

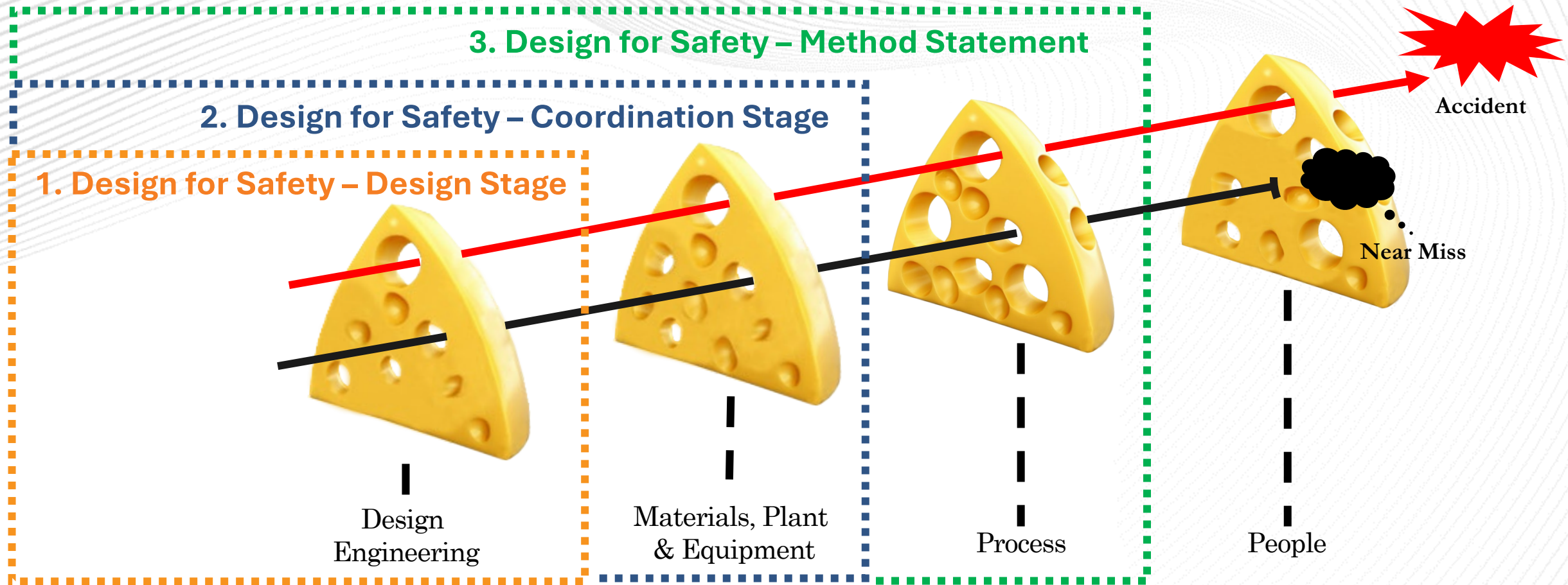
Webinar on Design for Safety



GAMMON E & M LIMITED

金門機電有限公司

Design for Safety – Thoughtful & Caring Culture



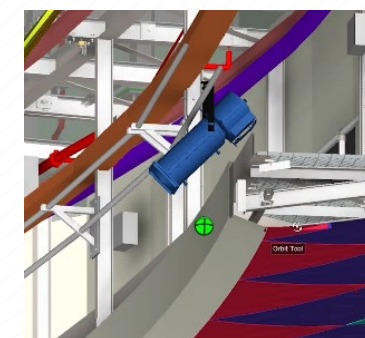
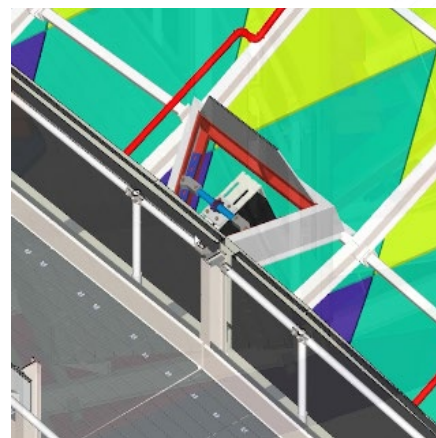
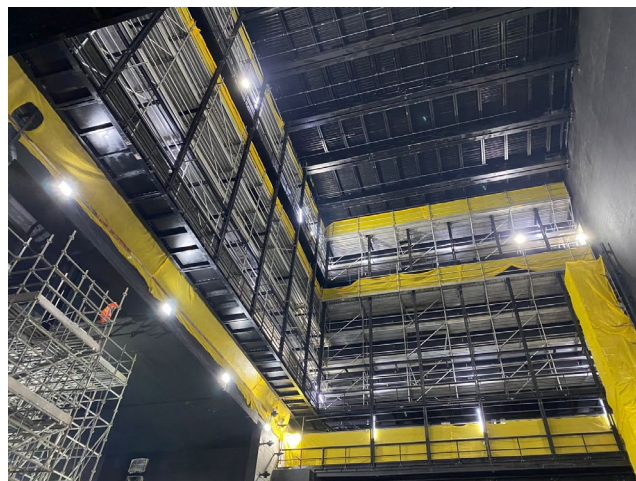
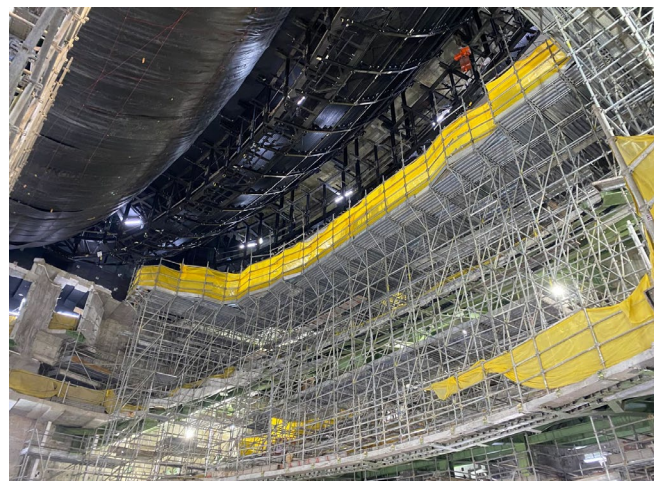
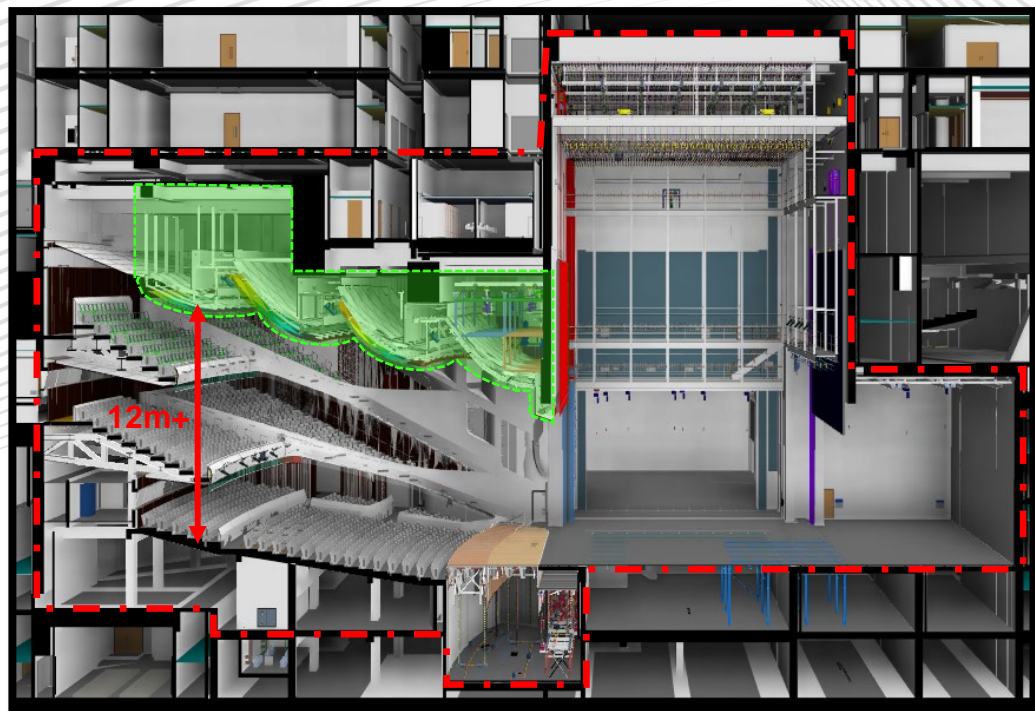
Swiss Cheese Model

People make mistakes, we need several lines of defense

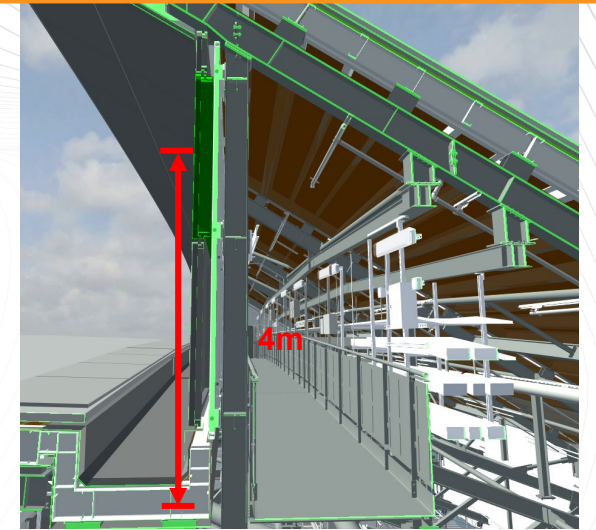
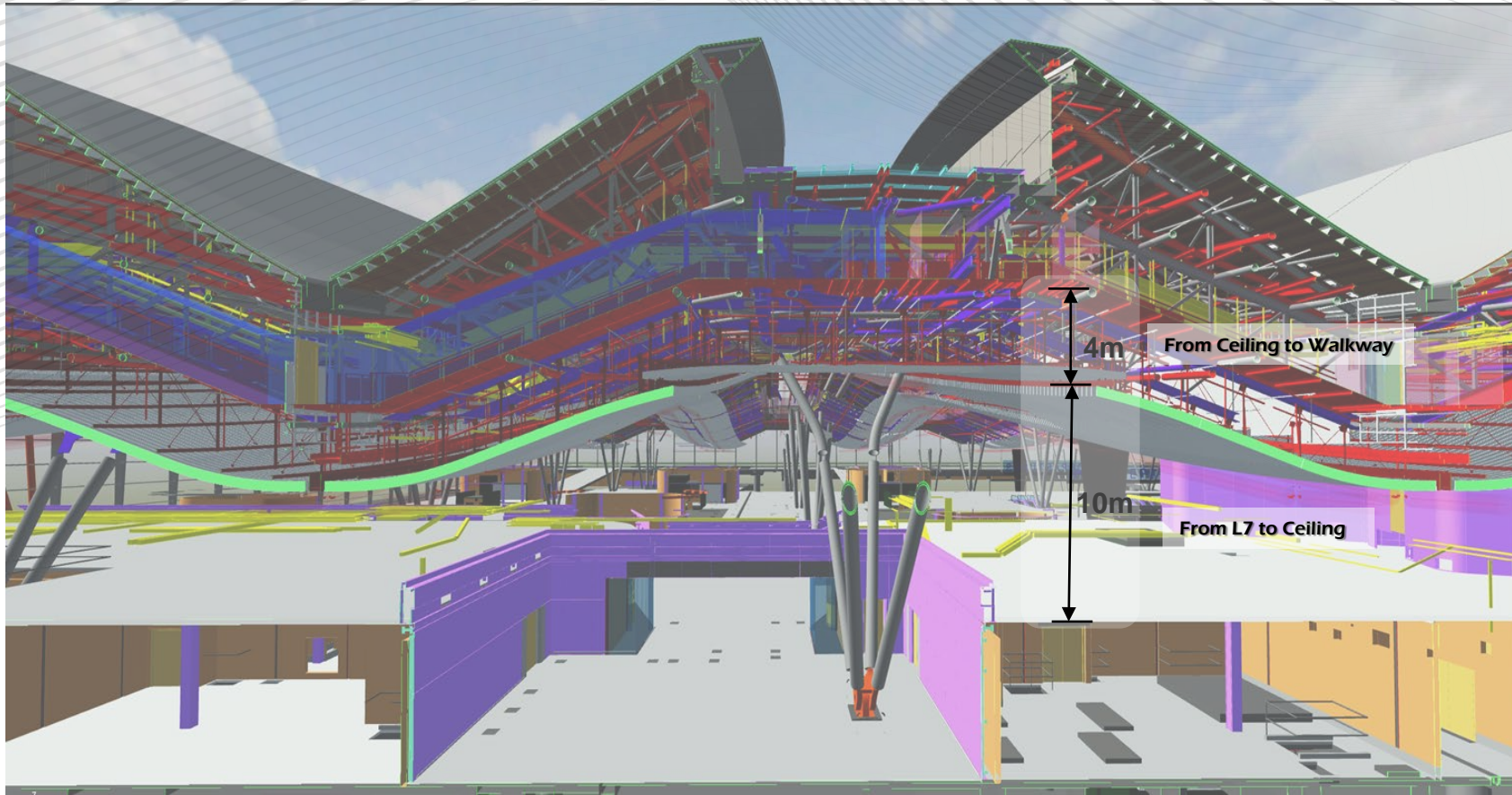
Design for Safety Design Stage

DFS start with a thoughtful mind

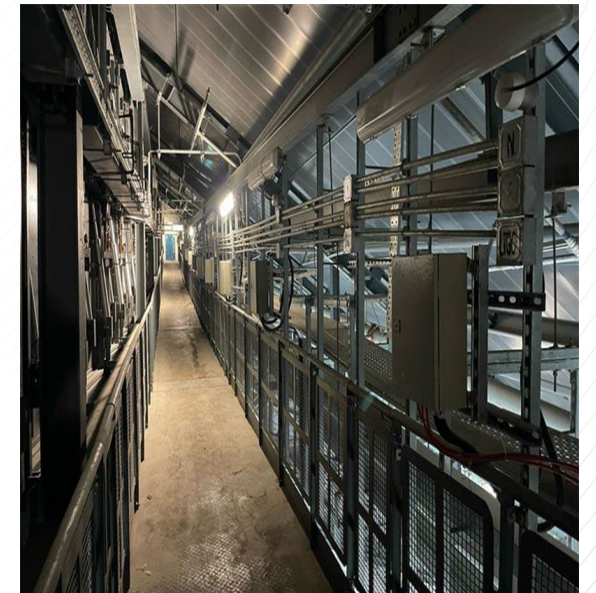
Design for Safety – Maintenance Walkway



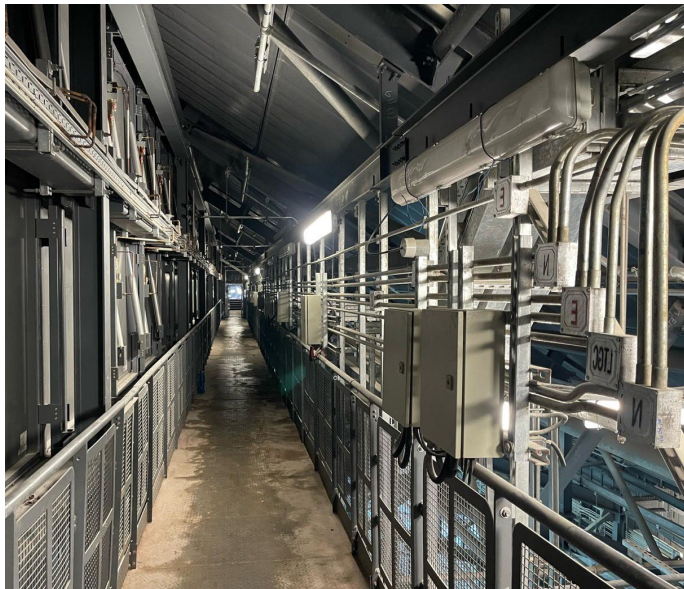
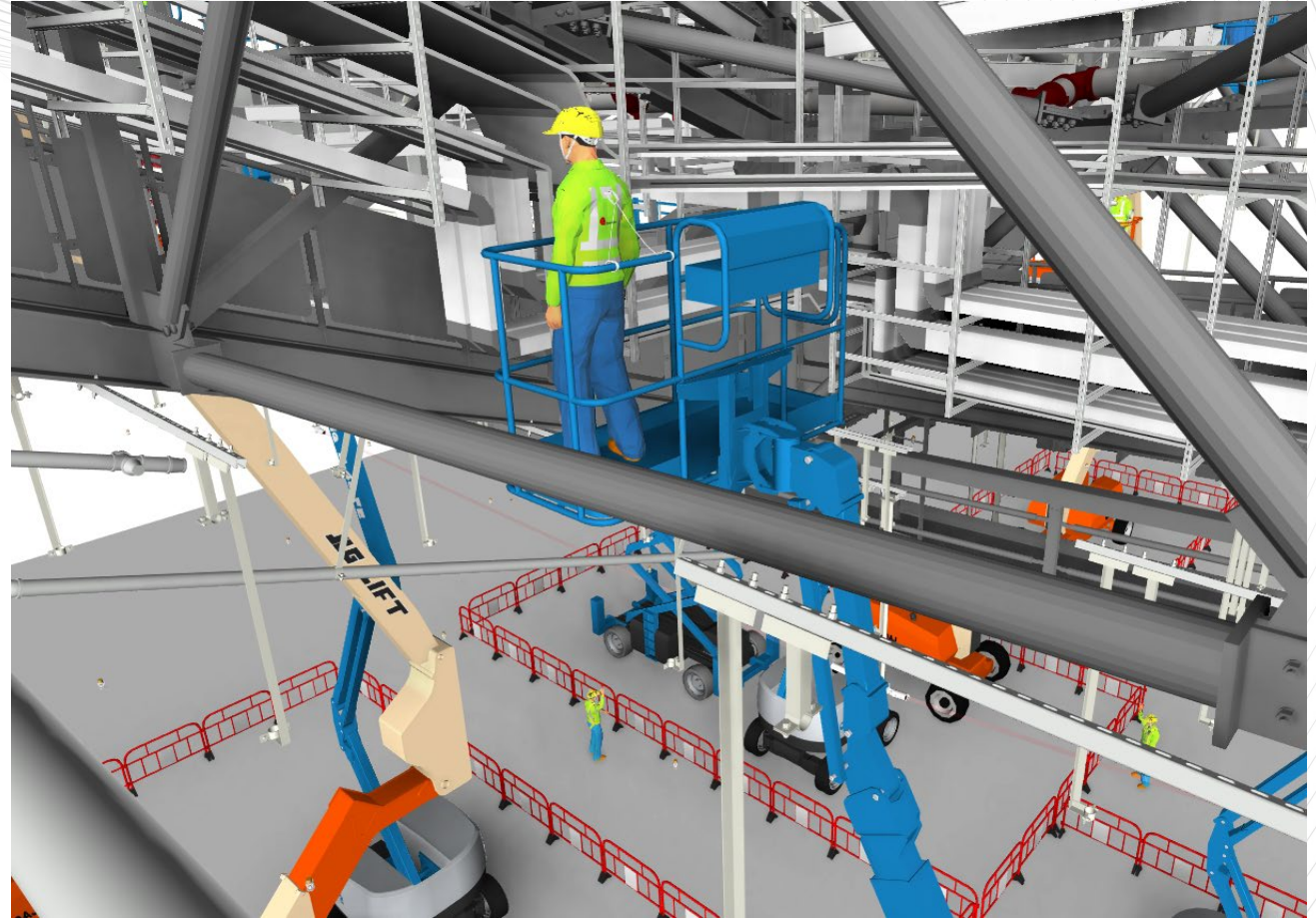
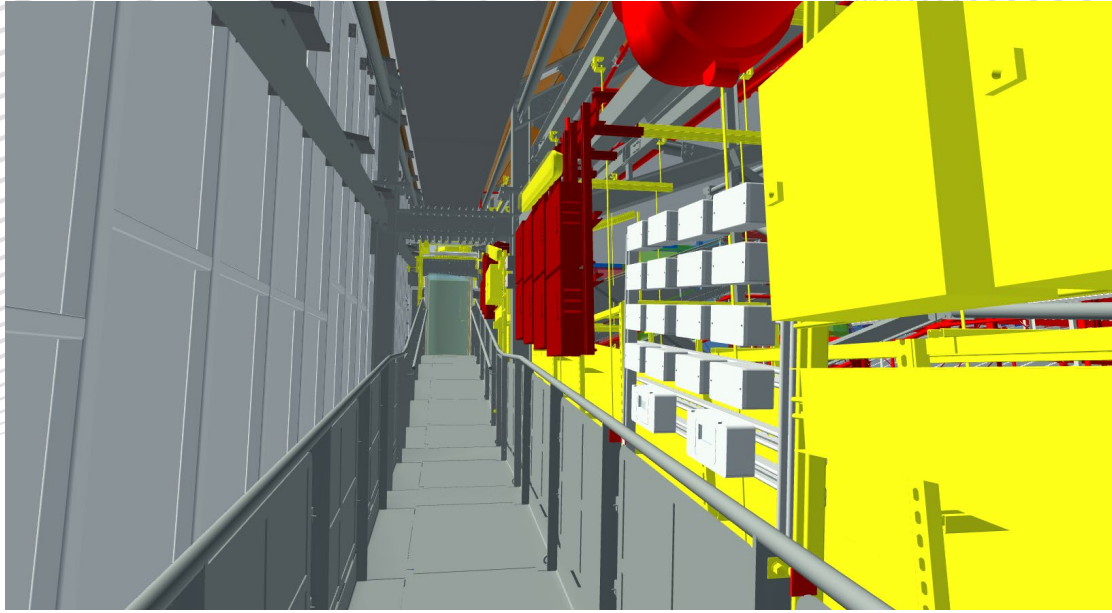
Design for Safety – Maintenance Walkway



From Walkway to High Ceiling

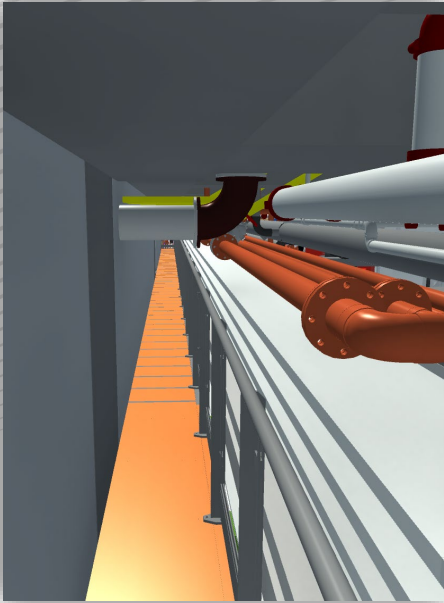


Design for Safety – Maintenance Walkway



Design for Safety – Maintenance Walkway

BIM



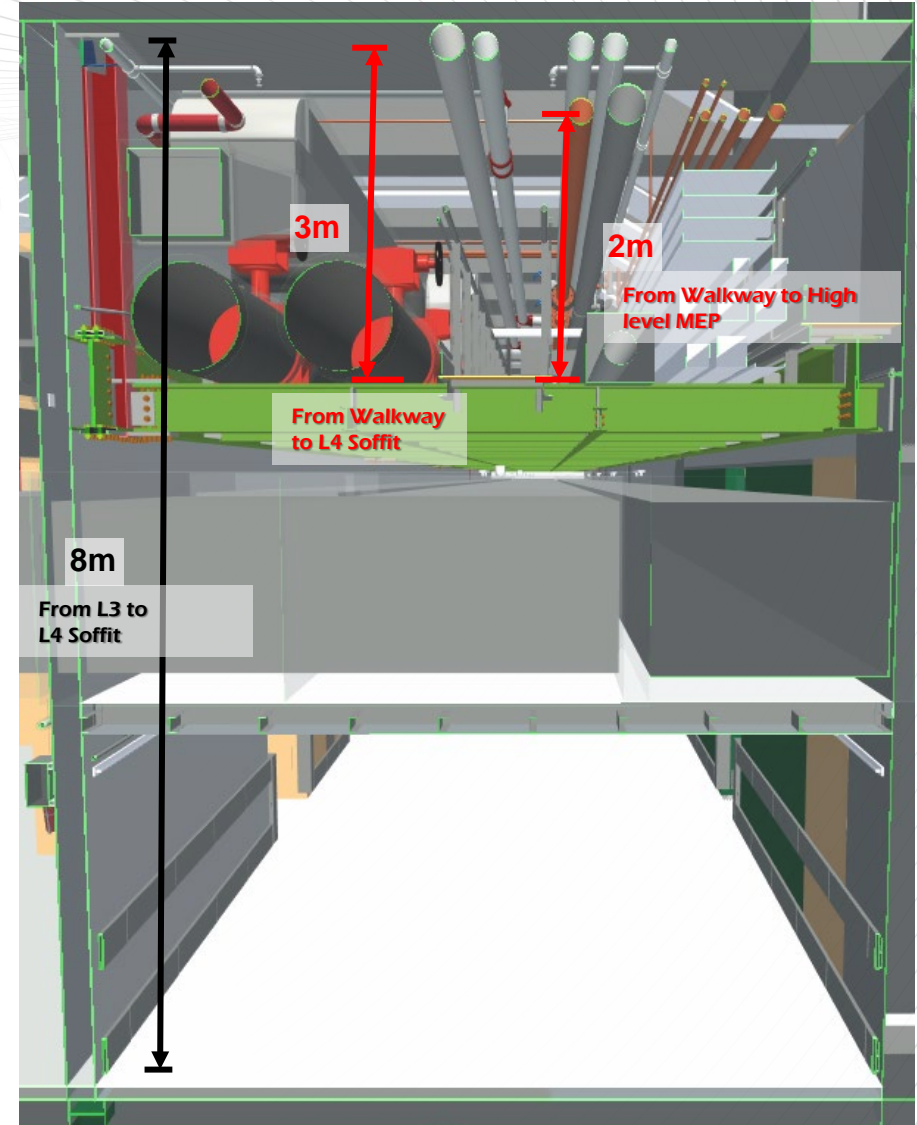
Site Photo



BIM



Site Photo



Services Highway
at L3, T2

Design for Safety Coordination Stage

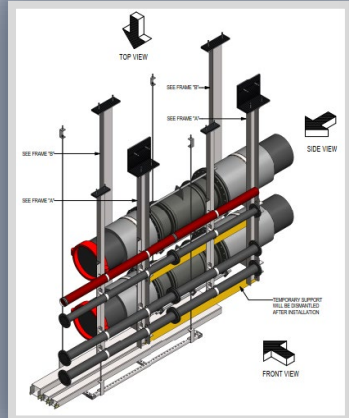
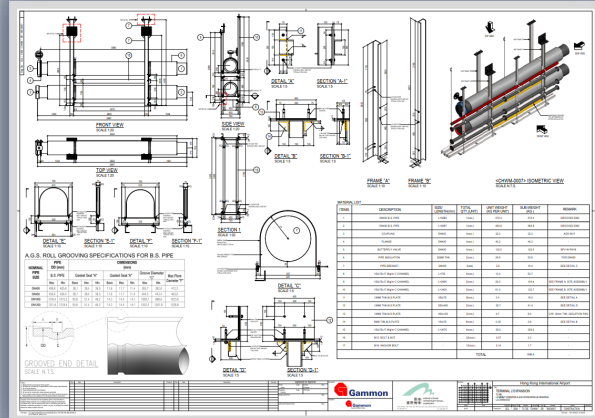
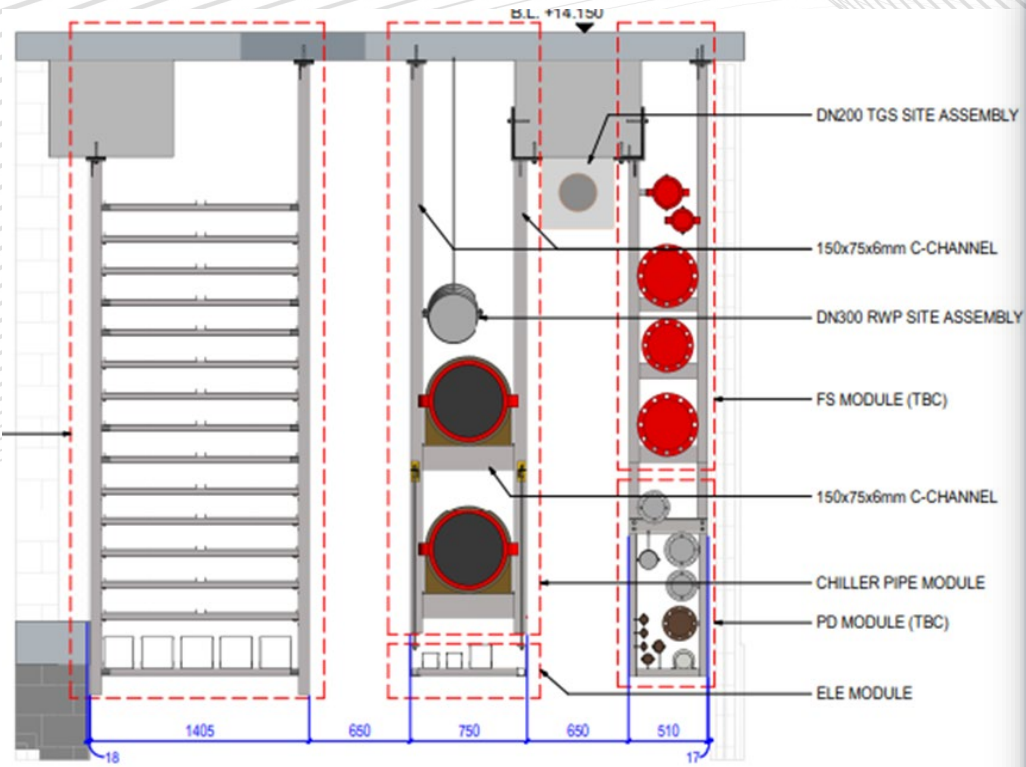
Corporate building DFS Culture

Design for Safety – Accessibility

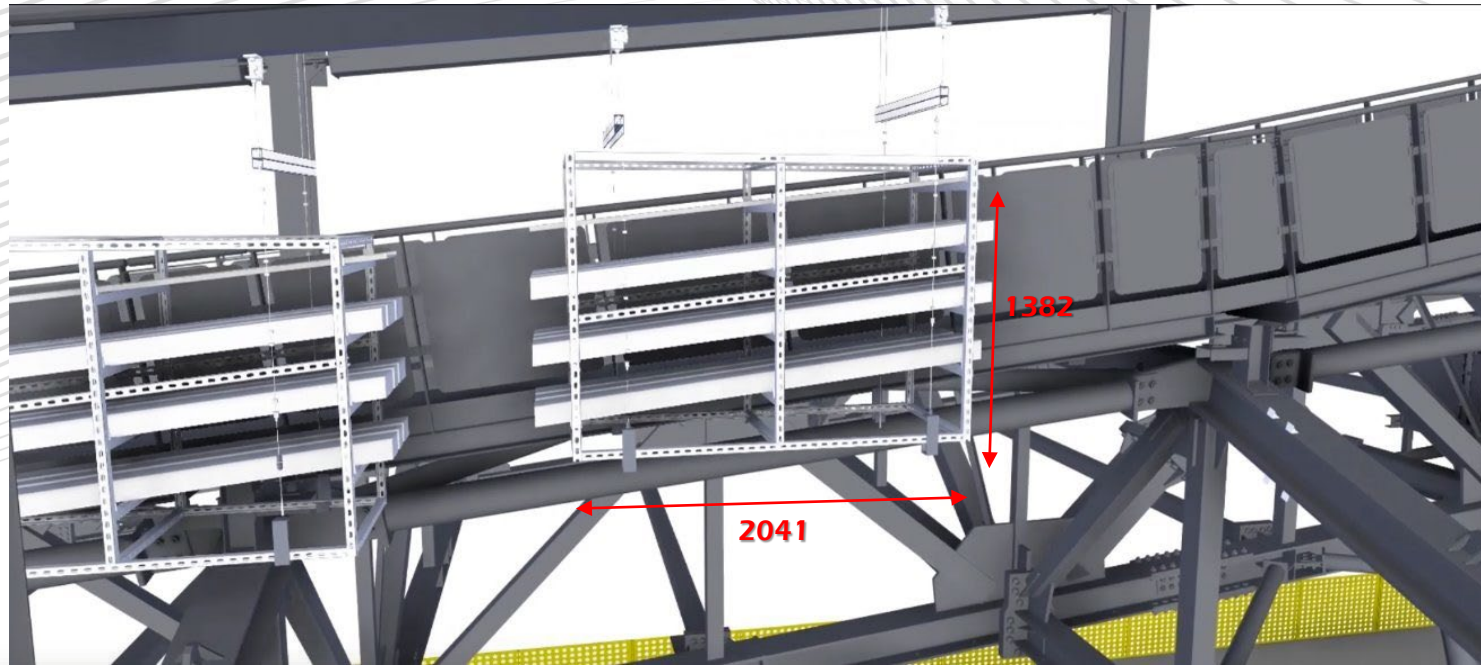


Design for Safety – Accessibility

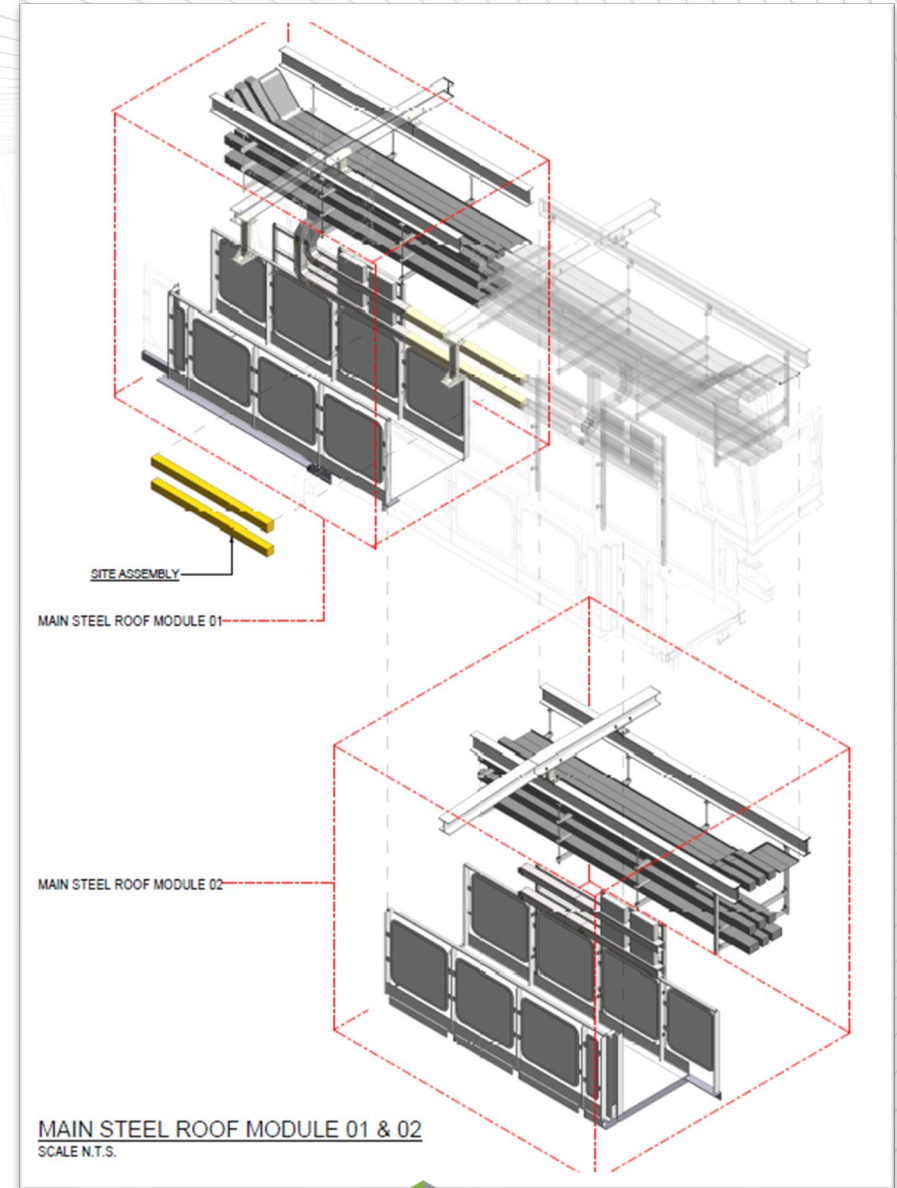
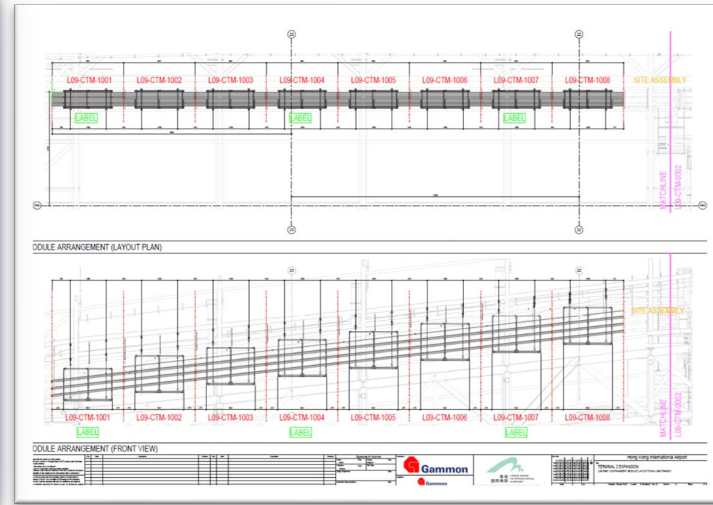
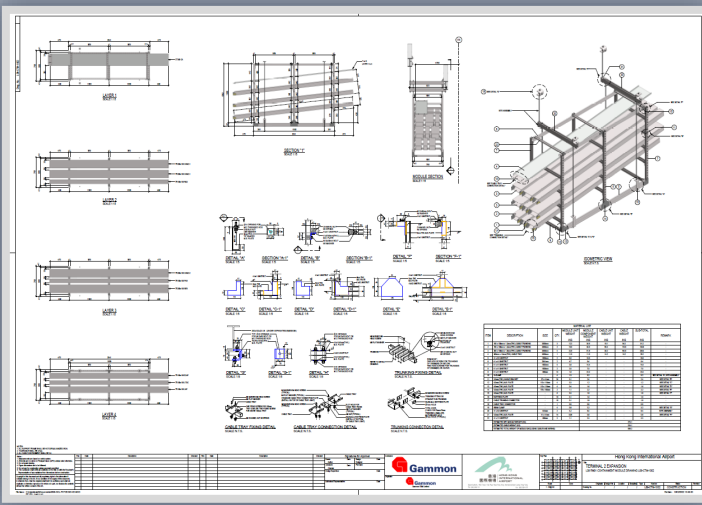
Design for Safety – Accessibility



Design for Safety – Accessibility



BIM



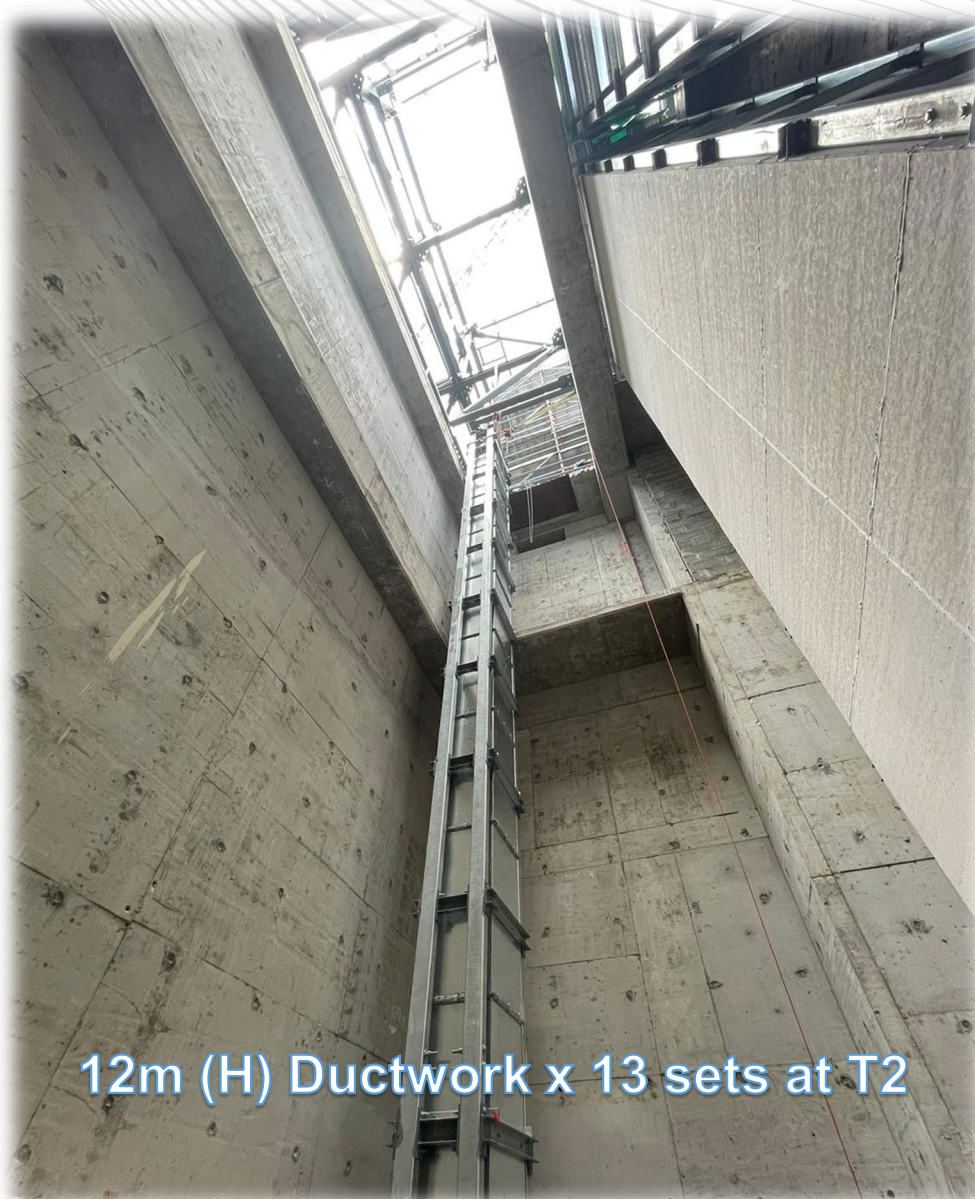
Fabrication drawing



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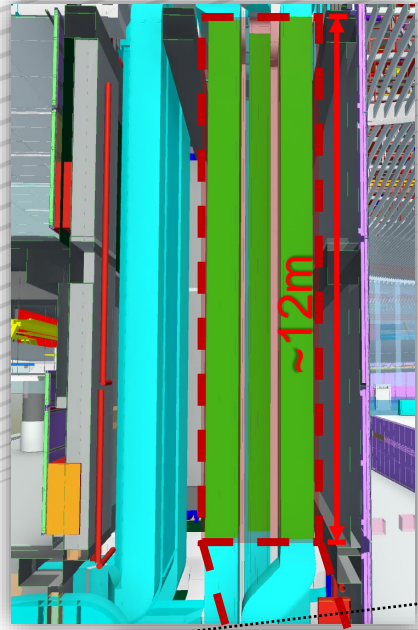
Design for Safety – Ductwork Module Riser (Buildability)



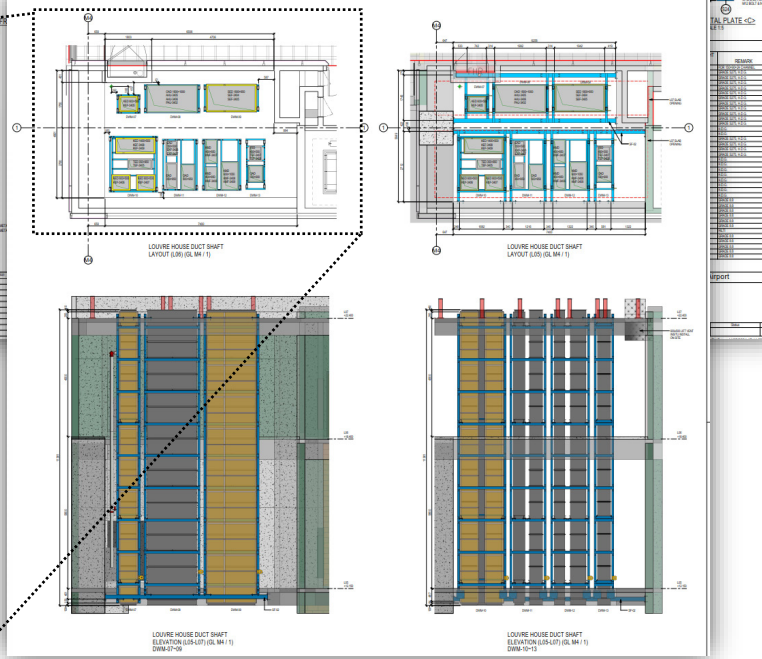
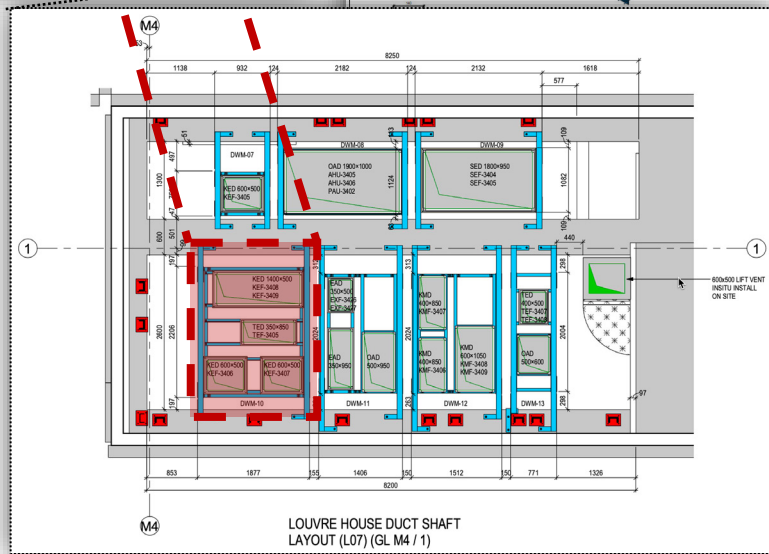
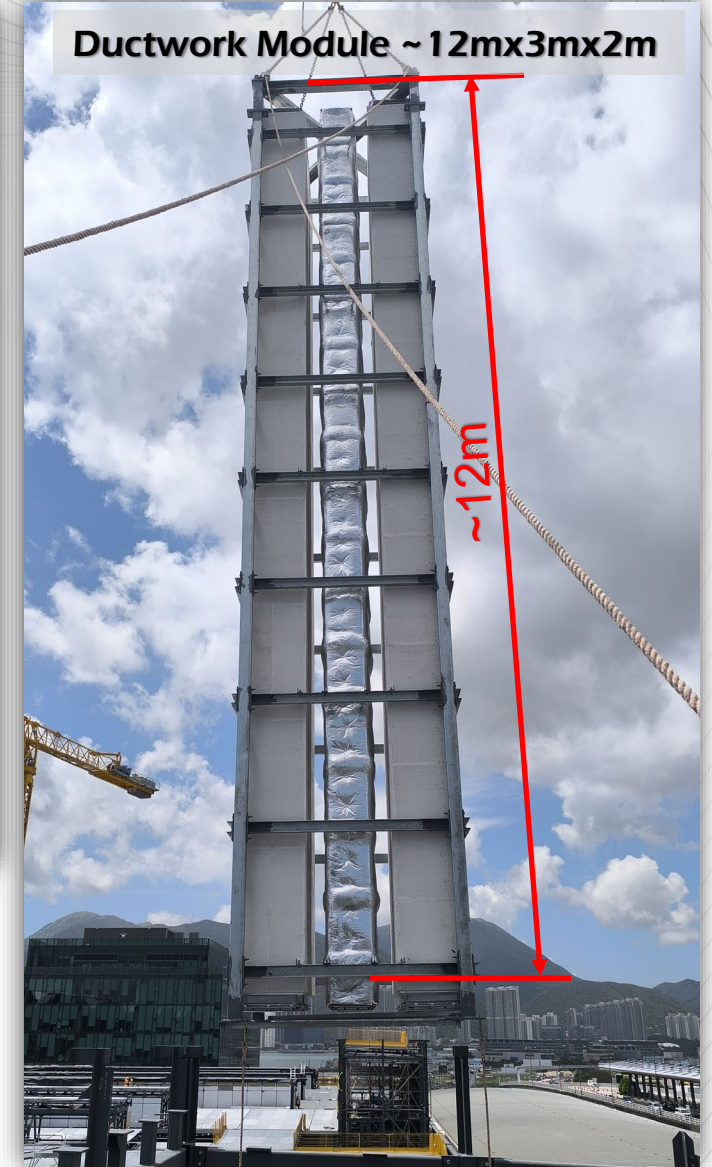
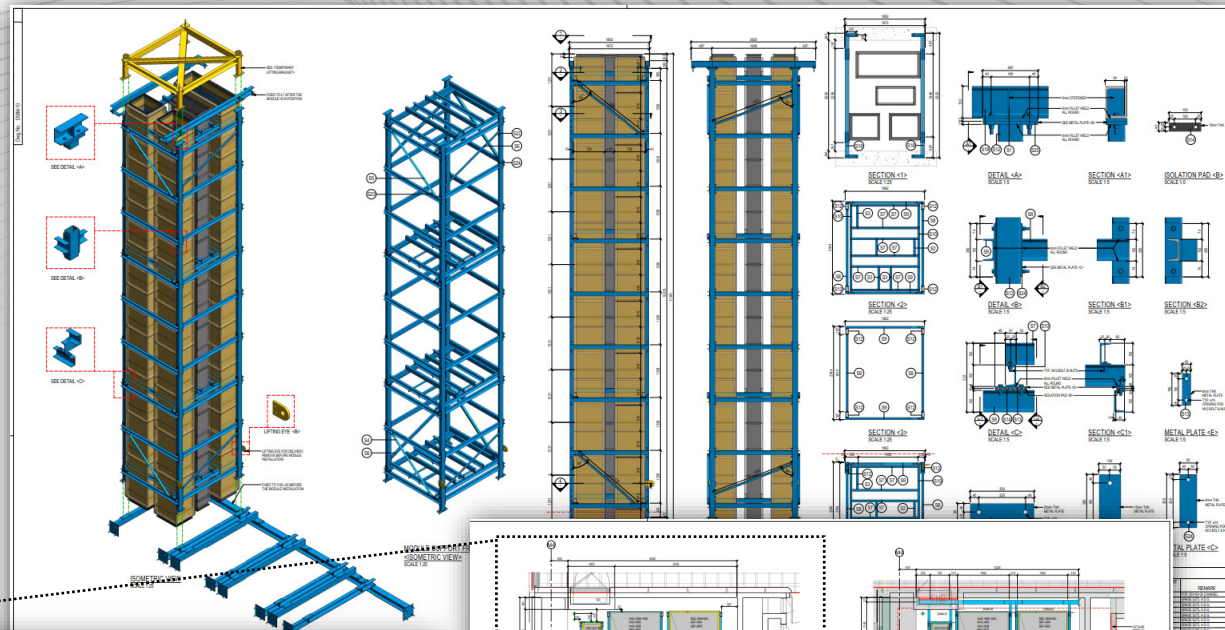
12m (H) Ductwork x 13 sets at T2



Design for Safety – Ductwork Module Riser (Buildability)



BIM

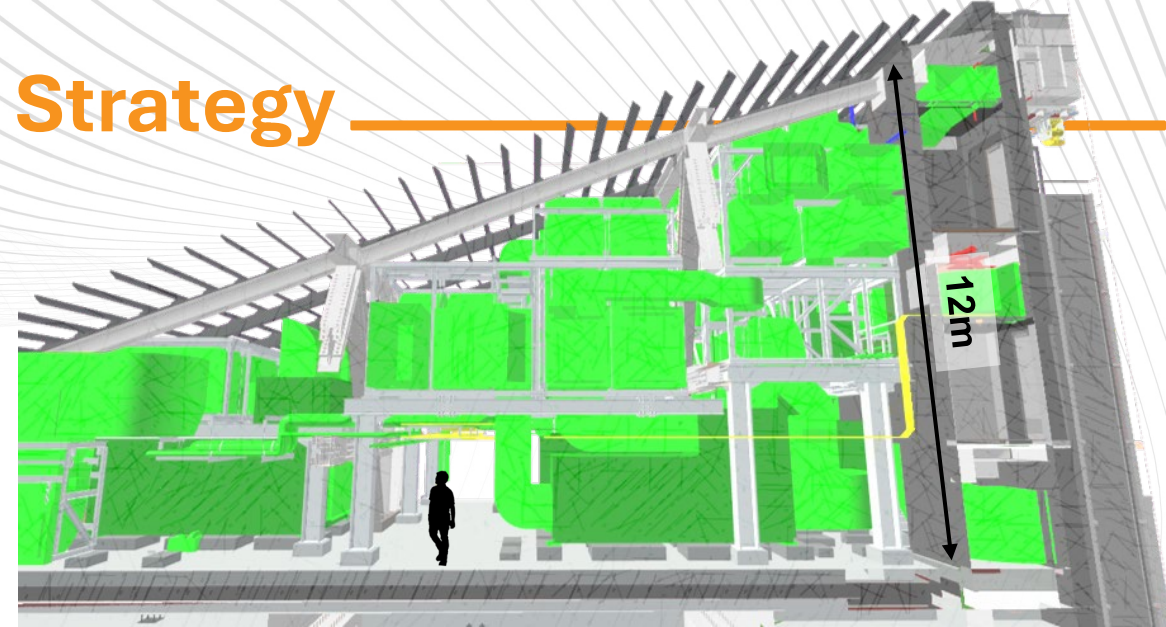
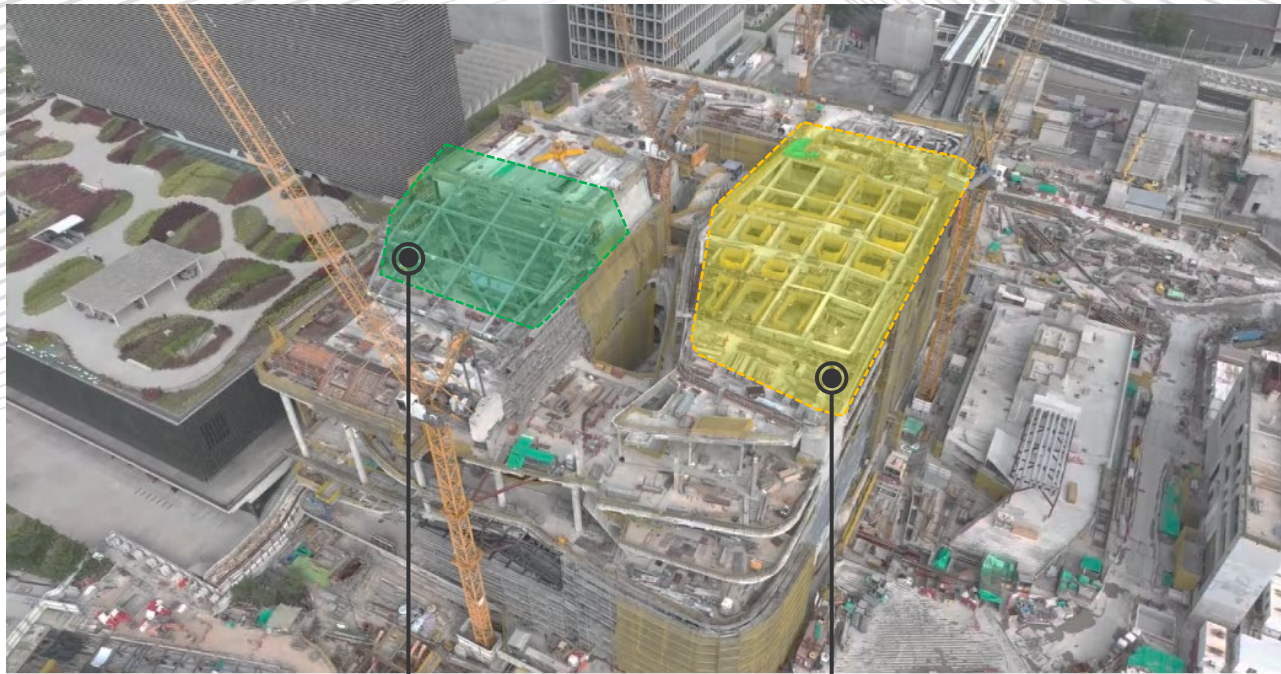


Fabrication drawing

Design for Safety Method Statement

We Design the Safety Process

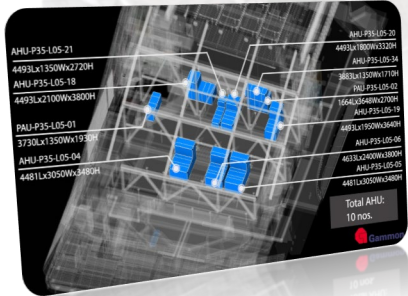
Design for Safety – Planning a DFS Strategy



MT Roof Main Plant Room

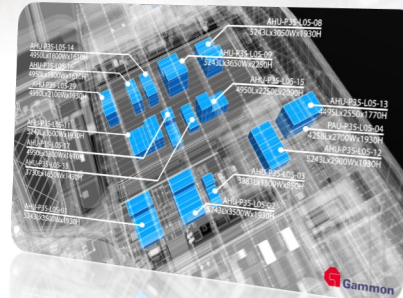


LT Roof Main Plant Room



MT Roof Main Plant Room
 : 200+ tons MEP works
 : 28 Mega Size MiMEP

LT Roof Main Plant Room
 : 400+ tons MEP works
 : 53 Mega Size MiMEP



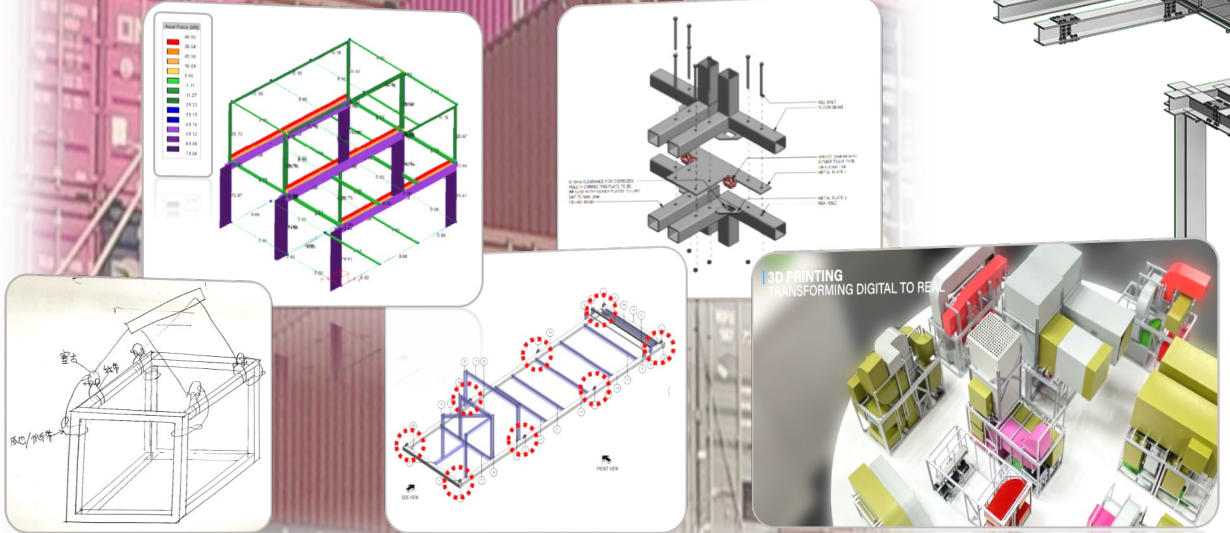
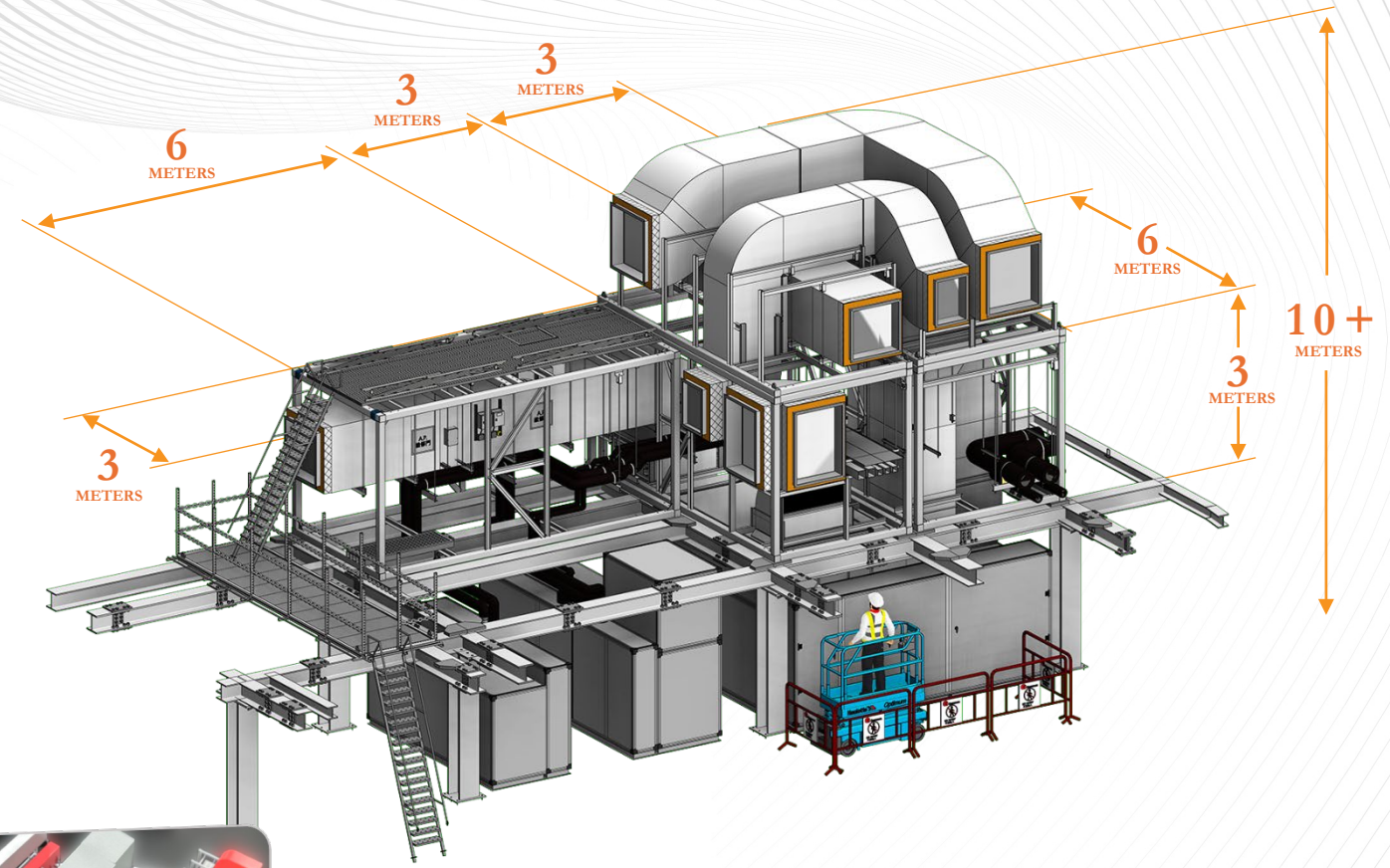
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Design for Safety – Concept and Design

概念與設計
 Concept and Design

ONE Step, Risk Less
 一步到位 風險降低



Standardized a 3.3.6 Design performing Stability Stacking.
 Design Consider Lifting Load, Wind Load, Hangers/Supports Strengthening.
 Multiple controls from Design, Engineering, Manufacturing.

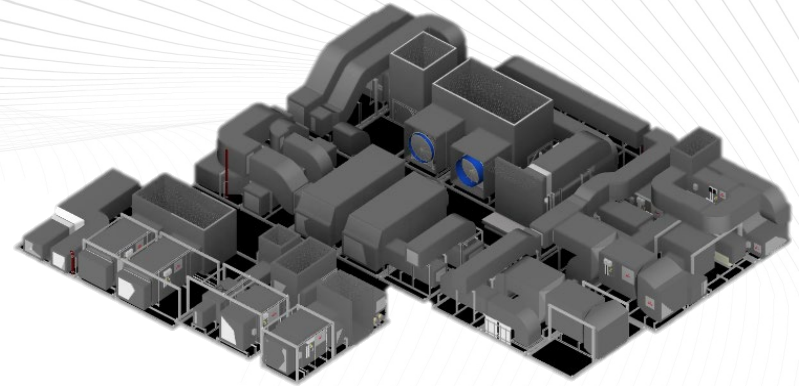
統一規範 縝密設計 嚴密把控 - 務求推動高標準化

Design for Safety – Problem Solving

解決核心問題 Problem Solving

Reducing the Problem of massive MEP works at Height
LT-03 Layer unified the MEP services at height into modules
By MiMEP Stacking Method to minimize working time at Height

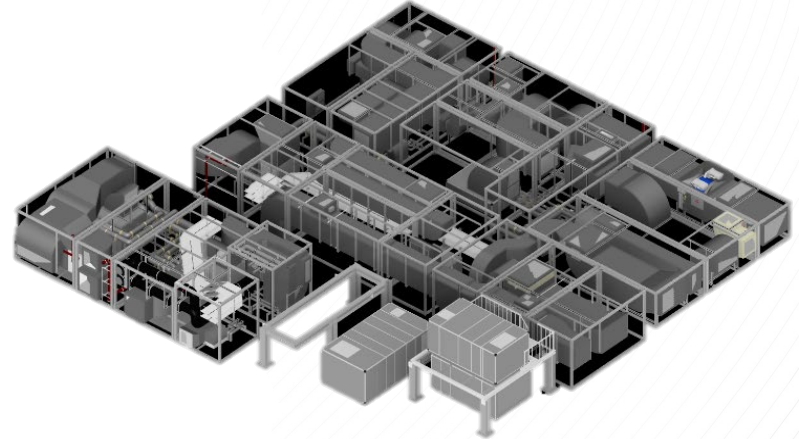
大幅減少高空機電安裝工作
將高位機電規劃設計成 LT-03 層的 MiMEP 模組
以吊運到位及疊層的方式減少安裝工序



Resolving the Problem of Hanging System Provision

By developing the plant room into MiMEP,
the MiMEP frame can preform as stacking design and self hanging system

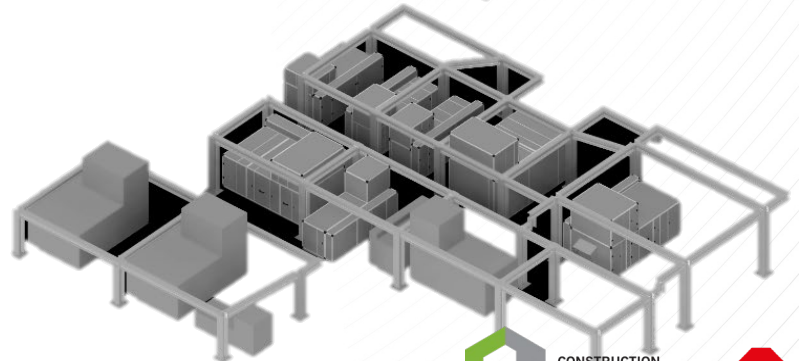
解決機電安裝打碼懸掛問題
在發展機房 MiMEP 設計時，
模組框架能同時具備疊層設計及作為懸掛打碼支撐使用



Reserving space for Equipment Maintenance

By MiMEP Approach, MEP services distributed to LT-02, LT-03 Layers
LT-01 Layer reserved most spaces for equipment maintenance

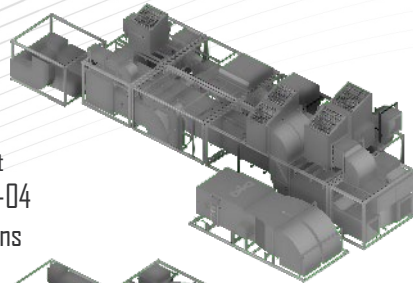
為主要設備預留維修空間
在 MiMEP 考慮時，風管喉管等機電設備分配到 LT-02 LT-03 層
以提供 LT-01 層的地面空間作主要設備的維修空間與路徑



Design for Safety – Problem Solving

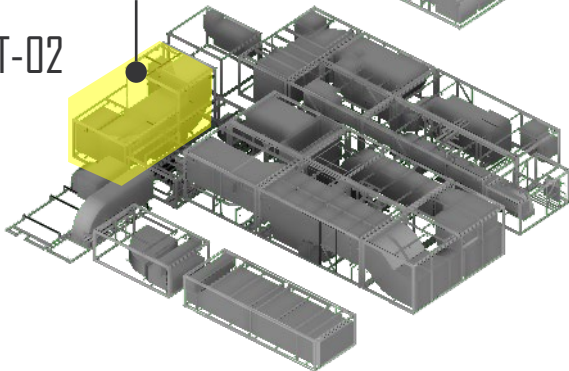
解決核心問題 Problem Solving

MT-03

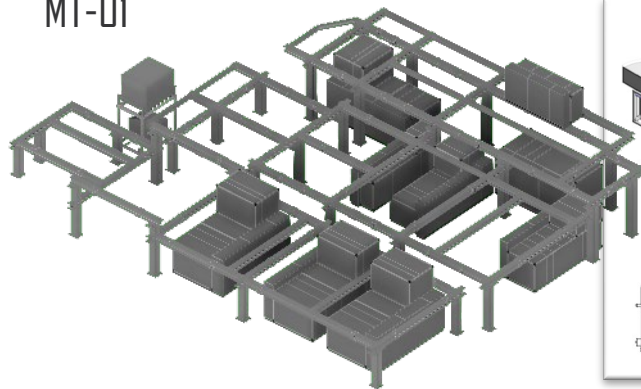


Heaviest
MT-02-04
10.5 tons

MT-02



MT-01



Lyric Theatre Roof Plant Room

MEP works: 400+ tons

Layers of Stack: 3 Layers

Nos. of MiMEP: 53 nos

Heaviest MiMEP: LT-02-15 (9.5tons)

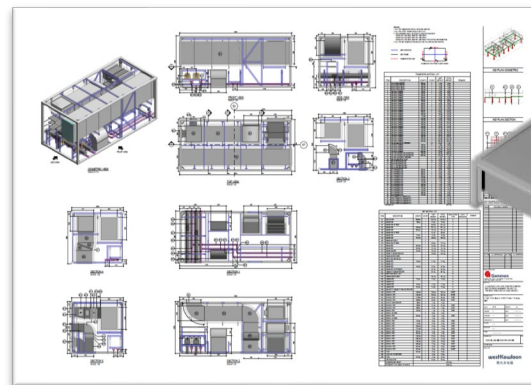
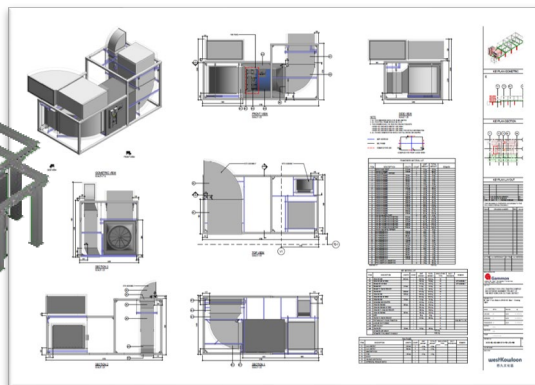
Medium Theatre Roof Plant Room

MEP works: 200+ tons

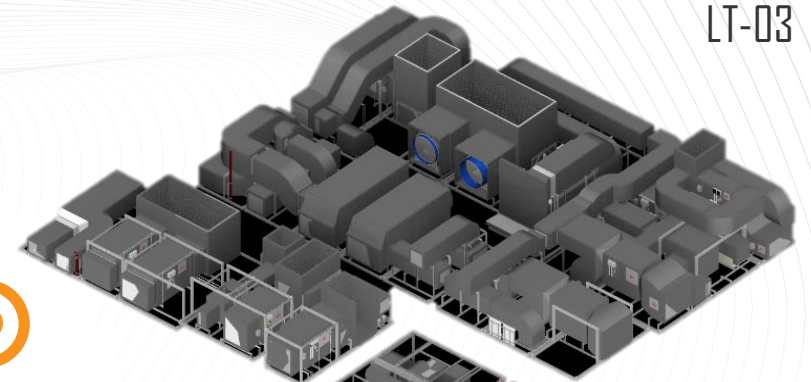
Layers of Stack: 3 Layers

Nos. of MiMEP: 28 nos

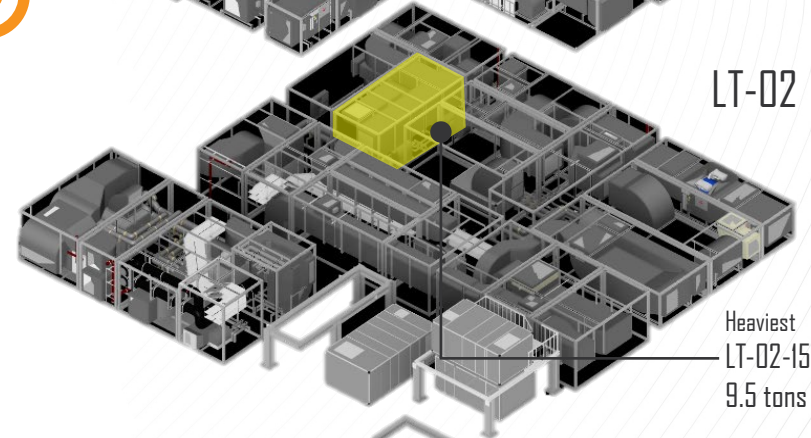
Heaviest MiMEP: MT-02-04 (10.5tons)



LT-03

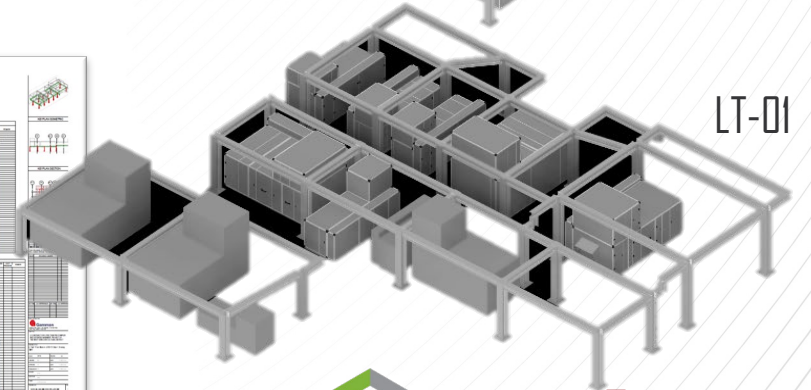


LT-02



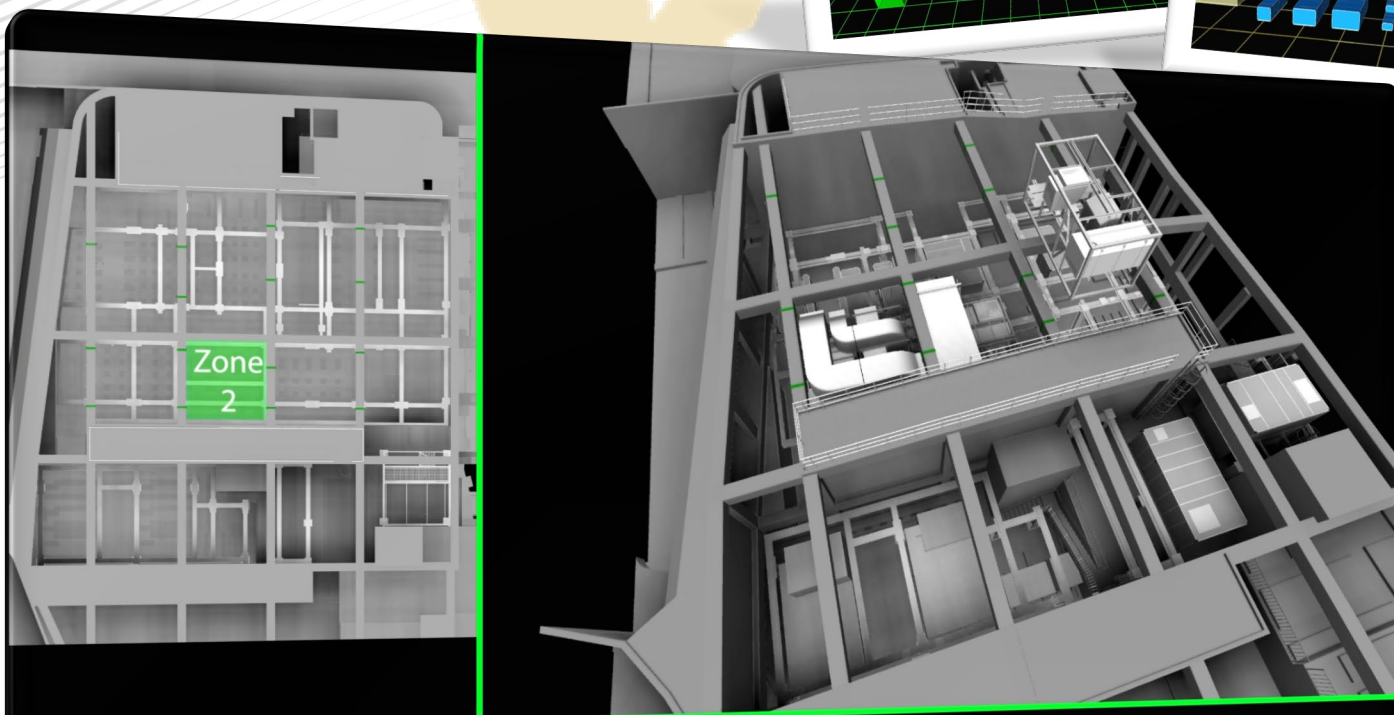
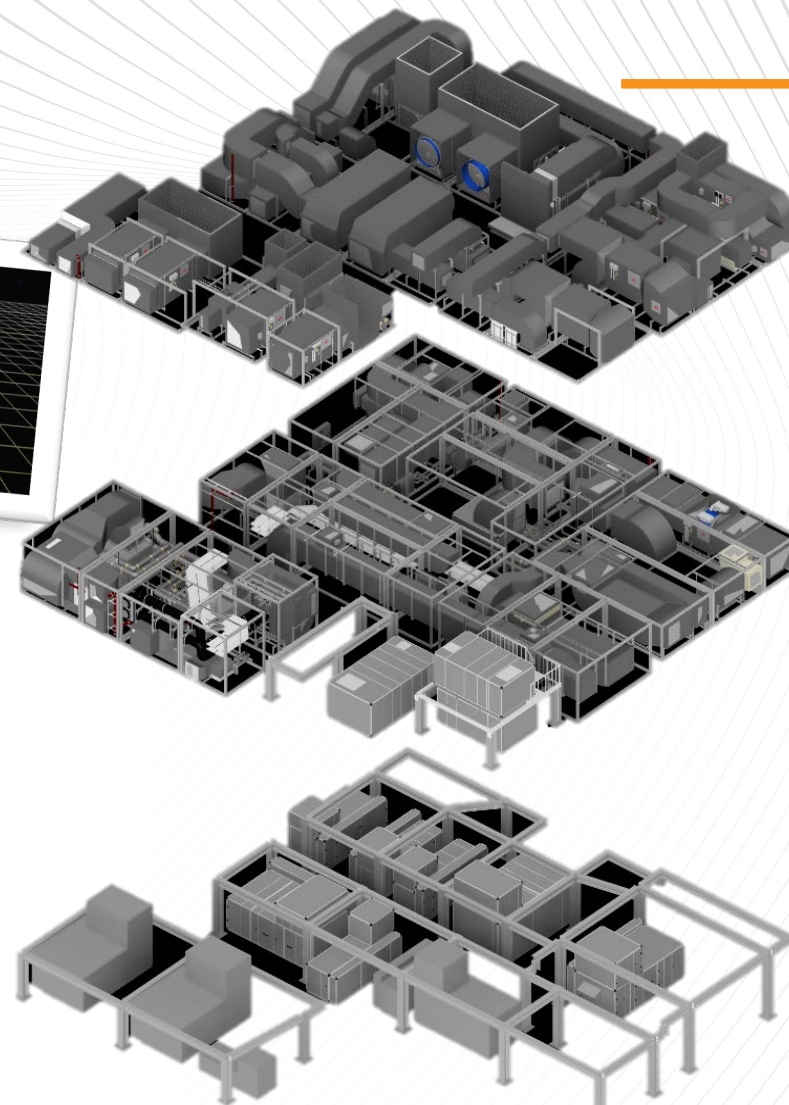
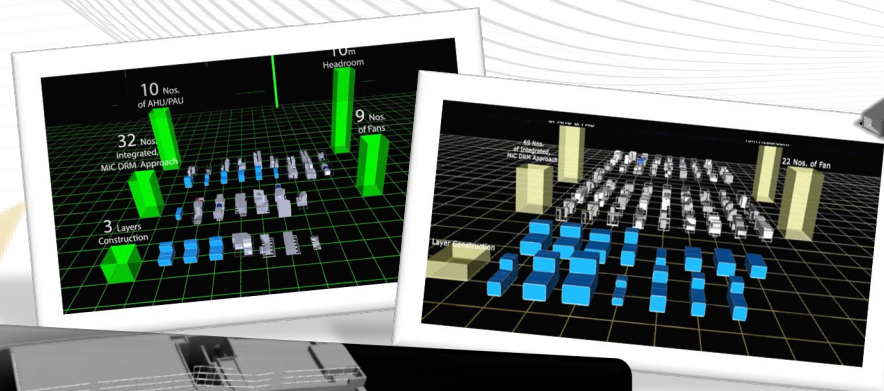
Heaviest
LT-02-15
9.5 tons

LT-01



Design for Safety – Sequence of Works

解決核心問題
Problem Solving



Lyric Theatre Project
LT Module Installation Sequence



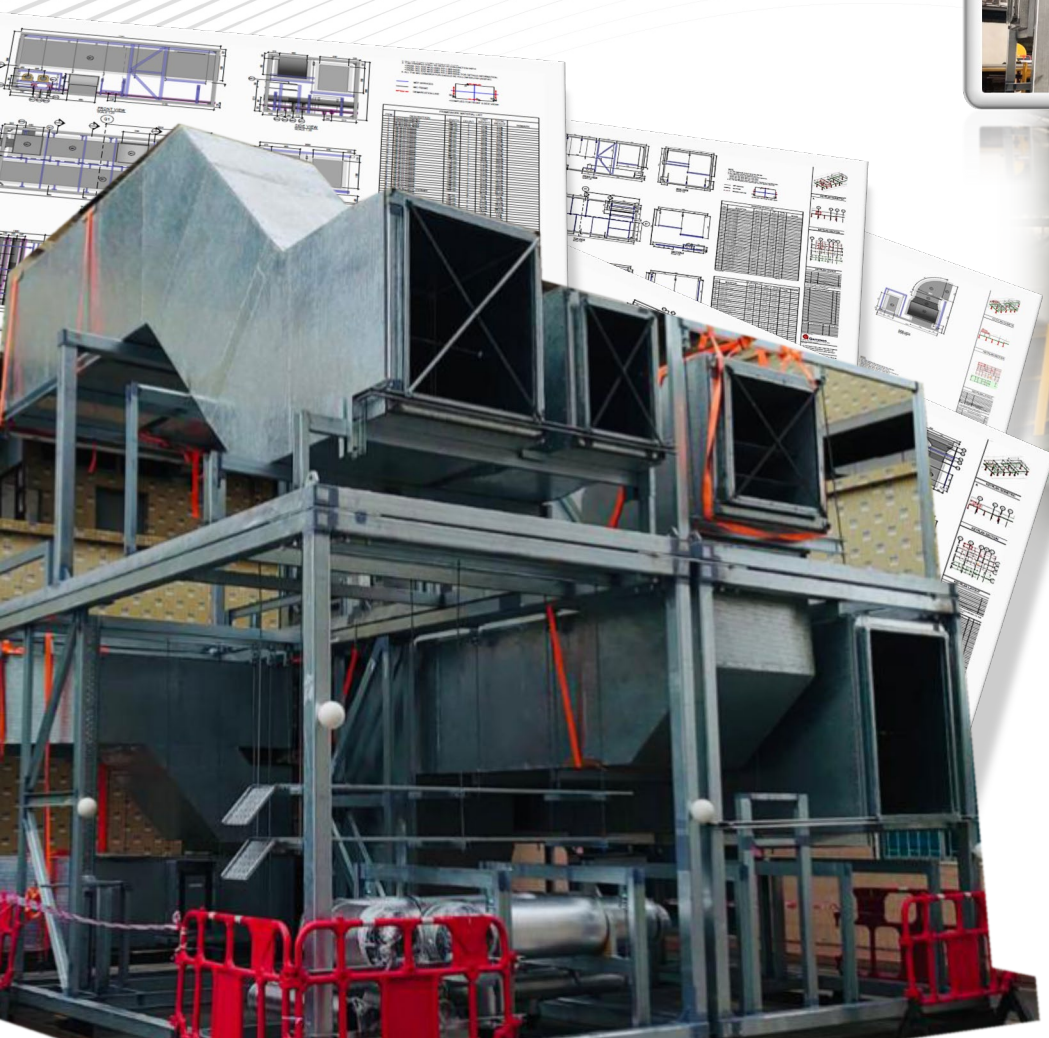
Project team launch the Mega MiMEP Approach by **Re-Engineering, Re-Coordinating** the main plant Every steps joint in single goal – **Mega MiMEP Design**

一個團隊 環環相扣 精益求精 - **Mega MiMEP**

Design for Safety – Off-Site Production

落實與生產

Implement Fabrication



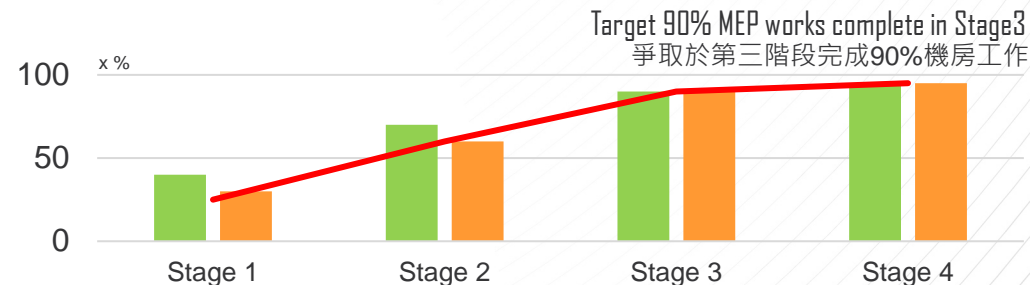
MiMEP Factory Collaboration

廠房協作 一站式生產



Proactively Increase Productivity & Shorten Construction Programme
主動提高產能並加快施工工期

- Fabrication
- Installation
- Completion



Design for Safety – Off-Site Production

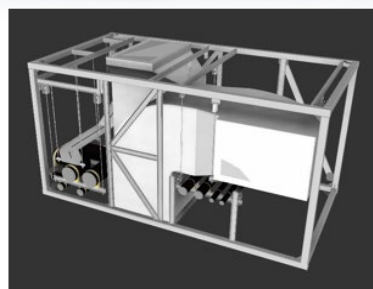
落實與生產

Implement Fabrication

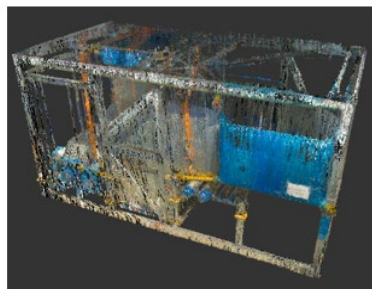


Our MiMEP Gallery

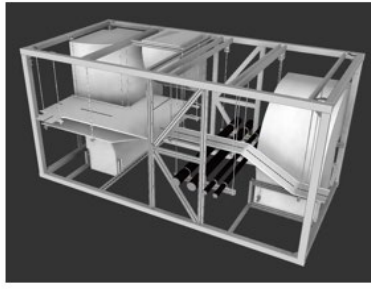
BIM Fabrication Model vs As Built Point Cloud Data



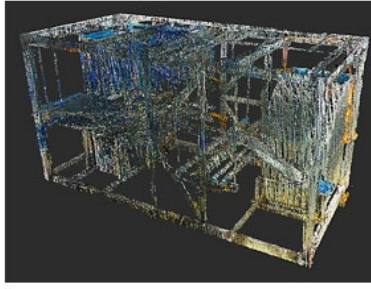
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Status: Delivered and installed
Installation Date: 06/12/2024



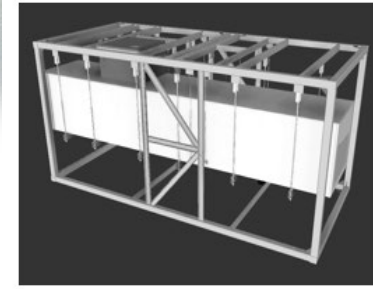
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Code: LT-02-07
Status: Delivered and installed
Installation Date: 10/12/2024



Code: LT-02-07
Status: Delivered and installed
Installation Date: 10/12/2024



Code: LT-02-08
Status: Delivered and installed
Installation Date: 13/12/2024



Code: LT-02-08
Status: Delivered and installed
Installation Date: 13/12/2024

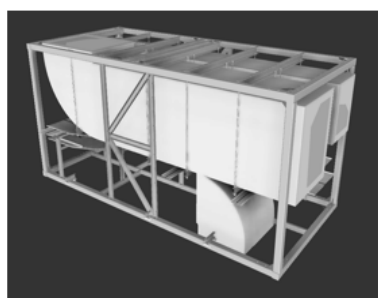
Design for Safety – Off-Site Production

落實與生產

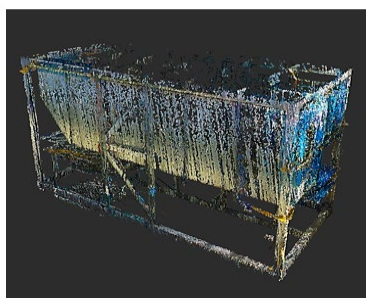
Implement Fabrication

Our MiMEP Gallery

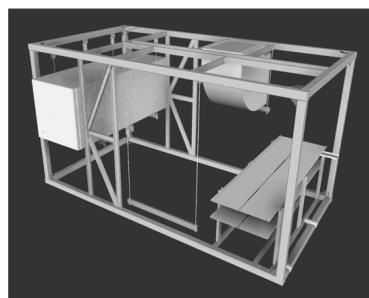
成品例子



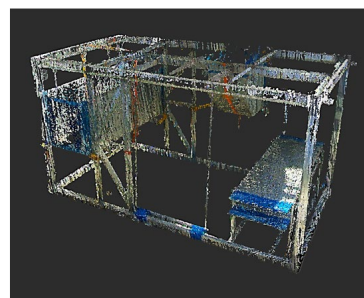
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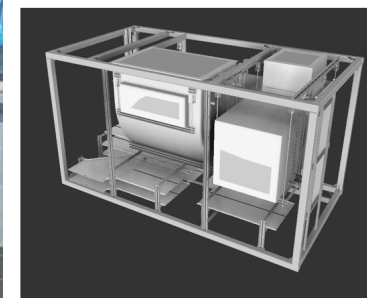
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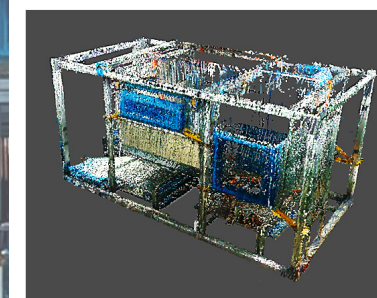
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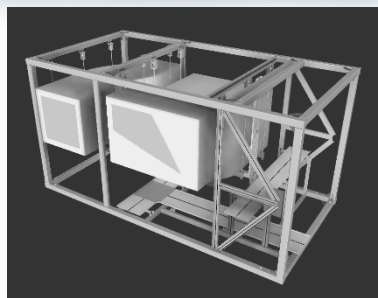
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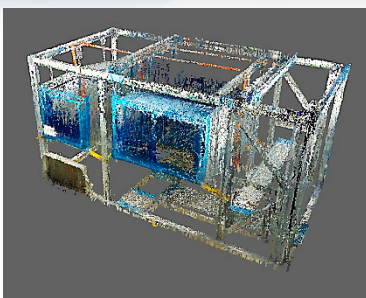
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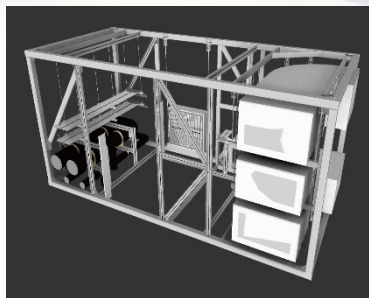
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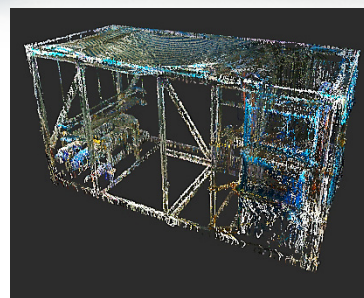
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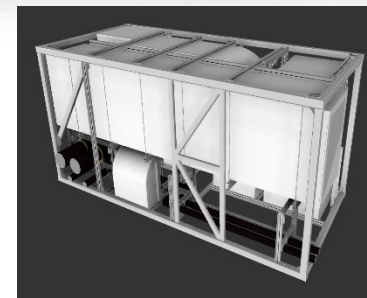
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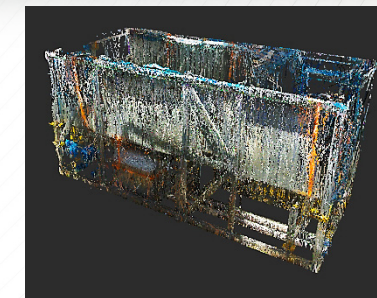
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Installation Date: 20/12/2024



Code: LT-02-14
Status: Delivered and installed
Installation Date: 20/12/2024



Code: LT-02-15
Status: Delivered and installed
Installation Date: 20/12/2024

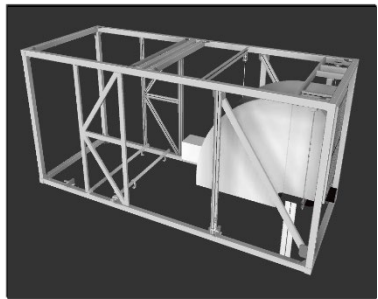


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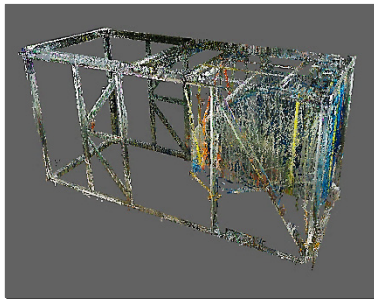
Design for Safety – Off-Site Production

落實與生產
Implement Fabrication

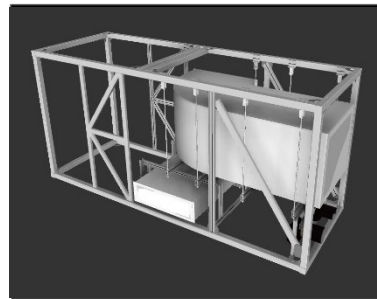
Our MiMEP Gallery
成品例子



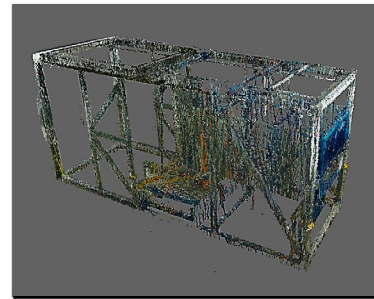
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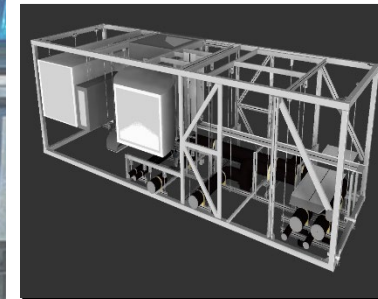
Code: LT-02-16
Status: Delivered and installed
Installation Date: 23/12/2024



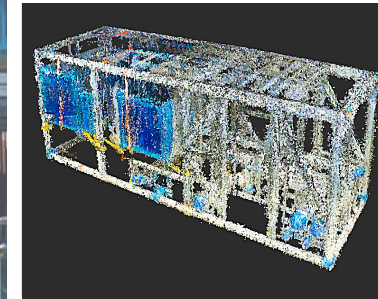
Code: LT-02-17
Status: Delivered and installed
Installation Date: 23/12/2024



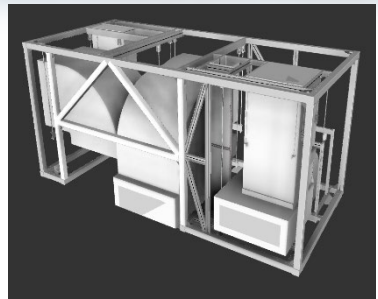
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Status: Delivered and installed
Installation Date: 23/12/2024



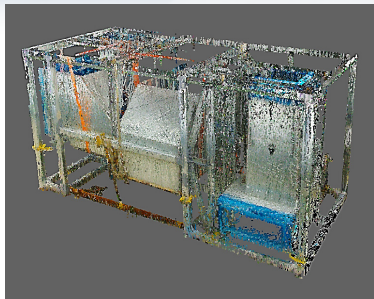
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Status: Delivered and installed
Installation Date: 28/1/2025



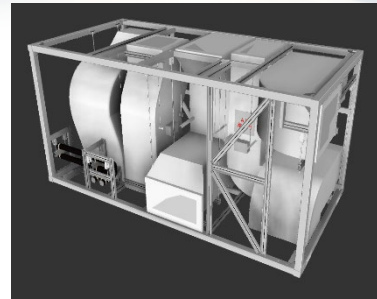
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Installation Date: 18/1/2025



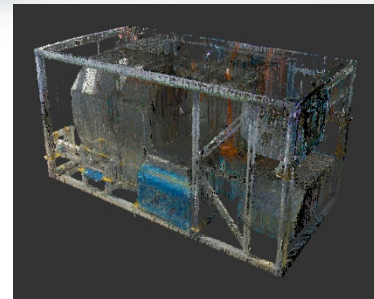
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Status: Delivered and installed
Installation Date: 23/12/2024



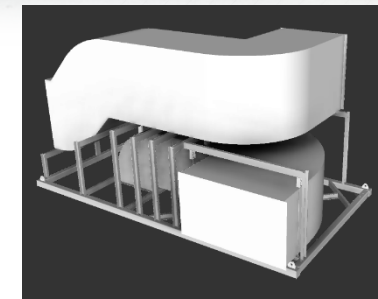
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Status: Delivered and installed
Installation Date: 23/12/2024



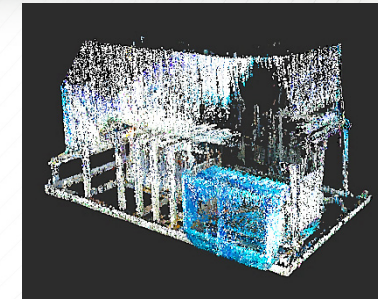
Code: LT-02-23
Status: Delivered and installed
Installation Date: 20/12/2024



Code: LT-02-23
Status: Delivered and installed
Installation Date: 20/12/2024



Code: LT-03-15
Status: Delivered and installed
Installation Date: 28/12/2024



Code: LT-03-15
Status: Delivered and installed
Installation Date: 28/12/2024

Design for Safety – On-site Validation

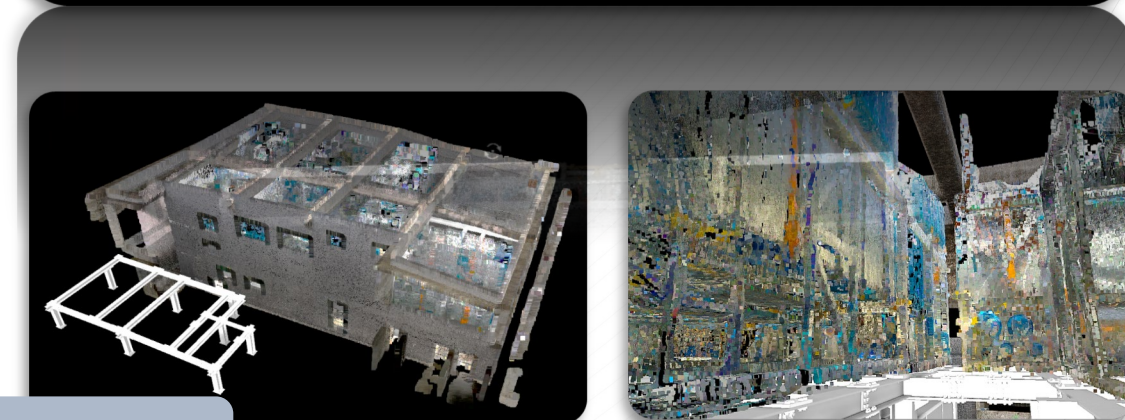
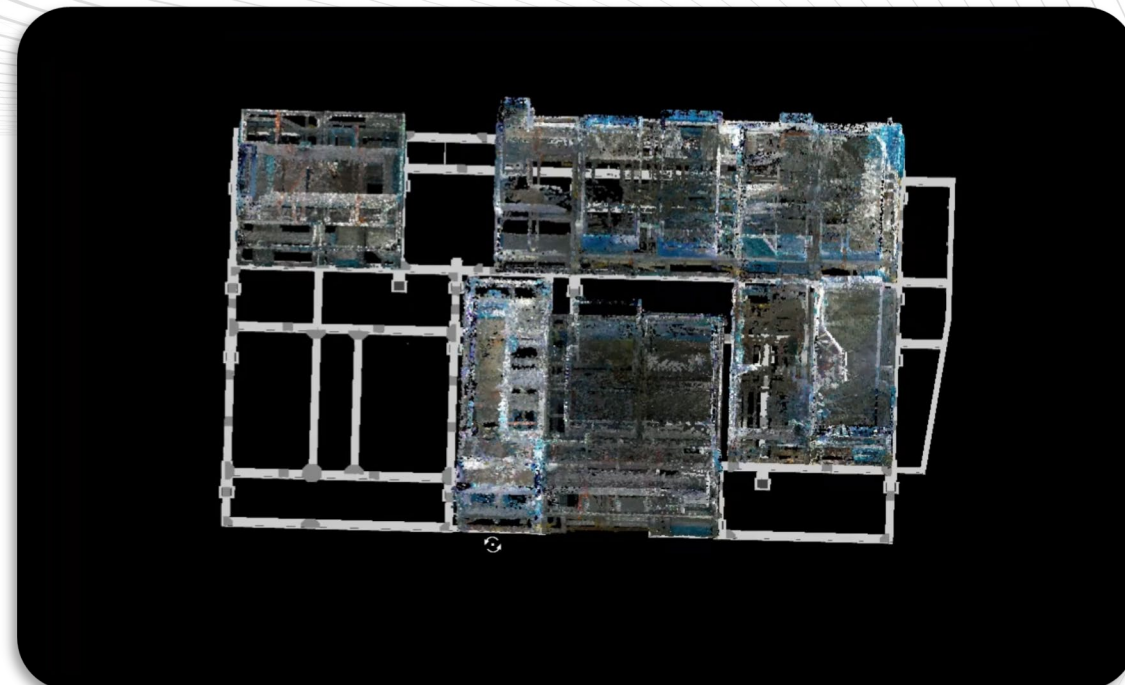
投入前的準備

Final Preparations

Project Team collect **Point Cloud Data** from both stage,
PRC MiMEP Warehouse + HK Job Site

By crossover collected **Point Cloud Data**, we able to **preview** our MiMEP plant.
Before build, we foresee hidden concern by a **Digital Rehearsal**.

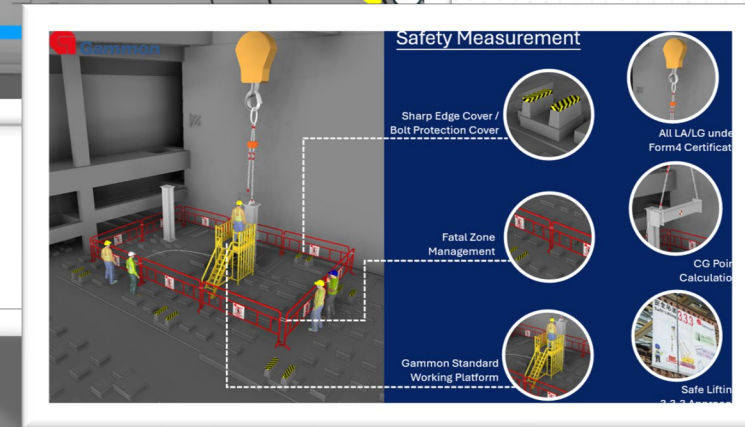
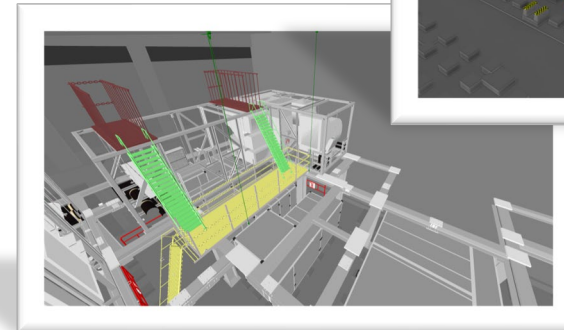
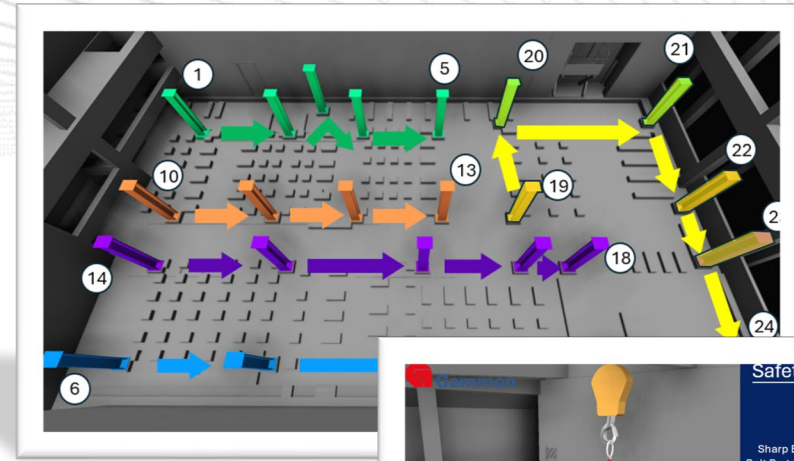
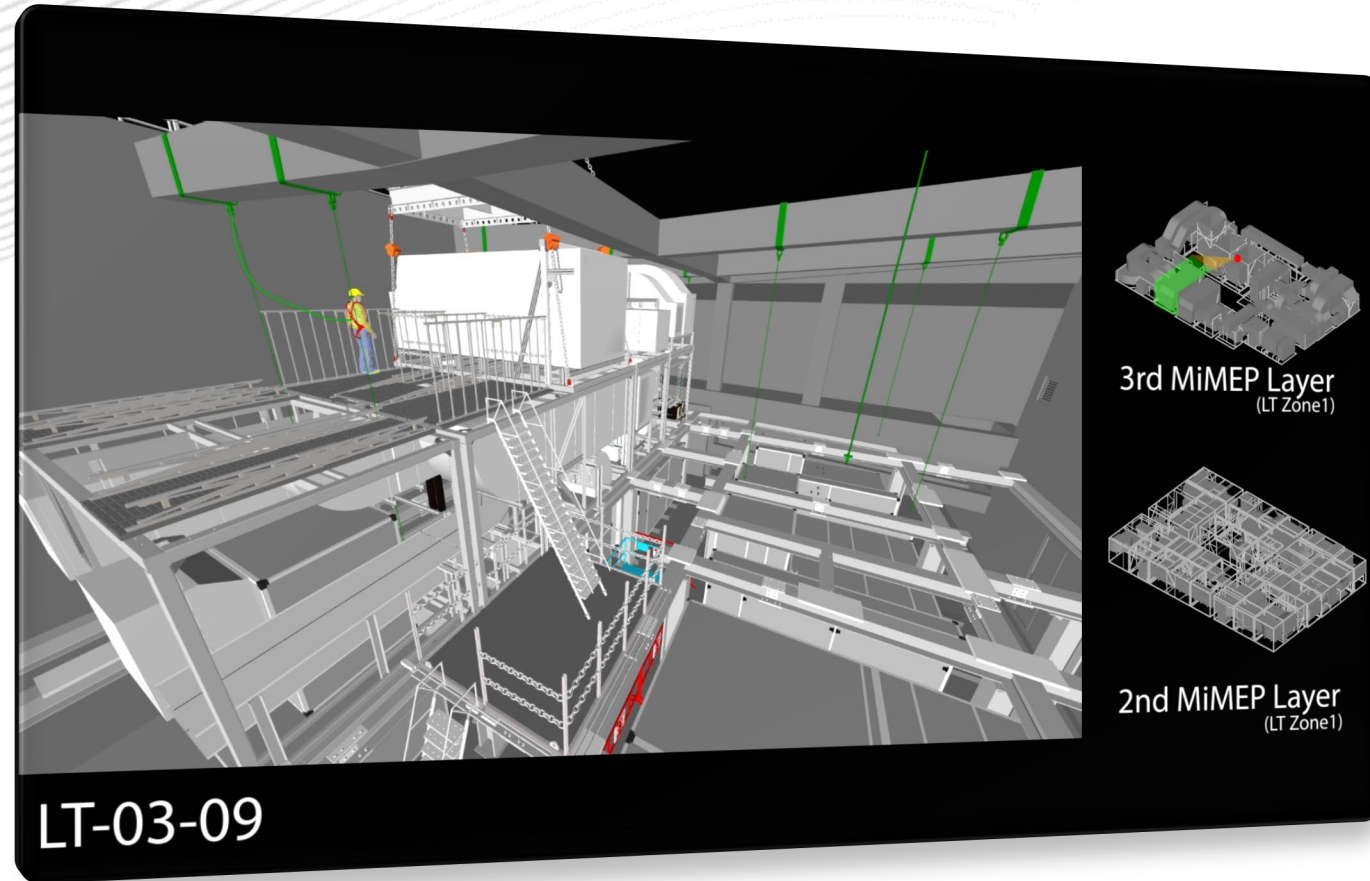
雲點科技連繫廠房與工地 - 實踐 MiMEP 數字預演



1 Scan in Factory + 1 Scan in Site = Crossover Checking

Design for Safety – Sequence of Works in Digital World

堅持建築設計安全
Insist Design for Safety



Project Team preform **BIM Method Statement** to ensure things are on track. By early planning, **MiMEP heavy hoisting** can go smoother and less risks. Studying deep and plan well, ensure **Safety consider in Design**.

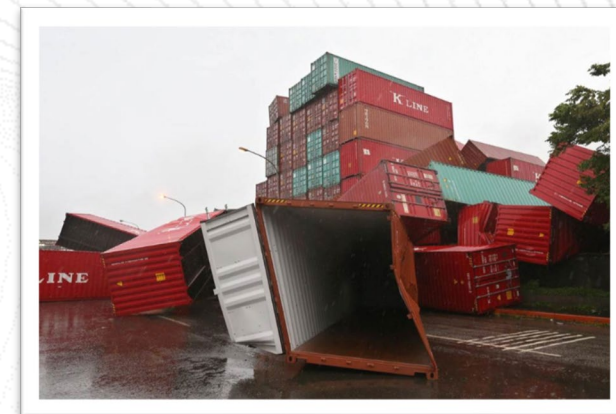
深入了解安裝工序 預示問題 及早排除風險危害

Design for Safety – Temporary Works

從安全考慮的臨時工程配置 Temporary Works for Safety

機房施工階段應對風暴的臨時加固措施

+10 **9** **8** **8** **▲ 極端情況**
NE 東北 SE 東南

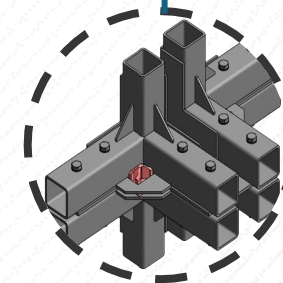
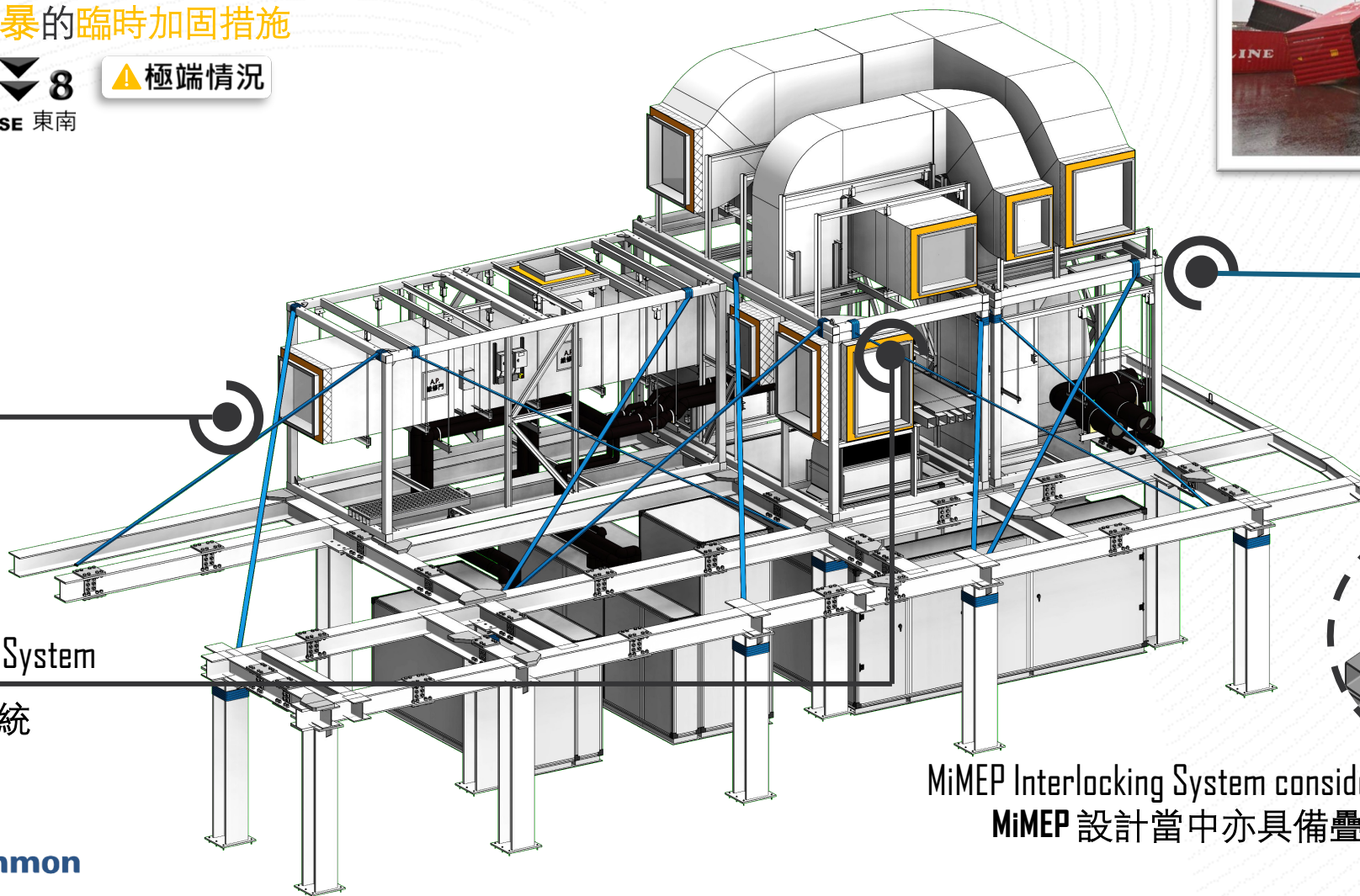


Cross Angle Lashing

對角繫穩

Design and Calculated Tie System

經計算設計的繫穩系統



MiMEP Interlocking System considered in Design
MiMEP 設計當中亦具備疊層互扣系統

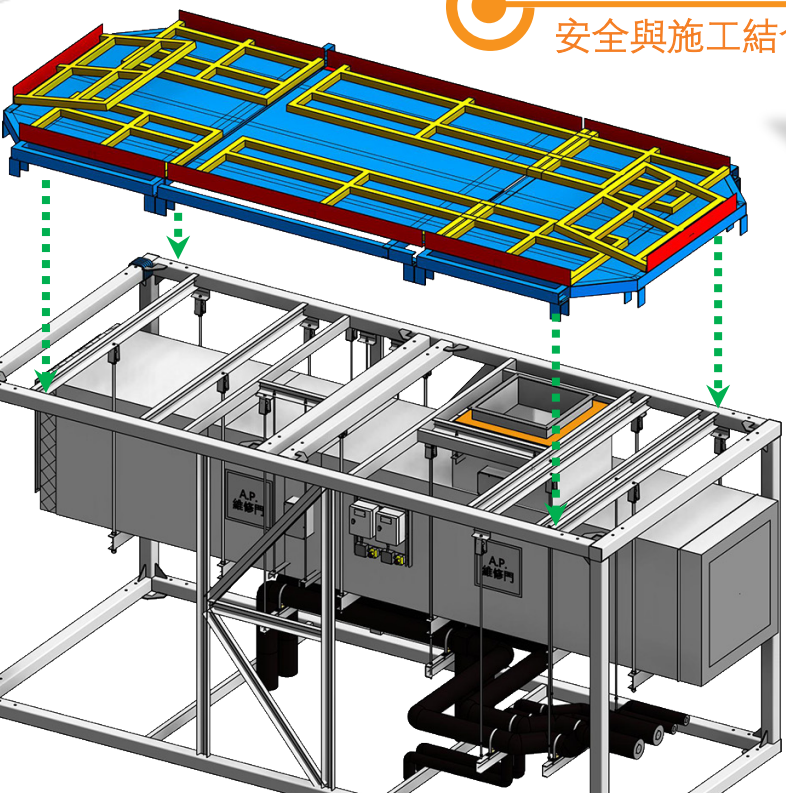
Design for Safety – Temporary Works

從安全考慮的臨時工程配置 Temporary Works for Safety

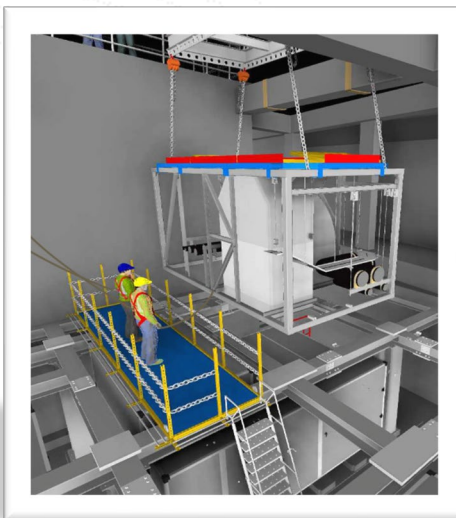
Pre-Installed Transformable Railing
with working platform

Transformable
可展開或摺疊

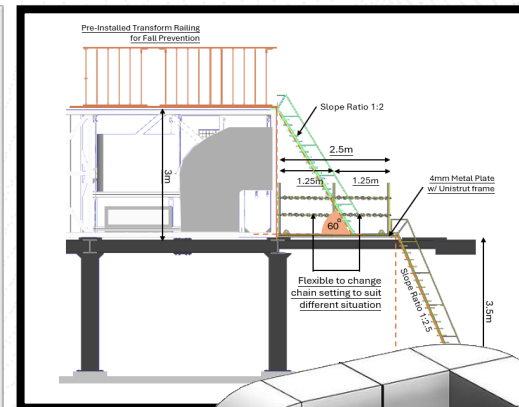
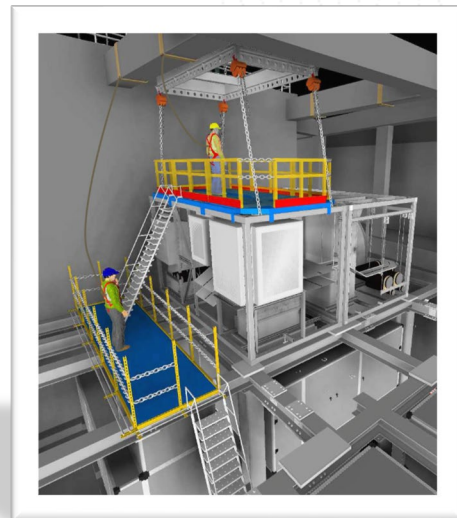
Integrated
安全與施工結合



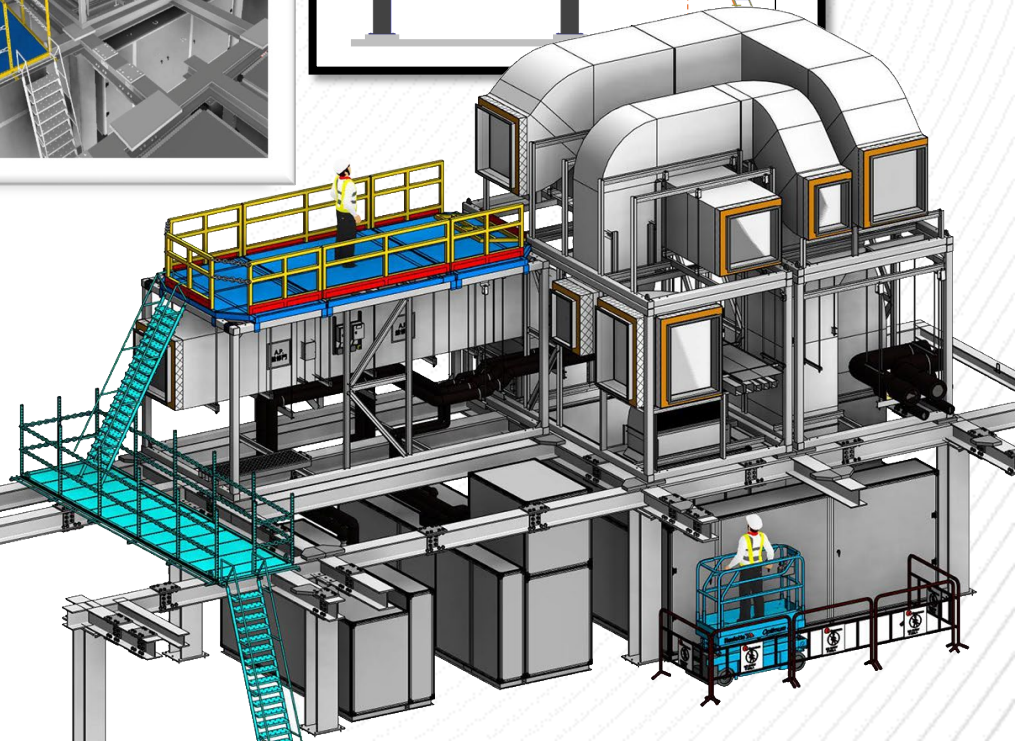
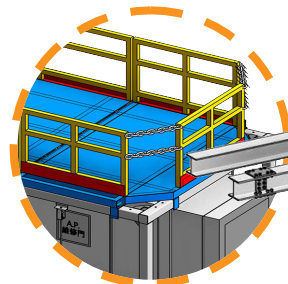
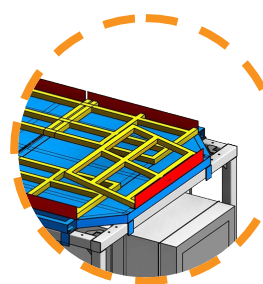
Transform to Folded Railing when hoist
摺疊護欄以應對吊運階段



Transform to Fall Prevention Railing
for detach hoisting chain
打開防墮護欄以應對模組上工作



Transformable to suit different working situation to
ensure under safe condition always.
護欄設計成可變型以應對不同工作階段



Design for Safety – Delivery Consideration

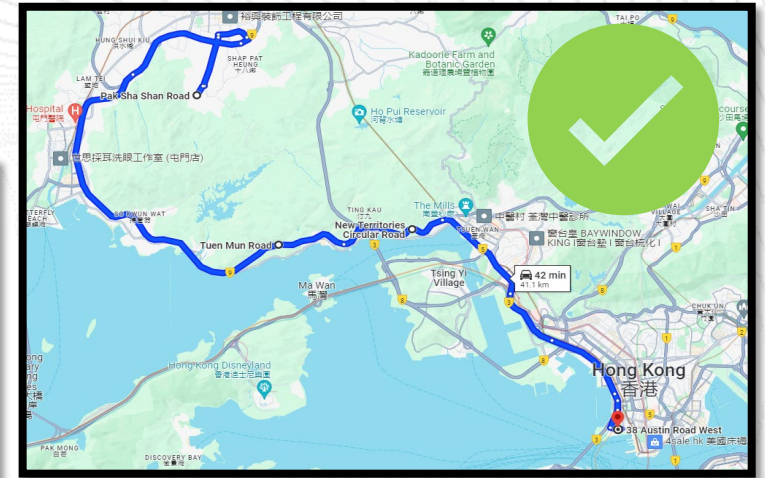
從安全考慮的臨時工程配置
Temporary Works for Safety

Logistic Temporary Measurement for Safety
 運輸過程的安全措施

Route 1 (Tai Lam Tunnel + Cheung Tsing Tunnel) ❌
Not Preferred
 - Limitation of Tunnel
 - Cannot reinstate if incident inside tunnel
 - Never succeed on Permit Application

Route 2 (Tolo Highway + Tai Po Road) ❌
Not Preferred
 - Total Distance is 20km more than others
 - More Risks since Tai Po Road has climbs and slopes

Route 3 (Castle Peak Road) ❌
Not Preferred
 - The overall width of castle peak road is worse than Tuen Mun Road



Delivery Routes Evaluation | 道路風險評估

Driver Restrictions | 駕駛員限制



NO Speeding/
 Speed under 50km/h
 車速設限



NO Drive
 Restrict Driver
 禁止疲勞駕駛



Pre-Screening of Driver/
 Experience Validation &
 Safety Record
 駕駛經驗要求

Collapse Prevention | 防止貨物下墮的措施

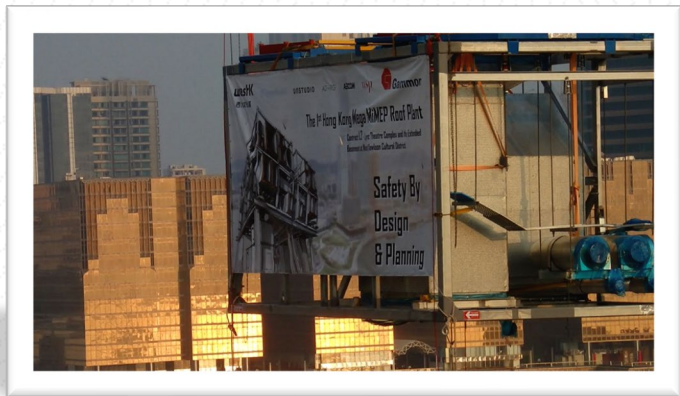
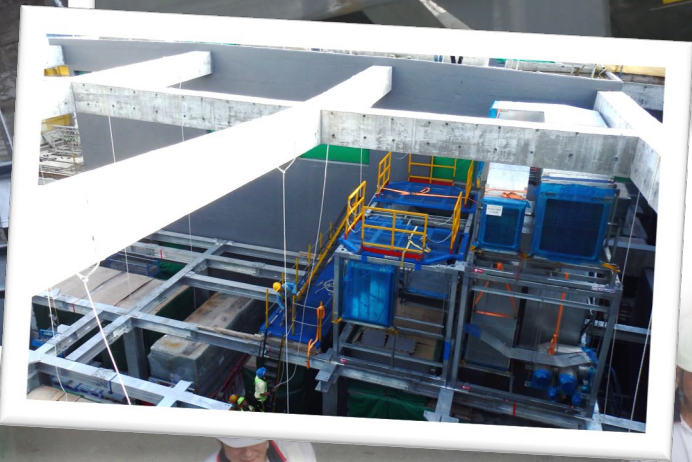
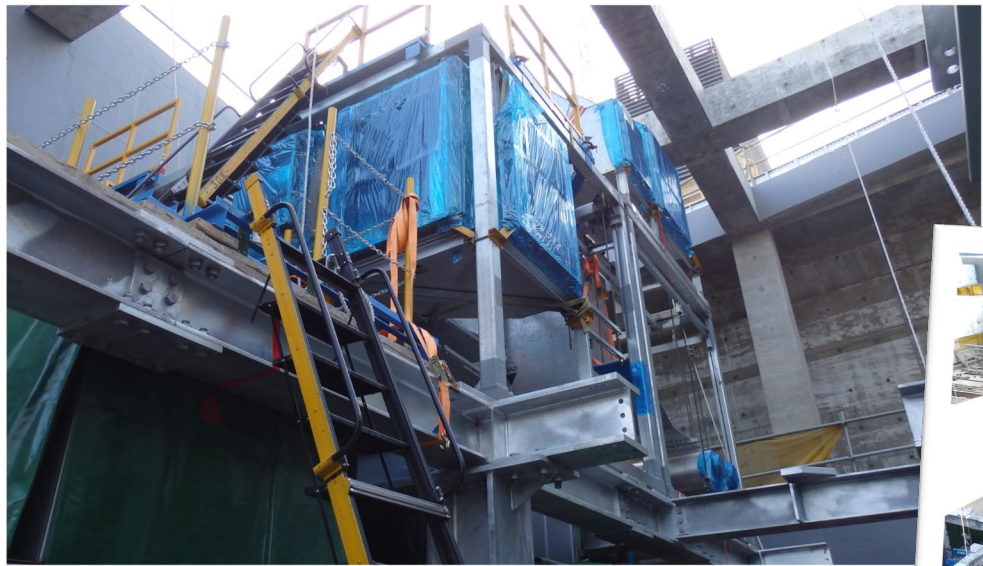


CONSTRUCTION
 INDUSTRY COUNCIL
 建造業議會

Gammon

Design for Safety – On-Site Installation

堅持建築設計安全
Insist Design for Safety



Design for Safety – On-Site Installation

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Insist Design for Safety



Design for Safety – On-site Installation

堅持建築設計安全
Insist Design for Safety



2 Mega MiMEP roof plant rooms modules completed in 2 months with 81 Mega MiMEP.
Design for Safety make sure things going safe under a rapid programme.

在平衡施工安全與快速節奏中 建築設計安全發揮重要作用

THANK YOU

