procedures and goals, the design of the building must be controlled. Heading a team, the designer could be a project architect, building surveyor structural engineer or design manager.

Learners will come to understand that the changing role of a designer requires a sound understanding of each of the stages involved in the creation of a building, from concept to completion, and of the roles of the individuals responsible for these. The designer must be able to communicate effectively with other, key, team members, from client to contractors.

Learners will come to know the constitution of the design team and the roles of its members and understand the key stages of the design process. They will be aware of the organisational interactions between members of the design team, client, contractor and other key players involved with a typical construction project, and of the aesthetic, environmental and legislative constraints that affect the design of buildings.

The Royal Institute of British Architects (RIBA) provides check-list detailed guidance on all stages of the design process in the Architect's Plan of Work, and this provides a framework for the delivery of this unit.

Learning outcomes

On completion of this unit a learner should:

1 Know the members of the design team and the organisational and control procedures used to support the overall design process in order to achieve the client's requirements

2 Be able to identify the requirements of the client in terms of spatial needs, aesthetics and financial limitations, together with the effects of technical, environmental and legislative constraints

3 Understand the stages of the design process, from the client's initial need for a building to the creation and co-ordination of the design team, briefing, outline design to final design proposal, production of procurement information, tender action, mobilisation, construction, completion, commissioning and project feedback

4 Be able to explain the changing role of the designer in respect of other professions such as architectural technologists, building surveyors and specialist design consultants and understand the interaction of design teams working within traditional design-led procurement systems and modern project management-led systems including the Private Finance Initiative.

Unit content

1 **Know the members of the design team and the organisational and control procedures used to support the overall design process in order to achieve the client's requirements**

Building designers: architect; architectural technologist; building surveyor; structural engineer; mechanical and electrical engineer, eg heating and ventilation engineer, lift engineer, interior designers

Exterior designers: landscape architect; highways engineers

Design advisors: quantity surveyors; site investigation consultants; town and country planning consultants; environmental consultants; lighting consultants; project managers; management contractors; site managers

Design regulators: planning supervisors (health and safety); town and country planning officers; building control officers; environmental health officers

Organisation of design team and group dynamics: roles and responsibilities; benefits of team working; shared expertise; coordination and communication; partnership; interaction

2 **Be able to identify the requirements of the client in terms of spatial needs, aesthetics and financial limitations, together with the effects of technical, environmental and legislative constraints**

The client's needs: spatial requirements; aesthetics; quality assurance; budget; best value goals; time constraints

Technical and maintenance needs: technical details; buildability; quality issues; health and safety plans; planned maintenance requirements

Environmental needs: environmental impact of design choices, eg materials, methods, services installations, recycling; sustainability, eg local, regional, global compliance

Legislative constraints: building regulations; town and country planning; health and safety

3 **Understand the stages of the design process, from the client's initial need for a building to the creation and co-ordination of the design team, briefing, outline design to final design proposal, production of procurement information, tender action, mobilisation, construction, completion, commissioning and project feedback**

RIBA Plan of Work — Design Phase: pre-contract design process; appraisal; strategic brief; outline proposal; detailed proposal; final proposal; production of information (including drawings); tender documentation; tender action; mobilisation

RIBA Plan of Work — Construction Phase: construction to practical completion

RIBA Plan of Work — Post Practical Completion: feedback; operation of building; maintenance

4 **Be able to explain the changing role of the designer in respect of other professions such as architectural technologists, building surveyors and specialist design consultants and understand the interaction of design teams working within traditional design-led procurement systems and modern project management-led systems including the Private Finance Initiative**

Traditional design-led procurement: role of design team; leading of process from inception to practical completion

Modern design procurement methods: role of designer within modern procurement systems; project management; management contracting; design and build; design managers within Private Finance Initiative (PFI) and Public and Private Partnering (PPP)

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 describes 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:**
P1 identify and explain the roles and responsibilities of members of the design team P2 list and discuss the stages of the design and construction processes	M1 produce job descriptions and person specifications for each member of the design team M2 discuss the benefits of developing the design using a series of clearly identified stages	
P3 list the various drawings required for town and country planning and building regulations approval and explain their functions P4 identify the design needs of the client and the technical, environmental and legislative constraints affecting the design	M3 explain the need for good building aesthetics and internal spatial layout in the context of limited budgets, time constraints, legal and environmental issues	D1 explain the purposes of the key acts and regulations which control the design of buildings and analyse their potential impact on the final design

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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:**
P5 produce an organisational chart for the client, design and construction team members working on a project management, Private Finance Initiative, project and explain its operation.	M4 produce a portfolio of architectural drawings based upon a brief for a low-rise domestic or commercial building.	D2 identify, discuss and evaluate the ways in which the client's budgetary limits influence the process of design and the design of the completed building.

Essential guidance for tutors

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 roles of the client, design team, construction team and the technical, environmental and legal aspects involved in construction projects must be given at an early stage in the delivery of the unit in order to place the design process into context.

Learners should develop an understanding of the traditional progressive development of an architect-led design process followed by the modern project management-led approach to design associated with larger, more complex projects using systems such as the Private Finance Initiative or Public and Private Partnering.

Learners must be made aware of the legislation and guidance that regulates and underpins the design process. At this stage of the learners' development it is necessary to provide a broad understanding of the acts and regulations that affect building design. However, there is no requirement for a deeper understanding and a detailed treatment of the legislation should be avoided.

Health and safety, environmental and quality issues are all of major importance in the design process and should be embedded throughout delivery of the unit.

Where possible, case studies of real or simulated construction projects should be used to contextualise the learning process and learners should be encouraged to use suitable examples from their own workplaces. In addition, centres should attempt to develop links with design practices and/or contractors to provide relevant learning materials, deliver guest lectures and organise site visits.

Learners should be encouraged to use their homes, workplaces or other suitable case studies as a basis to review good and bad aspects of the design and whether any design issues relate to pure aesthetics, spatial layout, human comfort criteria, sustainability, health and safety or maintenance requirements.

There are numerous websites relating to design processes and those of the Royal Institution of British Architects and the Chartered Institute of Architectural Technologists are particularly useful.

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. 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 three assignments. The first of these would cover criteria P1, P2, M1 and M2; the second would cover P3, P4, M3 and D1; and the third would cover criteria P5, M4 and D2.

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

For P1, learners must identify and explain the roles and responsibilities of members of the design team. This should include a list of design team members, a description of their roles and responsibilities and how they interact with each other, and an organisational chart.

For P2, learners must list and discuss the stages of the design and construction processes. They should review each stage of the RIBA Architects Plan of Work and within each stage learners must discuss the issues being covered by the design team and the action they take. It is essential that the three types of briefing: 'initial', 'strategic' and 'project' are identified and discussed.

For P3, learners have to list the various drawings required for town and country planning and building regulations approval and explain their functions. After identifying the drawings required, learners should discuss the number and combination of drawings, scales, dimensions and technical information requirements and explain their specific purposes.

For P4, learners are required to identify the design needs of the client and the technical, environmental and legislative constraints affecting the design. They should identify the key needs such as aesthetics, spatial arrangements and functional layout together with the technical, environmental and legislative factors affecting the design.

For P5, learners must produce an organisational chart for the client, design and construction team members working on a project management, Private Finance Initiative, project and explain its operation. They should demonstrate an understanding of this method of managing the design process and give examples of companies who specialise in Private Finance Initiative work. After outlining the procedures, learners should describe the design management role within such a procurement arrangement.

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

For M1, learners have to produce job descriptions and person specifications for each member of the design team. They should identify and explain the essential and desirable characteristics of each member of the design team in terms of their skills and qualifications. Using a standard job description format learners should generate person specifications suitable for recruitment purposes.

For M2, learners must discuss the benefits of developing the design using a series of clearly identified stages. This should include an explanation of the advantages of following a structured, formalised process but without restricting the designer's need for artistic freedom.

For M3, learners are required to explain the need for good building aesthetics and internal spatial layout in the context of limited budgets, time constraints, legal and environmental issues. They should analyse the compromise that is required in order to achieve a successful building design, when financial limitations, time, legislative and environmental issues have to be taken into account.

For M4, learners must produce a portfolio of architectural drawings based upon a brief for a low-rise domestic or commercial building. The drawings should be suitable for submission for town and country planning and building regulations approval.

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

For D1, learners must explain the purposes of the key acts and regulations which control the design of buildings and analyse their potential impact on the final design. The Town and Country Planning Act, Building Regulations and other key legislation affecting the design process should be reviewed in broad terms followed by a discussion of the ways in which they control and influence the final building design.

For D2, learners have to identify, discuss and evaluate the ways in which the client's budgetary limits influence the process of design and the design of the completed building. This should convey a clear understanding that the client's budgetary limit is of crucial importance in the design process and should allude to elemental cost planning which facilitates the control of costs through design changes which are feasible and appropriate.

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

The learning outcomes in this unit are closely linked with, for example, *Unit 5: Construction Technology and Design in Construction and Civil Engineering*, *Unit 6: Building Technology in Construction*, *Unit 15: Building Surveying in Construction* and *Unit 17: Building Regulations and Control 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 communication, information and communication technology, improving own learning and performance and problem solving. Opportunities for satisfying requirements for Wider Curriculum Mapping are summarised in *Annexe F: Wider curriculum mapping*.

Essential resources

Learners should be encouraged to provide their own basic drawing equipment for use at home and in the centre. Learners will need guidance in making purchases and should be encouraged to obtain good-quality equipment. Drawing facilities should also be provided by the centre, together with access to CAD facilities to enable learners to produce drawings using CAD should they choose. Learners will also need access to real examples of industry standard design information including drawings. Local professional practices are a useful source of such information, provided the necessary copyright permissions are sought.

The use of design team information, procedures and documentation for live or completed construction projects on which to base assessment tasks would enhance the learning experience by contextualising the study of design procedures.

Indicative reading for learners

Textbooks

Collier T — *Design, Technology and the Development Process in the Built Environment* (Spon Press UK, 1995) ISBN 0419195505

Phillips R — *Architects Plan of Work* (RIBA Publishing, 2000) RIBA Order Code 21009

RIBA — *Architect's Job Book* (RIBA Publishing, 1995) ISBN 1859460070

Thompson A — *Architectural Design Practice, 2nd Edition* (Butterworth-Heinemann, 1998)

Tunstall G — *Managing the Building Design Process* (Butterworth-Heinemann Ltd, 2000) ISBN 0750650699

Zunde J M — *Design Procedures Level 4* (Sheffield Hallam University Press, 1992) ISBN 0863392024

Websites

www.ciat.org.uk

www.riba.org.uk

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. Tutors 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.

Communication Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• partaking in a group discussion about the needs of a client requiring a house to be designed	C3.1a Take part in a group discussion.
• (from the discussion in C3.1a) presenting an overview of the design brief for a house	C3.1b Make a formal presentation of at least eight minutes using an image or other support material.
• discussing the benefits of developing the design using a series of clearly identified stages	C3.2 Read and synthesise information from at least **two** documents about the same subject. Each document must be a minimum of 1000 words long.
• producing a job description and a person specification for each member of the design team.	C3.3 Write **two** different types of documents each one giving different information about complex subjects. One document must be at least 1000 words long.

Information and communication technology Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• using the internet and other electronic media to research and gather information on construction methods • using ICT processes to produce the assessment evidence.	ICT3.1 Search for information, using different sources, and multiple search criteria in at least one case. ICT3.2 Enter and develop the information and derive new information. ICT3.3 Present combined information such as text with image, text with number, image with number.
Improving own learning and performance Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• (on receipt of assignment brief) planning work programme to meet the submission date • undertaking a review of assignment production progress at regular intervals • submitting an assignment on the due date • reviewing and responding to tutor feedback on assignment.	LP3.1 Set targets using information from appropriate people and plan how these will be met. LP3.2 Take responsibility for your learning, using your plan to help meet targets and improve your performance. LP3.3 Review progress and establish evidence of your achievements.

Problem solving Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• identifying the design needs of the client and the technical, environmental and legislative constraints affecting the design • producing an organisational chart for the client, design and construction team members working on a PFI project and explaining its operation.	PS3.1 Explore a problem and different ways of tackling it. PS3.2 Plan and implement at least one way of solving the problem. PS3.3 Check if the problem has been solved and review your approach to problem solving.