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通告

Message

在本期通訊，我們訪問了鑽挖隧道的工程專家及介紹有關馬頭角城市設計概念研究。就中九龍幹線在九龍灣水域進行臨時填海工程，我們正準備於09年7月進行另一項公眾參與專題活動。

In this issue, we interview a Bored Tunnel Engineering Expert and introduce the Ma Tau Kok Urban Design Conceptual Study. Regarding the temporary reclamation works at Kowloon Bay water for Central Kowloon Route, we are planning to arrange another public engagement event on this subject in July 2009.

訪問鑽挖隧道工程專家

Interview with Bored Tunnel Engineering Expert

在過往的通訊，我們介紹了中九龍幹線主要由深層鑽挖隧道的形式興建，而傳統的鑽爆式方法，將會用作興建深層鑽挖隧道。

雖然深層鑽挖隧道的興建，將會在地下約30-100米以下的堅固岩石內進行，但我們或許仍然擔心或疑問，在地底內進行鑽爆工程，會否影響地面的建築物或大廈。有見及此，我們訪問了一位從事設計及建造隧道的專家-吳志良先生。吳先生是一位資深的工程師，擁有超過20年的隧道設計及建造經驗，其中包括最近落成的八號幹線尖山隧道及沙田嶺隧道。吳先生也是中九龍幹線勘測研究的其中一位顧問。以下是我們專家訪問一些有關用鑽爆式方法興建隧道的問題：

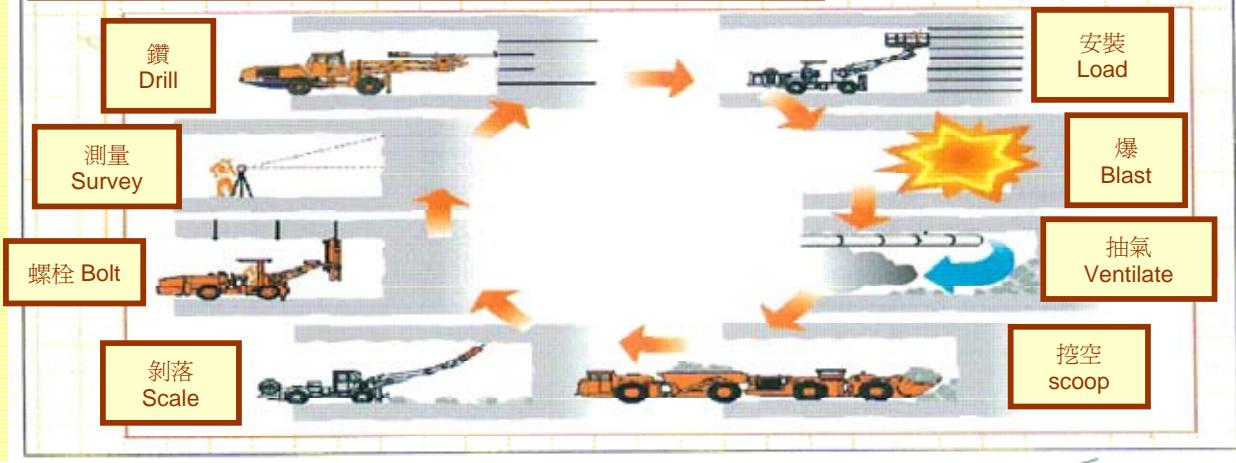
In previous issues, we have mentioned that the Central Kowloon Route will be mainly in the form of deep bored tunnel to be constructed by conventional drill and blast method.

Although the drill and blast construction will be carried out at underlying rock strata below ground approximately 30-100m deep, some of us may worry or query whether the above ground structures/buildings will be affected. In view of this, we interviewed an expert on tunnel design and construction – Mr. Chi Leung NG. Mr.NG is an experienced engineer who has over 20 years of experience in tunnel design and construction. Recently completed projects include Eagle's Nest Tunnel and Sha Tin Heights Tunnels of Route 8. Followings are some discussions regarding the drill and blast tunneling construction method :



中九龍幹線 Central Kowloon Route Alignment

傳統鑽爆式方法 Conventional Drill – and – Blast Method



問：什麼是鑽爆式隧道？

答：鑽爆式方法是用炸藥使岩石破裂成比較鬆散的石塊。工序首先是在岩石面鑽孔，然後將炸藥放入孔洞，再根據設定的次序進行連續的引爆。最後是將爆破後鬆散的石塊挖走。以上圖示意一般的工序。

問：為什麼鑽爆式適合用於中九龍幹線工程？

答：隧道興建方法是根據隧道的大小、長度及其穿越地區的地質而有不同的考慮。鑽爆式方法是最常用於堅硬石層興建比較大型的隧道的方法之一。中九龍幹線中一段2.7公里長的深層隧道需要穿越堅硬的花崗石層，最適合使用鑽爆式方法，因為在考慮安全、所需時間及成本效益幾方面都較為優勝。

問：利用鑽爆式興建隧道的好處是什麼？

答：承上題，中九龍幹線中的深層隧道是比較長及大型(雙管各3線隧道)，並需要穿越堅硬的花崗岩。現時的隧道鑽挖機並未能鑽挖大型隧道管道，而利用普通機械鑽挖岩層效率則非常低。鑽爆式方法卻可克服這些問題。

問：對地面的結構及樓宇會造成影響？

答：興建隧道有可能令地面發生不均勻的沉降，而對地面的結構及樓宇造成的影響。這是由於隧道管道受壓力後輕微移動或地下水的浸入令土力改變所致。因此，工程顧問在籌劃工程時會作岩土評估、詳細設計和評估地層移動及地下水流，確定它們不會構成如地面沉降等的不良影響。這些報告會提交有關政府部門審批。另外一項可能的影響是爆破時產生的震盪。顧問在設計工序時會根據地質及可接受的震盪範圍而訂定爆炸品的用量及工序安排。所謂可接受範圍，約相等於重型貨車經過時所產生的震動。

問：使用爆炸品可會有潛在安全問題？

答：爆炸品在工程中的安全使用及各項應用守則都受到嚴格規管。在中九龍幹線工程，我們安排了政府礦務部負責運送爆炸品到主要的裝卸地點，因此管理及安全是不容置疑的。爆炸品將會由持有許可證的車輛運送，亦會由爆炸品監管員及保安人員隨行。另外，爆炸品會由合資格的主管人員臨場處理及監督。

問：怎樣監管爆破工程？

答：有關爆破工序的細節，如每日進行爆破工程的規模、次數及時間均有嚴格規定，並須經礦務部審批，及在工地受嚴格監管。

Q: What is Drill-and-blast tunneling?

A: Drill-and-blast is to use explosives to break and loosen the rock mass. Holes are drilled from the tunnel face and ahead. Explosives are then loaded in these holes and then detonated in a designed sequential order. The blasted rocks will then be removed out of tunnel. The general sequences for the works are shown in the figure above.

Q: Why Drill-and-blast tunneling is considered as the suitable method in this project?

A: It depends on the length and size of tunnel, as well as the geology that the tunnel passes through. Drill-and-blast method is one of the most common methods. For Central Kowloon Route, its 2.7 km long deep bored tunnel section passes through hard Granite. To break through such a hard rock in a safe, fast and cost-effective way, drill-and-blast method is the most suitable choice.

Q: What are the advantages of using Drill-and-blast method?

A: As discussed before, CKR tunnel is very big (dual 3-lanes tunnel) and long, and needs to pass through very hard Granite. Since there is no modern technique such as Tunnel Boring Machine for hard rock in large diameter and the mechanical method is too slow, drill-and-blast method is the one that can cope with the work.

Q: Are there any impacts on the above ground structures and buildings?

A: For tunnels, the key possible impact on above-ground structures and buildings is the differential settlement. This is related to the tunnel slight deformation under pressure and the groundwater ingress to the tunnel which affects geotechnical behaviour. To control these effects, the engineering consultants will carry out geotechnical assessment, detailed design and assessment on ground and groundwater movement to ensure that there is no adverse impact such as ground settlement. The reports will be issued to relevant departments for approval. Another possible impact is the vibration if blasting works is proposed. The consultant will consider the geology and the allowable vibration limits to determine the blasting design and arrangement. The allowable vibration limit is similar to the vibration caused by a heavy goods vehicle passing by.

Q: Are there any potential safety problems of using explosives?

A: The use and handling of explosives in construction are strictly controlled. In CKR, we have arranged for the delivery of explosives to the major loading points by Mines Division, of which the control is undoubtedly and absolutely safe.. The explosives will be delivered in licensed vehicle, with escort by the blasting supervisor and the security personnel. Besides, the on-site handling of the explosive will be undertaken and supervised by competent and approved specialists.

Q: How to control the carrying out of the blasting works?

A: The details of the scope, number and time of blasting activites would be strictly controlled and supervised, according to the approval by the Mines Division of the Government.



在隧道內進行測量

Surveying inside the tunnel



在隧道內進行鑽挖

Drilling works inside the tunnel.

馬頭角城市設計概念研究經已展開

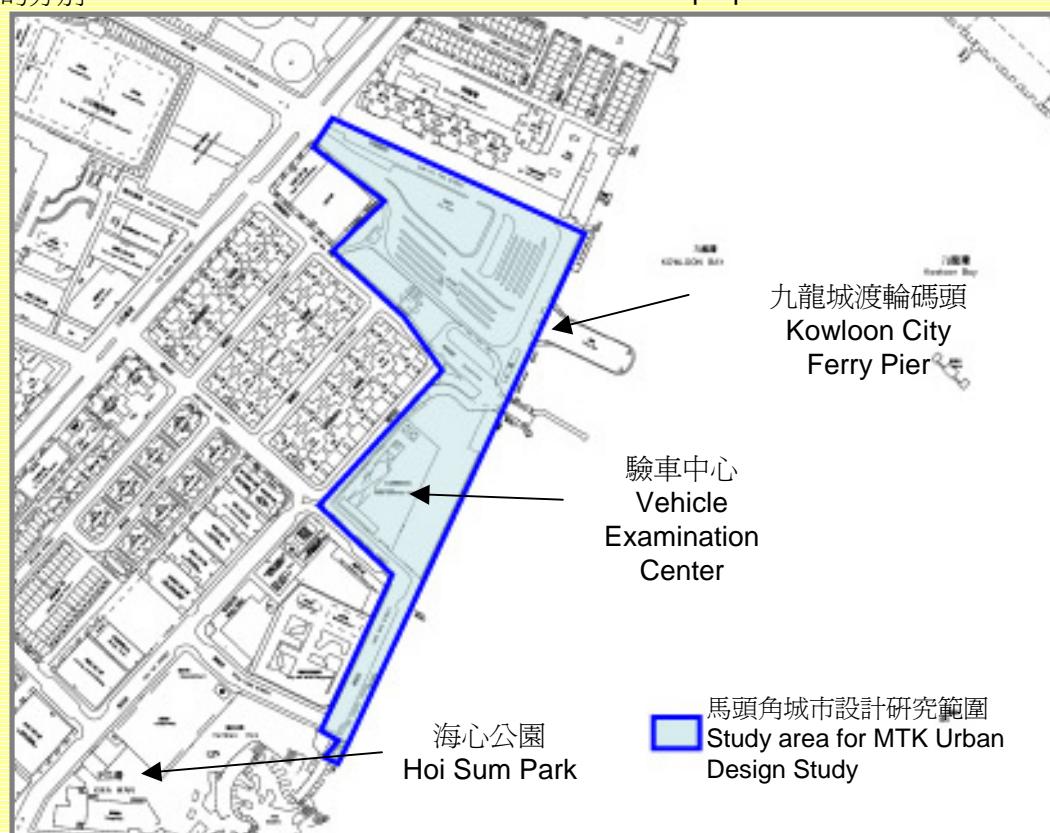
Commencement of Ma Tau Kok Urban Design Conceptual Study

在2009年2月27日向立法會交通事務委員會的簡介中，委員會認為需要在馬頭角受中九龍幹線影響的地方進行一個城市設計研究，以優化及激活馬頭角及海濱地區。

為了回應委員會的關注，我們建議在馬頭角海濱受興建中九龍幹線影響的地方，進行城市設計概念研究，包括準備概念發展藍圖、進行大綱設計及公眾參與活動。城市設計概念研究的相關文件，會使公眾能夠更容易理解及比較城市設計概念研究與傳統的規劃研究的分別。

At the presentation on the progress of Central Kowloon Route (CKR) to the LegCo Panel on Transport on 27 February 2009, members suggested that a urban design study should be carried out in Ma Tai Kok in area affected by CKR project to enhance and revitalise the area and harbour-front.

To address the Panel's concern, it is proposed to carry out an urban design conceptual study for the MTK waterfront area affected by the construction of CKR, including the preparation of a



驗車中心
Vehicle
Examination
Center

九龍城渡輪碼頭
Kowloon City
Ferry Pier

馬頭角城市設計研究範圍
Study area for MTK Urban
Design Study

Conceptual development plan, outline design of the associated elements and conducting public engagement. The deliverables of an Urban Design Conceptual Study, including artistic impressions, would also be easier for the public to comprehend, compared to those of a traditional Planning Study.

顧問公司現正進行有關馬頭角地區的城市設計概念研究，我們會在研究完成後，向公眾匯報研究結果。

The Consultants are now carrying out the Ma Tau Kok Urban Design Conceptual Study. We will report the results and findings of the study upon completion.



馬頭角城市研究研究範圍 Study Area for Ma Tau Kok Urban Design Study

報告板 Bulletin Board

- 活動- 我們正籌備於**2009年7月**舉行一項公眾參與活動，收集公眾對中九龍幹線在九龍灣水域進行臨時填海及討論有關中九龍幹線工程施工期間的環境事宜進行討論。活動詳情，請留意日後的中九龍幹線通訊及宣傳資料。
- Event – we are arranging a public engagement event to be held in July to gather public views on the proposed temporary reclamation in Kowloon Bay waters and discuss the environmental issues during construction for the CKR project. For event details, please refer to our coming issue of Newsletter and publicity**



我們重視你的意見 We Value Your Comment



「中九龍幹線通訊」是以月刊形式出版。如對本工程有任何疑問及意見，歡迎提供意見

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