Marching to Success

Pilot MiC Project of Student Hostel at Wong Chuk Hang for The University of Hong Kong

Date: December 18, 2019

Presented by

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Estates Office,
The University of Hong Kong

Modular Integrated Construction (MiC)

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The HKSAR Government is committed to promote and lead the adoption of MiC in the construction industry.

The University of Hong Kong support the use of advance construction technology to speed up the student residence construction.

WCH Project has been selected by Development Bureau as one of the Pilot Projects for MiC in Hong Kong.

Why Modular Integrated Construction?

BIM integration

MiC facilitates the use of BIM within the design and construction phase.

Improved site safety

Some procedures can be carried out in a controlled factory environment.

Less waste and reduced carbon footprint

Factory construction facilitates a reducing in waste and carbon footprint also.

Shortened construction period

Due to controlled nature, tasks can be run parallel reducing the construction timeframe.

Improved supply chain management

A reduction in external variables leads to improved supply chain management.

Improved quality control

Factory automation leads to improved quality control.

Less local disruption

Disruptive construction activities can be relocated off-site.

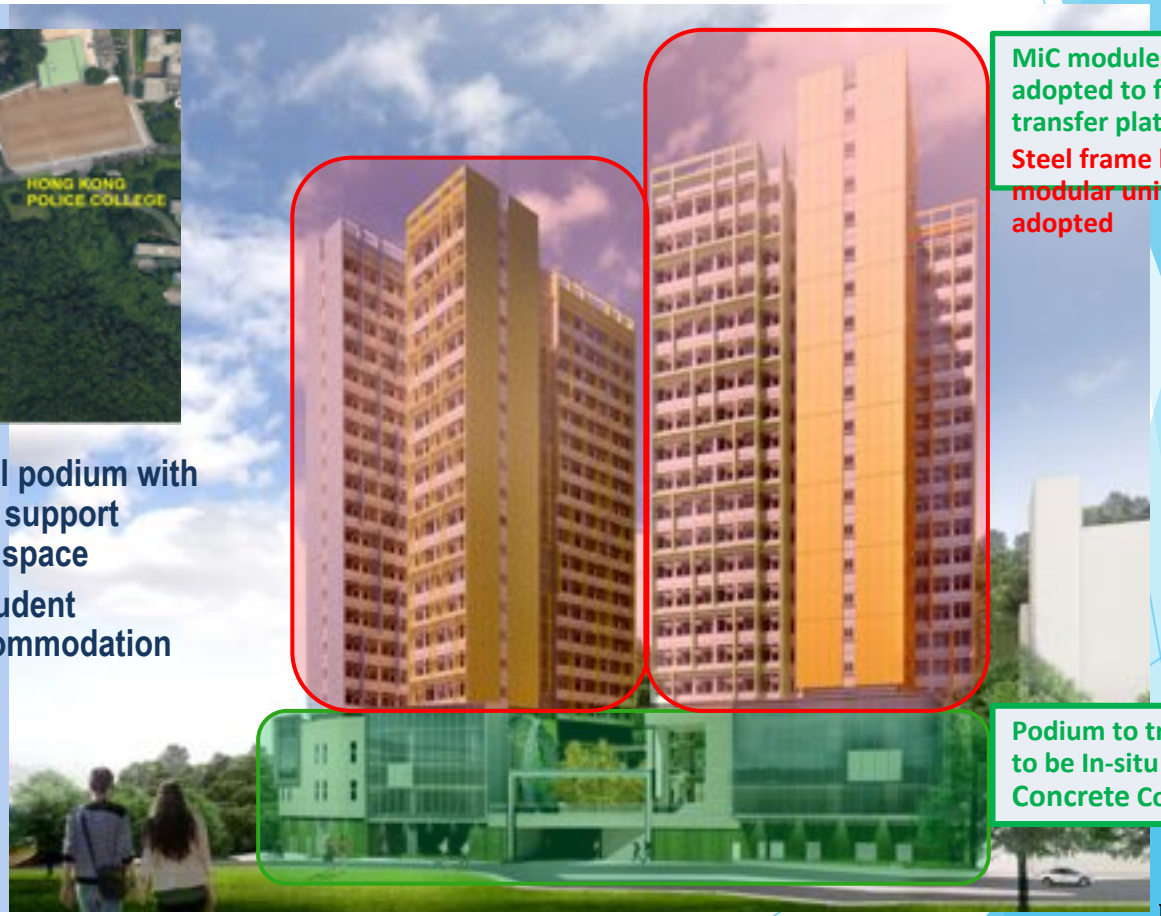
Less potential for contractual claim

A more controlled work environment leads to less potential for contractual claim.

Why MiC for Student Hostel at Wong Chuk Hang?

Why MiC for Student Residence at Wong Chuk Hang?

- A 3-storey non-residential podium with common space, canteen, support facilities and car-parking space
- Two 17-floor towers of student residences and staff accommodation
- 1,224 hostel places
- Site Area: 4306 m^2
- NOFA: 14,277 m^2
- CFA: 28,176 m^2



MiC modules to be adopted to floors above transfer plate.

Steel frame hybrid modular units are to be adopted

Podium to transfer plate to be In-situ Reinforced Concrete Construction

Why MiC for Student Residence at Wong Chuk Hang?

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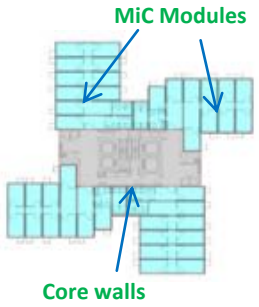
Design aspects

Repetitive units

1224 student places with appx. 1000 modules achieving great economy of scale.



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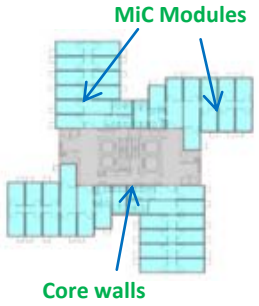
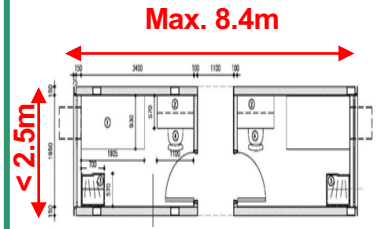


Compact

Average room size is about 6.5m2 with the dimensions as below.

Unit sizes complies with local traffic restrictions.



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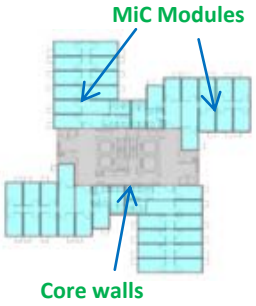

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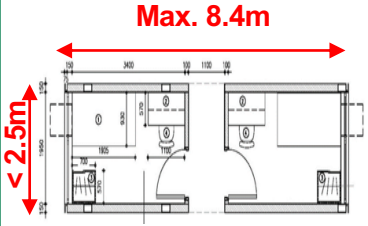

Lightweight

Units are easily hoisted and transported with a weight range 6.5 – 14 ton.

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Design aspects

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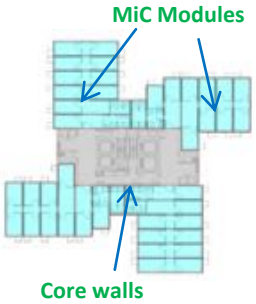

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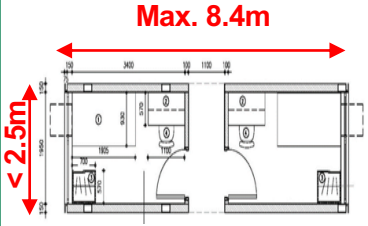


Lightweight

Units are easily hoisted and transported with a weight range 6.5 – 14 ton.

Fully furnished

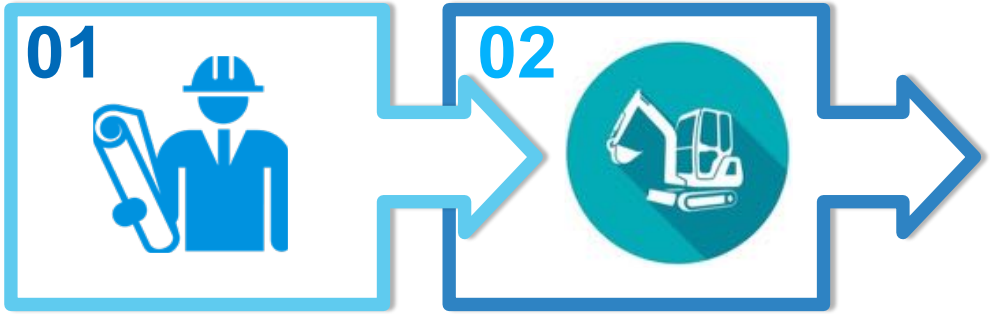
Units are fully finished and furnished utilizing the improved quality offered by MiC.

Challenges & MiC-ready Approach

Constrains for MiC application in Hong Kong

01 **Inadequate statutory procedures and regulations for MiC;**

Constrains for MiC application in Hong Kong



02 No local expertise in construction industry;

Constrains for MiC application in Hong Kong

03 **Stringent contract procurement rules for public works – Cannot specify particular suppliers**

Our strategy for Contract Procurement for WCH

Provide Briefing Sessions

Tenderers can understand better requirements & clarify uncertainties in order not to over-price the tender with unnecessary risks

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Competitive Tender

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Allow all Types of MiC System

Competitive Tender

Allow all types of MiC system with No In-Principle Acceptance

Facilitate different types of MiC specialists to participate in the tendering which would increase tender competition.

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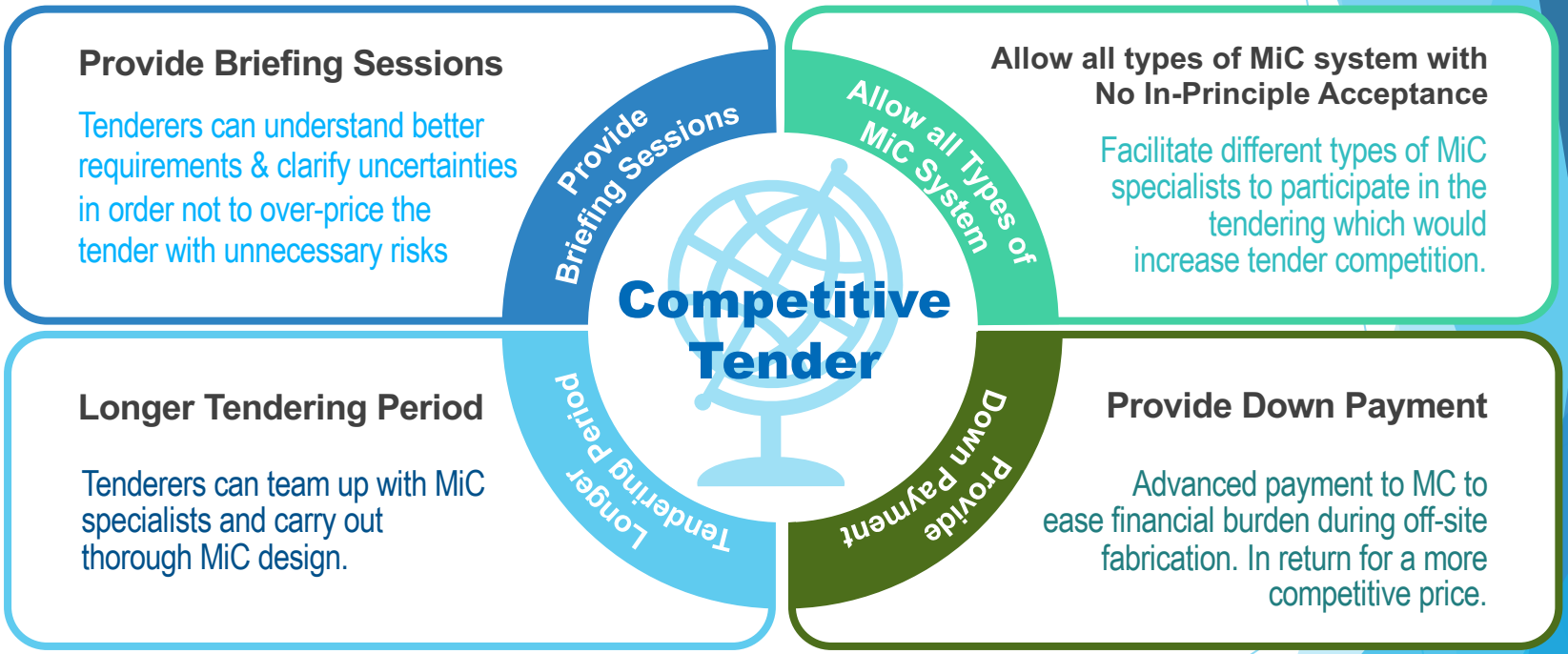
Allow all types of MiC system with No In-Principle Acceptance

Facilitate different types of MiC specialists to participate in the tendering which would increase tender competition.

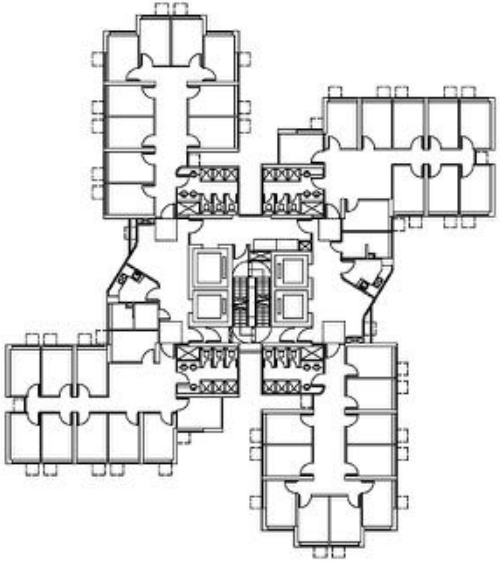
Longer Tendering Period

Tenderers can team up with MiC specialists and carry out thorough MiC design.

Our strategy for Contract Procurement for WCH



Implementation of MiC-ready Tendering Strategy



Original Typical Layout Approved by BD for conventional construction

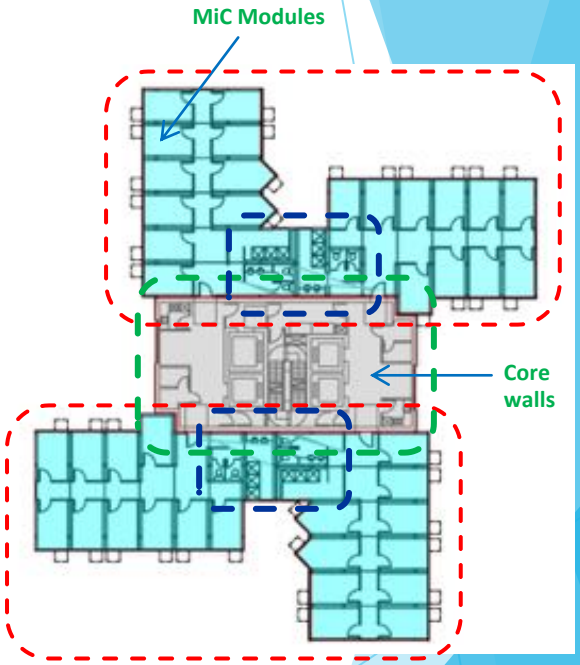
Modularization

- Structural change to double column and double slab system;

- Modularized student rooms into limited types;

- Enlargement of central core for structural stability;

- Revised toilet layout to suit MiC unit.



Modularized Typical Layout for MiC

Elimination of Potential Risks

01

Increased slab thickness due to 6-side enclosed modular units leading to the increase in overall building height.
New **Section 16 Planning Application** for minor relaxation in building height from +87mPD to +90mPD ***was approved in Nov, 2018.***

Increase in overall building height

Elimination of Potential Risks

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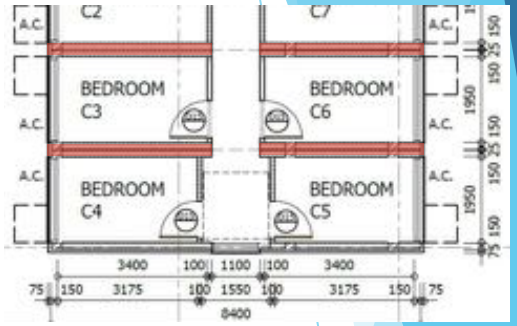


Increase in Gross Floor Area

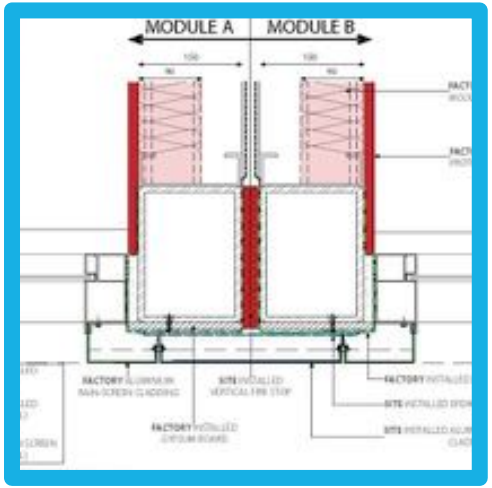
Increase in overall building height

02 Increase double wall had taken up extra floor space, i.e. increase GFA;

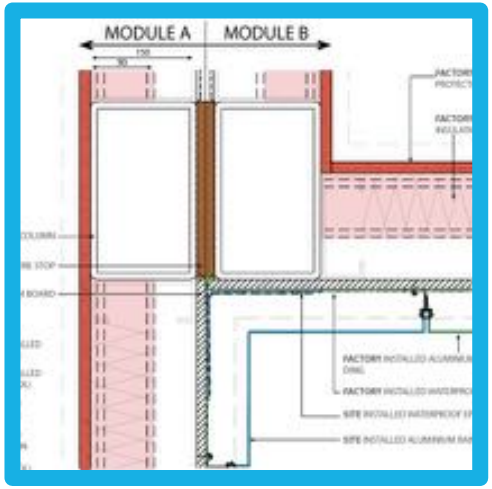
All necessary statutory approval have been obtained prior to award of Main Contract.

Elimination of Potential Risks

MiC Detailing



Plan
Indication of waterproofing & fire proofing



Section
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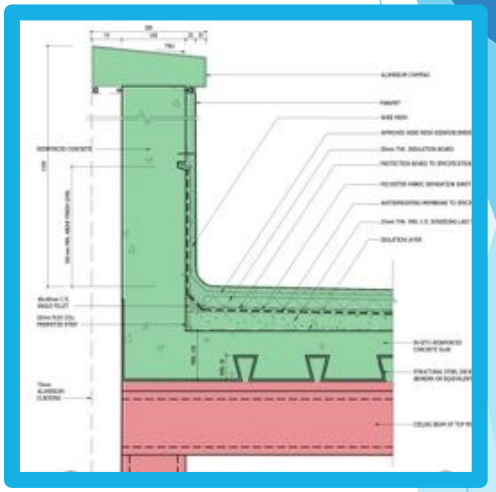


Roofing
Cast in-situ concrete slab to enhance waterproofing capability

All critical details design intent have all been included in tender drawings

Outcomes

Outcomes at This Stage

Tender Return

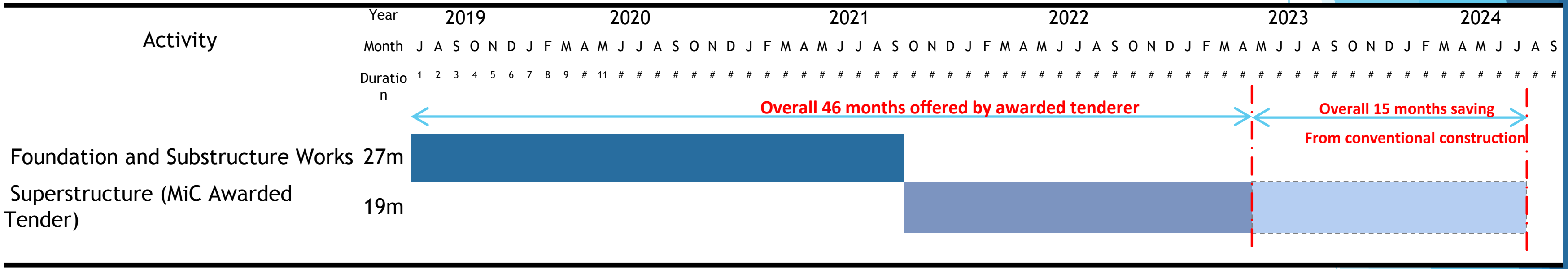
Two-envelop tender was issued with cost : technical ratio at **60 : 40**.

Encouraging results found for the 8 tenders submitted.

Half of the tenderers are technically capable to deliver the MiC project;

Outcomes at This Stage

Construction Programme



MiC can achieve faster construction programme

Estates Office, HKU

Outcomes at This Stage

Project Cost

Amongst valid tenders, all are within or 0% - 8% lower than the original project estimate with MiC application.

All offers are very close.

In conclusion, MiC can achieve cost balance or even saving.

Main Contractor's MiC Proposal

MiC Experience

Contractual
Non-contractual

HKU
(Client)

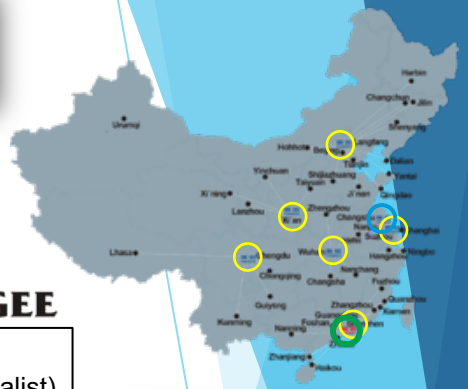
Paul Y
(Main Contractor)

Collaboration Team

Yahgee
(Fabrication Specialist)

iMax
(MiC Specialist)

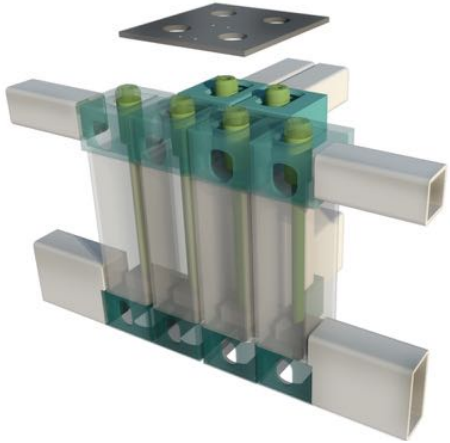
Main Contractor is allowed to form a collaborative team for his own system



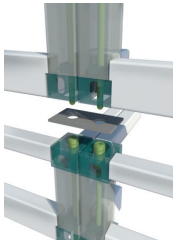
Apartment, New Zealand

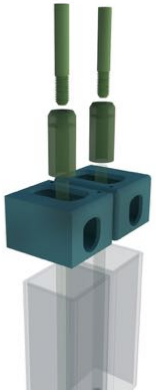
Desmond Poh
Over 35 years Modular Experience
5 years of MiC / PPVC Experience
Inventor of Candle-Loc System
Current MD of iMax Modular
Former Founder and MD of Moderna Homes
Active participated in MiC Projects in Asia

Site Installation – Candle-Loc Connection System

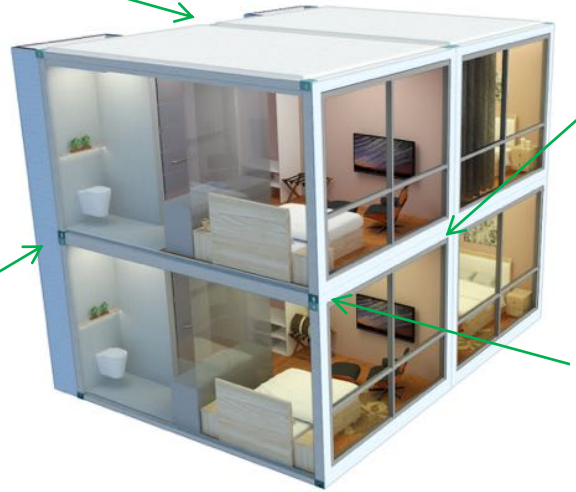


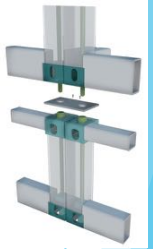
“Candle-Loc” perfectly aligned and inserted inside the module columns for Multi-storey buildings

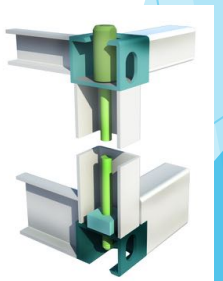




Simple multiple assemblies of modules





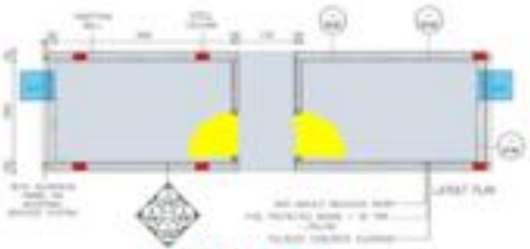


THE UNIVERISTY OF HONG KONG

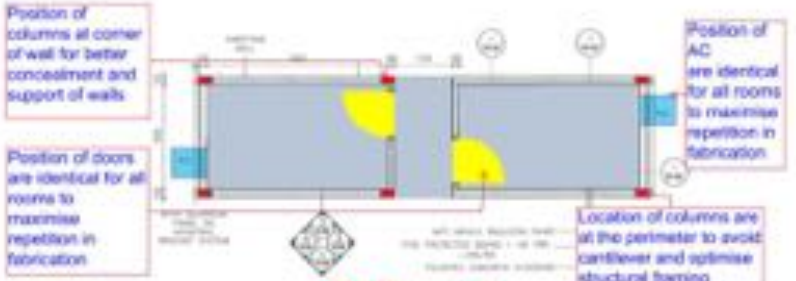
1224 - PLACE STUDENT RESIDENCE

Current MiC Design Progress

Layout Optimization



M2 Original



M2 Proposed

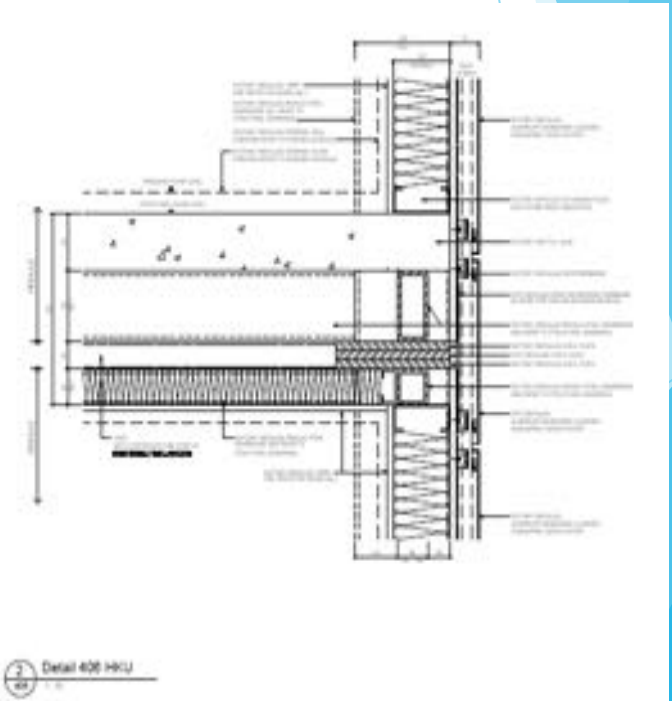
Layout Optimization

A.3 - Revised MiC tabulation

	MiC / sty	Total MiC
Current design – 7 module type	32	1088
Proposed design – 4 module type	28	**952**

↓ 136 MODULE ✓
↑ PRODUCTIVITY ✓
↑ EFFICIENCY ✓

Optimized Layout for BD Pre-acceptance Submission



What's Next?

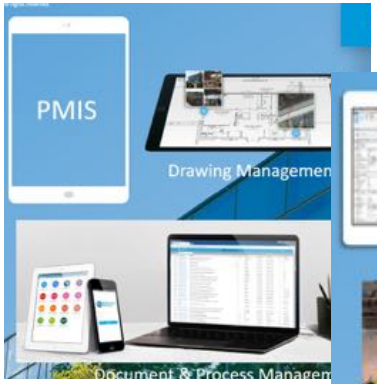
Advanced Technology for Smart Construction Site

Expected Support from Construction Innovation Technology Fund (CITF)

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

CITF 建造業創科基金

The application of new construction technology to resolve problems



Project Management Information System

BIM

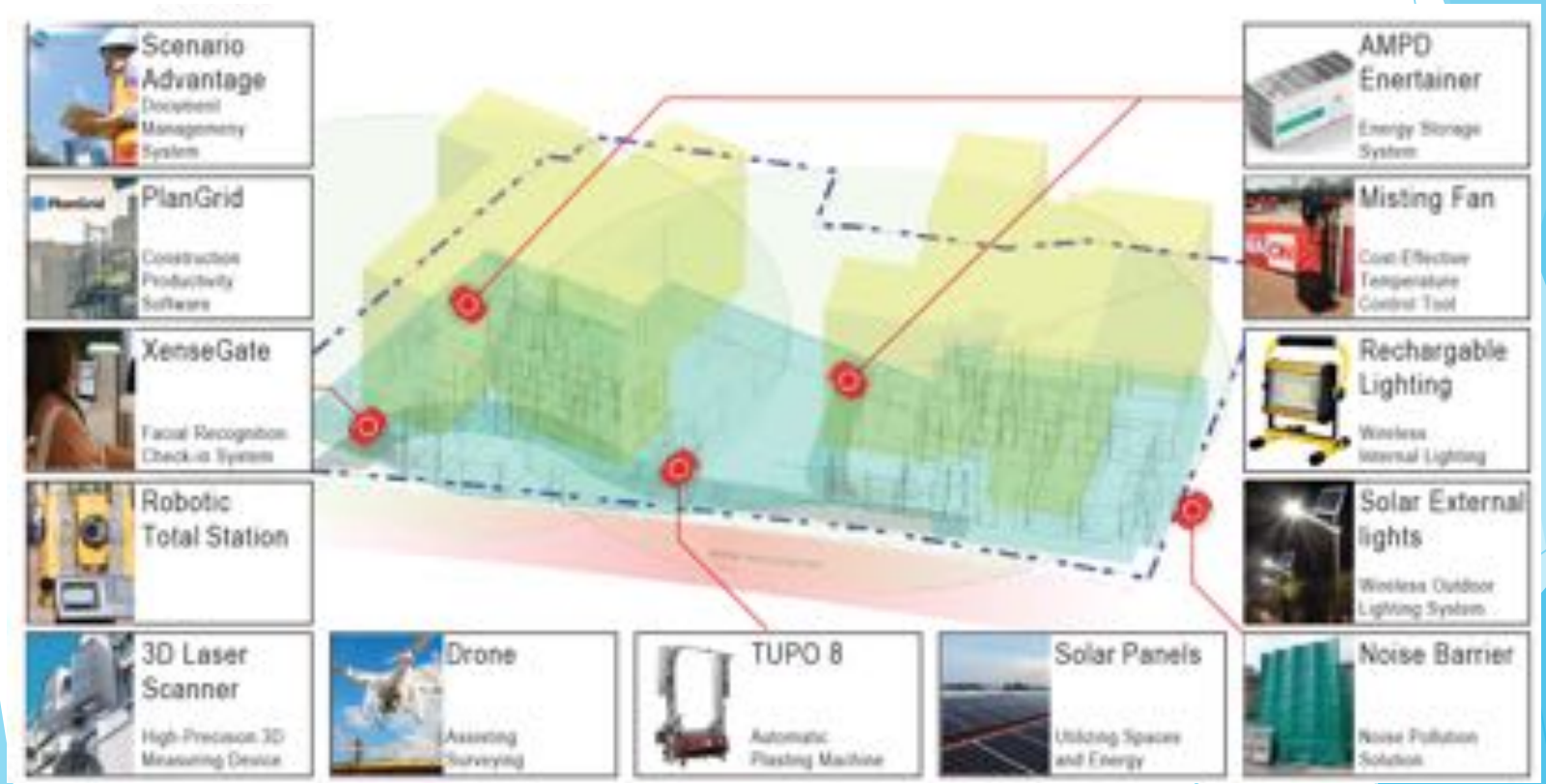
Robotic Total Station

3D Laser Scanning

RFID

Advanced Technology for Smart Construction Site

Smart Construction Site



Advanced Technology for Smart Construction Site

Smart Construction Site

Advanced technology to be applied at WCH during module installation stage

Good Quality Assurance and Quality Control System

Stringent quality checking and assurance plan

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Good Quality Assurance and Quality Control System

Potential blockchain technology to enhance QA & QC procedure and credibility

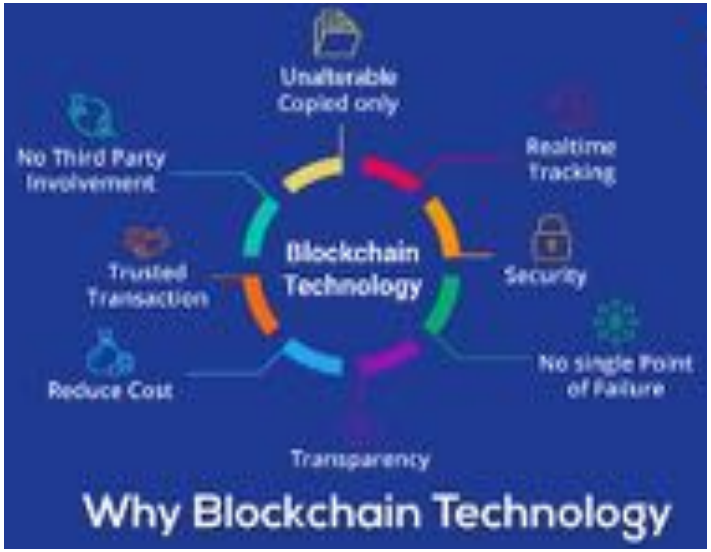
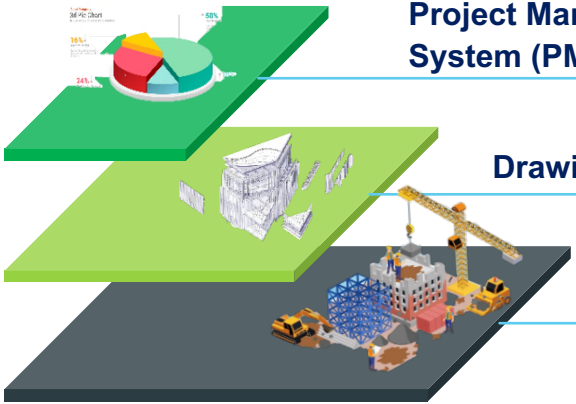


Image source: https://blogs.iadb.org/caribbean-dev-trends/en/blockchain-technology-explained-and-what-it-could-mean-for-the-caribbean/

Image source: http://www.jllapsites.com/research/iot-new-construction-intelligence/

Blockchain Technology



Project Management Information System (PMIS)

Drawing Management System

Site Set-up, Plant & Equipment

Internet of Things

Estates Office, HKU

Forecast

As MiC technology and market mature, we anticipate

Faster construction programme;

More environmental friendly approach in construction;

Construction cost for MiC will be further reduced;

Thank You