



The McAvoy Group

Overcoming Barriers to Offsite Construction

Offsite construction for a smarter tomorrow
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Inspiring
brighter
futures

What are the Barriers to Offsite Construction?

The way we do things

Procurement

Capacity

The way we do things – Construction Project

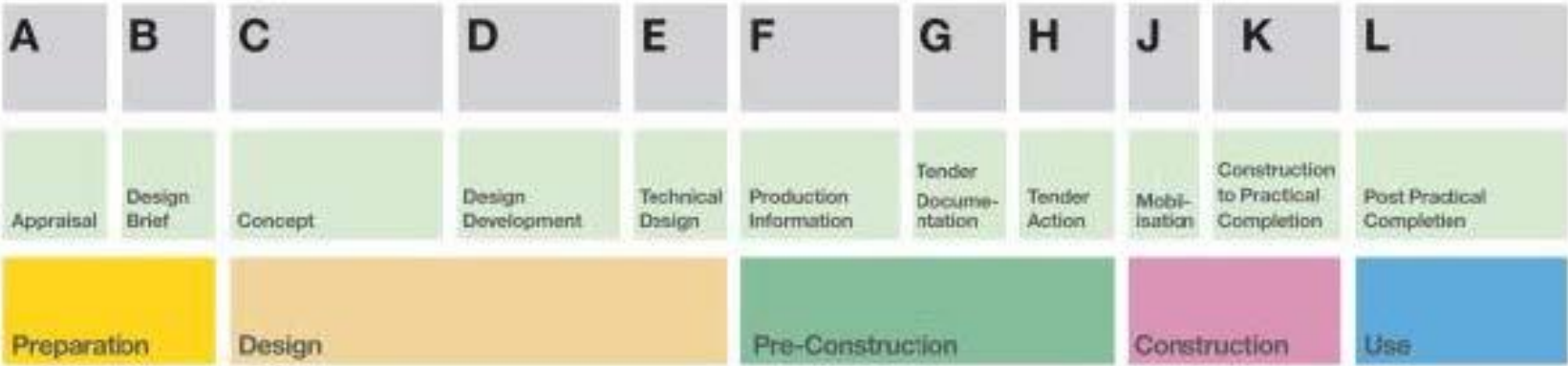
RIBA Plan of Work 2013



UK Government Digital Plan of Work



RIBA Outline Plan of Work 2007



The way we could do things - Construction Product











RIBA 

RIBA Plan of Work **Designing for Manufacture and Assembly overlay**

www.offsiteschool.com/DfMA

This Overlay to the RIBA Plan of Work 2013 includes additional task bars to support Designing for Manufacture and Assembly. It should be used in conjunction with the RIBA Plan of Work 2013: www.ribaplanofwork.com

	0	1	2	3	4	5	6	7
Stages								
Tasks	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In Use
Core Objectives from the RIBA Plan of Work	Identify client's Business Case and Strategic Brief and other core project requirements.	Develop Project Objectives , including Quality Objectives and Project Outcomes , Sustainability Aspirations , Project Budget , other parameters or constraints and develop Initial Project Brief . Undertake Feasibility Studies and review of Site Information .	Prepare Concept Design , including outline proposals for structural design, building services systems, outline specifications and preliminary Cost Information along with relevant Project Strategies in accordance with the Design Programme . Agree alterations to brief and issue Final Project Brief .	Prepare Developed Design , including coordinated and updated proposals for structural design, building services systems, outline specifications, Cost Information and Project Strategies in accordance with the Design Programme .	Prepare Technical Design in accordance with the Design Responsibility Matrix and Project Strategies to include all architectural, structural and building services information, specialist subcontractor design and specifications, in accordance with the Design Programme .	Offsite manufacturing and onsite Construction in accordance with the Construction Programme and resolution of Design Queries from site as they arise.	Handover of building and conclusion of the Building Contract .	Undertake In Use services in accordance with Schedule of Services .
DfMA Strategy	Consider opportunities for applying DfMA across portfolios or programmes of projects. Consider how DfMA might impact on the Business Case or Strategic Brief . Consider whole life issues in the Strategic Brief including options for reuse or repurposing and recycling of components at the end of the building's life. Consider Research and Development that might assist Feasibility Studies or the Concept Design including intellectual property issues.	Initiate DfMA thinking and incorporate client requirements into the Initial Project Brief . This should include high-level targets for the extent of DfMA adoption and time/cost/waste savings against traditional benchmarks. Consider opportunities for 'repeatability', site/logistical constraints, Research and Development and early input required from specialist subcontractors. Consider best practice DfMA exemplars for comparable projects. Test the feasibility of high-level DfMA objectives included in the Initial Project Brief using the Site Information and Feasibility Studies .	Test initial Concept Design options against the DfMA aspirations set out in the Initial Project Brief . Identify opportunities for the greatest impact and initiate any Research and Development required to integrate DfMA into the Concept Design . Prepare the Construction Strategy considering high-level DfMA benefits including safety, productivity, quality and sustainability, considering topics such as eliminating scaffolding, wet or hot works, the delivery methodology and the suitability of proposed systems. Consider DfMA aspects in Risk Assessments and the Health and Safety and Maintenance and Operational Strategies . Ensure that the Cost Information takes account of the DfMA methodologies set out in the Construction Strategy .	Update the Construction Strategy taking into account DfMA opportunities appropriate to the Developed Design and coordination activities. Prepare a schedule of DfMA components and consider national (or other) standards appropriate for DfMA. Consider buildability, including how the erection sequence, fabrication or manufacturing techniques and tolerances impact on interfaces. Update Risk Assessments and the Health and Safety and Maintenance and Operational Strategies taking into account DfMA considerations.	Develop the DfMA components more accurately considering the implications of the possible methods of manufacturing or fabrication. Develop the interfaces and specifications including structural, water/moisture/vapour penetration and acoustic issues. Update the Construction Strategy considering the lifting, handling and transportation strategy for each component and sub-assembly. Consider manufacturing and assembly risks in the updated Risk Assessment and Health and Safety Strategy . Develop a commissioning plan optimising the use of factory acceptance testing.	Update the Construction Strategy , including a logistics plan that ensures the right materials, plant and operatives are deployed in the right place at the right time. Commission the building progressively and capture 'As-Constructed' Information. Consider how DfMA impacts the Construction Programme .	Consider how to capture commissioning and 'As-Constructed' information in a manner that will assist the In Use stage including the potential disassembly of the building. Update the Construction Strategy considering the lifting, handling and transportation strategy for each component and sub-assembly.	Consider any Feedback during the In Use stage necessary to inform future projects. Monitor the performance of standardised components including maintenance and replacement and provide Feedback . Monitor disassembly or potential reuse of materials during demolition at the end of the stage and provide Feedback .
Suggested BIM Tasks for DfMA	Analyse data from the existing building to identify key metrics for success. Gather cost and programme data from previous projects to set benchmarks. Consider establishing a BIM object library if components are going to be used across multiple projects.	Use BIM for the preparation of Feasibility Studies including data-rich 'placeholder' objects with limited geometry to assist in the preparation of Cost Information . Use BIM to test and optimise the Initial Project Brief . Include the Level of Development required at each stage when preparing the Design Responsibility Matrix . Consider the implications for professional services contracts and the Design Responsibility Matrix where a client is using their own BIM library, including intellectual property and professional indemnity insurance.	Develop the BIM model and components to next Level of Development set out in the Design Responsibility Matrix . Validate the model against the client's information requirements. Consider DfMA tolerances in the development of the BIM model.	Progress the BIM model and components to next Level of Development as set out in the Design Responsibility Matrix . Validate the model against the client's information requirements. Use digital technologies as part of coordination exercises.	Progress the BIM model and components to next Level of Development as set out in the Design Responsibility Matrix . Validate the model against the client's information requirements. Use 4D technologies to test and rehearse the sequencing set out in the Construction Strategy , including every aspect of manufacture, logistics and assembly before work starts on site.	Use BIM to train site operatives. Use digital technologies to track each step of the manufacturing, packing, logistics and delivery process. Consider recording the complete history and location of every component for Feedback , future use and learning. Link components to assembly manuals, method statements and quality records including identifying any aspects of the design which may be reused in the future.	Ensure any relevant documentation relating to DfMA components is linked to BIM components for Feedback , including lessons learned and potential repurposing. Use 4D technologies to test and rehearse the sequencing set out in the Construction Strategy , including every aspect of manufacture, logistics and assembly before work starts on site.	Consider configuration management techniques to maintain an up-to-date record (BIM model) of the building.
Suggested Procurement Tasks for DfMA	Feedback - Ensure lessons learned from previous projects have been incorporated. Consider how DfMA impacts on the assembly of the project team including how the project team will achieve a collaborative approach and how innovation can be incentivised.	Consider how to emphasise the importance of DfMA in the Initial Project Brief when assembling the project team and developing the Procurement Strategy , including how to select design team members with DfMA experience. Ensure that any tender information encourages the behaviours required for effective collaboration and the experience needed to identify early DfMA opportunities.	Update the Procurement Strategy and hold discussions with contractors and specialist subcontractors relevant to the procurement route to test DfMA objectives set out in the Concept Design including the Construction Strategy . Consider the appropriateness of early contractor involvement (ECI).	Hold further discussions with contractors and specialist subcontractors relevant to the procurement route to test DfMA components and coordination exercises set out in the Developed Design including the updated Construction Strategy .		Capture Feedback including lessons learned from site installation to inform the Procurement Strategy of future projects.	Ensure that 'As-Constructed' information relating to DfMA elements has been delivered including Feedback on information to be incorporated into the client's in-house BIM object library. Provide Feedback on the capability and performance of specialist subcontractors who delivered DfMA aspects.	

Overcoming Procurement Issues

- Client need confidence that there is a robust supply chain
- Supplier needs confidence that there is a strong pipeline
- Which Form of Contract should be used
- Is there a suitable framework
- Presumption in favour of offsite
- Procuring for Value
- FAC1 form of contract



Overcoming Capacity Issues

- Client need confidence that there is a robust supply chain
- Supplier needs confidence that there is a strong pipeline
- Presumption in favour of offsite



Early example of steel offsite construction

- Built with a standardised offsite manufactured steel frame
- Just 20 months from design to completion with 12 months on site
- Built in 1931
- Still considered to be one of the iconic designs of the 20th Century

Should we use the term Modern Methods of Construction?

