BCAL

CONSULTING

Capability & Competency Statement

Competency & Capability Statement

COMPANY CREDENTIALS

Established Civil & Structural Engineering practice with successful legacy spanning 40 years in the built environment across many sectors including but not limited to healthcare, education, commercial, logistics, industrial, arts/culture, residential, highways and water management/drainage. As a multi-disciplinary consultancy, we employ chartered Civil and Structural Engineers, experienced Principal Designers and operate at the forefront of Building Information Modelling (BIM) backed up by formal accreditation through BRE Global. BCAL have also compiled building manuals and H&S files for over 20 years for main contractors and property developers; having seen them through their various forms from their inception as paper copies through their transition to electronic formats such as pdf and now as cloud-based BIM linked information resources as part of the UK's digital transformation.

BCAL are committed to ensuring all technical staff receive adequate training and exposure to a wide variety of projects for the company to discharge its professional obligations. Any potential gaps in competence are identified, recorded, and targeted through dedicated learning (CPD) or filled in by other qualified specialists to which we have access to. BCAL will not undertake any specific duty-holder roles when the needs of the project in question are beyond its Engineers' competence or organizational capability.

DESIGN THROUGH RIBA WORKSTAGES:

BCAL generally work broadly along the lines of the work-stages summarised in the IStructE Plan of Work, with services generally split into 3 key stages highlighted below. Whilst it is envisaged that typical projects tend to follow a similar design approach, we remain relatively flexible in our approach to adapt to any specific client requirements that may diverge from this.

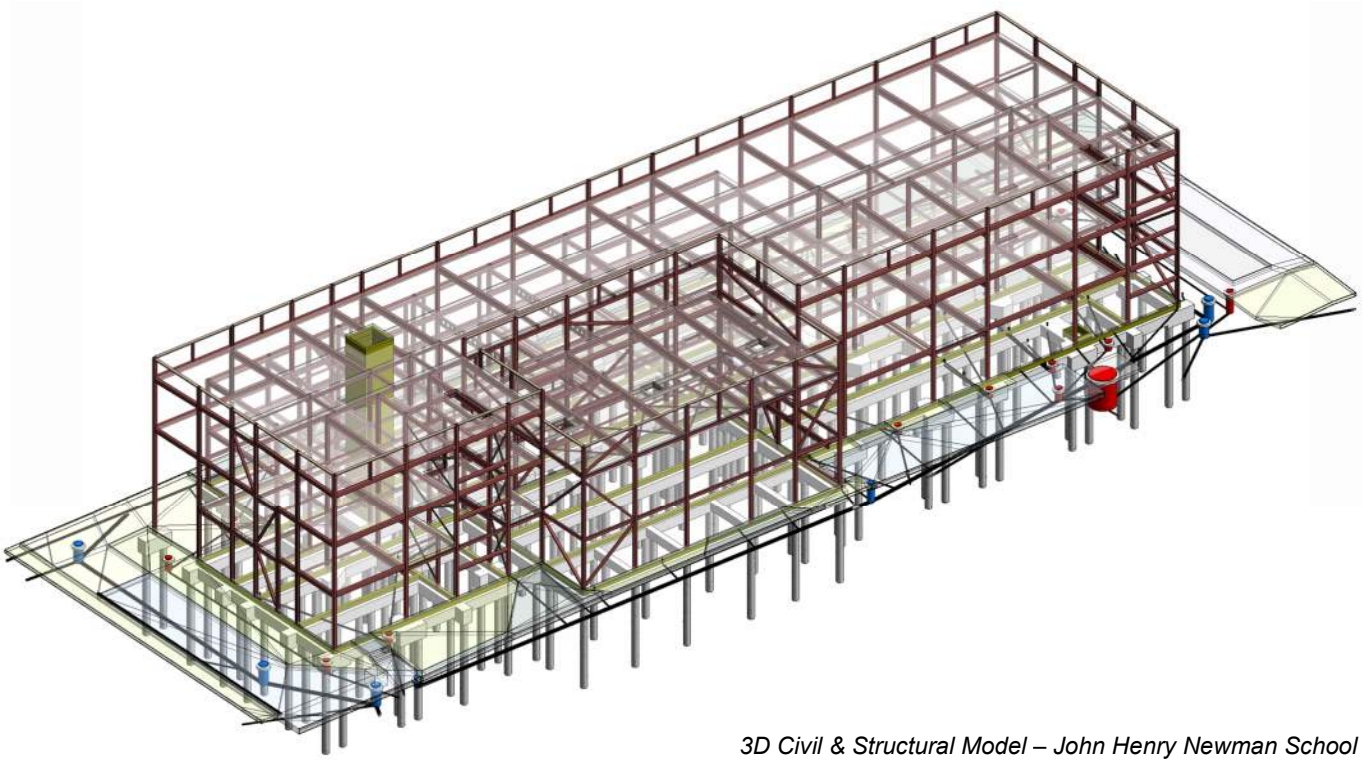
1) Feasibility (RIBA Stages 1 – 2) (typ.4-6 weeks)
2) Preconstruction (RIBA Stages 3 concept – 4 detailed) (typ.8-16 weeks)
3) Construction and Post-Construction (RIBA Stages 5 – 7) (typ.12-24 months)

1) Feasibility

Involves a high-level design feasibility/risk identification exercise that looks at both the client's strategic brief/requirements and general site constraints by carrying out various basic online searches (local flood mapping, adopted drainage infrastructure etc.) and early predevelopment enquires with local highways etc. A high-level commentary on the civil and structural design aspects associated with an early Architectural scheme design or outline design and access statement. Any additional survey requirements (e.g., ground investigations, subsite, topographical etc.) can be scoped up. Ideally this is the best time to carry out a site visit, commission transport assessments, travel plans and flood risk assessments in order to support any pre-planning applications. BCAL is always keen to adopt a design with sustainability and environmental impact high up on the priority list; in-line with government aspirations to achieve net-zero carbon developments whilst maintaining adherence to tight budgets, which is one of the key challenges set to the design team. The groundwork must be put into place early on to facilitate this aim. Resource allocation at this stage is primarily principal/senior/director level as decisions made at this stage will echo throughout the entire project.

2) Preconstruction

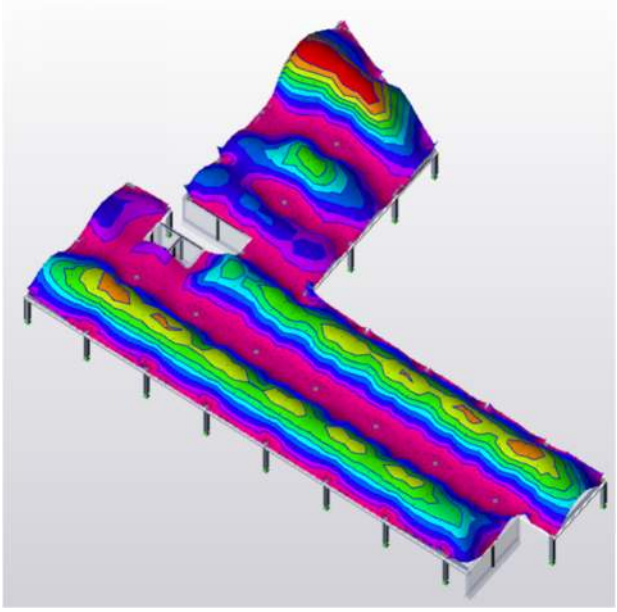
Stage 3 concept designs are drawn up in sufficient level of detail for robust market testing or tendering exercises. All projects at BCAL are now delivered at this stage to BIM Maturity Level 2, which also includes below ground drainage infrastructure and external works. 3D model information is available in multiple formats, complete with material schedules, which the client is encouraged to pass onto their supply chain for more expedient and accurate price returns. It is also at this stage where the key design parameters are established such as form of construction (RC/Steel frame, load-bearing masonry, timber, off-site modular construction etc.) whilst maintaining a keen eye upon any budgetary constraints. BCAL's legacy across multiple sectors including education, public/institutional, logistics, residential and commercial have led them to be trusted on various consultant frameworks and lessons learnt from one sector can be drawn across them all.



3D Civil & Structural Model – John Henry Newman School

Stage 4 comprises detailed design to use as a basis for contract awards and gear up for a start on site. The civil and structural design is almost completely coordinated with the other key disciplines at this point. Finished site levels are modelled and visually expressed in 3D to ensure the risk of more serious issues on site are mitigated. If the superstructure design goes down the route of more specialised off-site routes (SIPS, CROSSLAM, METFRAME etc.) then BCAL's role principally changes to a more design management one, overseeing the relevant supply chain and adding value through our design expertise.

A key feature of BCAL's work ethic is that it brings a greater level of project management to the design process than what would normally be expected from a civil and structural consultant working in accordance with ACE's general scope of services. BCAL also sees itself at the forefront of using and promoting BIM enabled technology to successfully deliver a genuinely quality product within exceptional timeframes. All our engineers (from graduate to director level) are trained in the use of 3D modelling and design software. We genuinely feel that we set the benchmark for excellent levels of design collaboration through BIM. It's something that has now come to define the practice. Our standard service includes quality 3D models, primarily produced using Revit (but also available in multiple formats) for elements of structure, and now includes comprehensive 3D information relating to external works and below ground drainage. All our models are fully compliant with the requirements of ISO 19650 and PAS 1192:6, with embedded H&S information. Resource allocation at this stage features an equal mix of experienced qualified senior engineers overseeing graduate engineers carrying out the detailed design.



FE analysis of existing RC slab – Spires Academy

<u>3) Construction and Post-Construction</u>

Site support services during construction stage and subcontractor design approvals. Regular site visits to ensure construction takes place in accordance with the design. BCAL's wide range of experience across multiple sectors gives us the ability to offer expedient solutions to potential problems faced on site. Record information in the form of updated drawings and 3D models are issued as standard for inclusion into the O&M Manuals prior to handover. BCAL are equally comfortable working on both traditional and design and build forms of contract and understand the nuances attached to each, tailoring our services to meet the expectations of the Main Contractor.

Avenue Campus Residential Project with all Civils information produced in 3D using Revit

Logistics/manufacturing development with all civil & structural outputs derived from a fully federated 3D Revit model

RECENT NOTABLE PROJECTS:

Kingsbrook Secondary School, Aylesbury (Morgan Sindall) – Completed 2022 (£35m). Large new-build 6FE secondary school (with 8FE and 10FE design options) comprising steel-framed construction with precast concrete floor planks. Regular liaison with Herts LLFA to agree on SuDS strategy, which features include porous paving/hardstanding, swales, green roofs and below-ground attenuation tanks. Originally specified piled substructure redesigned as conventional mass concrete spread-type foundations.

DSV Mercia Park, near Tamworth (Winvic) – Completed 2021 (£34m). Circa 500,000 sq.ft. development fully designed and built within an extraordinary 12-month timeframe. Civil & structural design delivered through both in-depth familiarity with employer's requirements and expertise in BIM. Furthermore, entire project output delivered exclusively through 3D Revit models including all external works and below ground drainage. Project set a new benchmark for the successful delivery of industrial projects within BCAL within full BIM Level 2 environment.

Kingsbrook and Abbey View Primary Schools, Aylesbury and High Wycombe (Morgan Sindall) – Completed 2021 (£20m). New-build primary schools featuring off-site modular timber-framed (SIPs) construction.

John Henry Newman School, Stevenage (Kier) – Completed 2024. 2 new-build multi-storey teaching blocks (replacing existing facilities) comprising steel-framed construction with precast concrete floor planks and load-bearing masonry extension to existing sports block. SuDS features include porous paving/hardstanding, dry swales, rain gardens and below-ground attenuation tanks. A combination of piled and conventional mass concrete spread-type foundations. Planning achieved through a process of close liaison with Herts LLFA with consultation meetings held on site.

Dallington Cemetery Extension – Completed 2025. Complicated cemetery extension project that required significant liaison/interaction with the Environmental Agency (EA), Lead Local Flood Authority (LLFA) and the Local Authority client to achieve planning and subsequent delivery on site. The project hit numerous impediments, which required BCAL to draw upon their strategic management experience in order to mitigate the prolongation of the development.

SUSTAINABLE DESIGN PRINCIPLES AT BCAL:

Having worked on a number of recent developments with major contractors using offsite methods for government compliant multi-storey structural forms, most notably using SIPs with concrete floors, BCAL hold an exceptional understanding of modern methods of sustainable construction. At BCAL, we also appreciate the fact that a net-zero carbon solution cannot be achieved in a cost-effective manner by focussing on the type of construction alone. Rather than blindly adhering to established norms or convention, each facet of the design at BCAL is closely scrutinised to minimise the materials used and ultimately reducing the embedded carbon. We fully understand the inherently conservative nature of current design standards (one that is certain to be looked at as sustainability comes to the forefront of the industry's agenda), but also appreciate the routes available to avoiding unnecessary levels of design redundancy providing one has the time to explore them; something that is invariably in short supply. BCAL have often solved this problem by its keen embrace of technology, which allows one to potentially carry out more efficient designs within often seemingly unfeasibly short timescales using fewer resources.

Timber Frame / SIPs Construction – Avanti Brook Primary School, Bishop's Stortford

COMPLIANCE WITH BUILDING SAFETY ACT 2022:

The company have assessed competence thresholds that each individual is expected to meet when delivering or managing the duty-holder functions of both Designer and Principal Designer roles in alignment with BSI Flex 8670. The broad requirements set out in BSI Flex 8671 have been followed to address the key competency points:

a) behavioural competence

As chartered professionals (MICE, MIstructE, MCIOB etc.), behavioural competence is mandated through the core objectives set by the relevant professional institutions and councils. All our Principal Designers are experienced and qualified professionals who oversee the training of less experienced technical staff.

b) legislative and regulatory framework for compliance

The company ensures that regular training is in place in the form of self-learning CPD and dedicated courses so that each designer is familiar with the current legislative and regulatory framework. BCAL also carry out CPD presentations to other parts of the industry on the role of PD and therefore must remain at the forefront of this and subject to periodic revalidation. BCAL technical staff have also attended several webinars, courses, briefings and forums on the subject of the Building Safety Act to enhance their knowledge.

c) management of design work compliance

The PD service at BCAL has been mapped out through a rigorous process of internal development starting in early 2023, which must be followed by all company Principal Designers and Designers with the core features summarised as:

- The Principal Designer must plan, manage, and monitor the design work, ensuring that the design if built would comply with the building regulations
- Ensure that they and the designers in the team, co-operate, communicate, and coordinate their work with the Client, the Principal Contractor and other Designers
- Liaise with the Principal Contractor and share information relevant to the building work
- Change Control Plan/Recording of Design Changes
- Collation of Fire Safety Information
- Demonstration of Competency to the Client

d) technical framework for compliance

As chartered engineers, the company's training regime and technical expectations go above and beyond that of the general requirements under PAS 8671. Memberships of relevant bodies are listed below. Furthermore, appropriate management policies, procedures, systems, and resources are in place to ensure the individuals in the organisation meet the competencies required by these regulations.

Evidence of compliance of our key design responsibilities are demonstrated primarily through proactive input into the Building Regulations Risk Tracker which is produced by the Building Regulations Principal Designer (BRPD). BCAL appreciate the fact that the purpose of this document is different to what is eventually issued by Building Control or a Registered Inspector. In many instances, it acts as a precursor to their tracker, and the focus is to ensure building safety in design is maintained above anything else. In addition to this, there is meaningful involvement with the Designer's Responsibility Matrix (DRM) - which may be issued as part of the BIM execution Plan (BEP) on relevant projects, Design/Workshop Review notes - carried out periodically with select relevant members of the design team and contractor's supply chain, Design Reports - issued at each project milestone, which collates much of the information gathered to date and Change Control trackers - developed on a project-by-project basis. Where relevant the Golden Thread of Information is both facilitated and maintained through digital information.

At BCAL it is understood that designers must have sufficient technical expertise, experience, and qualifications to discharge their professional duties to ensure their aspect of the design is compliant with the Building Regulations and relevant codes of practice. Particular emphasis has been put on compliance with Parts A (Structure) and B (Fire Safety) of the Approved Documents, which form the key project risks in terms of the Building Safety Act. As qualified Civil and structural Engineers, a detailed understanding of the key parts of the Building Regulations (for example parts A and B) in addition to associated design codes (British Standards/Eurocodes) comes as standard. Compliance with operational safety comes in the form of interacting with the CDM Principal Designer and input into the project Residual Risk Register. All models are fully compliant with the requirements of ISO 19650 and PAS 1192:6, with embedded H&S information and the use of industry leading integrated design software (Tekla Structural Designer etc.) ensures code compliant design and therefore mitigating and eliminating the fundamental design risks.

COMPANY SUMMARY CV's (KEY PERSONNEL):

NAME: Mohammad Ziauddin POSITION: Director PROFESSION: Structural Engineer
QUALIFICATIONS: BEng (Hons) CEng MICE
KEY EDUCATION PROJECT HIGHLIGHTS:
Wootton Park School Northampton (£16m), Northampton College Advanced Construction Engineering Centre (£3m), New Boarding House Rugby School (£5.5m), Surrey Veterinary School Guildford (£29m), Northwest Kent College Dartford (£31m), Clydebank Schools (£29m), Park Community School Havant (£15m), Granta SEN School Linton (£8.5m), Littleport Primary School (£5m)

PROFILE SUMMARY:
Drawing upon over 25 years' experience, acquired working for a variety of highly reputable companies, Mohammad brings a distinct approach to design; one that mixes traditional consulting engineering services with the pragmatic, delivery focused attitude of a contractor. As someone who naturally embraces and promotes the use of technology, the vast majority of his projects have featured BIM for over a decade. As a company director his priority is to understand client needs before developing a tailor-made design service and ensuring the business remains flexible in order to achieve this. He has been fortunate to have been able to work on a truly diverse range of projects across the UK, giving him a certain level of hands-on technical expertise, which he keenly maintains to this day.

NAME: Barry King POSITION: Director PROFESSION: Civil Engineer
QUALIFICATIONS: BEng (Hons) MCIHT

KEY EDUCATION PROJECT HIGHLIGHTS:
Moulton College – Student Accommodation, Social Centre, Chris Moody Centre, Library and ICT Building, Equestrian Centre. Silverstone Primary School, Kingscliff Primary School, New Swimming Pool Northampton School for Boys, Science Hub Cardinal Newman School Luton, Girls Boarding House Uppingham School, Exeter Primary School Corby, Maplefields School Corby

PROFILE SUMMARY:
Extensive knowledge and experience of below ground and surface water drainage and external works/highways design with a keen eye on detail from the outset of any project is a key reason Barry has a proven track record in delivering efficient, buildable, and cost-effective solutions. He understands that the key to achieving successful sustainable urban drainage strategies (SuDS) is forging close, collaborative working relationships with the relevant lead local flood authority, client, and other members of the design team as early as possible. His technical expertise enables him to react quickly and advise on the relative pros and cons on a variety of potential design options, facilitating a seamless design development process right across the RIBA work-stages.

NAME: Matthew Harrison POSITION: Associate Director
PROFESSION: Project/BIM Management QUALIFICATIONS: HNC Building Studies MInstRE
KEY EDUCATION PROJECT HIGHLIGHTS:
Kingsbrook Secondary School (£30m), Kingsbrook Primary School (£8m), John Henry Newman School (£16m), Salmon's Brook SEN School (£8m), Mercia Park 6 (£34m).

PROFILE SUMMARY:
With experience in the design, management and construction of projects across all sectors, Matt is a highly enthusiastic and experienced BIM/Project Manager, well suited to any demanding role. One of his roles at BCAL is to explore and adopt the latest software available in order to maintain and improve their BIM capabilities while ensuring clients are getting the most out of the information available. He has played a key part in the development of BCAL's cloud-based Digital Building Manual Solution. Having served 13 years in the Royal Engineers, Matt has experience in design, construction and management across all sectors worldwide including Oman, which involved the design and construction of both technical and domestic multi-storey accommodation blocks and infrastructure.

The Institution of Structural Engineers

The Structural Plan of Work 2020

v1.0 (26/04/20)

NOTES:

The IStructE Structural Plan of Work 2020 has been developed to coordinate and integrate with the RIBA Plan of Work 2020. It is intended that the Structural Plan of Work provides a complementary framework for organising the structural engineering requirements for building projects to provide structural engineers, clients and other design disciplines with a more collaborative and unified approach to the process planning of projects.

Reference: [i]RIBA Plan of Works 2020

Stages 0 and 1 comprise the Briefing portion where the initial brief and project requirements are determined.

Stages 2, 3 and 4 comprise the Design portion of the project where all of the information required for the Manufacturing and Construction of the project is prepared. A sub-stage 4.5 is included within the Plan of Work for the preparation of the production information required to undertake the construction works. This sub-stage is frequently undertaken by a range of designers and specialist sub-contractors.

Stage 5 starts when the Contractor takes possession of the site (or instruction to commence production in the case of off-site manufacture) and hence there is likely to be significant overlap between Stage 4, Stage 4.5 and Stage 5 for the various structural aspects of the project (e.g. pile design and bending schedules completed and piles installed on site prior to secondary steelwork being fully detailed). Stage 6 starts at Practical Completion and finishes at the end of the defects liability period.

A Responsibility Matrix should be prepared early in the project to identify who is responsible for the various aspects of the structural works, at what levels of details and at which stage in the project.

Note that there may be different organisations appointed for different stages of the project (e.g. one organisation is appointed for Stages 0 and 1, but then a separate organisation is appointed for Stages 2-6), or that separate appointments may be made for the different stages (e.g. a separate appointment is used for Stage 7 services).

*Statutory requirements are given in the Plan of Work as generally applies within the UK. The section should be adapted and amended to suit the relevant requirements of the jurisdiction for the project.

		0 Strategic Definition[i]	1 Preparation and Brief[i]	2 Concept Design[i]	3 Spatial Coordination[i]	4 Technical Design[i]	4.5 Production Information	5 Manufacturing and Construction[i]	6 Handover[i]	7 Use[i]
		Briefing		Design				Delivery		Evaluation
Overview[i]		Client's key requirements defined	Project feasibility confirmed and initial **Project Brief** defined. Related information collated and prepared to enable the project to progress	Architectural and engineering concept information prepared and developed to meet the **Project Brief**	Architectural and engineering information **Spatially Coordinated** between disciplines into a single solution aligned to the **Project Brief**, **Cost Plan** and **Project Strategies**	Architectural and engineering technical design finally coordinated and completed to assemble and construct the project	Engineering information, including specialist sub-contractors' technical information, prepared to enable the manufacture, assembly and construction to proceed	Manufacturing, assembly and construction completed	Project handed over, defects rectified and initial Aftercare completed	Facilities and asset management. Post Occupancy Evaluation of building performance in use as required
Contingency Assessment				Appropriate to a design contingency of 20 - 25%	Appropriate to a design contingency of 10 - 15%	Appropriate to a design contingency of 5 - 10%	Appropriate to a design contingency of 2 - 5%			
Design		Contribute to preparation of **Client Requirements**	Contribute to preparation of **Project Brief** Contribute to the **Site Information** Identify survey information required and provide survey scopes Identify structural constraints Identify information required for structural design	Prepare the structural concept design defining the scope, scale and form of the structure, and integrated with the other design disciplines Review survey information and identify any additional surveys required and provide survey scopes Develop, review and assess structural options Define structural design standards and criteria to be used for design, including: - Loading (static and dynamic) - Durability and design life - Fire resistance (in relation to the fire strategy) - Ground movements - Thermal movements - Serviceability criteria (including deflection and vibration criteria) - Embodied carbon targets Define structural grids and structural zones Develop foundation strategy Consider strategy for in use, maintenance and deconstruction	Develop the structural design for defining the detailed form and function of all components in terms of overall size, typical detail, performance and outline specification Spatially coordinate the structural design and integrate with the architectural and other design disciplines Prepare calculations in sufficient details to facilitate and verify design solutions Confirm structural grids and structural zones Develop strategy for in use, maintenance and deconstruction Design for economy of materials by sufficiently detailed analysis to ensure elements fulfil their role safely but without needless use of excess material Design for load conditions and load combinations that can be justified on current knowledge of intended use and ensure that the client is aware of these	Prepare Structural Technical Design Details and designs of specialist structural contractors coordinated and integrated into the structural design Prepare full setting out information for all structural items, fully coordinated and integrated with other design items Review **Contractor Designed Items** and ensure that they are integrated in the structural design Confirm strategy for in use, maintenance and deconstruction	Development and review of temporary works designs	Review temporary works designs		
Interface			Contribute to the development of the **Responsibility Matrix** Assist in the development of the **Project Information Requirements** (PIR) Identify adjoining landowners' issues	Review, update and confirm agreement of the **Responsibility Matrix** Provide information for preparation of **Cost Plan** and **Project Strategies** Undertake third party consultations	Establish critical construction details, tolerances, performance tolerances and anticipated movements (static and dynamic), defining critical coordination clearances Below ground services and structure integration Undertake third party consultations	Liaise with specialist subcontractors as necessary Integration of builders work items into structural design Undertake third party consultations	Review of Contractor's proposed method statements or sequencing proposals for complex or critical structural items			Conclude as required activities listed in Plan for Use Strategy including **Post-occupancy Evaluation**, review of **Project Performance**, **Project Outcomes** and Research and Development aspects.
Construction				Identify **Contractor Designed Items** Consider constructability issues	Provide **Performance Specification** for **Contractor Designed Items** Develop constructability issues and highlight any project specific criteria including critical temporary works requirements	Develop temporary works briefs	Manufacturing and construction information (e.g. reinforcement drawings and bar bending schedules, steelwork fabrication drawings) prepared	Resolve site queries Undertake site visits and inspections to review the progress of the works on site **'As-constructed' Information**, prepared by relevant parties as agreed/defined in the scope of services		
Management			Provide information for and contribute to **Project Execution Plan** as required Identify and define statutory requirements relevant to the structural design	Consider and contribute to H+S risk management process and develop proposals for risk mitigation Assist **Lead Designer** with preparation of stage **Design Programme**	Develop and contribute to H+S risk management process and develop proposals for risk mitigation Assist with the implementation of **Change Control Procedures** Assist **Lead Designer** with preparation of stage **Design Programme** Provide information for preparation of **Cost Plan**, Project Carbon Tracking and **Project Strategies**	Develop and contribute to H+S risk management process and develop proposals for risk mitigation Assist **Lead Designer** with preparation of stage **Design Programme** Provide information for preparation of **Cost Plan** and **Project Strategies**		Review quality records and assist in the resolution of manufacture and construct non-conformities Assist with the preparation of Building Log Book, O&M Manual etc as required	Undertake tasks listed in Plan for Use Strategy Contribute to post-contract reviews and certification Contribute to Lessons Learnt exercises	Undertake tasks listed in Plan for Use Strategy
Sustainability		Support the strategic definition of the project in relation to the client's needs, including the appropriateness of development versus upgrading or extending existing buildings as an alternative to demolition	Support the client in developing a brief with clear sustainability outcomes that will contribute positively towards mitigating Climate Breakdown Identify potential Climate Change Impact on the design requirements for the project over its intended life span to ensure resilience	Evaluate options to lower the embodied carbon within the structural design, including material choices and efficient building layout Agree embodied-carbon tracking terms and targets Consider design for deconstruction and re-use	Assist with the establishment of a method of carbon tracking that is compatible across the whole design team Track embodied carbon in structural components to an accepted and agreed standard and level of detail Design to achieve the embodied carbon targets agreed at Stage 2	Develop the detailed structural design to minimise wasteful use of resources, both in quantum and in detail Provide **Structural Sustainability Report**	Update **Structural Sustainability Report** from Stage 4 based on more detailed development of the Technical and Production Design	Collaborate with clients, architects, engineers and contractors to further reduce construction waste Ensure that the **Structural Sustainability Report** requirements, including the embodied structural carbon targets, are achieved through construction Assist in the preparation of overall sustainability certification	Document the project Sustainability Targets and achievements (including Carbon) and share on an open source basis	Support as appropriate a **Post-occupancy Evaluation** to understand the embodied and operational resource use, and use the results to inform future work As required, undertake a **Post-occupancy Evaluation** to correlate designed performance and achieved performance of the structural systems Share this data, knowledge and research on an open source basis
Statutory Requirements*			CDM requirements including appointment of Principal Designer	CDM requirements including Designer duties				Assist with the preparation of the Health and Safety File information	Update Health and Safety File information if required	
				Preliminary **Building Regulations** discussions		Submission of information to demonstrate compliance with **Building Regulations**				
				Provide information to support Party Wall Agreements, and other relevant Approval in Principle (AIP) and statutory requirements and agreements						
				Planning Application support						
Stage Outputs Deliverables at end of stage			Initial **Project Brief** **Site Information** Structural Constraints Structural Survey Reports Climate Change Impact Statement	**Basis of Structural Design** Deliverables List Initial Structural Drawings / Model Concept **Structural Sustainability Report**	Structural Drawings / Information Model spatially co-ordinated Movement and Tolerances Report Outline Structural Specification **Performance Specification** for **Contractor Design Items** Outline **Structural Sustainability Report**	Structural Drawings / Information Model suitable for manufacture and construction Structural Specification **Structural Sustainability Report**		Handover documentation		
Information Exchanges			Prepare **Exchange Information Requirements** (EIR)	Review **Exchange Information Requirements** (EIR) and contribute to BIM Execution Plan (BEP)	Preliminary clash detection and resolution	Clash detection and clash resolution		BIM Handover deliverables		
Collaboration Requirements				Integrate with appropriate disciplines including **Lead Designer** to confirm spatial layouts, structural grids and zones	Integrate with design team to assist with the spatial coordination of items	Detailed integration with specialist sub-contractor design and final integration of all design items				
Design Assurance			Initial review of key structural engineering risks impacting on successful delivery of project	Design review of structural principles including stability, loading criteria, load paths, structural assumptions and risks	Detailed reviews of structural principles, stability, soil-structure interaction, load paths, material specifications	Detailed calculation checking (including third party checking if required) Review of specialist sub-contractor designs	Review and checking of manufacturing and construction information	Review of manufacture and construct quality testing and conformity with design specification. Snagging and structural defects		