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## **Site Formation Works of the Kai Tak Cruise Terminal Project**

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URS/Scott Wilson

26<sup>th</sup> April 2012

The Australian Consulate General, Hong Kong, "The Wombat Hole" 24/F Harbour Centre,  
25 Harbour Road, Wanchai, Hong Kong

Following an introduction by President Scott Smith, Ian proceeded to entertain and inform the audience of 48 Members and Guests of the design and construction of the site formation works associated with the new international cruise terminal project being undertaken by the Hong Kong Government Civil Engineering Department as part of the re-development of the former Kai Tak International Airport site.



The site formation works primarily comprise the construction of an 850m long two-berth piled quay deck to accommodate Mega-class cruise vessels to around 220,000 DWT. The quay deck adjoins the iconic cruise terminal building, being constructed concurrently under a separate works contract.

Hong Kong has traditionally relied on Ocean Terminal at Tsim Sha Tsui for the bulk of ocean going cruise ships however it is limited to ships up to around 100,000 tonnes. It is unable to cope with larger vessels such as the Queen Mary 2 – 148,582 GT and 345m long. These vessels are required to berth at Kwai Chung Container Terminal – not a very visitor friendly environment. Kwai Chung has been used eleven times in the five year period 2001 – 2005 and thirty three times in the three year period 2009 - 2011, indicating the more frequent visits of the larger cruise vessels. With the closure of Kai Tak airport in July 1998, new possibilities opened up.



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## Kwai Chung Container Terminal



2009-2011  
33 times

### **Timeline:**

October 2008: The Government decides to implement a new Cruise Terminal using public funds

April – July 2009: Detailed design by URS/Scott Wilson

August – November 2009: Tendering

December 2009: Commencement of Construction

Mid 2013: Commissioning of Cruise Terminal Berth 1

2014: Commissioning of Cruise Terminal Berth II.

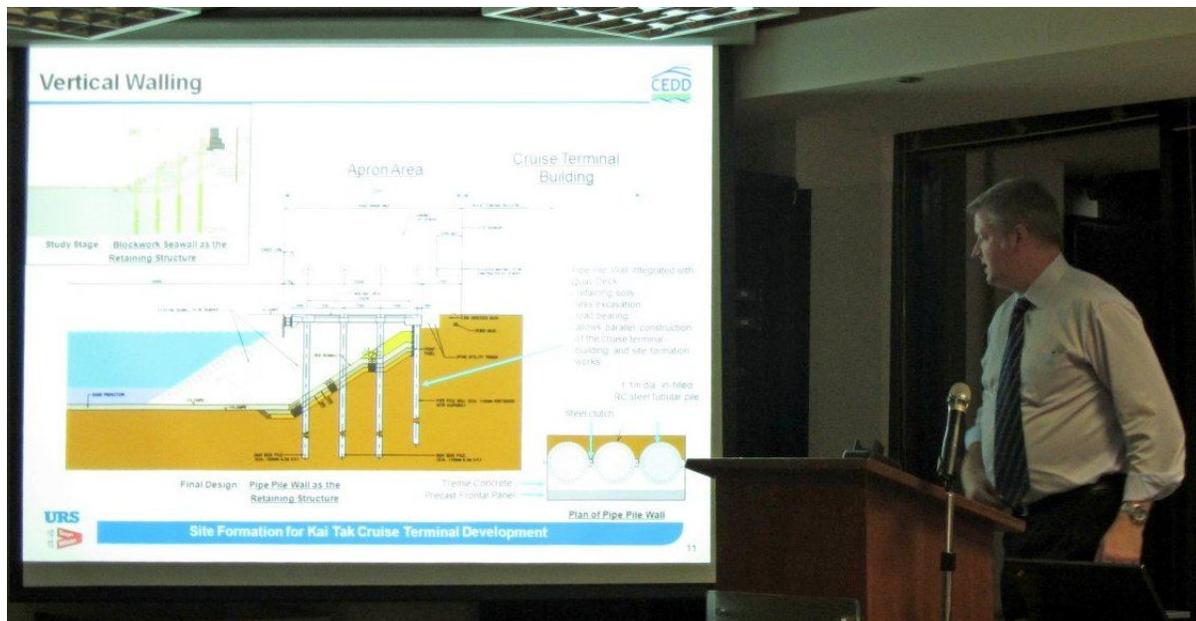
### **Topics Covered by Ian**

- The cruise industry is expected to bring in some HK\$1.5B - \$2B in revenue and employ some 7,000 to 10,000 people by 2020
- Longer cruise ships at Ocean terminal tend to extend out into the channel and this makes it difficult to moor them securely and also poses a hazard. One possible solution was to put a dolphin in the channel but this also creates a navigation problem. Kwai Chung was the only other alternative berth.
- The largest cruise ships can now reach up to in excess of 360 meters in length. More of the larger cruise ships have been coming to HK in recent years.
- The new Kai Tak terminal will have two berths, Berth I will be 450 meters and Berth II 400 meters. There are also two transition areas, north (viewing area) and south (helipad) which will blend the terminal into the rest of the Kai Tak development.



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- Three dredging zones – A, B and C. A and B will be completed to conform to the cruise terminal opening dates. Zone C requires the decommissioning and removal of two submarine gas supply pipelines.
- Government initially intended this be privately funded but two earlier tenders failed and in 2008 the Government decided to use public funds.
- Contract Let 1<sup>st</sup> December 2009 after URS/Scott Wilson commencement detailed design in April 2009.
- Berth I Commissioning hard date June 2013
- Site formation works handover in October 2012 for terminal construction.
- Berth II Commissioning later part of 2014.
- Gas main relocation beyond 2014
- Main design was to provide Berths for mega cruise vessels up to 220,000 GT displacement 110,000 tonnes. Cruise ship design beam dimensions are showing a trend of increasing with time but are maintaining drafts of around 10+ meters so as to be able to visit a wider range of berths around the World.
- The design had to work to a zero reclamation regime due to Harbour Reclamation Ordinance as well as parallel construction of the terminal under a separate contract.



- Site boundary was defined as the high watermark at edge of the existing runway reclamation.
- No permanent construction for a piled deck could be taken beyond the boundary (waterline) so excavation was required to be made into the airport excavation area.
- The preliminary design arrangement comprised a piled deck with 4 rows of piles and gravity block retaining wall along the rear edge of the deck. This arrangement required temporary excavation into the cruise terminal building site. This arrangement was configured to separate the deck structure from the land works to suit maintenance responsibilities.



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- URS configured an arrangement incorporating a continuous pipe pile wall, which avoided the need for the gravity retaining structure and thereby avoided the encroachment into the cruise terminal building site. Various options considered and tubular steel piles decided on.
- Piles are 1200mm diameter for the front row and 1100mm in the three rows behind. The piles incorporated in the pipe pile wall are clutched together using weld-on steel sections.
- Reinforced concrete inserts were constructed inside the tube piles allowing steel on the pile to be sacrificial (corrode away) leaving the reinforced concrete section as the support element.
- Further details on construction and construction sequence.
- Issues found and solved along the way.
- Pile toe levels varied from of -15mCD to -65mCD.
- Piles were manufactured in China, spiral wound and welded..
- Guide frame used by contractor in setting the piles in the pipe pile wall to maintain the alignment of the clutches, as the piles tend to rotate when being driven.
- Piles driven in 12m long sections and butt welded together.
- Piling hammers from 12 to 25 tonne.
- Front row of piles were treated for appearance sake in a black protective coating.
- 700,000 cubic meters removed from dredging zones A and B.
- Maximum dredged depth of the order of 5 or 6 meters, mostly mud - some contaminated material which was disposed of accordingly.
- Enclosed boom hanging silk curtain down to sea floor protection applied around dredging areas.
- Long arm back hoe brought in to assist with sea wall removal to help profile temporary slope.
- Armour rock placed in reverse manner from which runway fill was removed.
- Silk curtains used around the site to limit migration of fines.
- Water quality monitoring around the Harbour and site works for the sea water intake protection as well as other work being done around the Harbour to ensure no pollution from those works coming to this site.
- Around 150 pieces of coral were found in the Harbour nearby and these were relocated to Tseung Kwan O and monitored for 12 months that it was OK.
- Reuse the old seawall materials, 200,000 cubic meters used on this site, sorting setup.

Following Ian's presentation various audience questions were answered by Ian including:

- How do cruise ships compare to Panamax vessels?
- Existing Ocean Terminal will continue?
- Where does the dredging material end up?
- Any issues applying for Environmental Approval?
- How often would dredging need to be done to keep the appropriate Harbour depth?
- How much water is there above the three Cross Harbour Tunnels?
- Why the rigour with steel tube inspection and inspection issues?



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In conclusion Scott presented Ian with a bottle of special EAust HK 10th Anniversary red wine. Many thanks to Ian for an enlightening presentation on a future HK landmark.

