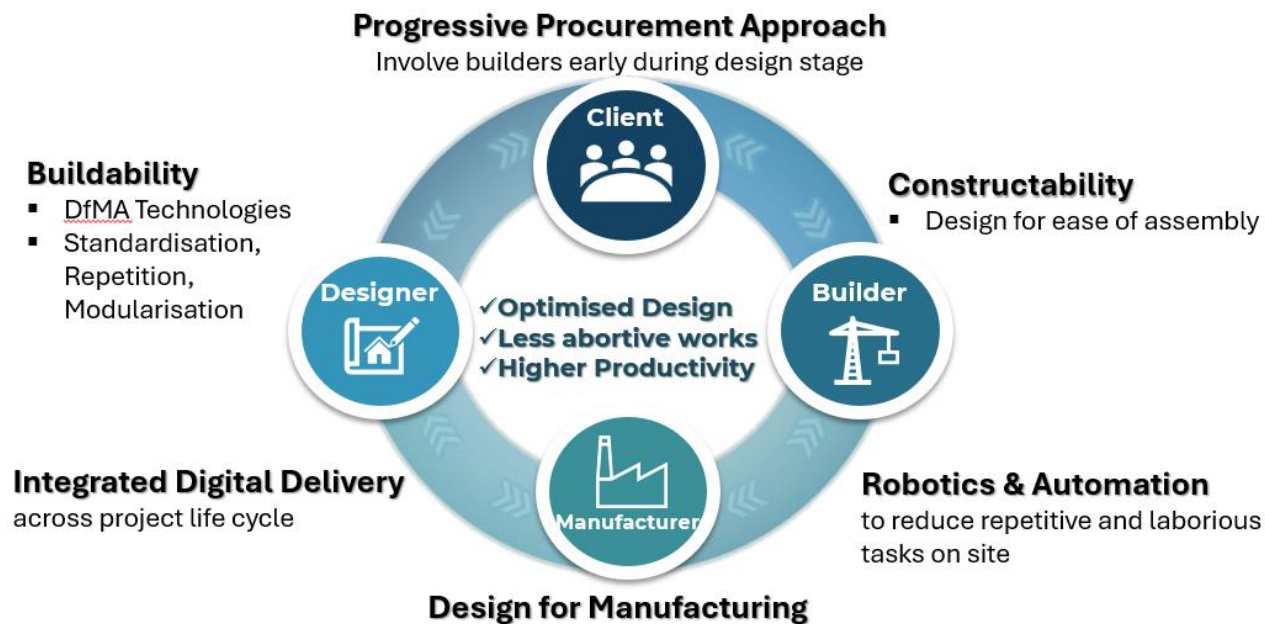


Information Kit on Integrated Buildability and Constructability Framework Pilot

1. Background

The current Buildability framework and Constructability frameworks have provided the approach for Design for Manufacturing and Assembly (DfMA) adoption and buildable design principles across the industry. While these frameworks have been instrumental to encourage more labour-efficient designs and construction methods, BCA recognises that project productivity requires a more comprehensive approach beyond DfMA implementation. **Through the new Integrated Buildability and Constructability framework (B+C), BCA aims to address the need to consider both manufacturability and effective constructability in project designs, supported by robust cross-disciplinary collaboration and coordination.**

To maximise productivity benefits, project teams shall now incorporate manufacturing, and optimisation of construction and assembly considerations, evaluate critical factors affecting practical construction, at the early design stage with early contractor's involvement. Project teams are encouraged to consider adopting productivity enablers such as Integrated Digital Delivery (IDD) and Robotics and Automation (R&A) solutions to enhance project outcomes.



Information Kit on Integrated Buildability and Constructability Framework Pilot

2. Introduction on Productivity Score and Scoring Mechanism

The integrated Buildability and Constructability (B+C) framework evaluates building projects through two key components:

- Buildable Design Score (B-Score) which assesses labour-efficient designs such as DfMA adoption, and instil buildable design principles
- Constructability Score (C-Score) which focuses on practical construction optimisation and innovative technology implementation

Productivity Score

Total Productivity Score comprises:

- a. **Buildable Design Score (B-Score)** for Superstructure works, with a maximum of 100 points
 - Assess the adoption of labour-efficient designs and buildable design principles
 - Evaluate the extent of DfMA implementation
- b. **Constructability Score (C-Score)**, with a maximum of 20 points ***NEW***
 - Evaluate critical factors affecting practical construction
 - Incorporates inputs from contractors and manufacturers to optimise construction methodologies
 - Encourage adoption of productivity enablers including IDD and R&A

The total Productivity Score is calculated by adding the B-Score and C-Score.

Minimum Productivity Score

The minimum Productivity Score shall be equivalent to the Buildable Design Score (B-Score) as stipulated in prevailing Code of Practice on Buildability. This requirement may be subject to revision in future framework enhancements.

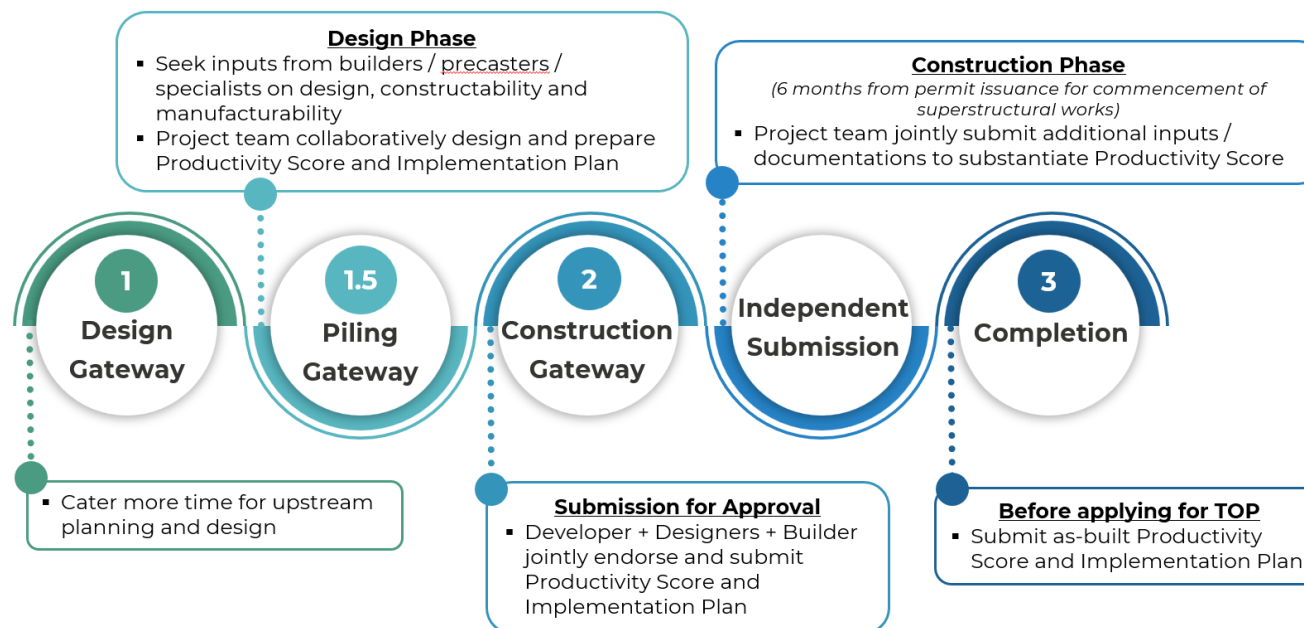
Information Kit on Integrated Buildability and Constructability Framework Pilot

3. Submission Timeline and Requirements

Project team including Developer, Architect, Structural Engineer, Mechanical Engineer, Electrical Engineer and Builder shall jointly endorse and submit the pilot form and proposal substantiating compliance with prevailing Buildability requirements and new Constructability requirements at the following stages:

- Construction Gateway stage
- Independent Submission (6 months from permit issuance to commence superstructural works)
- Temporary Occupation Permit / Statutory Completion stage

B+C Framework Submission Timeline



Information Kit on Integrated Buildability and Constructability Framework Pilot

B+C Framework for Large projects with GFA $\geq 25,000\text{m}^2$

Total Score (Max. 120 pts)	*NEW* Integrated Buildability and Constructability Framework (Developer, Architect, Structural Engineer, Mechanical Engineer, Electrical Engineer and Builder to jointly endorse)			
Work Disciplines	Structural	Architectural	MEP	Project Management, Innovation and Others
DfMA Technologies	Current Buildable Design Appraisal System (BDAS)			IDD Essential Use Cases: 1. Visualisation and design checks 2. BIM-based documentation 3. Data-driven project performance monitoring
Modularisation, Standardisation, Repetition				4. Integrated Concurrent Engineering (ICE) meetings 5. Digital submission and approval 6. Digital Request for Info (RFI) 7. BIM-based cost estimation 8. Digital contract management 9. Digital construction scheduling and sequencing 10. Digital logistics 11. Digital safety planning and management 12. Digital site management 13. Digital progress monitoring 14. Digital inspection 15. Digital defects management 16. Digital handover
Basement Works/ System Formwork [^]	*NEW* Basement design optimisation Vertical and Horizontal	^ To ensure that industry adopts productive casting method for remaining on-site concreting works. SF is also part of GLS/GFA scheme/outcome-based requirement		
Design for Manufacturing	*NEW* Design optimisation for efficient production			
Design for Assembly	*NEW* Optimise component sizes for delivery w/o escort (otherwise to consider logistical needs) Design for perm/temp loads, architectural finishes loads, PMEP module loads Self-supporting components to reduce false work Access and lifting, sufficient space for assembly Productive practices to ease assembly Simulate construction sequence			
	Productive Tech e.g. piling, basement construction works, Mechanisation, Robotics & Automation			
Legend:	Pre-requisite (w/o point)	Bonus points (Max. 20 pts)		

Information Kit on Integrated Buildability and Constructability Framework Pilot

B+C Framework (Lite) for Mid-size projects with $5,000\text{m}^2 \leq \text{GFA} < 25,000\text{m}^2$

Total Score (Max. 120 pts)	*NEW* Integrated Buildability and Constructability Framework (Developer, Architect, Structural Engineer, Mechanical Engineer, Electrical Engineer and Builder to jointly endorse)			
Work Disciplines	Structural	Architectural	MEP	Project Management, Innovation and Others
DfMA Technologies	PPVC APCS, Structural Steel, MEI Prefabricated components Mechanical connections Current Buildable Design Appraisal System (BDAS)			IDD Essential Use Cases: 1. Visualisation and design checks 2. BIM-based documentation
Modularisation, Standardisation, Repetition	Standard columns / beams Repeated layout No complex form Repetition of PBU, unit types Standard PBU, Precast HS, Doors			3. Data-driven project performance monitoring 4. Integrated Concurrent Engineering (ICE) meetings 5. Digital submission and approval 6. Digital Request for Info (RFI) 7. BIM-based cost estimation 8. Digital contract management 9. Digital construction scheduling and sequencing 10. Digital logistics 11. Digital safety planning and management 12. Digital site management 13. Digital progress monitoring 14. Digital inspection 15. Digital defects management 16. Digital handover
Basement Works/ System Formwork^	Basement design optimisation Vertical and Horizontal	^ To ensure that industry adopts productive casting method for remaining on-site concreting works. SF is also part of GLS/GFA scheme/outcome-based requirement		
Design for Manufacturing	Design optimisation for efficient production			
Design for Assembly	■ Optimise component sizes for delivery w/o escort (otherwise to consider logistical needs) ■ Design for perm/temp loads, architectural finishes loads, PMEP module loads ■ Self-supporting components to reduce false work ■ Access and lifting, sufficient space for assembly ■ Productive practices to ease assembly ■ Simulate construction sequence Productive Tech e.g. piling, basement construction works, Mechanisation, Robotics & Automation			
Legend:	Pre-requisite (w/o point) [independent submission]	Bonus points (Max. 20 pts) [independent submission]	B+C Lite for mid-size projects [CG submission]	

Information Kit on Integrated Buildability and Constructability Framework Pilot

Selected items can be submitted through Independent Submission (6 months from Permit to commence superstructural works)

"NEW"	Items	Structural	Architectural	MEP	Project Management, Innovation and Others (up to 10 points)
1. Pre-requisites (No points, to ensure critical considerations are made for practical construction)					
a. Basement Works	Show evidence of optimisation				e. Submit evidence showing implementation of IDD use cases* (1 point for each additional case, up to 5 pts) Projects can propose innovative solutions that meet productivity outcomes Legend: Should be considered / can be planned before BP/CG submission / more critical Allow independent submission (6 months from Permit to commence super structural works)
b. System Formwork	70% System Formwork				
c. Design for ease of Manufacturing	Show evidence of design inputs from precaster / manufacturer / specialist				
d. Design for ease of Assembly	Submit report showing the following design considerations: ▪ Delivery with or w/o escort ▪ Loading (Permanent/Temporary) ▪ Self-supporting components ▪ Plan for access, lifting plan (ensure lifting ops are within height limits) ▪ Delivery with or w/o escort ▪ Loading for architectural finishes ▪ Sufficient space for assembly (ensure modules can be easily manoeuvred on-site) ▪ Delivery with or w/o escort ▪ Loading for PMEP modules ▪ Sufficient space for assembly (ensure modules can be easily manoeuvred on-site) Show productive practices to ease assembly PPVC, APCS, MET, Structural Steel / architectural wall and finishes / PMEP Submit simulations showing construction sequence				
2. Design for ease of Assembly (To award points for adoption of productive tech)					
a. Mechanisation, Robotics & Automation (up to 3 pts each based on extent of adoption and impact, up to 10 pts)	▪ Autonomous material handler ▪ Rebar tying ▪ Concrete finishing ▪ Welding ▪ 3D printing	▪ Marking machine ▪ Tile grouting ▪ Floor tiling ▪ Wall Skimming / Painting ▪ Wall Installation ▪ 3D printing	▪ Synchronised lifting machine ▪ Robotic drilling machine		

Information Kit on Integrated Buildability and Constructability Framework Pilot

4. Frequently Asked Questions (FAQs)

S/N	Questions	Answers
1	What are the benefits for participating in this pilot?	▪ Opportunity to co-create and finetune regulatory framework ▪ Get familiarised with new framework requirements ▪ Receive guidance on preparation of implementation plan
2	Do I have to comply with new Buildability and Constructability requirements?	During the pilot phase of Integrated Buildability and Constructability framework, participants shall: ▪ Comply with prevailing Buildability requirements i.e. minimum Buildable Design Score or outcome-based options (based on the date of first URA Planning Permission application), <u>and</u> ▪ Adopt the new Constructability pre-requisites, in lieu of the current Constructability requirements Participants shall prepare implementation plan demonstrating compliance with the following: a. Buildability requirements (pre-requisites and minimum. B-Score or outcome-based options) b. Constructability pre-requisites (<i>*NEW*</i>) c. IDD pre-requisites (<i>*NEW*</i>)
3	I would like to participate in the pilot. However, I have already obtained Building Plan (BP) approval / Construction Gateway (CG) approval.	We welcome industry to participate in this pilot even though BP / CG approval has been obtained, or project is subject to an older Code of Practice on Buildability.
4	How would this pilot affect my current submissions?	Your current submissions would not be affected. Pilot submissions will be assessed separately via email.

Information Kit on Integrated Buildability and Constructability Framework Pilot

S/N	Questions	Answers
5	Where can I view the pilot submission form?	The pilot submission form is available for download from the BCA website via https://www1.bca.gov.sg/buildsg/productivity/buildability-buildable-design-and-constructability . Please submit the completed form along with your implementation plan for BCA's assessment.
6	How do I submit the documentation?	Participants can submit documentations through the current submission platforms or via email. Submissions will be routed to BCA processing officers for assessment.
7	I would like to participate in the pilot. However, my project is subject to an older Code of Practice on Buildability. Who do I contact for more information?	If you are interested in participating, please register your interest via https://go.gov.sg/buildability-constructability-pilot. Interested participants can submit your queries to BCA officer, Ms. Wong Jia Min (Wong_Jia_Min@bca.gov.sg) or via online BCA's feedback form at https://www2.bca.gov.sg/feedback/.