

建造業安全周2019 - 工地齊FUN享
Construction Safety Week 2019 - Site Safety Gathering

經驗分享

Sharing Session

安全高空工作

Safe Working at Height

講者：

Speaker:

二零一九年十一月四日

4th November 2019

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1.0 項目概況

1.0 Overview of Project

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1.0 項目概況

1.0 Overview of Project

合約編號及名稱: SS F512 - 康寧道公園及牛頭角食水配水庫重置設施建造工程

Contract No. & Title: SS F512 - Construction of Re provisioning Facilities at Hong Ning Road Park and Ngau Tau Kok Fresh Water Service Reservoir

客戶及監督公司: 建築署及利安顧問有限公司

Client & Supervising Company: ArchSD & Leigh & Orange Ltd

總承建商: 俊和建築工程有限公司 (建築服務部)

Main Contractor: Chun Wo Construction & Engineering Co., Ltd. (Construction Service Department)

預計施工日期: 二零一八年七月至二零二零年十一月

Scheduled Project Period: 07/2018 – 11/2020

合約總額: 港幣 3.2億

Contract Sum: HK\$320M

項目的主要內容:

Project mainly:

將康業街遊樂場設施重置到運作中的康寧道公園及牛頭角食水配水庫

Re provisioning of Tsun Yip Street Playground facilities to Hong Ning Road Park and Ngau Tau Kok Fresh Water Service Reservoir which is in operating comprise



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2.0 高空工作的安全管理方法

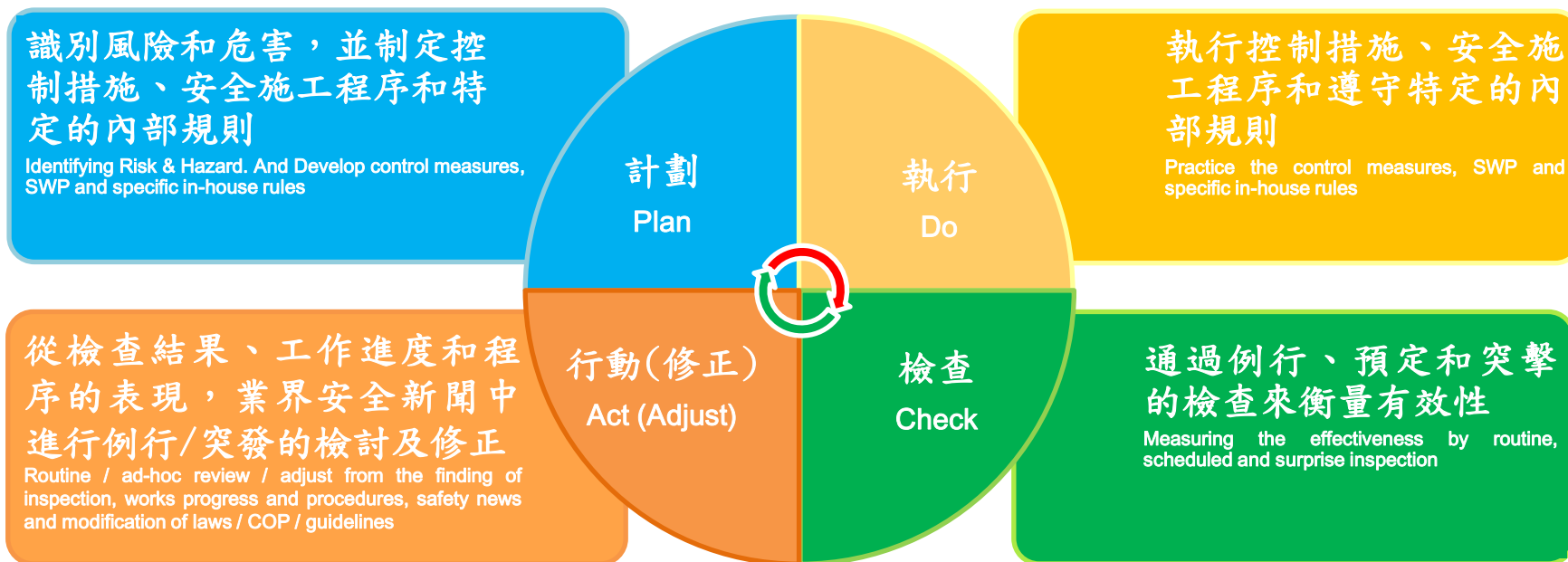
2.0 Safety Management Method on Working at Height

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2.0 高空工作的安全管理方法

2.0 Safety Management Method on Working at Height



職安全健[計劃]、[執行]、[檢查]、[行動]PDCA管理程序

OSH [Plan], [Do], [Check], [Act] (PDCA) Management Circle

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3.0 安全高空工作的實施 (計劃)

3.0 Implementation on Safe Working at Height (Planning)

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3.0 安全高空工作的實施 (計劃)

3.0 Implementation on Safe Working at Height (Planning)

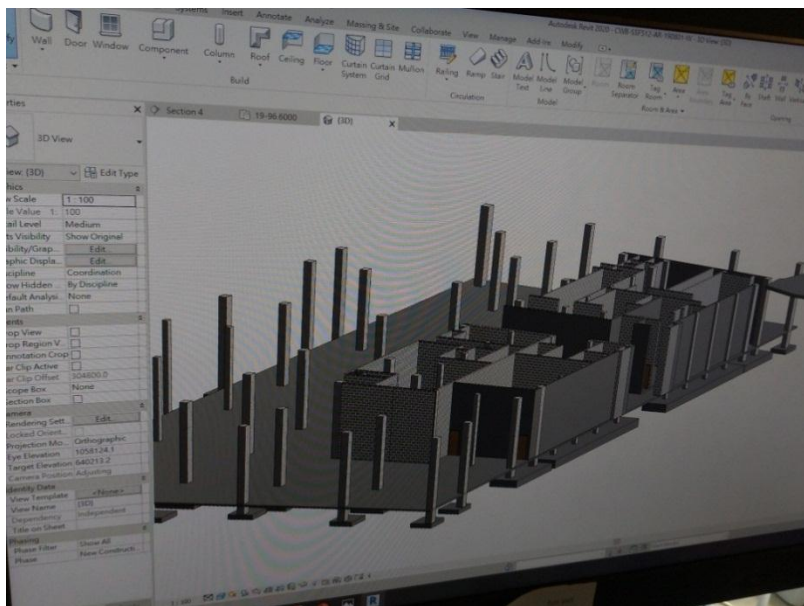


圖3.0.1
Fig. 3.0.1

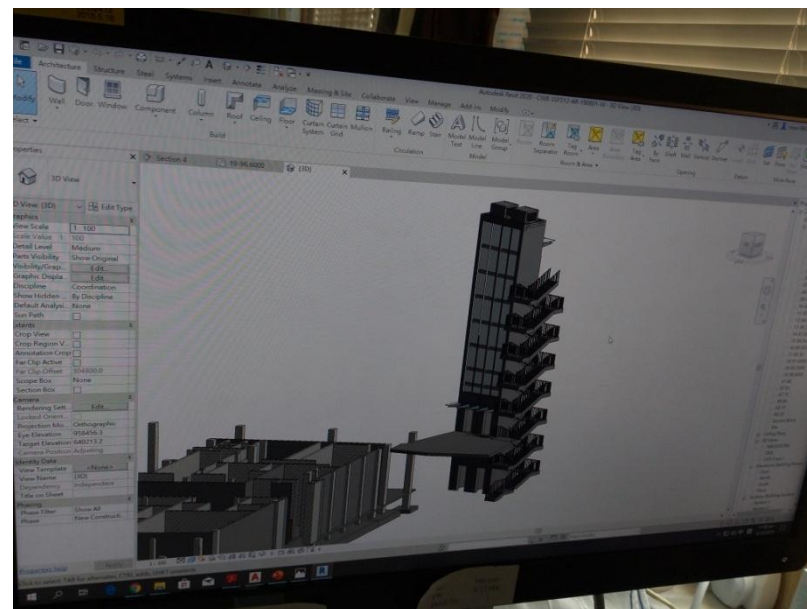


圖3.0.2
Fig. 3.0.2

使用建築資訊模型化系統協助計劃和管理安全措施 (圖3.0.1及3.0.2)

Use the Building Information Modeling (BIM) System assist to plan and manage the safety measure (Fig. 3.0.1 & 3.0.2)

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4.0 安全高空工作的實施（設備）

4.0 Implementation on Safe Working at Height (Equipment)

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4.0 安全高空工作的實施 (設備) – 4.1 棚架工作平台

4.0 Implementation on Safe Working at Height (Equipment) – 4.1 Scaffold Working Platform



圖 4.1.1
Fig. 4.1.1



圖 4.1.2
Fig. 4.1.2



圖 4.1.3
Fig. 4.1.3

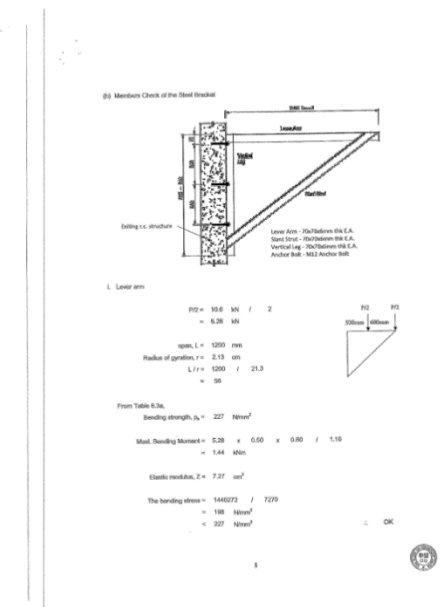


圖 4.1.4
Fig. 4.1.4

提供並架設由註冊專業工程師設計(圖4.1.3及4.1.4)的金屬棚架工作台(圖4.1.1)和竹棚架工作台架(圖4.1.2)供高空工作使用

Provide and erect Metal Scaffold Working Platform (Fig.4.1.1)and Bamboo Scaffold Working Platform (Fig.4.1.2) for working at height which designed by RPE (Fig.4.1.3 & 4.1.4)

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4.0 安全高空工作的實施 (設備) - 4.1 棚架工作平台 (續)

4.0 Implementation on Safe Working at Height (Equipment) - 4.1 Scaffold (con't)



圖 4.1.5
Fig. 4.1.5

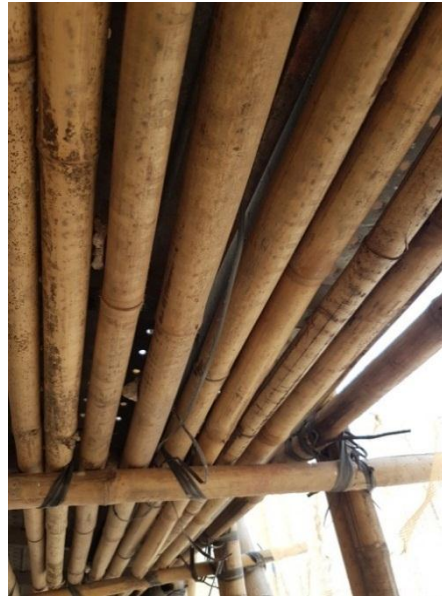


圖 4.1.6
Fig. 4.1.6



圖 4.1.7
Fig. 4.1.7

所有竹棚工作台均以鋪橋板(圖4.1.5)及密竹(圖4.1.6)搭建，並必須搭建斜梯配以踏腳板作為上落竹棚架工作台之用(圖4.1.7)

All Bamboo Scaffold Platform were erected by full planks (Fig. 4.1.5) and closely spaced bamboo (Fig. 4.1.6). And also erected the staircase with planks for access the Bamboo Scaffold Platform (Fig. 4.1.7)

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4.0 安全高空工作的實施 (設備) - 4.1 棚架工作平台 (續)

4.0 Implementation on Safe Working at Height (Equipment) - 4.1 Scaffold (con't)

Prescribed Form	Applicable Plants/ Equipment/ Construction Activities	Statutory Requirement	Chun Wo Group Standard Requirement
FAIU (LALG) Form 1	1. All types of cranes 2. Crab 3. Drilling boring machines 4. Blackbox 5. Manual electric chain block 6. All kinds of winch system	Within preceding 7 days	Every Monday, or day after holiday
CSSR Form 1	Material Hoist	At least once a week	Every Monday, or day after holiday
CSSR Form 4	Excavation of- 1. Shaft 2. Trench 3. Trial Hole	At least once in every 7 days	Every Thursday, or day after holiday
CSSR Form 5	1. Bamboo/ metal scaffold 2. Mobile working platform 3. Lift shaft platform 4. Loading platform 5. Falsework slab 6. Tower staircase	Not exceeding 14 days	5 th , 15 th , 25 th of the month
FAIU (SWP) Form 1	Gondola	Preceding 7 days	Every Monday, or day after holiday
Builder's LIR Form 7	Passenger Hoist	Not exceeding 7 days	Every Monday, or day after holiday

CSSR Form 5	Not exceeding 14 days	5 th , 15 th , 25 th of the month
1. Bamboo/ metal scaffold 2. Mobile working platform 3. Lift shaft platform 4. Loading platform 5. Falsework slab 6. Tower staircase		

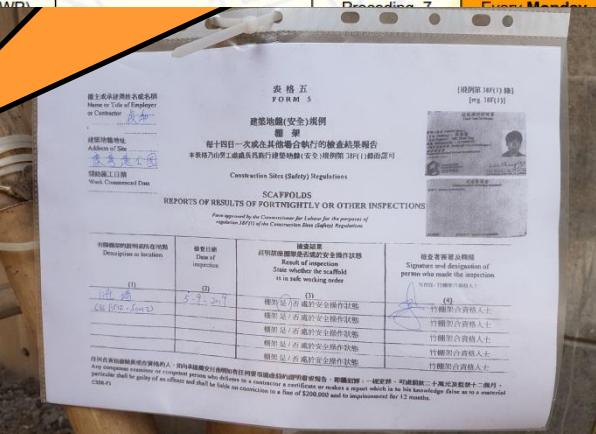



圖 4.1.9
Fig. 4.1.9

圖 4.1.8
Fig. 4.1.8

所有棚架工作台會由合資格人士跟據公司定立的準則於每月五、十五及廿五日進行檢驗(圖4.1.8)，而區域管工亦須於每工作日早上十時前檢查棚架確保處於安全狀態(圖4.1.9)

All Scaffold Platform must inspect by Competent Person on 5th, 15th and 25th each month according to company's standard (Fig. 4.1.8). Moreover, Area Foreman must check and ensure the Scaffold Working Platform is in safe condition before 10:00am every working day (Fig. 4.1.9)

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4.0 安全高空工作的實施 (設備) - 4.2 電動液壓式升降台

4.0 Implementation on Safe Working at Height (Equipment) - 4.2 Electrical Hydraulic Aerial Platform



圖 4.2.1
Fig. 4.2.1



圖 4.2.2
Fig. 4.2.2

配置多部通過合資格人士及公司機械檢驗組檢驗(圖4.2.2)的電動液壓式升降台(圖4.2.1)為時常轉換不同高度的工作時使用

Provision of large number of Electrical Hydraulic Aerial Platform (Fig. 4.2.1) for working at different heights from time to time which has been inspected by Competent Person on and checked company's Plant Inspection Team (Fig. 4.2.2)

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5.0 安全高空工作的實施（環境）

5.0 Implementation on Safe Working at Height (Environment)

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5.0 安全高空工作的實施（環境） - 5.1 企腳面邊緣

5.0 Implementation on Safe Working at Height (Environment) - 5.1 Floor Edge



圖 5.1.1
Fig. 5.1.1



圖 5.1.2
Fig. 5.1.2

所有企腳面邊緣均裝置鎖通高、中欄桿及踢腳板(圖5.1.1及5.1.2)，以防止人體下墜及物體下墜

Setup the CHS top and intermediate guard-rail with toe-board at all of floor edge for prevent falling at height and object (Fig. 5.1.1 & 5.1.2)

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5.0 安全高空工作的實施 (環境) - 5.2 企腳面孔洞





5.0 Implementation on Safe Working at Height (Environment) – 5.2 Floor Opening

Floor Opening Cover Review

Temporary			Permanent		
Tower Crane	Material Hoist	Placing Boom	Refuse Chute	Cable	Pipe
Refuse Chute	Survey Hole	上料吼/上線吼	Air Duct	LMR	Manhole

19mm plywood covering standard with warning notice and following measures :

- M1. Nailing at covering corners (mins. 4 nos.)
- M2. At least 2 nos. reinforcing strut (joist) inside the opening
- M3. Steel mesh fencing/ CHS guardrail

(M1) (M1 & M2) (M1, 2 & 3)

Floor Opening Cover Review		≤40	450	500	550	600	650	700	750	800	850	900	950	≥1000
≤400	0	1	1	1	1	1	1	1	1	1	1	1	1	1
450	1	1	1	1	1	1	1	1	1	1	1	1	1	1
500	1	1	1	1	1	1	1	1	1	1	1	1	1	1
550	1	1	1	1	1	1	1	1	1	1	1	1	1	1
600	1	1	1	1	1	1	1	1	1	1	1	1	1	1
650	1	1	1	1	1	1	1	1	1	1	1	1	1	1
700	1	1	1	1	1	1	1	1	1	1	1	1	1	1
750	1	1	1	1	1	1	1	1	1	1	1	1	1	1
800	1	1	1	1	1	1	1	1	1	1	1	1	1	1
850	1	1	1	1	1	1	1	1	1	1	1	1	1	1
900	1	1	1	1	1	1	1	1	1	1	1	1	1	1
950	1	1	1	1	1	1	1	1	1	1	1	1	1	1
≥1000	1	1	1	1	1	1	1	1	1	1	1	1	1	1

- Responsible Foreman shall maintain a register for those in Orange and Red
- Inform the Responsible Foreman and Safety Officer prior to open any registered cover
- Inform the Responsible Foreman and Safety Officer after cover reinstatement

圖 5.2.1
Fig. 5.2.1



圖 5.2.2
Fig. 5.2.2



圖 5.2.3
Fig. 5.2.3

所有企腳面孔洞均跟據公司定立的準則(圖5.2.1)對應不同孔洞的尺寸而作出不同程度的覆蓋及保護措施(圖5.2.2)，而區域管工亦須於每工作日早上十時前檢查企腳面孔洞確保處於安全穩固(圖5.2.3)

According to company's standard (Fig. 5.2.1) to setup different level of cover and protection for different size of floor opening. Moreover, Area Foreman must check and ensure the protection of floor opening is in safe condition before 10:00am every working day (Fig. 5.2.3)

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5.0 安全高空工作的實施 (環境) - 5.3 斜坡上工作

5.0 Implementation on Safe Working at Height (Environment) - 5.3 Working on Slope



圖5.3.1
Fig. 5.3.1



圖5.3.2
Fig. 5.3.2

提供並架設裝有安全上落通道、高&中欄桿及踢腳板的工作台於斜坡上工作時使用(圖5.3.1)；但當遇到不能架設工作台的位置時，會於每一工友工作位置裝設兩條通過合資格人士檢驗的繩索(一條獨立救生繩、一條獨立工作繩)供給工友配以雙尾繩全身式安全帶於該位置工作(圖5.3.2)

Erect working platform with safe access, top and intermediate guard-rail and toe-board for working on slope (Fig. 5.3.1); However, two ropes (one independent lifeline and one independent working rope) inspected by Competent Person will be installed at each working position of workers for worker to use assisted by full-body harness with double lanyards and fall arresters when the work location is unable to erect the safe working platform (Fig. 5.3.2)

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5.0 安全高空工作的實施 (環境) – 5.4 於2米以下高工作(離地工作)

5.0 Implementation on Safe Working at Height (Environment) – 5.4 Working at below 2m Height (Work-Above-Ground)



圖 5.4.1
Fig. 5.4.1



圖 5.4.2
Fig. 5.4.2



圖 5.4.3
Fig. 5.4.3

使用流動式工作台 (圖5.4.1) 和梯台 (圖5.4.2) 進行離地工作，並透過BYGO顏色辨別系統配以特定的標籤 (圖5.4.3) 進行例行及特別檢查以確保安全 (圖5.4.2)

Use Mobile Platform (Fig. 5.4.1) and Steps Platform (Fig. 5.4.2) for working above ground and route special check (Fig. 5.4.2) with designed label to ensure all platforms in is safe condition trough by BYGO Color System (Fig. 5.4.3)

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6.0 安全高空工作的實施（工程控制）

6.0 Implementation on Safe Working at Height (Engineering Control)

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6.0 安全高空工作的實施 (工程控制) - 6.1 遙控拆卸機械人

6.0 Implementation on Safe Working at Height (Engineering Control) - 6.1 Brokk



圖 6.1.1
Fig. 6.1.1

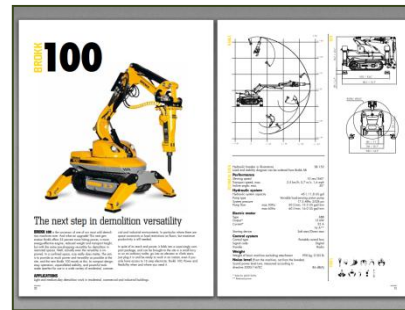


圖 6.1.2
Fig. 6.1.2

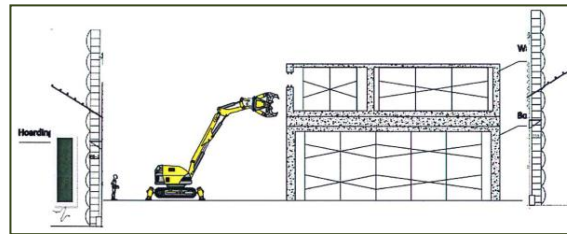


圖 6.1.3
Fig. 6.1.3



圖 6.1.4
Fig. 6.1.4

使用遙控拆卸機械人取代人手進行拆卸工作 (圖6.1.1及6.1.2) 以避免工友由於高空工作及因體力處理操作產生的危險 (圖6.1.3及6.1.4)

Use the Brokk to instead manual handling for demolition work (Fig. 6.1.1 & 6.1.2) to avoid danger to workers from Working at Height and Manual handling (Fig. 6.1.3 & 6.1.4)

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6.0 安全高空工作的實施 (工程控制) - 6.2 遙控石矢斗

6.0 Implementation on Safe Working at Height (Engineering Control) - 6.2 Upiloted Concrete Skip



圖 6. 2. 1
Fig. 6.2.1



圖 6. 2. 3
Fig. 6.2.3



圖 6. 2. 2
Fig. 6.2.2



圖 6. 2. 4
Fig. 6.2.4

使用遙控石矢斗取代人手進行石矢灌注工作 (圖6.2.1及6.2.2) 以避免工友由於高空工作及因體力處理操作產生的危險 (圖6.2.3及6.2.4)

Use the Upiloted Concrete Skip to instead manual handling for concreting work (Fig. 6.2.1 & 6.2.2) to avoid danger to workers from Working at Height and Manual Handling (Fig. 6.2.3 & 6.2.4)

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7.0 安全高空工作的實施（行政控制）

7.0 Implementation on Safe Working at Height (Administrative Control)

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7.0 安全高空工作的實施 (行政控制) - 7.1 安全施工程序

7.0 Implementation on Safe Working at Height (Administrative Control) – 7.1 Working sequence

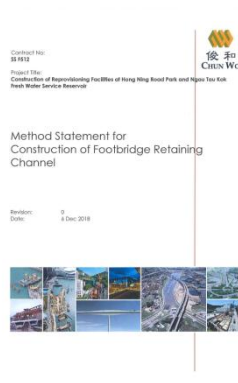


圖 7.1.1
Fig. 7.1.1

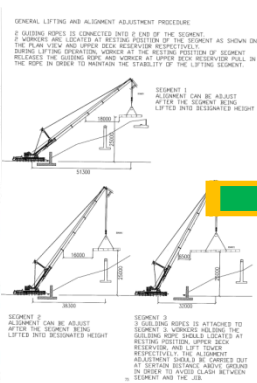


圖 7.1.2
Fig. 7.1.2

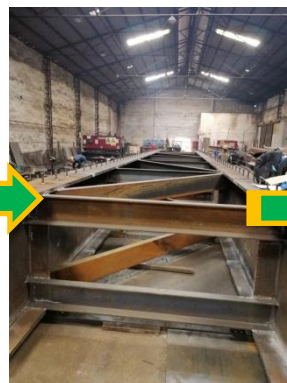


圖 7.1.3
Fig. 7.1.3



圖 7.1.4
Fig. 7.1.4

安裝行人天橋時透過預先設計及使用安全施工程序(圖7.1.1)及於供應商廠房內預先制作出合適安全尺寸及重量的預制件(圖7.1.2)，並將預制件送到工地後於地面加工及安裝為之後工序準備的防墮安全措施(圖7.1.3)，才進行吊運及安裝行人天橋程序(圖7.1.4)以減少工友於高空工作的時間及由高空工作對工友產生的危險

For installation of link bridge, thought the designed and use the safety working procedure (Fig. 7.1.1) and the prefabricated parts with safe size and weight in the supplier's factory (Fig. 7.1.2). Adjust and install the falling prevention measures for subsequent processes on ground after the prefabricated parts delivered on site (Fig. 7.1.3). Finally, carried out the lifting and the remaining installation procedure for link bridge procedure (Fig. 7.1.4) reduce the time for workers to working at height level and the danger to workers from Working at Height (Fig. 7.1.4)

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7.0 安全高空工作的實施 (行政控制) - 7.2 更改工作順序

7.0 Implementation on Safe Working at Height (Administrative Control) - 7.2 Change the working sequence

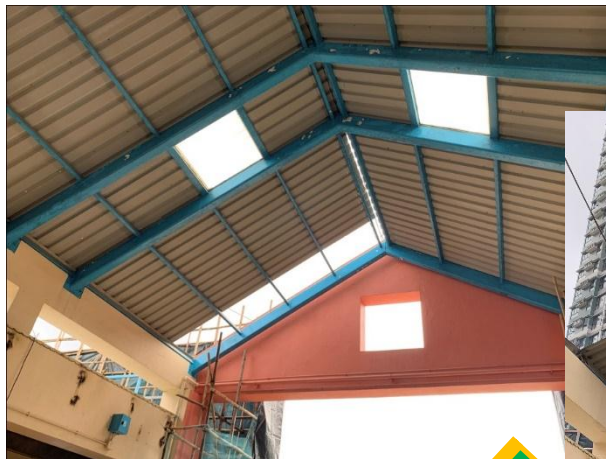


圖 7.2.1
Fig. 7.2.1

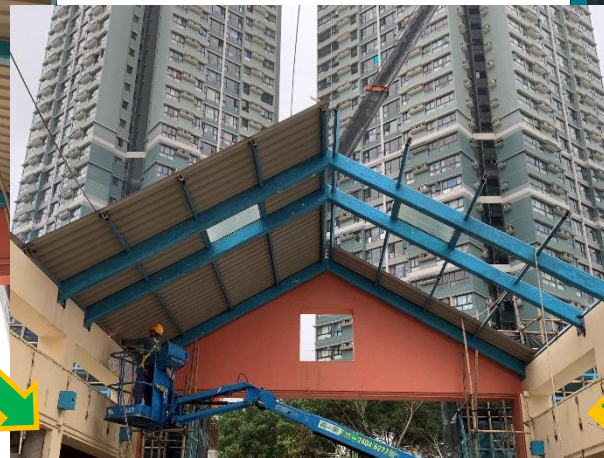


圖 7.2.2
Fig. 7.2.2



圖 7.2.3
Fig. 7.2.3



透過更改工作順序以減少由高空工作及物體下墮對工友產生的危險：例如拆卸鐵簷篷(圖7.2.1)時先將鬆散及較輕部分用電動液壓式升降台協助拆卸(圖7.2.2)，後以吊機將重型部分分件吊到平地，最後逐小部分拆卸(圖7.2.3)

To reduce the danger to workers from Working at Height and falling object by change the working sequence: For example, when dismantle the metal canopy (Fig. 7.2.1), the loose and light parts are first dismantled assisted by the Electrical Hydraulic Aerial Platform (Fig. 7.2.2), and then the heavy part is lifted to the ground by the crane, and finally small partial disassembly (Fig. 7.2.3)

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7.0 安全高空工作的實施（行政控制） - 7.3 訓練及推廣

7.0 Implementation on Safe Working at Height (Administrative Control) – 7.3 Training and Promotion



圖 7.3.1
Fig. 7.3.1



圖 7.3.3
Fig. 7.3.3



圖 7.3.2
Fig. 7.3.2



圖 7.3.4
Fig. 7.3.4

圖 7.3.5
Fig. 7.3.5

透過日常安全訓練（圖7.3.1）及免費午膳安全聚會暨“虛擬現實裝置”安全訓練（圖7.3.2及7.3.3）以加深工友們於安全高空工作上的認識，並對安全高空工作上有良好實踐的工友作出特別獎勵以推動工友們積極實踐安全施工（圖7.3.4及7.3.5）

Through route safety training (Fig. 7.3.1) and every free lunch safety gathering and “VR” safety training (Fig. 7.3.2 and 7.3.3) to deepen the understanding of workers on safe working at height and workers with good practice on safe working at height will got special awards to encourage workers to practice working in safe actively (Fig.7.3.4 and 7.3.5)

建造業安全周2019 - 工地齊FUN享

Construction Safety Week 2019 – Site Safety Gathering

8.0 安全高空工作的實施（檢討及修正）

8.0 Implementation on Safe Working at Height (Review and Adjustment)

建造業安全周2019 - 工地齊FUN享

Construction Safety Week 2019 – Site Safety Gathering

8.0 安全高空工作的實施（檢討及修正） - 8.1 巡查及會議

8.0 Implementation on Safe Working at Height (Review and Adjustment) – 8.1 Inspection and Meeting



圖 8.0.1
Fig. 8.0.1



圖 8.0.2
Fig. 8.0.2

透過例行及特別安全巡查（圖8.0.1）取得工地安全表現上的成果於每月及特別安全管理工地會議上加以分析及檢討以定立修正或改良安全施工方案（圖8.0.2），以零意外及零事故完成工程的目標令工地持續進步

Obtaining results on site safety performance through routine and special safety inspections (Fig. 8.0.1) to analysis, discuss and review to adjust or improve the Safe Working Procedure at monthly and special safety management site meetings (Figure 8.0.2). To made the site continue to improve by the goal of completing the project with zero accidents and zero incidents.

這就是我們於安全高空工作上的經驗分享
This is the end of our sharing on Safe Working at Height

謝謝

Thank you