



CONSTRUCTION
INDUSTRY COUNCIL
建造業議會

Meeting Social Housing Needs with MiC Technology

Social Innovation Symposium “Transitional Social
Housing - Deliver with Expediency and Decency”

8 July 2020

Ir Dr Richard Pang

Director - Industry Development
Construction Industry Council

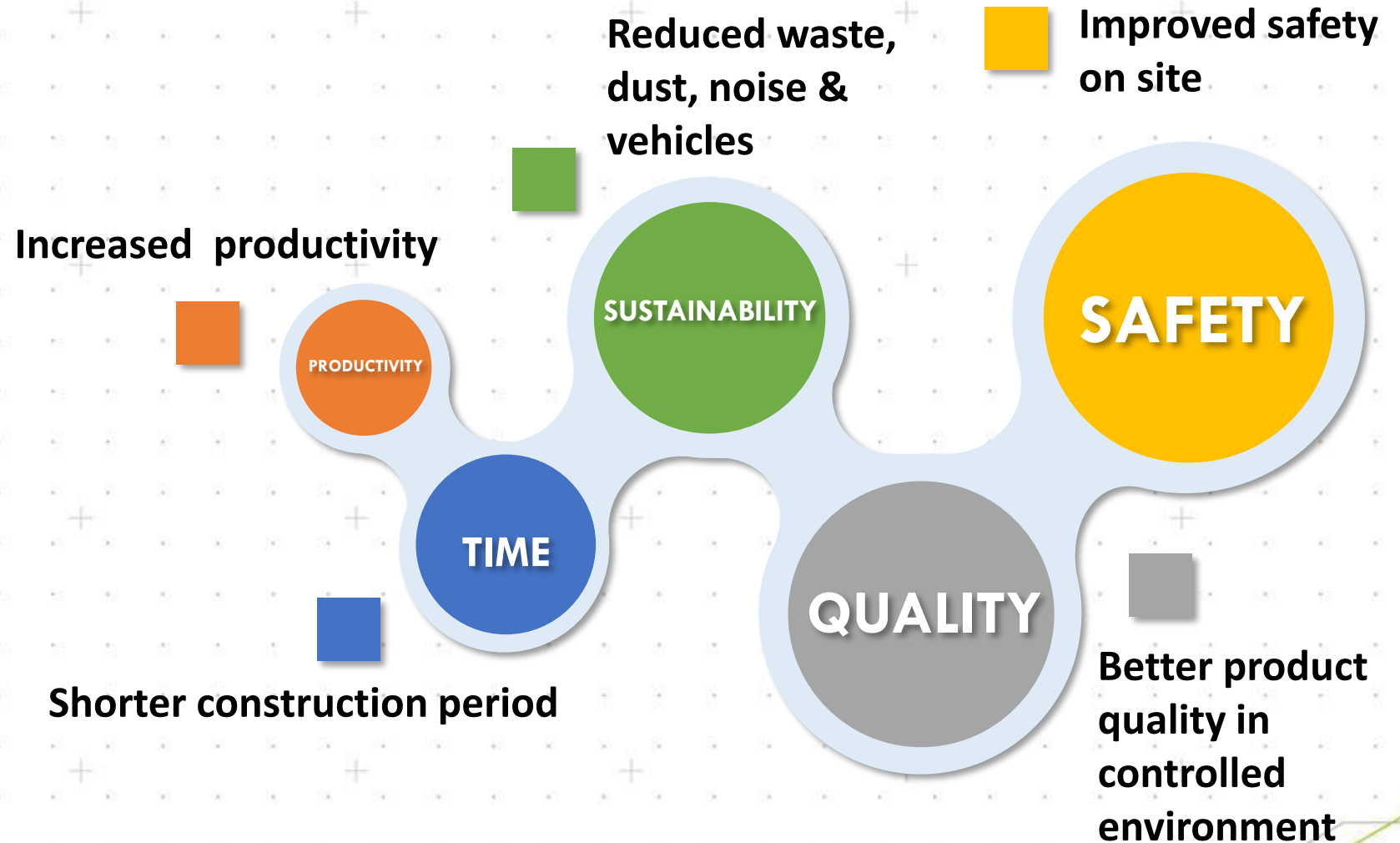
MODULAR INTEGRATED CONSTRUCTION (MIC)

“ ... a construction method whereby free-standing volumetric modules (with finishes, fixtures, fittings, etc.) are manufactured offsite and then transported for constructing buildings on site ”

Extract from Buildings Department
Practice Note for Authorized Persons,
Registered Structural Engineers and
Registered Geotechnical Engineers ADV-36



Advantages



Signature Overseas MiC Projects

Avenue South Residence



The Clement Canopy



101 George Street



AC Hotel New York NoMad by Marriott



	Avenue South Residence	The Clement Canopy	101 George Street	AC Hotel New York NoMad by Marriott
Contractor	United Tec Construction	新加坡寶嘉	Tide Construction Development	Skystone Group
MiC Supplier	United Tec Construction	新加坡寶嘉	Vision Modular Systems	DMD Modular
Type of Module	Concrete	Concrete	Steel	Steel
GFA	84 551 sqm	46,000 sqm	41,819 sqm	7230 sqm
Project Description	2 blocks of 56-storey with 988 residential units and 5 blocks of conserved 4-storey flats with 86 residential units and 8 shops	A residential project comprising two 40-floor tower blocks with 505 residential units	2 towers with 44 and 38 storey respectively and comprise 546 residential units	A 26-storey and 168-room hotel
No. of modules	3,069	1,866	1,500	TBC
(Expected) Construction Period)	About 42 months (including project design)	About 24months	24months (2018-2020)	90 days (Anticipated modules installation time)
(Expected) Project Completion Date	2023	2019	2020	End of 2020
Project Merit	Upon completion, it will be the tallest concrete PPVC (PPVC) project in the world	It is the tallest concrete PPVC (MiC) project in the world	On completion, it will be the tallest steel MiC building in the world	Upon completion, it will be the world's tallest MiC hotel



MiC Around the World



● Habitat 67, Canada

- Built in 1967
- Reaching up to 12-storey
- 354 identical, prefabricated concrete forms
- one of the major symbols of Expo 67

● Fürth Hospital, Germany

- Gross floor space (sq. m) 7250
- 133 nos. of modules
- Construction time 10 months



● Apex House, UK

- 29-storey student accommodation
- Tallest MiC building in Europe as of 2017
- 679 nos. of modules
- Construction time 12 months

● Victoria Hall, UK

- 19-storey
- over 90% reduced waste during construction
- 383 nos. of modules
- Construction period: 16 months



● The Clement Canopy, Singapore

- Two 40-floors tower blocks
- 1866 modular units
- Total lifting operation completed in 14 months
- Anticipated project completion date: 2020

Housing Crisis in the UK

- ◆ A lack of affordable homes
- ◆ Skills shortages
- ◆ Modern Methods of Construction



◆ **7.5%** of the homes built in the UK used prefabricated or modular elements in 2017-2018

◆ **300,000** homes to be built each year (government's target)

◆ Boosting **investment** on modular housing from 2019

◆ Support sustainability

- Around **400** million tonnes of construction materials each year
- MiC plays a key role in **reducing** the carbon footprint

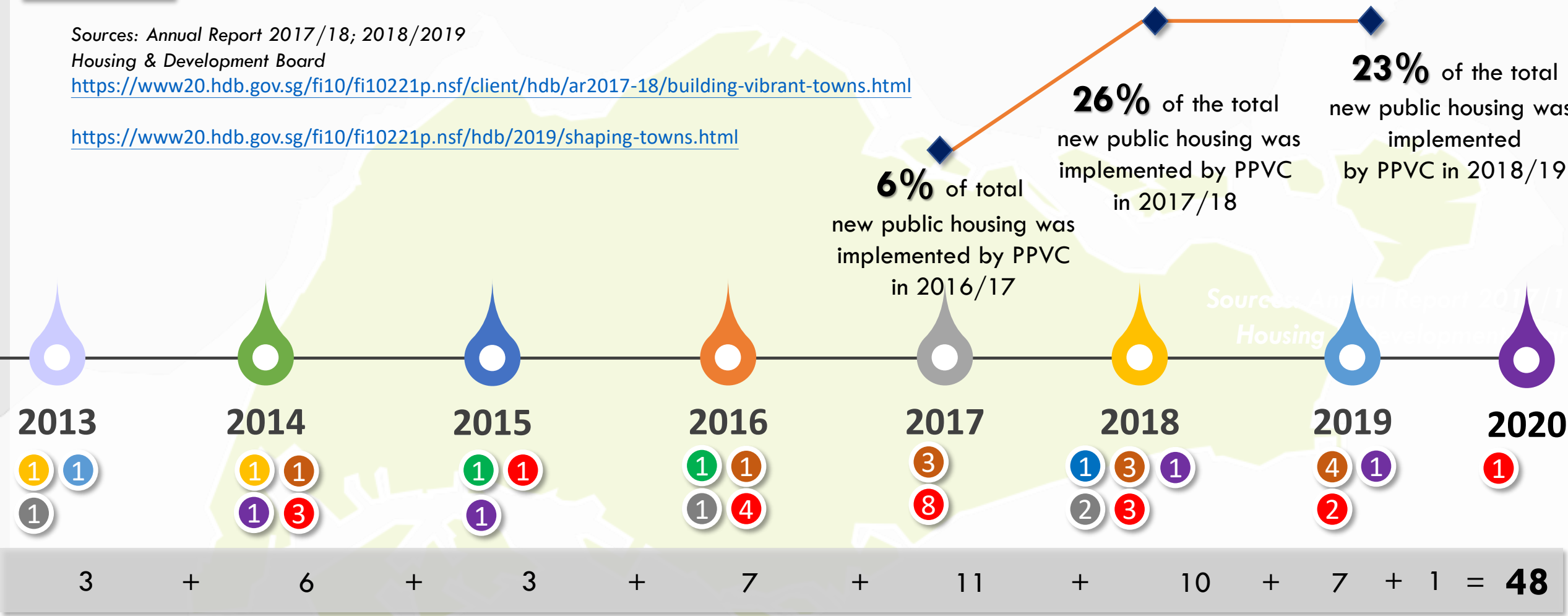




Overview of PPVC in Singapore (as of Feb 2020)

PPVC Development in Singapore

Sources: Annual Report 2017/18; 2018/2019
Housing & Development Board
<https://www20.hdb.gov.sg/fi10/fi10221p.nsf/client/hdb/ar2017-18/building-vibrant-towns.html>
<https://www20.hdb.gov.sg/fi10/fi10221p.nsf/hdb/2019/shaping-towns.html>



- Government Buildings
- Healthcare
- Hotel
- Hostel
- Public Housing
- Private Housing
- Others

No. of PPVC Projects (by announcement date)

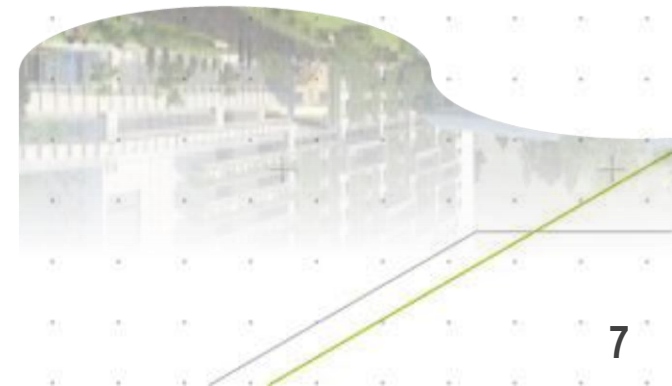


HOUSING &
DEVELOPMENT
BOARD

Building and Construction Authority

PPVC Development in Singapore

- ◆ Growing demand for consultants and builders
 - **23%** of the total new public housing was implemented by PPVC in 2018/19
 - A stronger demand for consultants and builders familiar with PPVC technology
- ◆ Improve productivity by **up to 40%**
 - Manpower / time savings, depending on the complexity of the projects
- ◆ Cost premium - Estimate cost of **8% less** than conventional project
- ◆ Increase of **DfMA** adoption in recent years
 - From **22%** in **2018** to about **30%** in **2019**,
target of 70% by 2025
- ◆ **75%** of all its units launched in 2020 will adopt DfMA methods





2 major goals proposed:

(1) More than **15% prefabrication** for
new buildings by 2020

(2) Will establish

- > 50 exemplary cities
- > 200 industrial bases
- > 500 exemplary projects
- > 30 technology innovation bases

Key Tasks:

- Prepare development plan
- Develop system of standardization
- Improve technical system
- Improve design capabilities
- Enhance industry support capabilities
- Implement “Engineering, Procurement and Construction” (EPC)
- Promote full renovation for building construction
- Promote green development
- Improve project quality and safety
- Cultivate industry teams



DfMA Development in the Mainland Guangdong Province

Target	Supporting Policy
1. Pearl River Delta Cities	(1) Prioritized land usage plan (2) Instant refund of VAT (3) Capital subsidy (4) Financial support
By the end of 2020 New construction area > 15%, Government investment projects > 50%.	
By the end of 2025 New construction area > 35%, Government investment projects > 70%.	
2. Eastern, Southern and Northern Districts (with population exceeding 3 million)	
By the end of 2020 New construction area > 15% Government investment projects > 30%.	
By the end of 2025 New construction area > 30%, Government investment projects > 50%.	
3. Other Districts	
By the end of 2020 New construction area > 10% Government investment projects > 30%.	
By the end of 2025 New construction area > 20% Government investment projects > 50%.	





Implementation of DfMA in Shenzhen

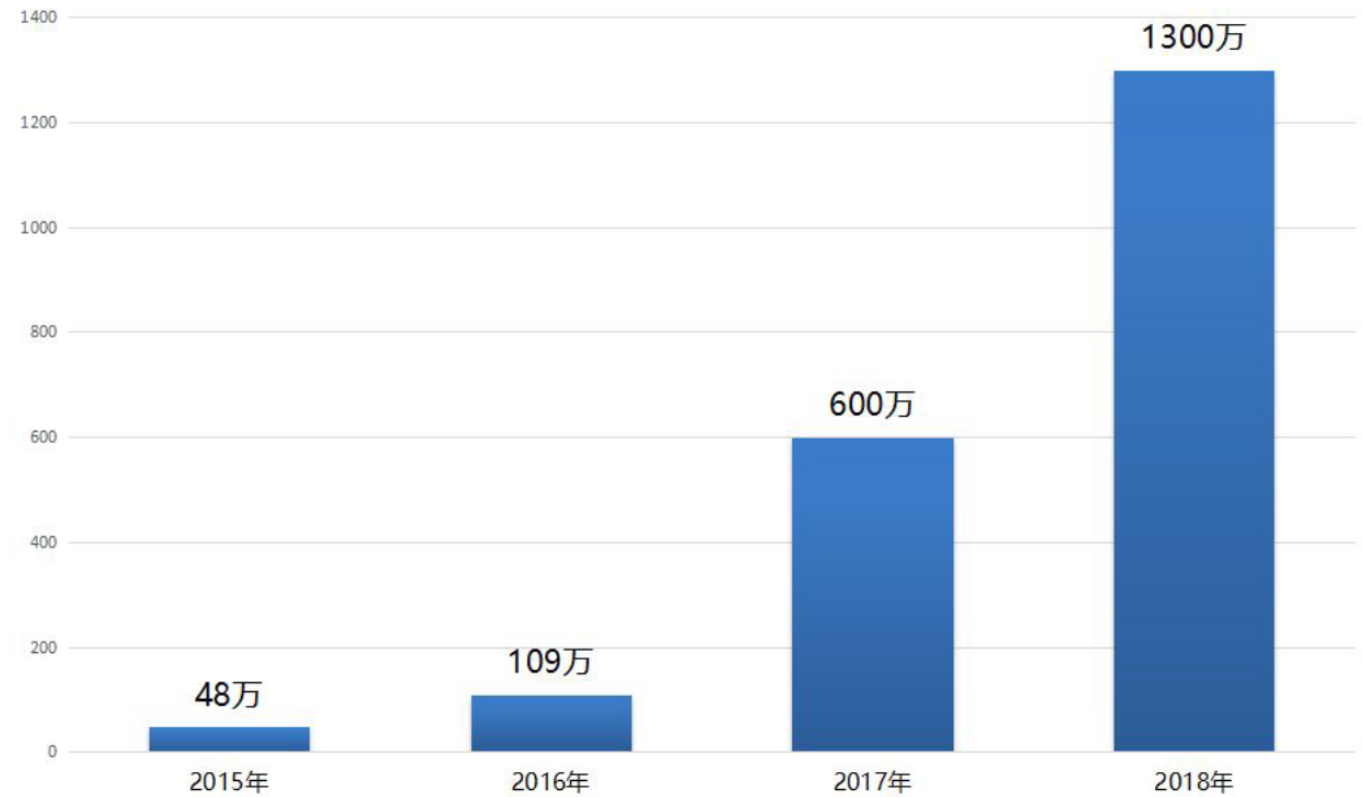
◆ In 2018

- New construction area: **16%**
- Concrete: **3.246** million sqm
- Steel: **1.734** million sqm
- New construction area: **30** million sqm

◆ As of March 2019

- Total no. of projects: **188**
- Concrete: **151** (Including **18** completed projects and **133** ongoing projects)
- Project construction area: more than **13** million sqm

深圳市年度累计装配式建筑项目面积



來源：深圳市住建局



Development of MiC in Hong Kong

The Chief Executive's Policy Address 2017 & 2018



01 Promote & lead adoption of MiC

02 Take lead in piloting MiC projects

03 Enhance monitoring measures

04 Provide funding support

05 Consider GFA concessions



Development of MiC in Hong Kong



**MiC Display Centre
Opening Ceremony
and B2B Networking**

**HKU Estate
Office Sharing
Session**



**International
Conference on MiC**

Overseas Visits

**Joint Working
Group on MiC**

**MAY
2017**

**2017
2018**

**APR
2018**

**SEP
2018**

**OCT
2018**

**NOV
2018**

**DEC
2018**

**The Chief
Executive's Policy
Address**



**Ground Breaking
ceremony of
'Disciplined Services
Quarters for the Fire
Services Departmental
Pak Shing Kok, Tseung
Kwan O'**



Development of MiC in Hong Kong



Client Contractor Supplier
Forum on MiC

MiC Client Forum

Technical Visit
to Singapore

CIExpo 2019
Conference on MiC

JAN
2019

FEB
2019

MAY
2019

JUN
2019

SEP
2019

DEC
2019

MAR
2020

Collect information from
various government
departments to prepare
guidelines on
the statutory requirements
for MiC projects

The Buildings Department
(BD) issued the PNAP APP-161
on
“Exemption of Gross Floor
Area for
Buildings adopting Modular
Integrated Construction”

BCA ACADEMY
of the built environment
HKIC CPD co-organises
3-day Executive
Programme with BCAA,
Singapore

DEVB TC(W) No.
2/2020
on Modular
Integration
Construction





>30 MiC projects
under consultation and/or
construction

MiC Projects in Hong Kong

Permanent MiC Buildings

1	InnoCell	HKSTP	2018 - 2020
2	Jat Min Chuen Elderly's home	HKHS	2020 - 2022
3	HKU Student Hostel	HKU	2019 - 2023
4	Pak Shing Kok FSD Quarters	ArchSD	2018 - 2020
5	"RCHE" in Kwu Tung North	ArchSD	2019 - 2022
6	Fire station-cum-ambulance depot in Area 72, TKO	ArchSD	2022 - 2025
7	Chai Wan Ambulance Depot	ArchSD	2022 - 2025
8	Public Housing in Tung Chung	HKHA	2021 - 2024

Transitional Social Housing

9	Nam Cheong Street	HKCSS	2019 - 2020
10	Yen Chow Street	HKCSS	TBC - 2021
11	Yip Shing Street	HKCSS	2020 - 2021
12	Song Wong Toi Road	Lok Sin Tong	2020 - 2021
13	United Court/ Tung Tau, Yuen Long	Sheng Kung Hui	TBC-2022



Quarantine Centres

		Completion Date
14	Lei Yue Mun (completed)	HKSARG Apr 2020
15	Penny's Bay (Phase 1 completed)	HKSARG Apr 2020
16	Sai Kung Outdoor Recreation Centre (completed)	HKSARG Apr 2020
17	Pat Heung Junior Police Call Center in Yuen Long (completed)	HKSARG Apr 2020



**Completed within
1-2 months!**



MiC Display Centre/ Physical Resources Centre

- ◆ The first MiC building constructed in Hong Kong
- ◆ Opened in Nov 2018
- ◆ The widest module 4.5m
- ◆ More new technologies and models
- ◆ Pilot project videos, exclusive interviews, project updates and information



- More display units/devices/equipment to show MiC information

- Sample connections to showcase the connection of the building

Resources Centre

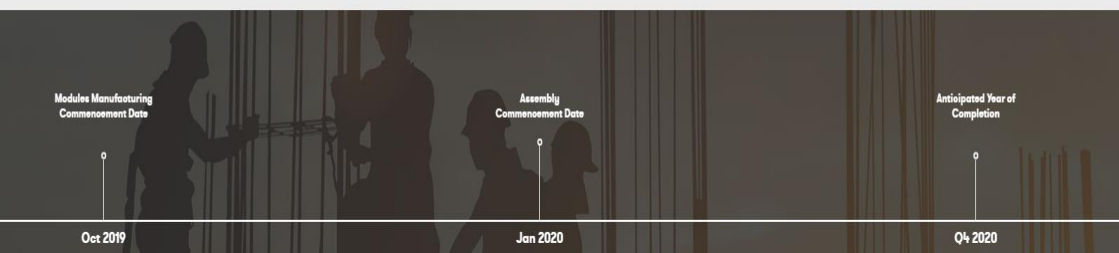
[News](#)[Events](#)[What is MiC](#)[MiC Development in Hong Kong and Overseas](#)[MiC Display Centre](#)[Download Centre](#)[Contact and Enquiry](#)

19,000
(M²) CFA

10,990
(M²) MiC CFA

17
SUPERSTRUCTURE STOREYS

15
MiC STOREYS



- ◆ Local MiC Projects Info
- ◆ Overseas MiC Projects Info
- ◆ MiC News
- ◆ Government Technical Guidance/Circulars
- ◆ >100 MiC Suppliers Info
- ◆ CIC Events
- ◆ MiC Reference Materials
- ◆ Exclusive Pilot Project Teams' Interviews/Footages

Online Resources Centre

MiC Website

Projects In Hong Kong | Overseas Significant Projects



Disciplined Services Quarters for the Fire Services Department at Pak Shing Kok, Tseung Kwan O
The Architectural Services Department's Disciplined Services Quarters for the Fire Services Department at Pak Shing Kok, Tseung Kwan O is the first public works project adopting MiC in Hong Kong. It turns a new page in the construction industry. [Details](#)



Elderly's Home at Jat Min Chuen in Sha Tin
Hong Kong Housing Society will use MiC method to build a tower for the elderly on a badminton court at Jat Min Chuen in Sha Tin. The targeted tenants are households aged 70 or older and living in oversized rental flats. Those are willing to trade down will be exempted from paying rent for their lifetimes. [Details](#)



InnoCell at Hong Kong Science Park
Hong Kong Science and Technology Parks Corporation announced that InnoCell, a smart living and co-creation community for tech talents, will be built using the MiC technology. [Details](#)



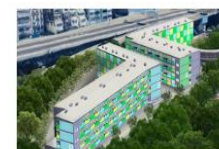
Residential Care Homes for the Elderly (RCHE) in Kwu Tung North
The Architectural Services Department "Multi-welfare Services Complex" for the Social Welfare Department in Kwu Tung North is a 8-storey building, providing residential care homes for the elderly, which will be built using Modular Integrated Construction (MiC) technology. [Details](#)



Student Residence at Wong Chuk Hang Site for the University of Hong Kong
A new student residence of HKU at Wong Chuk Hang has been selected by Development Bureau as a pilot MiC project. The funding for this project has been approved by the Finance Committee of the Legislative Council Construction commenced in the third quarter of 2019. [Details](#)



Transitional Homes at Nam Cheong Street in Sham Shui Po
The Hong Kong Council of Social Service (HKCSS) launched the "Modular Social Housing Project". The project adopts MiC method to build transitional social homes. The first project is located in Sham Shui Po. The Community Care Fund has approved HK\$25 million subsidies. Meanwhile, the developer will rent the site for HK\$1. The project is under progress now. [Details](#)



Transitional Homes at Yen Chow Street in Sham Shui Po
HKCSS launched the second project under "Modular Social Housing Project". It is an idle government land located at Yen Chow Street in Sham Shui Po where will provide around 205 household units. [Details](#)



Transitional Homes at Yip Shing Street in Kwai Chung
HKCSS launched the third project under "Modular Social Housing Project". It is an idle government land located at Yip Shing Street where will provide around 100 household units. [Details](#)



Topic

Proposed Speaker

Date

1	Transitional Social Housing	HKSARG/PolyU/HKCSS	8 Jul
2	DWSS on InnoCell	HKSTP/Dragages	16 Jul
3	HKSTP InnoCell Project	HKSTP/L&O/HH/ATAL	7 Aug
4	DfMA/MiC MEP	ATAL	TBC
5	MiC and IT technology	TBC	End of Aug

InnoCell



Nam Cheong Street
Transitional Homes

Quarantine Camp at Penny's
Bay (Phase 1)

Quarantine Camp at Lei Yue Mun

Webinars/Seminars



◆ Various **Webinars on**

- Innovation
- Professionalization
- Revitalization



◆ Enrich industry practitioners' **knowledge**

◆ Share the **latest construction developments**

◆ Provide **practical knowledge and information** including transitional social housing projects

Local Site Visits

Pilot Projects in Hong Kong

Period	Site
8, 10 Jan 20	ArchSD PSK Site
12 Mar 20	InnoCell
9 Apr 20	Penny's Bay Quarantine Centre
4 May 20	Lei Yue Mun Quarantine Centre
20 May 20	Nam Cheong Street Project



ArchSD PSK Site



InnoCell



Penny's Bay Quarantine Centre



Lei Yue Mun Quarantine Centre



Nam Cheong Street Project

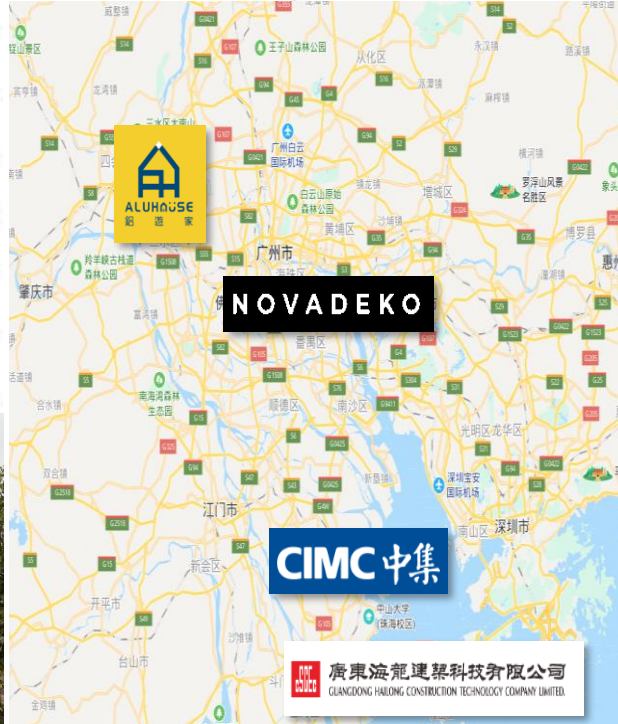


Visit to MiC Factories in Greater Bay Area

14-16 Jan 2020 For NGOs



香港聖公會福利協會有限公司
HONG KONG SHENG KUNG HUI WELFARE COUNCIL LIMITED



Technical Visit to Singapore

24-26 June 2019



- ◆ Site and Corporate Visits
- ◆ Explore opportunities in providing suitable training courses on MiC (PPVC) for Hong Kong stakeholders
- ◆ Bring advanced technologies to Hong Kong
- ◆ Knowledge exchange on MiC projects



3-Day Executive Training Course in Singapore In Sep 2019

- ◆ Lectures/ Case studies/ Site visits
- ◆ Delegation includes clients, consultants, contractors, NGOs, etc.



- ◆ Knowledge sharing and networking
- ◆ Understand the DfMA application spectrum with focus on PPVC to help participants' consideration in design and construction for MiC projects



Training Courses for MiC

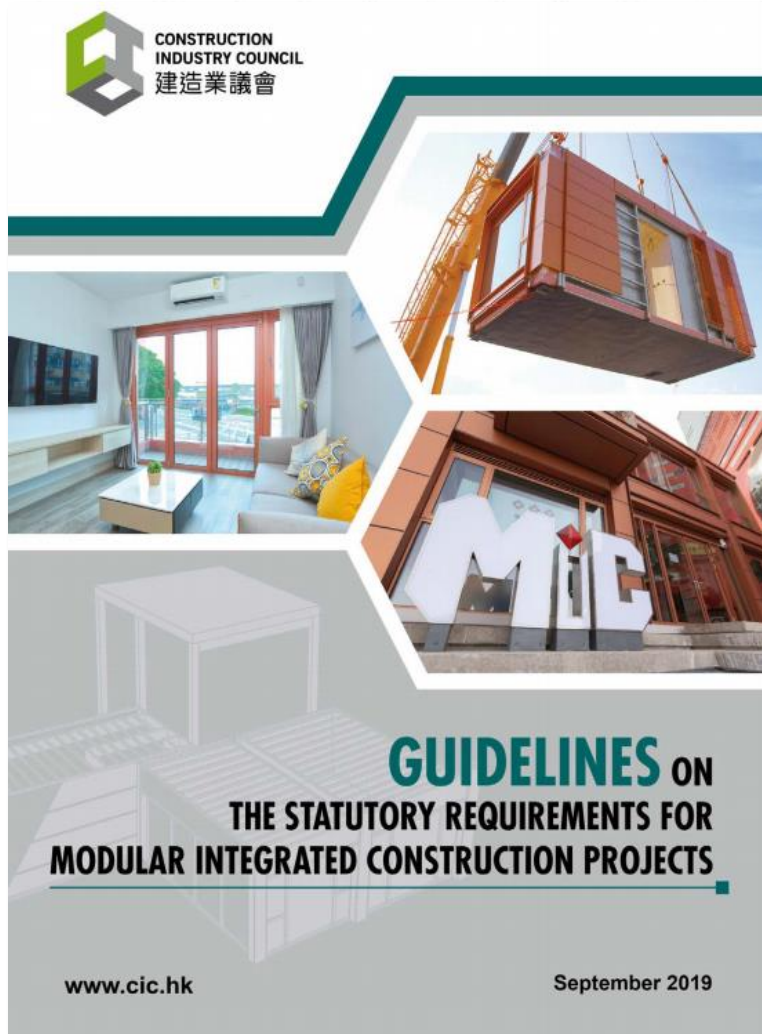
Courses	Date	Content
Certificate in MiC for Project Manager and Clerk of Works	Q3 2020	The architectural concept, related legal requirements, testing requirements and BIM management platform
Certificate in Modular Integrated Construction (MiC) for Foremen	July 2020	Changes in works and roles of a foreman; practicality and operability
Certificate in Lifting Safety Supervisor	June 2020	The necessary knowledge and supervision skills in lifting
Certificate In MiC Module Installation	Q3 2020	MiC module installation courses for riggers / metal formwork installers

Equip students with the latest industry knowhow

Enhance overall productivity and quality in construction

Expanding on MiC and DfMA related courses to cater for the industry's development and market needs

Reference Material



- ◆ Reference Material prepared with input/support from Government Regulatory Departments
- ◆ Provide information and references to facilitate implementation of MiC building projects (including TSH projects) in Hong Kong
- ◆ 2nd version with updates from BD, EPD, TD and WSD
- ◆ Q&As on Transport of MiC Modules and WLP Applications



THE CONSTRUCTION INNOVATION AND TECHNOLOGY FUND (CITF)

Established to encourage wider adoption of innovative constructive methods and new technologies with a view to enhancing productivity, uplifting built quality, improving site safety and enhancing environmental performance.

Covers technology adoption & manpower development.

Total funding of **HK\$1 billion**.

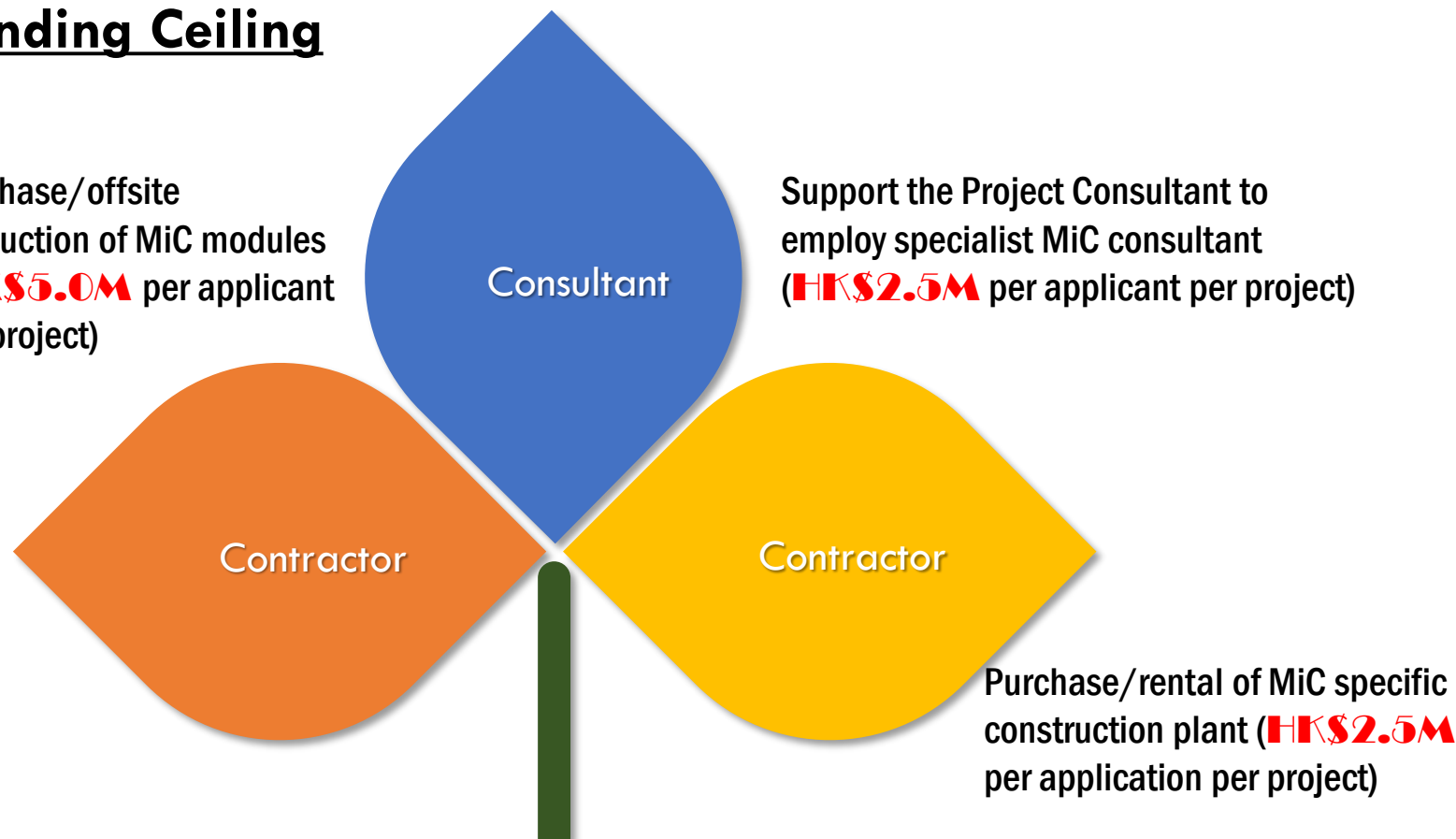
Funding Mode

Co-fund with **70%** grant from CITF at maximum for costs involved

Funding Ceiling

Purchase/offsite production of MiC modules (**HK\$5.0M** per applicant per project)

Supports projects with good social cause

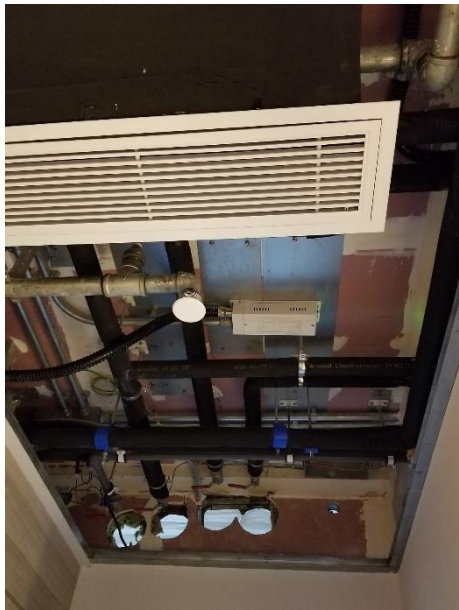


Approx. Proportion of Modular Cost



Structural Carcass

- ◆ Structural Steel
- ◆ Fire Protection to Steel
- ◆ Floor Slab/Roofing Sheet
- ◆ Connections, etc.



MEP

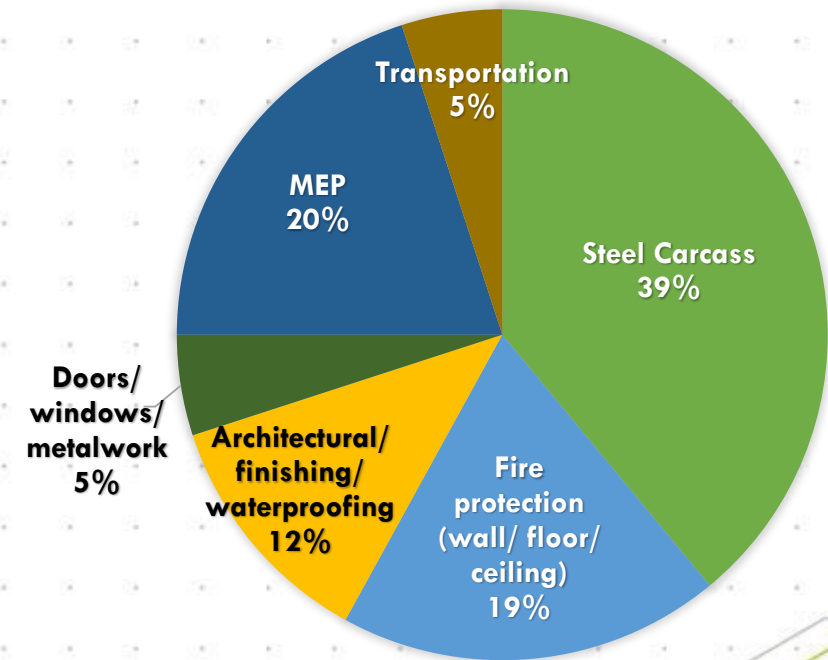
- ◆ Electricity
- ◆ Plumbing
- ◆ Drainage
- ◆ Fire Services
- ◆ Air-conditioning, etc.



Transportation

- ◆ Shipment
- ◆ Land Transport

Q1 你是否認同過渡性社會房屋應採用統一的標準室內單位設計？	Count	Percentage
非常不同意	2	1.32%
不同意	7	4.64%
頗不同意	19	12.58%
中立	27	17.88%
頗為同意	21	13.91%
同意	52	34.44%
非常同意	23	15.23%
Total	151	100.00%



Challenges

Statutory approval 01

BD, FSD, WSD, EMSD, TD, EPD, Custom & Excise Department, etc.

Supply chain (both material & manpower) 02

Availability & capability

Logistics (Width of modules) 03

Shipping/road transport, local site storage or Just-in-time (JIT) delivery

Design 04

Standardization on module types and sizes, building components and material standards, design freeze, maintenance & renovation

GFA concession 05

Thicker walls

Skills shortage 06

Overseas factories and Hong Kong

QA/QC 07

Inspection and acceptance

Procurement 08

D&B, insurance, ECI, down payment, material offsite and ownership

Technical issues (Materials standards) 09

Waterproofing, durability, fire protection and connections



Take Aways

- ◆ MiC has many advantages, in particular, **speed**
- ◆ The TSH project (15,000 units in 3 years) is very **challenging**
- ◆ MiC is a suitable solution to meet **social housing needs**
- ◆ Economy of scale is needed **for cost effectiveness** and **speed**
- ◆ Work on **design standardisation** across projects (module types and sizes, building components and material standards)
- ◆ Engage supply chain (GBA) and deal with **logistics upfront**
- ◆ The TSH project will **facilitate MiC development** in HK
- ◆ **CIC stands ready** to help

