

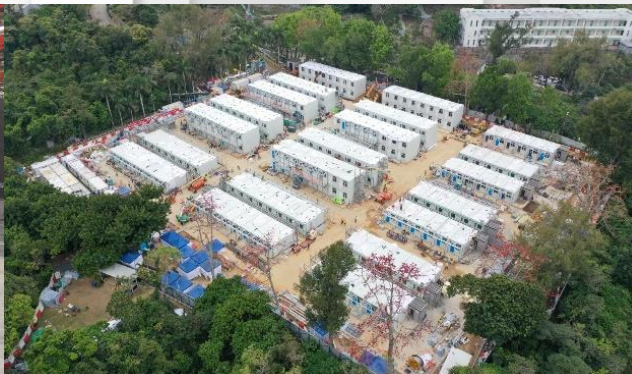
The Hong Kong Concrete Institute (HKCI)



Annual Seminar 2020

Modular Integrated Construction – Issues and Solutions

Mr. YU Tak Cheung, JP
Director of Buildings, Buildings Department





Source:

https://www.bing.com/images/search?view=detailV2&thid=AMMS_44ab0a96ad53526f28035785b8eb30c5&mediaurl=http%3a%2f%2fupload.wikimedia.org%2fwikipedia%2fcommons%2fd%2fdc%2fSteve_Jobs_Headshot_2010-CROP_%2528cropped_2%2529.jpg&expw=2929&expw=3026&q=steve+job&selectIndex=0&stid=a92f6c87-d5f3-7bd6-c85c-f7e39061e30f&cbn=EntityAnswer&FORM=IRPRST&idpp=overlayview&ajaxhist=0





**“Design is not just what it
looks like and feels like.
Design is how it works.”**

Steve Jobs

Modular Integrated Construction



Traditional
Cast-in situ
Concrete

***2D Precast
Construction***



3D Modular
Integrated
Construction

Modular Integrated Construction



What is MiC?

Freestanding volumetric modules (with finishes, fixtures, fittings, etc.) manufactured off-site and then transported to site for assembly (PNAP ADV-36)



**Off-site
Production**



On-site Installation



**Module
Transportation**



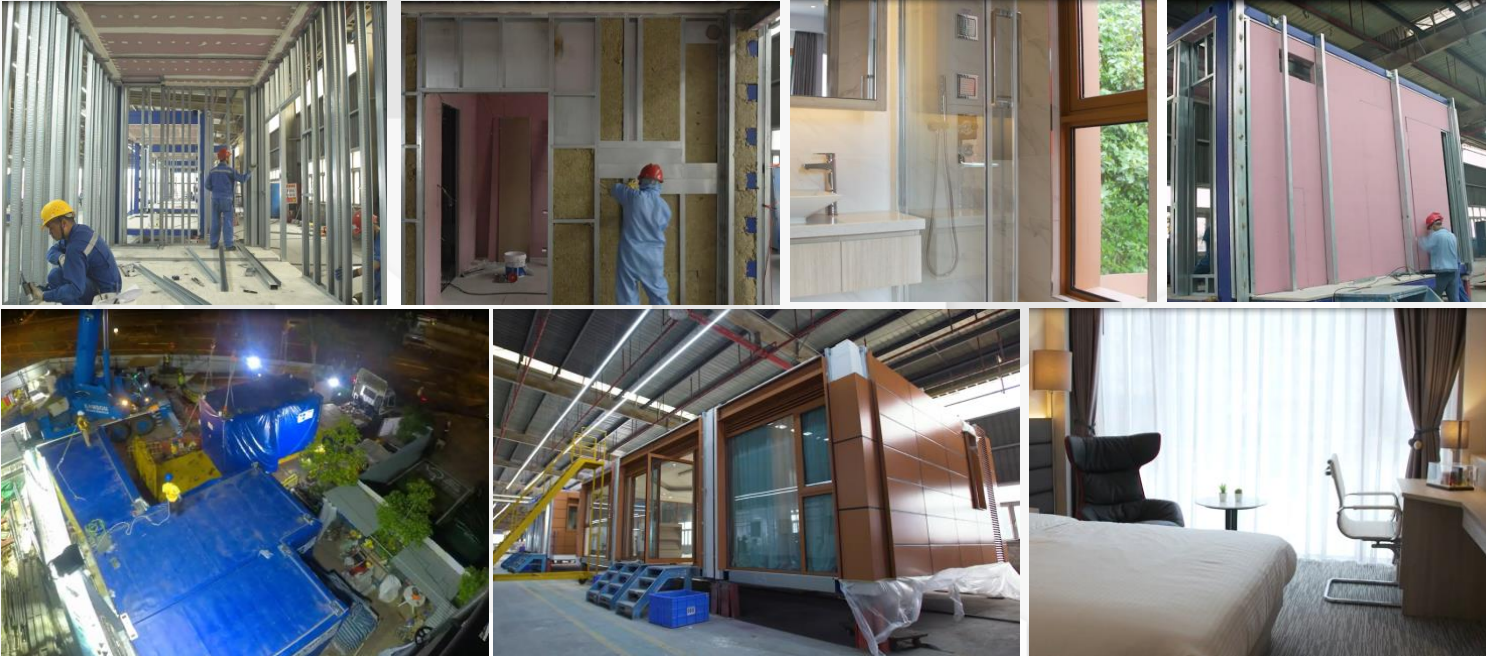
Completion

Modular Integrated Construction

What is MiC?



Volumetric modules prefabricated and completed with finishes, fixtures, fittings, etc. in a controlled factory environment



Modular Integrated Construction



Challenges of the Construction Industry

- Ageing workforce
- Shortage of skilled workers
- Young people reluctant to join the construction workforce
- High construction cost
- Declining productivity



Source: Construction 2.0, Development Bureau



Modular Integrated Construction

Government's Initiatives



Adopting Innovative Construction Method

- Promote and lead the adoption of Modular Integrated Construction in the construction industry. By adopting the concept of “factory assembly followed by on-site installation” and the mode of manufacturing, labour intensive processes can be accomplished in off-site prefabrication yard with a view to enhancing productivity and cost-effectiveness. (DEVB) ([New Initiative](#))



Modular Integrated Construction

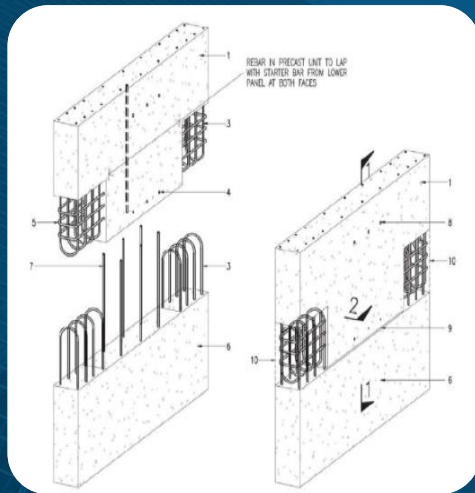
Technical Challenges



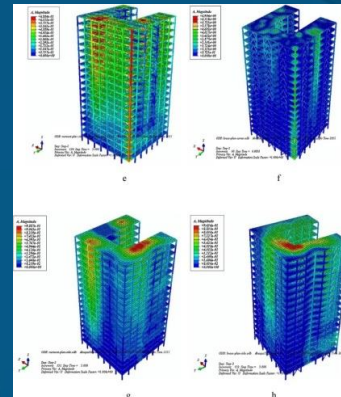
Code of Practice on Wind Effects
in Hong Kong 2019



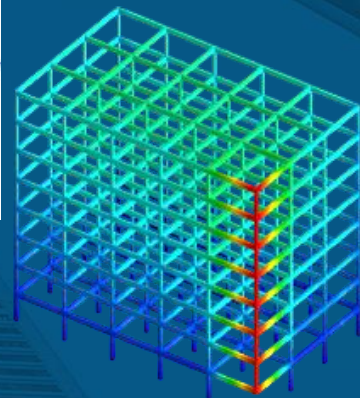
Strong Wind



Structural
Connections



Robustness



Modular Integrated Construction

Technical Challenges



Module Lifting Capacity



**Quality Assurance :
Factory outside HK**

Modular Integrated Construction

Facilitation Measures (PNAP)



Buildings Department	Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers	ADV-36
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Modular Integrated Construction

Introduction

Modular Integrated Construction (MiC) is a construction method that employs the technique of having freestanding volumetric modules (with finishes, fixtures, fittings, etc.) manufactured off-site and then transported to site for assembly. Proven benefits include improved site safety, more efficient and better quality control, shortened construction period, less construction waste, less demand for on-site labour, less disturbance and nuisance to the neighbourhood, etc., not just contributing to the quality and sustainable built-environment but also help ease some of the challenges of the local construction industry. To encourage MiC, the Buildings Department (BD) has formulated streamlined measures and guidelines to facilitate the industry in meeting the relevant standards and requirements under the Buildings Ordinance (BO).

Considerations Unique to MiC

2. Similar to the use of prefabricated building components, the project team should engage the MiC suppliers at the early design stage to sort out the issues usually not encountered in conventional in-situ construction. Apart from the extent of standardisation and buildability of such modules, the mode of delivery with due regard to the specific site conditions, the issues that may arise from meeting the relevant requirements including those on supervision as well as the programme of plan submissions to the BD should be considered in advance. General guidelines on the design and quality control requirements under the BO for MiC are given in Appendices A and B respectively.

PNAP APP-36

Appendix A – Design Requirements

- Fire Safety
- Joints and Gaps
- Structural Design
- Provisions for Maintenance

Appendix B – Quality Control and Supervision

Appendix C – Pre-acceptance Checklist for MiC

Modular Integrated Construction

Facilitation Measures (IPA)



Form MIC 1



Integrated



Application Checklist

Appendix C (PNAP ADV-36)

Pre-acceptance Application Checklist for MiC

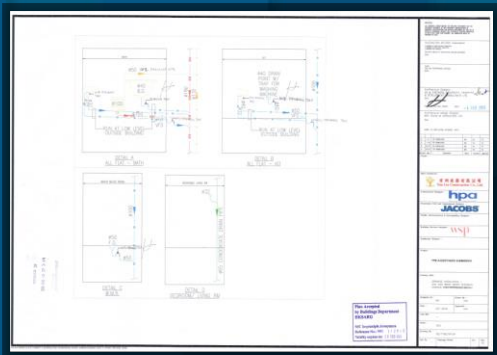
The application checklist aims to remind AP and RS that the following information should be contained in the plans and supporting documents submitted with the application. The checklist should be completed by the AP and any other information essential for the assessment of the application is in Section 10.

Material Product Specification & QAS

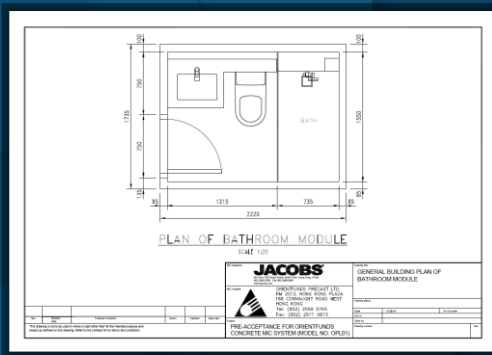
Quality Assurance Scheme on Concrete Module Production



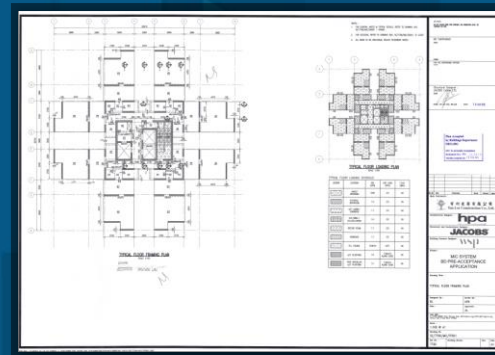
GBP Plans/ Details



Drainage Plans/ Details



Structural Plans / Calculation



Modular Integrated Construction

Facilitation Measures (IPA)



**IPA
Submission**

**Notify applicant
within 45 days**

Accept

- Shown in BD website
- Assigned a unique reference no for a validity period of max. 5 years

Reject

- Applicant to be re-submit within 60 days


Abandoned

- if no response from applicants for 60 days

Modular Integrated Construction

Facilitation Measures (IPA)






Buildings Department
The Government of the Hong Kong Special Administrative Region

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[Building works](#)
[Safety and inspection](#)
[Resources](#)
[About us](#)

Codes and references

Modular Integrated Construction

[Home](#) > [Resources](#) > [Codes and references](#) > [Modular Integrated Construction](#)



Pre-acceptance Mechanism

Introduction

Modular Integrated Construction (MiC) refers to a construction whereby free-standing integrated modular units are manufactured in a factory and then transported to site for installation in a building.

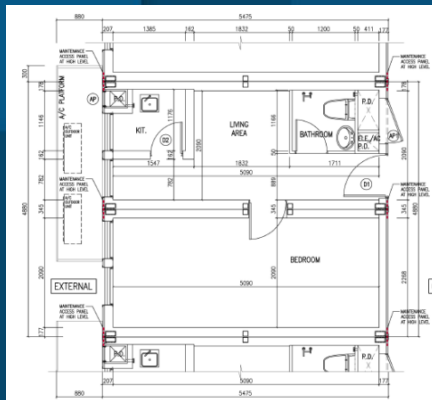
	No. of Application	No. of In-principle Acceptance Granted
2018	12	4
2019	31	4
2020 (Up to October)	37	19
TOTAL	80	27
Accepted Lists on BD Website		
Steel MiC System: 18		
Concrete MiC System: 9		

Modular Integrated Construction

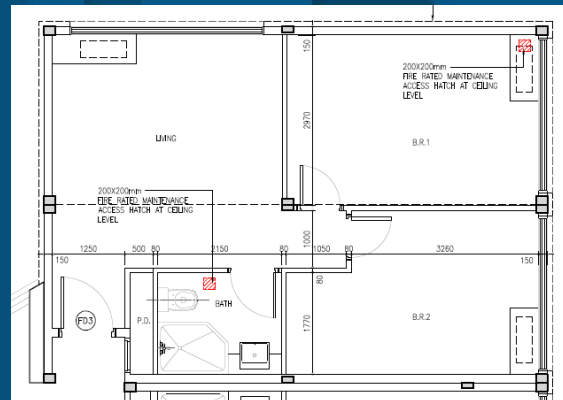
Accepted MiC Systems



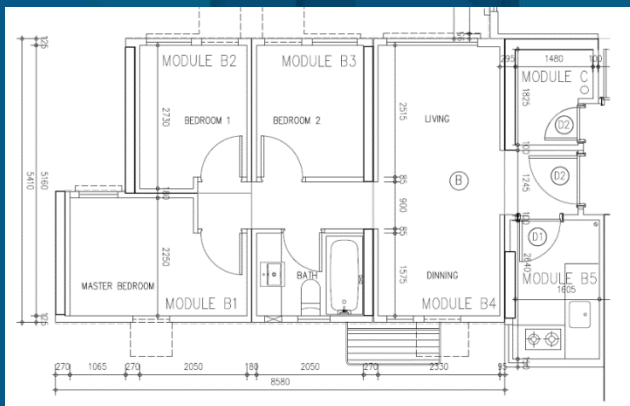
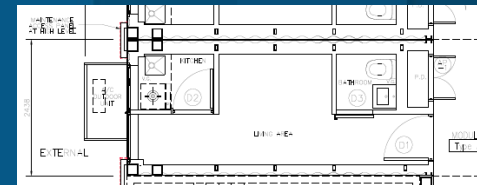
1-bedroom Unit



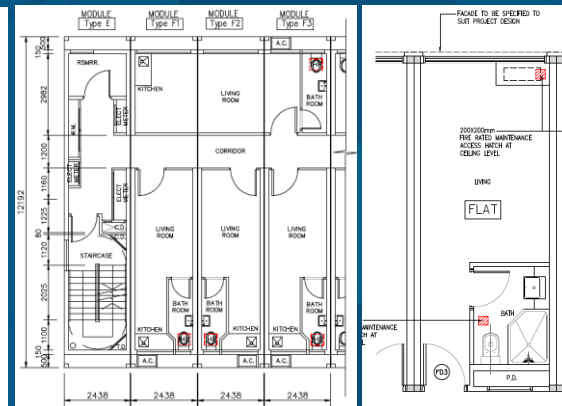
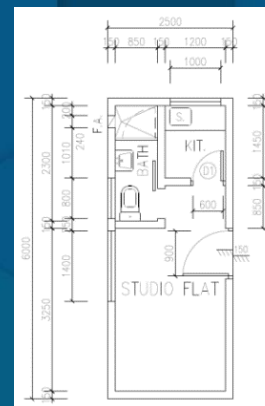
2-bedroom Unit



Studio Flat

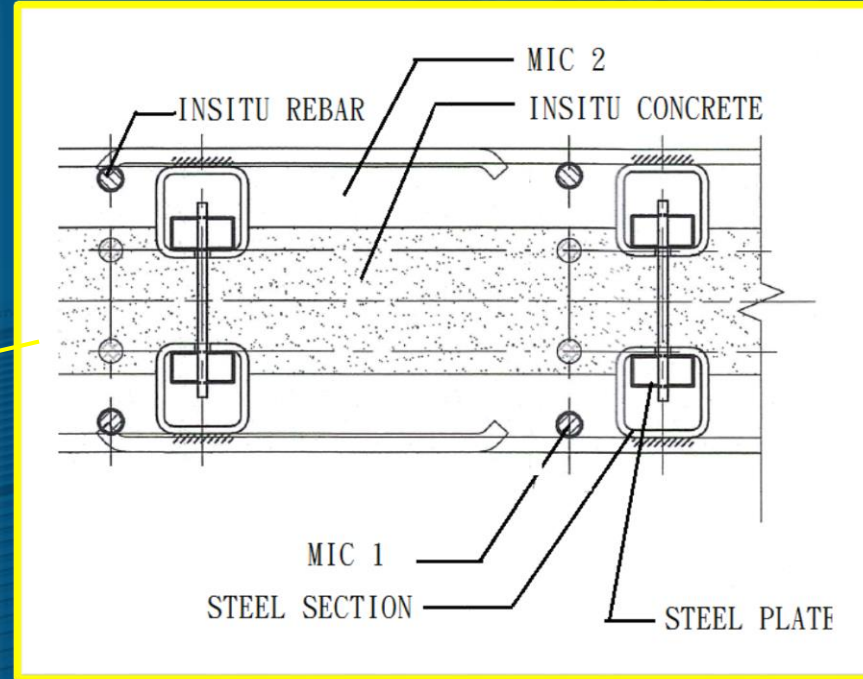
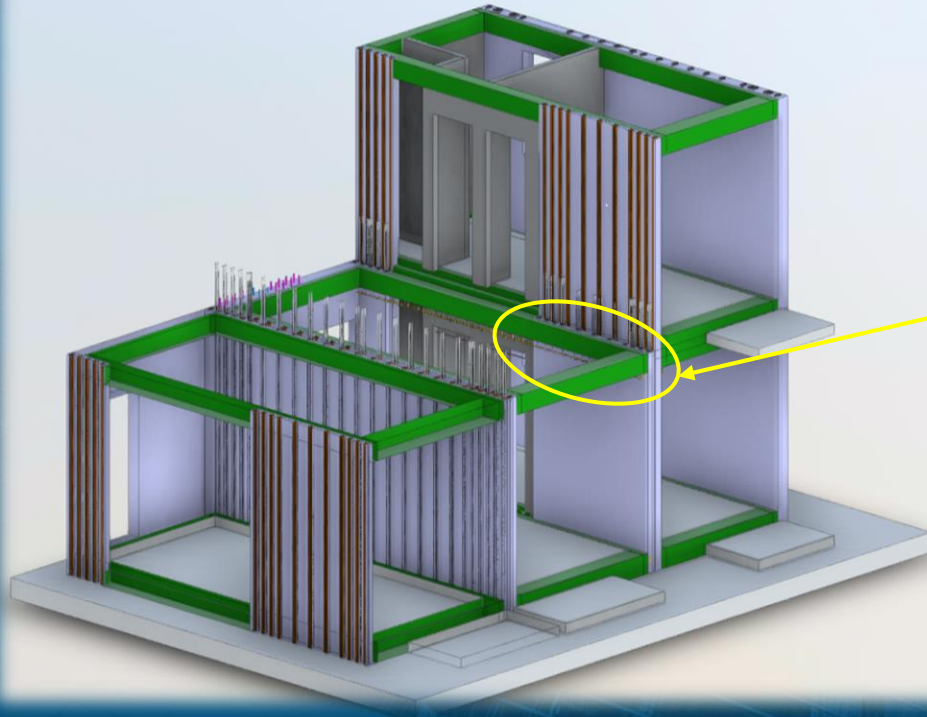


3-bedroom Unit



Modular Integrated Construction

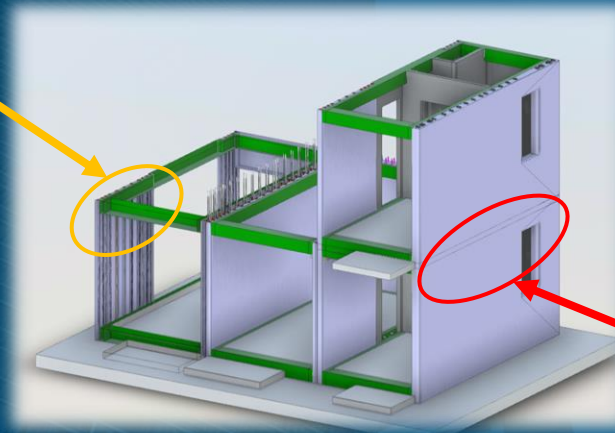
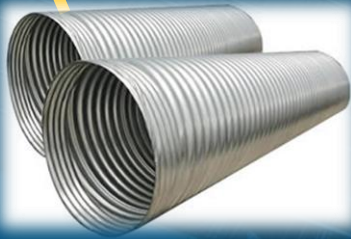
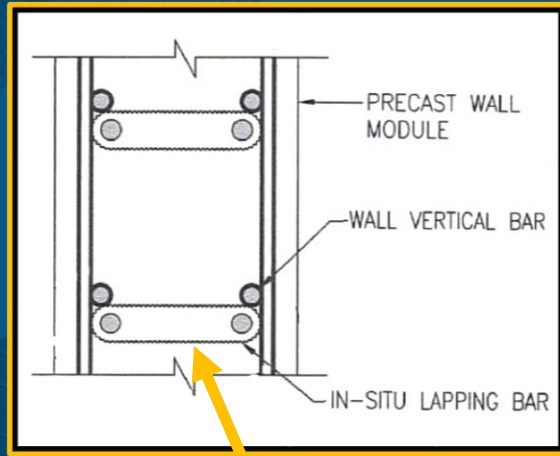
Accepted Concrete MiC System



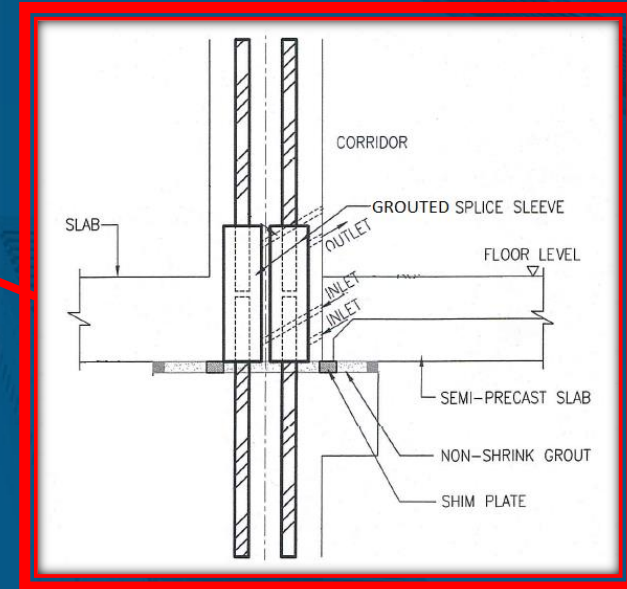
Patented Details

Modular Integrated Construction

Accepted Concrete MiC System

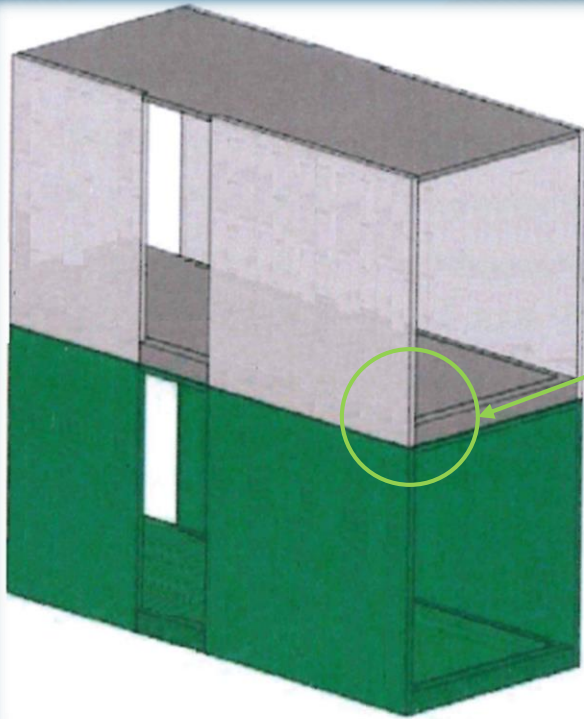


Patented Details



Modular Integrated Construction

Concrete MiC – Connection Details



Redacted

Redacted

Modular Integrated Construction

Quality Control and Supervision



- Module Fabricated by a Factory with ISO 9001 or Equivalent Quality Assurance Certification
- Quality and Qualified Supervision

Table 1 Minimum Qualification and Supervision Frequency of QCST and QCCT

	AP Stream	RSE Stream	RC Stream	
Qualifications of Supervisory Personnel	T3*	T3*	T3*	T1*
Supervision Frequency	Weekly	Weekly	Weekly	Continuous

* T3/T1 refers to Grade T3/T1 Technically Competent Person equivalent as stipulated in the Code of Practice for Site Supervision

- Monthly or On-site Audit Checks by AP and RSE



Certificate No. CC 1196

This is to certify that the Quality Management System of

STARFON COMPANY LIMITED

complies with the requirements of ISO 9001 : 2015 quality management system standard, applicable to:

Design, production and supply of all kinds of precast concrete products including precast facade, panel wall partition, semi-precast slab, precast staircase, precast bathroom, precast kitchen, semi-precast water tank, cooking bench and sink unit Design, manufacturing and supply of Starfon™ products used in cladding, partition, countertop, decorative board, door, furniture, interior decorative article, wall tile and floor tile

The certificate remains valid subject to satisfactory maintenance of the system which will be monitored by Hong Kong Quality Assurance Agency.

Signed for and on behalf of
HONG KONG QUALITY ASSURANCE AGENCY



Chief Executive Officer

Director

Registered address: 11/F, S. Wah Centre, 171 Jena Road, North Point, Hong Kong. Tel: (852) 2202 1411 Fax: (852) 2202 1022
Held in accordance with the Agency's Regulation, the Hong Kong Quality Assurance Agency maintains its liability or responsibility for any product or service supplied by the organization in accordance with the requirements of this Certificate Scheme. The use of the Accreditation number shown on this certificate (if applicable) confers accreditation in respect of those activities covered by the Accreditation Authority. This certificate remains the property of HKQAA and shall be returned when required by the Agency. Further clarifications regarding the scope of this certificate and the applicability of ISO 9001 : 2015 requirements can be obtained by consulting the organization.

Date of Issuing: 17 August 2018 Expiry Date: 24 August 2020
Effective Date (Re-certification / Extension / Renewal): 30 August 2017 Amendment Date: 14 June 2017



HKQAA 9124 Rev.12

Modular Integrated Construction

Quality Control and Supervision



Circular Letter



來函編號 Your Ref. :
本署編號 Our Ref. : BD GR/1-125/54
電話號碼 Tel No. : 2626 1138
傳真號碼 Fax No. : 2625 4061
網址 Web Site : www.bd.gov.hk

7 February 2020

To: All Authorized Persons
Registered Structural Engineers
Registered Geotechnical Engineers
Registered General Building Contractors
Registered Specialist Contractors
Registered Minor Works Contractors

Dear Sirs/Madams,

**Qualified Supervision for Precast Concrete Construction,
Modular Integrated Construction and Heat Soak Process of Tempered Glass**

The use of precast concrete construction and tempered glass is common in development projects and there are several development projects adopting modular integrated construction (MiC) at module production stage. In general, the precast concrete elements, MiC modules and tempered glass are fabricated/produced in factories in the Mainland.

2. Under item 6 in section 17(1) of the Buildings Ordinance, conditions will be imposed when approving the plans of a development project (approval conditions) requiring, among others, qualified supervision provided by the project Authorized Person (AP), Registered Structural Engineer (RSE) and Registered Contractor (RC) as appropriate for the heat soak process of the tempered glass; and the fabrication, assembly, installation, erection and examination of precast

Issuance of Circular
letter on 7.2.2020 for
alternative
arrangement of
videotelephony to
conduct supervision

Modular Integrated Construction



Early Production of Modules

Quality Assurance Scheme and MiC Supervision Plan

- To be submitted at least 14 days before commencement of production work in factory
- Simultaneous construction in factory and on site



Modular Integrated Construction



GFA Concession

PNAP APP-161

- 6% of the MiC floor area to be disregarded from GFA calculation
- Not subject to the overall cap of 10% under PNAP APP-151

Buildings Department Practice Note for Authorized Persons,
Registered Structural Engineers and
Registered Geotechnical Engineers APP-161

Exemption of Gross Floor Area for Buildings adopting Modular Integrated Construction

Modular Integrated Construction (MiC) is a construction method that employs the technique of having freestanding volumetric modules (with finishes, fixtures, fittings, etc.) manufactured off-site and then transported to site for assembly. MiC has proven benefits on more efficient and better quality control, less construction waste, shortened construction period, etc. However, MiC will involve repetitive double walls between MiC modules and thicker enclosure walls to cater for rigging and hoisting during transportation and assembly on site.

2. To encourage wider use of MiC in new buildings, the Building Authority is prepared to grant the following gross floor area (GFA) exemptions:

- (a) 6% of the MiC floor area¹ of a new building may be disregarded from the GFA of the development upon submission of an application for exemption under section 42 of the Buildings Ordinance; and
- (b) The disregarded GFA under item (a) above is not subject to the overall GFA cap of 10% under PNAP APP-151.

List of GFA Concessions

		Practice Notes	Features subject to compliance with the pre-requisites in para. 6 & 7 of PNAP APP-151	Features Subject to the Overall Cap of 10% in para.4 of PNAP APP-151
Additional Green Features under JPN				
38.	Buildings adopting Modular Integrated Construction	JPN2 and PNAP APP-161		

Modular Integrated Construction

Completed Pilot MiC Projects



Disciplined Services Quarters for
The Fire Services Department at
Pak Shing Kok



InnoCell at Hong Kong
Science Park

Transitional Housing Project
at Nam Cheong Street



Modular Integrated Construction



Ongoing Pilot MiC Projects



HKU Student Residence
at Wong Chuk Hang



Elderly's Home at Jat Min Chuen
in Sha Tin



Residential Care Homes for the Elderly
At Kwu Tung North



Transitional Housing Project
at Yen Chow Street in Sham Shui Po



Transitional Housing Project
at Yip Shing Street in Kwai Chung



Public Housing Project
at Tung Chung Area 99

Modular Integrated Construction

Communication with Stakeholders



Briefing Session on PNAP APP-161 and PNAP ADV-36 for Modular Integrated Construction

16 September 2019

Alex CHIK Technical Secretary/Building
Fion AU Technical Secretary/Structural
Lawsons YUE Senior Building Surveyor/Hong Kong West 1



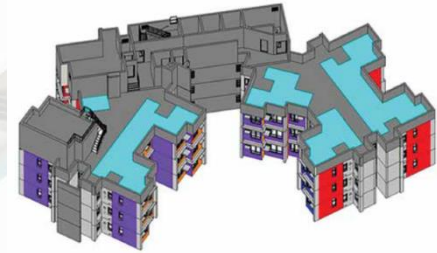
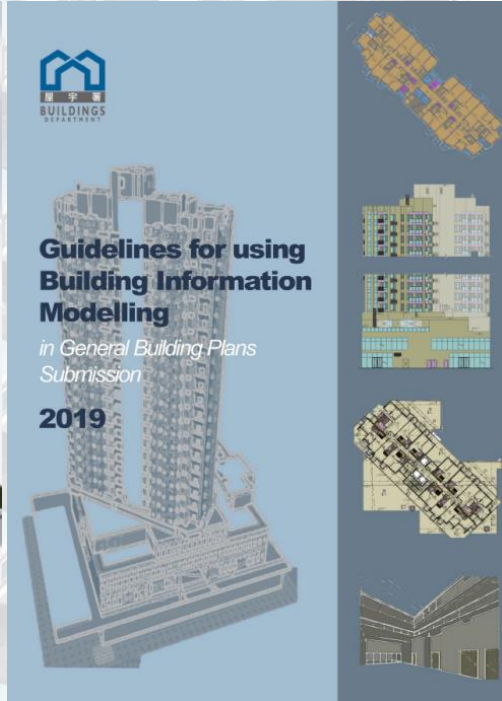
GUIDELINES ON THE STATUTORY REQUIREMENTS FOR MODULAR INTEGRATED CONSTRUCTION PROJECTS

www.cic.hk

September 2019

Modular Integrated Construction

Building Information Modelling



Thank you

