

Unit 4: Construction Design

Unit code:	T/504/4340
QCF level:	6
Credit value:	15

Aim

This unit will enable learners to develop an understanding of the processes required to design a complex construction project, and the skills to produce sustainable concept and design solutions.

Unit abstract

The emphasis on using 'green' approaches has affected the design and construction of the built environment. Any asset to the built environment that we develop should be sustainable. It is now considered best practice to address sustainability at the design stage.

In this unit learners will develop a design solution from a brief from the design concept stage through to evaluation of their own solution, in terms of its buildability.

Learners will explore the context within which complex construction projects are designed. They will produce a design solution that fulfils a design brief and takes into account sustainable practices and reflects the sustainable agenda. Learners will evaluate the design solution in terms of its sustainability potential and are expected to use industry-standard software to present their design solutions.

Learning outcomes

On successful completion of this unit a learner will:

- 1 Understand the application of processes involved in the design of complex construction projects
- 2 Be able to produce sustainable concept solutions
- 3 Be able to produce sustainable design solutions.

Unit content

1 Understand the application of processes involved in the design of complex construction projects

Design processes: project scope; project drivers (functional, commercial, sustainable, technological); market research; consent and approval; acquisitions; environmental impact strategies; user analysis; social responsibilities; land and property assets; utilities; legislation; Building Information Modelling (BIM)

Procurement: methods of procurement, e.g. traditional, management contracting, design and build, private finance initiative (PFI); risk management

Stakeholder plan: roles and responsibilities; relationship management

Legislation and approved codes of practice: current legislation relevant to the home country; UK legislation to include the Health and Safety at Work etc Act (1974), the Construction (Design and Management) Regulations (2007), approved codes of practice and guidance notes, the Management of Health and Safety at Work Regulations (1999)

2 Be able to produce sustainable concept solutions

Design issues: client needs; constraints, e.g. legal, budgetary; spatial context; operational analysis; user analysis

Structural form and finishes: functional requirements; shape and form; scale, proportion and aesthetics; technologies; systems; construction methods; environmental impact

Sustainability: passive approaches; renewable, low carbon and intelligent technologies; sustainable materials; facilities management; in-use and end-of-use strategies

Concept solutions: 2-D and 3-D drawings and illustrations; application of industry standard software; value engineering; Building Information Modelling (BIM)

3 Be able to produce sustainable design solutions

Design solution: design programme (interdependence of design activities, information flows, reducing design iterations, timelines and milestones); detailed structural, architectural and service 2-D and 3-D drawings and illustrations, using industry standard software; specifications; procurement strategies; project administration; health, safety and welfare issues including legislation, e.g. Construction (Design and Management) Regulations, 2007; design stage risk assessment; strategies to avoid, reduce or mitigate risk

Buildability of design solution: for client needs; benchmarking for sustainability potential; embodied energy; adaptability; flexibility; value for money; Building Information Modelling (BIM)

Learning outcomes and assessment criteria

Learning outcomes On successful completion of this unit a learner will:	Assessment criteria for pass The learner can:
LO1 Understand the application of processes involved in the design of complex construction projects	1.1 Evaluate the effectiveness of design processes from conception to handover for a specified project brief 1.2 Critically evaluate procurement arrangements for a specified project brief 1.3 Produce a stakeholder plan for a specified project brief 1.4 Produce a Health and Safety plan for a specified project
LO2 Be able to produce sustainable concept solutions	2.1 Analyse specific design issues presented by the project brief 2.2 Justify proposed structural form and finishes 2.3 Assess the potential sustainability of the concept solution 2.4 Produce a sustainable concept solution to meet the requirements of the brief
LO3 Be able to produce sustainable design solutions	3.1 Develop a safe and sustainable design solution for a specified project brief 3.2 Evaluate the buildability of the final design solution

Guidance

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

The learning outcomes associated with this unit are closely linked with:

Level 4	Level 5	Level 6
Unit 1: Design Principles and Application for Construction and the Built Environment (D/601/1245) Unit 6: Health, Safety and Welfare for Construction and the Built Environment (T/601/1252) Unit 7: Construction and Maintenance of Buildings (F/601/1254) Unit 10: Building Services Design, Installation and Maintenance in Construction (R/601/1260) Unit 13: Environmental Impact of Construction (A/601/1270) Unit 24: Design Procedures for Construction (A/601/1284)	Unit 4: Management Principles and Application for Construction and the Built Environment (T/601/1249) Unit 8: Technology of Complex Buildings (J/601/1255) Unit 11: Contractual Procedures and Procurement for Construction and the Built Environment (T/601/1266) Unit 20: Construction Methods and Design Solutions (M/601/1279)	Unit 2: Innovation in a Sustainable Construction Industry (H/504/4334) Unit 3: Managing in the Natural and Built Environment (T/504/4337) Unit 5: Building Services Design (F/504/4342) Unit 6: Civil Engineering Design (D/504/4347) Unit 9: Construction Regulations for a Sustainable Society (M/504/4353)

This unit has been informed by the following National Occupational Standards:

- CCOL4/C02 Manage the performance of teams and individuals in construction
- CCOL4/O07 Identify, assess and evaluate project requirements in construction
- CCOL4/O08 Develop and agree detailed project designs in construction
- CCOL4/O10 Prepare procurement schedules and programmes of works in construction
- BEDCL4/O17 Develop, refine and advise on design options in the built environment
- BEDCL4/O05.1 Assess the environmental impact of development proposals.

Essential requirements

Learners should have access to industry-standard software capable of producing and evaluating design solutions.

Delivery

This unit can be delivered using product exemplars, case studies, visits to construction sites and building and architectural practices, and through attending relevant conferences. Visiting speakers from a design, construction or product development background could enrich the learning experience by relating theory to practice.

Assessment

It is possible to use a design brief of a single substantial project to assess the unit in a holistic and integrated manner. Centres are encouraged to engage with employers when designing the assessment. Given the nature of the unit, the majority of assessment evidence is expected to be in the form of a portfolio of learner work. The portfolio may be supplemented by presentations and research-based reports for peers or industry representatives.

Resources

Books

Deplazes A – *Constructing Architecture: Materials, Processes, Structures, A Handbook* (Springer, 2006) ISBN 978-3764371906

Emmitt S and Yeomans D T – *Specifying Buildings: A Design Management Perspective*, 2nd Edition (Butterworth-Heinemann, 2008) ISBN 978-0750684507

Littlefield D – *Metric Handbook – Planning and Design Data*, 3rd Edition (Architectural Press, 2007) ISBN 978-0750652810

McEvoy M and Dye A – *Environmental Construction Handbook* (RIBA Publishing, 2008) ISBN 978-1859461631

Phillips R – *Royal Institute of British Architects – Plan of work – Multidisciplinary Services* (RIBA Publishing, 2008) ISBN 978-1859461952

Thompson A and Mason R – *Architectural Design Procedures*, 3rd Edition (Architectural Press, 2012) ISBN 978-0750665599

Journals

Architectural Engineering and Design Management (Taylor and Francis)

Construction Management and Economics (Taylor and Francis)

BRE Digest (Building Research Engineering (BRE))

BRE Good Building Guide (BRE)

Journal of Green Building (Green Building Press)

The Architects' Journal (EMAP)