The Institution of
StructuralEngineers

The Structural Plan of Work 2020: Overview and Guidance

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Constitution of Task Group

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Note:
The Structural Plan of Work (and where appropriate the Responsibility Matrix) is intended as guidance only and is not a substitute for a contract of services between the Structural Engineer and their client. As is normal the contract of services must specifically, and with sufficient clarity, fully define the services to be provided by the Structural Engineer and, separately and consistently, the services to be provided by the other professionals delivering the project. Each project member should fully understand their areas and scope of responsibility.

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Foreword

I am pleased to present this new publication of the Structural Plan of Work 2020. There have been numerous discussions over the past few years about having guidance to assist structural engineers, and those they work with, in understanding the stages through which a project undergoes as it develops from a project brief, through design and construction, to handover and use. The publication of the Structural Plan of Work is designed to provide a complementary framework to the well-established RIBA Plan of Work whilst focussing on the structural engineering aspects of project design and delivery.

The Structural Plan of Work 2020 has been developed alongside the recently published RIBA Plan of Work 2020 and shares stage naming and key terms. It is our aspiration that this coordination between the frameworks assists project teams in collaborating and integrating so as to enhance the successful delivery of projects.

It is envisaged that the Structural Plan of Work will assist not just structural engineers but also clients and other construction professionals to align and understand project stages. Of course, all projects are different, and the Structural Plan of Work is aimed to be a framework which can be adapted to suit particular project requirements whilst still maintaining some standardisation and alignment across the project teams.

I trust the Structural Plan of Work 2020 is a valuable and positive resource to be used in the development of projects, but would also welcome feedback so that it can be improved and developed to further meet the needs of project teams going forwards.

Finally, I would like to convey my thanks for the support and assistance provided by RIBA, and express my gratitude to the Task Group members and the Institution of Structural Engineers' staff who have given their time and efforts to help make this publication real.

Andy Yates
Chair of Task Group

1. Introduction

Aims

The IStructE Structural Plan of Work 2020 has been developed to coordinate and integrate with the RIBA Plan of Work 2020[1]. 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.

The aim is to provide a plan of work which enables improved clarity over the role and deliverables required for the successful delivery of structural engineering on projects. It also aims to encourage the use of a properly managed process during the development of a project to promote collaborative working between design and construction disciplines to facilitate successful project outcomes.

Following the Structural Plan of Work is not mandatory but sets out good practice for professional structural engineers and their clients to use as guidance in developing project-specific scopes.

Scope

The Structural Plan of Work is intentionally limited to items and issues related to the structural engineering aspects of a project. It should be read in conjunction with the RIBA Plan of Work 2020[1] which provides a broader overview of the wider project process.

The Structural Plan of Work has also been developed with regard to the guidance for the management of the construction design process provided in *BS 7000-4: 2013 Design management systems. Guide to managing design in construction*[2] and *BS 8536-1: 2015: Briefing for design and construction. Code of practice for facilities management (Buildings infrastructure)*[3].

It is recognised that there can be overlap between responsibilities of engineering disciplines on projects. For example, a large project may have separate teams providing the Structural Engineer, Civil Engineer and Geotechnical Engineer roles, whereas on a smaller project, all these roles may be undertaken by the Structural Engineer. The Structural Plan of Work has been developed from the viewpoint of a Structural Engineer with the aim of highlighting the tasks which are typically required for a project. However, for a specific project, the Responsibility Matrix should be used to clarify the exact scope of responsibility between parties.

Whilst the stage naming and descriptions are aligned with the RIBA Plan of Work 2020[1], it is acknowledged that the appointment of the various parties may not be aligned, particularly in the earlier project stages. It is strongly recommended that the appointment of the various professional services is aligned to the various project stages as this will greatly assist with the successful delivery of the project. However, should appointments not be aligned, it should be highlighted to the client and agreement reached on the deliverables required from each stage.

Throughout this Guidance document, Information Boxes are provided. These are to provide some additional background and supporting information but are not part of the Structural Plan of Work itself.

This is the first edition of the Structural Plan of Work and constructive feedback is encouraged to assist with the evolution and development of this resource. Comments can be sent to technical@istructe.org

Note:
The Structural Plan of Work (and where appropriate the Responsibility Matrix) is intended as guidance only and is not a substitute for a contract of services between the Structural Engineer and their client. As is normal the contract of services must specifically, and with sufficient clarity, fully define the services to be provided by the Structural Engineer and, separately and consistently, the services to be provided by the other professionals delivering the project. Each project member should fully understand their areas and scope of responsibility.

References

The following references are used throughout the document:

- [1] *RIBA (2020) Plan of Work 2020*, [online] available at: www.ribaplanofwork.com [Accessed 30 April 2020]
- [2] British Standards Institution (2013) *BS 7000-4:2013 Design management systems. Guide to managing design in construction*, London: BSI
- [3] British Standards Institution (2015) *BS 8536-1:2015 Briefing for design and construction. Code of practice for facilities management (Buildings infrastructure)*, London, BSI.

2. Guidance notes

The Structural Plan of Work is divided into eight primary Stages, representing the full cycle of a building project, from Strategic Definition (Stage 0) defining the need for a project, through Design and Delivery stages, to the in use stage where the project is completed (Stage 7). The eight Stages purposely replicate those used in the RIBA Plan of Work 2020 to facilitate coordination and a unified approach to project development.

Whilst the eight primary Stages replicate the RIBA Plan of Work 2020, the tasks and requirements of the stages are specifically prepared to align with the structural design requirements for a project and the typical duties of the Structural Engineer. A sub-stage (sub-stage 4.5) is included within the Structural Plan of Work to capture and differentiate the production of construction information (e.g. specialist sub-contractor designs) from both the design development during Stage 4, and the manufacture and construction activities of Stage 5.

The project stages are summarised below:

- **Stage 0: Strategic Definition.** This stage compromises the strategic decision making to determine that a project is the desired way of achieving the client's aims.
- **Stage 1: Preparation and Brief.** This stage is where the client team develops and records the detailed requirements for the project brief including the scope definition and agreed areas of responsibility of the Structural Engineer.
- **Stage 2: Concept Design.** This is the start of the design process and the development of the design to align with the Initial Project Brief.
- **Stage 3: Spatial Coordination.** This stage represents the development of the structural design to integrate with the other design disciplines so as to align into a single spatially co-ordinated solution aligned with the Project Brief.
- **Stage 4: Technical Design.** This stage is the final design stage whereby all the design information is finally coordinated and completed to enable the manufacture and construction of the project to be progressed, including the relevant regulatory compliance requirements.
- **Sub-stage 4.5: Production Design.** This sub-stage prepares the engineering information, including specialist sub-contractors' technical information, to enable the manufacture, assembly and construction works to proceed, including the relevant regulatory compliance requirements.
- **Stage 5: Manufacturing and Construction.** This stage starts with the Contractor taking possession of the site, or the instruction to proceed with production in the case of off-site manufacture, and concludes with the achievement of Practical Completion (or alternative contractual term), including the relevant regulatory compliance requirements.
- **Stage 6: Handover.** This stage occurs from Practical Completion until the end of the defects period, including the relevant regulatory compliance requirements.
- **Stage 7: Use.** This stage starts concurrently with Stage 6 but continues throughout the operation and maintenance of the project over its lifetime.

Across the work stages, eight bars are provided to describe the various activities to be undertaken at each stage as described below:

- **Overview.** This bar provides an overview of each stage of the Structural Plan of Work.
- **Contingency Assessment.** This bar provides an indication of the level of contingency within the structural design which is likely at each of the design stages. It is provided to both highlight the increasing level of definition as the design develops, but also to provide an indication of the level of uncertainty and risk which should be allowed for within the Cost Plan.
- **Core Tasks.** This bar is split into 5 sections (Design, Interface, Construction, Management and Sustainability) to provide a description of the core tasks to be undertaken at each of the work stages.
- **Statutory Requirements.** This bar highlights the general statutory requirements within the UK to be considered at each of the project stages. For other jurisdictions, including specific requirements for UK countries, the relevant statutory requirements should be substituted.
- **Stage Outputs.** This bar provides a summary of the outputs to be provided at each of the stages.
- **Information Exchanges.** This bar highlights the information exchanges and BIM related tasks across the work stages.
- **Collaboration Requirements.** This bar summarises the collaboration requirements to facilitate the integration of the structural design with the other design disciplines.
- **Design Assurance.** This bar provides a summary of the typical activities and reviews to be undertaken to provide assurance that the structural design is adequate.

Throughout this Guidance document, Information Boxes are provided. These are to provide some additional background and supporting information but are not part of the Structural Plan of Work itself.

3. Glossary and Definitions

Terms highlighted in **bold** throughout the Structural Plan of Work are defined here.

'As-constructed' Information	Information produced at the end of a project to represent what has been constructed. This will comprise a mixture of 'as-built' information from specialist subcontractors and the 'final construction issue' from design team members. Clients may also wish to undertake 'as-built' surveys using new surveying technologies to bring a further degree of accuracy to this information.
Basis of Structural Design	The **Basis of Structural Design** provides a technical description of the structural principles and criteria to be used in the design. It provides a confirmation (and technical interpretation) of the Final Project Brief as well as providing the basis for the detailed development of the structural design and a record of the design criteria to be used. (Note that it is similar to an Approval in Principle (AIP) document prepared for bridges and highways structures).
Building Contract[1]	The contract between the client and the contractor for the construction of the project. The **Building Contract** may contain design duties for specialist subcontractors and/or design team members. On some projects, more than one **Building Contract** may be required; for example, one for shell and core works and another for furniture, fitting and equipment aspects.
Building Information Modelling (BIM)	BIM is widely used as the acronym for 'Building Information Modelling', which is commonly defined (using the Construction Project Information Committee (CPIC) definition) as: '*digital representation of physical and functional characteristics of a facility creating a shared knowledge resource for information about it and forming a reliable basis for decisions during its life cycle, from earliest conception to demolition*'.
Change Control Procedures[1]	Procedures for controlling changes to the design and construction following the sign-off of the Stage 2 Concept Design and the final **Project Brief**.
Client Requirements[1]	A statement or document that defines the **Project Outcomes** and sets out what the client is seeking to achieve. It is used to develop the Business Case, which examines any viable options that meet the **Client Requirements**.
Contractor Designed Items	An item of the design where a specialist subcontractor has design responsibility for undertaking the design of the item in accordance with a **Performance Specification** provided by others.
Cost Plan[1]	The estimate of the construction, or capital, costs for a building, aligned with the Project Budget, unless otherwise agreed with the client team. The **Cost Plan** may also include, or be linked to, whole life cost information.
Design Programme[1]	The duration of the design tasks of each member of the design team, overseen by the lead designer and usually agreed before each design stage commences. The **Design Programme** is derived from the **Project Programme**.
Exchange Information Requirements	As defined in BS EN ISO 19650-1[3.1], the '*managerial, commercial and technical aspects of producing project information. The managerial and commercial aspects should include the information standard and the production methods and procedures to be implemented by the delivery team.*'

Feasibility Studies[1]	Studies undertaken to test the feasibility of the **Client Requirements** and emerging **Project Brief** against a specific site/context, and to consider how to deal with sitewide issues.
Feedback[1]	Knowledge derived from previous similar projects, often used to inform dialogue at Stage 0. **Feedback** might comprise **Post Occupancy Evaluation** feedback, building visits, case study information or discussions with the project teams involved.
Information Exchange[1]	The formal issue of information for review and sign-off by the client at key stages of the project. The project team may also have additional formal **Information Exchanges** as well as the many informal exchanges that occur during the iterative design process.
Lead Designer	A specific role undertaken for the project which includes setting design standards, co-ordinating and integrating the design, co-ordinating advice on design related issues and providing advice.
Movement and Tolerances Report	A report describing the anticipated movements of the structure over its design life and how these movements are to be accommodated within the design (including within any **Contractor Designed Items**). It also provides the structural tolerances assumed within the design and to be achieved within the Manufacturing and Construction stage.
Performance Specification	A detailed specification providing the performance (descriptive) requirements to enable others, typically specialist sub-contractors, to complete their design in accordance with the **Project Brief**.
Post Occupancy Evaluation[1]	Evaluation undertaken once the building is occupied to determine whether the **Project Outcomes** and **Sustainability Outcomes** set out in the **Project Brief**, or later design targets for Building Systems, have been achieved.
Practical Completion[1]	The point in the process when the construction work is certified as practically complete under the Building Contract.
Project Brief[1]	Detailed requirements for the design and management of the project, included in design team professional services contracts, to enable the design team to begin design work in Stage 2.
Project Execution Plan[1]	The **Project Execution Plan** is produced in collaboration between the project lead and **Lead Designer**, with contributions from other designers and members of the project team. The **Project Execution Plan** sets out the processes and protocols to be used to develop the design. It is sometimes referred to as a project quality plan.
Project Information Requirements	Information, including models, documents, specifications, schedules and spreadsheets, issued between parties during each stage and in formal Information Exchanges at the end of each stage.
Project Outcomes[1]	The desired outcomes for the project, including **Sustainability Outcomes**, set out in Stage 0 to inform the **Client Requirements**. The outcomes may include operational aspects, as well as a mixture of subjective and objective criteria, and will influence the preparation of the **Project Brief**.
Project Performance[1]	The performance of the project process and project team, determined using **Feedback** following completion of a building.

Project Programme[1]	The overall period for the briefing, design, manufacturing, construction and post-completion activities of a project.
Project Strategies[1]	Strategies to support the design process, generally developed in parallel with the design stages (Stage 2-3) and to respond to the Business Case or **Project Brief** before they are concluded or support the use of the building. These strategies typically include the following: • Conservation Strategy • Cost Strategy • Fire Safety Strategy • Health and Safety Strategy • Inclusive Design Strategy • Planning Strategy • Plan for Use Strategy • Procurement Strategy • Sustainability Strategy These strategies are usually prepared in outline at Stage 2 and in detail at Stage 3, with the recommendations absorbed into the technical design and information exchanges. The strategies are not typically used as Construction Information but may inform the construction process.
Responsibility Matrix[1]	A matrix determining who is responsible for the different tasks to be undertaken at each stage. It can set out which project team member should lead on each task and who should provide support. This document sets out the extent of any performance specified design. The **Responsibility Matrix** is created at a strategic level at Stage 1 and fine-tuned in response to the Concept Design at the end of Stage 2 in order to ensure that there are no design responsibility ambiguities or omissions at Stages 3 and 4.
Site Information	Specific project information in the form of surveys or reports relating to the particular site/context for a project, including Site Surveys.
Structural Sustainability Report	A cumulative report that develops during design and construction stages to record the initial structural **Sustainability Outcomes** set for the project, the agreed structural sustainability strategy, the structural sustainability design targets and means to achieve them and ultimately the level of structural sustainability achieved in the constructed project.
Sustainability Outcomes[1]	**Project Outcomes** related to sustainability. These start as the client's aspirations for sustainability, then will be developed into detailed target metrics as the design progresses. The Sustainability Strategy is prepared in response to the **Sustainability Outcomes**.

Reference

- [3] British Standards Institution (2019) *BS EN ISO 19650 Organization and digitization of information about buildings and civil engineering works, including building information modelling - Information management using building information modelling: Part 1: Concepts and principles*, London: BSI

4. The Structural Plan of Work 2020

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Stage 0:
Strategic Definition[1]

Overview[1]	Client's key requirements defined
Contingency Assessment	-
Core Tasks	**Design:** • Contribute to preparation of **Client Requirements** **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
Statutory Requirements	-
Stage Outputs	-
Information Exchanges	-
Collaboration Requirements	-
Design Assurance	-

Description

The overall aim of Stage 0 is for the client to develop the **Strategic Brief** for the project and to confirm that a building project is the best means of achieving the **Project Outcomes**. This stage is undertaken by the client team, but they may seek advice from a range of professional advisers to assist them.

This stage may require a high-level review of alternative options such as refurbishment, new build or extension. The development of the **Strategic Brief** may include **Feedback** from similar projects or from previous projects or buildings being in use (Stage 7). An evaluation of whether existing buildings can be reused or upgraded as a more carbon efficient alternative to demolition and new build should be considered. In addition, the client should be advised of potential changes in legislation and public opinion as the UK economy is driven towards net zero carbon by 2050 to ensure that the proposed development serves the client's short and long term interests.

For the Structural Engineer, input to Stage 0 may be limited and consists of providing suitable technical advice and assistance to the development of the **Strategic Brief**.

There are no specific outputs defined for Stage 0 as they need to be determined depending on the client's requirements. If appointed for Stage 0, the Structural Engineer should ensure that the required outputs from the stage are clearly defined.

The outcome of Stage 0 is confirmation that a building project is the best means of achieving the client's goals and that the project should proceed to Stage 1: Preparation and Brief.

Sustainability and Climate Change Commitments

In June 2019 the UK Government became the first major economy in the world to pass legislation to bring all greenhouse gas emissions to net zero by 2050.

Buildings construction and operations accounted for 36% of global final energy use and nearly 40% of energy-related carbon dioxide (CO2) emissions in 2017[4.1]

Structural engineers can play a significant role in reducing carbon dioxide emissions due to building construction and operation. A number of organisations have signed the Structural Engineers Declaration[4.2] to seek to:

- Raise awareness of the climate and biodiversity emergencies and the urgent need for action amongst their clients, collaborators and supply chains
- Advocate for faster change in the industry towards regenerative design practices and a higher Governmental funding priority to support this
- Establish climate and biodiversity mitigation principles as a key measure of the industry's success: demonstrated through awards, prizes and listings
- Share knowledge and research to that end on an open source basis
- Evaluate all new projects against the aspiration to contribute positively to mitigating climate breakdown, and encourage their clients to adopt this approach
- Upgrade existing buildings for extended use as a more carbon efficient alternative to demolition and new build whenever there is a viable choice
- Include life cycle costing, whole life carbon modelling and **Post Occupancy Evaluation** as part of the basic scope of work, to reduce both embodied and operational resource use
- Adopt more regenerative design principles in practice, with the aim of providing structural engineering design that achieves the standard of net zero carbon
- Collaborate with clients, architects, engineers and contractors to further reduce construction waste
- Accelerate the shift to low embodied carbon materials in all their work
- Minimise wasteful use of resources in their structural engineering design, both in quantum and in detail

While this declaration has not been made by all practices, the Structural Plan of Work 2020 incorporates sustainability as a core task throughout all stages and it is recommended that all engineers consider the above principles and how they can be incorporated into all of their work.

References

4.1 International Energy Agency and the United Nations Environment Programme (2018) *2018 Global Status Report: towards a zero-emission, efficient and resilient buildings and construction sector*, [online] available at: https://webstore.iea.org/2018-global-status-report [Accessed 30 April 2020]

4.2 Institution of Structural Engineers (2020) *Structural Engineers Declare*, [online] available at: https://www.structuralengineersdeclare.com

Stage 1:
Preparation and Brief[1]

Overview[1]	Project feasibility confirmed and initial **Project Brief** defined. Related information collated and prepared to enable the project to progress
Contingency Assessment	-
Core Tasks	**Design:** • 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 **Interface:** • Contribute to the development of the **Responsibility Matrix** • Assist in the development of the **Project Information Requirements** (PIR) • Identify adjoining landowners' issues **Management:** • Provide information for and contribute to **Project Execution Plan** as required • Identify and define statutory requirements relevant to the structural design **Sustainability:** • 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
Statutory Requirements	CDM requirements including appointment of Principal Designer
Stage Outputs	Initial **Project Brief** Site Information Structural Constraints Structural Survey Reports Climate Change Impact Statement
Information Exchanges	Prepare **Exchange Information Requirements** (EIR)
Collaboration Requirements	-
Design Assurance	Initial review of key structural engineering risks impacting on successful delivery of project

Description

Stage 1 is where the client team develops and records the detailed requirements for the project brief in the initial **Project Brief**. Design tasks do not happen during this stage, but the information required for the design team to proceed with subsequent stages is developed and collated.

Under the Construction (Design and Management) Regulations 2015[4.3], a client must appoint a Principal Designer as soon as is practicable. It is recommended that this appointment is made during Stage 1 and is aligned with a **Lead Designer** role who can advise the client and assist in ensuring adequate compilation of the required information to complete Stage 1.

The role of the Structural Engineer during Stage 1 is to assist the client in providing the information needed for the design stages to progress.

This stage is led by the client team and the appointment of a Structural Engineer may be a separate commission from the later stages. As such, the Structural Engineer should ensure that the relevant **Site Information** collated during Stage 1 is complete, accessible and available for use in the structural design in subsequent stages. Any limitations or assumptions should also be clearly stated.

The **Responsibility Matrix** should be developed during Stage 1 by the client team. The procurement of the design team for subsequent stages occurs during Stage 1 and hence the tender and appointment documents for the design team need to be developed during Stage 1. The **Responsibility Matrix** is a key item to ensure that all tasks are covered, and responsibility allocated. For the Structural Engineer, a crucial item is to confirm that the engineering responsibilities are adequately covered, particularly with relation to civil engineering and geotechnical engineering aspects where there can be ambiguity.

Surveys which will be required (e.g. geotechnical, unexploded ordnance (UXO), buried services, asbestos, demolition etc.) should be identified and scoped. The information from these surveys will be required towards the start of Stage 2 and hence consideration should be made towards completing these items during Stage 1.

The collation of record structural information regarding the site or existing buildings should be collated during Stage 1. This should include existing Health and Safety File information.

Structural Feasibility studies should be carried out during Stage 1 to confirm that the project is feasible. These studies should not be development of the design for the project, rather that they are used to confirm the viability of the project and inform the development of the **Project Brief**. An example of this could be a feasibility study for adding additional storeys to an existing building; a preliminary load assessment could be undertaken to ascertain if two or three storeys could be added which may impact on the economic viability of the project progressing.

Structural surveys, if required, should also be undertaken during Stage 1.

If specific planning information will be required (e.g. Basement Impact Assessments), these should be identified during this stage.

The Structural Engineer should assist in identifying adjoining landowner issues which will impact on the successful development of the structural design (e.g. party wall, adjacent basement or buried structures). Similarly, if adjacent landowners require specific approvals or

Collaboration, communication and information sharing

The development and implementation of newer technologies and processes (in particular BIM) bring new ways of working and a greater need to work collaboratively across design and construction disciplines. The incorporation of coordinated design models and asset information during the design development process places a greater need for a collaborative and unified approach. An integrated and collaborative approach to design and construction is essential to ensure that the client's aspirations are successfully delivered but also that the buildability of the design and the operational performance of the project is achieved.

To facilitate the successful delivery of a project clear communication and information sharing is required throughout the project team. In the early stages of a project (preferably during Stage 1 and the preparation of the Exchange Information Requirements) the roles and responsibilities for the various project parties should be identified and clearly stated. Each member of the project team should have clear and defined areas of responsibility so that each member of the team is fully aware of their respective outputs and responsibility.

procedures (for example in the UK, Network Rail, London Underground, Canals and Rivers Trust) these should be identified and, if appropriate, preliminary discussions could be held. If specific statutory or regulatory bodies (for example in the UK, Environment Agency, Heritage England) will require input during the project, they should also be identified.

The Exchange Information Requirements (EIR) should be developed during Stage 1.

The Structural Engineer should assist the client and design team in considering the development of a brief that would benefit the client whilst benefitting the wider community and planet. For all building projects it is vital to consider size, use, density of occupation, future flexibility of use and long-term resilience to impact of climate change as a key part of the design brief.

An initial review of the key structural engineering risks should be undertaken to assess the impact of these on the successful delivery of the project. The identified risks, and any proposed mitigation actions should be captured and made available for the subsequent design stages of the project.

The outcome of Stage 1 is an **Initial Project Brief** which has been agreed and signed off by the client together with the **Site Information** which provides the information required for the design stages to progress. The Structural Constraints for the project should have been identified and any Structural Survey reports should be completed. The **Responsibility Matrix** should be prepared and agreed by the client.

Reference

4.3 HM Government (2015) *The Construction (Design and Management) Regulations 2015*, [online] available at: http://www.legislation.gov.uk/uksi/2015/51 [Accessed 15 April 2020]

Stage 2:
Concept Design[1]

Overview[1]	Architectural and engineering concept information prepared and developed to meet the **Project Brief**
Contingency Assessment	Appropriate to a design contingency of 20 – 25%
Core Tasks	**Design:** • Prepare the structural concept design defining the scope, scale and form of the structure, 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 **Interface:** • Review, update and confirm agreement of the **Responsibility Matrix** • Provide information for preparation of **Cost Plan** and **Project Strategies** • Undertake third party consultations **Construction:** • Identify **Contractor Designed** Items • Consider constructability issues **Management:** • Consider and contribute to H+S risk management process and develop proposals for risk mitigation • Assist **Lead Designer** with preparation of stage **Design Programme** **Sustainability:** • 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
Statutory Requirements	CDM requirements including Designer duties Preliminary **Building Regulations** discussions Provide information to support Party Wall Agreements, and other relevant Approval in Principle (AIP) and statutory requirements and agreements **Planning Application** support

Stage Outputs	**Basis of Structural Design** Deliverables List Initial Structural Drawings / Model Concept **Structural Sustainability Report**
Information Exchanges	Review **Exchange Information Requirements** (EIR) and contribute to BIM Execution Plan (BEP)
Collaboration Requirements	Integrate with appropriate disciplines including **Lead Designer** to confirm spatial layouts, structural grids and zones
Design Assurance	Design review of structural principles including stability, loading criteria, load paths, structural assumptions and risks

Description

Stage 2 represents the start of the design process and the development of the design to align with the **Project Brief**. This stage should be led by the **Lead Designer**.

This stage represents the start of the design team working together and hence it is important that the **Responsibility Matrix** is reviewed, updated and agreed between both the design team and the client team. If there are any ambiguities or conflicts between the **Responsibility Matrix** and appointment documents these should be resolved as early as possible. The design team should also highlight to the client any additional appointments which may be needed to successfully deliver the project, such as specialist consultants.

A list of **Contractor Designed Items** should be also developed. This needs to identify which aspects of the project will be designed by a specialist sub-contractor but also who will provide the descriptive (performance) specification for the items.

The structural design will start to be developed, which may include a number of option studies, but should lead to a single option being selected.

The structural design should be developed such that the structural grids and structural zones are confirmed and fixed. Coordination will be required to other designers to agree the spatial arrangements and services zones.

The foundation strategy for the project should be developed and agreed.

The **Site Information** and surveys prepared during Stage 1 should be reviewed and the need for any additional surveys should be highlighted and scoped. If surveys have not been carried out during Stage 1, then they should be completed during Stage 2. Proceeding to Stage 3 design without the necessary survey information can provide considerable risk to the project.

A key output of Stage 2 is the development of the **Basis of Structural Design** document. This should define the structural design standards and criteria to be used for the design including:

- loading (static and dynamic)
- durability and design life
- fire resistance
- ground movements
- thermal movements
- serviceability criteria (including deflection and vibration criteria)
- embodied carbon targets

The **Basis of Structural Design** document serves as the technical interpretation of the Project Brief for the structural engineering of the project and provides a document which can be referred back to as the design develops. It is of particular importance to other parties who will be involved in the structural design (e.g. specialist sub-contractors, checking engineers) as it will provide them with relevant technical information and background to the project.

To support the **Sustainability Outcomes**, the following should be agreed and included in the **Basis of Structural Design** or **Structural Sustainability Report**:

- methodology for embodied carbon tracking, including for the structural engineering components
- embodied carbon targets that meet mutually agreed standards

- aspirations for design for construction and de-construction and level of off-site pre-fabrication
- structural design loads that will ensure the building is not over-designed
- structural material choices that will ensure economy of material use and achievement of embodied carbon targets
- proposed structural grids and element sizes (vertical and horizontal) that will ensure the design is efficient in its use of material

Constructability issues should be considered during Stage 2. If significant temporary works or complex sequencing is required to construct the project, then alternative options and arrangements should be reviewed. Similarly, issues relating to the project during the in-use stage, including maintenance and deconstruction, should be considered in the development of the structural design.

The design development at this stage needs to consider Health and Safety issues and a project-wide risk management process should be undertaken, including proposals for mitigating risks. In the UK, the duties of the Designer under CDM Regulations[4.4] need to be adhered to.

A **Design Programme** should be developed by the **Lead Designer** during Stage 2 and agreed between the client and all the designers. The programme should include each of the project stages but also highlight when planning, procurement and construction periods are due to take place, and particularly any early works, enabling works or off site works which may require different timescales for the production of their construction information.

At this stage it is also useful to develop a list of deliverables (including specialist sub-contractor design items), identifying at which stage they will be delivered, so that it is clear to others what can be expected and at which stage. The input of specialist sub-contractors needs to be identified and appropriate timescales allowed to facilitate their integration into the overall design.

It can also be useful to agree across all design disciplines a design freeze and which aspects of the design are now fixed at the completion of Stage 2. Freezing of key design items will assist in minimising project risk and adverse impacts for cost and programme.

Design reviews are required during Stage 2 to ensure that the structural principles and design for the project are appropriate, adequate and in accordance with the **Project Brief**. The design review should include a review of: the proposed stability systems; loading criteria and load paths; that any structural assumptions are valid; and that any key risks associated with the structural design have been appropriately communicated and recorded.

The outputs from Stage 2 should be the **Basis of Structural Design** document, an agreed deliverables list, and the initial structural drawings and/or models. At the completion of Stage 2, the client should review the structural proposals and confirm their agreement to proceed to Stage 3.

Planning

The submission of the Planning Application for projects has historically typically varied considerably between Stages 2, 3 and 4, partially dependent on the complexity and sensitivity of the project but also the client's priorities and the relative appointments of the designers. The RIBA Plan of Work 2020 suggests that the Planning Application is generally made at the end of Stage 3 (although it acknowledges that this may vary).

There are a number of engineering deliverables which may be required to provide information to support the Planning Application (e.g. Basement Impact Assessments, Flood Risk Assessment, Contamination and Remediation Strategy, Drainage Strategy etc.). In the early stages of the project (either during Stage 1 or Stage 2), it needs to be determined and made clear what engineering deliverables will be required to support the Planning Application, who is responsible for preparing them, and at what stage of the project.

The development of the structural design for the project is not dependent on the Planning Application and hence can, to some extent, be disassociated from the project stages. However, it should be noted that the structural design should be developed to at least completion of Stage 2 prior to submission of the Planning Application to avoid undue risk from having an uncoordinated design and unforeseen risks to the delivery of the project.

It is recommended that during Stage 1 or at the start of Stage 2, agreement is reached with the client and other designers at which stage the Planning Application will be made.

References

4.4 HM Government (2015) The Construction (Design and Management) Regulations 2015, [online] available at: http://www.legislation.gov.uk/uksi/2015/51 [Accessed 15 April 2020]

Stage 3:
Spatial Coordination[1]

Overview[1]	Architectural and engineering information **Spatially Coordinated** between disciplines into a single solution aligned to the **Project Brief, Cost Plan** and **Project Strategies**.
Contingency Assessment	Appropriate to a design contingency of 10 – 15%
Core Tasks	**Design:** • 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 **Interface:** • 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 **Construction:** • Provide **Performance Specification** for **Contractor Designed Items** • Develop constructability issues and highlight any project specific criteria including critical temporary works requirements **Management:** • 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** **Sustainability:** • 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

Statutory Requirements	CDM requirements including Designer duties Preliminary **Building Regulations** discussions Provide information to support Party Wall Agreements, and other relevant Approval in Principle (AIP) and statutory requirements and agreements **Planning Application** support
Stage Outputs	Structural Drawings / Information Model spatially co-ordinated **Movement and Tolerances Report** Outline Structural Specification **Performance Specification** for **Contractor Design Items** Outline **Structural Sustainability Report** outlining targets and strategies to meet them (including embodied carbon)
Information Exchanges	Preliminary clash detection and resolution
Collaboration Requirements	Integrate with design team to assist with the spatial coordination of items
Design Assurance	Detailed reviews of structural principles, stability, soil-structure interaction, load paths, material specifications

Description

Stage 3 represents the development of the structural design to spatially coordinate with the other design disciplines so as to align into a single solution aligned with the **Project Brief**.

The structural design should be developed through detailed analysis and calculations to verify the design solutions. At the completion of Stage 3, all the primary structural elements should be dimensionally fixed and should be coordinated with the architectural and building services aspects of the project. Drawings and details should be prepared to illustrate and communicate the structural design.

The integration of the structure with other aspects of the project needs to be developed, particularly for critical construction details and where tolerances and/or movements affect the detailing. Any below ground services should be integrated with the structural design.

At this stage, it is important that tolerances and movements are adequately considered and incorporated into the design. It is recommended that a **Movement and Tolerances Report** is prepared which identifies the anticipated movements during the lifetime of the project, the tolerances to be achieved during construction, and the design solutions to accommodate these movements and tolerances.

If there are any third-party requirements for the project, liaison and discussion with these parties should be carried out during Stage 3 to ensure that their requirements are adequately incorporated into the design.

Performance Specifications should be prepared during this stage for **Contractor Designed Items**. These specifications should provide sufficient description and detail to enable others to undertake their design responsibility whilst remaining within the overall structural design philosophy for the project (as set out in the **Structural Basis of Design** document). Drawings and details illustrating the design intent and requirements should be provided to complement and adequately communicate the requirements for the **Contractor Designed Items**. Liaison with specialists should be sought as appropriate during this stage to ensure that the **Performance Specifications** are accurate, appropriate and achievable.

Note that although the Structural Plan of Work is procurement neutral, it is likely that sufficient structural information will be required during this stage to enable detailed cost plans to be prepared, or for the project to be tendered by contractors. It is therefore essential that

the structural information prepared provides sufficient information and clarity to facilitate the accurate pricing of the works by others.

Health and Safety issues and the risk management process must be reviewed, developed and updated as the design develops. The CDM requirements including Designer duties must still be adhered to.

From the start of Stage 3 formal **Change Control Procedures** should be adopted throughout the project team to effectively track and manage change.

Change Control

Changes to the scope of work for a project can have implications for the design which can also impact on the cost, programme or performance in use. It is important to distinguish between design change (a change to the scope of the project) and design development (development of the project due to an increasing level of definition). However, it is also important to understand the impact of design development on the work of others whereby what may be perceived as small changes, can have a significant impact on the work of others.

Effective communication of changes greatly assists with the successful delivery of a project. All impacted members of the project team should be alerted to changes as soon as possible. The anticipated impact on the project, time and costs should also be communicated to the client.

It is worth highlighting the impact of late changes on a project which, due to the typical advance progress of the structural works, can have significant and, more importantly, unforeseen impacts on the project. Design change should therefore be avoided during Stage 4 unless considered essential for reasons of safety, security or inoperability.

It is strongly recommended that a design change control process is adopted throughout the project team to assist with the management of change and so that the impacts on cost, programme and performance are evaluated, agreed and recorded prior to being integrated into the design.

Constructability issues need to be considered and developed as the structural design progresses. If there are specific criteria or temporary works items which need to be achieved to adequately construct the project (e.g. jacking / preloading, or existing structure temporary support), these should be identified and communicated.

Clarity on methods of construction and deconstruction anticipated in the design should be finalised; which elements will be pre-fabricated off-site or on-site and specific requirements for the appropriate sourcing of materials and materials passporting.

Detailed design reviews are required during Stage 3 to ensure that the structural principles and design for the project are appropriate, adequate and in accordance with the **Project Brief** and the **Basis of Structural Design**. The design reviews should include a review of: the proposed stability systems; loading criteria and load paths; soil-structure interaction; material specifications; that any structural assumptions are valid; and that any key risks associated with the structural design have been appropriately communicated and recorded.

At this stage, preliminary clash detection and clash resolution exercises should be carried out between the designers, in accordance with the BIM Execution Plan.

During Stage 3 it is appropriate to undertake preliminary Building Regulations discussions to ensure that any key features of the structural design are understood by the Building Regulations assessor and any areas of concern are highlighted. Other information may need to be prepared during Stage 3 to support other Statutory Requirements (e.g. Party Wall Agreements, or Approval in Principle documents).

It is recommended that an outline structural specification is prepared for the completion of Stage 3. This should highlight the main materials and workmanship to be used for the project and will assist with the development of the **Cost Plan**.

The outputs from Stage 3 should be spatially coordinated structural drawings and/or Information Model. A **Movement and Tolerances Report**, and an Outline Structural Specification. At the completion of Stage 3, the client should review the structural proposals and confirm their agreement to proceed to Stage 4.

Stage 4:
Technical Design[1]

Overview[1]	Architectural and engineering technical design finally coordinated and completed to assemble and construct the project
Contingency Assessment	Appropriate to a design contingency of 5 – 10%
Core Tasks	**Design:** • 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 **Interface:** • Liaise with specialist subcontractors as necessary • Integration of builders' work items into structural design • Undertake third party consultations. **Construction:** • Develop temporary works briefs **Management:** • 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** **Sustainability:** • Develop the detailed structural design to minimise wasteful use of resources, both in quantum and in detail • Provide **Structural Sustainability Report**
Statutory Requirements	CDM requirements including Designer duties Submission of information to demonstrate compliance with **Building Regulations**
Stage Outputs	Structural Drawings / Information Model suitable for manufacture and construction Structural Specification Structural Sustainability Report
Information Exchanges	Clash detection and clash resolution
Collaboration Requirements	Detailed integration with specialist sub-contractor design and final integration of all design items
Design Assurance	Detailed calculation checking (including third party checking if required) Review of specialist sub-contractor designs

Description

Stage 4 is the final design stage whereby all the design information is finally coordinated and completed to enable the manufacture and construction of the project to be progressed. Within the Structural Plan of Work, Stage 4 includes a sub-stage (Stage 4.5, described below) where the specific engineering information required for the manufacture and construction works is carried out. This sub-stage is provided to capture and differentiate the production of construction information (e.g. specialist sub-contractor designs) from both the design development during Stage 4, and the manufacture and construction activities of Stage 5. It frequently occurs that specialist sub-contractor design and detailing items are required as part of the overall structural design (e.g. pile design, steelwork connection design, steelwork fabrication drawings, reinforcement detailing and bar bending schedules).

There is likely to be overlap between Stage 4 (and sub-stage 4.5) and Stage 5 and this frequently has considerable impact on the structural design works. For example, piling and foundations works could be underway on site whilst the structural design of cladding rails is still being carried out. This overlapping of stages should be explicitly acknowledged by all members of the design team, and the **Responsibility Matrix** and **Design Programme** reviewed and updated. The impact of late changes to the spatial arrangements can cause adverse impacts (and unforeseen impacts) to the cost, programme and performance of the project.

During Stage 4, there may be a range of parties all contributing to the structural works (e.g. Structural Engineer, Main Contractor, specialist sub-contractors) and the clarity of the Responsibility Matrix is important to ensure that all tasks are covered, and that there is no overlapping of responsibilities.

During Stage 4 the spatial arrangements of the design should not change or evolve (this should have been completed during Stage 3), rather that the information required to manufacture and construct the project is developed and finally coordinated between the various design disciplines. The details of specialist structural sub-contractors should be integrated into the structural design. The structural information should be fully set out and fully coordinated and integrated with the other design items.

If any third-party approvals are required for the design, these should be completed, and approval gained, during Stage 4.

The temporary works briefs (particularly for complex or critical temporary works items) should be developed and, depending on who prepares them, should be reviewed by the Structural Engineer who has developed the structural design, to ensure that the design intent has been correctly interpreted and that there are no adverse impacts on the permanent works.

Health and Safety issues and the risk management process must be reviewed, developed and updated as the design and manufacture and construction information develops. The CDM requirements including Designer duties must still be adhered to.

The structural design should continue to be undertaken to minimise the wasteful use of resources, both in quantum and in detail.

A **Structural Sustainability Report** should be provided that explains the sustainability approach, demonstrating what targets have been achieved through design and what targets will be reached during subsequent (construction) stages. It should also describe a strategy to ensure that these targets can be achieved during subsequent stages. It should indicate anticipated methods for construction and deconstruction, and be clear on which elements will be pre-fabricated off-site and how material sourcing will be controlled to achieve the specifications for embodied carbon.

Detailed calculation checking (including third party checking, if required) should be carried out prior to the completion of Stage 4, including the resolution of any queries or areas of concern.

Information to suitably demonstrate compliance with **Building Regulations** (or other relevant statutory requirements) should be completed prior to the end of Stage 4.

During Stage 4, clash detection and clash resolution exercises should be carried out to assist with the integration of the structural design with the other design items.

The outputs from Stage 4 should be the final set of structural drawings and/or Information Model to enable manufacture and construction to commence.

Procurement

There are a multitude of procurement routes and arrangements used on construction projects and the specific arrangements used on a specific project need to be clearly stated and understood by all members of the project team. The Structural Plan of Work is procurement neutral however it is critical that whatever procurement route is chosen it is clear who is responsible for providing the information necessary for the successful completion of the project.

The structural engineering aspects of a project over Stages 1 to 6 are frequently undertaken by a number of different parties (e.g. structural engineer, specialist designer, specialist sub-contractor, etc.) and through varying appointment routes (e.g. via client, via contractor, etc.). The arrangements can vary through the lifetime of the projects (e.g. via novation).

It is important the procurement route for all aspects of the project is understood early on so that it can be made clear what information will be produced at which stage and at what level of detail. Ambiguity in appointments and contractual responsibilities can lead to higher levels of project risk and unnecessary tension within the project team. However, early supplier engagement, transparency of cost, integrated team working, and collaborative working can all assist with reducing and mitigating project risk and providing value for money for clients.

Sub-stage 4.5: Production Design

Overview[1]	Engineering information, including specialist sub-contractors' technical information, prepared to enable the manufacture, assembly and construction to proceed
Contingency Assessment	Appropriate to a design contingency of 2 – 5 %
Core Tasks	**Design:** • Development and review of temporary works designs **Interface:** • Review of Contractor's proposed method statements or sequencing proposals for complex or critical structural items **Construction:** • Manufacturing and construction information (e.g. reinforcement drawings and bar bending schedules, steelwork fabrication drawings) prepared **Sustainability:** • Update **Structural Sustainability Report** from Stage 4 based on more detailed development of the Technical and Production Design
Statutory Requirements	-
Stage Outputs	Structural Drawings / Information Model suitable for manufacture and construction Structural Specification **Structural Sustainability Report**
Information Exchanges	Clash detection and clash resolution
Collaboration Requirements	Detailed integration with specialist sub-contractor design and final integration of all design items
Design Assurance	Review and checking of manufacturing and construction information

Description

Sub-stage 4.5 prepares the engineering information, including specialist sub-contractors' technical information, to enable the manufacture, assembly and construction works to proceed. It will begin at some point during Stage 4 and will overlap with other Stage 4 activities as well as very likely to be overlapping with Stage 5.

As described above, this sub-stage has been included to capture and differentiate the production of construction information (e.g. specialist sub-contractor designs) from both the design development during Stage 4, and the manufacture and construction activities of Stage 5.

This sub-stage is very likely to have considerable overlap with Stage 5, however the development of the engineering information for a specific part of the works should be completed with sufficient time so as not to adversely impact on the construction of that portion of the works.

Sub-stage 4.5 is likely to require the input of a range of parties to prepare the structural information necessary for the manufacture and construction of the works. As such, it is important that all the parties integrate and collaborate to ensure that all the various structural items are coordinated together, and that they align with the overall structural design for the project.

Stage 5: Manufacturing and Construction[1]

Overview[1]	Manufacturing, assembly and construction completed
Contingency Assessment	-
Core Tasks	**Design:** • Review temporary works designs **Construction:** • 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:** • 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 **Sustainability:** • 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
Statutory Requirements	Assist with the preparation of the Health and Safety File information
Stage Outputs	Handover documentation
Information Exchanges	BIM Handover deliverables
Collaboration Requirements	-
Design Assurance	Review of manufacture and construct quality testing and conformity with design specification Snagging and structural defects

Description

Stage 5 comprises the manufacturing and construction of the project following completion of the design works in Stage 4. For the structural works it is acknowledged that there is typically overlap between the Stage 4 and Stage 5 activities. As noted above, this overlapping of stages should be explicitly acknowledged by all members of the design team, and the **Responsibility Matrix** and **Design Programme** reviewed and updated.

At the start of Stage 5, it should be clear who is responsible for responding to site queries, who undertakes site visits and inspections, and who monitors the progress of the works.

'As-constructed' Information is to be prepared by the relevant parties as agreed and defined in the scope of services. It should also be made clear what level and form of information will be provided for this, and the level of accuracy required (for example, there is a significant difference in preparing information from 'red-line' mark-ups, and from point cloud information).

Stage 5 ends with the achievement of **Practical Completio**n for the project, and the handover of the building from the construction team to the client.

To achieve **Practical Completion** typically requires the provision of the Health and Safety File information and handover documentation. It should be made clear at the outset of Stage 5 who is responsible for the production of this information, what it comprises, and when it is required. This work might include the preparation of the Building Manual or the delivery of asset information (for example, schedule of design life of elements and life to first maintenance). The handover information may also include design loading drawings for the finished structure and information on how the structure has been designed for demolition.

Stage 6:
Handover[1]

Overview[1]	Project handed over, defects rectified, and initial Aftercare completed.
Contingency Assessment	-
Core Tasks	**Management:** • Undertake tasks listed in Plan for Use Strategy • Contribute to post-contract reviews and certification • Contribute to Lessons Learnt exercises **Sustainability:** • Document the project Sustainability Targets and achievements (including carbon) and share on an open source basis
Statutory Requirements	Update Health and Safety File information if required
Stage Outputs	-
Information Exchanges	-
Collaboration Requirements	-
Design Assurance	-

Description

With a greater emphasis on sustainability and minimising resource usage, it is becomingly increasingly important that structural engineers review completed projects and from this learn, share and apply lessons learnt to future projects. The Structural Engineer should reflect on the completed project and critically assess where items could have been approached or undertaken differently to enhance the project outcomes. These findings should feed into the design and development of future projects. The project Sustainability Targets and achievements (including carbon) should be documented and shared on an open source basis so that the wider structural engineering community can also benefit from the data. There may also be project team tasks from the Plan to Use Strategy requiring the input of the Structural Engineer, including Lessons Learnt exercises.

Stage 7:
Use[1]

Overview[1]	Facilities and asset management. **Post Occupancy Evaluation** of building performance in use as required
Contingency Assessment	-
Core Tasks	**Interface:** • 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 **Management:** • Undertake tasks listed in Plan for Use Strategy **Sustainability** • Support as appropriate a **Post-Occupancy Evaluation** to understand the embodied and operational resource use, then 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	-
Stage Outputs	-
Information Exchanges	-
Coordination Requirements	-
Design Assurance	-

Description

Stage 7 is the operation and maintenance of the building for its lifetime. On the majority of buildings, the project team's work will be complete at the end of Stage 6.

The Structural Engineer is likely to have very little involvement in Stage 7 however there may be ongoing tasks within the Plan for Use Strategy to be concluded and the client may undertake a **Post-Occupancy Evaluation**, review **Project Performance** and **Project Outcomes**. Information from these tasks, particularly in relation to embodied and operation resource use, should be used to inform future work.

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