Modular Integrated Construction (MiC) Workshop on Technical Aspects of Design

Presentation by
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Technical Secretary/Structural

12 July 2021

Modular Integrated Construction (MiC)

What is MiC?

*A construction method that employs the technique of having **freestanding volumetric** modules with **finishes, fixtures, fittings**, etc. **manufactured off-site** in a controlled factory environment and then **transported to site** for assembly (PNAP ADV-36)*

On-site Installation

Off-site Production

Module Transportation

Completion

Source of Photos: Construction Industry Council

Modular Integrated Construction (MiC)

What is MiC?

Freestanding Volumetric Modules

Modular Integrated Construction (MiC)

What is MiC?

Completed With Finishes, Fittings and Fixtures

Finishes, fixtures & fittings to be completed and installed in the off-site factory:

- **Ceiling, wall and floor finishes except for jointing areas**
- **For painting, only final coat may be applied on site**
- **Window and doors**
- **For bathrooms/toilets : Sanitary fitments, plumbing and drainage pipes, cabinets and other fixtures**
- **For kitchens : Sanitary fitments, plumbing and drainage pipes, cooking benches, cabinets and other fixtures**
- **Electrical conduits and ducting**

Modular Integrated Construction (MiC)

What is MiC?

Completed With Finishes, Fittings and Fixtures

Modular Integrated Construction (MiC)

What is MiC?

Manufactured off-site

Source of Photos: Construction Industry Council

Modular Integrated Construction (MiC)

What is MiC?

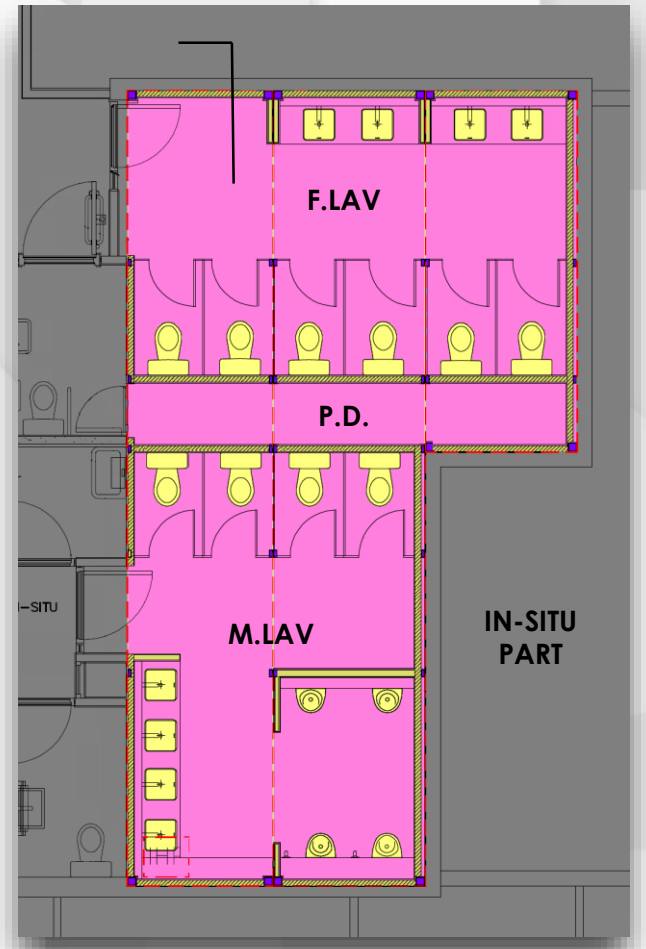
Transported to site for assembly

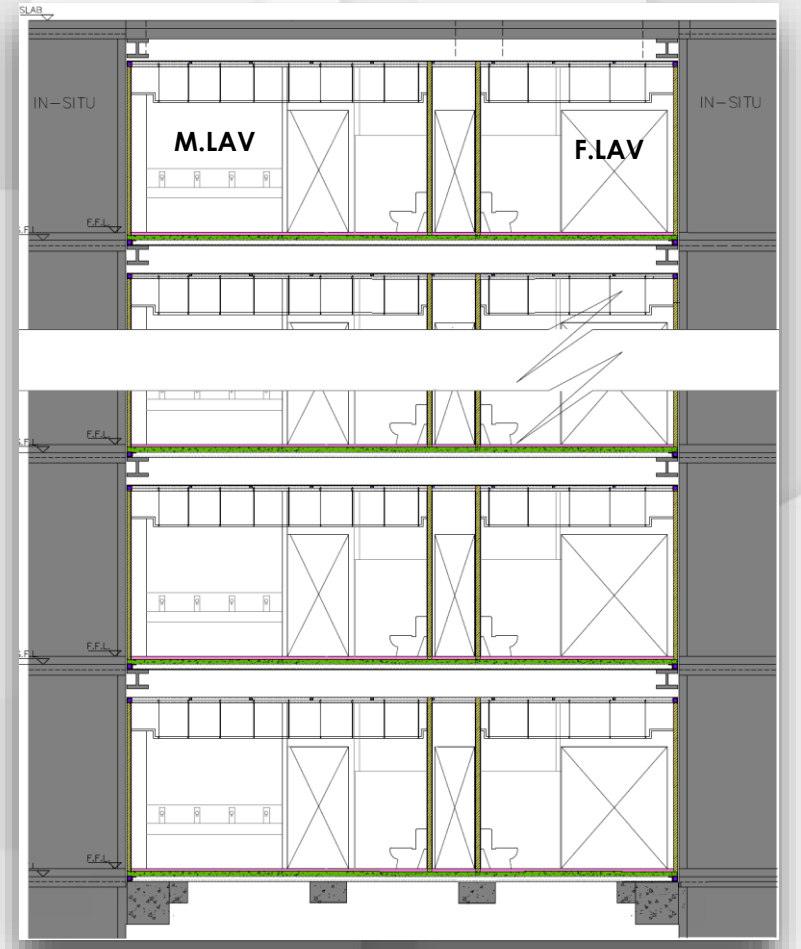
Source of Photos: Construction Industry Council

Modular Integrated Construction (MiC)

What is MiC?

Example of MiC: Toilet MiC Modules in Multi-storey Commercial Building



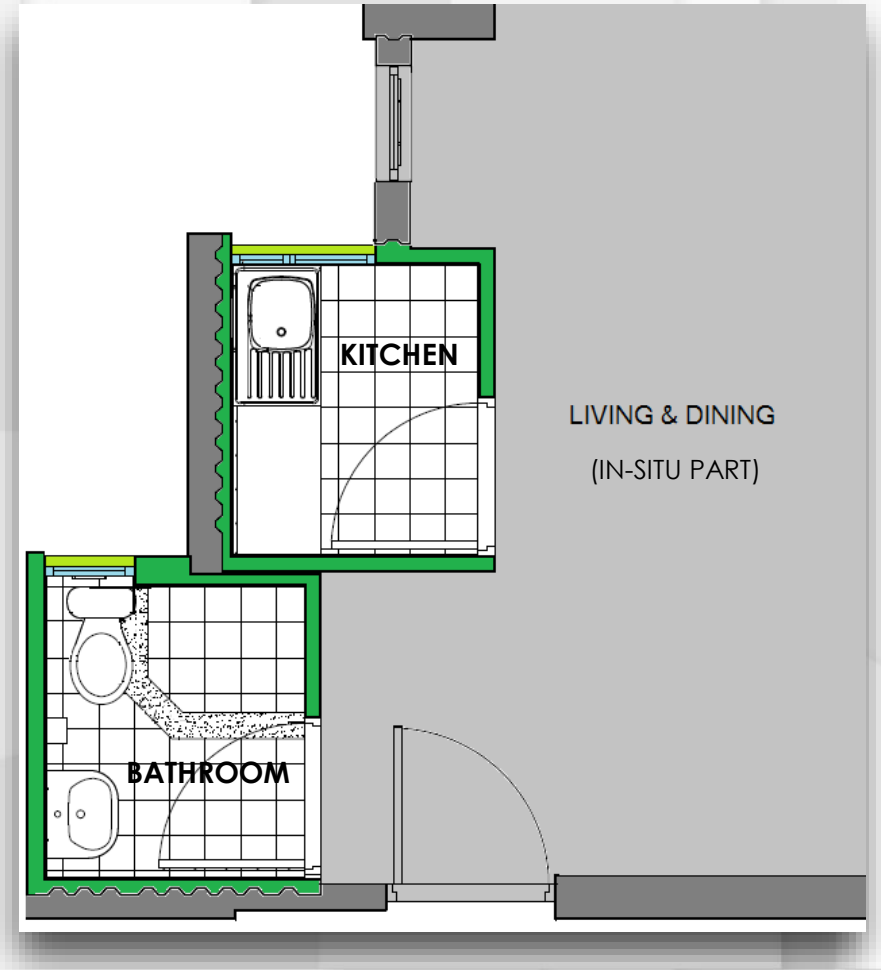


- Steel MiC modules with RC floor slab
- Module floor slab integrated with the building structure
- Modules with finishes, fixtures and fittings (including cabinets, MVAC, FSI, sanitary fitments, P&D, electrical appliances and associated conduits etc.) installed off site

Modular Integrated Construction (MiC)

What is MiC?

Example of MiC: Bathroom and Toilet Modules in Domestic Building



- Concrete MiC modules
- Modules with finishes, fixtures and fittings (including cabinets, cooking benches, sanitary fitments, P&D, electrical appliances and associated conduits etc.) installed off site

Modular Integrated Construction (MiC)

What is MiC?

Precast Components are NOT regarded as MiC

Precast Staircase

Precast Slab

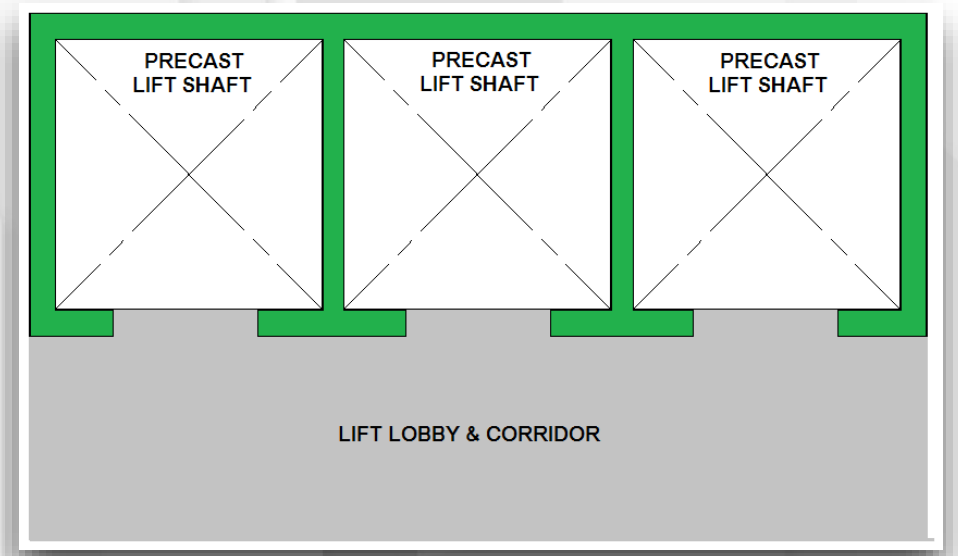
Precast Façade

Modular Integrated Construction (MiC)

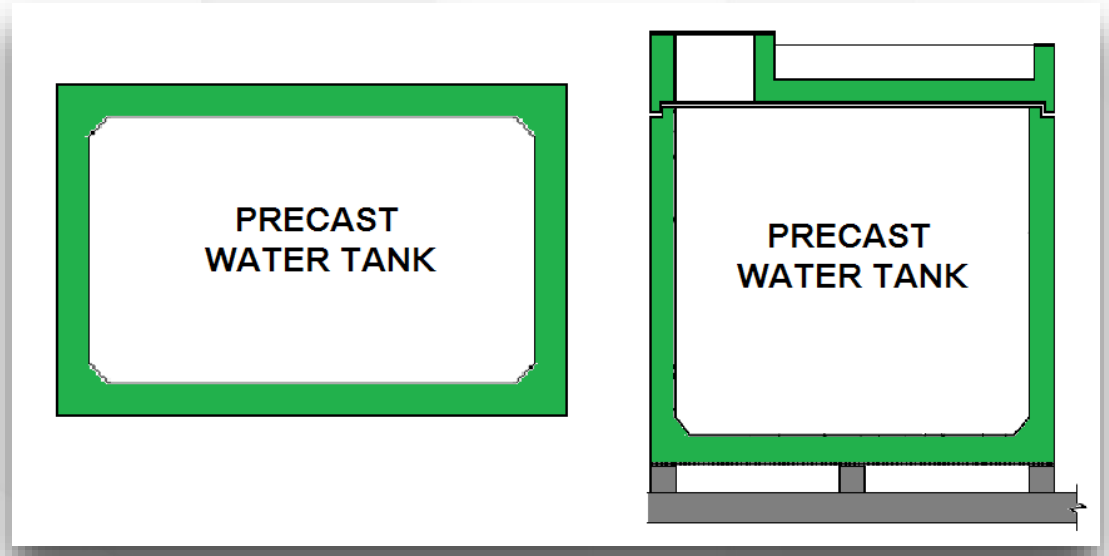
What is MiC?

Precast Components are NOT regarded as MiC

Precast Lift Shaft

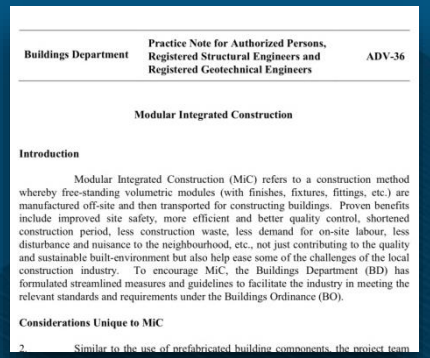


Precast Water Tank



Timeline of BD's Initiatives

Oct 2017
Policy Address 2017



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

Modular Integrated Construction

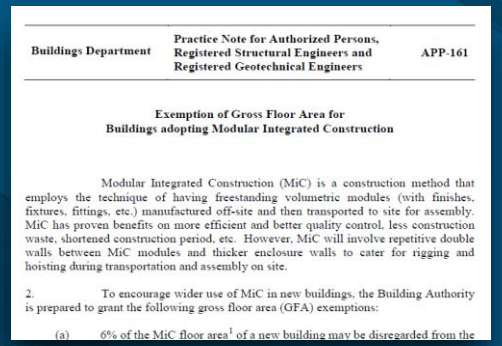
Introduction

Modular Integrated Construction (MiC) refers to a construction method whereby free-standing volumetric modules (with finishes, fixtures, fittings, etc.) are manufactured off-site and then transported for constructing buildings. 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

Dec 2017
Issue of PNAP ADV-36



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 area[1] of a new building may be disregarded from the

May 2019
Issue of PNAP APP-161 introduces GFA concessions for adoption of MiC

Jun 2021
Building Proposal with MiC Adopted
- 4 completed with OP Issued
- 18 approved
- 6 being processed

Nov 2017
Launch of Pre-acceptance Mechanism for granting In-principle Acceptance (IPA) to MiC systems/ components

Apr 2018
1st Pre-acceptance Submission Received

Sep 2018
1st In-principle Acceptance (IPA)

Jul 2020
1st Private MiC Building Completed with OP Issued

Facilitative Measures of MiC System

Modular Integrated Construction

PNAP ADV-36

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

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

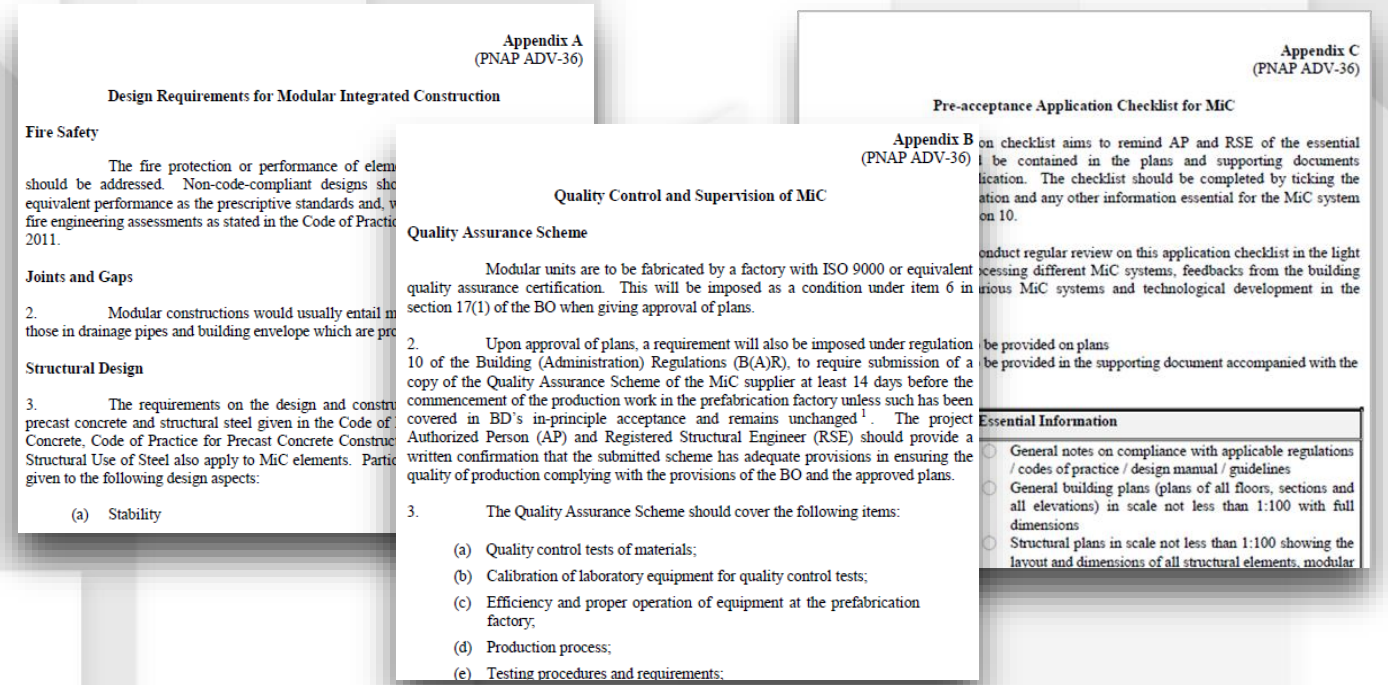
2. Similar to the use of prefabricated building components, the project team should engage the MiC suppliers at the early design stage to sort out the issues usually not encountered in conventional in-situ construction. Apart from the extent of standardisation and buildability of such modules, the mode 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.

(A) Design Requirements

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

(B) Quality Control and Supervision

(C) Pre-acceptance (IPA) Mechanism



Appendix A
(PNAP ADV-36)

Design Requirements for Modular Integrated Construction

Fire Safety

The fire protection or performance of elem
should be addressed. Non-code-compliant designs sho
equivalent performance as the prescriptive standards and, w
fire engineering assessments as stated in the Code of Practi
2011.

Joints and Gaps

2. Modular constructions would usually entail m
those in drainage pipes and building envelope which are pro

Structural Design

3. The requirements on the design and constru
precast concrete and structural steel given in the Code of
Concrete, Code of Practice for Precast Concrete Construc
Structural Use of Steel also apply to MiC elements. Partic
given to the following design aspects:

(a) Stability

Appendix B
(PNAP ADV-36)

Quality Control and Supervision of MiC

Quality Assurance Scheme

Modular units are to be fabricated by a factory with ISO 9000 or equivalent quality assurance certification. This will be imposed as a condition under item 6 in section 17(1) of the BO when giving approval of plans.

2. Upon approval of plans, a requirement will also be imposed under regulation 10 of the Building (Administration) Regulations (B(A)R), to require submission of a copy of the Quality Assurance Scheme of the MiC supplier at least 14 days before the commencement of the production work in the prefabrication factory unless such has been covered in BD's in-principle acceptance and remains unchanged[1]. The project Authorized Person (AP) and Registered Structural Engineer (RSE) should provide a written confirmation that the submitted scheme has adequate provisions in ensuring the quality of production complying with the provisions of the BO and the approved plans.

3. The Quality Assurance Scheme should cover the following items:

(a) Quality control tests of materials;
(b) Calibration of laboratory equipment for quality control tests;
(c) Efficiency and proper operation of equipment at the prefabrication factory;
(d) Production process;
(e) Testing procedures and requirements;

Appendix C
(PNAP ADV-36)

Pre-acceptance Application Checklist for MiC

on checklist aims to remind AP and RSE of the essential
be contained in the plans and supporting documents
lication. The checklist should be completed by ticking the
ation and any other information essential for the MiC system
on 10.

onduct regular review on this application checklist in the light
cessing different MiC systems, feedbacks from the building
rious MiC systems and technological development in the

be provided on plans
be provided in the supporting document accompanied with the

Essential Information
General notes on compliance with applicable regulations / codes of practice / design manual / guidelines
General building plans (plans of all floors, sections and all elevations) in scale not less than 1:100 with full dimensions
Structural plans in scale not less than 1:100 showing the layout and dimensions of all structural elements, modular

Quality Control and Supervision

Quality Control and Supervision (PNAP ADV-36)

Manufacture and Assembly in Off-site Factory

- QA System of Factory
  - ISO 9001 or equivalent quality assurance certification
  - Quality Assurance Scheme (QAS) to be submitted **14 days before production**
  - If QAS of future project mainly follows the one with IPA, submit revised portion
- Quality and Qualified Supervision
  - MiC supervision plan to be submitted 14 days before production
  - AP, RSE and the AS of RC should inspect and carry out audit checks at least once every month

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

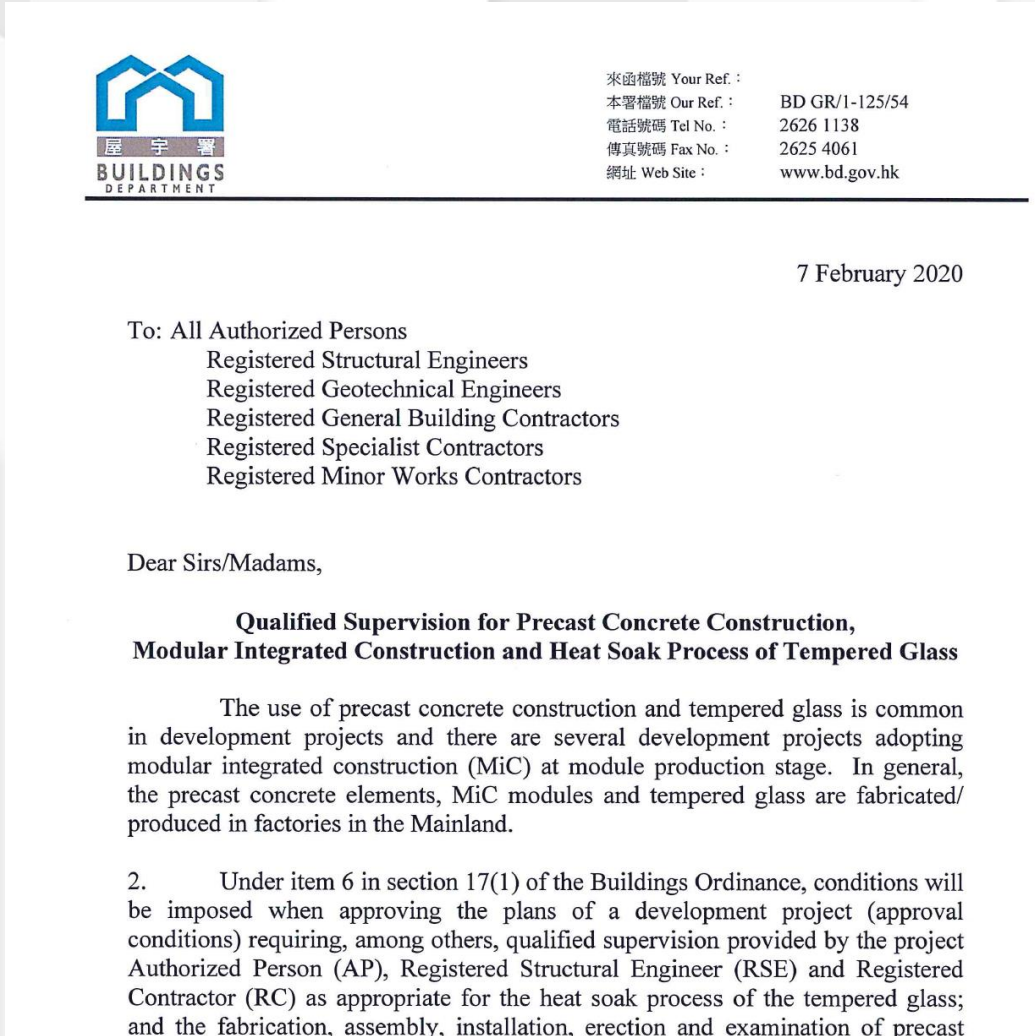
Installation on Site

- Quality supervision by AP, RSE and RC
  - Code of Practice of Site Supervision
  - If no audit check at factory by AP/RSE, on-site audit checks to quality of modules delivered to site (Sampling rate at least 1%)

Modular Integrated Construction

Quality Control and Supervision

Circular Letter



屋宇署
BUILDINGS DEPARTMENT

來函檔號 Your Ref. :
本署檔號 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

Plan Processing Mechanism

Pre-submission Enquiry Service

PNAP ADM-19

- To settle design principles of unconventional design or performance of modules or new construction materials in early design stage
- Project based, **site specific**

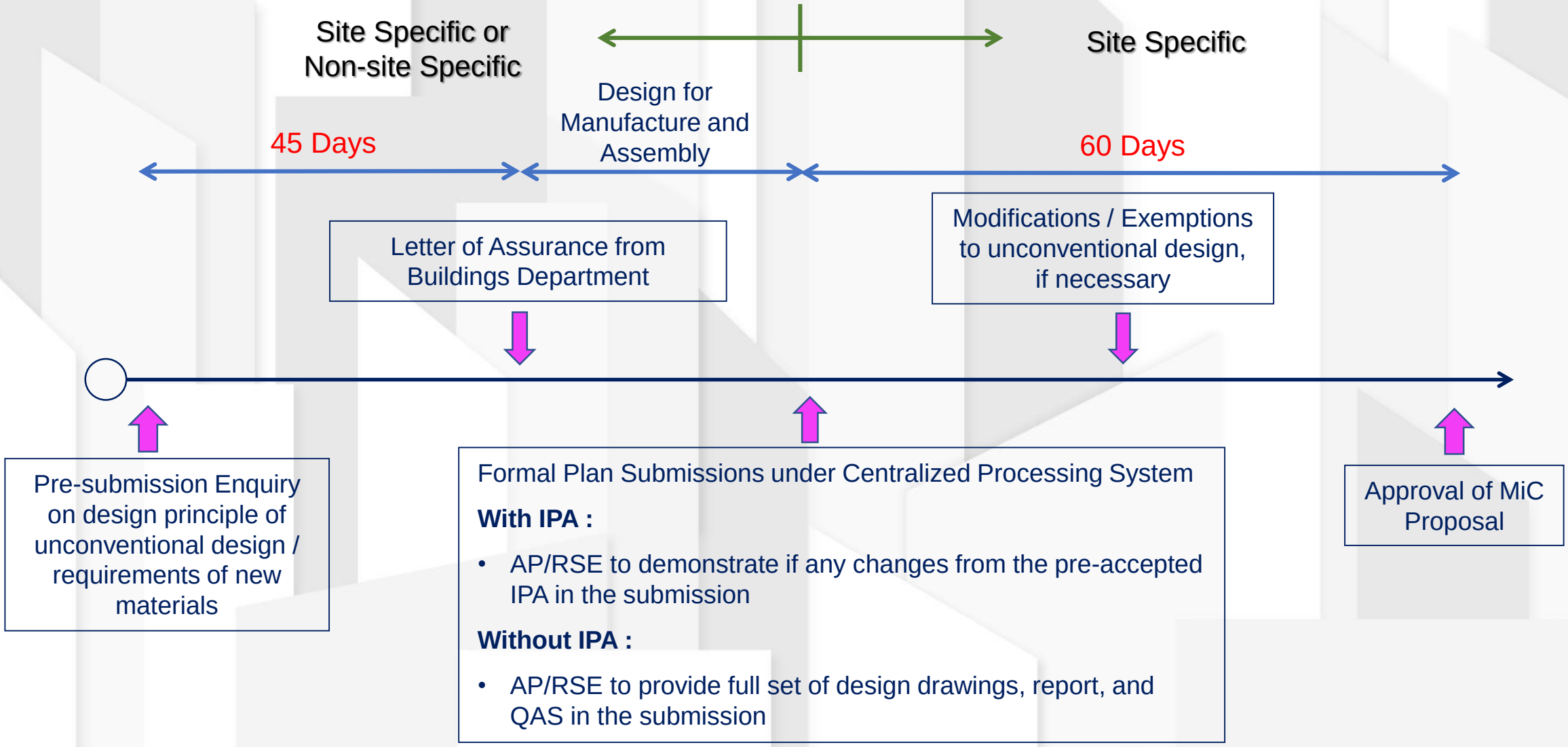
Pre-acceptance Mechanism

PNAP ADV-36

- A channel for industry to know about the MiC standards and requirements under Buildings Ordinance
- To resolve design and construction matters of MiC system / component
- Applicant based
- Based on assumed layout and **non-site specific** building details
- **Not** a pre-requisite for approval of plans for future projects
- Cover Quality Assurance Scheme (QAS) of factory

Pre-submission Enquiry Service

- For Client and/or AP/RSE of a particular project



Plan Processing Mechanism

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Pre-acceptance Mechanism

PNAP ADV-36

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- Based on assumed layout and **non-site specific** building details
- **Not** a pre-requisite for approval of plans for future projects
- Cover Quality Assurance Scheme (QAS) of factory

BUILDINGS DEPARTMENT

Pre-acceptance of MiC Systems

> Facilitate wider use of MiC

> Resolve non-site specific design for construction matters

> Provide greater confidence in using MiC

As at 30 June 2021

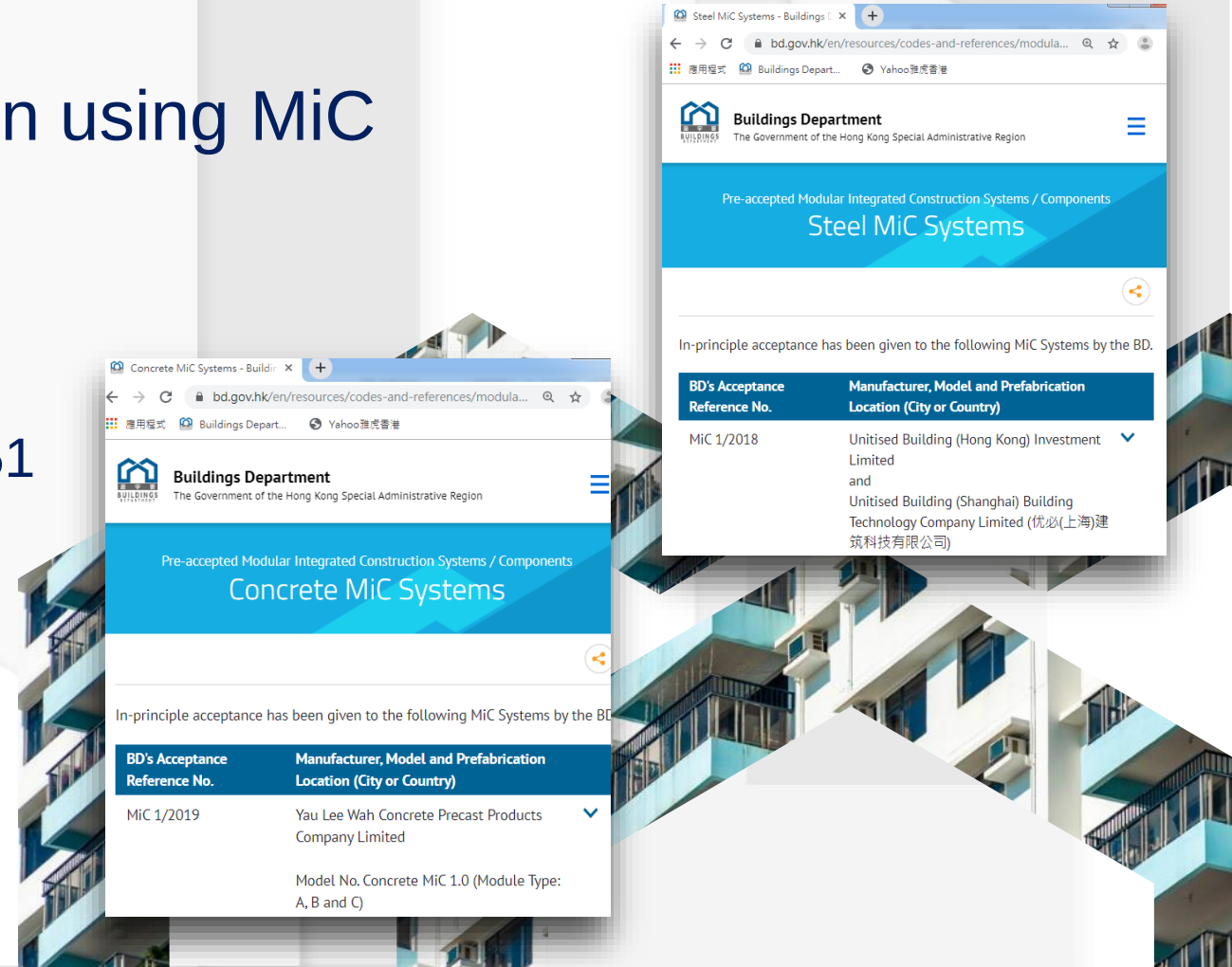
No. of IPA Granted: 38

No. of Application being Processed: 51

Accepted Lists on BD Website

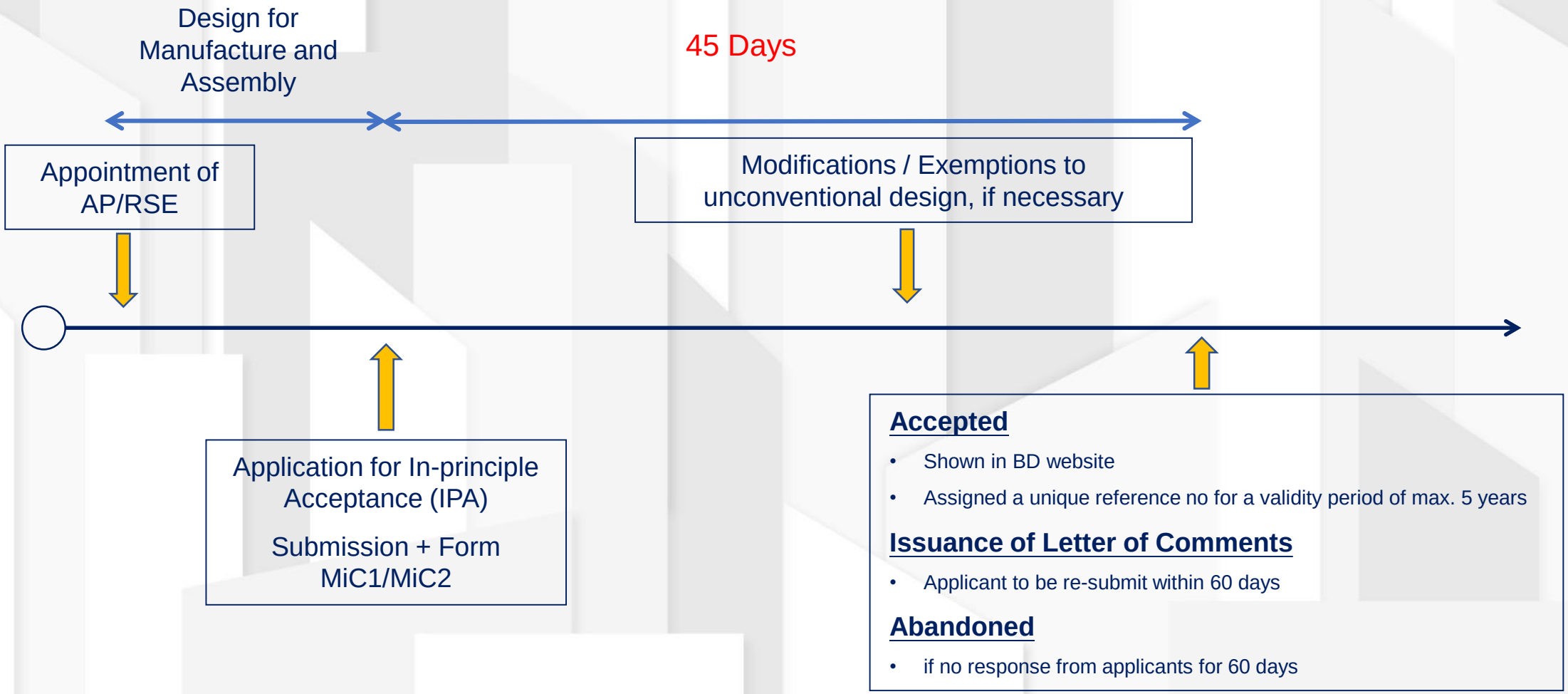
Steel MiC System : 22

Concrete MiC System: 16



Pre-acceptance Mechanism

- For MiC Suppliers / Contractors with Off-site Prefabrication Factory
- IPA BD Reference No. can be quoted in future formal plan submissions



Application for Pre-acceptance of MiC Systems

下載初稿 Download Draft | 列印 Print | 重設 Reset | 儲存 Save | 提交 Submit

屋宇署 BUILDINGS DEPARTMENT

申請原則上認可組裝合成建築法
Application for In-principle Acceptance of Modular Integrated Construction (MIC)

表格 Form MIC 1

- 呈交表格時須附上圖則及相關的證明文件。
- 請以正楷填寫，並在適當方格內加上『√』號。填寫前，請細閱《注意事項》。
- **Submit this form with plans and relevant supporting documents accompanied.**
- Read the "Matters to Note", complete in BLOCK LETTERS and tick the appropriate boxes.

致建築事務監督 **To the Building Authority**

甲部 申請詳情
Part A Application Particulars

由申請人填寫
To be completed by the applicant

1 「組裝合成」建築法的詳情
Details of the Modular System

建築法的說明 / 品牌 System Description / Brand Name

型號 Model Number

擬議用途 Intended Use(s)
（請參閱《建築物消防安全守則》表A1）
(Please refer to Table A1 of Code of Practice for Fire Safety in Buildings)

預製組件廠房地址 Prefabrication Factory Address

生產商 Manufacturer

聯絡地址 Correspondence Address

商業登記號碼(如適用) Business Registration No.(if applicable)

聯絡電話 Contact Tel. No.

傳真號碼 Fax No.

聯絡人 Contact Person

姓氏先行 Surname first

聯絡人電郵地址 E-mail Address of Contact Person

2 申請人的資料
Details of the Applicant

☐ 與上述生產商相同
Same as the manufacturer as mentioned above

☐ 其他（資料如下）
Other (with particulars as follows)

中文姓名 Name in Chinese

姓氏先行 Surname first

聯絡地址 Correspondence Address

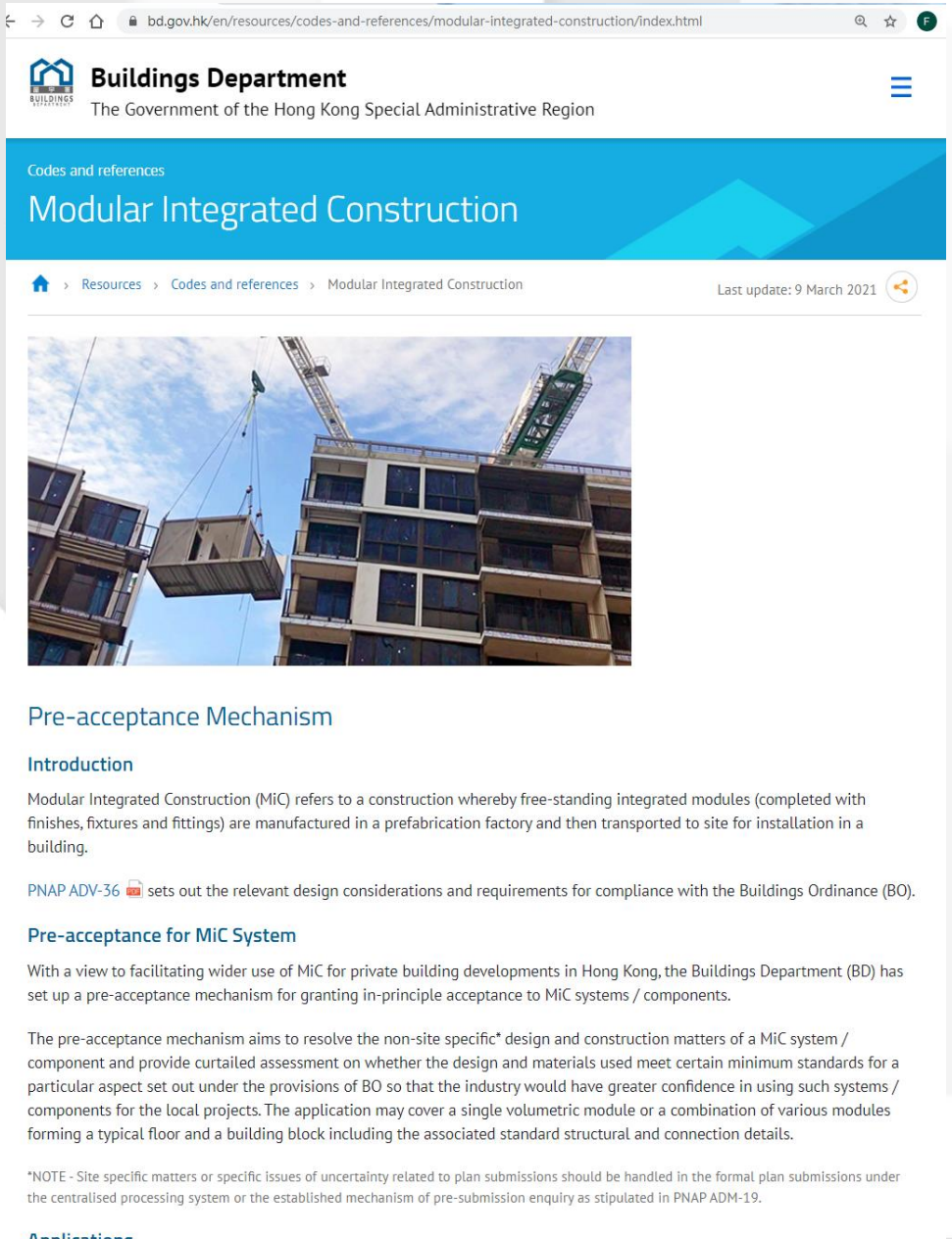
英文姓名 Name in English

姓氏先行 Surname first

Form MiC1 – Application for IPA of MiC

- **'Model Number' :** a unique reference of the IPA system and not easily be duplicated
- **'Intended Use(s)' :** use classification in Table A1 of Code of Practice for Fire Safety in Buildings 2011 (FS Code)
- **'Manufacturer' :** the IPA system under application to be granted to (not necessarily the prefabrication factory)
- **'Prefabrication Factory Address' :** more than one acceptable and with certificate(s) on ISO 9001 quality assurance
- **'Applicant' :** the manufacturer or their agent

Application for Pre-acceptance of MiC Systems



Submission Documents:

(a) Form MiC1;
(b) Checklist in PNAP ADV-36;
(c) Two sets of coloured plans (architectural, structural and drainage layout / details);
(d) Structural calculations;
(e) Material or product specifications;
(f) Quality certifications or test reports by accredited laboratories;
(g) Quality Assurance Scheme (ISO 9001 certification etc.);
(h) Fabrication process in factory;
(i) Method Statement;
(j) User manual with safety notices and instructions for alterations; and
(k) Other relevant information for the particular application.

Application for Pre-acceptance of MiC Systems

Appendix C
(PNAP ADV-36)

Pre-acceptance Application Checklist for MiC

This application checklist aims to remind AP and RSE of the essential information which should be contained in the plans and supporting documents accompanied with the application. The checklist should be completed by ticking the items relevant to the application and any other information essential for the MiC system should be listed out in Section 10.

The BD will conduct regular review on this application checklist in the light of experience gained in processing different MiC systems, feedbacks from the building industry on the use of various MiC systems and technological development in the relevant fields.

○ Essential information to be provided on plans
△ Essential information to be provided in the supporting document accompanied with the plans

Section		Essential Information
1.	General	○ General notes on compliance with applicable regulations / codes of practice / design manual / guidelines ○ General building plans (plans of all floors, sections and all elevations) in scale not less than 1:100 with full dimensions ○ Structural plans in scale not less than 1:100 showing the layout and dimensions of all structural elements, modular units, structural connections and locations of movement joints ○ Intended height and use of building ○ Intended use of every module of the system ○ Table indicating the required and provided sanitary provisions ○ Standard details, if applicable, gas flue aperture, balcony, A/C platform, curtain/window wall, non-structural external wall system/cladding, sunken slab, impermeable construction of rooms with water supply, protective barrier, projections, vertical greening, pipe ducts etc. ○ Standard details to show the method of sealing up gaps of partition or internal wall, between modules interface △ Job reference (both local and international), if any
2.	Fire Safety	○ Detail drawings to illustrate compliance of the Code of Practice for Fire Safety in Buildings (FS Code) in term

IPA Checklist in PNAP ADV-36 (Appendix C) :

○ Essential information required to be provided on plans

△ Essential information to be provided in the supporting documents accompanied with the plans

To ensure the fundamental issues could be fully considered.

Application for Pre-acceptance of MiC Systems

As at end of June 2021

>10% applications abandoned

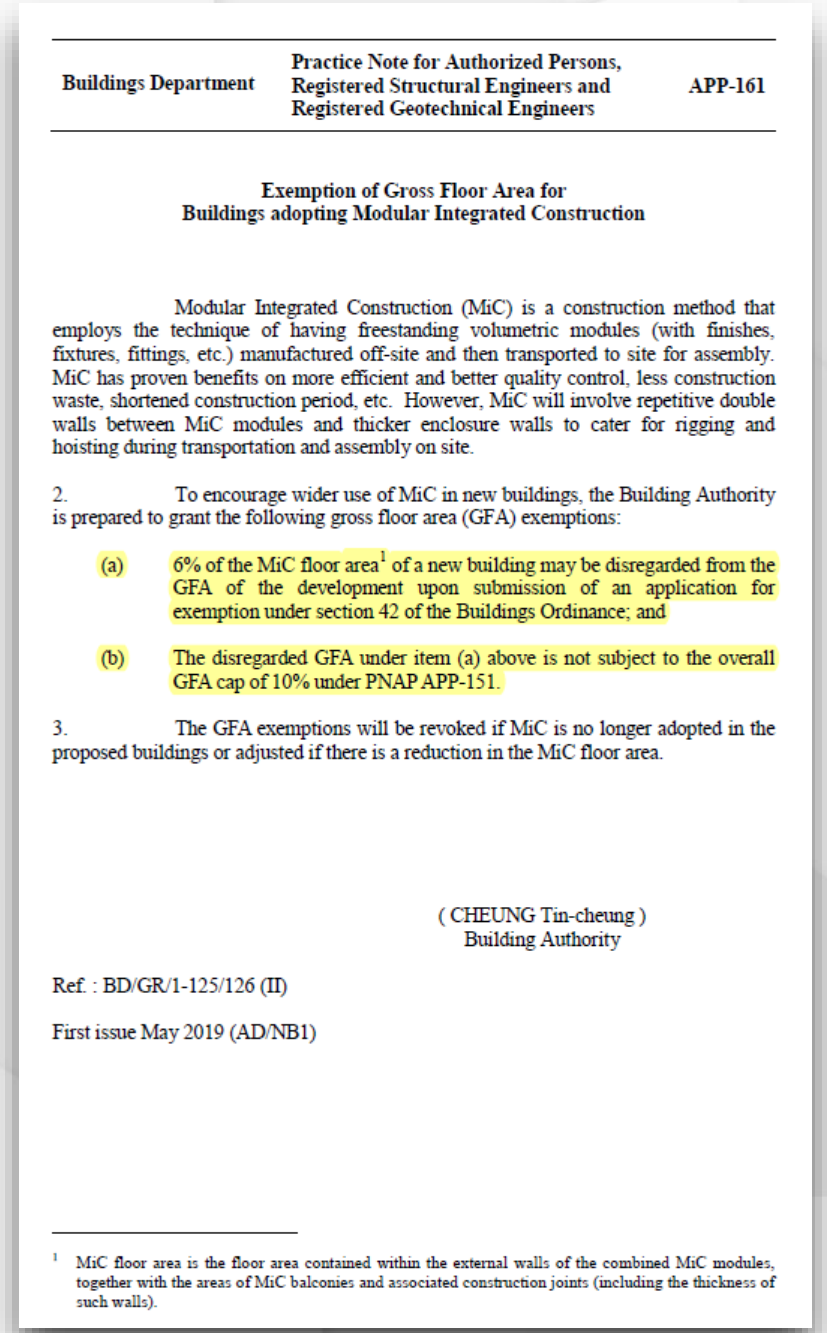
> 30% applications pending resubmission
with comments given >60 days

→ Welcome direct communication to resolve queries

Gross Floor Area (GFA)Concession for Adoption of MiC

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 area[1] 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.

3. The GFA exemptions will be revoked if MiC is no longer adopted in the proposed buildings or adjusted if there is a reduction in the MiC floor area.

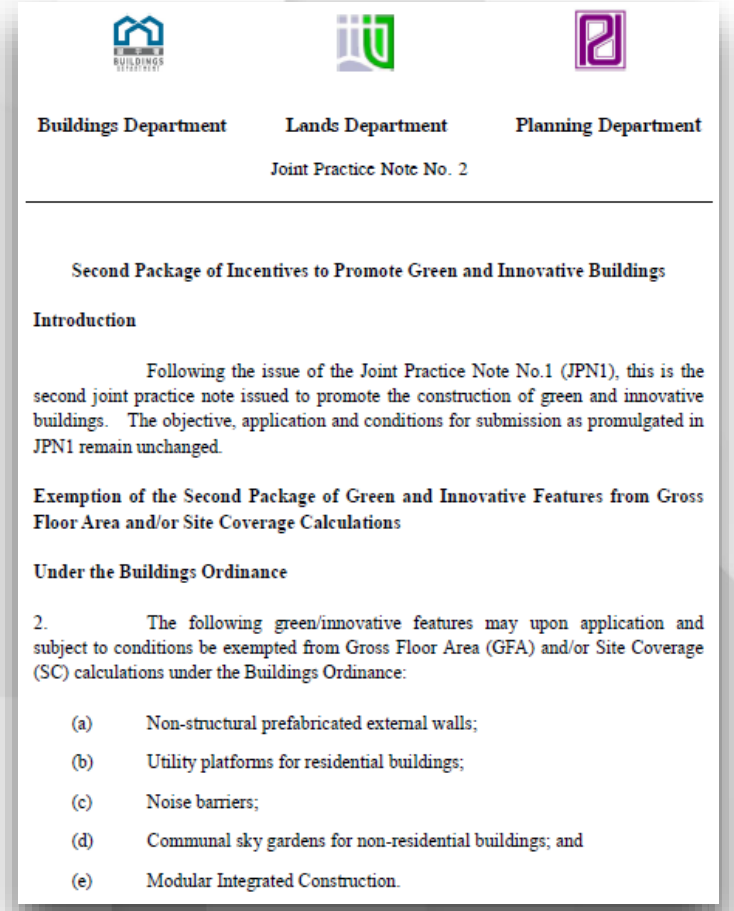
(CHEUNG Tin-cheung)
Building Authority

Ref. : BD/GR/1-125/126 (II)

First issue May 2019 (AD/NB1)

[1] MiC floor area is the floor area contained within the external walls of the combined MiC modules, together with the areas of MiC balconies and associated construction joints (including the thickness of such walls).

Revised Joint Practice Note No.2



Buildings Department | Lands Department | Planning Department

Joint Practice Note No. 2

Second Package of Incentives to Promote Green and Innovative Buildings

Introduction

Following the issue of the Joint Practice Note No.1 (JPN1), this is the second joint practice note issued to promote the construction of green and innovative buildings. The objective, application and conditions for submission as promulgated in JPN1 remain unchanged.

Exemption of the Second Package of Green and Innovative Features from Gross Floor Area and/or Site Coverage Calculations

Under the Buildings Ordinance

2. The following green/innovative features may upon application and subject to conditions be exempted from Gross Floor Area (GFA) and/or Site Coverage (SC) calculations under the Buildings Ordinance:

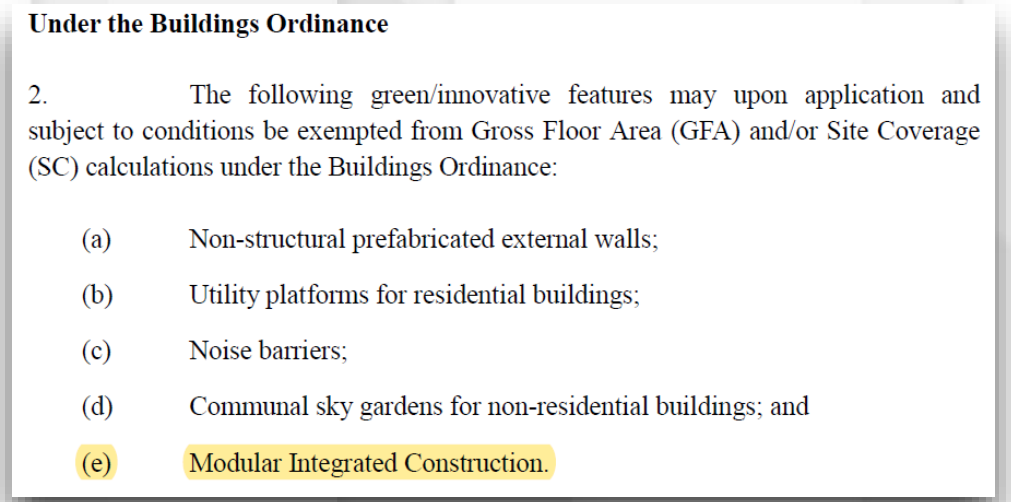
(a) Non-structural prefabricated external walls;

(b) Utility platforms for residential buildings;

(c) Noise barriers;

(d) Communal sky gardens for non-residential buildings; and

(e) Modular Integrated Construction.



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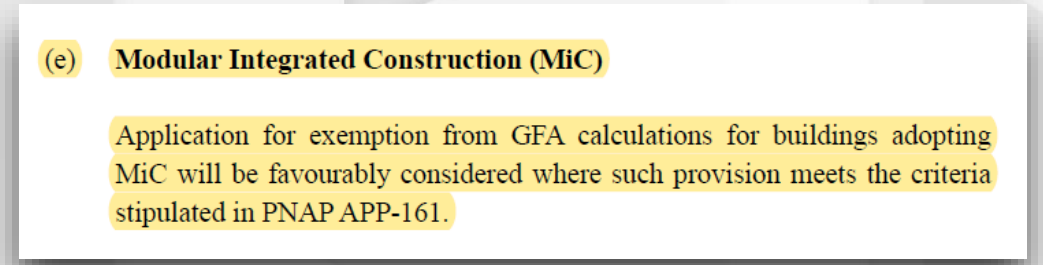
(c) Noise barriers;

(d) Communal sky gardens for non-residential buildings; and

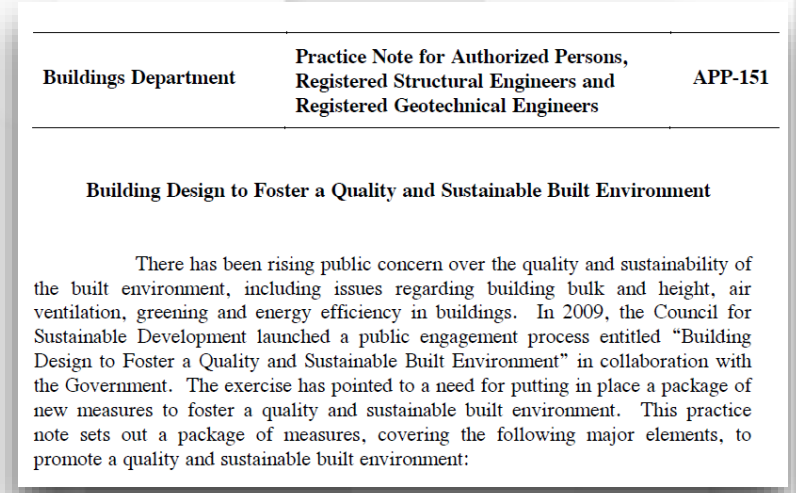
(e) Modular Integrated Construction.



(e) **Modular Integrated Construction (MiC)**

Application for exemption from GFA calculations for buildings adopting MiC will be favourably considered where such provision meets the criteria stipulated in PNAP APP-161.

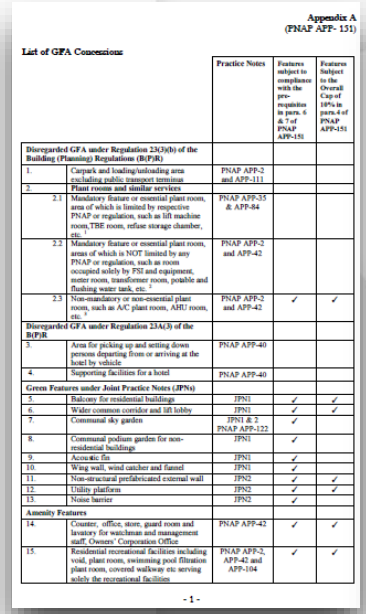
Revised PNAP APP-151



Buildings Department	Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers	APP-151

Building Design to Foster a Quality and Sustainable Built Environment

There has been rising public concern over the quality and sustainability of the built environment, including issues regarding building bulk and height, air ventilation, greening and energy efficiency in buildings. In 2009, the Council for Sustainable Development launched a public engagement process entitled "Building Design to Foster a Quality and Sustainable Built Environment" in collaboration with the Government. The exercise has pointed to a need for putting in place a package of new measures to foster a quality and sustainable built environment. This practice note sets out a package of measures, covering the following major elements, to promote a quality and sustainable built environment:



Appendix A
(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
Disregarded GFA under Regulation 23(3)(b) of the Building (Planning) Regulations (B(P)R)				
1.	Carpark and loading/unloading area excluding public transport terminus	PNAP APP-2 and APP-111		
2.	**Plant rooms and similar services**			
2.1	Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, such as lift machine room,TBE room, refuse storage chamber, etc. [1]	PNAP APP-35 & APP-84		
2.2	Mandatory feature or essential plant room, areas of which is NOT limited by any PNAP or regulation, such as room occupied solely by PSI and equipment, meter room, transformer room, potable and flushing water tank, etc. [2]	PNAP APP-2 and APP-42		
2.3	Non-mandatory or non-essential plant room, such as A/C plant room, AHU room, etc. [3]	PNAP APP-2 and APP-42	✓	✓
Disregarded GFA under Regulation 23A(3) of the B(P)R				
3.	Area for picking up and setting down persons departing from or arriving at the hotel by vehicle	PNAP APP-40		
4.	Supporting facilities for a hotel	PNAP APP-40		
Green Features under Joint Practice Notes (JPNs)				
5.	Balcony for residential buildings	JPN1	✓	✓
6.	Wider common corridor and lift lobby	JPN1	✓	✓
7.	Communal sky garden	JPN1 & 2 PNAP APP-122	✓	
8.	Communal podium garden for non-residential buildings	JPN1	✓	
9.	Acoustic fin	JPN1	✓	
10.	Wing wall, wind catcher and funnel	JPN1	✓	
11.	Non-structural prefabricated external wall	JPN2	✓	✓
12.	Utility platform	JPN2	✓	✓
13.	Noise barrier	JPN2	✓	
Amenity Features				
14.	Counter, office, store, guard room and lavatory for watchman and management staff, Owners' Corporation Office	PNAP APP-42	✓	✓
15.	Residential recreational facilities including void, plant room, swimming pool filtration plant room, covered walkway etc serving solely the recreational facilities	PNAP APP-2, APP-42 and APP-104	✓	✓
16.	Covered landscaped and play area	PNAP APP-42	✓	
17.	Horizontal screen/covered walkway, trellis	PNAP APP-42	✓	✓*
18.	Larger lift shaft	PNAP APP-89	✓	✓
19.	Chimney shaft	PNAP APP-2	✓	✓
20.	Other non-mandatory or non-essential plant room, such as boiler room, SMATV room [4]	PNAP APP-2	✓	✓
21.	Pipe duct, air duct for mandatory feature or essential plant room [5]	PNAP APP-2 & APP-93		
22.	Pipe duct, air duct for non-mandatory or non-essential plant room [6]	PNAP APP-2	✓	✓
23.	Plant room, pipe duct, air duct for environmentally friendly system and feature [7]	PNAP APP-2	✓	
24.	High headroom and void in front of cinema, shopping arcade etc. in non-domestic development [8]	PNAP APP-2	✓	
25.	Void over main common entrance (prestige entrance) in non-domestic development	PNAP APP-2 & APP-42	✓	✓
26.	Void in duplex domestic flat and house	PNAP APP-2	✓	✓
27.	Sunshade and reflector	PNAP APP-19, APP-67 & APP-156		
28.	Minor projection such as AC box, window cill, projecting window	PNAP APP-19 & APP-42		
29.	Other projection such as air-conditioning box and platform with a projection of more than 750mm from the external wall	PNAP APP-19	✓	✓
Other Items				
30.	Refuge floor including refuge floor cum sky garden	PNAP APP-2 & APP-122		
31.	Covered area under large projecting/overhanging feature	PNAP APP-19		
32.	Public transport terminus (PTT)	PNAP APP-2		
33.	Party structure and common staircase	PNAP ADM-2		
34.	Horizontal area of staircase, lift shaft and vertical duct solely serving floor accepted as not being accountable for GFA	PNAP APP-2		
35.	Public passage	PNAP APP-108		
36.	Covered set back area	PNAP APP-152		
Bonus GFA				
37.	Bonus GFA	PNAP APP-108		
Additional Green Features under JPN				
38.	Buildings adopting Modular Integrated Construction	JPN2 and PNAP APP-161		

Notes:
1 Mandatory feature or essential plant room, area of which is limited by respective PNAP or regulation, include duct for basement smoke extraction system, lift machine room, telecommunication and broadcasting room, refuse storage chamber, refuse storage and material recovery chamber, material recovery chamber, refuse storage and material recovery room, or similar feature / plant room, and pipe and air ducts which are part of the distribution network for such mandatory feature or essential plant and contained within such room.

2 Mandatory feature or essential plant room, area of which is NOT limited by any PNAP or regulation*, include electrical switch room, meter room, transformer room, generator room, potable and flushing water tank and pump room, sewage treatment plant room, refuse chute,

- 1 -

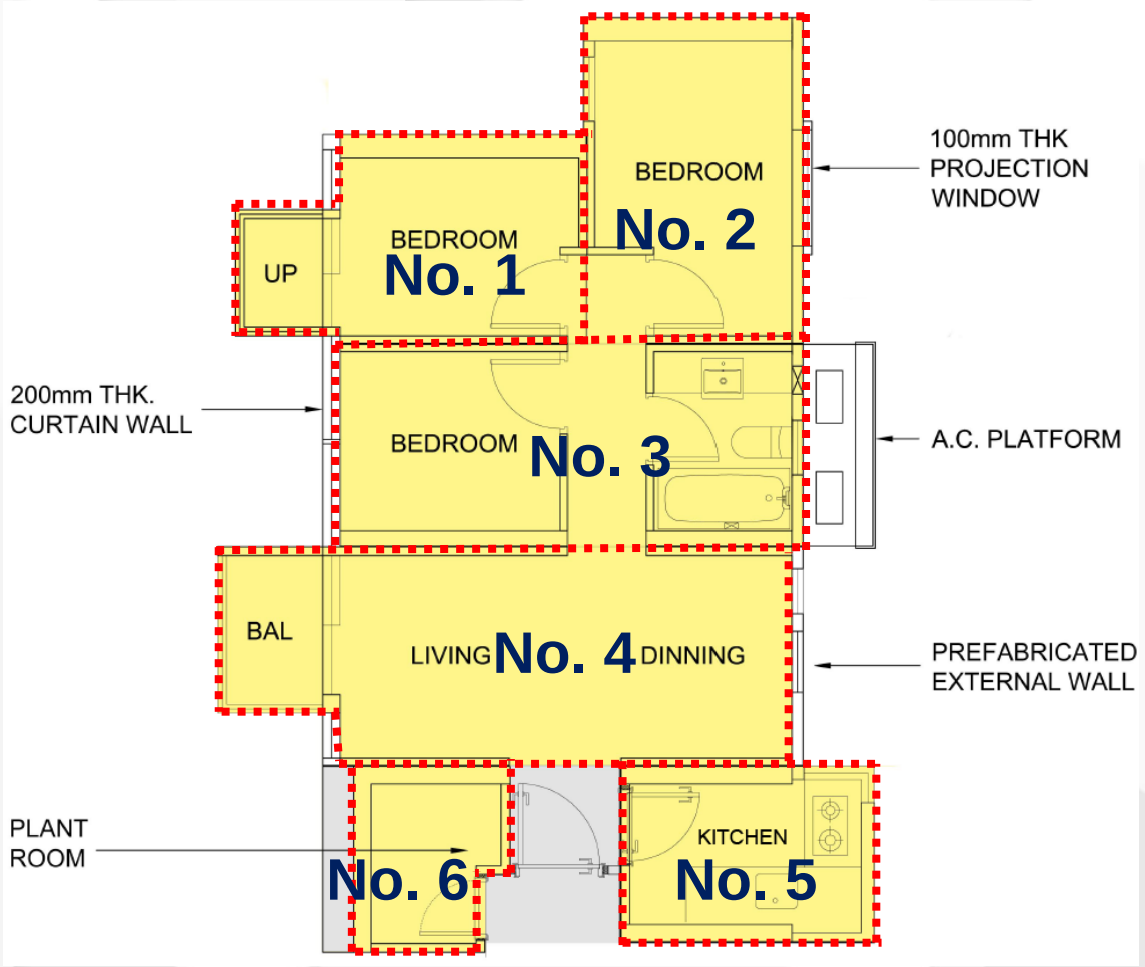
List of GFA Concessions

		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		

MiC Floor Area

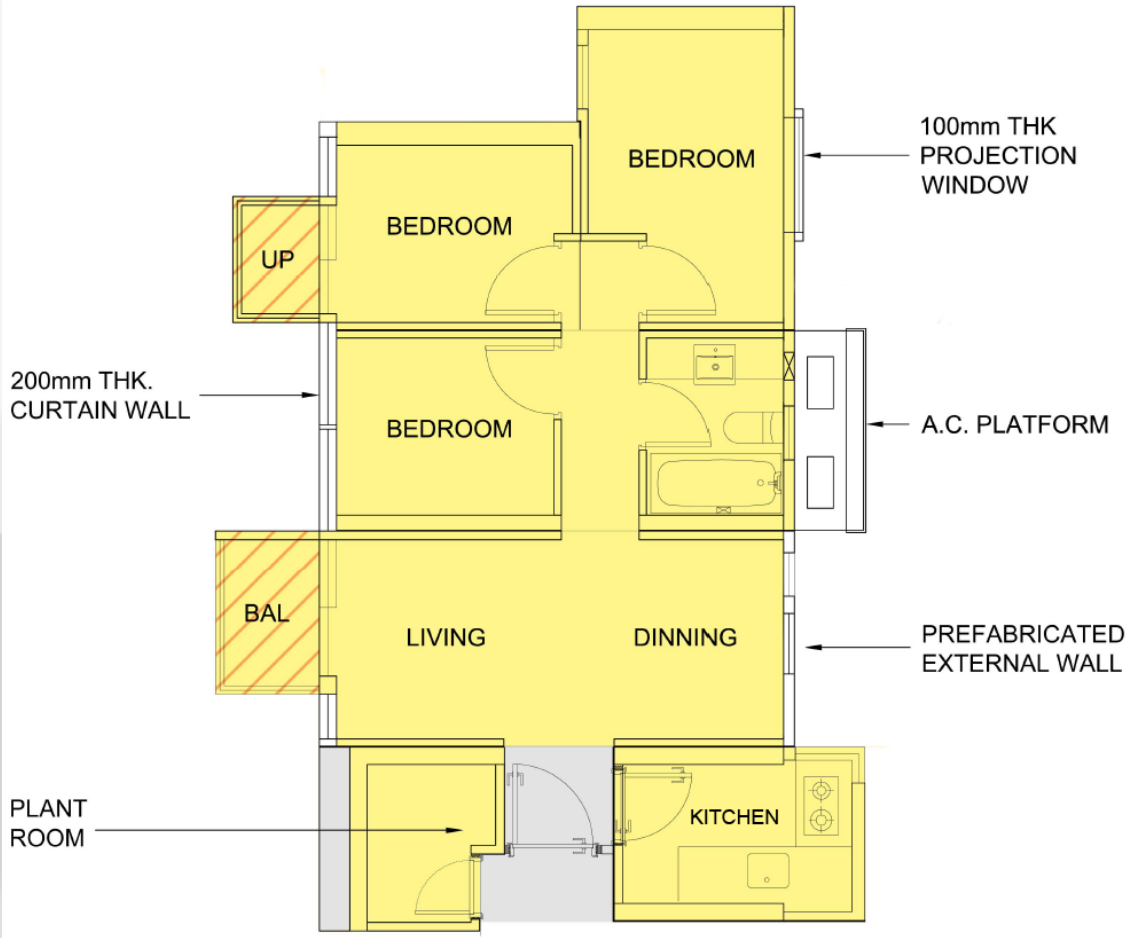
- **Floor area contained within the external walls of the combined MiC modules**

- **Together with the areas of MiC balconies and associated construction joints (including the thickness of such walls)**



Balcony and Utility Platform (UP)

- **Balcony and UP of an MiC module are counted as MiC floor area and eligible for 6% GFA exemption**
- **Extant GFA & SC concessions can be separately claimed subject to relevant conditions in JPNs**



Prefabricated External Wall

- Considered as 2-dimensional components
- NOT considered as part of the volumetric MiC module
- NOT counted as MiC floor area
- GFA concession under JPN2 is still applicable

Curtain Wall and Cladding

- **Curtain wall system and cladding attached to MiC module NOT counted as MiC floor area**

- **Non-accountable GFA areas under PNAP APP-2**

Minor Projections

- Minor projecting features (e.g. AC platforms, projecting windows, window cill, etc.) NOT counted as MiC floor area
- Non-accountable GFA areas under PNAP APP-19

Plant Rooms

- **Plant rooms in MiC Module are counted as MiC floor area and eligible for 6% GFA exemption**

- **Plant rooms may also be disregarded from GFA calculation subject to B(P)R23(3)(b) and relevant PNAP**

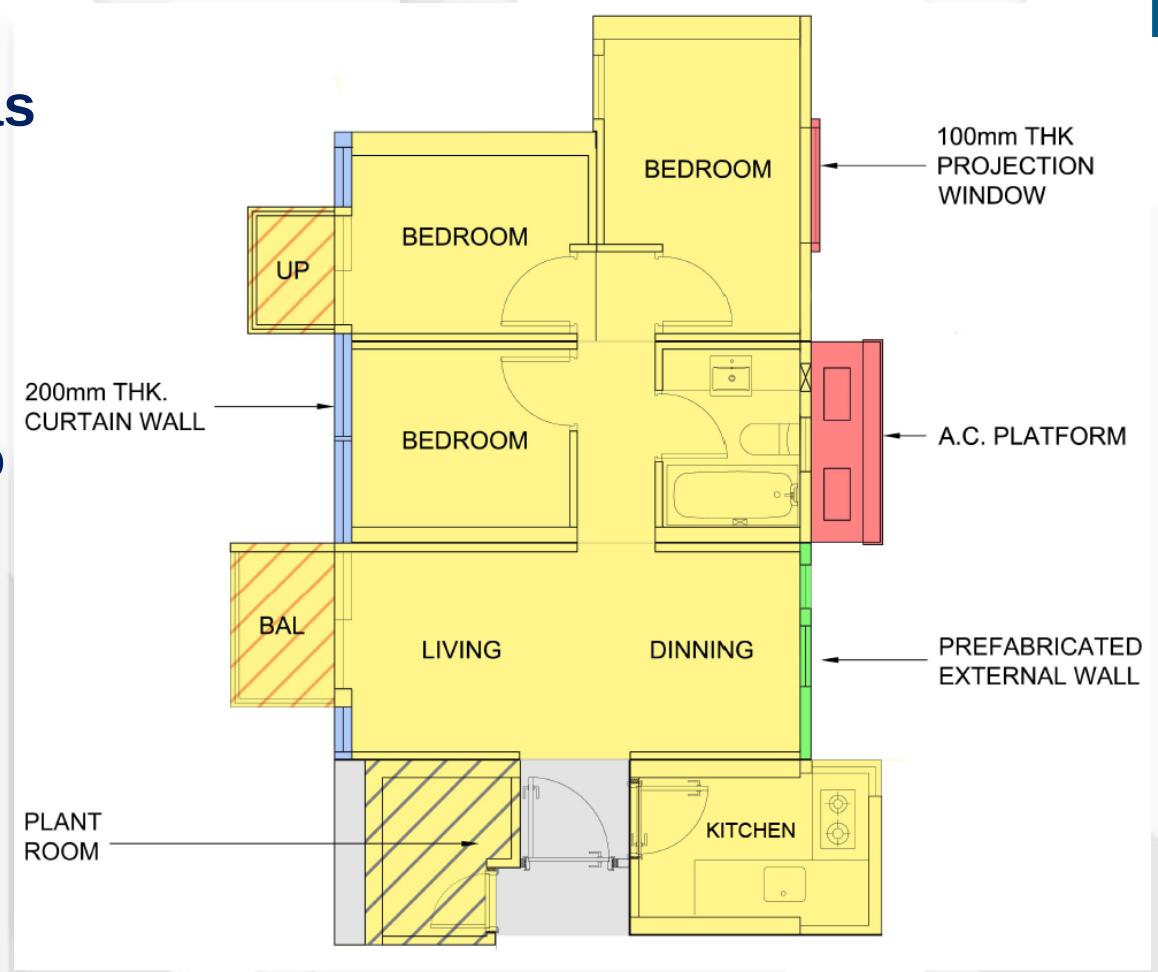


Illustration of GFA Calculation

GFA

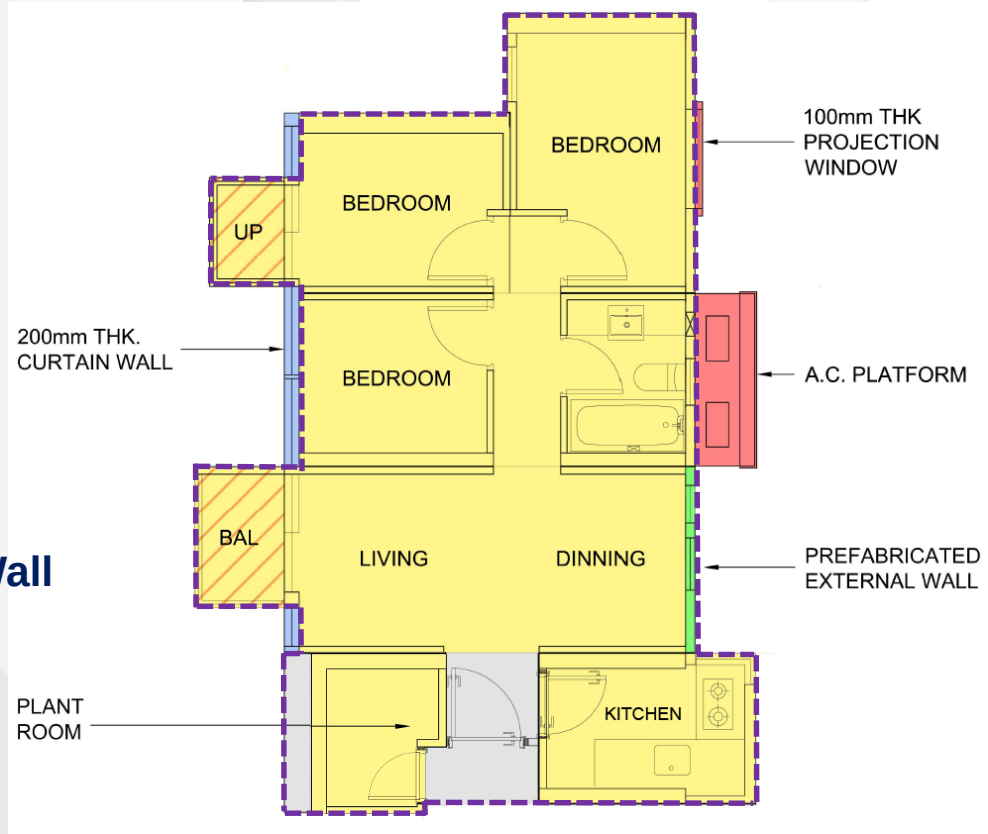
Deduct 6% of MiC Floor Area

Deduct 50% of Balcony and UP

Deduct Prefabricated External Wall

Deduct Plant Room

= Total Accountable GFA



Reminders for Preparation of IPA Submission

Reminders for IPA Submission

Architectural and Drainage

a) Essential information included in plans and accompanied with relevant supporting documents (Appendix C of PNAP ADV-36):

Section	Essential Information	
General	O	Standard details of gas flue aperture, balcony, AC platform, curtain wall / window wall, non-structural external wall system/cladding, sunken slab, impermeable construction of rooms with water supply, protective barrier, projections, vertical greening, pipe ducts etc.,
	O	Standard details on the method of sealing up gaps of partition or internal wall, between modules interface
Fire Safety	O	Detail drawings for compliance with FS Code in term of Means of escape, fire resisting construction and means of access for firefighting and recue
	△	Fire test reports
Lighting & Ventilation	O	Calculation / demonstration for Building (Planning) Regulations 30 & 36
Drainage	O	Detail drawings for compliance with Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations (Note: Compliance of requirements under PNAP APP-164 for drainage for drainage approval after 31.8.2021)
Barrier Free Access	O	Provisions under Chapter 2 of Design Manual Barrier Free Access 2008
Maintenance	O	Access for inspection / maintenance / repair
	△	User manual

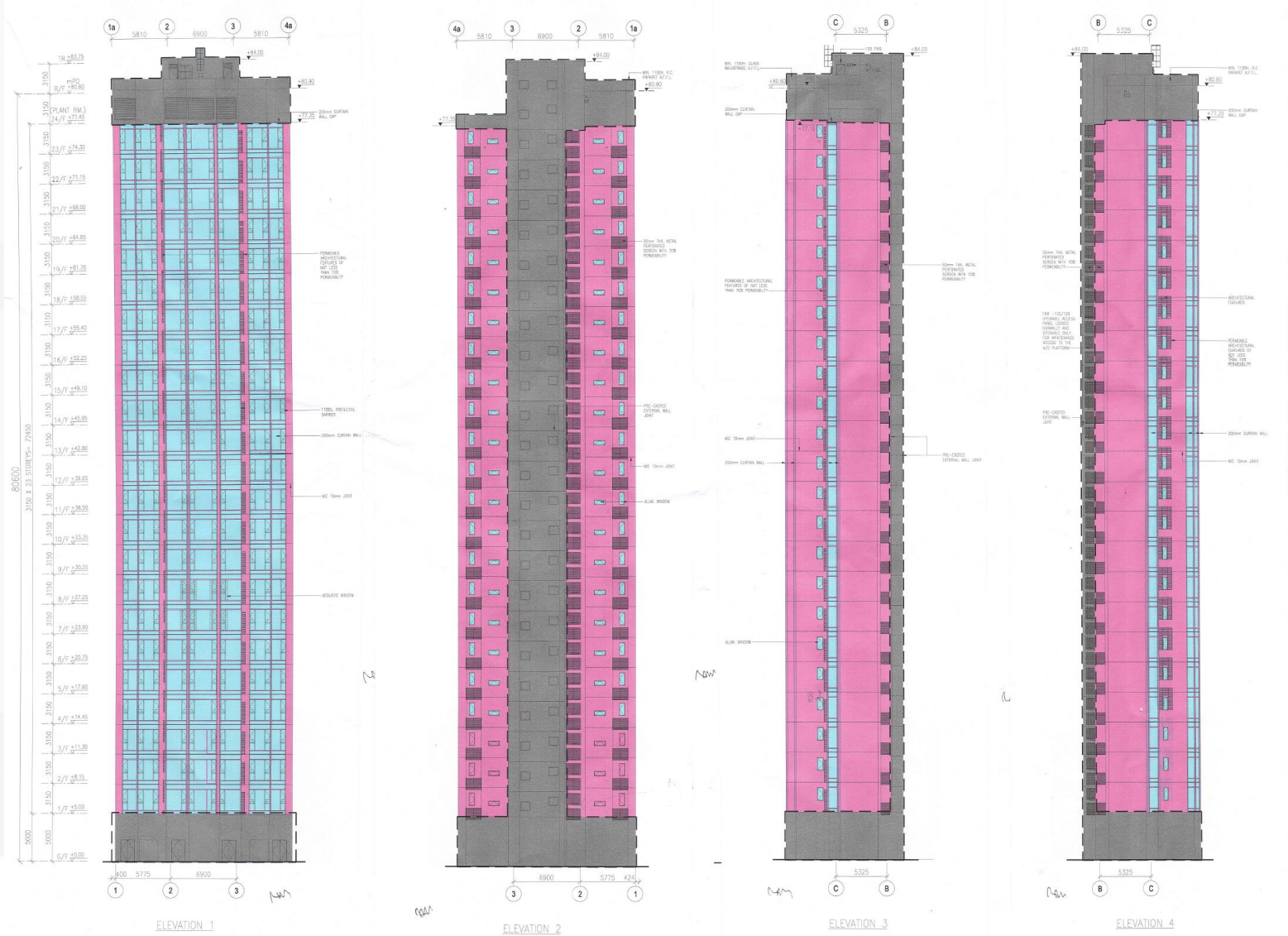
Reminders for IPA Submission

Architectural and Drainage

b) **Extent of MiC** portion & insitu portion of the building and extent of different MiC modules clearly delineated

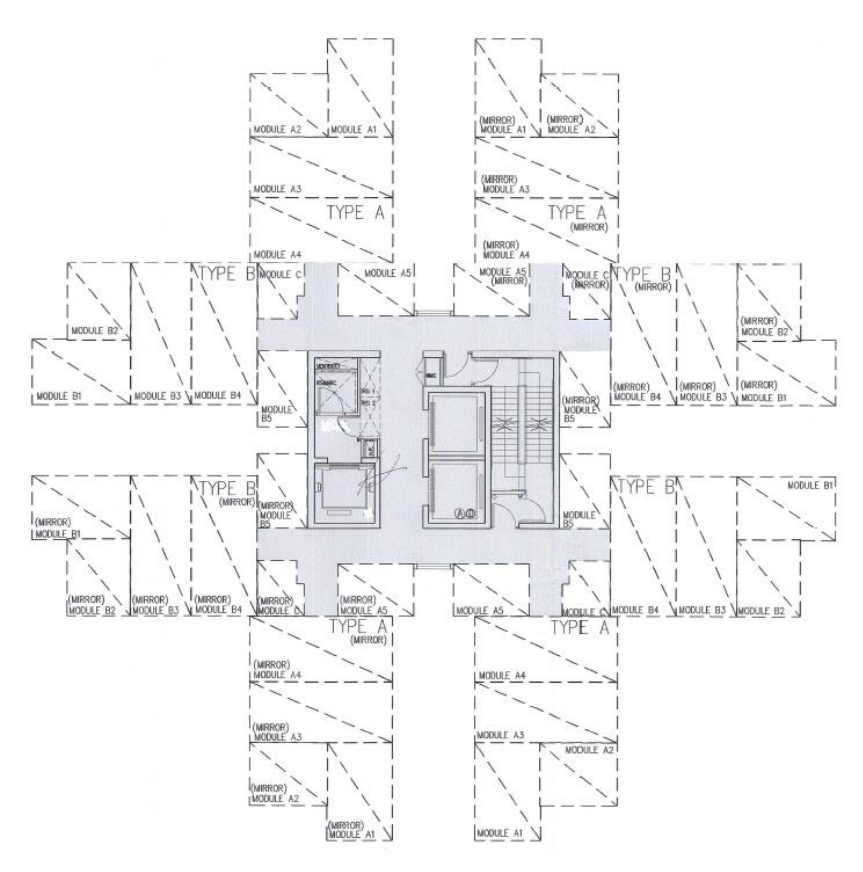
- Plans, elevations, sections, details with appropriate colours in accordance with PNAP ADM-9.
- MiC schematic diagram(s) to demarcate different MiC modules on each floor
- Different MiC modules to assign with a different module type name / number

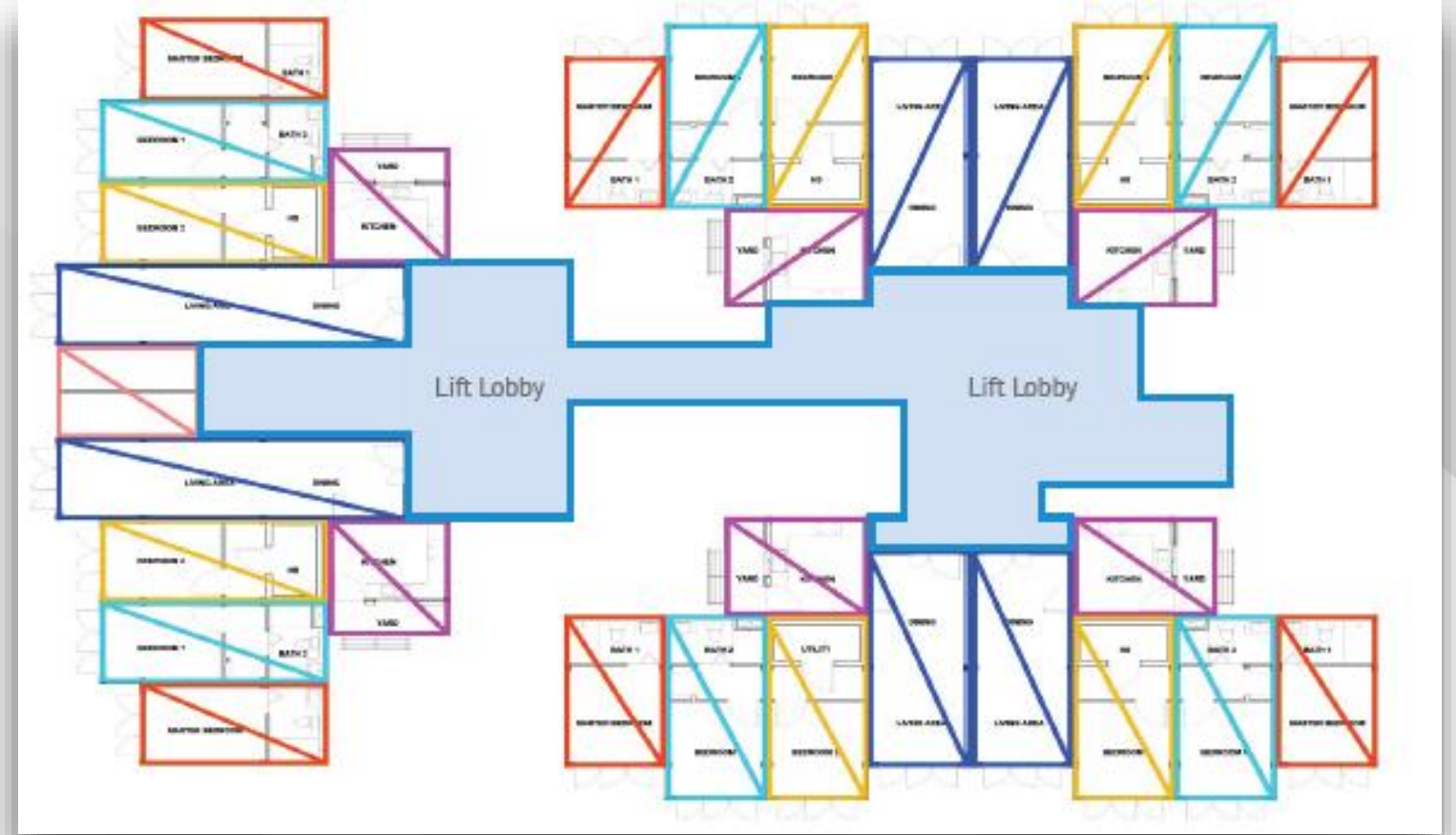
Example - Layout and Elevations



Courtesy of Urban Renewal Authority

Example - MiC Schematic Diagram





Reminders for IPA Submission

Architectural and Drainage

c) **Extent of finishes, fittings and fixtures** of MiC modules to be pre-fabricated / installed off site indicated for acceptance

- Prefabricated with finishes, fixtures, fittings, etc.
- Reflect on relevant drawings
- Tabulate in a “Schedule of Finishes, Fixtures and Fittings to be Prefabricated/Installed Off-site”

Example – Schedule of Finishes, Fixtures and Fittings Pre-fabricated / Installed Off-site

Item		Finishes, Fixtures and Fittings Pre-fabricated/Installed Off-site			Remarks
External Finishes	Façade	Synthetic Enamel Paint			
	Window	Aluminum Window leaves and frames			
		Living/Dining Area	Kitchen	Toilet/Bathroom	
Internal Finishes	Ceiling	Anti-Mould Acrylic Emulsion Paint	Anti-Mould Acrylic Emulsion Paint	Anti-Mould Acrylic Emulsion Paint	
	Floor	PVC Tile	Homogeneous Tile	Homogeneous Tile	
	Wall	Anti-Mould Acrylic Emulsion Paint	Anti-Mould Acrylic Emulsion Paint	Homogeneous Tile	
Fixtures and Fittings	Electrical	Conduits and wiring within module	Conduits and wiring with module	Conduits and wiring with module	Connection to MCB of module by site work
	Lights	• Conduits • LED ceiling light	• Conduits • LED ceiling light	• Conduits • LED tri-proof light	
	Plumbing	N/A	• Copper pipe for potable water	• uPVC pipe for flushing	• pipes on external wall by site work
	Drainage	N/A	uPVC pipe	uPVC pipe	Drainage pipes on external wall by site work
	Gas	N/A	N/A	Gas Heater with pipeworks	
	MVAC	N/A	Window mount type ventilation fan	Window mount type ventilation fan	
	Fixtures	Timber Door	• Kitchen FRR Door • S.S. sink with waste and overflow • Kitchen Countertop	• Timber Door • Wall-hung Basin • Watercloset • Shower Fittings	

Reminders for IPA Submission

Architectural and Drainage

d) **Adequate fire protection or performance** of element of construction of MiC

- Section 35 of B(C)R and FS Code
- Provide schedule of fire resisting products
- Provide reports on fire tests for loadbearing / non-loadbearing elements to be submitted
- Incorporate installation details of fire protection materials in accordance with fire test reports

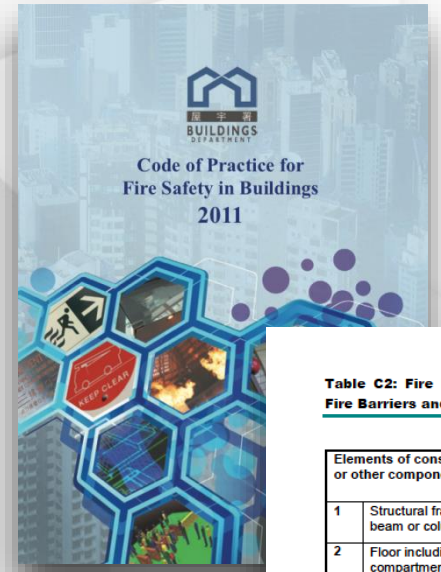


Table C2: Fire Resistance Rating Criteria for Elements of Construction, Fire Barriers and Other Components

Elements of construction or other components		Criteria to be satisfied			Method of Exposure
		Stability	Integrity	Insulation	
1	Structural frame, beam or column	Y	N	N	Exposed faces only
2	Floor including fire compartment floor	Y	Y	Y	Each side separately
3	Roof forming part of an exit route or performing the function of the floor	Y	Y	Y	From underside
4	Loadbearing wall not being a fire barrier	Y	N	N	Each side separately
5	External wall	Y*	Y	Y	Each side separately
6	Loadbearing wall being a fire barrier	Y	Y	Y	Each side separately
7	Non-loadbearing wall being a fire barrier	N	Y	Y	Each side separately
8	Protected shaft, lobby and corridor	Y*	Y	Y	Each side separately
9	Fire shutter, fire stop, fire dampers, sealing system	N	Y	N (unless specified)	Each side separately
10	Smoke outlet shaft	Y	Y	Y	From outside
11	Enclosure around services other than Item 14	N	Y	Y	From outside
12	Door (including frame and fixing)	N	Y	N (unless specified)	Each side separately (except lift doors – from landing side only)
13	Fixed light (including frame, glazing & fixing)	N	Y	Y	Each side separately
14	Enclosure around services in required staircase/protected lobby	N	Y	Y	Each side separately

Example – Schedule of Fire Resisting Products

Item no. for easy cross reference with construction detail

Product information: product name, description of construction, performance, testing standard, information of relevant test / assessment reports, etc.

Element of construction and components / Application Locations

Loadbearing Element

Non-loadbearing Element

Protection of Openings in Fire Barrier

Linings and Insulation

Others

Item		Location of Application	Product Name	Description of Construction	Performance	Testing Standard	Details of Test or Assessment Report					Remarks
							Name of Accreditation Body	Name of Laboratory / Assessing Organisation	Report No.	Date of Test / Report	Validity Date	
Loadbearing Element	1	Structural Frame including Beam and Column	ABC Protection Board	2 Layer of 9mm boards	120/120/120	BS 476 Part 21	ABC Laboratory	HOKLAS	ABC-123	12-Jul-21	11-Jul-26	
	2	Wall	N/A	N/A	N/A	BS 476 Part 21	N/A	N/A	N/A	N/A	N/A	
	3	Floor	CDE Composite Slab	125 thick composite slab system	120/120/120	BS 476 Part 21	ABC Laboratory	HOKLAS	ABC-456	12-Jul-21	11-Jul-26	
Non-loadbearing Element	4	Separation Wall	EFG Board Dry Wall System	9mm EFG brand board + 50mm (100kg/m3) + 9mm EFG brand board	- / 60 / 60	BS 476 Part 22	123 Laboratory	HOKLAS	123-ABC	29-Jun-21	7-Aug-25	
	5	Spandrel										
Protection of Openings in Fire Barriers	6	Door	Timber Composite Fire Resisting Doorset with Smoke Seal	N/A	- / 60 / 60	BS EN 1634-1:2008 BS EN 1634-3:2004	BD Laboratory	HOKLAS	BD-00001	25-Nov-20	3-Jan-25	
	7	Sealant	HK123 Fire Sealant	Up to 40mm linear joint	- / 120 / 120	BS 476 Part 22	Overseas Laboratory	UKAS	OS-123456789	5-Jan-19	Infinite	
	8	Collar	N/A	N/A	N/A	BS 476 Part 22	N/A	N/A	N/A	N/A	N/A	
	9	Damper	N/A	N/A	N/A	BS 476 Part 22	N/A	N/A	N/A	N/A	N/A	
Linings and Insulation (Non-combustibility)	10	External Wall	N/A	N/A	N/A	BS 476 Part 4	N/A	N/A	N/A	N/A	N/A	
	11	External Wall Insulation	N/A	N/A	N/A	BS 476 Part 4	N/A	N/A	N/A	N/A	N/A	
	12	Internal Linings	N/A	N/A	N/A	BS 476 Part 7	N/A	N/A	N/A	N/A	N/A	
	13	Air Duct (Internal)	N/A	N/A	N/A	BS 476 Part 6	N/A	N/A	N/A	N/A	N/A	
	14	Air Duct (External)	N/A	N/A	N/A	BS 476 Part 7	N/A	N/A	N/A	N/A	N/A	
Others	15	Cavity Barrier	HK123 Fire Sealant	Up to 40mm linear joint	- / 120 / 120	BS 476 Part 22	Overseas Laboratory	UKAS	OS-123456789	5-Jan-19	Infinite	

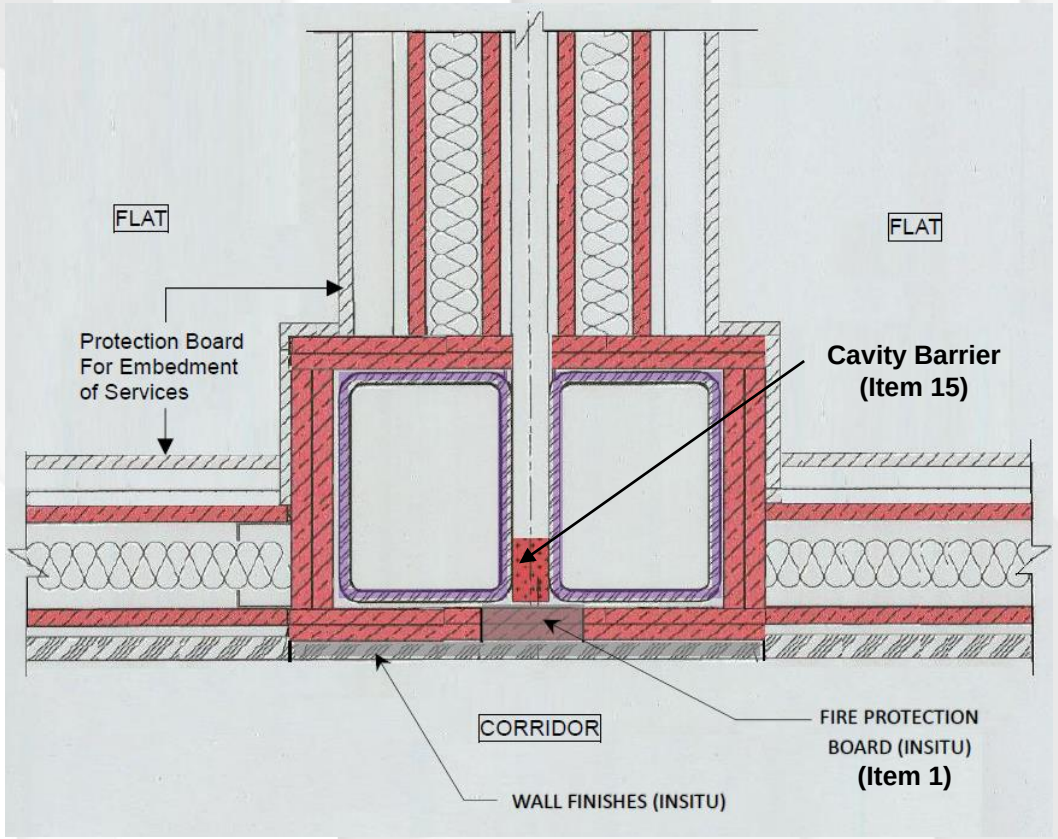
Reminders for IPA Submission

Architectural and Drainage

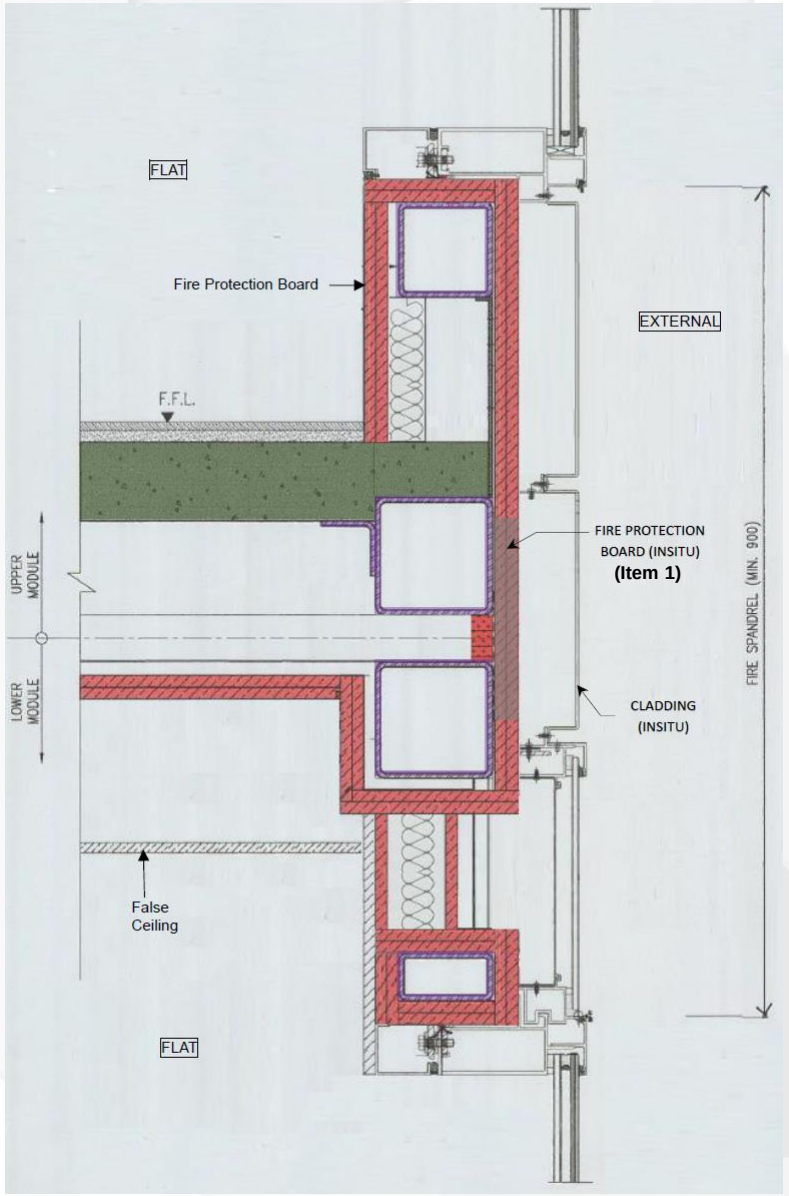
e) **Sufficient construction / joint details** and information of the adopted proprietary fire rated products of the MiC System provided

- Illustrate the treatment of joints, including touch up of finishes, fixtures & fittings, between MiC modules / between MiC module & Insitu portion of the building;
- Demonstrate adequate protection against moisture penetration for wall, floor and roof for compliance with Sections 32 to 34 of Building (Construction) Regulation (B(C)R); and
- Demonstrate adequate protection against fire at joints for compliance with section 35 of B(C)R including the provision of cavity barriers at internal cavities.

Example - Blow-up Details (Steel System)

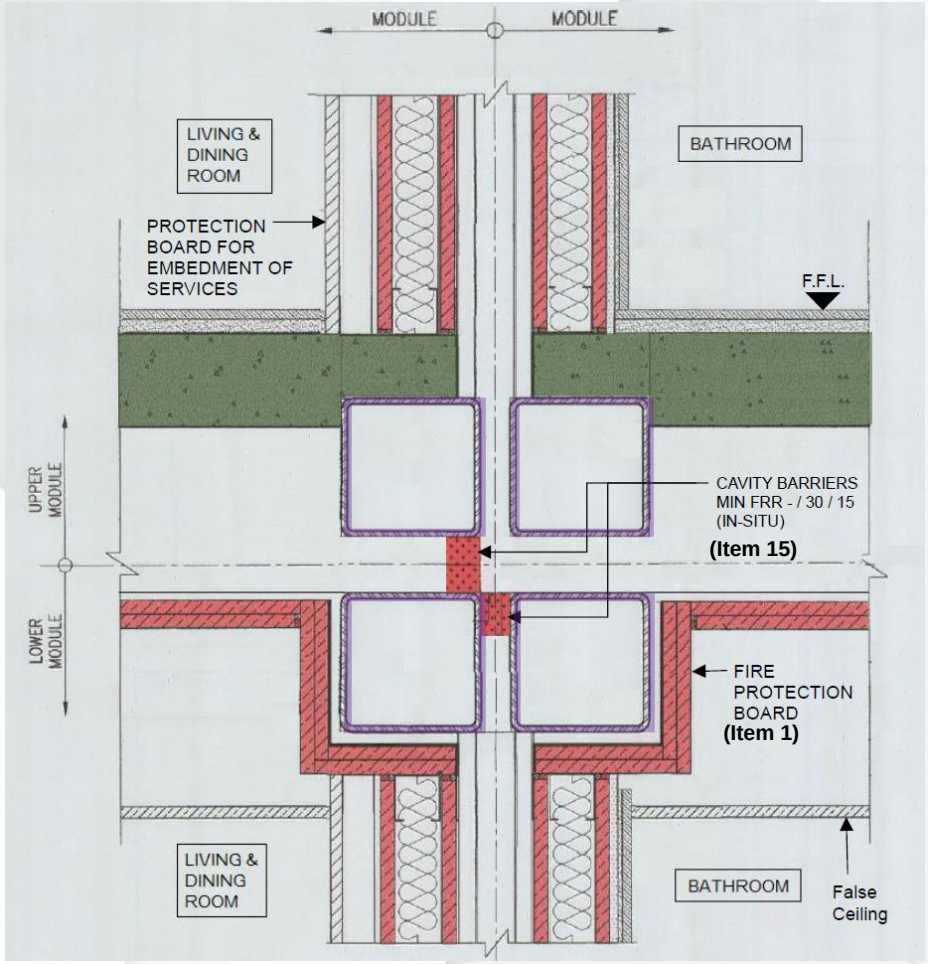


Blow-up Plan for Module-Module Joint

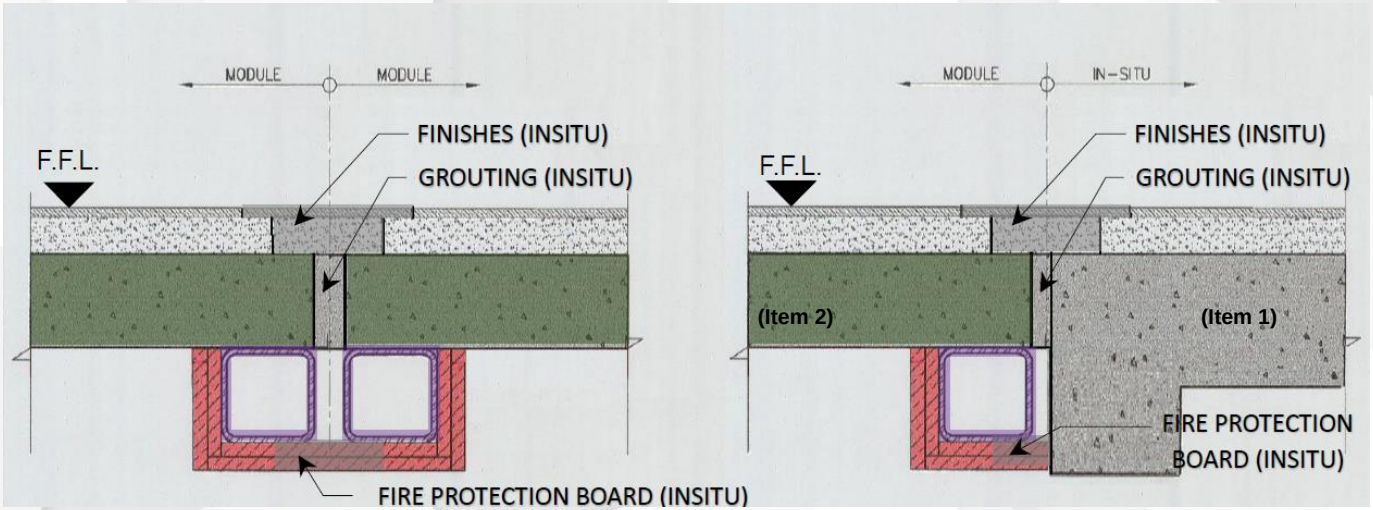


Blow-up Section for Spandrel

Example - Blow-up Details (Steel System)



Blow-up Section for
Cross Joint of 4 Modules



Blow-up Section for
Module Slab – Module Slab

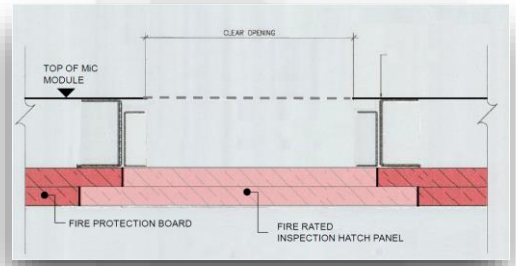
Blow-up Section for
Module Slab – Insitu Slab

Reminders for IPA Submission

Architectural and Drainage

f) Sufficient access for inspection and maintenance at strategical locations

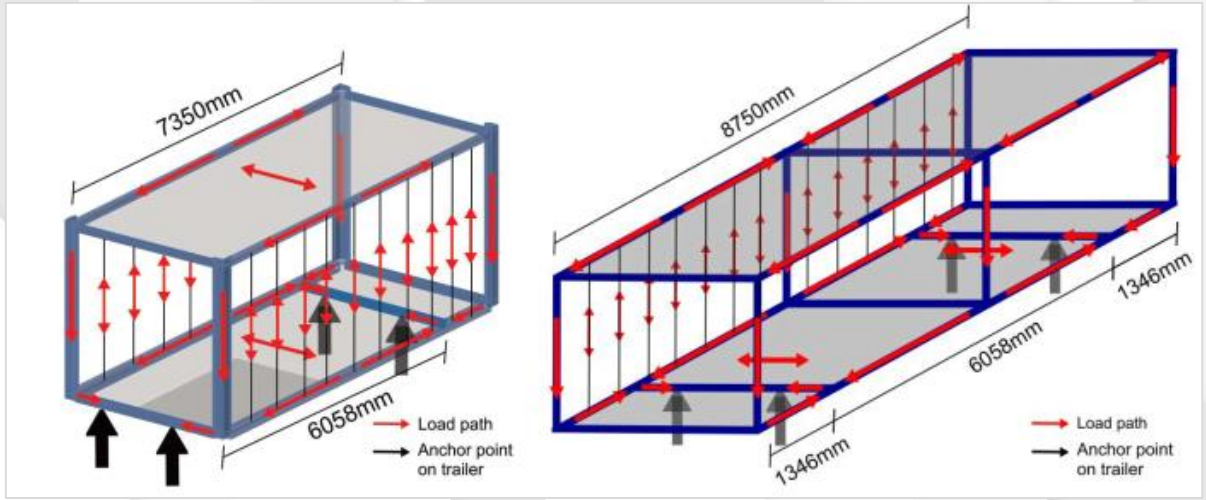
- Planning and Design of Drainage Works (PNAP APP-93)
- Code of Practice on Access for External Maintenance 2021
- Provisions to facilitate maintenance / prevention of damaging MiC system:
  - Inspection hatches
  - Finishing board for services / fire rated material protection
  - User Manual



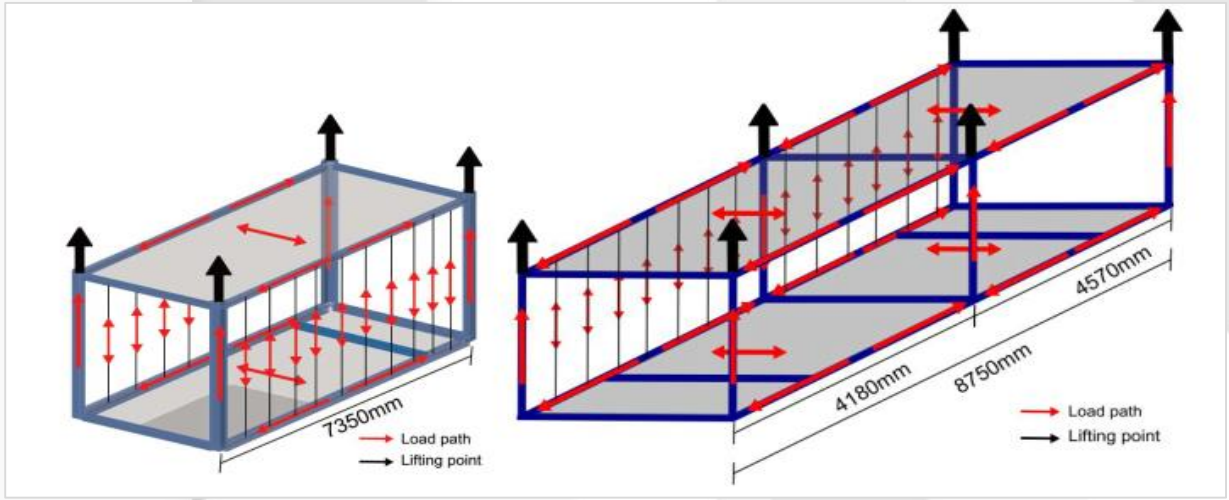
Reminders for IPA Submission

Structural

a. Different load path during temporary and permanent stages and locked in stress should be considered



Transportation Stage



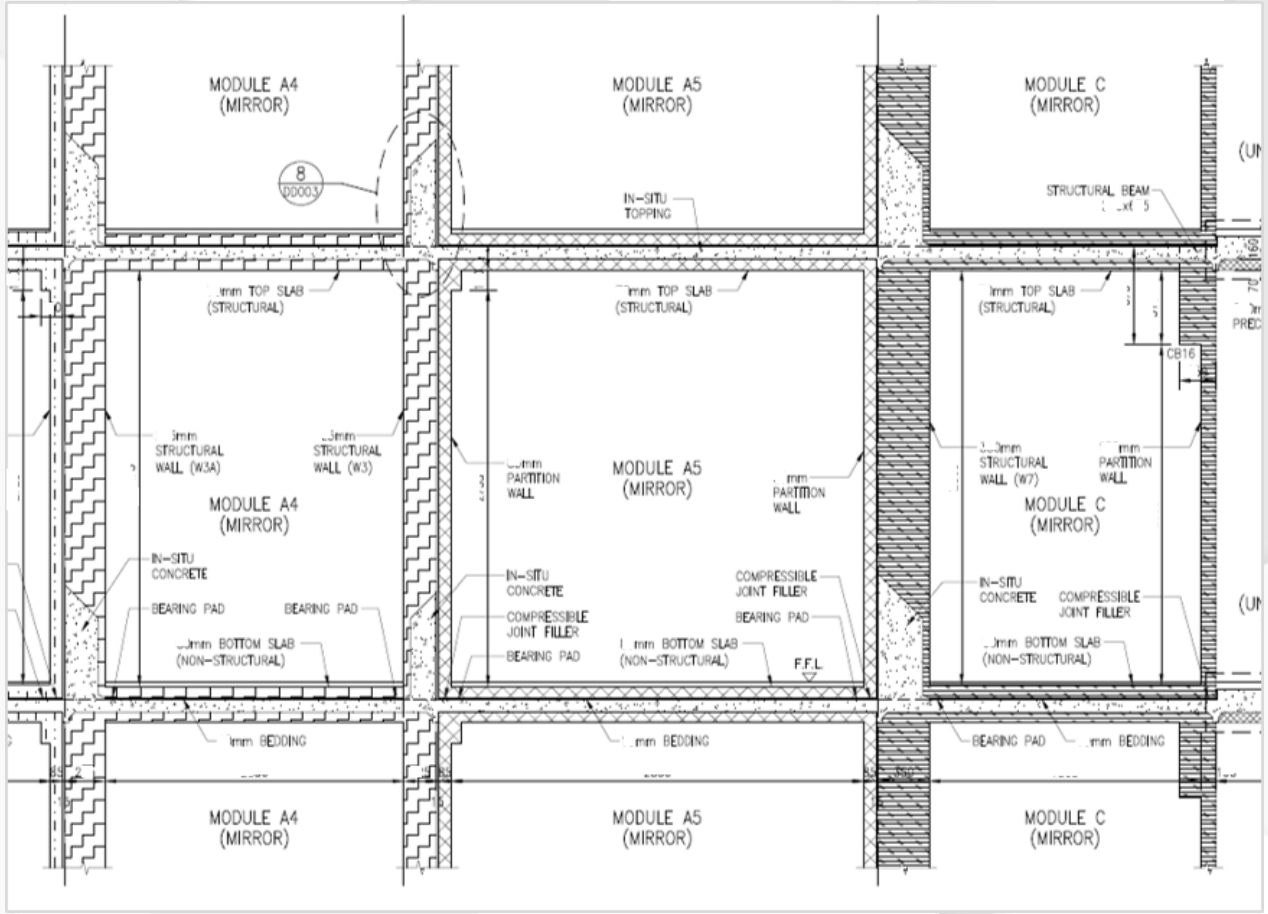
Lifting Stage

Courtesy of Hong Kong Science & Technology Parks Corporation

Reminders for IPA Submission

Structural

a. Different load path during temporary and permanent stages and locked in stress should be considered



VERTICAL LOAD PATH

- AT TEMPORARY STAGE, LOAD OF 90mm BOTTOM SLAB & 85mm WALL TRANSFER TO LINTEL BEAM, WHICH SPAN BETWEEN THE SIDE WALLS/LIFTING ANCHOR (WHEN LIFTING).
- AT PERMANENT STAGE, LOADING OF 85mm WALL & 90mm BOTTOM SLAB ACT ON 160mm FLOOR SLAB, WHICH SPAN BETWEEN SIDE WALLS. FACADE LOAD IS HANGED BY UPPER BEAM, WHICH SPAN BETWEEN SIDE WALLS. WEIGHT OF 160mm SLAB AND LINE LOAD TRANSFER TO SIDE STRUCTURAL WALLS.

HORIZONTAL LOAD PATH

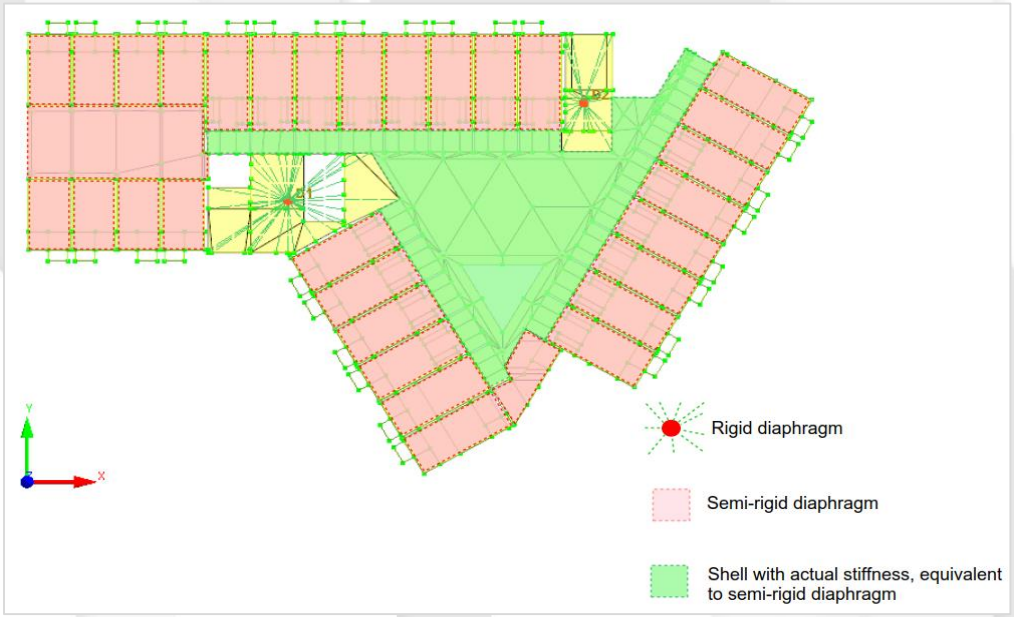
- AT TEMPORARY STAGE, WIND LOAD ACT ON FACADE AND THEN TRANSFERRED TO SIDE WALLS.
- AT PERMANENT STAGE, WIND LOAD ACT ON EDGE BEAM TO FLOOR SLAB, WHICH ACTS AS RIGID DIAPHRAGM. LOADING TRANSFER THROUGH SLAB TO SHEAR WALL, AND THEN TO THE BASE.

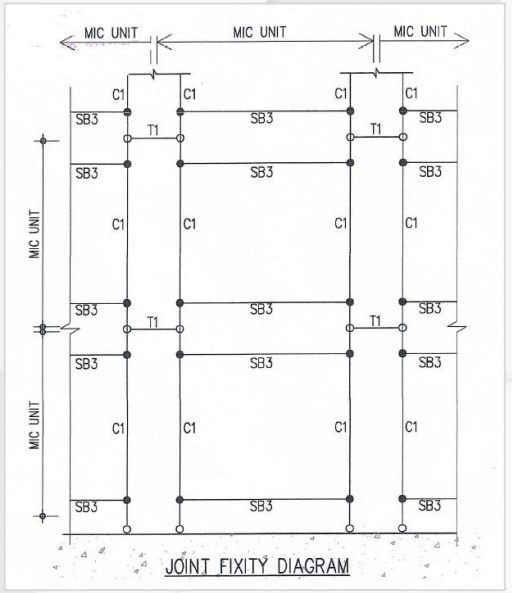
Courtesy of Yau Lee Wah Concrete Precast Products Company Limited

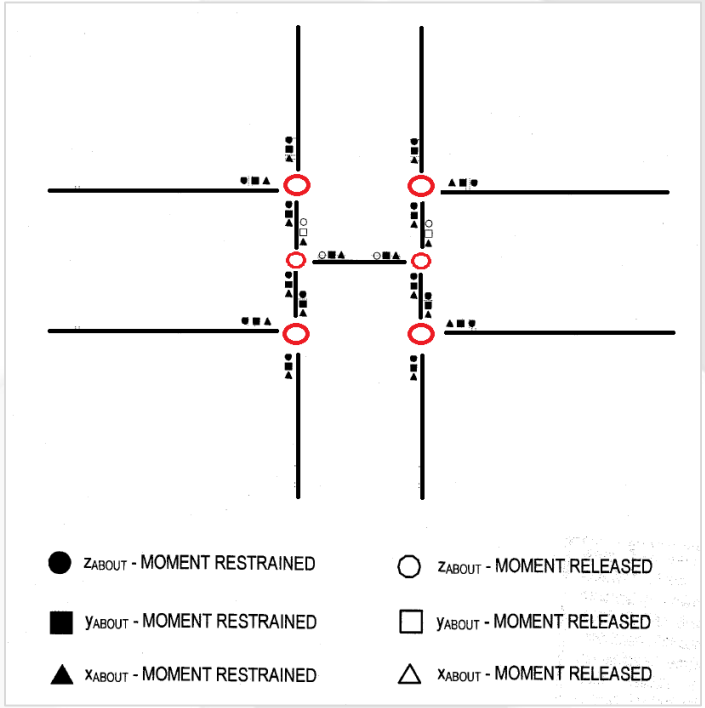
Reminders for IPA Submission

Structural

b. Joint fixity and rigid diaphragm assumptions in computer model should tally with actual conditions







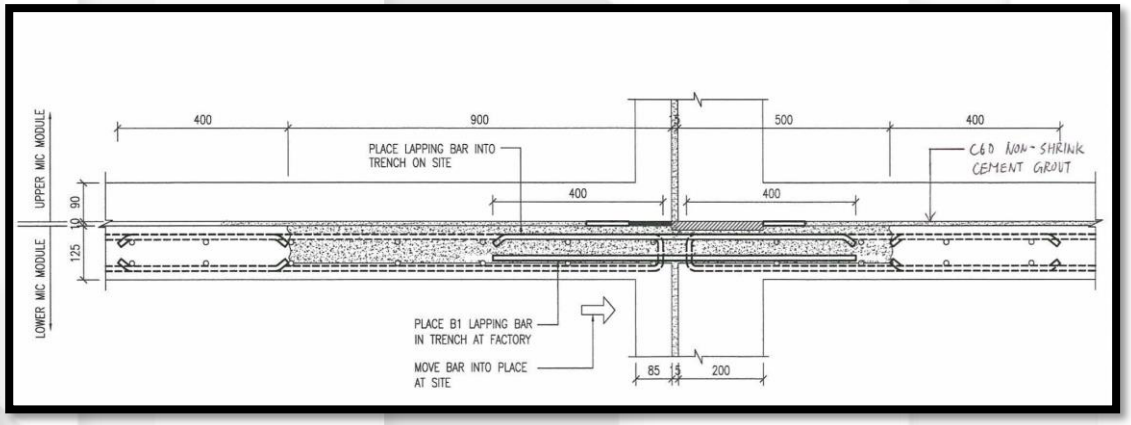
Courtesy of Hong Kong Science & Technology Parks Corporation and OIYN Ltd.

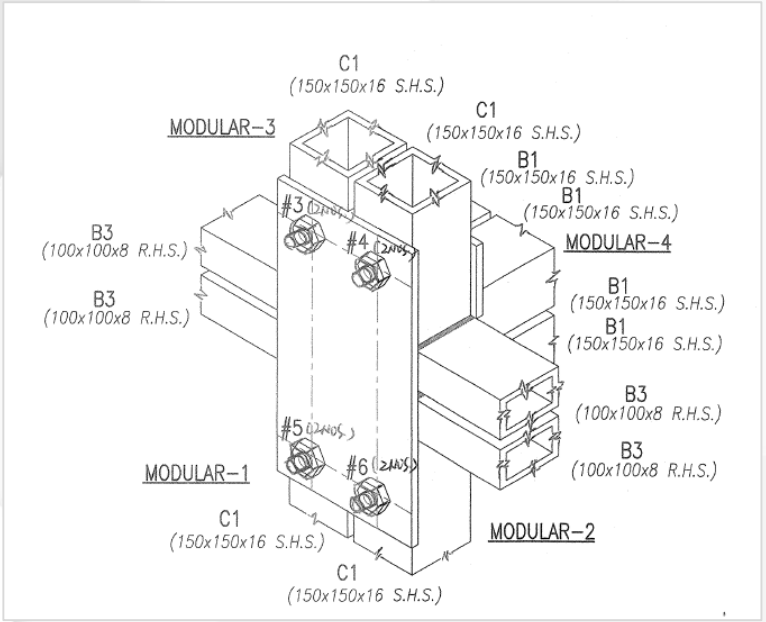
Reminders for IPA Submission

Structural

c. Design against structural integrity and robustness

- Adequate horizontal ties





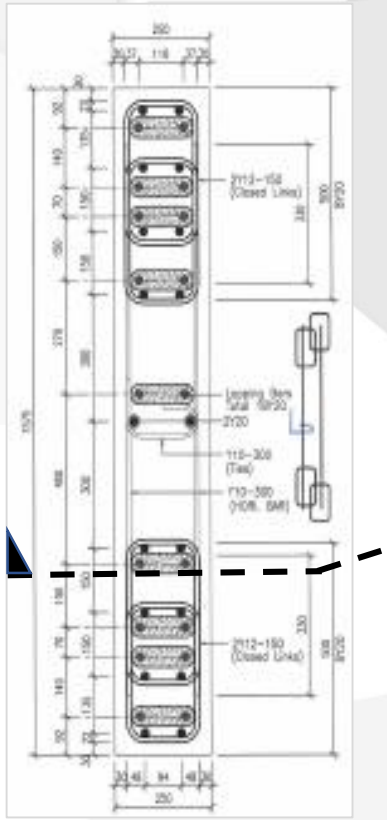
Courtesy of Urban Renewal Authority and The Hong Kong Council of Social Service

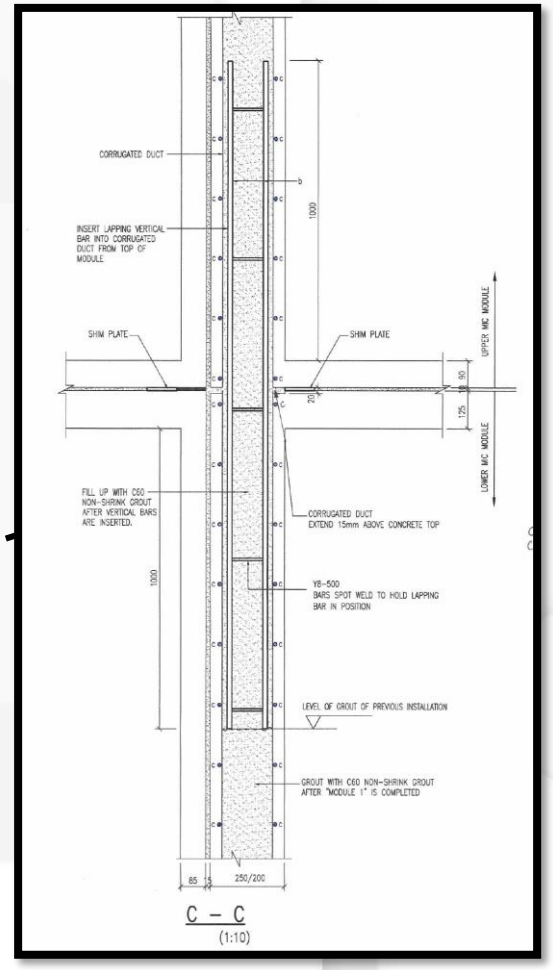
Reminders for IPA Submission

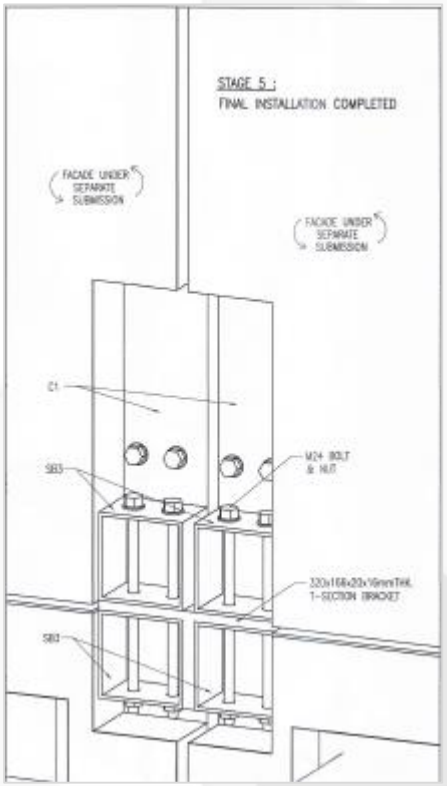
Structural

c. Design against structural integrity and robustness

- Adequate vertical ties







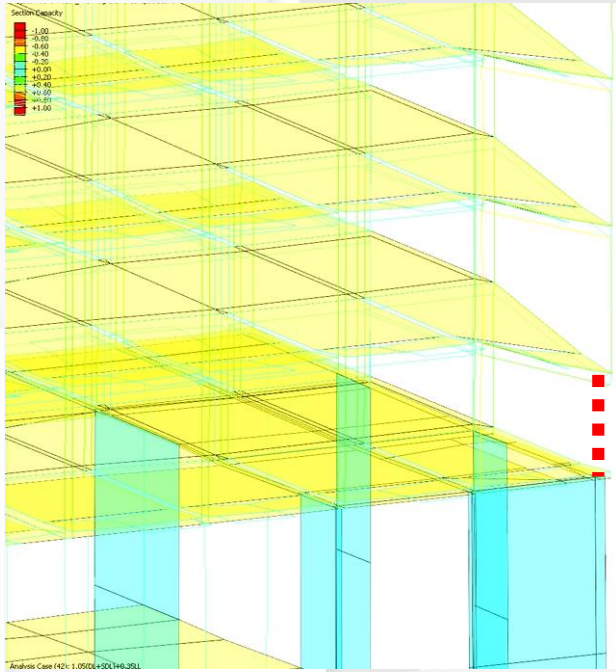
Courtesy of Urban Renewal Authority and OIYN Ltd.

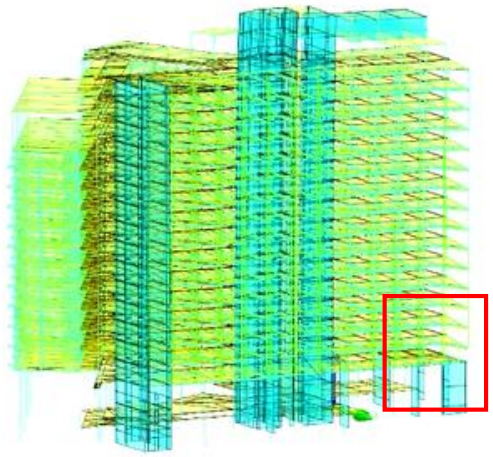
Reminders for IPA Submission

Structural

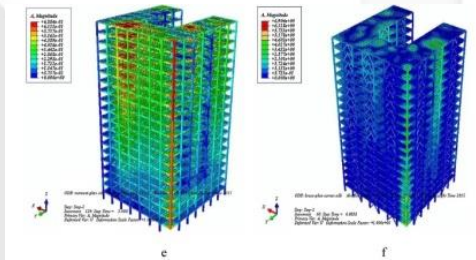
c. Design against structural integrity and robustness

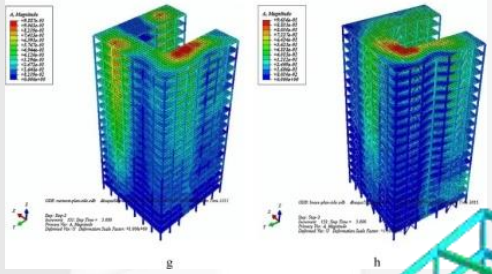
- Hypothetical column removal scenarios should be designed for

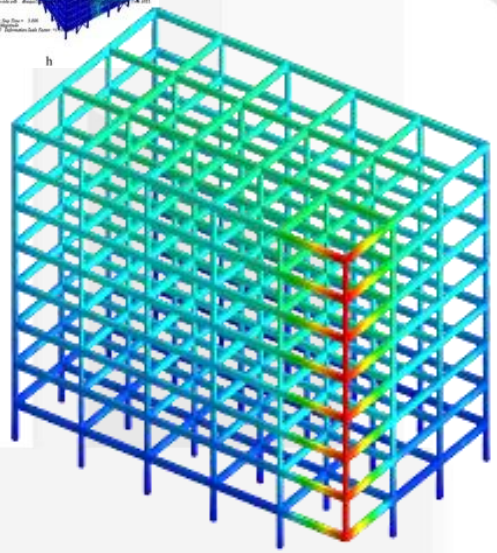




Hypothetical removal of column







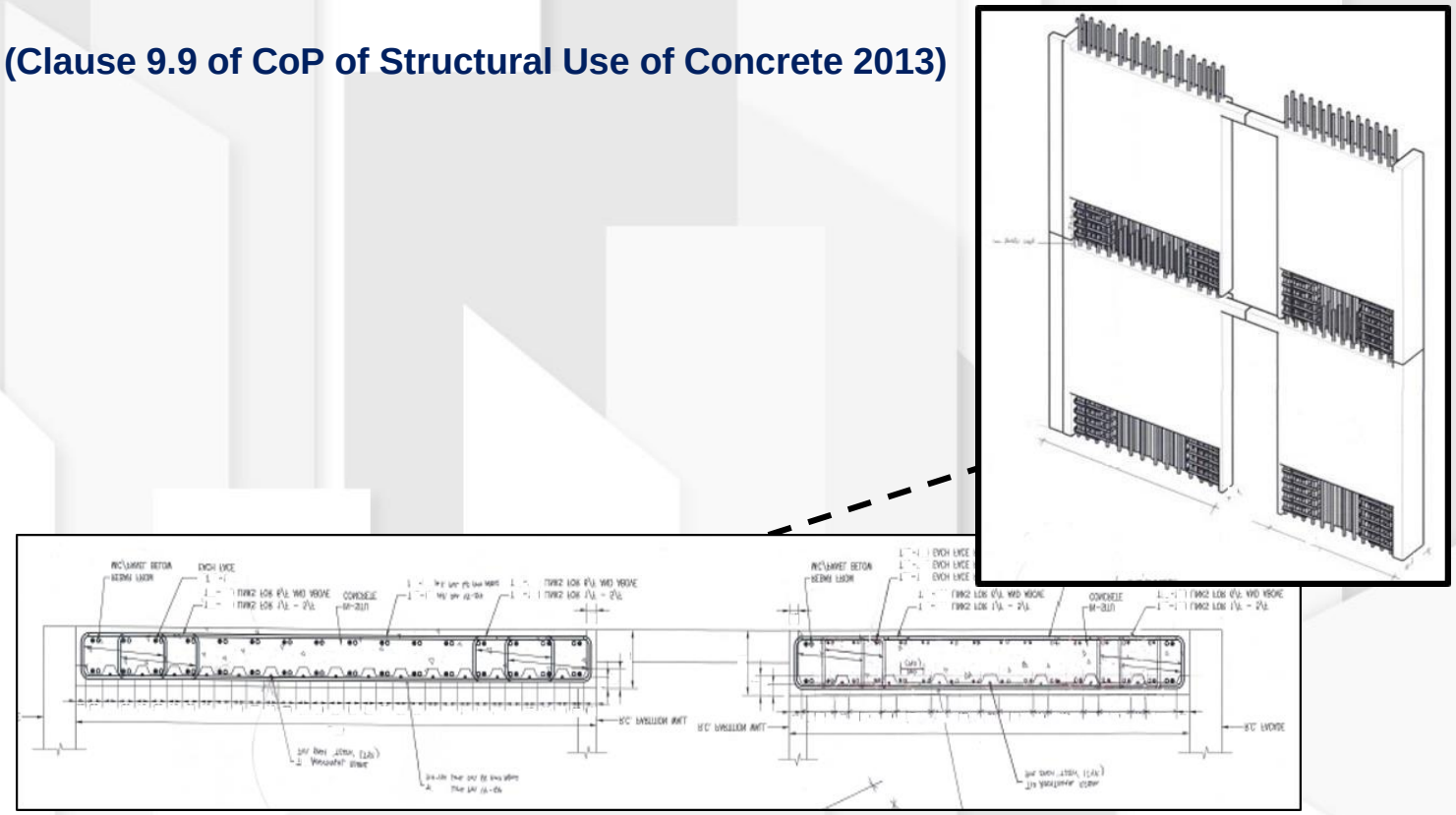
Courtesy of Hong Kong Science & Technology Parks Corporation

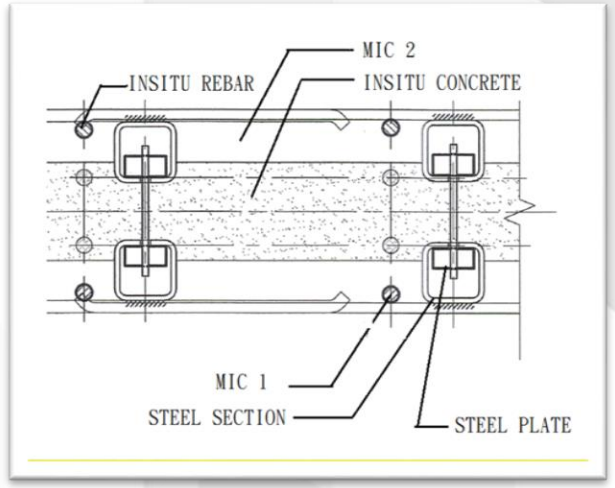
Reminders for IPA Submission

Structural

d. Requirements for ductility in reinforced concrete structures

(Clause 9.9 of CoP of Structural Use of Concrete 2013)





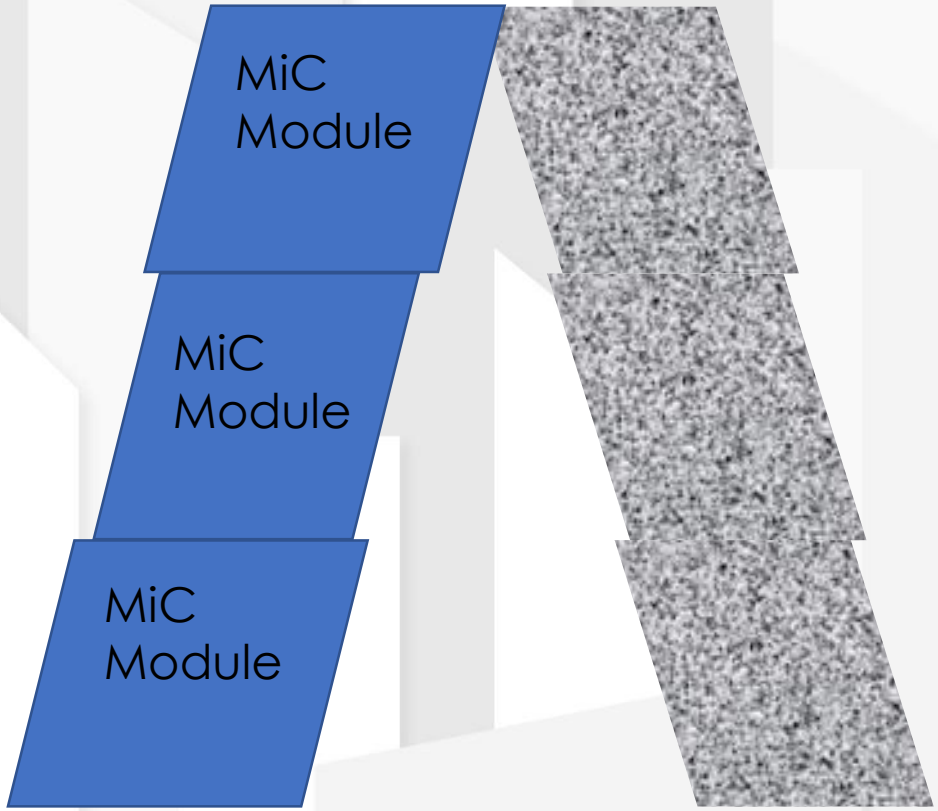
Patented Detail

Courtesy of Yau Lee Wah Concrete Precast Products Company Limited and
Chun Wo Construction & Engineering Co. Ltd with P&T Architects and Engineers Limited

Reminders for IPA Submission

Structural

e. Effects of fabrication and installation tolerance



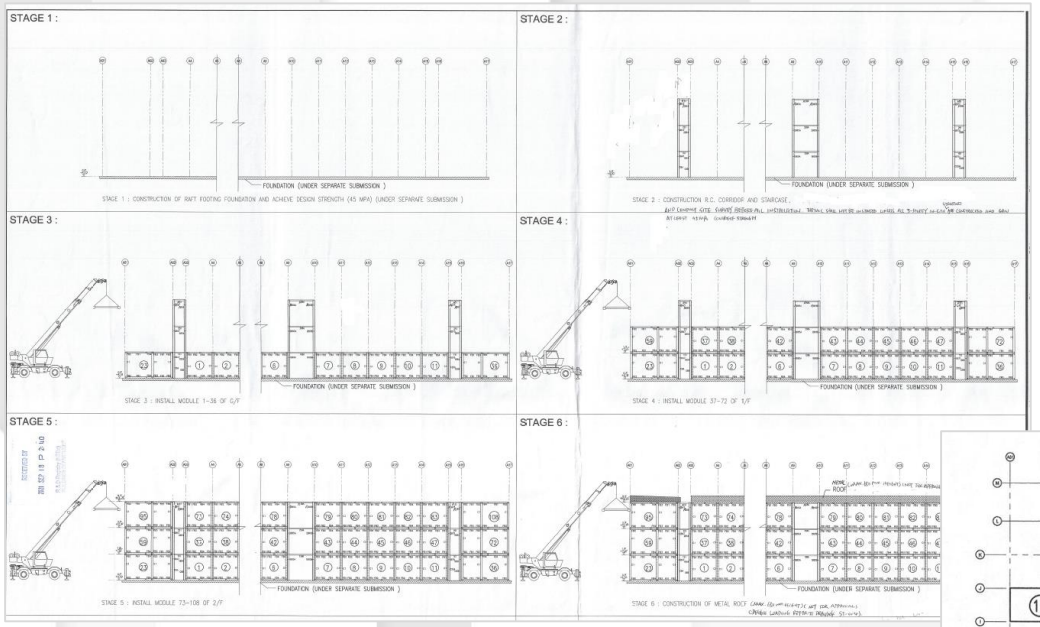
ALLOWED DEVIATION FOR FABRICATION		
MODULE HEIGHT	MODULE WIDTH	MODULE LENGTH
+/- 1.5mm	+/- 1.5mm	+/- 4.0mm

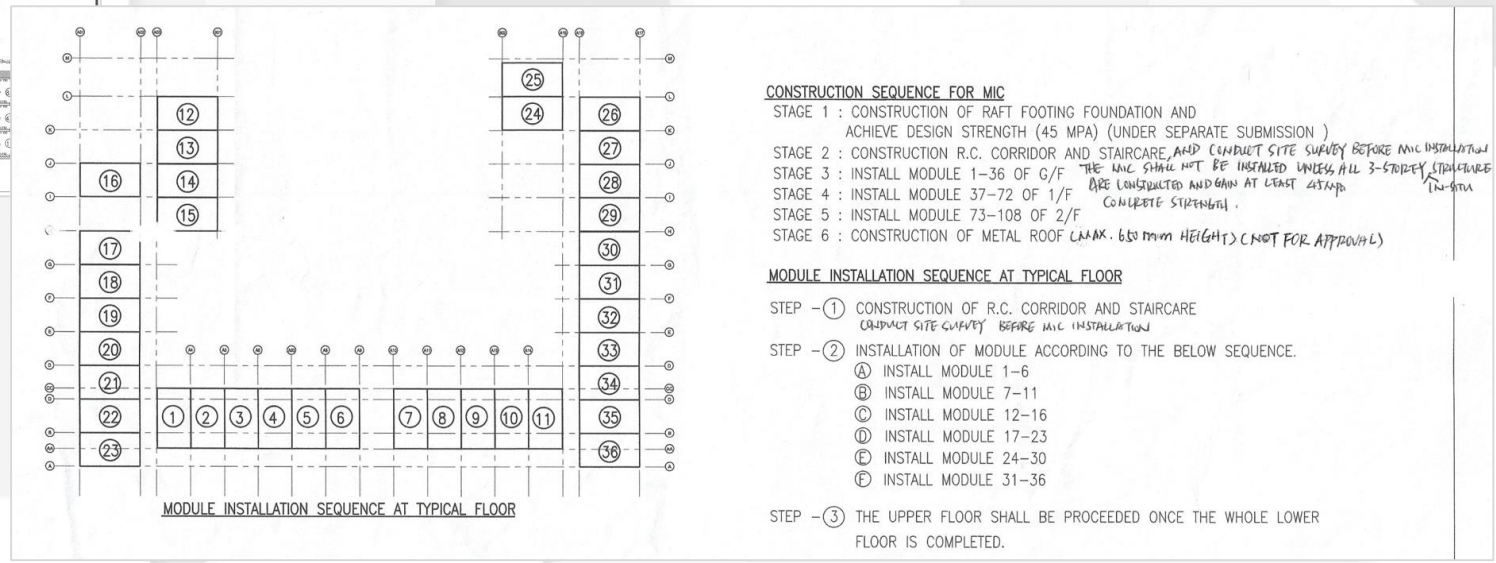
LATERAL DEVIATION BETWEEN CONSECUTIVE STOREYS	MAX. +/- 5mm
LATERAL DEVIATION RELATIVE TO BASE	MAX. +/- 25mm
DEVIATION IN COLUMN CENTRELINES AT SPLICE BETWEEN LOWER AND UPPER MODULE	MAX. 5mm
GAP BETWEEN BEARING SURFACE AT SPLICE	MAX 0.1mm

Reminders for IPA Submission

Structural

f. Master construction sequence should be provided



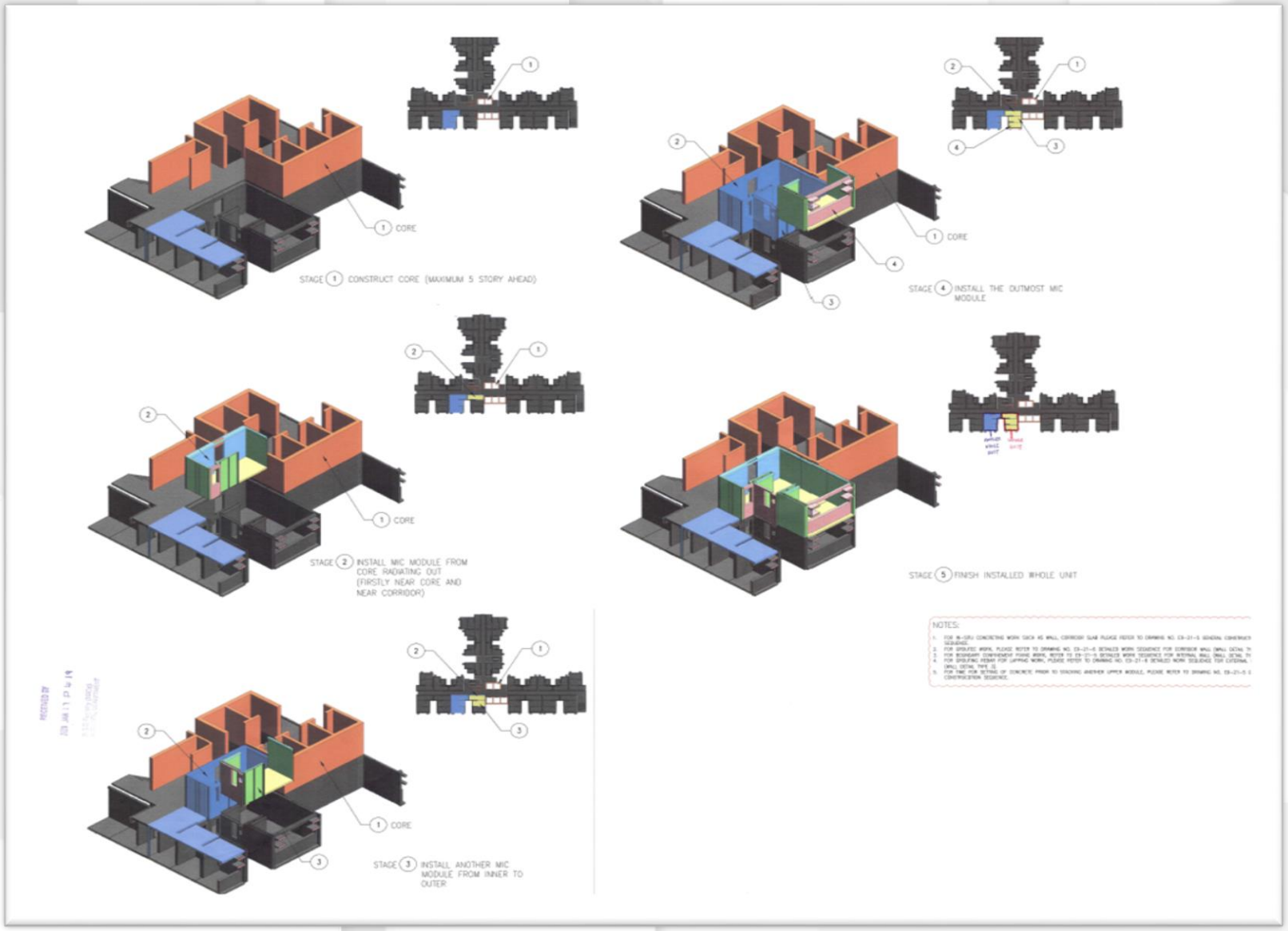


Courtesy of The Lok Sin Tong Benevolent Society, Kowloon

Reminders for IPA Submission

Structural

f. Master construction sequence should be provided



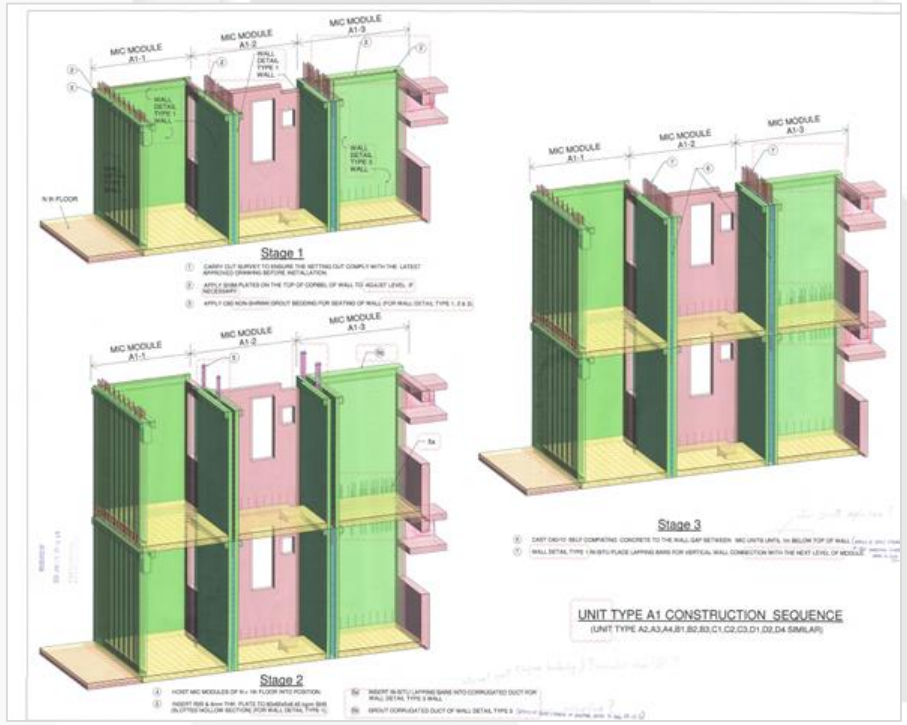
Courtesy of Chun Wo Construction & Engineering Co. Ltd with P&T Architects and Engineers Limited

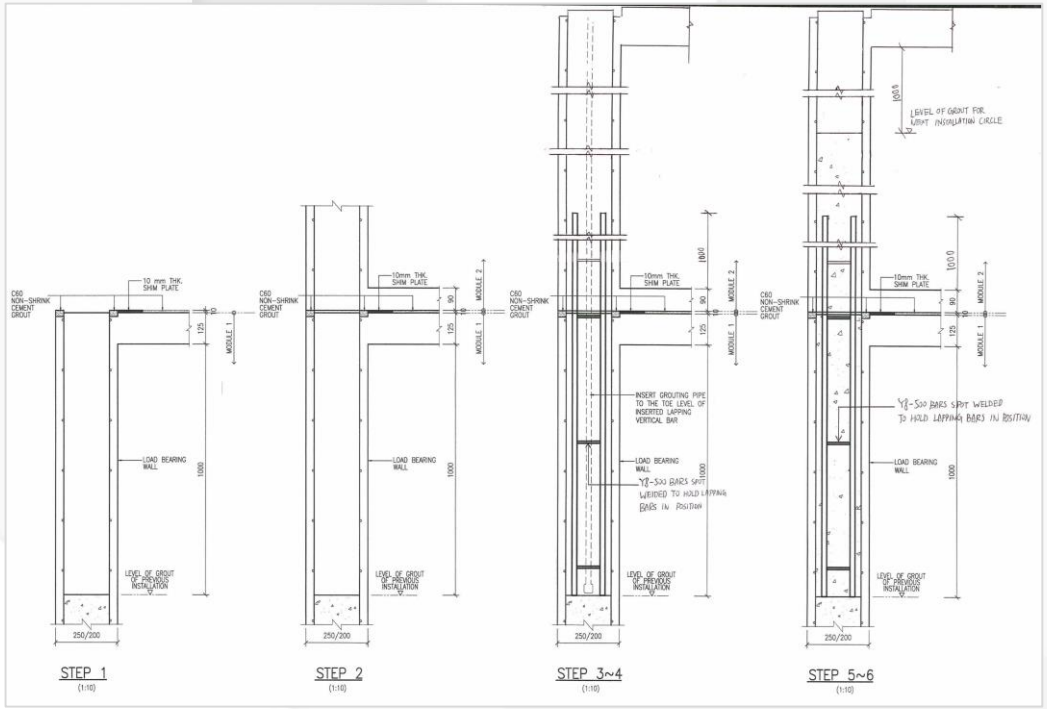
Reminders for IPA Submission

Structural

g. Method statement of installing structural connections

- Detailed steps and diagrams to show constructability
- Quality control measures
- Early involvement of contractor and MiC supplier



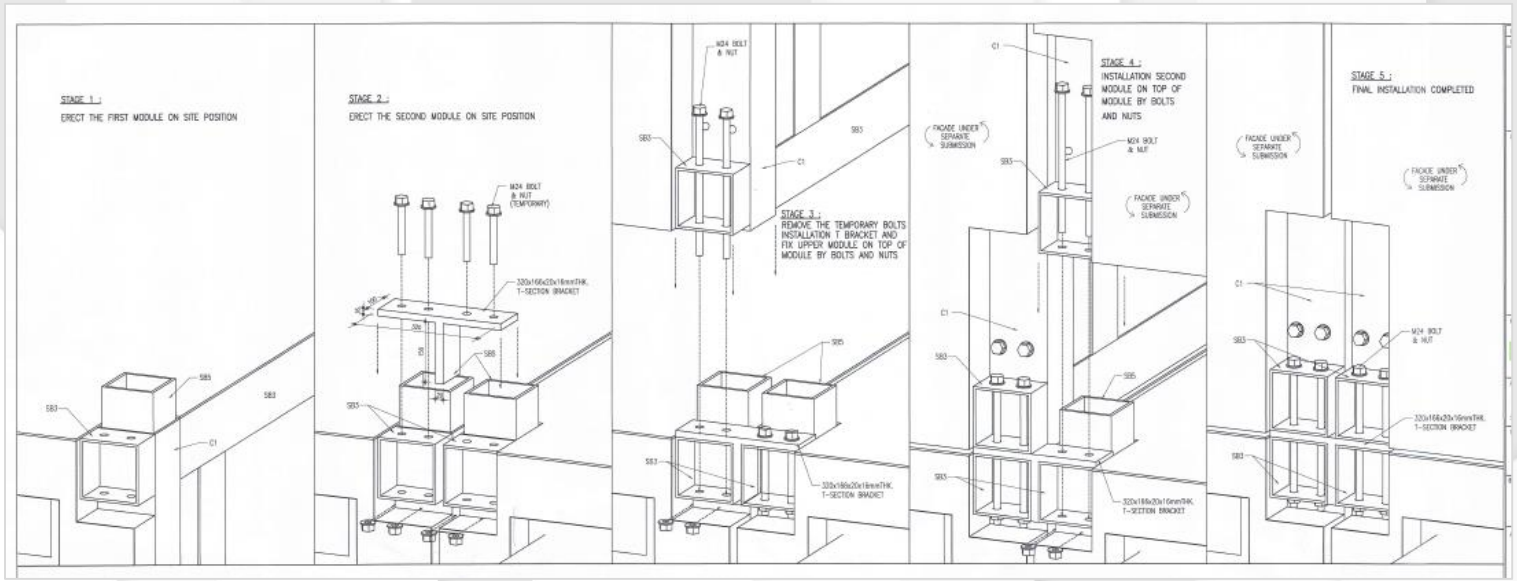


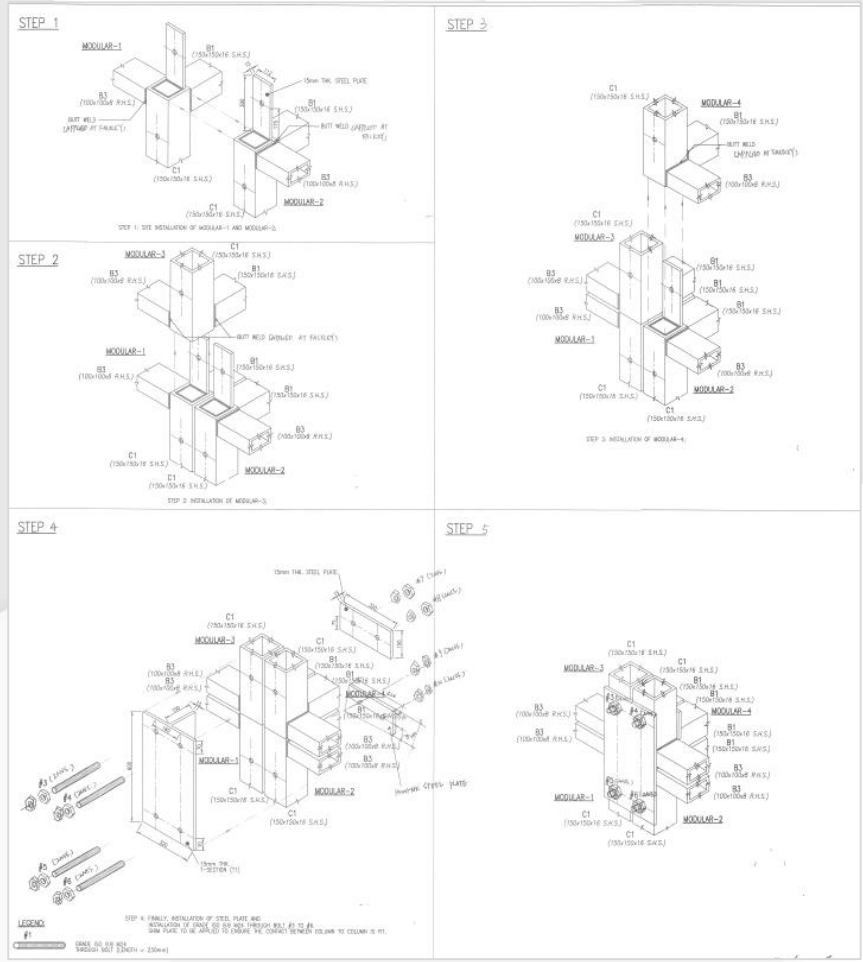
Courtesy of Chun Wo Construction & Engineering Co. Ltd with P&T Architects and Engineers Limited

Reminders for IPA Submission

Structural

g. Method statement of installing structural connections





Courtesy of OIYN Ltd. and
The Hong Kong Council of Social Service

Reminders for IPA Submission

Quality Assurance Scheme (QAS) of factories

a. ISO 9001 expiry and validity;

b. In case manufacturer pair up with prefabrication factories –

- ✓ roles of each party should be clarified;

c. In case with more than one factory involved –

- ✓ production logistics and roles of manufacturer and each factories should be provided;

Certificate No: CC 1196

Q CERTIFIED COMPANY HKQAA

This is to certify that the Quality Management System of

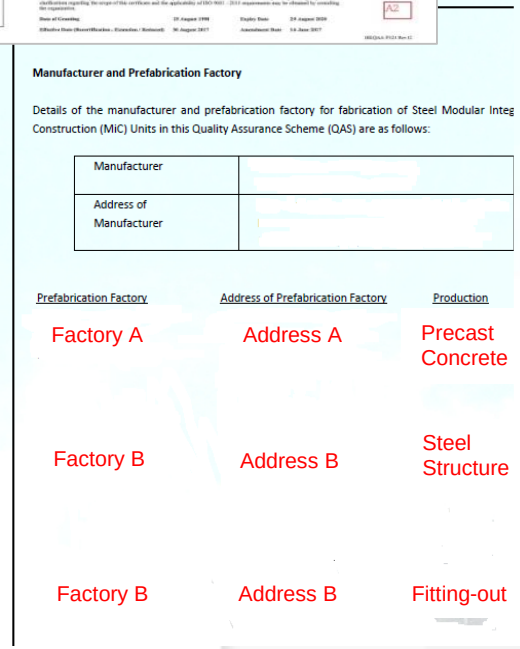
complies with the requirements of ISO 9001 : 2015 quality management system standard, applicable to:

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

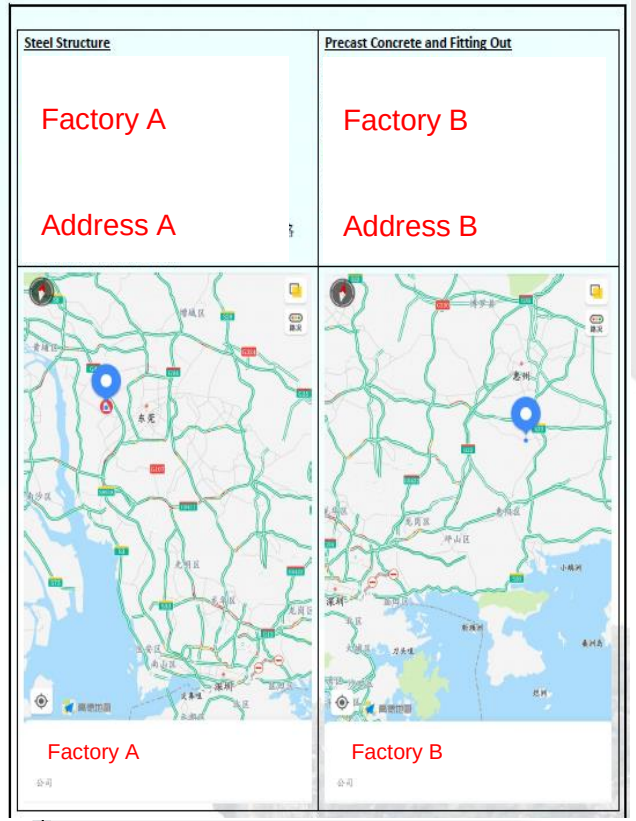


Manufacturer and Prefabrication Factory

Details of the manufacturer and prefabrication factory for fabrication of Steel Modular Integ Construction (MiC) Units in this Quality Assurance Scheme (QAS) are as follows:

Manufacturer	
Address of Manufacturer	

Prefabrication Factory	Address of Prefabrication Factory	Production
Factory A	Address A	Precast Concrete
Factory B	Address B	Steel Structure
Factory B	Address B	Fitting-out



Steel Structure	Precast Concrete and Fitting Out
Factory A	Factory B
Address A	Address B

Q&A

Thank you

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Online Social Media Platforms