

# Construction and the Built Environment

## Standards for 14 to 19 Education

Updated and revised 22 January 2019

### **Construction & the Built Environment Education Advisory Committee**

The education standards and associated guidance set out in this key document and companion document provide a single reference point for all those with an interest in ensuring that education, training and qualifications meet the current and anticipated future needs of the sector. These standards are supported by a wide range of those having a legitimate interest in raising the level of skills across construction and the built environment.

## Contents

<b>Section A:</b> Background	3
Purpose	4
14 to 19 Standards and Guidance on the Design of Qualifications	5
<b>Section B:</b> Pathways	
Building Information Modelling (BIM): Introduction & Overview	6
The 14 to 19 Construction and the Built Environment (CBE) Education standards	7
The Specialist 14 to 19 Education Standards	12
<b>Section C:</b> Annex A	
Membership of the Advisory Committee	38

This work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.

## Section A

---

### Background

Towards the end of 2012 an Advisory Committee for 14 to 19 CBE Education was established under the chairmanship of Roy Cavanagh MBE (Seddon). Roy has now retired and the committee is now chaired by Bridget Bartlett (formerly Deputy Chief Executive, Chartered Institute of Building).

The Committee includes membership drawn from a range of organisations representing the breadth of the CBE education. These organisations include employers (such as Balfour Beatty, Seddon Group, Wates Group, Laing O Rourke, Interserve, Lovell Partnership), professional bodies (such as CIOB, ICE, RICS, CIAT, I Struct E, CIH, CIBSE, CIHT), awarding organisations, universities, further education providers and schools. In March 2017, the committee amalgamated with E4BE (Education for the Built Environment): the new committee is the Construction and Built Environment (CBE) Education Advisory Committee.

The Advisory Committee aims to provide a single voice for CBE in relation to learning and education. It is not funded by the UK government and operates entirely on voluntary efforts and employers who have chosen to invest their time in it. The current sponsors of the committee are ICE, CIOB and RICS. The committee is focused on providing a public voice for those with a legitimate interest in CBE education. The committee seeks to promote a vibrant community to share good practice, discuss issues, offer opportunities for networking and help create a connected and resilient partnership. It also aims to help address skills gaps in the sector and to help inspire young people to train, progress to further, higher and professional education and employment. Key objectives include the following: Influence, policy and diversity - to support efforts aimed at influencing the future shape of construction and the built environment education. Also, to promote diversity, equality and inclusion in that framework to widen access to a more diverse pool of talent; Industry focused education - to encourage and promote the delivery of CBE education, training, up-skilling and re-skilling including work experience opportunities and work related education supported by employers and the professions; Standards and qualifications - to advise on the direction and implementation of initiatives aimed at maintaining and developing CBE education standards capable of supporting a range of qualifications suitable for all learners across a range of levels; Promotion - to promote the education standards and curricula that meets the needs of the industry and to raise awareness of the work of the committee.

The committee had previously agreed that consideration should be given to establishing, and then promoting, credible 14 to 19 education standards. A small steering group was established to lead a programme of work to:

- Ensure that the education standards meet the needs of 14 to 19 learners and employers.
- Provide a sound basis for progression to apprenticeships, further, higher and professional education and training and employment.
- Ensure that the content forms a unique standard which is a point of reference and specification for school and college-based 14 to 19 learning, curriculum and qualifications in the context of construction and the built environment.
- Identify and address any issues concerning content and design and particularly to test that the thematic approach remains one that continues to be supported and valued.

## Section A:

### continued...

A range of education standards had been published and were updated in 2015 to address BIM. Subsequently a light-touch review was undertaken to ensure that the specialist education standards were up-to-date. This document presents the results of the light-touch review.

Key changes include:

- The addition of a number of Learning Outcomes relating to sustainability.
- The addition of an annex dealing with sustainability that links with the work of the Green Construction Board.
- Updated specification for specialist subject Heritage.
- Introduction of annex outlining support for Heritage.
- Some changes regarding Housing learning outcomes.
- A number of changes to the specification Regulatory Framework and Planning.
- Deletion of Health and Fitness.

These 14 to 19 UK standards for CBE education are supported by partner organisations associated with the work of the advisory committee.

## Purpose

The standards have been designed to support a programme of applied and practical learning which introduces young people to the fabric of the world in which we live and its impact on individuals and communities. It progressively builds up an understanding of the physical extent and significance of the CBE and the activities that shape, develop and influence it.

Programmes based on these standards should provide different opportunities to explore CBE at different levels and will:

- Support progression and transfer laterally and progress to further training, apprenticeships and education.
- Aid effective transition to further education, work- based learning or higher education and to adult and working life.
- Provide the basis for motivation learning experience for individuals, through a blend of general education and applied learning within a coherent and motivating programme.

Standards 1.1 to 1.3 together provide a broad introduction to the nature and extent of CBE, the factors influencing its design and construction and its impact on people and communities.

Standards 2.1 to 2.3 together provide an opportunity to develop and apply a range of skills and knowledge in relation to the design, creation, maintenance and use of the built environment.

## Section A:

continued...

Standards 3.1 to 3.3 together provide opportunities to analyse, evaluate and explore principles and practices relating to the social, economic and cultural contributions of the built environment and the wider factors influencing the design, creation, maintenance and management of CBE.

The purpose of the 14 to 19 Specialist education standards is to support learner choice, to support breadth and depth of study and achievement and also to lay a foundation for future progression to further and higher education, the professions, apprenticeships and employment.

14 to 19 Specialist education standards in CBE may also:

- Support choice and progression within a coherent whole programme
- Enable the learner to specialise and/or take up relevant complementary learning.
- Provide opportunities to meet particular needs.

These standards will be of interest to awarding organisations to provide a basis for a range of specifications that may inform the design of optional and specialist unit in applied, technical and vocational qualifications. The specialist standards complement the Construction and the Built Environment 14 to 19 standards and the qualifications that have been based on them.

## 14 to 19 Standards and Guidance on the Design of Qualifications

The suite of standards provides opportunities to explore CBE at different levels. We recommend that the following guidance should be taken into account by awarding organisations in the future development of relevant qualifications.

Qualifications should:

- a) Be freestanding and provide a breadth of learning opportunities for young people of all abilities who may, or may not, continue to explore the built environment.
- b) Present learners with a coherent and comprehensive picture of construction and the built environment in terms of the different demands made upon land use over time and the economic, social and environmental factors that influence this use.
- c) Provide opportunities to take a holistic view of the built environment; how solutions to needs are designed; the processes and technologies involved in creating buildings and structures; the value and uses of those buildings and structures; and the impact they have on communities and individuals. These three key themes should be treated in ways that reflect the complexity and nature of construction and the built environment.
- d) Provide opportunities to investigate, explore, analyse and review all aspects of the built environment through focused projects and practical tasks.
- e) Encourage the provision of guidance on career pathways and evolving job roles across the built environment and the levels of educational attainment required for particular professional routes.

## Section B:

---

### Pathways

Some of the Specialist Standards are offered in terms of a number of suggested pathways:

- Construction
- Building services engineering
- Management of built assets
- Management in the built environment

Each pathway comprises a number of standards and associated learning outcomes.

### Building Information Modelling (BIM): Introduction & Overview

As we move into a digitally aligned Construction industry, Building Information Modelling (BIM) forms an integral part of design, construction and management and is therefore supplemented by an annex to this document covering the following areas:

1. An Introduction to the basic principles of BIM and how BIM can influence projects processes, productivity and management of a built asset. The introduction also introduces the relevance of standards in relation to BIM
2. The underpinning principles of BIM are covered, these include the need to promote and teach the basics of project collaboration and communication which is one of the most important areas of a project involving BIM. This section also covers the importance of information and delivery of that information as well as any security issues that may arise.
3. Technologies and definitions of BIM related processes are important and provide a basis for the introduction of key areas in education. The technologies, changes in these areas as real time analysis and information evolve, and how these technologies can be utilised at all stages of a project is also explained in this section.
4. Evolving job roles will continue to develop as we move into a BIM aligned digital landscape. These roles and responsibilities outlined in the Supplement can provide students with the information relevant to make decisions post Regulated Qualifications Framework (RQF) level 3 and will help them choose a guided career path.

All of the above are outlined in further detail in the BIM Supplement (see companion document) and referenced to specific learning outcomes within these education standards.

## The 14 to 19 CBE Education Standards

### Standards 1.1 to 1.3 (180 Guided Learning Hours)

The following standards are associated with Level 1 of the Regulated Qualifications Framework (RQF) in England and related and equivalent levels in the other UK National qualification frameworks.

Standards 1.1 to 1.3 taken together provide individuals with a motivating programme of study in the context of construction and the built environment.

#### The purpose of these standards is:

- To explore the nature and extent of the built environment
- To introduce the phases of the built environment life cycle
- To explore construction methods and techniques
- To explore the roles of individuals employed within the built environment.

### Standard 1.1: Design of the Built Environment I

#### Learning outcomes:

- I.1.1 Identify social, cultural, economic, environmental and infrastructure factors influencing design.
- I.1.2 Explain how planning of the built environment impacts on design.
- I.1.3 Develop an understanding of sustainability and environmental protection as it applies to the design of the built environment.
- I.1.4 Describe the properties of a range of materials and their impact on the design of the built environment.
- I.1.5 Explain why a range of structures are designed in the way they are.
- I.1.6 Demonstrate an understanding of design principles through the design of a simple structure.
- I.1.7 Explain the principles of BIM and collaborative working and its related outcomes as well as the technologies that support a BIM project.

### Standard 1.2: Create the Built Environment I

#### Learning outcomes:

- I.2.1 Describe how construction methods and materials have changed over time.
- I.2.2 Apply safe working practices to undertake basic operations within the built environment.
- I.2.3 Identify and describe the major requirements for health and safety and environmental protection.
- I.2.4 Use a range of hand tools and equipment used in the construction crafts and building services.
- I.2.5 Describe where and how sustainable materials and processes can be used during the construction of the built environment.
- I.2.6 Identify a range of specific job roles in the built environment.
- I.2.7 Interpret a range of basic technical information.

### Standard 1.3: Value and Use of the Built Environment I

**Learning outcomes:**

- 1.3.1 Identify how the existing infrastructure and transport services impact on people and places around them.
- 1.3.2 Describe how the welfare of people who use the built environment can be ensured.
- 1.3.3 Identify where and how sustainable materials and processes can be used in maintaining the built environment.
- 1.3.4 Describe the life cycle of structures in the built environment and their contribution to economic and social development.
- 1.3.5 Explain the principles of building performance in-use and the causes of the 'performance gap'.

### Standards 2.1 to 2.3 (360 Guided Learning Hours)

The following standards are associated with Level 2 of the Regulated Qualifications framework in England and related and equivalent levels in the other UK national qualification frameworks.

Standards 2.1 to 2.3 taken together provide an opportunity to develop and apply a range of skills and knowledge in the development, maintenance and use of the built environment.

**The purpose of these standards is to provide a broad understanding and working knowledge of:**

- Design considerations and architectural features associated with the built environment.
- The specific job roles and skills associated with the key functions in the built environment.
- The preparation and use of drawings and models as well as all other technical information
- The properties of materials used in the built environment.
- The tools and practical techniques used in the design, construction, maintenance and management of the built environment.

### Standard 2.1: Design the Built Environment 2

**Learning outcomes:**

- 2.1.1 Identify and explore the factors influencing the design process, including BIM related processes.
- 2.1.2 Identify planning requirements and their impact on design.
- 2.1.3 Examine the nature and use of utilities in the design of the built environment.
- 2.1.4 Investigate the use and properties of materials used in construction of the built environment.
- 2.1.5 Identify how the use of sustainable materials can influence the design process.
- 2.1.6 Identify and make use of, a range of technical information available to design the built environment, including BIM related technology.
- 2.1.7 Analyse a range of common structural forms and building elements used in the design process.
- 2.1.8 Analyse a range of metrics used to set performance outcomes for buildings in-use along with methodologies for measuring actual performance.



## Section B:

continued...

- 2.1.9 Apply design principles through the design and evaluation of a complex structure.
- 2.1.10 Investigate how the key elements of design inter-relate: cost to build, planned density of occupation in a given area and the value of the resulting built assets.

### Standard 2.2: Create the Built Environment 2

#### Learning outcomes:

- 2.2.1 Examine main job roles and their relationship to each other within the built environment and explore typical career pathways, qualifications and progression.
- 2.2.2 Identify and use a range of technical information used in the construction of the built environment.
- 2.2.3 Investigate a range of methods and techniques used in the construction of groundworks, sub structure, superstructure and external works.
- 2.2.4 Identify a range of hazards and risks commonly encountered in the construction of the built environment and show how they can be minimized.
- 2.2.5 Identify and apply good practice in safe working techniques.
- 2.2.6 Select and use a range of tools, materials and personal protective equipment to perform construction activities.
- 2.2.7 Analyse a range of metrics used to set performance outcomes for buildings in-use along with methodologies for measuring actual performance.

### Standard 2.3: Value and Use of the Built Environment 2

#### Learning outcomes:

- 2.3.1 Identify and explore the social, cultural, environmental and economic components and benefits of sustainability.
- 2.3.2 Identify and describe the contribution that the built environment makes to the cultural, physical, spiritual and emotional well-being and economic prosperity of individuals and communities.
- 2.3.3 Describe the main activities and roles involved in maintenance and service support functions.
- 2.3.4 Explain the contribution of facilities management and support services to the maintenance, development and economic benefit of the built environment.
- 2.3.5 Analyse a range of metrics used to set performance outcomes for buildings in-use along with methodologies for measuring actual performance.
- 2.3.6 Identify and explore the contribution of property services and housing to the development of the built environment and the wider community.

## Standards 3.1 to 3.3 (540 Guided Learning Hours)

### Learning outcomes:

The following standards are associated with Level 3 of the Regulated Qualifications Framework in England and related and equivalent levels in the other UK national qualification frameworks.

Standards 3.1 to 3.3 taken together provide a motivating programme of study in the context of construction and the built environment which equips individuals with the practical skills, knowledge and understanding which underpins progression to technical and professional careers and further study.

### The purpose of these standards is to develop a range of analytical and investigative skills in relation to:

- The social, economic and cultural contribution of the built environment to individuals and the community
- The factors and principles influencing the design, creation, maintenance and management of the built environment.
- The contribution of activities within the built environment to sustainability.
- The resourcing and management of projects in the built environment.
- The specific job roles and skills associated with key functions in the built environment.

## Standard 3.1: Design the Built Environment 3

### Learning outcomes:

- 3.1.1 Explore the historical, political infrastructure including transport, economic, social, cultural and aesthetic factors influencing the design process.
- 3.1.2 Identify and explore the principles and methods involved in urban design and their influence on the urban environment.
- 3.1.3 Identify and explore the various stages of the design process.
- 3.1.4 Examine the various stages of the planning process and evaluate the important factors that affect planning procedures and decisions.
- 3.1.5 Examine the health, safety and environmental factors influencing the design of the built environment.
- 3.1.6 Investigate the provision of primary services utilities to the design of buildings in terms of the main features, basic operating principles and the materials used.
- 3.1.7 Identify the impact of projected climate change on the design of the built environment and on ways of minimising energy demand and reducing emissions to air, land and water of new and existing buildings.

## Section B:

### Standard 3.2: Create the Built Environment 3

#### Learning outcomes:

- 3.2.1 Examine main job roles and their relationship to each other within the built environment and explore typical career pathways, qualifications and progression.
- 3.2.2 Identify ways of protecting and maintaining the environment during construction of the built environment.
- 3.2.3 Identify and evaluate the construction processes required to construct the sub-and superstructures of a range of buildings, including finishes and services.
- 3.2.4 Identify and evaluate a range of project management tools and techniques.
- 3.2.5 Identify and evaluate a range of quality assurance and project monitoring processes.
- 3.2.6 Identify and evaluate the health, safety and environmental factors influencing the creation of the built environment.
- 3.2.7 Compare existing and developing processes used in the creation of the built environment and evaluate their impact.
- 3.2.8 Explore the barriers to delivering an assured performance building and examine how these barriers might be overcome.
- 3.2.9 Identify and evaluate the principles of renewable energy and its technical and social implications.
- 3.2.10 Identify and evaluate ways of conserving natural resources and recycling waste in the creation of the built environment.

### Standard 3.3: Value and Use of the Built Environment 3

#### Learning outcomes:

- 3.3.1 Describe and evaluate ways of engaging stakeholders and communities in the development and use of the built environment and the local infrastructure including transport.
- 3.3.2 Identify ways of protecting and maintaining the environment during use of the built environment.
- 3.3.3 Evaluate the social, economic and commercial contribution of the built environment to the wider community.
- 3.3.4 Evaluate the role of asset management in the economic and social development of the built environment.
- 3.3.5 Identify and evaluate ways of protecting the physical structure of the built environment.
- 3.3.6 Examine the basic principles of soft landings and how post occupancy evaluation can ensure the soft landings approach was considered and developed.

## The Specialist 14 to 19 Education Standards

The following education standards are associated with Level 1 of the Regulated Qualifications Framework in England and related and equivalent levels in the other UK national qualification frameworks.

All subjects are 30 Guided Learning Hours.

### S I.1: Investigating Maintenance of the Built Environment

This introduces learners to the principles and practices of basic building maintenance.

#### Learning outcomes:

- A. Explore the need for building maintenance and the importance of good design and workmanship.
- B. Identify and describe a range of common building defects and reasons for poor performance.
- C. Apply safe working practices to undertake basic building maintenance operations.

### S I.2: Investigating Modern Methods of Construction

This provides the learner with an introduction to modern methods of construction and their impact on traditional forms of construction.

#### Learning outcomes:

- A. Identify factors which inhibit the efficiency of traditional construction methods.
- B. Identify the range of modern methods of construction which can enhance the efficiency of the construction process.
- C. Relate specific modern methods of construction to specific traditional methods of construction.
- D. Describe the impact of modern methods of construction on the speed, quality and cost of construction and the performance of buildings in use.

### S I.3: Construction and the Built Environment and Its Impact on Individuals and Communities

This provides learners with an introduction to the contribution the built environment makes to the lives of individual and the wider communities they live in.

#### Learning outcomes:

- A. Identify the various types of buildings and structures and their functions within the built environment.
- B. Identify and explore the contribution that different types of building and structures make to the quality of life of individuals and the local community.
- C. Describe the impact different types of land use has on the safety, health and well-being of individuals and communities.
- D. Identify ways in which individuals and communities can influence the built environment to their benefit.

## Section B:

### S I.4: Handling and Storing Resources

This introduces learners to safe manual handling of construction materials and how they should be stored.

#### Learning outcomes:

- A. Safely manually handle a range of construction materials and components.
- B. Correctly stack and store a range of construction materials and components.
- C. Describe the importance of correct lifting techniques and consequences if they are not applied.
- D. Recognise correct storage methods for a range of construction materials and components and state the implications of poor storage.
- E. Check and record incoming materials and components.

### S I.5: Living in the Built Environment

This provides learners with an introduction to the role property and housing plays in our lives and its contribution to our quality of life and prosperity.

#### Learning outcomes:

- A. Explore the way in which housing and property fit alongside other types of land use in a planned environment.
- B. Identify the importance of where we live and how it affects our own well-being, that of the community and the environment in general.
- C. Investigate how property of different kinds contributes to our personal wealth and the wider economy.
- D. Describe the different types of job roles performed in selling, letting, managing and maintaining property of different kinds.

### S I.6: Supporting the Built Environment

This provides learners with an introduction to the support services involved in maintaining and protecting the built environment.

#### Learning outcomes:

- A. Identify and explore the types of services needed to maintain and protect buildings and other structures.
- B. Investigate how support services contribute to our health, security and well-being.
- C. Describe how support services are organised and delivered.
- D. Describe the different types of jobs roles performed in managing and performing support services.

### S I.7: Building Services Engineering

This provides learners with an introduction to building services engineering, and the range of occupations and careers available within the sector (air conditioning and refrigeration, electrical installation, heating and ventilating, plumbing and renewable energy industries).

#### Learning outcomes:

- A. Describe the impact of building services engineering on people's lives and the built environment.
- B. Identify and discuss the different industries and their careers within building services engineering.

## Section B:

continued...

- C. Identify the application of building services engineering systems.
- D. Describe the function and safe use of hand tools in the building services engineering sector.
- E. Demonstrate the safe use of hand tools to carry out simple building services engineering tasks.

### S 1.8: Engineering Construction

This provides learners with an introduction to the breadth and scale of the engineering construction sector.

#### Learning outcomes:

- A. Recognise the various types of engineering construction plant, and describe their purpose and contribution to the national economy.
- B. Describe how the impact of engineering construction plant upon the environment and people's lives is planned and controlled.
- C. Describe the various occupations and careers within engineering construction design, build and maintenance.
- D. Describe the main principles of engineering construction methods and techniques and the associated safety requirements.

The following standards are associated with Level 2 of the Regulated Qualifications Framework in England and related levels in the other UK national qualifications frameworks.

#### The specialist standards include the following pathways:

- Construction
- Building services engineering
- Management of built assets
- Management of built environment

All subjects are 30 Guided Learning Hours (GLH) unless otherwise stated.

## Construction Pathway

### S 2.1: Performing Within Wood-Related Construction Operations

This provides learners with a good knowledge and understanding of the application of the processes and techniques required to perform a range of wood-related construction operations.

#### Learning outcomes:

- A. Identify and select appropriate hand and portable power tools required to carry out wood-related activities.
- B. Apply safe working practices to the use of hand tools and power tools to perform wood-related operations to given specifications.
- C. Carry out setting out operations.
- D. Apply safe working practices in the use of low-level access equipment.

## Section B:

### S 2.2: Performing Within Trowel-related Construction Operations

This provides learners with a good knowledge and understanding of the application of the processes and techniques required to perform a range of trowel- related construction operations.

#### Learning outcomes:

- A. Identify and select appropriate hand tools and equipment to carry out simple brickwork and blockwork tasks.
- B. Apply safe working practices to the use of hand tools and equipment to produce solid brick and block walling and cavity walling to given specifications.
- C. Carry out setting out activities to acceptable standards.
- D. Apply safe working practices in the use of low-level access equipment.

### S 2.3: Performing Within Decorative-Related Construction Operations

This provides learners with a good knowledge and understanding of the application of the processes and techniques required to perform a range of decorative- related construction operations.

#### Learning outcomes:

- A. Identify and select appreciate hand tools and materials commonly used by the decorator for basic painting and wallpapering tasks and producing basic textured finishes and the installation of coving.
- B. Apply safe working practices for the preparation of surfaces, application of paints, hanging of wall coverings and coving and centrepieces to acceptable standards.
- C. Apply safe working practices in the use of low-level access equipment.

### S 2.4: Performing Within Construction and Civil Engineering Operations

This provides learners with a good knowledge and understanding of the application of the processes and techniques required to perform a range of construction and civil engineering operations.

#### Learning outcomes:

- A. Recognise and select appropriate tools, materials and personal protective equipment to carry out basic construction and civil engineering operations.
- B. Apply safe working practices to the use of hand tools and equipment to perform basic construction and civil engineering operations.

### S 2.5: Performing Industrial Pipefitting Operations

This provides learners with a good knowledge and understanding of the application of the principles of industrial pipefitting.

#### Learning outcomes:

- A. Describe the principles and techniques for the fitting and support of various types of industrial pipework.
- B. Identify and describe the function of tools, materials and equipment used for the fitting of various types of industrial pipework and associated components.

## Section B:

continued...

- C. Understand the key principles of industrial pipework design, protection, insulation and maintenance.
- D. Interpret and produce basic industrial pipefitting drawings.
- E. Demonstrate an awareness of industrial pipefitting regulations, including how and why to apply those related to health and safety.

### **S 2.6: Performing Metal-Related Operations**

This provides learners with a good knowledge and understanding of the application of the tools, equipment, techniques and processes involved in the preparation, shaping, joining and finishing of metals and metal products used within the construction process.

#### **Learning outcomes:**

- A. Identify and describe the properties of different metals and how they behave.
- B. Identify and describe the function of tools, materials and equipment used in different metal working activities.
- C. Describe and apply the correct standard operating procedures for the shaping, joining and finishing of different metals.
- D. Apply safe working practices relevant to each metal working process.

### **S 2.7: Management of Resources, Plant and Equipment**

This provides learners with a good knowledge and understanding of the application of the techniques used to manage resources, plant and equipment.

#### **Learning Outcomes:**

- A. Identify how resources are divided between materials, labour and plant/equipment in any project and how these are calculated.
- B. Explore methods used to quantify and plan the use of resources.
- C. Describe the techniques used to record resource usage.
- D. Explore the common techniques used to control the use of materials, labour and plant/equipment.

### **S 2.8: Installation and Assembly of Prefabricated Units**

This provides learners with a good knowledge and understanding and application of the principles and techniques of the installation of prefabricated factory produced units.

#### **Learning outcomes:**

- A. Identify and describe the relative merits of factory produced units as compared with on-site production.
- B. Identify and describe the tools and equipment used for the installation and assembly of a variety of prefabricated units.
- C. Identify the specific hazards of the installation and assembly of prefabricated units.
- D. Demonstrate an awareness of the legislation and codes of practice covering the installation of prefabricated units.



## Section B:

### S 2.9: Performing Structural Steel Working Operations

This provides learners with a good knowledge and understanding of the application of the principles of structural steel working.

#### Learning outcomes:

- A. Describe the principles and techniques for the handling and erection of structural steelwork.
- B. Identify and describe the function of tools, materials and equipment used for the moving and fitting of structural steelwork.
- C. Understand the key principles of structural steelwork design.
- D. Interpret and produce basic structural steelwork drawings.
- E. Demonstrate an awareness of structural steel working regulations, including how and why to apply those related to health and safety.
- F. Understand how the BIM process can begin to enable differing communication of structural steelwork drawings and models.

### S 2.10: Performing Glazing Operations

This provides learners with a good knowledge and understanding of the techniques of glazing in the construction and maintenance of buildings.

#### Learning outcomes:

- A. Describe the properties of glass as a construction material.
- B. Identify and describe the tools and equipment used for glazing in a variety of applications.
- C. Identify the methods and systems for the installation and repair of glazing.
- D. Identify the specific hazards of glazing operations.
- E. Demonstrate an awareness of the need for quality assurance in all aspects of glazing operations.

### S 2.11: Welding and Fabrication

This provides learners with a good knowledge and understanding of the principles and techniques of welding and fabrication.

#### Learning outcomes:

- A. Interpret simple fabrication drawings and accurately mark out simple profiles for a welded assembly.
- B. Use mechanical and thermal cutting equipment to cut out simple profiles.
- C. Use fusion and welding processes to produce simple welded assemblies and make simple repairs to components.
- D. Identify risks and hazards associated with welding processes and apply appropriate safety precautions.

## Building Services Engineering Pathway

### S 2.12: Building Services Engineering Studies

This provides learners with an opportunity to focus on building services engineering and explore the range of occupations and careers available within the sector. This topic is a mandatory requirement for learners undertaking any of the following: Level 2 Performing Plumbing Operations, Performing Refrigeration and Air Conditioning Operations, Performing Heating and Ventilating Operations and Performing Electrical Installation Operations.

#### Learning outcomes:

- A. Describe the impact of building services engineering on people's lives, the environment and the UK economy.
- B. Identify and discuss the different industries within the building services engineering sector, the careers paths, employment/working terms and conditions and Apprenticeships programmes. Describe how building services engineering occupations interact.
- C. Explain the fundamental operating principles of a range of building services engineering systems and their components.
- D. Describe and demonstrate the selection and safe use of hand and power tools in the building services engineering sector; identify the characteristics of materials used within systems.
- E. Interpret and prepare elementary building services engineering drawings, including use of information and communication technology.
- F. Understand how the BIM process can begin to enable differing communication of building services drawings and models.

### S 2.13: Plumbing Studies (60 Guided Learning Hours)

This provides learners with an opportunity to focus on plumbing operations and development knowledge, understanding and experience of plumbing systems, their operational features and characteristics. It is a requirement that the learner follows the level 2 building services engineering topic (2.12) prior to starting this topic or undertake both topics simultaneously. It is possible to combine the learning outcomes from the two topics into one learning programme.

#### Learning outcomes:

- A. Identify the key legislation and codes of practice and their impact on the plumbing industry.
- B. Describe plumbing systems and apply criteria for non- complex component selection.
- C. Develop and apply essential plumbing installation techniques.
- D. Identify and develop essential plumbing maintenance principles.

### S 2.14: Refrigeration and Air-Conditioning (RAC) Studies (60 Guided Learning Hours)

This provides learners with an opportunity to focus on refrigeration and air- conditioning (RAC) operations, to develop knowledge, understanding and experience of RAC systems, their operational features and characteristics.

## Section B:

continued...

It is a requirement that the learner follow the Level 2 Building Services Engineering (topic 2.12) prior to starting this topic or undertake both topics simultaneously. It is possible to combine the learning outcomes from the two topics into one learning programme.

### Learning outcomes:

- A. Identify the key legislation and codes of practice and their impact on the RAC industry.
- B. Describe RAC systems and apply criteria for non-complex component selection.
- C. Develop and apply essential RAC installation techniques.
- D. Identify and develop essential RAC maintenance techniques.

## S 2.15: Electrical Installation Studies (60 Guided Learning Hours)

This provides learners with an opportunity to focus on electrical installation operations in buildings and structures, and develop knowledge, understanding and experience of electrical installation systems, their operational features and characteristics. It is a requirement that the learner follow the Level 2. Building Services Engineering topic (2.12) prior to starting this topic or undertake both topics simultaneously. It is possible to combine the learning outcomes for the two topics into one learning programme.

### Learning outcomes:

- A. Identify the key legislation and codes of practice and their impact on electrical installation.
- B. Describe electrical installation systems and apply criteria for non-complex component selection.
- C. Develop and apply essential electrical installation techniques.
- D. Identify and develop essential electrical maintenance techniques.

## S 2.16: Heating and Ventilating Studies (60 Guided Learning Hours)

This provides an opportunity for learners to focus on heating and ventilating operations and develop knowledge, understanding and experience of heating and ventilating systems, their operational features and characteristics.

It is a requirement that the learner follows the Level 2 Building Services Engineering topic (2.12) prior to starting this topic or undertake both topics or undertake both topics simultaneously. It is possible to combine the learning outcomes from the two topics into one learning programme.

### Learning outcomes:

- A. Identify the key legislation and codes of practice and their impact on the heating and ventilating industry.
- B. Describe heating and ventilating systems and apply criteria for non-complex component selection.
- C. Develop and apply essential heating and ventilating installation techniques.
- D. Identify and develop essential heating and ventilating maintenance techniques.

## Management of Built Assets Pathway

### S 2.17: Facilities and Energy Management and Support Services

This provides learners with a good understanding of the application of the activities involved in the managing and delivering of support services in buildings and other structures and their immediate surroundings including energy efficiency, cleaning and the maintenance of a safe and hygienic environment.

**Learning outcomes:**

- A. Recognise the role of facilities and energy management within the built environment.
- B. Identify the full range of building maintenance and service support functions involved in facilities and energy management and how they relate to each other.
- C. Describe the main activities and roles within each separate cleaning, caretaking, hygiene and facilities support services function, including energy management, environmental support services, sustainable procurement and resource efficiency.
- D. Identify ways in which the support of the Facilities and Energy Management team can identify ways to improve buildings, construction, occupation and performance.

### S 2.18: Housing Services

This provides learners with a good knowledge and understanding of the application of the activities involved in the allocation, letting and maintenance of the housing stock in the public and private sector.

**Learning outcomes:**

- A. Recognise the role of housing services within the built environment.
- B. Identify and explore the wider social, economic, environmental and legislative factors which have a direct influence on housing services.
- C. Identify and describe the different forms of public and private housing provision available.
- D. Identify and describe the contribution housing services make to the well-being of individuals, communities and the environment.
- E. Identify the full range of functions involved in managing, letting, allocating housing, supporting tenants and how they relate to each other.

### S 2.19: Surveying for the Built Environment

This provides learners with a good knowledge and understanding of the application of surveying techniques and activities used in the built environment.

**Learning outcomes:**

- A. Identify and describe the different types of surveying specialisms and their contribution to the built environment.
- B. Identify and apply a variety of measurement methods and mathematical calculations relevant to surveying.
- C. Use basic surveying equipment to arrive at accurate measurements.
- D. Identify and describe the correct ways of recording and reporting on findings.
- E. Identify and describe modern methods of surveying including laser scanning, photogrammetry and digital site capture.

## S 2.20: Sale and Letting of Residential, Industrial and Commercial Property

This provides learners with a good knowledge and understanding of the application of the processes involved in the sale, letting and management of residential, industrial and commercial property.

### Learning outcomes:

- A. Identify and describe the primary functions involved in the sale and letting of residential, industrial and commercial property.
- B. Identify and describe the customer care and client support requirements in the sale and letting of residential, industrial and commercial property.
- C. Identify and describe the primary legislation governing the sale, letting and management of residential, industrial and commercial property; including relevant UK and European policy on the minimum energy efficiency standards for buildings.
- D. Identify and describe the services related to the sale and letting of property including surveying, energy assessment and property management.
- E. Identify and describe ways of monitoring and responding to local property market changes.

## S 2.21: Planning in Construction and the Built Environment

This provides learners with a good knowledge and understanding of the application of the processes involved in planning the development of the built environment.

### Learning outcomes:

- A. Identify and describe the role of planning and its contribution to the built environment.
- B. Identify and describe the economic, legal, environmental and social factors which influence the planning process.
- C. Identify the full range of functions involved in planning and monitoring developments of the built environment and how they relate to each other.
- D. Identify and describe the major stages in the planning process.
- E. Identify and describe how individuals and communities can participate in the planning process.

## S 2.22: Introduction to Valuation

This provides learners with a good knowledge and understanding of the application of the activities involved in establishing the value of physical assets within the built environment.

### Learning outcomes:

- A. Identify the different purposes of carrying out a valuation of property.
- B. Identify the factors which need to be taken into account to determine the value of property including energy efficiency, cost of running etc.
- C. Identify the full range of functions involved in carrying out valuation services.
- D. Explain the contribution of valuation services to the maintenance and development of the built environment.

### **S 2.23: Community Management and Regeneration**

This provides learners with a good knowledge and understanding of the activities involved in relation to the contribution of housing services to community development and social, and environmental, regeneration.

#### **Learning outcomes:**

- A. Identify and describe the factors which influence the growth or decline of communities, including sustainability and environmental impacts.
- B. Identify and describe the main agencies involved in neighbourhood management and their impact on communities.
- C. Describe the contribution of housing services to the health, safety, security and well-being of individuals and local communities.
- D. Identify ways in which individuals can influence decisions about the quality of services in the local community.

### **The following topics may be associated with any pathway**

### **S 2.24: Performing Built Environment Maintenance Operations**

This provides learner with a good knowledge and understanding of the application of the principles and practices of basic building maintenance.

#### **Learning outcomes:**

- A. Explore the need for building maintenance and the importance of good design and workmanship and proper commissioning of systems.
- B. Identify and describe a range of common building defects and reasons for poor performance.
- C. Apply safe working practice to undertake basic building maintenance operations.

### **S 2.25: Relationship of Construction and the Built Environment to the Wider Community**

This provides learners with a good knowledge and understanding of the impact of the built environment on local communities and on the quality of life of individuals within them.

#### **Learning outcomes:**

- A. Identify the different ways in which land is used to meet the needs of individuals and communities.
- B. Identify ways in which the built environment can promote or act against the well-being of individuals and communities.
- C. Describe how the planning and development of the built environment has changed over time and the impact of these changes on individuals and communities.
- D. Identify ways in which individuals and communities can influence the built environment to their benefit.

## Section B:

The following standards are associated with Level 3 of the Regulated Qualifications Framework in England and related levels in the other UK National Qualification Frameworks.

**The specialist learning is organised in the following pathways:**

- Construction
- Building services engineering
- Management of built assets
- Management in the built environment

All subjects are 30 Guided Learning Hours unless otherwise stated.

## Construction Pathway

### S 3.1: The Relationship of the Built Environment to the Wider Environment and Community

This provides learners with an opportunity to analyse evaluate and explore principles and practices in relation to the way in which the built environment influences, and is influenced by, communities and individuals.

**Learning outcomes:**

- A. Identify ways in which the competing demands on land use are balanced and accommodated within the built environment.
- B. Identify and explore the impact of planning and development decisions on the quality of life of whole communities and individuals.
- C. Identify and define how the built environment can contribute to the health, safety and well-being of individuals and communities.
- D. Identify and describe how the planning of the built environment can contribute to sustainability of the natural environment.
- E. Identify ways in which individuals and communities can be consulted on and engage in, the development of the built environment.

### S 3.2: Site Surveying (60 Guided Learning Hours)

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the full range of surveying and related support services involved in performing a range of surveying activities.

**Learning outcomes:**

- A. Identify and describe the main features of a variety of cartographic materials required to carry out different forms of surveying.
- B. Identify and describe how to locate key features relevant to the conduct of a survey and their implications.

## Section B:

continued...

- C. Identify and apply a variety of measurement methods and mathematical calculations relevant to surveying.
- D. Use basic surveying equipment to arrive at accurate measurements.
- E. Record measurements and key features of a site survey using standard formats, units and terminology.

### S 3.3: Civil Engineering Construction (60 Guided Learning Hours)

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the fundamental techniques, processes and materials associated with civil engineering construction. The role and responsibilities of the civil engineer within the construction industry is also examined.

#### Learning outcomes:

- A. Describe a range of fundamental techniques, processes and materials used in the design, planning and construction of a range of civil engineering works.
- B. Evaluate the select techniques, processes and materials appropriate to different physical, financial and environmental requirements and constraints.
- C. Define infrastructure projects and determine the contribution made by the civil engineer in their development, construction and maintenance.
- D. Explore the roles, responsibilities and interrelationship of key team members in the civil engineering construction process.

### S 3.4: Energy and Utility Supply (60 Guided Learning Hours)

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the installation and maintenance of utilities services.

#### Learning outcomes:

- A. Investigate and describe the procedures used in the installation and maintenance of gas, water, waste water utility supplies to building developments.
- B. Investigate and describe the procedures used in the installation and maintenance of overhead and underground electricity and telecommunications utility supplies to building developments.
- C. Describe the regulatory framework and health and safety legislation relating to the provision of overhead and underground utilities supplies.
- D. Describe the procedures used in the location, detection and inspection of utilities services.
- E. Investigate and describe current and developing technologies in the installation, replacement and repair of underground utility supplies.



### S 3.5: Construction Health and Safety (60 Guided Learning Hours)

This provides learners with an understanding of the hazards and risks associated with health, safety and welfare in construction work. It is designed to enable learners to develop an understanding of the requirements of construction health, safety and welfare legislation and their responsibilities.

#### Learning outcomes:

- A. Identify the employer's general responsibilities and the employee's specific responsibilities for health, safety and welfare in the workplace and the implications for them to work.
- B. Select methods of reducing the risks identified in the workplace to comply with workplace policy and legal requirements including using hazard identification to establish the work practices or site conditions which may harm themselves or others.
- C. Evaluate the employee's role in accident prevention and the avoidance of dangerous conditions.
- D. Report and record accidents and incidents to those responsible for health, safety and welfare in the workplace.
- E. Explain and discuss the effects of BIM in construction health and safety and how this can begin to help reduce and eliminate hazards and risks in building construction.

### S 3.6: Setting Out Processes (60 Guided Learning Hours)

This provides learners with opportunities to apply the mathematical and practical site surveying skills to the typical setting out processes required in construction work.

#### Learning outcomes:

- A. Use non-programmable calculators to carry out the mathematical operations associated with setting out and demonstrate an appreciation of how spreadsheets and engineering surveying software can help to facilitate such operations.
- B. Work with others to carry out fieldwork exercises to establish the contours of an area and make simple volume measurements.
- C. Work with other people to perform the setting out of buildings, drainage and roads.
- D. Demonstrate an appreciation of the uses and advantages of emerging technology and software for the current techniques employed in setting out processes.

### S 3.7: Transport (60 Guided Learning Hours)

This provides learners with an opportunity to explore the scope of and the activities in the transport sector. Learners will be able to describe the key features of the sector and the role of transport in development of society; and they will understand how the planning, design, construction, installation and operation of traffic and transport systems is carried out.

#### Learning outcomes:

- A. Describe the primary features of transport in the UK (e.g. road, rail, water, air), and the importance of the movement of goods and people in national and international contexts.
- B. Describe how traffic and transport development in the UK/Europe is managed (e.g. statutes, regulations, National, regional and local planning policy)

continued...

- C. Explain how the integration of traffic and transport is managed in an urban area (e.g. pedestrians, cycles, cars, lorries, buses, trams, trains) and in the rural area.
- D. Identify the chief features of the planning, design, construction, operation and maintenance of a highway or public transport network in the UK, and explore how this can be done in an environmentally sustainable way.
- E. Describe the primary features of road safety philosophy, and explore how roads can be made safer for all road users (e.g. pedestrians, cyclists, motorists, animals), with special emphasis on accessibility for vulnerable groups.

## Building Services Engineering Pathway

### S 3.8: Building Services Engineering (Electrical) (90 Guided Hours)

This provides learners with an opportunity to focus on planning, design and analysis of systems design in building services engineering (electrical) systems. Learners will develop a knowledge, understanding and experience of the underlying regulations, standards, and industry codes of practice and principles associated with the design and installation of low voltage electrical systems for buildings and structures. It is a requirement that the learner follow the level 2 Building services engineering topic (2.12) prior to starting this topic and that this topic is undertaken simultaneously.

#### Learning outcomes:

- A. Investigate and describe the regulations and legislation relating to the provision of electricity in buildings and structures.
- B. Investigate a range of wiring systems and techniques and their applications.
- C. Explore and apply relevant technical and scientific principles.
- D. Identify design principles to meet customer's specification and needs.

### S 3.9: Building Services Engineering (Mechanical) (90 Guided Learning Hours)

This provides an opportunity for learners to focus on planning, design and analysis of component application in building services engineering (mechanical) systems (air conditioning and refrigeration, renewables, ASHP, GSHP etc.) Learners will develop a knowledge, understanding and experience of the underlying regulations, standards, industry codes of practices and principles associated with the design and installation of mechanical engineering services systems (air conditioning and refrigeration, heating and ventilation and plumbing) for buildings and structures.

It is a requirement that the learner follow the level 2 Building Services Engineering topic (2.12) prior to starting this topic or that this topic is undertaken simultaneously.

#### Learning outcomes:

- A. Investigate and describe the regulations and legislation relating to the provision of mechanical engineering services in buildings and structures.

continued...

- B. Investigate a range of mechanical engineering services systems and their applications.
- C. Explore and apply relevant technical and scientific principles.
- D. Identify design principles to meet customer specification and needs.

## Management of Built Assets Pathway

### S 3.10: Integrated Facilities Management and Support Services

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the full range of services involved in delivering a broad range of discrete and integrated support services including building maintenance, space management, catering, cleaning and security.

#### Learning outcomes:

- A. Identify and describe the full range of functions provided by facilities management and their contribution to the built environment.
- B. Identify and describe the key business drivers and factors influencing facilities management delivery.
- C. Identify and describe alternative forms of outsourcing and contracting support services and the procedures for tendering and contracting.
- D. Identify and describe the design principles which apply to electrical systems, lighting, mechanical systems and buildings.
- E. Identify and describe best environmental practice in the delivery of facilities management services.
- F. Identify the effects of BIM and facilities management and how the integration of the BIM process can aid in the capture and management of information on building projects.
- G. Identify and describe the critical alignment between facilities management and business strategy.

### S 3.11: Sale, Letting and Management of Built Assets

This provides learners with an opportunity to analysis evaluate and explore principles and practices in relation to the full range of services involved in the sale, letting and management of built assets including residential and commercial property.

#### Learning outcomes:

- A. Identify and explore the contribution of residential and commercial property services to the development of the built environment and the wider economy.
- B. Identify and describe the primary functions involved in the sale and letting of residential and commercial property.
- C. Identify and describe the primary functions involved in the management of commercial property and residential blocks.
- D. Identify and describe the primary functions involved in home inspection and reporting.
- E. Identify and describe the primary legislation governing the sale, letting and management of residential and commercial property.

### S 3.12: Valuation Services

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the full range of services involved in establishing the value of property in the built environment for sale, lending and asset purposes.

#### Learning outcomes:

- A. Identify and describe the different purposes of carrying out a valuation of property.
- B. Identify and describe ways of gathering and evaluating base data for the evaluation.
- C. Identify and describe the full range of techniques required to establish an accurate valuation of different types of property for different valuation purposes.
- D. Identify and explore the legal and regulatory factors influencing the valuation.
- E. Identify and describe how to prepare and present a valuation to the client which complies with legal requirements and commercial best practice.

#### See Also

**S 3.1: The Relationship of the Built Environment to the Wider Environment and Community- See the Construction Pathway on Page 23**

**S 3.8: Integrated Facilities Management and Support Services- See the Building Services Engineering Pathway on Page 28**

### S 3.13: Community Management and Regeneration

This provides learners with an opportunity to analyse evaluate and explore principles and practices in relation to the role of housing in contributing to the development of sustainable communities.

#### Learning outcomes:

- A. Identify and describe the legislation governing rented housing and its impact on community development.
- B. Identify and describe the contribution of housing associations and their relationship to the wider community.
- C. Identify and describe the contribution of tenants participation activities to wider policies of social inclusion and community support.
- D. Identify and describe the contribution of housing to specific local functions including education, law enforcement, social services and health.
- E. Identify and describe the role of neighbourhood management within wider community development initiatives.

### S 3.14: Housing Management Services

This provides learners with an opportunity to analyse evaluate and explore principles and practice in relation to the full range of activities involved in managing housing processes and activities in the built environment.

#### Learning outcomes:

- A. Identify and describe the contribution housing makes to the achievement of social and economic policies.

## Section B:

continued...

- B. Identify and describe major components of housing and property law and their impact on housing policies and practices.
- C. Identify and describe the role and functions of institutions responsible for the provision of housing services.
- D. Identify and describe how housing provision is financed and the effect of different financing solutions on housing provision.
- E. Identify and describe the main management functions involved in the maintenance, refurbishment and regeneration of the housing stock.

### S 3.2: Site Surveying – See the Construction Pathway on Page ??

#### S 3.15: Residential Block Management

This provides learners with an opportunity to analyse, evaluate and explore the processes involved in the management of residential blocks including negotiating management agreements, providing services, preparing service provision bids, managing finances and providing the full range of block management services.

##### Learning outcomes:

- A. Identify and describe ways of establishing customer requirements and setting up management agreements.
- B. Identify and investigate ways of establishing, providing and monitoring the required management services.
- C. Establish and review financial management and monitoring requirements including collection and arrears.
- D. Identify and evaluate ways of letting and monitoring service contracts.
- E. Identify and describe ways of ensuring that residential blocks are safe, well maintained and fully insured against risks.

#### S 3.16: Building Surveying Surveys

This provides learners with an opportunity to analyse evaluate and explore principles and practices in relation to the full range of building surveying services including surveying the internal and external fabric of a building as well as its internal services.

##### Learning outcomes:

- A. Identify and select appropriate methods to accurately capture the information and measure the length, width and height of rooms and building spaces.
- B. Identify and describe the size, location and condition of building elements, services, appliances and fittings.
- C. Identify and describe typical building defects, their causes and potential remedies.
- D. Identify and describe the current standards and legislation controlling the safety or otherwise of water, heating and electricity service installations.
- E. Identify and describe the correct ways of recording and reporting on findings.

## Management in the Built Environment Pathway

### S 3.17: Financial Management and Control

This provides learners with a good knowledge and understanding of the application of the techniques used to manage finances and control spending within projects.

**Learning outcomes:**

- A. Identify and describe the relationship between project price, costs and profit.
- B. Identify and describe the key components of a budget for a given project including life cycle costing.
- C. Identify how resources are divided between materials, labour and plant/equipment in any project and how these are calculated.
- D. Describe ways in which resource use is monitored against overall budget and ways of amending projects to maintain efficient and cost- effective use of materials including life cycle costing assessments.

### S 3.18: Supply Chain Relationship Management

This provides learners with a good knowledge and understanding of the application of the various types of supply chain operating in the built environment and the skills required to manage the supply process.

**Learning outcomes:**

- A. Identify the nature and role of various types of service sub- contractors, materials suppliers and component manufacturers involved in the built environment.
- B. Identify and describe the main components of sub-contracted supply contracts.
- C. Identify how different sub- contracted services and supplies fit into an overall project plan and the importance of ensuring outcomes are not adversely impacted by siloed allocation of responsibility.
- D. Identify and describe the different techniques used for planning supply chains, purchasing services and programming delivery.
- E. Describe how supply chain contracts are monitored and evaluated.

### S 3.19: Managing the Built Environment

This provides learners with an opportunity to analyse evaluate and explore principles and practices in relation to the generic skills involved in the management of all aspects of the built environment.

**Learning outcomes:**

- A. Identify ways of identifying and evaluating key market and business factors which define the business drivers within the built environment.
- B. Identify and evaluate the principles of organisational structure and how they are applied to different types of organisations in the built environment.
- C. Identify and explore the key management competences involved in the planning, delivery and management of projects and services within the built environment.
- D. Identify and describe how quality assurance processes are managed in the built environment.
- E. Identify and describe how customer service and client liaison processes are managed in the built environment.

## Section B:

### S 3.20: Team Leadership and Participation

This provides learners with an opportunity to analyse evaluate and explore the ways in which teams are formed, managed and how they operate.

#### Learning outcomes:

- A. Identify and evaluate the different types of team structures and their relevance to different projects and activities within the built environment.
- B. Identify and evaluate the factors influencing the selection and recruitment of multi-disciplinary teams for specific projects including impact of fragmentation and disjointed responsibility for outcomes.
- C. Identify and explore the different ways in which teams can be motivated and led dependant on the purpose and nature of projects.
- D. Identify and explore the dynamics of how teams function and the ways in which they can be helped to maintain focus and momentum.
- E. Describe the life cycle of teams in relation to tasks and identify how to manage the process of completing team activities.
- F. Describe how BIM project teams are formed and established and how this process is undertaken relating to capability and assessment of teams.

### S 3.21: Security and a Secure Framework for Managing Digital Information of a Built Asset

This provides learners with an opportunity to analyse evaluate and explore the ways in which information can be securely stored, shared and accessed for built assets in the construction industry.

#### Learning outcomes:

- A. Identify and evaluate the different types of threats that exist in the management of the built asset and how these can be addressed.
- B. Describe how information can be securely stored and the implications of external access to this data.
- C. Describe how roles and responsibilities will form part of building projects that will align to the security requirements of a project.
- D. Identify the processes that are required to be put in place for effective protection of asset data for building projects.

**The following topics may be associated with any pathway**

### S 3.22 Heritage (60 Guided Learning Hours)

This provides learners with the opportunity to gain knowledge and understanding of how to care for traditional (pre 1919) and historic buildings. The range of work includes conservation, alteration, extension, refurbishment, repair and maintenance, installation of services and energy efficiency retrofit.

#### Learning outcomes:

- A. Identify and describe the age, materials and construction methods of traditional (pre-1919) and historic buildings.

## Section B:

continued...

- B. Understand and explain the legislation and official guidance relating to built heritage.
- C. Understand and describe the heritage values and significance of traditional (pre-1919) and historic buildings and how they contribute to sustainable development.
- D. Explore, analyse and evaluate how the principles of conservation are applied in practice, including using traditional skills, materials and methods, minimum intervention, 'like for like' repairs and practices.
- E. Understand and describe the difference in performance characteristics between traditional and modern materials and construction methods, with particular reference to the energy performance of building parts and as whole buildings.
- F. Identify and describe the causes of common defects in traditional (pre-1919) and historic buildings, and the range of investigative and recording techniques used to understand building condition.
- G. Understand the range of maintenance and repair operations, and explain the importance of these for maintaining traditional buildings.
- H. Describe and evaluate the benefits, options and risks of energy-efficiency and retrofit measures, and of climate change adaptation and mitigation measures using a whole building approach.

### S 3.23: The Regulatory Framework and Compliance

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the main legislative and regulatory requirements and their impact on processes and practices within the built environment.

#### Learning outcomes:

- A. Identify and describe the regulatory frameworks governing tendering and contracting, planning, health and safety, environmental protection, construction and management of the built environment.
- B. Identify and describe the different systems for compliance and accountability used in the built environment and how they are monitored.
- C. Identify and describe how regulation and compliance influence working practices in different disciplines within the built environment.
- D. Identify and describe the major types of non-compliance, their causes and the consequences of non-compliance.
- E. Identify and describe best practice in compliance within the different disciplines within the built environment.

### S 3.24: Planning the Built Environment

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the full range of services involved in planning the design, building and maintenance of the built environment including infrastructure services.

#### Learning outcomes:

- A. Identify and explore the impact of planning decisions on the built environment itself, communities and individuals.



## Section B:

continued...

- B. Identify and define the various components of the planned environment including commercial, industrial, housing and recreational zoning, amenities and infrastructure requirements.
- C. Identify ways in which the competing demands on land use are balanced and accommodated within the planning of the built environment.
- D. Identify and explore the stages involved in the planning process and the procedures to be followed to ensure compliance with legislation.
- E. Identify and define the legislative framework which controls the planning process and its impact on development of the built environment.
- F. Understand how sustainable development objectives are delivered in a market economy.

### S 3.25: Technical Drawing

This provides learners with the opportunity to analyse evaluate and explore principles and practices in relation to reading and understanding drawings and details and the basic skills required to produce graphical information using manual techniques.

#### Learning outcomes:

- A. Identify the appropriate level of detail and content required to meet requirements and ensure site operatives are not left to decide how works are carried out on site.
- B. Recognise and describe a wide range of equipment, media and techniques currently used in the production of graphical information.
- C. Interpret a wide variety of graphical information and extract relevant and clearly structured information from a range of graphical sources.
- D. Produce graphical details and schedules using traditional manual drafting techniques.

### S 3.26: CAD (Computer Aided Design)

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to CAD within built environment design.

#### Learning outcomes:

- A. Explore the role and potential of computer aided design in the built environment.
- B. Identify the appropriate level of detail and content required to meet requirements.
- C. Understand and interpret computer generated drawings.
- D. Produce basic drawings of existing buildings and/or elements of buildings using CAD.
- E. Produce basic built environment designs using CAD.

## Section B:

### S 3.27: Object Based Modelling

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to model based design in the context of building design and construction.

#### Learning outcomes:

- A. Identify the role and potential of object based modelling in the built environment.
- B. Explain the principles of 'Level of detail' to meet project needs.
- C. Identify how object based modelling can be used on building projects.
- D. Identify how to create a simple object based model to create a simple energy analysis of a building.
- E. Produce basic images and visuals using the digital building model.

### S 3.28: BIM (Building Information Modelling)

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to BIM within the built environment.

#### Learning outcomes:

- A. Explain the basic principles and definition of BIM within the context of the built environment.
- B. Explain the UK BIM Maturity Levels and explore the definition of each.
- C. Produce basic BIM Information for a building project and create information exchanges.
- D. Describe the relevance of the UK standards to be used and reviewed when working on a BIM project.
- E. Describe the basic terminology in relation to BIM, including level of detail and information to be embedded and used on a BIM project.

### S 3.29: Client, Customer and Supplier Management in the Built Environment

This provides learners with an opportunity to analyse evaluate and explore principles and practices in relation to basic economic principles, the various types of chain supplies operating in the built environment and customer service practices.

#### Learning outcomes:

- A. Describe the different forms of finance available to support construction and the built environment projects.
- B. Identify the nature and role of various types of service sub-contractors, materials suppliers and component manufacturers involved in the build environment.
- C. Identify how different sub- contracted services and supplies fit into an overall project plan.
- D. Describe how supply chain contracts are monitored and evaluated.
- E. Identify the various forms and characteristics of different customer care policies and explain how they relate to the business objectives of different forms of organisation in the built environment.

### **S 3.30: Mathematical Techniques in Construction and the Built Environment (120 Guided Learning Hours)**

This introduces learners to the application of mathematical techniques to the solution of typical construction and built environment problems.

#### **Learning outcomes:**

- A. Identify a wide range of analytical methods or techniques and select the correct technique(s) for a variety of relevant construction and built environment problems.
- B. Use a variety of analytical methods or technique(s) to determine clear and accurate answers to a variety of relevant construction and built environment problems.
- C. Select and use graphical solutions where most appropriate and produce them accurately, to a high level of presentation, conforming to all the standard conventions.
- D. Interpret and explain the solution to relevant construction and built environment problems and clearly explain the use to which the answers may be put and the benefit of the techniques used.
- E. Apply mathematical techniques to the manipulation and interpretation of formulae and data.
- F. Select and use a range of mathematical techniques to determine accurate solutions to a variety of construction and built environment problems.
- G. Apply the principles of differential and integral calculus to solve practical problems.
- H. Produce appropriate and accurate solutions using various statistical methods.
- I. Identify mathematically driven tools to automate design and construction processes that relate to differing building construction types.

### **S 3.31: Measuring, Tendering and Estimating Processes in Construction and the Built Environment.**

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the measurement, estimating and tendering processes that are used in a typical project in the construction industry in both the pre-and post-contract stages.

#### **Learning outcomes:**

- A. Examine the uses of measurement by all professionals during both the pre-and-post contract stages of a simple construction project.
- B. Apply basic mensuration techniques and explore the production of accurate quantities in both traditional and digital techniques.
- C. Examine estimating techniques and the way in which they affect the tendering process including life cycle cost and environmental impact assessments.
- D. Identify the legal and commercial requirements of the tendering process.
- E. Describe the common methods used to tender for a variety of construction works and identify the documentation associated with each method.
- F. Identify the range of BIM related tools that can support basic mensuration techniques and processes.

### S 3.32: Science and Materials in Construction and the Built Environment (90 Guided Learning Hours)

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the basic factors that affect human comfort in the internal environment are identified and explored, the nature of forces acting on structures and their effects are examined.

#### Learning outcomes:

- A. Describe the basic factors that affect human comfort, identify acceptable ranges of values for each and perform simple calculations appropriate to given internal environments.
- B. Identify the various static and dynamic forces that act on structures, the stresses such forces will generate and the effect of such stresses and perform typical calculations and/ or produce graphical solutions as appropriate.
- C. Explore a range of construction materials, investigating the reasons for the specification of such materials and describe the production and /or manufacture of each from the basic raw materials.
- D. Describe the important properties of the common construction materials, the ways in which they may deteriorate and the preventative techniques used to minimise or eliminate such deterioration.

### S 3.33: Structural Mechanics

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to structural behaviour and the analysis of beams, columns, frameworks and retaining walls and carrying out simple beam and column design to relevant standards.

#### Learning outcomes:

- A. Apply the concepts of structural mechanics to the analysis of statically determinate beams, columns, frameworks and retaining structures.
- B. Carry out mathematical calculations to determine structural properties of sections.
- C. Produce calculations for the simple design of beams and columns using relevant British Standards
- D. Investigate the computer software available to assist in structural analysis and design and describe its advantage and uses.

### S 3.34: Renewable Energy Sources

This provides learners with an opportunity to analyse evaluate and explore principles and practices in relation to energy production and energy conservation with regard to renewable energy sources.

#### Learning outcomes:

- A. Describe the principles of renewable energy.
- B. Describe and investigate the technical, economic and social implications of renewable energy.
- C. Examine the scientific principles that underpin energy conservation.
- D. Investigate and describe various sources and systems of renewable energy and examine how they operate effectively within a building energy system.
- E. Identify current energy use and evaluate the potential for cost-effective alternative renewable energy sources.

### **S 3.35: Quantity Surveying/Cost Management and Client Advisory Services**

This provides learners with an opportunity to analyse, evaluate and explore principles and practices in relation to the full range of quantity surveying services including estimating, tender documentation, tender analysis, contractual issues and post contract financial control.

#### **Learning outcomes:**

- A. Identify and describe the methods of cost management of design from feasibility to design completion.
- B. Identify and describe the techniques of project evaluation and reporting findings to the client and design team.
- C. Identify and evaluate the various forms of standard contract used in the construction industry and the implications and obligations that apply to the parties to the contract.
- D. Identify and describe the principles of quantification and costing of construction works as a basis for the financial management of contracts including life cycle costing.
- E. Identify and evaluate the most appropriate type of procurement and associated tender documentation, analyse procedures and reporting on findings.
- F. Identify and describe the project financial control and reporting during the construction phase.
- G. Identify and describe the role of a contract administrator under the main forms of standard contract.
- H. Identify how BIM can begin to support the practices and processes in relation to quantity surveying services.

## Section C

---

### Annex A: Membership of the I4 to I9 Advisory Committee

**Membership includes the following:**

Royal Town Planning Institute  
 The Learning Machine (TLM)  
 Middlesex University  
 South & City College Birmingham  
 BACH  
 Wates Group  
 Chartered Institute of Building (CIOB)  
 City and Guilds  
 WJEC (Welsh Joint Educational Committee)  
 Pearson UK  
 North Kent College  
 Institution of Civil Engineers (ICE)  
 Construction Industry Training Board (CITB)  
 Qualifications Wales  
 Royal institution of Chartered Surveyors (RICS)  
 Chartered Institute of Architectural Technologists (CIAT)  
 Laing O Rourke  
 Bucks UTC  
 Class of Your Own  
 NOCN  
 SQA (Scottish Qualifications Authority)  
 UCEM  
 Lovell Partnership  
 Chartered Institution of Building Services Engineers (CIBSE)  
 Institute of Workplace and Facilities Management (IWFM)  
 Balfour Beatty Plc  
 Engineering Construction Industry Training Board (ECITB)  
 Construction Industry Council (CIC)  
 Chartered institute of Housing (CIH)  
 Cross Industry Construction Apprenticeship Task Force (CCATF)  
 Institution of Structural Engineers (IStructE)  
 Constructing Excellence  
 ISG plc  
 Build UK  
 Interserve  
 Engineering Council  
 Chartered Institution of Highways and Transportation (CIHT)  
 Leeds College of Building  
 Duprez Consulting  
 Council of Heads of Built Environment Education Executive (CHOBE)

## Section C:

### continued...

Federation of Master Builders (FMB)  
Chartered Institution of Civil Engineering Surveyors (CICES)  
Technician Apprenticeship Consortium (TAC)  
Building People  
Sir Robert McAlpine  
British Institute of Facilities Management (BIFM)

### Membership and contributors to BIM Sub- Group and BIM 14 to 19 Standards for Education:

- British Standards Institution (BSI)
- Chartered institute of Architectural Technologists (CIAT)
- CIOB (Chair)
- CITB
- Class of your own
- College of Estate Management (CEM)
- Creonova/BIM Task Group
- ICE
- Leeds College of Building
- Middlesex University
- RICS
- Salford University

### Contributors to the work on sustainability include:

Rob Lambe (chair), Melius Homes  
Richard Bayliss, CITB  
Emeritus Professor Malcolm Bell, Leeds Beckett University  
Ian Billyard, Leeds College of Building  
Kevin Dowd, SummitSkills  
Cat Hirst, UK-GBC  
David Pierpoint, Retrofit Academy  
Liz Reason, Green Gauge Trust  
Phil Stott, YTKO  
Lynne Sullivan OBE, LSA Studios.

### Others:

- Alex Luck Associates
- Arup Associates
- BAM
- Construction Industry Council (CIC)
- Digital Node
- University of Westminster

### Traditional and Heritage Building

Special thanks to Jill Fairweather (Inspector of Historic Buildings, Cadw), Kate Gunthore (Historic England) and Gareth Williams (CITB)



## Attribution 4.0 International (CC BY 4.0)

This is a human-readable summary of (and not a substitute for) the [license](#). [Disclaimer](#).

### You are free to:

**Share** — copy and redistribute the material in any medium or format

**Adapt** — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.



### Under the following terms:



**Attribution** — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

**No additional restrictions** — You may not apply legal terms or [technological measures](#) that legally restrict others from doing anything the license permits.

### Notices:

You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable [exception or limitation](#).

No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as [publicity, privacy, or moral rights](#) may limit how you use the material.