Beamont Collegiate Academy Curriculum Map

Year: 10

Subject: Engineering (Constructing the Built Environment)

Intent	Implementation	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Clarity around knowledge	Theme / topic	**Unit 1 -** Introduction to the built environment (Theory).		**Unit 2 -** Designing the Built Environment – Mini Controlled Assessment Task focussing on the design/development of a Residential/Non-Residential Building/Structure (Practical).		**Unit 1 -** Introduction to the built environment (Theory).	
	Key substantive knowledge	**1.1 <u>The sector:</u>** • buildings and structures • infrastructure and civil engineering products • building services engineering • professional and managerial roles and responsibilities associated with the built environment sector. **1.2 <u>The built environment life cycle:</u>** • raw material extraction • manufacturing • construction • operation and maintenance • demolition • disposal, reuse or recycling. **1.3 <u>Types of building and structure:</u>** • different forms of infrastructure construction • low-rise: • residential dwellings • commercial buildings • industrial buildings • agricultural buildings • community buildings		**<u>2.1 Identifying and calculating information:</u>** • Area • volume • length • angles • levels • high-level design requirements **<u>2.2 Writing and setting success criteria:</u>** • interpreting the client brief • accuracy of the design work • quality of presentation **<u>2.3 Drawing plans:</u>** • block plans • floor plans • cross-sections • scale drawings. **<u>2.4 Drawing elevations:</u>** • internal • external – rear (north); front (south); left (east); right (west). **<u>2.5 Using the language of drafting:</u>**		**1.5 <u>Building structures and forms:</u>** • cellular constructions • rectangular frame constructions • portal frame constructions • heritage and traditional methods. **1.6 <u>Sustainable construction methods:</u>** • the environmental, financial, cultural and social benefits of sustainable construction methods • pollution and the preservation of the natural environment and natural habitats • sustainable materials used to create building frames, walls, roofs • waste disposal, re-use and recycling planning permission, brownfield sites and greenfield sites. **1.7 <u>Trades, employment and careers:</u>** • bricklaying • stonemasonry • plastering • carpentry and joinery • electrical installation • plumbing installation

		• religious buildings • recreational buildings. **1.4 <u>Technologies and materials:</u>** • main elements and components of low-rise buildings • main materials involved in constructing walls, installing building services, fitting roofs and finishing interiors • renewable technologies and materials, including heat pumps, wind turbines and solar panels.	• BS standards (BS 1992:2007 + A2:2016 and subsequent updates, Building Information Modelling) • presentation techniques • conventions – annotations; lines; hatching; a range of symbols • consolidation and presentation. **<u>2.6 Drawing two dimensional (2D) plans:</u>** • the conventions and requirements of 2D plans of construction designs • scales used in different applications **<u>2.7 Creating three dimensional (3D) virtual models and plans:</u>** • applying scenes, backgrounds and surroundings to a 3D building model • rendering the external finishes (colour and texture) of a 3D building model using standard conventions • adding features such as images of people, vehicles and landscaping to enhance a 3D building model • creating 360o views of a 3D building model, including rotation • adding building components, other details and colour to a 3D building model • importing fixture models from a library and scaling to fit their 3D model. **<u>2.8 Evaluating design tasks:</u>** • requirements of the brief • personally-set success criteria • needs of end users, including their safety.	• painting and decorating • flooring and tiling. **<u>1.8 Health and safety:</u>** • risks for employees, employers and the public during construction and the built environment projects • following procedures and carrying out risk assessments • relevant legislation, including Health and Safety at Work Act and Control of Substances Hazardous to Health (COSHH) regulations • using personal protective equipment (PPE) • safely working with gas, water and electricity • working at height and in enclosed spaces.

	Disciplinary knowledge	**1.1 The Sector** • **Industry structure and roles**: Key stakeholders, including architects, contractors, and regulators. • **Project management**: Skills in budgeting, scheduling, and risk management in construction projects. **1.2 The Built Environment Life Cycle** • **Design and construction**: Processes from initial planning to on-site building execution. • **Operation and decommissioning**: post-construction maintenance and end-of-life building strategies. **1.3 Types of Building and Structure** • **Residential and commercial buildings**: Design and regulatory requirements for housing and office structures. • **Infrastructure and industrial projects**: Knowledge of public utilities, roads, bridges, and factories. **1.4 Technologies and Materials** • **BIM and digital tools**: Use of technology for design, planning, and collaboration. • **Sustainable materials and methods**: Emphasis on green building	**2.1 Identifying and Calculating Information** • **Site analysis and measurements**: Gathering data on dimensions, environmental factors, and existing conditions. • **Technical calculations**: Applying formulas for structural loads, material quantities, and cost estimation. **2.2 Writing and Setting Success Criteria** • **Defining design objectives**: Establishing measurable goals for functionality, aesthetics, and sustainability. • **Performance indicators**: Criteria for evaluating energy efficiency, durability, and compliance with regulations. **2.3 Drawing Plans** • **Floor plans and layouts**: Creating scaled representations of spaces and room configurations. • **Spatial arrangement**: Ensuring efficient use of space and adherence to design standards. **2.4 Drawing Elevations** • **Exterior views**: Depicting the appearance of a building from different sides (front, rear, side).	**1.5 Building Structures and Forms** • **Structural systems**: Understanding load-bearing structures, such as frames, walls, and foundations. • **Architectural forms**: Familiarity with design principles for various building shapes, styles, and layouts (e.g., domes, arches, and cantilevers). **1.6 Sustainable Construction Methods** • **Energy-efficient designs**: Knowledge of passive solar design, insulation, and energy-efficient building envelopes. • **Eco-friendly materials**: Use of renewable resources, low-carbon materials, and construction techniques that reduce environmental impact. **1.7 Trades, Employment, and Careers** • **Construction trades**: Awareness of skilled trades like carpentry, plumbing, electrical, and masonry. • **Career pathways**: Insight into job opportunities, qualifications, and training programs in the construction sector. **1.8 Health and Safety** • **Worksite safety regulations**: Knowledge of health and safety laws, personal protective equipment (PPE), and accident prevention.

		technologies and eco-friendly construction materials.	• **Material and feature detailing**: Showing textures, colours, and architectural elements. **2.5 Using the Language of Drafting** • **Standard drafting terminology**: Understanding terms like scale, dimension, section, and symbols. • **Technical symbols and notation**: Mastery of industry-standard symbols for components like doors, windows, and electrical fittings. **2.6 Drawing Two Dimensional (2D) Plans** • **Scaled 2D drawings**: Producing accurate floor plans, sections, and site layouts. • **Orthographic projections**: Using 2D views to represent different aspects of a building. **2.7 Creating Three Dimensional (3D) Virtual Models and Plans** • **3D modelling software**: Using tools like Revit or SketchUp to create detailed virtual representations. • **Rendering and visualization**: Creating realistic images to convey material finishes, lighting, and spatial relationships. **2.8 Evaluating Design Tasks**	• **Risk management**: Identifying and mitigating hazards on construction sites, including safe handling of tools and materials.

			• **Design review**: Assessing if the design meets functional, aesthetic, and regulatory requirements. • **Iterative improvement**: Making adjustments based on feedback, testing, and performance outcomes.	
Clarity around sequencing	Main links across the curriculum	• Understanding industry roles and stakeholders. • Phases from design to demolition. • Different buildings serve various purposes. • Innovative tools and sustainable resources. • Designs impacting functionality and aesthetics. • Eco-friendly practices reducing environmental impact. • Diverse professions within the construction industry. • Protocols ensuring worker safety standards.	• Identifying and calculating information • Writing and setting success criteria • Drawing plans • Drawing elevations • Using the language of drafting • Understanding 2D construction plan conventions and scales for applications. • Adding backgrounds, finishes, features, and 360° views to 3D models. • Assessing requirements, success criteria, and end-user safety needs. • Producing accurate scaled drawings, including floor plans and layouts. • Using software tools for detailed 3D virtual building representations. • Reviewing designs for functionality, aesthetics, and regulatory compliance.	• Understanding industry roles and stakeholders. • Phases from design to demolition. • Different buildings serve various purposes. • Innovative tools and sustainable resources. • Designs impacting functionality and aesthetics. • Eco-friendly practices reducing environmental impact. • Diverse professions within the construction industry. • Protocols ensuring worker safety standards.
	Authentic cross curricular links	Engineering, Civil Engineering, Maths, Science, Geography.	Art, Science, Draftsman, Engineering, Civil Engineering, Maths, Science, Geography.	Engineering, Civil Engineering, Maths, Science, Geography.
Vocabulary	Key words/terms	• Buildings and structures • Infrastructure • Building services engineering • Professional roles • Built environment life cycle • Raw material extraction	• Area and volume calculation • High-level design requirements • Client brief interpretation • Block and floor plans • Internal and external elevations • BS standards	• Cellular constructions • Sustainable construction methods • Pollution and environmental preservation • Sustainable materials

		• Construction technologies • Demolition and disposal • Renewable technologies • Low-rise buildings	• Drafting conventions • 2D plans and scales • 3D virtual models • Design task evaluation	• Waste disposal and recycling • Bricklaying and stonemasonry • Plumbing and electrical installation • Health and safety risks • Personal protective equipment (PPE) • Risk assessments and legislation (COSHH, Health and Safety at Work Act)
Assessment	Summative assessment	End of unit test – 1.1 – 1.4	Mini Controlled Assessment practical outcome – marked against the assessment criteria of Unit 2.	End of unit test – 1.5– 1.8
Links to the real world / careers / PD		**Civil Engineering - Architect, Surveyor, Contract Manager, Quantity Surveyor, Site Manager, Structural Engineer, Various Construction Trades.**		