



MEDIA RELEASE

GOOD PROGRESS MADE IN KEY TRANSFORMATION FOCUS AREAS FOR THE BUILT ENVIRONMENT SECTOR, SUPPORTED BY A SKILLED AND COMPETENT LOCAL CORE

Singapore, 5 March 2020 – The Built Environment (BE) sector has reported good progress in its transformation efforts, in the key areas of Design for Manufacturing and Assembly (DfMA), Integrated Digital Delivery (IDD) and Green Buildings. Sharing the updates during the Ministry of National Development's Committee of Supply debate today, Mr Zaqy Mohamad, Minister of State for National Development and Manpower, also said the sector can look forward to new and higher skilled jobs for locals.

Launch of the Construction and Facilities Management Industry Digital Plan (IDP)

2 In the area of Integrated Digital Delivery (IDD), there are now 35 public and private sector projects piloting IDD, compared to 12 projects in 2018. The use of IDD in the built environment has reaped benefits such as productivity gains, with closer collaborations among stakeholders throughout the building life cycle; reduction of waste by minimising rework; and improving quality and site safety. Firms can tap on the Productivity Innovation Project (PIP) scheme under the BuildSG Transformation Fund (BTF) to support their IDD implementation.

3 To further help firms build up their digital capabilities, the Building and Construction Authority (BCA) and the Infocomm Media Development Authority (IMDA), in partnership with SkillsFuture Singapore (SSG), have developed the Construction and Facilities Management Industry Digital Plan (IDP). The IDP aims to guide SMEs in their digital

transformation efforts through a 3-stage roadmap and will provide them with a step-by-step guide on the solutions to adopt at each stage of their IDD journey. We have set aside \$19 million until January 2023 under the Productivity Solutions Grant (PSG) to defray the costs for adoption of pre-approved digital solutions that improve productivity. SMEs can apply for this grant through the Business Grant Portal. More details will be shared in due course.

Raising the bar for productivity in the built environment

4 As of 2019, the BE sector has achieved a 31% DfMA (Design for Manufacturing and Assembly) adoption rate (in terms of Gross Floor Area) and is on track to reach the target of 40% this year. Looking further ahead, BCA aims to raise the adoption rate to 70% by 2025. We have enhanced the buildability framework in December 2019, and introduced changes, which includes mandating higher buildability standards for larger residential developments with GFA more than 25,000m². Moving forward, we will enhance the Buildability Framework further, to make DfMA the default way of building in Singapore.

5 The public sector will also continue to take the lead in the adoption of DfMA. To this end, we will set aside \$120 million under the Public Sector Construction Productivity Fund (PSCPF) for public sector agencies to adopt DfMA in projects launched by 2021. For private sector projects, we will continue to provide funding support for projects which adopt DfMA technologies voluntarily through the PIP scheme.

Pushing for higher standards for a more sustainable Built Environment

6 As of Dec 2019, Singapore has greened more than 40% of its buildings (by GFA), which is halfway toward the 2030 national target of 80%. To move to the next phase, BCA and the Singapore Green Building Council (SGBC) will co-create the next Singapore Green Building Masterplan (SGBMP 2020) with stakeholders from the public, private and people sectors, including Trade Associations and Chambers (TACs).

7 One of the key initiatives under the SGBMP 2020 is to review the mandatory minimum environmental sustainability standards for buildings. To support the push towards more energy efficient buildings, BCA plans to raise the minimum energy performance standards for both new and existing buildings in the coming years. BCA will engage stakeholders to work on the details through the SGBMP 2020 co-creation process.

8 BCA also intends to publish the energy performance data for all buildings with the building's name, address and energy performance data made public on BCA's website. This will allow building owners to benchmark their buildings' energy performance against others, encourage them to retrofit to improve their buildings' energy efficiency, and benefit from energy savings.

Good jobs and a better working environment for locals

9 As the BE sector continues to progress with industry transformation, there is a need for a strong core of local PMETs to sustain our efforts. Transformation has brought about new and higher-skilled jobs, which makes the sector more attractive to locals. For example, the wider adoption of DfMA technologies and Building Information Modelling (BIM) in the sector has created job roles such as BIM modellers, production managers, and logistics and supply chain planners, which would appeal to mid-career entrants and tech-savvy youngsters. On this front, BCA is working with the Workforce Singapore (WSG) and the Ministry of Manpower (MOM) to enhance the Professional Conversion Programmes (PCPs) for the BE sector. Those currently employed in the sector and those seeking a mid-career switch could apply for these PCPs.

- PCP for BIM Professionals: The existing BIM PCP will be enhanced. Firms will now have the option of allowing their PCP participants to complete their full-time training in BIM first, before continuing with on-the-job training at the firms. This is in addition to the current model where PCP participants are trained in BIM concurrently while working with their firms on a part-time basis.

- PCP for DfMA: BCA and WSG are collaborating to develop new PCPs for DfMA, targeted at mid-career PMETs interested in prefabrication jobs. A firm-level PCP with Teambuild Construction will be open for applications by mid-2020.
- BCA and WSG will continue to work with the industry to roll out more PCPs in 2020 for in-demand jobs. More details will be announced later.

10 To complement workforce attraction and retention, BCA has been working with SSG and WSG to develop a Skills Framework for the BE sector. When launched later this year, the Skills Framework will provide clear skillsets required and career pathways for BE job roles, as well as wage information and training programmes for skills upgrading and mastery.

Enclosed

Annex A – Construction and Facilities Management Industry Digital Plan (IDP)

Annex B – Productivity and DfMA

Annex C – Green Buildings

Annex D – Manpower

Issued by the Building and Construction Authority on 5 March 2020

About BCA

The Building and Construction Authority (BCA) of Singapore champions the development of an excellent built environment for Singapore. BCA's mission is to shape a safe, high quality, sustainable and friendly built environment, as these are four key elements where BCA has a significant influence. In doing so, it aims to differentiate Singapore's built environment from those of other cities and contribute to a better quality of life for everyone in Singapore. Hence, its vision is to have "a future-ready built environment for Singapore". Together with its education arm, the BCA Academy of the Built Environment, BCA works closely with its industry partners to develop skills and expertise that help shape a future-ready built environment for Singapore. For more information, visit www.bca.gov.sg.

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Annex A

**FACTSHEET ON CONSTRUCTION AND FACILITIES MANAGEMENT
INDUSTRY DIGITAL PLAN**

Background

1. The Construction and Facilities Management (FM) Sector is a key pillar of Singapore's economy, contributing 9% of the nation's Gross Domestic Product (GDP) and supported by 16,000 enterprises. The building life-cycle comprises four segments, namely: Design, Fabrication, Construction and Asset Delivery & Management.
2. Building and construction projects often involve many different parties – developers, consultants, builders, sub-contractors, suppliers and facility managers. There is a need for timely access to information to ensure closer coordination and collaboration among the many industry stakeholders across the building life-cycle and ecosystem. Digital technology thus plays an important role in ensuring that correct and consistent information is readily available, which helps streamline processes, and reduce rework arising from mistakes and increase safety. Many of these industry stakeholders are small and medium-sized enterprises (SMEs), which would benefit from access to timely information through the adoption of digital technology.
3. The Construction and FM Industry Digital Plan (IDP) ¹ is part of the SMEs Go Digital programme that is designed to help SMEs go digital.

¹ www.go.gov.sg/imda-construction-idp



4. Under the IDP, we will set aside \$19 million in funding (under the Productivity Solutions Grant (PSG) of the BuildSG Transformation Fund (BTF)) until January 2023 to support SMEs² to defray costs for adoption of pre-approved solutions that enhances productivity. SMEs can access ESG's online centralised portal, Tech Depot, to access the list of pre-approved digital solutions and to apply for funding to adopt these solutions at the Business Grants Portal. The funding will cover up to 70% of the qualifying cost. Firms can make multiple applications until January 2023, subject to a funding cap of \$30,000 per firm.³
5. The IDP provides enterprises with a step-by-step guide on the digital solutions and necessary skills to adopt at each stage of their growth. The IDP will be updated progressively as newer technologies are introduced and are adopted by the industry.

² To qualify for the grant, the applicant must meet the following criteria: (i) the applicant must be registered in Singapore; (ii) have > 30% local shareholding ownership; and (iii) have annual sales turnover ≤ S\$100 million or staff strength of ≤ 200 employees. The applicant must also have its primary and/or secondary business activity in the Construction and FM-related sub-sectors according to the Singapore Standard Industrial Classification (SSIC) code. Their purchase/subscription of the IT solution must be solely for use in Singapore (i.e. not for the use of another party or the applicant's overseas entities).

³ Firms will not be allowed to apply for the same pre-approved solution more than once within the funding period. The list of pre-approved solutions under the IDP will be updated as newer technologies are introduced over time.

04 DIGITAL ROADMAP

This digital roadmap serves as a guide for you to follow on your digital journey.



Note: This roadmap will be updated over time as digitalisation of the industry progresses and new technologies are introduced to the industry.

- **Stage 1: Getting Digital Economy Ready.** Digital solutions listed in stage 1 will enable SMEs to build their core digital competencies and optimise operations⁴. These digital solutions are important building blocks to enable enterprises to begin their Integrated Digital Delivery⁵ (IDD) journey
 - **Stage 2: Growing in the Digital Economy.** The second stage emphasises the need to be part of an integrated ecosystem, so that enterprises can grow with their peers in the digital economy. This stage highlights the importance of IDD for construction enterprises to integrate and streamline key processes along the value chain.
 - **Stage 3: Leaping Ahead.** The third stage enables enterprises to implement advanced digital technologies to strengthen their competitive edge, and enable them to venture into overseas markets and influence their SME partners to uplift their digital capabilities. This will also allow them to plug in to the IDD.
6. The IDP also includes a Digital Roadmap on Training to ensure that the industry's workforce is adequately prepared with the necessary skills and knowledge to adopt digital solutions and is ready for changes that come with digital transformation.

⁴ These include digital modeling, visualisation, analysis, quantity surveying and valuation, site and yard management, asset management and facilities management for SMEs.

⁵ IDD aims to connect various industry parties involved in building and construction projects over the entire building life-cycle through digital information and technology.

DIGITAL ROADMAP ON TRAINING

	STAGE 01 GETTING DIGITAL ECONOMY READY	STAGE 02 GROWING IN THE DIGITAL ECONOMY	STAGE 03 LEAPING AHEAD
TECH BASIC COURSES	<ul style="list-style-type: none"> • SkillsFuture for Digital Workplace • Introduction to Construction Industry Transformation Map (ITM) and Integrated Digital Delivery (IDD) • Understanding Building Information Modelling (BIM) Data and Modelling 	<ul style="list-style-type: none"> • Overview – Integrated Digital Delivery (IDD) Concepts and Project Framework • Understanding Project Collaboration • Understanding Construction Site Management 	<ul style="list-style-type: none"> • Understanding Digital Design for Manufacturing and Assembly (DFMA) • Understanding Virtual Construction • Basics to Smart Facilities Management (FM)
	VENDOR-SPECIFIC SOLUTIONS TRAINING		
TECH ADVANCED COURSES	<ul style="list-style-type: none"> • Basic Building Information Modelling • Intermediate Building Information Modelling (Coordination & Documentation) • Advanced Building Information Modelling (Computational) 	<ul style="list-style-type: none"> • Integrated Digital Delivery (IDD) Project Planning and Execution 	<ul style="list-style-type: none"> • Integrated Digital Delivery (IDD) Application and Development • Data Analytics and Machine Learning • Internet of Things

Please visit BCA Academy, <https://bcaa.edu.sg/idd> and Singapore Polytechnic, <https://www.sp.edu.sg/page/construction-and-facilities-mgt-idd-idp> for details.

7. The sector-specific IDPs are central to the SMEs Go Digital programme⁶, which comprises the following:

- **Consultancy Services**

For a more comprehensive review of their business, SMEs can approach Business Advisors at their nearest **SME Centre**⁷ for business diagnosis and advisory on digital solutions relevant to their operations. SMEs that require specialist consultancy on sophisticated technologies, such as data analytics and cybersecurity, will be referred to the Principal Consultants at the **SME Digital Tech Hub**⁸. These digital consultancy services are provided at no cost to SMEs.

⁶ www.imda.gov.sg/SMEsGoDigital

⁷ List of SME Centres can be found: <https://www.enterprisesg.gov.sg/contact/overview>

⁸ www.digitaltechhub.sg

- **Digital Project Management Services**

SMEs can also engage **Digital Project Management Services**⁹ to support them in the implementation of digital solutions. The project managers can help with business processes re-engineering and job redesign to get the maximum benefits and have more sustainable outcomes from going digital.

- **Pre-approved Solutions**

SMEs looking to build core digital competencies and optimise operations can choose from the list of pre-approved solutions on Tech Depot and receive grant support for eligible projects. Tech Depot is a one-stop, centralised platform aimed at improving SMEs' access to technology and digital solutions. SMEs can visit www.smeportal.sg/techdepot for more information.

- **Start Digital**

For SMEs that are just starting their business or are new to digital technology, they can take up a Start Digital Pack¹⁰ to start their business right with foundational and competitively-priced digital solutions. New SMEs can take up any two solutions free for at least six months with a minimum 18-month contract period from five categories: Accounting, Human Resources Management & Payroll, Digital Marketing, Digital Transactions and Cybersecurity. The solutions are pre-approved by IMDA and offered by Start Digital Partners like DBS, M1, Maybank, OCBC, Singtel, StarHub and UOB.

⁹ Digital Project Management Services can be accessed: <http://www.smfederation.org.sg/capability-capacity-development/project-management-services>

¹⁰ www.imda.gov.sg/StartDigital

SME Feature - Guan Ho Construction Co Pte Ltd



1. Guan Ho is one of Singapore's pioneers in the construction industry, with over 60 years of experience. Guan Ho was conferred the BCA Award in various categories for the past years. Some of the latest awards include the BCA Construction Excellence Award (Merit) for Kindergarten Package II, BCA Green and Gracious Builder Award (Excellent) and BCA Construction Excellence Award (Excellence) for Nanyang Primary School and West Spring Primary School.

Featured IDD project - Punggol Town Hub

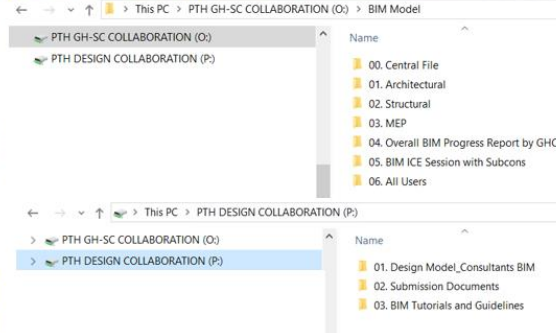
2. Guan Ho is the main contractor for the construction of the Punggol Town Hub, an integrated hub that boasts a hawker centre and a library, among other amenities. Adopting Integrated Digital Delivery (IDD) for the entire building process, Guan Ho has utilised various technologies to enhance coordination and productivity.
3. The Punggol Town Hub is also one of the first 12 demonstration projects announced during the launch of BCA's IDD Implementation Plan in Nov 2018, and the first IDD project for both the developer, the People's Association, and Guan Ho.

Digital Project Management Information System

4. Guan Ho deployed Virtual Reality (VR) technology during the project to enable real time rendering of designs to enhance stakeholders' interaction. The use of Building Information Modelling (BIM) meant the team could check the interfacing connection between the structural steel beams and precast columns in 3D instead of looking at it in 2D drawings.

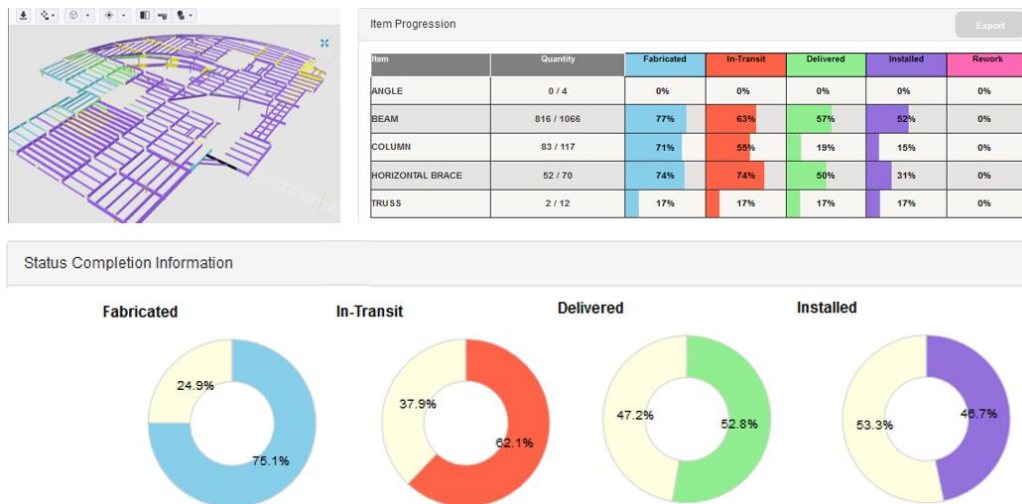


5. Drones were used to capture real-time aerial images of the construction site, which allowed the team to monitor progress easily during the actual construction stage. Compared to 18.5 manhours required for traditional site walks, there is time savings of approximately 33% when drones are used.



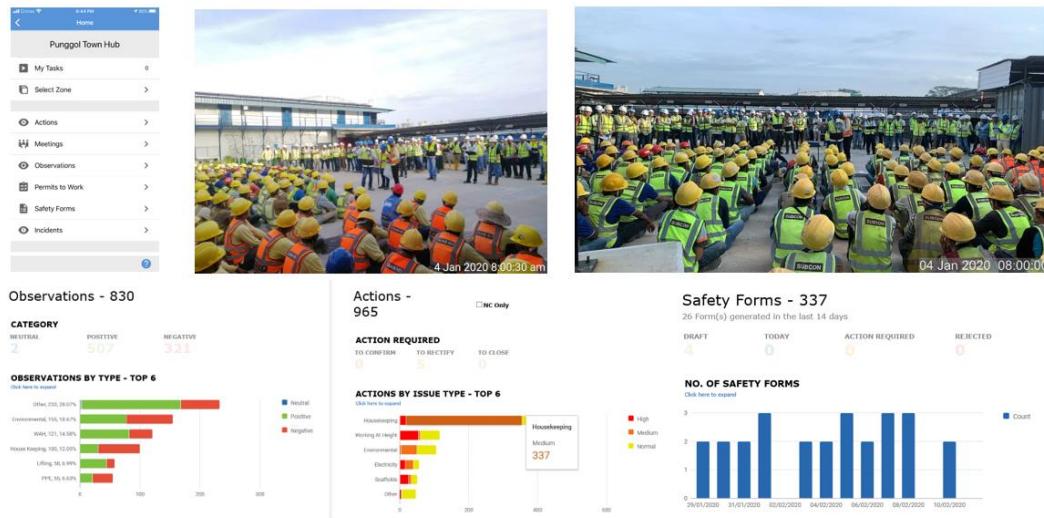
6. Guan Ho adopted cloud-based collaboration to enjoy real-time information sharing on the project data, which greatly enhanced project coordination, execution and validation. The company estimates up to 20% time savings through cloud-based collaboration, compared to 14.6 manhours used in conventional 2D drawings as a result of improved communication and collaboration among stakeholders, which also facilitated more informed decision-making.

Logistics Tracking Platform for Structural Steel and Precast Elements



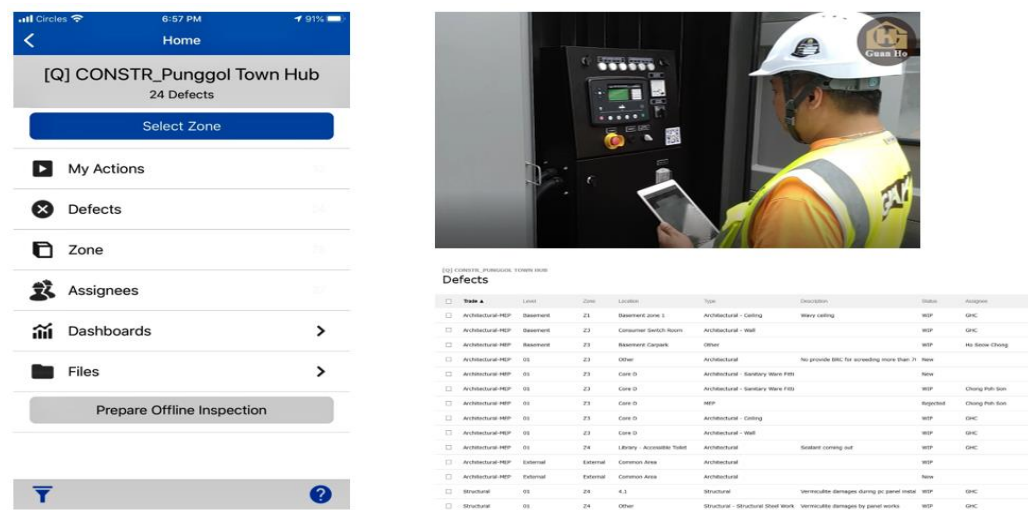
7. Guan Ho worked closely with their structural steel fabricator Kong Hwee Iron Works and precaster Eastern Pretech to set up a logistics tracking platform for structural elements such as precast columns and structural steel beams. The use of live tracking of the prefabricated components through QR codes enhanced logistic processes including more efficient inventory control during fabrication, efficient allocation of space for materials on-site, and monitoring of structural elements delivery to reduce the risk of delay during the construction process.
8. The quality and defects validation status of the component was also recorded, thus enabling Guan Ho to have a better gauge of the number of components that can leave the plant, reducing the need for site storage and achieving just-in-time delivery for installation on the building. Thus, achieving 23% time savings from this digitalised inventory control, as compared to 266 manhours using manual report.

Digital Safety Management System



9. The system facilitates real-time reporting, tracking and follow-up of safety issue on site. In addition, Guan Ho also used an advanced rendering software to help safety supervisors to identify safety hazards through 3D visualization.
10. Guan Ho enjoyed up to 32% time savings using e-permit-to-work, as compared to the current paper submission by the worker, with manual validation carried out by the safety supervisor, which took 38 minutes. Up to 35% of time savings were also reaped from the lodgement of non-conformances during safety inspection, incident reporting and safety inspection of machinery and tools, compared to using hardcopy reports.

Digital Quality / Defects Management System



11. The cloud-based digital quality and defects management system receives updates from mobile devices to ensure timely reporting, tracking and quicker follow up of defects discovered at the construction site. There is 30% time savings to churn out consolidated reports, and up to 20% improvement in the management of defects, as a result of proper categorising and organising of issues for easy identification, follow-up and delegation to the appropriate parties.

Additional resource: Guan Ho Video



SME Feature – MKPL Architects Pte Ltd

1. Formed in March 1995, MKPL is an architectural firm that aims to combine master planning, architecture, landscape, interior and furniture design to produce a total design product. The firm's design philosophy focuses on creating strong, clear architecture forms and spaces that are comfortable and liveable, viewing the vernacular and regional culture as a rich resource that can suggest appropriate solutions and references. Advances in technology and construction are also embraced as opening existing possibilities in ways of living and interacting with the environment.
2. MKPL has received more than 70 national and international awards, including the RIBA International Awards for Architectural Excellence and the Singapore Institute of Architects (SIA) Architectural Design Award.
3. MKPL's key objectives in embarking on Integrated Digital Delivery (IDD) is to facilitate more time for their architects to think about design and for their project team and clients to better appreciate and refine the design to meet their needs. To digitalise the practice, MKPL developed processes to suit their workflows. While there had been reservations among various stakeholders initially, more and more parties grew to be open about process transformation to accommodate new technology, allowing the firm to move forward. Today, MKPL is fully committed to digitalising the right way and for the right reasons, not adopting new technology for the sake of it.

Virtual Planning and Design



Virtual design of SMU Connexion



4. MKPL uses a combination of modelling, rendering and computational solutions to carry out space planning, simulation of environmental conditions and on the interiors

to ensure the design not only meets the client's requirements, but is also sustainable both in its materials and also with the surroundings.

Design for Buildability



BIM model of Woodleigh Village

Project Reference No.:		SS	WS	BF	BR
A1027-01005-2010		BS	35.03	30.99	2.00
Block No./Name:		ANNEX 1			
Wall System		Labour Systing Index (%)	Length (m) (%)	% Length (%)	Buildability Score (0) x (0) x 40
1 CURTAIN WALL/FULL HEIGHT GLASS PARTITION DRY PARTITION WALL/PREFABRICATED RAILING					
1.1	Curtain Wall, Full Height Glass Partition	1.60	148.89	10.80%	7.08
1.2	Prefabricated Railing	1.60			
1.3	(B) Dry Partition Wall without plastering, tiling or stone finishes	1.60			
1.4	(B) Dry Partition Wall with plastering, tiling or stone finishes	0.70			
2 PRECAST CONCRETE PANEL WALL (includes normal weight concrete panels, lightweight concrete panels, unadorned aerated concrete panels)					
2.1	Without plastering, tiling or stone finishes	0.80	2.31	0.33%	0.12
2.2	With plastering, tiling or stone finishes	0.80	828.63	45.18%	14.46
3 PC FORMWORK					
3.1	Without plastering, tiling or stone finishes	0.75			
3.2	With plastering, tiling or stone finishes	0.50			
4 CAST-IN-SITU RC WALL					
4.1	(B) Without plastering, tiling or stone finishes	0.70	16.55	2.34%	0.65
4.2	(B) Without plastering, tiling or stone finishes and using prefabricated reinforcement	0.74			
4.3	(B) With plastering, tiling or stone finishes	0.50	61.08	12.80%	2.57
4.4	(B) With plastering, tiling or stone finishes and using prefabricated reinforcement	0.54			
5 PRECAST BLOCK WALL					
5.1	Without plastering, tiling or stone finishes (external wall)	0.45			

5. MKPL uses a Buildability Score Plug-in solution to their BIM model to automatically generate schedules of standardised components, saving up to 90% of time originally used to verify buildability manually. This frees up more time for the architects to focus on refining the design to enhance the buildability of the project downstream.

Virtual Walk-through



Sengkang Grand Mall & Residences

6. Sengkang Grand Mall & Residences is one of the iconic first-of-its kind integrated development with a retail mall, community club, hawker centre, community plaza,

childcare centre, bus interchange and seamless connectivity to Buangkok MRT station.

7. Due to the design complexity of this integrated development, MKPL adopted virtual walk-through presentation to main stakeholders for effective communication and approval.
8. Compared to the multiple still images, MKPL believes that the virtual walk-through help various project stakeholders understand the infrastructure effectively. Using virtual walk-throughs, there is an improvement of approximately 50% in terms of communication time for clarification.

Additional resource: MKPL Architects Video



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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)¹¹ and Advanced Precast Concrete System (APCS)¹² 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

¹¹ 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.

¹² 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)¹³ 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 25,000m² 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 respectively¹⁴. 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.

¹³ 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.

¹⁴ 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 facilities¹⁵ 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.

¹⁵ 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 <i>(including one Concept and Price tender)</i>	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 \geq 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

Annex C

FACTSHEET ON GREEN BUILDINGS

Background

1. Climate change is a global concern. In Singapore, buildings account for over 20% of Singapore's emissions. The greening of buildings is one of our key efforts in building more sustainably and in mitigating our emissions. We have set a national target to green 80% of our total gross floor area (GFA) in buildings by 2030. As of December 2019, more than 40% of Singapore's GFA has been greened.
2. The BCA Green Mark scheme was introduced in 2005 as a rating tool to assess the environmental performance of buildings. The Green Building Masterplan has been continually updated since its inception in 2006. The first edition targeted new buildings, to embed sustainability as part of a building's life cycle from the onset. As the Built Environment (BE) sector began to embrace the idea of sustainable buildings, the Building and Construction Authority (BCA) expanded its ambition to green the larger stock of existing buildings and engage building occupants to change their energy consumption behaviour.
3. BCA also launched the Super Low Energy (SLE) Building programme in 2018 to encourage firms to go beyond the existing Green Mark Platinum standards and achieve best-in-class building energy performance in a cost-effective manner.

The Next Lap for Green Buildings

Co-creation for the next Singapore Green Building Masterplan (SGBMP)

4. While considerable progress has been made, we must do more to address the existential threat posed by global warming, something which many Singaporeans are also concerned about. Hence, BCA and the Singapore Green Building Council (SGBC) will co-create the next Singapore Green Building Masterplan (SGBMP 2020) with stakeholders from the public, private and people sectors. The co-creation process will encourage stakeholders to co-own and co-deliver the SGBMP, recognising the shared responsibility in raising building performance and to sustain it over the life cycle of the building.
5. Apart from traditional industry stakeholders, such as the Trade Associations and Chambers (TACs), BCA and SGBC will bring onboard other stakeholders, including

tenants, home-buyers, youths and activists, to generate broader mind share for the SGBMP.

Raising Minimum Energy Performance Standards

6. As part of the key initiatives under the previous Green Building Masterplans, BCA introduced a mandatory minimum standard of environmental sustainability for new buildings in 2008 and for existing buildings in 2014.

7. To support the push towards more energy efficient buildings, BCA plans to raise the minimum energy performance standards for both new and existing buildings in the coming years. A recent consultancy study has shown that there is a clear business case to do so from the building life cycle perspective.¹⁶ BCA will engage stakeholders to work on the details through the SGBMP 2020 co-creation process.

Publication of Building Energy Performance Data

8. In 2013, BCA required all building owners to submit their energy performance data. In 2017, BCA gave building owners the option of voluntarily having their energy data disclosed to the public. Moving forward, BCA will publish buildings' energy performance data to facilitate benchmarking and spur building owners to undertake retrofitting measures to improve the energy efficiency of their buildings. Implementation will be rolled out in phases according to building type, starting with commercial buildings.

9. There will be no additional effort nor cost to the building owners beyond the current requirement to complete the annual mandatory submission. Building owners will be given a 1-year notice before the 2020 energy performance data is released publicly in 2021.

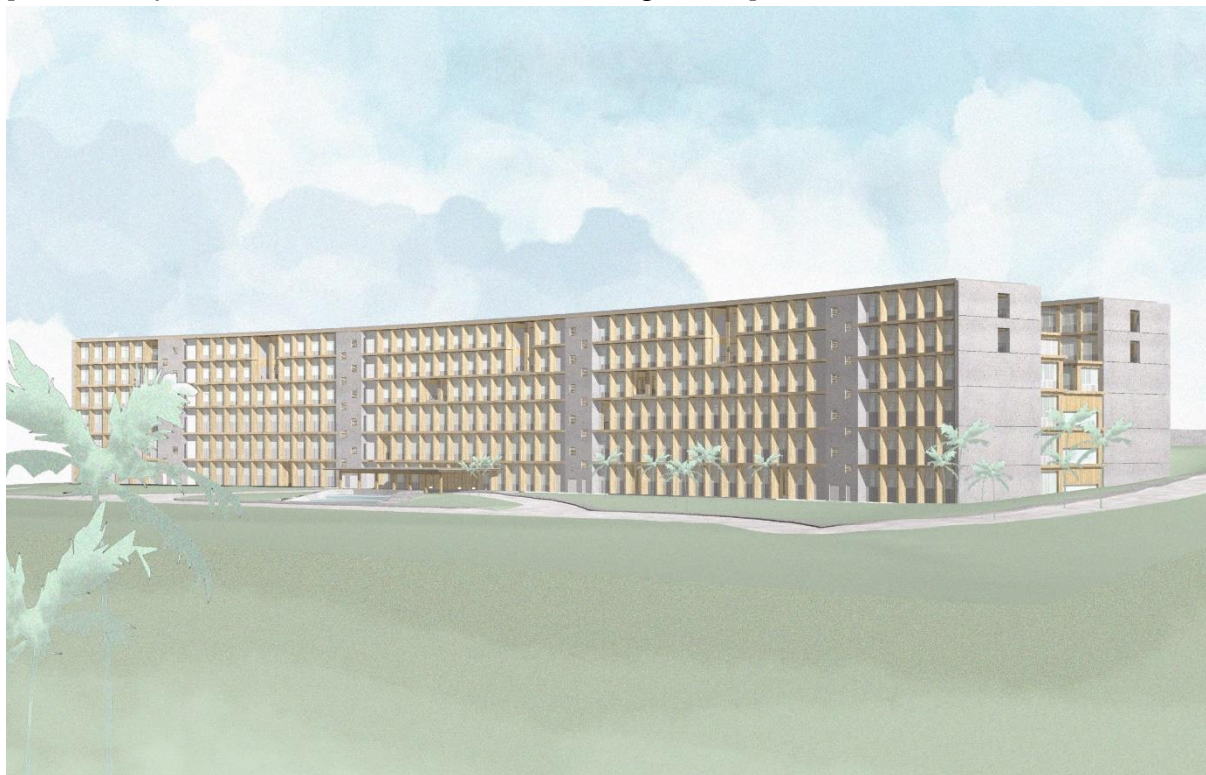
¹⁶ A consultancy study was conducted to examine the robustness and cost effectiveness of the BCA Green Mark Scheme: <https://www1.bca.gov.sg/buildsg/sustainability/green-mark-for-independent-consultancy-study-on-bca-green-mark-schemes>

Example: Building System & Diagnostics (BSD) Pte Ltd

Building System and Diagnostic Pte Ltd (BSD) is a leader in the field of Green Built Environment consultancy. Since 2003, it has been providing specialised advisory services in the fields of sustainable building design, construction and operations, energy optimisation solutions, to improve the overall energy performance of buildings. Over the years, BSD's consultancy teams in Singapore, Malaysia, Myanmar and China have contributed to more than 200 Green Mark projects. BSD also develops Energy Masterplans at the township and estate level, leads research and innovation projects into frontier building related solutions, and conducts building physics analysis and simulations to improve our built environment.

Being one of the pioneers in Singapore's green building movement, BSD recognises that for a greener future to materialise, there is a need to constantly push boundaries on energy efficiency to achieve best-in-class building energy performance in a cost-effective manner. Hence, BSD is now actively participating in Super Low Energy and Zero Energy building projects, to design buildings that are both resource-efficient and comfortable for occupants using computer simulations and performance modelling.

[Artist's impression of NTU Academic Building South]



One example is the new Academic Building South project that is currently being developed by the Nanyang Technological University (NTU), a champion in Singapore's green building movement and the first recipient of the Green Mark Platinum^{STAR} Champion award. The building uses environmentally friendly materials and adopts energy efficient features such as Mass Engineered Timber (MET), Passive Displacement Ventilation (PDV), coupled with efficient water-cooled air-conditioning systems, LED lights and powered by solar photovoltaic panels, which aim to offset up to 100 per cent of the building's energy consumption.

Annex D

MEDIA FACTSHEET ON CREATING GOOD JOBS FOR LOCALS

Background

1. With the adoption of new technologies and digitalisation, the construction sector has created new and higher-skilled jobs that generally command better salaries and offer better working environments than on-site construction work. This makes it more attractive for local professionals, managers, executives and technicians (PMETs) to join the sector.
2. The sector has made good progress, with more local PMETs hired today compared to 2010, when the first Construction Productivity Roadmap was rolled out. However, the share of local PMETs in construction has fallen in the same period. It is not sustainable to continue relying on foreign manpower to support the sector's continued growth. Hence, we will take steps to encourage the industry to hire more locals.

Tightening Firms' Access to S Pass Holders

3. Hence, as announced by DPM in the 2020 Budget Statement, the S Pass sub-Dependency Ratio Ceiling (sub-DRC) for the construction sector will be reduced from the current 20% to 18% on 1 January 2021 and subsequently to 15% on 1 January 2023.
4. It is timely to rebalance the share of local PMETs in the sector. The strong construction demand projected for the medium term provides more certainty for firms to upskill their workforce and develop a core of local PMETs.

Building Up a Pipeline of Local PMETs

5. The Government is strengthening its measures to ensure that there is an adequate pipeline of local PMETs equipped with the necessary construction-related skillsets to contribute to the sector. The Building and Construction Authority (BCA) has been working with Institutes of Higher Learning (IHLs) and the industry to ensure that the curriculum for built environment courses is kept updated to meet the industry's evolving needs.
6. Firms can also take advantage of various grants and initiatives available to strengthen business capabilities and operational efficiencies. For instance, BCA has been partnering firms to offer the iBuildSG scholarships and sponsorships, which are available for students to pursue relevant courses at the ITE, Diploma and Degree levels.

Adapt & Grow (A&G) Initiatives

7. Beyond schemes targeted at fresh graduates, the Workforce Singapore (WSG) has a suite of A&G initiatives for firms to attract mid-career entrants into the Built Environment (BE) sector. One of the key A&G initiatives is the Professional Conversion Programme (PCP), which facilitates local PMETs acquiring new skillsets necessary for a mid-career switch.
8. Specific to the BE sector, BCA and WSG have jointly rolled out PCPs for Building Information Modelling (BIM) Professionals and for Lift Specialists in 2018 and 2019 respectively.¹⁷
9. While both PCPs have received positive responses from mid-career participants, we noted employers' feedback that they prefer hiring trained BIM modellers who can contribute to work immediately. Hence, BCA and WSG will adjust the BIM PCP so that firms will now have the option of allowing participants to complete their full-time training in BIM first, before continuing with on-the-job training at the firms. This is in addition to the current model where PCP participants are trained in BIM concurrently while working with their firms on a part-time basis.
10. Separately, BCA is working with Design for Manufacturing and Assembly (DfMA) facilities to develop PCPs for prefabrication job roles. To this end, Teambuild Construction, a local firm, has developed a firm-level PCP, which will be open for applications later this year.
11. In addition, BCA and WSG will continue to work with the industry to roll out more PCPs in 2020 for in-demand jobs. More details will be announced later.

Skills Framework for the Built Environment

12. To complement our manpower development efforts on various fronts, BCA, together with SkillsFuture Singapore (SSG) and WSG, has partnered industry stakeholders to co-develop a Skills Framework for the BE sector. The Skills Framework provides key information on various job roles in the construction and facilities management sectors, charts out clear progression pathways for career development, maps out the skillsets required at various levels for the key job roles and the training programmes available for skills upgrading and mastery. The Skills Framework for BE will also promote the recognition of skilled individuals in the sector (e.g. through accreditation

¹⁷ The PCP for BIM is administered by BCA whereas the PCP for Lift Specialists is administered by the Singapore Lift and Escalator Contractors and Manufacturers Association (SLECMA).

***Embargoed until after delivery of
MOS Zaqy Mohamad's speech at MND's COS***

schemes) to help facilitate workers' career and wage progression. More details on the Skills Framework for BE will be announced later this year.