Annex B

FACTSHEET ON DESIGN FOR MANUFACTURING AND ASSEMBLY (DfMA)

1 Under the Construction Industry Transformation Map (ITM), BCA continues to build a robust DfMA ecosystem to sustain the adoption of productive technologies over the longer term. Through the DfMA approach, buildings are designed for works to be done largely off-site in a controlled manufacturing environment to achieve time and manpower savings. Work sites are also kept safer and neater, with reduced dis-amenities to the surrounding living environment.

2 We have achieved a DfMA adoption rate of 31% (in term of Gross Floor Area (GFA)) in 2019, and are on track to meet our ITM target of 40% in 2020. We aim to achieve 70% DfMA adoption by 2025.

Public Sector Construction Productivity Fund (PSCPF)

3 The public sector has been taking the lead in DfMA adoption. The Public Sector Construction Productivity Fund (PSCPF) was launched in 2017 to support public sector projects to adopt DfMA technologies. $120 million will be set aside for the public sector to adopt DfMA in projects launched by 2021.

4 Agencies are adopting more DfMA technologies in their projects. HDB will be adopting Prefabricated Prefinished Volumetric Construction (PPVC)[1] and Advanced Precast Concrete System (APCS)[2] for 30% and 45% of the units to be launched for sales in 2020 respectively.

Generating DfMA Demand in the Private Sector

5 BCA has worked with URA to require the adoption of productive technologies (e.g. PPVC, structural steel, etc.) under the Government Land Sales (GLS) programme. As of December 2019, we have required the adoption of PPVC for 36 sites (34 residential sites and 2 hotels). To encourage innovation, another 4 sites have outcome-based productivity requirement (e.g. minimum percentage of productivity improvement). Under the Industrial Government Land Sales (IGLS) programme, we worked with JTC to require the adoption of a minimum level of prefabrication. As of December 2019, we have required 55 industrial

[1] Prefabricated Prefinished Volumetric Construction (PPVC) involves the fabrication of modules off-site in a controlled manufacturing environment, which are later brought to site for assembly.

[2] Advanced Precast Concrete System (APCS) speeds up construction by using larger precast components that reduces the amount of temporary support structures needed on site. It also uses mechanical connections, which minimises the wet works used onsite.

sites to meet the minimum level of prefabrication. A summary of the sites is provided in **Table A**.

6 Separately, the BuildSG Transformation Fund (BTF)[3] also supports voluntary adoption of DfMA. For example, Singapore-registered firms can tap on the Productivity Innovation Project (PIP) under BTF to help fund the cost premium associated with adopting DfMA technologies.

Enhancements to the Buildability framework

7 From 15 December 2019 onwards, large residential non-landed (RNL) projects with a GFA of 25,000m^2 and more must meet a higher buildability requirement which guides building design (see **Table B** for more details). To place more focus on actual site productivity gains instead of just regulatory compliance, alternative design solutions for these large RNL developments were made available. Consultants may adopt these options instead of following the usual code compliance method.

8 Beyond the large RNL projects, BCA will further enhance the Buildability framework this year to integrate DfMA into the design of buildings, and make DfMA the default way of building.

Off-site Construction Special Scheme (OCSS)

9 We have seen several leading firms investing in highly automated plants to produce high quality, prefabricated components and modules for DfMA in Singapore. In 2019, BCA worked with the Ministry of Manpower (MOM) to develop an Off-site Construction Special Scheme (OCSS) for DfMA facilities. This voluntary manpower scheme encourages the industry to move towards off-site prefabrication work. Eligible DfMA facilities are able to hire an allocated number of construction work permit holders (WPHs) at the lower Man-year Entitlement (MYE) levy rates of $300 and $700 for Higher-Skilled (R1) and Basic-Skilled (R2) workers respectively[4]. For a facility that employs 200 WPHs, the annual cost savings from levy reduction can be up to $600,000. Firms under the OCSS will be required to improve their workforce profile, including building a stronger core of local PMETs to take on the higher-skilled jobs created in DfMA facilities.

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[3] The BTF is a consolidation of funding support for firms and individuals in key areas of the Construction Industry Transformation Map (ITM). For example, under the Productivity Innovation Project (PIP) Scheme, $187.5mil has been set aside to support Singapore-registered firms to build capabilities in DfMA technologies and IDD, and improve site processes in order to achieve higher site productivity. Projects can be supported for up to 70% of the qualifying costs, capped at $10 million.

[4] Without the OCSS, most of the Work Permit Holders (WPHs) hired by DfMA facilities will be on the higher MYE-waiver tier, with rates of $600 for Higher-Skilled (R1) workers and $950 for Basic-Skilled (R2) workers.

10 As of end Dec 2019 (six months since the launch of OCSS), BCA has supported more than 1,100 off-site WPHs hired by six DfMA facilities[5] and their subcontractors. One such firm that has benefited from the OCSS scheme is Greyform Pte Ltd, which operates an Integrated Construction and Prefabrication Hub. Greyform capitalises on digital technology and automation for long-term competitiveness, and aims to attract more young PMETs into the industry. Under the OCSS, Greyform had increased its workforce localisation rate, while enjoying significant levy savings.

11 Building on the success of the pilot scheme, BCA is in the process of engaging more DfMA facilities and their sub-contractors to come on board and benefit from the scheme.

[5] The six DfMA facilities include

1) Dragages Singapore Pte Ltd
2) Greyform Pte Ltd
3) Integrated Precast Solutions Pte Ltd (Teambuild Construction Pte Ltd)
4) Precast Concrete Pte Ltd (Soilbuild Construction Pte Ltd)
5) Robin Village Development Pte Ltd (Tiong Seng Contractor Pte Ltd)
6) Steeltech Industries Pte Ltd (Tiong Seng Contractor Pte Ltd)

Table A: Progress of GLS sites as of December 2019

DfMA Technology	Number of GLS sites	Number of Awarded Sites
PPVC	34 residential sites* and 2 hotel sites since 2014	27
Productivity Outcomes *(including one Concept and Price tender)*	3 white sites in Nov 2019 and 1 residential site in Dec 2017	1
Structural Steel	2 commercial sites since 2017	1
Minimum Prefabrication Level	All Industrial GLS sites with GFA ≥ 5,000m^2 since Nov 2014	55

** This includes 4 sites, which have both commercial and residential components under URA's land use zoning.*

Table B: Changes in Minimum Buildable Design Score for Building Works

(i) Minimum Buildable Design Score for Building Works in Code of Practice (COP) 2019 with *effect from 15 December 2019*

CATEGORY OF BUILDING WORK / DEVELOPMENT	MINIMUM BUILDABLE DESIGN SCORE	
	5,000 m^2 ≤ GFA < 25,000 m^2	GFA ≥ 25,000 m^2
Residential (landed)	78	81
Residential (non-landed)	85	**92**
Commercial	87	90
Industrial	87	90
School	82	85
Institutional and others	79	82

(ii) Minimum Buildable Design Score for Building Works in Code of Practice (COP) 2017, *previously in effect from 1 May 2017 to 14 December 2019*

CATEGORY OF BUILDING WORK / DEVELOPMENT	MINIMUM BUILDABLE DESIGN SCORE		
	2,000 m^2 ≤ GFA < 5,000 m^2	5,000 m^2 ≤ GFA < 25,000 m^2	GFA ≥ 25,000 m^2
Residential (landed)	73	78	81
Residential (non-landed)	80	85	88
Commercial	82	87	90
Industrial	82	87	90
School	77	82	85
Institutional and others	73	79	82