CONSTRUCTION INDUSTRY COUNCIL
建造業議會

CIC Taster Course for University Students

BIM-enabled Modern Construction Practices

Course Materials

September 2021

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Course Materials

Table of Content

1. Background

The trend towards application of innovation and technology has become an overt change in global construction industry in recent years. Adoption of advanced technologies (e.g. Building Information Modelling (BIM), Modular Integrated Construction (MiC)/Design for Manufacture and Assembly (D*f*MA), digital technologies for construction safety and green construction technology, etc.) has been transforming worldwide construction practices and reaping substantial benefits in construction.

BIM technology digitalises whole-building life-cycle process that can enhance design, construction, and facilities management; and hence contribute to improvement of productivity, cost-effectiveness and site safety performance, uplift of built quality and enhancement of environmental sustainability. Since BIM empowers communications and coordination among construction project participants and stores all necessary building information into one single digital model, it can be applied to facilitate embodied carbon calculations of whole-building at the early design stage and hence enable embodied carbon reduction to achieve overall carbon targets. Besides, BIM together with other digital technologies can be applied at the early design stage to eliminate and mitigate site safety hazards to achieve design for safety. While MiC technology (as an example of D*f*MA) can deliver significant benefits in construction, it requires higher accuracy in design, better coordination and planning in transportation, etc. BIM integration provides a digital platform to optimize the benefits of MiC technology.

Figure 1: BIM-enabled Modern Construction Practices

2. Aim and Objectives

This CIC Taster Course for University Students aims to provide an opportunity for university students to gain an insight into the world of BIM-enabled Modern Construction Practices through a series of interactive taster courses and educational tours in the CIC Construction Exhibition Hub with inspiration along the way.

Upon successful completion of the CIC Taster Course, participants should be able to:

(1) Recognize the global trend towards application of innovation and technology in the world of BIM-enabled modern construction practices;

(2) Appreciate the importance of BIM in information management in construction for the whole-building life-cycle process;

(3) Exemplify the information sharing among construction project participants in BIM processes;

(4) Appraise the impacts of wider adoption of MiC/D*f*MA in the context of the local construction industry in Hong Kong;

(5) Explain the advantages and application of CIC Carbon Assessment Tool (CAT) to manage carbon performance for new buildings and infrastructure projects; and

(6) Describe the implications of using digital technologies in construction safety for improvement of site safety performance in Hong Kong.

Figure 2: The CIC Construction Exhibition Hub

3. CIC Taster Course Schedules

Virtual Project Approach: Building Life-Cycle Stages

Planning & Design Stage → **Manufacturing & Construction Stage** → **Operation & Maintenance Stage**

Day 1:		**CIC BIM Space, 29/F, Megabox, Kowloon Bay.**
09:30 – 09:40	(1)	**Introduction to CIC Taster Courses for University Students**
09:40 – 12:30	(2)	**Planning & Design Stage**: ☑ Introduction to BIM and Digitalisation (Part 1) ☑ Introduction to MiC / D*f*MA (Part 1) ☑ Embodied Carbon & CIC Carbon Assessment Tool (CAT)
12:30 – 14:00		Lunch Break
14:00 – 17:30	(3)	**Manufacturing & Construction Stage**: ☑ Introduction to BIM and Digitalisation (Part 2) ☑ Introduction to MiC / D*f*MA (Part 2) Day 1: Q&A + Conclusion
Day 2:		**CIC Zero Carbon Park, MiC Resources Centre, Kowloon Bay.**
09:30 – 12:30	(4)	**Manufacturing & Construction Stage (Continued)**: ☑ Introduction to BIM and Digitalisation (Part 3) ☑ Introduction to MiC / D*f*MA (Part 3) ☑ Digital Technologies for Construction Safety
12:30 – 14:00		Lunch Break
14:00 – 17:20	(5)	**Operation & Maintenance Stage**: ☑ Introduction to BIM and Digitalisation (Part 4) ☑ Introduction to MiC / D*f*MA (Part 4) ☑ Educational Tours: CITAC; ZCP + MiC Resources Centre Day 2: Q&A + Conclusion Day 1 & Day 2: Course Feedback Form
17:20 – 17:30	(6)	**Conclusion to CIC Taster Courses for University Students**

CIC BIM SPACE | 29/F, Tower 2, Enterprise Square Five (MegaBox), 38 Wang Chiu Road, Kowloon Bay, Kowloon.
CIC Zero Carbon Park | 8 Sheung Yuet Road, Kowloon Bay, Kowloon.

CONSTRUCTION INDUSTRY COUNCIL
建造業議會

4. Introduction to CIC Taster Course for University Students

CONSTRUCTION
INDUSTRY COUNCIL
建造業議會

CIC Taster Course for University Students

Introduction

CONSTRUCTION EXPENDITURE FORECAST FOR PUBLIC AND PRIVATE SECTORS* (2021/22 TO 2030/31)

公營界別及私營界別建造工程量預測*

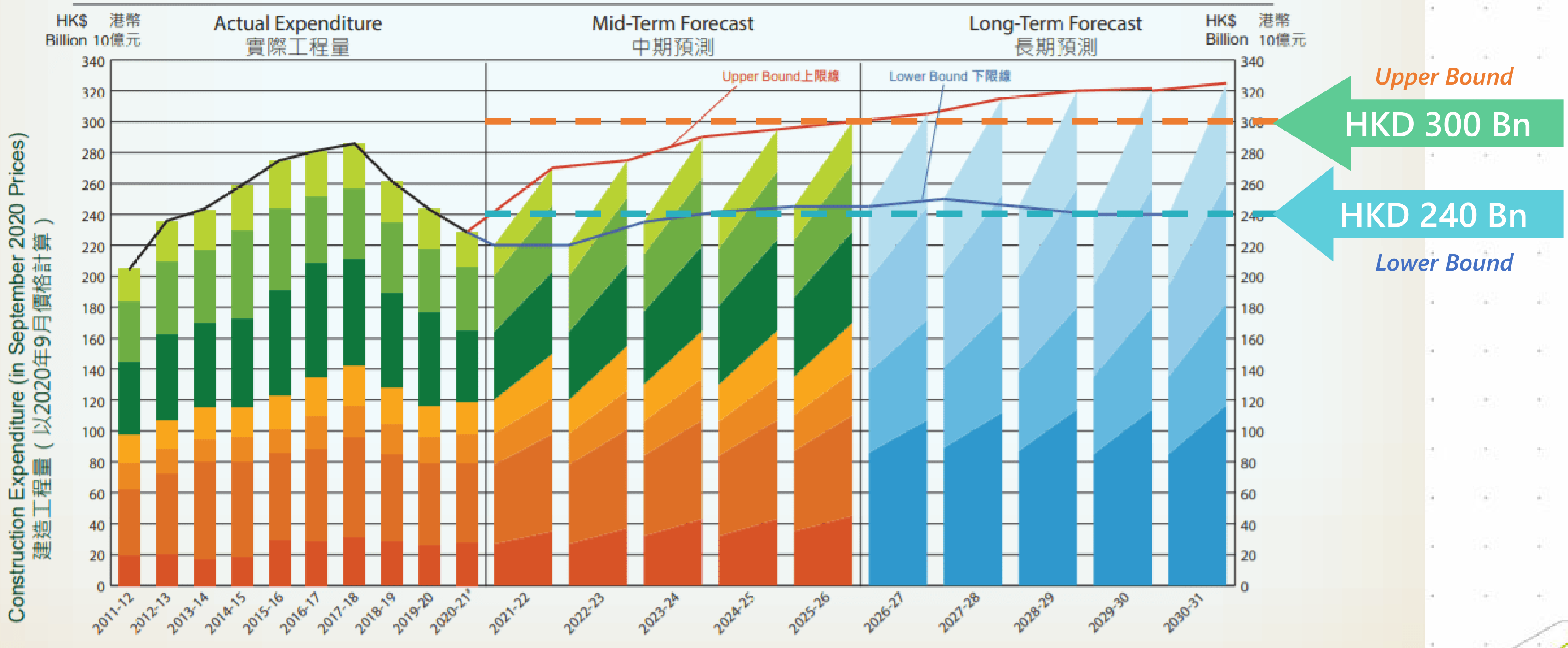
(2021/22 至 2030/31)

Actual Expenditure & Mid-Term 實際工程量及中期預測 | Long-Term 長期預測

Public Sector 公營界別 | Private Sector 私營界別 | Public Sector 公營界別 + Private Sector 私營界別

E&M Works* 機電工程
RMAA Works* 裝修及維修工程
Civil Works 土木工程
Building Works 建造工程

*E&M Works - Electrical and Mechanical Works
機電工程 - 電力與機械工程
*RMAA Works - Repair, Maintenance, Alteration and Additional Works
裝修及維修工程 - 維修、保養、改建及加建工程



*Based on the information up to May 2021
按截至2021年5月工程資料推算
#Provisional figures
暫定數字

Demographics of Registered Workers

Number of Registered Construction Workers

574,949

Average Age

46.3

Registered
General Workers

332,603

Registered
Semi-skilled Workers

33,754

2024: Shortage of 2,000+ RSWs

2025: Shortage of 3,800+ RSWs

(Using Upper Bound of Expenditure Forecast)*

Registered
Skilled Workers (RSW)

208,592

Average Age

52.0

** Data Period: Jun. 2021*

CONSTRUCTION EXHIBITION HUB

Brand New Experience in Construction Technology

Construction 2.0

Innovation

Professionalisation

Revitalisation

BIM Space

Building Information Modelling Solutions

MiC Resources Centre

Innovative Construction Method - MiC

CITAC

Application of Smart Technologies in Construction

CIC-Zero Carbon Park

Introduction of Advanced Eco-Building Designs and Technologies

WHO TO ENGAGE ?

Construction Practitioners

Architects, Engineers, Surveyors, AP/RSE/RGEs, BIM, Safety and Design Professionals, General/Project/Construction Managers, TCPs, Professors, Site Agents, Inspector of Works, Clerk of Works, Foremen, Related Practitioners (e.g. IT, Logistics).

Senior Executives and their Representatives

Government Departments, Management in companies, professional bodies, trade associations and statutory bodies

Students

University Students, STEM Alliance, Secondary Schools, Senior Primary Schools

General Public

Members of the public

Engagement with Higher Education Institutions (HEI)

1. **Signed Memorandum of Understanding (MOU)**
   - *HKU – Faculty of Engineering, Faculty of Architecture*
   - *HKUST – School of Engineering*
   - *CityU – College of Science and Engineering*
   - *PolyU – Faculty of Construction and Environment*
   - *Chu Hai – Faculty of Science and Engineering*
   - *CUHK – School of Architecture*
   - *IVE – Engineering Discipline*
   - *THEi – Faculty of Science and Technology*
   - *VTC*

2. **Training provided through BIM Competition (covering ArchiCAD, ArcGIS, BIM Track, BIM360, Enscape, Fuzor, IES, Open Building Design, Revit, Tekla, etc.)**
   - *(2019) 11 Hands-on Training Sessions organised with a total of 214 attendance*
   - *(2020) 13 Hands-on Training Sessions organised with a total of 381 attendance*
   - *(2021) 20 Hands-on Training Sessions organised with a total of 319 attendance*

3. **BIM Training Materials/Opportunity offered**
   - *Presentation Material of Awareness Seminar and Workshop (88 pages)*
   - *Course Material of BIM Management Training Course (112 pages)*
   - *Course Material of BIM Management Training Course (Civil Discipline) (92 pages)*
   - *Offered two free seats of Basic Modelling Course to each MOU HEI*
   - *Train-the-Trainer Summer School 2019 with a 60-page handbook (18 teachers attended)*
   - *Shared BIM models from Government projects*

4. **Established a Task Group on BIM-enabled Modern Construction Training under the Task Force on BIM Training**
   - *BIM Education Symposium (under planning)*
   - *Student BIM Projects Award (under planning)*
   - *Taster Courses on BIM-enabled Modern Construction (including BIM, DfMA, MiC, Green Construction and Digital Technologies for Safety) (pilot in August)*

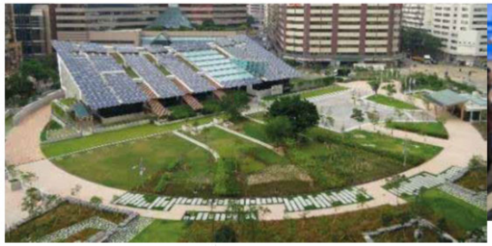
CIC Taster Course for University Students

- To provide an opportunity for universities students to gain an insight into the world of **BIM-enabled modern construction practices** through a series of taster courses and educational tours in the CIC Construction Exhibition Hub:

- Introduction to BIM and Digitalisation
- Embodied Carbon and CIC Carbon Assessment Tool (CAT)
- Introduction to MiC / DfMA
- Digital Technologies for Construction Safety

- Educational Tours to CIC Construction Exhibition Hub

BIM SPACE | ZCP | CITAC | MiC Resources Centre



CIC will issue CPD Certificate of Attendance to Participants

Taster Courses: BIM-enabled Modern Construction Practices

BIM

- Application of BIM technology in whole-building life-cycle processes
- BIM and Digitalisation Tools

MiC/DfMA

- Benefits (Productivity; Quality, Safety and Environmental Performance)
- MiC Development Trends

Construction Safety

- Design for Safety in Construction and Maintenance
- Application of Digital Technologies for Construction Safety: (BIM, AR/VR, IoT, AI, and UAS, etc.)

Green Construction

- Carbon policy and Carbon Target; CIC Carbon Assessment Tool (CAT)
- CIC Green Product Certification

Advanced Technologies in Construction

- **CIC Construction Exhibition Hub** (BIM SPACE, CITAC, MiC and ZCP): Educational Tours

CERTIFICATE OF ATTENDANCE
出席證書

This is to certify that
茲證明

had attended the [Event Name (Eng)] organised by the Construction Industry Council on [Event Date (Eng)]
出席由建造業議會於[Event Date (Chi)]舉辦之[Event Name (Chi)]

For and on behalf of
Construction Industry Council
建造業議會授權蓋印

Remark: It is suggested that participation in this tour counts for [CPD Time] CPD hours
備註: 建議參與是次導賞團可獲 [CPD Time] 小時持續專業發展時數

5. Day 1: Planning and Design Stage

CIC Taster Courses for University Students

Day 1 – Planning and Design Stage

Day 1 Schedule

In the morning:

- Importance of Civil and Structural Engineers
- BIM in Planning and Design Stage
- CIC Support on BIM
- Hands-on Workshop on BIM Authoring Tool
- Embodied Carbon and CIC Carbon Assessment Tool (CAT)

In the afternoon:

- BIM and DfMA in (Design to) Construction Stage
- Hands-on Workshop on BIM Viewing Tool
- Day 1 Conclusion (Key Takeaways)

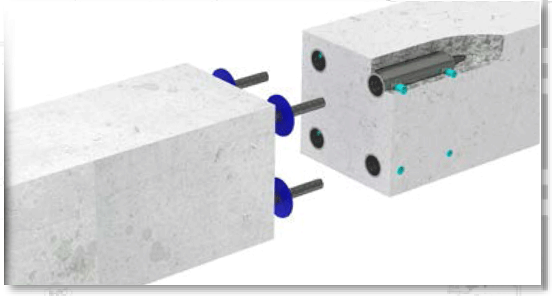
(1) Importance of Civil and Structural Engineers

Why **civil and structural engineers** has a critical role to play in modernisation and transformation of construction industry?

Design Approach affects

how **efficient and sustainable** modernised construction methods can be **adopted widely**

Kwikastrip Rebar Pull out Starter



Grout Sleeve Precast Connection

System Formwork

Delta Beam + Hollowcore Precast Pre-stressed Plank

Geothermal Loop and Energy Piles

High cement replacement concrete in structural element without rapid strength development required

LYTAG®
lightweight solutions

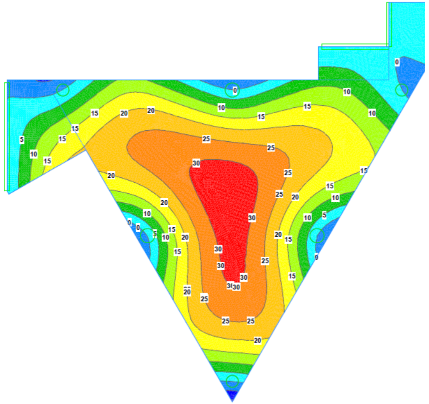
Structural Lightweight Concrete up to C40 commonly used in the UK
1850kg/m3 Density & Design to Eurocode standard
Possible to count as **recycled aggregate** content in accordance with BREEAM Technical Guide SD 5073

Widely Used **Sustainable Solutions** contributed by Structural Engineers

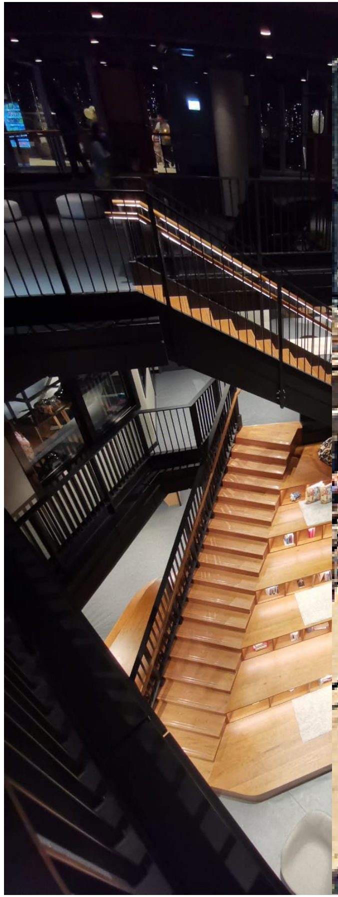
Simplify the **DESIGN EFFORT**

but complicate the

CONSTRUCTION?



Perform Advanced Analysis and Design to optimise the structure and effective adoption of system formwork to **simplify the construction** and **reduce floor cycle** ahead of MiC installation

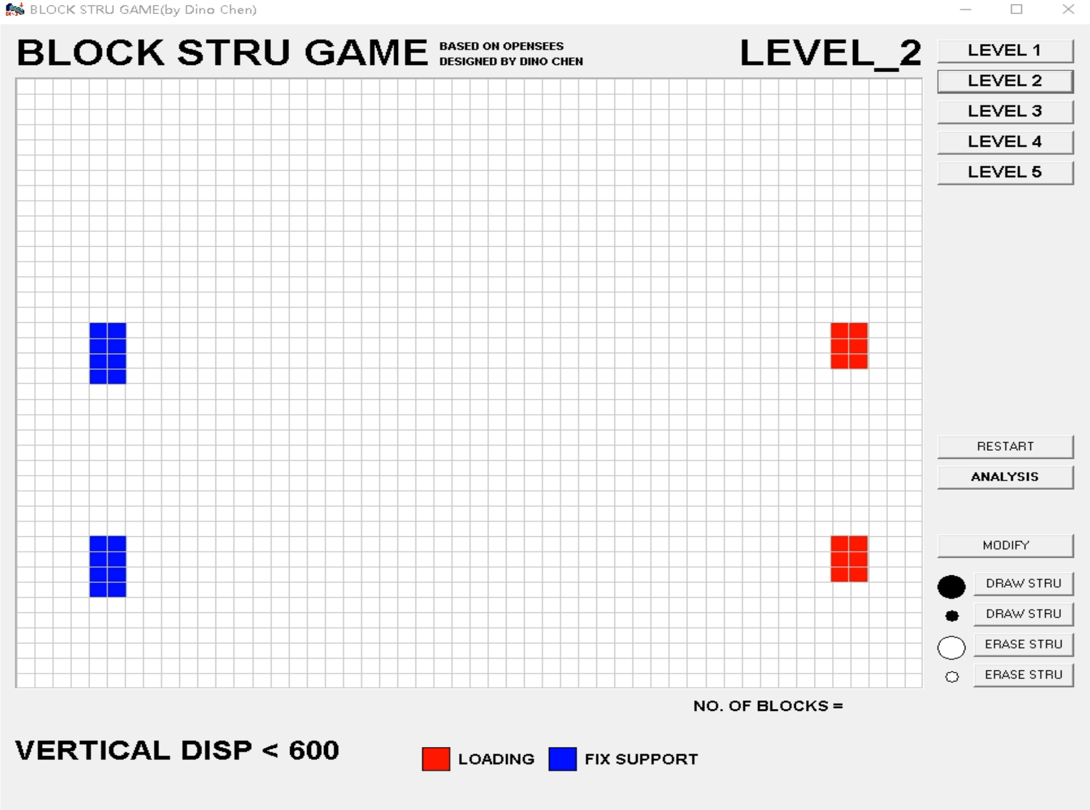


Capability of

Analysis & Design Software

Hardware computing power significantly grow

1980 1990 2000 2010 2020+



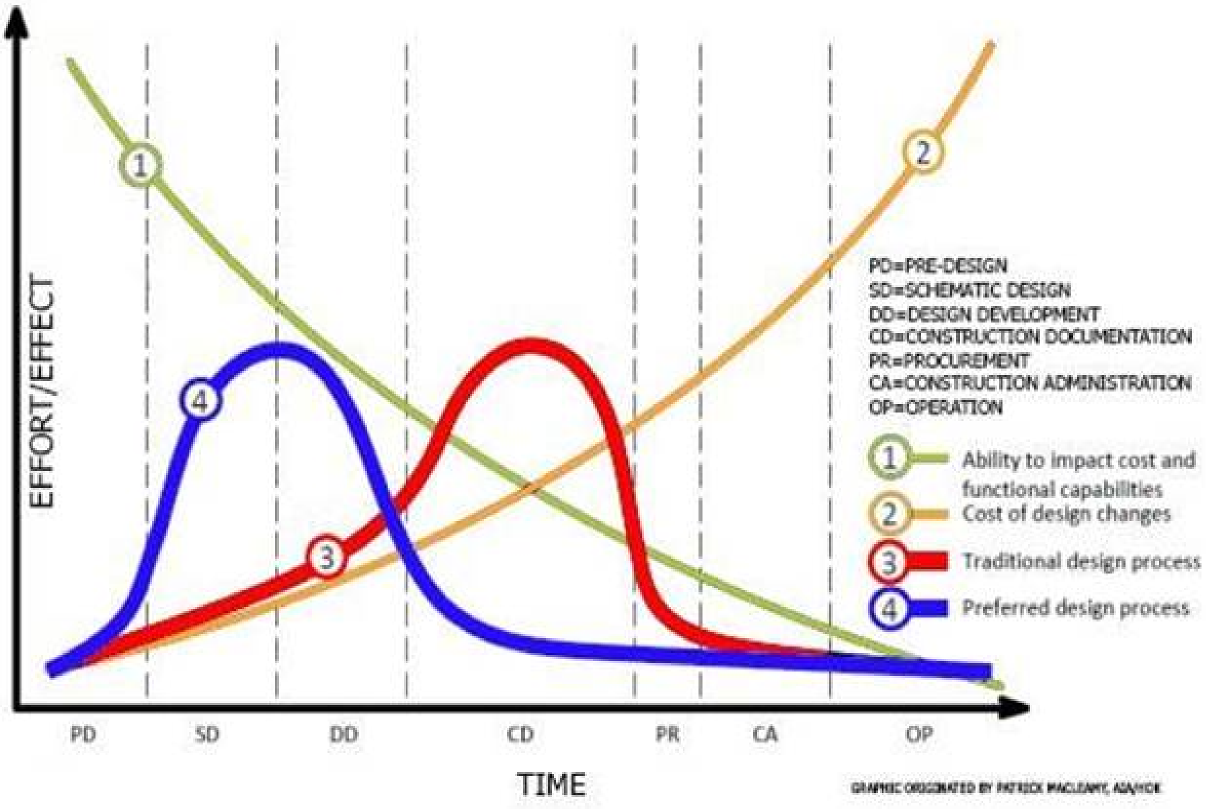
Linear components (e.g. Column-beam frame)
Rigid diaphragm assumption for multi storey building

2D components (flat slab, deep beam, wall)
Semi rigid diaphragm, non-linear analysis, dynamic analysis, 2nd order effect

Computational Fluid Dynamic,
Parametric and Generative Design to optimise and standardise complex geometry

Video Courtesy of Dr. Dino Chen WSP HK

Efficient use of advanced technologies should be planned ahead from early stage and built in the back bone of the building



Structural Engineers **should not** underestimate themselves how their decisions dictate successfulness of whole project delivery.

Four **key components** to embark on Construction Modernisation

1 Collaborative (Partnering) Mindset

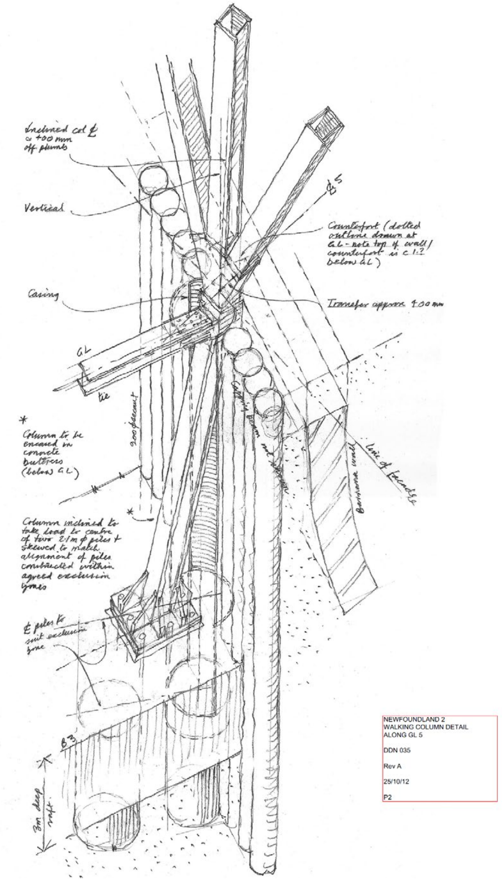
2 Innovative Mindset

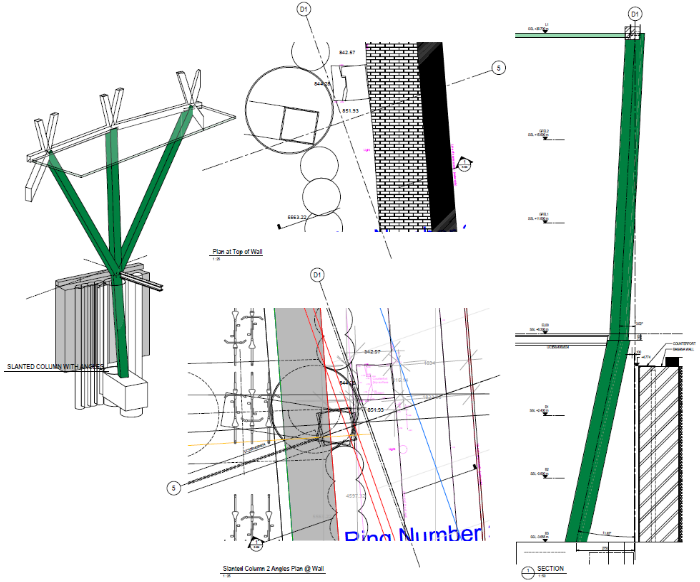
3 Technical Mindset in DfMA & Sustainability (Zero Carbon)

4 Design Knowledge from Experience and Lesson Learnt (overseas practices, multi-discipline, value engineering)

Collaborative & Partnering Mindset

Communication is the **essence of Collaborative** mindset



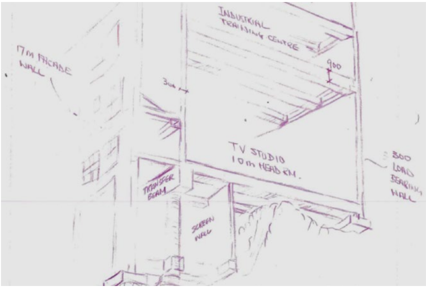


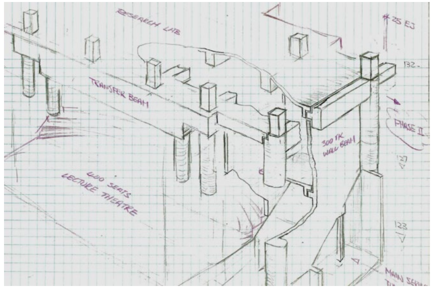
Images Courtesy of WSP UK

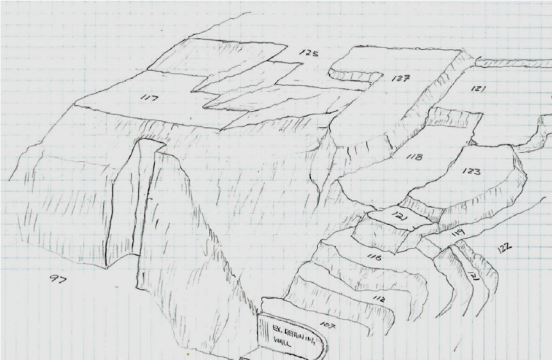
In 1980s ~ 90s

courtesy of **Ir George Chan**

Visualise the complex issues for **coordination**

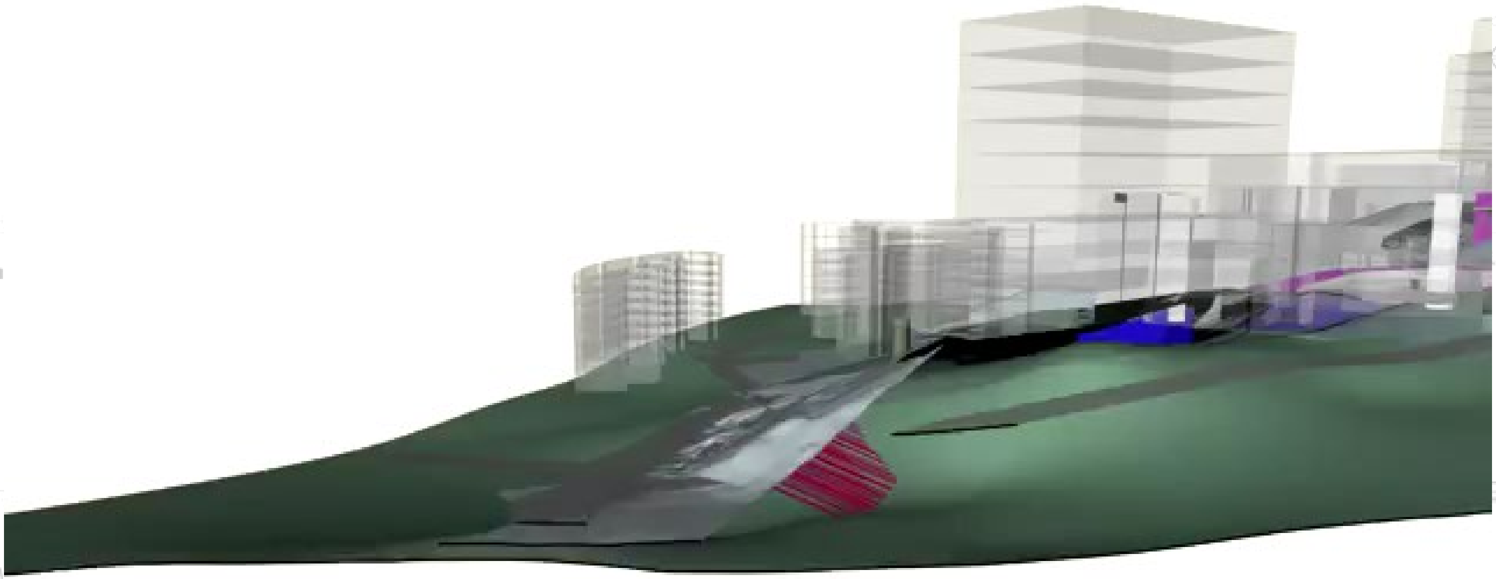






Images courtesy of HKUST

Visualise the complex issues for coordination

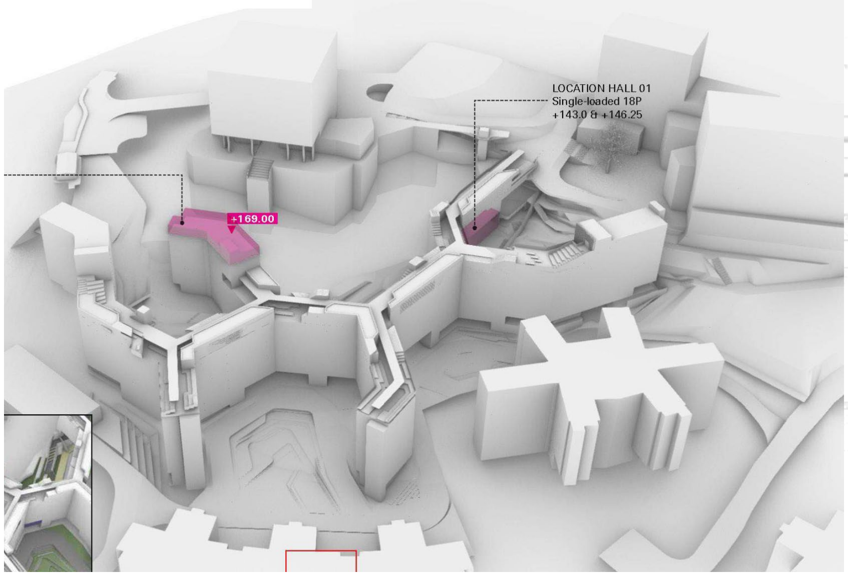


Video Courtesy of HKUST, Leigh & Orange Limited & Zaha Hadid Architects, WSP HK

Outcome of **Collaborative** Mindset

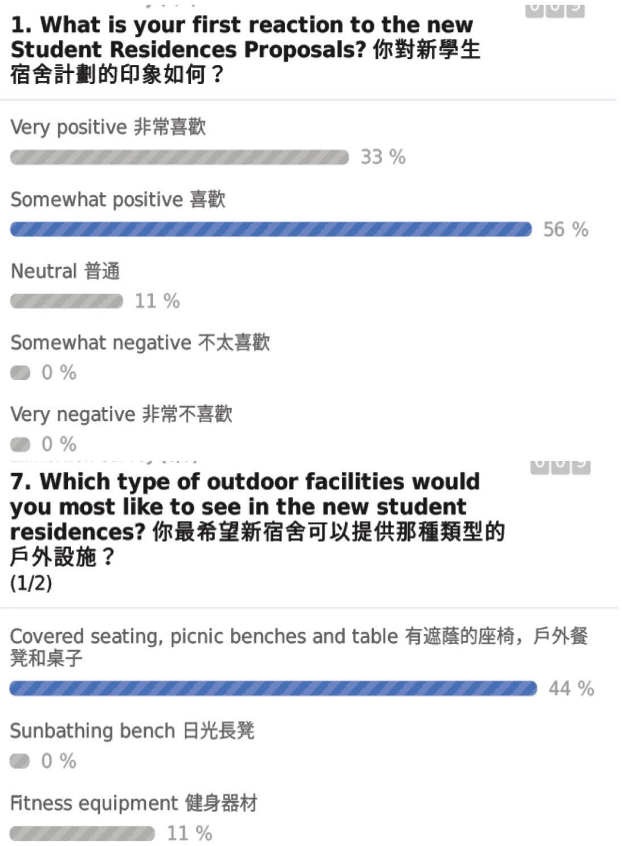
Images Courtesy of HKUST, Leigh & Orange Limited & Zaha Hadid Architects

Project Team Collaborative Solution



Images Courtesy of HKUST, Leigh & Orange Limited & Zaha Hadid Architects

Exhibition | 10th April – 30th April

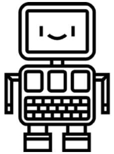


Collaboration & Engagement with Key Stakeholders

Images courtesy of HKUST, Leigh & Orange Limited & Zaha Hadid Architects

Innovative Mindset

Digitalisation:
BIM, IoT, Digital Twins

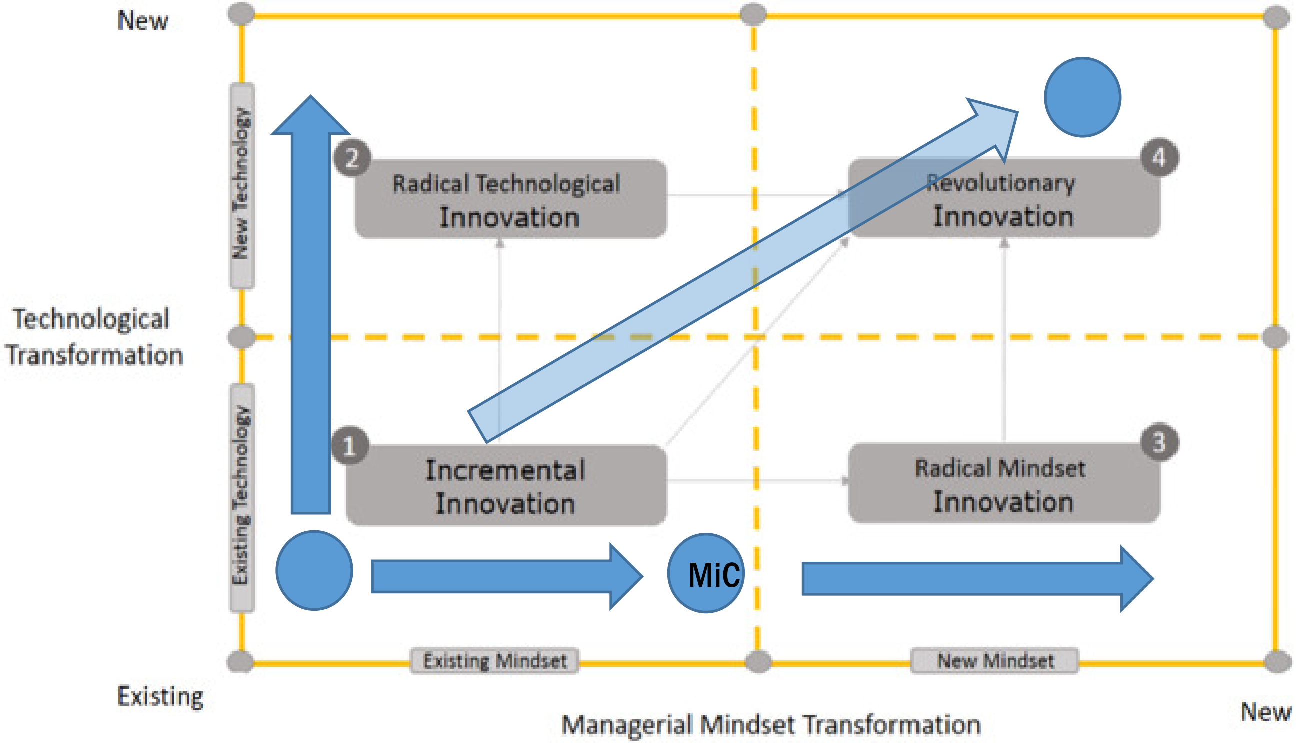


Automation:
Robotics, AI

Connectivity:
5G, LoRaWAN

New materials:
Ultra High Performance Concrete

Design software capability



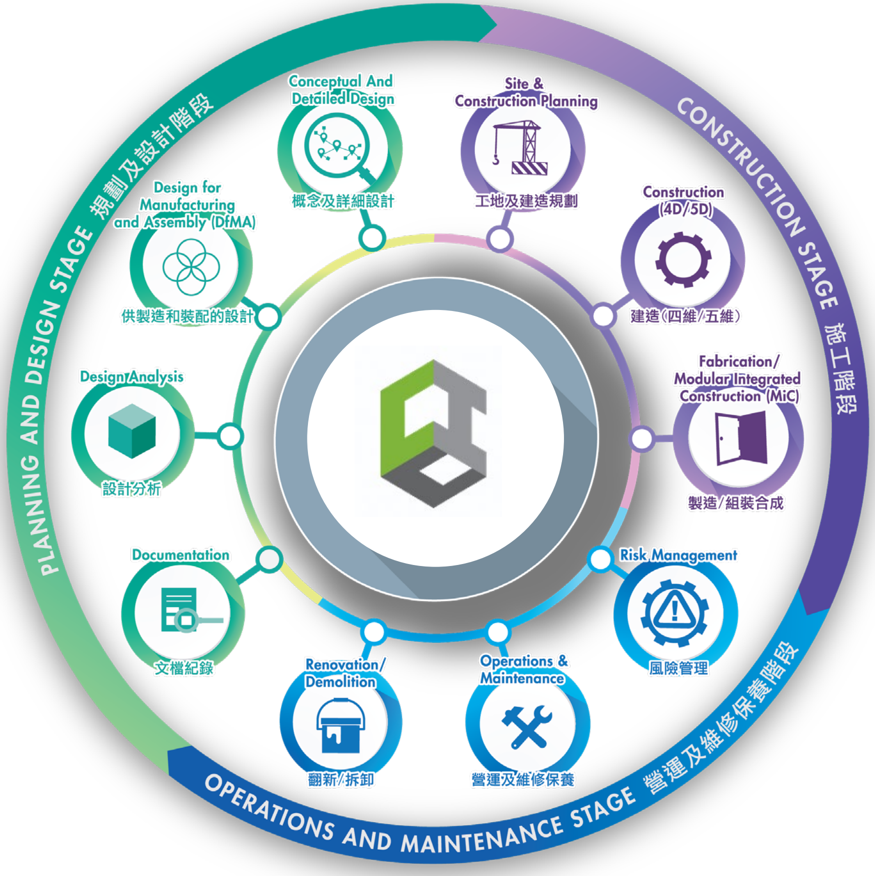
DfMA, Cross Discipline Collaboration, Revitalisation

(2) Stages of Project Lifecycle

1. Planning and Design (AM)

2. Construction (PM)

3. Operations and Maintenance



What is BIM?

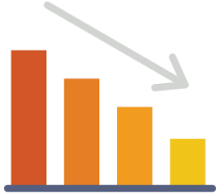
Why Use BIM?

Industry Aspect

Challenges of HK Construction Industry:

Labour Shortage

Cost Increase



Productivity Decrease

Green Building & Construction

DEVB & CIC are actively encouraging the construction industry to adopt new technologies, such as

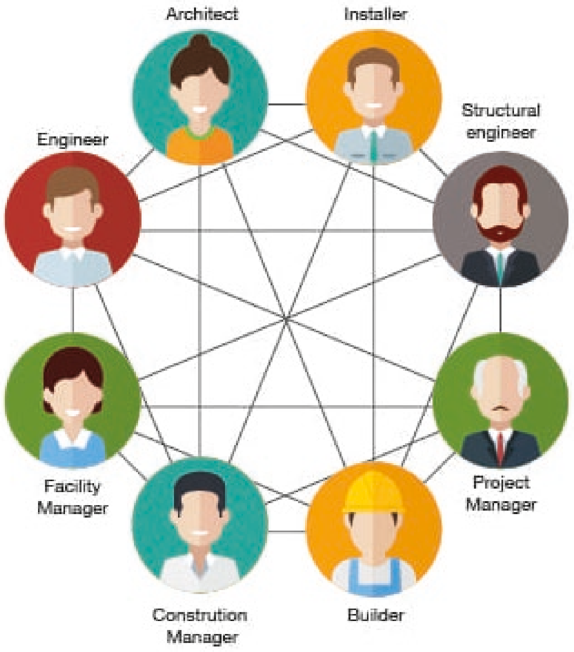
- Building Information Modelling (BIM)
- Modular Integrated Construction (MiC)
- Automated steel reinforcing bar prefabrication yards

BIM is a ‘Vehicle‘ for both MiC & prefabrication

Why Use BIM?

Project Aspect

Traditional Modes of Project Team Communication

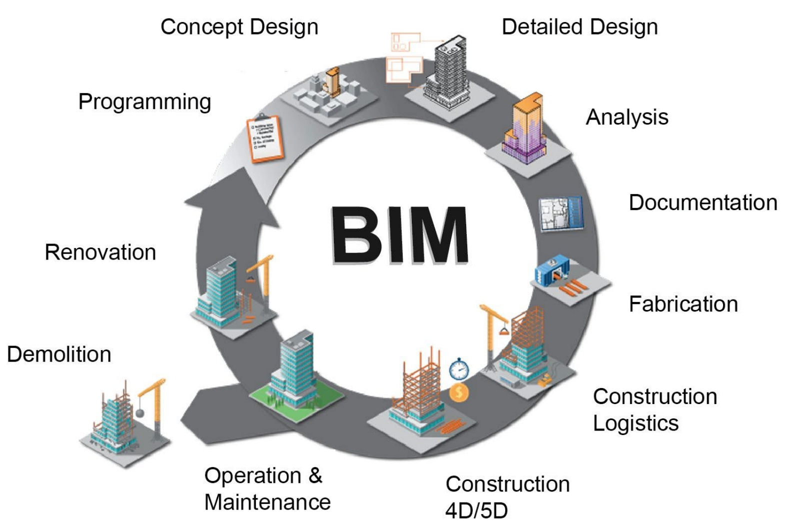


Source: http://biblus.accasoftware.com/en/buildingsmart-and-bim-digital-award-two-important-awards-to-acca-software/

BIM 建築信息模擬

Building Information Modelling is the process of generating and managing building data during the building or assets life cycle.

What is BIM?



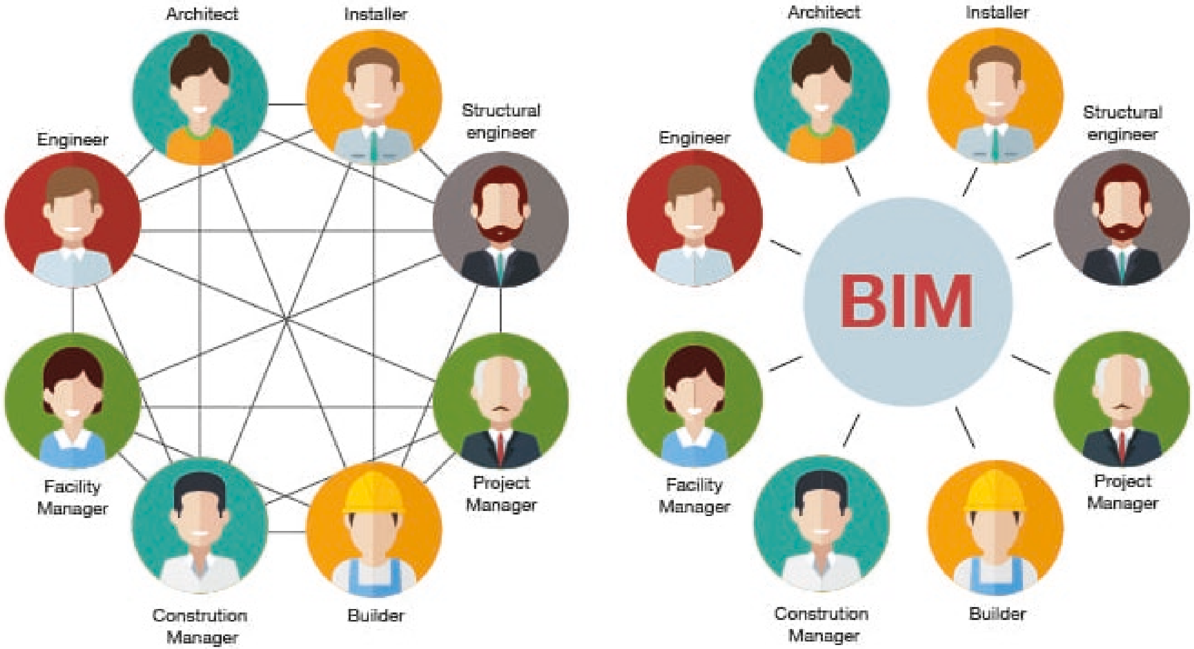
It is a new way of working using new technology to facilitate project management, better construction process control, cross-disciplinary collaboration, communication with external stakeholders, decision support and risk management.

Why Use BIM?

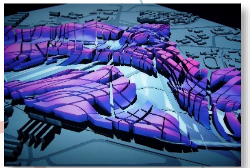
Project Aspect

Traditional Modes of Project Team Communication

Web-based (**BIM**) Platform as **Single Source of Truth**



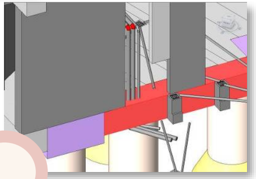
Source: http://biblus.accasoftware.com/en/buildingsmart-and-bim-digital-award-two-important-awards-to-acca-software/



Design Options (Hang Yee, hands-on parametric design software)

DfMA/MiC

Submissions



Buildability / Clash Detection / Design for Safety

Applications of BIM

1. Planning and Design

2. Construction

3. Operations & Maintenance

BIM provides virtual design to design /project team which includes architect, engineers, QS, etc. The models can be updated, monitored & used throughout the entire project design cycle.

Documentation

Review / VR

BIM Models

Design Coordination & Collaboration

Analysis

Submissions

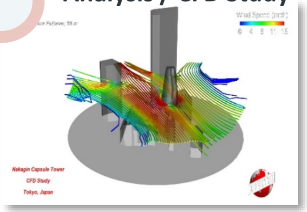
Project Management

Visualization / Simulation

Performance Study

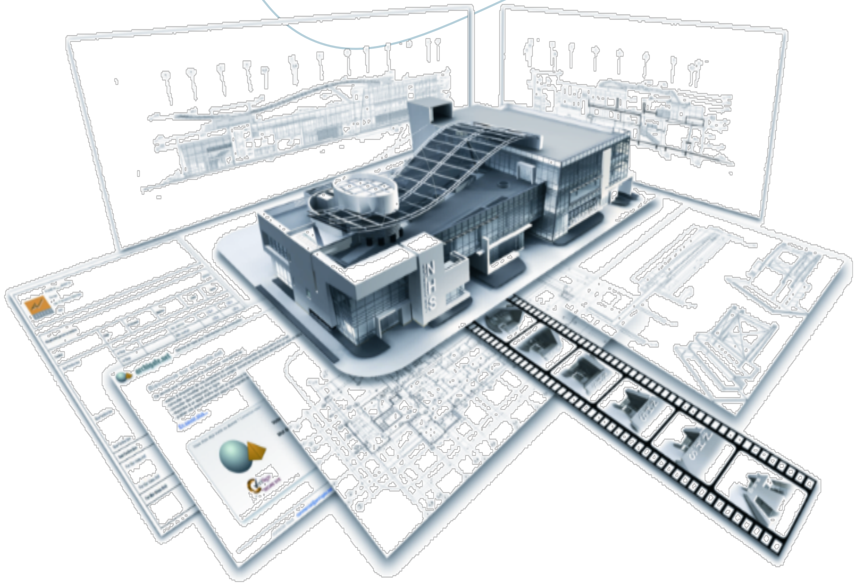
Cost / Quantities/ BIM E-tendering

Carbon Assessment / Engineering Analysis / CFD Study



BIM Dimensions

Concept of Single Source of Truth



Single Source of Truth allows well-coordinated drawing information, ensures consistency and easy management.

"Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition."

- The National Building Information Model Standard Project Committee

Development Bureau's Technical Circular

No.7/2017 Adoption of BIM

香 港 特 別 行 政 區 政 府

The Government of the Hong Kong Special Administrative Region

政府總部 發展局 工務科	**Works Branch** **Development Bureau** **Government Secretariat**
香港添馬添美道 2 號 政府總部西翼 18 樓	18/F, West Wing, Central Government Offices, 2 Tim Mei Avenue, Tamar, Hong Kong

Ref : DEVB(W) 430/80/01

Group : 2, 5, 6

1 December 2017

Development Bureau

Technical Circular (Works) No. 7/2017

Adoption of Building Information Modelling for Capital Works Projects in Hong Kong

Effective Date

3. This Circular takes effect on **1 January 2018**.

Policy

9. Capital works projects with project estimates more than **$30 Million**[1] shall use BIM technology. The policy is applicable for projects in the investigation, feasibility, planning, design or construction stages in the

Development Bureau's Technical Circular

No.12/2020

BIM Use

BIM Uses

1. Works Departments shall adopt the stipulated mandatory BIM uses in respective stages of a project. Works Departments may adopt the optional BIM uses when necessary.

	BIM Use	Investigation, Feasibility and Planning	Design	Construction
1	Design Authoring	M[h]	M	M
2	Design Reviews	M[h]	M	M
3	Existing Conditions Modelling	M[i]	M	M
4	Site Analysis	M[i]	M	
5	3D Coordination		M	M
6	Cost Estimation	O	M[a]	M[b]
7	Engineering Analysis		M[l]	M[l]
8	Facility Energy Analysis		O	O
9	Sustainability Evaluation	O	M[j]	M[j]
10	Space Programming	O	M[c]	
11	Phase Planning (4D Modelling)		M[d]	M
12	Digital Fabrication		M[k]	M[e]
13	Site Utilization Planning			M[f]
14	3D Control and Planning			M[m]
15	As-Built Modelling			M
16	Project Systems Analysis			O
17	Maintenance Scheduling			M[g]
18	Space Management and Tracking			O
19	Asset Management			M[n]
20	Drawing Generation (Drawing Production)		M	M

Legend:

M – Mandatory BIM Use for the mentioned stage, including that carried forward from previous stage. The underlined items are new mandatory BIM uses.

O – Optional BIM Use

Development Bureau's Technical Circular

No.12/2020

BIM Team Structure

The Consultant/Contractor* shall propose and establish a BIM team that is appropriate for the scale and complexity of the Assignment/Contract*, highlighting key roles and responsibilities of each position, within [14][#] calendar days after commencement of Assignment/Contract*. The team shall be led by a BIM Team Leader who holds a key position in the Consultant/Contractor's* project team structure. The BIM team shall include sufficient and technically competent resources in order to complete all BIM tasks and deliverables specified in the Assignment/Contract*. Notwithstanding, the BIM team shall comprise at least [3][#] personnel well trained in relevant disciplines. These personnel shall have qualifications as follows:

(a) BIM Team Leader shall be a CIC-Certified BIM Manager (CCBM) with effect from 1 July 2021 for all technical & fee proposals of consultancy agreements or construction works tenders to be invited on or after 1 January 2021

OR

Subject to the app
CCBM shall comp

(i) shall
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(ii) shall h
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(b) BIM Coordinator

(i) shall have a minimum of three years related construction project experience; and

(ii) shall have a minimum of one year practical experience in BIM projects

OR

shall be a CIC-Certified BIM Coordinator (CCBC)

Who Use BIM?
(Roles and Responsibility)

Role	Strategic						Management				Production	
	Corporate Objectives	Research	Process + Workflow	Standards	Implementation	Training	Exceution Plan	Model Audit	Model Coordination	Content Creation	Modelling	Drawing Production
BIM Manager	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
New! BIM Coordinator	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N
BIM Modeler	N	N	N	N	N	N	N	N	N	Y	Y	Y

Borrmann, Andre & König, Markus & Koch, Christian & Beetz, Jakob. (2018). Building Information Modeling: Why? What? How?: Technology Foundations and Industry Practice.

Hardware – Requirements for Workstation

Example:

How to Use BIM?

Hardware for ARCHICAD 22

Recommended hardware

- Processor: 64-bit processor with four or more cores
- RAM: 16 GB or more is recommended; for complex, detailed models 32 GB or more may be required
- Hard disk: installing ARCHICAD on a SSD (or Fusion) drive is recommended; 5 GB free disk space is required for the installation, 10 GB or more is required per active project
- Graphics card: Dedicated OpenGL 3.3 compatible graphics card with on board memory of 1024 MB or more is recommended to fully exploit hardware acceleration capabilities. You can find a list of recommended graphics cards at: http://www.graphisoft.com/videocards
- Display: A resolution of 1440 x 900 or higher is recommended

You can find more details about recommended hardware on Help Center.

Minimum hardware

- Processor: 64-bit processor with two cores
- RAM: 8 GB
- Hard disk space: 5 GB or more is required for the installation
- Graphics card: OpenGL 3.3 compatible graphics card
- Display: A resolution of 1366 x 768 or higher

Optional Hardware Peripherals

All major plotters, printers and digitizers can be used with ARCHICAD.

Internet

Fast Internet access is needed for connecting to BIMcloud in a remote location and to download updates for ARCHICAD 22.

Protection Key

You will need an ARCHICAD 22 CodeMeter hardware key or CodeMeter Act software protection key to start ARCHICAD 22.

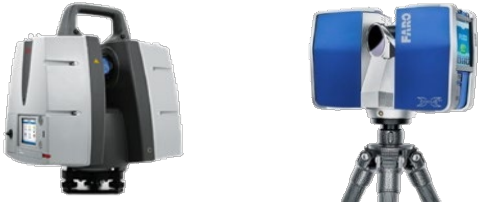
How to Use BIM?

Revit 2021 Minimum: Entry-Level Configuration	
Operating System *	64-bit Microsoft® Windows® 10. See Autodesk's Product Support Lifecycle for support information.
CPU Type	Single- or Multi-Core Intel®, Xeon®, or i-Series processor or AMD® equivalent with SSE2 technology. Highest affordable CPU speed rating recommended. Autodesk® Revit® software products use multiple cores for many tasks.
Memory	8 GB RAM • Usually sufficient for a typical editing session for a single model up to approximately 100 MB on disk. This estimate is based on internal testing and customer reports. Individual models will vary in their use of computer resources and performance characteristics. • Models created in previous versions of Revit software products may require more available memory for the one-time upgrade process.
Video Display Resolutions	**Minimum:** 1280 x 1024 with true color **Maximum:** UltraHigh (4k) Definition Monitor
Video Adapter	**Basic Graphics:** Display adapter capable of 24-bit color **Advanced Graphics:** DirectX® 11 capable graphics card with Shader Model 5 and a minimum of 4GB of video memory
Disk Space	30 GB free disk space
Media	Download or installation from DVD9 or USB key
Pointing Device	MS-Mouse or 3Dconnexion® compliant device
.NET Framework	.NET Framework Version 4.8 or later.
Browser	Microsoft® Internet Explorer® 10 (or higher)
Connectivity	Internet connection for license registration and prerequisite component download

Hardware – Integration with other Technologies

How to Use BIM?

Workstation



3D Laser Scanner

Virtual Reality

Drone

HoloLens

RFID

3D Printer

How to Use BIM?

Software

Source: https://totalbimmakeover.wordpress.com/2017/03/10/digital-collaboration-tools-which-one-to-use-daniel-kalnins-pulse-linkedin/

Integration of BIM & DfMA

Technical illustrations by kind permission of Stora Enso

Integration of BIM & MiC

MiC Pilot Projects in Hong Kong

(3) CIC Support on BIM

CIC as a Centre of Excellence for BIM in Hong Kong

Application of BIM, digital construction, and its related technologies in construction industry (hereinafter known as "BIM")

We serve as a BIM solution hub and provide support in five key areas

Adoption / Promotion

Training

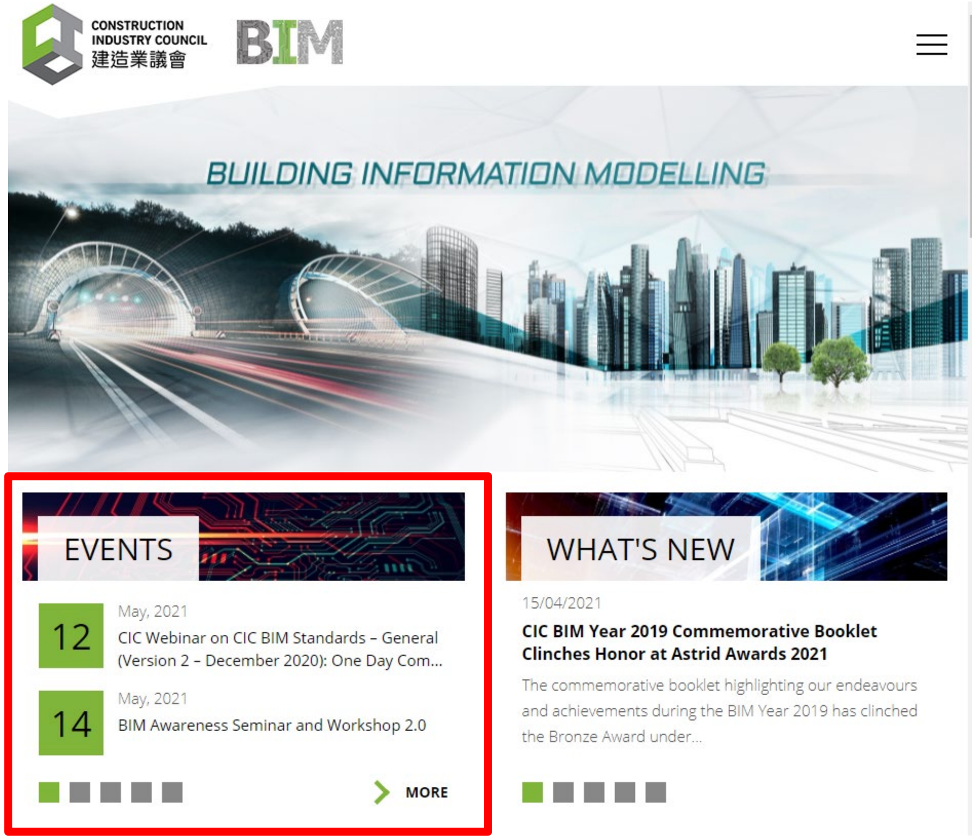
Standards / Guidelines

Certification and Accreditation

R&D, Funding Support

BIM Webinar Series

- Events details and schedule will be shown at CIC BIM Portal
- BIM related webinar is mostly held on Wed PM
- https://www.bim.cic.hk/en/events/list



CIC as Coordinator in BIM Development

Professionals / Specialists

香港建築師學會
The Hong Kong Institute of Architects

British Chambers of Commerce

THE HONG KONG INSTITUTE OF SURVEYORS
香港測量師學會

HKIE THE HONG KONG INSTITUTION OF ENGINEERS

AAP

The Hong Kong Institute of Building Information Modelling
香港建築信息模擬學會

chartered ices

香港建築業承建商聯會
GBCA Hong Kong General Building Contractors Association

Global BIM CENTRE OF EXCELLENCE

HKIUS 香港管線專業學會
Hong Kong Institute of Utility Specialist

The Association of Consulting Engineers of Hong Kong
香港顧問工程師協會

HKFEMC 香港機電工程商聯會

香港建造商會
Hong Kong Construction Association

THE REAL ESTATE DEVELOPERS ASSOCIATION OF HONG KONG

(Anchor)

Project Clients

發展局
Development Bureau

CEDD

香港機場管理局 AIRPORT AUTHORITY HONG KONG

市區重建局 URBAN RENEWAL AUTHORITY

屋宇署 BUILDINGS DEPARTMENT

Academia

VTC

IVE

Thei

CityU

CIC's Works on **BIM**

Adoption / Promotion

Standards / Guidelines

Certification & Accreditation

香港建造學院 HONG KONG INSTITUTE OF CONSTRUCTION

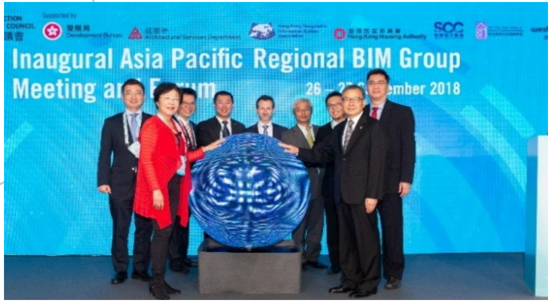
Training

CIC RESEARCH & TECHNOLOGY DEVELOPMENT FUND
建造業議會研究及技術發展基金
Transforming Construction Practice Through Innovation
創新改變建造方式

CITF 建造業創科基金

Funding Support

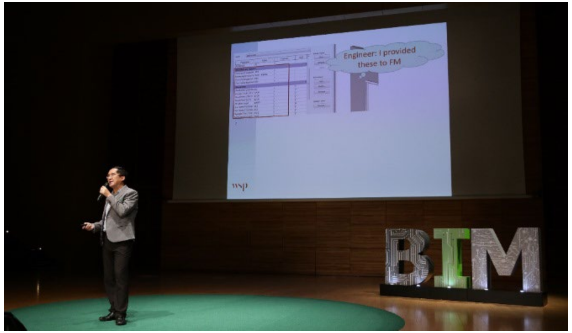
Adoption / Promotion on BIM



Asia Pacific Regional BIM Group Meeting and Forum

BIM Competition

CIC BIMSpace



BIM Talks

Awareness Seminar and Workshop 2.0

Adoption / Promotion on BIM

- Understand BIM market in Hong Kong with a baseline of BIM adoption
- Identify key hurdles for BIM adoption
- Recommend strategies and actions for CIC and the industry to advance BIM implementation
- Establish a benchmarking methodology for Hong Kong's BIM adoption in the future

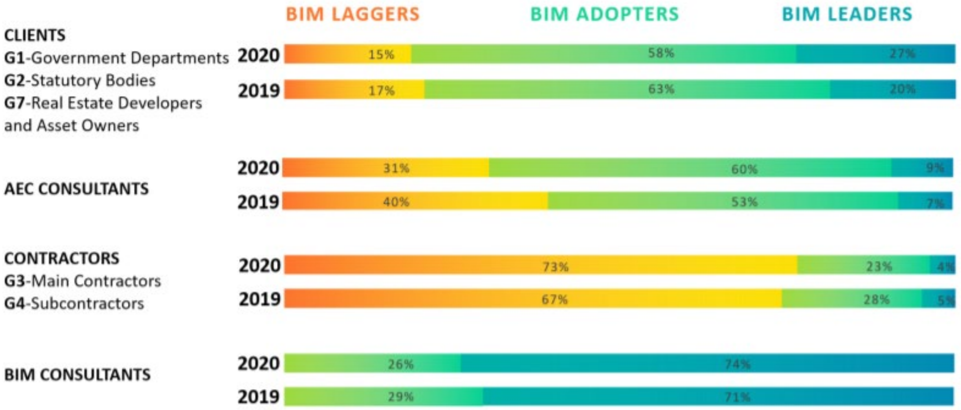


Fig. 8a BIM adoption distribution in the four groups

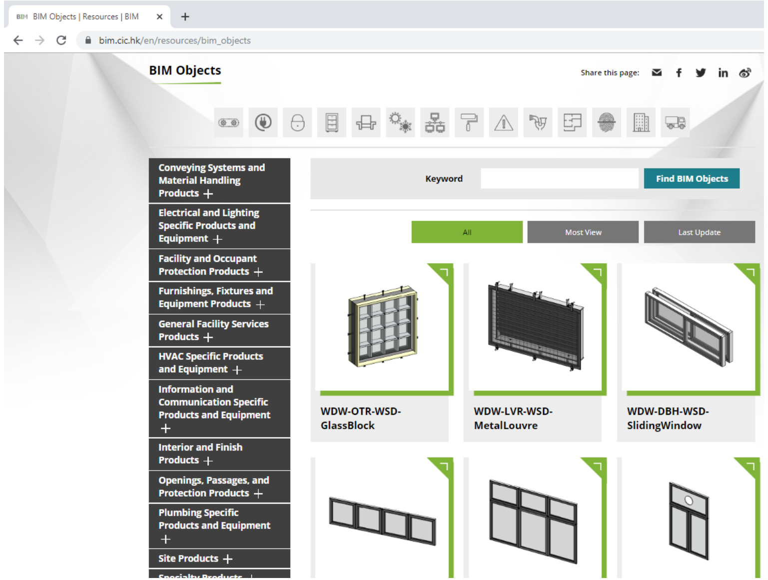
2020

Rank	BIM Use	% Adopted	
1	3D Coordination	77%	
2	Design Reviews	72%	↑ 1
3	Drawing Generation	64%	↑ 1
4	Design Authoring	58%	↓ 2
5	Existing Conditions Modelling	56%	
6	As-Built Modelling	56%	
7	Site Analysis	50%	↑ 2
8	Phase Planning (4D Modelling)	50%	
9	3D Control and Planning	49%	↓ 2
10	Site Utilisation Planning	43%	↑ 3
11	Engineering Analysis	42%	↓ 1
12	Space Programming	36%	↓ 1
13	Cost Estimation	35%	↓ 1
14	Digital Fabrication	30%	
15	Asset Management	26%	
16	Space Management and Tracking	21%	↑ 1
17	Project Systems Analysis	16%	↓ 1
18	Maintenance Scheduling	14%	↑ 2
19	Facility Energy Analysis	13%	
20	Sustainability Evaluation	13%	↓ 2

Standards / Guidelines on BIM

BIM Standards (Phase Two) :

- Statutory Plan Submission
- Mechanical Electrical Plumbing (MEP) Level of Development (LOD)
- Underground Utilities
- Practice and guidance for the production of BIM Objects

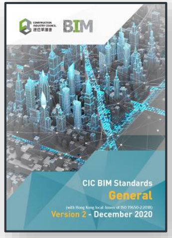


EIR template with Sample Project EIR (December 2020)

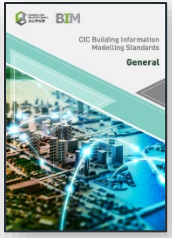
Planning and Design Stages

Construction Stages

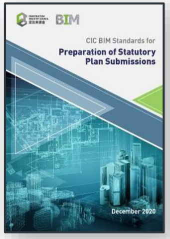
BIM Standards - General



(Version 2) (December 2020)

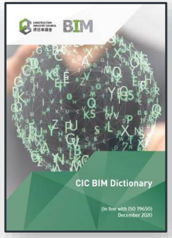


2019 Edition (August 2019)



BIM Standards and New Software User Guides and Software Templates (December 2020)

BIM Standards for Architecture and Structural Engineering (Version 2) (December 2020)



Training on BIM (resource online)

- Conduct various levels of BIM Training Courses from modelling to management
- Offer training for various BIM software
- Cooperate with professional institutes in organizing discipline specific training
- Cooperate with higher education institutes on BIM education

香港建造學院 HONG KONG INSTITUTE OF CONSTRUCTION

CIC BIM CERTIFICATION AND ACCREDITATION SCHEMES
建造業議會建築信息模擬認可及認證計劃

Course Name

Day Time Courses	Evening Courses
Professional Certificate for Building Information Modelling (BIM) Manager	Professional Certificate for Building Information Modelling (BIM) Manager
Professional Certificate for Building Information Modelling (BIM) Coordinator	Professional Certificate for Building Information Modelling (BIM) Coordinator
Certificate in Building Information Modelling (BIM) – Asset Management for EMSD Projects	Certificate in Building Information Modelling (BIM) – Asset Management for EMSD Projects
Certificate in Building Information Modelling (BIM) Usage for Frontline Staff of Construction Works	Certificate in Building Information Modelling (BIM) Usage for Frontline Staff of Construction Works
Building Information Modelling (BIM) Basic Modelling Course - Revit	Building Information Modelling (BIM) Basic Modelling Course - Revit
Building Information Modelling (BIM) Advanced Modelling Course (Architecture)-Revit	Building Information Modelling (BIM) Advanced Modelling Course (Architecture)-Revit
Building Information Modelling (BIM) Advanced Modelling Course (MEP)-Revit	Building Information Modelling (BIM) Advanced Modelling Course (MEP)-Revit

Certification & Accreditation on BIM

To ascertain the competency of BIM practitioners and the quality of local BIM training programmes

- Certification of BIM Managers
- Accreditation of BIM Manager Courses

- Global BIM Manager Professional Training, BSI Pacific Limited
- Professional Certificate for Building Information Modelling (BIM) Manager, HKIC
- Professional Certificate in BIM Management, Form.Welkin Limited
- Professional Diploma in Building Information Modelling, THEi

- Certification of BIM Coordinators (NEW)
- Accreditation of BIM Coordinator Courses (NEW)

- Global BIM Coordinator Professional Training, BSI Pacific Limited
- Professional Certificate for Building Information Modelling (BIM) Coordinator, HKIC
- Professional Development Course for BIM Coordinator, SGS Hong Kong Ltd.
- Professional Certificate in BIM Coordination, Form.Welkin Limited
- Professional Certificate in Building Information Modelling (Building Works), HKVTC
- Higher Diploma in Architectural Studies, HKVTC
- Higher Diploma in Civil Engineering, HKVTC
- Higher Diploma in Architectural Technology and Design, HKVTC
- Higher Diploma in Surveying, HKVTC
- Higher Diploma in Building Studies, HKVTC

Key Figures

CIC CERTIFIED
BIM MANAGER
建造業議會認可建築信息模擬經理

456 CCBMs

Received **930+** applications since the scheme is launched on 28/1/2019

CIC ACCREDITED
BIM MANAGER COURSE
建造業議會認證建築信息模擬經理課程

4 Accredited Courses

Course Providers –

1. BSI Pacific Limited
2. Hong Kong Institute of Construction
3. Technological and Higher Education Institute of Hong Kong
4. Form.Welkin Limited

CIC CERTIFIED
BIM COORDINATOR
建造業議會認可建築信息模擬協調員

123 CCBCs

Received **780+** applications since the scheme is launched on 31/3/2020

CIC ACCREDITED
BIM COORDINATOR COURSE
建造業議會認證建築信息模擬協調員課程

10 Accredited Courses

Course Providers –

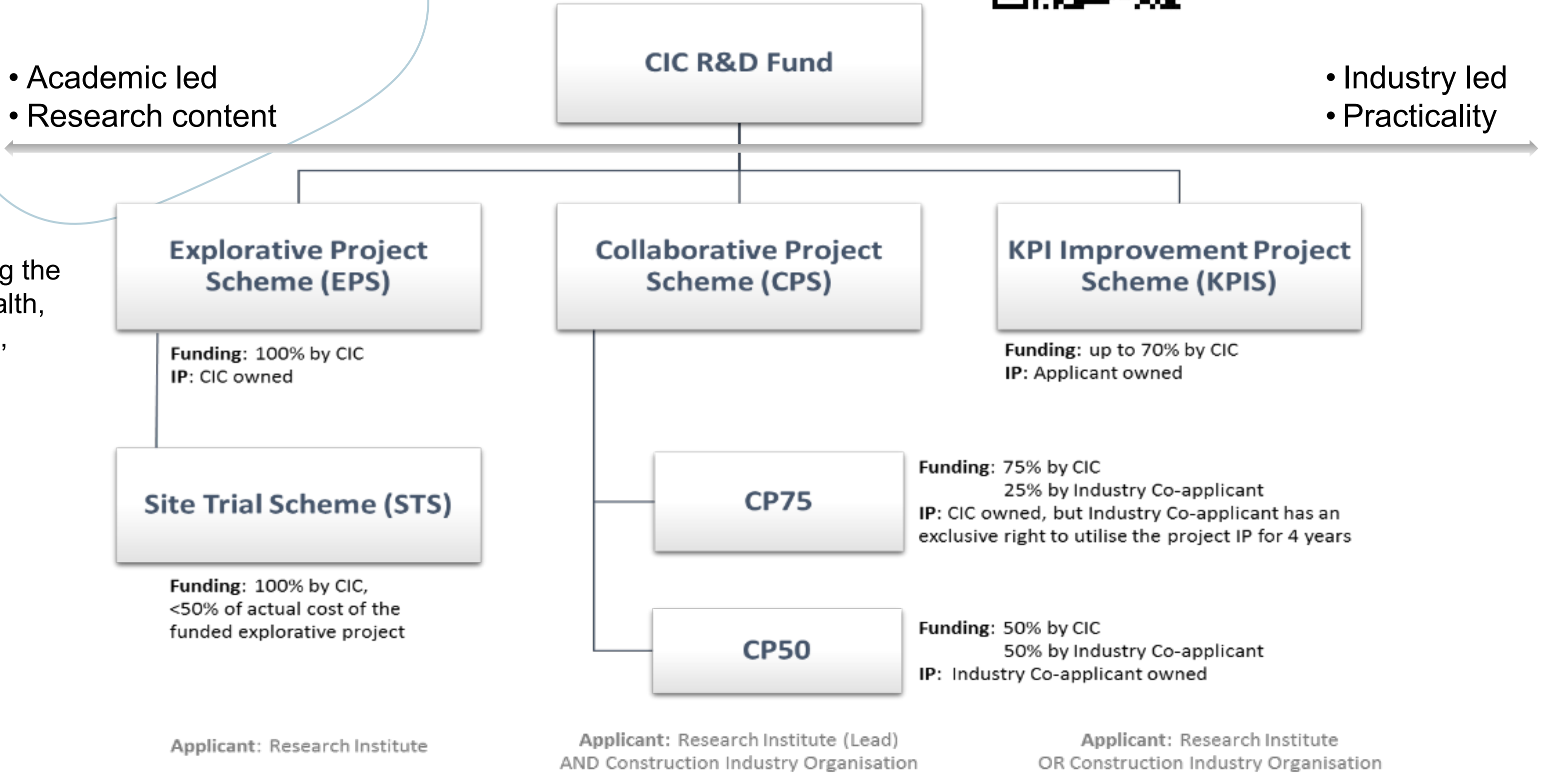
1. BSI Pacific Limited
2. Hong Kong Institute of Construction
3. SGS Hong Kong Limited
4. Form.Welkin Limited
5. Hong Kong Institute of Vocational Education, Vocational Training Council, IVE (6 courses)

As at 23/6/2021

Funding Support

CIC Research and Technology Development Fund

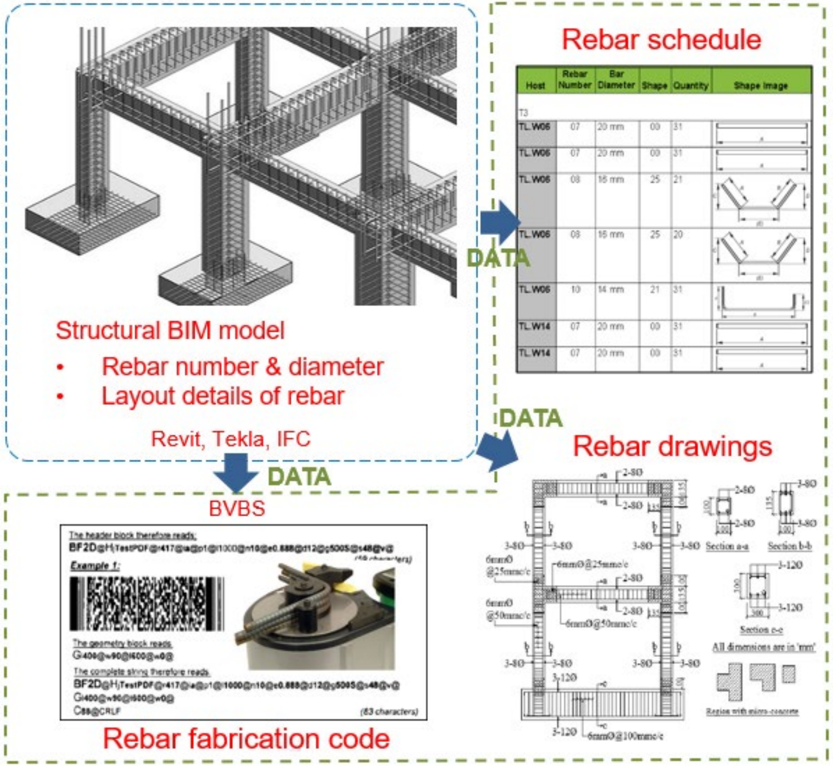
Since 2012, Covering the areas of safety & health, productivity & quality, environment, and procurement.



Note: Under CPS and KPIS, Applicants under the CPS and the KPIS are encouraged to offer sharing of the benefits generated from the use of the research products by the industry

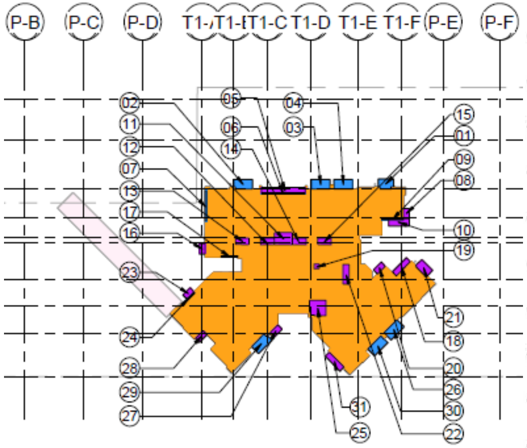
R&D Project - BIM-based Rebar Design Optimization and Prefabrication Automation

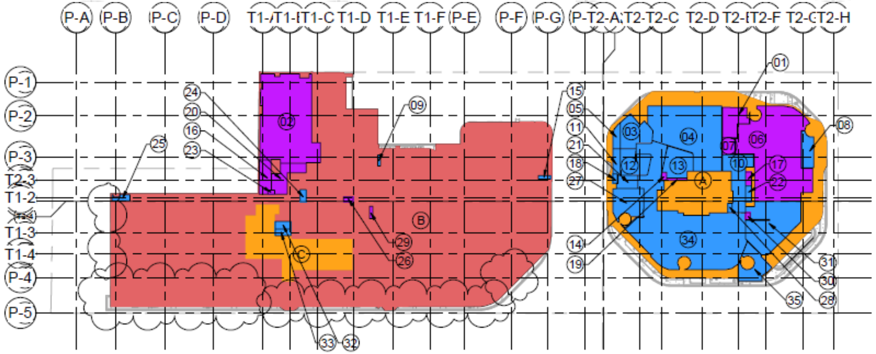
- *Generate 3D rebar model from structural design output.*
- *Automated optimisation and clash-avoidance after building 3D rebar model from design output.*
- *Automated generate BVBS formatted file for rebar cut-and-bent machine.*
- *Facilitate RC detail drawings generation in BIM authoring software.*

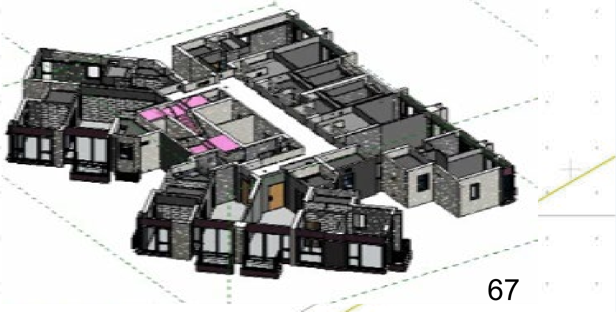


R&D Project - BIM-Automation of Gross Floor Area (GFA) Calculation, Fire Safety and Prescribed Checking for General Building Plans (GBP) Preparation

- *Automated most of the time-consuming works commonly required for calculation of GFA.*
- *Automated checking and calculation of Fire Safety issues and Prescribed Checking such as prescribed window calculation, sanitary fitment calculation, etc. for BIMGBP preparation.*







Funding Support

Funding Scope:

1. Technology Adoption

- Building Information Modelling (BIM)
- Advanced Construction Technologies (ACT)
- Modular Integrated Construction (MIC)
- Prefabricated Steel Rebar (STB)

2. Manpower Development

- Technology Enrichment Courses for Students
- Non-local Training / Visits for Practitioners
- International Conferences in Hong Kong
- Local Collaborative Courses

	BIM Training	BIM Experiential Use and Project Adoption
Funding Mode	Cash rebate (subject to satisfactory completion of the course)	Co-fund with 70% grant from CITF at maximum for costs involved
Funding Ceiling	A ceiling of HK$800,000 per applicant can be shared between BIM Training and BIM Adoption	
	Within the funding ceiling, each person enrolling training is entitled to HK$3,000 per course at maximum	● Experiential use is capped at maximum HK$200,000 ● Within the funding ceiling, CITF will only fund each computer at maximum HK$21,000 and BIM software license period up to 3 years (computers subsidised by CITF are required to have BIM software installed and be used for this purpose)

BIM in Global Context

BIM in Global Context

中华人民共和国住房和城乡建设部

Ministry of Housing and Urban-Rural Development of the People's Republic of China (MOHURD)

OPEN BIM™

buildingSMART® International

National Institute of BUILDING SCIENCES

buildingSMARTalliance®

National BIM Standard-United States®

ISO

cdbb

Centre for Digital Built Britain

EUBIM TASKGROUP

BIMMDA

BUILDING INFORMATION MODELING

Building and Construction Authority

We shape a safe, high quality, sustainable and friendly built environment.

(4) CIC BIM Space Guided Tour and Workshop

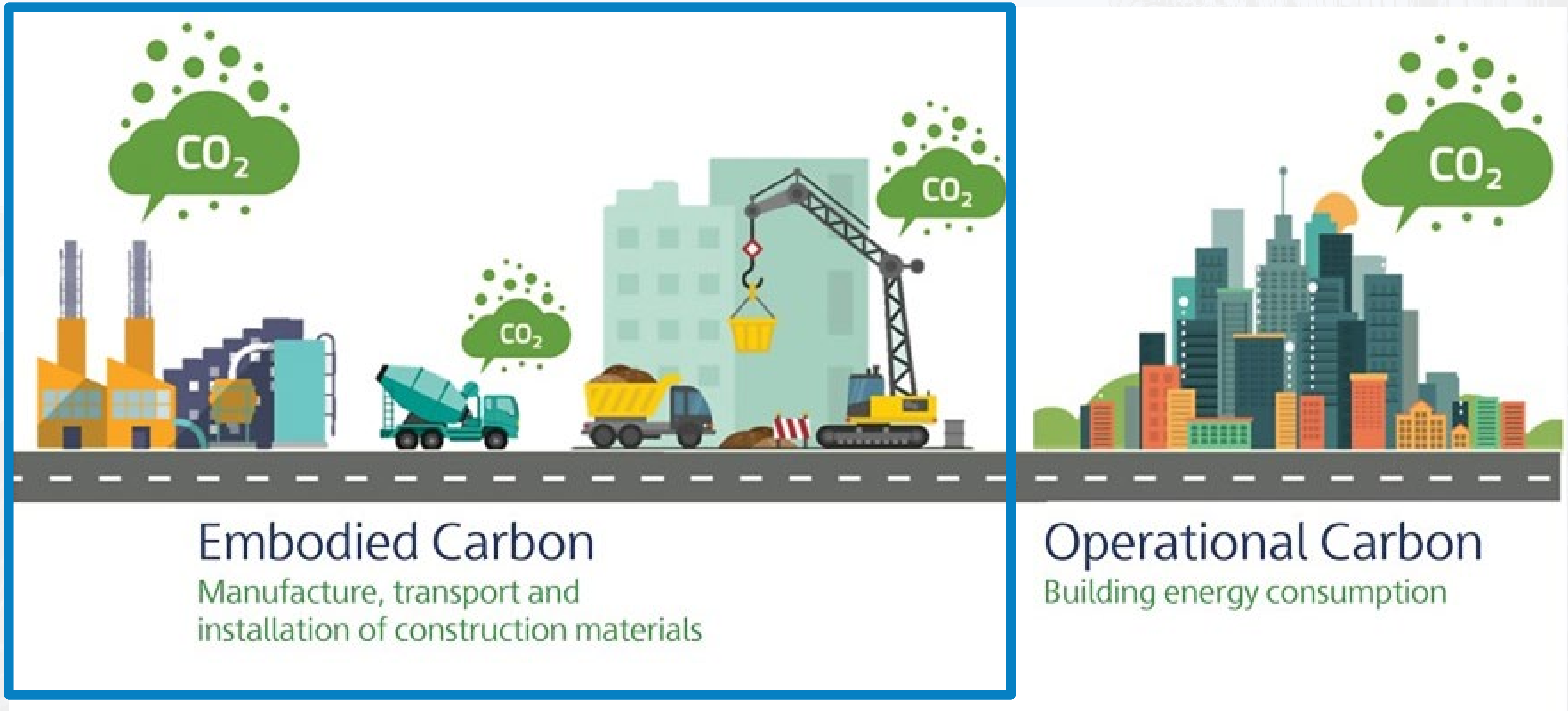
CONSTRUCTION
INDUSTRY COUNCIL
建造業議會

Introduction to Embodied Carbon and CIC Carbon Assessment Tool

- Introduction of Embodied Carbon and CIC CAT
- Case Studies at Design and Construction Stages
- Practices of CAT

What is Embodied Carbon?

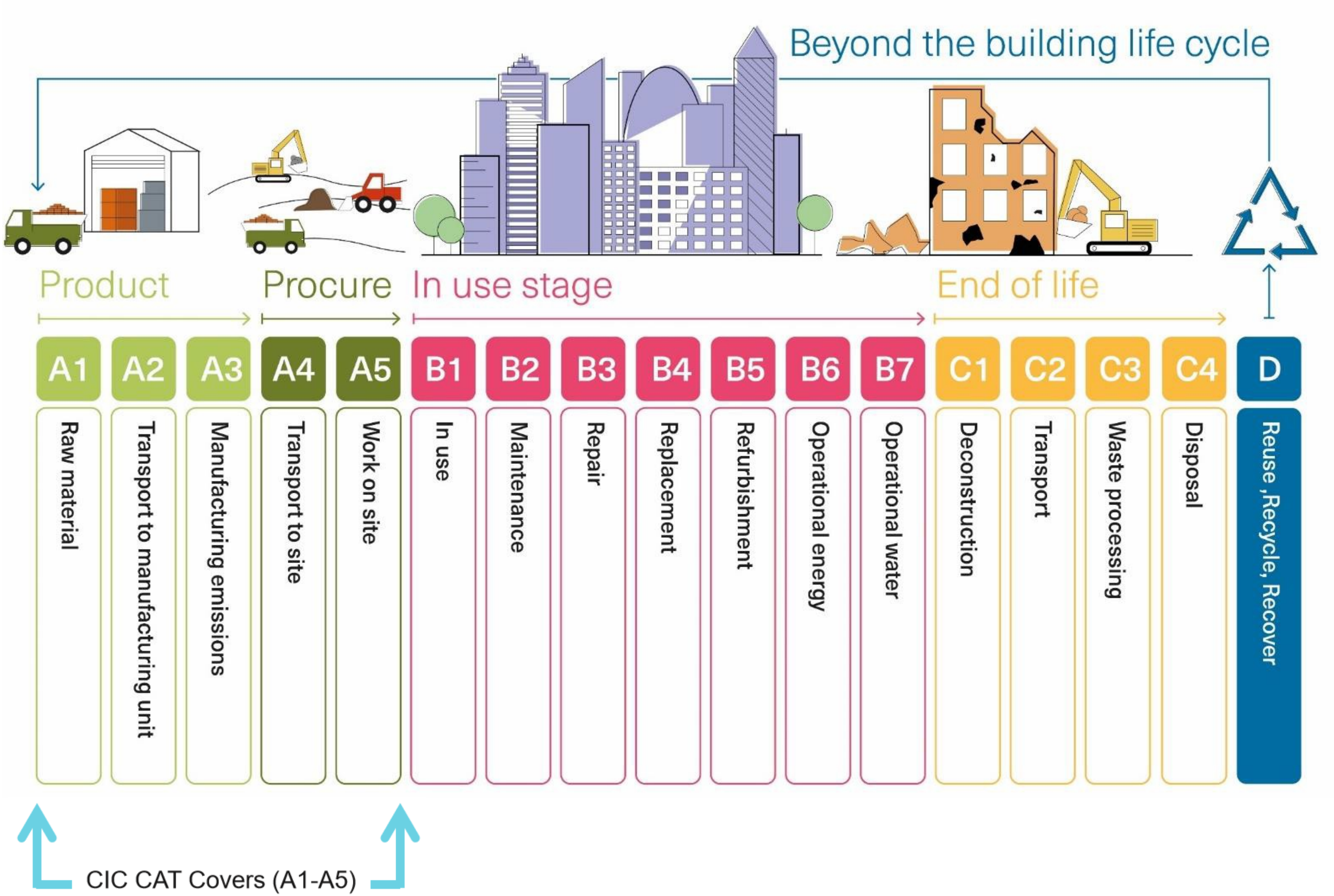
What is Embodied Carbon?

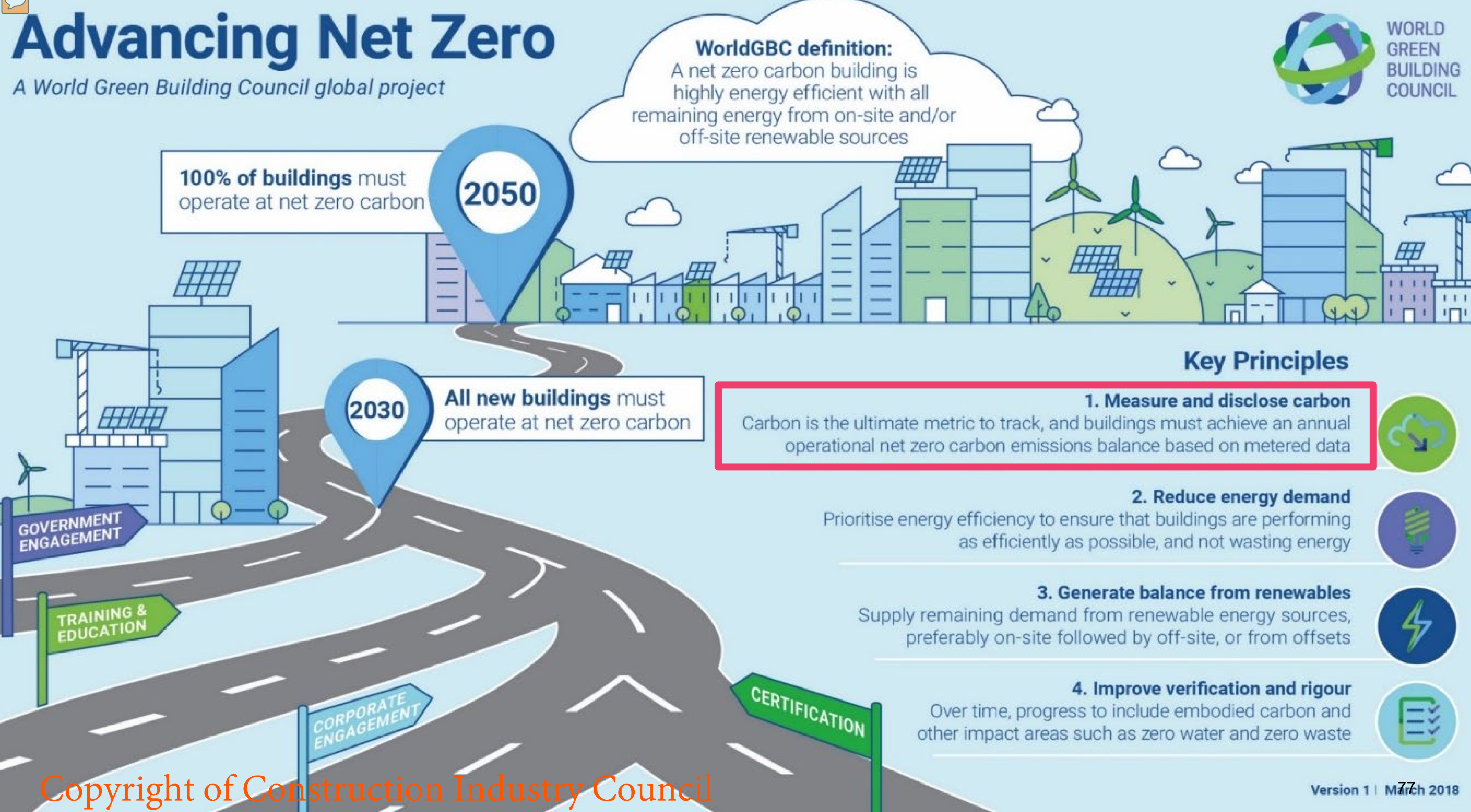


What is Embodied Carbon?

Energy and water consumption associated with materials:

- "Upfront" - material extraction, manufacturing, transportation, installation
- "In-use" - maintenance, replacement and emissions associated with refrigerant leakage, etc.
- "End of life" - demolitions, disassembly and disposal




Advancing Net Zero
A World Green Building Council global project
WorldGBC definition:
A net zero carbon building is highly energy efficient with all remaining energy from on-site and/or off-site renewable sources
WORLD GREEN BUILDING COUNCIL
100% of buildings must operate at net zero carbon
2050
2030
All new buildings must operate at net zero carbon
Key Principles
1. Measure and disclose carbon
Carbon is the ultimate metric to track, and buildings must achieve an annual operational net zero carbon emissions balance based on metered data
2. Reduce energy demand
Prioritise energy efficiency to ensure that buildings are performing as efficiently as possible, and not wasting energy
3. Generate balance from renewables
Supply remaining demand from renewable energy sources, preferably on-site followed by off-site, or from offsets
4. Improve verification and rigour
Over time, progress to include embodied carbon and other impact areas such as zero water and zero waste
GOVERNMENT ENGAGEMENT
TRAINING & EDUCATION
CORPORATE ENGAGEMENT
CERTIFICATION
Version 1 | March 2018

CIC Carbon Assessment Tool
建造業議會碳評估工具

- Official launched in Dec 2019
- First online carbon tool for HK construction industry
- Adaptable for new **buildings and infrastructure** projects

Scope

Function

Carbon Measurement for Material and Site Impact

Facilitate Low-carbon Planning, Design & Construction

Performance Benchmarking

Interactive Tool

Materials and Site Activities Included

Permanent Works

Buildings	Civils
Concrete – ready made and pre-cast	Concrete – ready made and pre-cast
Cement – grouting, rendering	Cement – grouting
Reinforcement Steel	Reinforcement Steel
Structural Steel	Structural Steel
Fill / Aggregate	Bitumen / Asphalt
Façade – glazing (curtain wall system)	Train Tracks / Water Pipes
Façade – cladding panel (aluminium)	Fill / Aggregate
Glue Laminated timber	Façade – cladding panel (aluminium)

Temporary Works

Buildings	Civils
Formwork – metal and timber	Formwork – metal and timber
Steel used in Excavation and Lateral support (ELS) and hoarding	Steel used in Excavation and Lateral support (ELS) and hoarding
Steel casing / sheet-pile used in foundation works	Steel casing / sheet-pile used in foundation works
Scaffolding – metal and bamboo	Steel used in temporary platform / access bridge / cofferdam
	Scaffolding – metal and bamboo

Site Impact

Impact
On site electricity / town gas consumption
Fuel consumption (diesel, bio-diesel, LPG etc)
Water consumption
Waste disposal
HFC/PFC emissions
Materials transportation
Tree planting
Fugitive emission data such as acetylene/CO_2 used in welding and flame cutting

How to reduce carbon at design stage?

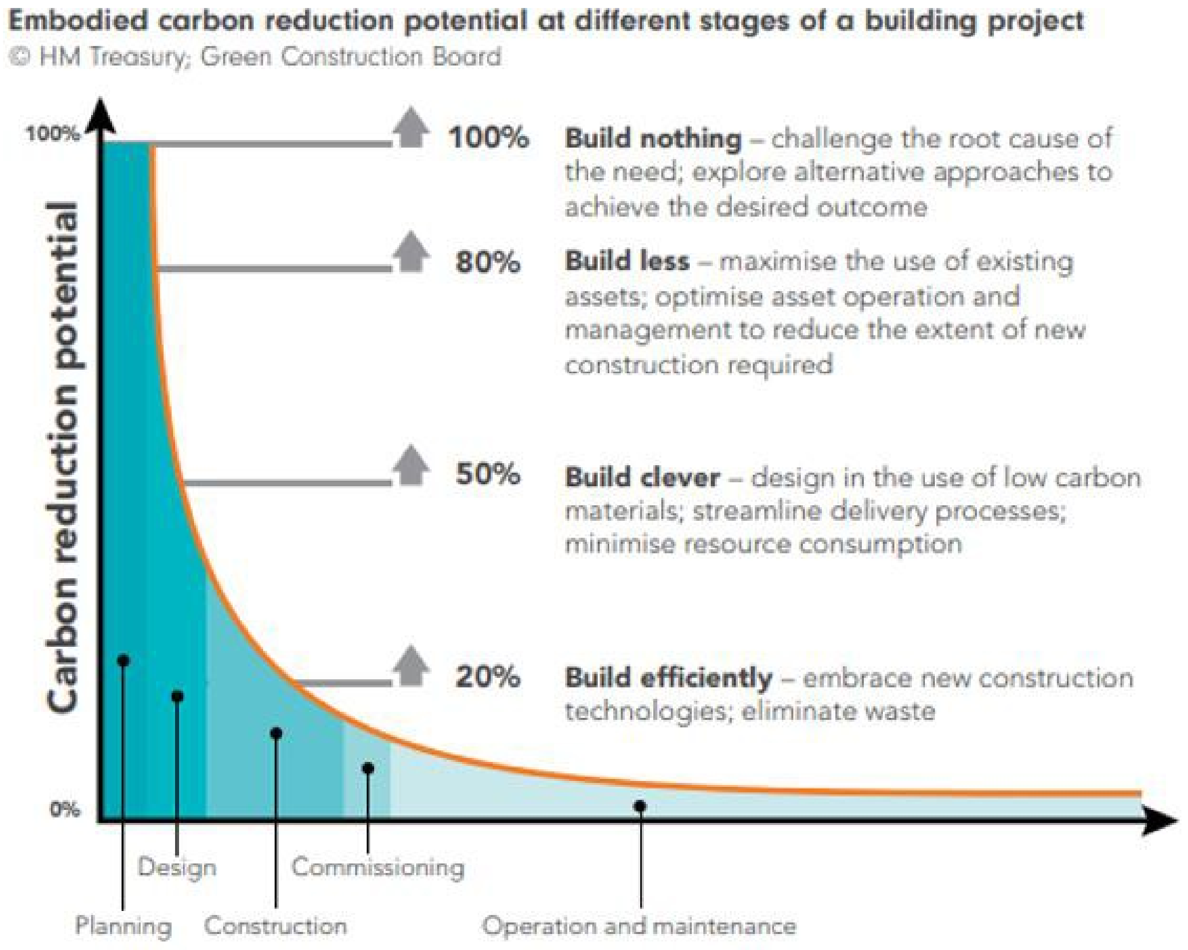
Embodied Carbon and Structural Design

- Earlier in the design process embodied carbon is considered the greater the savings

- Design optimisation is fundamental part of any structural design process

- This optimisation is carried out for:
  - Structural Performance
  - Cost and material quantities
  - Programme / time
  - Buildability

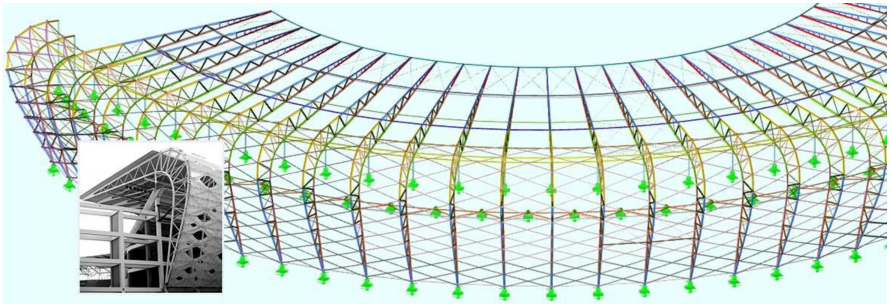
- Embodied carbon is another indicator during design optimisation



CUNDALL

How can Reductions in Embodied Carbon be achieved

- Structural rationalisation
- Reuse existing structure and materials
- Utilisation of different structural forms to achieve maximum loading efficiency
- Structural components should be considered to have multiple purpose (non-structural elements)
- Design to enable construction to utilise:
  - Modular Integrated Construction (MiC)
  - Prefabrication
- Design for Demolition / End of Life
- Specification of low carbon materials:
  - Lower carbon content concrete mixes
  - High recycled content steel



CIC GREEN
PRODUCT CERTIFICATION
HK G-PASS

How to reduce carbon at construction stage ?

Scope: Material Use and Site Impacts

Material Use

+

Site Impacts

Total Embodies Carbon Estimation (Construction Stage)

Site Impacts

Fuel Consumption e.g., Biodiesel B5

C&D Waste (Tonnes)

Electricity (kWh)

Water (m³)

Refrigerant (kg)

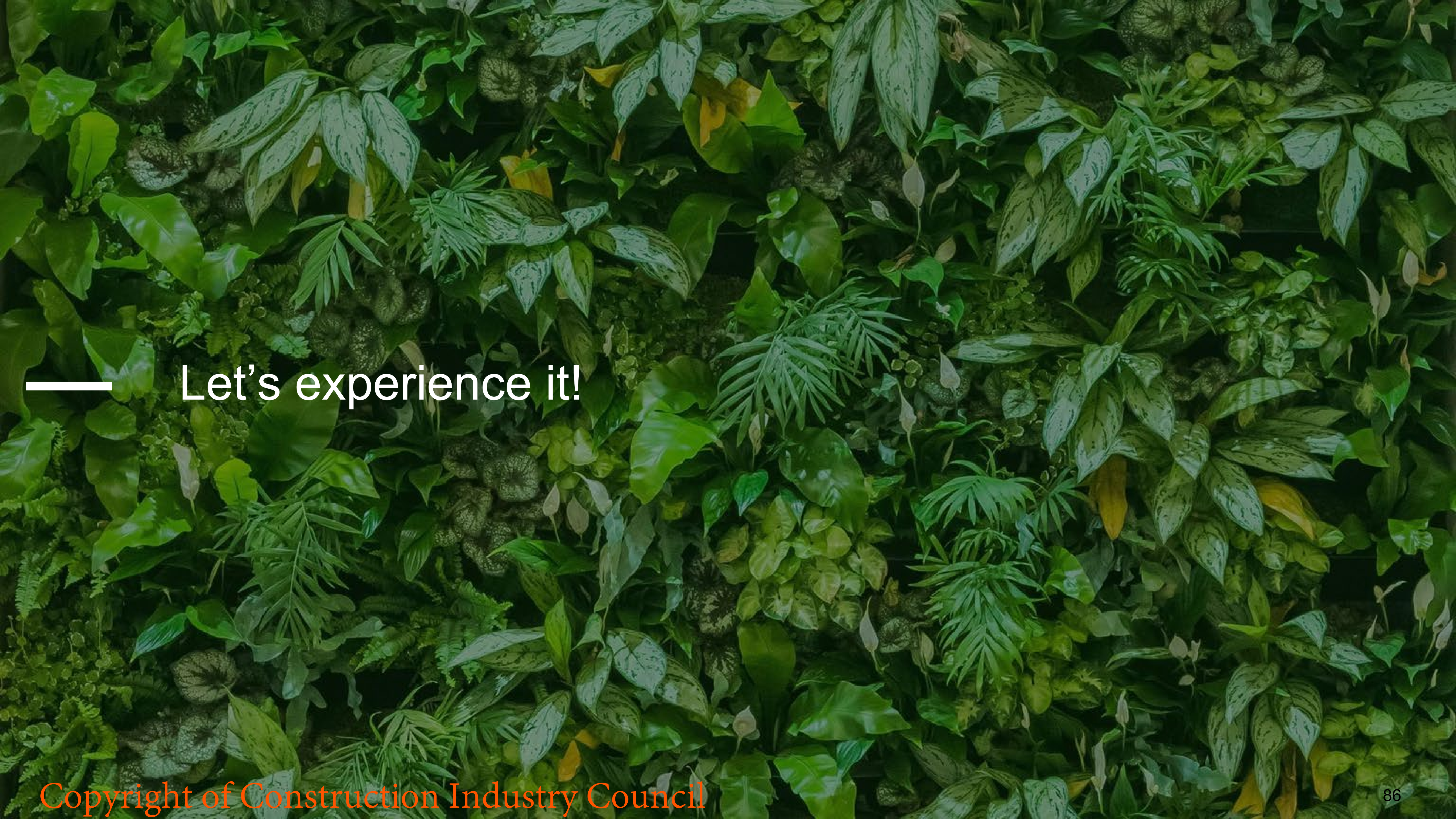
Town Gas (unit)

煤氣 Towngas

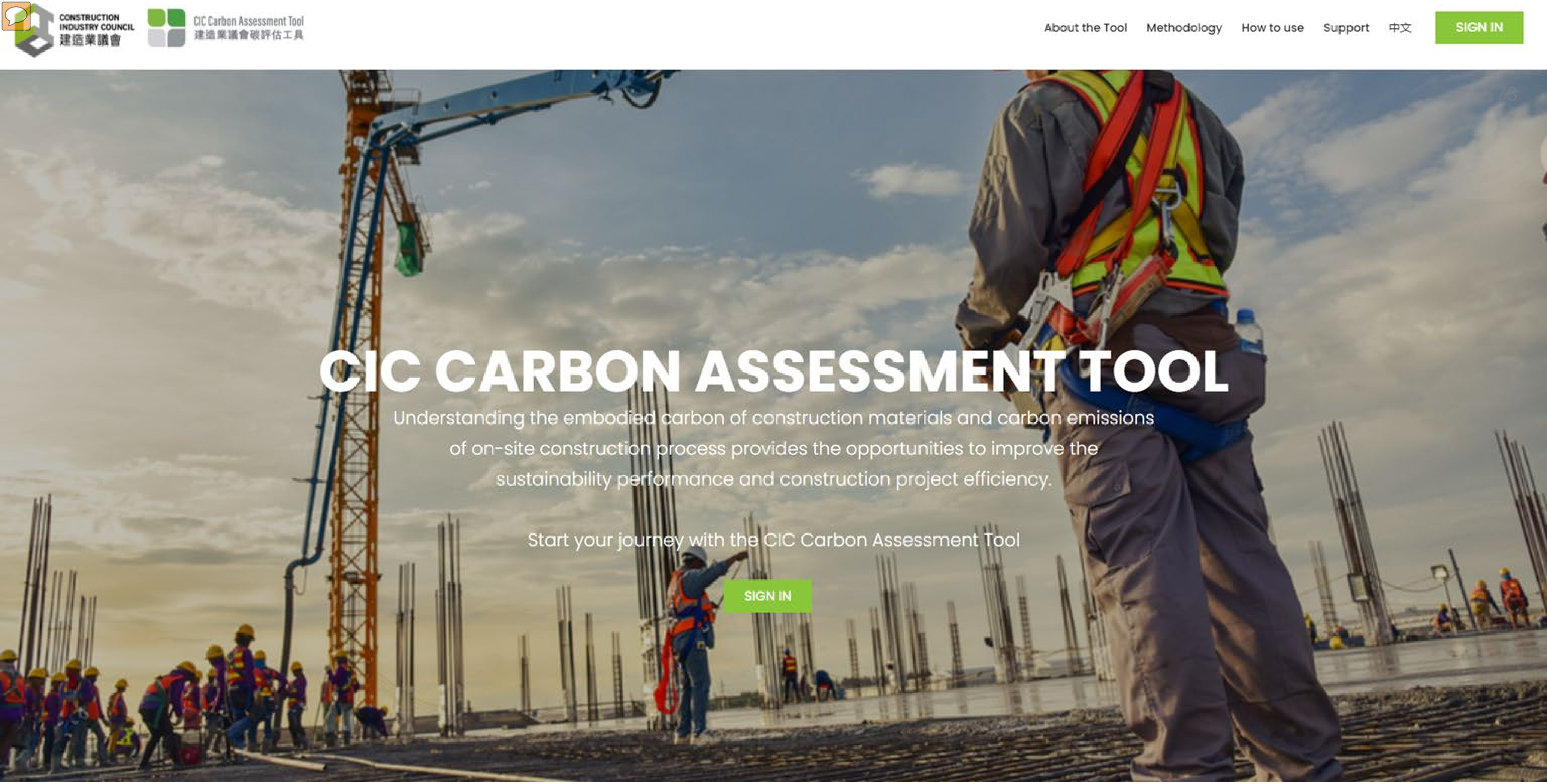
Welding and Flan Cutting (litre)

Tree (Number of Trees)

CUNDALL

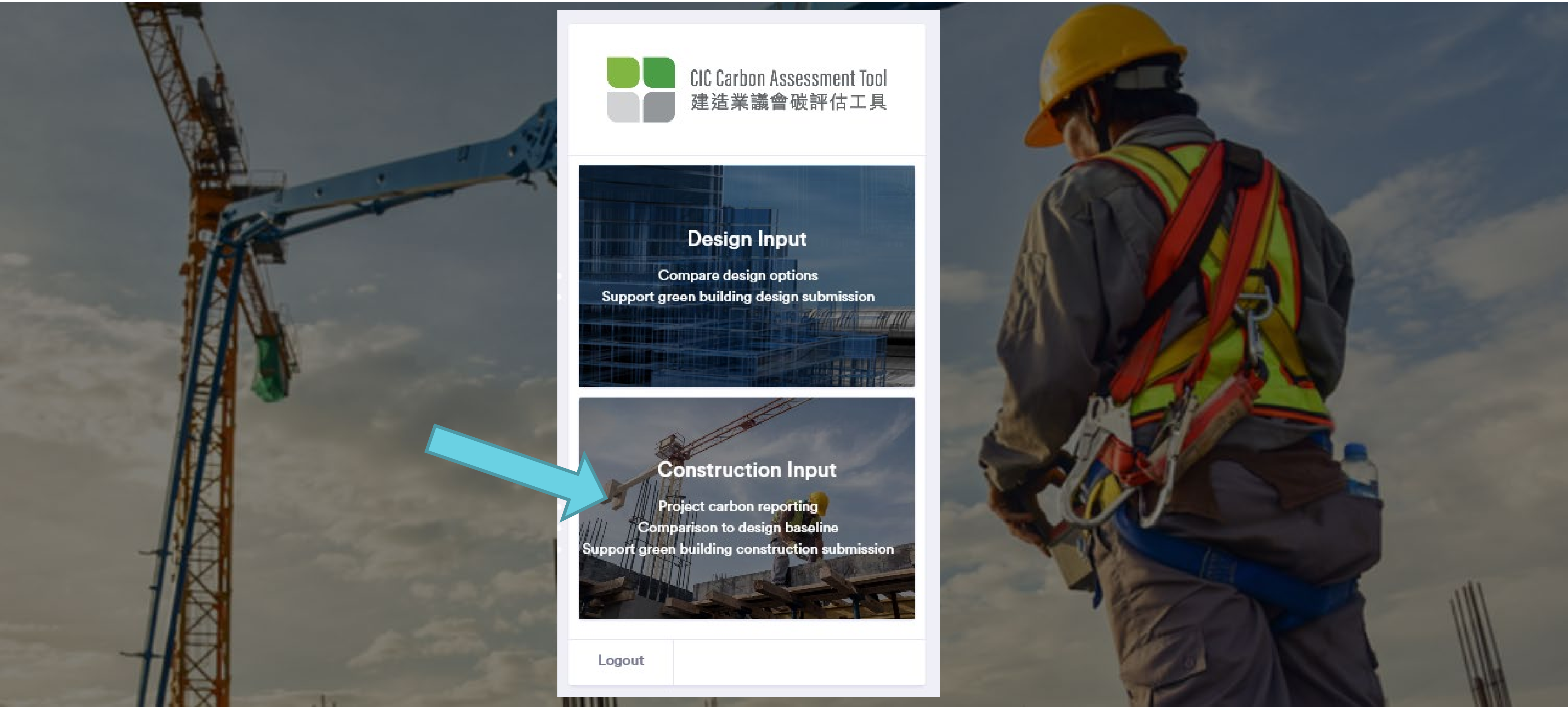


Let’s experience it!

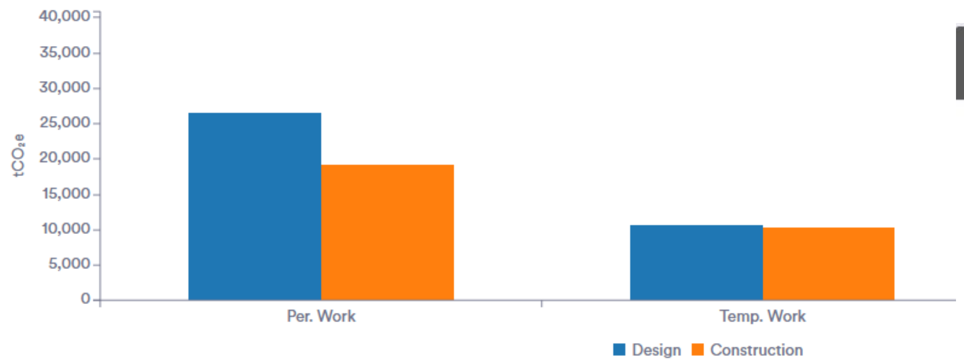


https://www.youtube.com/watch?v=TmIjcfftSTU

Design Input & Construction Input



Design and Construction Comparison



Performance

	Design	Construction
Total Carbon of the Project (tCO_2e)	37,079 tCO_2e	29,890 tCO_2e
Normalised Carbon of the Project ($tCO_2e/(m^2)$)	37 tCO_2e	30 tCO_2e

Performance

	Total Carbon Emissions (tCO_2e)	Carbon Intensity per CFA (tCO_2e / m²)	Carbon Intensity per million Hong Kong Dollar (tCO_2e / million $HKD)	Carbon Intensity per thousand man-hours (tCO_2e / thousand man-hours)
Permanent Works	19,203.89	19.2	9.6	1,920.39
Temporary Works	10,272.54	10.27	5.14	1,027.25
Site Impacts	413.07	0.41	0.21	41.31
Total	29,889.51	29.89	14.94	2,988.95

Carbon Emission Breakdown

- Concrete 14,264 tCO_2e
- Reinforcement Bar 3,301 tCO_2e
- Concrete Precast 719 tCO_2e
- Façade 562 tCO_2e
- Others 357 tCO_2e

- Structural Steel 10,244 tCO_2e
- Timber Formwork 16 tCO_2e
- Metal Formwork7 tCO_2e
- Timber Hoarding 5 tCO_2e
- Others 1 tCO_2e

- C&D Waste 324.2 tCO_2e
- Welding and Flame Cutti 36.3 tCO_2e
- Refrigerant 28.6 tCO_2e
- Fuel Consumption 21.5 tCO_2e
- Others 2.4 tCO_2e

Sustainable Material Use Report for Projects

Project Information

Project Name	Project Classification	CFA (m^2)	Project Value	Total Construction Man-Hour
Demo Project	Commercial	1,000 (m^2)	HK$ 2,000 (million)	10 (thousand man-hours)

Total Carbon Emissions
29.2K tCO_2e

Low-carbon Materials
42.85%

Clean Energy
93.05%

Waste Recycling
25.85%

Low Carbon Materials Usage By Quantity

In-situ Concrete
41.35%

Structural Steel
66.67%

Reinforcement Bar
45.97%

Timber
88.24%

Aggregates
64.07%

CONSTRUCTION INDUSTRY COUNCIL 建造業議會 CIC Carbon Assessment Tool 建造業議會碳評估工具

About the Tool Methodology How to use Support 中文 SIGN IN

USER GUIDES AND TUTORIALS

The Tool aims to be simple and user friendly. To assist you further we have developed User Guides and Tutorials.

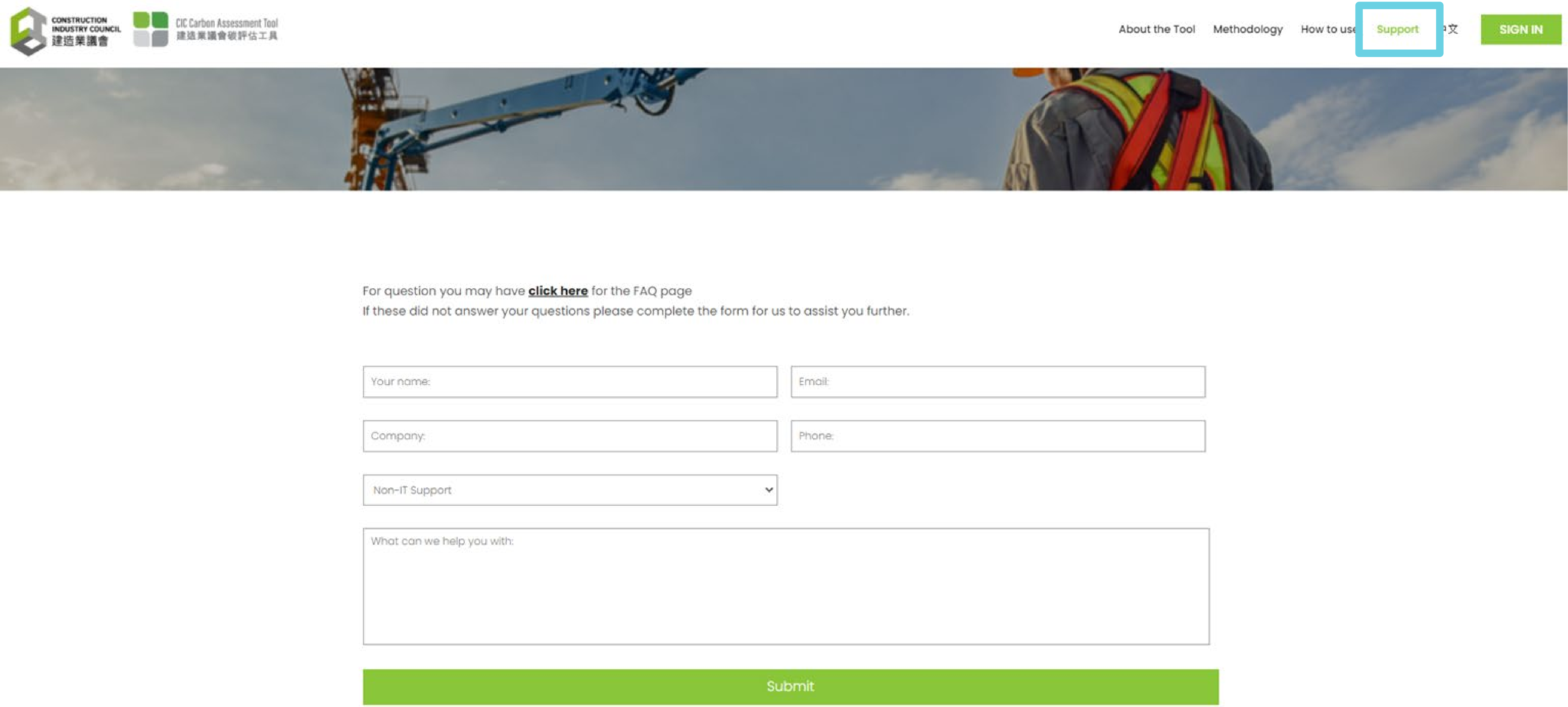
A trial data set is also available for you to experiment with the Tool as you explore the further.

User Guide

Tutorial

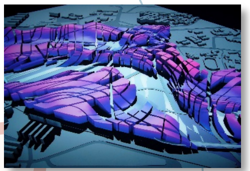
Trial Data

Support



CONSTRUCTION INDUSTRY COUNCIL
建造業議會
CIC Carbon Assessment Tool
About the Tool
Methodology
How to use
Support
SIGN IN
For question you may have click here for the FAQ page
If these did not answer your questions please complete the form for us to assist you further.
Your name:
Email:
Company:
Phone:
Non-IT Support
What can we help you with:
Submit

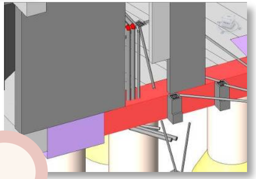
6. Day 1: Manufacturing and Construction Stage



Design Options

DfMA/MiC

Submissions



Buildability / Clash Detection / Design for Safety

Applications of BIM

1. Planning and Design
2. Construction
3. Operations & Maintenance

BIM provides virtual design to design /project team which includes architect, engineers, QS, etc. The models can be updated, monitored & used throughout the entire project design cycle.

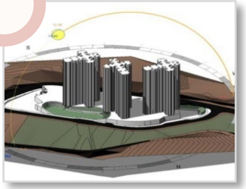
Review / VR

Documentation

BIM Models
Design Coordination &
Collaboration
Analysis
Submissions
Project Management

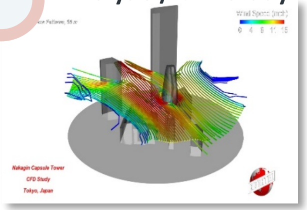
Visualization / Simulation

Performance Study



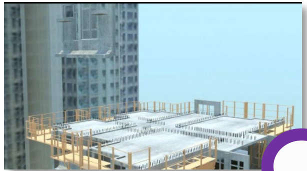
Cost / Quantities/ BIM E-tendering

Carbon Assessment / Engineering Analysis / CFD Study



MiC

Prefabrication / DfMA



Procurement & Supply Chain

Simulation / VR

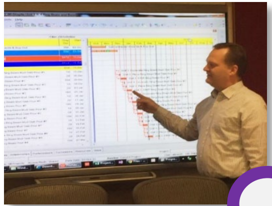
Applications of BIM

1. Planning and Design

2. Construction

3. Operations & Maintenance

BIM provides virtual design & construction models for project team to update, monitor & use throughout the project construction processes.



Works Scheduling

Construction & Safety Planning

Cost control

Contract Documentation

BIM Models

Coordination

Collaboration

Logistics / Procurement

Prefabrication

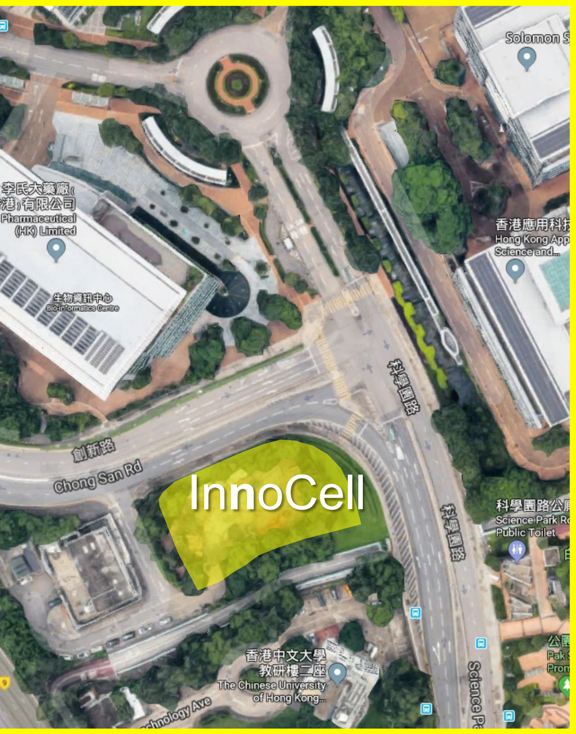
Project Management

Project Case Study:

InnoCell

Hong Kong Science & Technology Park Crop

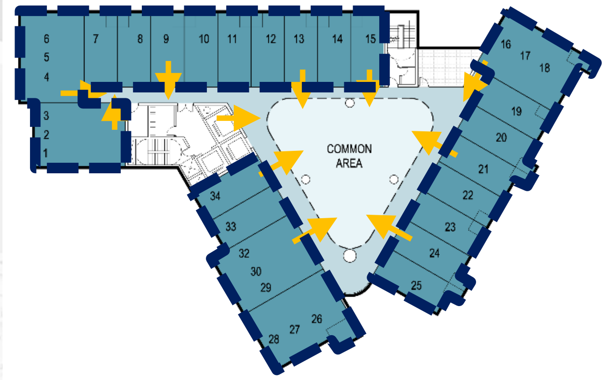
Location


Solomon S
李氏大藥廠(
港)有限公司
Pharmaceutical
(HK) Limited
香港應用科技
Hong Kong App
Science and...
生物資訊中心
Bio-informatics Centre
科學園路
創新路
Chong San Rd
InnoCell
科學園路公廁
Science Park Ro
Public Toilet
香港中文大學
教研樓二座
The Chinese University
of Hong Kong...
Science Pa
chnology Ave
Pak S
Prom


INNOCELL

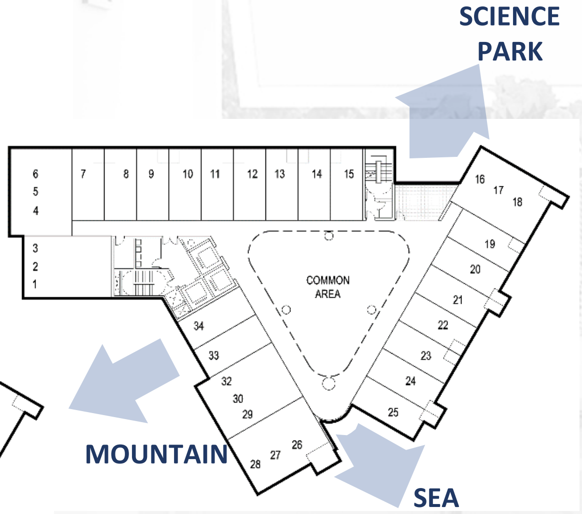
Centralized Communal Space

"Fostering an Innovator Community"

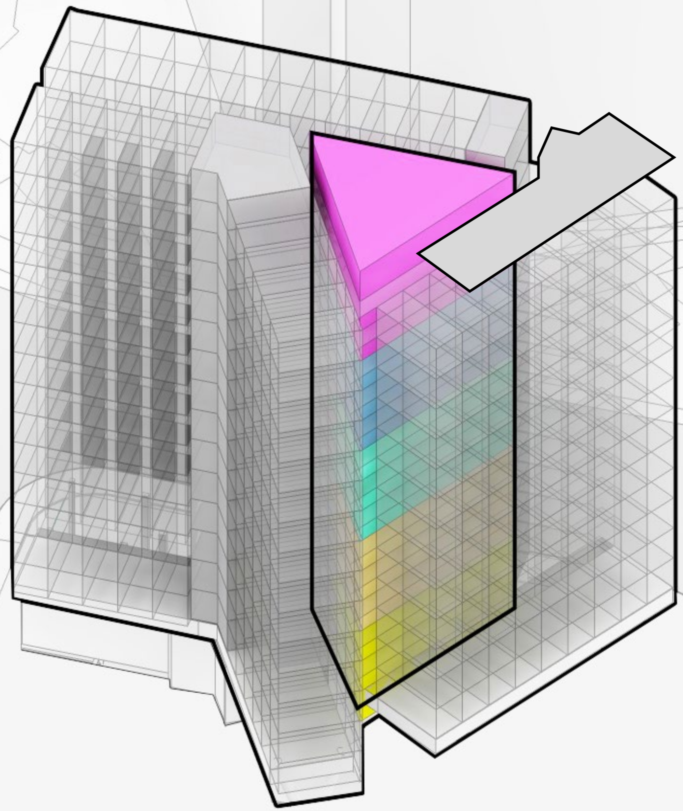


1. CLUSTERED UNITS

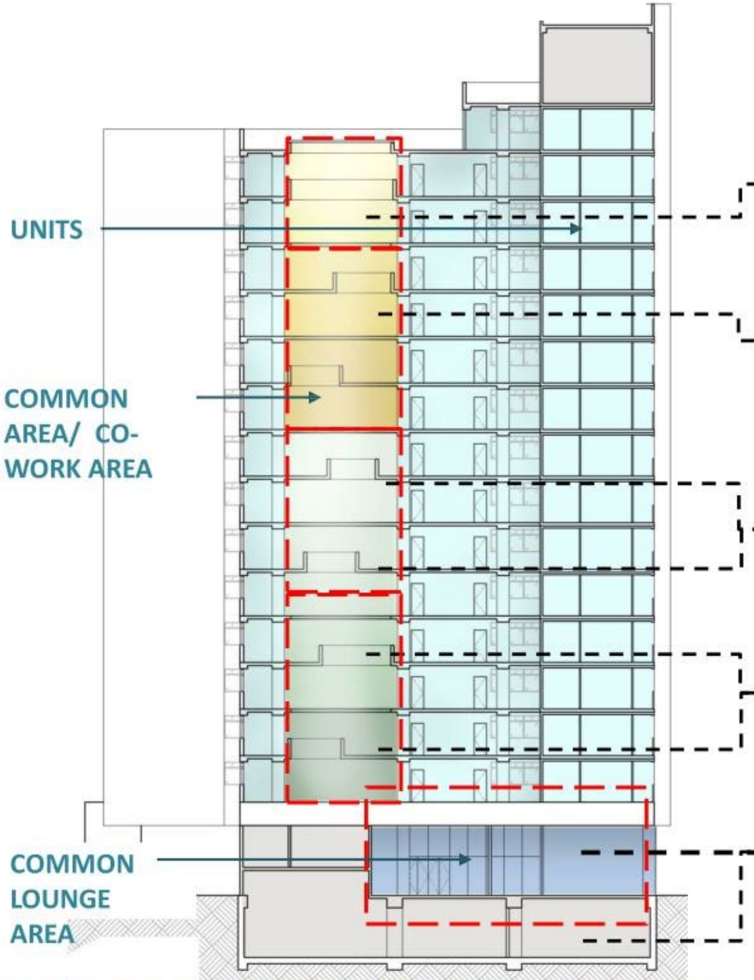
2. COMMON AREA WITH NATURAL LIGHT & WIND

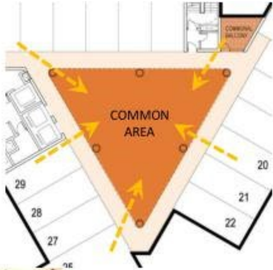


3. SIGHTLINES



Centralized Communal Area






SKYGARDEN


READING LOOP


COMMON DINING & MUSIC STATION


GAME CENTRE & WORKING POD


COMMON LOUNGE SPACE & LAUNDRETTE

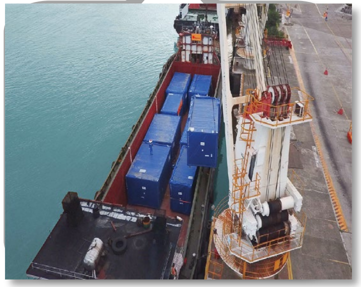
Design

Statutory Approval

Off-Site Fabrication

Logistics

Site Installation



DESIGN

EFFICIENT PROJECT TYPE FOR MiC APPLICATION

PUBLIC HOUSING

PRIVATE RESIDENTIAL MARKET

STAFF QUARTER

HOSPITAL / ELDERLY HOME

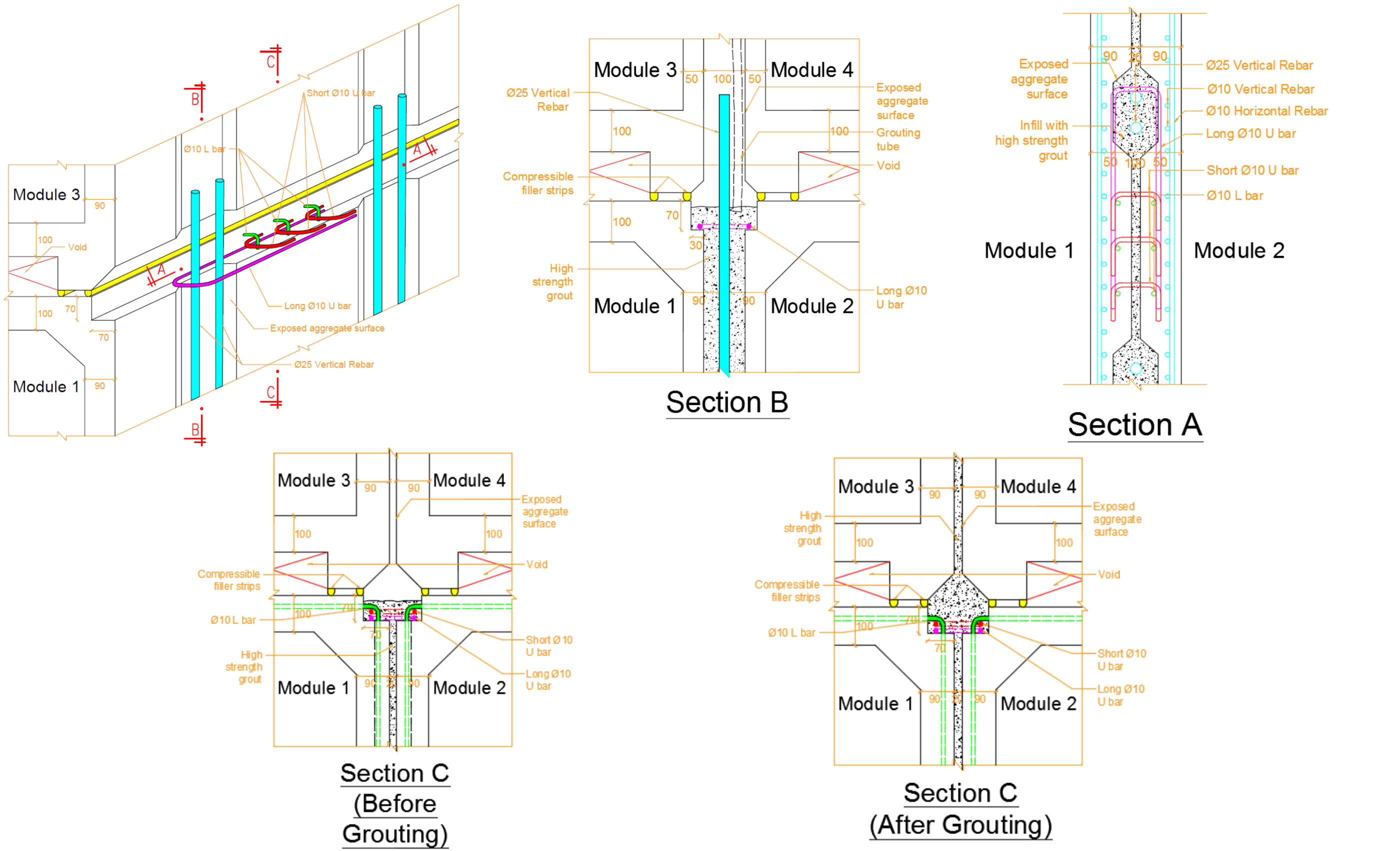
HOTEL / HOSTEL

Module Type (RC MiC vs Steel MiC)

	Steel MiC	RC MiC
Weight	About 40% lighter than RC construction	Slightly heavy than RC Construction due to RC twin wall / twin slab requirement
Site Connection	Bolt and mechanical fixing	Cast in-situ / Grouting
Design Life	50 years + design in accordance with HK COP sufficient maintenance provision	
Fire protection	Fire board lining with module interior	Specified concrete cover and min. dimension to meet FRR requirement
Weather Proofing	Corrosion protection paint / GMS	Waterproofing membrane /spray on the ceiling slab of module
Site Erection	More availability of Tower crane to handle 20tons module	Limited Selection of Tower Crane to handle >30 tons module
Maintenance	Inspection hatch as per ADV36	Same as conventional RC building
Experience	Widely used in different countries for two decades	Limited project references availability

RC MiC Modules Connection Details

(Copyright by WSP HK)



RC MiC Modules

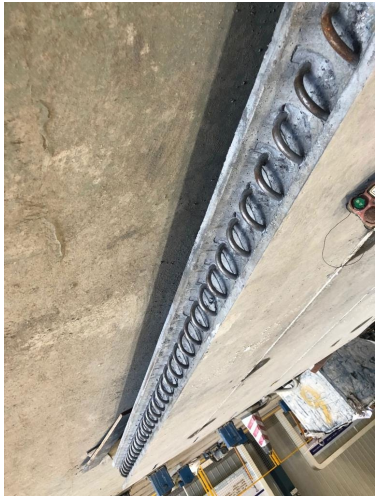
(In courtesy of MDM)

Disadvantage: Heavy Self Weight
Solution: Void Former Slab Structure to save the dead Load

ADVANCED CONSTRUCTION TECHNOLOGIES (ACT)

PRE-APPROVED LIST ITEM CODE OF MATRIXDECK SYSTEM : PA18-037

Code	Technology	Benefits	Make and Model	Product Descriptions	Reference Photo
PA18-037	Construction Material 建築物料	Enhance productivity and built quality 提高生產力及提升建造質素	MDM Group Inc. Ltd. MatrixDeck Panel Configuration Models A200 to A850	MatrixDeck System is a green technology. It is essentially a structural floor system that provides a 150kg per square meter of carbon emission saving when compared to conventional building system. It is a high performance reinforced concrete floor slab that allows greater column spacing and minimizes the material usage of concrete and steel reinforcement when compared to conventional structural floor system. [illegible]	



Disadvantage: Double Wall which is not structural effective approach
Solution: Composite wall Connected By Patent Spiral Joint

RC MiC Modules

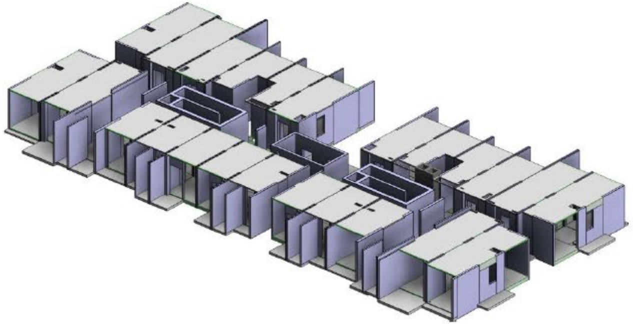
(In courtesy of MDM)

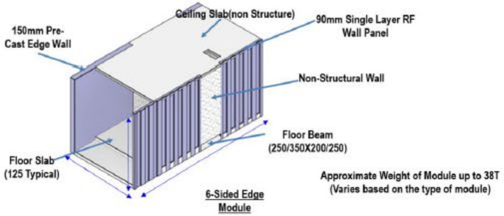
MiC Water Cooling Chiller Plant at CIC Zero Carbon Park

RC MiC Modules

(In courtesy of P&T)

The Tapestry (2016) – 6 sided PPVC



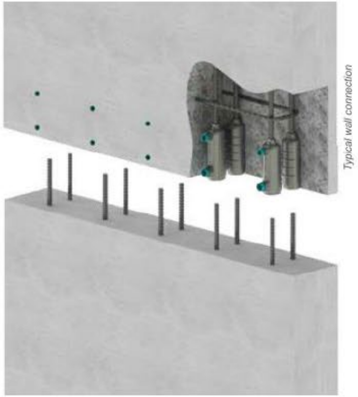


6 sided modules
Composite structural wall
Finishes and MEP substantially completed at factory

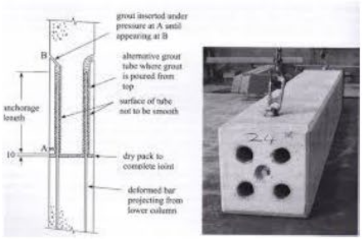
RC MiC Modules

(In courtesy of P&T)

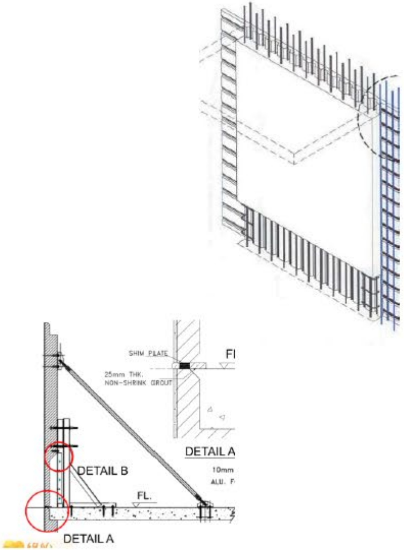
Challenges to Concrete MiC Design in Hong Kong



Grout filled pipe sleeve couplers



Lapping in grout filled corrugated ducts

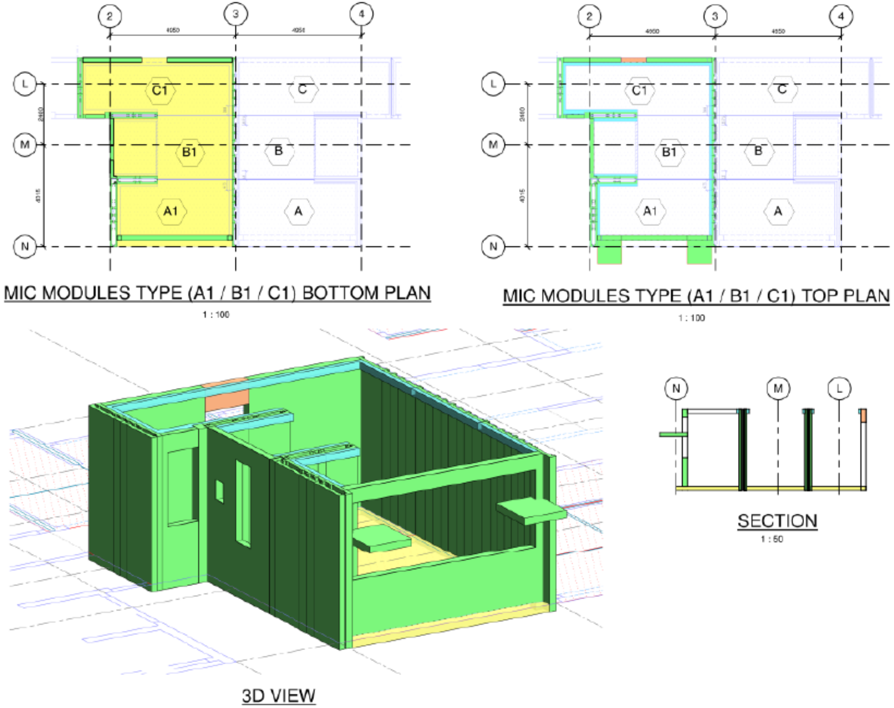


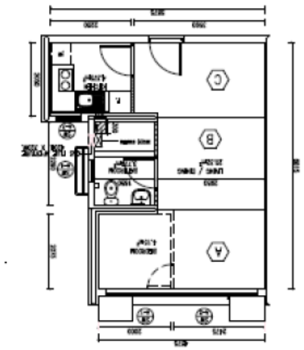
Semi-precast structural wall
Lapping reinforcement joint
HKCOP Precast Concrete 2016

RC MiC Modules

(In courtesy of P&T)

Possible Solutions

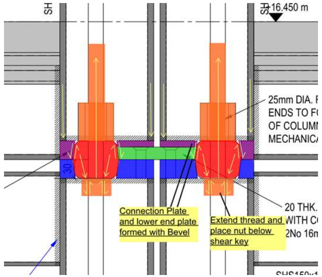


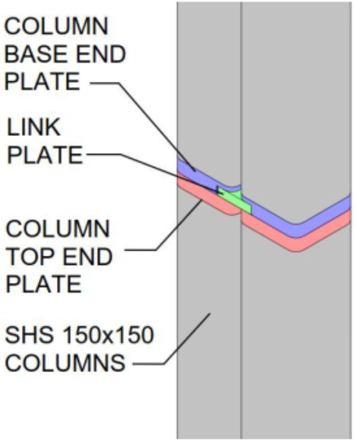


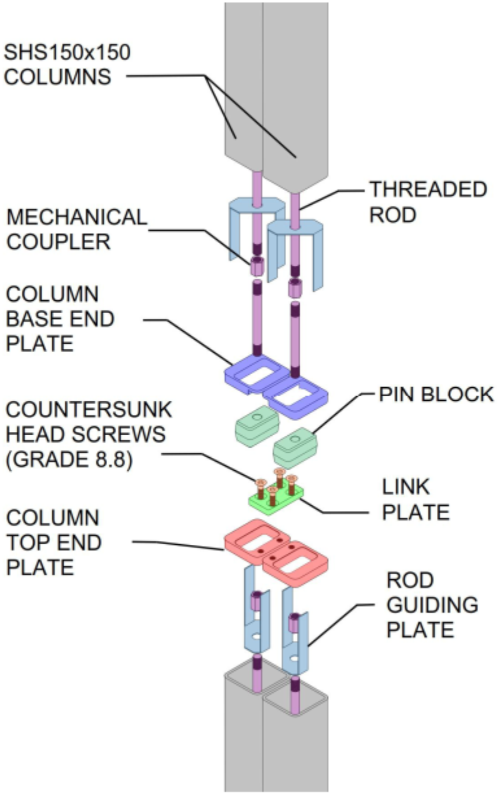
Optimise MiC module layout to avoid unnecessary structural walls

Use some open sided modules if needed

Modules Connection Details – Steel MiC (In courtesy of UB / CIMC)

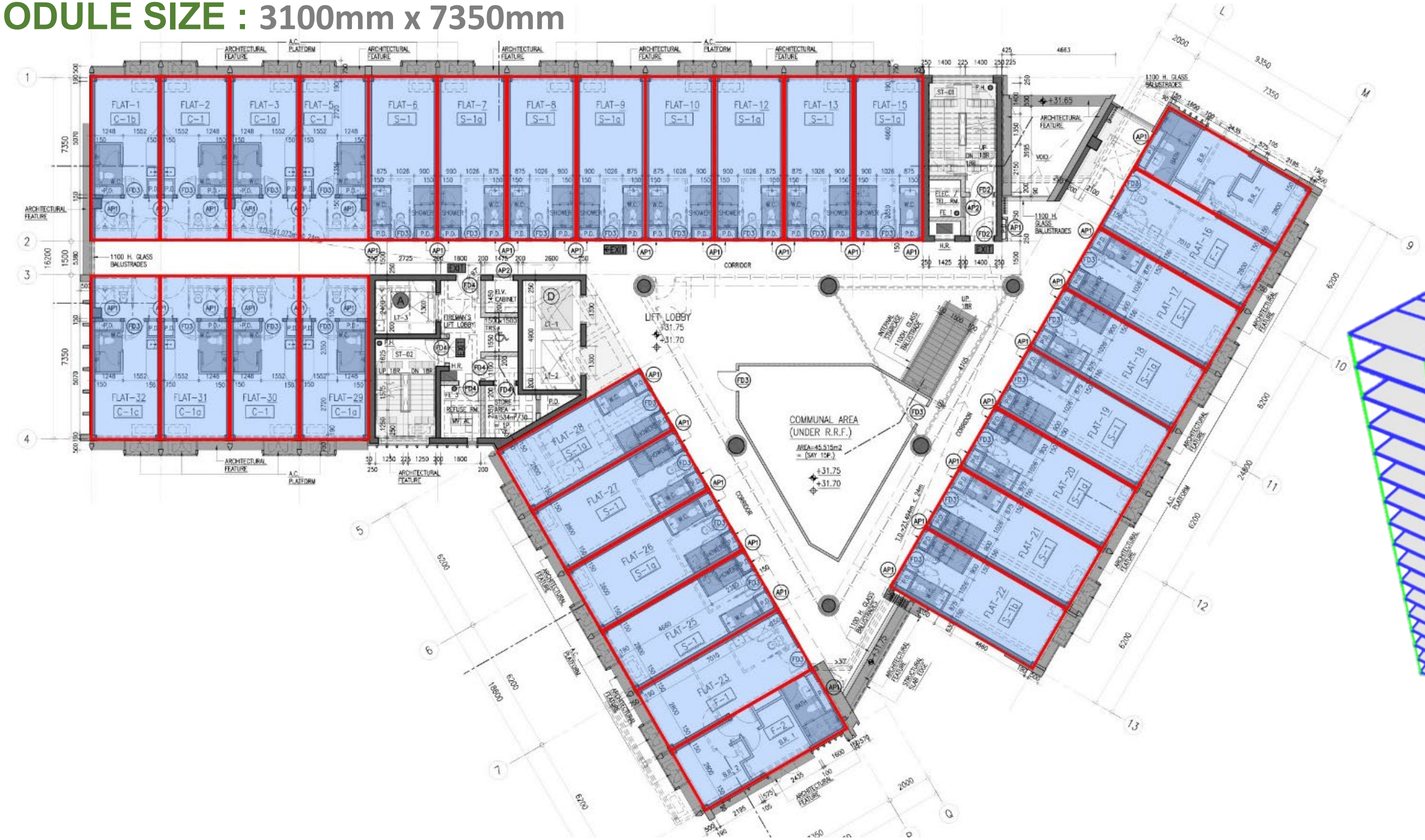


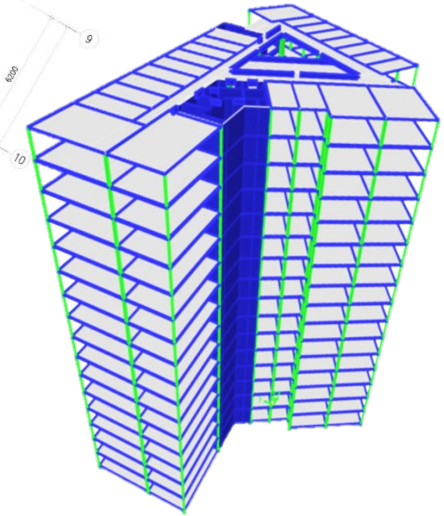




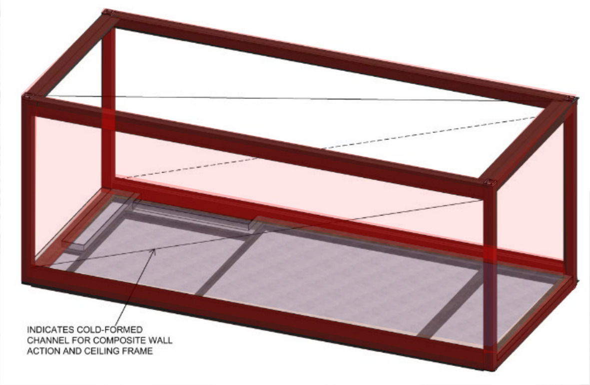
MiC Allocation

MODULE SIZE : 3100mm x 7350mm

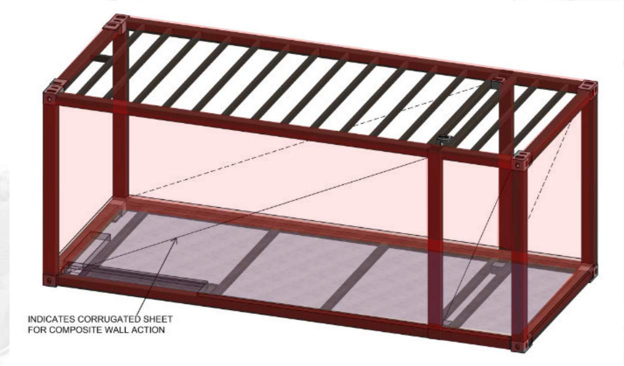




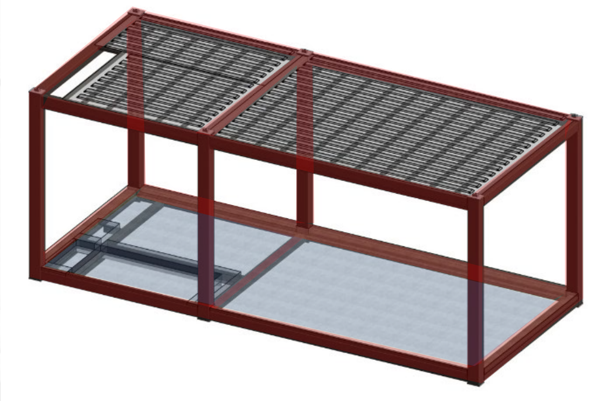
MiC Structure Form



VENDOR 1

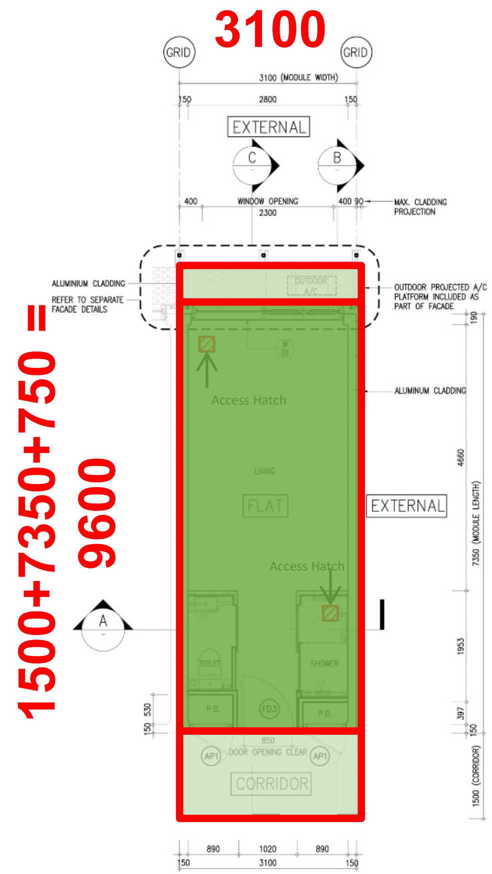


VENDOR 2



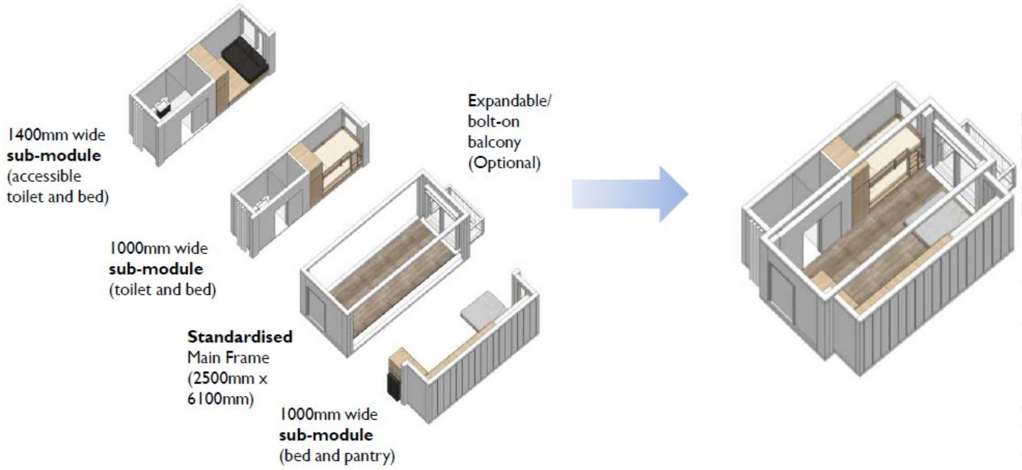
VENDOR 3

MiC Prototype Display



MODULE SIZE : 3100mm x 7350mm + 1500mm corridor + 750mm A/C platform

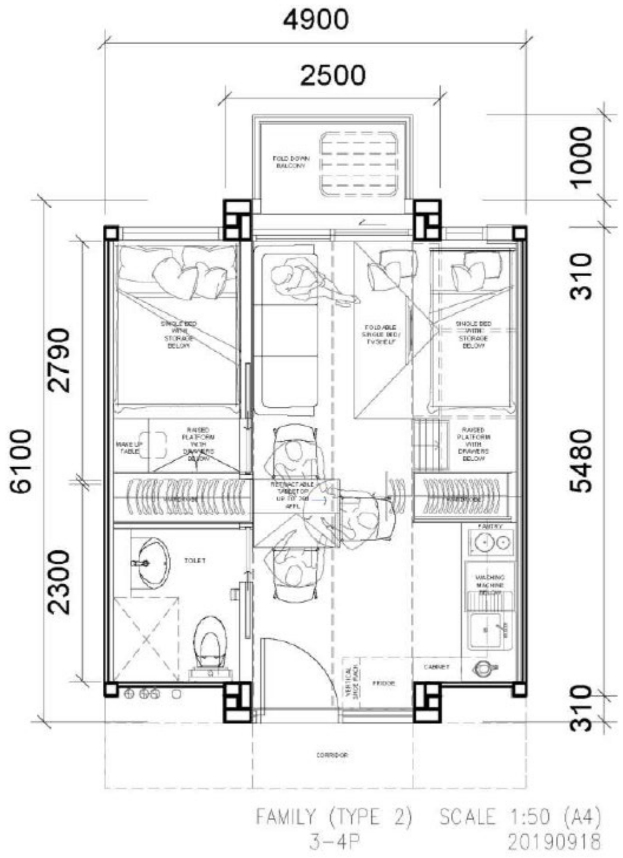
Expandable MiC (1+1 better than 2in1?)



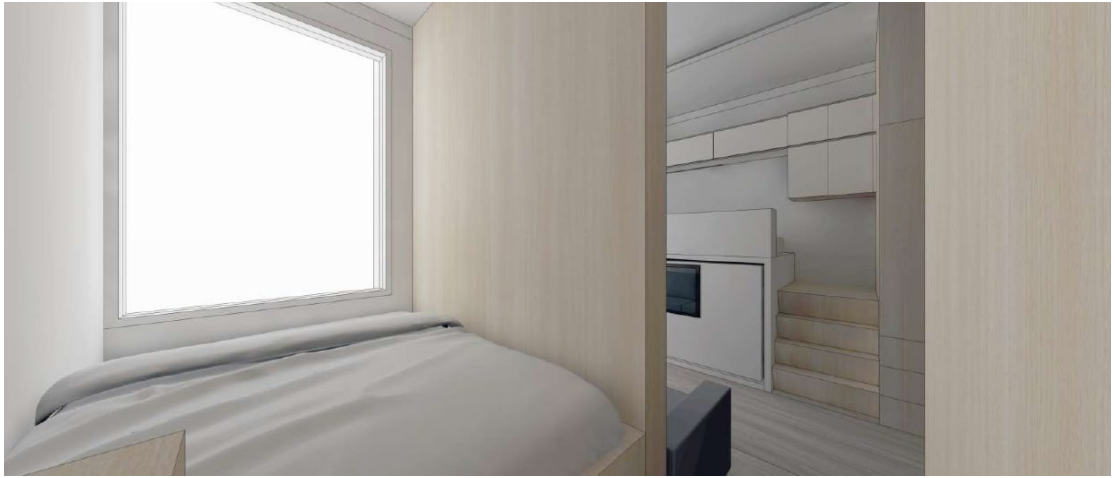
Sub-MiC components

Minimise the site work for the connection between modules to facilitate future relocation

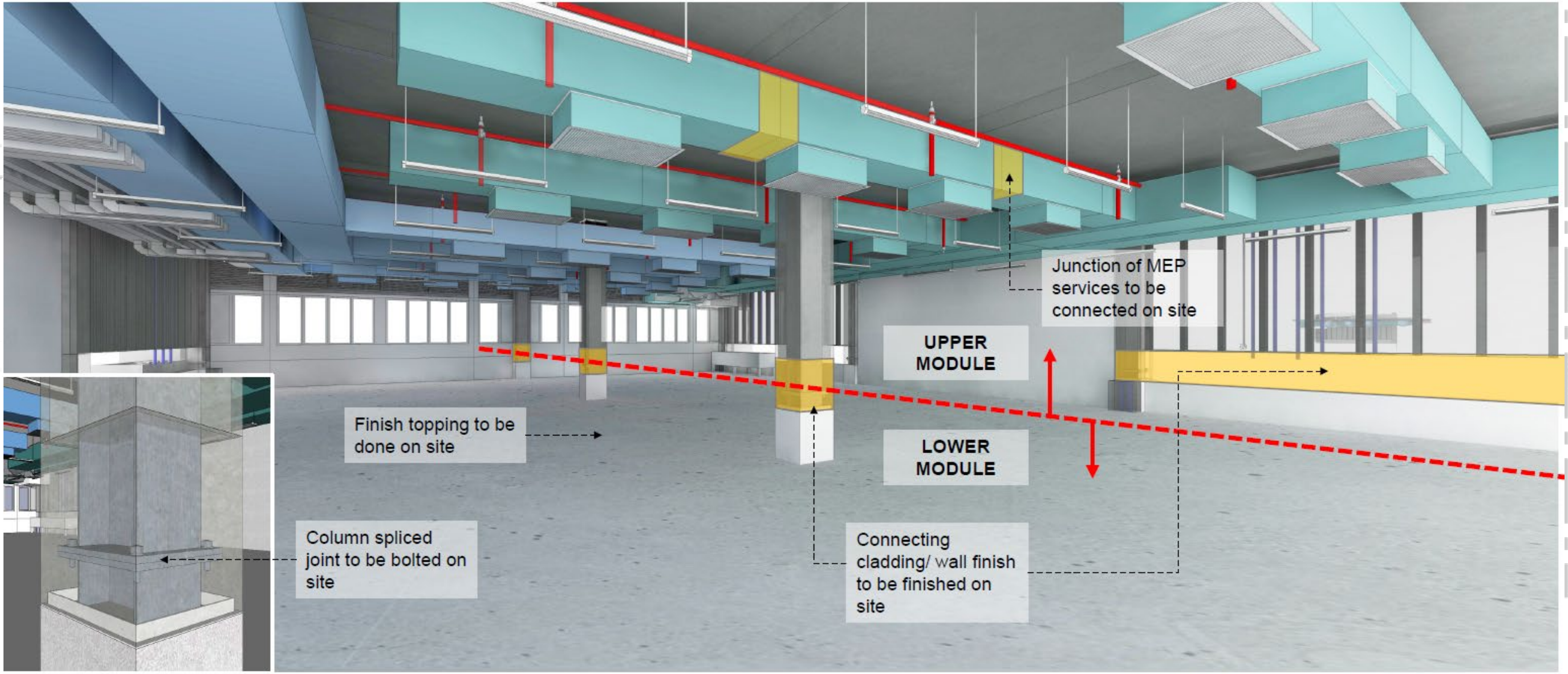
Images courtesy of J.C.DISI, POLYU and Leigh & Orange Ltd



Images courtesy of J.C.DISI, POLYU and Leigh & Orange Ltd



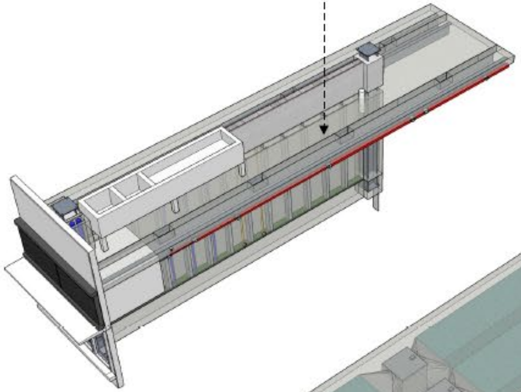
Open-Box MiC for Multi-Storey Open Space Functionality

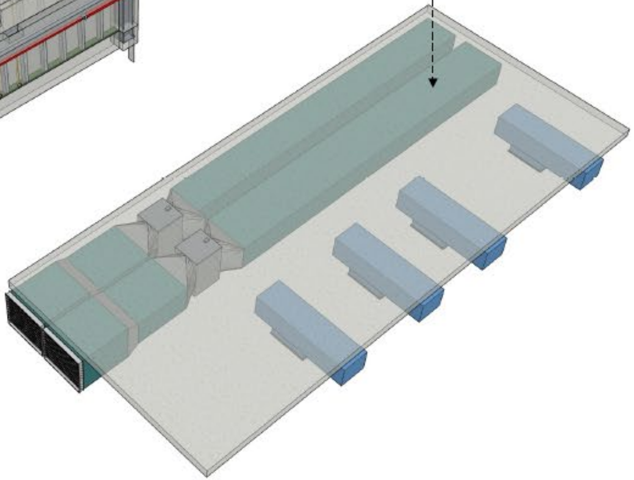


Column detail

MIC TYPE 1

- ✓ **VOLUMETRIC MODULE**
- ✓ **STRUCTURE**
  - Lightweight flat slab system with steel column
- ✓ **BUILDING SERVICE**
  - Air duct, electrical tray trunk, sprinkler main pipe, surface drain, concealed conduit and pipeworks, pipeduct etc.
- ✓ **FINISHES FIXTURES AND FITTINGS**
  - Dry wall system with paint finish
  - Prefixed lighting fixtures, sink and faucet, power socket etc.
- ✓ **EXTERNAL WALL AND FAÇADE**
  - External grade dry construction with integrated window, louvre and façade feature and finishes



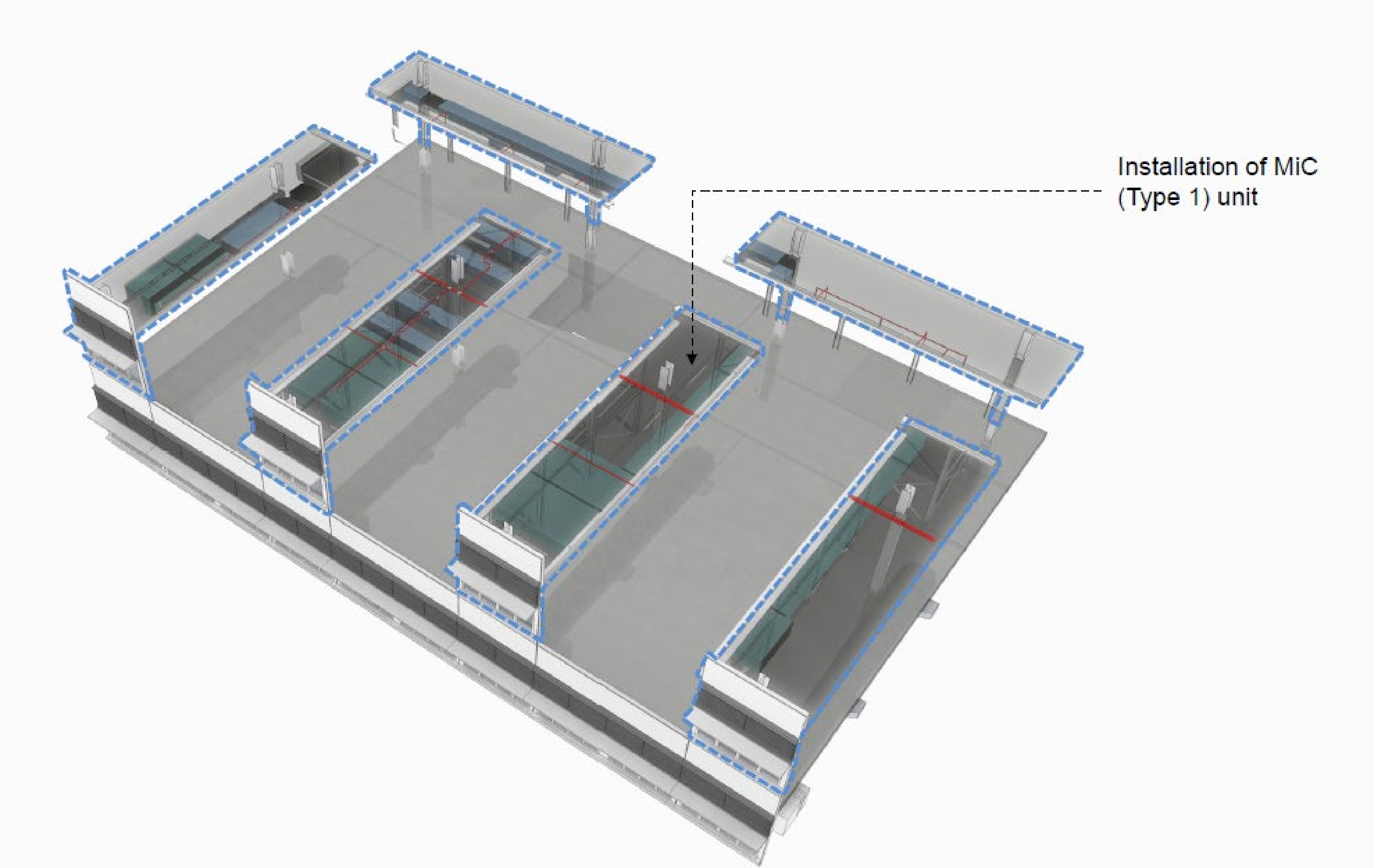


MIC TYPE 2

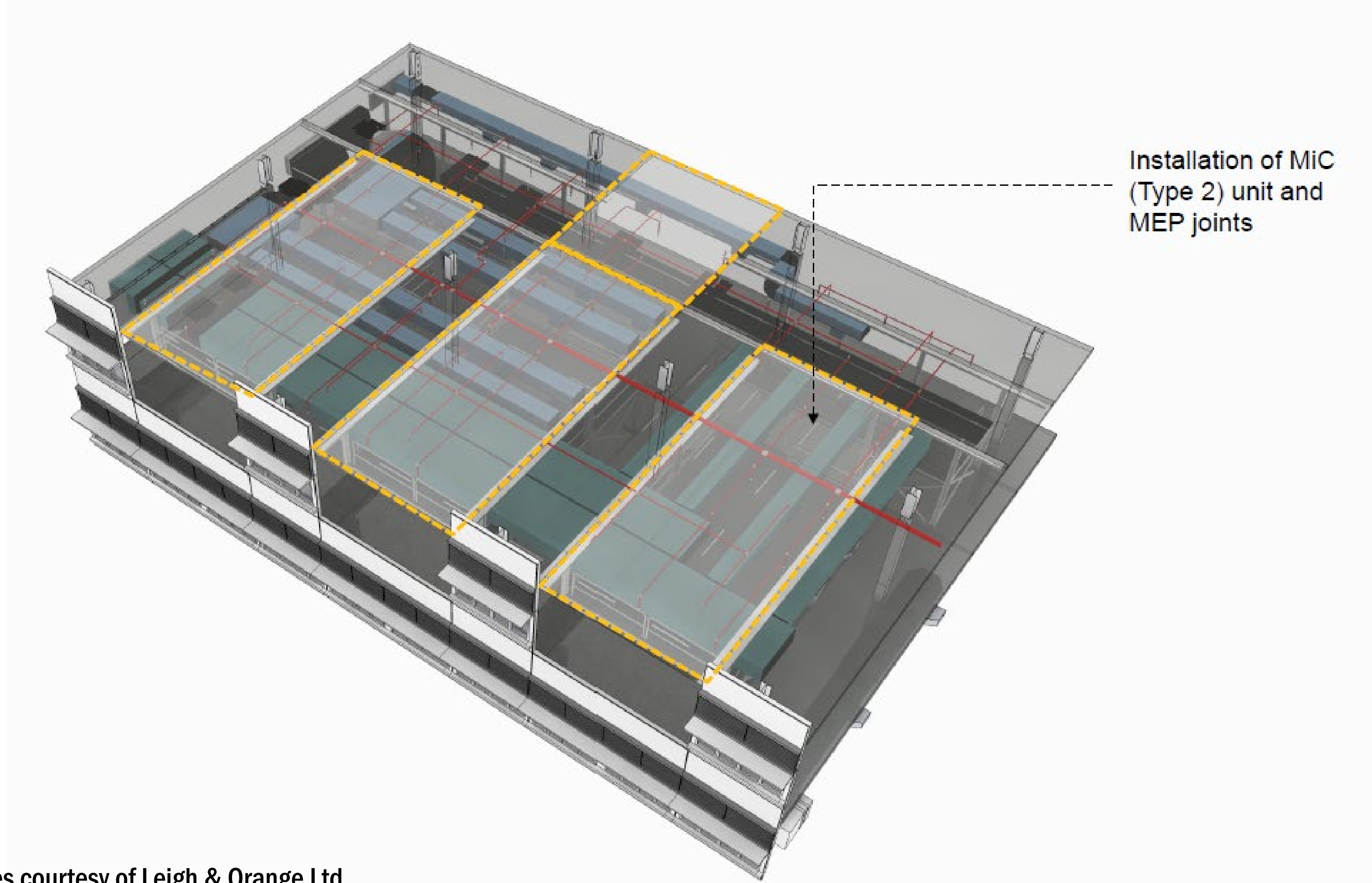
- ✓ **VOLUMETRIC MODULE**
- ✓ **STRUCTURE**
  - Lightweight flat slab system
- ✓ **BUILDING SERVICE**
  - Air duct, electrical tray trunk, sprinkler main pipe, concealed conduit and pipeworks, etc.
- ✓ **FINISHES FIXTURES AND FITTINGS**
  - Prefinished ceiling and lighting fixtures

High-level offsite furnished module

Images courtesy of Leigh & Orange Ltd



Images courtesy of Leigh & Orange Ltd

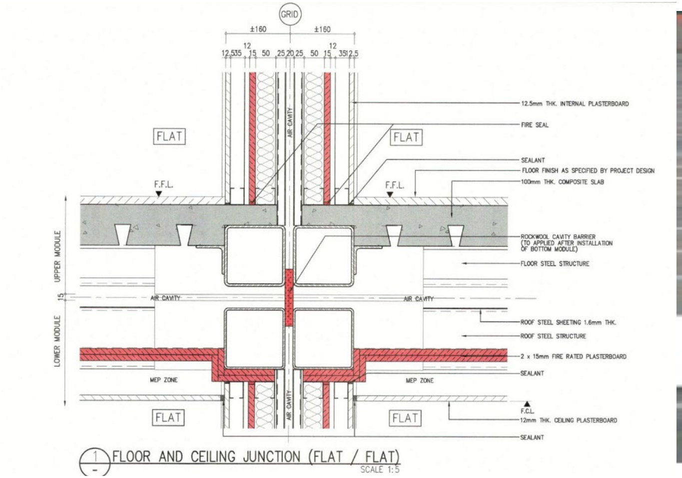


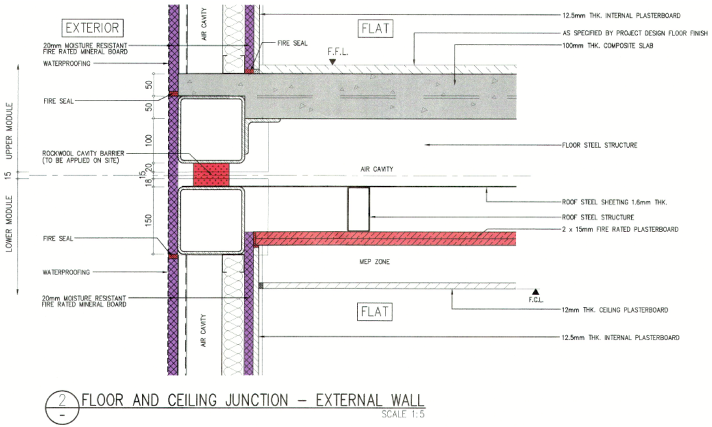
Images courtesy of Leigh & Orange Ltd

Fire Resisting Criteria of Construction Elements

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)

Wall / Floor Build Up including FRR Construction for Steel MiC





(Courtesy of L&O)

Triple proof MiC joint sealer

Corrosion Protection of Light Steel Construction

Light Steel Framing and Modular Construction

Technical Information Sheet ED022

SCI
Steel Knowledge

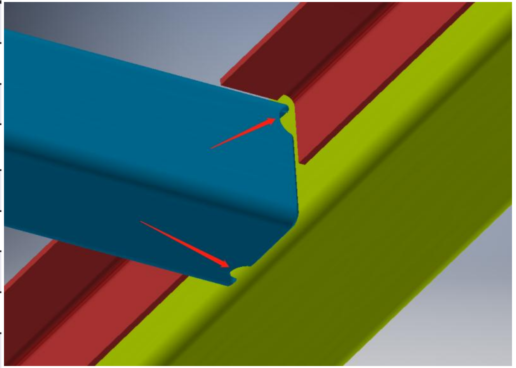
Durability of Light Steel Construction

A G J Way MEng CEng MICE

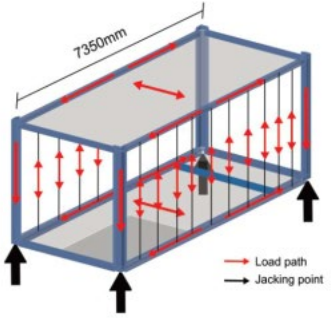
PRODUCT APPLICATION	ENVIRONMENTAL CONDITIONS	PREDICTED DESIGN LIFE
Walls and floors in warm frame applications	No risk of water ingress or condensation	250 years
Non-load bearing stud partitions	Warm internal environment and no risk of water ingress	250 years
Infill external walls in multi-storey buildings	Warm frame and no risk of water ingress	250 years
Roof structures (insulated)	Low risk of condensation	200 years
Suspended ground floors (with over-site membrane)	Low risk of water ingress; some risk of condensation	100 years
Roof structures (uninsulated)	Some risk of condensation	100 years
Purlins and side rails supporting metal cladding	Low risk of condensation; some dust and pollution	60 years
Sub-frames to over-cladding panels	Low risk of water ingress; risk of condensation	60 years
Suspended ground floors (without over-site membrane)	Low risk of water ingress; higher risk of condensation	50 years

Note: All values are for Z275 (Total weight of zinc coating on both surfaces = 275 g/m^2).

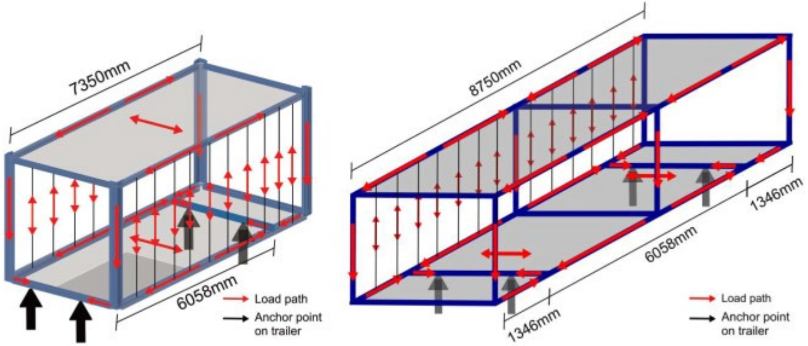
Table 2 Predicted design life for galvanised steel in different applications



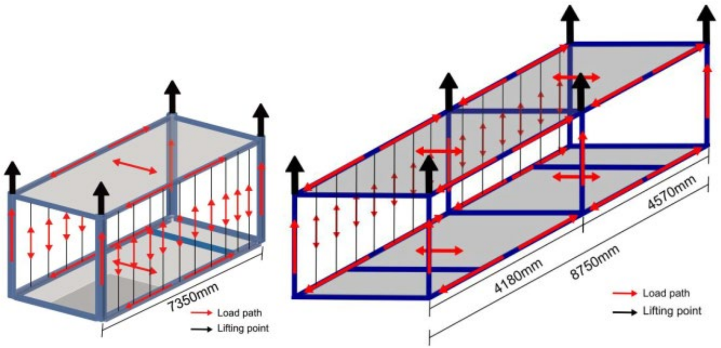
Design Consideration and Load Cases



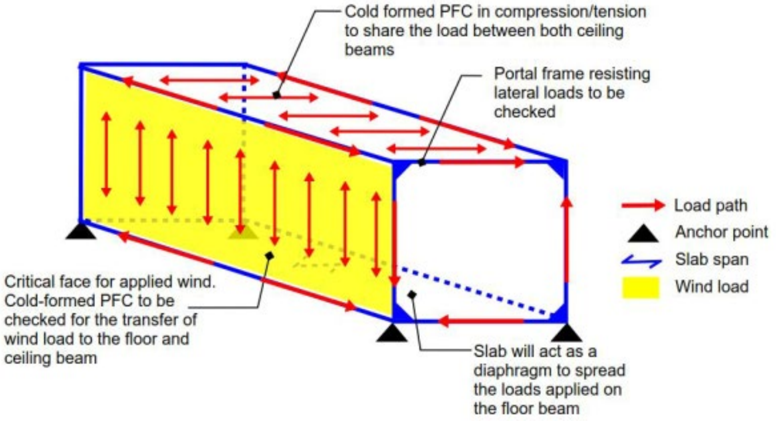
Factory Support Condition



Road Transportation Condition

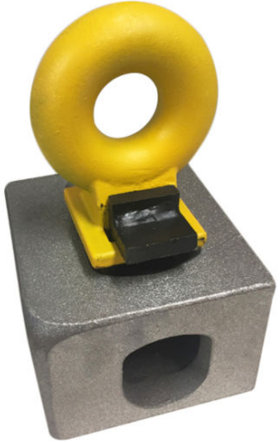


Lifting Condition

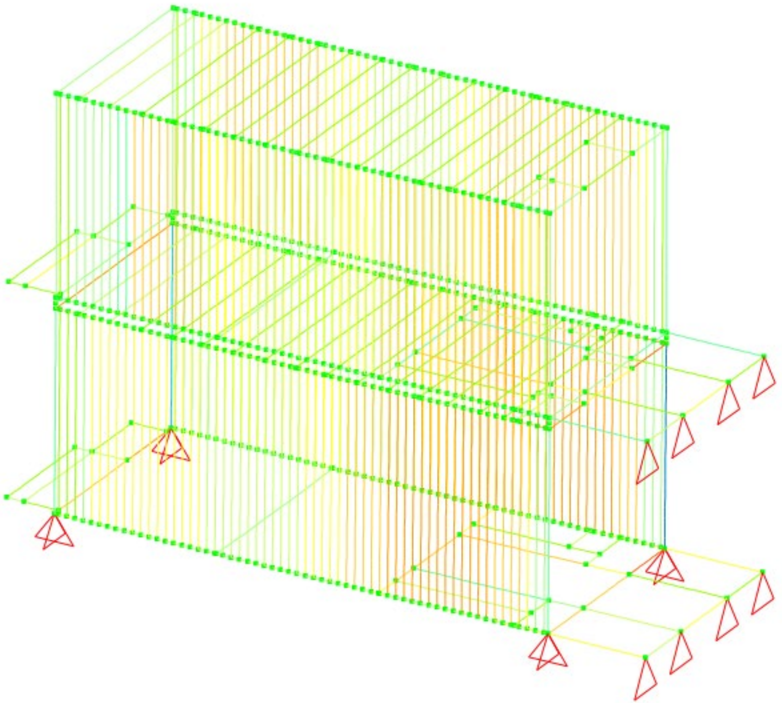


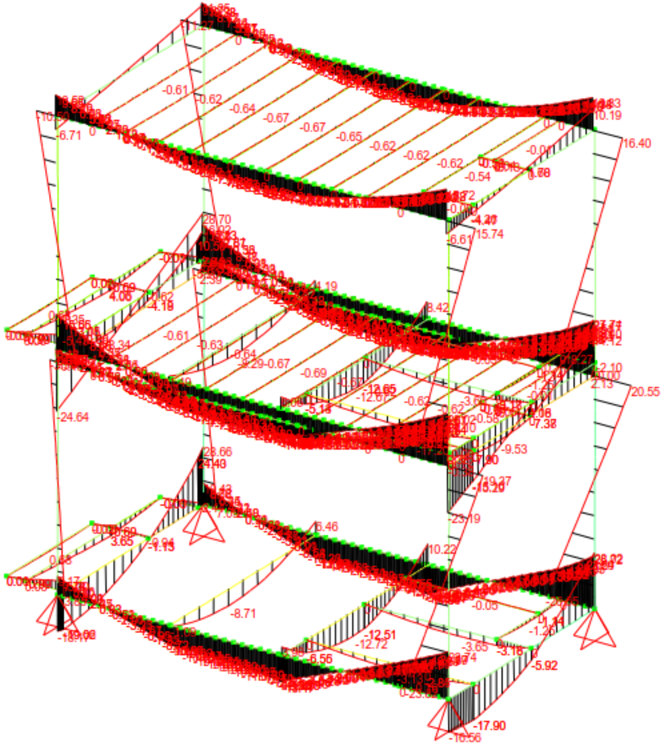
Lateral Stability due to Wind Load

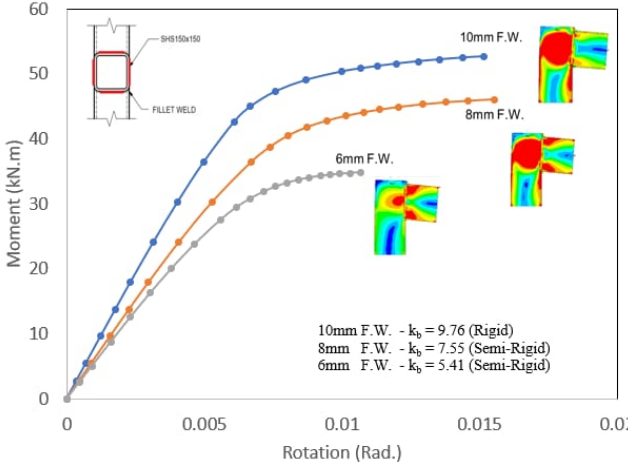
Lifting Frame

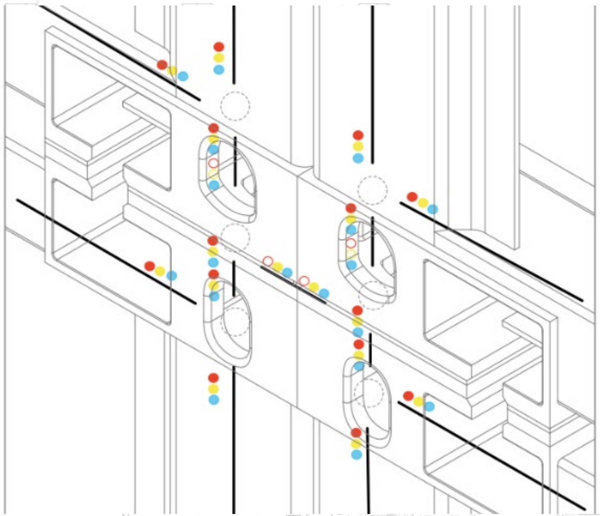


Temporary Condition after Installation



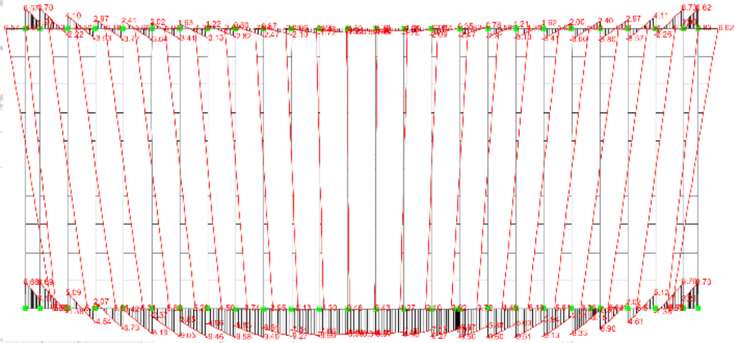






Semi-Rigid Beam Column Joint for Progressive Collapse Design to Optimise Structural Member Sizes

Utilisation of In-Plane Stiffness of Cold Form Thin Profiled Wall Panel to Optimise the Beam Sizes

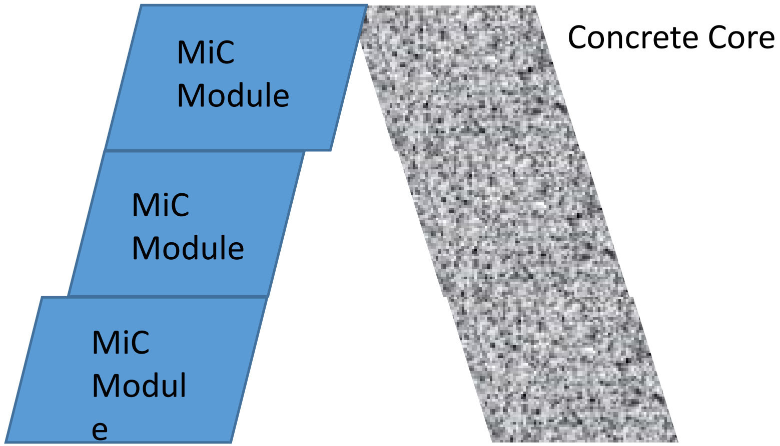


Images courtesy of WSP HK

Construction and Fabrication Tolerance

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

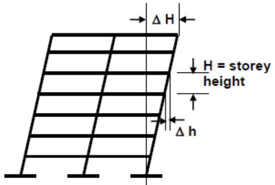
POSITIONAL DEVIATION AT COLUMN BASE	MAX. +/- 10mm
LATERAL DEVIATION BETWEEN CONSECUTIVE STOREYS	MAX. +/- 5mm
LATERAL DEVIATION RELATIVE TO BASE	MAX. +/- 25mm
DEVIATION IN COLUMN CENTRELINES AT SPLICE BETWEEN LOWER AND UPPER MODULE	MAX. 5mm
GAP BETWEEN BEARING SURFACE AT SPLICE	MAX 0.1mm



Reference from CoP for Structural Use of Steel

Multi-storey columns plumb

Deviation in each storey and maximum deviation relative to base. (It is recommended that checks on plumb be carried out at least every five stories)



$\Delta h = \pm$ H/600 or 5 mm whichever is greater

ΔH = max 50mm typically (at any level)
ΔH = max 25mm for columns adjacent to lift shafts

Alignment of columns at splice

Deviation in the centreline of adjacent columns at a splice.

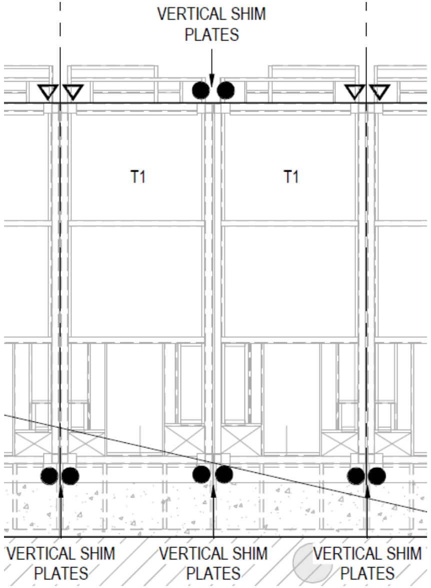
Δ = 5mm about either axis

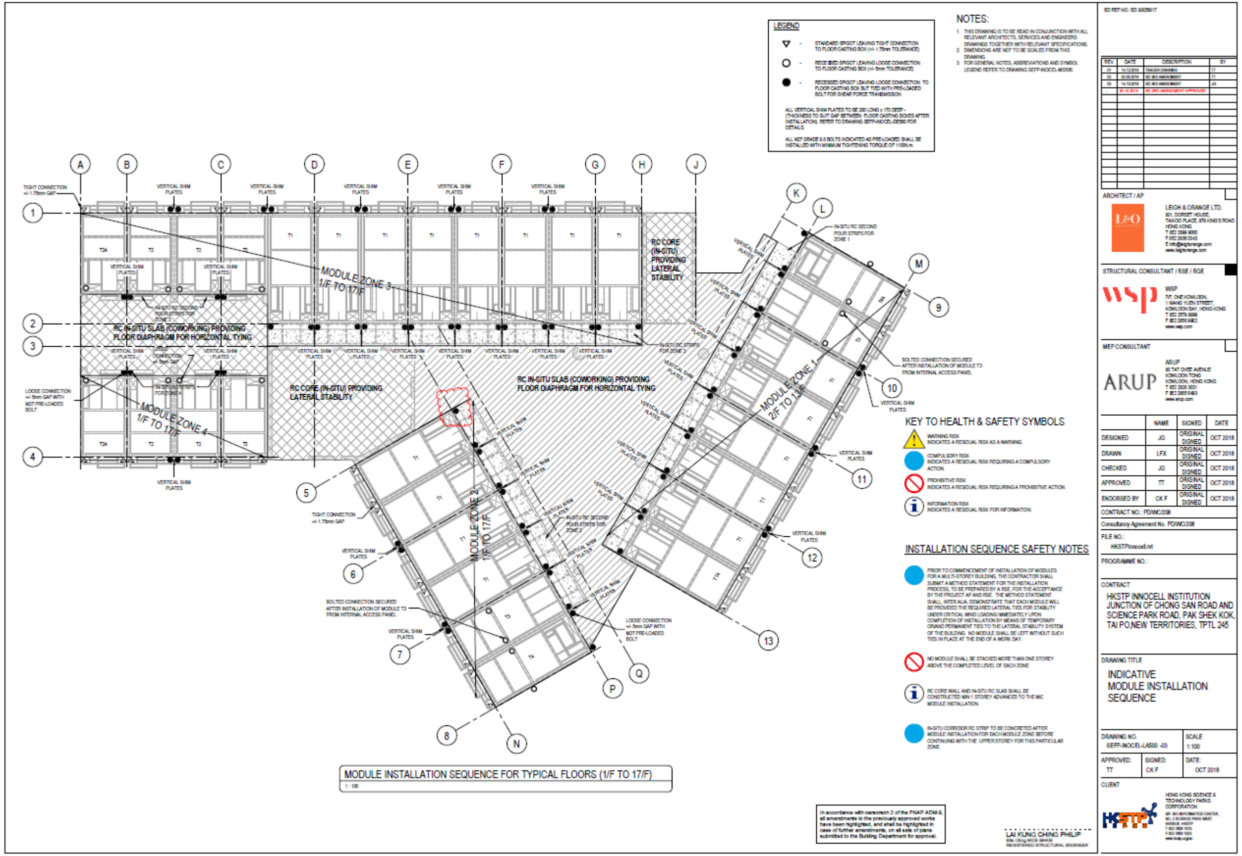
Installation Tolerance

▽ - STANDARD SPIGOT LEAVING TIGHT CONNECTION TO FLOOR CASTING BOX (+/- 1.75mm TOLERANCE)

○ - RECESSED SPIGOT LEAVING LOOSE CONNECTION TO FLOOR CASTING BOX (+/- 5mm TOLERANCE)

● - RECESSED SPIGOT LEAVING LOOSE CONNECTION TO FLOOR CASTING BOX BUT TIED WITH PRE-LOADED BOLT FOR SHEAR FORCE TRANSMISSION





Preloaded Bolt

BS EN 14399-9:2018

BSI Standards Publication

High-strength structural bolting assemblies for preloading

Part 9: System HR or HV - Direct tension indicators for bolt and nut assemblies

Table 10 — Feeler gauge requirements

Number of indicator protrusions	Minimum number of feeler gauge refusals
4	3
5	3
6	4
7	4
8	5
9	5

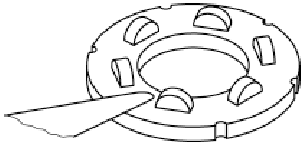


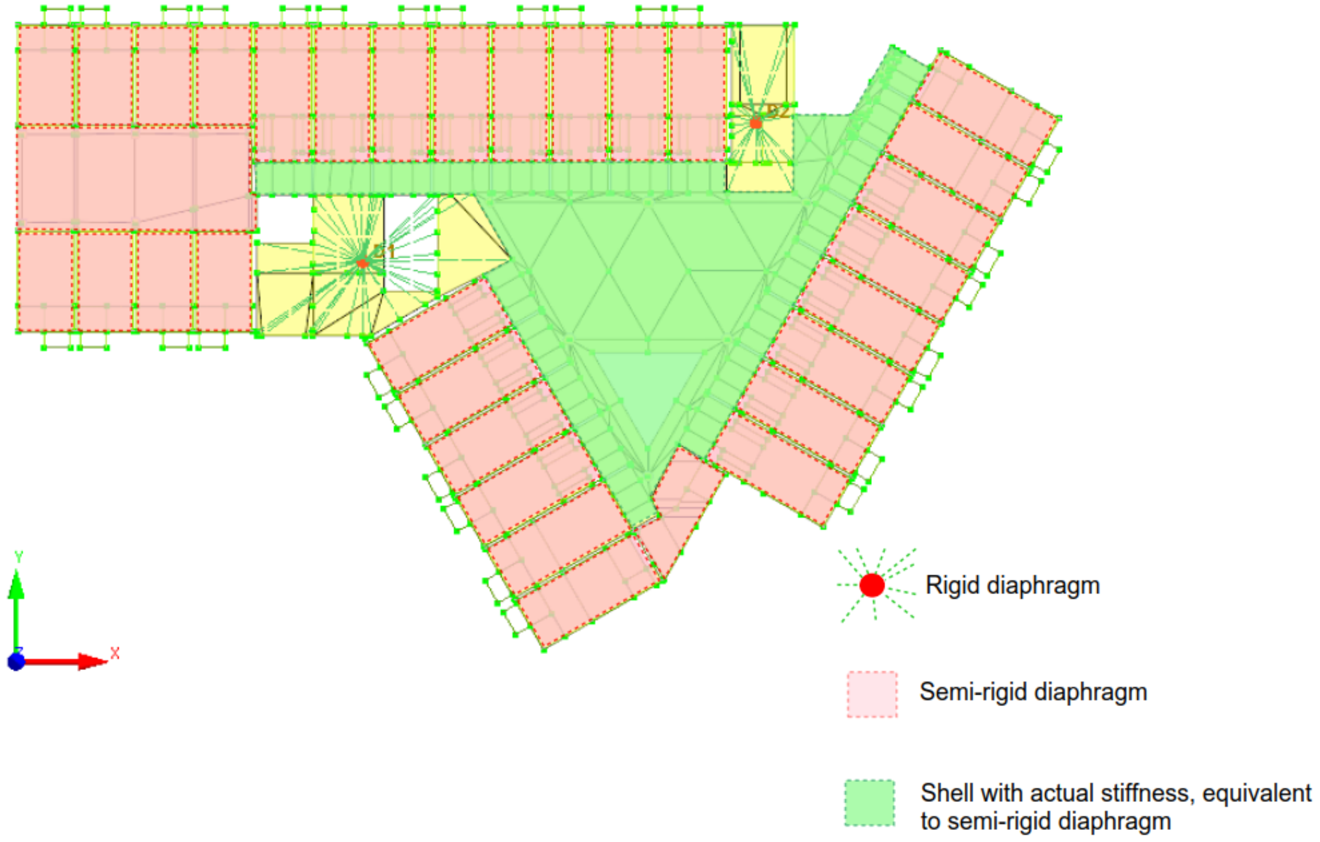
Figure 9 — Checking the indicator gap (example with six protrusions)

Table G.43 Preloaded hexagon head bolts in category B shear connections, property class 8.8, in S275

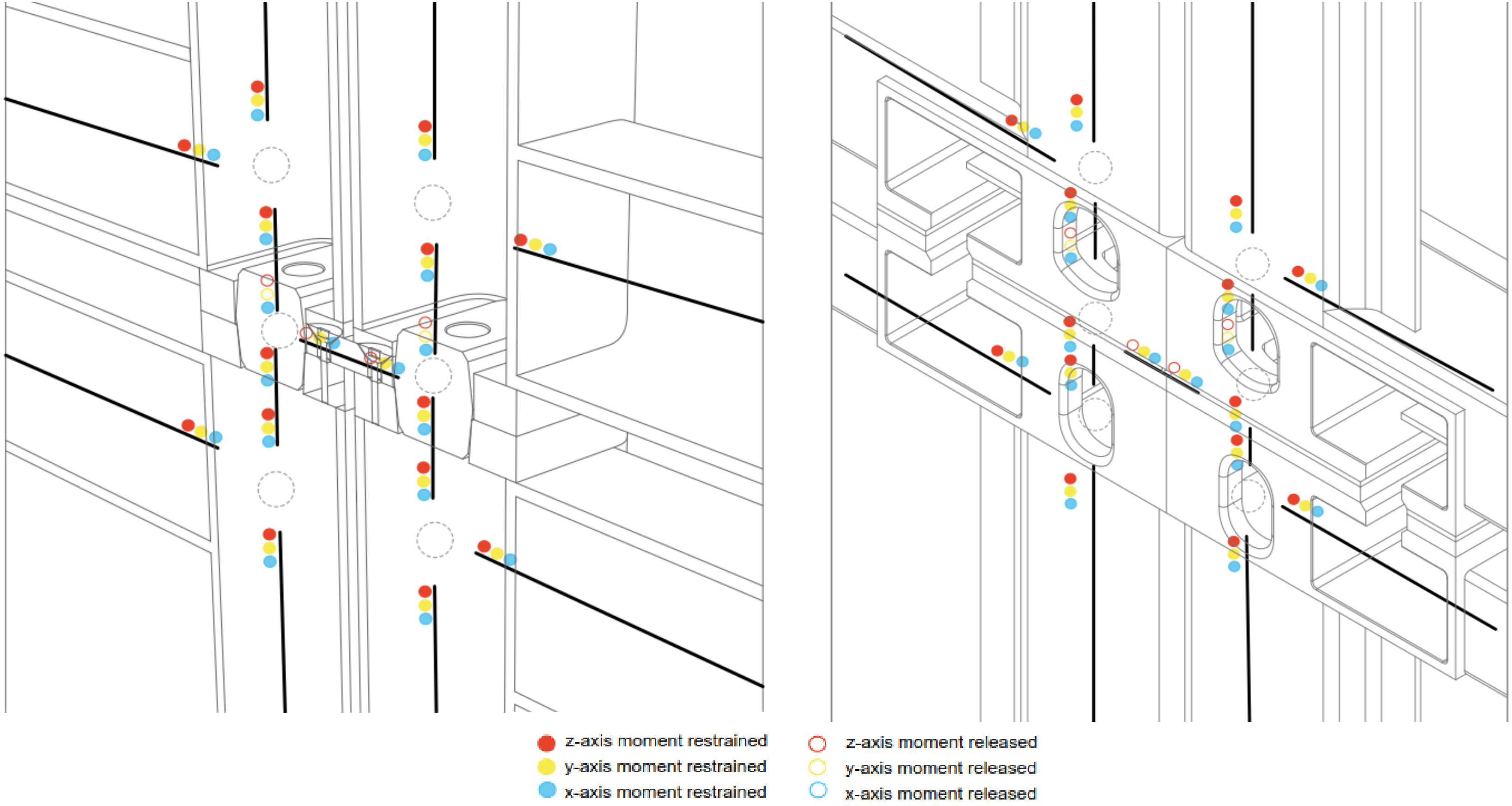
Diameter of Bolt	Tensile Stress Area	Shear Resistance		Slip resistance, $F_{s,Rd,ser}$							
		Single Shear	Double Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
d	A_s	$F_{v,Rd}$	$2 \times F_{v,Rd}$								
mm	mm^2	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN
12	84.3	27.5	55.0	8.6	17.2	12.9	25.7	17.2	34.3	21.5	42.9
16	157	60.3	121	16.0	32.0	24.0	48.0	32.0	63.9	40.0	79.9
20	245	94.1	188	24.9	49.9	37.4	74.8	49.9	100	62.4	125
24	353	136	271	35.9	71.9	53.9	108	71.9	144	89.9	180
30	561	215	431	57.1	114	85.7	171	114	228	143	286

Reference from P358 SCI Guide

Floor Diaphragm Assignment



Module Connection Fixity Assignment



Staged Construction modelling

To understand stress build up at the module connection during construction

Progressive Collapse Consideration

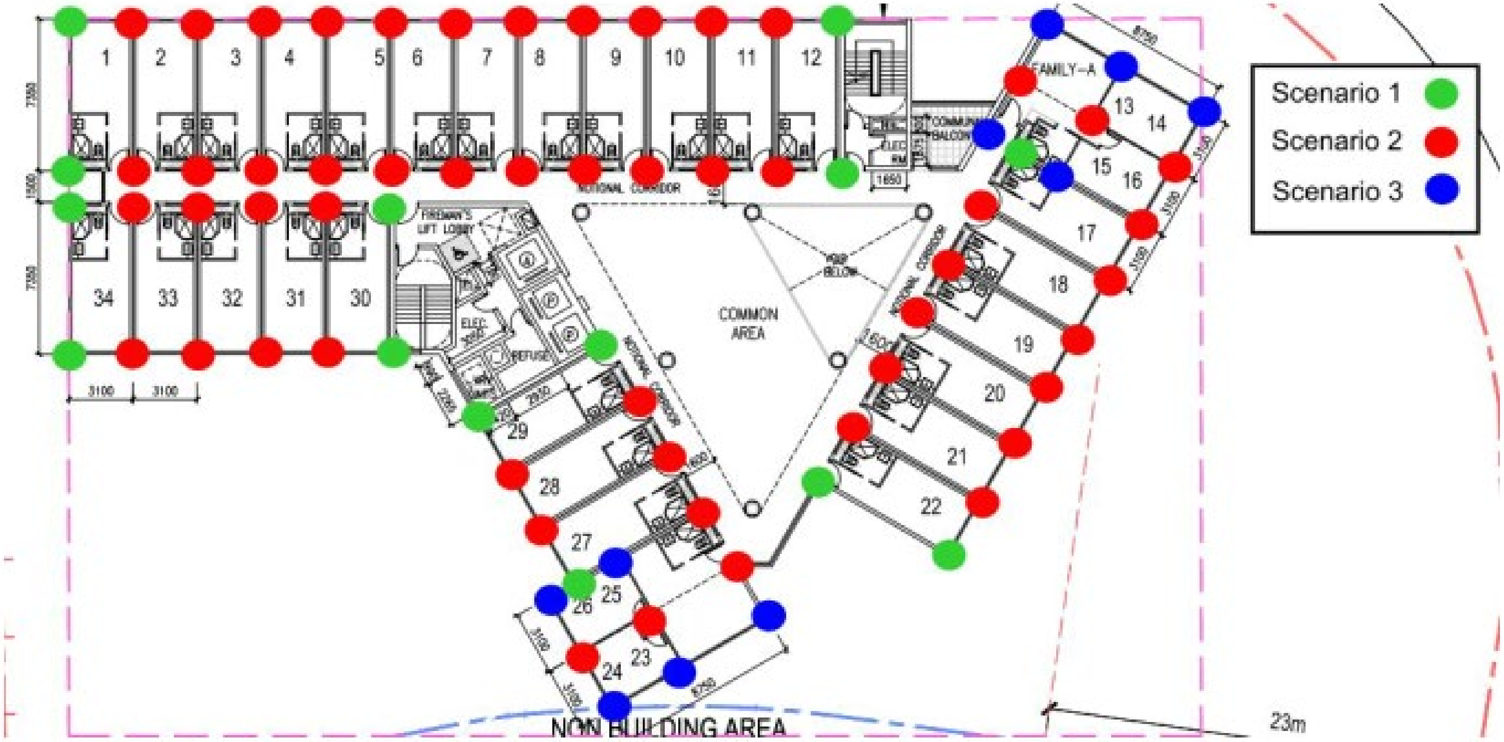
Table 4.3 - Partial load factors and combinations for extreme events

Load combination (including earth, water loading where present)	Load Type						
	Dead G_k		**Imposed** Q_k		**Earth and water** S_n	**Wind** W_k	**Extreme Event** A_k
	Adverse	Beneficial	Adverse	Beneficial			
1. dead, imposed and extreme event	1.05	1.0	0.35	0	1.05	-	1.0
2. dead, lateral and extreme event	1.05	1.0	-	-	1.05	0.35	1.0
3. dead, lateral, imposed and extreme event	1.05	1.0	0.35	0	1.05	0.35	1.0

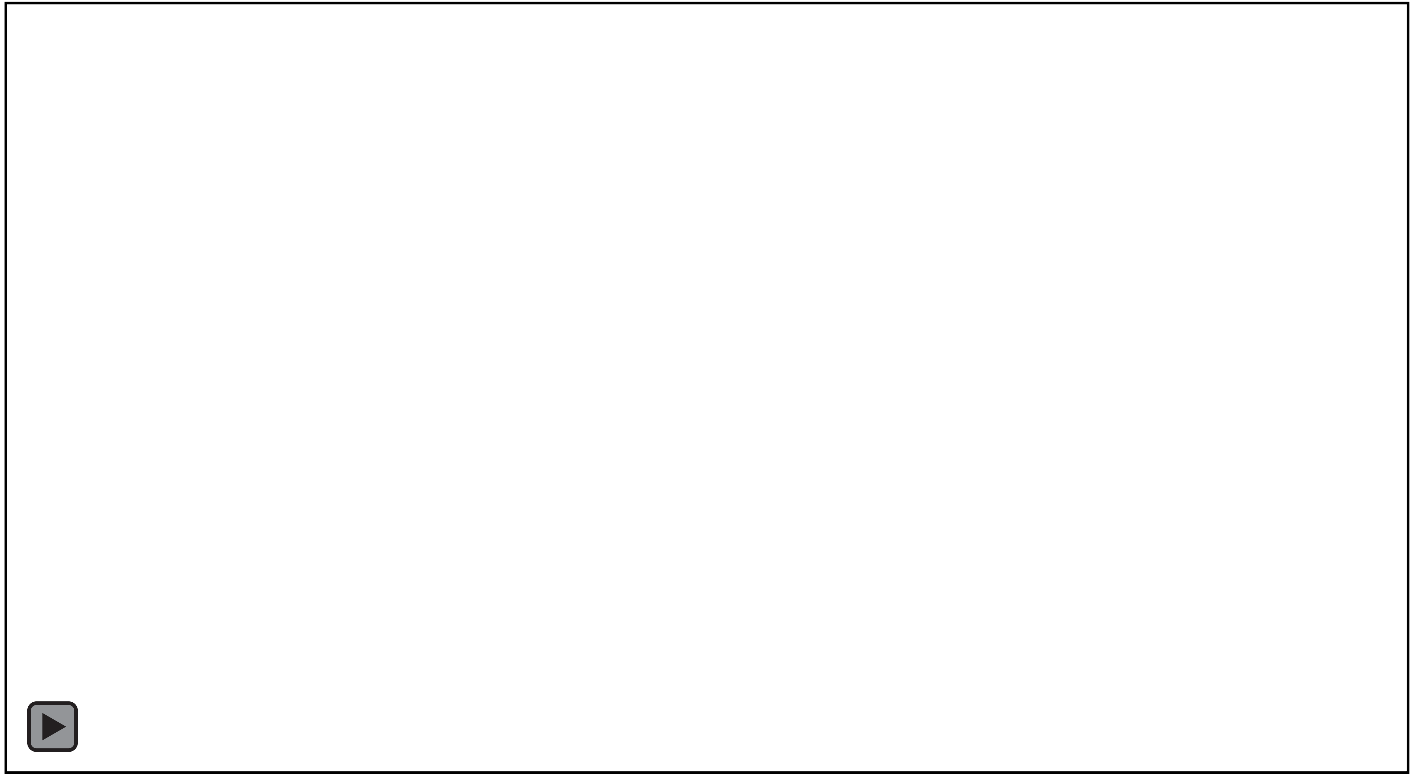
Table D1a - Essential performance requirements for hot rolled and hot finished structural steel and cold formed steel

Performance requirement	**Specified by**	**Additional requirements for steel in structures designed by the plastic theory**
Minimum yield strength	Smaller of yield strength (R_{eH}), 0.2% proof strength ($R_{p\,0.2}$) and stress at 0.5% total elongation ($R_{t\,0.5}$)	$R_m/R_{eH} \geq 1.2$ (1.2 is a minimum and a higher value may be required)
Minimum tensile strength	Tensile strength (R_m)	
Notch toughness	Minimum average Charpy V-notch impact test energy at specified temperature	None
Ductility	Elongation in a specified gauge length Bend test	Stress-strain diagram to have a plateau at yield stress extending for $\boxed{\text{at least six times the yield}}$ strain. The elongation on a gauge length of $5.65\sqrt{S_o}$ is not to be less than 15% where S_o is the cross sectional area of the section

Hypothetical Column Removal Scenario



Module Steel Frame Stress Changes in Extreme Event



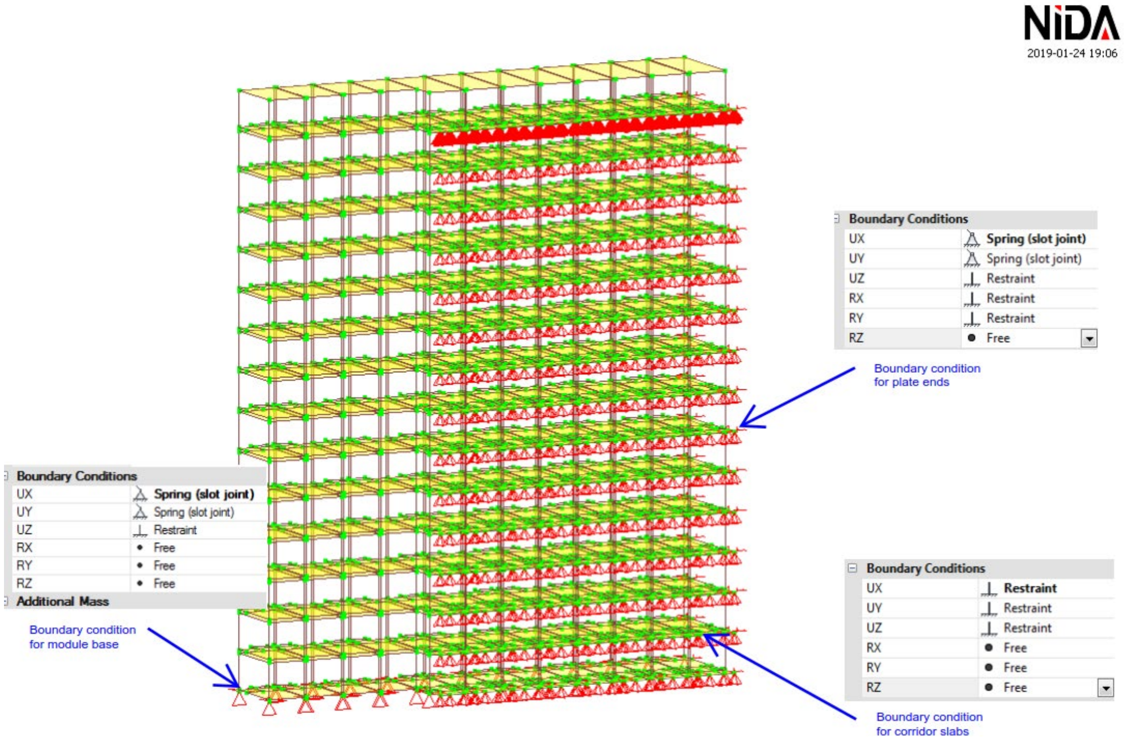
Picture frame to resist the remaining structure after single column removal

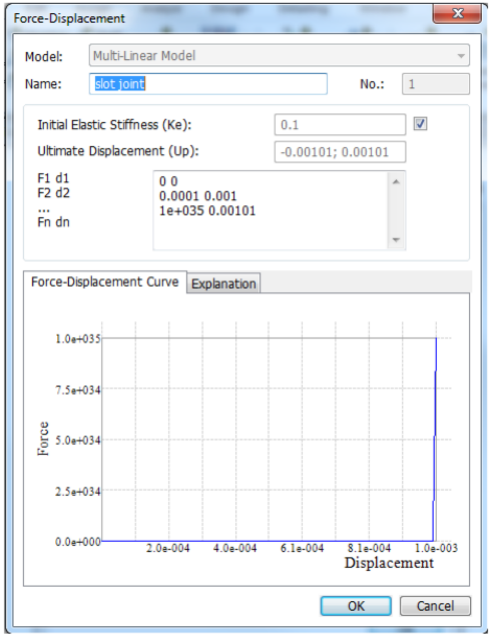
Module Connection FEM

Tight Spigot to transfer horizontal force through connection plate between modules

Preloaded bolts to transfer horizontal force through connection plate between modules

Thermal Effect on Modules





Thermal Effect on Modules

(In courtesy of IMax)

2.5.6 Load effects from temperature change

Where, in the design and erection of a structure, it is necessary to take into account of changes in temperature, it may be assumed that in Hong Kong, the average temperature varies from +0.1ºC to +40.0ºC. The actual range, however, depends on the location, type and purpose of the structure and special consideration may be necessary for structures in other conditions, and in locations outside Hong Kong subjected to different temperature ranges. For some structures such as pre-tensioned rod and cable structural systems, structural stability and designed pre-tension force very much depend on the assumed temperature change and special attention should be paid on design of this structural form, see clause 13.3. Clause 13.3.4.3 provides more detailed guidance for temperatures of elements exposed to sunlight.

13.3.4.3 Temperature

Temperature load plays a particularly important role in design of glass and façade supporting structures. The temperature range below may be used for local design.

(1) External ambience temperature should be 0-40°C and internal temperature should be 5-35°C.

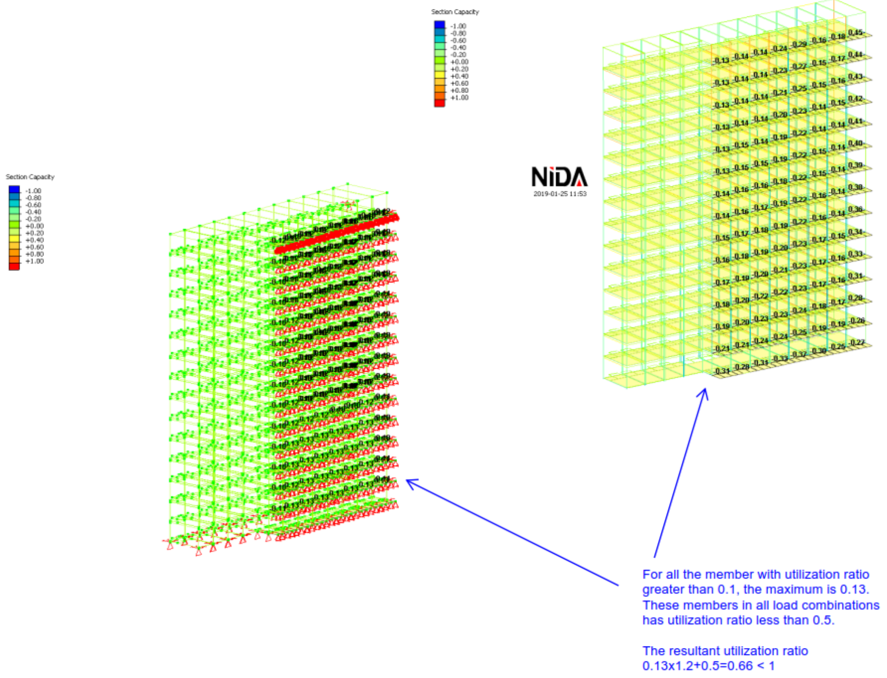
(2) Surface exposed outside and under sunlight should be considered for a temperature of 0-80°C for dark colour and 0-60°C for light colour.

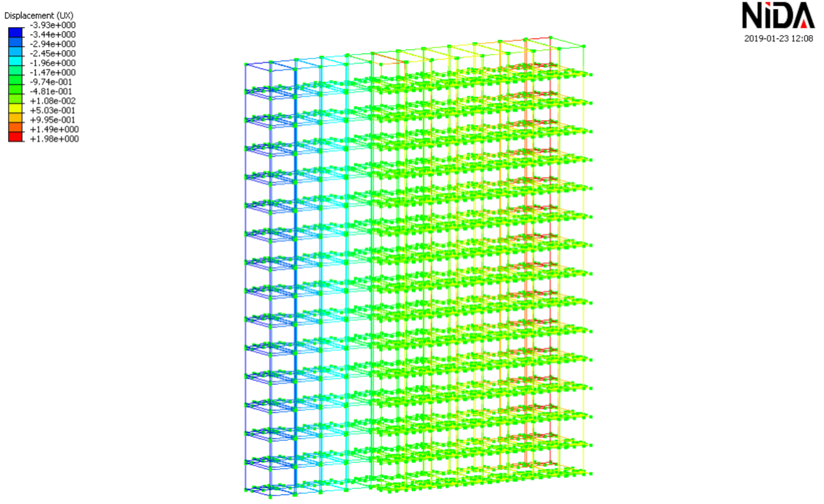
(3) Surface not exposed outside but under direct sunlight should be considered a temperature range of 10-50°C.

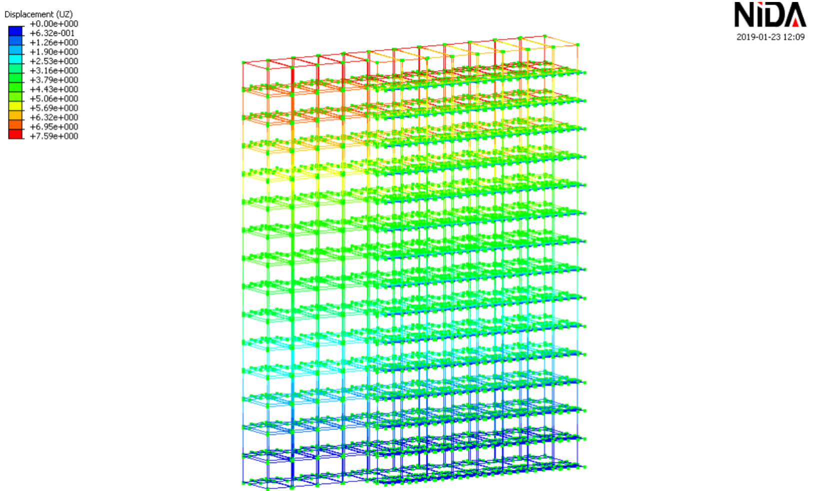
(4) Surface temperature exposed outside should be 0-50°C for clear glass and 0-90°C for tinted glass.

(5) The actual temperature changes of a structure should be determined relatively to the temperature when the structure is installed at site. For example, if the temperature during installation is 20°C, the temperature changes will be +30°C and -10°C in accordance with (3) above.

Thermal Effect on Modules

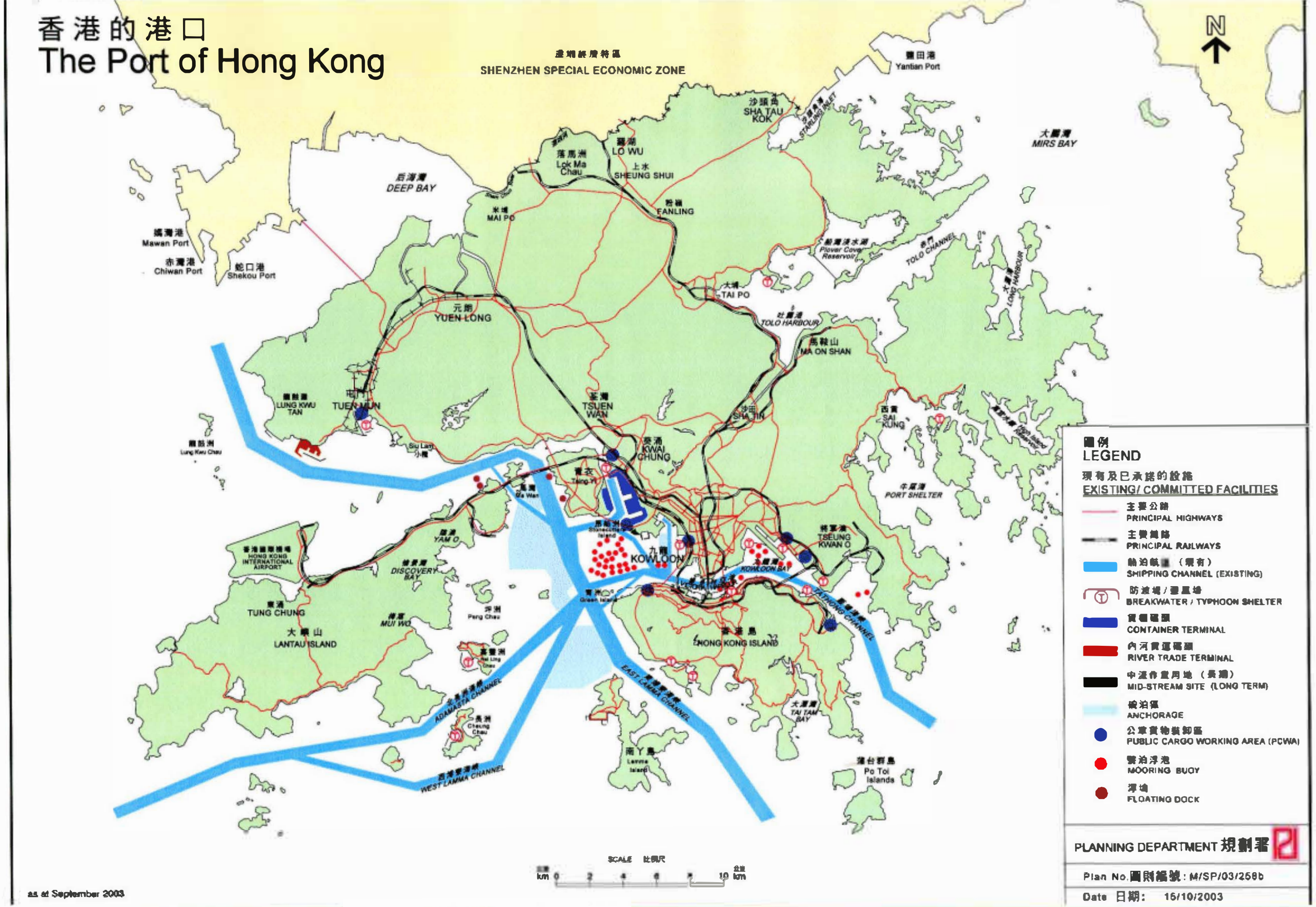






SITE LOGISTICS

香港的港口
The Port of Hong Kong



Transportation Restriction (Extracted from Transportation Department

- Extends beyond the front of the vehicle by more than 1.5 metres.
- Extends beyond the rear of the vehicle by more than 1.4 metres.
- Is more than 2.5 metres in width.
- Is higher than 4.6 metres from the road surface.
- Is at a height that may cause damage to any object or wires erected above the road.

https://www.td.gov.hk/en/road_safety/road_users_code/index/chapter_6_for_professional_drivers/loads_/index.html

Route Search Routes & Services About KMB

Mechanical Features

Chassis Configuration	Rear Engine Dennis Angle Drive
Engine Type	Gardner 6LXCT / Cummins LT10
Cylinder Capacity (c.c.)	10,450 c.c. / 10,000 c.c.
BHP	220 / 245
Gear Box Type	Voith D851.2 / Voith D863
Means of Operation	Electro-hydraulic
Axle Type & Ratio	Crown & Pinion with reduction 5.3:1

http://www.kmb.hk/en/business/sales_businfo_leyland.html

Critical Dimensions

Dimensions	Length(mm)	10,990
	Width(mm)	2,500
	Height(mm)	4,369
Track Width	Front(mm)	2,032
	Int(mm)	2,032
	Rear(mm)	1,892
Overhang	Front(mm)	1,956
	Rear(mm)	3,023
Turning Circle(mm)		21,996
Swept Circle(mm)		24,900
Outswing(mm)		610
Wheelbase	1st to 2nd(mm)	5,410
	2nd to 3rd(mm)	1,600
Unladen Weight(kg)		13,010

Flatbed Trailer Size

	Model	Max Payload (t)	Vehicle length x width (mm)	Min height (mm)
	THP/SL2 Split	82.3	3,000 x 3,000	1,175
	THP/SL4	116.15	6,000 x 3,000	1,175
	MPA6	95	10,000 + 7,000 x 2,750 + 640	780

Transportation Restriction

TD Requirement for Wide Load Delivery	
Width of load on Vehicle	Hour
Width <2.5m	Any time
2.5m< width <3.5m	Permissible from 10:00 am to 4:00 pm with Wide Load Permit
	Permissible from 8:00 pm to 7:00 am with Wide Load Permit
>3.5m	Special Wide Load Permit to be applied with Transport Department

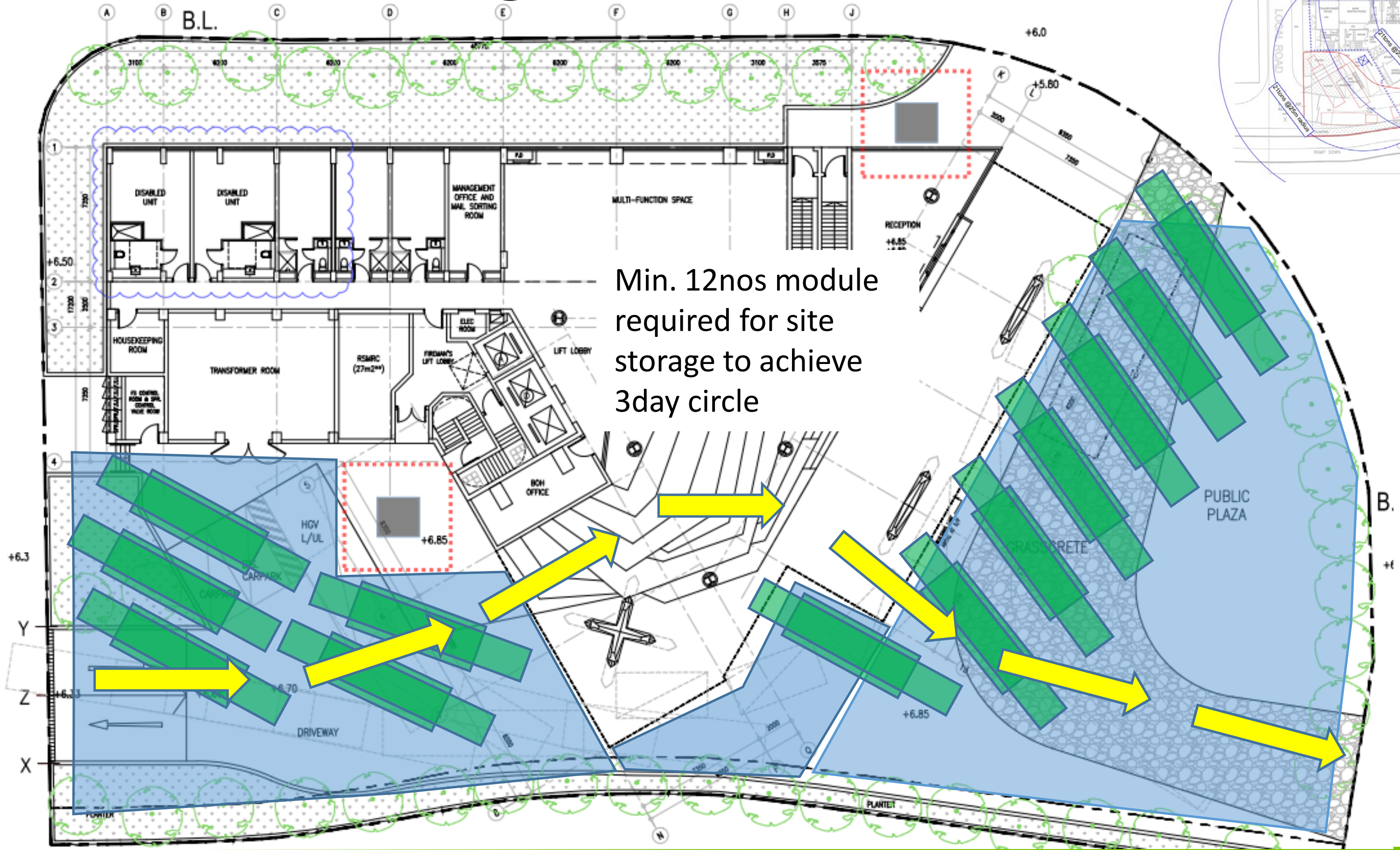
Subject to swept path and temporary traffic assessment

Environmental Restriction

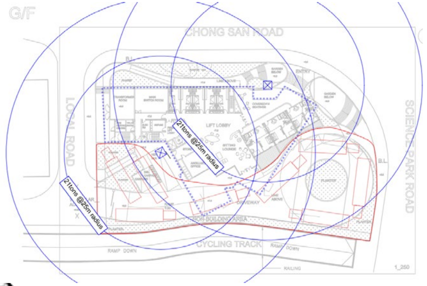
EPD Requirement for Noise Control	
Barge Loading/Unloading	
Preferred Barge Loading Hours	8:00am to 9:00pm
Cease Barge Loading Activities	11:00pm to 7:00am
Assumed Sound Power Level	
Lorry	112 dB(A)
Tower Crane	95 dB(A)
Basic Noise Levels	
Evening Hours 7:00pm to 11:00pm	65 dB(A) for InnoCell Site
Night Hours 11:00pm to 7:00am	50 dB(A) for InnoCell Site

Accommodate 8 nos. of modules on site over night (7nos + 1no buffer)
2nos. Of 40m Jib Luffing Crane (21tons capacity @ 25m Jib)

Construction Site logistics



Min. 12nos module required for site storage to achieve 3day circle

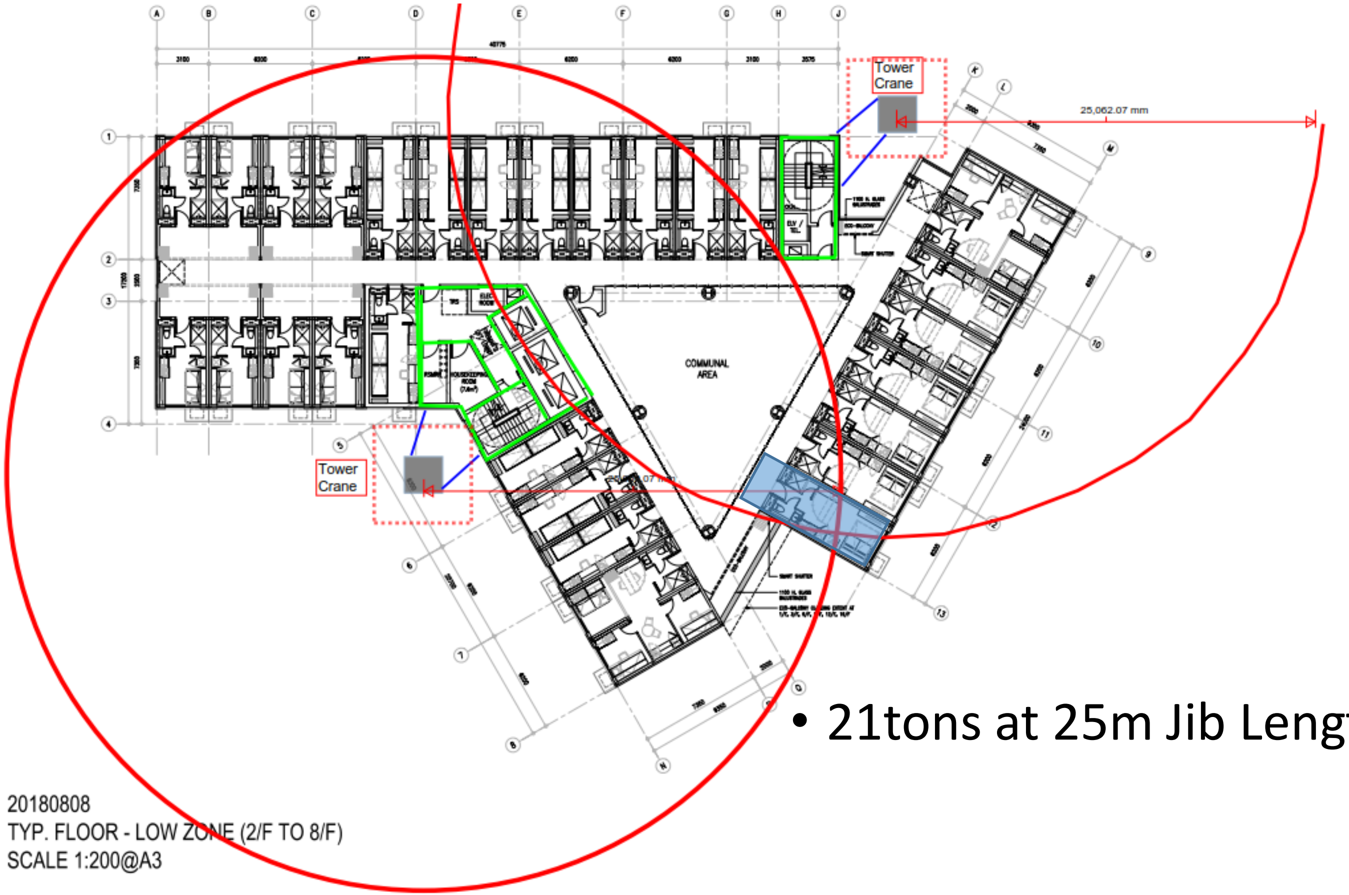


Construction Site logistics

1no. Site Gantry (6m wide)

2nos. Site Gantry (6m & 7.5m wide)

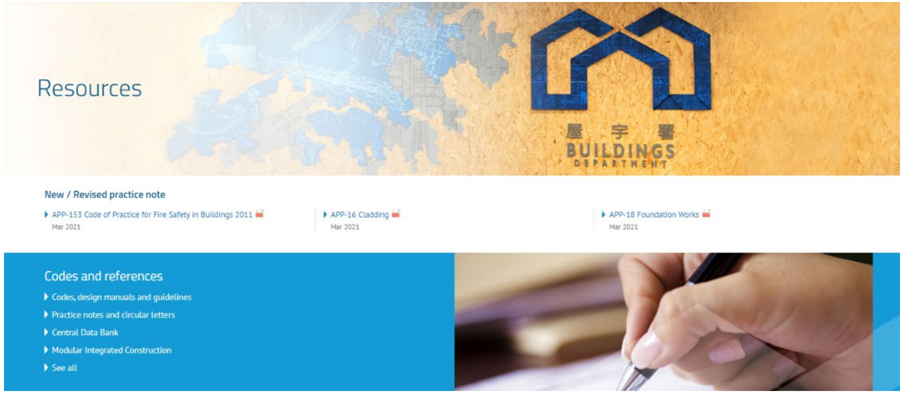
Hoisting / Tower Crane Arrangement



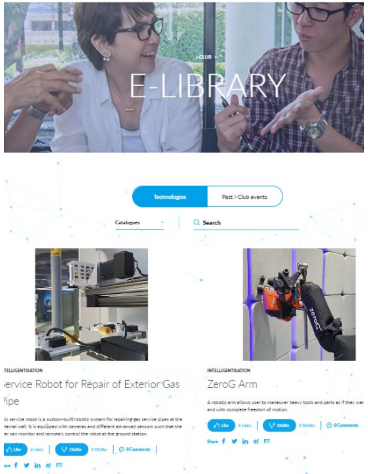
- 21tons at 25m Jib Length

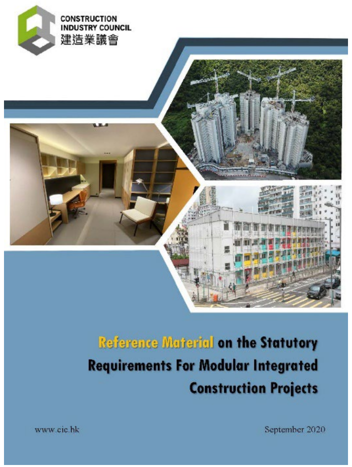
20180808
TYP. FLOOR - LOW ZONE (2/F TO 8/F)
SCALE 1:200@A3

Knowledge sharing



BD Central Data Bank





CIC i-Club Technical Library

MiC Reference Materials /
Potential Model Specifications

Project Case Study:

Overseas MiC / DfMA projects

Embedded Connection Between Insitu RC Core and MiC Module Connection Points

Overseas MiC project

Lessons Learnt

from best practice, overseas experience

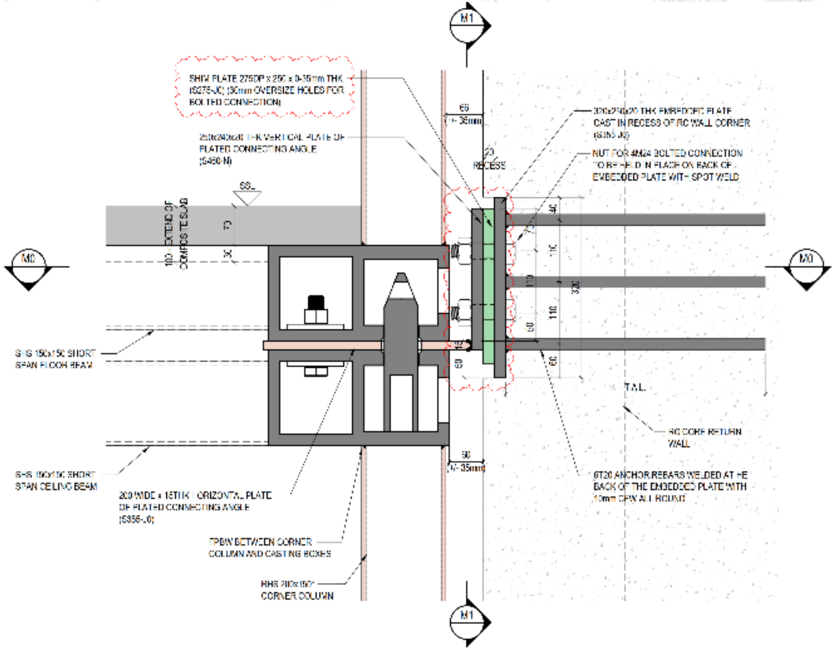
Misalignment of Post Drill Connection

Images Courtesy of HKSTP, WSP HK & HipHing

Lessons Learnt

from best practice, overseas experience

Embedded Connection Between Insitu RC Core and MiC

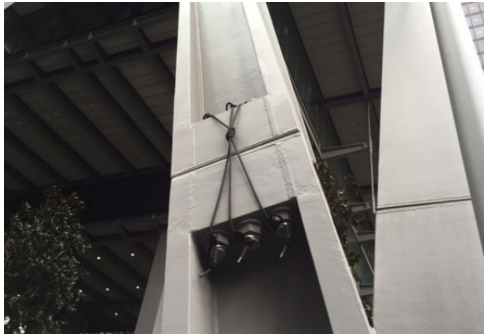


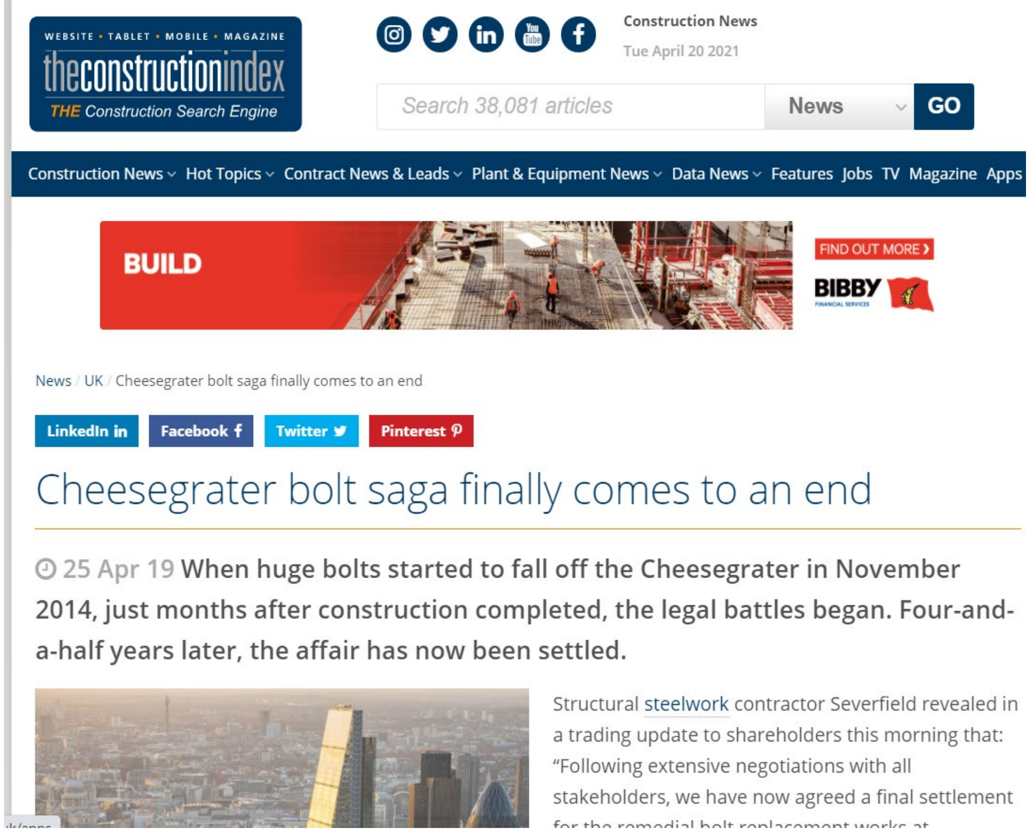
Improved Embedded Connection in InnoCell

Images courtesy of HKSTP, WSP HK & HipHing

Leadenhall Building (A.K.A. Cheesegrater)

Hydrogen Embrittlement





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News / UK / Cheesegrater bolt saga finally comes to an end

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Cheesegrater bolt saga finally comes to an end

25 Apr 19 **When huge bolts started to fall off the Cheesegrater in November 2014, just months after construction completed, the legal battles began. Four-and-a-half years later, the affair has now been settled.**

Structural steelwork contractor Severfield revealed in a trading update to shareholders this morning that: “Following extensive negotiations with all stakeholders, we have now agreed a final settlement

Avoid ultra high strength bolt and simplified diagrid splicing connection

Images Courtesy of Canary Wharf Group, HCLA & WSP UK

Overseas Project Sharing

Newfoundland, Canary Wharf

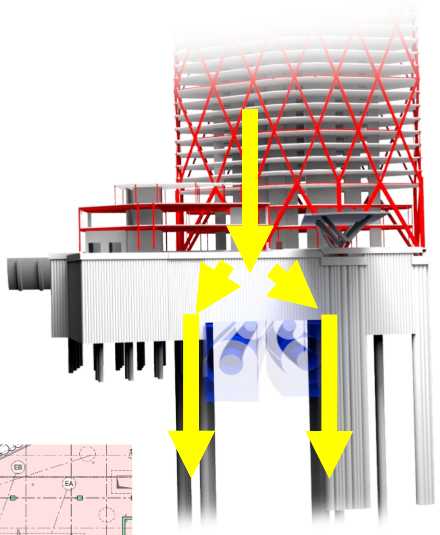
Client – Canary Wharf Group

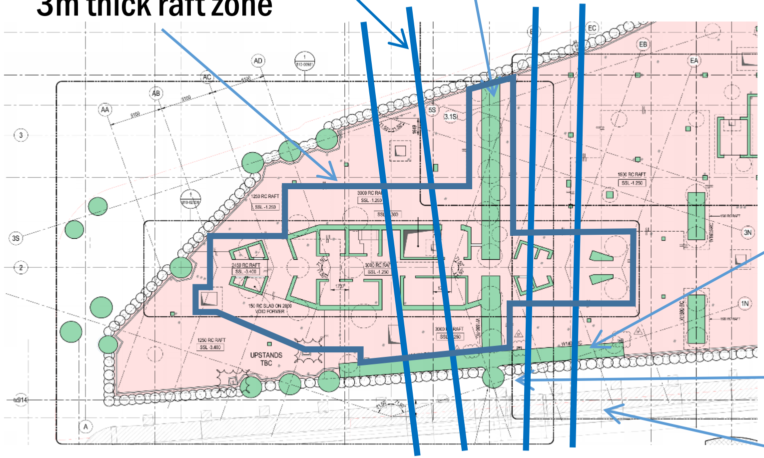
- +220m 60-story Tall Residential Tower
- 3 Level basement utilising Enhanced Retaining Wall (skin wall) acting as transfer structure
- Exo-skeleton Diagrid with Hybrid DfMA to reduce construction time by 10%
- 4-floor Jump and Superstructure Top-down Approach

Council on Tall Buildings and Urban Habitat

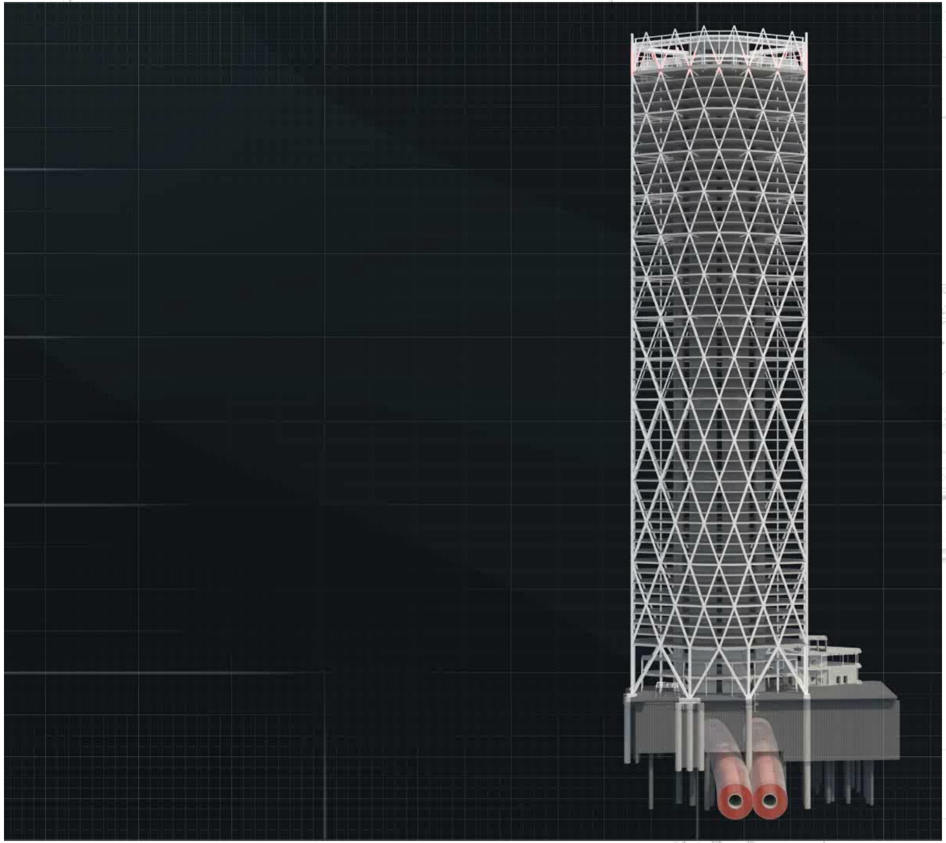
Best Tall Building 200-299m – CTBUH Annual Award 2021

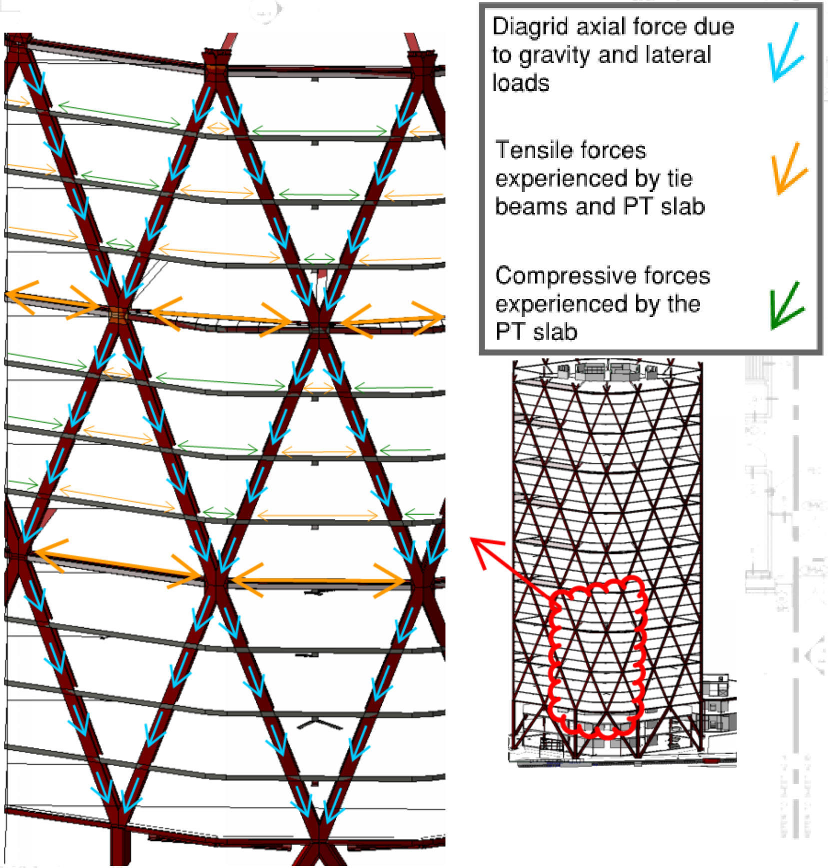
Basement transfer structures





Images Courtesy of WSP UK



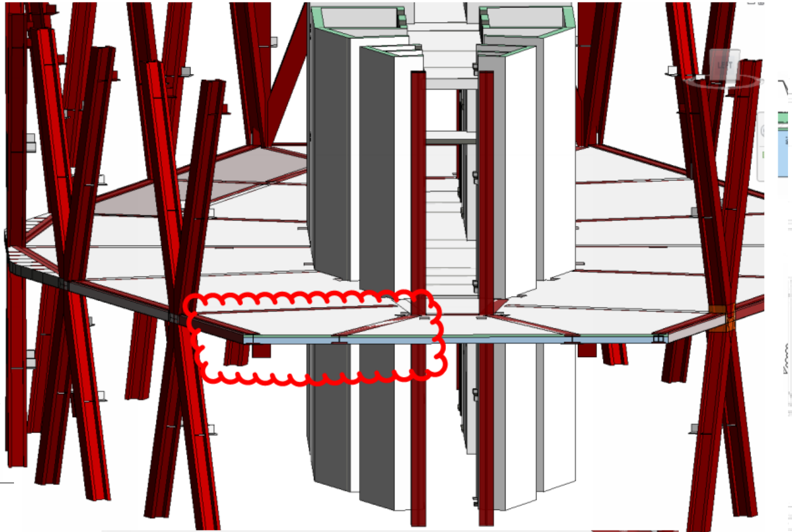


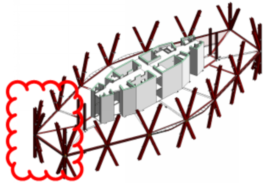
Images Courtesy of WSP UK

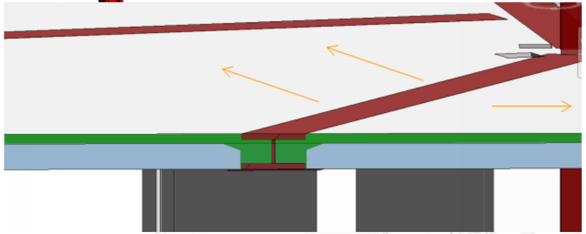
Overseas Project Sharing

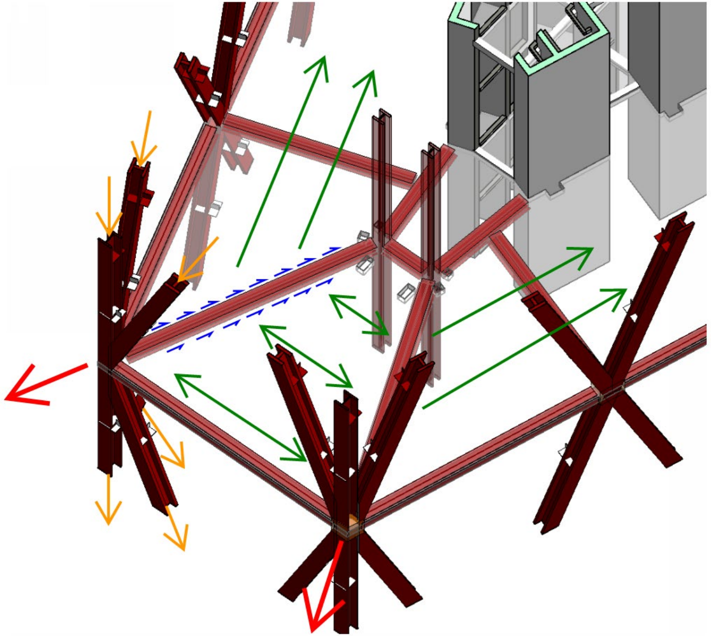
Newfoundland, Canary Wharf

Node floor







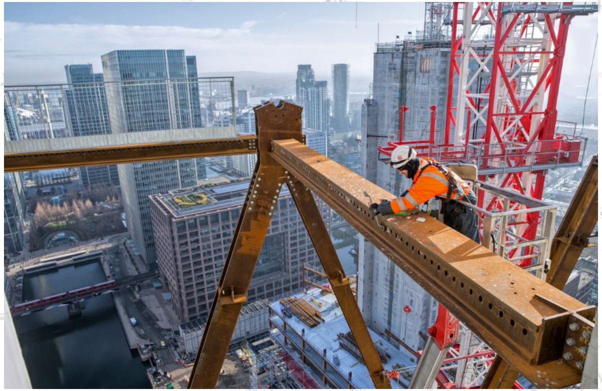


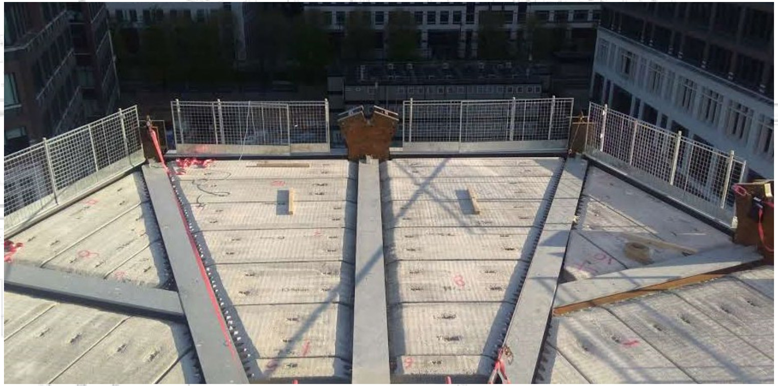
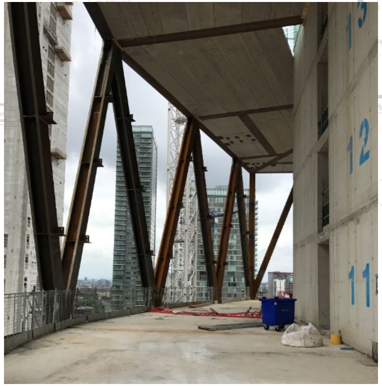
Images Courtesy of WSP UK

Overseas Project Sharing

Newfoundland, Canary Wharf

Hybrid solution developed



Images Courtesy of Canary Wharf Group & WSP UK

Day 1: Conclusions

1. Introduction to CIC 2-Day Taster Courses for University Students.
2. Importance of Civil and Structural Engineers in modernisation and transformation of the construction industry.
3. BIM in Planning and Design Stage.
4. CIC Support on BIM.
5. Hands-on Workshop on BIM Authoring Tool.
6. Embodied Carbon and CIC Carbon Assessment Tool (CAT).
7. BIM in (Design to) Construction Stage.
8. Hands-on Workshop on BIM Viewing Tool.
9. DfMA/MiC Project Case Study - InnoCell (HSTP)

Day 1: Key Takeaways

1. Know how importance you are as a Civil or Structural Engineer to drive the adoption of modern construction methods.
2. Think (Design) more and Do (Construction) smart.
3. Architect is your partner. Embrace innovative and collaborative mindset.
4. Remember some BIM uses in construction.
5. Equip yourselves with knowledge and skills in BIM/Digitalisation in construction
6. Consider to obtain CCBC and CCBM qualificataion.
7. Embodied carbon management is the key to drive carbon neutrality in Hong Kong.

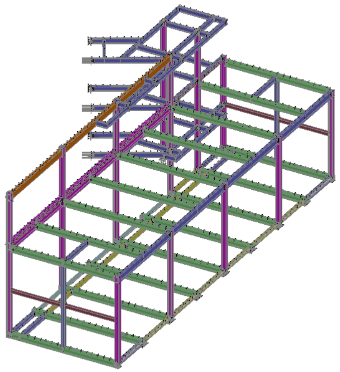
7. Day 2: Manufacturing and Construction Stage (Continued)

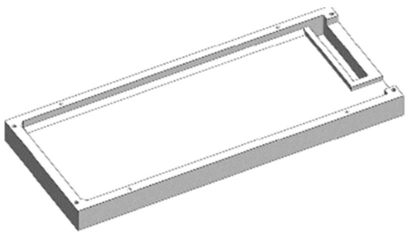
Project Case Study:

InnoCell

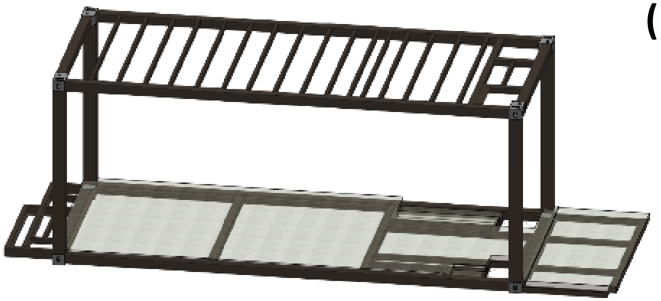
Hong Kong Science & Technology Parks Crop

The InnoCell





Structural steel works for terrace & Precast RC roof (R, UR, TR/F)



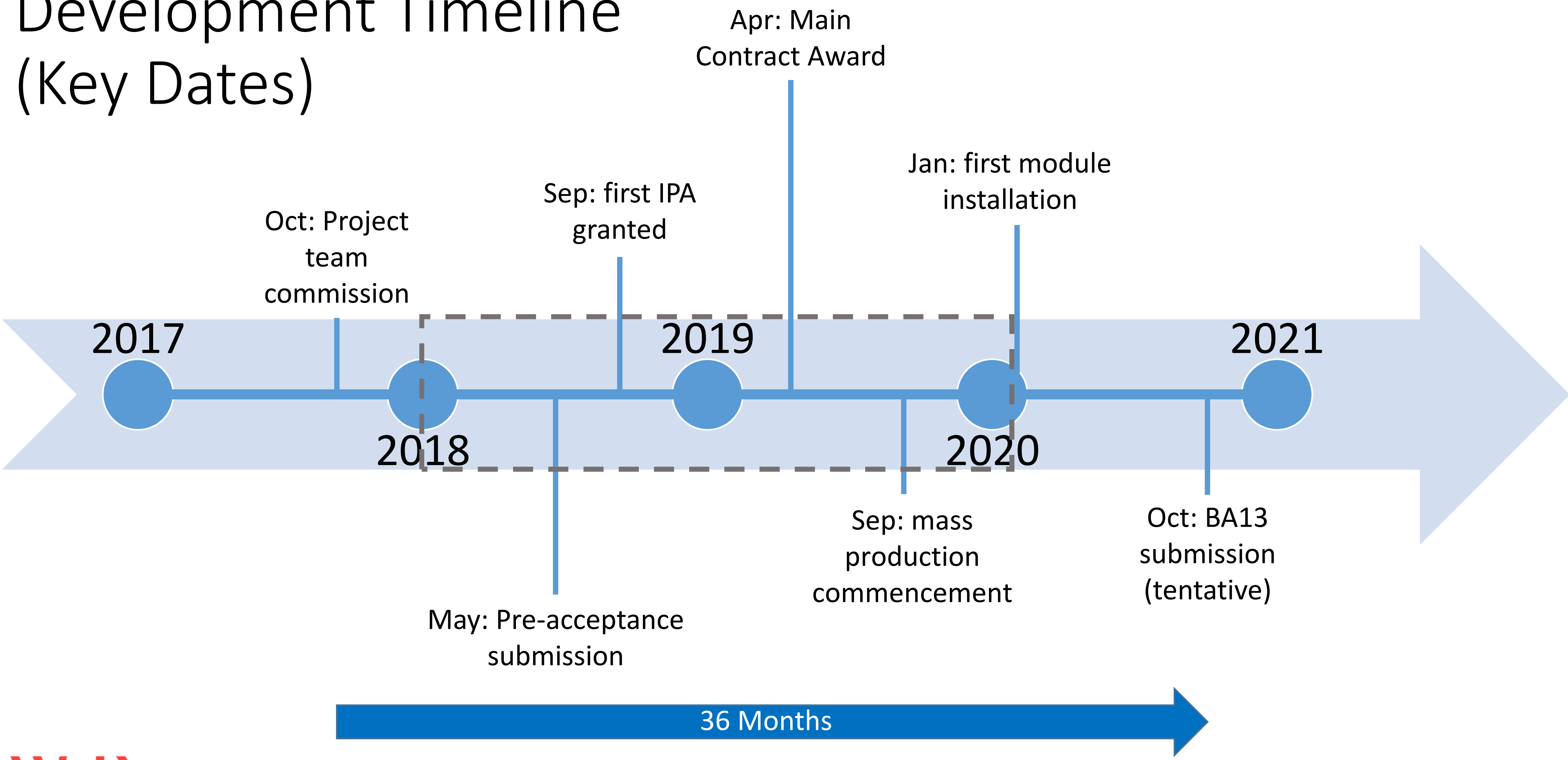
418 Nos. MiC modules (1 – 17/F)

RC transfer plate / beams (1, 2/F)

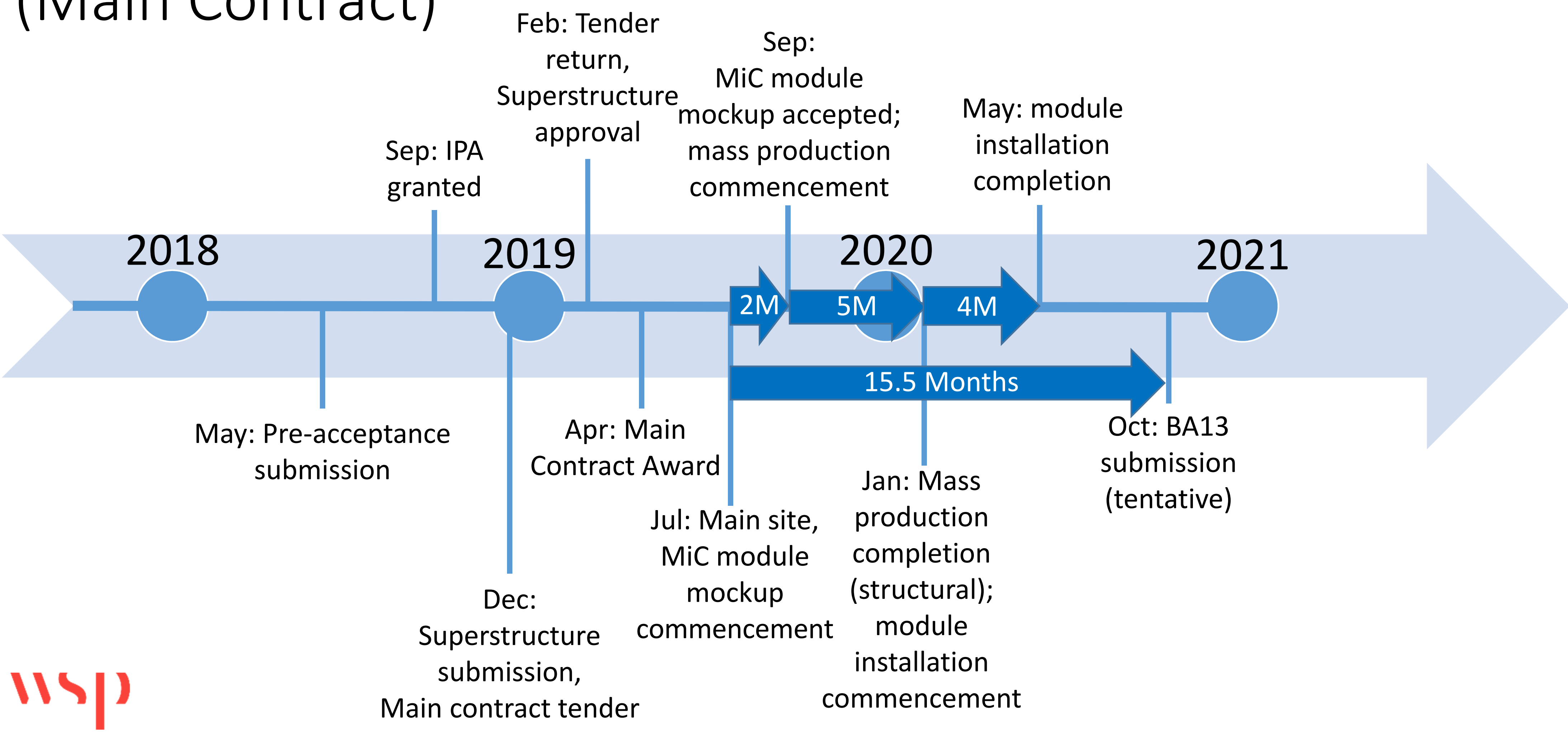
Basement & RC podium (B, G, UR/F)

Development Timeline

Development Timeline (Key Dates)



Development Timeline (Main Contract)



wsp

Site Progress

Site Progress

1. Open excavation – Late July, 2019

2. Pile cap construction – Late Aug, 2019

Site Progress

3. Basement construction – Early Sep, 2019

4. G/F construction – Mid Sep, 2019

Site Progress

5. Transfer floor construction – Late Oct, 2019

6. Core wall construction – Mid Dec, 2019

Site Progress

7. Core wall construction – Early Jan, 2020

8. Module installation– Late Jan, 2020

Site Progress

9. Module installation– Mid Mar, 2020

10. Installation completion– Late May, 2020

Site Progress

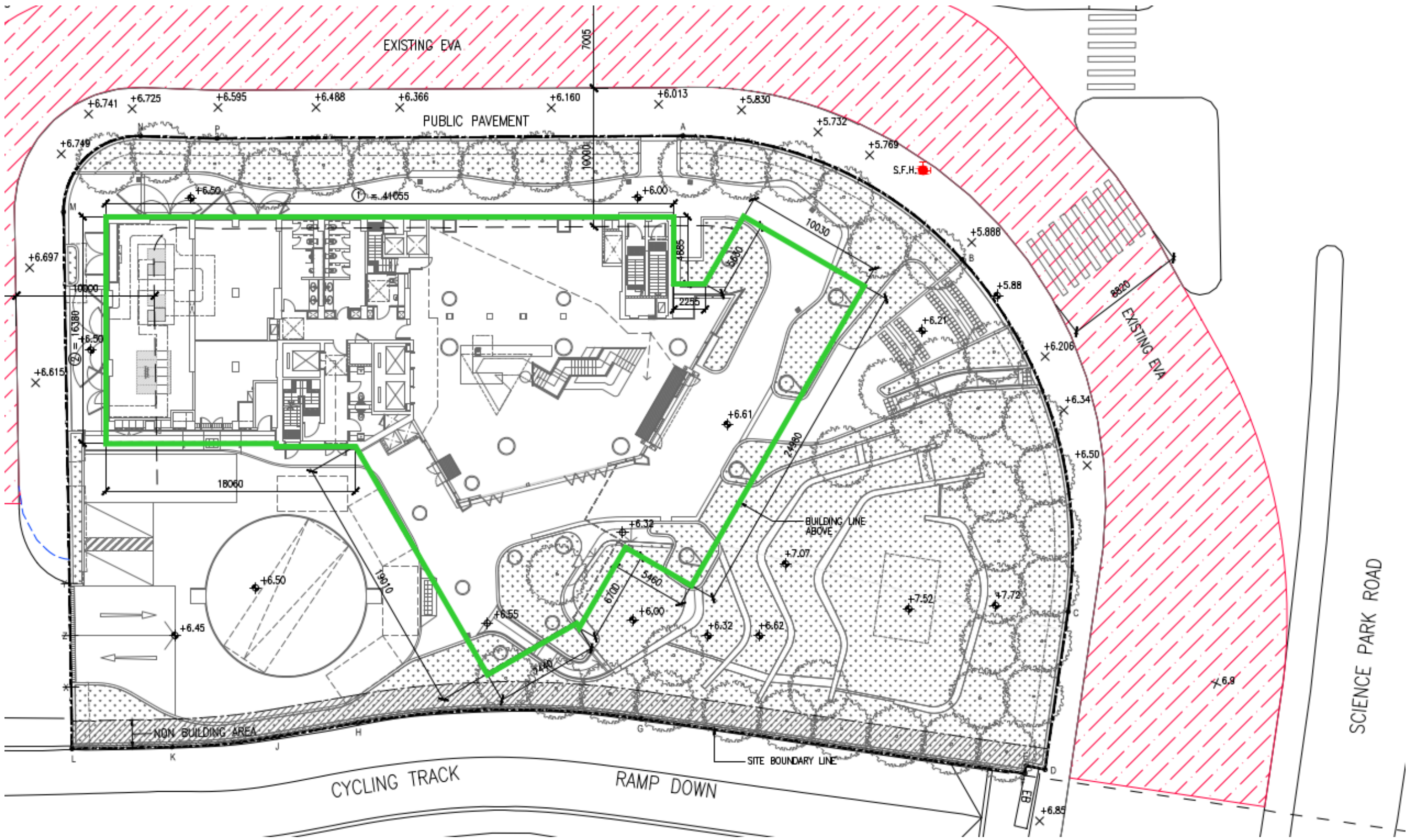
11. Recent– Early Sep, 2020

Engineering Ideas Advanced in Early Development

Engineering Ideas Advanced in Early Development

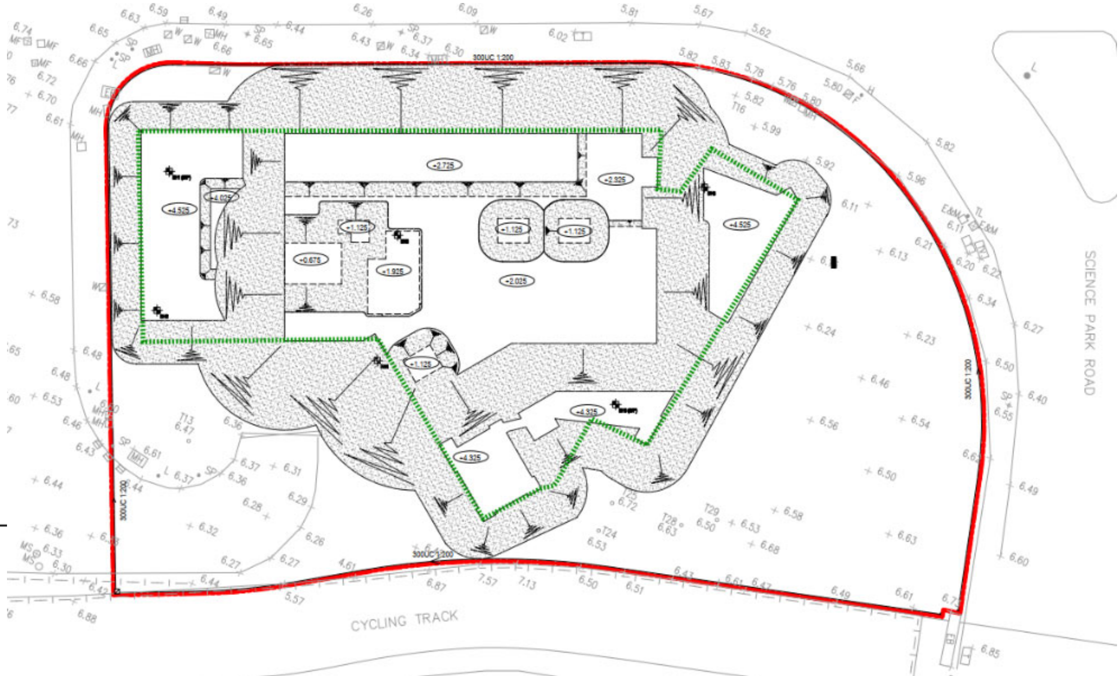
<u>Challenges</u>

- Need for a basement
- Limited space between basement to site boundary



(Image courtesy of Leigh & Orange Architects)

Engineering Ideas Advanced in Early Development

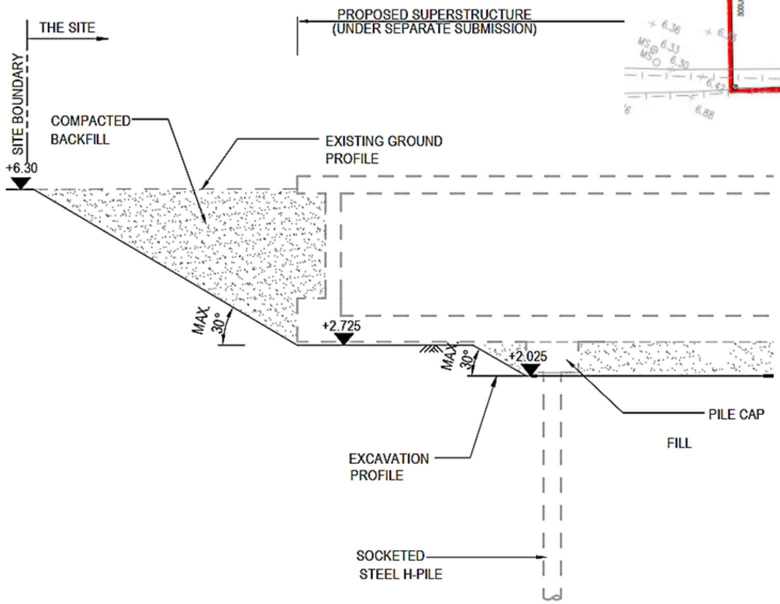


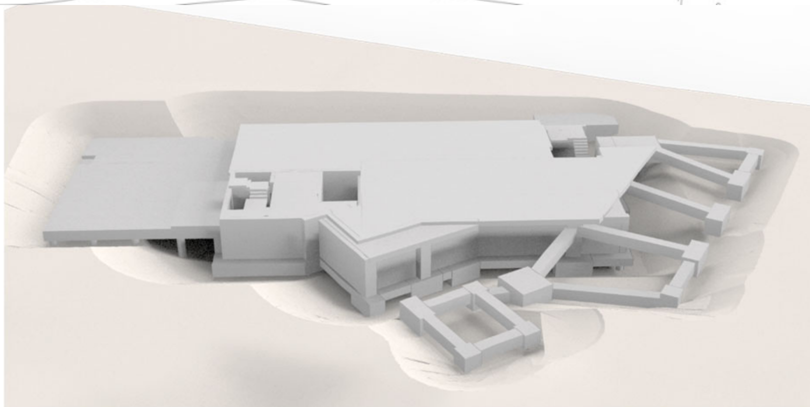
Solutions

- Reduce pile cap thickness
- Use pile cap as basement slab
- Provide trenches for MEP services

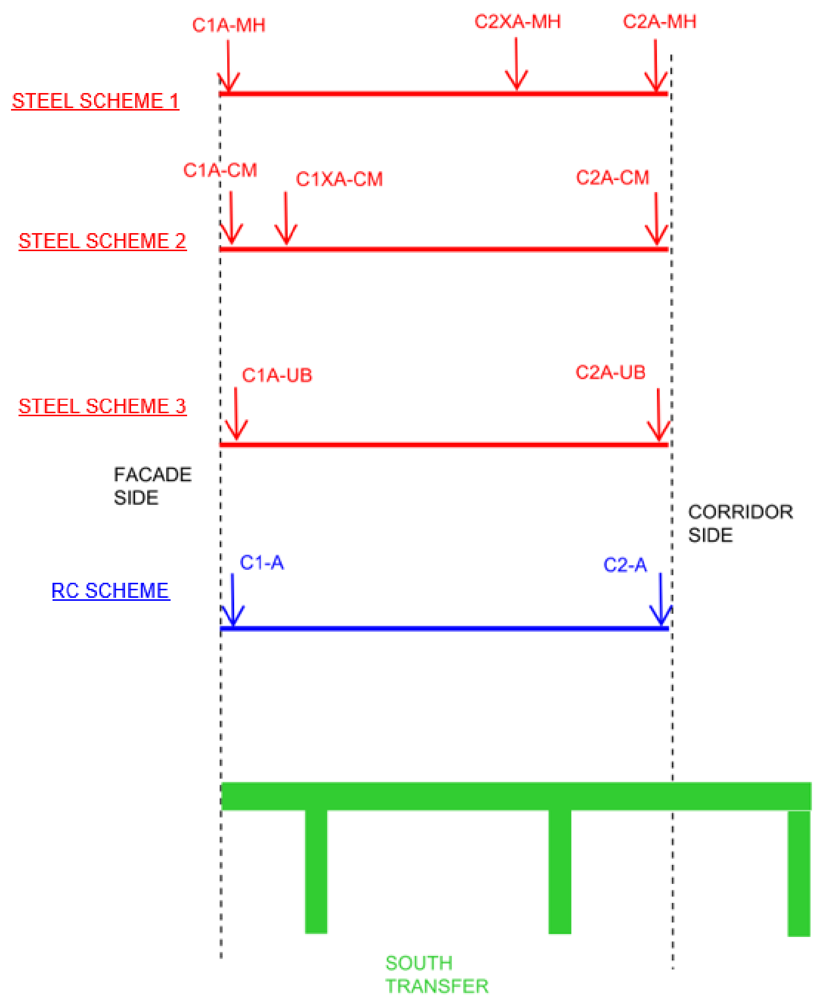
Advantages

- Cost-saving
- Time-saving





Engineering Ideas Advanced in Early Development



Challenges

- Consider various MiC vendor systems
- Different supporting system for MiC
- Affect loading distribution at transfer beam/foundation

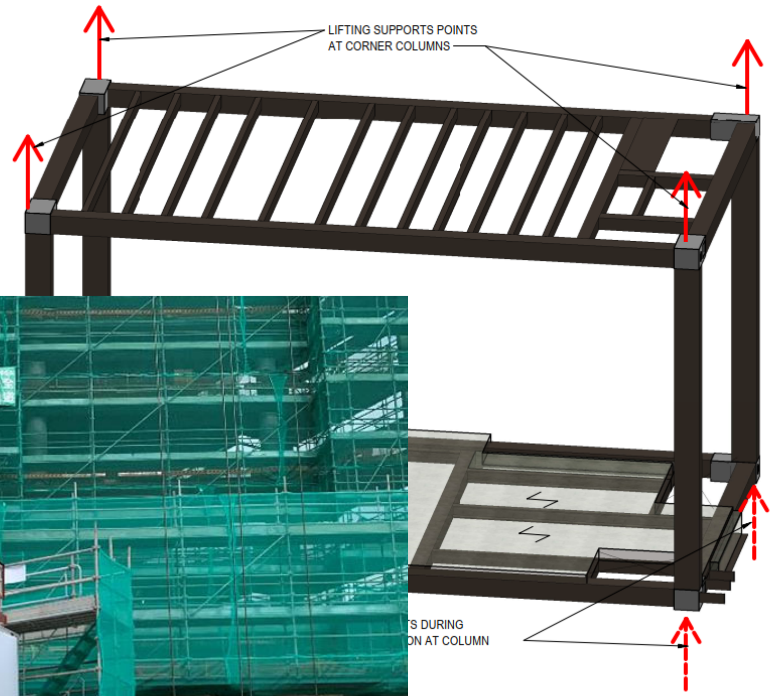
Solutions

- Allowed different load arrangement in design of transfer beam/foundation

Advantages

- Flexible to allow different type of MiC

Engineering Ideas Advanced in Early Development



Challenges

- Consideration of temporary loading conditions of modules
- Limited storage space in site

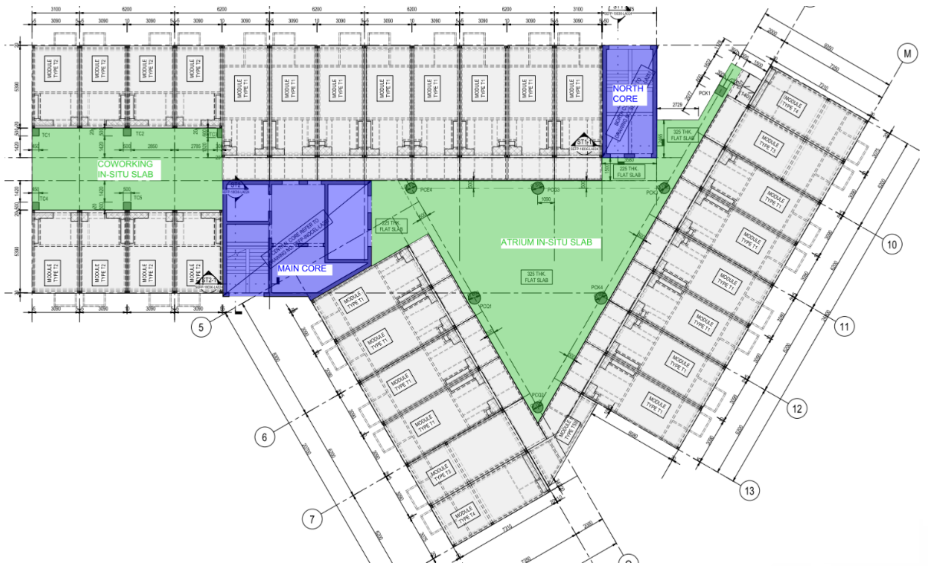
Solutions

- Allowed modules to be stacked in two layers temporarily

Advantages

- Doubled storage capacity

Engineering Ideas Advanced in Early Development



Challenges

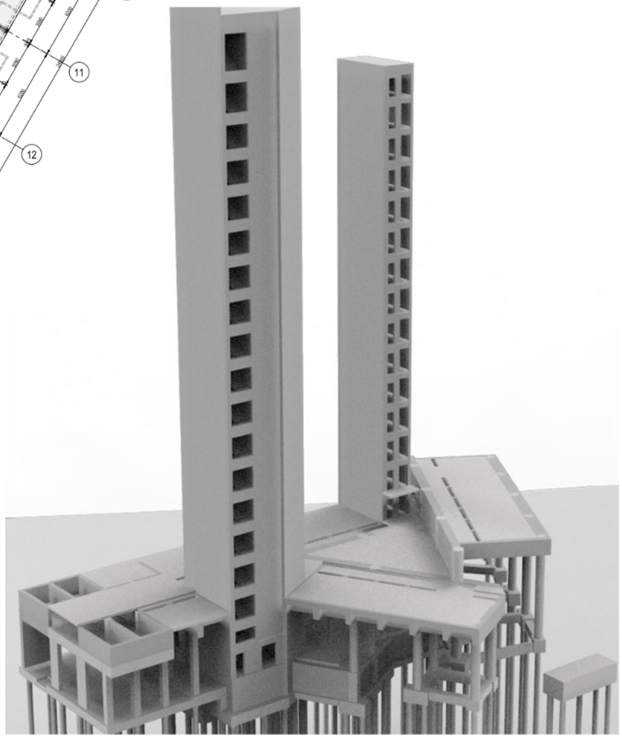
- Consideration of construction sequence of core and MiC units

Solutions

- Core to be erected in advance
- Provide the lateral stability in both permanent and construction stages

Advantages

- Enhanced efficiency and flexibility in erection of MiC units



Engineering Ideas Advanced in Early Development

Challenges

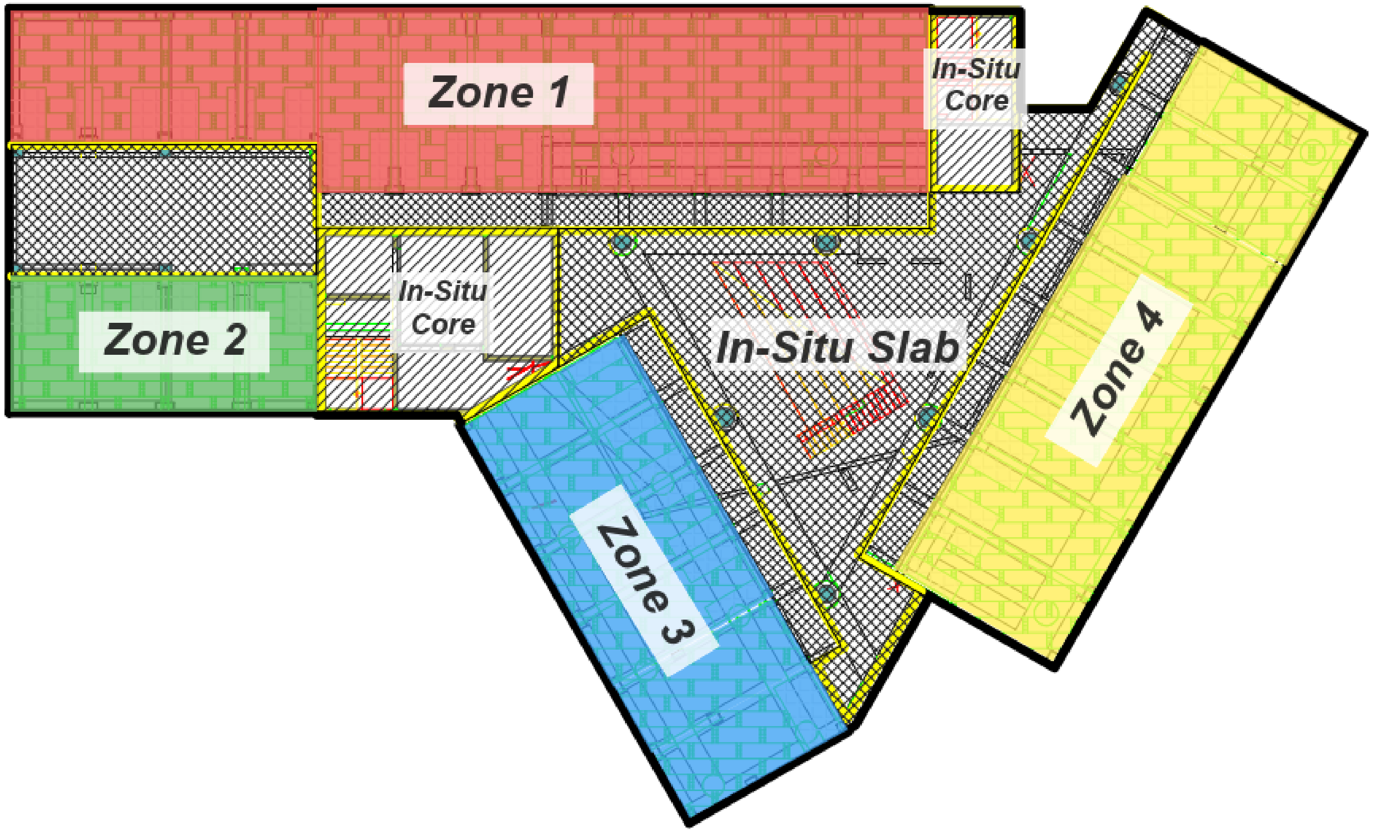
- Inconsistent fabrication start time of module types

Solutions

- Modules to be installed in sequence of zone, not floor

Advantages

- Enhanced efficiency and flexibility



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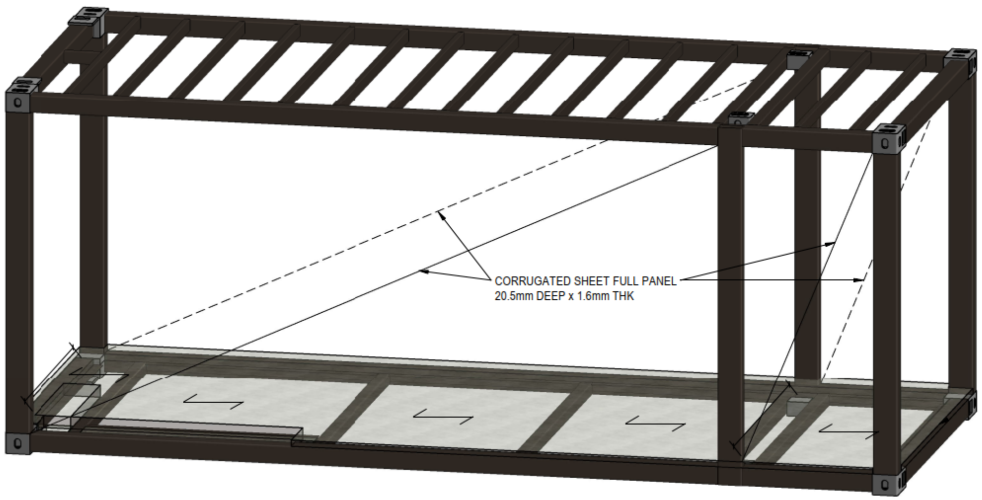
Engineering Ideas Advanced in Early Development

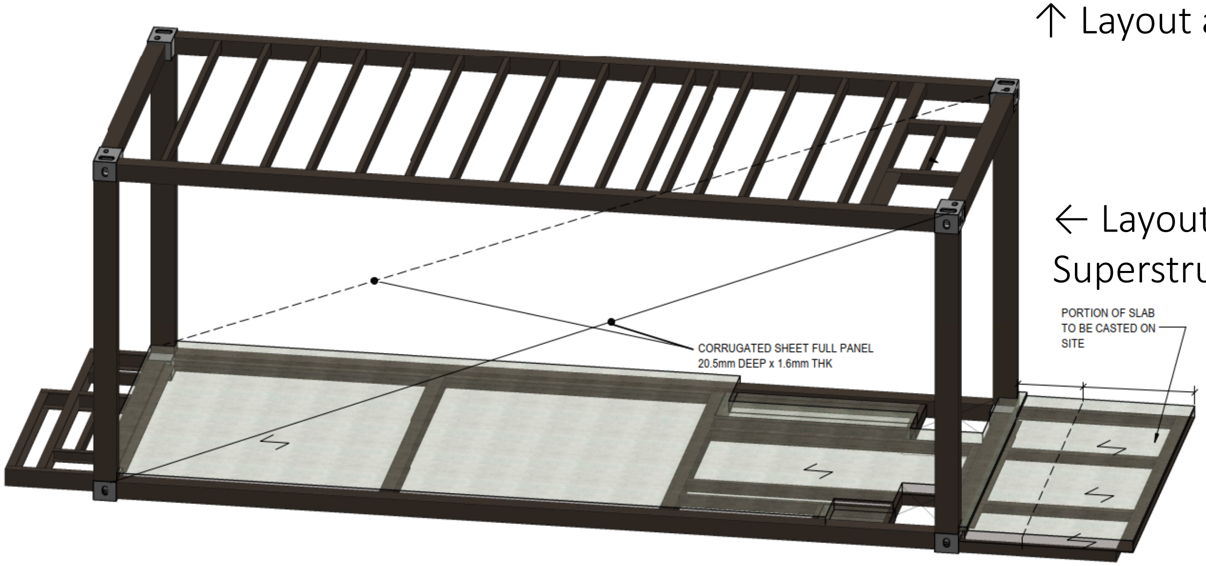
<u>Challenges</u>
- Design change after IPA granted

<u>Solutions</u>
- Compared differences and justify in Superstructure submission

<u>Advantages</u>
- Changes are allowed before fabrication



↑ Layout accepted in IPA



← Layout approved in Superstructure

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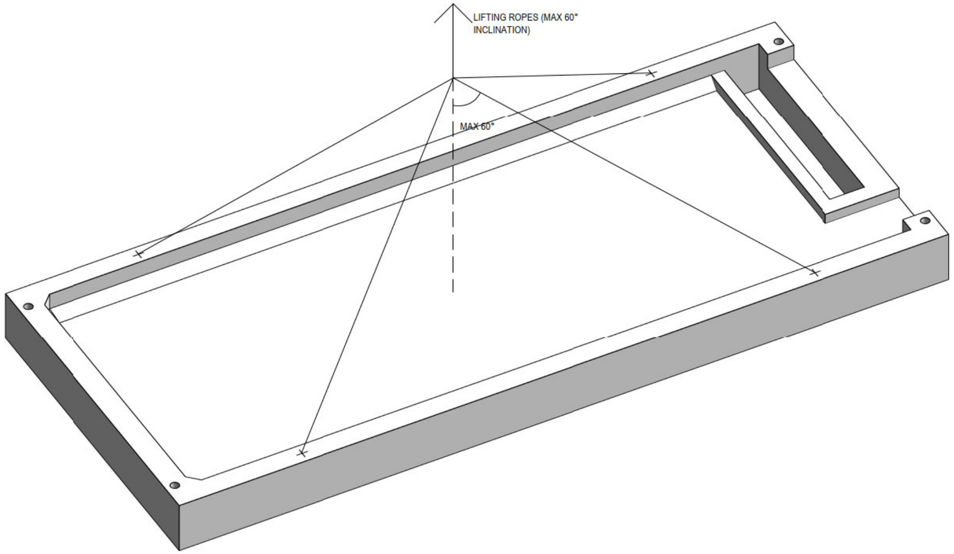
Engineering Ideas Advanced in Early Development



Challenges

- Enhance application of DfMA

Solutions

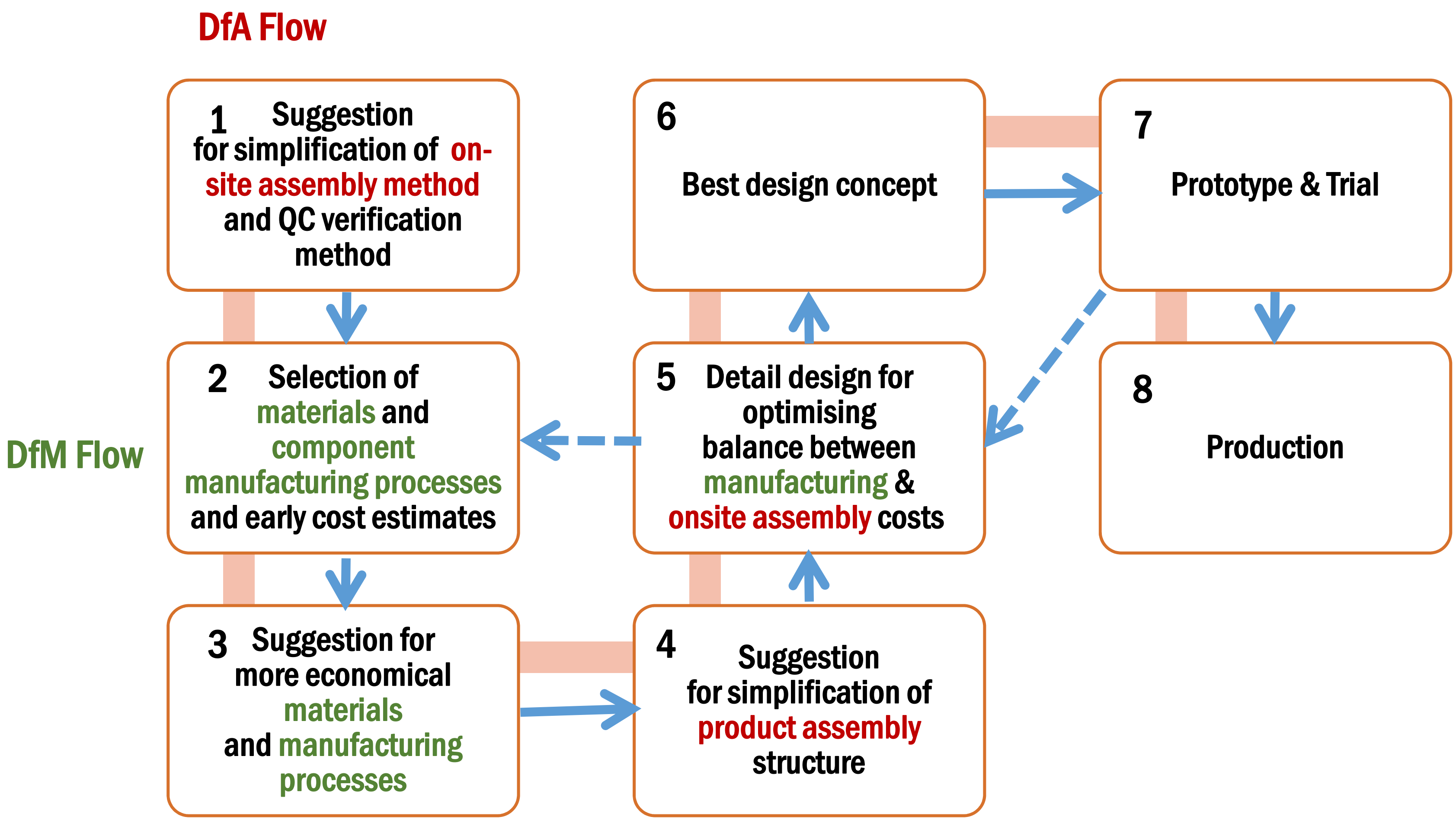
- Precast slabs for roof

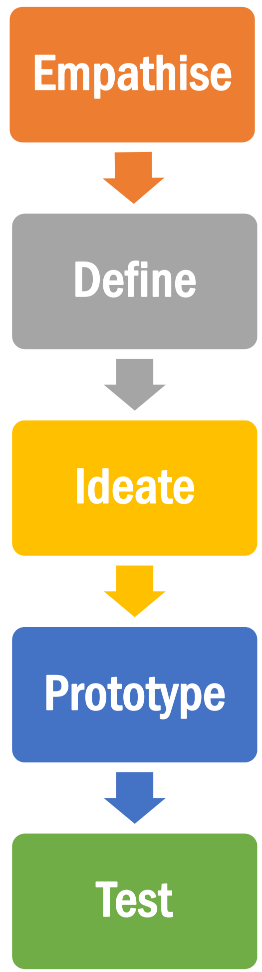
Advantages

- Improved quality control

DfMA Design Process

Design Thinking Process



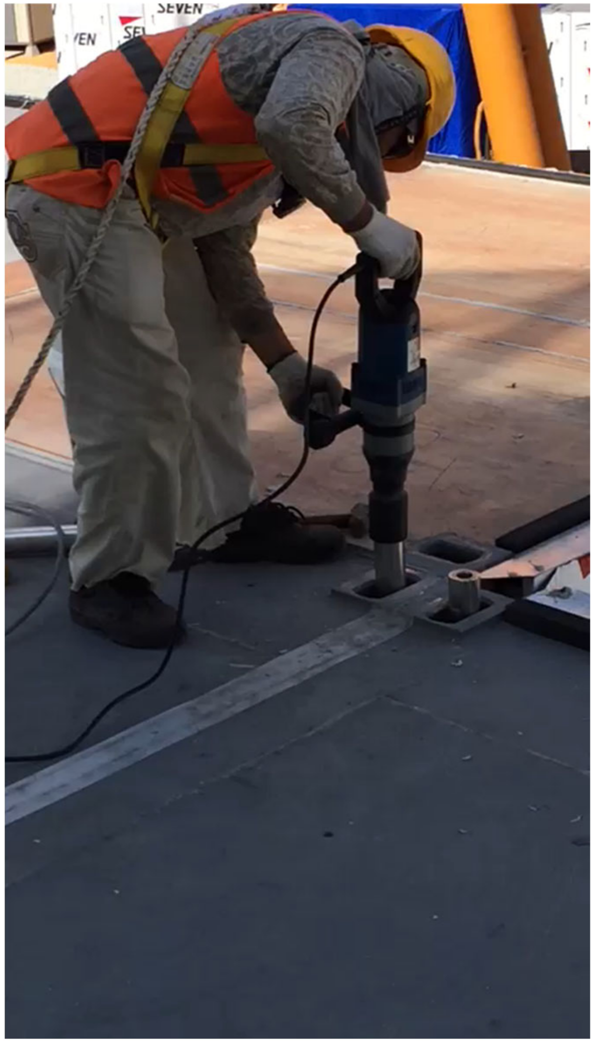


TRIAL INSTALLATION

InnoCell – Trial Assembly in Factory (1:30s-)

Site installation

(In courtesy of IMax)



Design for Assembly

Quality Control & Safe Installation of Preloaded Bolt using Hydraulic Wrench and Special Adaptor

Tighten Preloaded Bolt by Manual Torque Wrench

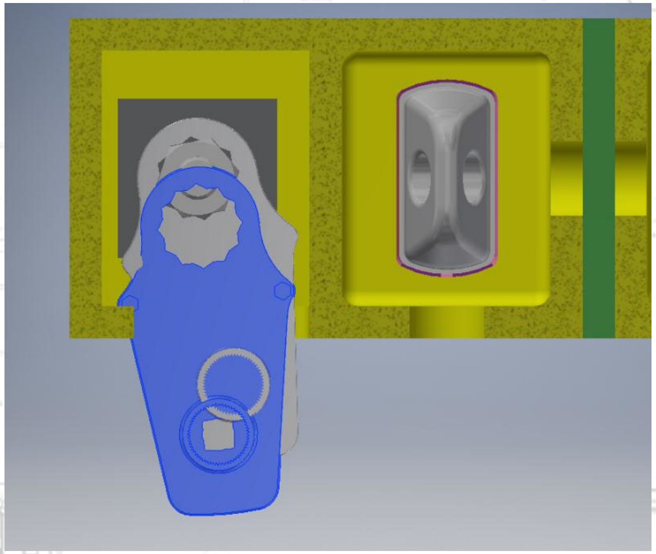
Typical Hydraulic Wrench

Special Adaptor

Images courtesy of WSP HK & CIMC

Design for Assembly

Re-engineering of Connection Box to Resist High-Rise Building Loads and Fit for Insertion of Special Adaptor



Tighten Preloaded Bolt by Hydraulic Wrench & Special Adaptor

Re-engineering of Connection Box to Resist High-Rise Building Load and Fit for Insertion of Special Adaptor

Images Courtesy of HKSTP, L&O, WSP HK, HipHing and CIMC

Application of latest GB standards and Subgrade JR for Steel Building Structure

Adoption of GB Steel for MiC Modules for Building Projects in Hong Kong

1. Recommendation

It is recommended to accept structural steel hollow sections and steel plates of Grade Q355B to

that the cost of the GB steel commonly used in the Greater Bay Area is lower than that of the Grade S355J0 steel).

2.4 Specifying S355J0 for building projects in Hong Kong is simple, straightforward, but very conservative as the average daily temperatures at the construction sites in Hong Kong in winter months are well above 0 °C. It should be noted that design codes and professional guides on steel construction in many countries, including Hong Kong, provide equivalent design guidance

Appendix A

Hong Kong Code of Practice for Structural Use of Steel 2011 - Steel Subgrade Selection

The maximum basic thickness for minimum service temperature, 27J Charpy impact value and strength

The minimum service temperature T_{min} in the steel should normally be taken as 0.1 °C for external steelwork.

T_{27J} is 20 °C for the test temperature of Subgrade JR (Class "B" in GB code)

Y_{nom} is 355 N/mm2 for the steel plate thickness no greater than 16mm

N = (0.1-20) / 10 = -1.99

t_1 = 50 x (1.2)^-1.99 x (355/355)^1.4 = 35.4mm

For stress above 0.3 Y_{nom} and welded connections to the unstiffen flanges/across ends of cover plates, K = 0.5 refer to Table 3.8 below

Table 3.8 - Factor K for type of detail, stress level and strain conditions

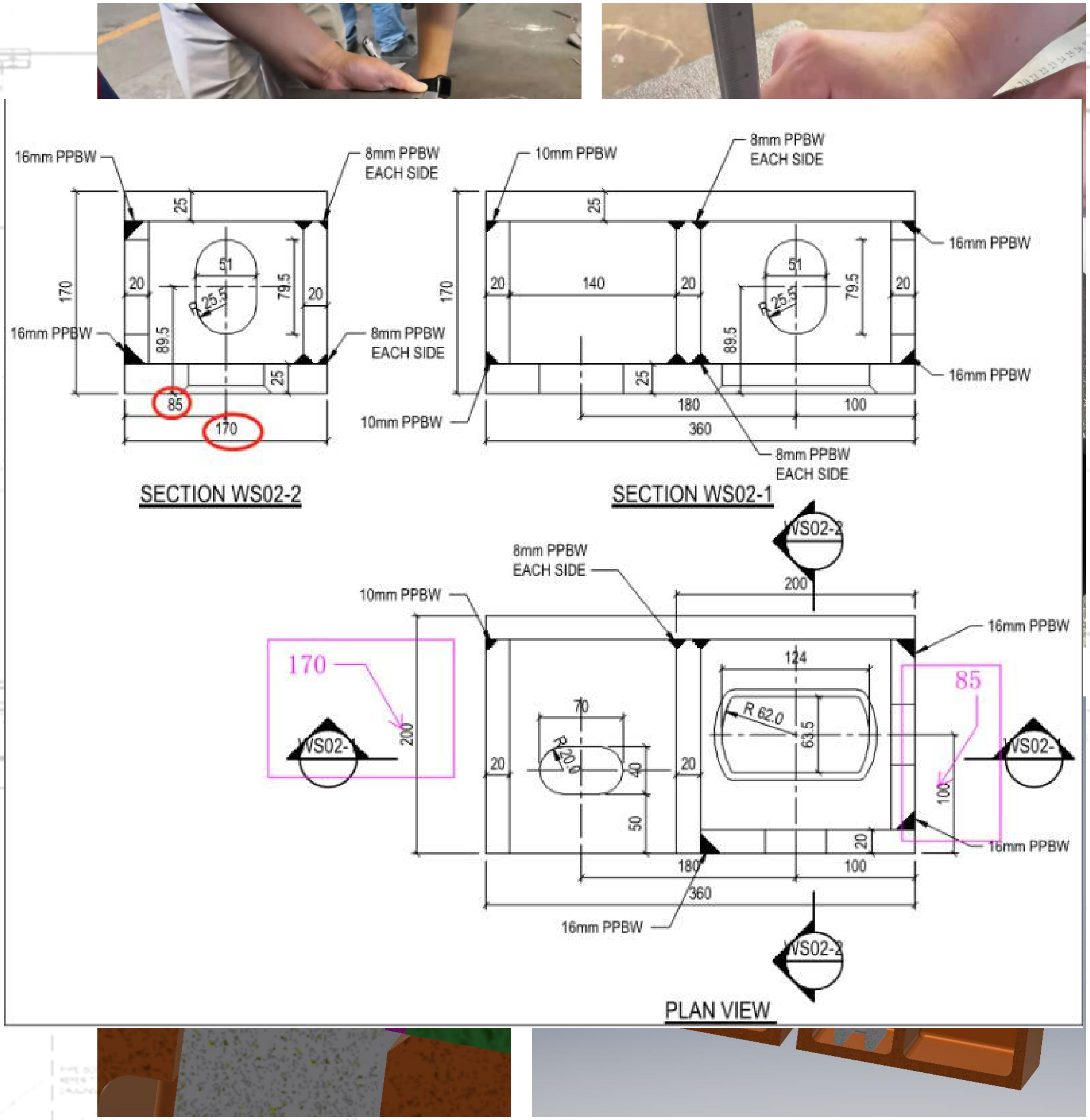
- Why do we push for this?
- Cheaper material cost?
- Lead time to order the raw materials which is crucial for the construction of the quarantine facilities.

INNO+ CELL

Prefabrications of MiC

Design for Manufacture

Die Cast Mould of Connection Box
Reuse for 20,000 times



S275 Steel Grade
See Appendix A1.2 Castings and Forgings in HK COP Structural Use of Steel 2011

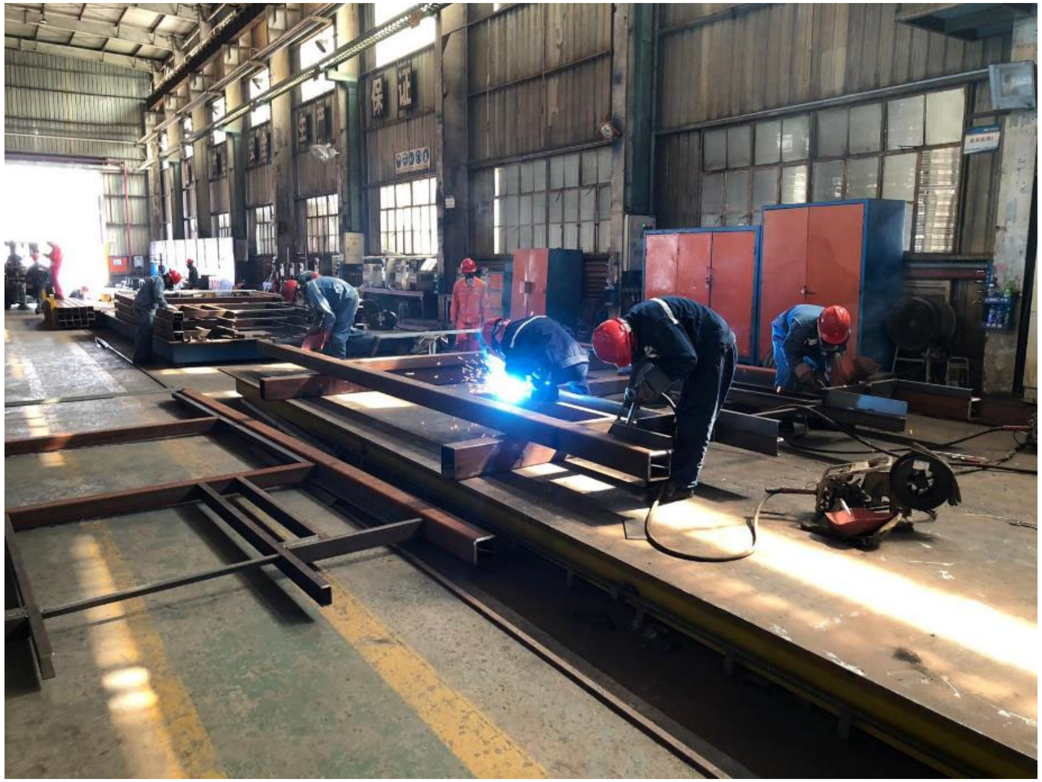
Images Courtesy of WSP HK, CIMC

Fabrication Procedures

1. Material delivery

2. Material treatment (~0.5 days)

Fabrication Procedures



3. Welding to form parts (~1 day)

4. Galvanizing (~3 day)

Fabrication Procedures

5. Surface treatment at welded joints (~0.5 days)

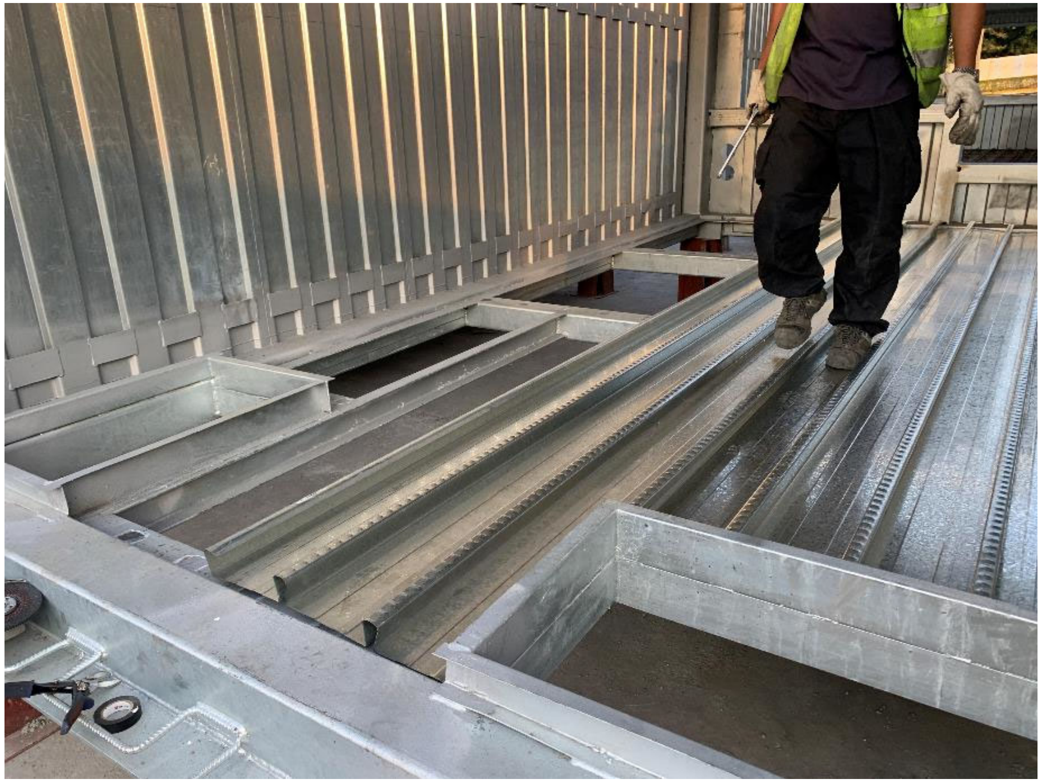
6. Module assembly (~0.5 days)

Fabrication Procedures

7. Weld test (~0.5 days)

8. Application of anti-corrosion paint at weld joints (~0.5 days)

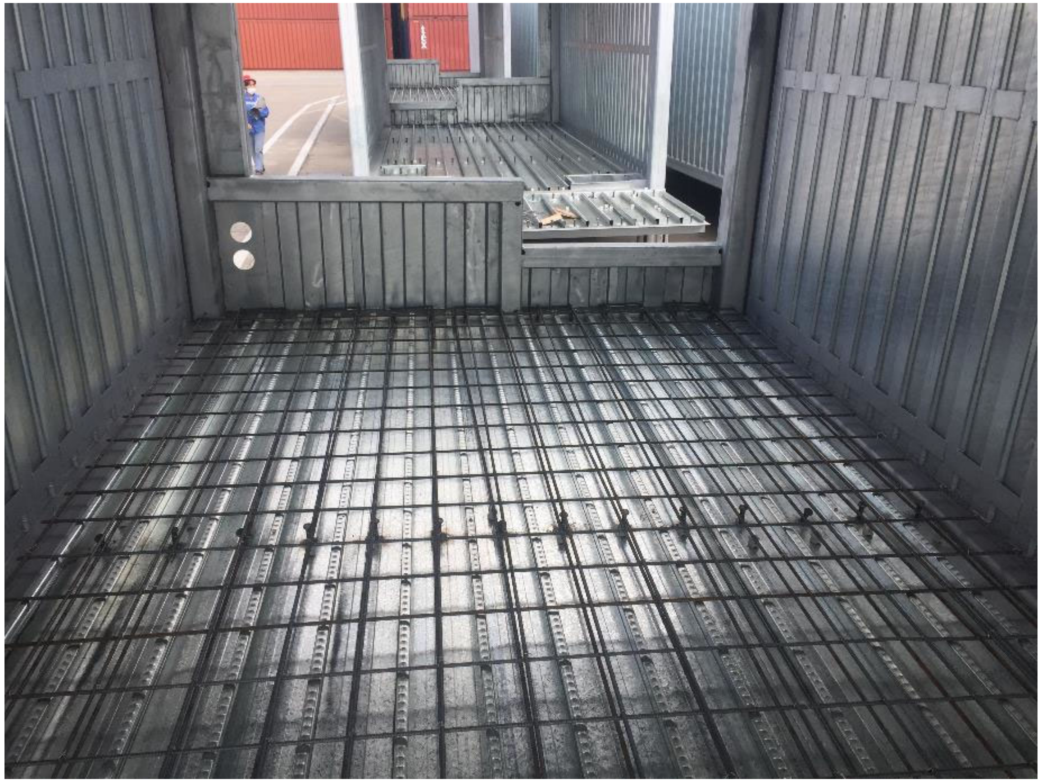
Fabrication Procedures



9. Bondek installation (~0.5 days)

10. Shear studs welding (~0.5 days)

Fabrication Procedures



11. Rebar fixing (~0.5 days)

12. Concreting (~0.5 days)

Factory Supervision

Factory Supervision

1. Material delivery

2. Material treatment

3. Welding to form parts

4. Galvanizing

Material verification and sampling

Welding test

Measurement of thickness of galvanizing layer

Factory Supervision

5. Surface treatment at welded joints

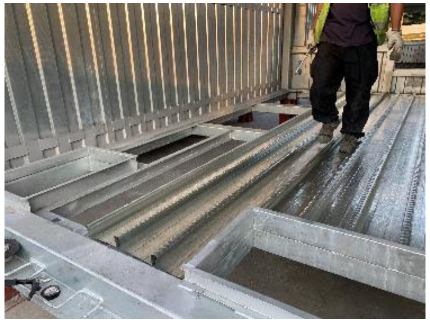
6. Module assembly

7. Weld test

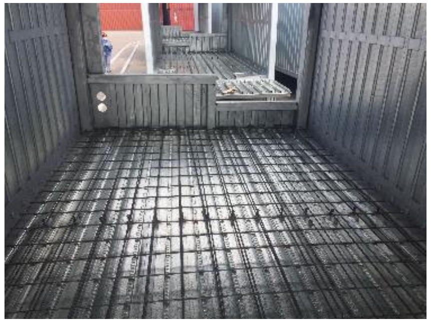
8. Application of anti-corrosion paint at weld joints

Measurement of module size

Factory Supervision


9. Bondek installation


10. Shear studs welding


11. Rebar fixing


12. Concreting

Bending test of shear stud


Rebar checking

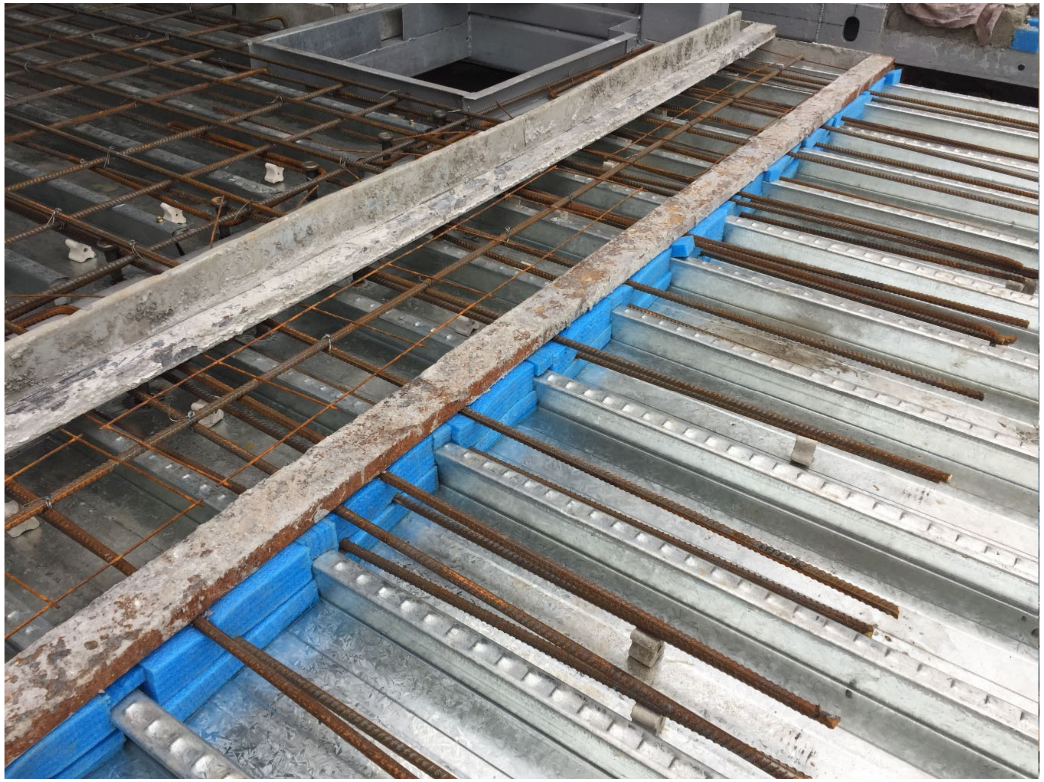

Slump test

Improved QA/QC System

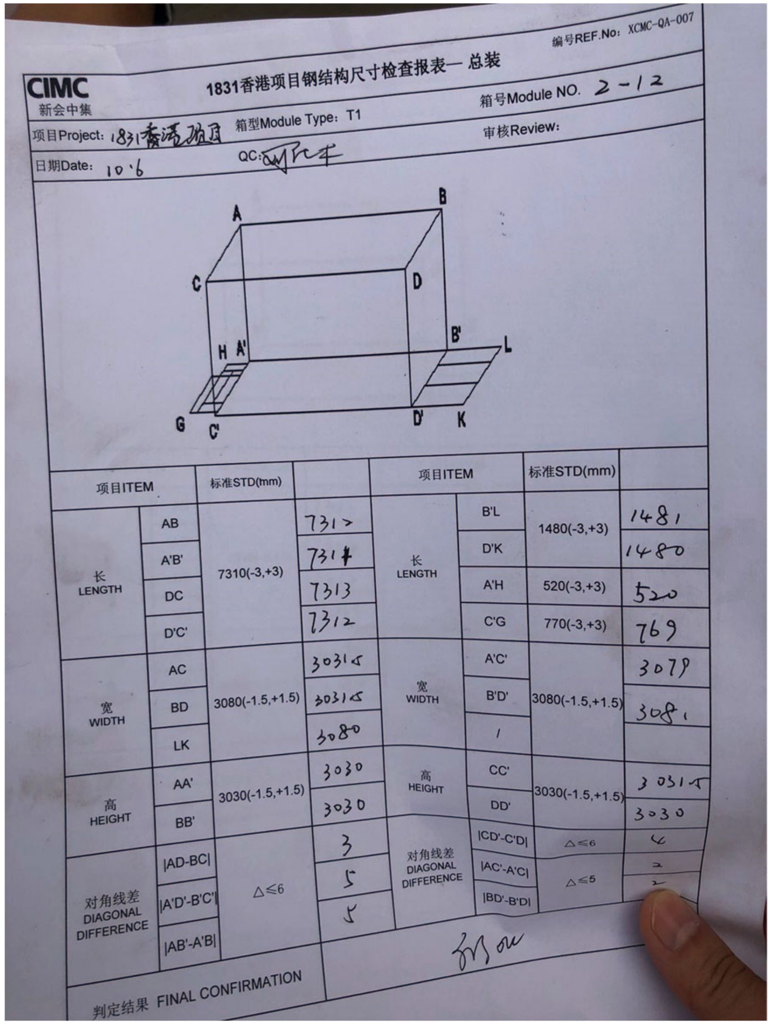
Unique marking for each parts

Unique marking for each module

Improved QA/QC System



Improved formwork system (wooden to metal)



CIMC 新会中集

1831香港项目钢结构尺寸检查报表— 总装

编号REF.No: XCMC-QA-007

箱号Module NO. 2-12

项目Project: 1831香港项目 箱型Module Type: T1

审核Review:

日期Date: 10.6 QC:

项目ITEM		标准STD(mm)		项目ITEM		标准STD(mm)	
长 LENGTH	AB	7310(-3,+3)	7312	长 LENGTH	B'L	1480(-3,+3)	1481
	A'B'		7314		D'K		1480
	DC		7313		A'H	520(-3,+3)	520
	D'C'		7312		C'G	770(-3,+3)	769
宽 WIDTH	AC	3080(-1.5,+1.5)	3031.5	宽 WIDTH	A'C'	3080(-1.5,+1.5)	3079
	BD		3031.5		B'D'		3081
	LK		3080		/		
高 HEIGHT	AA'	3030(-1.5,+1.5)	3030	高 HEIGHT	CC'	3030(-1.5,+1.5)	3031.5
	BB'		3030		DD'		3030
对角线差 DIAGONAL DIFFERENCE	|AD-BC|	△≤6	3	对角线差 DIAGONAL DIFFERENCE	|CD'-C'D|	△≤6	4
	|A'D'-B'C'|		5		|AC'-A'C|	△≤5	2
	|AB'-A'B|		5		|BD'-B'D|		2
判定结果 FINAL CONFIRMATION							

Self-checking of module dimensions

Improved QA/QC System

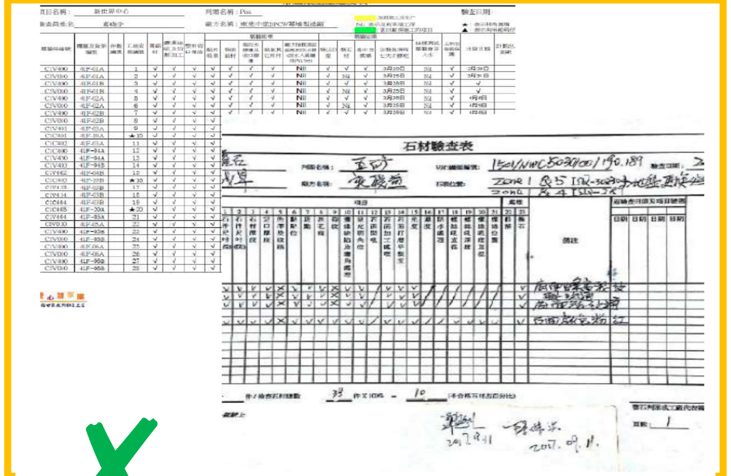
Trial module assembly

On-line Inspection System (Novade)

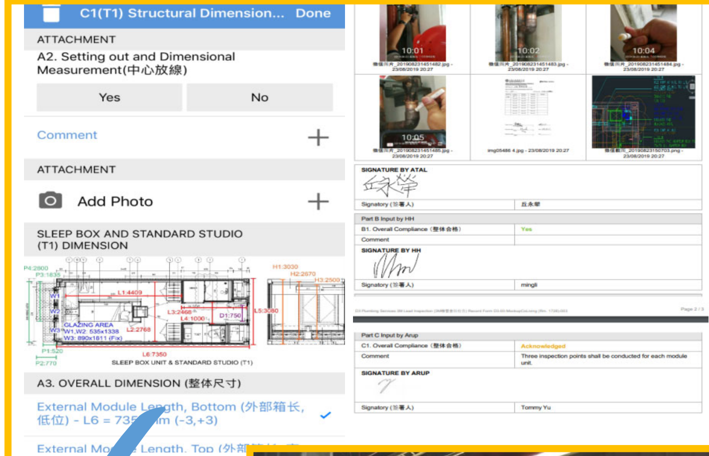
185,592 sheets will be saved by the end of this project.
(Equals to 10 year **12 trees and 264 kg CO2 emission**

Go Paperless

CONVENTIONAL PAPER RECORD

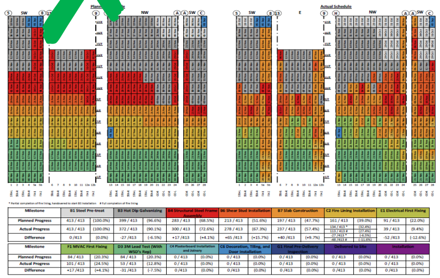


ON-LINE INSPECTION - NOVADE



HIP HING	Main Works Contract for InnoCell at Pak Shek Kok, Tai Po 科學園創新斗室工程	
箱號	0613	
結構箱型	T1	
裝修箱型	SL-L	

UNIQUE QR CODES FOR EACH MODULE FOR TRACKING



PROGRESS MONITORING

INNO CELL

HKSTP 香港科技園

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

wsp

協興建築 HIP HING CONSTRUCTION

On-line Inspection System (Inspection Test Plan)

ARCHITECTURAL

- Module Leveling before fit-out
- Window and door S.O.
- Waterproofing application
- Check minimum areas of windows & water tightness
- Final Inspection

STRUCTURAL

- Opening-up of the concrete surface at 3 locations
- Measurement of the concrete cover
- As-built Setting out / Level of Module Installation on site
- Modules Bolt Fixing
- Rebar fixing & etc.

BUILDING SERVICES

- AC: Condensation pipework water flow test EL: Continuity test of protective conductors, Insulation Resistance Test
- PD: hydraulic test, water test for basin, shower waste, W/C and drainage services

FAÇADE

- Water test for curtain wall

香港科技園 InnoCell - Structural MIC Prefabrication Inspection and Test Summary Plan

HIP HING ENGINEERING CO LTD 協興工程有限公司 — Member of NWS Holdings | CIMC Modular Building Systems

ITP Document No.: ITP-S-MIC-001 | Revision: 6 | Date: 04 Oct 2019

Task No.	Task Description	Timing	Type of Inspection	Specification / Reference Documents	Acceptance Criteria	Inspection Requirement: CIMC	ZP	HH	RSE Rep.	AP Rep.	Remarks
1.0	Acceptance of ITP	Review & check prior to Works	Approved Submission Form	ITP-S-MIC-001	ITP reviewed by all parties and accepted to use in Project	R	R	R	R	R	
2.0	Documentation review										
2.1	Shop Drawing / Fabrication Drawing	Review & check prior to Works	Review	Approved Submission Form	Ensure all drawings are at Construction Issue	R	R	R	R	R	
2.2	Workshop Work Method Statement	Review & check prior to Works	Review	Approved Submission Form, ADV-36 PS.S1 - CL5.4	The method statements to be submitted by the Contractor shall: - describe the methods of design, construction and/or manufacture and installation proposed for all normal activities associated with the relevant part or phase of the Works; - detail any special activities or processes required or proposed for the relevant part or phase of the Works; - identify the amount and nature of the Contractor's equipment and temporary Works which the Contractor proposes to use; - describe the supervision policy which the Contractor proposes to follow, particularly with regard to the work of Sub-Contractors of any tier; - contain sufficient information to enable the Architect to understand and appraise the Contractor's plan for the execution of the Works and for the control of the quality of the Works; - contain details for traffic management and/or road closures if required; and - include other relevant information.	W/R	W/R	W/R	W/R	R	
2.3	Proposed Testing Laboratory / Fabrication Factory - Welding Test, Material Test, Concrete Cube Test, Rebar Test, etc. - Factory of MIC Fabracation/ Galvanization / Heat Soak Treatment / Façade Fabrication, etc.	Review & check prior to Works	Review	Approved Submission Form	Ensure Proposed laboratory are HOKLAS / CNAS Lab or MRA Partners Factories are under ISO9000 or equivalent	W/R	W/R	W/R	W/R	R	
2.4	Material against material submission schedule - Structural Steel, Welding Consumable, Aluminum, Steel reinforcement, Concrete, others Accessories, etc.	Review & check prior to Works	Review	Approved Submission Form	As per corresponding requirement	W/R	W/R	W/R	W/R	R	
2.5	Other Document Submission - Welding Procedure and Welder Test Certificate, Calibration Report of the Heat Soak Treatment Oven, Material Supplier Information, etc.	Review & check prior to Works	Review	Approved Submission Form	As per corresponding requirement	W/R	W/R	W/R	W/R	R	
3.0	Prefabrication of Façade (Curtain Wall + Cladding)										
3.1	Material Verification and Pre-treatment										
a	Structural Steel Delivery - Hot-rolled Steel Section - Hot-finished Hollow Steel Section	Each Batch / Upon Delivery	Measure and Visual inspection	PS.S2, BS EN 10025-1:2004 PS.S2, BS EN 10210-1:2006	- Straightness of Section by Visual inspection - Mill certificate of steel Grade comply with approved drawings - Measure Dimension of Section comply with Section Table - Condition of Steel for Fabrication is not to be more heavily pitted or rusted thatn Grade C of Swedish Standard SIS 05 59 00 - Material Tolerances Clause 15.1 to 15.9 of HKCSUS	-	A1	W2	W3	W3	
b	Hot-dip Galvanizing	Every Batch	Lab procedure	BS EN ISO 1461	Table 3 of BS EN ISO 1461 - Min. coating thickness and Mass on samples	-	W1	W2	W2	W3	RISC
c	Aluminum Delivery - Aluminum Extrusion - Aluminum Sheet	Each Batch / Upon Delivery	Measure and Visual inspection	Approved Drawing, -BS EN 8118, BS EN 755, BS EN 573-3, AAMA 2605.5 -BS EN 485-2, BS EN 573-3	Comply with Approval Drawing 1. Grade, dimension, pattern, colour and visible surface defects; 2. Check the coating thickness with Coating Thickness Gauge 3. conduct cross cut adhesion test.	-	A1	W2	W3	W3	
d	- Structural Sealant	Each Batch / Upon Delivery	Measure and Visual inspection	Dow Corning Quality Assurance	1) Print Review 2) Adhesion Test 3) Compatibility Test		A1	W2	W3	W3	
e	Glass										
	- Heat Soak Treatment for Tempered Glass	Every Batch	Inspection refer to Factory Test Procedure	Factory Test Procedure BS EN 14179-1, PNAP APP-37	A minimum Spacing of 20mm for spearation of the glass panels 1. Heating Phase: from 0° C to 250° C (not exceeds 270° C) 2. Holding Temperature:250° C 3. Holding Time: 2 hours 4. Finishing Temperature: 260° C ± 10° C 5. Cooling Phase: from 250° C ± 10° C to 70° C	-	A1	W1	W2 (30%min.)	W3	RISC
	- Fragmentation Test	1 nos / Project	Measure and Visual inspection	Factory Test Procedure BS EN 14179-1	The particle count of each specimen 50x50mm 1. not less than 40 individual particles (for glass thickness less than 15mm) 2. not less than 30 individual particles (for glass thickness equal to 15mm or above) 3. the length of the longest particle should not exceed 100mm	-	A1	W2	W2	W3	
	- Surface Compressive Stress	1 nos / Batch	Visual inspection	ASTM C1279	The surface compressive stress of tempered glass should be greater than 69MPa	-	A1	W2	W2	W3	
	- Thickness and Flatness	Every Batch	Measure and Visual inspection	ASTM C1036, ASTM C1048, ASTM S1651	Thickness should not be less than the minimum thickness adopted in calculation (measurement should be separated into the thicknesses of the individual glass panes for laminated glass and IGUs)	-	A1	W2	W2	W3	
	- Blemish Inpsection	Every Batch	Measure and Visual inspection	ASTM C1036	Refer to table 1-10 as per standard ASTM C1036	-	A1	W2	W2	W3	
	- Boil Test	3 nos. / Project	Factory procedure and Visual inspection	BS EN 12543	No Bubble or other defects should develop more than 12mm from the outer edge of the specimen	-	A1	W2	W2	W3	
	- Impact Test	1 nos / Project	Visual inspection	BS EN 12600	No Glass Breakage	-	A1	W2	W2	W3	
3.2	Fabrication and Assembly										
a	Setting Out / Level / Verticality of Connection Members	Prior to Connection	Measure and Visual Inspection	Approved Shop Drawing PS.S2, BS EN 1090-2	- Comply with Approved Drawings - Tolerance : BS5606, Clause 15.11 and 15.12 if HKCSUS	-	A1	W2	W3	W3	
b	Welding for Hot-rolled / Hot-finished sections	Weld Joints / After hold time and before delivery for hot-dip galvanizing	Visual and NDT by Laboratory	ADV-36(Section 14.3.6 of COP for SUS 2011), PS.S2, BS EN ISO 17637(VT), BS EN ISO 17638 (MPI), BS EN ISO 17640 (UT)	Refer to Laboratory Testing Procedul *All welds - 100% VT FPBW and FSBW - 100%UT and 100%MPI PPBW and FW with leg length>12mm - 20%UT and 20%MPI FW with leg length ≤12mm - 10%MPI	-	H & A1	W2	W2	W3	RISC RE to instruct test location
c	Bolt and Nut Connection for Aluminium and Structural Steel Member	Connection Members	Measure and Visual inspection	PS.S2, BS 4190, BS 4320, Approved Drawing	- Comply with Approved Drawings	-	A1	W2	W3	W3	
d	Install Glass Window (Structural Sealant)	Random	Measure and Visual inspection	BS 3712	- Comply with Approved Drawings	-	A1	W2	W3	W3	
e	Final Check-up for Façade Size	Every Batch /Prior to delivery to Modules Prefabrication Yard	Measure and Visual Inspection	Approved shop drawing	- Approved shop drawing	-	H & A1	W2	W3	W3	

DOC. TITLE: CIMC QAS FOR HKSTP INNOCELL PROJECT

Page 371 of 419

Sub Contractor → **Main Contractor (T1)** → **RE/COW/BSI (T3)**

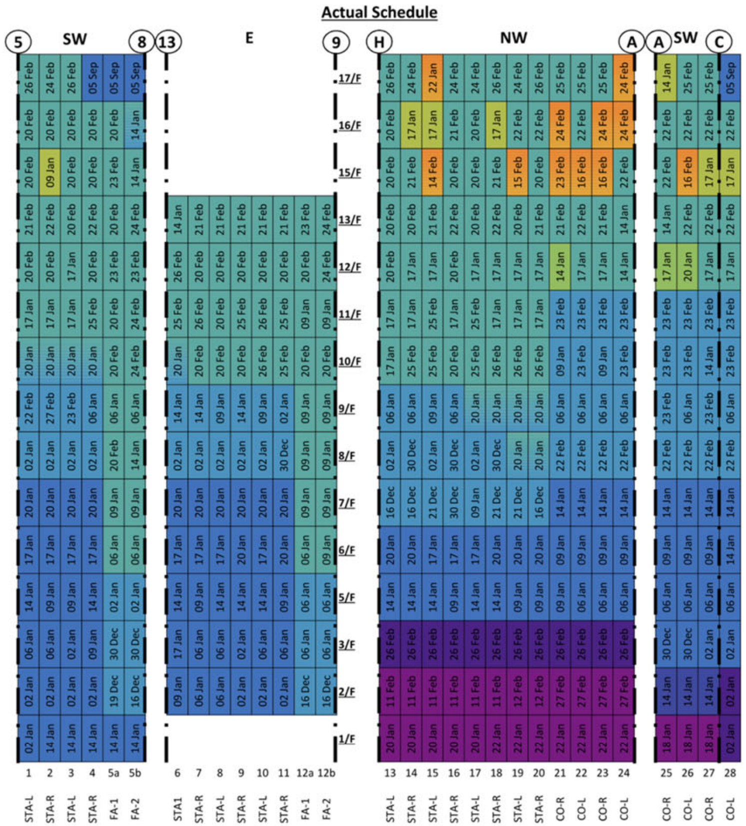
Sub Contractor:
- **Initiate** the inspection form
- Record the work done
  - Test report
  - Photo record

Main Contractor (T1):
- **Verify** sub-contractor's works
- Arrange inspection

RE/COW/BSI (T3):
- **Verify** main contractor and sub-contractor's works

INNO+CELL | HKSTP 香港科技園 | CONSTRUCTION INDUSTRY COUNCIL 建造業議會 | wsp | 協興建築 HIP HING CONSTRUCTION 新創建集團成員 Member of NWS Holdings

On-line Inspection System (Inspection Summary)



Milestone	B1 Steel Pre-treat		B3 Hot Dip Galvanizing		B4 Structural Steel Frame Assembly		B6 Shear Stud Installation		B7 Slab Construction		C2 Fire Lining Installation		E1 Electrical First Fixing		F1 MVAC First Fixing	
Planned Progress	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)
Actual Progress	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413 (a) 407 / 413 (b)	(100.0%) (98.5%)	310 / 413	(75.1%)	378 / 413	(91.5%)
Difference	0 /413	(0.0%)	0 /413	(0.0%)	0 /413	(0.0%)	0 /413	(0.0%)	0 /413	(0.0%)	0 /413 (a) -6 /413 (b)	(0.0%) (-1.5%)	-103 /413	(-24.9%)	-35 /413	(-8.5%)

Milestone	D3 3M Lead Test (With WSD's Rep)		C5 Plasterboard Installation		B5 Façade Installation		C6 Decoration, Tiling Installation		C7 Furniture Installation		G1 Final Pre-Delivery Inspection		Delivered to Site		Installation	
Planned Progress	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	413 / 413	(100.0%)	387 / 413	(93.7%)	257 / 413	(62.2%)	227 / 413	(55.0%)
Actual Progress	335 / 413	(81.1%)	233 / 413	(56.4%)	393 / 413 (c) 236 / 413 (d)	(95.2%) (57.1%)	225 / 413	(54.5%)	143 / 413	(34.6%)	44 / 413	(10.7%)	41 / 413	(9.9%)	27 / 413	(6.5%)
Difference	-78 /413	(-18.9%)	-180 /413	(-43.6%)	-20 /413 (c) -177 /413 (d)	(-4.8%) (-42.9%)	-188 / 413	(-45.5%)	-270 /413	(-65.4%)	-343 /413	(-83.1%)	-216 /413	(-52.3%)	-200 /413	(-48.4%)

INNO CELL
CONSTRUCTION INDUSTRY COUNCIL 建造業議會
協興建築 HIP HING CONSTRUCTION

Module Installation

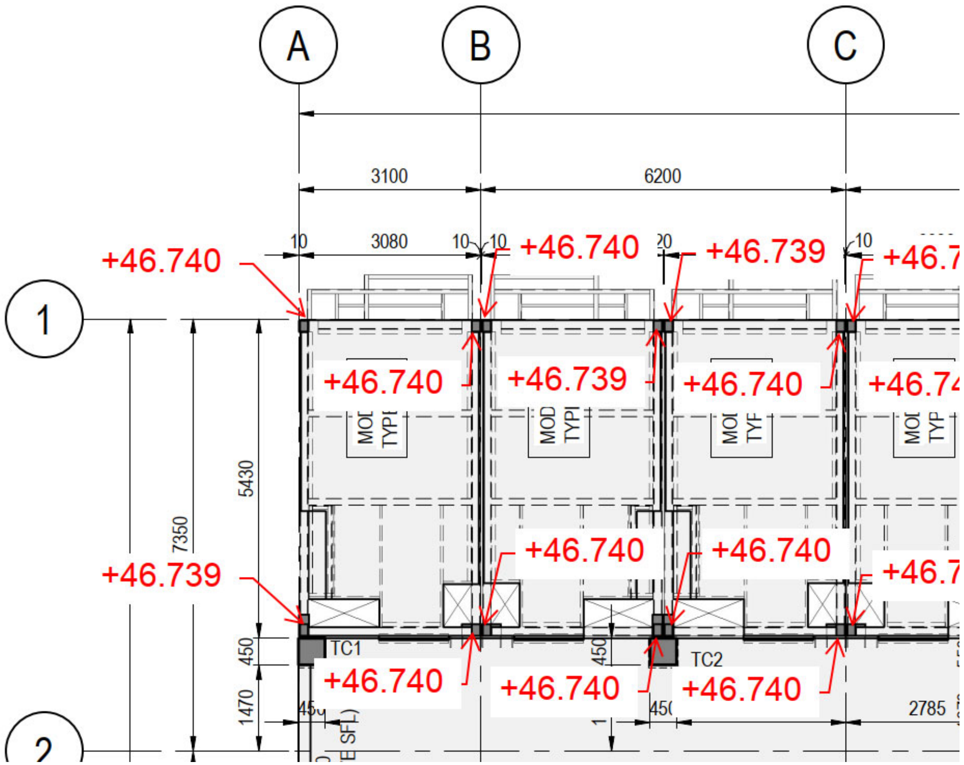
Preparation

Identification of defects caused during delivery

Reference lines for checking of alignment

Preparations

Verification of floor level for module installation



Survey plan to record the floor level before installation

Lifting

Lifting to the designated location

Verification of alignment

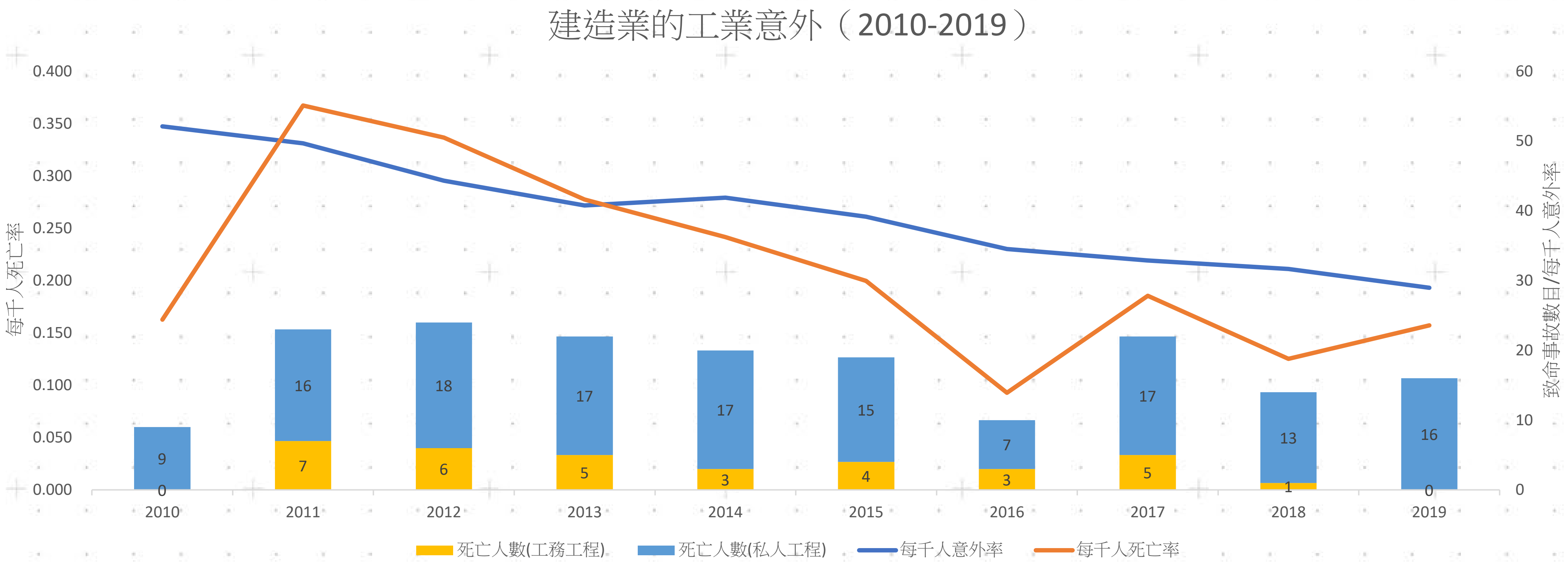
CONSTRUCTION INDUSTRY COUNCIL
建造業議會

Digital Technology for Construction Safety

Content

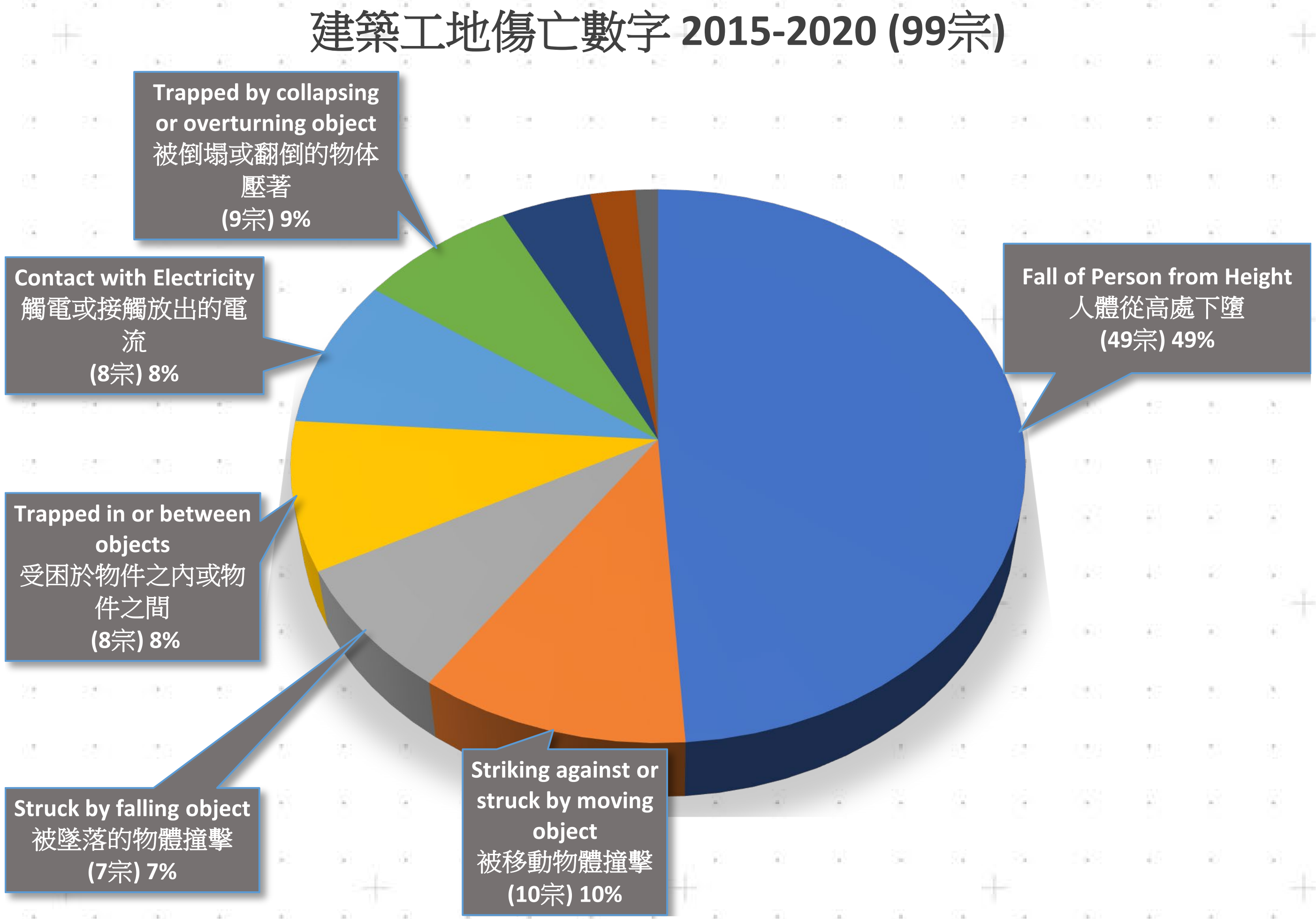
1. Introduction to the Concept of Design for Safety
2. IoT Technology for Construction Safety: Sensor, Helmet, etc.
3. Systematic Safety Inspection Analysis Tools & Platform
4. VR for Construction Safety Training
5. Conclusion & Q&A

近10年業界安全表現



年份	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
業界事故數目	2884	3112	3160	3232	3467	3723	3720	3902	3541	2947
業界死亡人數	9	23	24	22	20	19	10	22	14	16
每千人意外率	52.1	49.7	44.3	40.8	41.9	39.1	34.5	32.9	31.7	29.0
每千人死亡率	0.163	0.367	0.337	0.277	0.242	0.200	0.093	0.185	0.125	0.157

死亡事故分析 (2010 至 2020)



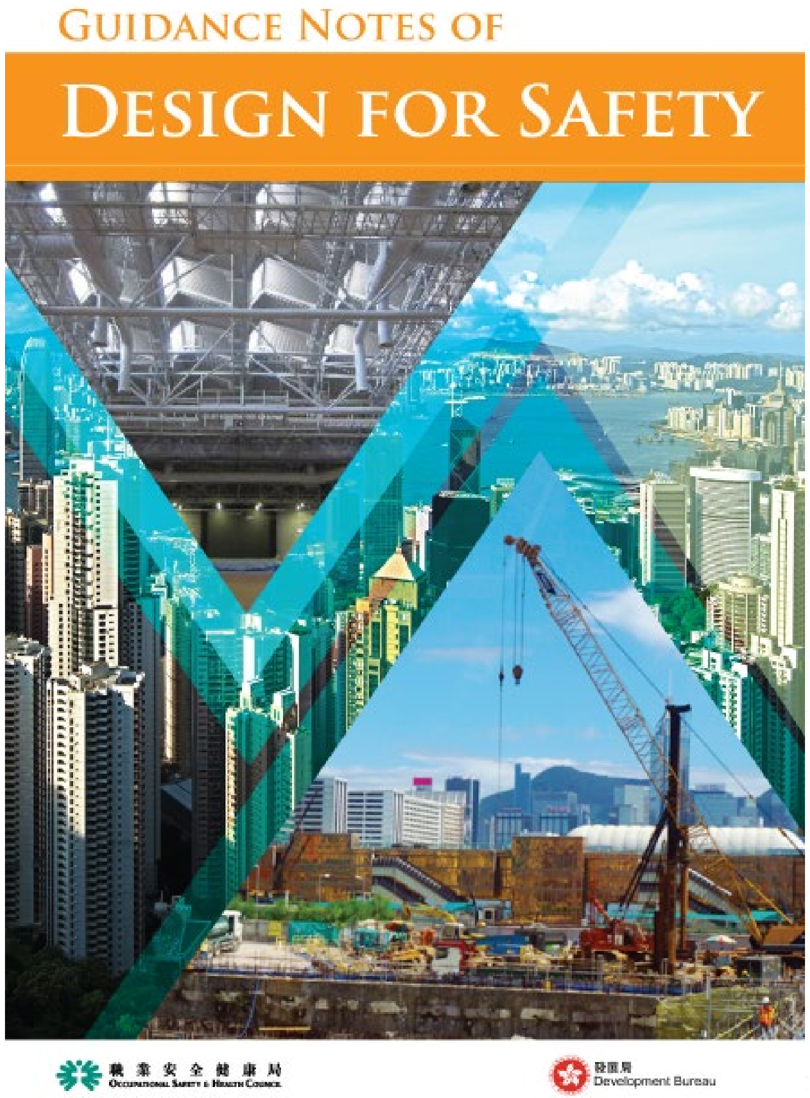
	百分比 (%)
人體從高處墮下 Falling from Height	49%
觸電或接觸放出的電流 Electrocution	8%
被移動物件或與移動物件碰撞 Striking against or struck by Moving Object	10%
遭墮下的物件撞擊 Struck by Falling Object	7%
受困於倒塌或翻側的物件 Trapped in collapsed / overturning object	9%
受困於物件之內或物件之間 Trapped in between objects	8%
其他 Others	9%

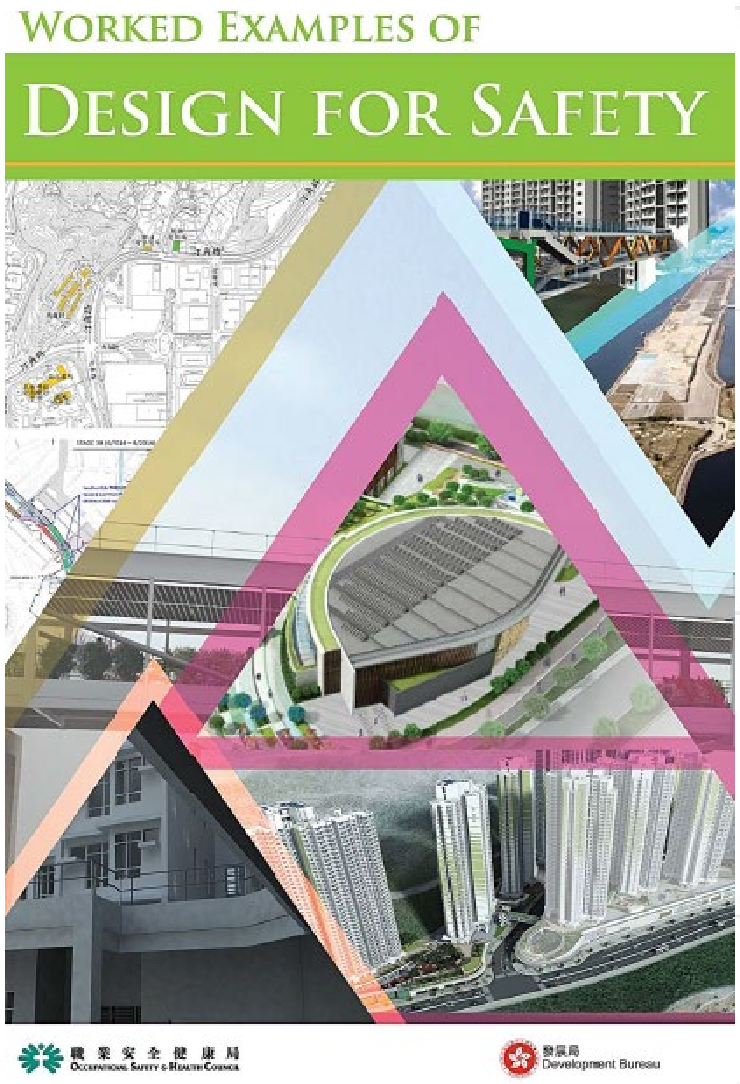
死亡事故分析 2021

個案	日期	建造業死亡意外事件 (2021)	意外性質
1	15/1/2021	屯門醫院擴建地盤　64歲工人2米平台墮下　留醫10日不治	人體從高處墮下
2	19/2/2021	新田圍邨工人墮樓亡 疑爬梯修水管失足奪命	人體從高處墮下
3	23/2/2021	皇后山公屋地盤男工失足高處墮下　當場不治	人體從高處墮下
4	15/3/2021	男子從6呎高木梯墮地　昏迷送院	人體從高處墮下
	19/3/2021	工人企梯換燈膽疑失足墮樓 重創身亡 (自顧人士)	人體從高處墮下
5	20/3/2021	大埔康樂園工人遭太陽能板擊中頭部　昏迷送院	遭墮下的物件撞擊
6	3/4/2021	遭升降台車撞倒拖行10米　觀塘64歲男工人留院2日不治	受困於倒塌或翻側的物件
	4/4/2021	元朗攸潭美村男子遭剷車夾傷 (自顧人士)	受困於倒塌或翻側的物件
7	14/4/2021	啟德地盤吊臂鐵勾鬆脫　工人被擊中死亡	被移動物件或與移動物件碰撞

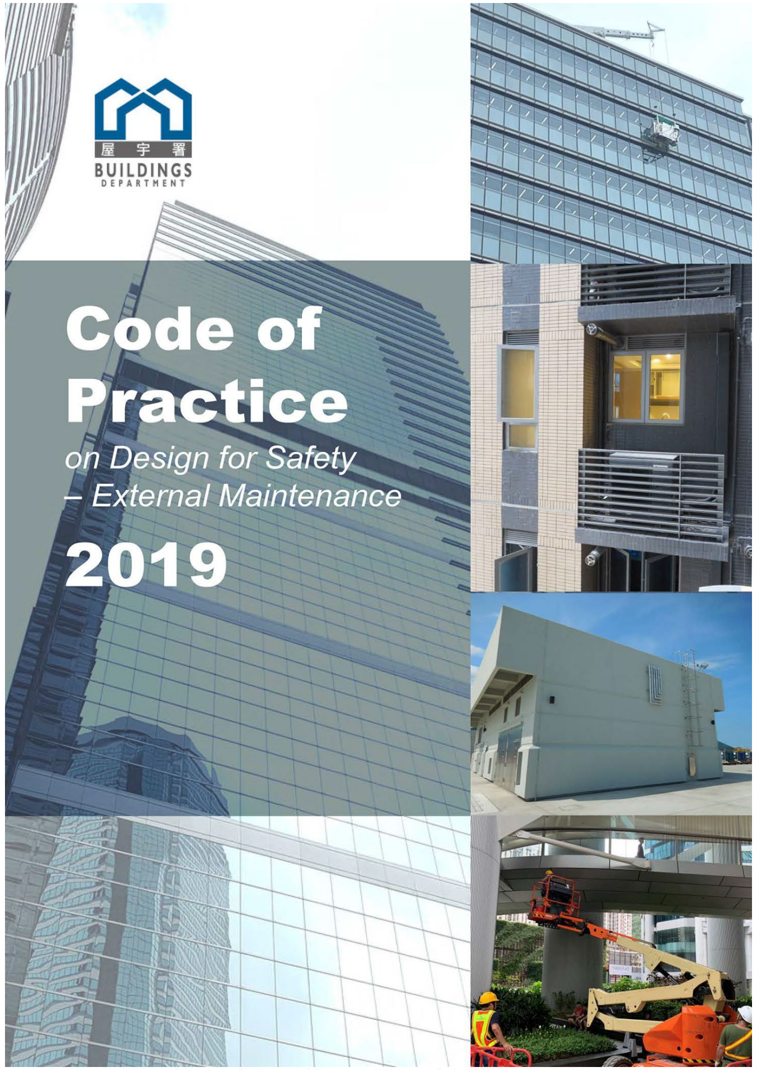
個案	日期	建造業死亡意外事件 (2021)	意外性質
	18/4/2021 *	啟德地盤男子疑墮斃　勞工處正調查意外原因 (非法勞工)	人體從高處墮下
8	21/4/2021	啟德發展區地盤男工遭石屎斗砸斃	被移動物件或與移動物件碰撞
	5/5/2021 *	男工人上水地盤3米高台墮地 頭傷昏迷送院 (自願人士/ 未確定)	人體從高處墮下
9	8/5/2021	南丫島男工頭撼石頭昏迷　直升機送院惜不治	與固定或不動物件相撞
	25/5/2021	八鄉男工5米高貨櫃墮下　昏迷不治 (非建築工地)	人體從高處墮下
	25/5/2021	打鼓嶺78歲泥頭車司機　昏迷於密斗及車轆間　送院不治 (非建築工地)	受困於倒塌或翻側的物件
10	4/6/2021	火炭5旬搭棚師傅意外失足	人體從高處墮下
11	8/6/2021	將軍澳61歲地盤工人遭升降台欄勒頸	受困於物件之內或物件之間

建築設計安全 - 指南及實例





建築設計安全 – 其他政府部門指引



建築設計安全 – 簡介

建築安全設計的程序
工程項目階段
初步設計
詳細設計
招標
建造
運作及維修保養
指引章節
4.1.1
4.1.2
4.2.1
4.3.1
4.4.1
4.5
構思
評估設計
集思會
重新設計以控制風險
定案
風險評估 / 危害識別
擬備招標文件
招標
批出合約
評審標書
實際完工 / 交樓
建造工程
風險控制措施
維修保養工程
優化安全施工環境
檢討
溝通、合作及協調
須遞交的文件
• 健康及安全關注摘要
• 初步危害分析
• 危害及影響摘要
• 投標前健康及安全計劃
• 健康及安全計劃大綱
• 建造健康及安全計劃
• 運作及維修保養的資訊
• 向客戶 / 設計師反映意見
健康與安全檔案

油塘四山街工廈倒塌

https://www.youtube.com/watch?v=Dz_OA1XhRQ0

科學園三期臨時結構倒塌

https://tv.on.cc/hk/index.html?i=OBK-130325-12240-39M&d=1364229301

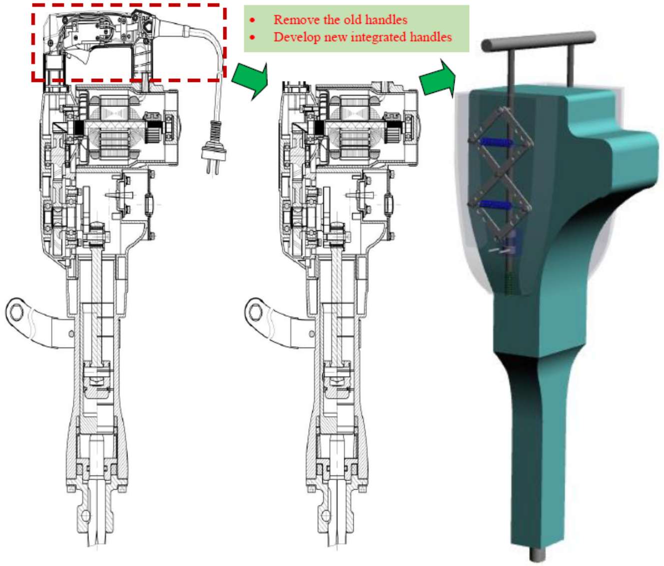
Source: On.cc News

議會支持下的研究

(i) 應用物聯網（IoT）科技防止建築過程中臨時支撐體系倒塌；

(ii) 使用機械臂取代傳統建築方法；

(iii) 運用Exoskeleton (外骨骼) 減少工人工作期間健康上的危害



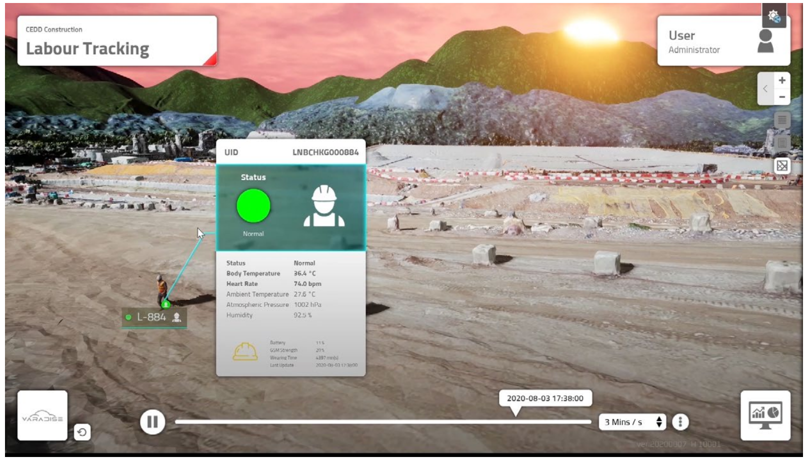
Smart Platform For Construction Site Safety Monitoring

- Digital Twin
- AI Powered Dashboard
- Inspection Recording System

Digital Twin With Real-Time IoT Data

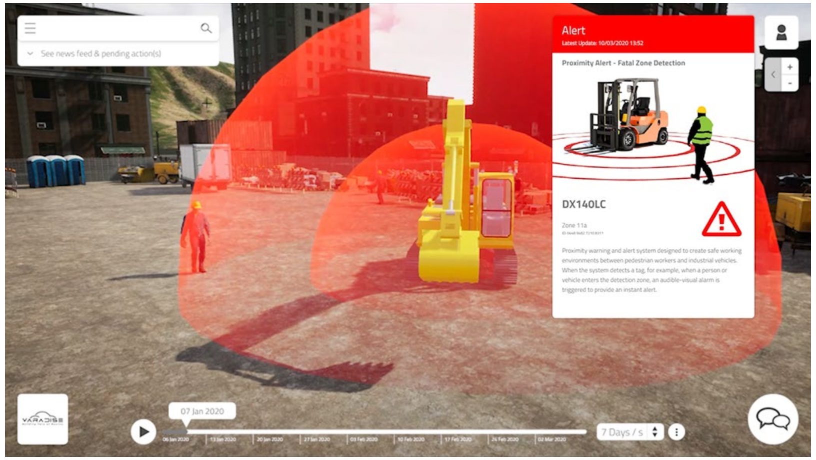
Labor Tracking with IoT

Labor location and health can be monitored in BIM for Safety Management and Geo-fencing with Smart Helmet



Real Time Worker Health Status

Worker Location Monitoring

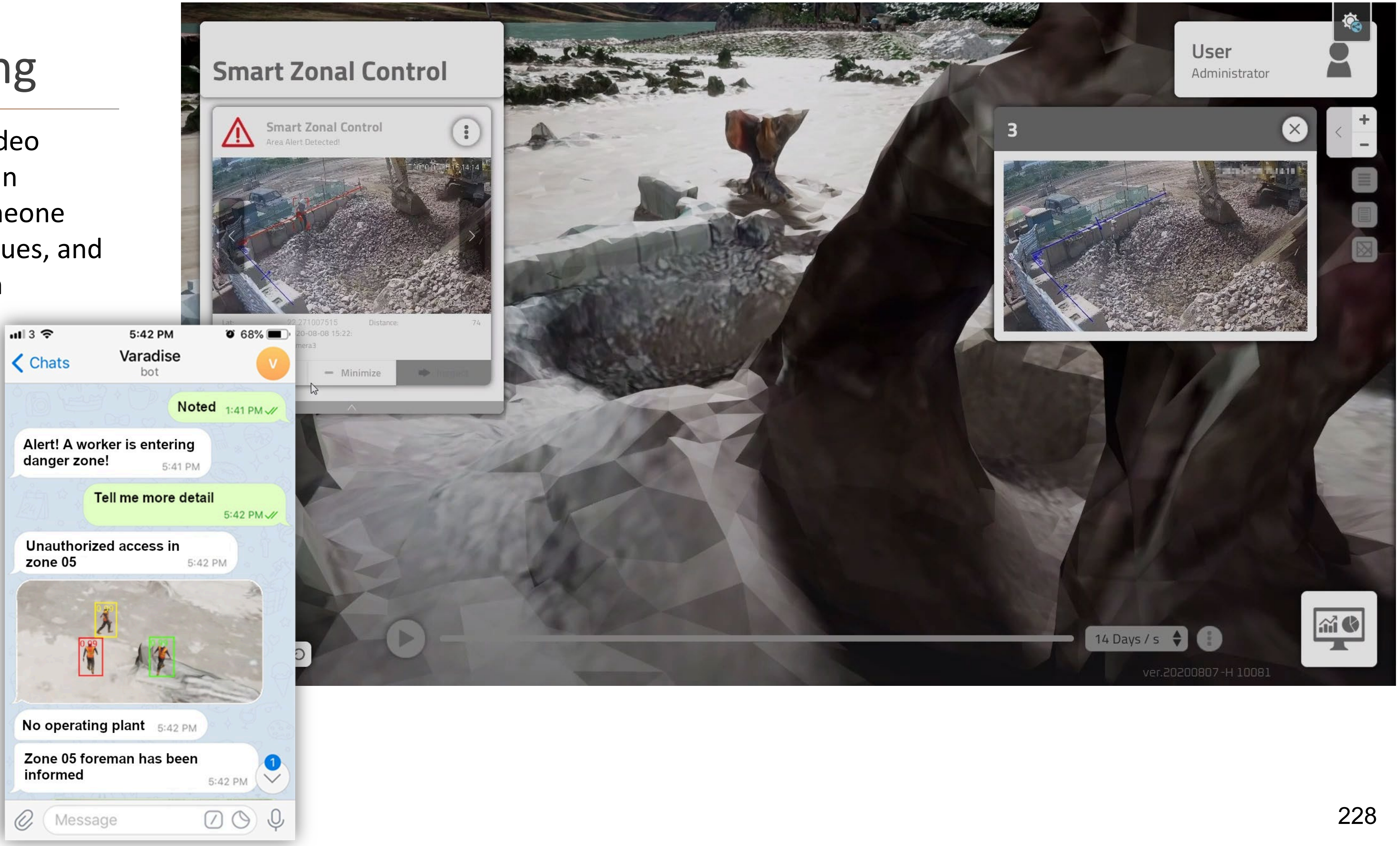


Proximity Detection & Alert

CCTV AI Recognition For Site Safety

Dangerous Zone Monitoring

The platform uses continuous AI-powered video analysis to monitor site conditions and human activities (e.g. human detection to avoid someone break intro restricted area.), detect safety issues, and deliver instant alerts to protect workers from dangerous operation



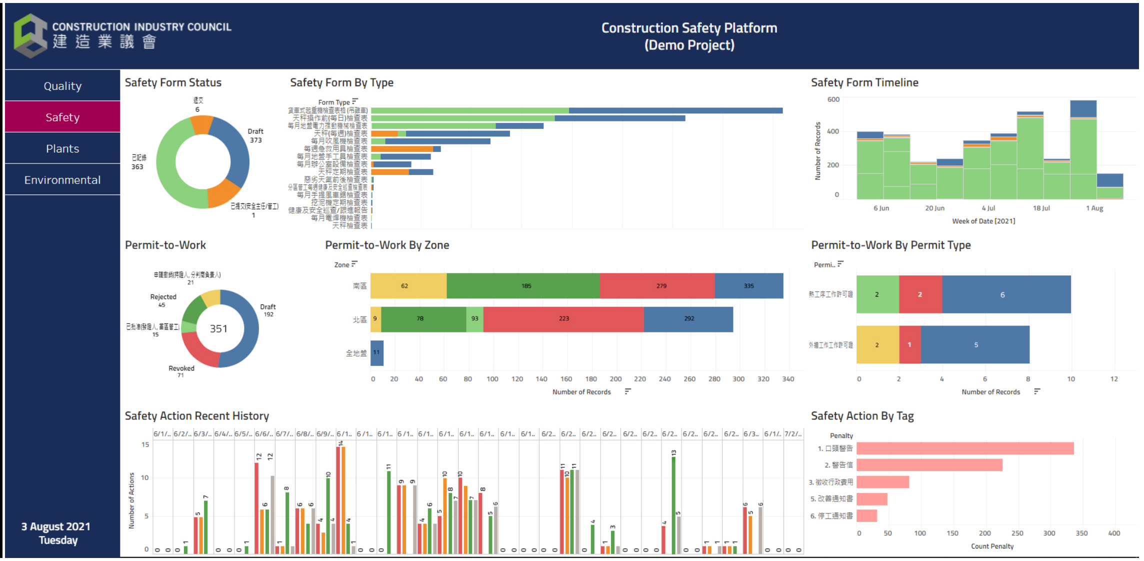
AI Dashboard & Safety Inspection Record

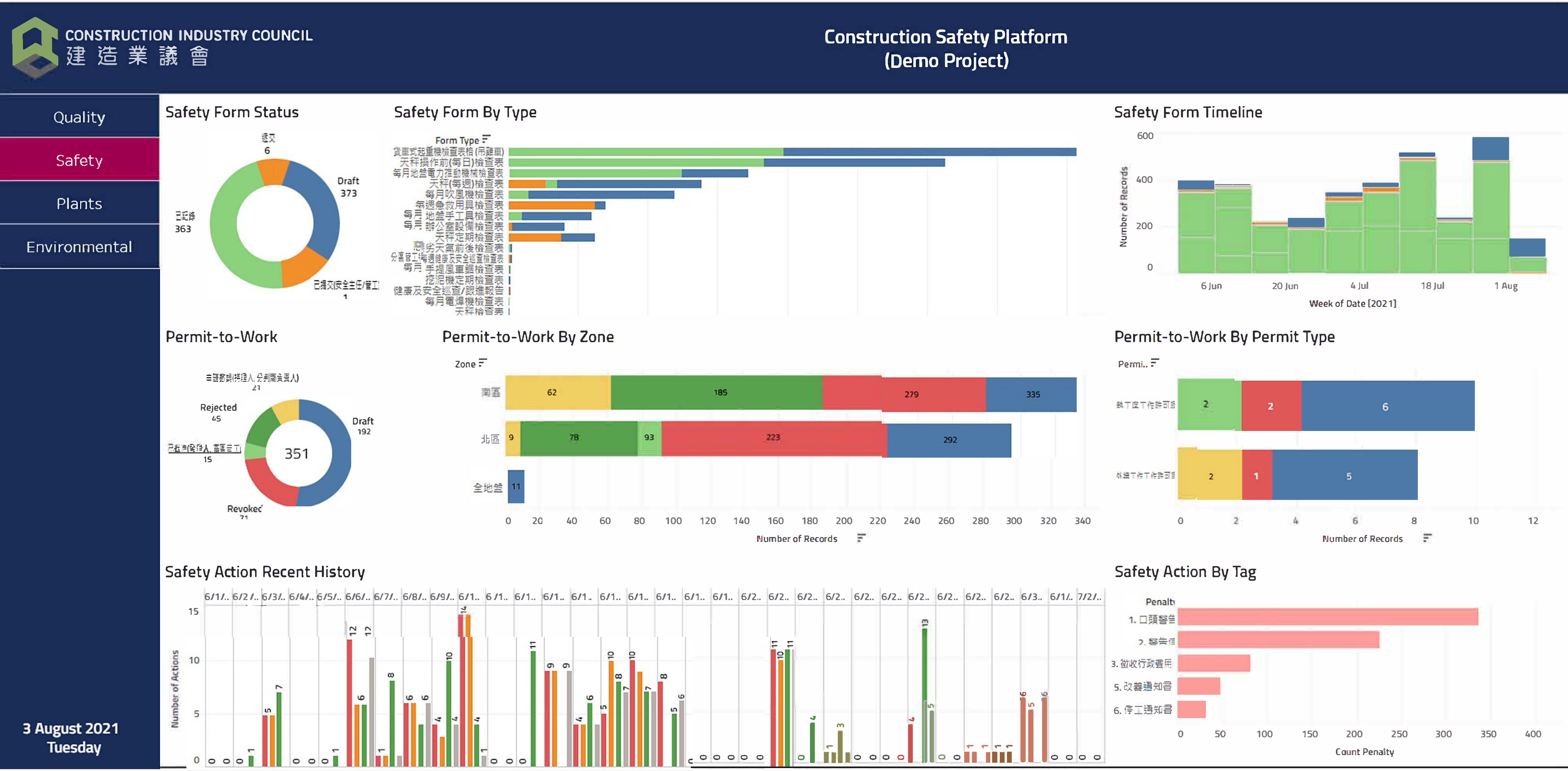
Live Monitoring Dashboards with IoT analytics

The Integrated Dashboard provides full and instant data management.

AI Dashboard gives supervisors a clear picture of

1. workers' real time location and status, dump trip,
2. sudden fall and medical SOS alert
3. work site environment condition





CONSTRUCTION INDUSTRY COUNCIL
建造業議會
Construction Safety Platform
(Demo Project)
Quality
Safety
Plants
Environmental
3 August 2021
Tuesday
Safety Form Status
Draft 373
363
6
1
Safety Form By Type
Form Type
Safety Form Timeline
Number of Records
Week of Date [2021]
6 Jun
20 Jun
4 Jul
18 Jul
1 Aug
Permit-to-Work
351
Draft 192
Rejected 45
Revoked
21
15
Permit-to-Work By Zone
Zone
北區
全地盤
Number of Records
Permit-to-Work By Permit Type
Number of Records
Safety Action Recent History
Number of Actions
Safety Action By Tag
Penalty
1. 口頭警告
2. 警告信
3. 徵收行政費用
5. 改善通知書
6. 停工通知書
Count Penalty

建造業安全錦囊

建造業安全錦囊為前線工友、業界及持分者提供一站式平台，即時查閱安全訊息及推廣安全活動，並藉此：

(i) 讓前線工友即時尋找工地安全資訊及指引；

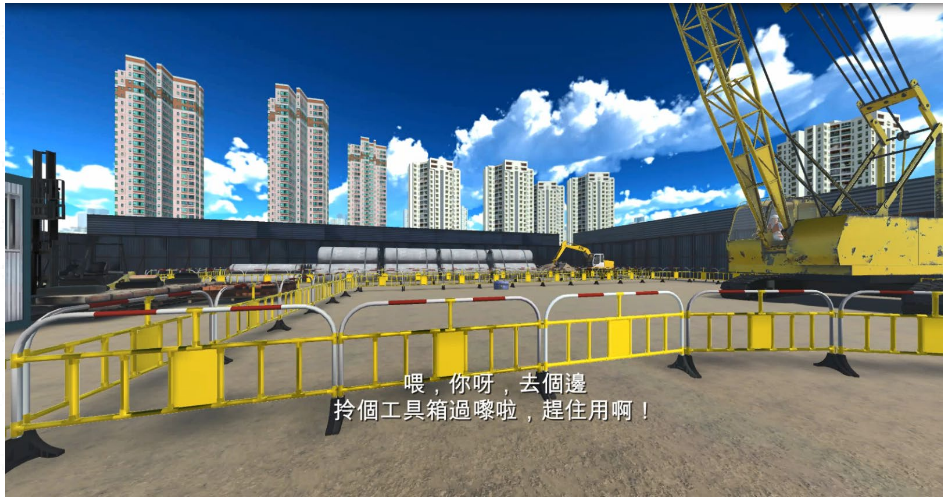
(ii) 向業界持分者推廣安全領導；

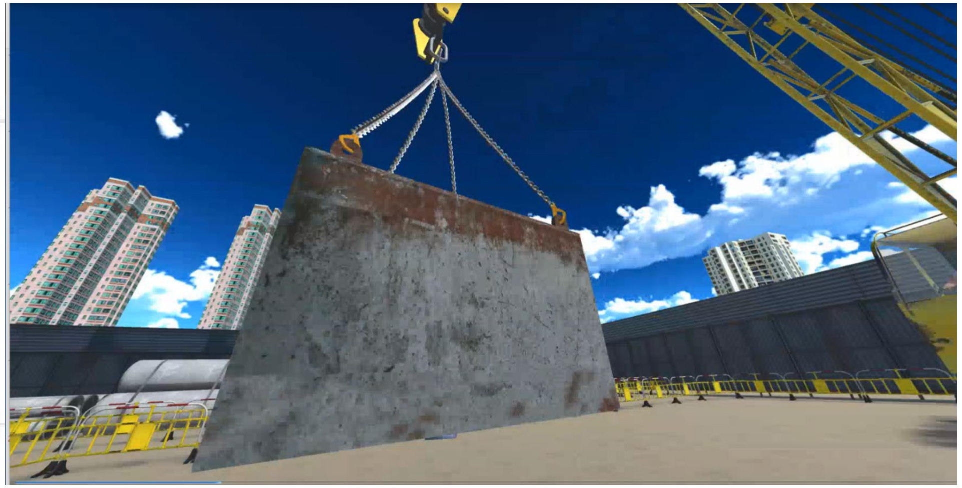
(iii) 向業界工人提供電子証件夾

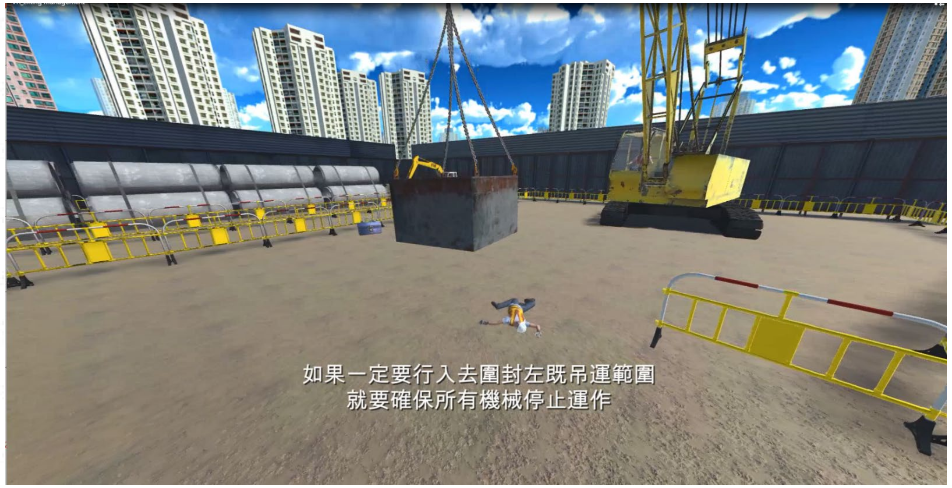
利用虛擬實景進行安全訓練 - 安全體驗訓練中心

- 通過VR技術體驗不同的事故場景
- 了解高空作業和起重操作安全的重要性

利用虛擬實景進行安全訓練 – 工地齊分享







下載平台: https://ssg.chaintechdev.com

建造業安全角色與責任

香港建造業

主要持份者的安全角色及責任

研究報告

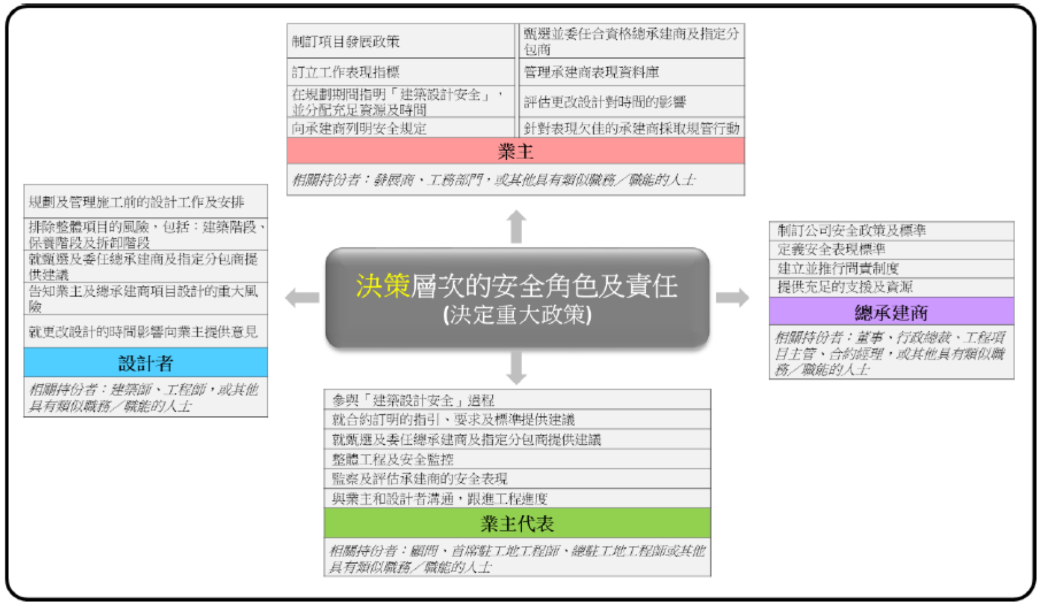
顧問報告終稿

二零二零年三月

安全，是每個人的責任。

每個人都對其旁鄰人士負有謹慎責任。旁鄰人士不僅指人與人之間的距離，還可以指雙方之間的謹慎責任。

在建築項目中，各方會作出協調，一同工作。這代表他們有責任確保自己在合理預見的情況下考慮其作為或不作為對旁鄰人士造成任何的損害，並避免有關情況發生。



建造業安全刊物 - 安全指引

2007年7月10日，在銅鑼灣一個拆卸地盤的一台塔式起重機在更改高度操作時倒塌，導致兩名工人死亡及五名工人受傷。促使議會及有關持份者合力謀求方法以便進一步提升塔式起重機的使用安全。議會經與業界商討後，於2008年發表第一份安全指引—《塔式起重機安全指引》 (第一版)，該指引載列提升塔式起重機操作安全的良好做法及改善塔式起重機使用安全的各項建議措施，供建造業自發遵守，協助業界從業員精益求精。

隨後議會為持續地推廣良好安全作業方式及保障建造業工人安全，議會向界發表了共22份的安全指引，期望所有業內人士採納有關指引列出的建議，並無時無刻遵守有關所列標準或程序。

建造業安全刊物 - 安全提示 / 訊息


CONSTRUCTION INDUSTRY COUNCIL 建造業議會

CIC Safety Message 建造業安全訊息

業界意外事故

於2020年5月13日，在港鐵香港站發生的一宗致命工作意外，意外中一名男工在一間機房內穿過構築物墮至下面的鐵路路軌，送院後證實不治。建造業議會就此向各持份者發放以下安全訊息。 煩請 閣下在合適情況下，將以下安全訊息轉發給 貴會會員/機構相關人員及業界其他持份者，謝謝。

相關連結：https://www.info.gov.hk/gia/general/202005/13/P2020051300478.htm?fontSize=1
來源：政府新聞處

改善建議

▶ 作為承建商/分判商/僱主：

1. 委任合資格人士就高處工作進行針對性的風險評估，在充分考慮其工作性質及工作環境後，找出所有與該工作相關的潛在危害；
2. 在每個工作地方提供適當和足夠的安全進出口，並定期檢查及妥善維修；
3. 確保每一個工作平台均鋪好橋板，並須穩固和平坦地擱在其支持物上；
4. 鄰近危險邊緣、孔洞或空隙的位置，均妥為圍封或覆蓋，其構造能防止人、物料及物品墮下；
5. 如果這些是不切實可行，須向工友提供適當的防墮系統及裝備，以供高處工作的工友使用；及
6. 確保提供足夠的安全資料、指導及訓練，並確保工友熟悉相關的安全施工程序及安全措施。

在樓面孔洞設置護欄、底護板及警告告示

▶ 作為前線管工及工友：

1. 嚴格落實安全施工方案、程序和安全措施等；
2. 實施有效的監察和監管，以確保工友嚴格遵從上述的安全措施；
3. 工友如發覺工作地點不安全或個人防護裝備不足夠，應立即停工，並向主管匯報；及
4. 不可擅自移開保護措施。

▶ 作為安全從業員：

1. 協助僱主確保安全措施得以嚴格遵從，並滙報不符合安全要求情況。

維修工作平台

以上只列出安全重點，詳細內容請參閱《建築地盤(安全)規例》、勞工處發出的《安全帶及其繫穩系統的分類與使用指引》及由建造業議會發出的《高空工作安全手冊》。

免責聲明 本訊息不構成有關事宜或任何其他事宜的專業意見。此外，對採用或不採用本訊息所引致的任何後果，建造業議會(包括議會成員及僱員)概不負責。如有任何關於本訊息的問題，可致電2100 9000查詢。


CONSTRUCTION INDUSTRY COUNCIL 建造業議會

CIC Safety Message 建造業安全訊息

業界意外事故

於2020年3月31日，一名工人於將軍澳某地盤工作時被工字鐵擊中，送院後證實不治。建造業議會就此向各持份者發放以下安全訊息。煩請 閣下在合適情況下，將以下安全訊息轉發給 貴會會員/機構相關人員及業界其他持份者，謝謝。

相關連結：https://www.info.gov.hk/gia/general/202003/31/P2020033100353.htm
來源：政府新聞處

改善建議

▶ 作為承建商/分判商/僱主：

1. 委任合資格人士就吊運工序進行針對性的風險評估，包括吊運方法 / 起重裝置具裝配方法等，找出所有影響吊運工序安全的潛在危害；
2. 根據風險評估的結果，制定吊運計劃，內容須涵蓋揀選適當的起重機 / 起重裝置和相關工人的資格；
3. 委派一名合資格及具經驗的合資格人士監督吊運操作，並以確保所有風險獲有效控制；
4. 圍封所有吊運區，並展示適當的警告告示，若圍封吊運區不合理切實可行，則須採取其他有效措施，例如委派訊號員，確保沒有人可擅自闖入吊運區；
5. 向所有相關工友 / 僱員提供足夠的安全資料、指導及訓練，並確保他們熟悉相關的安全施工程序及安全措施。

吊運路線不可在其他人之上經過

▶ 作為前線管工及工友：

1. 確保負荷物已由曾接受適當訓練的合資格吊索工穩固地懸掛，以防止起重裝置、負荷物在起重操作中滑脫或移位；
2. 使用起重裝置前，必須檢查其狀態是否良好，並適當地使用；
3. 嚴格監察吊運操作，確保自身及其他工友不會停留在吊運途中的物件下方的位置；
4. 與起重機機手保持良好有效溝通。

▶ 作為安全從業員：

1. 協助合資格人士進行就相關工作進行針對性的風險評估，並考慮現場實際工作環境，協助僱主在合乎法例及指引的要求下，制定安全施工方案及程序；
2. 制定和實施有效的主動視察計劃，以確保安全措施得以嚴格遵從，並滙報不符合安全要求情況。

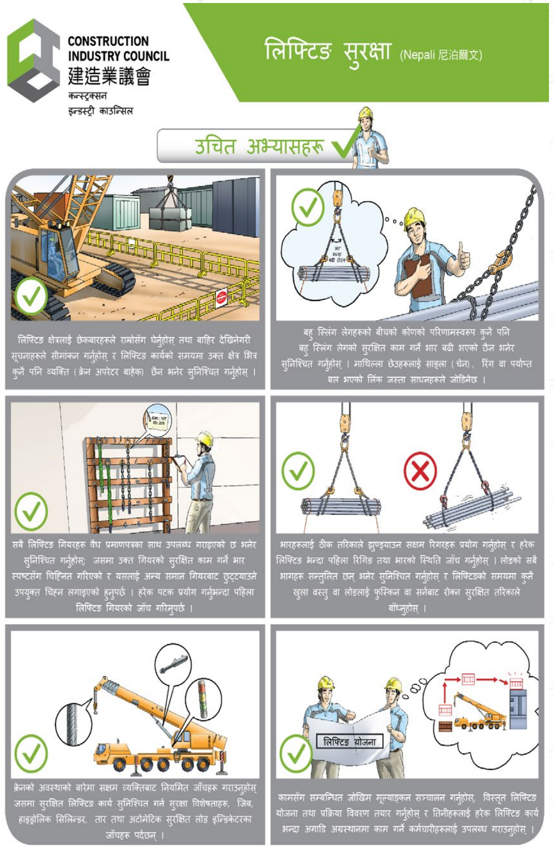
以上只列出安全重點，詳細內容請參閱《建築地盤 (安全) 規例》及勞工處發出的《安全使用流動式起重機工作守則》。

免責聲明 本訊息不構成有關事宜或任何其他事宜的專業意見。此外，對採用或不採用本訊息所引致的任何後果，建造業議會(包括議會成員及僱員）概不負責。如有任何關於本訊息的問題，可致電2100 9000查詢。

2011年7月8日，荃灣一個建築地盤內發生致命意外，兩名工人在扎結一個鑽樁鋼筋籠時，該鋼筋籠突然倒塌將他們壓斃。

預防建造業意外是議會重點工作之一，議會在該意外發生後迅即發表了第一份的安全提示《第001/11號—扎結鑽樁鐵籠》，並於其後為建造業的嚴重或致命意外，適時地提醒承建商、工友及各持份者採取必要的安全措施以避免悲劇重演。安全提示/訊息不僅提醒業界遵守安全法規的重要性，同時向從業員展示何為負責任的作業方式。

建造業安全刊物 - 安全海報



為確保重要訊息能直接傳達至前線監工人員及工友，議會於2012年開始出版與健康、安全及福利有關的海報，將安全重點以豐富的圖像及顯淺易明的方式供前線工友閱覽。

此外，為照顧少數族裔的需要及希望更廣泛地推廣安全，議會於2018年為各安全海報翻譯成尼泊爾文、烏爾都文及印地文供少數族裔工友閱覽。這些海報不僅體現了議會對重要議題的關注，亦有助於讓公眾了解議會在當中的貢獻。

建造業安全刊物－參考資料

議會致力在香港建造業的各個範疇不斷改進並協助業界精益求精，議會於2017年3月發表了《工地福利健康和安全措施參考資料》（參考資料）。

該參考資料主要對象為私人發展商，在參考資料列出發展商、香港房屋委員會、香港鐵路有限公司為建造業工友提供福利和健康措施的良好守則，冀可按個別工地情況，積極採用，以保障工友的安全，改善工地的工作環境。

此外，根據勞工處的統計資料，人體從高處墮下是一項導致嚴重身體受傷甚至死亡的主要意外類別，為加強發前線從業員的安全意識，議會發表了《高空工作安全手冊》，以多圖少字方式闡釋各高處工作安全重點。

建造學院 - 安全訓練課程

為了提升在職工人的安全知識水平，以及行業整體的安全表現；本學院現正開辦以下安全訓練課程，幫助工友提升安全觸覺及建立安全文化，以大大減低意外事件的發生。

現時，學院提供不同類別的課程供業界人士報讀：

- 平安卡 (綠卡)
- 指定行業安全訓練 (銀卡)
- 密閉空間安全訓練
- 安全體驗訓練團 (SETC)
- 其他建造業安全課程
    - 適合管理人員或專業人士的安全課程
    - 適合監督工地安全的從業員的安全課程
    - 適合工地從業員的安全課程

建造學院 - 安全訓練課程 - 安全體驗訓練中心

於2019年，建造業議會在葵涌院校內建立「安全體驗訓練中心」，目的是打破傳統課室為本的安全訓練，新增揉合模擬建造業意外體驗的安全訓練。「安全體驗訓練中心」可以讓香港建造學院學生和業界從業員在安全的環境下，體驗工地意外的情況，加強他們的工地安全意識。

中心佔地約 3,000 平方呎，由八個不同區域所組成，包括「個人防護裝備」、「離地工作安全訓練」、「起重吊運設備」、「消防安全」、「安全使用化學物品及電力」、「良好工地整理」、「機械操作及切割夾捲危害」，以及「虛擬實境訓練」，為多個工種提供模擬工地實境的意外體驗及訓練。

建造業創新及科技基金

促進生產力

- 節省工程所需時間
- 提高成本效益
- 促進工人生產力
- 提高可見性及減少不可行的設計

提高建造質素

- 減少不必要的修改及執修工作
- 減少施工期間的修改，從而改善設計及建造質素

改善工地安全

- 改善工地安全及工人健康
- 透過設計管理或提供安全設備，減低工人在建造操作上的安全風險

提升環保效益

- 減少施工期間的物料浪費及/或污染
- 緩和施工期間對工地周邊造成的環境滋擾

CITF 建造業創科基金

- 政府撥款港幣10億元，成立建造業創新及科技基金
- 基金鼓勵採用自動化、工業化和數碼化技術
- 推動本地建造業轉型，提升本港建造業質素
- 建造業議會是基金的執行伙伴

建造業創新及科技基金 - 預先批核名單

先進建築物料: 6 項

先進科技方案: 12 項

自動化設備: 72項

納米防水物料

可拆式活動隔音屏障

三維鐳射掃瞄儀

混凝土樓板替代物料

太陽能拖車式告示板

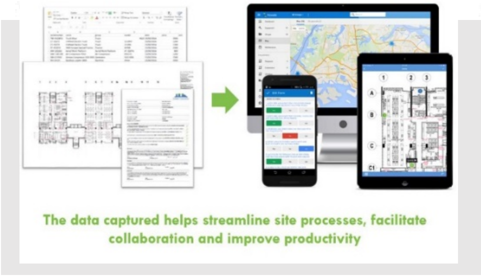
遙控牆鋸

(reference example photos 參考例子圖片)

建造業創新及科技基金 - 預先批核名單

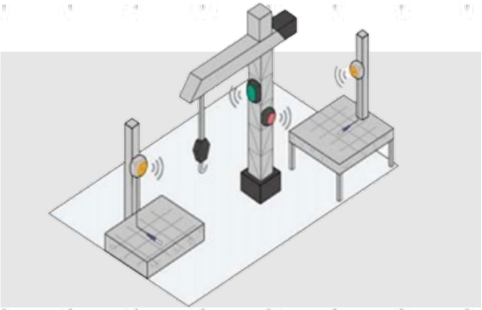
數碼化建築工序: 17項

工程項目管理軟件



工程項目管理軟件

物聯網: 82項



混凝土成熟程度感測器

無線感應器

機械人: 9 項

多功能拆卸機械人

焊接機械人

(reference example photos 參考例子圖片)

CONSTRUCTION INDUSTRY COUNCIL
建造業議會
生命第一
LIFE FIRST
認清你的安全責任
謹守崗位 安全至上
KNOW YOUR RESPONSIBILITIES
SAFETY COMES FIRST

CONSTRUCTION INDUSTRY COUNCIL
建造業議會
生命第一
LIFE FIRST
檢視工序 做足措施
勿走捷徑 安全行先
DO WHAT IS RIGHT
NOT WHAT IS EASY
PLAN AHEAD TO PUT SAFETY FIRST

CONSTRUCTION INDUSTRY COUNCIL
建造業議會
生命第一
LIFE FIRST
對自己的家人負責
安全 你有得揀
BE RESPONSIBLE
FOR YOUR FAMILY
SAFETY IS A CHOICE YOU MAKE

CONSTRUCTION INDUSTRY COUNCIL
建造業議會
生命第一
LIFE FIRST
對危險說不
SAY NO TO DANGER

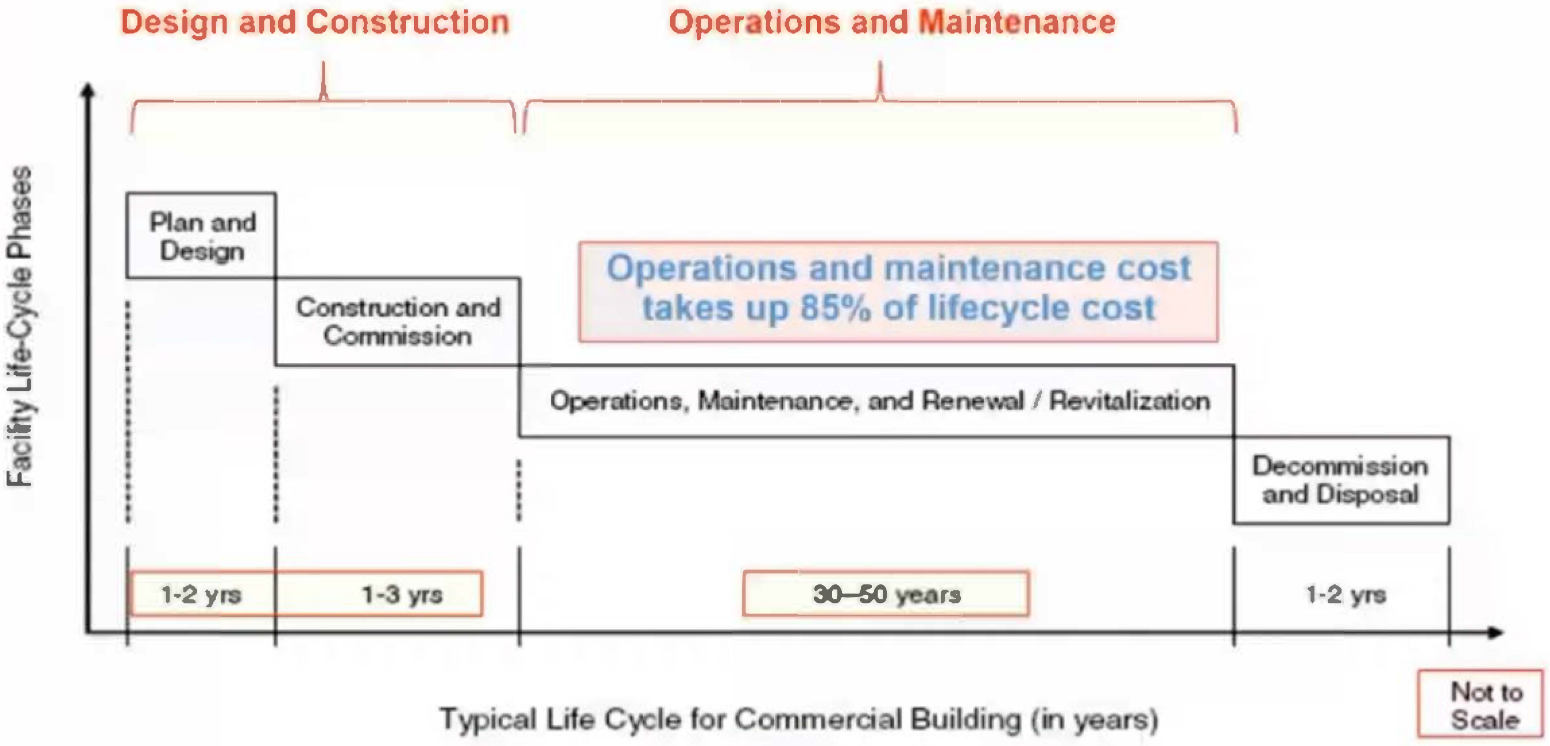
8. Day 2: Operation and Maintenance Stage

Operations and Maintenance (O&M) Stage

FM/ AM

CONSTRUCTION INDUSTRY COUNCIL
建 造 業 議 會

Importance of Asset / Facility Management



"BIM for AM / FM: Experience Sharing and Way Forward from HKUST Digital Twin" – Jack Cheng (HKUST)

What is Asset Management / Facility Management?

Asset Management (AM) = Facility Management (FM) ?

[ISO 55000:2014]

- **Asset**: *"item, thing or entity that has potential or actual value to an organization, in which value can be tangible or intangible" "Physical assets usually refer to equipment, inventory and properties owned by the organization"*
- **Asset Management:** *"coordinated activity (planning and implementation) of an organization to realize value from assets, which normally involve a balancing of costs, risks, opportunities and performance."*

"BIM for AM / FM: Experience Sharing and Way Forward from HKUST Digital Twin" – Jack Cheng (HKUST)

What is Asset Management / Facility Management?

HKUST BIM Lab
Integrate. Innovate. Inspire

Asset Management (AM) = Facility Management (FM) ?

[ISO 55000:2014]

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[ISO 41011:2017]

- Facility Management: "organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business"

What is Asset Management / Facility Management?

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[ISO 41011:2017]

- **Facility Management**: "organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business"

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Component Asset?
Built Asset? (= Facility)

[ISO 41011:2017]

- Facility Management: "organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business"

Facility = Buildings + Civil Infrastructure

What is Asset Management / Facility Management?

HKUST BIM Lab
Integrate. Innovate. Inspire.

Asset Management (AM) = Facility Management (FM) ? 🤔

[ISO 55000:2014]

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Component Asset?
Built Asset? (= Facility)

[ISO 41011:2017]

- **Facility Management**: "organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business"

Facility = Buildings + Civil Infrastructure

Facility Management Activities

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Facility Management
(Cross-disciplinary subject)

Can BIM be applied to ALL of them?

Operations and Maintenance
(Hard Services)

- Fire Safety System
- Lift & Escalator
- Air Conditioning
- M&E Plants
- Plumbing and Drainage
- Building Facades

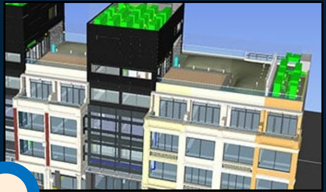
- Cleaning
- Maintenance Management
- Inspection
- Performance Monitoring
- Minor Project Management
- Decoration & Refurbishment

Other Services
(Soft Services)

- Space Management
- Security
- Energy Monitoring & Management
- Waste Disposal & Recycling
- Asset Management
- Pest Control
- Catering Services
- Emergency Management
- Reception Services and Telephony
- Client and Lease Management

Etc.

"BIM for AM / FM: Experience Sharing and Way Forward from HKUST Digital Twin" – Jack Cheng (HKUST)



Alteration & Addition Works

Utilization / Leasing Review

Predictive / Preventive Maintenance

Security / Risk Analysis

Visualization & Inspections

1. Planning and Design
2. Construction
3. **Operations & Maintenance**

Operation Review /
Energy Performance Review

Works Order & Repair

As-built
BIM Models for
Maintenance Management
Space Management
Asset Management
Risk Management

Development Bureau's Technical Circular

No.12/2020 BIM Use

Annex 1

BIM Uses

1. Works Departments shall adopt the stipulated mandatory BIM uses in respective stages of a project. Works Departments may adopt the optional BIM uses when necessary.

	BIM Use	Investigation, Feasibility and Planning	Design	Construction
1	Design Authoring	M[h]	M	M
2	Design Reviews	M[h]	M	M
3	Existing Conditions Modelling	M[i]	M	M
4	Site Analysis	M[i]	M	
5	3D Coordination		M	M
6	Cost Estimation	O	M[a]	M[b]
7	Engineering Analysis		M[l]	M[l]
8	Facility Energy Analysis		O	O
9	Sustainability Evaluation	O	M[j]	M[j]
10	Space Programming	O	M[c]	
11	Phase Planning (4D Modelling)		M[d]	M
12	Digital Fabrication		M[k]	M[e]
13	Site Utilization Planning			M[f]
14	3D Control and Planning			M[m]
15	As-Built Modelling			M
16	Project Systems Analysis			O
17	Maintenance Scheduling			M[g]
18	Space Management and Tracking			O
19	Asset Management			M[n]
20	Drawing Generation (Drawing Production)		M	M

Legend:

M – Mandatory BIM Use for the mentioned stage, including that carried forward from previous stage. The underlined items are new mandatory BIM uses.

O – Optional BIM Use

CICBIMS: Section 3:

BIM Implementation Planning (BIM Uses)

	BIM Use	Plan	Design			Construct		Operate
		Concept Design, Inception Feasibility & Planning	Preliminary & Scheme Design	Detailed Design	Tender Stage	Construction	As-Built	Facilities Management, Operation
1	**Design Authoring**	Y / N	Y / N	Y / N	Y / N	Y / N		
2	**Design Reviews**	Y / N	Y / N	Y / N	Y / N	Y / N		
3	**Drawing Generation (Drawing Production)**	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	
a	*Master Layout Plan / Development Plan*	Y / N	Y / N					
b	*Statutory Submission*		Y / N	Y / N	Y / N	Y / N	Y / N	
c	*Tender drawings*			Y / N	Y / N			
d	*Construction and Shop drawings*				Y / N	Y / N	Y / N	
e	*Sale and Lease drawings*						Y / N	
4	**Existing Conditions Modelling**	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	
5	**Sustainability Evaluation**	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N	Y / N
6	**Site Analysis**	Y / N	Y / N	Y / N				
7	**Space Programming**	Y / N	Y / N	Y / N				
8	**Cost Estimation**	Y / N	Y / N	Y / N	Y / N	Y / N		
a	*Quantity take-off and cost estimating*	Y / N	Y / N	Y / N	Y / N	Y / N		
b	*5D modelling / cash flow forecasting*				Y / N	Y / N		
9	**Spatial Coordination**			Y / N	Y / N	Y / N		
10	**Engineering Analysis**		Y / N	Y / N	Y / N	Y / N		
a	*Structural Analysis*		Y / N	Y / N	Y / N	Y / N		
b	*Ventilation Analysis*		Y / N	Y / N	Y / N	Y / N		
c	*Lighting Analysis*		Y / N	Y / N	Y / N	Y / N		
d	*Energy Analysis / Thermal Analysis*		Y / N	Y / N	Y / N	Y / N		
e	*Fire Engineering*		Y / N	Y / N	Y / N	Y / N		
f	*Civil Engineering*		Y / N	Y / N	Y / N	Y / N		
g	*Other Engineering Analysis*		Y / N	Y / N	Y / N	Y / N		
11	**Facility Energy Analysis**			Y / N	Y / N	Y / N		
12	**Building Code Checking and Validation**		Y / N	Y / N	Y / N	Y / N	Y / N	
13	**Phase Planning (4D Modelling)**			Y / N	Y / N	Y / N		
14	**Digital Fabrication**			Y / N	Y / N	Y / N		
15	**Site Utilisation Planning**				Y / N	Y / N		
16	**3D Control and Planning**					Y / N		
17	**3D Construction Coordination**					Y / N		
18	**Construction System Design**					Y / N		
19	**Construction Quality Management**					Y / N		
20	**As-Built Modelling and Asset Information Modelling**					Y / N	Y / N	Y / N
21	**Maintenance Scheduling**					Y / N	Y / N	Y / N
22	**Project Systems Analysis**						Y / N	Y / N
23	**Space Management and Tracking**						Y / N	Y / N
24	**Asset Management**						Y / N	Y / N
25	**Sales and Marketing**			Y / N	Y / N	Y / N	Y / N	Y / N
26	**Heritage Information Modelling**						Y / N	Y / N
-	**Other BIM Uses**							

BIM Uses

20. As-Built Modelling
21. Maintenance Scheduling
22. Project System Analysis
23. Space Management & Tracking
24. Asset Management
25. Sales and Marketing
26. Heritage Information Modelling

20. As-Built Modelling

LOIN - Level of Information Need

Phases →

LOIN

LOD-G — Graphics

Architectural	100	200	300	400	--
Structural	100	200	300	400	--
MEP	100	200	300	400	--
Discipline ⋮	⋮	⋮	⋮	⋮	⋮

LOD-I — Information

Architectural	100	200	300	400	500
Structural	100	200	300	400	500
MEP	100	200	300	400	500
Discipline ⋮	⋮	⋮	⋮	⋮	⋮

DOC — Documentation

Architectural	Professional deliverables e.g. Statutory drawings, Contract drawings	IFC, SPF, XML, JSON, PDF, DWG, DOCX, etc
Structural	Professional deliverables e.g. Statutory drawings, Contract drawings	
MEP	Professional deliverables e.g. Statutory drawings, Contract drawings	
Discipline ⋮	⋮	

21. Maintenance Scheduling

22. Project System Analysis

BMS

A **building management system**(**BMS**), otherwise known as a **building automation system** (**BAS**), is a computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems, and security systems.

Energy Saving 節能

AI + IOT

甚麼是
建構更美好生活？

23. Space Management & Tracking

24. Asset Management

Project Example

Shanghai Street 618 Preservation and Revitalisation
618上海街傳承及活化項目

25.
Sales and Marketing

26. Heritage Information Modelling

Braving the Epidemic 抗疫

BIM for AM/FM: reference

Home > Events > Event Calendar > CIC Webinar on BIM for Asset Management / Facility Management: Experience Sharing and Way Forward from HKUST Digital Twin

Back

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CIC Webinar on BIM for Asset Management / Facility Management: Experience Sharing and Way Forward from HKUST Digital Twin

Date:
28 Dec 2020 (Mon)

Time:
16:00 - 17:00

Language:
Cantonese

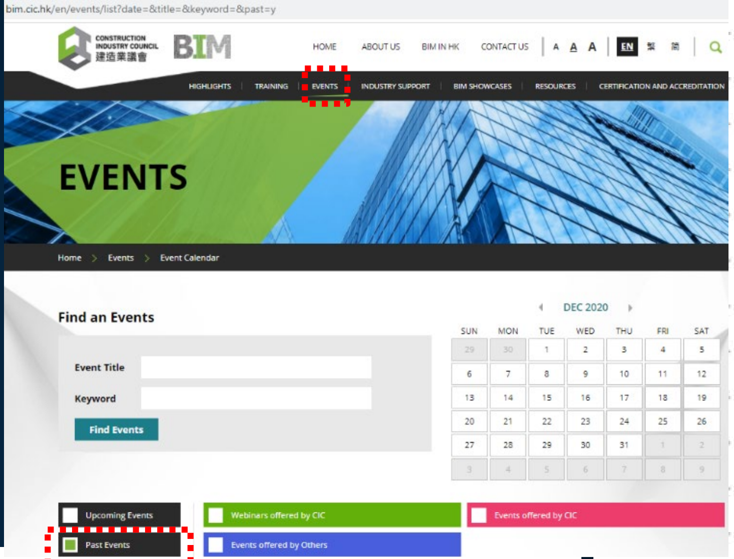
Fee:
Free of Charge

Format:
Webinar

BIM technology has been increasingly adopted for design and construction of buildings and civil infrastructures in recent years. However, the application of BIM for facility management or asset management is still at an early stage. As the operations and maintenance (O&M) stage takes a majority of the entire life cycle of a built facility, it is important to explore the potential applications of BIM for facilitating the O&M stage of a building and making it smart.

In this webinar, Dr. Jack CHENG will present the key concepts of asset information models (AIM) and BIM for facility management. Digital twin technology for building operations and maintenance will also be introduced. Taking HKUST campus as an example, creation and application of digital twins integrated with BIM and IoT for supporting facility management activities like air quality monitoring, space management, and maintenance planning will be illustrated and discussed. Finally, Dr. CHENG will share the importance of standardization, lessons learned, and way forward for BIM-based facility management.

https://www.bim.cic.hk/en/events/detail/310



Highlights of Webinar:

- Introduction and illustration of BIM-based asset / facility management (AM / FM)
- Sharing of collection, verification, standardization, and integration of as-is building information for facility management

Speaker:

Dr. Jack CHENG, Associate Professor and Director of BIM Lab, The Hong Kong University of Science and Technology

Remarks:

An electronic copy of CPD attendance certificate will be issued to participants with over 80% attendance within one month after the live webinar. Any attendance on replay sessions after webinar will not be considered for CPD attendance certificate.

Should you have any queries, please contact Mr. Michael LEUNG (email: michaelleung@cic.hk; tel: 3199 7324).

Watch Recorded Webinar Video

BIM for AM/FM: reference

CIC Webinar on BIM Talks: Celebration of BIM Achievement - BIM Projects 2020 Winners' Sharing

Apply Now

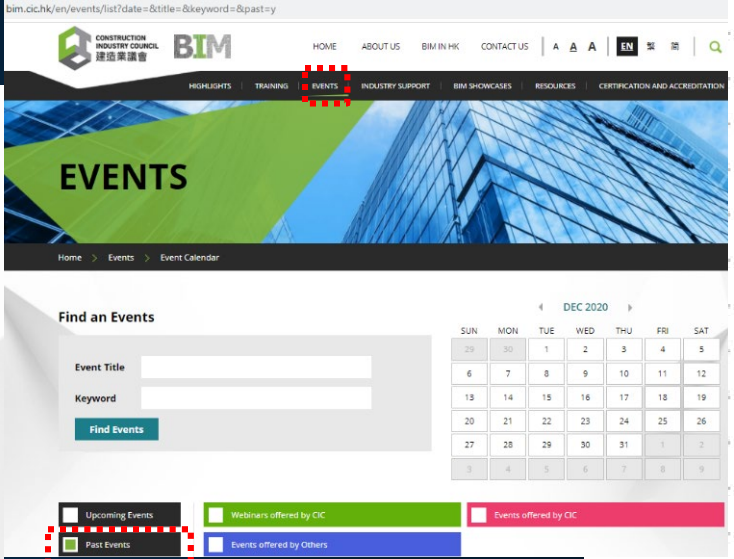
Date:
28 May 2021 (Fri)

Time:
15:00-17:00

Format:
Webinar

Language:

The Construction Industry Council (CIC)'s goal of organising BIM Talks is to bring together bright minds to give talks that are related to the successful implementation of BIM in real life, and on a wide range of topics to ... und from the industry will be invited to share their



BIM Adoption and Sustainable BIM FM Platform for Shanghai Street 618 Preservation and Revitalisation

Mr. Anderson LEUNG, Director, Works & Contracts, Urban Renewal Authority
Mr. Thomson LAI, Asia Digital Leader, AECOM

Abstract: 618 Shanghai Street is URA's first project to use BIM as a tool in enhancing design coordination, crashes prevention in construction, quality buildings, and operational efficiency of facilities management (FM). This project has leveraged several BIM technologies across the project life cycle. To improve the operation efficiency, the URA has appointed AECOM to develop a centralized BIM-FM platform on the cloud which integrates the as-built BIM, Building Management System (BMS) data and Internet of Things (IoT) system that are installed on site. With the latest BIM technologies, it offers a sustainable and expandable solution to achieve better building maintenance and property management for building a quality city.

In this session, we are delighted to invite Mr. Anderson LEUNG, Director, Works & Contracts of URA, and Mr. Thomson LAI, Asia Digital Leader of AECOM, will present the digital twin platform for facilitate management in 618 Shanghai Street and how its technology integrated with the BIM, BMS and IoT together in this redevelopment project.

Neuron: How will the digital twin platform reshape smart buildings for the future?

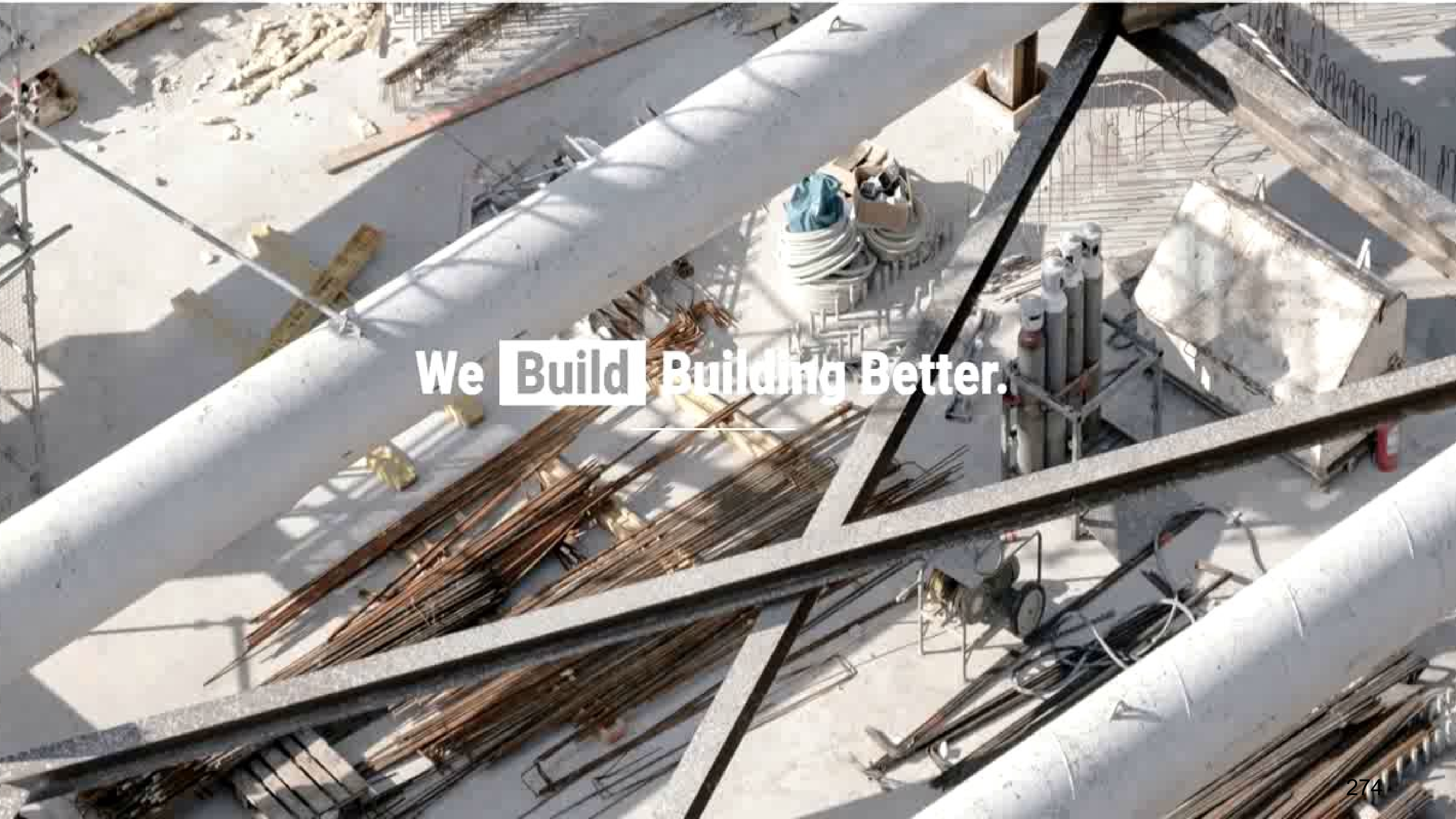
Mr. Mark CHEN, Associate, Arup

Abstract: The digital twins is an emerging technology that will drive the next generation smart building evolution. Beyond a single technology, it is empowered by the integration of disruptive digital technologies such as BIM, WebGL, Big Data, AI, cloud native and semantic data platforms.

Neuron is a digital twin platform developed by Arup with track record in Hong Kong and beyond. It is designed as the 'digital brain' for smart buildings – integrating Arup's total engineering domain expertise into the building life cycle optimisation.

Mr. Mark CHEN is leading the development of Neuron. In this session, he will share his vision on the future smart building development and how Neuron will embrace disruptive digital technologies in the upcoming projects.

https://www.bim.cic.hk/en/events/detail/345


We Build Building Better.

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