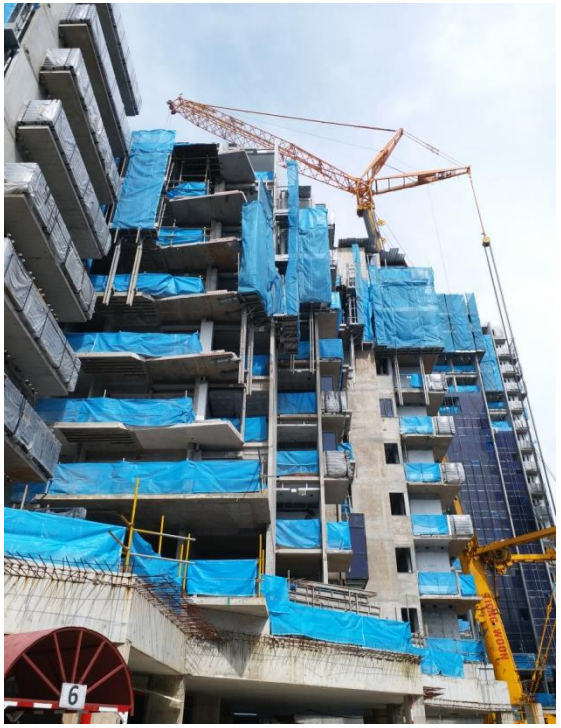
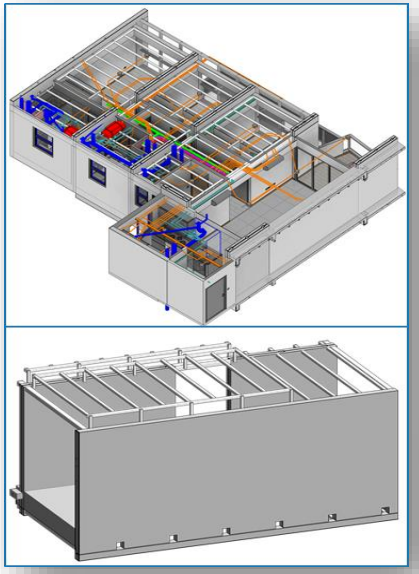
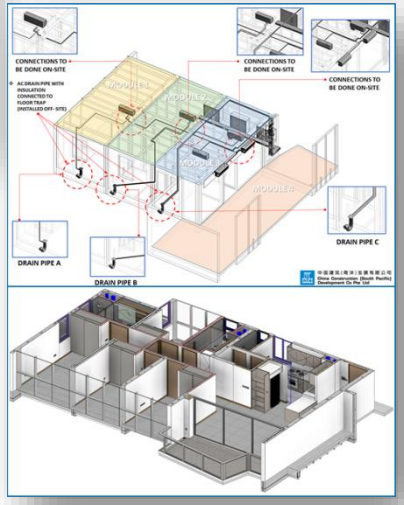
中國海龍建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED







Modular Integrated Construction (MiC)

06/11/2018

Content

中国海龙建筑科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

中国海龙建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

1 Company Overview

-Shenzhen Factory (PRC)
-Zhuihai Factory (PRC)

Company Overview

中国海龙建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

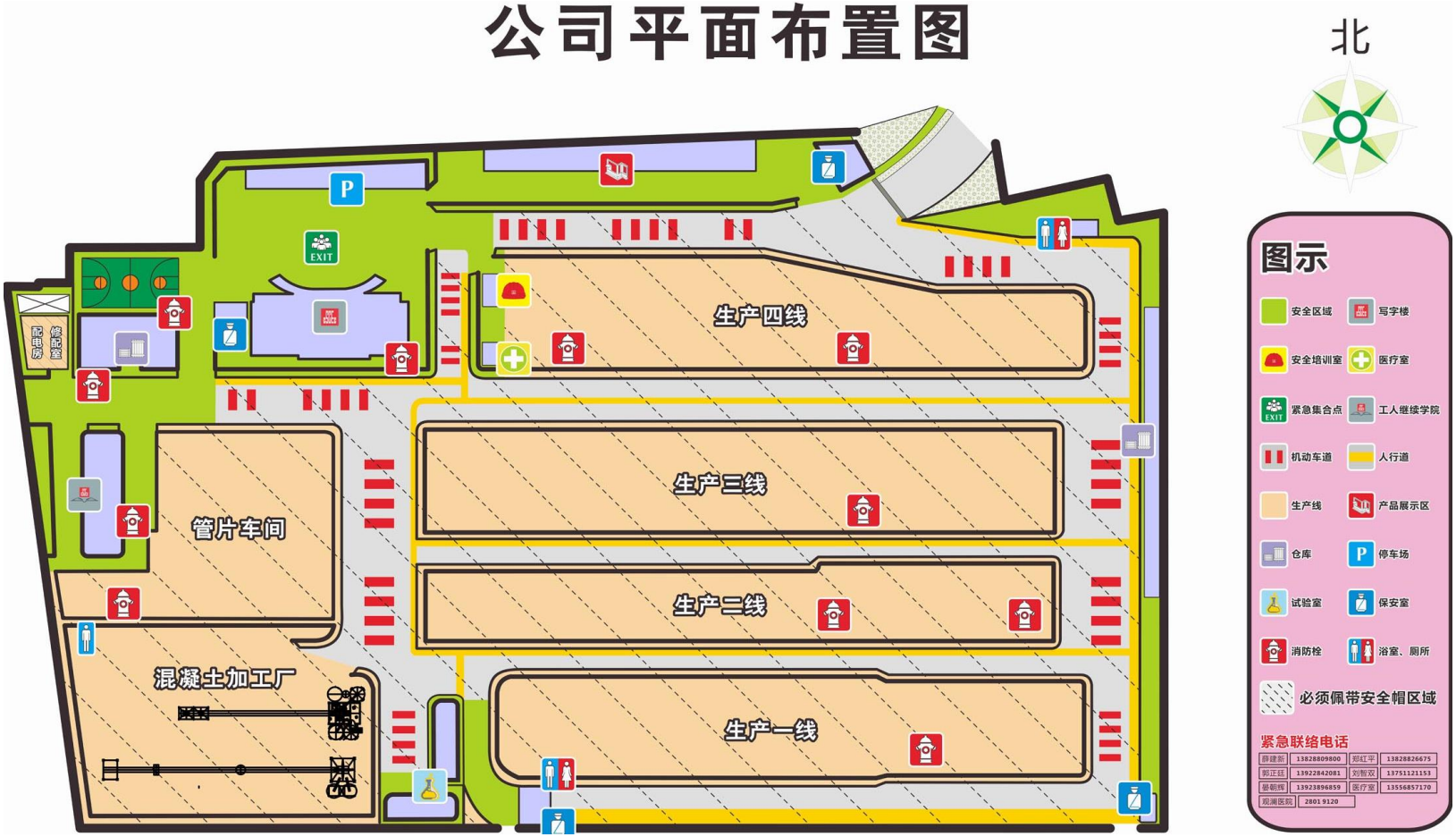
Shenzhen Factory

Established in January 1993, a wholly-owned subsidiary of China State Construction International Holdings Ltd.
The major products include:
*Precast facade
*Precast partition walls, floor slabs, staircases and balconies
*Precast primary and secondary beams, columns and composite GRC
*Precast integrated kitchens and bathrooms

Company Overview

中国海龙建筑科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

Company Layout Plan



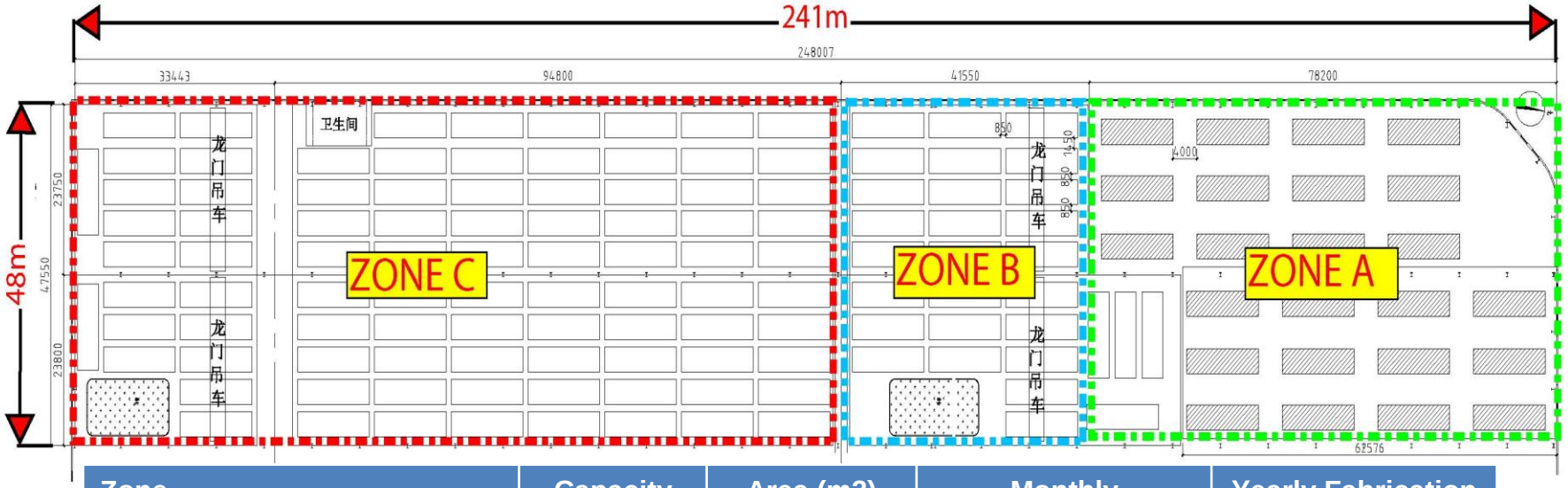
Area : 50,000 m2

Company Overview

中国海龙建筑科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

Zhuihai Factory

Production Layout Plan



Zone	Capacity (MiC Unit)	Area (m2)	Monthly Fabrication (Nos.)	Yearly Fabrication (Nos.)
A (Casting Concrete)	24	3,700	**125**	**1500**
B (Decoration and Finishing)	30	2,000		
C (Storage)	90	5,800		
TOTAL	**144**	**11,500**		

Company Overview

中國海龍建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

Approved precast supplier to HK Government, Property Developers, Main Contractors

香港房屋委員會

香港特別行政区政府
路政署

香港特別行政区政府
土木工程拓展署

CEDD

香港特別行政區政府
渠務署

中海地产

Sino Group

SWIRE

長江实业(集团)有限公司

MTR

HH

KERRY PROPERTIES
嘉里建設

華人置業集團
CHINESE ESTATES GROUP

WHEELOCK

K. WAH REAL ESTATES CO., LTD.
嘉華地產有限公司

華懋集團
Chinachem Group

中國建築工程(香港)有限公司
CHINA STATE CONSTRUCTION ENGINEERING (HONG KONG) LTD.

瑞安建筑有限公司

前田建設

新昌
HSIN CHONG

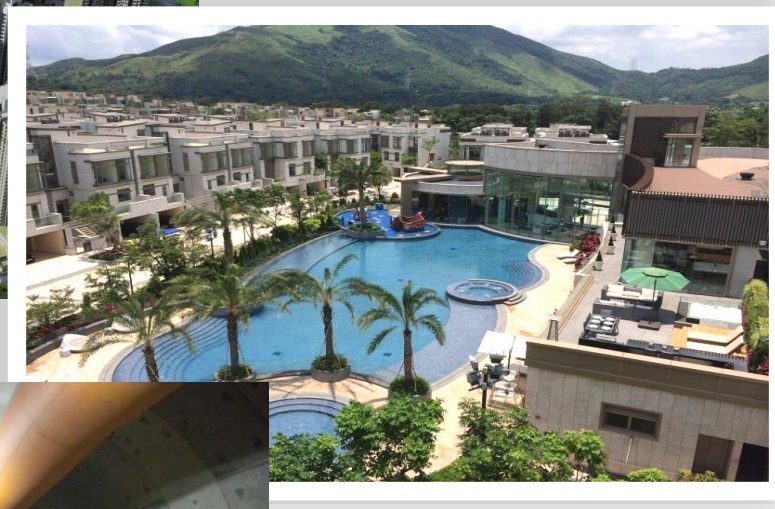
永森建築工程有限公司
Wing Sum Construction & Engineering Co., Ltd.

恒達建築有限公司
HENG TAT CONSTRUCTION CO. LTD.

Company Overview

中國海龍建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

Strong in technical supports to various types of building and civil projects



Company Overview

中国海龙建筑科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

Precast integrated kitchens and bathrooms

Steel Modular Office

中国海龙建筑科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

2 Design of Steel MiC

中国海龙建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

Low Rise Building

Steel MiC

Statutory Submission and Design of MiC system

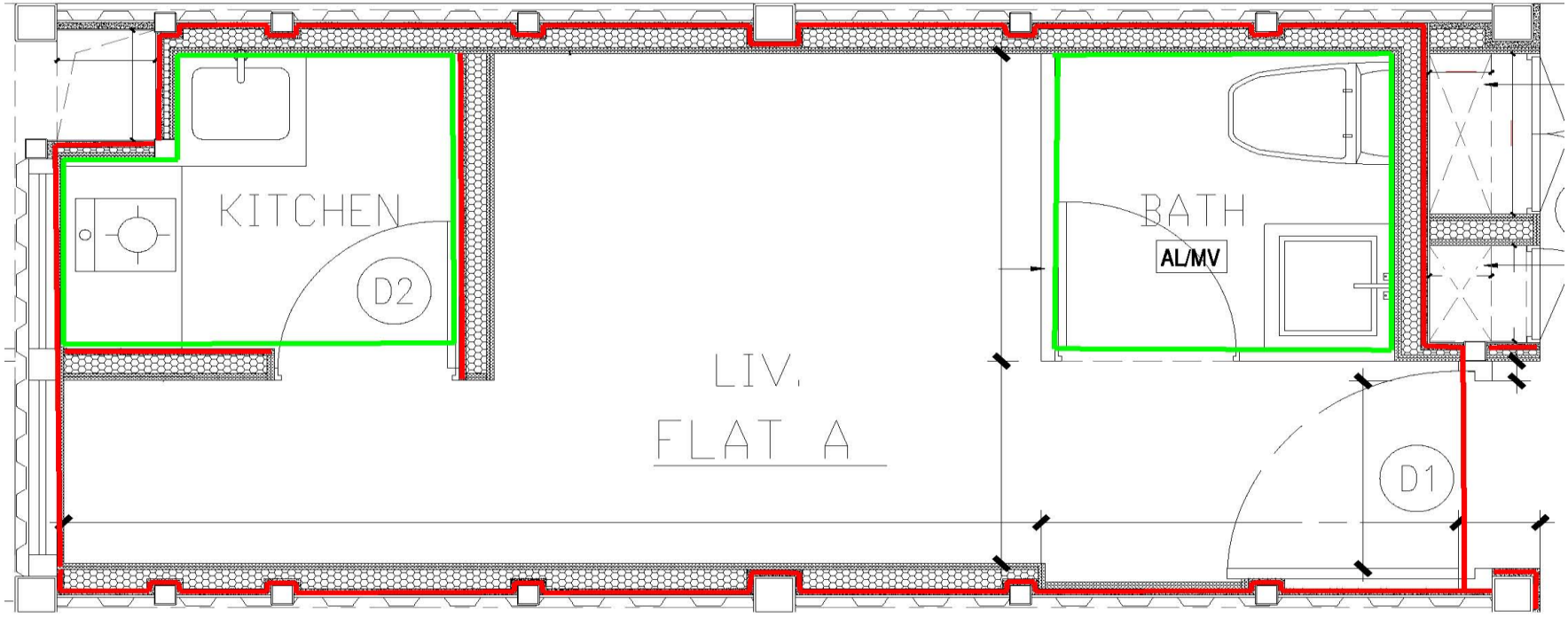
Elevation

Statutory Submission and Design of MiC system

Design of Fire and Water Resistance System (Steel MiC)

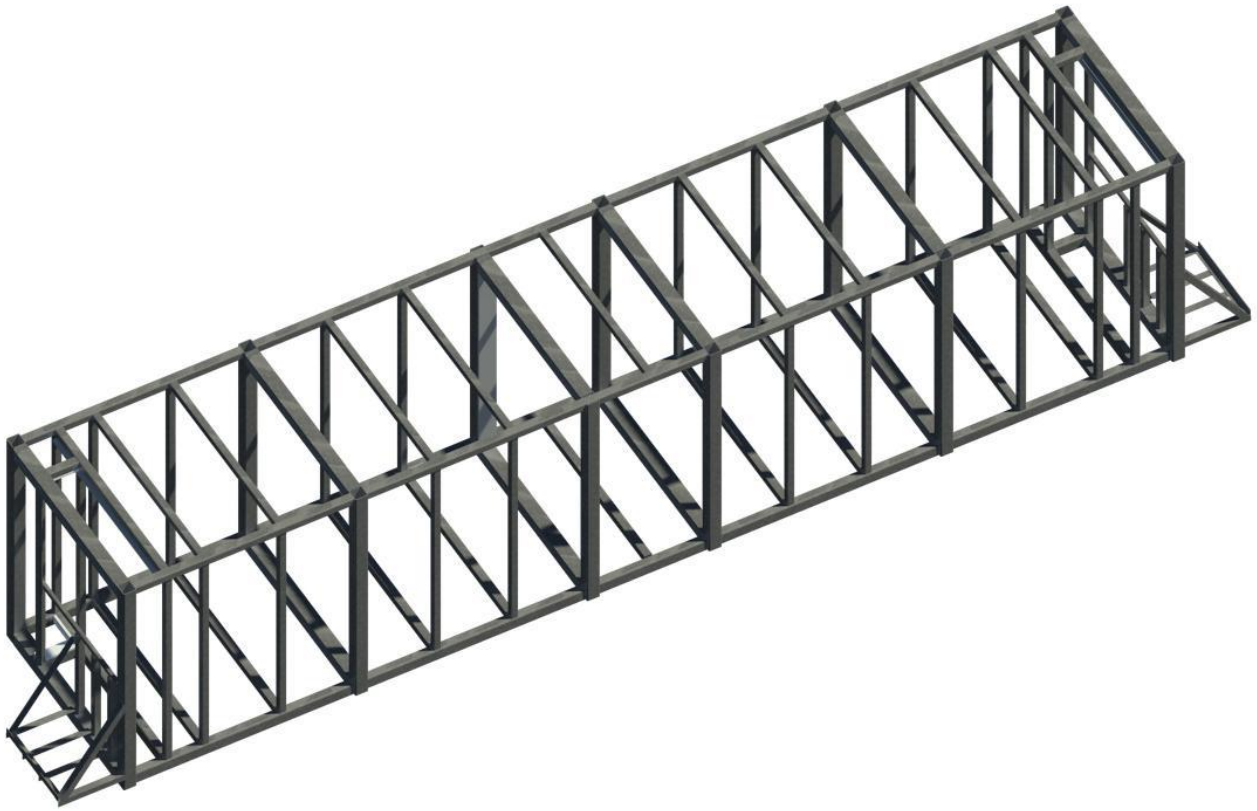
60 mins Fire Resistance Rating

Wet Resistance



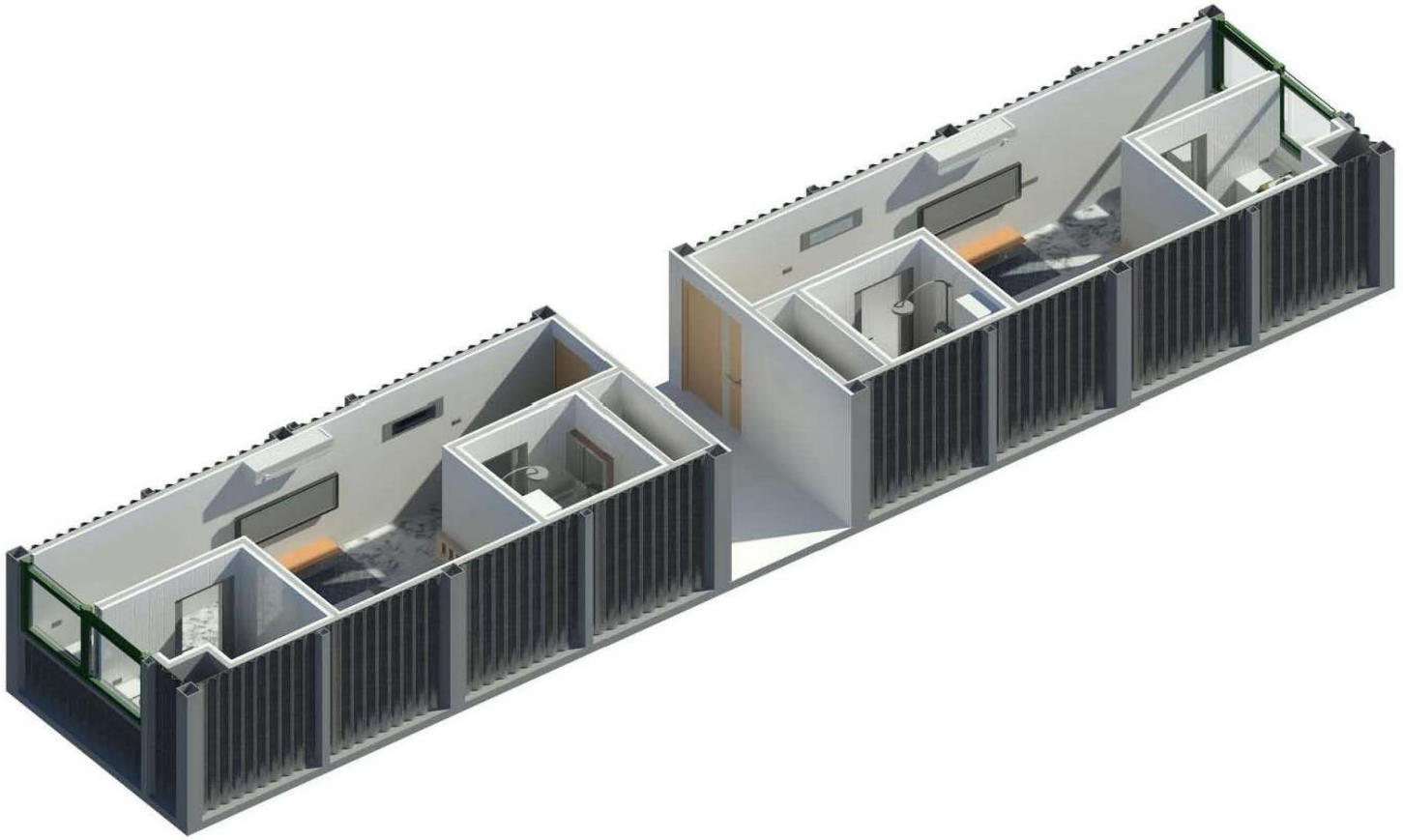
Design of MiC system

Steel Frame of Steel MiC



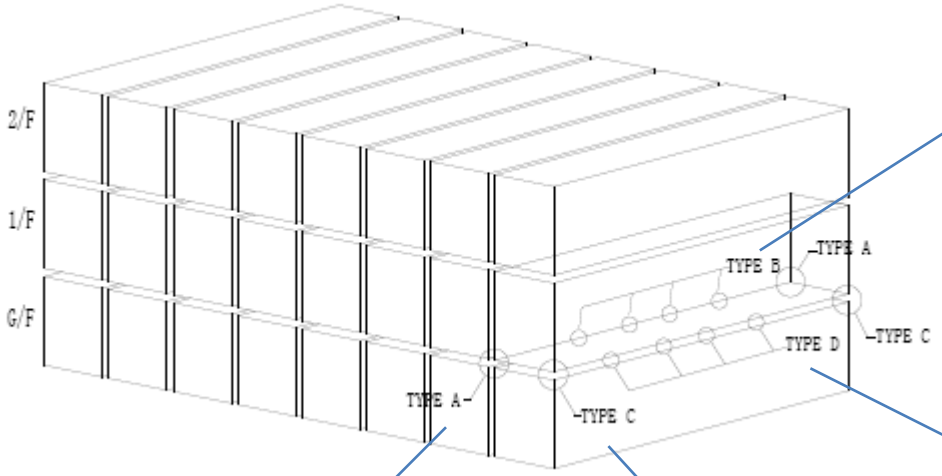
Design of MiC system

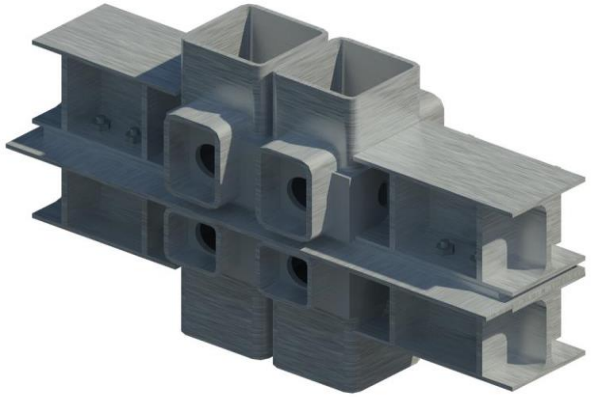
BIM Study of Steel MiC

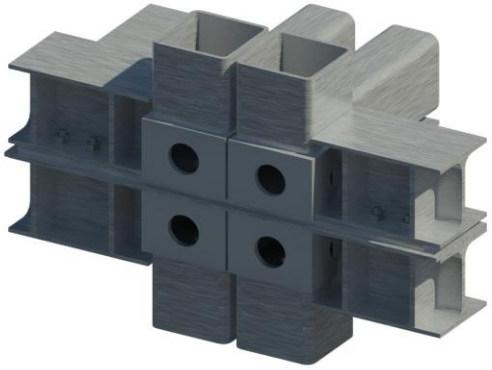


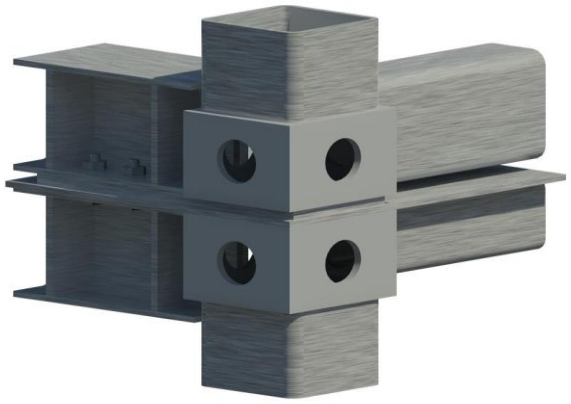
Design of MiC system

Design of Connection (Steel MiC)







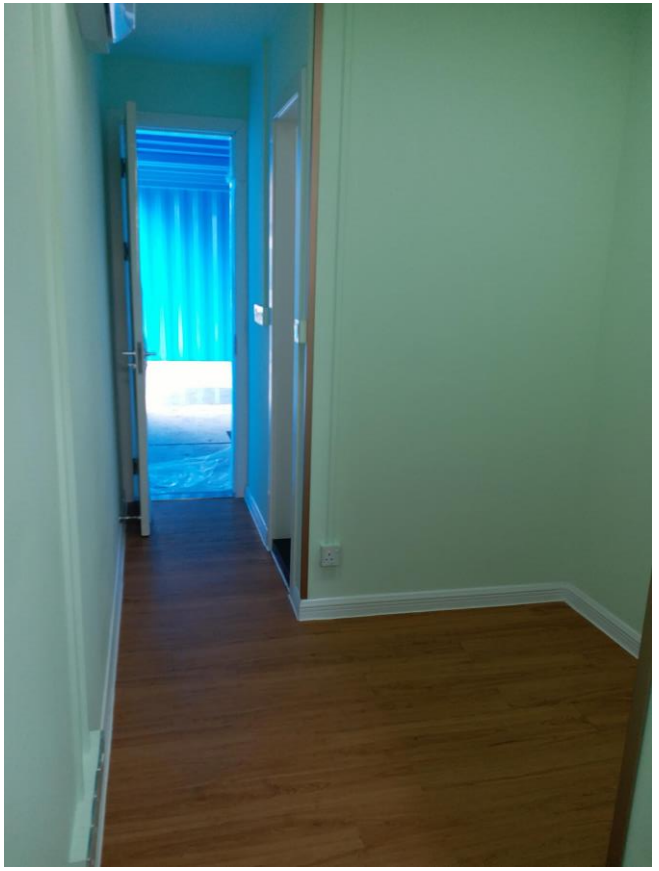


Design of MiC system

Mock Up of Steel MiC

Entrance and Pipe Duct

Living Room



Design of MiC system

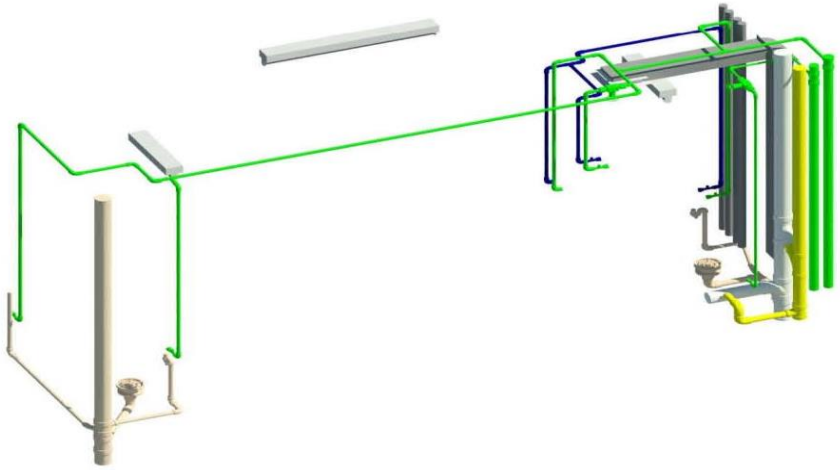
Mock Up of Steel MiC

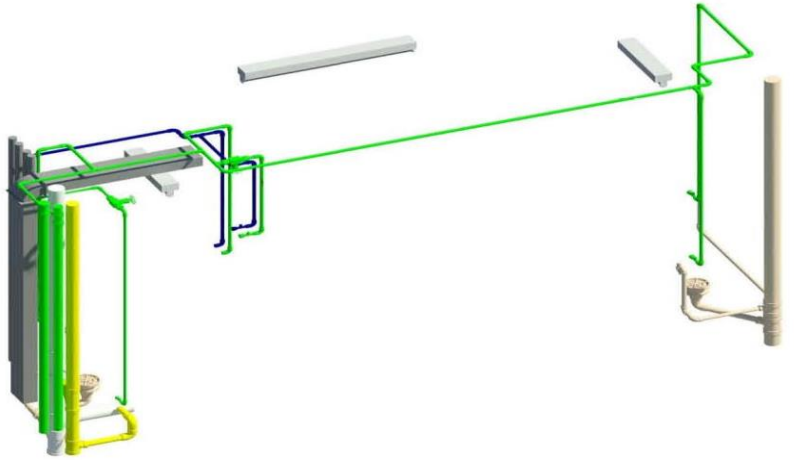
Toilet

Kitchen

Design of MiC system

BIM Study on MEP Services





中国海龙建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

High Rise Building

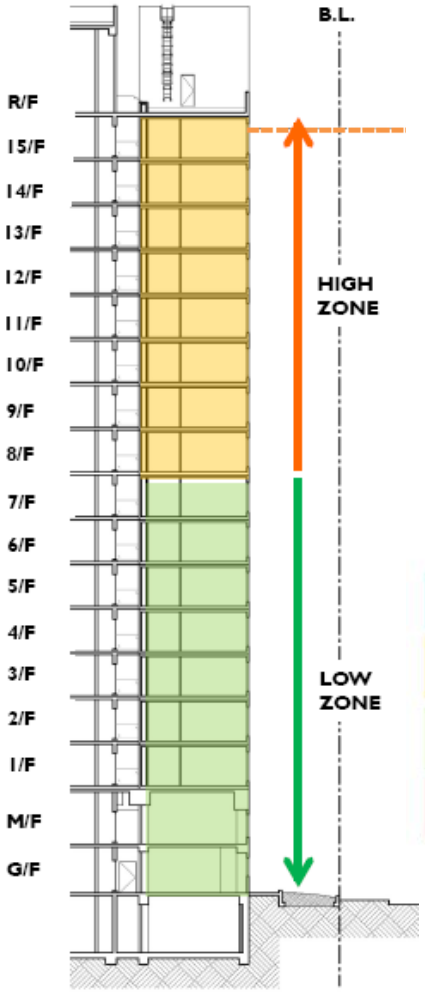
Steel MiC

Design of MiC system

Elevation

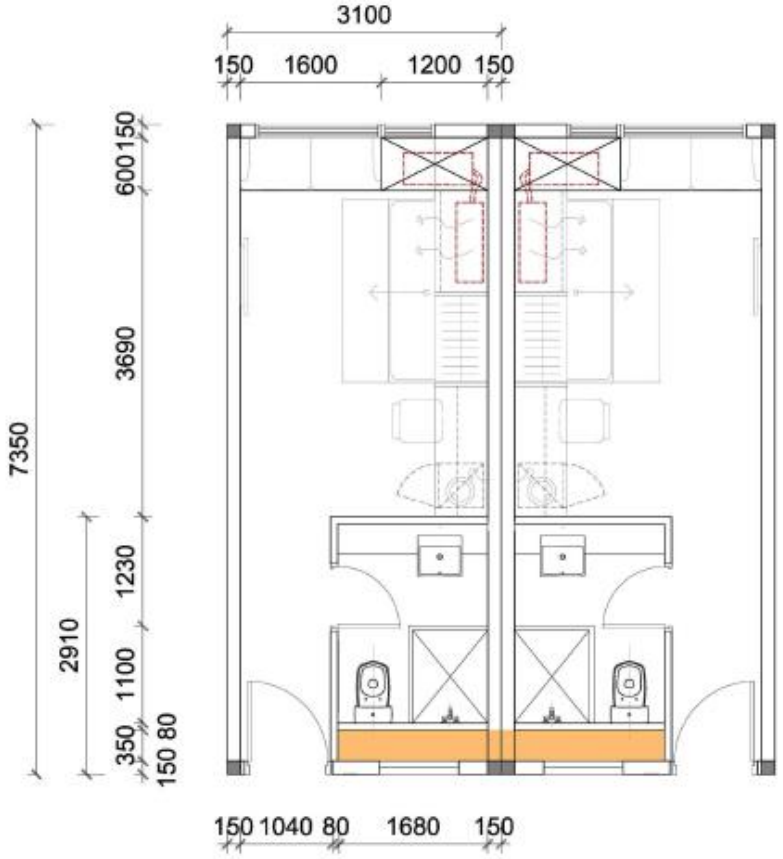
Design of MiC system

Plan and Sections



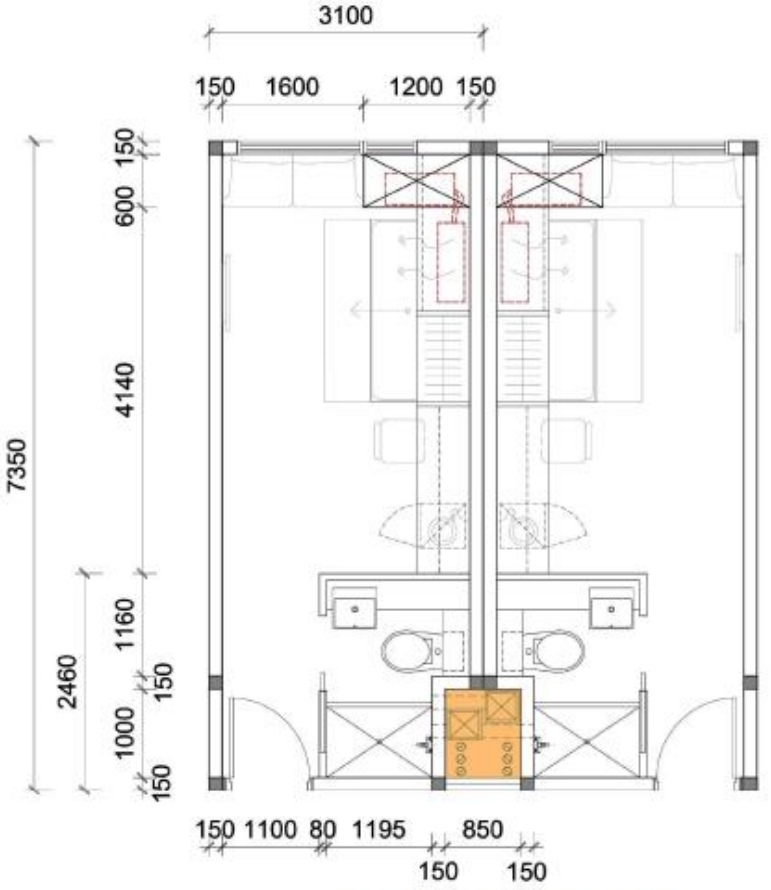
- Co-living units
- Standard Studio
- Sleep Box
- Family Unit

Design of MiC system



STANDARD STUDIO
(Dual Pipe)

PD AREA PER PAIR OF UNIT =
1.29 m2



STANDARD STUDIO
(Shared PD)

PD AREA PER PAIR OF UNIT =
0.85m2

Design of MiC system

STANDARD UNIT

Foldable Bed

Acoustic wall

Foldable Table

Design of MiC system

FAMILY UNIT I

Foldable Bunk Bed

Rotating
Foldable Table

3 Design of RC MiC

Statutory Submission

Preparation for Design Proposal RC-MiC System

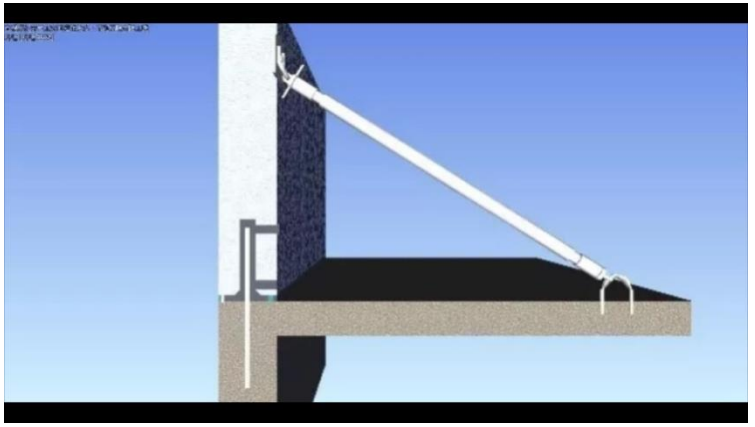
1. The NMB splice sleeve system is submitted to HA and is discussed with HA's project team and CSE / DC. Supplementary information will be submitted on early August 2018.

2. Discussion and study with Centre for Innovation in Construction & Infrastructure Development (CICID) from HKU for the viability of adopting MiC system in public housing construction in HK, which is comssioned by HA.

3. Design study for Concrete+Steel Composite Structure.

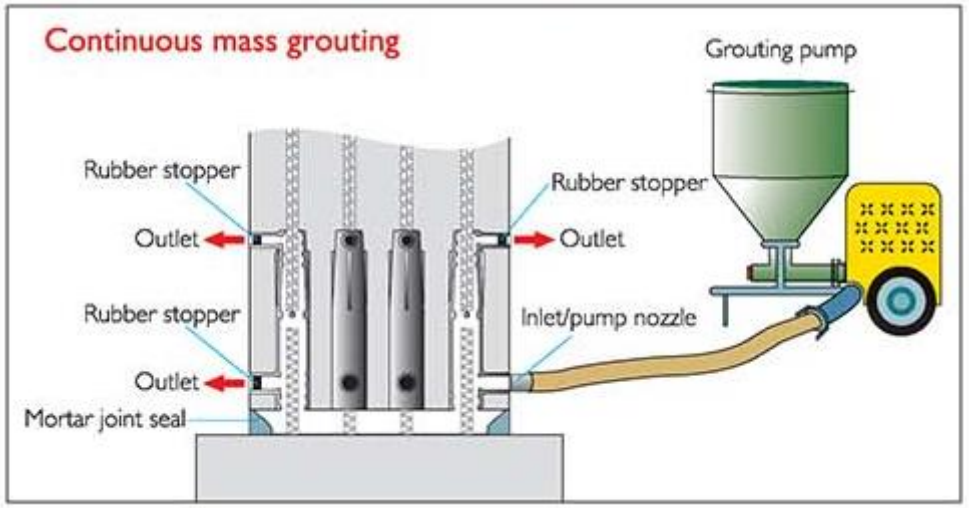
4. Based on the modular design in Nam Cheong Street from Hong Kong Council of Social Service (HKCSS), RC MiC system will be submitted to BD.

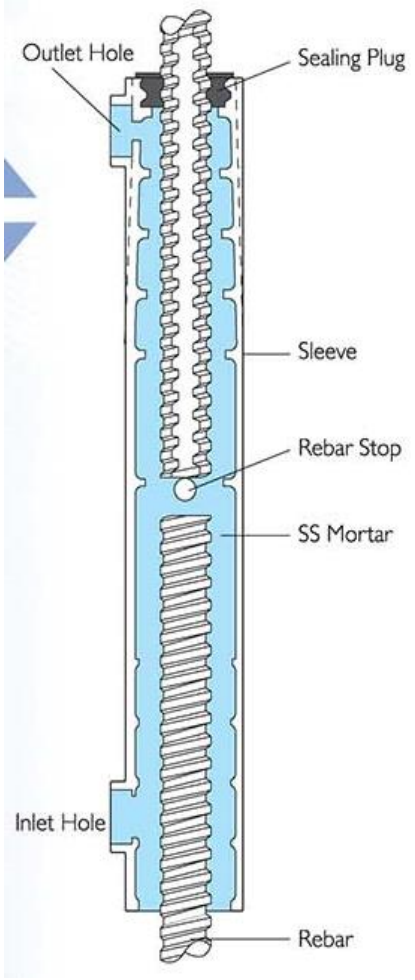
5. Material study for Lightweight cocnrete with HKU.



Design of RC MiC

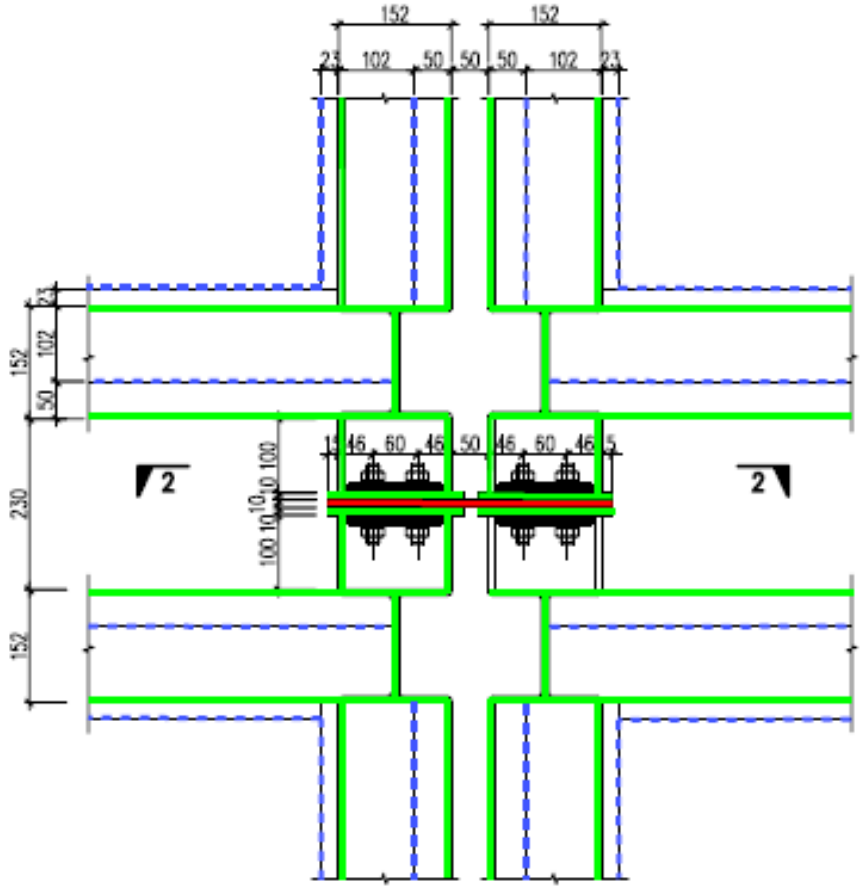
Design of Connection - NMB Splice Sleeve (RC MiC)





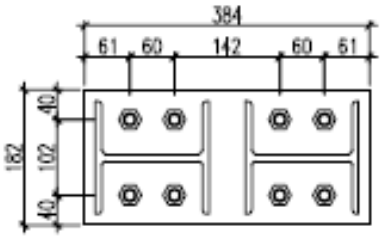
Design of RC MiC

Design of Connection - RC+Steel Composite Structure



Concrete

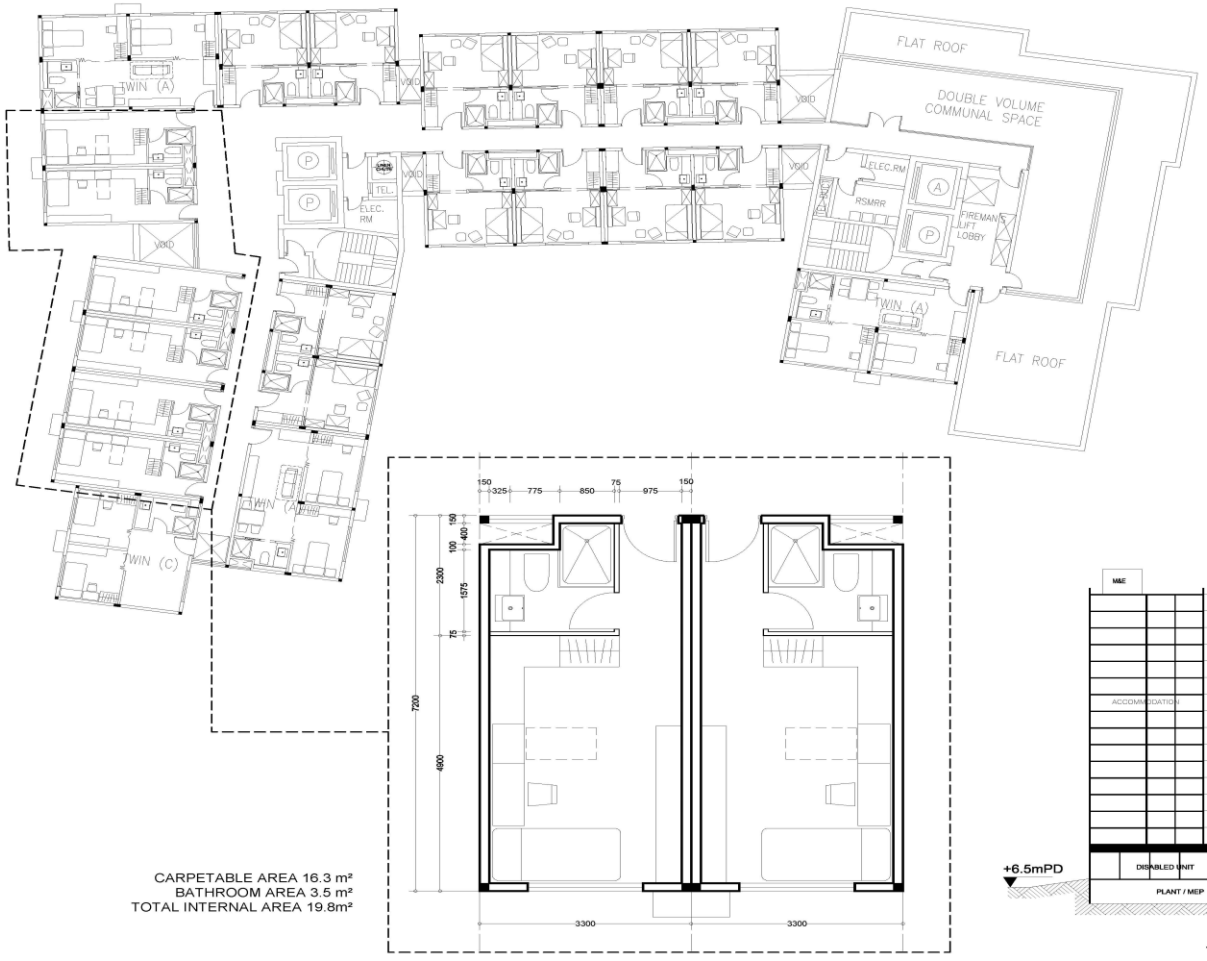
Steel



SECTION 2–2

Design of RC MiC

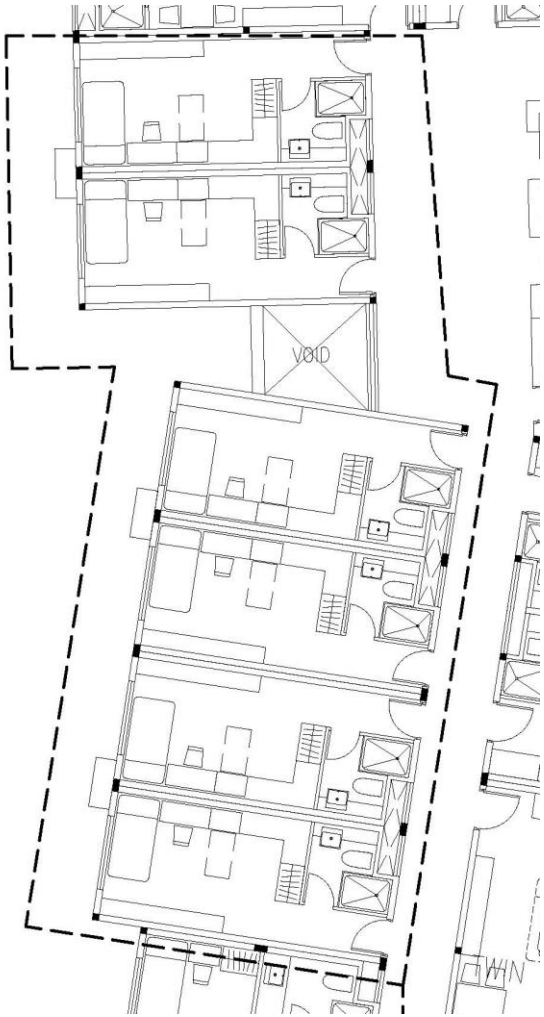
Mock Up of RC MiC

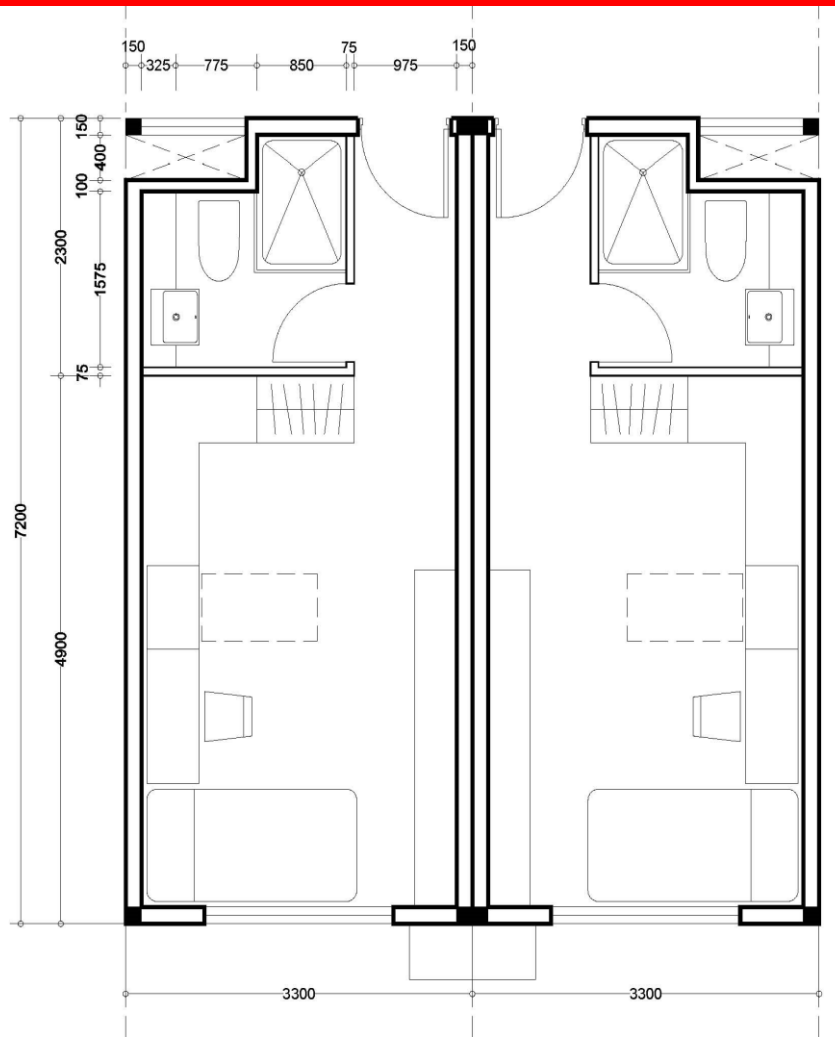


TYPICAL SECTION

Design of RC MiC

Mock Up of RC MiC





CARPETABLE AREA 16.3 m²
BATHROOM AREA 3.5 m²
TOTAL INTERNAL AREA 19.8m²

Design of RC MiC

Mock Up of RC MiC **3.3m (W) x 7.2m (L) x 3.3m (H)**

Design of RC MiC

Mock Up of RC MiC **3.3m (W) x 7.2m (L) x 3.3m (H)**

Fabrication, Handling and Transportation

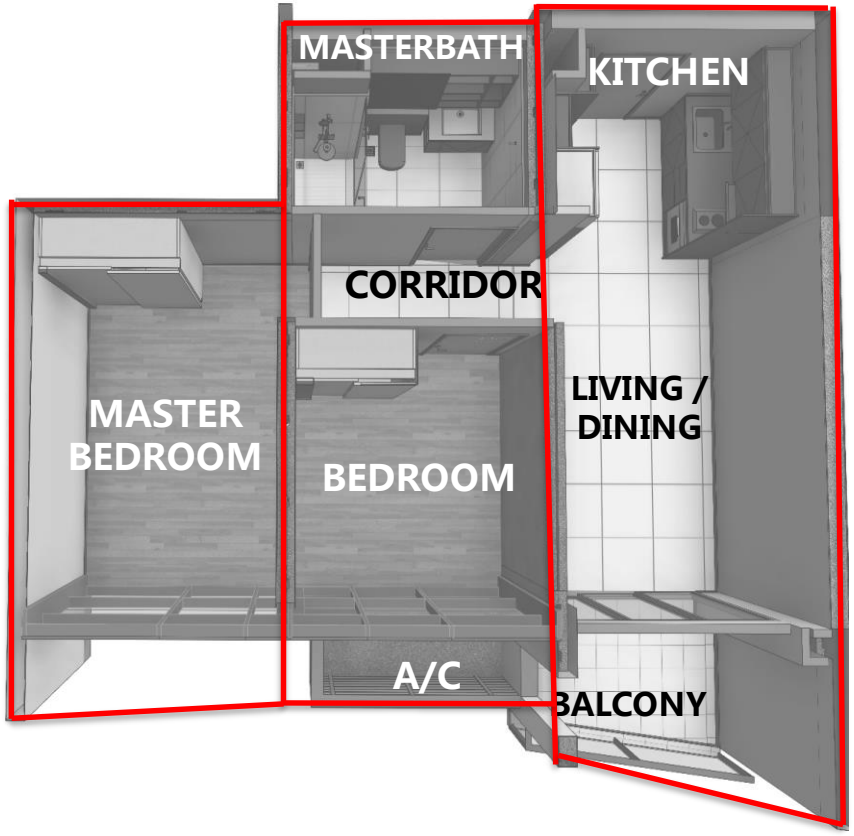
Mock Up of RC MiC **3.3m (W) x 7.2m (L) x 3.3m (H)**

中国海龙建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

4 Fabrication, Handling And Transportation

Fabrication, Handling and Transportation

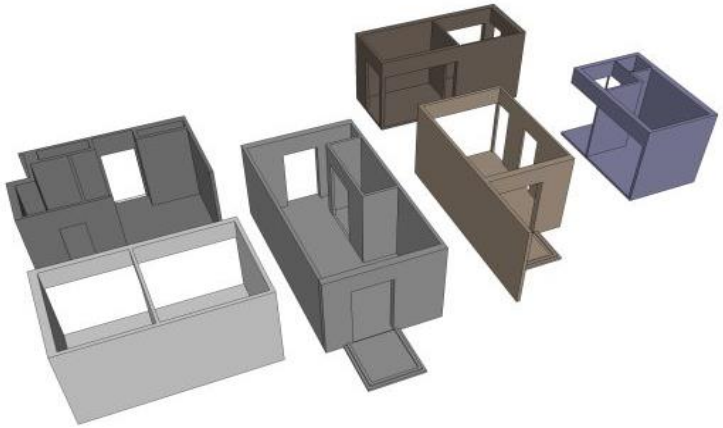
Design of Modular units



2.4m < W < 3.5m For ONE Modular

Fabrication, Handling and Transportation

Design of Modular units



2.4m < W < 3.5m For ONE Modular

Fabrication, Handling and Transportation

Design of Modular units

2.4m < W < 3.5m For ONE Modular

Fabrication, Handling and Transportation

Design of Modular units

2.4m < W < 3.5m For ONE Modular

Fabrication, Handling and Transportation

Design of Modular units

2.4m < W < 3.5m For ONE Modular

Fabrication, Handling and Transportation

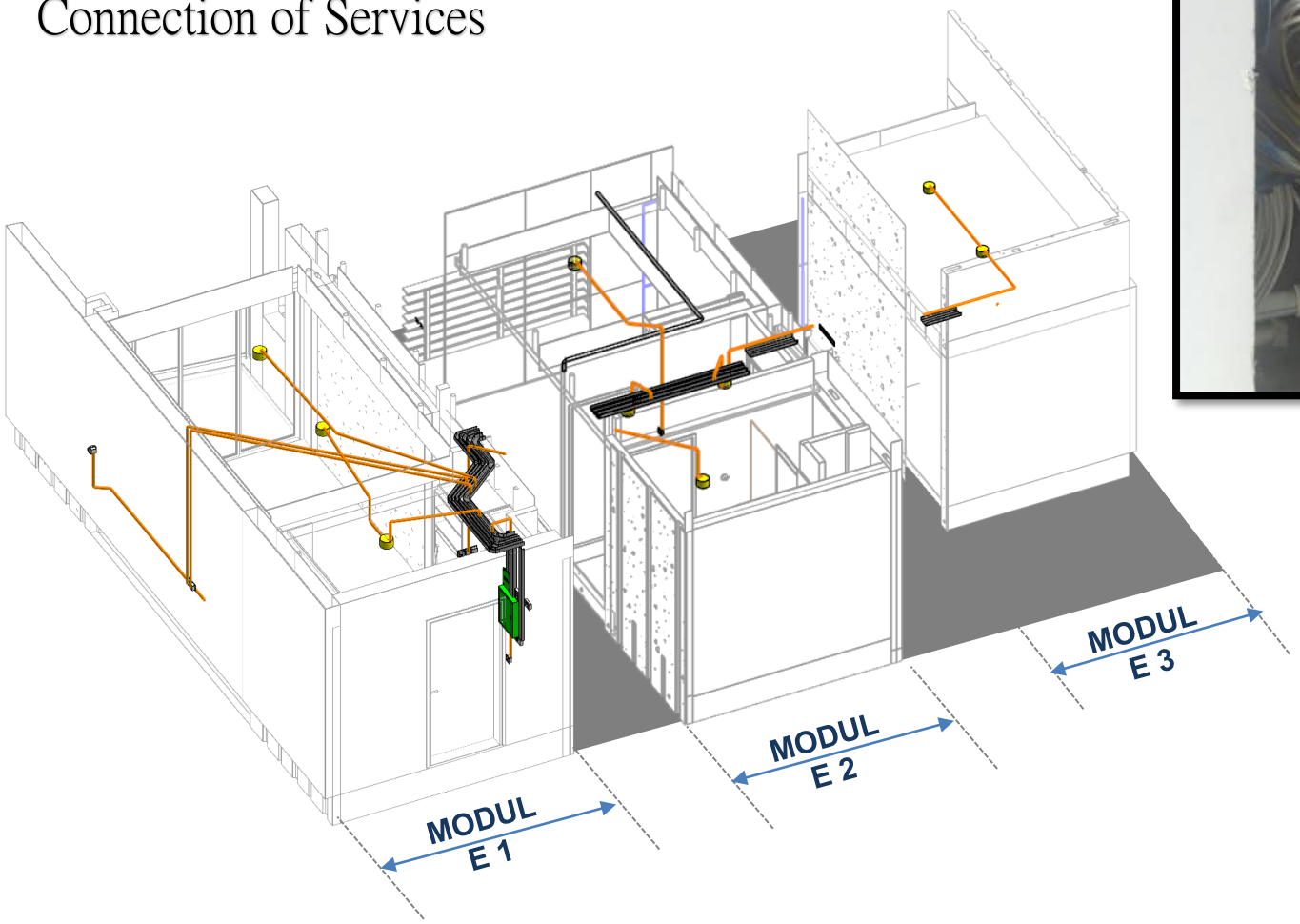
Handling and Transportation of Steel MiC

Fabrication, Handling and Transportation

Handling and Transportation of RC MiC

Fabrication, Handling and Transportation

Connection of Services



OFF SITE FIX
- Electrical Conduit
- Junction box

ON SITE FIX
- Wiring
- Connection

Fabrication, Handling and Transportation

2.4m < W < 3.5m

12.2m

3.1m < H < 4.0m

0.6m < H <1.5m

中国海龙建築科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

5 Supervision and Quality Assurance

Familiarisation to Building Ordinance and Code of Practice (PNAP ADV-036)

Section	Description	Essential Information	Action
1	General	General Building Plans Structural Plans	AP / RSE
2	Fire Safety	Details for fire resistance, fire protection and fire fighting, etc. Use of limited non-combustible materials	AP
3	Lighting and Ventilation	Window area and ventilation	AP
4	Drainage	Drainage Plans	BSE
5	Barrier Free Access	Acess and facilities for the disable	AP
6	Structure	Structural system and modular design	RSE / HL
7	Quality Assurance	Quality Assurance System of the prefabrication factory	HL
8	Fabrication, Storage, Transportation and Installation	Method statment for fabrication, storage, protection, transportation and installation	RSE / HL
9	Maintenance	Access points for inspection and maintenance	AP
10	Other Essential Information	Justification and substantiations for modular system (if any)	ALL

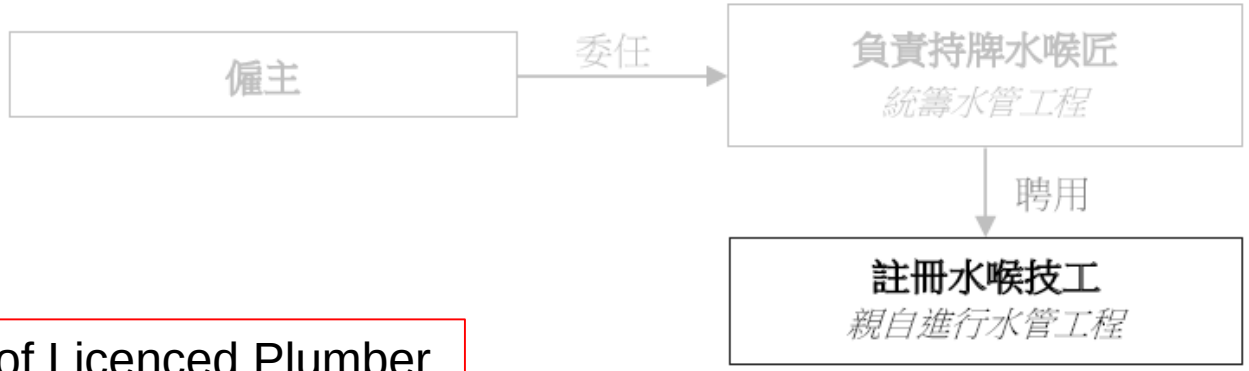
Supervision and Quality Assurance

Minimum qualification and supervision frequency of Quality Control Supervisory and Co-ordination Team,

	AP Stream		RSE Stream		RC Stream			Electricity Work	Water Work
Qualifications of Supervisory Personnel	T3	AP	T3	RSE	T3	T1	AS	REW	LP
Supervision Frequency	Weekly	Monthly	Weekly	Monthly	Weekly	Continuous	Monthly	Continuous	Continuous

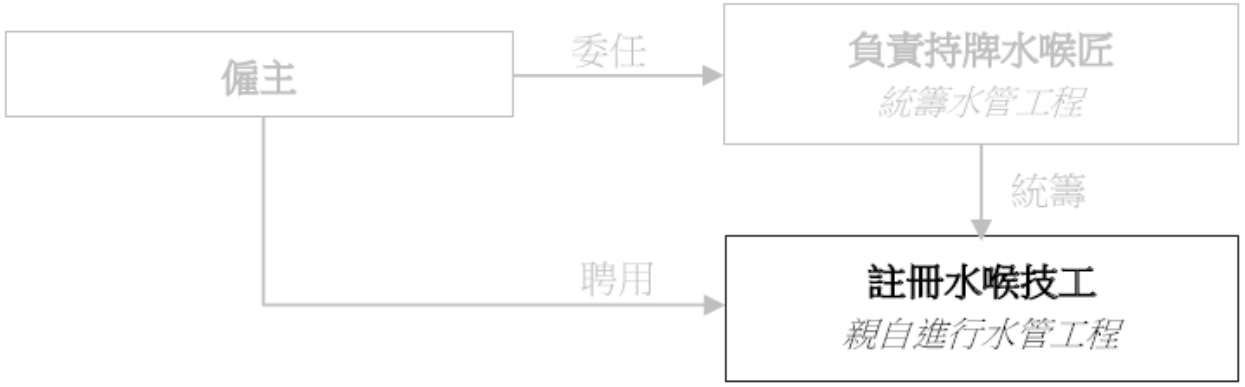
T3/T1 refers to Grade T3/T1 Technically Competent Person equivalent as stipulated in the Code of Practice for Site Supervision
AP : Authorized Person
RSE : Registered Structural Engineer
AS : Authorized Signatory
REW : Registered Electrical Worker
LP : Licenced Plumber

Supervision and Quality Assurance



Supervision of Licenced Plumber

或



Supervision and Quality Assurance

Supervision of Registered Electrical Worker

Code 21 PROCEDURES FOR INSPECTION, TESTING AND CERTIFICATION

21A Inspection of Low Voltage Installations

21B Testing of Low Voltage Installations

- (1) Safety
- (2) Sequence of tests
- (3) Continuity of protective conductors
- (4) Continuity of ring final circuit
- (5) Insulation resistance
- (6) Polarity
- (7) Earth electrode resistance
- (8) Earth fault loop impedance
- (9) Functions of all devices including protective devices
- (10) Additional checks for installations in hazardous environment

21C Inspection of High Voltage (H.V.) Installations

21D Testing of High Voltage Installations

- (1) Safety
- (2) Testing requirements

21E Points to be Noted by Registered Electrical Workers

- (1) Signing of certificates
- (2) Dates of tests, inspections and certification
- (3) Items to be inspected and tested
- (4) Related ordinance and regulations to be observed
- (5) Energisation of installation for testing purposes
- (6) Standard symbols to be used

中国海龙建筑科技有限公司
CHINA STATE HAILONG CONSTRUCTION TECHNOLOGY COMPANY LIMITED

6 Construction Programme

Fabrication and Installation Programme

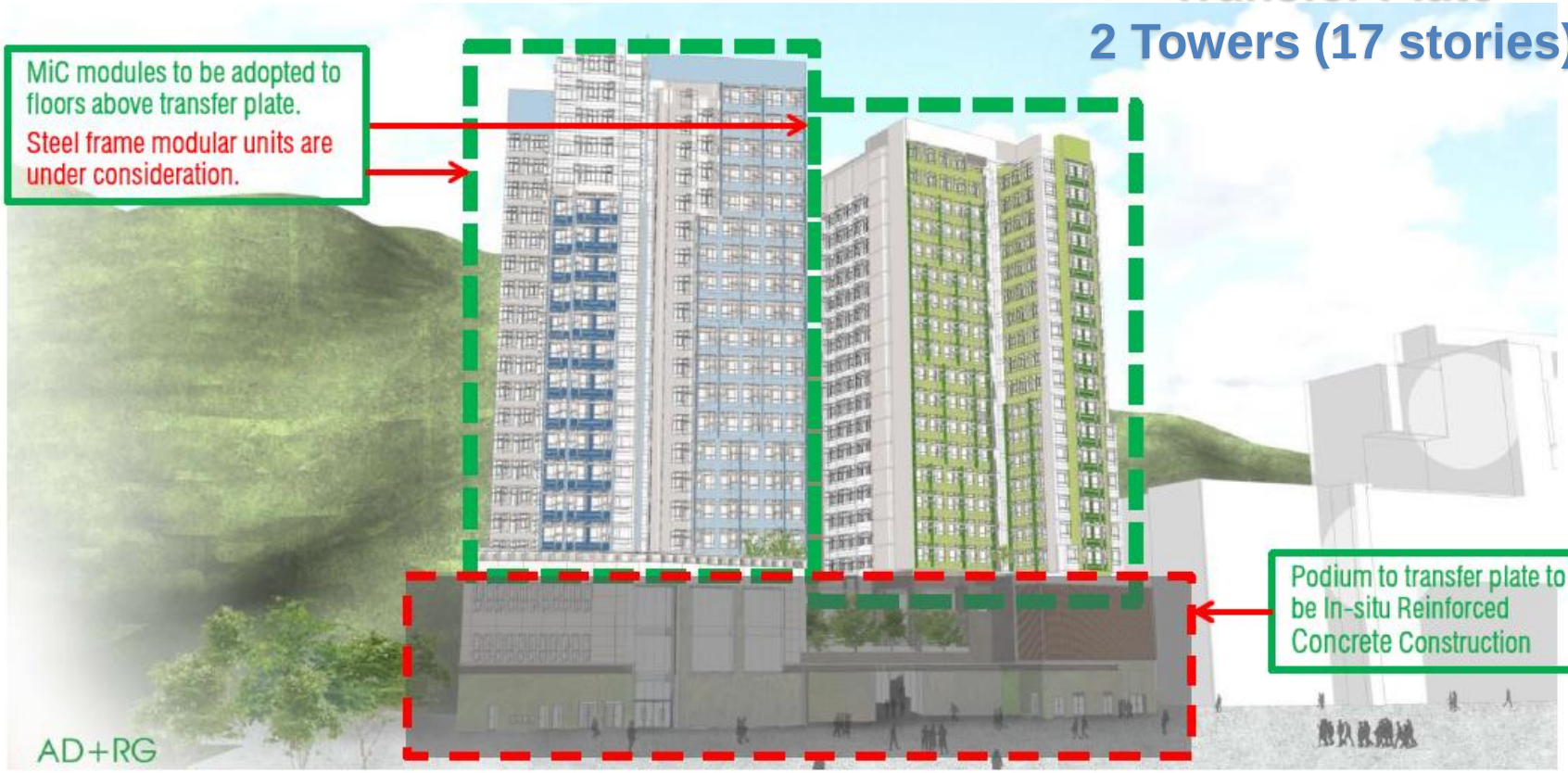
Typical Production and Fabrication Cycle for one moldular unit

Item	Activity	Day													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Steel frame fabrication														
2	Steel mold installation (Inner)														
3	Steel reinfrocement														
4	Cast-in item installation														
5	Steel mold installation (Outer)														
6	Window frame installation														
7	Casting concrete														
8	Curing														
9	Demolding														
10	Waterproofing														
11	Window / Door installation														
12	Tiling														
13	Skin coat and painting														
14	Fitting installation														
15	MEP works														
16	General cleaning														

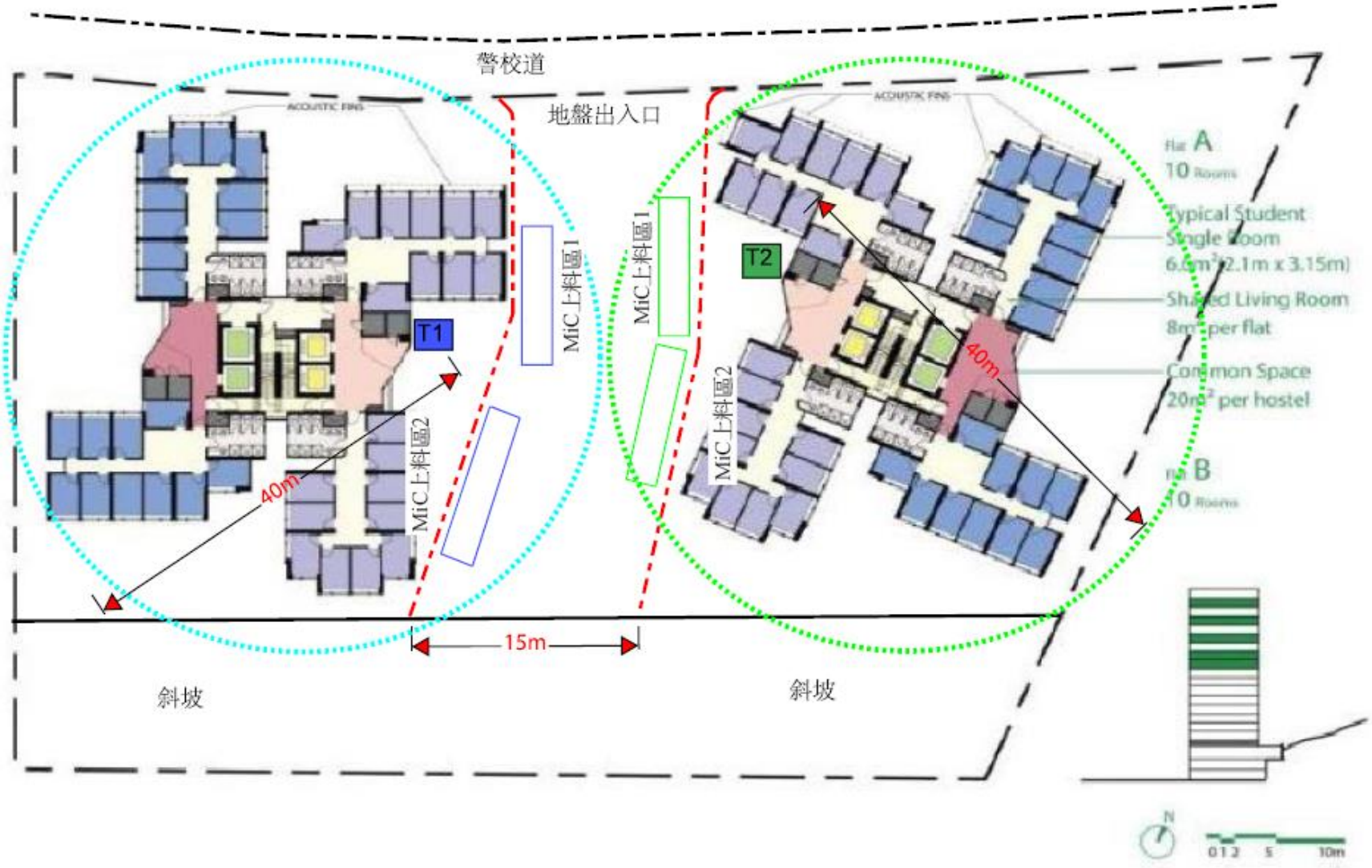
Fabrication and Installation Programme

Case Study for Use of MiC system

Podium
Transfer Plate
2 Towers (17 stories)



Fabrication and Installation Programme



Fabrication and Installation Programme

Crane	Radius and Capacity	Install unit per day
T1	40m 40t	13 nos
T2	40m 40t	13 nos

For T1, 13 nos. x 45 mins/no. = 9.75 hrs
For T2, 13 nos. x 45 mins/no. = 9.75 hrs

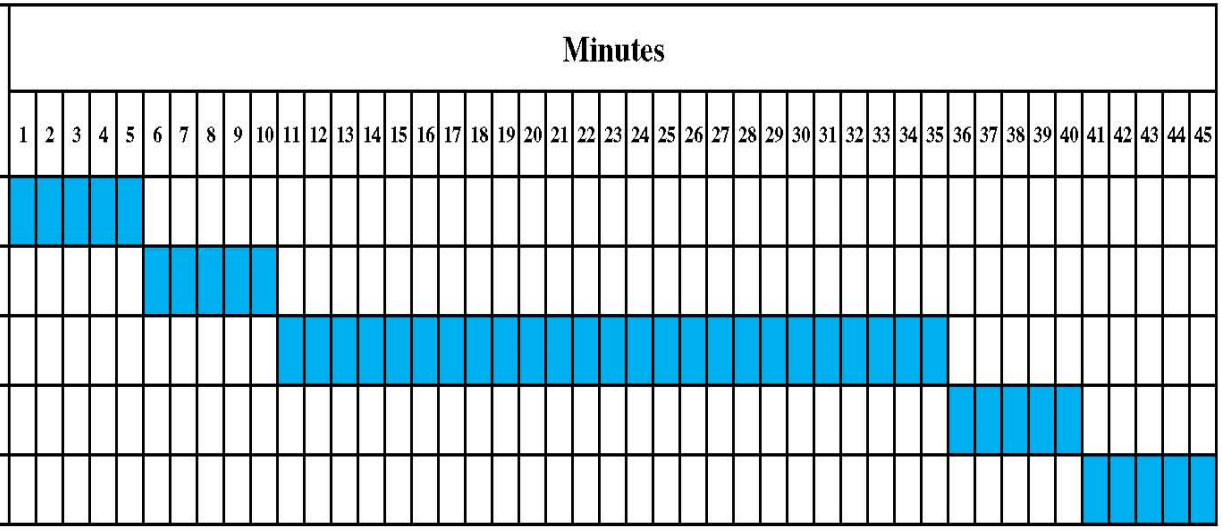
i.e. One whole floor (26 nos.) can be completed in TWO day.

Three times faster than conventional construction method.

Fabrication and Installation Programme

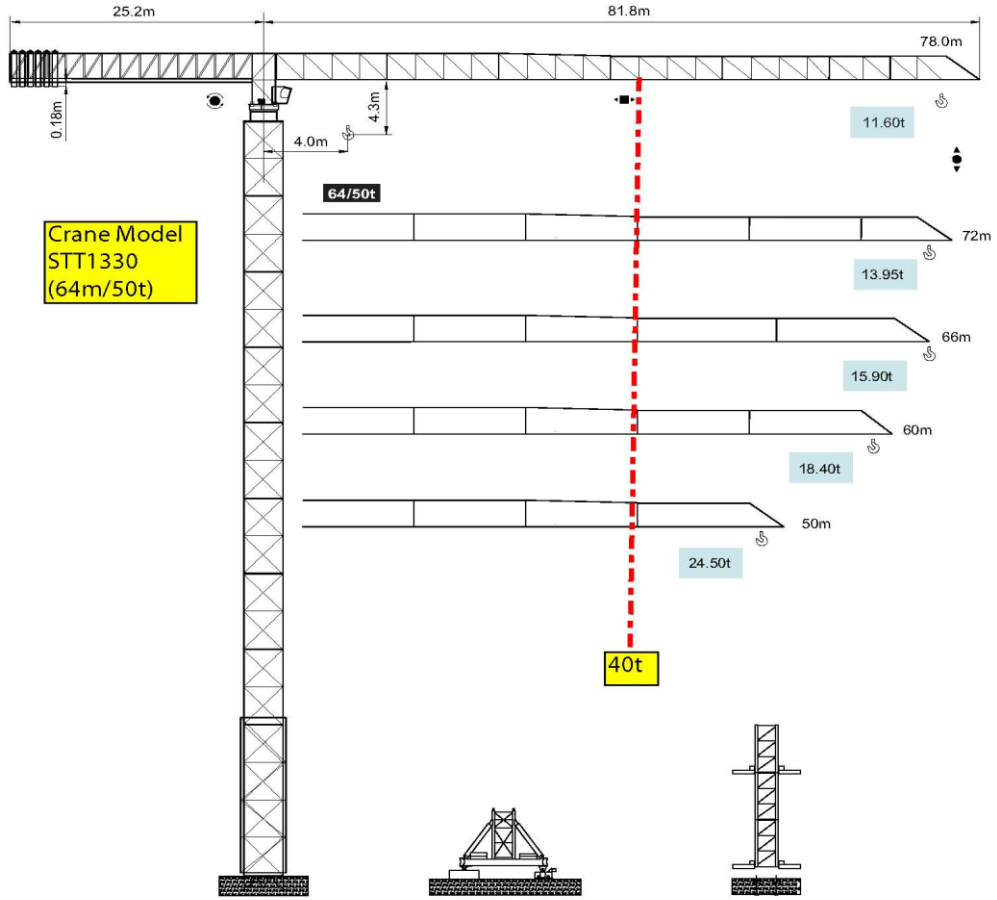
Installation for One Modular Unit

Item	Activity	Duration (Mins)	Minutes
1	Setup for lifting	5	
2	Lifting to installation level	5	
3	Levelling and installation	25	
4	Release the lfting device	5	
5	Back to G/F	5	
	TOTAL	45	



Fabrication and Installation Programme

Tower Crane Capacity

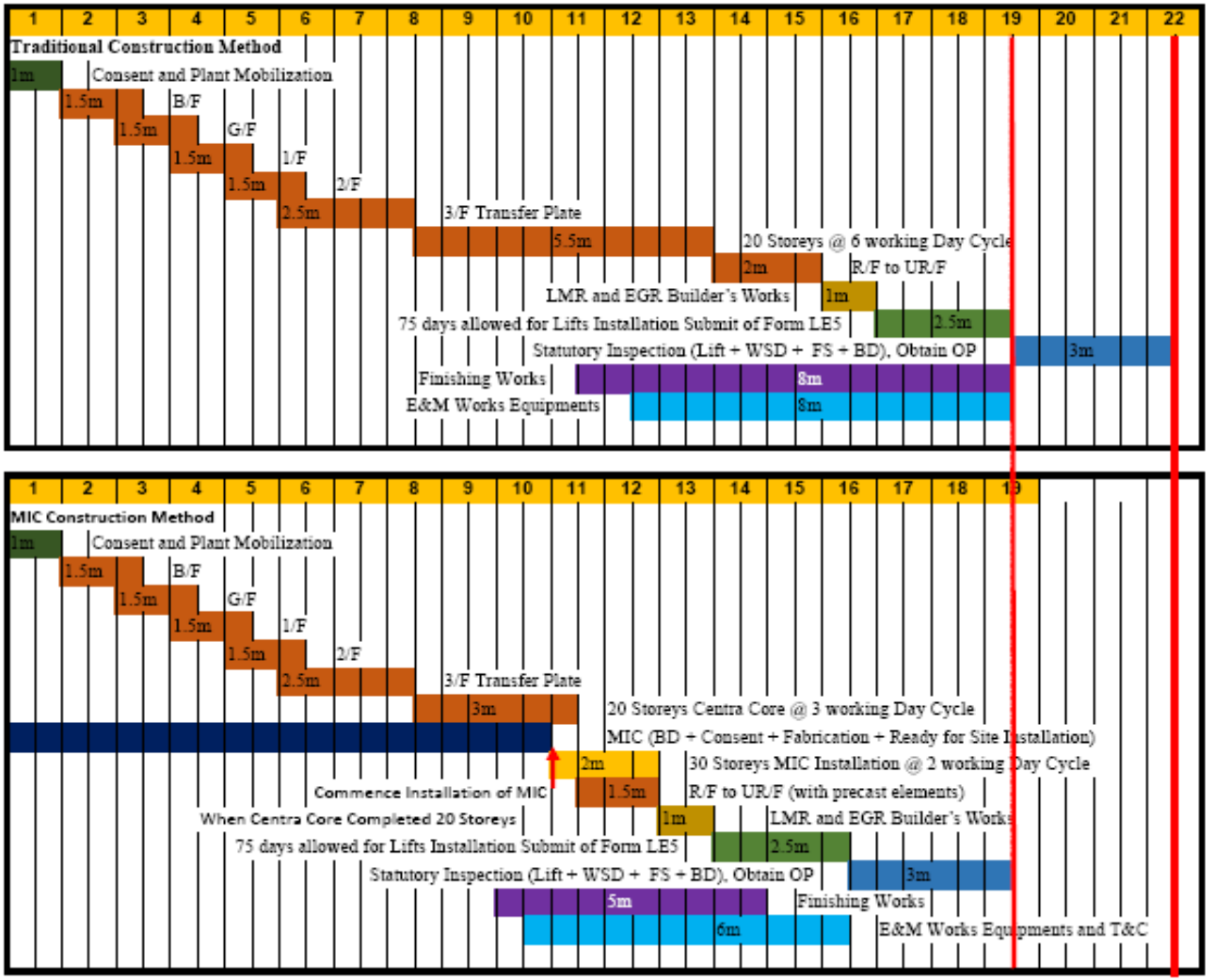


Fabrication and Installation Programme

Use of MiC Construction

Outline Programme for Comparison of MIC and Traditional Construction Method (20 Storeys)

Save 3 months !!

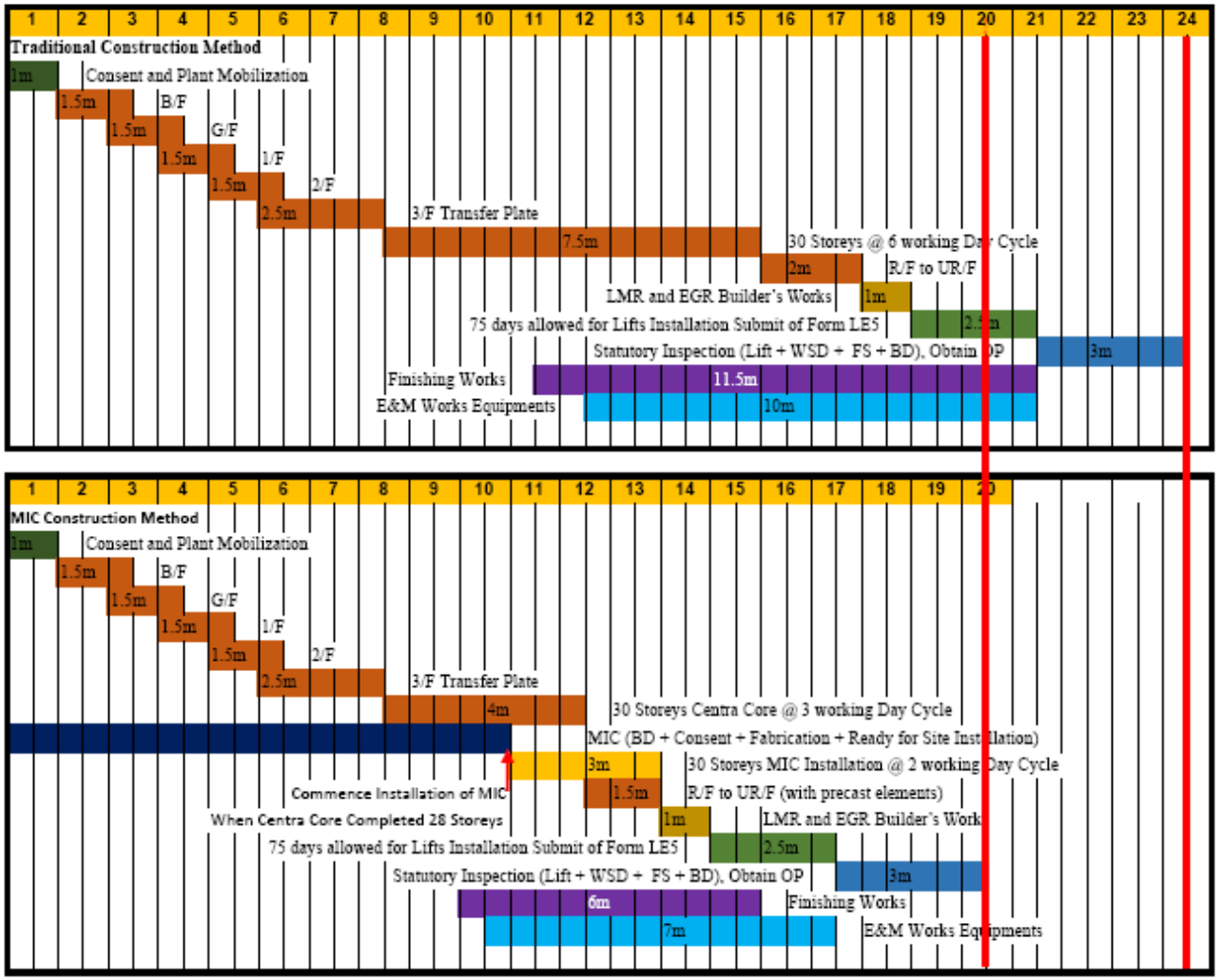


Fabrication and Installation Programme

Use of MiC Construction

Outline Programme for Comparison of MIC and Traditional Construction Method (30 Storeys)

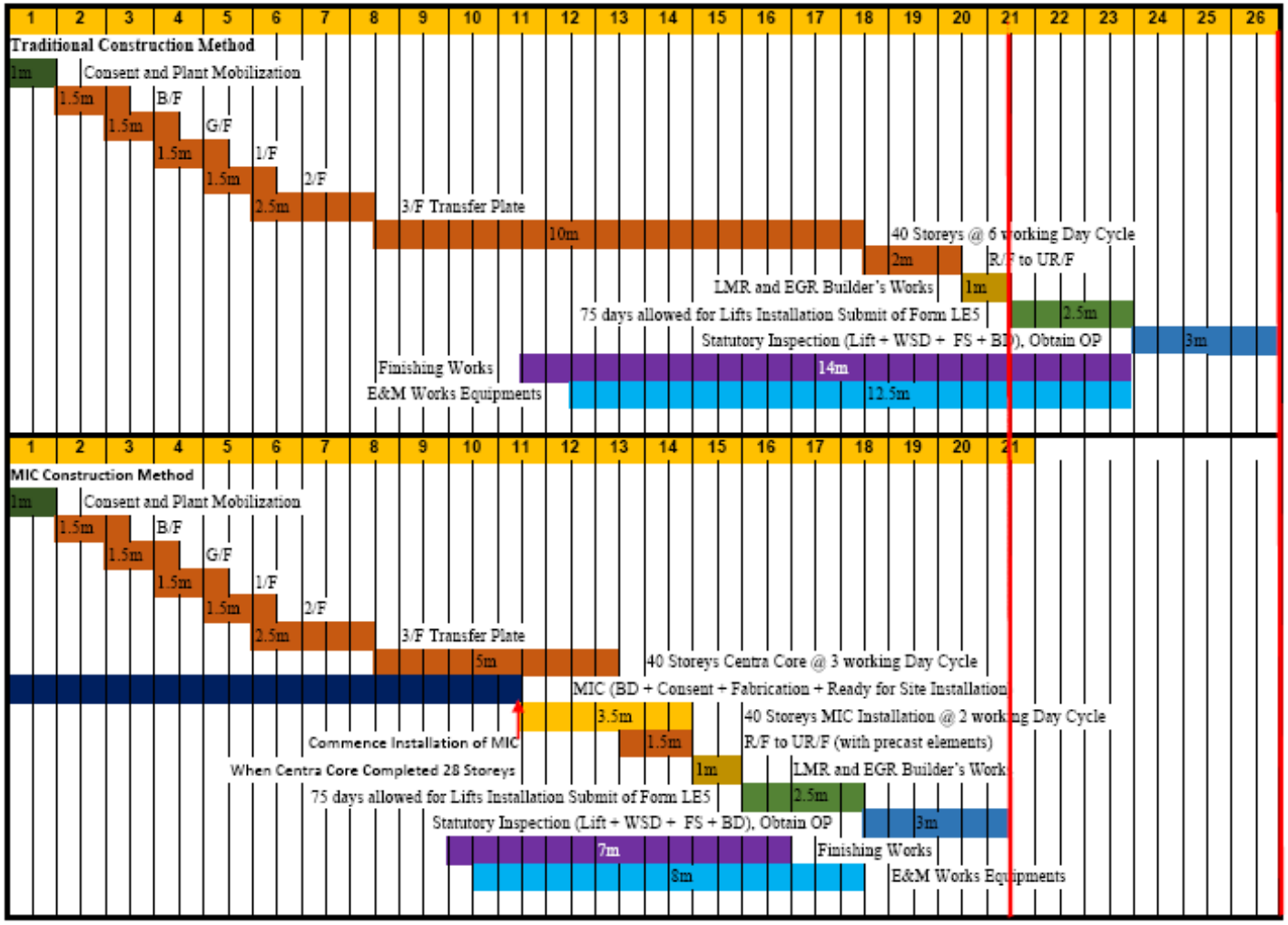
Save 4 months !!



Fabrication and Installation Programme

Use of MiC Construction

Outline Programme for Comparison of MIC and Traditional Construction Method (40 Storeys) **Save 5.5 months !!**



中国海龙建筑科技有限公司
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THANK YOU