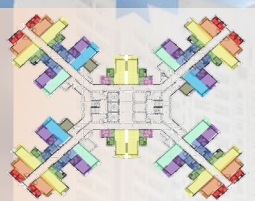


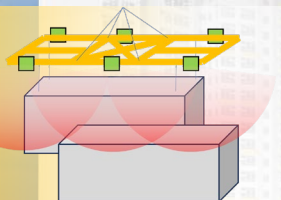
**Enhanced
MiC Modules**



**Smart Tower
Crane System**



**MiC Precision
Positioning**



**Peelable
Protective Coating**

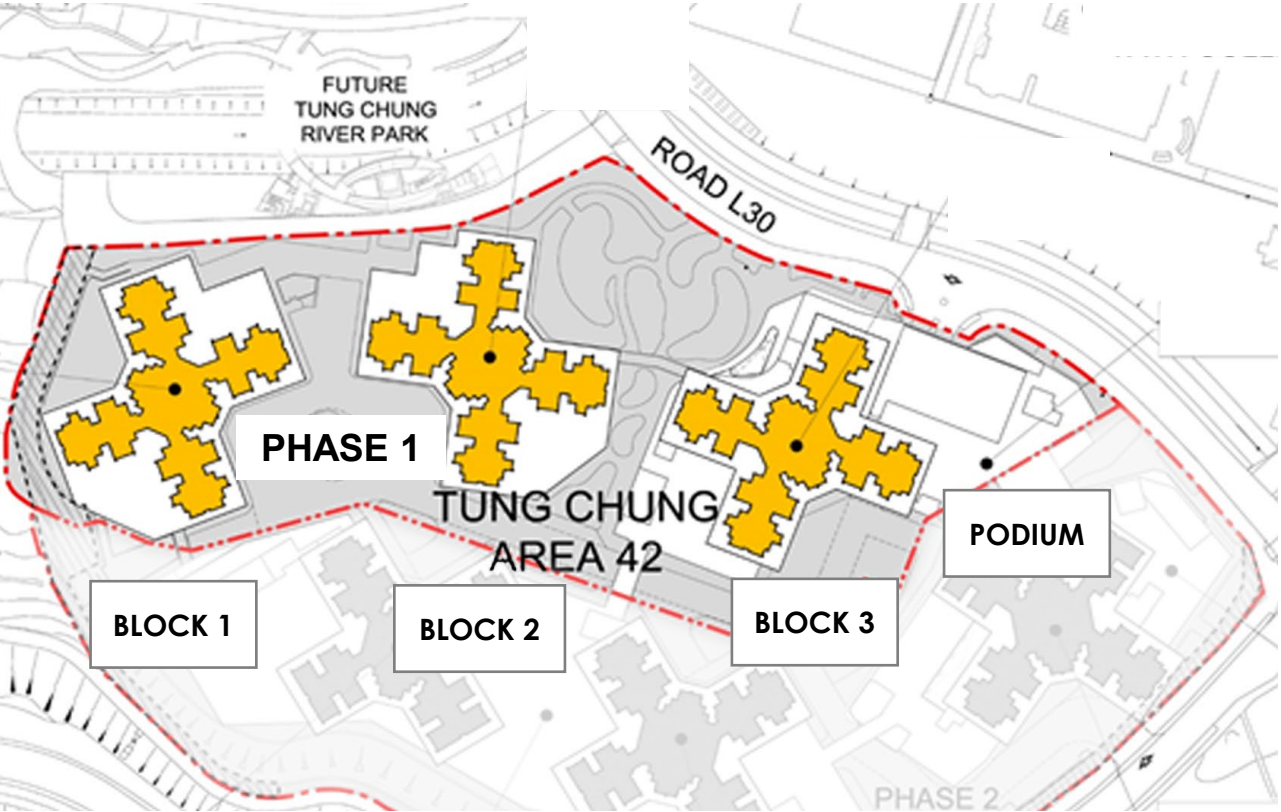
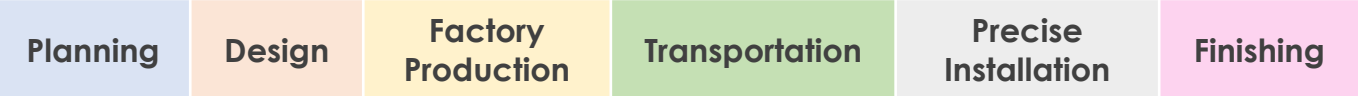


**Application for Excellence in Design of MiC Project Award
Public Housing Development at Tung Chung Area 42 Phase 1**

 **Hong Kong Housing Authority**

Project Overview

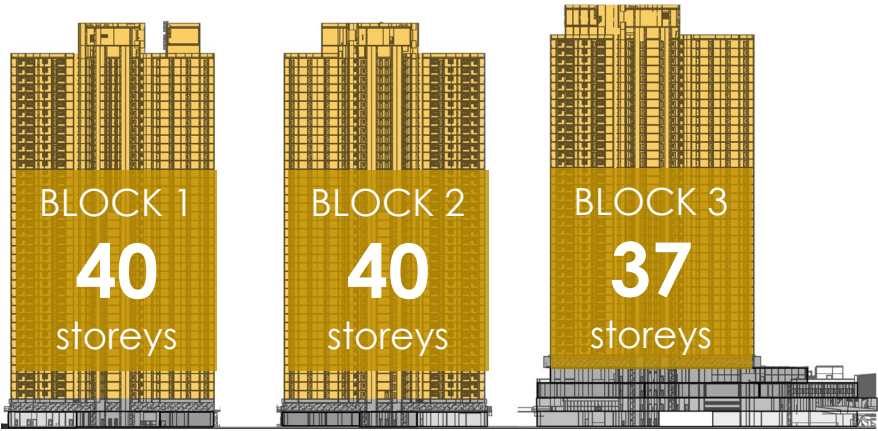
MiC design in Tung Chung 42 Phase 1 adopts an **integrated and end-to-end approach**, covering the entire process -



Master Layout Plan

Site Section

4	Flat Type	-4.28%	Cost compare to Pre-Tender Estimate
3,276	Flats		
10	MiC modules Type	-10%	Power Consumption
8,307	MiC modules	-40%	Waste Disposal
100%	MiC Adoption	-50%	Water Consumption
6 days	Construction Cycle per Floor	-2 months	Shorten Construction period (from 33 m to 31 m)



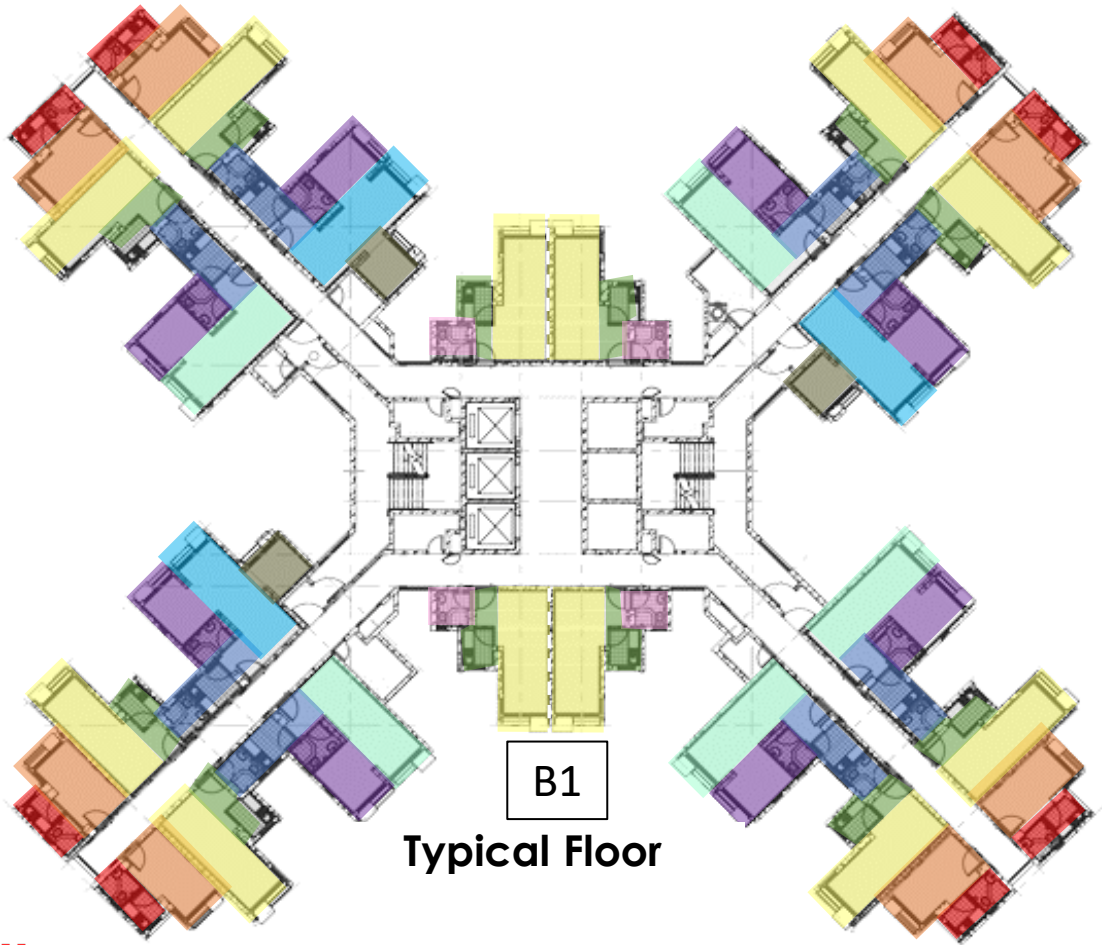
Project Overview

	Innovation and Creativity	Sustainability	Design for safety and Prefabrication	Efficiency and Cost Effectiveness	Functionality and Usability
Enhanced Module Design	✓		✓	✓	✓
Smart Tower Crane Systems HKCRC 香港智能建造研發中心	✓		✓	✓	
Smart optics for MiC precision positioning ASTRI 香港應用科技研究院	✓		✓	✓	
Peelable Protective Coating NAMI	✓	✓		✓	
Indoor Spraying Robot	✓	✓	✓	✓	
HA – PIMAP Housing Authority Project Information Management and Analytics Platform	✓	✓	✓	✓	
DCSMS Development and Construction Site Mobile System	✓		✓	✓	
Just-in-Time	✓		✓	✓	



Enhanced Module Design

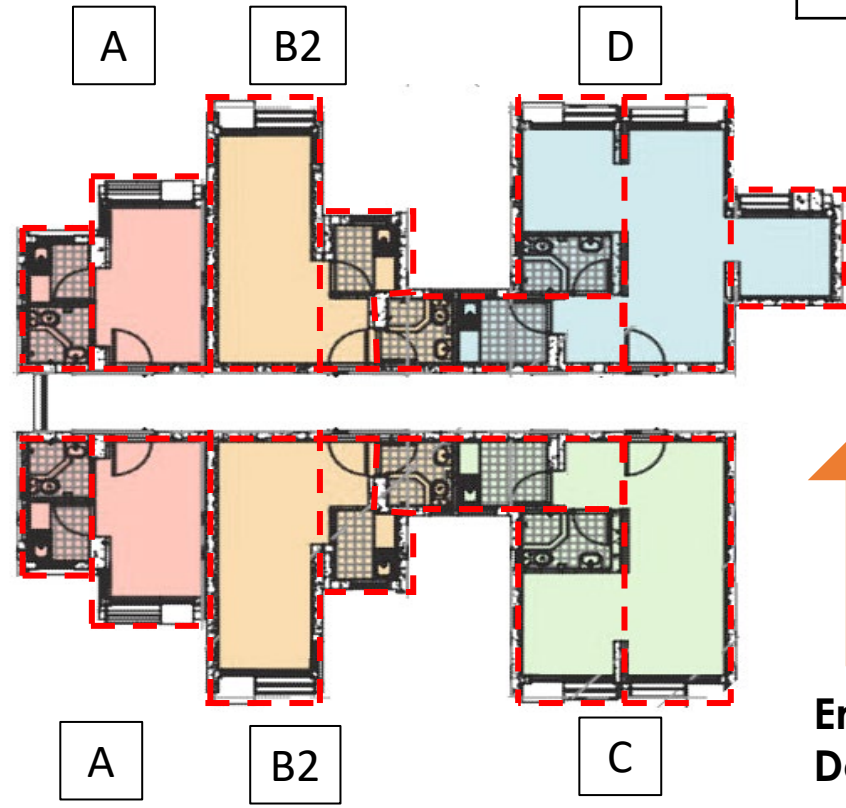
Module	1	2	3	4	5	6	7	8	9	10	Total
Nos.	8	8	12	12	8	8	3	3	4	5	71



Typical Floor

	Previous			
Flat Type	A	B	C	D
Module Nos.	2	3	3	4
Total Module	79 x 117 floors			
Overall	9243 nos.			

Enhanced					
A	B1	B2	C	B2	D
2	3	5		5	
 71 x 117 floors					
8307 nos. (-936 nos.)					



11%
Efficiency
(-936nos.)

Enhanced Module Demarcation



Enhanced Module Design

Rotational
Symmetry
Identical Wing



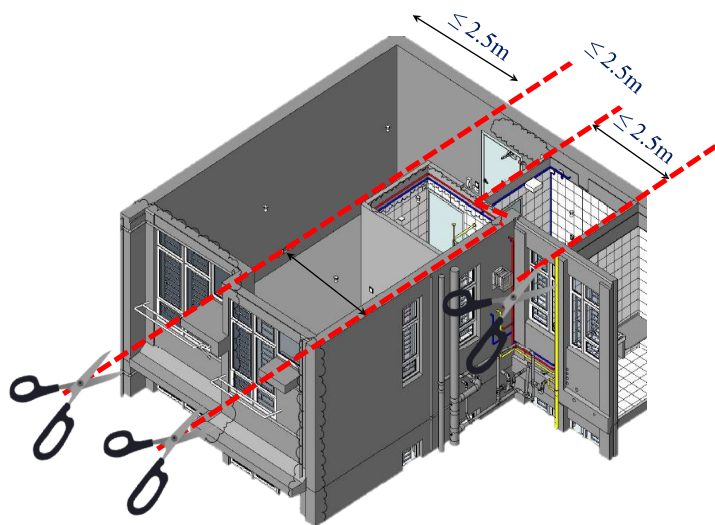
Enhance Buildability

Prototype for
future potential
standard block

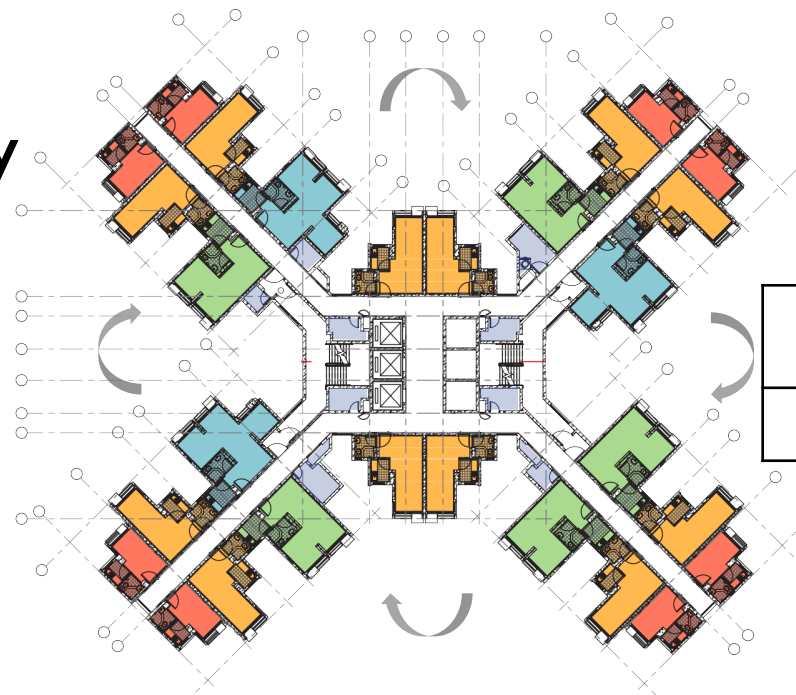
Efficient Layout



Scalability
for future projects



Modular flat to be subdivided into modules
to **suit the 2.5m width limit** for transportation.



Flat Type	A	B	C	D
Nos.	8	12	6	2

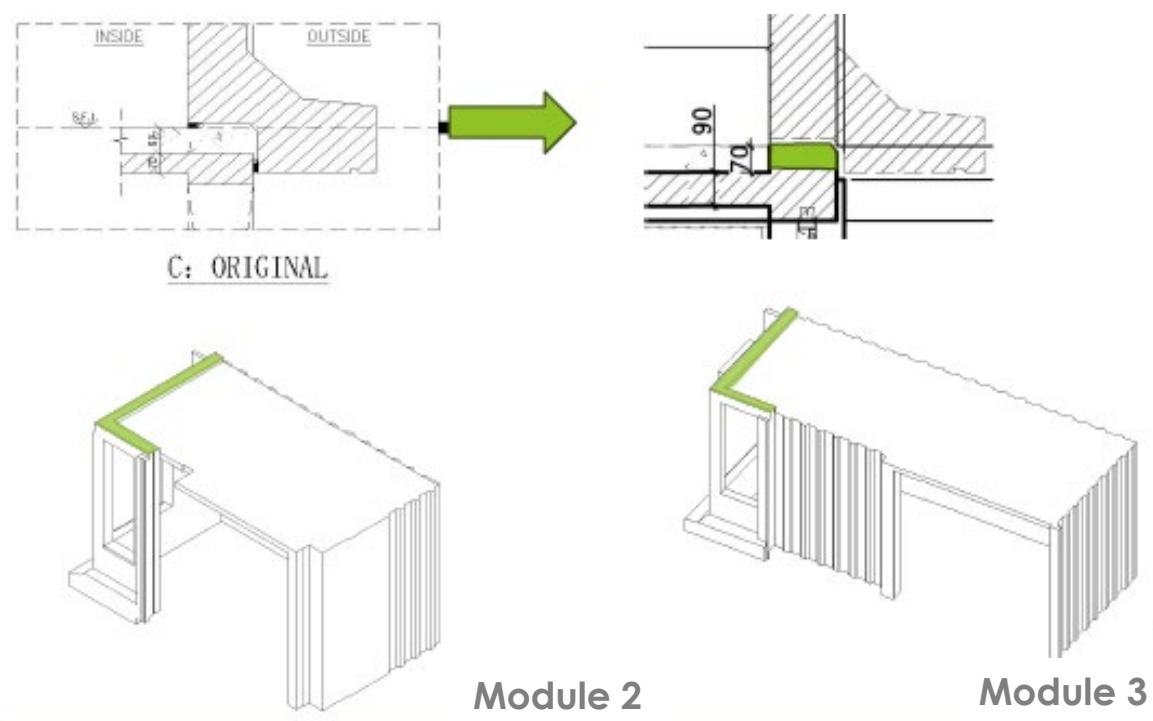


BIM Simulation for Installation
Sequence of MiC modules



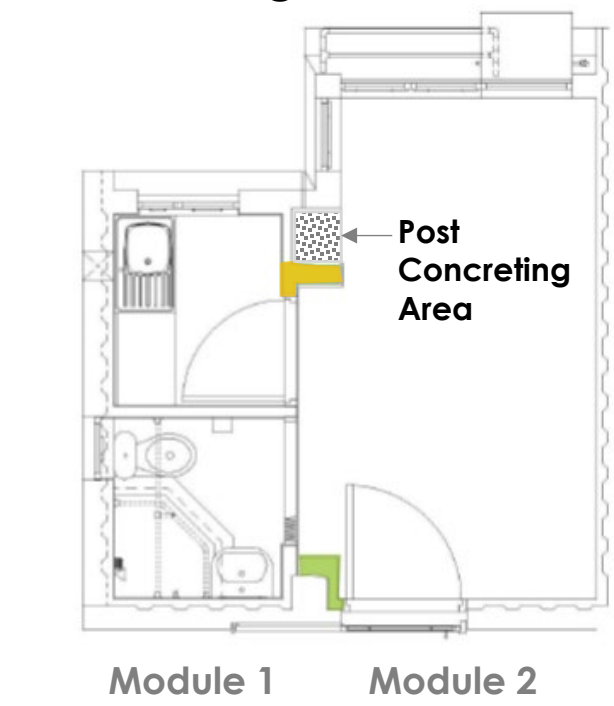
Enhanced Module Design

Leakage Prevention

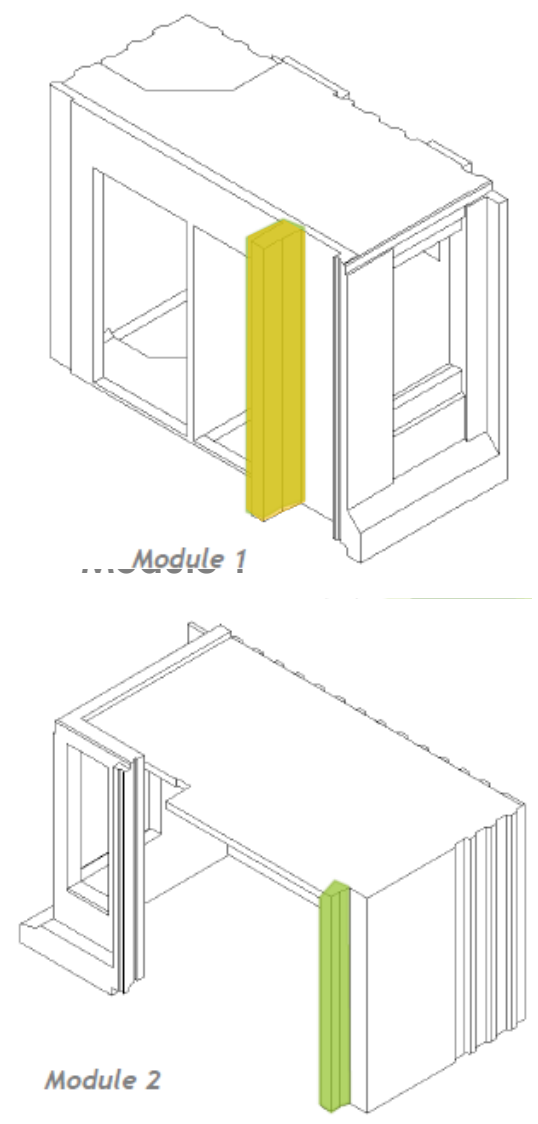


Better RC Quality
Reduce **leakage during in-situ concreting** and in-situ concrete chiseling

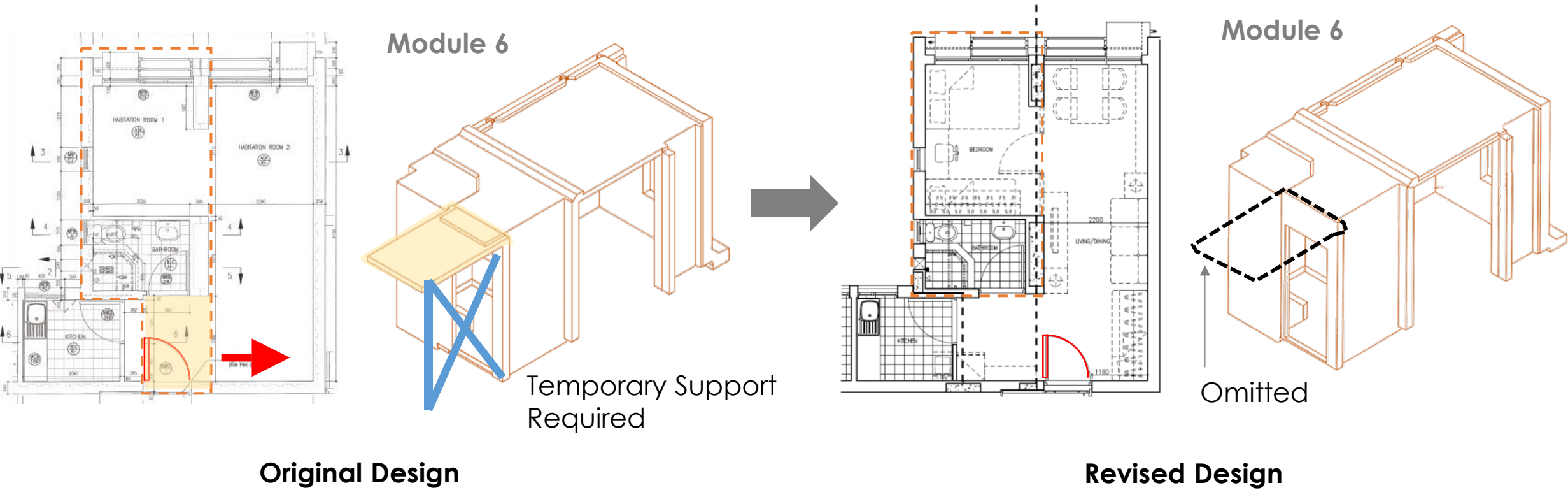
Step Joints Mitigation & Water Leakage Prevention



Better Workmanship Control
Mitigate Step Joints at 3D connection plans and **prevent potential water leakage**



Enhanced Module Design



Temporary Support Reduced



Buildability
Cost Effectiveness

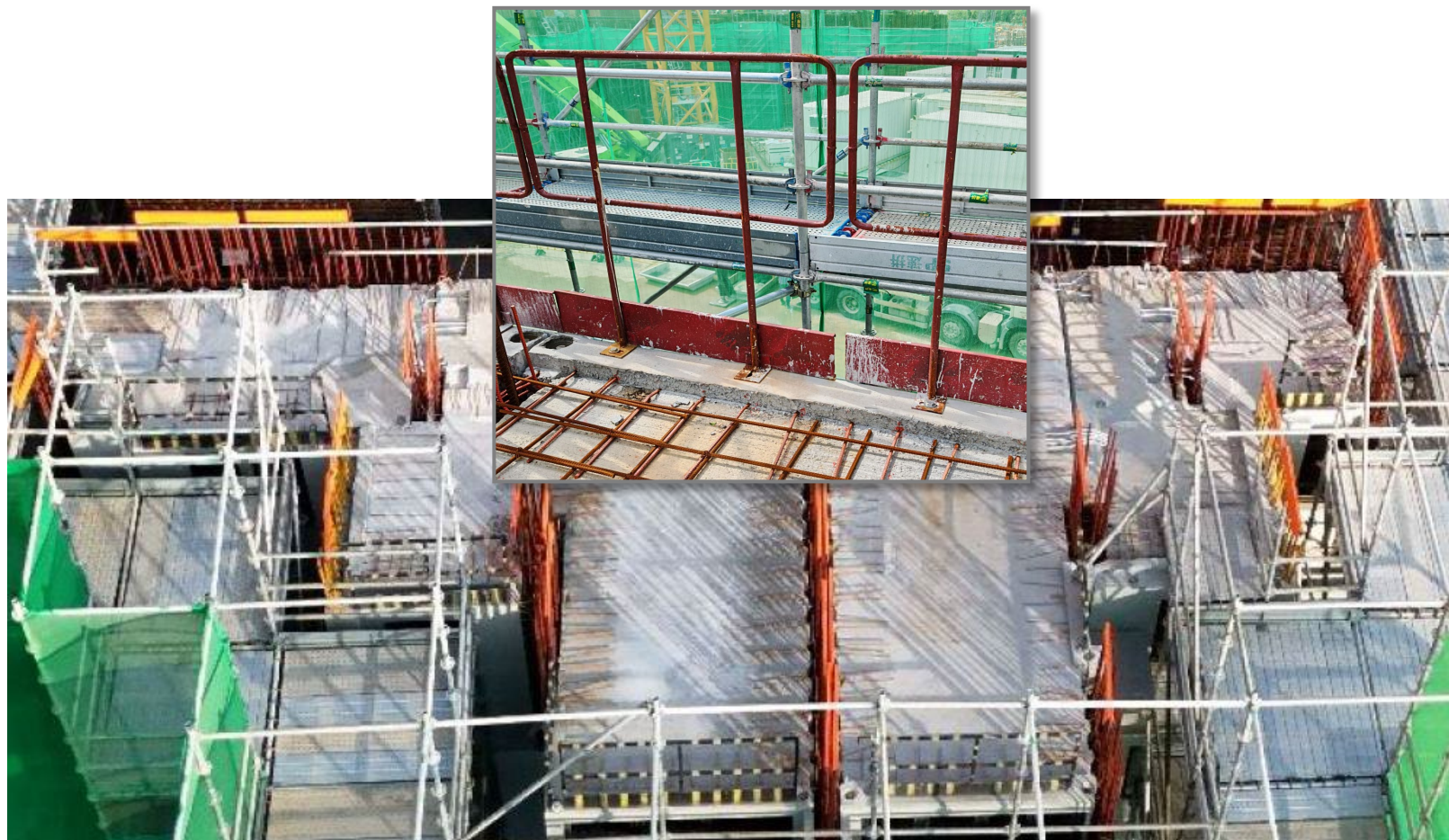


Enhanced Module Design for Site Safety



Safety Railings provided on Factory

Railing fixing holes are pre-casted in each MiC modules to allow readily mounting the safety railings on the modules once they are installed on floor.



Safety Railings provided on the MiC module top on site



Smart tower crane for MiC Lifting

Partner: **HKCRC**
香港智能建造研發中心

Remote operation

Low-latency teleoperation with multi-angle video and LiDAR depth overlays.



AI safety visualization

real-time detection/tracking of personnel and machinery near lifted MiCs, with visual and audible alerts.

AI powered lifting

point-to-point auto-lifting with obstacle avoidance; precise distance control; proactive anti-sway control.



Components



Smart tower crane for MiC Lifting

Partner: **HKCRC**

香港智能建造研發中心

Smart Operation Control



AI safety detection



Auto Route Planning & Assisted Lifting



Anti-swing



Anti-collision

Integrate IoT technology

Dynamic site logistics

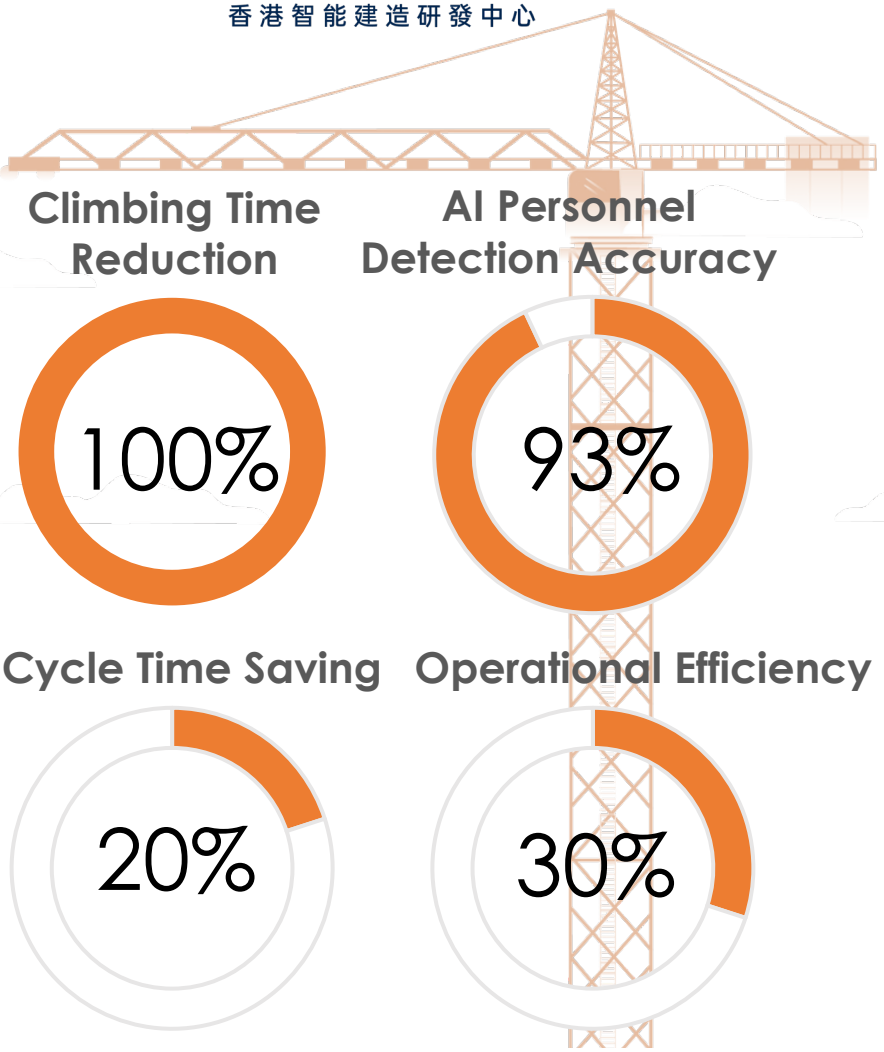
- Real-time control
- Safety
- Productivity

Public Housing Development at Tung Chung Area 42 Phase 1

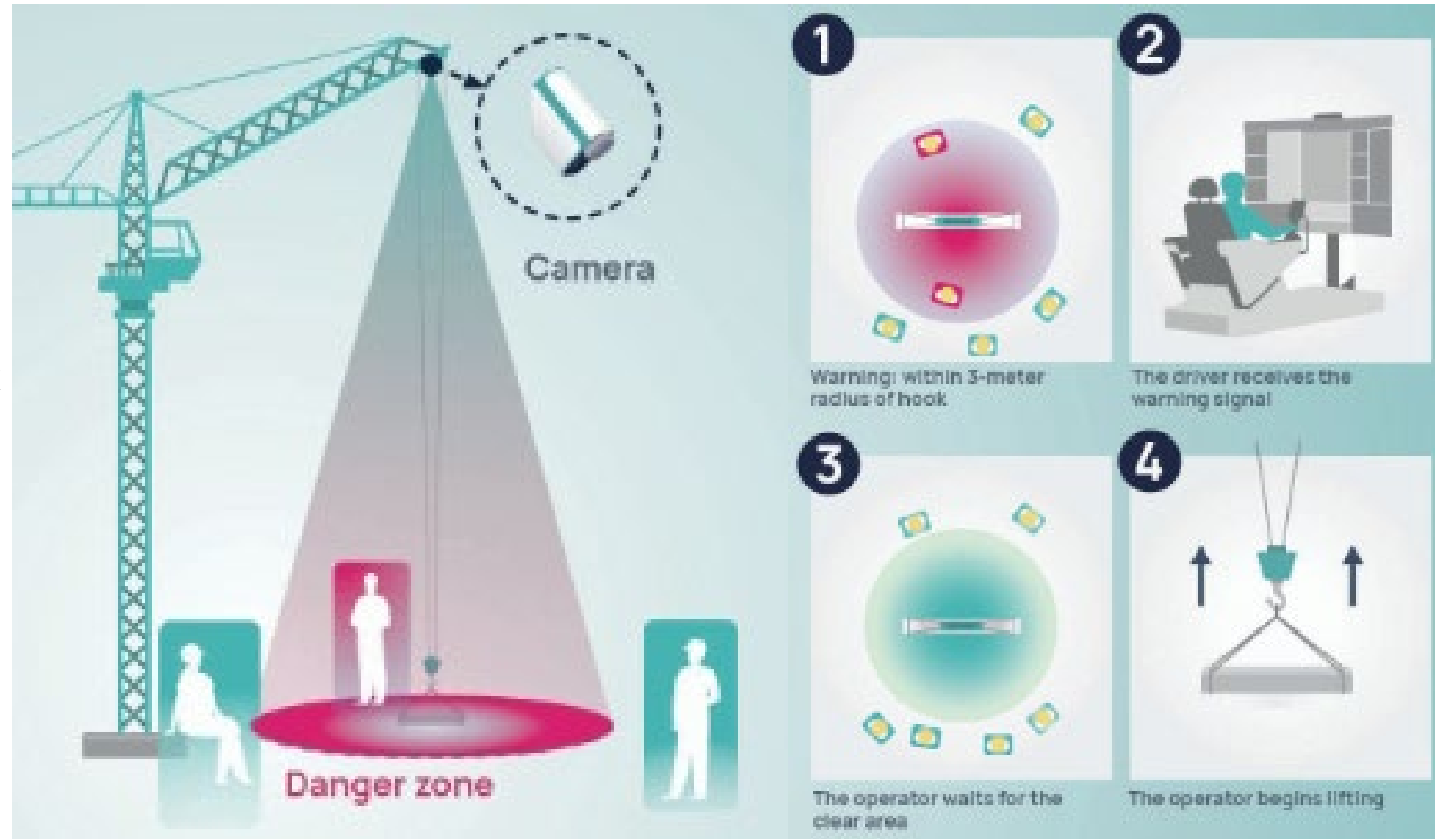


Smart tower crane for MiC Lifting

Partner: **HKCRC**
香港智能建造研發中心



Safety Control



Smart optics for MiC Precision Positioning

Partner: **ASTRI**
香港應用科技研究院

Accurate MiC positioning

enabled by non-visible light communication (nVLC), advanced optics and edge computation

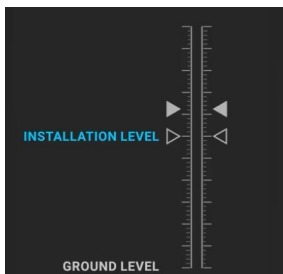
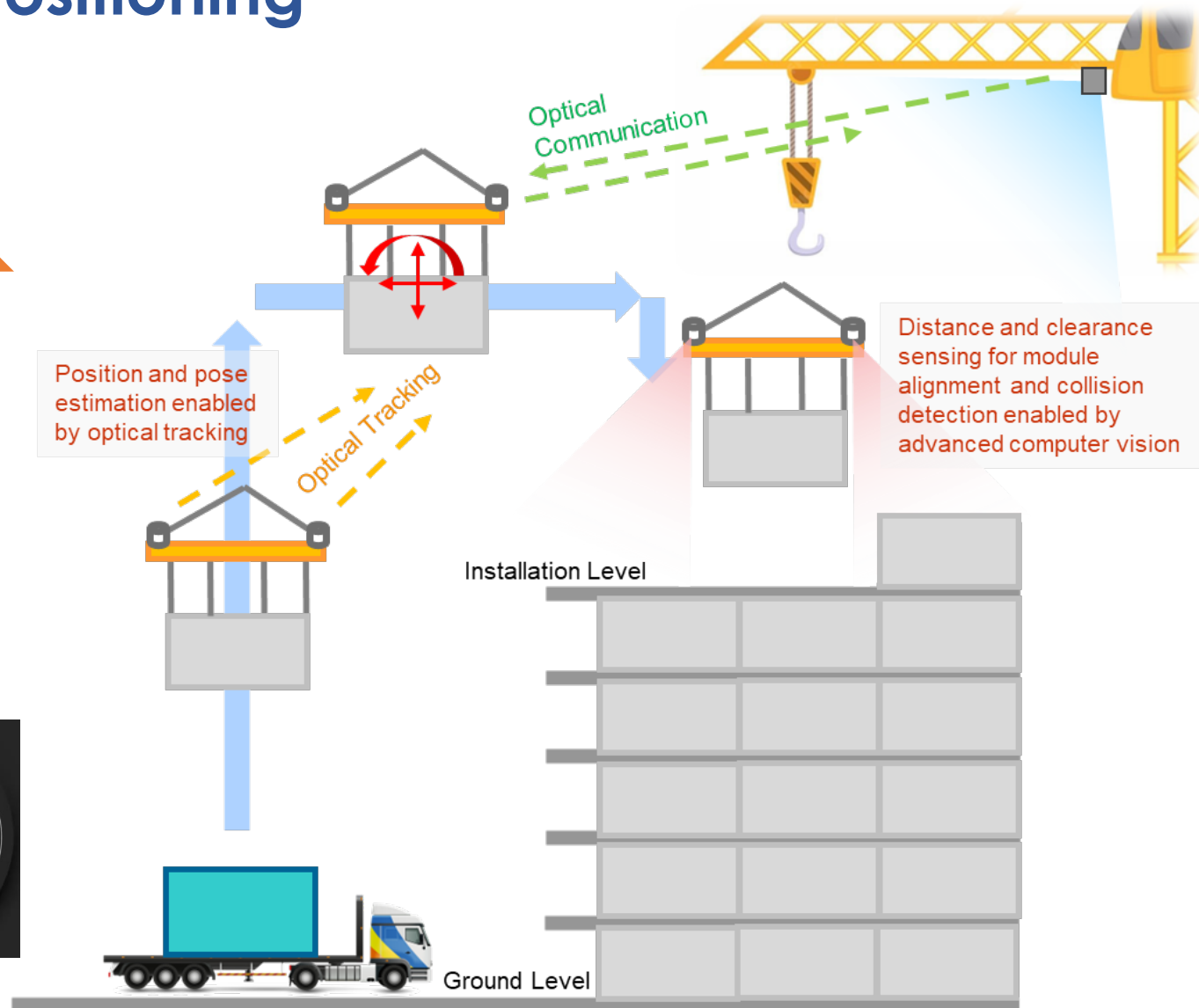
Fast and low-latency position on lifted objects

=

Effective Solution

Operational Efficiency

In planning, control and alignment



Smart optics for MiC Precision Positioning

Partner: **ASTRI**
香港應用科技研究院

Smart Identification of MiC module type and installation location with RFID

1. to assist tower crane operator for lifting
2. to facilitate MiC module installation alignment by utilising LiDAR and non-visible light communication
3. to enable for deploying other types of sensors on the lifting frame

- Effectiveness
- Safety
- Productivity



Key Innovation

1. Smart Identification of MiC module type and installation location with RFID
2. Precision positioning system utilising LiDAR and non-visible light communication to facilitate MiC module installation alignment
3. Technology enabler for deploying other types of sensors on the lifting frame to strength site safety monitoring



Smart optics for MiC Precision Positioning

Partner: **ASTRI**
香港應用科技研究院

Smart module identification



UPDATE



Lifting frame-mounted RFID reader
get embedded tags information

Extract MiC target position from
database and real-time alignment
monitoring

1. **Shorten overall construction time** by speeding up
installation and alignment

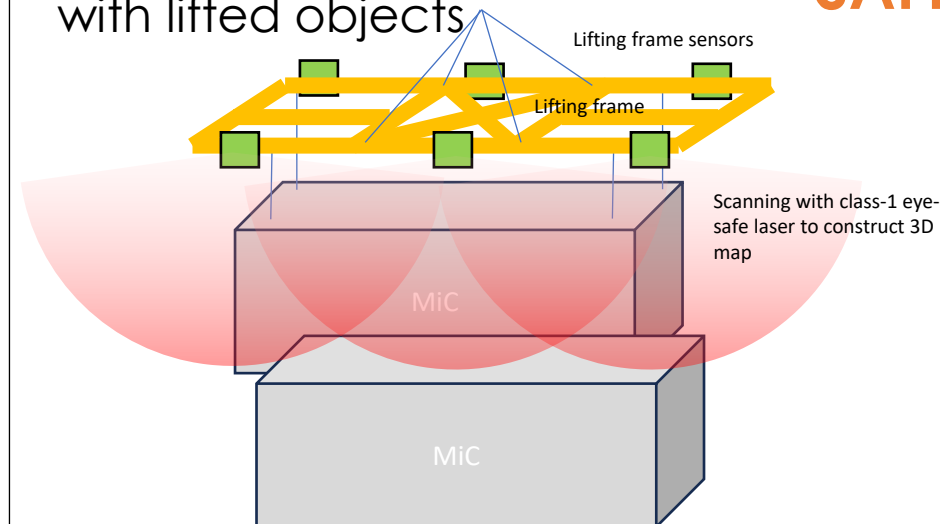
2. **Reduce number of workers** in
MiC installation



Offers continuous on-the-fly
monitoring of crane operations

Provides **timely alerts** to on-site
personnel

Minimizes human interactions
with lifted objects



Public Housing Development at Tung Chung Area 42 Phase 1

Peelable Protective Coating

Partner:  **NAMI**

1. Protect the glass, wood door and metal **from factory, transportation to construction site**
2. **No residue formed** on the glass surface or unwanted early wearing-off of coating, thereby streamlining the cleaning process and saving time.

- Eco Friendly
- Scratch & Impact Resistance
- Durability
- UV protection
- Repels Water
- Fire Retarding
- Suitable for Non-Flat Surface

- **Cost**
- **Time**
- **Construction waste**



Protection



Factory



Transportation



Construction Site



Indoor Spraying Robot

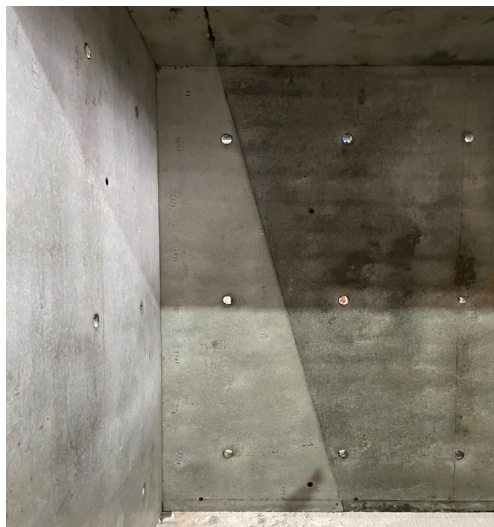
Applying Building Information Modelling technology, the indoor painting robot has assisted in painting works automatically.

It also allows a single operator to remotely control multiple robots at the same time.

The application of the robot can replace most of the physically demanding work of skilled painters, resulting in minimising the safety and health risks to the workers.

It also enhances construction efficiency and site safety.

As painting cannot be pre-applied at areas between modules where post concreting works, final coat to be applied on site for the whole room to avoid double handling of re-painting works and ensure there is no colour difference.



Skim Coat Spray Machine



Skim Coat Sander Machine

70% saving in Painter
80% saving in Time



Cost Effectiveness



PIMAP-Project Information Management and Analytics Platform

PIMAP integrates big data collected from the various IoT applied at housing projects in a virtual platform with digital BIM and GIS models to provide visualisation and analytics at various stages of a housing project from planning, design, construction to handover at anytime and anywhere to enhance works productivity and uplift managerial efficiency.



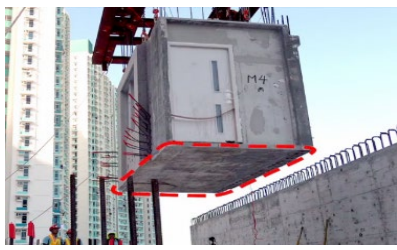
Production



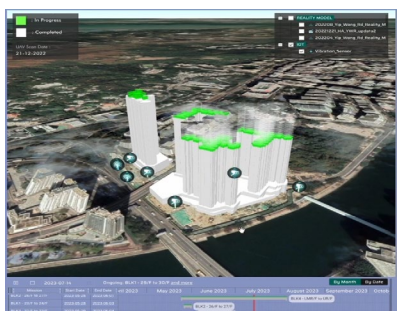
Installation



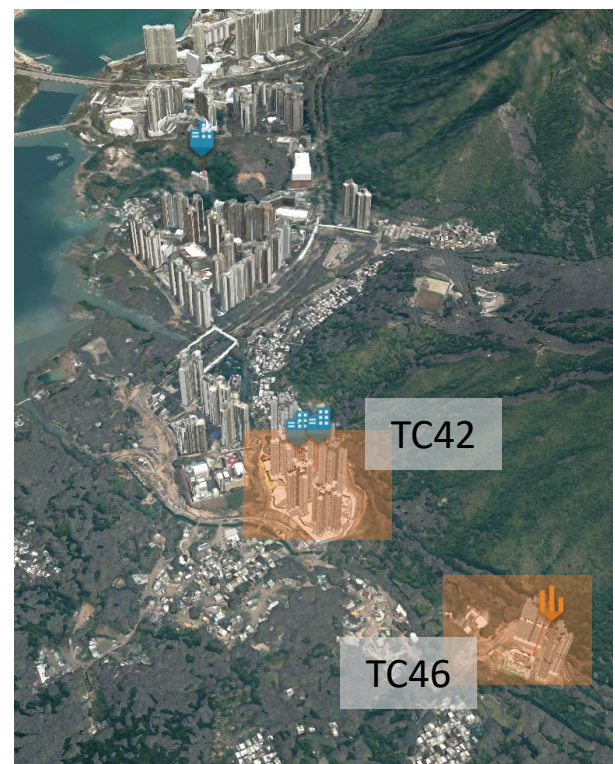
Integration of IoT Technology
Records Remote Monitoring on the
Platform Enhancing Management
Efficiency



Transportation



Site Progress



PIMAP has been adopted to coordinate the construction period with neighboring projects and **Tung Chung Area 42**.



The map illustrates the proposed MiC delivery routes and CEODD works areas for Tung Chung Area 42 and Area 46. Key features include:

- Delivery Routes:** Red dashed lines indicate the TCA42 & TCA46 MiC delivery routes. Red arrows show the site entrances for both areas.
- CEODD Works Areas:** Yellow hatched areas represent the CEODD works areas, including a 230m layby for MiC vehicles to avoid traffic jams along the under-construction road.
- Roads and Landmarks:** The map shows Road L29, Road L30, Tung Chung River, and Tung Chung Road. Other landmarks include Tung Chung Area 46 and Tung Chung Area 42.
- Timeline:** The map is divided into three sections based on the completion of the CEODD works: "By 2025/2026", "By 2025/2026", and "By 2026/2027".

Legend:

- Red dashed line: TCA42 & TCA46 MiC delivery route
- Red arrow: Site entrance
- Yellow hatched area: CEODD works area



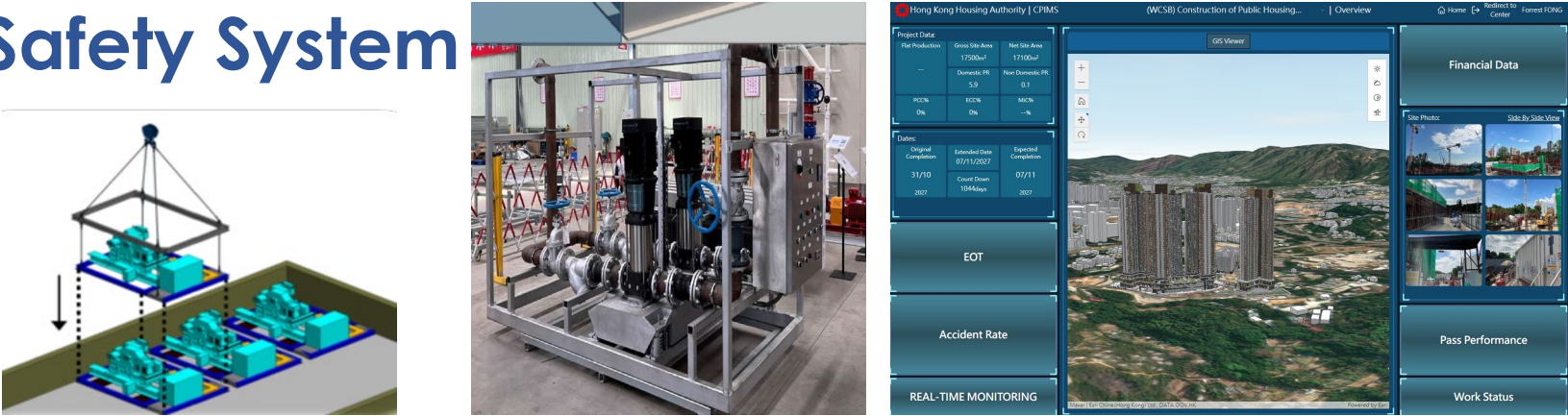
DCSMS - Development and Construction Site Mobile System

Mobile-enabled common platform for communication, streamline workflow and improve productivity and traceability in site inspection



MiMEP & 4S Smart Site Safety System

MiMEP and 4S System are also adopted to further improve the site safety and efficiency.



Public Housing Development at Tung Chung Area 42 Phase 1



Just in Time Delivery

MiC factory have a central monitoring system to monitor the logistic status of each MiC module.

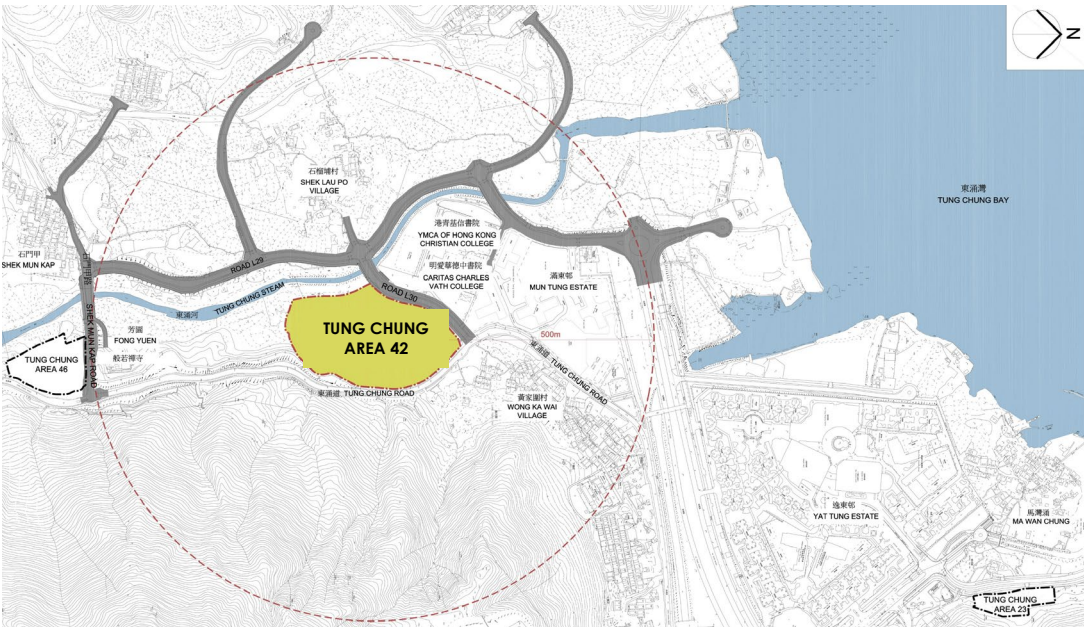
MiC modulescould be installed just at the time of delivery to avoid queuing outside the site.



Radio Frequency Identification (RFID)

There are several benefits for RFID Application in MiC Unit -

- Unique Identification
- Improve Traceability
- Enhance Data Management
- Real time Monitoring
- Streamline the Work Flow



Public Housing Development at Tung Chung Area 42 Phase 1

