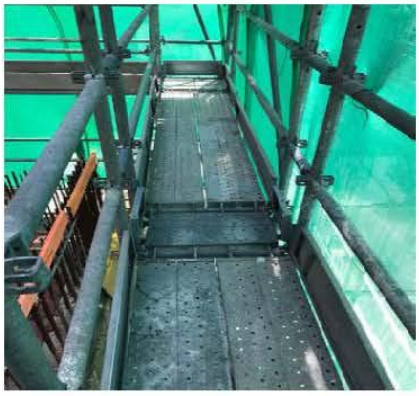
Summary of Site Safety Enhancement measures proposed by HA New Works Contractors:

1. Use of Metal Scaffolding

外牆金屬棚架

上落通道金屬棚架

提供安全出入通道，張貼檢查表格五。



出入通道

特別注意樓邊及危險區圍封，提供特制圍欄及適當位置加裝隔網。

特別注意樓邊及危險區圍封，提供特制圍欄及適當位置加裝隔網

2. Safety in Close Vicinity of Mobile Plant by AI monitoring system


鏟車尾部警示燈

3. Permit-to-Work System for External Scaffold Work

1.1 有關人員及責任

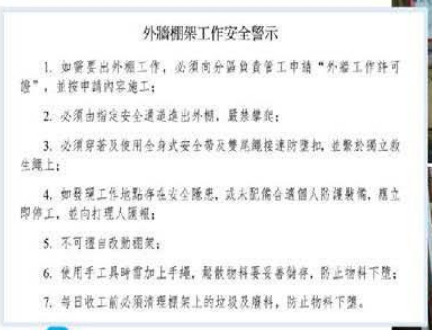
	監督人員 (前線分區管理人員)	監督人員 (打理人)	工人
1. 開工前	確保棚架符合所負責工序使用的要求 及 已由合資格人士定期檢查及簽發表格五(CSSR-F5)		-
2. 開工前檢查	確保沒有交叉作業(即沒有其他人於同一位置但兩個不同層面同時工作) 確保外牆棚架適合工作 (包括消除可預見危害及設置足夠安全措施) ，並做好相片記錄及匯報	於現場配合前線分區管理人員指示	
3. 安全培訓	確保工人已接受「外牆棚架工作」及「外牆棚工作許可證制度」培訓		每月參與相關培訓並佩戴 粉紅色安全帽以作識別
4. 簽發許可證 (只限當日申請)	核對工人資料並簽發許可證	填報工人資料並接受許可證	-
5. 開工前安全交底	與工人進行開工前交底及保留記錄，確定工人清楚外牆棚工作注意事項， 了解安全工作步驟		出席開工前交底並清楚外牆棚安全 工作流程及注意事項
6. 工作期間	每天進行不少於四次巡查並進行拍照記錄及匯報 確保現場展示工作許可證 及「外牆棚架工作安全警示」 如發現施工期間有嚴重不安全情況，須停止工人施工，並安排整改		確保工作期間持續佩戴防墮設備 並扣於穩固點；如發現嚴重不安全 情況 (如救生繩不足、棚架架設 不當或交叉作業等)，可拒絕施工， 並聯絡監督人員要求整改
7. 撤銷許可證	完成工作後，確保全部工人、工具及物料等已撤離，方可撤銷許可證		完成工作後，將現場工具、物料等 清理，並通知打理撤銷許可證

1.2 申報流程


外牆棚工作許可證
Permit to Work (External Scaffold Work)

01

安排外牆棚工作前，必須向負責監督人員申請「外牆棚工作許可證」


外牆棚架工作安全警示

1. 如需要出外棚工作，必須向分區負責管工申請"外牆工作許可證"，並按申請內容施工；
2. 必須由指定安全通道進出外棚，嚴禁攀爬；
3. 必須穿著及使用全身式安全帶及雙尾繩接連防墮扣，並繫於獨立救生繩上；
4. 如發現工作地點存在安全隱患，或天點備合適個人防護裝備，應立即停工，並向打理人匯報；
5. 不可擅自改動棚架；
6. 使用手工具時需加上手繩，鬆散物料要妥善儲存，防止物料下墮；
7. 每日收工前必須清理棚架上的垃圾及廢料，防止物料下墮。

02

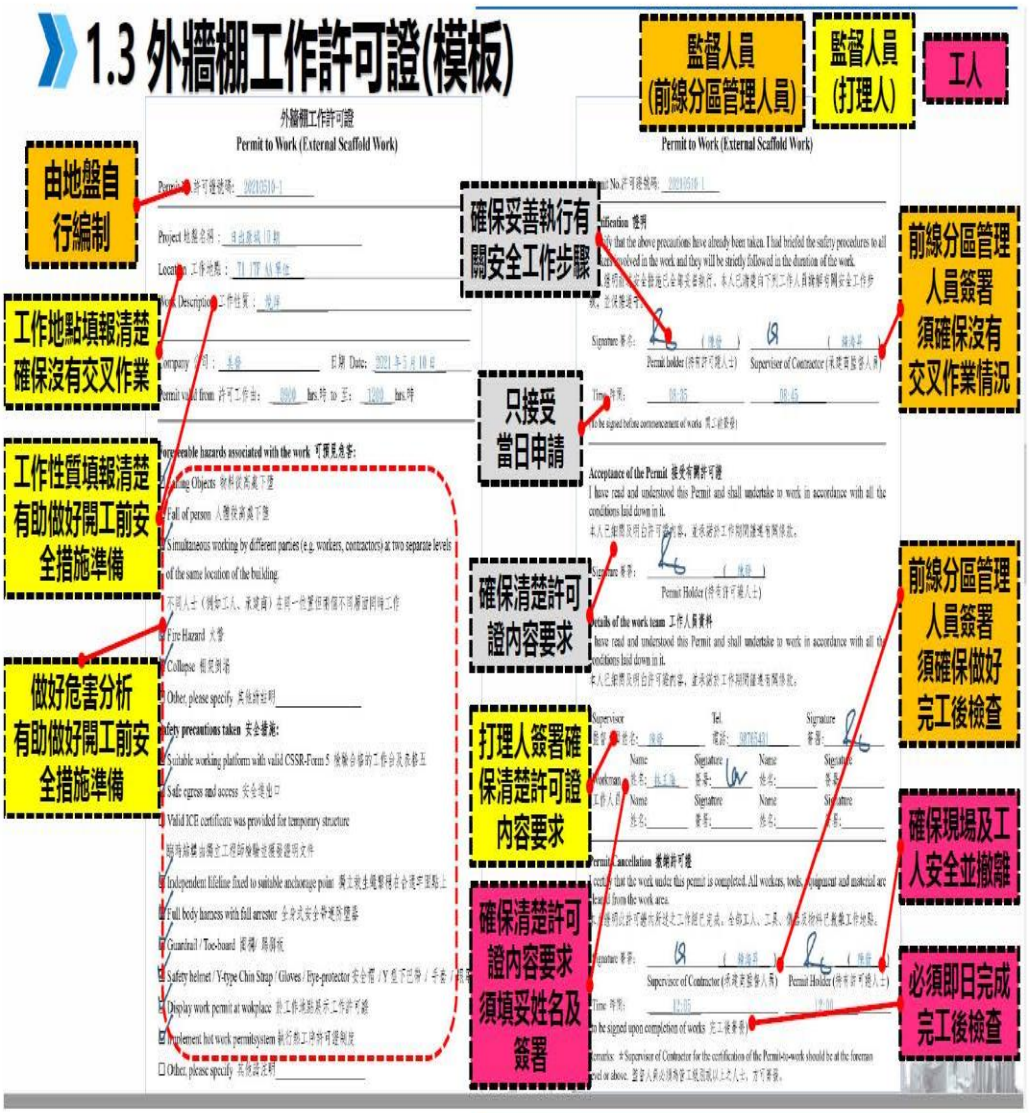
前線分區管理人員須確定現場棚架狀況良好、有法定檢查表格、及足夠安全措施，並張貼棚架工作安全告示

開工前做好安全交底，明確當日
安全施工內容

簽發「外牆棚工作許可證」
(只接受當天申請)

每日收集的許可證須做好匯總
(填寫在外牆棚架工作告示板及
通訊群組內匯報)

完成工作後，確保全部工人、工具、
及物料等已撤離工作地點，
並撤銷許可證。


1.3 外牆棚工作許可證(模板)
監督人員 (前線分區管理人員)
監督人員 (打理人)
工人
外牆棚工作許可證
Permit to Work (External Scaffold Work)
由地盤自行編制
確保妥善執行有關安全工作步驟
前線分區管理人員簽署須確保沒有交叉作業情況
工作地點填報清楚確保沒有交叉作業
只接受當日申請
工作性質填報清楚有助做好開工前安全措施準備
確保清楚許可證內容要求
前線分區管理人員簽署須確保做好完工後檢查
做好危害分析有助做好開工前安全措施準備
打理人簽署確保清楚許可證內容要求
確保現場及工人安全並撤離
確保清楚許可證內容要求須填妥姓名及簽署
必須即日完成完工後檢查


1.4 監管及檢查工作要點
LP10安全管理群組
01
負責監督人員和安全主任每天進行不少於四次巡查，並進行拍照記錄及匯報
02
巡查時需檢查竹棚架狀況，並確認工人已佩戴粉紅色安全帽-表示已接受外牆棚工作安全培訓
03
定期清理外牆棚架雜物，如混凝土廢料、垃圾等

1.4 監管及檢查工作要點

05

- 如發現不安全情況應立即停工整改
- 工人在棚架進行不安全工作，必須立即阻止

06

- 如有人(除棚架分判外)擅自更改或拆卸棚架，必須趕離地盤
- 如對棚架有意見/要求，應與當區管工協商處理

1.5 網絡實時監控系統協助管理

- 為加強監察地盤高危工序施工位置(如外棚暗通天位)，公司要求地盤於相關位置安裝網絡實時監控系統，並將有關CCTV 影像設置於地盤當眼位置，以加強監察效果。

外棚工作實時CCTV直播閣

4. Safety of Lifting Operation

管工

- 安排分區內工作，防止交叉作業
- 簽發吊運許可證 (電子版)

訊號員(俊和)

- 獲授權拒絕進行任何違反吊運守則的操作
- 起吊前確保所有人離開危險區域後，才可發出吊運訊號
- 配備哨子、通訊器，穿著藍色配有LED燈的反光衣及佩帶藍色安全帽

埋碼員(俊和/ 分判商/ 供應商)

- 穿著注明埋碼員的藍色反光衣、注明埋碼員的黃色安帽。

圍封危險區

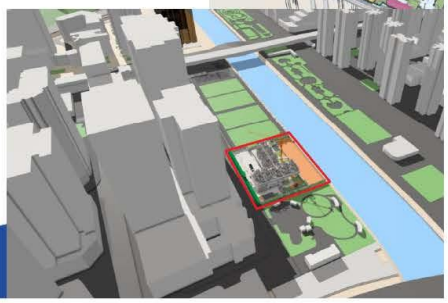
地面硬度測試

- 各種吊機之可吊重量達**70噸或以上**，必須安排測試
- 測試亦可應用於70噸或以下，或鬆土地面

5. Use of BIM for Planning, Construction and Safety

BIM application

- **BIM uses**
  1. Design Reviews
  2. Phase planning (4D Modelling)
  3. Spatial Coordination
  4. Drawing Production
  5. Cost Estimation (QTO)
  6. Site Utilization Planning
  7. 3D Construction Coordination
  8. Construction System Design
  9. As-Built Site Condition Survey by 3D Laser Scanning
  10. As-Built & Asset Information Modelling
- **Planning Stage 4D simulation**

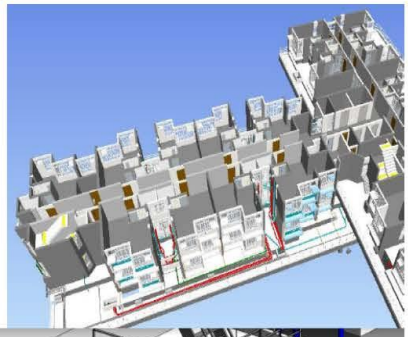


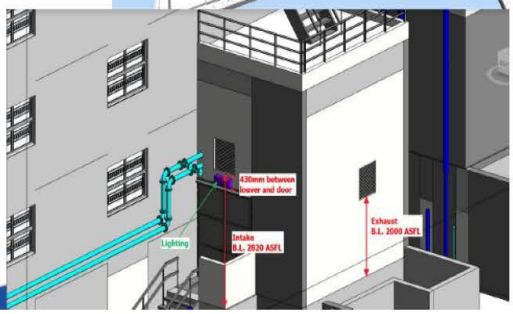
BIM Software

- Revit - Modelling
- Navisworks - Review
- Fuzor - 4D animation

1. Design Review

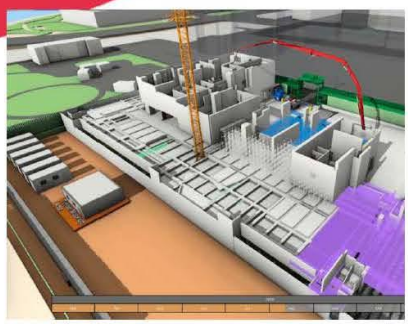
- Weekly Technical Meeting (BIM Workshop)
- Architect, Engineers, Contractor participate
- Review, report & comment via E-mail and meeting

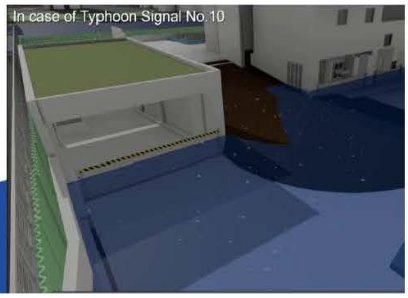




2. Phase planning

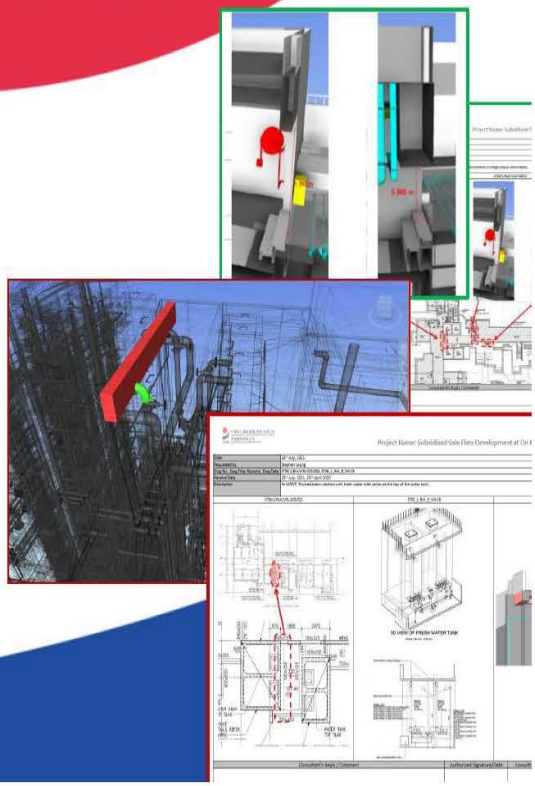
- Site layout planning
- Construction sequence
- Planning for Typhoon No.10 incident

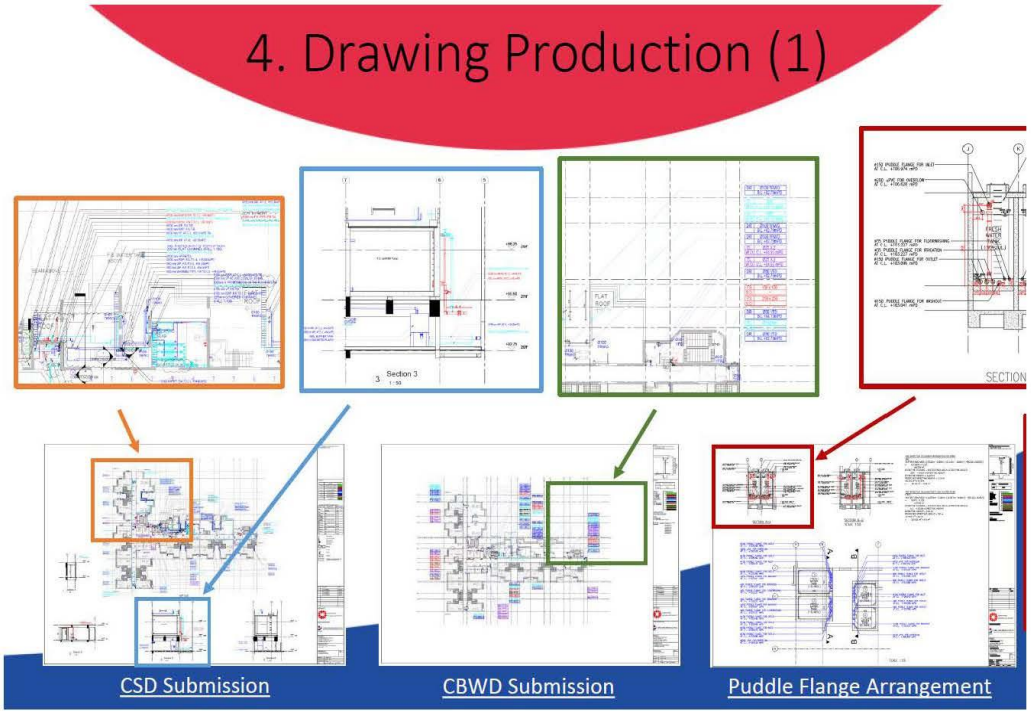


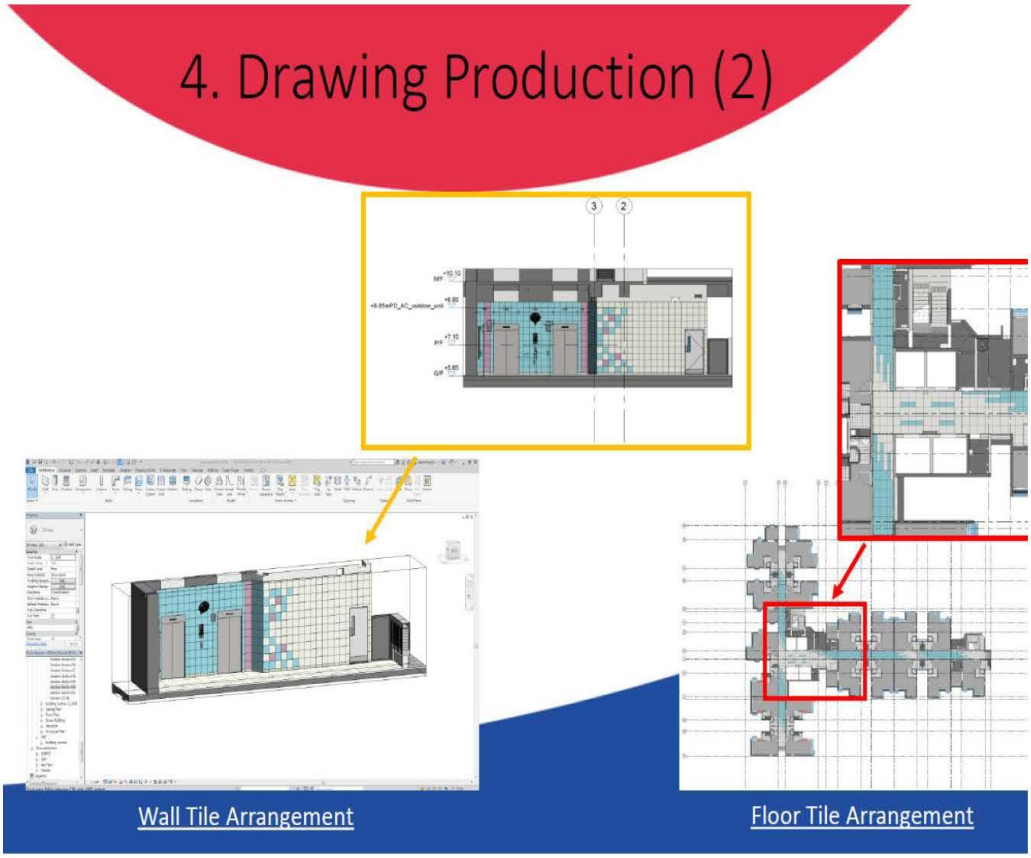


3. Spatial Coordination

- Automatic Clash Detection
- Minimize abortive works




4. Drawing Production (1)
CSD Submission
CBWD Submission
Puddle Flange Arrangement


4. Drawing Production (2)
Wall Tile Arrangement
Floor Tile Arrangement

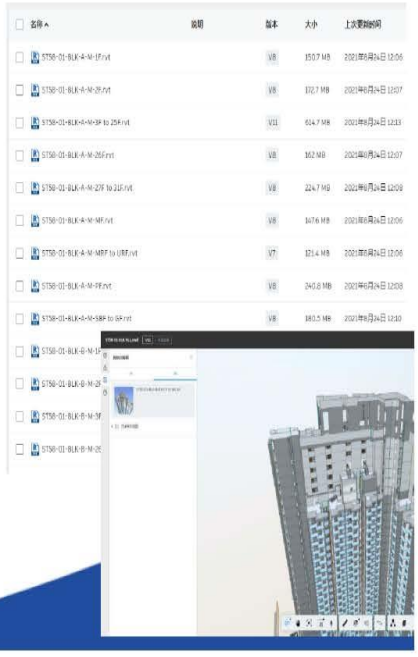
3D Laser Scanning

- 3D laser scanning for validation of as-built model

- Site survey
  - More efficiently
  - More accurate
  - More safely
  - Time saving

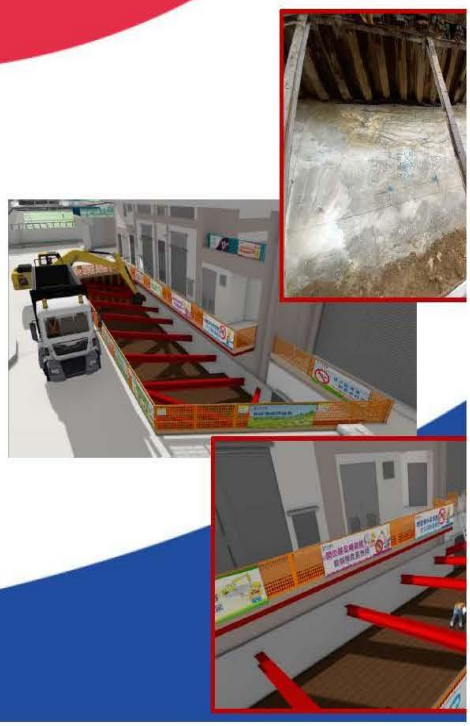
CDE

- Common Data Environment (CDE) BIM360
- Single source of truth for Model, Drawing & Document transmission
- Review model and drawing without software

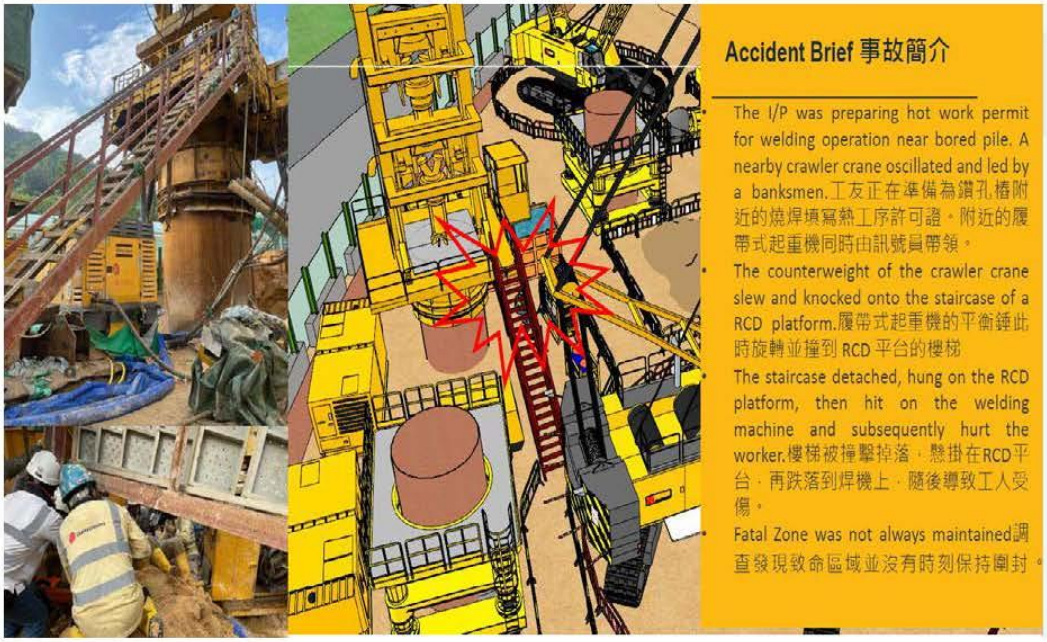


Construction sequence

- ELS work for Construction sequence and safety monitoring
- To simulate the site condition/safety provisions
- Ensure the feasibility before construction work



6. Implementation of Fatal Zone



Findings:

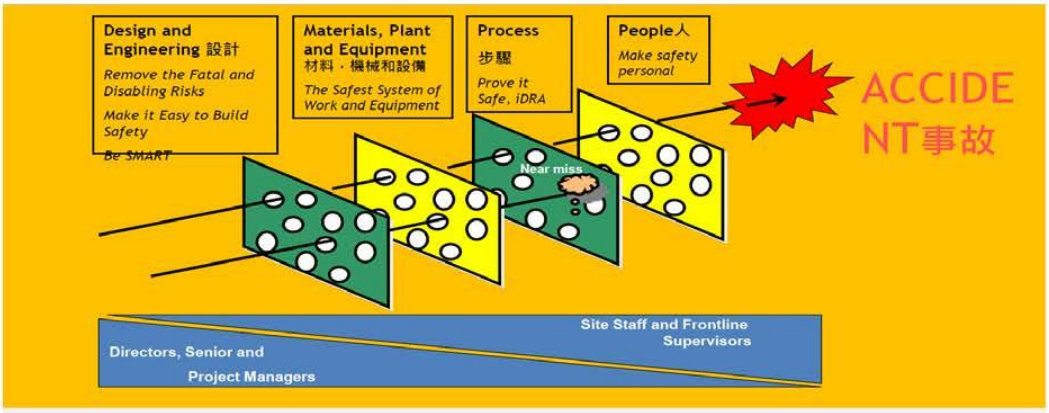
- Inadequate Planning to arrange the site logistics for the plant movement in limited space
- Insufficient checking the condition of workplace before commencement of work by frontline staff and area in charge

RECOMMENDED ACTIONS:

1. Establish site planning to staff, review layout and logistic plan on daily basis, especially highlighted the congested area.

2. Assign area supervisor to check fatal zone of these areas before commencement of work.

3. Project in Charge carry out site inspection and monitoring on every shift to check the implementation.



4 Layers of Protection 四層保護 - SWISS CHEESE MODEL 芝士理論

7. Safe Lifting Procedures of Crane Truck

Permit-to-lift system for Crane Truck

Site Engineer and Appointed Foreman to:

- ✓ Check the setting up of the lifting appliance including ground conditions
- ✓ Check that the outriggers are fully extended
- ✓ Check the lifting appliance capable of lifting the load
- ✓ Check that the mats are at least three times larger in area than the float and completely support the float.
- ✓ Check that measures are in place (e.g. barriers and warning signs) to prevent workers from entering into the maneuvering area of the lifting appliance

Provide Fall Arrest Block (Sala block) for rigger working at height on Crane Truck

Provide Fall Arrest Block (Sala block) for rigger and signaler working at height on Crane Truck

8. Safety of Work Near Window Opening

Working near wall opening

Safe System of Work for glazing installation works

1) Well Planning
2) Safe System of Works
3) Permit-to-Work

1) Well Planning

Organization:

Project Management

- Overall monitoring of the safe working procedures.
- Endorse "Permit for glazing installation".

Safety Officer

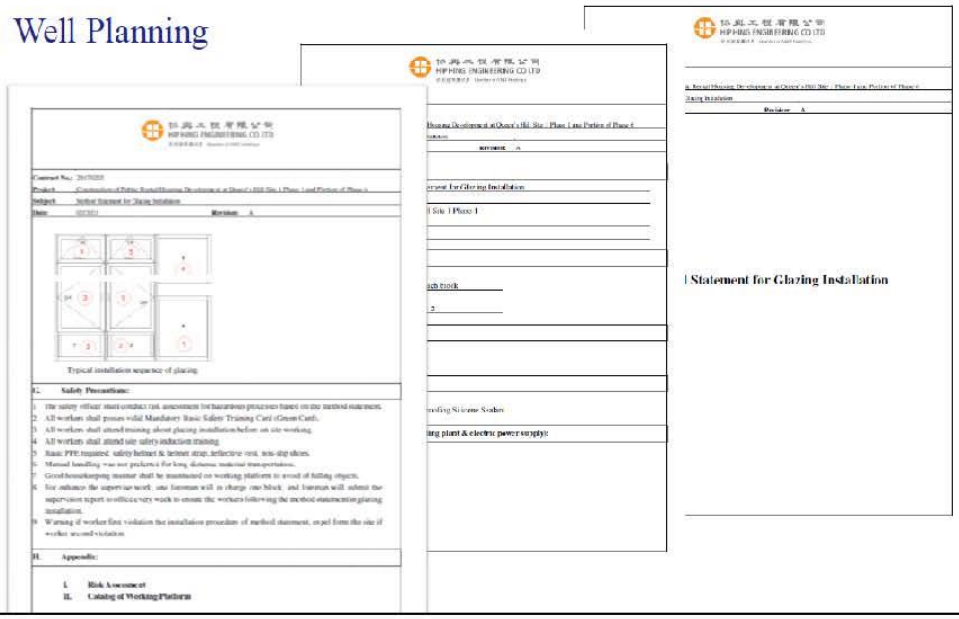
- Coordinate and monitor safe working procedures are in place.
- Conduct risk assessment to identify potential hazards and precaution measures to eliminate the hazard or reduce the risks.
- Arrange and conduct special training of safe working procedures.

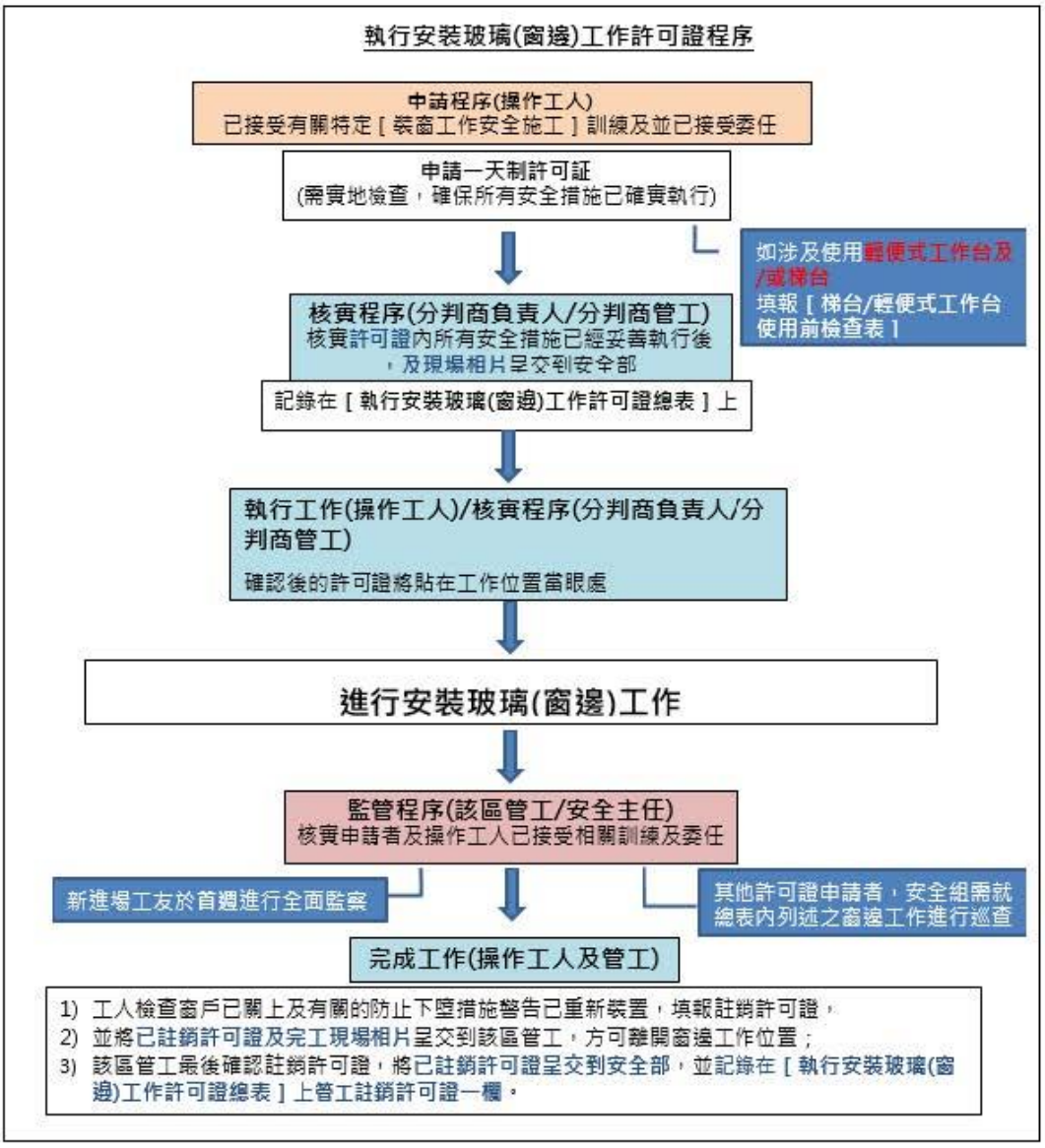
Site Agent and Front-line Supervisor

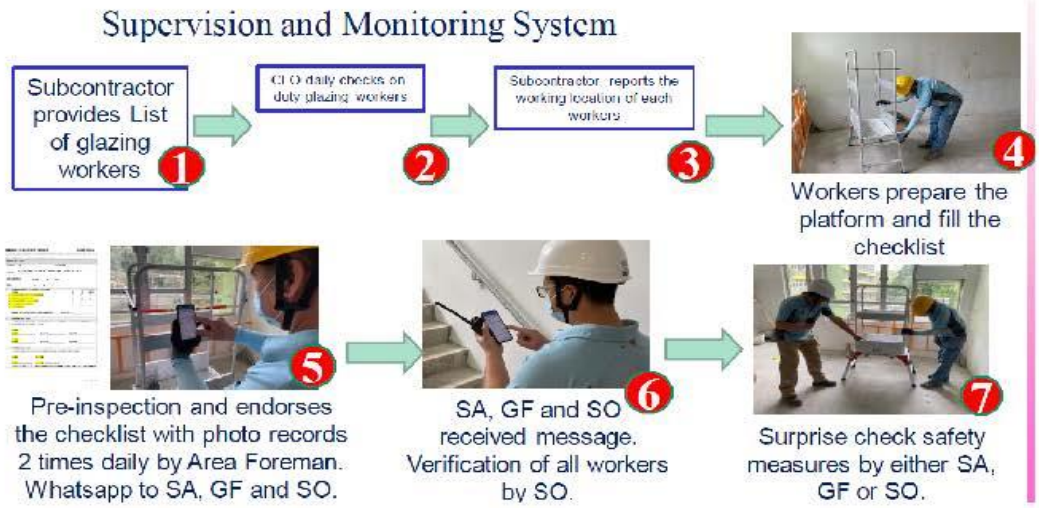
- To ensure trained workers are assigned for the task.
- To closely monitor the works on spot are conducted in safe manner.

•METHOD STATEMENT OF GLAZING INSTALLATION

1) Well Planning




執行安裝玻璃(窗邊)工作許可證程序
申請程序(操作工人)
已接受有關特定 [裝窗工作安全施工] 訓練及並已接受委任
申請一天制許可証
(需實地檢查，確保所有安全措施已確實執行)
如涉及使用輕便式工作台及/或梯台
填報 [梯台/輕便式工作台使用前檢查表]
核實程序(分判商負責人/分判商管工)
核實許可證內所有安全措施已經妥善執行後，及現場相片呈交到安全部
記錄在 [執行安裝玻璃(窗邊)工作許可證總表] 上
執行工作(操作工人)/核實程序(分判商負責人/分判商管工)
確認後的許可證將貼在工作位置當眼處
進行安裝玻璃(窗邊)工作
監管程序(該區管工/安全主任)
核實申請者及操作工人已接受相關訓練及委任
新進場工友於首週進行全面監察
其他許可證申請者，安全組需就總表內列述之窗邊工作進行巡查
完成工作(操作工人及管工)
1) 工人檢查窗戶已關上及有關的防止下墮措施警告已重新裝置，填報註銷許可證，
2) 並將已註銷許可證及完工現場相片呈交到該區管工，方可離開窗邊工作位置；
3) 該區管工最後確認註銷許可證，將已註銷許可證呈交到安全部，並記錄在 [執行安裝玻璃(窗邊)工作許可證總表] 上管工註銷許可證一欄。



此圍欄於

(一) 裝窗工作完成

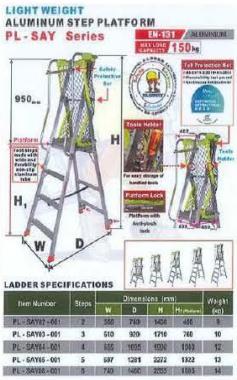
及

(二)工作許可證正式註銷前

禁止移離

2) Safe System of Works
- Tools & Equipment (Step Platform)


協興工程有限公司
HIP HING ENGINEERING CO LTD
梯台及輕便工作台記錄

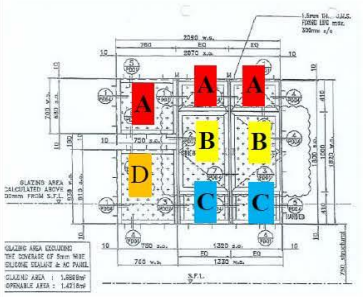


No Hop up Platform & Ladder Platform Except with a Permit

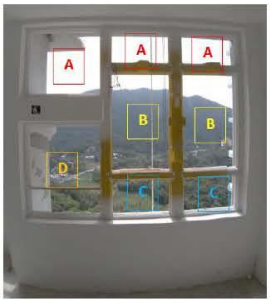
- Work at height should be **planned in advance**
- Use of ladder platform for working purpose must be **justified by task-specific risk assessment**
- Ladder Platforms should **NEVER** be allowed for working purpose if the **falling height is 2m or more**
- Ladder Platforms could only be used after fulfilling the conditions imposed under a **permit-to-use system**

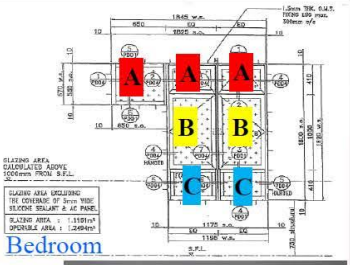
2) Safe System of Works
- Tools & Equipment (Suction Lifter with Priming Pump)

1) Well Planning
- Type of Window
- Sequence of installation



Living Room





Bedroom

SAFE WORK PROCEDURE FOR GLAZING INSTALLATION WORKS (ON GROUND)

Barricading working area

Shifting the panel to the position

SAFE WORK PROCEDURE FOR GLAZING INSTALLATION WORKS (USING PLATFORM)

Shifting the platform

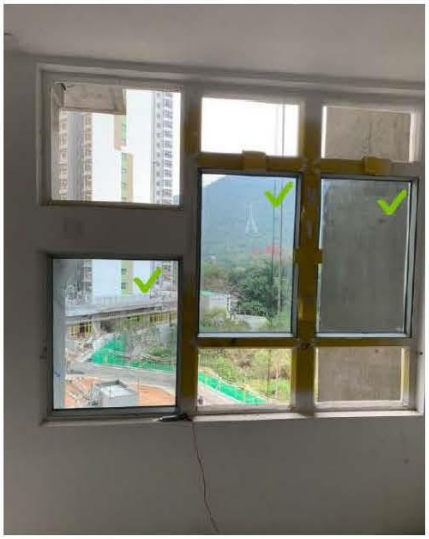
Climbing up the platform

Deliver the panel

Installing the panel

Installing the glazing beads

ENHANCEMENT ACTIONS FOR FUTURE



•PRE-GLAZE IN FACADE FACTORY

Enhancement actions

1. Assign a team of 2 workers for carrying out the glazing installation works.
2. Implement Safe System of Works for glazing installation works.
3. Assign frontline supervisors to conduct the inspection 2 times per day.
4. HH purchases and supplies appropriate platforms.
5. Display safe work procedure and warning notice at working areas.
6. Provide specific daily safety morning briefing to workers before commencement of works.

9. Use of Information Technology for Site Safety

Safety Innovations in the Past Years

AR, VR, AI

Immersive VR Training

A.I. Site Monitoring & AR Assist

360° Mobile Safety Information System

Virtual Reality (VR) Cave (applied at Queen Mary Hospital)

Safety of Working at Height

VR Cave to **provide innovative and interactive safety training to the workers.**

What's New - CRANE ROPE MONITORING

A.I. Powered Monitoring

Data livestream

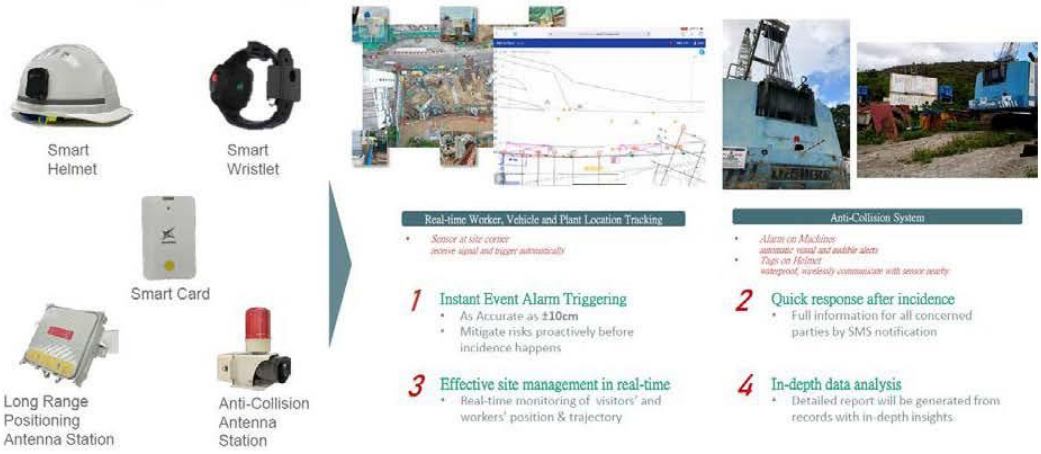
The camera(s) continuously record the rope condition which it is monitored in real-time and equipped with an alert system. Data is streamed to the cloud server for processing.

Defects to be identified

01 Broken wires | 02 Rusting | 03 Peening | 04 Reduction in diameter | 05 Heat damage | 06 Rope deformation

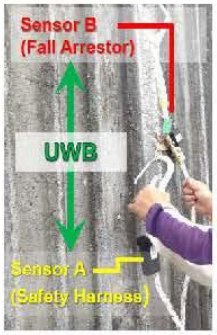
What's New - XensePath UWB Safety Management System

Asset Location Tracking, Behaviour Monitoring and Anti-Collision



IoT Sensors and System (applied at Queen Mary Hospital)

IoT Sensor is developed and applied on **Safety Harness**, in order to ensure the worker has fixed his harness onto the designated anchorage point during **work-at-height**.



What's New - 5G-BIM-MR

For Excavation Safety

Before BIM-MR | After BIM-MR

Less alignment error, safer excavation

- Precise alignments
- "Seeing through" underground utilities
- Markings NOT affected by working environment change

Boost general safety performance

- Immediate and deeper understanding of working environment, installation sequences
- code of practice

10. Safe Operation of Mobile Crane

一般吊運工序 – 操作流動式起重機的管理要求

- 工序參與人員的資格
- 流動式起重機的架設地點選擇
- 操作流動式起重機配套

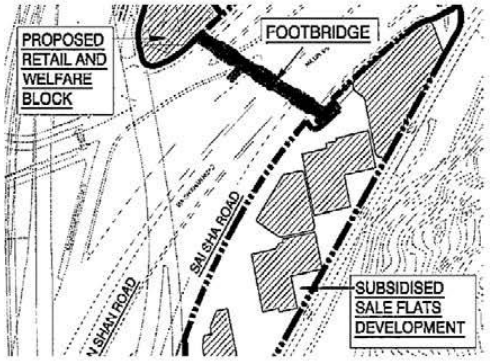
Safety of Operation of Mobile Crane – General Lifting
(安全操作流動式起重機 – 一般吊運工序)




大型吊運工序 – 操作流動式起重機的管理要求

- 策劃
- 工序參與人員的資格
- 流動式起重機的架設地點選擇
- 流動式起重機架設、拆卸及測試

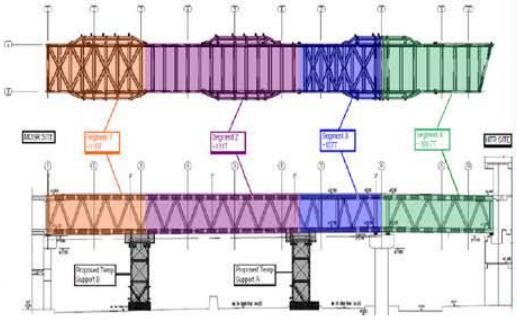
Safety of Operation of Mobile Crane – Footbridge Erection
(安全操作流動式起重機 – 行人天橋裝嵌)



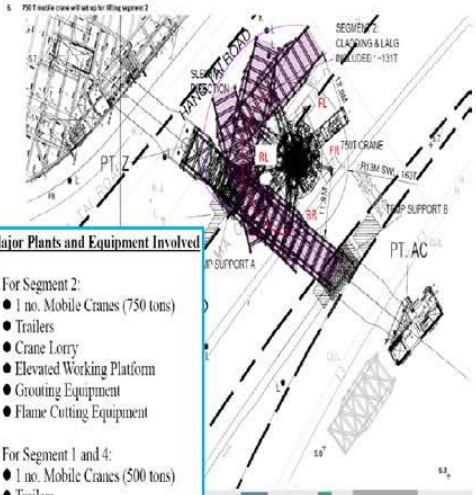
Safety of Operation of Mobile Crane – Footbridge Erection
(安全操作流動式起重機 – 行人天橋裝嵌)

流動式起重機的架設地點選擇

- 負荷物
- 安全操作負荷
- 工作半徑
- 承重力
- 物料存放位置



Location of Lifting Crane for Lifting Segment 2



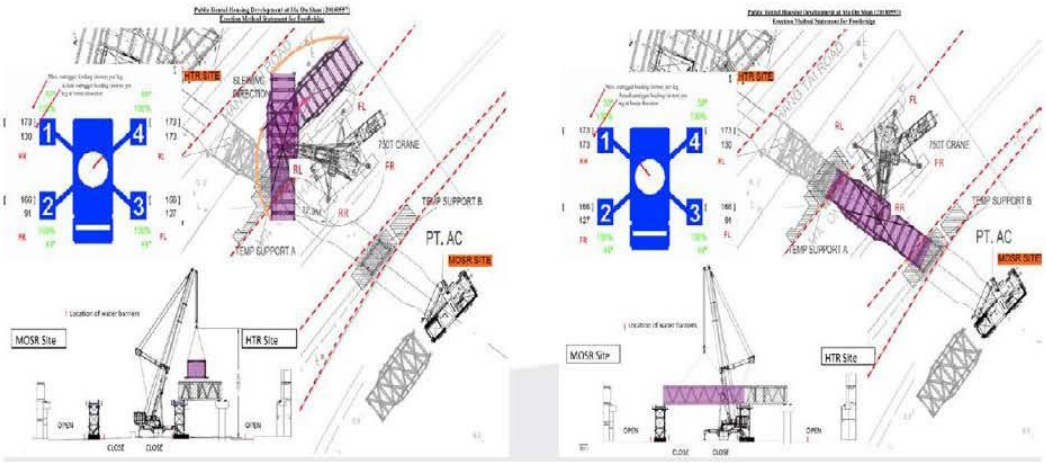
Major Plants and Equipment Involved

For Segment 2:
- 1 no. Mobile Cranes (750 tons)
- Trailers
- Crane Lorry
- Elevated Working Platform
- Grouting Equipment
- Flame Cutting Equipment

For Segment 1 and 4:
- 1 no. Mobile Cranes (500 tons)
- Trailers
- Crane Lorry
- Elevated Working Platform
- Grouting Equipment
- Flame Cutting Equipment

策劃
- 施工方案

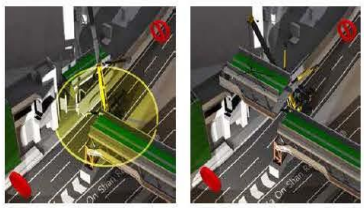
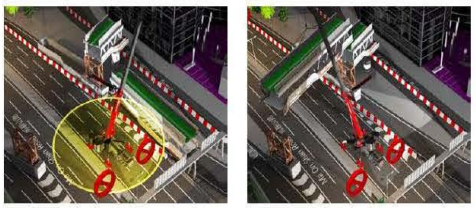
流動起重機安全操作負荷為 163噸
負荷物 (橋) 及吊具重量為 <133噸
負載量為 ~81.5%

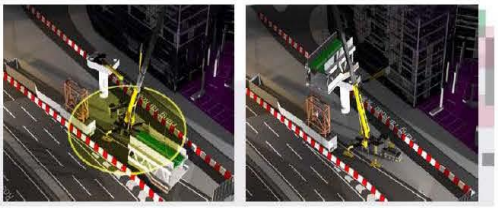


策劃
- 使用BIM模型

策劃

- 使用BIM模型



工序參與人員的資格

- 認可起重機操作員訓練證書
- 認可訊號員及索具工訓練證書



流動式起重機架設、拆卸及測試








行人天橋裝嵌



11. Safe Use of Compressed Air Receiver for Piling Works

Common Use of Air Receiver for Piling Works

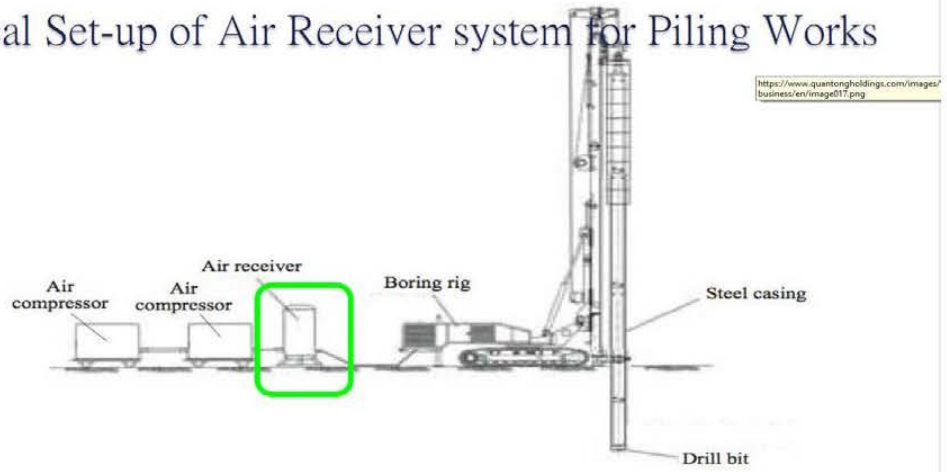
- Compressed Air Receivers are mainly used to flush out water and soil from boring for Piling Works

- For examples:
  Drill machine for soil nail; and
  Boring machine for socketed H-Pile, Mini-Pile Pipe Pile etc.

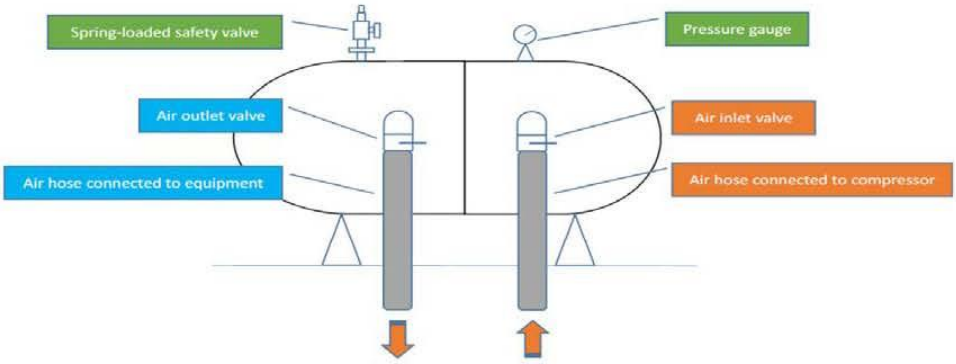
Drill machine for soil nail

Boring machine for socketed H pile, mini pile, pipe pile etc.

Typical Set-up of Air Receiver system for Piling Works

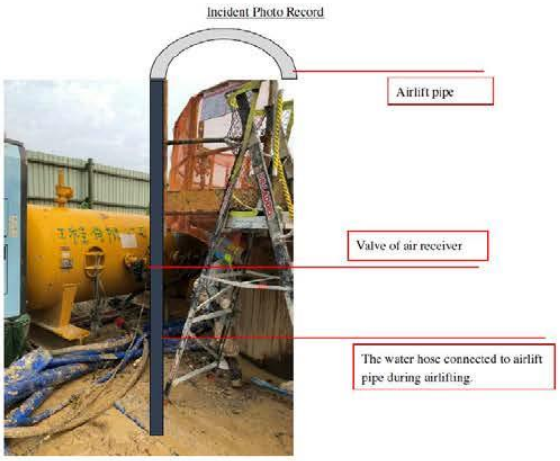


Typical Compressed Air Receiver



Incident Case Sharing

- At the time of incident, an idling air receiver (for Socket H-Pile located next to the bored pile operation) connected with the air hose with the free-end connection.
- When the airlifting of bored pile was in progress, the vibration of water hose connected to the airlifting pipe causing the air receiver valve accidentally turned on.
- Subsequently, it caused the free-end of connected air hose being swung and eventually hit and damaged three vehicles in the adjacent car parking.



Possible Causes of the incident

- The valve of air receiver was interfered and opened accidentally;
- Along the way, the air hose connected to the air receiver was not securely fixed.

Recommendations

- Both ends of air hose should be securely fixed;
- Air hose should be disconnected from air receiver after use every time so as to prevent from any free-end of air hose but connected;
- Use of handle locking device for the valve to prevent from accidentally turn on.

Recommendations

- Both ends of air hose should be securely fixed;
- Air hose shall be fixed by whip check.

Recommendations

- Handle locking device for the valve

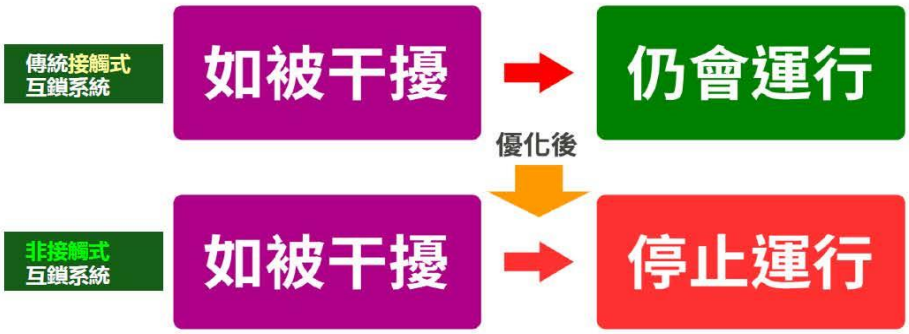
The valve is closed and locked in normal situation.

It is required to pull up the steel ring and turn the handle for turn on the valve.

12. Safety of Material Hoist Operation with Enhancement

非接觸式 紅外綫互鎖系統開發原因

簡單優化原理



*** 至於是否紅外綫或RFID不是重點
只要是非接觸式即可

非接觸式 紅外綫互鎖系統操作原理

1. 當閘門被關上，發射器與接收器對準，系統判定門已被關上，讓開士機安全操作運行；
2. 當閘門被打開，兩邊感應器無法對準時，系統會判定門被打開，禁止運行內籠升降；
3. 原有互鎖系統及新加入的裝置，更加有效防止人爲干擾

**坊間有多種非接觸式裝置，靈敏度迥異，有點對點對準，亦有可調節感應範圍

優點及研發過程經驗分享

1. **維修容易** 預備足夠配件，如遇故障，地盤機房能即時更換，避免長時間等候專業承辦商遠道來搶修；


◄ 成品式 連保護罩


半成品式▲ 自製保護罩

2. **快速檢測** 建議新舊檢查燈箱分開，縮短診斷時間；

3. **通用性** 無論雙掩門或上下趟門均可安裝；

4. **保留原廠互鎖系統** 建議保留原廠系統，運行雙互鎖系統，以新互鎖系統彌補傳統接觸式的不足；

5. **污水保護** 為免上層落石矢英泥水弄污感應器，建議在頂部裝上護罩抗污；降低維護頻率。


保護罩抗污

; 感應器安裝位置之影響